

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

ANNUAL REPORT

TENTH MEETING
VICTORIA, B.C., CANADA
OCTOBER 5-13, 2001

January 2002
Secretariat / Publisher
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REPORT OF OPENING SESSION



The Opening Session was called to order on October 8, 2001, at 8:30 a.m. The Chairman, Dr. Hyung-Tack Huh, welcomed delegates, observers and researchers to the PICES Tenth Annual Meeting.

Welcome address on behalf of the Government of Canada

Dr. Huh introduced the Honorable Gilbert Parent, Ambassador of the Environment, who greeted participants on behalf of the Government of Canada (*OP Appendix 1*).

Remarks by representatives of Contracting Parties and the Chairman of PICES

Dr. Huh called upon Dr. Laura Richards to make a statement on behalf of the Canadian Government. Dr. Richards addressed the session and her remarks are appended to the report in *OP Appendix 2*.

Dr. Huh invited Dr. Nagahisa Uki to speak on behalf of the Japanese Government. Dr. Uki addressed the session and his remarks are appended to the report in *OP Appendix 3*.

Dr. Huh called upon Mr. Qian-Fei Liu to make a statement on behalf of the Chinese Government. Mr. Liu addressed the session and his remarks are appended to the report in *OP Appendix 4*.

Dr. Huh then asked Dr. Jin-Yeong Kim to speak on behalf of the Korean Government. Dr. Kim addressed the session and her remarks are appended to the report in *OP Appendix 5*.

Dr. Huh called upon Dr. Lev N. Bocharov to speak on behalf of the Russian Government. Dr. Bocharov addressed the session and his remarks are appended to the report in *OP Appendix 6*.

Dr. Huh invited Dr. Vera Alexander to make a statement on behalf of the U.S. Government. Dr. Alexander addressed the session and her remarks are appended to the report in *OP Appendix 7*.

Dr. Huh thanked the Honorable Gilbert Parent and all the delegates for their remarks and spoke on behalf of PICES. The text of his address is appended to the report in *OP Appendix 8*.

Keynote lecture

Dr. Huh called upon Ms. Patricia Livingston, the Science Board Chairman, to introduce the keynote speaker, Dr. Warren S. Wooster (School of Marine Affairs, University of Washington). This introduction can be found on the PICES Home Page, as a Power Point file "wooster_intro.ppt". Dr. Wooster gave the keynote lecture titled "PICES – The first decade and beyond". The full text of the lecture will be published in the PICES Scientific Report No. 21 (spring 2002), and the following is the summary of his presentation:

While PICES celebrates its tenth anniversary, its origins can be traced back more than 25 years. Early informal discussions of the need for such an organization took place at an FAO Technical Conference on Fishery Management in Vancouver in 1973. More active consideration began at the University of Washington in 1976, and the first informal meeting on the subject occurred in 1978. Between then and March 1992 when the PICES Convention was signed, there were 8 other informal and formal reunions, involving participants from most of the present member countries. While some time was required to develop mutual understanding of what such an organization could accomplish, the long gestation period was mostly due to the shifting political relations among the countries concerned.

Early in the discussions, it became clear that interests of the proposed organization would not overlap with those of the international organizations operating in the region. These were either global and broad in scope, or regional and specialized, in most cases for fishery management. PICES was envisioned as a regional organization, similar in many ways to the International Council for the Exploration of the Sea, ICES, in the North Atlantic, and was to be devoted to marine science in its broad aspects, and particularly to the interactions between the physical ocean environment and the ecosystems that function therein. This focus became particularly relevant as the impact of climate variations and the threat of climate change became apparent.

In its first decade, PICES considered a wide array of problems, including those of specific regions, such as the Okhotsk Sea and Oyashio region, the Bering Sea, the subarctic gyre, and the Japan/East Sea; circulation modeling, carbon dioxide, and the iron fertilization experiment; monitoring, data exchange and quality control; pollution assessment methodology; coastal pelagic fisheries, marine birds and mammals, crabs and shrimps, and harmful algal blooms. The major program on Climate Change and Carrying Capacity incorporates an interdisciplinary, integrative, and comparative approach, encompasses estimations of ecosystem carrying capacity and will shed light on the implications of climate changes for fisheries management. These efforts continue as the problems evolve and new ones arise.

The coming decade may include more cooperative operational efforts, for example in establishing an effective ecosystem monitoring system, and in data and information exchange and analysis in order to generate regular and timely ecosystem status reports, and to provide scientific assessment and advice to its members and to interested regional organizations. The goal of PICES should be to continue and enhance its services to its members and to their scientists.

Wooster Award ceremony

Dr. Huh reminded the audience that in October 2000, PICES announced a new award that will be given annually to an individual who has made significant scientific contributions to North Pacific marine science, such as understanding and predicting the role of human and climate interactions on marine ecosystem production. The award was named in honour 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. Criteria for selection are sustained excellence in research, teaching, administration or a combination of the three in the area of North Pacific marine science. The award consists of a commemorative plaque and travel support to attend the following PICES Annual Meeting in order to receive the award.

Dr. Huh informed the participants that nominations for the first Wooster Award were received and considered by the PICES Science Board, and the late Professor Michael M. Mullin of the Scripps Institution of Oceanography was selected as the recipient of the award. Dr. Huh made the following statement:

As many of you know, the marine science community had to face the loss of Professor Mullin on December 19, 2000. Professor Mullin was an enthusiastic supporter of PICES and we have benefited greatly from his knowledge and insightful ideas. He had been a BIO Committee member since PICES was established in 1992, and put the Committee on firm footing while serving as its first Chairman. He was also the main organizer of the successful Beyond El Niño Conference (PICES' first large-scale collaborative activity with 5 other international organizations) held in La Jolla, in March 2000. His excellence in research and teaching, and his broad involvement in North Pacific marine science that spanned many nations, disciplines and scales, is a model for future Wooster Award recipients that will be difficult to match. He will be missed immensely by all but his keen interest and attitude for marine science will not be

forgotten. In addition to the Wooster Award, PICES dedicates this year's topic session on "Plankton Size Classes, Functional Groups and Ecosystem Dynamics: Causes and Consequences" and the subsequent special issue of Progress in Oceanography to his memory.

Then Dr. Warren Wooster presented a commemorative plaque to Professor Mullin's widow, Constance, and son, Stephen. A permanent plaque identifying Wooster Award winners will reside at the PICES Secretariat in Sidney, British Columbia, Canada.

OP Appendix 1

Welcome Address by the Honorable Gilbert Parent, Ambassador of the Environment (Canada)

Thank you, Dr. Huh, for your kind introduction. On behalf of the Government of Canada, it is my pleasure to welcome you to the Tenth Anniversary Meeting of the North Pacific Marine Science Organization (PICES). This meeting marks an important milestone in the evolution of PICES. Many officials who were instrumental in the founding of this organization are in the audience today. When you look back to what has been achieved in the last 10 years, you must congratulate yourselves foremost on how the Organization has brought scientists of the Pacific Rim countries together. PICES has helped member countries in the sharing of scientific information and in building teams which are working together to get a better understanding of the North Pacific Ocean. In doing so, you are also building a better understanding between our peoples.

Although you may have begun as a modest scientific body, you have held a very clear vision, and today you are dealing with practical concerns to which urgent answers are needed. The migration of key ecological species, the association of ocean processes to the production of local biota and fisheries, pollution and marine resource use, onshore developments and coastal ecosystems, all have important socio-economic as well as environmental implications. Judging from the growing attendance at the annual meetings, you are accomplishing your goals with remarkable success.

However, we still do not fully understand what is happening in the oceans and how the changes affect marine resources. The eastern and northern Pacific Ocean experienced El Niño or El Niño-like conditions in recent years,

cumulating in the largest recorded El Niño in 1997. During this period, the survival of many salmon species at sea has been poor over a wide area in the North Pacific. But now there are some signs of improvement. For example, in Canada, we are seeing better return of some species. I understand that there are reports of the largest run of salmon in the Columbia River in 50 years. If ocean conditions can change so quickly, what will be the impacts to the marine environment in the next 30 to 50 years when the enhanced greenhouse gas effect brings warmer global temperatures?

In my view, PICES is one of the foremost organizations with the people who would be called upon to address these questions and to find the answers. I urge you to use the wonderful networks of people and the framework for sharing information, that you have built, to sail full steam ahead into the Pacific Ocean, to carry out joint programs, to do the measurements and experiments to find the answers to what is happening there. Many aspects of our daily lives, from how much fish can be harvested, to how much electricity can be produced, to what crops should be planted, to what changes in disease patterns will take place, depend on more knowledge of the oceans. Your findings would provide the sound scientific basis for decision making by government authorities. The governments around the world have to act now and they can only do so with the proper knowledge coming from organizations such as PICES.

The Government of Canada does not doubt the reality of climate change and about the enormity of the domestic and international challenges we

face. Furthermore, in the Speech from the Throne to open the first session of the 37th Parliament of Canada, in January this year, ocean research was noted as one of the areas where new federal investment would bring direct benefits to Canadians.

I am encouraged that you are reviewing the progress which PICES has made over the last 10 years. I know that you will learn from this experience and continue to build and maintain a strong and vibrant organization that can succeed in meeting its objectives in the next decade.

Thank you.

OP Appendix 2

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 welcome you to Victoria. I hope that you have an enjoyable stay in this provincial capital city and that you can find time to explore Victoria's many attractions. I also hope that you have an opportunity to visit two of Fisheries and Oceans Canada's major science facilities - the Institute of Ocean Sciences just north of here in Sidney, and the Pacific Biological Station, a two-hour drive north in Nanaimo.

PICES, and not Canada, is the official host for this meeting, but Canada has been pleased to assist the Secretariat in making this meeting possible. I would like to express my appreciation to the PICES Secretariat and to Dr. Alexander Bychkov for both supporting the work of the Organization over the last year and for organizing this meeting. Canadian marine scientists have worked with the Secretariat in organizing this week's events and I would like to thank all of them for their support. In addition, I would like to invite you to the reception tonight that will be hosted by Canada.

This meeting marks a special 10th anniversary for PICES. Today's Science Board symposium provides us with an opportunity to look back and to reflect on the considerable progress that we have made. It is also an opportunity to chart a course for the next 10 years and to shape our vision for the PICES organization of the future.

One tool that could guide our vision is a strategic plan or blueprint. Canada would also like to encourage the completion of long-standing project activities so that PICES can move forward and take on new activities that continue to advance scientific knowledge. A review of the committee structure might be a useful step in this process.

Last year, PICES initiated planning for an Ecosystem Status Report of the North Pacific. For the past few years, Canada has produced a regional ocean status report that has proved valuable to oceans and fisheries managers as well as to scientists. An Ecosystem Status Report for the North Pacific could promote the collection and exchange of scientific data, one of the main objectives of PICES. Such a report could also identify knowledge gaps to help guide further study and future international collaborations.

I would like to emphasize that Canada continues to be a strong supporter of PICES and the ideals that PICES represents. As a maritime nation, Canada understands the advantages of coordinating research and freely exchanging scientific information on the oceans with programs such as ARGO. International collaboration is essential to address global problems like climate change and understanding basin-scale ecosystems that support marine fisheries.

Canada is pleased with the progress that PICES has made in collaborating with international groups, such as the IOC, JGOFS, GLOBEC and

CLIVAR. Canada would also like to encourage even greater collaboration among international organizations. These types of interactions will ensure that all components of the North Pacific ecosystem become integrated into our knowledge base.

The high attendance at this meeting is a tribute to the success of PICES and to the broad interest in PICES activities. It is also a measure of the stimulating program prepared by the committees and session convenors. Let us build on this enthusiasm to ensure a vibrant organization that we can celebrate at the next anniversary. Thank you.

OP Appendix 3

Remarks at the Opening Session by Dr. Nagahisa Uki (Japan)

Thank you, Mr. Chairman for your kind introduction.

Distinguished delegates and colleagues, on behalf of the participants from Japan, I would like to thank the PICES Secretariat and the Canadian delegation for inviting us to the Tenth Anniversary Meeting held in this beautiful seaside city, Victoria.

Well, PICES gave the newborn cry ten years ago here in the city of Victoria. In the meantime, PICES has been greatly contributing to the progress of marine science of the North Pacific through many activities, like the Scientific Committees, workshops, publications, PICES-GLOBEC CCCC Program and so forth. Moreover, its cooperation with other international organizations including NPAFC is also remarkable. We highly appreciate the efforts and contributions of the past Chairmen and leaders. It is our great honor to be a part of this activity from its foundation, and we, Japanese scientists, are very proud of being a part of the major effort from the beginning.

Through the 21st century, humankind has to face a shortage of food supply. More suitable and sustainable utilization of fisheries resources is certainly required. Furthermore, due to the anxiety about the global environmental degradation, such as global warming and loss of biodiversity, we need to preserve the marine

environment itself. And we believe that keeping the right nurturing has become a basic global subject. In our country, a new Fundamental Law of Fisheries was established last June. This Law aims to maintain and recover fisheries resources and also to secure a “stable supply of fisheries products” and a “sound development of fisheries”.

We expect that PICES will lead scientific research and investigations on preservation and sustainable utilization of marine resources, including lower to the highest trophic levels of the marine ecosystem. As a result, PICES will provide a scientific direction to solve the problems in the coming second decade, not only for the North Pacific Rim’s people but also for people all over the world. I hope for the prosperous development of PICES activities and there is no doubt that Japan will show continued and positive support towards PICES.

Before finishing my greetings, I offer my sincere sadness and condolences to the American people and all participants due to the recent unprecedented wrongful acts of terrorism. Overcoming such a wicked attack on science and civilization, I am sure that the Tenth Anniversary Meeting of PICES will become a great success.

Buildings can be destroyed, however, courage, honor and love are forever. Thank you.

OP Appendix 4

Remarks at the Opening Session by Mr. Qian-Fei Liu (People's Republic of China)

Mr. Chairman, distinguished guests, ladies and gentlemen:

On this occasion, I want to sincerely thank the PICES Secretariat and the Canadian Government for the excellent organization of the Tenth Annual Meeting and their support to scientific activities.

I am also very honoured to have the opportunity to participate in the Tenth Anniversary of PICES. Here I will say, a great happy birthday to PICES. In these 10 years, with increase in meeting attendance, PICES has grown to a strong organization with a good scientific reputation. Now, if you mention the name of PICES, many people will be glad to talk to you.

The Chinese Government has always supported PICES scientific activities. Today, with concern over the problems of the environment, and oceanic and fisheries resources, humans have to put more effort into studying the related problems. Wide international cooperation is needed to solve these problems through scientific approaches. As the locomotive in the North Pacific Ocean, PICES plays an important

role in facilitating and promoting joint scientific research activities.

The ocean occupies more than 70% of the total surface area of the Earth and it has a close relationship with human existence. Oceanic research is aimed at not only the oceanic environment, but also the interaction of the ocean and atmosphere. The result of these studies will benefit human beings in return.

China, as one of the coastal nations of the North Pacific, has been paying much attention to oceanic scientific research. Recently, under the coordination and support of PICES, Chinese scientists have had opportunities to be involved in cooperative research with other member states and share scientific information with them. This greatly promotes the development of ocean sciences in China. We hope that such international cooperation will continue in the future and that PICES will make even greater contributions to scientific research in the North Pacific.

Finally, I wish the Tenth Annual Meeting a great success. Thank you for your attention.

OP Appendix 5

Remarks at the Opening Session by Dr. Jin-Yeong Kim (Republic of Korea)

Mr. Chairman, distinguished delegates, ladies and gentlemen:

First of all, it is a great pleasure for me to be here as a part of the Korean delegation. On behalf of the Korean delegation and scientists, I would like to extend my heartfelt appreciation to the PICES Secretariat and the Government of Canada for preparing the Tenth Annual Meeting of PICES, and also to Mr. Chairman for giving me this opportunity of speaking to PICES.

As we know, the Convention for a North Pacific Marine Science Organization entered into force

on March 24, 1992, and the PICES First Annual Meeting was held in October 1992, in Victoria, Canada. During the last 10 years, PICES has made steady progress as the center in the field of marine science of the North Pacific region, through sharing and exchange of knowledge and information among marine scientists. Korea would like to take this opportunity to heartily congratulate PICES on the tenth anniversary and to express thanks to the Organization for its efforts up to this day.

There are a lot of problems related to the ocean to be linked directly to the existence of human

beings. For a solution of various human's dilemma, sharing and exchange of information and knowledge among marine scientists is very important. Most phenomena of the ocean are so complicated that they cannot be understood or solved by any single discipline of marine science. This is the reason why interdisciplinary activities and studies are stressed in the sphere of marine science and oceanography in recent years.

In this regard, PICES should take the leading role in intergovernmental and agency-wide cooperation in the North Pacific region from now on. With the help and assistance from member countries, PICES should also present a new

direction for the humankind to go forward in the field of marine sciences. I sincerely hope that PICES will develop and prosper incessantly and its vision and accomplishment will continue for a long time.

Our oceans are important not only to us but to the next generations to come. Our cooperation in marine research will be our duty and gift to our children. I believe through PICES, we can achieve harmonious and mutually beneficial cooperation as we start to see through many joint studies. And let us hope for the continuous effort in the advancement of humanity.

Thank you all for your attention.

OS Appendix 6

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

Dear Mr. Chairman, delegates, ladies and gentlemen, dear Dr. Wooster, the PICES founder.

First of all, let me thank the PICES Secretariat, the host of this Anniversary Meeting, and Fisheries and Oceans Canada, for the opportunity to be a part of this event, which summarizes the first ten years of geographically diverse PICES activities, that were efforts of many scientists in our marine scientific community.

Here, I represent not only the Russian delegation, the Russian Government, and scientists of the Russian Far East, but also the TINRO-Center, a scientific center which I head. It is a great honor and pleasure for me, since the specialists from our Centre were among those who first outlined the draft plans and developed constitutive documents for a new Pacific organization that later became PICES.

Russia became an official PICES member in 1996, but scientists and administrative officers were an active part of PICES activities all through the years since the establishment of the Organization in 1992. Ten years is a rather long time for an international organization in our rapidly changing world. It is now time for

maturity. Our Organization has reached the reproductive state. The growth rate of the scope of PICES is about to suggest the formation of a new specialized and more detailed oriented body for coordinating marine scientific research in the North Pacific, with PICES as the basis.

The results of the work done by PICES during the last year are extremely substantial. Over the course of the week we will have many chances to discuss all the issues on the agenda for the Tenth Annual Meeting, the Science Board, Scientific Committees, Working Groups and workshops. The result of PICES X will be satisfactory, like any other PICES meeting according to the spirit of the Organization.

We are happy to experience once more the dynamic and creative atmosphere of PICES meetings. We would like to give our special thanks to the Secretariat and all the Fisheries and Oceans Canada volunteers for their huge effort in preparing this Anniversary Meeting.

Many thanks to the father-founders of PICES and its veterans. Good luck to the PICES Tenth Annual Meeting and new creative steps in the 21st century. Thank you.

OS Appendix 7

Remarks at the Opening Session by Dr. Vera Alexander (U.S.A.)

It is a great honor to say a few words on behalf of the United States of America.

Ambassador Parent, Mr. Chairman, venerable ancestors and distinguished delegates and participants:

More than two decades ago, there was a dream. This dream was to create an effective multi-national approach to marine science research in the North Pacific Region. This huge region cannot be addressed without such a cooperative venture. The waters know no boundaries, and the biota, whether or not they migrate, also cross national boundaries without giving any consideration to our human designations. What started back then as a series of discussion meetings and scientific symposia emerged into the healthy, viable organization, which we call PICES – the North Pacific Marine Science Organization.

On behalf of the United States delegation, I am pleased to offer congratulations. The first ten years have shown steady evolution towards an organization which is making a difference in marine research and especially integration of knowledge in the North Pacific Ocean. We can now be certain that the dream will be fulfilled. At the same time, we must continue to work together so that the full potential of PICES is realized and so that in ten more years we will be as proud or even prouder of the accomplishments. Congratulations to Dr. Warren Wooster, the other founding ancestors, the delegates, advisors, scientific leaders and many supporters, and not least of all, to our wonderful Secretariat. And thank you to PICES Secretariat staff for their excellent work in convening this special Tenth Anniversary Meeting.

OP Appendix 8

Welcome Address by Dr. Hyung-Tack Huh, Chairman of PICES

Honorable Ambassador Gilbert Parent, Dr. Warren Wooster, Dr. William Doubleday, distinguished participants, ladies and gentlemen:

It is indeed a great honor and pleasure for me to address you at this Tenth Anniversary Meeting of PICES. This should be an opportunity to review the achievements for the last ten years and to look to the future of our Organization. In this regard, we are particularly honored by the presence of Dr. Warren Wooster, the principal founder and the first Chairman of PICES, who will give us a keynote lecture on “PICES – The first decade and beyond”.

A decade means a lot to us. An oriental proverb says: “A decade makes even rivers and mountains change”. I believe that ten years of PICES made an epoch in marine science of the

North Pacific. Over the last ten years, PICES has evolved significantly from an organization devoted mainly to the coordination of marine science programs in the North Pacific, to an organization having expanded its role to provide needs of member countries for the advancement of their marine science and interests in the North Pacific.

As we are well aware, ocean research in the North Pacific area is crucial to all nations, particularly to the member states of PICES. The scientific problems in the North Pacific Ocean are too extensive and complicated in its geographical and transboundary nature, and, therefore, they could only be solved by international, multidisciplinary cooperative research efforts. PICES was established in 1992 to advance such cooperative efforts.

The Organization has grown into a major international forum for exchange of new information, exploration of new ideas and building cooperative approaches to key scientific questions. Due to its international nature and the scientific excellence of the participants, Annual Meetings of PICES became the choice and most attractive forum for ocean science in the North Pacific. The number of attendees at the Annual Meetings has increased steadily from less than 100 at PICES I in 1992, to well over 500 at PICES IX in 2000. I feel that I am very fortunate to have been the Chairman during this exciting period. Thanks to the member states for their active participation.

PICES has made great achievements through the publication of research results and data to disseminate new knowledge and foster an ecosystem/interdisciplinary approach in marine science. We have witnessed a significant growth in the number of regular publications: from 1-2 volumes of the PICES Scientific Report Series in 1993, to 5 volumes in 2001. The books "Dynamics of the Bering Sea" and "Historical Atlas of the North Pacific Ocean" published in 1999 and 2001 represent a true international collaboration to update present knowledge of the North Pacific Ocean.

We are proud to have had PICES special issues published in *Progress in Oceanography*. Three volumes of this series have already been published since 1999 ("Ecosystem Dynamics in the Eastern and Western Gyres of the Subarctic Pacific" in 1999, "North Pacific Climate Regime Shifts" in 2000 and "Pacific Climate Variability and Marine Ecosystem Impacts" in 2001). PICES is going to continue to publish this series in the coming years.

By working closely with other international organizations, PICES has provided synthesis of regional research issues and contributed to the global research program. PICES has hosted many conferences, symposia and workshops in relation to GLOBEC, CLIVAR, GCOS, GEOHAB, GOOS, ARGO, etc. Good examples are the conference on "*Pacific Climate Variability and Marine Ecosystem Impacts: El Niño and beyond*" organized in March 2000,

jointly with SCOR, IATTC, IPHC, ISC and NPAFC; the joint PICES-GLOBEC topic sessions on "*Recent findings and comparisons of GLOBEC and GLOBEC-like programs in the North Pacific*", convened at every Annual Meeting since PICES VII; Workshop on "*Impact of Climate Variability on Observation and Prediction of Ecosystem and Biodiversity Changes in the North Pacific*" held in March 2001 and co-sponsored by the Census of Marine Life and the International Pacific Research Center; and the Symposium on "*The Role of Zooplankton in Global Ecosystem Dynamics (Comparative Studies from the World Ocean)*" that is being planned jointly with ICES and GLOBEC for May 2003.

The PICES-GLOBEC Program on Climate Change and Carrying Capacity (CCCC Program) provides a mechanism for integrating national GLOBEC research programs in the North Pacific, and is a regional component of the international GLOBEC effort. To ensure that PICES will serve as a regional focal point for integrating North Pacific climate research, PICES has been fostering collaboration with programs such as ARGO, CLIVAR, JGOFS and NEAR-GOOS.

Through these cooperative activities, PICES has led the way quite successfully in revealing the linkages between the North Pacific climate variations and fluctuations of marine productivities. To further progress the development of climate agenda, PICES needs to strive more positively to strengthen its ties with other international organizations, and to expand ties with countries not only in the North Pacific but also the whole Pacific Rim.

Ladies and gentlemen, distinguished participants:

In the plenary sessions, we will have more opportunities to hear in-depth overviews of the scientific activities of the last ten years by PICES. We have an exciting and diverse program covering a wide range of scientific topics, from migrations of key ecological species to the physical, chemical and biological processes affecting productivities and

environments of the North Pacific Ocean. I would like to call for the attention of all participants to enjoy and take full benefit of this Tenth Anniversary Meeting of PICES.

We have no host country this year for PICES X. The Tenth Anniversary Meeting has been prepared by the PICES Secretariat with support from Fisheries and Ocean, Canada. I would like to commend and appreciate the excellent and hard work done by the staff of the Secretariat and the generous support of the Canadian Government.

Before closing my remarks, I would like to express my deep regret over the loss of Professor Mike Mullin. As we all know, Professor Mullin was an enthusiastic supporter of PICES from the very beginning of our Organization, and we have benefited greatly

from his knowledge and insightful ideas. I hope you would join me in offering our sincere condolence to his family.

Global issues are raising a new consciousness in people of the 21st century for sustainable management of the oceans. I hope PICES X, the first annual meeting of PICES in the 21st century, will mark a milestone which will lead the way to create new global partnerships among different individuals, institutions and countries, for enhancing knowledge and information on ocean processes.

Finally, I would like to thank you all again for coming to Victoria, and look forward to a productive and enjoyable meeting.

Thank you very much for your kind attention.

REPORT OF GOVERNING COUNCIL MEETING



The Governing Council met from 13:30-17:30 on October 7, from 13:30-17:30 on October 12, and from 9:00-12:00 on October 13, under the chairmanship of Dr. Hyung-Tack Huh. Dr. Alexander S. Bychkov served as rapporteur.

All Contracting Parties were represented at the three sessions (*GC Endnote 1*). Dr. William G. Doubleday attended only the first session. The Chairman of the Science Board, Ms. Patricia Livingston, the Chairman-elect of the Science Board, Dr. R. Ian Perry, and observers from Mexico, Drs. Daniel Lluch-Belda and Arthuro Muhlia Melo, were in attendance during the last session.

Agenda Item 1. Opening remarks

At the first session, the Chairman welcomed the delegates and noted that for this Annual Meeting Ms. Hiroko Watanabe represented Mr. Takashi Osanai (Japan); Mr. Qian-Fei Liu represented Mr. Zheng-Ping Tang (China); Ms. Hong-Mei Xin represented Mr. Jing-Guang Li (China); and Dr. Jin-Yeong Kim represented Mr. Young-Suk Kim (Korea).

Dr. Doubleday announced that this would be his last Council meeting and introduced Dr. Elisabeth Marsollier, who would take over his responsibilities as Canadian Delegate. Council welcomed Dr. Marsollier and expressed its gratitude for Dr. Doubleday's leadership and valuable contribution to PICES activities.

Agenda Item 2. Adoption of agenda

The Chairman reviewed the agenda (*GC Endnote 2*) and suggested the order in which to take up the various items. Dr. Vera Alexander proposed the adoption of the agenda without changes, seconded by Dr. Laura Richards. This

report summarizes the treatment of each agenda item during the course of the three sessions.

Agenda Item 3. Preliminary Report on Administration

The Executive Secretary summarized the activities of the Organization and the Secretariat since the PICES Ninth Annual Meeting (*GC Endnote 3*).

Agenda Item 4. Membership and observers from other countries

The Secretariat did not receive proposals from non-member countries to accede to the PICES Convention in 2001.

At the Eighth Annual Meeting, Council adopted the resolution reflecting a strong interest in having Mexico accede to the PICES Convention (Decision 99/A/5). This interest has been confirmed at the Ninth Annual Meeting, when, in response to an invitation from Mexico, Council approved a visit of a PICES delegation to La Paz (Decision 00/A/6). The purpose of the visit should be to facilitate the incorporation of Mexico to PICES by presenting information on the history, structure, objectives and procedures of the Organization to a wider array of potential Mexican participants.

The Executive Secretary reported on the results of the visit of the PICES delegation to La Paz, in May 2001 (*GC Endnote 4*), and then updated Council on the progress in implementing recommendations adopted at the joint meeting:

1. A draft of the presentation document indicating the importance and relevance of PICES for Mexican scientists, and suggesting the accession of Mexico to the

Organization, was prepared on behalf of major Mexican marine research institutes. After approval by the directors of the institutes, it will be circulated to relevant government agencies.

2. Mexican scientists expressed sufficient interest in attending PICES X. In total, 19 papers were submitted by Mexican scientists and accepted for oral (8) or poster (11) presentation at various scientific sessions and workshops. It was expected that 18 scientists from all major marine research institutes would participate in the Annual Meeting. Six scientists formally applied and received partial travel support from PICES. Dr. Gilberto Gaxiola (CICESE) was invited to attend the MONITOR workshop to provide an over-view of Mexico's IMECOCAL time-series.
3. A proposal was received to convene a 3-day PICES symposium on *North Pacific transitional areas* hosted by CIBNOR and CICIMAR in La Paz, in spring 2002. This proposal was endorsed by the Science Board and forwarded to Council for approval.

In August 2001, directors of CICESE, CICIMAR, CIBNOR and INP were invited as observers from Mexico to attend the PICES Tenth Annual Meeting. Responses expressed great interest in PICES activities and in maintaining direct contact with PICES, and indicated that Drs. Silvio Guido Marinone, Daniel Lluch-Belda and Arthuro Muhlia Melo would represent CICESE, CICIMAR and CIBNOR, respectively, at PICES X.

By the invitation of Council, Drs. Lluch-Belda and Muhlia Melo attended the last meeting. They confirmed the support of Mexican scientists for Mexico to join PICES, provided information about the current status of the presentation document, and suggested that the next step should be an international scientific symposium organized by PICES and hosted by Mexico.

Council noted a steady progress in developing PICES-Mexico relations. Council also approved the recommendation to hold an international symposium on *North Pacific transitional areas* in La Paz, Mexico, in April 2002 (Decision 01/S/1).

Agenda Item 5. Relations with relevant international organizations

At the Ninth Annual Meeting, Council approved some additions to the Standing List of International Organizations and Programs, and a selected subset of organizations and programs that were considered to have the highest priority for PICES with respect to scientific cooperation in the year 2001 (Decision 00/S/5). The Science Board Chairman and Executive Secretary reported on interactions with the relevant organizations and programs since last year's meeting (details are reflected in the Report on Administration and in the Science Board Report).

Council noted that integration, coordination, and communication with other international organizations and major international programs of regional and global scale improved and extended significantly after PICES became better known in the scientific community. These cooperative links have brought new scientists into the PICES community, and have allowed the Organization to advance its scientific agenda and to integrate PICES activities with global climate change programs. Canada indicated that impressive progress in relations with other organizations was the result of efforts by the Science Board and the Secretariat. U.S.A. suggested the importance of collaborating with national regional programs and regional fisheries organizations, especially now, when the development of a North Pacific Ecosystem Status Report was approved as a high priority project for PICES.

Council reviewed and approved the revised Standing List of International Organizations and Programs as recommended by the Science Board (*SB Endnote 8*) and agreed with identified priorities in 2002 (Decision 01/S/6(i)).

Council specifically discussed cooperation with ICES, and accepted the recommendation that the Science Board develop potential areas of cooperation based on specific proposals for interaction between ICES and PICES (Decision 01/S/6(ii)).

Census of Marine Life Program (CoML)
Climate Variability and Predictability Program
Global Ocean Ecosystem Dynamics (GLOBEC)
Gulf Ecosystem Monitoring Program (GEM)
International ARGO Science Team (IAST)
International Council for the Exploration of the Sea (ICES)
International Geosphere-Biosphere Program (IGBP)
International Pacific Halibut Commission (IPHC)
Joint Global Ocean Flux Study (JGOFS)
North Pacific Anadromous Fish Commission (NPAFC)

Pacific Salmon Commission (PSC)

Sir Alister Hardy Foundation for Ocean Science (SAHFOS)
Scientific Committee on Oceanic Research (SCOR)

Letters of invitation to attend PICES X were sent to inter-governmental and non-governmental organizations on the agreed Standing List of Organizations and Programs, and the following sent observers:

Mr. Jay Charland
Dr. Howard Freeland
Dr. Roger Harris
Ms. Molly McCammon
Dr. Stephen Riser
Dr. Pentti Malkki
Dr. Barrien Moore III
Dr. Bruce Leaman
Dr. Toshiro Saino
Dr. Vladimir Karpenko
Mr. Vladimir Fedorenko
Mr. Yoshikiyo Kondo
Mr. Don Kowal
Dr. James Woodey
Dr. P. Christopher Reid
Dr. Peter Burkill

Agenda Item 6. Tenth Anniversary of PICES

The Executive Secretary reported on the implementation of Council's decisions made at the Eighth and Ninth Annual Meetings (Decision 99/A/4 and Decision 00/A/5) to commemorate the tenth anniversary of PICES (*F&A Endnote 4*). Council commended the Secretariat for the excellent response to these decisions and thanked all organizations that provided voluntary contributions to support PICES X and activities related to the tenth anniversary of the Organization.

Agenda Item 7. PICES Intern Program

At the Ninth Annual Meeting, Council extended the deadline for applications to the 2001 PICES Intern Program to February 1, 2001 (Decision 00/A/8(ii)). Three nominations were received prior to this deadline, and Dr. Jung Hwa Choi (Republic of Korea) was selected as the second Intern in March 2001. The recommended period of appointment for Dr. Choi, from 6 to 10 months, was meant to give him the opportunity to be involved in all major PICES activities

including the organizing of the PICES Tenth Annual Meeting in Victoria, Canada, in October, 2001. The Executive Secretary reported that the existing funding allowed a 10-month appointment, but the actual duration of the Intern's term was limited to 6 months by Canadian visa regulations. A dialogue with Canadian authorities (Human Resources Development Canada, Citizen and Immigration Canada, and the Department of Foreign Affairs and International Trade) on proper arrangements for the Program is in progress, with kind assistance of Fisheries and Oceans Canada.

Council reviewed the results from the first two years of the Intern Program, and concluded that PICES and member countries benefit from the Intern Program, and that it should continue.

The Executive Secretary reminded Council that the Intern Program was not budgeted for 2001, and following Decision 00/A/8(iii), letters were sent to invite member countries to make voluntary contributions to support the Intern Program in 2001 and beyond. Only two countries, Canada and U.S.A., contributed \$10,000 and \$12,000, respectively, to the Trust

Fund to finance the Program. These contributions allowed the continuation of the Intern Program in 2001.

In 2000, and again in 2001, Canada suggested that the Intern Program should gradually be built into the annual budget. Dr. Richard Marasco reported that the F&A Committee did not reach a consensus on this proposal; Russia and the United States supported the Canadian position, but China and Japan expressed a desire to finance the Program from voluntary contributions and/or the Trust Fund. As a result, there was no special allocation for the Intern Program in the proposed *FY 2002* budget and forecast *FY 2003* budget. Although the member countries made no firm commitments, Canada and the United States indicated a willingness to support the Program if funds become available at fiscal year end.

Permanent funding for the Intern Program requires replenishing the Trust Fund on a regular basis or developing some other mechanism to support it. Council debated various approaches to finance the Program and agreed to use registration fees collected for the Annual Meeting to support the Intern Program (Decision 01/A/4(iv)).

In April 2001, National Delegates were reminded that according to the Guidelines for application and selection procedure, they should invite and review applications for the 2002 PICES Internship from their home country and submit nominations to the Secretariat before October 7, 2001, the date of the first Council meeting at PICES X. At the second meeting (October 12), the Executive Secretary informed Council that two nominations were received prior to the deadline, and Ms. Natalya Bessmertnaya (TINRO-Centre, Russian Federation) was selected as the third Intern.

Agenda Item 8. PICES Visiting Scientist Program

Council reviewed the proposal to establish a PICES Visiting Scientist Program. The initial document was prepared by the Secretariat and

circulated to all National Delegates in July 2001. Comments were included in the draft presented at the meeting. Council noted that the Program will provide an opportunity for national agencies and/or other international science organizations to contribute “in kind” toward achieving PICES goals, and thus enhance the ability of the Organization and the Secretariat to support the increasing work demand and improve the way the Organization functions. Council made editorial changes that allowed more flexibility in the duration of term, and approved the PICES Visiting Scientist Program as amended (Decision 01/A/6, *GC Appendix B*).

The Program will be initiated in 2002, and the selected expert’s term will start after the approval of the specific MOU. The Science Board identified the high priority projects for PICES and gave the highest rank to the development of the North Pacific Ecosystem Status Report. It was suggested that the secondment of experienced scientists from PICES member nations through the Visiting Scientist Program would be the most reliable approach to organize and coordinate the work involved in producing this report. Possible tasks for the visiting scientist include: (i) to identify and to solicit data summaries, syntheses and overviews from regions and for taxa/species of interest; (ii) to compile contributions to the report; (iii) to co-convene a meeting of a group of experts to review the draft report and revise it as necessary; (iv) to participate in workshop development for improving future reports; and (v) to assist in fund-raising for training and capacity building efforts in developing countries to improve the regional/national ecosystem status reports.

Agenda Item 9. Schedule and financing of future Annual Meetings of the Organization

At PICES IX, Council endorsed the proposal by the People’s Republic of China to host the Eleventh Annual Meeting in 2002 (Decision 00/A/4(ii)). The dates and place of PICES XI were not identified at that time. Discussion with representatives of the host country and GLOBEC International proceeded during the year, and ended with the recommendation to

hold PICES XI from October 18-26, 2002, in Qingdao, concurrently with the second GLOBEC Open Science Meeting (October 15-18, 2002). Council approved this recommendation (Decision 01/A/4(i)) and confirmed a willingness to provide \$40,000 to China to partially cover meeting costs.

A letter from the Korean Ministry of Marine Affairs and Fishery (MOMAF) confirmed the earlier offer of the Republic of Korea to host the Twelfth Annual Meeting. Council then approved the proposal to hold PICES XII from October 17-25, 2003, in Seoul, and requested that sufficient budgetary information be provided as soon as possible, to facilitate *FY 2003* budget planning (Decision 01/A/4(ii)).

In keeping with the six-year rotation cycle, Council invited the United States of America to explore the feasibility of hosting PICES XIII in October 2004, and inform the Secretariat on this matter by the end of 2001. The most desirable dates for the meeting are October 15-23, 2004 (Decision 01/A/4(iii)).

Council discussed the financing of future Annual Meetings of the Organization, and by the recommendation of the Finance and Administration Committee, approved charging a registration fee for the PICES Annual Meetings. Council adopted the proposed registration fee structure and unanimously agreed that collected fees be credited to the Working Capital Fund, and used to support the Intern Program and high priority projects. (Decision 01/A/4(iv)).

Agenda Item 10. Assistant Executive Secretary position

According to the PICES operational procedures, the term of office for the Assistant Executive Secretary is three years, and may be extended or renewed at the discretion of Council. Dr. Stewart M. (Skip) McKinnell was appointed as the Assistant Executive Secretary, effective September 7, 1999, and his term will come to an end in September 2002, immediately prior to the Eleventh Annual Meeting. Council discussed possible options and at the recommendation of the Finance and Administration Committee,

agreed to offer Dr. McKinnell a second term. Dr. McKinnell should inform the Executive Secretary on his decision by January 31, 2002.

Agenda Item 11. Report and recommendations of Finance and Administration Committee

The Finance and Administration Committee met under the chairmanship of Dr. Richard J. Marasco, who presented the report to the Governing Council (see F&A Report for text). Council approved the report.

11.1 Audited accounts for fiscal year 2000

At the recommendation of the Finance and Administration Committee, Council accepted the audited accounts for *FY 2000*. Council agreed to retain the existing auditor *Flader & Greene* for another year (Decision 01/A/1).

11.2 Annual contributions

Council reviewed historical statistics on the payment schedule of annual fees to the Organization (*F&A Endnote 5*), and directed the Executive Secretary to send a letter to member countries commending them for improved performance in submitting annual contributions in 2000-2001, and advising on the benefits of paying contributions by the first day of the PICES fiscal year (January 1), as required by Regulation 5(ii) of the Financial Regulations (Decision 01/A/3).

11.3 Budget

11.3a Estimated accounts for fiscal year 2001

The estimated accounts for *FY 2001* were reviewed by the Finance and Administration Committee and approved by Council (Decision 01/A/2).

11.3b Proposed budget for fiscal year 2002

Council approved the proposed *FY 2002* budget of \$623,000. The amount of \$59,000 will be transferred from the Working Capital Fund to the General Fund to reduce the total required

contribution to \$564,000, setting the 2002 fees at \$94,000 per Contracting Party (Decision 01/A/2(i)).

11.3c Forecast budget for fiscal year 2003

The *FY* 2003 forecast budget of \$639,000 was prepared under guidelines adopted by Council in 1999 and presented as an information item for Contracting Parties. It will be further considered at PICES XI (Decision 01/A/2(ii)).

11.3d Working Capital Fund

The Working Capital Fund is forecast to be \$196,700 at the end of 2001. Council approved a transfer of \$59,000 to the General Fund to reduce the fees for each Contracting Party, and a transfer of \$16,600 to the Trust Fund to recover all 2001 expenditures and restore the Trust Fund to the level of \$105,000. After these transfers, the Working Capital Fund will total approximately \$122,400, including \$12,300 contributed by the National Marine Fisheries Service (NOAA, U.S.A.) to finance the development of a North Pacific Ecosystem Status Report through the proposed PICES Visiting Scientist Program (Decision 01/A/2(iii)).

11.3e Home Leave and Relocation Fund

The status of the Home Leave Relocation Fund was reviewed. It was noted that expenditures in *FY* 2001 were offset by bank interest earned by the Fund and in part by the transferred income tax levies. The Fund will be at its maximum level of \$110,000 at the end of the fiscal year.

11.3f Trust Fund

In *FY* 2001, the Trust Fund was used to bring young scientists from all PICES member countries and scientists from countries with "economies in transition" to the PICES Tenth Annual Meeting, to finance the Intern Program, and to support activities of Working Groups and Task Teams. These expenditures were compensated only partly by the voluntary contributions from Canada and U.S.A. for the Intern Program, travel grants from the Scientific Committee of Oceanic Research (SCOR) and Fisheries and

Oceans Canada (DFO), and bank interest (for details see *GC Endnote 3*). As a result, the Trust Fund was reduced by about \$11,600.

The Trust Fund is forecast to be \$88,400 at the end of 2001. The approved transfer of \$16,600 from the Working Capital Fund will recover all 2001 expenditures and restore the Trust Fund to the level of \$105,000 (Decision 01/A/2(iii)). This amount includes \$5,000 provided by DFO for Canadian academics and not used in 2001.

Transfers of residual surpluses from the Working Capital Fund have allowed the Trust Fund to be replenished for the last several years. Council confirmed that this practice should continue, but recommended that the Finance and Administration Committee explore other options for the Trust Fund replenishment, as it is unlikely that surpluses of this magnitude will remain in the future.

11.4 Fund-raising activities

Council noted high level of external funding for various activities initiated by PICES and thanked the Science Board Chairman and the Secretariat for their effective fund-raising efforts. Voluntary contributions and grants received for financing special activities in *FY* 2001 are reflected in the Report on Administration (*GC Endnote 3*).

Council reviewed the performance of the Fund-Raising Committee and approved the proposal to disband this Committee and assign its functions to the Finance and Administration Committee. Council also agreed to task the Science Board with the responsibility of providing fully developed project proposals to facilitate fund-raising activities (Decision 01/A/5).

Agenda Item 12. Report and recommendations of Science Board

The Science Board met under the chairmanship of Ms. Patricia Livingston, who presented the report to the Governing Council (see Science Board Report for text). Council approved the Science Board Report. Details are given in *Appendices A-C*.

Agenda Item 13. Other business

The Tenth Annual Meeting provided an opportunity to review progress made by PICES from its inception in 1992, and to discuss the future development of the Organization. To ensure that PICES can take on new activities and continue to serve as a major international forum for marine science in the North Pacific, Council decided to perform an internal audit of the Organization that should determine if the original purposes of the Organization are being

realized. Council agreed to establish a Review Committee that was charged with the task of reviewing the objectives, functions and role of PICES, analyzing the existing structure of PICES and, if necessary, developing proposals for change to meet future needs. The Review Committee should submit its report to Council at PICES XI. Dr. Marasco was requested to draft the terms of reference and proposal for membership for the Committee by December 31, 2001 (Decision 01/A/7).

GC Appendix A. Decisions

01/A/1: Auditor

Council accepted the audited accounts for 2000 and agreed to retain *Flader and Greene* as auditor for another year.

01/A/2: Budget

Council accepted the estimated accounts for 2001 and agreed to the following actions:

- i. *2002 Budget*
The budget of \$623,000 was approved. The amount of \$59,000 will be transferred from the Working Capital Fund to reduce the total required contribution to \$564,000, setting the 2002 fees at \$94,000 per Contracting Party.
- ii. *Forecast 2002 Budget*
The forecast budget of \$639,000 for 2003 was reviewed and will be further considered at the Eleventh Annual Meeting.
- iii. *Inter-fund Transfers*
A transfer of \$59,000 from the Working Capital Fund to the General Fund for 2002 was approved. A transfer of \$16,600 from the Working Capital Fund to the Trust Fund was approved to recover all 2001 expenditures and restore the Trust Fund to the level of \$105,000. After these transfers, the Working Capital Fund will total \$122,400 including the \$12,300 contribution by the National Marine Fisheries Service (NOAA, U.S.A.) to finance the North Pacific Ecosystem Status Report.

01/A/3: Annual contributions

The Executive Secretary will send a letter to member countries commending them for improved performance in submitting annual contributions in 2000-2001, and advising on the benefits of paying contributions by the first day of the PICES fiscal year (January 1), as required by Financial Regulations 5(ii).

01/A/4: Future Annual Meetings

- i. Council agreed to hold the Eleventh Annual Meeting in Qingdao, the People's Republic of China, from October 18-26, 2002.
- ii. Council approved the proposal of the Republic of Korea to hold the Twelfth Annual Meeting October 17-25, 2003, in Seoul¹. Sufficient budgetary information should be provided as soon as possible, to facilitate *FY 2003* budget planning.
- iii. Council requested the United States of America to explore the possibility of hosting the Thirteenth Annual Meeting, and inform the Secretariat on this matter by the end of 2001. The most desirable dates for the meeting are October 15-23, 2004.

¹ After the Annual Meeting, PICES learned of a conflict between the dates proposed for PICES XII and those of a Lowell Wakefield Symposium (Anchorage, U.S.A), and Council agreed that PICES XII be held October 10-18, 2003.

- iv. Council approved charging a registration fee for the PICES Annual Meetings and adopted the following registration fee structure:

Type	CDN \$
Early registrants	100
One-day fee	75
Late registrants	150
Students	40

Fees will be collected by the Secretariat and credited to the Working Capital Fund. These funds will be used to support the Intern Program and high priority projects.

01/A/5: Fund-Raising Committee

Council agreed to disband the Fund-Raising Committee and assign its functions to the Finance and Administration Committee. Council also tasked the Science Board with the responsibility of providing fully developed project proposals to facilitate fund-raising activities.

01/A/6: Visiting Scientists Program

Council approved the PICES Visiting Scientist Program as amended (*GC Appendix B*).

01/A/7: PICES Review Committee

Council approved the establishment of a Review Committee to perform an internal audit of the Organization and to submit a report at PICES XI. Dr. Marasco will draft the terms of reference and proposal for membership for the Committee by December 31, 2001.

01/S/1: Inter-sessional Meetings, Working Group and CCCC Program Workshops

The following inter-sessional meetings, Working Group and CCCC Program workshops are to be convened (see Acronym List at the end of the Annual Report):

- A 4-day IRI/IPRC/PICES *Pacific climate – fisheries* Workshop, November 14-17, 2001, Honolulu, Hawaii, U.S.A.;
- A 4-day MODEL/REX Workshop to build a NPZF (nutrient-phytoplankton-zooplankton-

fish) version of the PICES NEMURO model, January 24-27, 2002, Nemuro/Yokohama, Japan (postponed from 2001);

- A 2-day meeting of WG 14 on *Effective sampling of micronekton*, February 16-17, 2002, Honolulu, Hawaii, U.S.A.;
- A 3-day MONITOR Workshop on *Voluntary observing systems*, February 2002, Corvallis, Oregon or Seattle, Washington, U.S.A.;
- A 2-day NPAFC/NASCO/IBSFC/PICES/ICES Symposium on *Causes of marine mortality of salmon in the North Pacific and North Atlantic Oceans and in the Baltic Sea*, March 14-15, 2002, Vancouver, Canada;
- A 2-day BASS/MODEL Workshop on *Using models to test hypothesis on effects of climate change on the North Pacific subarctic gyre system*, April 21-22, 2002, La Paz, Mexico;
- A 3-day International Symposium on *North Pacific transitional areas*, April 23-25, La Paz, Mexico;
- A 3-day *North Pacific Ecosystem Status Report* Workshop, June 2002, Sidney, Canada;
- A 3-day meeting of WG 16 on *Climate change, shifts in fish production, and fisheries management*, June 2002, Qingdao, People's Republic of China;
- A 3-day PICES/CREAMS/ONR Workshop on *Recent progress in studies of physical processes and their impact to the Japan/East Sea ecosystem*, August 2002, Seoul, Republic of Korea;
- A 2-day TCODE/GOOS Workshop, August 2002, Vladivostok, Russia (in conjunction with NEAR/GOOS meeting);
- A ½-day MONITOR Workshop on *Requirements and methods for early detection of ocean change*, October 2002, Qingdao, People's Republic of China (in conjunction with PICES XI);
- A ½-day MONITOR Workshop on *Monitoring from moored and drifting buoys*, October 2002, Qingdao, People's Republic of China (in conjunction with PICES XI);
- A 1-day CCCC Integration Workshop, October 2002, Qingdao, People's Republic of China (in conjunction with PICES XI);
- A 1-day PICES/GLOBEC Data Management Workshop on *Exchange, inventory and archival of GLOBEC data*, October 2002,

- Qingdao, People's Republic of China (in conjunction with PICES XI);
- A 1-day PICES/CLIVAR Workshop on *Implementation of CLIVAR in the North Pacific* (postponed from 2001), October 2002, Qingdao, People's Republic of China (in conjunction with PICES XI);
- A 2-day WG 15 Workshop on *Development of common standards for HAB data*, October 2002, Qingdao, People's Republic of China (in conjunction with PICES XI);
- ½-day meetings of WG 14, WG 15, WG 16 and CPR and MBM Advisory Panels, and 1-day meetings of WG 17 and IFEP Advisory Panel, October 2002, Qingdao, People's Republic of China (in conjunction with PICES XI);
- A 3-day JGOFS/PICES Symposium on *Carbon cycle in the North Pacific II: Last JGOFS synthesis*, December 4-6, 2002, Nagoya, Japan;
- A 4-day ICES/PICES/GLOBEC International Symposium on *Role of zooplankton in global ecosystem dynamics: Comparative studies from the world oceans*, May 20-23, 2003, Gijón, Spain;
- The Third PICES Workshop on *Okhotsk Sea and adjacent areas*, June 2003, Vladivostok, Russia.

01/S/2: Travel support

PICES will provide travel support for:

- One invited speaker per Scientific Committee and Program for topic sessions at the PICES Eleventh Annual Meeting (additional requests by the Scientific Committees is subject to fund availability; the Science Board Chairman and Executive Secretary are instructed to use criteria suggested by the Science Board in prioritising these requests);
- Seven scientists to attend various CCCC Task Team Workshops;
- Selected speakers to attend the International Symposium on *North Pacific transitional areas* (April 23-25, 2002, La Paz, Mexico);
- Two scientists to attend the interim meeting of WG 14 on *Effective sampling of micronekton* (February 16-17, 2002, Honolulu, Hawaii, U.S.A.);

- CCCC Co-Chairman to attend the meeting of the ICES Cod and Climate Change Program (April 19-20, 2002, Copenhagen, Denmark);
- Two to three scientists to attend the interim meeting of WG 16 on *Climate change, shifts in fish production, and fisheries management* (June 2002, Qingdao, People's Republic of China);
- Two to three scientists to attend the *North Pacific Ecosystem Status Report* Workshop (June 2002, Sidney, Canada);
- Two scientists to attend the PICES/CREAMS/ONR Workshop on *Recent progress in studies of physical processes and their impact to the Japan/East Sea ecosystem* (August 2002, Seoul, Republic of Korea);
- Two scientists to attend the meeting of WG 15 on *Ecology of harmful algal blooms in the North Pacific* (October 2002, Qingdao, People's Republic of China) (support for one scientist will be provided from the Trust Fund);
- One Russian scientist to attend the meeting of the Advisory Panel on *Marine Birds and Mammals* (October 2002, Qingdao, People's Republic of China) (support will be provided from the Trust Fund);
- Science Board Chairman to attend the NPAFC/NASCO/IBSFC/PICES/ICES Symposium on *Causes of marine mortality of salmon in the North Pacific and North Atlantic Oceans and in the Baltic Sea* (March 14-15, 2002, Vancouver, Canada); the International Symposium on *North Pacific transitional areas* (April 23-25, 2002, La Paz, Mexico); the ICES Annual Conference and Centenary (October 1-8, 2002, Copenhagen, Denmark); and the Second GLOBEC Open Science Meeting (October 13-18, 2002, Qingdao, People's Republic of China);

01/S/3: Publications

The following publications were approved for 2002:

- Final report of WG 13 on CO₂ in the North Pacific; Proceedings of PICES X Anniversary Symposium; Proceedings of the 2001 CCCC Task Team Workshops; and National

reports on Harmful algal blooms in the PICES region of the North Pacific in the PICES Scientific Report Series;

- Progress reports of WG 13 on CO₂ in the North Pacific, WG 14 on Effective sampling of micronekton, WG 15 on Ecology of harmful algal blooms in the North Pacific, WG 16 on Climate change, shifts in fish production, and fisheries management, CCCC Task Teams, and Advisory Panels on Continuous Plankton Recorder, Iron Fertilization Experiment and Marine Birds and Mammals in the 2001 Annual Report;
- Papers resulted from the 1999 MEQ Practical Workshop in a special issue of *Marine Environmental Research* (Guest editors: Richard F. Addison and John E. Stein);
- Selected papers from the 2001 POC/BIO/FIS Topic Session on “The physics and biology of eddies, meanders and rings in the PICES region” in a special issue of *Journal of Oceanography* (Guest editors: William B. Crawford, Alexander S. Bychkov, Stewart M. (Skip) McKinnell and Takashige Sugimoto);
- Selected papers from the 2001 CCCC Topic Session on “A Decade of variability in the physical and biological components of the Bering Sea ecosystem 1991-2001” in a special issue of *Progress in Oceanography* (Guest editors: Allen Macklin, Jeffrey M. Napp, Vladimir I. Radchenko, Sei-ichi Saitoh and Phyllis J. Stabenro);
- Selected papers from the 2001 FIS Topic Session on “Migration of key ecological species in the North Pacific Ocean” in a special issue of *Canadian Journal of Fisheries and Aquatic Sciences* (Guest editor: James Irvine);
- Selected papers from the 2001 PICES/JGOFS Topic Session on “Plankton size classes, functional groups, and ecosystem dynamics: Causes and consequences” in a special issue of *Progress in Oceanography* (Guest editors: Alexander S. Bychkov and Angelica Peña);
- CD-ROM Oceanographic Atlas of Okhotsk Sea, Bering Sea, and Japan/East Sea.

01/S/4: Future of current Working Groups

- Study Group on *North Pacific Ecosystem Status Report and Regional Analysis Centers*

(RACs) should complete its task in December 2001, and be disbanded (see *SB Endnote 7* for Study Group report and recommendations);

- WG 12 on *Crabs and shrimps* should complete its final report in 2001 and be disbanded;
- WG 13 on *CO₂ in the North Pacific* should complete its final report in 2002 and be disbanded (no further meetings of the Working Group are required);
- WG 14 on *Effective sampling of micronekton* and WG 15 on *Ecology of harmful algal blooms in the North Pacific* will remain until 2003, and prepare their final reports for publication in 2004;
- WG 16 on *Climate change, shifts in fish production, and fisheries management* will convene an interim meeting in July 2002, and a final meeting in October 2002 at PICES XI, and prepare a final report for publication in 2003.

01/S/5: New PICES groups

- i. WG 17 on *Biogeochemical data integration and synthesis* will be organized under the direction of the Physical Oceanography and Climate Committee (see *GC Appendix C* for terms of reference). The Technical Committee on Data Exchange will identify a member to sit on the Working Group;
- ii. *North Pacific Data Buoy* Advisory Panel will be organized and sponsored collaboratively by the Physical Oceanography and Climate Committee and the Data Buoy Co-operation Panel (see *GC Appendix C* for terms of reference).

01/S/6: Relations with other organizations and programs

- i. Council approved the revised Standing List of International Organizations and Programs and agreed with identified priorities for interaction in 2002 (*SB Endnote 8*).
- ii. Science Board will develop potential areas of cooperation with ICES based on specific proposals for interaction between the two Organizations.

GC Appendix B. Visiting Scientist Program

Rationale

Scientific activities sponsored and/or conducted by PICES have increased significantly since its inception in 1992, as has its production of scholarly works. Growth was achieved by making efficient use of national contributions and by attracting external funding for PICES activities. Unprecedented level of participation in PICES activities associated with the Ninth (Hakodate, Japan, October 2000) and Tenth (Victoria, Canada, October 2001) Annual Meetings, confirmed the Organization's rapid growth and suggested a need to anticipate and plan for even further growth.

Neither the annual contributions by member countries, nor the size of the Secretariat staff have expanded with the increased level of activity, and the capacity of the staff has already been driven to the limit. Given the current reluctance of member countries to increase annual contributions, PICES is seeking alternative ways to enhance the ability of the Organization and the Secretariat to support the increasing demand. Establishing a PICES Visiting Scientist Program will allow national agencies and/or other international science organizations to contribute "in kind" toward achieving PICES goals, and improve the way the Organization functions.

Objectives of the program

- to strengthen the capacity of the Organization to develop and implement projects that have high priority for PICES and member countries; and
- to provide professional development of marine scientists and managers from PICES member countries.

Nature of the program

Each visiting scientist (expert) will be made available to PICES through secondments from national agencies and/or other international science organizations. He/she will be given a specific task that is important to PICES and

which is also in the interests of his/her agency/organization. The secondment should be governed by an MOU (Memorandum of Understanding) developed between PICES and the seconding agency/organization. The MOU spells out the terms of reference for the tasks, responsibilities, duration, as well as the legal terms.

The expert will work at the PICES Secretariat while remaining on the payroll of his/her agency/organization. The agency/organization shall pay the salary, allowances, and expenses incurred in travel to and from the place of residence and the location of the Secretariat, at the beginning, during, and at the end of his/her assignment. Since the expert will continue to be an employee of his agency/organization while at the PICES Secretariat, his/her expenses relating to taxes, medical and life insurance coverage, and any other benefits to which the expert is entitled, will remain the responsibility of his/her agency/organization.

PICES shall provide appropriate facilities at the Secretariat, similar to those normally granted to members of its own staff, including office space and administrative services.

Travel expenses associated with the expert's work in the Secretariat will be shared by PICES and the agency/organization as agreed upon in the MOU.

Qualification

The expert should be an experienced individual (Ph.D. or master's level scientist with over 5 years of post-master's degree experience) with good scientific writing and oral communication skills in English. Someone familiar with integrated marine observation and prediction programs (e.g., GLOBEC, GOOS, etc.) would be desirable.

Duration and starting date

The program will be implemented following the approval of the program by the Governing Council at the PICES Tenth Annual Meeting

(October 5-13, 2001), and identification of potential tasks by the Science Board. The expert's term will start after approval of the

specific MOU. Duration of the term will depend on the specific task.

GC Appendix C. Terms of Reference for new PICES groups

WG 17 on Biogeochemical data integration and synthesis

1. Develop a North Pacific database for ocean CO₂ and related parameters in association with existing data centers. Advise data centers which of the available historical data sets should be assigned a high priority for acquisition and conversion to an electronically readable form.
2. Prepare a written guide of best practices for oceanic CO₂ measurements and data reporting. Carry out, as needed, inter-laboratory method comparisons to assure future measurement quality. Encourage the availability of suitable reference materials.
3. Develop a strategy to co-ordinate the planning of future North Pacific measurement programs to ensure optimal use of resources to obtain appropriate temporal and spatial coverage as well as maximum comparability with historical data. Efforts should be made to encourage timely availability of the "new" data.
4. Organize a symposium or an Annual Meeting Topic Session on the impacts of climate change on the carbon cycle in the North Pacific.

North Pacific Data Buoy Advisory Panel

1. Maintain an observational buoy programme north of 30°N in the North Pacific Ocean providing meteorological and oceanographic data for real-time and/or research purposes in support of the World Weather Watch (WWW), the World Climate Research Programme (WCRP), the Global Climate Observing System (GCOS), the Global Ocean Observing System (GOOS), and other relevant WMO and IOC programmes as well as those sponsored by PICES.
2. Support the aims and objectives of the Data Buoy Co-operation Panel (DBCP) as set out in the terms of reference of DBCP, in particular with respect to (i) provision of good quality and timely data to users; (ii) insertion of real-time (or near real-time) data into the Global Telecommunication System; and (iii) exchange of information on data buoy activities and development and transfer of appropriate technology;
3. Support the aims and objectives of PICES, in particular with respect to encouraging (i) the exchange of ocean data and information in the North Pacific, and (ii) the development of new sensors that increase the utility of ocean data buoys and the exchange of information about those sensors.

GC Endnote 1

Participation List

Canada

William G. Doubleday
Elisabeth Marsollier
Laura Richards
Peggy Tsang (Advisor)

Japan

Nagahisa Uki
Hiroko Watanabe (Alternate Delegate)
Tokio Wada (Advisor)

People's Republic of China

Qian-Fei Liu (Alternate Delegate)
Hong-Mei Xin (Alternate Delegate)

Republic of Korea

Hye-Jung Kim
Jin-Yeong Kim (Alternate Delegate)

Russia

Lev N. Bocharov
Alexander A. Kurmazov (Advisor)
Igor I. Shevchenko (Advisor)

U.S.A.

Vera Alexander
Richard J. Marasco
Elizabeth Tirpak (Advisor)
William L. Sullivan (Advisor)

Other

Hyung-Tack Huh (Chairman, PICES)
Alexander S. Bychkov (Executive Secretary)
Patricia Livingston (Chairman, Science Board)
R. Ian Perry (Chairman-elect, Science Board)
Daniel Lluch-Belda (Observer, Mexico)
Arthuro Molina (Observer, Mexico)

GC Endnote 2

Governing Council Meeting Agenda

- | | |
|---|---|
| 1. Opening remarks | 11.1 Audited accounts for financial year 2000 |
| 2. Adoption of agenda | 11.2 Annual contributions |
| 3. Preliminary report on administration | 11.3 Budget |
| 4. Membership and observers from other countries | a. Estimated accounts for fiscal year 2001 |
| 5. Relations with relevant international organizations | b. Proposed budget for fiscal year 2002 |
| 6. Tenth anniversary of PICES | c. Forecast budget for fiscal year 2003 |
| 7. PICES Intern Program | d. Working Capital Fund |
| 8. PICES Visiting Scientist Program | e. Home Leave and Relocation Fund |
| 9. Schedule and financing of future Annual Meetings of the Organization | f. Trust Fund |
| 10. Assistant Executive Secretary position | 11.4 Fund-raising activities |
| 11. Report and recommendations of Finance and Administration Committee | 12. Report and recommendations of Science Board |
| | 13. Other business |

GC Endnote 3

Report on Administration for 2001

I. NATIONAL CONTRIBUTIONS

According to Regulation 5(ii) of Financial Regulations, all national contributions to PICES

are payable by the first day of the financial year (January 1) to which they relate. Dues for 2001 were paid as follows:

Japan -----	December 13, 2000
U.S.A.-----	January 3, 2001
Canada -----	January 24, 2001
Russian Federation -----	May 18, 2001
Republic of Korea-----	August 23, 2001
People's Republic of China-----	not received as of October 1, 2001

II. EXTERNAL AND ADDITIONAL FUNDING

This year serious efforts were made to get external and additional funding for various activities initiated by PICES. The following reflects special contributions and grants received:

- A grant of \$32,000 (US \$21,800) from the Alfred P. Sloan Foundation, received in 2000, was used this year to finance the PICES/CoML/IPRC Workshop on *Impact of climate variability on observation and prediction of ecosystem and biodiversity changes in the North Pacific* and a subsequent publication in the PICES Scientific Report series.
- In addition to their annual fees, Canada and U.S.A. contributed \$10,000 and \$12,000 (US \$7,800), respectively, to finance the PICES Intern Program.
- National Oceanic and Atmospheric Administration (NOAA, U.S.A.) and National Marine Fisheries Service (NMFS, U.S.A.) contributed \$15,350 (US \$10,000) and \$26,250 (US \$17,100), respectively, to support the PICES Tenth Anniversary. To reduce PICES expenses for the Annual Meeting, Fisheries and Oceans Canada (Pacific Region) offered to host the Welcoming Reception and provide computers, audio-video equipment and staff for technical and logistical support.
- An Ocean Exhibition, organized in conjunction with PICES X, raised \$9,000 in revenue.
- SCOR provided a grant of \$7,600 (US \$5,000) to support travel of scientists from countries with “economies in transition” to the PICES Tenth Annual Meeting.
- National Marine Fisheries Service (NMFS, U.S.A.) contributed \$12,300 (US \$8,000) to finance the production of a North Pacific Ecosystem Status Report through the proposed PICES Visiting Scientist Program.
- A grant from the Nakajima Foundation was approved to finance a MODEL Workshop on *Improvements to the PICES NEMURO Model* to be held in January 2002, in Nemuro/Yokohama, Japan.

The Asia-Pacific Network (APN) did not approve funding for a one-year pilot project

entitled “APN/PICES ECOPAC: Capacity Building in Climate and Marine Ecosystem Study” (proposal submitted to APN in September 2000).

III. INTER-SESSIONAL MEETINGS

The following inter-sessional meetings were convened/co-sponsored, for which financial, travel and logistical arrangements were made:

- A 3-day WG 13/TCODE Test Workshop on *CO₂ data integration*, January 22-24, 2001, in Sidney, B.C., Canada;
- A 2-day Third Annual Workshop on *Salmon ecology in coastal ecosystem*, January 31-February 1, 2001, in Nanaimo, B.C., Canada;
- A 2-day BASS/MODEL Workshop on *Quantification of a food web model for the subarctic gyre systems*, March 5-6, 2001, Honolulu, U.S.A.;
- A 3-day Workshop on *Impact of climate variability on observation and prediction of ecosystem and biodiversity changes in the North Pacific* (co-sponsored by the Census of Marine Life, through the Alfred P. Sloan Foundation, and the International Pacific Research Center), March 7-9, 2001, in Honolulu, U.S.A.;
- A 3-day *International Argo Science Team Meeting (IAST-3)*, March 20-22, 2001, in Sidney, B.C. Canada;
- A 3-day WG 13/TCODE Implementation Workshop on *CO₂ data integration* (co-sponsored by the National Institute for Environmental Studies and Marine Information Research Center, Japan), July 30-August 1, 2001, in Tokyo, Japan;
- A 4-day *NEAR-GOOS Forecasting Workshop* (in conjunction with the Fifth IOC/WESTPAC Scientific Symposium), August 27-30, 2001, in Seoul, Korea;
- A 2-day WG 15 Workshop on *Taxonomy and identification of HAB species* (in conjunction with PICES X), October 5-6, 2001, in Vancouver, B.C. Canada;
- A 2-day series of CCCC Task Team Workshops: a BASS/MODEL Workshop on *Ecosystem models for the Subarctic Pacific gyres*; a MONITOR Workshop on *Progress in monitoring the North Pacific*; a REX Workshop on *Temporal variations in*

size at age for fish species in coastal areas around the Pacific Rim; a REX/MODEL Workshop on *Higher trophic levels in the PICES NEMURO Model* (in conjunction with PICES X), October 5-6, 2001, in Victoria, B.C., Canada;

- A 4-day *Pacific climate - fisheries* Workshop (co-sponsored by the International Research Institute for Climate Prediction, the Center for Sustainable Fisheries, Intergovernmental Oceanographic Commission, GLOBEC and the International Pacific Research Center), November 14-17, 2001, in Honolulu, U.S.A.

A 4-day MODEL Workshop on *Improvements to the PICES NEMURO Model*, planned for summer 2001, is postponed and will be held in January 2002, in Nemuro (2 days) and Yokohama (2 days). A special grant from the Nakajima Foundation was approved to finance the workshop. Additional co-sponsorship will be provided by the city of Nemuro.

A 1-day PICES/CLIVAR Workshop on *Implementation of CLIVAR in the Pacific Ocean*, and a 1-day TCODE Workshop on *Data management methods and issues for the 21st century*, planned in conjunction with PICES X, are postponed and will be held in 2002, inter-sessionally or in conjunction with PICES XI.

Preparation and arrangements are in progress for the 3rd Zooplankton Production Symposium on *The role of zooplankton in global ecosystem dynamics: Comparative studies from the World Oceans* (co-sponsored by ICES, PICES and GLOBEC) to be held May 20-23, 2003, in Gijon, Spain; and for an International Symposium on *Recent progress in studies of physical processes and their impact to the Japan/East Sea ecosystem* (co-sponsored by PICES, CREAMS and ONR) to be held in May 2002, in Seoul, Korea.

IV. PUBLICATIONS

List of publications produced this year:

- PICES 2000 Annual Report was published and circulated in February;

- Announcement for the Tenth Annual Meeting was printed and distributed in February;
- Vol. 9 nos. 1 and 2 of PICES Press were circulated in February and July;
- Proceedings of the CREAMS 2000 International Symposium on Oceanography of the Japan/East Sea were published and distributed in February;
- PICES 2000 Directory was updated and circulated in July;
- Special issue of *Progress in Oceanography* on *Pacific climate variability and marine ecosystem impacts* (selection of papers presented at the Beyond El Niño Conference in March 2000) was published in August and distributed at PICES X in October;
- PICES Scientific Report No. 16: *Environmental assessment of Vancouver Harbour: Data report for the PICES Practical Workshop* (final report of WG 8), was published in August and distributed in September;
- PICES Scientific Report No. 17: *Climate Change and Carrying Capacity Program/Report on the 2000 BASS, MODEL, MONITOR and REX Workshops, and the 2001 BASS/MODEL Workshop*, was published and distributed in September;
- PICES Anniversary Publication: *Historical Atlas of the North Pacific Ocean: Maps of discovery and scientific exploration 1500-2000*, was published in August and distributed at PICES X in October;
- PICES Scientific Report No. 18: *Proceedings of PICES/CoML/IPRC Workshop on Impact of climate variability on observation and prediction of ecosystem and biodiversity changes in the North Pacific*, was published and distributed in September;
- Poster for the PICES Eleventh Annual Meeting was printed and distributed in September, and at the 2001 Annual Meeting in October;
- Poster and the first announcement for the 3rd Zooplankton Production Symposium on *The role of zooplankton in global ecosystem dynamics: Comparative studies from the World Oceans* (co-sponsored by ICES,

PICES and GLOBEC) were printed and distributed in September, and at the 2001 Annual Meeting in October;

- A Book of Abstracts for the Tenth Annual Meeting was prepared for circulation at the meeting in October;
- PICES Scientific Report 19: *Crustacean resources of the North Pacific Ocean* (final report of WG 12), will be published by the end of this year (after approval by FIS);
- Review and results from the 1999 and 2000 PICES method inter-comparisons for carbonate parameters will be published in a bilingual (Japanese/English) report by the Center for Global Environmental Research (CGER) of the National Institute for Environmental Studies, Japan, and in the PICES Scientific Report Series (PICES Scientific Report No. 20) by the end of this year;

V. TRAVEL AND REPRESENTATION AT OTHER ORGANIZATION MEETINGS

- Travel support was provided to Drs. Paulette Murphy (U.S.A.) and Tsuneo Ono (Japan), and Mr. Alexander Kozyr (U.S.A.), to participate in the WG 13/TCODE Test Workshop on *CO₂ Data Integration*, in Sidney, B.C., Canada, in January;
- Drs. Skip McKinnell (co-convenor), PICES Assistant Executive Secretary, and Frank Schwing (invited speaker) attended the Thrd Annual Workshop on *Salmon ecology in coastal ecosystem*, in Nanaimo, B.C., Canada, in January;
- Dr. Alexander Bychkov, PICES Executive Secretary, went to Vancouver, Canada, in February, to visit the North Pacific Anadromous Fish Commission and meet with Mr. Yuichi Kusumoto, Consul-General of Japan;
- Dr. Skip McKinnell was invited to participate in a workshop on *Abnormal behaviour of Fraser river sockeye salmon* convened by the Pacific Salmon Commission, in Vancouver, B.C., Canada, in February;
- Partial or full travel support was provided to 14 scientists from all PICES member countries and staff of the Secretariat (paid by Alfred P. Sloan Foundation grant), to attend the Workshop on *Impact of climate variability on observation and prediction of ecosystem and biodiversity changes in the North Pacific* in Honolulu, U.S.A., in March;
- Travel support was provided to Dr. Yury Volkov and Mr. Vladimir Yakuhin (Russia), to participate in the 3rd International Argo Science Team Meeting in Sidney, B.C., Canada, in March;
- Dr. Alexander Bychkov and Ms. Christina Chiu, PICES Administrative Assistant, attended the International Fisheries Commission Pension Society Meeting in Vancouver, Canada, in April;
- Dr. Vera Alexander (Vice-Chairman of PICES), Ms. Patricia Livingston (Science Board Chairman), Dr. Warren Wooster (founding father and first Chairman of PICES) and Dr. Alexander Bychkov travelled to La Paz, Mexico, in May, to meet with directors and leading scientists from Mexican research institutes, to inform them about PICES and explore an interest of Mexico to accede to the PICES Convention;
- Dr. Skip McKinnell travelled to Seattle, U.S.A., to attend a mini-Symposium to mark the 2001 cruise of T/S *Oshoro-maru*, in July;
- Dr. Alexander Bychkov attended the JGOFS Scientific Steering Committee Meeting and IGBP Open Science Conference in Amsterdam, The Netherlands, in July (partial support);
- Dr. Hyung-Tack Huh, Chairman of PICES, participated in IOC's (Inter-Governmental Oceanographic Commission) Assembly in Paris, France, in July (paid by Korean Government);
- Drs. Skip McKinnell and Yoshioki Oozeki (Japan) attended the NEAR-GOOS Forecasting Workshop, Dr. McKinnell also attended the NEAR-GOOS Coordinating Committee Meeting, in Seoul, Korea, in August;
- Full or partial travel support was provided to the following scientists to participate in various CCCC Task Team Workshops: Drs. Jacquelynne King (Canada), Bernard Megrey (U.S.A.) and Daniel Ware (Canada)

in a BASS/MODEL Workshop on *Quantification of a food web model for the subarctic gyre systems*; Dr. Andrey Krovnin (Russia) in a BASS/MODEL Workshop on *Ecosystem models for the Subarctic Pacific gyres*; Drs. Nikolai Naumenko and Olga Temnykh (Russia) in a REX Workshop on *Temporal variations in size at age for fish species in coastal areas around the Pacific Rim*; and Dr. Francisco Werner (U.S.A.) in a REX/MODEL Workshop on *Higher trophic levels in the PICES NEMURO Model*;

- Dr. Hyung-Tack Huh and Ms. Patricia Livingston travelled to Victoria, Canada, in October, for the PICES Tenth Annual Meeting;
- Full or partial travel support was provided to the keynote speaker (Dr. Warren Wooster) for the Opening Session, 5 invited speakers for the Science Board Anniversary Symposium, and 20 invited speakers (paid by PICES and co-sponsoring programs and organizations) for scientific sessions at the PICES Tenth Annual Meeting, in Victoria, Canada, in October;
- Partial travel support (paid by the Trust Fund and SCOR grant) was provided to 4 Chinese, 5 Mexican, 7 Russian, and 10 young scientists from all PICES member countries, to participate in the PICES Tenth Annual Meeting in Victoria, Canada, in October;
- Travel support was provided to Dr. Laurie Connell (U.S.A.), invited speaker with expertise in molecular biology of phytoplankton, to attend the WG 15 Workshop on *Taxonomy and identification of HAB species*, in Vancouver, B.C., Canada, in October;
- Drs. R. Ian Perry and Alexander Bychkov to represent PICES at the Census of Marine Life Steering Committee Meeting and the SCOR Executive Committee Meeting, in Mar Del Plata, Argentina, in October;
- Dr. Douglas E. Hay (FIS Chairman) and representatives of the Secretariat to participate in the NPAFC Ninth Annual Meeting in Victoria, Canada, in October-November;

- Two PICES' representatives to attend a *Pacific climate – fisheries* Workshop, in Honolulu, U.S.A., in November.

VI. RELATIONS WITH INTERNATIONAL SCIENTIFIC ORGANIZATIONS AND PROGRAMS

The following reflects expanding relationships with international scientific organizations and programs that are considered to have the highest priority for PICES with respect to cooperation and facilitation of ecosystem research in the North Pacific during this year:

- Global Ocean Ecosystem Dynamics project of IGBP (GLOBEC)
 - a. The PICES-GLOBEC Program on Climate Change and Carrying Capacity (CCCC) provides a mechanism for integrating national GLOBEC research programs in the North Pacific and is a regional component of the international GLOBEC effort;
 - b. GLOBEC co-sponsored a topic session on *Results of GLOBEC and GLOBEC-like Programs in the North Pacific Ocean (with emphasis on a possible 1998/99 regime shift)* at the PICES Tenth Annual Meeting, in October 2001;
 - c. GLOBEC accepted a proposal by PICES to organize and co-sponsor (with PICES and ICES) a 3rd Zooplankton Production Symposium on *The role of zooplankton in global ecosystem dynamics: Comparative studies from the World Ocean*, to be held May 20-23, 2003, in Gijón, Spain;
 - d. It was agreed to hold the PICES Eleventh Annual Meeting and the second GLOBEC Open Science Conference (OSC) concurrently in October 2002, in Qingdao, People's Republic of China. A PICES/CCCC Topic Session will be fully integrated into the GLOBEC OSC as a theme session, and every opportunity will be used for joint meetings of GLOBEC Foci Working Groups and PICES CCCC Task Teams with overlapping interest.

annual report will provide a synthesis of North Pacific monitoring data at all ecosystem levels, and will identify progress in climate and ecosystem change predictions that can be used to move towards ecosystem-based marine policy- and decision-making.

▪ Inter-American Tropical Tuna Commission (IATTC) and International Pacific Halibut Commission (IPHC)

- a. IATTC and IPHC participated in the PICES/CoML/IPRC workshop on *Impact of climate variability on observation and prediction of ecosystem and biodiversity changes in the North Pacific*, and contributed to the report from the workshop (PICES Scientific Report No. 18);
- b. Both organizations agreed to provide information on species of their concern for an annual North Pacific Ecosystem Status Report compiled and produced by PICES.

▪ North Pacific Anadromous Fish Commission (NPAFC)

- a. NPAFC agreed to provide information on species of their concern for an annual North Pacific Ecosystem Status Report compiled and produced by PICES;
- b. PICES was invited to be one of the co-organizers of a joint international symposium on *The causes of marine mortality of salmon in the North Pacific and North Atlantic Ocean and in the Baltic Sea* (other co-organizers are NPAFC, NASCO (North Atlantic Salmon Conservation Organization), IBSFC (International Baltic Sea Fishery Organization) and ICES).

▪ Argo project

- a. Following recommendations of the PICES Eighth and Ninth Annual Meetings to assist in the implementation of the Argo project, and a statement delivered by the Chairman of PICES at the *International Implementation*

Planning Meeting for Argo Floats in the Pacific Ocean and Adjacent Regions (Tokyo, Japan, May 2000), PICES co-sponsored a 3rd meeting of the International Argo Science Team (IAST-3) in Sidney, B.C., Canada, in March 2001. The meeting was attended by 39 scientists and managers from 13 countries and representatives of two international organizations (IOC and PICES). An article about the meeting, written by Dr. Dean Roemmich, IAST Chairman, was published in PICES Press, Vol. 9, No. 2.

▪ Climate Variability and Predictability Program (CLIVAR)

- a. Collaboration between CLIVAR and non-physical programs is clearly needed - both on scientific and on logistical/resources issues, and PICES is an important means of fostering this collaboration in the Pacific;
- b. PICES scientists attended the CLIVAR-Pacific Workshop (February 2001), and CLIVAR was represented at the PICES/CoML/IPRC Workshop on *“Impact of climate variability on observation and prediction of ecosystem and biodiversity changes in the North Pacific”* (March 2001);
- b. To foster collaboration, PICES and CLIVAR agreed to convene a 1-day joint workshop on *Implementation of CLIVAR in the Pacific Ocean* in 2002, inter-sessionally or in conjunction with PICES XI.

▪ North-East Asian Regional Global Ocean Observing System (NEAR-GOOS)

- a. PICES is actively communicating with scientists in the NEAR-GOOS effort and participating in NEAR-GOOS meetings. With the idea of broadening the program to an ecosystem-based effort, PICES co-sponsored the NEAR-GOOS Forecasting Workshop that was held in conjunction with the Fifth IOC/WESTPAC Scientific Symposium, in Seoul, Korea, in August 2001.

▪ Intergovernmental Oceanographic Commission (IOC)

- a. PICES has led the way in revealing the linkages between North Pacific climate variations and changing productivity and composition of fish communities. To further progress in this direction and ensure that the Organization will continue to serve as a regional focal point for integrating North Pacific climate research, PICES is strengthening its ties with the IOC research programs such as Argo, CLIVAR, GLOBEC, GOOS, etc. (see above).
- b. PICES Working Group 13 on *CO₂ in the North Pacific* has been actively coordinating the standardization, collection, and synthesis of CO₂ data in the region. To improve the overall quality of oceanic CO₂ measurements, PICES co-sponsored an international method inter-comparison study for carbonate parameters (more than 15 labs from 6 countries), which began in 1999 and continued through 2000. Results from this method inter-comparison were reviewed at two Technical Workshops, in April 1999 and October 2000, and will be published in the PICES Scientific Report series in summer 2001. To identify what needs to be done to provide for effective data exchange, PICES co-sponsored a series of multinational data integration/synthesis workshops aimed at achieving a detailed comparison of existing data sets for CO₂ in the North Pacific. The *CO₂ Data Integration Test Workshop* was held in January 2001, and the *CO₂ Data Integration Implementation Workshop* was held in August 2001.

These activities are highly valued by the IOC/SCOR CO₂ Panel. In a proposal about the design of Ocean Carbon Observation System, the Panel emphasized the importance of regional international forum, and supported PICES as an excellent forum for the Pacific region.

▪ Circulation Research of the East Asian Marginal Seas Program (CREAMS)

- a. PICES co-sponsored the publication of the Proceedings of CREAMS 2000 International Symposium on *Oceanography of the East Asian Marginal Sea* (May 2000, Vladivostok, Russia);
- b. An International Symposium on *Recent progress in studies of physical processes and their impact to the Japan/East Sea ecosystem* (co-sponsored by PICES, CREAMS and ONR) will be held in July-August 2002, in Seoul, Korea.

7. PICES INTERN PROGRAM

At the Ninth Annual Meeting, Council discussed the results from the first year of the PICES Intern Program (approved in 1999 and commenced in 2000), and concluded that PICES and member countries benefit from the Intern Program, and that it should be continued. After reviewing the Program, Council adopted the amendment to the Guidelines for application and selection procedure, extended the deadline for applications for the 2001 Intern Program to February 1, 2001, and invited member countries to make voluntary contributions to support the Intern Program in 2001 (see Decision 00/A/8).

PICES was able to continue the Intern Program in 2001 because Canada and U.S.A., in addition to their annual fees, contributed \$10,000 and \$12,000 (US \$7,800), respectively, to the Trust Fund to finance the Program. Prior to the new deadline, the Executive Secretary received three nominations for the 2001 term, and Dr. Jung Hwa Choi (Republic of Korea) was selected as the second Intern in March 2001. The recommended period of appointment, from 6 to 10 months, was meant to give him the opportunity to be involved in all major PICES activities including the organizing of the PICES Tenth Annual Meeting in Victoria, Canada, in October 2001. The existing funding allows a 10-month appointment, but the actual duration of the Intern's term is limited to 6 months by Canadian visa regulations. A dialogue with Canadian authorities on proper arrangements for the Program is in progress, with kind assistance of Fisheries and Oceans Canada.

GC Endnote 4

Report on the visit of the PICES delegation to Mexico

PICES representatives Dr. Vera Alexander (Vice-Chairman), Ms. Patricia Livingston (Chairman of the Science Board), Dr. Warren Wooster (founder and first Chairman of PICES) and Dr. Alexander Bychkov (Executive Secretary) met with Mexican scientists and officials from May 2-3, 2001, at CIBNOR (La Paz, Mexico). The purpose was to facilitate the incorporation of Mexico to PICES by presenting information on the history, structure, objectives and procedures of the Organization to a wider array of potential Mexican participants.

An open meeting was attended by a number of scientists from Mexican marine research institutes, and later the officials and some invited scientists met with the PICES delegation in a working session. Mexican officials included Dr. Mario Martínez García, Director of CIBNOR (Centro de Investigaciones Biológicas del Noroeste, SC - *Northwest Biological Research Center*), who hosted the meeting; Dr. Guillermo Compeán Jiménez, President of INP (Instituto Nacional de la Pesca - *National Fisheries Institute*); Lic. Ricardo Belmontes Acosta (Director de Políticas y Acuerdos Pesqueros Internacionales; Secretaría de Agricultura, Ganadería, Pesca y Alimentación - *Director of International Affairs, Ministry of Agriculture, Livestock, Fisheries and Food*); Lic. Clara Morán (Subdirectora de Asuntos Multilaterales, Consejo Nacional de Ciencia y Tecnología - *Deputy Director of Multilateral Affairs, National Council of Science and Technology*); Dr. Javier Mendieta, Director of CICESE (Centro de Investigación y Educación Superior de Ensenada - *Center for Scientific Research and Higher Education of Ensenada*); Dr. Francisco Arreguín Sánchez, Director of CICIMAR (Centro Interdisciplinario de Ciencias Marinas del Instituto Politécnico Nacional - *Interdisciplinary Center for Marine Sciences, National Polytechnical Institute*); Dr.

Federico Páez, representing the Director of the Instituto de Ciencias del Mar y Limnología, Universidad Nacional Autónoma de México - *Institute of Marine Science and Limnology, Mexican National Autonomous University*); Dr. Antonina Ivanova, Directora de Investigación Interdisciplinaria y Postgrado - *Director of Interdisciplinary Research and Graduate Education, Autonomous University of Baja California Sur*); and Dr. Jaime Farber Lorda (Coordinador de la Red Mexicana de Oceanografía y Pesca - *Coordinator of the Mexican Network of Oceanography and Fisheries*). Other scientists and representatives included Drs. Sergio Hernández-Vázquez and Salvador E. Lluch Cota (CIBNOR), Drs. Gerardo López Lemus and Luis Fletcher (INP) and Dr. Daniel Lluch Belda (CICIMAR).

There was a general consensus of interest in the potential accession of Mexico to PICES. Three main lines of action were adopted:

1. Mexican officials will further explore the interest of other government agencies involved and the formal procedures to be followed;
2. Mexican scientists will be encouraged to participate in PICES activities, beginning with the PICES Tenth Annual Meeting to be held October 5-13, 2001, in Victoria, Canada; and
3. PICES and Mexican participants will explore the possibility of organizing a special symposium in the spring of 2002, in La Paz, locally hosted by CIBNOR and CICIMAR. It was proposed that the symposium will examine recent advances in understanding the dynamics of marine ecosystems in high gradient regions of the Asian and North American coastal zones and in the open Pacific.

REPORT OF SCIENCE BOARD

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The Science Board met on October 7, 2001 (12:30-13:30), to develop recommendations to the Governing Council from the initial items on the agenda. The second meeting was held on October 12 (08:30-17:30), to deal with the remainder of the agenda, including items with financial implications for 2002 and beyond. Dr. Stewart M. McKinnell served as rapporteur for all meetings. (See *SB Endnote 1* for list of participants).

October 7, 2001

The Science Board Chairman, Ms. Patricia Livingston, welcomed members and observers and called the meeting to order. The agenda was discussed and adopted as presented (*SB Endnote 2*).

Letters from the *Exxon Valdez Oil Spill Trustee Council* (EVOS) concerning potential areas of cooperation between PICES and EVOS were distributed to Science Board members for discussion at the meeting on October 12.

Best Presentation Awards and Closing Session (Agenda Item 3)

The Science Board Chairman reviewed the criteria for Best Presentation Awards and the procedure for the Closing Session, based on recommendations made at PICES IX. It was re-iterated that young scientists should be the recipients of all but the Science Board award. At PICES X, Committee Chairmen would identify potential "young scientists". It was decided inappropriate to provide an award for the 2001 Science Board Symposium because all invited speakers were distinguished scientists. Science Board decided on a procedure to determine a Best Poster Award. Each Committee would nominate one poster for consideration, and the Science Board would meet informally at the "wine and cheese" Poster Session to determine the winner.

It was re-iterated that the Closing Session would consist of Best Presentation Awards to be given by each Committee, the Science Board Chairman describing the theme and possible Topic Sessions for the next Annual Meeting, and a few final words of thanks from the PICES Chairman. Committee Chairmen were reminded to provide a list of Topic Sessions approved by their Committee to the Science Board Chairman before the Closing Session. As was agreed last year, the Science Board Chairman will give an overview of the PICES meeting at the end of the Science Board Symposium to inform the audience about the structure of the meeting.

Election of Science Board, TCODE and CCCC Chairmen (Agenda Item 4)

Chairmanships of the Science Board, TCODE and CCCC were becoming vacant after the Tenth Annual Meeting. Inter-sessionally, the Science Board conducted elections, and Dr. R. Ian Perry (Canada) was elected as the Science Board Chairman, Dr. Igor I. Shevchenko (Russia) as the TCODE Chairman, and Dr. Harold P. Batchelder (U.S.A.) as the CCCC-IP Co-Chairman. Science Board members welcomed the new Chairmen and thanked outgoing Chairmen for their service. Ms. Livingston reminded the outgoing Chairmen that their obligations were fulfilled only after the Committee reports were finalized. Formal elections for BIO and POC Chairmen were held at Committee meetings at PICES X.

Publication Committee (Agenda Item 5)

The Science Board discussed, via e-mail, the ongoing need for a PICES Publication Committee, and noted that this Committee had not conducted substantive business in the last two years. Therefore, it was recommended to disband this Committee until an ongoing need for such a Committee had been shown. The Science Board agreed to review the need for a

Publication Committee and a PICES scientific journal in two years.

Governing Council decisions and Science Board recommendations from PICES IX (Agenda Item 6)

Science Board reviewed and accepted the status report on decisions and recommendations from PICES IX, which were of relevance to the Science Board (*SB Endnote 3*).

Other business (Agenda Item 11)

PICES Anniversary publication

The Science Board noted that the efforts of the Executive Secretary in publishing the *Historical Atlas of the North Pacific Ocean* provided a significant contribution to the celebration of the PICES tenth anniversary.

Documenting PICES science

The Science Board discussed a proposal to enhance the documentation of PICES science (*SB Endnote 11*), and noted that revisions of the Chairman's Handbook would be required to implement the proposal. The Science Board Chairman volunteered to draft those changes for consideration by the Science Board at its next meeting. Science Board members agreed that Session Convenors should be asked to summarize Topic Session discussions that occurred at PICES X even though the changes to the Chairman's Handbook had not yet been adopted.

CCCC Integration Plan

Dr. Makoto Kashiwai, CCCC Co-Chairman, brought a proposal for a CCCC Integration Plan to the attention of the Science Board, so that Committees could discuss the proposal in light of its links to the North Pacific Ecosystem Status Report.

October 12, 2001

Ms. Livingston opened the second Science Board meeting and welcomed the newly elected Chairmen of POC (Dr. Kuh Kim, Korea) and BIO (Dr. Vladimir I. Radchenko, Russia).

The Science Board extended thanks to outgoing Chairmen, Mr. Robin Brown (TCODE), Dr. Tsutomu Ikeda (BIO), Dr. Vyacheslav B. Lobanov (POC), and David W. Welch (CCCC-IP) for their much appreciated service to PICES.

Items with financial implications for 2002 and beyond (Agenda Item 7)

Science Board discussed agenda items with financial implications to PICES. The following lists of inter-sessional meetings, travel support requests, publications, and related items were endorsed by the Science Board and forwarded to the Governing Council for approval.

Inter-sessional workshops, Working Group and CCCC Program meetings (Agenda Item 7a)

Meetings to be convened in 2001-2002:

- An IRI/IPRC/PICES *Pacific climate – fisheries* Workshop, Honolulu, Hawaii, U.S.A., November 14-17, 2001 (*SB Endnote 4*);
- A MODEL/REX Workshop to build a NPZF (nutrient-phytoplankton-zooplankton-fish) version of the PICES NEMURO model, Nemuro/Yokohama, Japan, January 24-27, 2002 (postponed from 2001);
- A 2-day inter-sessional meeting of WG 14 on *Effective sampling of micronekton*, Honolulu, Hawaii, U.S.A., February 2002;
- A 2-3 day MONITOR Workshop on *Voluntary observing systems*, Corvallis, Oregon, or Seattle, Washington, U.S.A., February 2002;
- A NPAFC/NASCO/IBSFC/PICES/ICES Symposium on *Causes of marine mortality of salmon in the North Pacific and North Atlantic Oceans and in the Baltic Sea*, Vancouver, Canada, March 14-15, 2002 (*SB Endnote 5*);
- An International Symposium (co-sponsored by CIBNOR and CICIMAR) on *North Pacific transitional areas*, La Paz, Mexico, April 24-26, 2002 (*SB Endnote 6*);
- A *North Pacific Ecosystem Status Report* Workshop, Sidney, B.C., Canada, June 2002;
- A 3-day inter-sessional meeting of WG 16 on *Climate change and fisheries*

management, Qingdao, People's Republic of China, June 2002;

- A PICES/CREAMS/ONR workshop on *Recent progress in studies of physical processes and impact to the Japan/East Sea ecosystem*, in Seoul, Korea, July-August 2002;
- A 2-day TCODE/GOOS Workshop in conjunction with NEAR-GOOS meeting, Vladivostok, Russia, August 2002;
- A 1-day CCCC Integration Workshop, Qingdao, People's Republic of China, October 2002 (in conjunction with PICES XI);
- MONITOR Workshops on *Requirements and methods for early detection of ocean change (½-day)* and *Monitoring from moored and drifting buoys (½-day)*, Qingdao, People's Republic of China, October 2002 (in conjunction with PICES XI);
- A 1-day TCODE/GLOBEC Workshop on *Inventory and archival of GLOBEC data* Qingdao, People's Republic of China, October 2002 (in conjunction with PICES XI);
- A 2-day WG 15 on *Ecology of harmful algal blooms in the North Pacific* Workshop on *Development of common data standards for HAB data*, October 2002 (just prior to PICES XI);
- A 1-day PICES/CLIVAR Workshop on *Implementation of CLIVAR in the North Pacific* in 2002 (postponed from 2001);
- A ½-day meeting of WG 14 on *Effective sampling of micronekton*, Qingdao, People's Republic of China, October 2002, prior to PICES XI;
- A ½-day meeting of the *Marine Birds and Mammals* Advisory Panel, Qingdao, People's Republic of China, October 2002, prior to PICES XI;
- A PICES/JGOFS Symposium on *Biogeochemical cycles in the North Pacific*, Nagoya, Japan, December 4-6, 2002.

Meetings planned or anticipated for 2003:

- An ICES/PICES/GLOBEC International Symposium on *Role of zooplankton in global ecosystem dynamics: comparative*

studies from the world oceans, in Gijón, Spain, May 20-23, 2003;

- The Third PICES Workshop on *Okhotsk Sea and adjacent areas*, Vladivostok, Russia, June 2003;
- CCCC Workshops just prior to PICES XII, Seoul, Republic of Korea, October 2003 (e.g. a BASS/MODEL/REX Workshop on *Approaches for linking basin scale models*);
- A WG 14 Workshop just prior to PICES XII, Seoul, Republic of Korea, October 2003;
- A *North Pacific Ecosystem Status Report* Workshop, Sidney, B.C., Canada, November 2003.

Proposed publications (Agenda Item 7b)

PICES Scientific Report Series:

- a. 2002 (approved in 2000):
 - Proceedings of the 2001 CCCC Task Team Workshops;
 - Proceedings of PICES X Anniversary Symposium;
 - Final report of WG 13 on *CO₂ in the North Pacific*;
 - National reports on *Harmful algal blooms in the PICES region of the North Pacific* (Orlova/Taylor/Trainer).
- b. 2003:
 - Proceedings of the 2002 CCCC Task Teams Workshops;
 - North Pacific Ecosystem Status Report (*SB Endnote 7*);
 - Final report of WG 16 on *Climate change and fisheries management*.
- c. 2004:
 - Final report of WG 14 on *Effective sampling of micronekton*;
 - Final report of WG 15 on *Ecology of harmful algal blooms in the North Pacific*.

Special issues of primary journal:

- a. 2002 (approved in 2000):
 - *Journal of Oceanography* – selected papers from the 2001 POC/BIO/FIS Topic Session on *The physics and biology of eddies, meanders and rings in the PICES region*;

- *Marine Environmental Research* - papers that resulted from the 1999 MEQ Practical Workshop.
- *Progress in Oceanography* – selected papers from the 2001 CCCC Topic Session on *A decade of variability in the physical and biological components of the Bering Sea ecosystem: 1991-2000*;
- *Progress in Oceanography* - selected papers from 2001 BIO Topic Session on *Plankton size-classes, functional groups, and ecosystem dynamics: Causes and consequences*;
- *Canadian Journal of Fisheries & Aquatic Sciences* – selected papers from the 2001 FIS Topic Session on *Migration of key ecological species in the North Pacific Ocean*.

b. 2003 and beyond:

- *Progress in Oceanography* - selected papers from the PICES/CREAMS/ONR workshop on *Recent progress in studies of physical processes and impact to the Japan/East Sea ecosystem*;
- *Journal of Oceanography* – invited papers from the 2002 PICES/JGOFS Symposium *Biogeochemical cycles in the North Pacific*;
- *Fisheries Oceanography* – selected contributions to the GLOBEC Open Science Meeting;
- *Progress in Oceanography* – selected papers from the 2002 POC/FIS Topic Session on *Detection of regime shifts in physics and biology*;
- *Marine Ecology Progress Series* – selected papers from the BIO/FIS/CCCC Topic Session on *Responses of upper trophic level predators to variations in prey availability: An examination of trophic level linkages*.

Other:

- CD-ROM Oceanographic Atlas of Okhotsk Sea, Bering Sea, and Japan/East Sea.

The Science Board endorsed the publishing of the above items. The Science Board Chairman

noted the request by the Secretariat that material from the CCCC Workshops should be submitted to the Secretariat **by February 1, 2002**, to be published in the PICES Scientific Report Series in a timely fashion. Committee Chairmen were reminded to identify Guest Editors and to develop a publication timetable for papers destined for primary journals.

Travel support requests (Agenda Item 7c)

- a. The CCCC Program requested support for 8 people to attend inter-sessional meetings: MODEL/REX Workshop (3), MONITOR Workshop on *Voluntary observing systems* (3), ICES Cod and Climate Change meeting (1), MONITOR Workshop just prior to PICES XI (1);
- b. One invited speaker per Scientific Committee and Program for Topic Sessions at PICES XI. Additional requests for travel support were: BIO (3), FIS (2), POC (1), and SB (4) for the SB Symposium;
- c. Co-sponsorship of the Symposium on *North Pacific transitional areas* in La Paz, Mexico, should take the form of travel support;
- d. Other travel requests included: inter-sessional meetings of WG 14 (2) and WG 16 (2-3), *North Pacific Ecosystem Status Report* meeting (2-3), and WG 15 Workshop (1);
- e. Trust Fund travel requests were: 1-2 scientists to attend the PICES/CREAMS Workshop in Seoul, Republic of Korea; Russian scientists to attend the meeting of the Marine Birds and Mammals Advisory Panel (1) and the WG 15 meeting (1) at PICES XI;
- f. Science Board Chairman to attend the IABO/IABSO Assembly and SCOR Meetings (October 24-31, 2001, Mar del Plata, Argentina); the Ninth NPAFC Annual Meeting (November 1-2, 2001, Victoria, Canada); the IRI/IPRC/PICES Climate-Fisheries Workshop (November 14-17, 2001, Honolulu, Hawaii, U.S.A.); the joint NPAFC/NASCO/IBSFC/PICES/ICES Symposium on *Causes of marine mortality of salmon in the North Pacific and North Atlantic Oceans and in the Baltic Sea*

(March 14-15, 2002, Vancouver, Canada); the International Symposium on *North Pacific transitional areas* (April 23-25, 2002, La Paz, Mexico); the ICES Annual Conference and Centenary (October 1-8, 2002, Copenhagen, Denmark); and the Second GLOBEC Open Science Meeting (October 13-18, 2002, Qingdao, People's Republic of China).

Science Board reviewed the above requests and suggested the following criteria be used by the Science Board Chairman to assist in prioritizing the requests:

1. Consider whether the proposed activity will result in useful products for PICES;
2. Balance travel support requests among PICES Committees and Programs; and
3. Use PICES funds to bring people to PICES rather than for sending them to other meetings.

Future of Working Groups and Scientific Programs (Agenda Item 8c)

Science Board recommended that:

- Study Group on *North Pacific Ecosystem Status Report and Regional Analysis Centers (RACs)* complete its task in December 2001, and be disbanded (See *SB Endnote 7* for Study Group report and recommendations);
- WG 12 on *Crabs and shrimps* and WG 13 on *CO₂ in the North Pacific* should complete their final reports and be disbanded;
- WG 14 on *Effective sampling of micronekton* continue its activities and produce a final report in 2003;
- WG 15 on *Ecology of harmful algal blooms in the North Pacific* continue for at least 1 more year; and
- WG 16 on *Climate change, shifts in fish production and fisheries management* convene its final meeting at PICES XI, and prepare a final report for publication in 2003.

New PICES groups (Agenda Item 8d)

POC proposed that PICES form two new groups:

- WG on *Biogeochemical data integration and synthesis*, under POC (see *GC Appendix C* for the terms of reference). TCODE will identify a member to sit on the Working Group.
- *North Pacific Data Buoy* Advisory Panel, co-sponsored collaboratively by POC and the WMO-IOC Data Buoy Co-operation Panel (see *GC Appendix C* for the terms of reference). Members considered that it fit well with the PICES definition of an Advisory Panel and PICES' aims with regard to data exchange and technology improvement.

The Science Board recommended that these two new groups be approved.

FIS will be proposing a Working Group in 2002 on *Ecosystem considerations in fisheries management* (see *FIS Endnote 4*).

PICES re-structuring

Science Board discussed the possibility of creating entities that operate in ways that were not consistent with the original structure outlined in the PICES Convention: virtual technical committees, persistent working groups, etc. It was agreed to review the current organizational structure of PICES and to develop a discussion document on that structure and its ability to serve PICES over the next decade by September 15, 2002.

Relations with other programs and organizations (Agenda Item 8f)

The Standing List of International Organizations and Programs facilitates PICES interactions with other programs and indicates high priority organizations/programs to which PICES should regularly send a representative (See *SB Endnote 8* for the revised list).

PICES Committees and Programs identified the following organizations/programs as having the highest priority:

BIO: ICES (WGZE), GLOBEC, GOOS
MEQ: ICES, AMAP, SCOR/GEOHAB, APEC MRC WG

FIS: AFS Program on Climate and Aquatic Resources, IPCC, ICES, NPAFC, GLOBEC/SPACC
POC: CLIVAR, Argo, CREAMS, WESTPAC, NEAR-GOOS, JGOFS, GOOS, GCOS, WMO/DBCP;
CCCC: GLOBEC, GOOS, NEAR-GOOS, GEM, SAHFOS, CoML, ICES-GLOBEC, NPAFC, IATTC, IPHC, ISC;
TCODE: GLOBEC, GOOS, JGOFS

Considering that ICES and PICES have a Memorandum of Understanding on scientific cooperation, and in light of recent informal communications between some representatives of ICES, ICES/CCC and PICES/CCCC, Science Board recommended that PICES develop potential areas of cooperation based on specific proposals for interaction between ICES and PICES.

PICES XI Annual Meeting (Agenda Item 9)

The following list of Topic Sessions to be convened at PICES XI was endorsed:

Science Board Symposium (³/₄-day)
Technological advancements in marine scientific research (Committee Chairmen will serve as Convenors) (*SB Endnote 9*)

BIO/MEQ Topic Session (1-day)
Food web dynamics in marginal seas: Natural cycles and human impacts (Convenors: Paul J. Harrison (Canada) and Korean/Chinese MEQ convenor)

BIO/FIS/CCCC Topic Session (½ day)
Responses of upper trophic level predators to variability in prey availability: An examination of trophic linkages (Potential Convenors: Hidehiro Kato (Japan), Elizabeth A. Logerwell (U.S.A.), Gordon A. McFarlane (Canada), and Sun Song (China))

BIO/POC/FIS Topic Session (½ day)
Topographic influences on micronekton and interactions with higher trophic levels (Potential Convenors: Richard D. Brodeur (U.S.A.), John

F. Dower (Canada), David L. Musgrave (U.S.A.), and Orio Yamamura (Japan))

FIS Topic Session (½ day)
Physical forcing of walleye pollock life history and population structure: New approaches to identifying critical temporal and spatial scales (Potential Convenors: Martin Dorn (U.S.A.), Suam Kim (Korea), Akira Nishimura (Japan), and Mikhail Stepanenko (Russia))

FIS Topic Session (½-day)
Comparison of the productivity of marginal seas with emphasis on the western Pacific (Japan/East Sea, Yellow Sea, and East China Sea) with a focus on small pelagics (Potential Convenors: Vladimir Belyaev (Russia), Suam Kim (Korea), Hideaki Nakata (Japan), and Qi-Sheng Tang (China))

MEQ Topic Session (½-day)
Advances in harmful algal bloom monitoring and mitigation (Potential Convenors: TBA (China) and Vera Trainer (U.S.A.))

MEQ Topic Session (½-day)
Effects of environmental changes on harmful algal bloom events (Potential Convenors: Edward Black (Canada) and Ming Jiang Zhou (China));

POC/FIS Topic Session (1-day)
The nature, detection, and impact of regime shifts in physics and biology (Potential Convenors: Jacquelynne R. King (Canada) and James E. Overland (U.S.A.))

POC Paper Session (½-1 day)

TCODE Electronic Poster Session
Data systems to support technological advances in observing systems (Potential Convenors: Vicky Lingwood (U.S.A.), Igor Shevchenko (Russia), and Ling Tong (China))

CCCC Poster Session
Recent results of GLOBEC and GLOBEC-like studies (Convenors: Harold P. Batchelder (U.S.A.) and Makoto Kashiwai (Japan))

Theme for PICES XII (Agenda Item 10)

Science Board discussed the proposed theme of *Human dimensions of ecosystem variability* for PICES XII, and accepted the theme with two suggested changes: “*What are the effects of ecosystem change on human societies?*” and “*What are the implications of fisheries management decisions affecting the nature and functions of ecosystems?*” (SB Endnote 10).

High priority scientific projects (Agenda Item 8e)

At the request of the PICES Fund-Raising Committee, Science Board developed written descriptions of three high priority scientific projects that could be furthered through fundraising efforts:

1. North Pacific Ecosystem Status Report;
2. International Zooplankton Monitoring Program; and
3. Workshop/Symposium series on *Effect of human and climate interactions on fish production*.

Science Board noted that the last project was already encompassed within the current North Pacific Ecosystem Status Report.

Some Science Board members felt that the schedule for preparing the pilot North Pacific Ecosystem Status Report was too ambitious, and that the target for preparing the first draft should be delayed until fall 2002. Even with the revised schedule, the production of the pilot report will require that member nations provide the support and data necessary to its completion.

Science Board discussed two letters from the Executive Director of the *Exxon Valdez Oil Spill Trustee Council* that described (1) EVOS' wishes to support and to contribute financially to the development of the North Pacific Ecosystem Status Report; (2) their views on the editorial process; and (3) their desire to include *human dimensions* as a subject of the report. Science Board agreed to include additional external review of the North Pacific Ecosystem Status Report, when desirable, but noted that at present, the EVOS suggestion to include the subject of

human dimensions was beyond the scope of the report.

Strategic Plans (Agenda Item 8a)

The Science Board Strategic Plan was updated to include last year's activities and the list of possible future themes for PICES Annual Meetings.

The Scientific Committees of PICES were challenged by the incoming Science Board Chairman, Dr. R. Ian Perry, to consider their scientific vision for the upcoming half decade, to be prepared to discuss and develop this inter-sessionally for consideration at PICES XI.

Other business (Agenda Item 11)

Science Board discussed a proposal to provide better documentation of PICES science and agreed to the procedures outlined in *SB Endnote 11*. Revisions to the Chairman's Handbook were proposed to describe the responsibilities of session convenors to document Topic Sessions and their discussions, and to ensure that convenors are aware of these duties before the Annual Meeting.

Science Board accepted the proposed changes to the Chairmen's Handbook that included revisions to convenors' duties and a formal definition of a PICES Study Group (*SB Endnote 12*).

Science Board noted the complete lack of attendance by all Committee members from the People's Republic of China. MEQ and POC participation was the worst in many years. CCCC noted that many members were absent.

MODEL Task Team requested access to the PICES webserver to post and access working documents related to MODEL activity. Science Board recommended that the Secretariat explore options to provide access to all Committees and Task Teams as necessary.

Science Board discussed the availability and accessibility for seabird data, following a request from MBMAP, and suggested that this should be

deferred until after the pilot North Pacific Ecosystem Status Report was finished and data issues were identified more generally.

Proposed membership changes - CCCC Program (Agenda Item 8c)

- Dr. Harold P. Batchelder (U.S.A.) will replace Dr. David W. Welch (Canada) as CCCC Co-Chairman;
- More time is needed to locate a replacement for Dr. Andrei Krovvin (Russia) as BASS Co-Chairman. Dr. Gordon A. McFarlane (Canada) will continue for one additional year as BASS Co-Chairman to provide continuity;
- Dr. Francisco E. Werner (U.S.A.) will replace Dr. Michio J. Kishi (Japan) as MODEL Co-Chairman; it was also recommended that when Dr. Bernard A. Megrey (U.S.A.) completes his term, that a new Co-Chairman be appointed from the western Pacific;
- Dr. Thomas C. Wainwright (U.S.A.) will replace Ms. Patricia Livingston (U.S.A.) on MODEL Task Team;
- Dr. William T. Peterson (U.S.A.) will remain as REX Co-Chairman for one additional year (through PICES XI), and Dr. Yoshiro Watanabe (Japan) will replace Dr. Tokimasa Kobayashi (Japan) as the other Co-Chairman of REX.

Best Poster Award

Ms. Sonia Hamilton (U.S.A.) was awarded the Best Poster Award for her electronic poster presentation entitled “The Bering Sea and North Pacific Ocean Theme Page: A web-based ocean information system”.

Science Board Symposium

The Science Board Symposium theme was *Ten years of PICES science: Decadal-scale scientific progress and prognosis for a regime shift in scientific approach* (PICES X Anniversary Special Symposium). Co-Convenors: Patricia Livingston (SB), Tsutomu Ikeda (BIO), Douglas E. Hay (FIS), John E.

Stein (MEQ), Susan E. Allen (POC), Thomas C. Royer (TCODE) and David W. Welch (CCCC).

This Science Board Symposium was a celebration and reflection on the first ten years of scientific progress by PICES. In-depth overviews of the scientific activities and results of PICES Committees and Scientific Programs were given by invited speakers on topics related to climate variability, ocean impacts at lower and top trophic levels, factors influencing fish stock fluctuations, human activities and marine environmental quality, and North Pacific ecosystem structure and function. These overviews consolidated our current information and framed new and better questions for future investigation.

A look to the future of marine science in the North Pacific was provided through thought-provoking invited talks on various topics, which ranged from the future of ocean sensing technologies and our predictive capabilities to human perspectives on ocean uses; broadening our scientific disciplinary focus; and improving the links between marine science and policy. Contributed perspectives on marine ecosystem science and new directions for PICES were welcomed in the accompanying poster session. Invited talks will be compiled into an issue of the PICES Scientific Report Series.

Invited talks

Paul H. LeBlond, Y. Nagata and V.B. Lobanov
The Physical Oceanography and Climate Committee: The first decade

D.E. Harrison and N. Smith
Ocean observing systems and prediction: The next ten years

Tsutomu Ikeda and P.A. Wheeler
Ocean impacts from the bottom of the food web to the top: Biological Oceanography Committee retrospective

Timothy R. Parsons
Future needs for biological oceanographic studies in the Pacific Ocean

Richard F. Addison, J.E. Stein, A.V. Tkalin, J.-Y. Zhou and U. Varanasi
PICES Marine Environmental Quality Committee: The first ten years

Robie W. MacDonald, B. Morton, and R.F. Addison

Marine environmental issues in the Northwest Pacific: trends and consequences

Douglas E. Hay, R.J. Beamish, G. Boehlert, V.I. Radchenko, Q.-S. Tang, T. Wada, D.W. Ware, and C.-I. Zhang

Ten years of PICES: An introspective, retrospective, critical and constructive review of fisheries science in PICES

Steven A. Murawski

Ecosystem considerations in fisheries management: The future of science and policy

R. Ian Perry and A.B. Hollowed

A review of the PICES Climate Change and Carrying Capacity Program

Berrien Moore III

Marine science-IGBP: Partners in the 21st century

Posters:

Daniel L. Bottom, J.D. Rodgers and X. Augerot
A classification of salmon biogeographic zones of the North Pacific Ocean

Svetlana V. Davidova and Y.I. Zuenko
Changes of the mass of subtropical fishes in the Japan Sea under the match/mismatch control

Charles W. Fowler and S.M. McCluskey
Sustainability, ecosystems and fishery management

Salvador Lluch-Cota, Y.M. Tourre, W.B. White, A. Bakun, D. Lluch-Belda, J. Alheit, D.B. Lluch-Cota, C. Colin and F.P. Chavez
Exploring mechanisms underlying global climate and fisheries variations in the PICES region

SB Endnote 1

Participation List

Members:

Patricia Livingston (Chairman, Science Board)
Tsutomu Ikeda (Chairman, BIO)
Douglas E. Hay (Chairman, FIS)
John E. Stein (Chairman, MEQ)
Vyacheslav B. Lobanov (Chairman, POC)
Makoto Kashiwai (Co-Chairman, CCCC)
David W. Welch (Co-Chairman, CCCC)
Robin M. Brown (Chairman, TCODE)

Invited Observers:

Harold P. Batchelder (Co-Chairman-elect, CCCC)
Kuh Kim (Chairman-elect, POC)
R. Ian Perry (Chairman-elect, Science Board)
Vladimir I. Radchenko (Chairman-elect, BIO)
Igor I. Shevchenko (Chairman-elect, TCODE)
Stewart (Skip) M. McKinnell (Assistant Executive Secretary, PICES, rapporteur)

SB Endnote 2

Science Board Agenda

October 7 and 12, 2001

October 7, 2001 (12:30 – 13:30)

1. Welcome and opening Remarks
2. Adoption of agenda
3. Review of procedures for Best Presentation Awards and Closing Session
4. Election of new SB, TCODE and CCCC Chairmen
5. Publication Committee – proposal for disbanding

6. Completion of PICES IX decisions and recommendations by Governing Council and Science Board

October 12, 2001 (08:30 – 17:30)

7. Reports of the Science Board Chairman, Scientific, Technical, and Standing Committees, CCCC IP, Working and Study Groups with regard to items having financial implications for 2001 and beyond

- a. Inter-sessional meetings proposed for 2002 and beyond (workshops, Working Group and CCCC Program meetings)
 - b. Proposed publications (PICES Scientific Report series and primary journals) for 2002 and beyond
 - c. Travel support requests
 - d. Other items with financial implications
8. Reports of Science Board Chairman, Scientific and Technical Committees, CCCC IP, Working and Study Groups with regard to other items
- a. Brief summary report of the groups' activities in the past year (including progress with regard to Strategic Plan items)
 - b. Proposed titles for Topic Sessions and Symposia for the next Annual Meeting
 - c. Proposed future status of existing groups (changes in duration of active groups, membership, terms of reference)
 - d. Proposed list of any future groups along with terms of reference and a list of potential members
- e. High priority scientific projects
 - i. North Pacific Ecosystem Status Report
 - ii. International Zooplankton Monitoring Program for the North Pacific
 - iii. Workshop/Symposium series on *Effect of human and climate interactions on fish production*
 - f. Relations with other international programs/organizations
 - g. Proposed recommendations and draft text on other items that would be included in the Science Board Report to Council (e.g., recommendations for letters of support to various research efforts)
 - h. Other items
9. PICES XI Annual Meeting
- a. PICES XI theme and Science Board Symposium
 - b. Topic Sessions
10. Selection of PICES XII theme
11. Other business
12. Adoption of the Science Board Report and recommendations to Council

SB Endnote 3

Progress on PICES IX decisions and Science Board recommendations

00/S/1: Intersessional meetings, Working Group and CCCC Program workshops

The following inter-sessional meetings were convened:

- NPAFC/PICES Workshop on *Factors affecting production of juvenile salmon: Comparative studies on juvenile salmon ecology between east and west North Pacific Ocean*, October 29, 2000, Tokyo, Japan (hosted by NPAFC);
- WG 13/TCODE Test Workshop on *CO₂ data integration*, January 20-22, 2001, Sidney, B.C., Canada (hosted by the Institute of Ocean Sciences, Fisheries and Oceans Canada);
- BASS/MODEL Workshop on *Quantification of a food web model for the eastern Pacific gyre*, March 5-6, 2001, Honolulu, Hawaii, U.S.A. (hosted by the NOAA/NMFS Laboratory);
- Workshop on *Impact of climate variability on observation and prediction of ecosystem and biodiversity changes in the North Pacific*, March 7-9, 2001, Honolulu, Hawaii, U.S.A. (co-sponsored by the Census of Marine Life and the International Pacific Research Center, and hosted by IPRC);
- *Third International Argo Science Team Meeting*, March 20-22, 2001, Sidney, B.C., Canada (co-sponsored by PICES and hosted by the Institute of Ocean Sciences, Fisheries and Oceans Canada);
- WG 13/TCODE Implementation Workshop on *CO₂ Data Integration*, July 31-August 2, 2001, Tokyo, Japan (co-sponsored by the National Institute for Environmental Studies and Marine Information Research Center, and hosted by JODC);
- NEAR-GOOS *Forecasting Workshop* in conjunction with the Fifth IOC/WESTPAC

Scientific Symposium, August 27-31, 2001, Seoul, Korea (co-sponsored by PICES);

- Series of CCCC Task Team Workshops: BASS Workshop to *Review ecosystem models for the subarctic Pacific*; REX/MODEL Workshop to *Implement improvements and include higher trophic levels to the PICES NEMURO Model*; and REX Workshop on *Temporal variations in size-at-age for fish species in coastal areas around the Pacific Rim*, October 5-6, 2001; Victoria, B.C., Canada (in conjunction with PICES X);
- WG 15 Workshop on *Taxonomy and identification of HAB species*, October 5-6, 2001, Vancouver, B.C., Canada (hosted by the University of British Columbia);
- PICES/CLIVAR Workshop on *Implementation of CLIVAR in the North Pacific*, October 5, 2001, Victoria, Canada, postponed because of delay in formation of the Pacific Panel of CLIVAR;
- TCODE Workshop on *Data management methods and issues for the 21st century*, October 5, 2001, Victoria, Canada, cancelled due to travel problems for some of the organizers and participants;
- MODEL Workshop on *Improvements to the PICES NEMURO Model*, summer 2001, Nemuro, Japan, postponed to January 2002.

00/S/2: Travel support

Full or partial travel support was provided to:

- One keynote speaker for the PICES X Opening Session and five invited speakers for the Science Board Anniversary Symposium;
- Twenty invited speakers (paid by PICES and co-sponsoring programs and organizations) for various Topic Sessions at PICES X;
- Eight scientists to attend various CCCC Task Team Workshops;
- Up to two Co-Chairmen of Working Groups to meet inter-sessionally. Funding was not requested;
- Three scientists to attend the WG 13/TCODE Test Workshop on *CO₂ Data Integration*;
- One scientist to attend the NEAR-GOOS Forecasting Workshop on behalf of the

CCCC/MONITOR Task Team. The Assistant Executive Secretary to discuss PICES emerging plans to develop a North Pacific Ecosystem Status Report;

- Two scientists to attend the 3rd International Argo Science Team meeting.

00/S/3: Publications

- The final report of WG 8 on *Practical Assessment Methodology* was published as PICES Scientific Report No. 16. The annual report of the CCCC Program activities for 2000/2001 was published as PICES Scientific Report No. 17. Proceedings of the PICES/CoML/IPRC Workshop was published as PICES Scientific Report No. 18;
- Thirty-two papers from the *Beyond El Niño Conference* held in La Jolla, U.S.A., in March 2000, were published in “Climate variability and marine ecosystem impacts, from the tropics to the Arctic”, a special issue of *Progress in Oceanography*, Vol. 49 (1-4);
- The final report of WG 12 on *Crabs and Shrimps and Results from the 1999 and 2000 PICES method inter-comparisons for carbonate parameters* will be published in the PICES Scientific Report Series by the end of 2001;
- *Historical Atlas of the North Pacific Ocean: Maps of discovery and scientific exploration 1500-2000*, was published for the Tenth Anniversary of PICES.

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

- WG 12 on *Crabs and shrimps* completed collation of results. After approval by FIS, the WG 12 final report will be published in late 2001, and the Working Group will disband;
- WG 13 had its final meeting at PICES X and will be disbanded after completion of its final report in spring 2002;
- WG 14 had a meeting just prior to PICES X, and will continue for 2002 and produce a report in 2003;

- WG 15 had a meeting just prior to PICES X, and will continue for at least one more year;
- WG 16 had a meeting just prior to PICES X, and will have a final meeting at PICES XI and produce report for publication in 2003.

00/S/5: New PICES groups

- The Study Group on *Ecosystem Status Report and RACs* completed its work and submitted its report to Science Board for consideration.

00/S/6: Relations with other organizations and programs

- NPAFC hosted a joint NPAFC/PICES Workshop on *Factors affecting production of juvenile salmon: Comparative studies on juvenile salmon ecology between east and west North Pacific Ocean*, in Tokyo, in October 2000.
- The Science Board Chairman, MEQ Chairman, and the Assistant Executive Secretary met with representatives from the GIWA Secretariat in December 2000, in Seattle, to discuss areas of mutual interest and potential cooperation between PICES and GIWA;

- Dr. Yoshioki Oozeki (MONITOR Task Team), Dr. Hyung-Tack Huh (PICES Chairman), Dr. Vyacheslav Lobanov (POC Chairman) and Dr. Skip McKinnell (Secretariat) attended the IOC/WESTPAC NEAR-GOOS Forecasting Workshop in Seoul, Korea, in August 2001;
- GLOBEC (Open Science Conference) and PICES (Eleventh Annual Meeting) are harmonizing their plans to meet in Qingdao, People's Republic of China, in October 2002;
- ICES, PICES and GLOBEC will organize and co-sponsor a major symposium on *Comparative Zooplankton Ecology* from May 20-23, 2003, in Gijón, Spain. PICES designed and produced the poster and first announcement for distribution to ICES and PICES before their Annual Meetings;
- PICES Chairman attended the IOC General Assembly in Paris, France, in July 2001;
- CCCC Program invited NPAFC researchers to participate in the REX Workshop at PICES X;
- A PICES delegation participated in a meeting with directors of various Mexican marine science institutions in La Paz, Mexico, May 3-5, 2001, to discuss future Mexican participation in PICES.

SB Endnote 4

Proposal for PICES co-sponsorship of IRI/IPRC Workshop

Title: IRI/IPRC/PICES *Pacific climate – fisheries* Workshop

Date/Location: November 14-17, 2001, East/West Center, Honolulu, Hawaii, U.S.A.

Justification: The International Research Institute for Climate Prediction (IRI), which is located at Lamont Doherty Earth Observatory, Columbia University, is interested in expanding its role in applications to climate-fisheries issues. This workshop is the first in a series of planned events to provide IRI a useful entry into this new area of applications of its widely recognized climatic expertise. One of the main workshop goals is to investigate the feasibility and potential advantages of attempting to extend

some of the insights and results that have been accumulating, with respect to small pelagic fishes and fisheries to large pelagics and also to marine resources and fisheries of island ecosystems.

Description: Observations and modeling have led to recent advances in understanding the influence of climate variability on ocean processes, and to the recognition of inherent variability of marine biological communities on various temporal and spatial scales. In parallel, there have been dramatic improvements in our ability to conduct biological sampling and genetic identification. But with few exceptions, there has been little progress in bringing together results from these related frontiers in a comprehensive framework, that can consistently

rationalize the accumulating store of information and experience, so as to provide a reliable basis for sorting out the various effects of fishing, natural climatic variability, and chronic alterations of environment and/or habitat. The result is that “sustainable fisheries” remains a theoretical ideal rather than a realistic operational goal. One of the major obstacles involves the large component of climate-associated variance, that commonly acts to obscure the results of human actions and to defeat attempts at prediction. Ways need to be found to more effectively involve climate scientists in interdisciplinary research collaborations. Furthermore, the time may have arrived to begin to question some of the conventional dogmas, postulates and working assumptions that have guided, but also constrained, fishery science through the twentieth century. (These may include, among others, (1) long-term stationarity of basic fish--environment linkages, (2) absolute uniqueness of specific regional situations, (3) a predominant effect of trophic interactions, (4) an expectation that a climate-driven stock oscillation should have essentially the same period as the climatic variation driving it, etc.).

Climate variability (on a variety of scales) can provide us with “experiments” to probe the real mechanistic “workings” of these ecological-biological-social systems, for which ordinary experimental controls are usually impractical (sustainable fisheries development requiring a more accurate understanding of those basic internal mechanisms). Further, a better

understanding of the interdependent spatial and temporal scales of “openness” or “closedness” of the resource systems on the ecological side (i.e., on population exchanges and changes in spatial pattern dynamics), may provide opportunities to explore additional options on the -management side.

Workshop foci:

1. To identify alternative conceptual frameworks and ideas that may better support fruitful interdisciplinary collaborations (particularly between climate scientists and fishery scientists);
2. To explore associated implications for innovative fisheries management approaches;
3. To consider potential applications of the comparative method as a means for effective multilateral research on climate, ecosystems and fisheries issues in the Pacific basin;
4. To explore in this regard, the potential utility of certain newly available technologies and methodologies.

Relationship to PICES goals: The workshop goals align with PICES needs with regard to refining/enhancing contributions to our proposed North Pacific Ecosystem Status Report and to further our collaboration with international organizations examining climate change and ecosystem responses.

Form of co-sponsorship: Participation of PICES Science Board Chairman.

SB Endnote 5

Proposal for PICES co-sponsorship of a NPAFC/NASCO/IBSFC/ICES/PICES Symposium

Title: *The causes of marine mortality of salmon in the North Pacific and North Atlantic Oceans and in the Baltic Sea*

Date/Location: March 14-15, 2002, Vancouver, British Columbia, Canada

Cosponsors: North Pacific Anadromous Fish Commission (NPAFC), North Atlantic Salmon Conservation Organization (NASCO), International Baltic Sea Fishery Commission (IBSFC),

International Council for the Exploration of the Sea (ICES), and North Pacific Marine Science Organization (PICES)

Description: The focus of the meeting is to review new information on the causes behind recent changes in the ocean mortality of salmon. Its objective is to compare the increased marine mortality of salmon stocks observed in recent years in the North Pacific and North Atlantic Oceans and in the Baltic Sea. It is hoped that

the comparison of this information will lead to a better understanding of the mechanisms that have caused increased marine mortality in recent years, identify research priorities, and stimulate increased cooperation and exchange of information in the future.

Provisional Agenda (Final Agenda will be available in the Second Announcement):

1. Introduction (Opening remarks)
2. Status of salmon stocks and fisheries
3. Possible factors associated with increased marine mortality
 - a. Climate
 - b. Fish farming, enhancement, and ocean ranching
 - c. Predation and competition

- d. Migration, post smolt survival, and ocean rearing areas
- e. Ecosystem changes and effects on salmon
- f. Freshwater life-history
- g. Other relevant factors

Speakers: The speakers will be nominated by NPAFC, NASCO, IBSFC, and other international organizations and selected by the organizing committee. The names of the speakers will be announced in the Second (Final) Announcement.

PICES involvement: PICES involvement will consist of nominating one or two members to the organizing committee for the symposium.

SB Endnote 6

Proposal for a PICES-sponsored Symposium on *North Pacific transitional areas*

Title: An international symposium on *North Pacific transitional areas*

zones and in the open Pacific, as well as the role of mixing in the productivity of the ecosystems.

Date/Location: April 24-26, 2002, La Paz, BCS, México

Convenors: Daniel Lluch-Belda (Mexico), Jeffrey J. Polovina (U.S.A.), William T. Peterson (U.S.A.), and Takashige Sugimoto (Japan)

Co-sponsors: North Pacific Marine Science Organization (PICES), Centro de Investigaciones Biológicas del Noroeste, SC (CIBNOR), and Centro Interdisciplinario de Ciencias Marinas del IPN (CICIMAR)

Symposium structure:

Session 1: Western Pacific transitional areas
Session 2: Central Pacific transitional areas
Session 3: Eastern Pacific transitional areas

Description: Convergence and divergence regions along the continental margins (e.g. Oyashio/Kuroshio) and in the open Pacific Ocean (e.g. Subarctic/Subtropic Transition Zone) create very dynamic and interesting places for physics and biology. Seasonal and interannual variability in the location of major fronts that delineate different water masses, can alter many aspects of regional ecosystems including everything from the local climate to the species composition at any particular location. The stronger the gradient, the more dramatic the change. This symposium will examine recent advances in understanding the dynamics of marine ecosystems in high gradient regions of the Asian and North American coastal

Each session will include 2 to 3 invited lectures (to be defined by the end of October 2001), a series of contributed lectures, a poster session, and each day a 1-hour plenary discussion based on topics identified by selected rapporteurs (who will provide main conclusions).

Key dates and notes

- First announcement will be published by late October;
- Abstract submission deadline will be set by early February;
- To accomplish peer-reviewed publication of selected papers by mid-2003, manuscripts should be submitted before summer 2002.

Local contact: Salvador E. Lluch-Cota

SB Endnote 7

Study Group Report: North Pacific Ecosystem Status Report and Regional Analysis Center

Membership

Patricia Livingston (Science Board Chairman), David L. Mackas (BIO), Chang-Ik Zhang (FIS), Richard F. Addison (MEQ), Vyacheslav B. Lobanov (POC), Bernard A. Megrey (TCODE), Makoto Kashiwai (CCCC), Warren S. Wooster (GOOS representative), Stewart M. McKinnell (PICES Secretariat)

Background

A Study Group was established at PICES IX to consider the needs for implementation of the North Pacific Ecosystem Status Report and Regional Analysis Center. This group should report its findings to PICES X. Suggested items for consideration would be to:

- Devise a detailed outline for the first Status Report
- Identify key contributors (individuals and organizations)
- Identify existing data sources for inclusion
- Examine the process and implications of how those data would be synthesized into the report
- Estimate the production, printing, and distribution costs of the document
- Examine the function, products and positive and negative implications of RACs

Accomplishments

Report outline

Based on an examination of a variety of status reports, a draft outline (attached) was prepared. The outline was reviewed by the Study Group and passed through Committees for review and revision.

Key contributors and data sources

A workshop was held March 7-9, 2001, in Honolulu, Hawaii, U.S.A., co-sponsored by PICES, Sloan Foundation's Census of Marine Life program, and the International Pacific Research Center. The primary purpose of the workshop was to identify data sources and key

contributors to the ecosystem status report. The workshop had over 60 participants, who identified many sources and types of time series data for inclusion into the report, along with existing diagnostic and predictive models presently in use. It was recommended that information about the data sources identified at the workshop be put into a North Pacific ecosystem meta-database to aid future efforts to compile the status report. The workshop report will be used to identify the individuals, organizations, and data sources for the first ecosystem status report. Refer to the workshop report (PICES Scientific Report No. 18) for details of the participants and data sources.

Process and implications of report synthesis

There was general recognition at the PICES/CoML/IPRC Workshop that the initial North Pacific Ecosystem Status Report would take the form of a "quick" report that might omit substantial interpretation of the observed trends. Some components of the report, such as physical oceanography and atmospheric information, might be updated more frequently (e.g., quarterly) than other components, such as fish stock assessments that might be carried out on an annual time frame. Thus, one possibility is that the report might be updated quarterly on the PICES web site for some components, but less frequently for other components. There would also need to be further work on future reports to decide how to provide objective interpretation and expert opinion of the trends to decision-makers. This is an area that is actively being worked on in some PICES countries and by ICES. We may need to have future workshops to refine a set of quantitative ecosystem change indicators and methods for synthesizing and interpreting results of these change indicators for a target audience that might consist of the interested public and policy- and decision-makers in PICES countries.

Two main ways to produce the report were suggested: (i) a report produced solely by PICES or (ii) using co-lead authors representing a geographic balance to author report sections

(similar to the IPCC process). Involving other international organizations in the assessment process was also recommended. The CCCC Program was mentioned as a possible lead group for report production.

Based on discussions at the workshop, the following process for report synthesis is proposed:

1. Compilation of a list of coordinating lead authors and contributing authors for each major section of the report by December 31, 2001. Co-lead authors for each major section would be drawn from each side of the North Pacific. This list of authors would be drawn from members of PICES Committees and Programs and key international organizations, and would represent a balance of scientific discipline and geographic representation;
2. Preparation of draft report by June 30, 2002;
3. Report review by the Science Board by August 15, 2002;
4. Preparation of final draft report by September 15, 2002;
5. Acceptance of report by the Science Board in October 2002;
6. Publication of report in 2003.

Printing and distribution costs

The PICES Secretariat estimated the costs of printing and distributing the report to be CDN\$ 10,000.

Production

In order to enhance regional contributions of the reports in the future, we suggest asking appropriate member nations to host 2-day regional workshops for a region of interest. Possible regions to cover are:

- Bohai/Yellow/East China Sea hosted by Korea or China
- Japan/East/Okhotsk Sea hosted by Japan, Korea, or Russia
- Oyashio/Kuroshio hosted by Japan or Russia
- Bering Sea hosted by U.S.A. or Russia
- Alaska Current hosted by Canada (British Columbia) or U.S.A. (Alaska)
- California Current hosted by U.S.A. or (Mexico)

- Pacific Basin/Transition Zone - hosted by U.S.A. (Hawaii, Honolulu)

Each workshop would have 1 day of presentations from about a dozen or so contributors (each with a written report) on the historical and current information about ecosystem status with everything from physics to whales, and 1 day to develop the key ideas for the current status, add limited interpretation for this year, and sketch out a summary report. In addition, there could be contributions by IPHC, NPAFC and IATTC on single species or taxonomic groups. The costs to the Secretariat for production would be participation of the project leader(s) in regional meetings. It would be about 7 workshops for report development in hopefully less than 7 trips as some of these could be combined if the dates were coordinated. We also want to consider a meeting of a "Review Committee" at the Secretariat. This would be 4-5 scientists (ecosystem specialists, not national representatives) at a cost of about \$8K. So, if we assume that the costs of production are only travel for one Project Leader and the Review Committee meeting, the total for production should be approximately CDN\$ 23,000.

Function, products, and implications of Regional Analysis Centers

The concept of Regional Analysis Centers was discussed at the PICES/CoML/IPRC workshop. The concept of Regional Analysis Centers (RACs) was discussed as a way for PICES to have a central focus for supporting the work involved in producing an Ecosystem Status Report. Participants mentioned two different ways of viewing these centers. One type of RAC would be an actual geographic location and building with staff assigned to it. The other view was that it could be thought of as a virtual where a variety of organizations and individuals contribute to the work even though they may not be housed in a common center.

The "Space Environment Database and Analysis Tools" project was mentioned as another model. This project is carried out by the Central Laboratory of the Research Councils of the United Kingdom, which provides the building space for outside researchers plus its own

technical experts to work on joining and interpreting data. Funding for this Central Laboratory is provided mainly by the other Research Councils of the U.K.

Finally, participants thought that although the RAC concept would draw heavily upon a distributed network of scientists to contribute to the work, some central support would still be required to accomplish the work. Initially, one person in the PICES Secretariat might be sufficient to organize and coordinate the work involved in producing an Ecosystem Status Report.

The Study Group recommends that PICES should initially implement the “virtual” RAC concept of a distributed network of scientists contributing to the work, with initially one or two people in the PICES Secretariat to organize and coordinate the work involved in producing an Ecosystem Status Report. These people might be provided through secondment of experienced scientists from PICES member nations through the proposed PICES Visiting Scientist Program.

Proposed outline

1. Introduction and scope
2. Status of monitoring and databases
3. Hydrography and climate
 - a. Large scale features and indices (e.g., ENSO, PDO, NPI indices)
 - b. Regional features and indices (e.g., regional seas ice cover indices, annual air and ocean temperature anomalies, salinity anomalies, precipitation anomalies)

4. Chemistry
 - a. CO₂ concentration
 - b. Dissolved oxygen levels
 - c. Nutrient levels and sources
 - d. Trace metals and organic pollutants: sources and levels in seawater, sediments and biota
5. Biology
 - a. Phytoplankton (chlorophyll, production, species composition and distribution, size composition, timing of spring bloom, harmful algal bloom number and extent)
 - b. Zooplankton (biomass, species composition and distribution, size composition, production)
 - c. Non-commercial benthos (biomass, species composition and distribution, size composition, summarized by feeding type)
 - d. Fish, shellfish and squid {catch - including bycatch and discards), mariculture activities, biomass, recruitment, species composition and distribution, size or age composition, mean weight at age, stock condition (number of stocks that are increasing, decreasing, stable), rates of fish disease occurrence, diet, larval and egg stage abundance and distribution}
 - e. Marine mammals and birds (number, reproductive performance, diet)
 - f. Number and type of non-native species
6. Ecosystem analysis and predictions
 - a. Status of modeling
 - b. Identification of human and natural processes influencing ecosystem change (diagnostic models)
 - c. Prediction of future ecosystem status (prognostic models)
7. Outstanding scientific questions and recommendations

SB Endnote 8

Revised Standing List of International Organizations and Programs

PICES is expanding its relationships with international scientific organizations and programs around the world. At the same time, there is the need to improve integration, coordination, and communication with regional scientific research efforts in the North Pacific that are aligned with the PICES ecosystem research focus. These regional programs may involve several PICES member countries and cover international areas of high ecological importance.

Annually, the Science Board examines and revises the Standing List of International Organizations and Programs. Additionally, it selects a subset of organizations and programs that are considered to have the highest priority (marked by *) for PICES with respect to scientific cooperation and facilitation in the coming year. This list will be used in part to assist the Executive Secretary and Science Board in decisions regarding travel to meetings of other international organizations.

ACIA	Arctic Climate Impact Assessment Program (ACIA of AMAP)
AFS CAR*	American Fisheries Society Program on Climate and Aquatic Resources
AMAP*	Arctic Monitoring and Assessment Program (AMAP)
APEC*	Marine Resources Conservation WG (MRC), Asia Pacific Economic Cooperation
APFIC	Asia-Pacific Fisheries Commission
Argo*	International Program for deployment of profiling floats (linked with GOOS)
CLIVAR*	Climate Variability and Predictability Program
CoML*	Census of Marine Life
CREAMS*	Circulation Research in the East Asian Marginal Seas
DBCP	Data Buoy Cooperation Panel
ECOR	Engineering Committee on Oceanic Resources
FAO	Food and Agriculture Organization
GCOS*	Global Climate Observing System
GEM*	Gulf of Alaska Ecosystem Monitoring and Research Program
GESAMP	Group of Experts on Scientific Aspects of Marine Pollution
GIPME	Global Investigation of Pollution in the Marine Environment
GLOBEC*	Global Ocean Ecosystem Dynamics
GOOS*	Global Ocean Observing System
IASC	International Arctic Science Committee
IATTC*	Inter-American Tropical Tuna Commission
ICES*	International Council for the Exploration of the Sea
ICSU	International Council of Scientific Unions
IGBP*	International Geosphere-Biosphere Program
IGOSS	Integrated Global Ocean Services System
IOC*	Intergovernmental Oceanographic Commission
IODE	International Oceanographic Data and Information Exchange
IPCC*	International Panel on Climate Change
IPHC*	International Pacific Halibut Commission
ISCTNP*	Interim Scientific Committee for Tuna and Tuna-like Species in the North Pacific
JGOFS*	Joint Global Ocean Flux Study
NAFO	North Atlantic Fisheries Organization
NASCO	North Atlantic Salmon Conservation Organization
NEAR-GOOS*	North East Asian Regional GOOS
NOWPAP	Northwest Pacific Action Plan
NPAFC*	North Pacific Anadromous Fish Commission
PORSEC	Pacific Ocean Remote Sensing Conference
PSC	Pacific Salmon Commission

PSG	Pacific Seabird Group
SAHFOS*	Sir Alister Hardy Foundation for Ocean Science
SCOPE	Scientific Committee on Problems of the Environment
SCOR*	Scientific Committee on Oceanic Research
SOLAS	Surface Ocean Low Atmosphere Study
SPC	South Pacific Commission
SPREP	South Pacific Regional Environmental Program
START	South Asian Regional Committee for the System for Analysis, Research and Training
UNEP	United Nations Environment Program
WCRP	World Climate Research Program
WESTPAC*	Cooperative Study of the Western Pacific, IOC Sub Committee for the Western Pacific
WMO	World Meteorological Organization
WOCE	World Ocean Circulation Experiment

2001 additions to list are Data Buoy Cooperation Panel and Surface Ocean Low Atmosphere Study.

SB Endnote 9

Science Board Symposium – PICES XI

Title: *Technological advances in marine scientific research*

Co-convenors: R. Ian Perry (SB), Vladimir I. Radchenko (BIO), Douglas E. Hay (FIS), John E. Stein (MEQ), Kuh Kim (POC), Igor I. Shevchenko (TCODE), and Makoto Kashiwai and Harold P. Batchelder (CCCC)

This symposium will explore the potential for new technologies to advance the scientific activities conducted by PICES researchers. Technological advancements are occurring in a variety of research areas. For example, microscopic laser ablation techniques, nuclear DNA techniques, “smart” tags, and acoustical tags for fish and mammals, are all improving stock identifications. For population assessments there are new developments in laser technology that can scan the upper 20-30m from aircraft and satellite technology and associated data analyses. Plankton studies are advancing

through bio-optical recording and analysis systems. There are continuing developments in acoustical tools, such as towed vehicles with upward- and downward-looking transducers, and long-range sidescan SONAR. Some of the most rapid advancements are occurring in physical oceanography with the development of “smart” drifters. New chemical techniques are also being developed to assess stable organochlorines, with implications for marine mammals and human health. This emphasis on technological advancements also includes new developments in information technology, numerical modeling, data processing and visualization. Invited talks on some of the most recent advancements in the scientific areas of physical/chemical oceanography and climate, biological oceanography, fisheries science, marine environmental quality, and ecosystem dynamics will be presented. Contributed talks and posters on this topic are also encouraged.

SB Endnote 10

PICES XII theme: Human dimensions of ecosystem variability

Marine ecosystems are dynamic in terms of climate and physical features, and the species that inhabit them. Human relationships and interactions with the ocean have been long-

lasting and changing in their nature and strength over the years. Even though natural variability in marine systems is thought to be large, separating natural climate variability from

human-induced sources is an ongoing challenge. Physical oceanography, chemistry and climate indices are being examined in relationship to living marine resource production. *What is our understanding of how these indicators are influenced by global climate warming?* Various human activities have the effect either of removing, altering or adding nutrients or species to areas. *How do these changes in nutrient composition and amounts, fishery removals or discards, habitat alteration, introduction of*

nonnative species or pollutants change ecosystem structure and production? What are the effects of ecosystem change on human societies? What are the implications of fisheries management decisions affecting the nature and functions of ecosystems? This theme seeks to highlight the many ways that humans interact with marine ecosystems and the scientific efforts to quantify and predict human impacts on such dynamic systems.

SB Endnote 11

Proposal to enhance documentation of PICES scientific sessions

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

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

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

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

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

PICES has struggled to enhance the discussions at our Topic Sessions, and if we ask convenors to document the sessions and the discussions, we may see a better organization of Topic Sessions in this regard. We would also have a more organized way to provide scientific recommendations for action to the parent Committee(s) that sponsored the session.

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

SB Endnote 12

Chairmen's Handbook Revisions 2001

- Add sentence at beginning of Publication Committee description that says:

This Committee was disbanded in 2001, and will be re-activated (possibly with changes in the terms of reference) when an ongoing need for such a Committee is demonstrated.

- Add Item B in the definition of Other Groups as follows:

B. Study Groups

The purpose of a Study Group is to analyze the scientific, policy, and/or financial implications of a proposal made by Science Board or Governing Council, and provide recommendations for Science Board or Council on the proposal. This type of group would typically be formed for a period of one-year and would provide a report of their findings and recommendations to Science Board or Council prior to the Annual Meeting after it was formed.

- Revise "Section IX - Scientific Sessions" item 2 "Responsibility of Convenors" as follows:

Add sentence at the end of paragraph (a): The program for each Topic Session should allow sufficient time for discussion of each paper and discussion time at the end of the session to consolidate scientific opinion regarding scientific findings, gaps, and recommendations for future work.

Add new paragraph (d): Convenors are responsible for preparing a report on their Topic Session that summarizes the purpose of the session (taken from the original session description), the information presented at the session (both oral and poster presentations), and the scientific findings, gaps, and recommendations for future work. The Secretariat will provide the final list of paper titles and authors to be included in the report. The report will be provided to the main sponsoring Committee and will be included in the Committee's final report to the Science Board.

REPORT OF BIOLOGICAL OCEANOGRAPHY COMMITTEE



The meeting of the Biological Oceanography Committee was held from 1330-1730 hours on October 10, 2001. The Chairman, Dr. Tsutomu Ikeda, called the meeting to order and welcomed new members Dr. Michio Kishi (replacing Prof. Takashige Sugimoto), Dr. Michael Dagg (replacing Prof. Michael M. Mullin), Dr. Richard D. Brodeur (replacing Dr. Linda Jones), Dr. Angelica Peña (replacing Dr. Kenneth L. Denman) (see *BIO Endnote 1* for attendance). The Committee reviewed the agenda and it was adopted as presented (*BIO Endnote 2*).

Business arising from last year's meeting (Agenda Item 3)

- a. Dr. Ikeda briefly informed the Committee on the process by which Prof. Michael M. Mullin was selected to be the first recipient of the Wooster Award.
- b. Additional members were added to WG 14 on Effective Sampling of Micronekton: Drs. Kouichi Kawaguchi (Japan), Michael Seki (U.S.A.), Orio Yamamura (Japan) and Won Duk Yoon (Korea). Dr. Yamamura will serve as Co-Chairman of the Working Group (see Agenda item 5 for details).
- c. The Publication Committee was disbanded because it had been inactive. It was thought to be important, however, and would be considered for revival within the next two years.
- d. BIO discussed the proposal on documenting PICES science (*SB Endnote 11*). Session conveners were requested to leave some time and to stimulate a discussion at the end of each session, to assure some synthesis of the session content occurred and was reported.

Election of BIO Chairman (Agenda Item 4)

This item actually was skipped until after Agenda Item 5 was completed, at which time Dr. Ikeda reviewed the PICES rules for election of the Committee Chairman. Drs. Vladimir I.

Radchenko (Russia), David L. Mackas and Paul J. Harrison (Canada) were nominated. Dr. Mackas declined because of time constraints – he is Co-Chairman of the MONITOR Task Team. Dr. Harrison withdrew because of his pending move to Hong Kong. Dr. Radchenko was elected as the new BIO Chairman with the term of his appointment to begin immediately after the close of this year's PICES Annual Meeting. The Committee thanked Dr. Ikeda for his leadership and valuable contribution to BIO activities over the years.

Progress report of Working Group 14 on Effective Sampling of Micronekton (Agenda Item 5)

The Co-Chairman of WG 14, Dr. Brodeur, gave a presentation summarizing the activities of the Working Group (*BIO Endnote 3*). He described the terms of reference for WG 14, and presented an overview of the meeting held on October 7, 2001. He then presented an outline of the report that would be written, indicating that it would be a large report because many aspects of micronekton sampling were being addressed.

The Working Group proposed to hold an inter-session meeting at the AGU/ASLO Ocean Sciences Meeting in Hawaii, in February 2002. The Committee noted that a formal request to the Science Board should be placed right away if this inter-session meeting was to be held. The target date for completion of the WG report is 2003. There was also discussion of a PICES-supported cruise to compare different micronekton sampling devices.

Dr. Brodeur proposed a joint session for the next PICES meeting tentatively titled "*Importance of shallow topography (shelf and seamounts) in concentrating micronekton and facilitating transfer to higher trophic levels*". Later, the Committee learned that the POC had approved this topic as a joint BIO/POC session, although

they requested a slight modification to the title to broaden the topic to include zooplankton. The revised title and abstract appears in *BIO Endnote 4*. FIS also discussed supporting this topic jointly, and this was approved.

Report of the Advisory Panel on *Marine Birds and Mammals* (Agenda Item 6)

The Panel Co-Chairman, Dr. Hidehiro Kato, distributed a written report to BIO members (*BIO Endnote 5*), and an overview of this handout was presented by Co-Chairman, Dr. Douglas F. Bertram. Dr. Bertram first summarized the terms of reference for the Advisory Panel on *Marine Birds and Mammals* (*MBMAP Endnote 2*), and then reviewed the recommendations on workshops and topic sessions that were discussed and agreed upon by the Panel at the meeting held on October 7, 2001 (*MBMAP Endnotes 4 and 5*). It was especially stressed that MBMAP term of reference #2, stated that member nations should be encouraged to catalogue their data on birds and mammals so it could be available to the scientific community. MBMAP advised that this should be given highest priority, and asked BIO to pass this concern to the Science Board.

It was noted that the names of the MBMAP members that would be attending the various Task Team (BASS, MONITOR, etc.) meetings be provided to the Chairmen of those groups so that MBMAP could be included in all appropriate communications.

ICES/PICES/GLOBEC Comparative Zooplankton Ecology Symposium (Agenda Item 7)

Dr. Ikeda reported that the joint Comparative Zooplankton Ecology Symposium, which PICES proposed at the ICES/PICES Zooplankton Ecology Workshop (Hawaii, March 2000), was approved by ICES and GLOBEC, and was now scheduled to be held at the Congress Center, in Gijón, Spain, during the period of May 20-23, 2003 (*BIO Endnote 6*). Drs. William T. Peterson and Tsutomu Ikeda are representing PICES in the Organizing Committee, and Dr. Ikeda is also a Co-

Convenor. The main goal of the symposium is to define the 'state of the art' of zooplankton ecology and to determine key research initiatives to be pursued in the 21st century. The sponsorship of the meeting reflects the global nature and global importance of the role of zooplankton in food chain dynamics and in biochemical cycles. The first announcement of the Symposium was widely distributed in October 2001, and is available on the websites of all the sponsoring organizations.

Review of BIO Strategic Plan (Agenda item 8)

The Chairman circulated an outline of goals for the BIO Strategic Plan and current activities toward these goals:

1. *Improve cooperation with other PICES components:* BIO accomplished this by sponsoring joint topic sessions with CCCC, POC, MBM Advisory Panel at PICES IX, and with POC, FIS and MEQ at PICES X.

2. *Enhance interaction with relevant international organizations:* BIO is organizing a joint ICES/PICES/GLOBEC Symposium on Comparative Zooplankton Ecology in May 2003 (see Agenda Item 7 above).

3. *Increase involvement in specific recognized scientific issues:* BIO participated in a recent workshop on *Designing the iron fertilization experiment in the Subarctic Pacific*, held in October 2000, in Tsukuba, Japan, and in its field experiments in 2001.

4. *Improve attendance and participation in PICES Committees, Task Teams and Working Groups:* This remains a problem area. This item elicited some discussion from the Committee, and it was recommended that this problem be brought again before the Science Board for discussion at that level.

5. *Improve inter-sessional work via e-mail leading to shorter and more efficient Annual Meetings:* This has only been partly successful. More e-mail does not necessarily lead to shorter meetings.

6. *Increase travel support for student participation at Annual Meetings*: PICES is providing partial support for some students and young scientists, but BIO was unable to document extent or details. This item was discussed at some length and several suggestions were put forward, including:

- PICES must make sure that the conveners of sessions can identify student abstracts;
- a competition for “best student paper” be held in association with BIO sessions, and the selected student be funded to attend the meeting and present his/her paper; and
- the conveners of BIO sessions should include at least 2 young investigators for oral presentations.

No clear action was taken on these issues.

An additional activity for the BIO Strategic Plan was suggested, that, essentially, BIO should develop a list of scientific topics or themes that could be considered by the community for future BIO sessions. BIO should also try to provide more scientific direction and vision to the community. At the end of the meeting, Dr. George L. Hunt also made a specific suggestion, which was an extension of his recent work on ecosystem controls in the southeastern Bering Sea (this work was presented in the CCCC Topic Session at PICES X). The Committee generally seemed to agree that the additional goal of providing scientific topics or themes of relevance to BIO should be incorporated into the Strategic Plan.

Proposals for the Topic Sessions at PICES XI (Agenda item 9)

Several topics were listed as potential themes for Topic Sessions at PICES XI:

1. Influence of climatic and pollution on ecosystem dynamics on marginal seas
2. Responses of marine organisms to iron input in the North Pacific
3. Modeling of fish recruitment, especially pelagic fish

Topic 1 was considered not sufficiently relevant to be presented next year. Topic 2 was

considered to be too early because the analyses from the field work would not be done in time to allow fully developed papers to be prepared. Topic 3 was not considered a BIO theme. Additional topics were proposed and discussed. It was concluded that the following three requests would be sent forward to the Science Board:

1. A full-day BIO Topic Session on *Food-web dynamics in marginal seas – natural cycles and human impacts*, proposed by Dr. Paul J. Harrison, who would be a co-convenor of this session (*BIO Endnote 7*);
2. A half-day BIO/FIS Topic Session on *Responses of upper trophic level predators to variability in prey availability: An examination of trophic level linkages* proposed by MBMAP; recommended convenors: Elizabeth A. Logerwell (U.S.A.), Hidehiro Kato (Japan) and Gordon A. McFarlane (Canada);
3. A half-day BIO/POC/FIS Topic Session on *Importance of shallow topography (shelf and seamounts) in concentrating oceanic micronekton and facilitating transfer to higher trophic levels*, proposed by WG 14; recommended convenors: Orio Yamamura (Japan), John F. Dower (Canada) and Richard D. Brodeur (U.S.A.).

2001 BIO Best Presentation Award (Agenda Item 10)

Six young candidates were listed as potential recipients of the award for oral presentation, to be selected immediately after the last day’s BIO Topic Session. Based on the recommendations, BIO voted for Dr. Sanae Chiba (Japan) for her paper (with Dr. Toshiro Saino) entitled “Plankton community study: A better way to understand ecosystem dynamics in the Japan/East Sea”.

Other topics (Agenda Item 11)

Concern was expressed about the overlap of sessions but it was stated that it was difficult to avoid completely.

The proposed theme for PICES XII (*SB Endnote 10*) to be held in October 2003, in Seoul, Korea, was discussed briefly. It was thought that this theme of *Human dimensions of ecosystem variability* should also include impacts of ecosystem changes on humans, and thus it was recommended that an additional sentence be included into the description. The sentence, “*What are the effects of ecosystem change on human societies?*”, will be put forward to the Science Board. Also, BIO recommended that the Science Board consider changing the wording of the title so that it more clearly reflected the intent and extent of the theme.

BIO requests to Science Board

Database development

MBMAP requested that member nations develop a catalogue of marine birds and mammals data (in a metadata format) on time-series of marine birds and mammal vital rates and dietary studies.

BIO Endnote 1

Members:

Richard D. Brodeur (U.S.A.)
Michael Dagg (U.S.A., rapporteurs)
Paul J. Harrison (Canada)
Tsutomu Ikeda (Japan, Chairman)
Woong-Seo Kim (Korea)
Michio Kishi (Japan)
David L. Mackas (Canada)
Angelia Peña (Canada)
Vladimir I. Radchenko (Russia)
Atsushi Tsuda (Japan)
Patricia A. Wheeler (U.S.A.)

Workshops/meetings prior to PICES XI

1. WG 14, one-half day
2. MBMAP, one-half day

Funding for publication

Selected papers from the 2001 BIO Topic Session on *Plankton size classes, functional groups, and ecosystem dynamics: Causes and consequences*, in a special issue of *Progress in Oceanography*.

Travel support requests

1. Two to three scientists to attend the interim meeting of WG 14 on *Effective sampling of micronekton*, to be held in conjunction with the AGU/ASLO Ocean Sciences Meeting (Honolulu, February 2002);
2. One Russian scientist to attend the MBMAP meeting at PICES XI;
3. Three invited speakers for the Topic Sessions at PICES XI (BIO/POC/FIS Topic Session - 1 person and BIO/FIS Topic Session - 2 persons).

Participation List

Others:

Douglas F. Bertram (Canada, MBM)
Edward Black (Canada)
Sung Y. Hong (Korea)
George L. Hunt (U.S.A., MBM)
Hidehiro Kato (Japan, MBM)
Elizabeth A. Logerwell (U.S.A.)
Jeffrey M. Napp (USA)
Chul Park (Korea)
R. Ian Perry (Canada, SB)
Toshiro Saino (Japan, JGOFS)
William Sydeman (U.S.A., MBM)

BIO Endnote 2

BIO Meeting Agenda

1. Welcome and introduction of members
2. Approval/modification of agenda
3. Business arising from last year's meeting
4. Election of BIO Chairman
5. Progress report of WG 14 on *Effective sampling of micronekton*
6. Report of Advisory Panel on *Marine Birds and Mammals*
7. ICES/PICES/GLOBEC Comparative Zooplankton Ecology Symposium
8. Review of BIO Strategic Plan
9. Proposals for the Topic Sessions at the PICES Eleventh Annual Meeting in 2002
10. 2001 BIO Best Presentation Award
11. Other topics
12. Draft report to Science Board

BIO Endnote 3

Progress report of WG 14 on *Effective sampling of micronekton*

The meeting was convened on October 7, 2001, by Co-Chairmen, Drs. Richard D. Brodeur and Orio Yamamura.

Introduction of attendees

Richard D. Brodeur (U.S.A., Co-Chairman)
John F. Dower (Canada)
Tsutomu Ikeda (Japan, observer, BIO Chairman)
Naoki Iguchi (Japan)
Kouichi Kawaguchi (Japan)
Chul Park (Korea)
Yasunori Sakurai (Japan)
Vadim F. Savinykh (Russia)
Michael Seki (U.S.A.)
Orio Yamamura (Japan, Co-Chairman)

Review of terms of reference:

- a. Evaluate sampling gear and problems, propose improvements, and recommend collaborations among PICES countries for gear inter-comparisons;
- b. Obtain and tabulate data on consumption and biomass of micronekton, stratify by region and taxa, quantify level of confidence to guide future research priorities.

Definition of micronekton and component taxa

Adult euphausiids, mesopelagic fish, mysids, pelagic shrimps, cephalopods.

Review of past year's activities

- a. Dr. Brodeur noted problems in getting a Co-Chairman and new members added by member countries. The original request was made at the previous PICES meeting but

new Co-Chairman (Dr. Yamamura) and members (Drs. Kawaguchi, Seki and Yoon) were not officially nominated until August 2001. This substantially held back progress of the Working Group in 2001.

- b. The Co-Chairman of WG 14, Dr. Brodeur, was invited to report on member nations' research on micronekton over the last three decades at the PICES/CoML/IPRC Workshop in Honolulu, in March 2001. Summary tables were completed and published in the PICES Scientific Report No. 18.
- c. Writing of WG report and integration of previous work began.

Format and composition of WG report

- a. Emphasize dominant species but will include any information available on rare species;
- b. Apply geographic zonation (by adaptation of zones used by WG 11 on *Marine birds and mammals*);
- c. Include reproduction, early life history, and demographic rates;
- d. Discuss prey-predator relationships and rates (diet composition, amount eaten (flux), predators and predation rate, parasites and disease);
- e. Consider sampling issues (net towing, other sampling, acoustics, visual, design);
- f. Compile existing data inventory for North Pacific; and
- g. Provide recommendations for future research.

Activities for upcoming year

- a. Design survey to send to “experts” inside and outside the PICES community concerning sampling issues, problems, and suggestions. It was proposed to make the survey available through the PICES website. Summarize the results of this survey for WG report;
- b. Modify assignments of writing tasks for WG report;
- c. Discuss timetable to complete draft report by next PICES Annual Meeting;
- d. Convene inter-sessional meeting of subset of WG members in conjunction with the AGU/ASLO Ocean Sciences Meeting, in February 2002, to assimilate progress on report. Travel support is needed for 1-2 WG members to attend; and
- e. Begin discussion of new sampling gear or

methods. Discussed modification of existing gear and new technology. Discussed potential for PICES-sponsored evaluation and inter-calibration cruise.

Proposed sessions for PICES XI

WG 14 recommends convening a BIO/POC/FIS Topic Session on *Biophysical mechanisms facilitating trophic transfer of zooplankton, euphausiids and other micronekton to top predators over shallow topography such as shelf breaks, canyons and seamounts* at PICES XI in Qingdao (People’s Republic of China). This session will take advantage of the large international audience there for the International GLOBEC Open Science Meeting. WG 14 requests funding for 1 invited speaker from outside the PICES region to give a global perspective on this topic.

BIO Endnote 4

BIO/POC/FIS Topic Session for PICES XI

Title (tentative): *Importance of shallow topography (shelf and seamounts) in concentrating oceanic organisms and facilitating transfer to higher trophic levels*

Proposed Conveners: Orio Yamamura (Japan), John F. Dower and Richard D. Brodeur

Description: Dense aggregations of zooplankton and micronekton have been reported in the boundary zone between the coastal and offshore waters of various regions. These include shelf-breaks, submarine canyons and shallow banks. Aggregations have also been reported in oceanic areas such as seamounts, which display enclosed

circulation or high productivity. Reid et al. (1991) have proposed the term “mesopelagic boundary community” to describe the fauna distributed in the boundary zone in which mesopelagic waters impinge on the upper slope of a land mass. These concentrations are utilized by many marine predators, including pelagic and demersal fishes and cephalopods, marine mammals, and seabirds. The transfer of oceanic energy to shallow regions may represent an important and unappreciated flux affecting production in these systems. Studies related to biophysical mechanisms responsible for these aggregations and their trophic implications are encouraged.

BIO Endnote 5

Report of the Advisory Panel on *Marine Birds and Mammals*

The second meeting of the *Marine Bird and Mammal* Advisory Panel (MBMAP) was held from 13:30 – 18:00 hours on October 7, 2001. The meeting had two parts, a report from Panel members on progress towards recommendations from the MBMAP meeting in 2000, and a workshop led by Drs. Anne B. Hollowed and

Elizabeth A. Logerwell. The Co-Chairmen, Drs. Hidehiro Kato and Douglas F. Bertram, called the meeting to order and welcomed the participants (*MBMAP Endnote 1*). The Panel reviewed the terms of reference (*MBMAP Endnote 2*) and the draft agenda that was adopted as presented (*MBMAP Endnote 3*).

Old business

The members attended CCCC Task Team meetings and workshops (BASS, MONITOR and REX). Advisory Panel members reported on the CPR/seabird program, a pilot study of ship based auto-video monitoring of marine mammals, time-series data sets for upper trophic levels in the NEP (including a brief discussion of monitoring of key species at key locations with similar methods), bird diet data from Japan and British Columbia, and marine mammal diets in the eastern and western North Pacific.

Sessions at future Annual Meetings

The Panel proposed to meet as a group for one half-day during the next Annual Meeting to discuss the progress of team members on specific assignments. This meeting should be scheduled to minimize overlap with CCCC Task Team meetings and workshops.

MBMAP also supports the idea of a separate half-day Topic Session advanced by Drs. Hollowed and Logerwell entitled *Responses of upper trophic level predators to variation in prey availability: An examination of trophic level linkages* (see recommendations and MBMAP Endnote 4).

Requests for travel funding

MBMAP requests support for Panel members from Russia to attend the next Annual Meeting.

Relations with other organizations, programs and projects

MBMAP members were assigned to the following CCCC Task Teams:

BASS – Drs. H. Kato and T. Loughlin

MODEL - Dr. P. Ross

MONITOR – Drs. D. Bertram and W. Sydeman

REX – Dr. Y. Watanuki

Members participated in and reported on the CCCC Task Team workshops and meetings as follows:

BASS: Dr. Loughlin attended the BASS Workshop and reported that marine birds and mammals were frequently mentioned there. He agreed to provide available information as requested. BASS is proposing an inter-sessional

workshop for 2002 on *Using models to test hypothesis on affect of climate change on the North Pacific subarctic gyre system.*

MONITOR: Drs. Bertram, Sydeman and Kato attended the MONITOR Workshop and Task Team meeting. Dr. Kato presented a summary of their pilot survey of an auto-video monitoring system for cetacean sighting on the R/V *Oshoromaru*. The CPR program invited seabird and marine mammal observers to participate in its east-west transects. MONITOR would like to convene an inter-sessional workshop in 2002 to: (1) describe/define a “basic suite” of North Pacific ecosystem monitoring variables and measurements locations, and (2) review measurements technologies for platforms of opportunity.

REX: Dr. Watanuki attended the REX Workshop and reported that the group was going to summarize time-series data of size-at-age of herring (and other epipelagic fish). It was acknowledged that seabird diet could potentially contribute to that goal.

Recommendations to BIO

The following recommendations were discussed and agreed upon by the Panel:

1. National funding for MBMAP members to attend sessions should be sought.
2. Member nations should be encouraged to catalogue and present a brief review of important time-series of marine bird and mammal vital rates, dietary and contaminant studies in the PICES region (in a METADATA format), and disseminate this information to the PICES community to provide evidence for upper trophic-level responses to oceanographic, climate and anthropogenic effects. It is hoped that this task would be given the highest priority, and further, that such a catalogue can be submitted to MBMAP next year.
3. Member nations should be persuaded to support and to contribute time-series data to the Pacific Seabird Monitoring database, the Pelagic Seabird database for the North Pacific, and to foster the development of similar databases for marine mammals. Analyses of existing databases and

- opportunities for comparative examinations should also be given high priority.
4. Identification of key colonies/rookeries, species, and methods for monitoring, is vital to the development of integrated long-term monitoring and research programs to investigate the status of marine birds and mammal populations in the North Pacific.
 5. Member nations should be encouraged to compile up to date time-series information on selected key species of marine birds and mammals for contribution to a North Pacific Ecosystem Status Report.
 6. The Panel supports the continuation of the CPR program with shipboard seabird and marine mammal observers when feasible, and the development of methodology for monitoring.
 7. The Panel proposes to continue development over the next two years of a comparison of time-series of prey use by marine birds and mammals in the eastern and western North Pacific Ocean, for the purpose of detecting differences in trophic structure and timing of responses by marine birds and mammals in relation to climate change events.
 8. The Panel recognizes that there are data gaps in the final report of WG 11 on *Consumption of marine resources by marine birds and mammals in the PICES region*, and where feasible, it would be valuable to assemble information to update the report.
 9. The Panel recommends convening a Topic Session on *Responses of upper trophic level predators to variation in prey availability: An examination of trophic level linkages (MBMAP Endnote 4)*.

MBMAP Endnote 1

Participation List

Members

Douglas F. Bertram (Canada, Co-Chairman)
 Hidehiro Kato (Japan, Co-Chairman)
 Thomas Loughlin (U.S.A.)
 Peter Ross (Canada)
 William Sydeman (U.S.A.)
 Yutaka Watanuki (Japan)

Observers

Norihisa Baba (Japan)
 Evelyn Brown (U.S.A.)
 Elizabeth Connors (U.S.A.)
 Mark Hipfner (U.S.A.)
 Anne B. Hollowed (U.S.A.)

George L. Hunt (U.S.A.)
 David Hyrenbach (U.S.A.)
 Tsutoma Ikeda (Japan, BIO Chairman)
 Jaime Jahncke (Peru/U.S.A.)
 Gary Kaiser (U.S.A.)
 Kouichi Kawaguch (Japan)
 Elizabeth A. Logerwell (U.S.A.)
 Kenneth Morgan (Canada)
 Phillip Mundy (U.S.A.)
 Douglas Neilson (U.S.A.)
 Yasunori Sakurai (Japan)
 Joanna Smith (U.S.A.)
 John E. Stein (U.S.A., MEQ Chairman)
 Andrew Trites (Canada)
 Akihiko Yatsu (Japan, WG 16 Co-Chairman)

MBMAP Endnote 2

Terms of Reference

1. Provide information and scientific expertise to BIO, CCCC Program, and, when necessary, to other Scientific and Technical Committees with regard to the biology and ecological roles of marine mammals and seabirds;
2. Identify important problems, scientific questions, and knowledge gaps in assessing the roles of marine mammals and seabirds in marine ecosystems;
3. Assemble relevant information on the biology of marine mammals and seabirds and disseminate it to the PICES community through scientific reports and symposia;
4. Develop strategies to improve collaborative, interdisciplinary research with marine mammal and birds researchers and the PICES scientific community.

MBMAP Endnote 3

MBMAP Meeting Agenda

- | | | | |
|-------|--|-------|---|
| 13:30 | Opening remarks | 14:35 | Bird diet data in the eastern N. Pacific |
| 13:35 | CPR/seabird program | 14:50 | Mammal diets in the North Pacific |
| 13:50 | CPR/marine mammal program | 15:05 | Future business |
| 14:05 | Time-series data for upper trophic levels in the NEP | 15:30 | Workshop on <i>Changes in prey availability to mammals, seabirds and fish: mechanisms and effects</i> |
| 14:20 | Bird diet data in the western N. Pacific | | |

MBMAP Endnote 4

Workshop on *Changes in prey availability to mammals, seabirds and fish: Mechanisms and effects*

The workshop provided an opportunity for researchers throughout the North Pacific to share information on the dynamics of prey availability to upper trophic levels. Potential topics included: 1) mechanisms resulting in changes in prey availability, e.g., local to regional-scale environmental variability; and 2) the effects of changes in prey availability on mammals, seabirds or fish. The workshop had two goals: (1) to share insights among PICES researchers, and (2) to discuss holding a special topic session on this subject during the PICES Eleventh Annual Meeting in 2002.

The workshop included four invited overview presentations of research in the PICES region:

Andrew Trites (University of British Columbia, Canada): *Nutrition, physiology, foraging, energetics and modeling studies of Steller sea lion.*

Yutaka Watanuki (Hokkaido University, Japan): *Inter-year variations in prey and chick production among three species of seabirds breeding at Teuri Island located in the Japan Sea coast of Hokkaido.*

Vladimir I. Radchenko (Sakhalin Research Institute of Fisheries and Oceanography, Russia): *Variability of Pacific salmon feeding strategy in different environmental and food conditions during the sea life period.*

Elizabeth A. Logerwell (Alaska Fisheries Science Center, U.S.A.): *Overview of National Marine Fisheries Service research on the interactions between groundfish fisheries and the prey of Steller sea lions.*

Participants at the workshop included:
Canada: Douglas F. Bertram, Kenneth Morgan, Peter Ross, Andrew Trites
Japan: Tomomori Azumaya, Yukimasa Ishida,

Hidehiro Kato, Yasunori Sakurai, Yutaka Watanuki, Orio Yamamura, Akihiko Yatsu
Russia: Alexander Kaev, Vladimir I. Radchenko
U.S.A.: Richard D. Brodeur, Elizabeth Conners, Michael Dagg, Nancy Davis, Mark Hipfner, Anne B. Hollowed (Co-Convenor), George L.

Hunt, David Hyrenbach, Elizabeth A. Logerwell (Co-Convenor), Thomas Loughlin, Allen Macklin, Kristin Marby, Douglas Neilson, Brenda Norcross, Julia K. Parrish, Jeffrey J. Polovina, Michael Seki, Joanna Smith, John E. Stein, William Sydeman, Lucy Vlietstra, Jen Zamon

MBMAP Endnote 5

Proposed MBMAP Topic Session for PICES XI

Title: *Responses of upper trophic level predators to variation in prey availability: An examination of trophic level linkages (½-day)*

Potential Co-Convenors: Anne B. Hollowed (U.S.A.), Hidehiro Kato (Japan), Elizabeth A. Logerwell (U.S.A.), Gordon A. McFarlane (Canada) and S. Song (China)

Purpose and scope

There is increasing interest in this topic as evidence accumulates of the impact of physical forcing on prey resources over a wide range of temporal and spatial scales. Predators respond to changes in their prey resources in a variety of ways, and this is important to gauging their potential as indicators of ecosystem variability. In addition, ecosystem management strategies need to define inter-relationships of species within an ecosystem, and the roles of predation in the regulation of marine populations. Papers on the responses of seabirds, mammals, and fishes will be solicited. The responses discussed could be at the individual (behavioral, physiological), or population level (reproductive performance) using ecological or evolutionary perspectives. Dimensions of prey availability could be quantity, spatial and temporal distribution, or quality. The session will be designed to complement and expand upon other BIO Topic Sessions.

Potential invited speakers

The convenors will decide upon which specific topics and themes to be explored and will determine the most appropriate speakers. *We would like to discuss the possibility of obtaining*

PICES support for 2 invited speakers. Support will also be sought through member nations.

Publication

We are interested in the publication of selected papers from the session in a peer-reviewed international journal.

Why PICES?

The proposed topic session would complement the BIO/POC/FIS Topic Session proposed by WG 14 on *Importance of shallow topography (shelf and seamounts) in concentrating oceanic micronekton and facilitating transfer to higher trophic levels*. The session proposed by WG 14 would focus on the physical mechanisms resulting in changes in prey availability, and the session proposed here would focus on the response of predators to those changes. The Topic Sessions could be scheduled sequentially.

Given the interdisciplinary nature of PICES, the PICES Annual Meeting is an ideal forum to present research on this topic. For instance, an invited paper on the linkages between physical oceanography, prey availability and predator response would address the interests of PICES Committees, such as BIO, POC, FIS, and the CCCC Program. Papers on responses such as changes in predator diet would relate to the modeling work of the MODEL and BASS Task Teams. Papers on the effects of changes in prey quality (e.g. toxin concentrations) would be of interest to MEQ.

This session would also present a unique opportunity to meet for scientists from a broad range of fields of research: from climate change to animal physiology.

BIO Endnote 6

ICES/PICES/GLOBEC Zooplankton Symposium (First Announcement)

Time and location

The International Council for the Exploration of the Seas (ICES), the North Pacific Marine Science Organization (PICES), and the International Global Ocean Ecosystem Dynamics (GLOBEC) program announce a Zooplankton Production Symposium titled *The Role of Zooplankton in Global Ecosystem Dynamics: Comparative Studies from the World Oceans*, to be held May 20-23, 2003, at the Congress Center in Gijón, Spain.

Rationale

The main goal of the Symposium is to define the current "state of the art" of zooplankton ecology and to determine key research initiatives to be pursued in the 21st century. The sponsorship of the meeting reflects the global nature and global importance of the role of zooplankton in food chain dynamics and in biochemical cycles. A focus of this meeting will be the effect of climate variability and global climate change on zooplankton. Although local, regional and global contributions are solicited, comparative studies between ocean basins are particularly encouraged. Since many ongoing research programs within ICES and PICES as well as national and regional GLOBEC and JGOFS research efforts are now entering a mature phase, papers that have a synthesis theme are especially welcome.

Scientific Program

Following on the highly successful 2nd Zooplankton Production Symposium in Plymouth (August 1994), papers are invited in the following topic sessions. Each session is a full day unless otherwise indicated:

- Physical variability and zooplankton population dynamics
- Role of zooplankton in biogeochemical cycles
- Climate influences - what are long-term zooplankton data sets telling us?
- New approaches to zooplankton modelling (morning session)

- Progress in molecular biology (afternoon session)
- Application of new technologies (morning session)
- Comparative life histories and life cycles of zooplankton populations within and between the North Pacific and North Atlantic
- Role of microzooplankton in the sea
- Special Workshops and/or afternoon excursions in/near Gijón

Two sessions run concurrently each day and each session will include one or two keynote speakers followed by contributed papers. For all sessions, poster submissions are encouraged and ample time will be allocated for poster viewing both during the day and during evening social events.

It is expected that the meeting will result in the publication of selected papers in a special issue of an international journal to be announced. The 2nd Zooplankton Production Symposium resulted in the publication of 45 papers in the 1995 ICES Journal of Marine Science 52:1-773.

Convenors

The Symposium has three Convenors representing the three sponsors: Dr. Roger Harris (Chairman, GLOBEC Scientific Steering Committee), Dr. Tsutomu Ikeda (Chairman, PICES Biological Oceanography Committee) and Dr. Luis Valdés (Chairman, ICES Working Group on Zooplankton Ecology).

Organizing Committee

This jointly-sponsored ICES/PICES/GLOBEC Symposium will be a major event for marine ecologists in general, and planktologists in particular. The preparation and practical planning for this event will be the responsibility of the Steering/Organizing Committee:

ICES

M. Alcaraz (Spain) - miquel@icm.csic.es
P. Wiebe (U.S.A.) - pwiebe@whoi.edu

PICES

T. Ikeda (Japan) - tom@pop.fish.hokudai.ac.jp
W. Peterson (U.S.A.) - Bill.Peterson@noaa.gov

GLOBEC

R. Harris (UK) - rph@pml.ac.uk
S. Poulet (France) - poulet@sb-roscoff.fr

Local arrangements

Local arrangements in Gijón will be coordinated by Dr. Luis Valdés, with assistance from Drs. J.M. Rodrigues and Dr. J.A. Gutierrez-Morán. For further information on cultural and touristic activities in this region of northern Spain, see “www.infogijon.com”.

Abstracts

Scientific sessions will include invited and contributed papers. Contributed papers will be selected for oral or poster presentation. All interested persons must provide abstracts of their presentation to the PICES Secretariat by November 15, 2002. Please indicate at which session you would prefer the paper to be presented. Abstracts should not exceed 250 words. Please submit your abstract through the PICES Home Page at “www.pices.int”, or by e-mail as an MS Word attachment to “secretariat@pices.int”. On-line abstract submission will be activated in February 2002.

Extended abstracts

Following the requirements of annual ICES and PICES meetings, all contributors are requested to bring to the meeting summaries of both oral and poster presentations (maximum of 2,500 words plus graphs and tables). Details of the format will be provided with letters of acceptance in January 2003.

Special Workshops

We anticipate that there may be interest by others in organizing special workshops that would be convened before, during or after the Symposium, on specialized topics relating to zooplankton ecology. We ask that all interested persons contact the Organizing Committee who will then assist in coordination of planning.

Pre-Registration

A Final Announcement with detailed scientific and logistic information will be circulated in February 2002. Please pre-register with us if you are interested in this Symposium and would like to receive the Final Announcement. The on-line Pre-Registration function will be activated on the PICES Home Page “www.pices.int” on November 1, 2001.

Information

Current information about the Symposium is available on the websites of all the sponsoring organizations and will be updated periodically:

PICES www.pices.int
GLOBEC www.globec.org
ICES www.ices.dk

For other queries, please contact PICES at:

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P.O. Box 6000,
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E-mail: secretariat@pices.int
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BIO Endnote 7

Proposed BIO Topic Session in 2002

Title: *Food web dynamics in marginal seas: Natural processes and the influence of human impacts* (1-day)

Co-Convenors: Paul J. Harrison (Canada) and possible Chinese or Korean scientists

Description:

Marginal seas are often one of the most productive regions of the world's oceans. They are sites of abundant natural resources, including various fisheries. In some cases, nutrients and production are transported offshore, enriching these areas. Human impacts are evident in some areas of these marginal seas and these

anthropogenic inputs including excessive nutrients, heavy metals and various organics, have altered various foodwebs. Sometimes changes in the phytoplankton species have resulted in changes in higher trophic levels including fisheries. Excessive nutrients may lead to over production of phytoplankton which are not eaten by zooplankton, and the decomposition of the bloom at depth may result in hypoxic or anoxic bottom waters with significant effect on the benthos. We need to understand these changes and their causes, if we are to better manage our marginal seas. Papers on the influence of excessive anthropogenic inputs on food web dynamics are encouraged.

REPORT OF FISHERY SCIENCE COMMITTEE

The meeting of the Fishery Science Committee (FIS) was held from 1330-1730 hours on October 10, 2001. The Chairman, Dr. Douglas E. Hay, called the meeting to order and welcomed the participants. The meeting was attended by 9 FIS members (from 5 countries) and 13 observers (from 5 countries). All countries were represented except China (*FIS Endnote 1*). The Chairman reviewed the original agenda and noted several modifications. These included a request to FIS to discuss co-sponsorship of a Joint Meeting on *The Causes of marine mortality of salmon in the North Pacific and North Atlantic Oceans and in the Baltic Sea*, scheduled for March 14-15, 2002, in Vancouver, Canada. The agenda was approved as modified (*FIS Endnote 2*). Only agenda items with substantive comments are included in this report.

Inter-sessional meetings in 2001 (Agenda Item 3)

There were no inter-sessional meetings of FIS or its Working Groups between PICES IX and PICES X.

Travel support and cost implications (Agenda Item 4)

At PICES IX, FIS requested travel support for a member of WG 16 to attend the American Fisheries Society (AFS) meeting in Phoenix, U.S.A., but these funds were not required in 2001. In view of this, FIS suggested that an equivalent level of support be made available to WG 16 members to attend a proposed inter-sessional meeting of WG 16 in Qingdao, People's Republic of China, in June 2002.

Implementation of PICES IX decisions (Agenda Item 6)

The main decisions were to convene a Topic Session on *Migrations of key ecological species in the North Pacific Ocean* and to participate in

organizing a joint POC/BIO/FIS Topic Session on *The physics and biology of eddies, meanders and rings in the PICES region*, both of which occurred at PICES X.

Changes in the Chairmen's Handbook were scheduled to be reviewed by FIS members before PICES X, but this was not done. FIS decided that the proposed changes did not warrant extensive review at this time, and did not affect the way that the Committee operates.

Report of FIS WG 12 on Crabs and shrimps (Agenda Item 7)

A draft of the final WG 12 report was circulated to the Committee and to observers. The draft had been formatted to the style used in the PICES Scientific Report Series. The final report is 77 pages including tables, figures and appendices, as well as a description of crab and shrimp resources throughout the North Pacific. FIS was advised that the draft has several sections that require some editing prior to the completion. Mainly these are small items, but may need some communication among members before the report is sent to the Secretariat. These minor revisions will be completed under the direction of Dr. Glen Jamieson before November 15, 2001.

FIS accepted the final report, subject to the completion of the minor editorial items identified in the draft, and removal of the "recommendation section". The Committee noted the recommendations commented on changes in membership of PICES nations and suggestions about the organization of PICES Working Groups. While some of the recommendations may have merit, FIS felt they exceeded the mandate of WG 12, and therefore should not be included in the report. On the completion of the report, the FIS Chairman will forward it to the Science Board and, in an accompanying letter, make note of these

recommendations, so that they are part of the record but not part of the report. This suggestion was endorsed by Dr. Jamieson, who represented the Working Group at the FIS meeting.

FIS noted that the report is long, thorough and well done. The report represents a substantial effort by some individuals, and FIS thanks them for their contributions. In this regard, FIS recommends that at the front of the report, the authors be identified and that sources of contributed material be acknowledged.

Progress report of WG 16 on *Climate change and fisheries management* (Agenda Item 8)

The Working Group 16 met in Victoria on October 6, and substantial progress was made (*FIS Endnote 3*). WG 16 expects to produce a draft report in August 2002, following a proposed inter-sessional meeting in Qingdao, approximately in June 2002. Dr. Tokio Wada was replaced as the WG 16 Co-Chairman by Dr. Akihiko Yatsu of the National Research Institute of Fisheries Science. Dr. Yatsu is an active member of BASS and a member of a Working Group of GLOBEC-SPACC.

Co-sponsored meetings and relationships with other organizations (Agenda Item 9)

Study Group Report on *North Pacific Ecosystem Status Report and Regional Analysis Center*

A Study Group report (written by 9 authors including FIS representative Dr. Chang-Ik Zhang) was reviewed by FIS (*SB Endnote 7*). At PICES IX, FIS endorsed the concept of an Ecosystem Status Report but was not prepared to endorse the Regional Analysis Center without further information. In the review of the Study Group report, FIS again endorsed the concept of the Ecosystem Status Report, but noted some uncertainties, and commented that the report may develop in different ways in different areas. The Study Group report does not clarify who would prepare the report: the Regional Analysis Center or some other agency? The cost implications of these proposals and the specific involvement of PICES in the Ecosystem Status Report have not been well defined. It is also not

clear to FIS what the next steps will be in the development of the Ecosystem Status Report, but it was suggested that the proposed schedule appears too ambitious. On the other hand, FIS noticed that this approach is being adopted by many nations and the preparation of such a report represents an important step towards the development of an ecosystem-based management.

Joint Meeting on *Causes of marine mortality of salmon*

FIS supported PICES' co-sponsorship of this meeting (*SB Endnote 5*) with NPAFC, NASCO, IBSFC and ICES, with the understanding that there are likely to be financial commitments related to this co-sponsorship, and also recommended the inclusion of a PICES representative on the Organizing Committee. The representative to the Organizing Committee could be a member of FIS, or some other scientist within PICES with appropriate expertise. FIS noted that the agenda appeared extremely broad for a 2-day meeting, and suggests that the meeting should attempt to develop more focus. The Committee would be prepared to comment on a draft agenda.

Pacific climate/fisheries Workshop

FIS endorsed PICES' co-sponsorship for and the attendance of a Science Board member to the workshop whose major sponsors include the International Research Institute for Climate Prediction, Columbia University, and the International Pacific Research Center, University of Hawaii (*SB Endnote 4*).

Symposium on *North Pacific transitional areas*

FIS endorsed the proposal from the Science Board Chairman to participate in a Symposium on *North Pacific transitional areas*, to be convened in La Paz, Mexico, in April 2002, to encourage exchange between PICES and Mexico on issues of common interest (*SB Endnote 6*). FIS encourages fisheries topics to be included. A co-convenor from FIS could be a useful addition to the agenda.

PICES/FIS-ICES collaboration

PICES and ICES have a Memorandum of Understanding on scientific cooperation. A

suggestion was made to the Chairman of FIS for PICES to consider a joint meeting on small pelagic fishes, noting that PICES/BIO is co-organizing a joint ICES/PICES/GLOBEC Symposium on *Role of zooplankton in global ecosystem dynamics: Comparative studies from the world oceans* in Gijón, Spain, in May 2003. In principle, FIS endorsed collaborative inter-sessional workshops/symposia with ICES but felt that more time would be needed to develop potential topics. The Committee would consider the opportunities for such collaborative workshops in the future.

Other potential joint activities

FIS noted that there may be potential for BASS-NPAFC linkages and collaborations in the future.

Reports from FIS members (Agenda Item 10)

Insufficient time precluded verbal reports from FIS members.

New Working Groups (Agenda Item 11)

The Chairman pointed out that a new Working Group could be established in 2002, and that topics should be developed as proposals in the following year. FIS discussed plans to form a new Working Group in 2003 titled: *Ecosystem considerations in fisheries management*. This Working Group would reconsider the impacts of fishing and other human interventions on ecosystem structure (*FIS Endnote 4*).

Proposed FIS Topic Sessions, joint Topic Sessions and Annual Meeting themes for 2002 and 2003 (Agenda Item 12)

Comments and recommendations for PICES XII Annual Meeting theme

FIS endorsed the overall theme of *Human dimensions of ecosystem variability* for PICES XII in 2003 (*SB Endnote 10*), and suggested that four to five presentations should be focused on the implications of fisheries management decisions in sustaining the structure and function of marine ecosystems. FIS recommended that

fisheries management paradigms be re-examined in light of evidence that marine communities are reorganized after sustained shifts in ocean climate. The PICES XII theme will complement several ongoing activities within FIS, including a joint Topic Session with POC on *The nature, detection and impact of regime shifts in physics and biology* proposed for PICES XI.

Discussion and recommendations on FIS Topic Sessions and joint Topic Sessions at PICES XI

Six proposals were presented as potential FIS-sponsored sessions in Qingdao, in 2002. Each was represented by one of the potential co-convenors in a short presentation. FIS approved all of the proposals but indicated that some could be improved with more focus. In the discussion of these proposals, FIS attempted to determine if one or more could be combined, if one or more could be presented as half-day sessions (rather than full-day sessions), and if one of more could be held at PICES XII.

Two of these proposals were for FIS Topic Sessions:

Physical forcing of walleye pollock life history and population structure: New approaches to identifying critical temporal and spatial scales. Co-Convenors: Martin Dorn (U.S.A.), Akira Nishimura (Japan) and Mikhail Stepanenko (Russia).

Comparison of the productivity of marginal seas with emphasis on the western Pacific (Japan/East Sea, Yellow Sea and East China Sea) with a focus on small pelagics. Co-Convenors: Vladimir Belyaev (Russia), Suam Kim (Korea), Hideaki Nakata (Japan) and Qi-Sheng Tang (China).

After discussion with the proponents of the proposals, FIS determined that both proposals could be accommodated with a combination of oral and poster presentations if each is allotted as a half-day session. The Committee emphatically requested that the convenors encourage and select contributions that stress innovative methods.

FIS strongly supported a joint FIS/POC full-day Topic Session at PICES XI:

The nature, detection and impact of regime shifts in physics and biology. Co-Convenors: Jacquelynne R. King (Canada) and James E. Overland (U.S.A.).

It was pointed out that this topic could provide a basis for development of a new Working Group on *Ecosystem considerations in fisheries management*, in 2003 (FIS Endnote 4). It also complements the proposed PICES XII theme of *Human dimensions of ecosystem variability*.

FIS supported the proposal for a joint BIO/POC/FIS Topic Session, and hopes that it can be included in PICES XI:

The importance of biophysical coupling in concentrating marine organisms around shallow topographies. Co-Convenors: Richard D. Brodeur (U.S.A.), John F. Dower (Canada), David L. Musgrave (U.S.A.) and Orio Yamamura (Japan).

The following two proposals were described based on written notes:

A joint BIO/CCCC/FIS Topic Session on *Responses of upper trophic level predators to variation in prey availability: An examination*

of trophic level linkages. Co-Convenors: Hidehiro Kato (Japan), Elizabeth A. Logerwell (U.S.A.) and Gordon A. McFarlane (Canada).

A joint BASS/FIS Topic Session on *Role of predation in the regulation of populations (incorporation of ECOSIM into management strategies)*. Convenors: Gordon A. McFarlane (Canada) and others to be determined.

In general, FIS approved these topics, but noted that they could be combined, perhaps as a joint Topic Session for PICES XII (2003).

Other business

The new Science Board Chairman challenged FIS to develop a Strategic Plan over 2002. Such a plan would consider what FIS would like to achieve during the next few years. Although vague, this challenge was accepted, and FIS will produce the new Strategic Plan before the next PICES meeting in 2002.

Best Presentation Award

Dr. David Hyrenbach (Point Reyes Bird Observatory, U.S.A.) won the FIS Best Presentation Award for his paper entitled "Oceanographic habitats of two sympatric North Pacific albatrosses: Scale-dependent processes".

FIS Endnote 1

Participation List

Members:

Richard J. Beamish (Canada)
George Boehlert (U.S.A.)
Douglas E. Hay (Canada, Chairman)
Anne B. Hollowed (U.S.A.)
Jin-Yeong Kim (Korea)
Suam Kim (Korea)
Gordon Kruse (U.S.A.)
Victor Lapko (Russia)
Kei-ichi Mito (Japan)
Takashi Minami (Japan)
Laura Richards (Canada)

Observers:

Kenji Asano (Japan)
Vladimir Belyaev (Russia)
Bill Clark (U.S.A.)
Yukimasa Ishida (Japan)
Jacquelynne R. King (Canada)
Jae-Bong Lee (Korea)
Patricia Livingston (U.S.A.)
Gordon A. McFarlane (Canada)
David Meerburg (Canada)
Tokio Wada (Japan)
Yasunori Sakurai (Japan)
Akihiko Yatsu (Japan)
Inja Yeon (Korea)

FIS Endnote 2

FIS Meeting Agenda

1. Welcome and introduction of members
2. Approval/modification of the agenda
3. Inter-sessional meetings in 2001
4. Travels support and cost implications
5. Publications of reports and cost implications
6. Implementation of PICES IX decisions
7. Report of FIS WG 12 on *Crabs and shrimps*
8. Progress report of WG 16 on *Climate change and fisheries management*
9. Co-sponsored meetings and relations with other organizations
10. Scientific items of interest – reports from FIS members
11. New Working Groups
12. Proposals/topics/issues for the Topic Session at PICES XI (October 2002)
13. Discussion of any other arising issues
14. Draft report and FIS recommendations to Science Board

FIS Endnote 3

Interim Report of Working Group 16 on *Climate change, shifts in fish production, and fisheries management*

The Working Group meeting was convened at 13:30 on October 6, 2001, by Co-Chairman, Dr. Richard J. Beamish.

Members present:

Canada	Richard J. Beamish, James Irvine Jacquelynne R. King,
China	No representatives attending
Japan	Akihiko Yatsu
Korea	Suam Kim
Russia	No representatives attending
U.S.A.	George Boehlert, Bill Clark (for Steven R. Hare)

Observers present:

Gordon (Sandy) A. McFarlane (Canada)
R. Ian Perry (Canada)

Introduction

Dr. Beamish welcomed the participants and provided an agenda for the meeting. Dr. Boehlert agreed to serve as rapporteur. The agenda was agreed upon, and a discussion of progress of the Working Group to date was made. For a variety of reasons, WG 16 has been unable to meet the objectives set forth in its meeting at PICES IX. As a result, the workshop scheduled for PICES X was cancelled, and an important objective of this meeting was to develop a Workplan to complete the Working Group's duties within the next year. Participants

agreed on the importance of the Working Group's work, specifically, to examine potential impacts of climate change on major fisheries of the subarctic North Pacific.

WG 16 Co-Chairman

It was noted that the Co-chairman of WG 16, Dr. Tokio Wada, had changed affiliations and was no longer able to serve as a Co-Chairman or member of this Working Group. It was recommended that Dr. Yatsu replace Dr. Wada as WG 16 Co-Chairman.

Future activities of WG 16

Dr. Beamish outlined a potential approach for the coming year. He recommended a report with three principal sections, specifically:

1. Trends in fishery landings for the subarctic North Pacific.
2. Analysis of the effects of fisheries and natural variability on important stocks in the North Pacific.
3. Potential effects of greenhouse-gases based warming on the fisheries of the North Pacific.

He suggested that an inter-sessional workshop would be required to complete this work, and that the end product would be the report, which

after review by FIS and approval by PICES, could be published, potentially as a book.

The Working Group discussed the kinds of assessments of climate change and its effects that are available, including those from the International Panel on Climate Change (IPCC). National assessments are available from the US, Canada, and Japan, and all participants were urged to review some of this documentation, particularly sections related to the North Pacific and its fisheries. Regional assessments are also available for the US, and it was noted that the document for the Pacific Northwest contains especially good information relative to fisheries. There was also discussion of the recent (August 2001) symposium on *Effects of global climate change on fisheries* at the annual meeting of the American Fisheries Society. Several aspects of that meeting, and papers presented there, were appropriate to the objectives of this Working Group.

Developing a Working Group report

Discussions of the Working Group report were done by section.

Section 1: *Trends in fishery landings for the subarctic North Pacific.* Needed for this section will be a decision on the species to consider, and also a compilation of all available catch data by nation. The goal is to compile a database of reliable information. Each country should consider the most important species to be included. Dr. Beamish provided an example with Canadian data, selecting as important, those species that represented 77% of the total value of landings in 2000. The Working Group discussed criteria for national species selection as including proportion of landings value, proportion of landings biomass, and “special interest species” that are of particular concern for reasons that might be unrelated to value or biomass (for example species formerly supporting a large fishery).

A discussion of the index years for important species ensued. It was suggested that a four-year average of value and catch, from 1996 to 1999, be used. Dr. Beamish noted that three was

a nicer number than four, and the three-year period from 1997 to 1999 was accepted. Dr. Beamish also volunteered to take the lead on this section and to send the results out to national members for their comments.

Questions and discussions included the use of FAO data and discussions with FAO, whether to use biomass data if they were available from stock assessments. There was also some question as to the information required. For example, should there be a spatial component to these data? It was suggested that this would not be needed for section 1 but might be important for section 2. It was noted, however, that documentation of all data would be highly important.

Section 2: *Analysis of the effects of fisheries and natural variability on important stocks in the North Pacific.* This section of the report will document how fishing and natural variation affect the fluctuation of fish populations. This will require analyses of the data collected in section 1 for selected species, as well as any other data that might be available. The species considered will be far less comprehensive than in section 1. It was suggested that the species synopses submitted to WG 16 by the national members should be distributed as a first approach to begin the process of identifying a smaller number of species. The following were suggested as being of interest nationally:

- Canada: Sablefish, herring, hake, sockeye salmon, prawns
- China: To be determined later
- Korea: Small yellow croaker, hairtail, saury, macroalgae
- Japan: Chum salmon, jack mackerel, anchovy, chub mackerel, squid (*Todarodes*)
- Russia (tentatively recommended by Chairman): Pink salmon, pollock, Pacific cod, Kamchatka crab
- United States: Halibut, sardine, coho salmon, Pacific ocean perch, crab

Dr. Yatsu recommended that a template be developed to serve as guidance for writing up the species accounts, and the Working Group

accepted. Dr. Yatsu agreed to take on the task of circulating a draft template for comment.

Section 3: Potential effects of greenhouse-gases based warming on the fisheries of the North Pacific. The objective of this section is to develop an analysis of how North Pacific fisheries will respond to greenhouse gas-induced scenarios of climate change. The multiplicity of climate change models and scenarios were discussed, and it was agreed to focus on perhaps 2 scenarios, most likely from the IPCC, since there are no currently agreed forward looking scenarios developed in other components of PICES. The possible species lists for this work would probably be a subset of that developed in section 2, dependent upon the types of data available for those species. In addition, this section should consider guilds or assemblages of species, particularly ideas about species groups replacements that may occur under scenarios of climate change.

FIS Endnote 4

Proposed topic of a new Working Group to be established in 2003

Proposed Title: *Ecosystem considerations in fisheries management*

This Working Group will incorporate new information on decadal scale shifts in ocean condition and re-examine interpretations of fishing effects in light of this information. Working Group members will consider papers that identify how climate variability impacts the structure and function within marine ecosystems

Timetable for developing WG work product:

November 30, 2001: WG members to send list of species for Section 2 to Dr. Beamish, who will distribute it to WG. Background information on these species could also be provided.

February 28, 2002: Complete draft of Section 1 (Beamish) and distribute for comment and revision to WG members.

June 2002: Convene a 3-day inter-session workshop to present and finalize the write-ups for Section 2, and to discuss outline for Section 3 and make writing assignments. Location: suggested to be in Asia to maximize WG member participation.

August 30, 2002: Complete draft report and distribute among WG members for discussion.

October 2002: Distribute report at PICES XI; approval for publication.

and how changes in climate variability trigger community re-organization. The Working Group will examine whether fisheries management decisions alter the intensity of, and temporal/spatial pattern of, community re-organization. The proposed joint FIS/POC Topic Session at PICES XI and the Working Group formation in 2003, will have strong linkages to the proposed PICES XII theme of *Human dimensions of ecosystem variability*.

REPORT OF MARINE ENVIRONMENTAL QUALITY COMMITTEE

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The meeting of the Marine Environmental Quality Committee was held from 1330-1730 hours on October 10, 2001. The Chairman, Dr. John E. Stein, called the meeting to order and welcomed the participants (*MEQ Endnote 1*). The Committee reviewed the draft agenda and it was adopted after revision (*MEQ Endnote 2*).

Practical Workshop Data Report (Agenda Item 2)

The Vancouver Harbour Practical Workshop Data Report was published this year as PICES Scientific Report No. 16. In the near future the report will also be available on the PICES web site.

Special issue in *Marine Environmental Research* – status report (Agenda Item 3)

Dr. Richard F. Addison summarized the publication status of the Vancouver Harbour Practical Workshop proceedings. A special issue of *Marine Environmental Research* will contain seven technical papers based on the results of the workshop. In addition, there will be an introductory paper which “sets the scene” for the workshop, and an overview paper which synthesizes the general workshop results. All papers except the overview had been received; four of the technical papers had been sent out for refereeing, and the remaining three will be sent out in early November 2001. Revised manuscripts, which have addressed referees’ comments, should be in Dr. Addison’s hands by mid-January 2002, so that a final package ready for production can be sent to the journal before the end of January. There was some discussion about the “overview” paper, and Dr. Michael Watson, who had been involved with the planning of the workshop but had not participated directly in the data collection and analysis, and was therefore well placed to step back and take a broad overview of the results, agreed to lead the writing of this paper. Dr.

Watson will invite Profs. Makoto Shimizu and Ming-Jiang Zhou to collaborate in preparing this overview.

Sessions at future Annual Meetings (Agenda Item 6)

The Committee recommended convening two half-day MEQ Topic Sessions and one half-day MEQ Paper Session at the PICES Eleventh Annual Meeting in Qingdao¹:

Advances in HAB monitoring and mitigation. Conveners: Tian Yan (China) and Vera Trainer (U.S.A.)

Effect of environmental changes on harmful algal bloom events. Conveners: Edward Black (Canada) and Ming-Jiang Zhou (China)

MEQ Paper Session. Convener: John E. Stein (U.S.A.)

Contributed papers for the MEQ Paper Session are encouraged to address scientific and technological advances in the assessment of marine environmental quality. Areas of interest are in new techniques to measure levels, transport and effects of chemical contaminants; approaches to environmentally sound mariculture, and development of science based criteria for protection of marine ecosystems (e.g., criteria for contaminated sediments, thresholds for biological effects, etc.).

The following possible themes for future PICES meetings were considered:

1. Ecological interactions between mariculture and indigenous species and habitat.

¹ After the Annual Meeting, PICES learned of a conflict between the dates proposed for PICES XI (October 18-25, 2002) and those of a Tenth International Harmful Algal Blooms meeting in Florida. This required some adjustment to activities planned by MEQ in Qingdao.

2. Emerging chemicals of concern: What is the risk of biological effects?
3. Sentinel species of marine environmental quality in the North Pacific.

Progress report of WG 15 on *Ecology of harmful algal blooms in the North Pacific* (Agenda Item 4)

The WG 15 progress report was presented by Dr. Vera L. Trainer (see *MEQ Endnote 3* for details). Recommendations to MEQ are as follows:

1. More interaction and collaboration between adjacent/contiguous countries is desired. For example, *Pseudo-nitzschia* and *Heterosigma* projects between the United States and Canada could be encouraged by PICES.
2. Monitoring of both shellfish and plankton is desired by all countries. There are serious limitations and problems in comparison among countries when only a single sentinel shellfish species is used for monitoring.
3. Information needs are identified, especially from Russia, the northern B.C. coast, and northern Alaska. Monitoring projects are required in these areas that are generally lacking in HAB data.
4. Mexico should be included in the database project and has expressed a desire to do so.
5. There is the need for a basic taxonomy class, especially for young U.S. and Canadian scientists (there are taxonomy classes that are offered, but these are focused towards scientists from 3rd world countries). This basic taxonomy class could be sponsored by ICES and/or PICES (perhaps jointly).
6. Convene a 2-day workshop on *Development of common standards for HAB data* prior to PICES XI. A possibility to conduct this workshop jointly with TCODE should be pursued.

Science Board issues (Agenda Item 7)

North Pacific Ecosystem Status Report

MEQ reviewed recommendations of the Study Group on *North Pacific Ecosystem Status Report*

and *Regional Analysis Center* (*SB Endnote 7*) and supported the development of the North Pacific Ecosystem Status Report. However, the lack of Committee members from the western Pacific limited discussion of this topic.

Annual Meeting theme at PICES XII

MEQ endorsed the proposed theme of *Human dimensions of ecosystem variability* (*SB Endnote 10*).

Symposium on North Pacific transitional areas

The MEQ supports holding this symposium (*SB Endnote 6*), however, participation by MEQ members is unlikely.

Documenting PICES science

MEQ had a lengthy discussion of this proposal (*SB Endnote 11*). It was endorsed with the following considerations. Several members did not see the value in documenting the discussions from Contributed Paper Sessions, because these sessions do not have a coherent scientific theme. However, it was agreed that there is value to PICES and to the respective Committee in documenting the content, discussions and recommendations that arise from sessions that have focused scientific themes.

Requests for funding

1. WG 15 requests the publication of their report in the PICES Scientific Report Series. The report will include an introduction (background), national reports on HAB events in the PICES region (these will detail types of HAB events, seasonality, earliest dates recorded, highest toxin levels, general environmental information, comprehensive literature, causative organisms, bloom reports with maps, unanswered questions, and research and monitoring needs), summary, and appendices (images, scanning electron micrographs, and maps).
2. Travel support for two scientists to attend a workshop (2 days) on *Development of common standards for HAB data* to be held prior to PICES XI. The participants are Ms. Michelle Tomlinson (U.S.A.), who is crucial to database development, and Dr. Tatiana Orlova (Russia), Co-Chairman of WG 15.

Relations with other organizations, programs and projects (Agenda Item 8)

ICES: An issue of high priority to the MEQ is the interaction of mariculture operations with local ecosystems. The Committee will seek to build a stronger relationship with ICES through its Working Group on *Environmental interactions of aquaculture*. This will be pursued through Dr Edward Black (Canada) who is currently the Chairman of the ICES Working Group.

GEOHAB: Dr. Max Taylor, Co-Chairman of WG 15, will attend the upcoming Canadian GEOHAB meeting and will represent interests of MEQ and WG 15 at this meeting.

APEC: There was a strong interest among Committee members to identify avenues for interaction of MEQ with various APEC Committees. An area of interest to MEQ is in training a new generation of systematists for identification of harmful algal species. Internationally there is great concern that we will lose this scientific expertise, which would severely impact our ability to investigate HAB events.

GOOS: There is interest in pursuing a relationship with the Health of The Oceans (HOTO) component of GOOS. However, presently the Committee is putting a higher priority on establishing relationships with GEOHAB and APEC.

MEQ Strategic Plan (Agenda Item 9)

Because of the low attendance by Committee members at this year's meeting, it was agreed that an update of the MEQ Strategic Plan (*MEQ Endnote 4*) would be postponed. The Committee will consider reviewing and revising the plan inter-sessionally.

Report on MEQ Scientific Sessions at PICES IX (Agenda Item 12)

Sediment contamination - the science behind remediation standards (MEQ Topic Session, S6). Convenors: Steve C. Samis (Canada) and Dong-Boem Yang (Korea).

Scientific criteria for the regulatory management of contaminated aquatic sediments are being developed in various jurisdictions around the North Pacific. Approaches to criteria setting for sediment quality evaluation and protection vary based on the legislative regime, the contamination history of regions, aquatic life at risk, human use of fish and economic factors. A number of other factors need to be defined, such as: appropriate thresholds for triggering remedial actions, dealing with mixtures of contaminants while using numeric criteria, definition of baseline or background conditions, importance of bioavailability, inter-calibration of bioassay test organisms and the use of risk assessment in lieu of numeric sediment criteria. Risk assessment is driven in part by socio-economic factors, but from a scientific perspective, contaminants that cause endocrine disruption in fish or that bioaccumulate in tissues will also drive regulatory decision making. From an ecological standpoint no observable effects in receptor biota is a reference point that can be implemented through the regulatory application of the lowest observable response level in carefully selected species. These and other factors will form the crux of a debate that this session and others that follow will need to foster.

Co-convenor Dong-Boem Yang (Korea) and presenters Peter Grevatt (U.S.A.), Ming-Jiang Zhou (China) and Mike Macfarlane (Canada) were unable to attend the meeting this year. Notwithstanding, a new presenter, Lee Nikl (Canada) accepted the challenge and filled a major gap in the program.

List of authors and titles of presented papers:

1. Peter M. Chapman (Canada). The Utility and use of Sediment Quality Values (SQVs).

2. James Meador (U.S.A.). Tissue and sediment concentrations of TBT and PCBs to protect juvenile salmonids under the *Endangered Species Act*.
3. Lee Nikl (Canada). History of contaminated sediment management in Canada's Pacific Region.
4. Vladimir M. Shulkin (Russia). Metal concentrations in mussels and oysters in relation to contamination of ambient sediments.
5. Evgueni Shumilin (Mexico). Heavy metals and metalloids from mining operations in coastal marine sediments of the peninsula of Baja California.
6. Doug Spry (Canada). Canadian sediment quality assessment tools.
7. Galina V. Moiseychenko (Russia). Heavy metals environmental contamination while offshore oil and gas deposits development. (poster)
8. Galina V. Moiseychenko (Russia). The contents of radionuclides in offshore bottom sediments of northeast Sakhalin in the area of oil and gas deposits. (poster)
9. Galina V. Moiseychenko (Russia). Methodical aspects and evaluation of bottom sediments contamination level. (poster)
10. Tatiana Konovalova (Russia). Results of environmental monitoring of the Piltun-Astokhskoye oil and gas field (northeast shelf of Sakhalin Island). (poster)

Common themes running through the oral presentations and brought out in the free-flowing discussion period were as follows:

- Clean up goals (e.g., restore ecosystem services) need to be enunciated in advance for each project.
- Numeric chemical criteria are not stand-alone tools. They are only one part of the arsenal.
- Biological criteria also may not stand alone – they do not necessarily show the cause of the impacts.
- Biological criteria need to be based on relevant species.
- One size does not fit all when it comes to clean up criteria.

- Focused international (e.g., Canada-US) workshops on the matter of regulatory clean-up criteria for aquatic sediments need to be held soon.

Physical oceanography to societal evaluation: Assessing the factors affecting coastal environments (MEQ Topic Session, S7).
 Convenors: Julia K. Parrish and John E. Stein (U.S.A.).

Ten papers were presented during this session that ranged from the physical oceanography of the coastal ocean off of Washington and Oregon, U.S.A., to the status of the human residents living near coastal estuaries. This was the first session at PICES to explicitly consider how humans respond to ecosystem variation; as such this session is an introduction to the proposed theme of PICES XII - *Human dimension of ecosystem variability*.

The introductory paper (J. Parrish) set the stage for subsequent papers by introducing the objectives of the overall project, and provided an overview of an approach for developing a set of indicators of estuarine structure and function that are science-based but also can be easily understood by the general public. The subsequent papers presented the science that will underpin the development of the indicators, and that are establishing a mechanistic basis for the selection of indicators. New findings on the physical oceanography of the coastal ecosystem in the study area show that ocean processes influence estuaries in a way that is markedly different from conventional wisdom (B. Hickey). Several papers demonstrated how biota are responding to ocean features and to intrusions of the Columbia River plume into coastal estuaries. Changes in the distribution and productivity of plankton, bivalves, crustaceans, and fish were presented (G. Swartzman, C. Roegner, J. Ruesnik, D. Armstrong). A new model was also presented that links oceanic environmental variables to returns of adult hatchery coho through a generalized additive model (E. Logerwell). The model was robust and was able to explain a substantial amount of the variability in the Oregon Production Index time-series, thus

providing support to the underlying conceptual model where survival during the first winter in the ocean is a critical period affecting recruitment.

The following presenter showed that in Pacific Northwest estuaries marshes and seagrasses, are key habitat features for many marine species. Retrospective studies demonstrated that in estuaries along the coast there have been significant changes in seagrass distribution and abundance. However, there is also significant inter-annual variation in densities of seagrasses, although the mechanisms for this variation remain to be fully elucidated (R. Thom).

The final two presentations discussed the human component of coastal ecosystems. Data has been collected to assess the economic status of several communities, the public's perception of the major ecological threats and what ecosystem components humans most value (D. Huppert). This information in conjunction with US Census data is being used to develop a times series of changes in socio-economic conditions of several communities. In addition, survey data are being collected from resource managers to better understand how scientific information can be used in environmental management (T. Leschine). This is important information in selecting environmental indicators that have the greatest potential to influence decision-making in natural resource management.

Emerging issues for MEQ: A ten-year perspective (MEQ Topic Session, S8).
Convenors: Richard F. Addison (Canada) and Ming-Jiang Zhou (China).

This session contained nine papers, six of which were invited. One invited paper (M.-J. Zhou) was withdrawn late in the planning process, and a former MEQ member Dr. Lee Harding, presented a paper in its place entitled "Threats to the marine environment from sea-based activities in Canada". Drs. M.Y. Zhu and R. Li were also unable to attend and their paper was presented by their colleague Mr. Shang Chen.

The papers covered a range of topics. It was obvious from the invited introductory paper (R.

W. Macdonald) and from later papers by M.Y. Zhu and R. Li, by S. Bertold and A. van Roodselaar, and by P.S. Ross, that our approaches to defining and assessing the impact of marine pollution go much further than simply recording chemical contaminants; various biological assessments are becoming increasingly important and may even be considered in regulatory processes. Chemical pollution is, of course, by no means the only "stress" on marine systems and even apparently "environmentally friendly" activities like eco-tourism may present threats to ecosystem stability that are difficult to quantify and assess (L. Harding). Even though "classical" chemical pollutants like PCBs have been controlled (and their environmental concentrations may be falling) hitherto unrecognized chemicals, such as polybrominated diphenyl ether flame-retardants, are actually increasing in concentration in various environmental reservoirs. (M. Ikonomou). Concentrations of persistent organic pollutants ("POPs") are high enough in some high trophic level biota such as mammals and birds to cause measurable deleterious effects (J. Elliott, P. Ross). Processes of contaminant transport continue to be of concern and trans-Pacific transport of dust and other particulate material may be a vector for wide distribution of POPs and other particle-associated chemicals (D. Jaffe). Modeling of chemical distribution from point source discharges (e.g., offshore drilling operations) continues to be developed as a predictive tool (I. Kochergin).

Physical, chemical and biological interactions during harmful algal blooms (MEQ/BIO/POC Topic Session, S9).
Convenors: Hak-Gyoon Kim (Korea), F.J.R. (Max) Taylor (Canada) and Vera L. Trainer (U.S.A.)

Dr. Kim was unable to attend the session because he needed to be present at an emergency harmful algal bloom (*Cochlodinium* bloom) in his country. He sent his regrets.

The following papers were presented:

1. Barbara M. Hickey (U.S.A.). Biological/physical connections of harmful algal blooms in the eastern Pacific Ocean. (invited)

2. Hee-Dong Jeong (Korea). The prediction and movement of the harmful algal blooms in Korean waters. (invited)
3. Adrian Marchetti (Canada). Evidence of toxin production by the oceanic diatom, *Pseudo-nitzschia* during Fe stimulated growth in an HNLC region.
4. Juliette Fauchot (Canada). Study of *Alexandrium tamarense* bloom dynamics in the St. Lawrence Estuary (Canada): A modeling approach.
5. Shang Chen (China). Study on the HAB biological model in China.
6. Mark Wells (U.S.A.). Iron regulation of domoic acid production by toxigenic *Pseudo-nitzschia* spp.

A common thread through several of the talks was the influence of nutrients, both macro and micro, on the development of harmful algal blooms (HABs), especially blooms of toxic *Pseudo-nitzschia*. There is a strong interest in understanding the role of iron on the initiation and proliferation of these blooms. It is currently believed that domoic acid (the toxin produced by *Pseudo-nitzschia* species) acts as a chelator, much like bacterial siderophores. The role of domoic acid as an iron chelator is currently being researched in the laboratory using cultured phytoplankton (Wells), and with *in situ* samples in shipboard studies (Marchetti). Another common subject of several talks in the session was the development of models describing HAB development and delivery to coastal regions. Fauchot (Canada) and Cheng (China) presented

their work on development of HAB models in their respective countries using retrospective data from shellfish and phytoplankton monitoring efforts. Both Hickey (US) and Jeong (Korea) focused their presentations on the physical oceanographic conditions that advect HABs to coastal regions, but also described their initial work on model development using data from cruises and coastal monitoring.

Best Presentation Award

Dr. Watson agreed to assess the presentations and recommended that the MEQ Best Presentation Award be given to Mr. Adrian Marchetti (Canada) for presentation of the paper entitled “Evidence of toxin production by the oceanic diatom *Pseudo-nitzschia* during iron stimulated growth during iron stimulated growth in an HNLC region”. His co-authors were: Paul J. Harrison and Vera L. Trainer. The Committee accepted this recommendation.

Other matters (Agenda Item 10)

The Chairman noted that this meeting would be the last meeting for Dr. Richard Addison as a Canadian member of MEQ. Members acknowledged Dr. Addison’s significant role in MEQ since PICES II in guiding the Committee’s activities as a previous Chairman of MEQ, and as key member in organizing and executing the Vancouver Harbour Practical Workshop.

MEQ Endnote 1

Participation List

Members:

Richard F. Addison (Canada)
 Hideaki Nakata (Japan)
 Steve C. Samis (Canada)
 John E. Stein (U.S.A., Chairman)
 C. Michael Watson (U.S.A.)

Observers:

Sam Geum Lee (Korea)
 Won Chan Lee (Korea)
 Lee Harding, (Canada)
 Vera L. Trainer (U.S.A., WG 15)
 Igor Kochergin (Russia)
 Evgueni Shumilin (Mexico)

MEQ Endnote 2

MEQ Meeting Agenda

1. Opening, introduction of members, and adoption of the agenda
2. Practical Workshop Data Report
3. Status report on publication of Practical Workshop papers in *Marine Environmental Research*
4. Progress report by WG 15 on *Ecology of harmful algal blooms in the North Pacific*
5. MEQ scientific sessions at PICES X
6. Topics for MEQ scientific sessions at PICES XI
7. Science Board issues and proposal on documenting PICES science
8. Relations with other organizations, programs and projects
9. MEQ Strategic Plan
10. Other matters
11. Draft report to Science Board

MEQ Endnote 3

Report of Working Group 15 on *Ecology of Harmful Algal Blooms (HABs) in the North Pacific*

Accomplishments in 2000 – 2001

1. Accomplishments include more complete and uniform country reports from China, Japan, Korea, Russia, western USA and western Canada. Mexico would also like to contribute their report to this publication. The WG 15 requests that national reports be published in the PICES Scientific Report Series. The report will include an introduction/background (Dr. Max Taylor), country reports (these will detail types of HAB events, seasonality, earliest dates recorded, highest toxin levels, general environmental information, comprehensive literature, causative organisms, bloom reports including maps, unanswered questions, and hopes for future work), summary (Dr. Max Taylor), and appendices (to include images, scanning electron micrographs, and maps).

2. A workshop on *Taxonomy and identification of HAB species and data management* was held at the University of British Columbia, October 4-5, 2001, hosted by Dr. Max Taylor. Guest speakers included Dr. Laurie Connell from University of Maine (molecular probes) and Ms. Michelle Tomlinson from the National Ocean Data Center (HAB database). Dr. Connell presented a session on gene probes that are currently being used and/or development for automated HAB species detection. She gave a demonstration of this technique and described the pros and cons of its use. Ms. Tomlinson gave a web-based demonstration of the HAB

database that is currently being developed for the entry of biological HAB data. To date, shellfish toxin data from Washington State has been entered. Alaska and British Columbia shellfish monitoring data will be entered by December 2001. These data can be accessed on the web and maps of HAB events can be created. (This work was also presented at the TCODE Electronic Poster Session). The intent of the WG 15 is to add HAB information into this database from as many PICES countries as possible (also including Mexico).

3. General recommendations to MEQ
 - a. More interaction and collaboration between adjacent/contiguous countries is desired. For example, *Pseudo-nitzschia* and *Heterosigma* projects between the United States and Canada could be encouraged by PICES.
 - b. Monitoring of both shellfish and plankton is desired of all countries. There are serious limitations and problems in comparison among countries when only a single sentinel shellfish species is used for monitoring.
 - c. Information needs are identified, especially from Russia, the northern B.C. coast, and northern Alaska. Monitoring projects are required in these areas that are generally lacking in HAB data.

- d. Mexico should be included in the database project and has expressed a desire to do so.
- e. There is the need for a basic taxonomy class, especially for young U.S. and Canadian scientists (there are taxonomy classes that are offered, but these are focused towards scientists from 3rd world countries). This basic taxonomy class could be sponsored by ICES and/or PICES (perhaps jointly).
- f. Convene a 2-day workshop on *Development of common standards for HAB data* prior to PICES XI. A possibility to conduct this workshop jointly with TCODE should be pursued.

Report of WG 15 Workshop on *Taxonomy and identification of HAB species and data management*

Introduction

The workshop was held over one and a half days prior to PICES X, at a venue provided by the Botany Department at UBC. After welcoming the 23 participants, the convenor, Dr. Max Taylor, stated the goals of the workshop, reminding them that it was not a training workshop but rather an opportunity for analysts to discuss problems related to the accurate identification of harmful species, uniformity of taxonomy and data reporting, management and usage. The agenda included presentations by Drs. F.J.R. "Max" Taylor, Yasuwo Fukuyo, Rita Horner, Laurie Connell and Ms. Michelle (Shelly) Tomlinson (in order of appearance), but provided as much time in the laboratory as possible to observe practical demonstrations and to microscopically examine material brought by the participants.

Presentations

Dr. Taylor used a brief summary of problems with fish- and shellfish-killing flagellate species to introduce taxonomic difficulties with HABs. These include misidentification (*Heterosigma* as *Olisthodiscus* in much earlier literature), taxonomic priority and usage (*H. carterae* vs. *H. akashiwo*), recent name changes (*Karenia*,

Karlodinium, *Akashiwo*), species recognition (within *Chattonella*) and the need for infraspecific levels of discrimination. Problems arising from the complex putative life-cycle stages and modes of nutrition in *Pfiesteria*, plus difficulty in distinguishing it from "*Pfiesteria-like organisms*" which may not be closely related (e.g. *Karlodinium galatheanum*), as well as toxin type and source were briefly mentioned. It is suspected that some common (psammophilic) sand dinoflagellates having a similar mode of feeding, currently attributed to *Katodinium*, may be closely related (Taylor, unpubl.).

It was noted that almost any bloom-forming phytoplankter can kill marine fauna if locally over-concentrated, leading to plankton death and oxygen depletion. Members of *Gonyaulax* have been commonly involved in this type of HAB phenomenon. The special case of *Noctiluca*, a microzooplankter often included in HABs because of numerous kills of fish and shrimp, especially in China, was illustrated and discussed. Only one species, *N. scintillans* (syn. *N. miliaris*) has been morphologically discriminated but more may exist and there is a need for genetic studies. The mechanism(s) of death due to *Noctiluca* blooms is unclear although high ammonia levels may be involved. It usually occurs in confined bodies of water, such as shrimp ponds. In passing it can be noted that this common, cosmopolitan species is often treated in ecological studies as if it was a phytoplankter, with possible links to inorganic nutrients being sought, but such links can only be indirect since its blooms have to follow those of a prey species.

The HAB biogeographic picture shows extraordinary latitudinal cosmopolitanism, including bihemispherism and a general lack of true endemism (except in polar regions) is the norm. This is generally not appreciated by non-phytoplanktological taxonomists and has an important bearing on the significance of supposed ballast water introductions. It is to be expected from general dinoflagellate biogeography that, for example, it is highly likely that species of *Pfiesteria* will be found in shallow estuaries in other countries with similar

coastal temperature ranges such as Brazil or southern Africa or Australia. Given the present climate of interpretation, artificial introduction would almost certainly be invoked as an explanation.

Dr. Fukuyo began by illustrating the seven orders of dinoflagellates involved in HABS, with most HAB species being found in the Prorocentrales (e.g. okadaic acid-producing *Prorocentrum* spp.), Dinophysiales (DSP-associated *Dinophysis* spp.), Gonyaulacales (several genera including *Alexandrium*, *Pyrodinium*, *Gambierdiscus*, *Ostreopsis*) and Gymnodiniales (*Karenia*, *Karlodinium* etc.). He provided plentiful excellent identificatory aid material to the participants, including publications and a CD produced in Japan. In the Peridinales, the recently described *Heterocapsa circularisquama* requires electron microscopy of its scales in order to identify it, but it has a characteristic movement when seen alive. It has killed oysters and other bivalves in Japan but fish in Hong Kong. The toxin of this economically important, recently described species is unknown.

Dr. Fukuyo then focussed on the PSP-producing genus *Alexandrium* with more than 20 species implicated in this widespread phenomenon as well as fish killers. He used it to illustrate the criteria employed in identification (tabulational features revealed by calcofluor or iodine staining) and visual aids to the identification of the species, including a manuscript by M. Yoshida prepared for a recent IOC-DANIDA training workshop. It was noted here, as seen earlier by Dr. Taylor, that the shape of cells and number of plates change in culture. In particular, chain formation is often reduced in culture, resulting in cells more rounded in shape.

This was followed, after laboratory material examination of dinoflagellates, by Dr. Horner who gave a talk on HAB diatoms, focussing on domoic acid-producing species of *Amphora*, *Nitzschia* (a recently-described benthic species from Vietnam) and *Pseudo-nitzschia* (six species so far). After a brief history of HAB diatom studies on the west coast of North America, noting that it is almost certain that records of

Pseudo-nitzschia seriata (= *Nitzschia seriata*) before the late 1990's are actually of *Ps. australis*, focus turned to the problems of visually discriminating between various toxic and non-toxic species of *Pseudo-nitzschia*. Electron microscopy, SEM or TEM, is needed to observe the fine details of valve structure needed to discriminate the species. Examples of local representatives of well-known toxic species were illustrated, including *Ps. australis*, *Ps. multiseries* and *Ps. Pseudodelicatissima*. *Ps. granii* has been isolated recently from the open North Pacific Ocean by researchers from UBC. Problems of overlap in descriptions and arising from different views (valve, girdle) were discussed. As toxicity varies with strains or physiological state within known toxic species their mere presence cannot be taken as evidence of the presence of toxins in shellfish. This is also found in culture. Even the type of chain formation can vary, including the formation of *Fragilariopsis*-like chains. A fungal parasite is commonly seen in wild coastal N.E. Pacific populations.

Another problem associated with diatoms in the PICES region is the death of farmed fish due to physical gill damage by *Chaetoceros concavicornis* and, possibly, *Ch. convolutes*. Earlier records referred only to the latter species but Taylor and co-workers have concluded that the former is the greater threat, having more developed spinulae on the setae. It is interesting that this species does not seem to be a problem, or is unrecognized, in other temperate fish farming areas.

In the laboratory, Dr. Connell gave a talk and demonstration of a commercially available LSU RNA sequence quantitative technique for HAB species identification (Saigene). It is almost fully automated and can handle large numbers of samples. It is in current use for identifying species of *Chattonella*, *Heterosigma*, *Alexandrium* and *Pseudo-nitzschia* (there are outstanding difficulties with *Ps. Pseudodelicatissima*). In the future, based on complete sequences of rRNA, it is likely that microchip probes will be developed. A very recent presentation at the 7th International Physiological Congress by Linda Medlin and

European colleagues showed excellent promise for discriminating species of *Alexandrium*.

Other fluorescent probes are used for toxins, using labelled antibodies. ELISA and other antibody methods for toxin detection in cells or shellfish were not discussed here since this workshop dealt with species recognition, but the need for a workshop on recent developments in these techniques was recognized as a need.

Ms. Tomlinson gave a web-based demonstration of an online HAB Data Management System (HAB-DMS), which is now available through the National Oceanographic Data Center (NODC, U.S.A.) at www.nodc.noaa.gov/cgi-bin/hab/hab.pl. A Pacific region website has been created and can be found at www.nodc.noaa.gov/col/projects/habs/pacindex.html. The FGDC record for the Washington State Department of Health PSP and Domoic Acid 1998-2000 (NODC #0000559) has been completed. The online linkage can be found at www.doh.wa.gov/ehp/sf/.

The Northwest Fisheries Science Center (NWFSC, NMFS, USA) has supplied harmful algal bloom datasets to the NODC. These include data from Washington State Department of Health, the Alaska Department of Fisheries. These data have been archived and documented using the FGDC format and are available in the originator's format through the NODC Direct system (www.nodc.noaa.gov/col/project/access/nodcdir.html). The FGDC metadata descriptions will be provided to the Howard Diamond by NODC, as a part of a routine transfer of metadata. These HAB data sets have been reformatted, and are in the process of being loaded into the HAB Data Management System (HAB-DMS). Currently, the HAB-DMS and web-based interface are being migrated to an operational mode. Therefore, sample data, which was loaded into the database for testing, are being removed and replaced by the current Washington State data sets archived at NODC.

In collaboration with Michelle Tomlinson, the NWFSC has developed a web-based form to facilitate the acquisition of information

regarding Harmful Algal Bloom reports in Pacific Rim countries. These will be linked to the HAB database as another source of HAB data and information. A statement of work is being written to describe additional enhancements to the system, as well as requirements for linking these HAB reports, as well as other sources of coastal data sets which reside within NODC, to the system.

Conclusion and recommendations

1. There is a need for at least one training workshop in which inexperienced PICES phytoplankton analysts become familiar with a wide range of HAB species potentially harmful in their waters (both Dr. Fukuyo and Dr. Taylor have taught several of these before, mostly in S.E. Asia). A special workshop to be convened in Japan, next October, immediately prior to PICES XI, was recommended, and would focus on antibody-based toxin detection techniques.
2. The initial entry of HAB shellfish data from the western US into the NODC database has been successful. The goals for the upcoming year include entry of data from western Canada and Asian Pacific countries. It was recommended that Asian Pacific country representatives make available their historical shellfish toxin data for entry into the database. There is concern that these data may be of a sensitive nature, and not desirable for general release to the public. This concern can be circumvented by focusing on historical data that is at least two years old. Additional funding should be sought to continue collaboration of PICES with NODC.
3. There is a need to continue the development of possibly the most useful PICES HAB database. Much further discussion of HAB databases is required to deal with design and standardization issues. A further workshop on the latter seems to be essential.
4. Participation by more PICES countries at future workshops, especially countries not present at this workshop (e.g., China, Korea, Russia) has to be encouraged.

Workshop agenda

October 5, 2001 (Friday):

- 0900 Gather at main entrance to Biosciences Bldg.
0915 Opening remarks, introductions, objectives, schedule
0930 *F.J.R. Taylor*. Fish-killing flagellates
0950 *Y. Fukuyo*. Dinoflagellate identification
1010 Coffee break
1030 Sample examination (lab.)
1200 Lunch break
1300 *R. Horner*. Diatom identification
1330 Sample examination/discussion (lab.)
1500 Coffee break
1520 *L. Connell*. Molecular identification aids demo
1700 Close Day 1

October 6, 2001 (Saturday):

- 0900 *M. Tomlinson*. Web access and HAB data handling
0930 Discussion
1030 Coffee break
1050 Sample examination/discussion (lab)
1200 Workshop conclusion

Participation list

Canada:

Alexander Culley, Helen Drost, Nicky Haigh, Lawrence, Adrian Marchetti, F.J.R. (Max) Taylor (Convenor), and J.N.C. (Ian) Whyte

Colombia:

Juan Saldarriaga

France:

Pascale Loret

Indonesia:

Gabriel Wagey

Japan:

Yasuwo Fukuyo, Yuichi Kotami

U.S.A.:

Brian D. Bill, William Cochlan, Laurie Connell, David Garrison, Julian Herndon, Rita Horner, Racheal Howard, James Postel, Michelle Tomlinson, Vera L. Trainer

MEQ Endnote 4

MEQ Strategic Plan

The MEQ Committee's area of responsibility is to promote and coordinate marine environmental quality and interdisciplinary research in the North Pacific. Marine environmental quality has an interactive role with the other PICES Committees to assess status and trends in environmental and biological conditions as affected by human activities. The coordination and research includes: understanding the sources, transport, and fates of contaminants found in the marine environment; the ecology and oceanography of harmful algal blooms; the biological effects of natural and anthropogenic toxic substances; the effects of mariculture on coastal environment; and the transport, introduction, and ecological effects of non-indigenous species and stocks.

Review of activities

The first MEQ meetings at Victoria, Canada (1992) and Seattle, U.S.A. (1993), were largely focused on identifying common problems of marine pollution in the North Pacific. It was decided that MEQ should concentrate its efforts on coastal pollution problems (instead of open ocean processes). The preliminary focus was on "Interdisciplinary methodology to better assess and predict the impacts of pollutants on structure and function of marine ecosystems". Two areas were mentioned as particularly important: algal blooms and chemical and biological contaminants. In 1992, Working Group 2 (WG 2) on *Development of common assessment methodology for marine pollution* was established under the leadership of Dr. Richard F. Addison (Canada) and Prof. Ming-Jiang Zhou

(China). Prof. Jia-Yi Zhou (China) was elected MEQ Chairman in 1992.

At PICES III in Nemuro, Japan (1994), MEQ held a symposium on *Interdisciplinary methodology to better assess and predict the impact of pollutants on structure and function of marine ecosystems*. It was decided also to organize a Practical Workshop at one of the impacted coastal ecosystems of the western North Pacific to work on common methodology of marine environment quality assessment. The proposed preliminary workshop site was the Yangtze estuary, East China Sea. After the meeting, Working Group 2 was disbanded and Working Group 8 was established to prepare and organize the Practical Workshop.

At PICES IV in Qingdao, China (1995), MEQ held a symposium on *Sources, transport, and impact of chemical contaminants*. WG 8 recommended organizing the Practical Workshop in Jiaozhou Bay, China (instead of Yangtze estuary) to trace the ecological impacts along the gradient of chemical contamination. Dr. Richard F. Addison was elected the new MEQ Chairman.

At PICES V in Nanaimo, Canada (1996), MEQ held a session on *Processes of contaminant cycling*. WG 8 developed a Scientific Workplan to hold the Practical Workshop in Qingdao, China, in 1997. Harmful algal blooms and environmental impacts of aquaculture were considered as possible topics for future MEQ sessions.

At PICES VI in Pusan, Korea (1997), MEQ held a session on *Processes of contaminant cycling*. Three priority areas were identified for inter-session activities: (i) Environmentally sound mariculture: Status and technology needs; (ii) Harmful algal blooms; and (iii) MEQ/PICES interactions with GIWA (Global Assessment of International Waters): a feasibility study. The WG 8 report on preparation of the Practical Workshop in Jiaozhou Bay, China, was also approved. Following the WG 8 meeting, the Chinese authorities informed PICES that "...the present situation in Jiaozhou Bay is not suitable to hold the workshop...", and after some

discussion within MEQ, the proposed site was moved to Vancouver Harbour.

At PICES VII in Fairbanks, U.S.A. (1998), MEQ discussed the report of WG 8 on preparation for the Practical Workshop in Vancouver Harbour in May-June 1999. MEQ held a topic session on "Science and technology for environmentally-sustainable mariculture" and a joint session with BIO on "Contaminants in high trophic level biota – linkages between individual and population responses". Dr. Alexander V. Tkalin was elected the new MEQ Chairman.

At PICES VIII in Vladivostok, Russia (1999), MEQ convened a Topic Session on *Ecological impacts of oil spills, oil exploration, land reclamation and other man-made activities* and a joint session with BIO on *Coastal pollution: Eutrophication, phytoplankton dynamics and harmful algal events*. The WG 8 Practical Workshop was held from May 24-June 7, 1999, in Vancouver Harbour.

At PICES IX in Hakodate, Japan (2000), MEQ held topic sessions on *Science and technology for environmentally sustainable mariculture: Impacts and mitigation in coastal areas* and on *Environmental assessment of Vancouver Harbour: Results of an international workshop*. Dr. John E. Stein was elected the new MEQ Chairman. WG 8 was dissolved after developing plans for publication of a data report and peer-reviewed articles concerning the results of the Practical Workshop.

In summary, over the past years, the Marine Environment Quality Committee of PICES has focused its activities on coastal pollution problems and common methodology to estimate the state of marine ecosystems under anthropogenic pressure. Closer links between marine chemists and marine biologists working on pollution problems in PICES member countries have been established.

The future

The main goal of MEQ, as part of PICES, is to improve "scientific knowledge about the ocean

environment, global weather and climate change, living resources and their ecosystems, and the impacts of human activities”. Increasing information exchange and collaboration between scientists of PICES countries will be of mutual benefit to their people and will help to sustainable development of these countries.

For the coming years, the following scientific themes are considered of high priority to MEQ:

- Impacts of climate change on coastal ecosystems;
- Ecological and environmental impacts of mariculture;
- Impacts of trawling of benthic habitat;
- Emerging of chemical contaminants of concern;
- Biogeochemical processes regulating contaminant dynamics in sediment;
- Biological and physical transport of anthropogenic substances in the North Pacific;

- Diseases in marine species: population level effects and the role of human activities in their occurrence;
- Harmonization of existing methodologies used in PICES countries;
- Scientific criteria for protection of marine ecosystems from contaminant impacts.

MEQ will work in establishing links with international organizations/programs (e.g., SCOR, ICES, GIWA, TRAP) that will improve coordination of multidisciplinary research to better understand the structure, function, and health of North Pacific marine ecosystems under anthropogenic pressure. The MEQ will also pursue building relationships with other international organizations that will broaden interest in MEQ activities within PICES countries, and will bring scientists from disciplines not currently represented in MEQ to PICES meetings and workshops.

REPORT OF PHYSICAL OCEANOGRAPHY AND CLIMATE COMMITTEE

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The meeting of the Physical Oceanography and Climate Committee was held from 1330-1730 hours on October 10, 2001. The Chairman, Dr. Vyacheslav B. Lobanov, called the meeting to order and welcomed the participants (*POC Endnote 1*). Dr. Susan E. Allen served as rapporteur. The Committee reviewed the agenda and it was adopted as presented (*POC Endnote 2*).

Business arising from PICES IX (Agenda Item 2)

Dr. Lobanov reported on the status of decisions made at PICES IX in 2000. Three sessions were convened at the PICES Tenth Annual Meeting: POC Topic Session on *Coastal ocean physical processes responsible for biological productivity and biological resource distribution*, POC/BIO/FIS Topic Session on *The physics and biology of eddies, meanders and rings in the PICES region*, and POC Paper Session. Inter-sessional workshops on *CO₂ data integration* were organized by WG 13 and TCODE in January 2001, in Sidney, B.C., Canada, and in August 2001, in Tokyo, Japan. Proceedings of the Symposium on *Oceanography of the Japan/East Sea* (CREAMS-2000), co-sponsored by PICES, was published, and *Review and results from 1999 and 2000 method intercomparisons for carbonate parameters* is being prepared for publication jointly with NIES, Japan. Communication with Argo, CLIVAR and NEAR-GOOS projects continued.

Sessions and themes at future Annual Meetings (Agenda Item 10)

Joint sessions at PICES XI

POC recommended convening a full-day joint Topic Session with FIS on *The nature, detection and impact of regime shifts in physics and biology*, and a joint session with BIO and FIS with the tentative title, *Topographic influences on micronekton*.

Annual Meeting theme at PICES XI

Technological advances in marine science research was supported as a theme for the PICES Eleventh Annual Meeting in 2002.

Annual Meeting theme at PICES XII

Human dimensions of ecosystem variability was supported as a theme for the PICES Twelfth Annual Meeting in 2003 (*SB Endnote 10*).

Report from WG 13 on CO₂ in the North Pacific (Agenda Item 4)

Dr. Andrew Dickson reported on the Working Group activity since PICES IX and future plans. WG 13 completed its task and will prepare a final report for publication in spring 2002. POC accepted the WG 13 progress report (*POC Endnote 3*) and approved the recommendations to continue activity on CO₂-related studies.

New Working Groups/Advisory Panels (Agenda Items 5 and 6)

To retain scientific focus on carbonate system studies within PICES after disbanding WG 13 on *CO₂ in the North Pacific*, it was suggested to establish a new Working Group jointly with TCODE on *North Pacific biogeochemical data integration and synthesis* (*POC Endnote 3*).

POC also recommended organizing, collaboratively, with the Data Buoy Cooperation Panel, a *North Pacific Data Buoy Advisory Panel* (*POC Endnote 4*).

A list of Working Groups for future activity would include:

- i. Working Group on *Coastal ocean physical processes responsible for biological productivity and biological resources distribution*; and

- ii. Working Group on *Mesoscale water dynamics and its implication to biological processes*.

Proposals with financial implications (Agenda Item 3)

Inter-sessional meetings

POC recommended that the following inter-sessional meetings be convened:

1. A 3-day International Symposium on *North Pacific transition areas* in La Paz, Mexico, in April 2002 (*SB Endnote 6*);
2. A 3-day PICES/CREAMS/ONR Workshop on *Recent progress in studies of physical processes and their impact to the Japan/East Sea ecosystem* in Seoul, Korea, in July-August 2002;
3. A 3-day PICES/JGOFS Symposium on *Biogeochemical cycles in the North Pacific* in Nagoya, Japan, in December 2002;
4. A Third Workshop on *The Okhotsk Sea and adjacent areas* in Vladivostok, Russia, in June 2003.

Requests for travel funding

1. 1-2 scientists from the western Pacific to attend the International Symposium on *North Pacific transition areas* in La Paz, Mexico, in April 2002;
2. 1-2 scientists from Russia and China to participate in the PICES/CREAMS/ONR Workshop on *Recent progress in studies of physical processes and their impact to the Japan/East Sea ecosystem* in Seoul, Korea, in July-August 2002.

Relations with other organizations and programs (Agenda Item 12)

POC revised the Standing List of International Organizations and Programs and recommended the addition of the Data Buoy Co-operation Panel (DBCP).

Conveners' report on POC Paper Session at PICES X

The POC Paper Session included presentations dealing with various issues of physical oceanography and climate, other than the POC Topic Session themes that were related this year to mesoscale phenomena, like eddies, rings and meanders, and coastal processes. That is why the papers on new results on a large-scale and long-term variability of physical environment in the North Pacific were selected for this ¼-day oral session. A large number of poster presentations provided recent findings in ocean circulation, structure of transition zones and fronts, water mass properties, transport and carbon cycle in the North Pacific, Okhotsk and Japan/East Seas.

Best Presentation Award

The nominee receiving most votes for the POC Best Presentation Award was Ms. Myong Sook Park (Korea) for her paper entitled "A numerical study on the physical processes and seasonal variability of fronts and eddies in the East/Japan Sea".

POC Strategic Plan (Agenda Item 11)

It was proposed to pay more attention to mesoscale dynamics and coastal areas, and to make the Strategic Plan more specific.

Election of a new POC Chairman (Agenda Item 7)

Dr. Kuh Kim (Korea) was unanimously elected as the new Chairman of POC. The Committee expressed its gratitude to Dr. Lobanov for his leadership and valuable contribution to POC activities over the years.

Science Board items (Agenda Item 8)

High priority scientific projects

POC discussed and supported the proposal for a North Pacific Ecosystem Status Report as a high priority scientific project for PICES (*SB Endnote 7*).

POC also supported the proposal on a workshop/symposium series on *Effect of human and climate interactions on fish production*.

CCCC Integration Plan

POC discussed and supported a plan for better integration among the Task Teams of the CCCC Program.

POC Endnote 1

Participation List

Members:

Susan E. Allen (Canada, rapporteur)
Howard J. Freeland (Canada)
Kuh Kim (Korea)
Vyacheslav B. Lobanov (Russia, Chairman)
David L. Musgrave (U.S.A.)
James E. Overland (U.S.A.)
Stephen C. Riser (U.S.A.)
C.S. Wong (Canada)

Observers:

Andrew Dickson (U.S.A.)
Gennady Kantakov (Russia)
Lucila Lares (Mexico)
Guido Marinone (Mexico)
Ron McLaren (Canada)
Yutaka Nagata (Japan)
Wonsun Park (Korea)
Konstantin A. Rogachev (Russia)
George V. Shevchenko (Russia)
Oleg V. Zaytsev (Mexico)
Yuriy I. Zuenko (Russia)

POC Endnote 2

POC Meeting Agenda

1. Introduction and approval/modification of the agenda
2. Completion of the decisions of PICES IX (Hakodate, 2000)
3. Proposals for 2002-2003 with financial implications (inter-sessional meetings, travel support, publications)
4. Report of WG 13 on *CO₂ in the North Pacific*
5. Proposal for *North Pacific Data Buoy Advisory Panel*
6. Proposals for new Working Groups
7. Election of new POC Chairman
8. PICES high priority scientific projects and role of POC in their implementation
9. PICES XI and PICES XII Annual Meetings themes
10. POC Topic Sessions for PICES XI
11. Discussion on POC Strategic Plan
12. Relations with other international scientific organizations/programs
13. Other items
14. Summary of POC recommendations to Science Board

POC Endnote 3

Progress report of WG 13 on *CO₂ in the North Pacific* and proposal for a new Working Group

Background

The North Pacific is an important sink for atmospheric carbon dioxide in the oceans, and consequently, plays a significant role in controlling long-term climate changes on the Earth. Some biogeochemical processes relating to the oceanic CO₂ system are peculiar to the North Pacific. This occurs because (i) the North Pacific is the final destination of circulation of the deep water that contains a high level of preformed nutrients, and (ii) the North Pacific Intermediate Water stores dissolved CO₂ for more than a few decades. There is a considerable contrast in the ecosystems producing organic carbon and CaCO₃ particles, one of the factors determining the strength of the CO₂ sink in the ocean, between the eastern and western North Pacific. The contrast is likely due to the difference in the nutrient composition in water supplied from the subsurface to the surface euphotic layer (i.e., physical forcing which affects mixed layer depth), and in the atmospheric input of iron and other substances. Continental shelf water is now receiving much attention as CO₂ sink. The CO₂ exchange under heavy winter storms in high-latitude ocean is also not well known.

Activities of WG 13

WG 13 focused its efforts on:

1. *Review the present level of knowledge on the processes controlling CO₂ in the North Pacific, and identify the gaps and problems.*

This was done through Working Group presentations and two symposia co-sponsored by PICES: *CO₂ in the Oceans* held in Tsukuba, Japan, in January 1999, and a further symposium on *North Pacific CO₂ data synthesis* in Tsukuba, Japan, in October 2000.

2. *Review the existing methodology of CO₂ measurements including the preparation of standards and reference materials, and advise on inter-calibration and quality control procedures.*

Two method inter-comparisons were conducted to evaluate the present methodology for total dissolved inorganic carbon and total alkalinity. These were each followed up with a Technical Workshop held in Tsukuba, Japan; the first in April 1999, and the second in October 2000. In all, 15 laboratories from 6 countries (7 from Japan, 4 from the United States, and 1 from each of Canada, Korea, Russia and China, Taipei) were involved in this activity, and about 30 scientists and technicians attended each workshop. A report on the results from these exercises will be published in the PICES Scientific Report Series by the end of 2001. A third inter-comparison is initiated for C¹³ measurements in both CO₂ gas and seawater samples. Participants have been identified (8 laboratories from Canada, Japan, U.S.A., Australia, Germany, France and China-Taipei) and samples will be distributed at the beginning of December 2001.

3. *Identify and encourage ongoing and planned national and international CO₂-related scientific programs in the North Pacific region, including long-term time-series observations.*

National presentations at the Working Group meetings led first to an encouragement of the Japanese re-occupation of the WOCE P1 line, and a sample exchange between the US and Japan. Subsequently, Japanese scientists have occupied P17N and are planning a re-occupation of P6 (in 2003). Initial discussions have begun for a global program of repeat hydrography and accompanying CO₂ measurements, to enable an understanding of the increase in the oceanic burden of anthropogenic CO₂.

4. *In coordination with TCODE, identify available and suitable data sets on the oceanic CO₂ system, and recommend the mechanisms of data and information exchange.*

The primary activity during 2001 was to work toward the eventual goal of establishing a publicly available database of CO₂ measurements in the North Pacific, which will enable such measurements to be synthesized into a coherent scientific picture of the North Pacific carbon cycle. Two workshops were held in this direction.

The first of these was held at IOS in Sidney, B.C., Canada, in January 2001. It brought together a small group of scientists and data managers from various PICES countries to discuss the likely technical issues involved in such a project, and to plan a second more detailed workshop to be held in Japan later in the year. One project agreed on at this planning meeting was the establishment of PICNIC, an inventory of North Pacific CO₂ data which was to be prepared as a web-site by the Marine Information Research Center (Japan).

The second workshop held at JODC in Tokyo, Japan, from July 31 to August 2, 2001, aimed at examining in more detail, the technical issues in integrating presently available data into a uniform data structure or database. Again this workshop was attended by a variety of PICES scientists and data managers. A number of issues were agreed on at this meeting: (i) the importance and success of the data inventory project initiated by MIRC; (ii) a draft data format for future CO₂ data; (iii) the use of the Live Access Server approach to serve distributed data sets and an agreement to share technical expertise to ensure this could be achieved; and (iv) the need to continue this project in future years.

5. *Organize a symposium, workshop or an annual meeting session on CO₂ studies in the North Pacific.*

In October 2000, at PICES IX in Hakodate, Japan, WG 13 co-organized a POC/BIO Topic

Session on *North Pacific carbon cycling and ecosystem dynamics.*

New CO₂ Working Group

The Working Group 13 has completed its terms of reference and should be disbanded after preparing a final report for publication in 2002.

There is clearly a need to continue activities initiated by WG 13 on a number of fronts. The data inventory needs to be transformed into a mechanism to actually access CO₂ data from the North Pacific, additional work needs to be conducted to ensure that future oceanic CO₂ measurements are of high quality, continued effort is needed to assure communication and coordination between PICES nations on CO₂-related research, and finally there is a need to retain a scientific focus on the carbon cycle within PICES.

Thus WG 13 recommends the formation of a new Working Group (under POC and TCODE) on *North Pacific biogeochemical data integration and synthesis* to undertake the following:

1. Complete the CO₂ data inventory and facilitate its being continually updated;
2. Continue a data archiving effort to make North Pacific CO₂ data publicly available;
3. Integrate North Pacific CO₂ data including the use of quality information;
4. Continue pursuit of data quality by
 - a. preparing written method descriptions
 - b. conducting inter-laboratory method comparisons
 - c. documenting QC protocols – best practices
 - d. incorporating data quality information into data structures for North Pacific data;
5. Plan revisits of deep ocean stations for data quality assessment purposes (especially evaluation of historical data);
6. Plan/coordinate new CO₂ measurement activities;
7. Design a strategy that allows new data to be incorporated into integrated data format as promptly as is practical;

8. Organize a scientific symposium to address the effects of climate change on the North Pacific carbon cycle.

Potential membership:

Canada: C.S. Wong (IOS), J. Page (IOS)
China: suggestions for suitable scientists are welcome
Japan: Y. Nojiri (NIES, Co-Chairman), S. Watanabe (JAMSTEC), Y. Watanabe (NIRE)

Korea: T-S. Lee (SNU), K. Lee (PU)
Russia: P. Tishchenko (POI), P. Makaveev, (P.P. Shirshov IORAS)

U.S.A.: A. Dickson (SIO, Co-Chairman), R. Feely (PMEL), P. Quay (UW), C. Sabine (PMEL/UW)

Data Centers: Representatives from MIRC (Japan), NODC (U.S.A.), CDIAC (U.S.A.) with expertise in dealing with CO₂ data.

POC Endnote 4

Proposal for a *North Pacific Data Buoy Advisory Panel*

The following terms of reference are intended to advise the deliberations of a group sponsored collaboratively between the Data Buoy Cooperation Panel (hereinafter DBCP) and the Physical Oceanography and Climate Committee (hereinafter POC) of PICES.

The *North Pacific Data Buoy Advisory Panel* is an independent self-funded body that maintains, as a significant element of its responsibilities, an observational buoy programme providing meteorological and oceanographic data for real-time and/or research purposes in support of the World Weather Watch (WWW), the World Climate Research Programme (WCRP), the Global Climate Observing System (GCOS), and the Global Ocean Observing System (GOOS), and other relevant WMO and IOC programmes as well as those sponsored by PICES/POC.

The *North Pacific Data Buoy Advisory Panel* will support the aims and objectives of the DBCP as set out in the terms of reference of the DBCP in particular with respect to:

- Provision of good quality and timely data to users;
- Insertion of real-time (or near real-time) data into the GTS;
- Exchange of information on data buoy activities and development and transfer of appropriate technology;

and will support the aims and objectives of PICES as expressed through POC in particular with respect to:

- Encouraging the exchange of ocean data and information in the N. Pacific;
- Encouraging the development of new sensors that increase the utility of ocean data buoys and the exchange of information about those sensors.

In accordance with the regional interests of PICES, the *North Pacific Data Buoy Advisory Panel* adopts a regional interest defined as the North Pacific Ocean, north of 30°N.

The *North Pacific Data Buoy Advisory Panel* will submit annual reports of their activities to the Chairman of the DBCP, and to the chairman of PICES/POC.

Notes:

The DBCP has at present seven action groups:

1. The European Group on Ocean Station (EGOS, adopted as AG in 1987)
2. The International Arctic Buoy Programme (IABP, adopted in 1991)
3. The International Programme for Antarctic Buoys (IPAB, adopted in 1994)
4. The International South Atlantic Buoy Programme (ISABP, adopted in 1994)
5. The International Buoy Programme for the Indian Ocean (IBPIO, adopted in 1996)
6. The Global Drifter Programme (GDP, adopted in 1996)
7. The TAO Implementation Panel (TIP, adopted in 1998)

REPORT OF TECHNICAL COMMITTEE ON DATA EXCHANGE

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The meeting of the Technical Committee on Data Exchange was held from 13:30-17:30 hours on October 10, 2001. The Chairman, Mr. Robin Brown, called the meeting to order and welcomed the participants (*TCODE Endnote 1*). The Committee reviewed the draft agenda and it was adopted (*TCODE Endnote 2*) after revision (items added under Agenda Item 7 – New business).

Progress on items in the 2001 Workplan

Little activity was undertaken on the creation of an inventory of GLOBEC data collected by PICES nations. The TCODE Chairman serves as a PICES representative on the International GLOBEC Data Management Task Team, but there has been little activity in the last year (Agenda Item 3.1).

The Chairman reported on the activities of the joint TCODE/WG 13/NPTT Workshops on *CO₂ data integration* held in Sidney, Canada, in January 2001, and in Tokyo, Japan, in August 2001. These activities resulted in a web-based inventory of North Pacific CO₂ measurements (www.mirc.jha.or.jp/PICNIC/). This inventory (as of October 2001) contains records of bottle data for 170 cruises and underway carbon data for 194 cruises in the Pacific Ocean (Agenda Item 3.2).

The status of the TCODE web pages was discussed (Agenda Item 3.3). The Chairman noted that the revised PICES web site no longer contains data “links”. Entries for the inventory of long time-series have been integrated into the Bering Sea Ecosystem Biophysical Metadatabase (www.pmel.noaa.gov/bering/mdb/new/). This database and web application are maintained by staff at NOAA/PMEL, but assistance of TCODE members is required to review and update the entries in this database, in particular, contact information and web site addresses. In addition, the PICES web site must

be modified to include a link to this resource. Other TCODE contributions (real-time data sources, internet utilities, etc.) require updating and linking to the new PICES web site. The Committee agreed to pursue some mechanism to allow TCODE to maintain web pages that are linked to the main PICES web site.

The TCODE Electronic Poster Session on *National and regional data centres* at PICES X was successful: 13 “e-posters” with good national representation (Agenda Item 3.4). The session was integrated with the main Poster Session and attendance was good. Mr. Brown agreed to solicit feedback from the presenters so that any improvements can be incorporated into subsequent “e-poster” sessions.

The TCODE Workshop on *Data management methods and issues for the 21st century* was cancelled due to travel problems for some of the organizers and participants (Agenda Item 3.5). Some of the presentations were re-scheduled in other sessions. The Committee felt that a presentation on this topic by Dr. Neville Smith (Australia) would be a useful contribution to the Science Board Symposium at PICES XI.

Sessions at future Annual Meetings

TCODE Electronic Poster Session at PICES XI
(in conjunction with the main Poster Session):

Data systems to support technological advances in observation systems.

Convenors: Vicky Lingwood (U.S.A.), Igor Shevchenko (Russia) and Ling Tong (China).

This session presents computer-based demonstrations of data systems that support observing systems for marine scientific research. Electronic poster displays will focus on innovative data acquisition systems, web pages, databases and tools for data analysis and

visualization. The goal of this session is to improve awareness of new data sources and systems that work with new technologies to advance scientific activities conducted by PICES researchers.

Inter-sessional Workshops

TCODE recommends convening a 1-day PICES/GLOBEC Workshop on *Exchange, inventory and archival of GLOBEC data* immediately prior to PICES XI in Qingdao (following the GLOBEC Open Science Meeting). Mr. Brown and Dr. Igor Shevchenko agreed to coordinate activity with the GLOBEC International Project Office (Agenda Item 7.5)

Requests for travel funding

Support is requested for the TCODE Chairman (or designate) to attend a workshop on *Data management for a future Global Ocean Observing System* as a PICES representative. Details on this workshop were not available at PICES X.

Projects requiring support

TCODE recommends that PICES provide support for an electronic *Oceanographic Atlas of the Bering Sea, Okhotsk Sea and Japan/East Sea*. This electronic atlas has been prepared by Dr. Igor Rostov (Pacific Oceanological Institute, Russia) and co-workers. The financial support (\$ 3000) is requested for translation of the text material into English, and production of CD-ROM disks. The support provided by PICES should be acknowledged in the labeling of the CD-ROMs and in the included documentation.

Best Presentation Award

Ms. Sonia Hamilton (U.S.A.) was awarded the Best Poster Award for her electronic poster presentation entitled "The Bering Sea and North Pacific Ocean Theme Page: A web-based ocean information system".

New business

TCODE reviewed the request for a standardized list of metadata keywords for use in PICES and other data inventories (Agenda Items 6.2 and 7.1). This request arose from discussions during the PICES/CoML/IPRC Workshop in Honolulu. TCODE recognized the value of such a list, but noted that the active participation of other Committees and CCCC Task Teams would be required in order to assemble a list that is appropriate for the full range of PICES activities and interests. Dr. Bernard A. Megrey and Mr. Allen Macklin offered to provide a provisional list of metadata keywords for comment by other PICES groups.

The TCODE Chairman reported on an International GLOBEC activity to assemble an inventory of long ocean time-series that are relevant to the GLOBEC program (Agenda Item 7.4). He agreed to contact the GLOBEC International Project Office for further information and to provide the TCODE inventory on long-term datasets for this activity.

The schedules for PICES XI and the GLOBEC Open Science Meeting were reviewed (Agenda Item 7.5). TCODE consented that this is a good opportunity to explore data management issues with the International GLOBEC by organizing a joint data management workshop on *Exchange, inventory and archival of GLOBEC data*.

TCODE reviewed the proposed terms of reference (*GC Appendix C*) for, and supports the formation of, a *North Pacific Data Buoy Advisory Panel* (sponsored collaboratively by the Physical Oceanography and Climate Committee and the Data Buoy Co-operation Panel) to coordinate deployments of buoys, sharing of data and development of new buoy-based observations systems (Agenda Item 7.6).

TCODE noted the formation of the IODE Group of Experts on Biological and Chemical Data Management and Exchange Practices

(GE-BCDMEP). Further details are available at the IODE web site - (<http://ioc.unesco.org/iode/>) (Agenda Item 7.7).

TCODE reviewed the proposal for a North Pacific Ecosystem Status Report (Agenda Item 7.8) and supports this ambitious plan. TCODE observed that the preparation of such a report would likely highlight some deficiencies in current data exchange practices and capabilities.

TCODE strongly supports the formation of a POC Working Group on *Biogeochemical data integration and synthesis* (see *GC Appendix C* for terms of reference) (Agenda Item 7.9). TCODE noted the progress made on method inter-comparisons, metadata requirements and carbon data inventories by the WG 13/TCODE team (and various supporting agencies) and was strongly supportive of activities to go to the next step in data integration. This is an area in which PICES is showing real leadership in the international arena. Mr. Brown was nominated to serve as the TCODE liaison with this new Working Group.

Participants were informed that a new Chairman, Dr. Igor I. Shevchenko (Russia), has been appointed by the Science Board to take over the Technical Committee on Data Exchange. This change is effective following the PICES Tenth Annual Meeting and completion of the annual

report by the outgoing Chairman. The Committee expressed its gratitude to Mr. Brown for his leadership and valuable contribution to TCODE activities over the years.

TCODE Workplan for 2001/2002

1. Revise/update PICES TCODE web pages (Action: Igor Shevchenko)
2. Organize joint PICES/GLOBEC data management workshop on *Exchange, inventory and archival of GLOBEC data* (Action: Igor Shevchenko & Robin Brown)
3. Produce and distribute a provisional list of metadata keywords for comment by other PICES groups (Action: Bernard Megrey & Allen Macklin)
4. Assist new POC Working Group on *Biogeochemical data integration and synthesis* (Action: Robin Brown)
5. Organize TCODE Electronic Poster Session at PICES XI on *Data systems to support technological advances in observation systems* (Action: Igor Shevchenko)
6. Produce a review of TCODE activities since formation and develop a Strategic Plan for discussion at PICES XI (Action: Igor Shevchenko)
7. Assemble feedback and develop recommendations for future electronic poster sessions (Action: Robin Brown).

TCODE Endnote 1

Participation List

Members:

Robin M. Brown (Canada, Chairman)
Bernard A. Megrey (U.S.A.)
Igor D. Rostov (Russia)
Thomas C. Royer (U.S.A.)
Satoshi Sato (Japan)
Igor I. Shevchenko (Russia)
Greg Steer (Canada)
Muneharu Tokimura (Japan)

Observers:

Andrey Andreev (Japan - JAMSTEC)
Norio Baba (Japan - JODC)
Hee-Dong Jeong (Korea - KODC)
Robert Keeley (Canada - MEDS)
Sung-Dae Kim (Korea - KORDI)
Taiyo Kobayashi (Japan - JAMSTEC)
Sachiko Oguma (Japan - MIRC)
Nikolai Rykov (Russia - FERHRI)
Toru Suzuki (Japan - MIRC)
Liz Tirpak (U.S.A. - State Department)
Michelle Tomlinson (U.S.A. - NODC)

TCODE Endnote 2

TCODE Meeting Agenda

1. Introduction of members
2. Adoption of agenda
3. Review progress on items in the 2001 Workplan
 - 3.1. GLOBEC data management
 - 3.2. TCODE/WG 13 CO₂ data integration
 - 3.3. PICES web pages
 - 3.4. PICES X - TCODE Electronic Poster Session on *National and Regional Data Centers*
 - 3.5. PICES X – Workshop on *Data management methods and issues for the 21st century*
4. Updates on data management activities in PICES nations
5. Business items from Science Board
 - 5.1 Proposed theme for PICES XII
 - 5.2 PICES XI theme and sessions
 - 5.3 Projects needing financial support
6. TCODE activities for 2001
 - 6.1. Inventory of long time-series
 - 6.2. Standardized metadata keywords
7. New business (additional items added at the meeting)
 - 7.1. Keywords for metadata
 - 7.2. Co-sponsorship of IRI/IPRC/PICES *Pacific climate/fisheries* Workshop
 - 7.3. Updates to data inventory – ARGO
 - 7.4. Inventory of Long Time-Series – International GLOBEC program
 - 7.5. PICES XI – PICES/GLOBEC Data Management Workshop
 - 7.6. *North Pacific Data Buoy* Advisory Panel
 - 7.7. IODE Group of Experts
 - 7.8. North Pacific Ecosystem Status Report
 - 7.9. Working Group on *Biogeochemical data integration and synthesis*
8. TCODE Workplan for 2002

REPORT OF THE IMPLEMENTATION PANEL ON THE CCCC PROGRAM

3

8

The CCCC Plenary Session was held from 0830-1230 hours on October 6, 2001. The CCCC-IP Co-Chairmen, Drs. David Welch and Makoto Kashiwai, called the meeting to order and welcomed the participants (*CCCC Endnotes 1 and 2*). The CCCC-IP heard overviews of the Task Team workshops that were held on October 5 (REX Workshop on *Temporal variations in size-at-age for fish species in coastal areas around the Pacific Rim*, and BASS/MODEL Workshop to *Review ecosystem models for the subarctic Pacific gyres*). In the afternoon of October 6, the REX/MODEL Workshop to *Include higher trophic levels in the PICES NEMURO model*, and MONITOR Workshop to *Review progress in monitoring the North Pacific*, were convened. The Executive Committee of the CCCC-IP met on the afternoon of October 7, to consider the reports of the Task Team business meetings, their recommendations and planned activities for 2002.

CCCC integration

The CCCC-IP discussed the goal of the Program implementation based on a proposal to develop a CCCC Integration Plan (*CCCC Endnote 3*) and made the following recommendations:

1. The CCCC-IP recommends that a workshop be organized immediately prior to the PICES Eleventh Annual Meeting to review the CCCC structure, to evaluate how well it has met past goals, and to assess how it should be structured to carry out future tasks. It was suggested that 1 day be reserved for the Program review, and that the meeting be open to scientists attending the GLOBEC-INT Open Science Meeting as well.
2. Given the extensive work that has been conducted by the Task Teams in the last few years, the CCCC-IP recommends that as part

of their inter-session activities, Task Teams review their terms of reference and their progress in meeting them, and consider how they may need to be revised and updated, and be prepared to discuss this issue at PICES XI.

3. CCCC-IP recommends that one member of CCCC attend the ICES *Cod and climate change* Workshop (April 19-20, 2002, in Denmark), in response to an invitation from that Working Group. The purpose is to discuss possible formal collaboration between the ICES and PICES groups, and begin consultations towards putting together a joint workshop focused on a subject of mutual interest, in 2004 or 2005.
4. The membership for each Task Team should be reviewed, in order to improve participation, and to ensure that each country is represented by active members, to the greatest extent possible. The REX Task Team meeting, for instance, was not attended by representatives from either China or Korea.

GLOBEC-PICES collaboration

Drs. Roger Harris and R. Ian Perry (GLOBEC SSC members) reviewed plans for the GLOBEC-INT Open Science Meeting (OSM) to be held in Qingdao, People's Republic of China, just prior to PICES XI. Although detailed planning is not yet complete, Dr. Harris suggested that time might be available to support a CCCC/GLOBEC topic session of perhaps four 30-minute invited talks. He suggested that session themes along the lines of *ENSO and decadal scale variation in the NE Pacific ecosystem*, or *Lower trophic level versus upper trophic level responses to climate variation* might make interesting and informative sessions with considerable mutual interest. The CCCC-IP proposed to the Science Board that the CCCC Topic Session that is

normally convened during the PICES Annual Meeting should be held as a session in the GLOBEC OSM, and furthermore, the two days between the GLOBEC OSM and PICES XI could be used for activities of joint interest to GLOBEC-INT and PICES-GLOBEC, including a session on *How to do a synthesis?* since the CCCC Program is likely to move into this phase fairly soon.

Recommendations to Science Board

Proposed Workshops in 2002

MONITOR requests support to convene an inter-sessional workshop in early 2002 to identify the outline of a comprehensive monitoring package that could be readily accommodated on Voluntary Observing Ships (VOS). Attendance would be in the range of 15-30 participants. The topics are:

- To define and describe a basic suite of variables and locations to be monitored in the North Pacific; and
- To assess the measurement technologies that are available and which could be placed in a sea chest.

MONITOR also proposes to hold a full-day workshop (or two half-day workshops) addressing two topics (either or both could be held jointly with the GLOBEC-INT Open Science Meeting):

- *Requirements and methods for early detection of ocean changes*; and
- *Monitoring from moored and drifting buoys*

BASS requests support for a one-day (or half-day) session at PICES XI on *Role of predation in the regulation of populations*". BASS proposes that this topic session be jointly sponsored with FIS¹.

BASS requests support for a combined BASS/MODEL/REX joint session at PICES XI (with GLOBEC-INT participation) to *Examine approaches for linking basin scale models to*

*coastal ecosystem models*². The session would focus on finalizing hypothesis testing, and would continue to parameterize the western gyre models, if possible, by calibrating the NEMURO model to the Station A7 data, which is more appropriate for this region. The hypotheses to be tested should focus on climate change scenarios, and final data synthesis for the marine birds and mammals should be completed prior to the workshop. The products of the meeting should include a PICES scientific report describing the two baseline models, the results and interpretations of hypothesis testing, and a data inventory.

MODEL and GLOBEC-INT Focus Group 3 (Modeling and Forecasting) should begin planning a joint session in Qingdao. A topic of mutual interest will be determined via e-mail by the summer of 2002 (e.g., open ocean-coastal coupling or methods to couple lower trophic and upper trophic level models).

MODEL and REX propose to jointly build a nutrient-phytoplankton-zooplankton-fish (NPZF) model of the North Pacific coastal ecosystem to examine regional and temporal variation in fish growth. The initial effort will be directed at incorporating herring as the model fish (*REX Endnote 2*). Support is requested for a Workshop to implement improvements to the PICES NEMURO model and to extend the NEMURO model to include herring and perhaps other planktivorous fish species (date and duration subject to external funding support being obtained; Co-Convenors: Michio J. Kishi and Bernard A. Megrey).

Science Board Symposium

The CCCC-IP suggested that a possible topic for the Science Board Symposium be developed inter-sessionally in consultation with Dr. Roger Harris and the GLOBEC-INT SSC, who are also in the early stages of developing the GLOBEC OSM agenda for their meeting in Qingdao. Efforts should be made to capitalize on the opportunity provided by the juxtaposition of the PICES and GLOBEC meetings in 2002, and to

¹ Became the BIO/FIS/CCCC Topic Session on *Responses of upper trophic level predators to variability in prey availability: An examination of trophic linkages*

² Deferred by the Science Board to PICES XII

encourage closer cooperation between the two organizations.

Requests for travel funding

- 1 invited speaker to attend the joint CCCC-GLOBEC session in Qingdao;
- CCCC-IP Co-Chairman to attend the ICES *Cod and climate change* Workshop (April 19-20, 2002, in Denmark);
- 3 scientists to attend the inter-sessional MONITOR Workshop on *Voluntary observing systems* (February 2002, in Corvallis, Oregon, or Seattle, Washington, U.S.A.);
- 1 scientist to attend the MONITOR Workshop at PICES XI;
- 1 scientist to attend the joint BASS/MODEL/REX workshop at PICES XI;
- 2 scientists to attend the inter-sessional BASS/MODEL Workshop on *Using models to test hypotheses on effects of climate change on the North Pacific subarctic gyre system* (April 2002, in La Paz, Mexico).

Changes in chairmanship

- CCCC-IP nominates Dr. Harold P. Batchelder (U.S.A.) to replace the outgoing North American Co-Chairman, Dr. David W. Welch (Canada), who completed his term of office.
- BASS requests that the CCCC-IP Co-Chairmen approach member countries to nominate a Co-Chairman to replace Dr. Andrey S. Krovnin (Russia). It is proposed that Dr. Gordon A. McFarlane (Canada) will remain as Co-Chairman for one more year to provide continuity during the final phase of BASS/MODEL joint activities.
- MODEL requests that Dr. Michio J. Kishi (Japan) be replaced by Dr. Francisco E. Werner (U.S.A.) as Co-Chairman, with Dr. Bernard A. Megrey (U.S.A.) to be replaced the following year by a Co-Chairman to be selected from the western Pacific.
- MODEL also requests that Ms. Patricia Livingston be replaced by Dr. Thomas C. Wainwright as a U.S.A. representative on the MODEL Task Team.

- REX requests that Dr. Yoshiro Watanabe (Japan) replace Dr. Tokimasa Kobayashi (Japan) as Co-Chairman. Additionally, REX requests that the term of Dr. William T. Peterson (U.S.A.) be extended until PICES XI when a new Co-Chairman from U.S.A. or Canada will be selected at PICES XI.

Other requests

MODEL requests access to the PICES web site, so that they may update model coding, documentation, and output runs for the models that have been developed to date, and to make the models more accessible to the scientific community.

Relations with other organizations, programs and projects

The Panel identified linkages with ICES, GLOBEC, and the Exxon Valdez Oil Spill - Gulf Ecosystem Monitoring (GEM) initiatives as high priorities for the coming year. The continued development of closer links with GOOS and the Sloan Foundation's Census of Marine Life initiative are also viewed as a promising area to support. Dr. Pentti Mälkki, President of ICES, arrived after the conclusion of the CCCC-IP meetings and indicated the interest of ICES in developing further contacts with PICES in areas of mutual interest. The CCCC-IP strongly supports the development of such links because there are many areas of common research that would benefit from a "two-ocean" comparison.

Best Presentation Award

Mr. Takehiro Iida of the Laboratory of Marine Environment and Resource Sensing, University of Hokkaido, Japan, received the CCCC Best Presentation Award for his paper entitled "Temporal and spatial variability of coccolithophore blooms in the eastern Bering Sea shelf".

CCCC Endnote 1

CCCC Implementation Panel Meeting Agenda

October 6 - CCCC Plenary Session

1. Opening Remarks
2. Overview of BASS workshop and activities
3. Overview of MODEL workshop and activities
4. Overview of MONITOR workshop and activities
5. Overview of REX workshop and activities
6. Review of informal discussions for future collaborations between the PICES CCCC and ICES/CCC Programs and development of a joint proposal for ICES/PICES workshop to review areas of common interest and collaboration
7. Current initiatives under IGBP/SCOR GLOBEC, and some thoughts on our future
8. A proposal to develop an Integration Plan for CCCC Program and suggestions for the future

9. Other possible opportunities for scientific collaboration and future directions
10. Discussion of future directions

October 7 - CCCC IP/Executive Committee Meeting

1. BASS report and recommendations
2. MODEL report and recommendations
3. MONITOR report and recommendations
4. REX report and recommendations
5. Discussion and action items:
 - International GLOBEC: Plans for Open Science Meeting
 - NPAFC/NASCO/IBSFC Workshop on *Causes of marine mortality of salmon*
6. International Organizations - Which are most important to CCCC?
7. Other issues

CCCC Endnote 1

Participation List

Executive Committee members:

Makoto Kashiwai (CCCC-IP Co-Chairman)
David W. Welch (CCCC-IP Co-Chairman)
Andrei S. Krovnin (BASS Co-Chairman)
Gordon A. McFarlane (BASS Co-Chairman)
Michio J Kishi (MODEL Co-Chairman)
Bernard A. Megrey (MODEL Co-Chairman)
David L. Mackas (MONITOR Co-Chairman)
Sei-ichi Saitoh (MONITOR Co-Chairman)
William T. Peterson (REX Co-Chairman)
Vladimir I. Karpenko (NPAFC representative)
R. Ian Perry (national representative of Canada)

Others:

Harold P. Batchelder (U.S.A., CCCC-IP Co-Chairman-elect)
Roger Harris (GLOBEC SSC Chairman)
Patricia Livingston (Science Board Chairman)
Stewart (Skip) M. McKinnell (Assistant Executive Secretary)
Takashige Sugimoto (Japan)
Al Tyler (U.S.A., national member)

CCCC Endnote 3

Proposal to develop CCCC Integration Plan (Abstract)

Background

In 1993, PICES and GLOBEC agreed to jointly organize an international science program on Climate Change and Carrying Capacity (CCCC) in the temperate and subarctic region of the

North Pacific Ocean. The CCCC Program is addressing how climate change affects ecosystem structure, and the productivity of key biological species at all trophic levels in the open and coastal North Pacific ecosystems. The Science Plan was drafted at the 1994 PICES-

GLOBEC Workshop and approved at PICES III. The Implementation Plan (Phase I) was drafted at the first meeting of the Implementation Panel (CCCC-IP) Executive Committee (EC) held in 1995, submitted to PICES IV, and approved for publication. The Task Teams; MODEL, BASS and REX were established as sub-structure of CCCC-IP at PICES-IV. The Implementation Plan (Phase II) was not drafted explicitly, but a revised statement of purpose and terms of reference for the program and re-formation of CCCC-IP structure, and establishment of MONITOR Task Team were approved in 1997, at PICES VI. The terms of reference for MONITOR were revised as decision 99/S/4.

In 1995, GLOBEC became one of the 9 core projects of the International Geosphere-Biosphere Program (IGBP), an interdisciplinary scientific activity established and sponsored by the International Council for Science (ICSU). The IGBP program is focused on acquiring basic scientific knowledge about the interactive processes of biology and chemistry of the earth as they relate to Global Change. IGBP is now entering its second decade of global change research. The first 10 years produced much innovative and exciting science. But new questions have arisen, demanding new approaches. To meet these challenges, IGBP is evolving towards a new structure, to be launched in early 2003.

The CCCC Program is going to enter its Phase III Implementation, in which we need to integrate and synthesize Program activities and results into the goals to be achieved; and to design the second decade's plan of the CCCC Program or a new research program by evaluating identified and demanded scientific questions. Here we need an Integration Plan.

Achievement of CCCC Program and outline of Integration Plan

The possible achievements of CCCC Program may include:

- Providing answers to the scientific questions originally posed for the CCCC Program;

- Providing guidance for the implementation and use of methods for the early detection and forecasting of changes in the North Pacific (contributing to the North Pacific Ecosystem Status Report); and
- Re-evaluating the original scientific questions of CCCC, evaluating where we stand in addressing these questions, and whether they remain the correct questions.

Thus, an outline of an Integration Plan could be to:

- Evaluate, reconfirm and expand, if desired, the CCCC questions, hypotheses, and goals;
- Allocate addressed Key Scientific Questions and Program Goals among Task Teams;
- Design Work Plan for each Task Team;
- Review the progress of the CCCC Program referring to the designed Work Plans; and
- Design the procedures and schedule for integrating activities.

A 1-day workshop to develop the Integration Plan is proposed to be held in conjunction with PICES XI.

Work Plan for Task Teams

Breaking down program achievements, we need to compose a Work Plan for each Task Team.

BASS

- Define scientifically the addressed questions and identify working hypotheses;
- Answer the addressed questions by integrating results of retrospective analyses;
- Identify focal field process studies for the addressed questions, and promote their implementation;
- Answer the addressed questions by model experiments;
- Work closely with NPAFC in answering the salmon related questions; and
- Contribute to the North Pacific Ecosystem Status Report by challenging revised scientific questions on early detection and long-term prediction.

REX

- Define scientifically the addressed questions and identify working hypotheses;
- Answer the addressed questions through comparative retrospective analyses;
- Identify focal field process studies for the addressed questions, and promote their implementation;
- Answer the addressed questions through comparative model experiments; and
- Contribute to the North Pacific Ecosystem Status Report by challenging revised scientific questions on early detection and long-term prediction.

MODEL

- Define scientifically the addressed questions, and identify working hypotheses and ecosystem models necessary in answering them;
- Develop necessary types of ecosystem models in answering the addressed questions;
- Answer the addressed questions through model experiments jointly with BASS and REX; and
- Contribute to the North Pacific Ecosystem Status Report by challenging revised scientific questions on early detection and long-term prediction.

MONITOR

- Identify existing ocean observation in the coastal and open North Pacific that are relevant to GOOS;
- Develop a PICES-GOOS implementation plan based on existing routine observations and augmented by new observations as appropriate;
- Provide a structured plan on how to transfer relevant CCCC activities to a PICES-GOOS program;
- Identify field program for inter-calibration of methods for ecosystem monitoring;
- Define scientifically the scientific questions on early detection and long-term prediction, and identify working hypotheses and ecosystem models necessary in answering them;

- Develop methods and/or models for early detection and long-term prediction; and
- Preparation of North Pacific Ecosystem Status Report and identification of feedbacks to the program.

Review progress of Program implementation

The progress in CCCC Program implementation can be reviewed by referring to the Work Plans for Task Teams.

Work flow and time schedule

A series of Workshops will need to be planned and scheduled, and will produce a series of scientific publication synthesizing (first decade) results of the CCCC Program.

Design the second decade of the CCCC Program implementation or on a new research program

A Workshop to design a plan for the second decade of the CCCC Program or a new research program, and complete with defined scientific questions, needs to be convened by the decision of the Science Board.

The Key Scientific Questions addressed by Science Plan

1. How do interannual and decadal variations in ocean conditions affect the species dominance, biomass, and productivity of the key zooplankton and fish species in the ecosystems of the PICES area?
- 2a. Are regime shifts in the eastern and western sides of the North Pacific basin in-phase? Do they have the same or opposite sign?
- 2b. Methods are required for both short-term detection and longer-term prediction of climate regime shifts.
- 3a. How are the open and coastal North Pacific ecosystems structured?
- 3b. Methods are required for both short-term detection and longer-term prediction of changes in ecosystem structure, stability and productivity.
4. What impact do variations in flow and dynamics of eastern and western boundary

currents have on the productivity of Pacific Rim coastal ecosystem? Do the strengths of the Alaska and California currents vary inversely? How are their dynamics related to those of the Kuroshio and Oyashio Current?

5. What factor affect current trends in the productivity of the North Pacific Ocean and their impacts on salmonid carrying capacity? To what extent do the seasonally migrating species such as Pacific pomfret, neon squid and Pacific saury compete with salmonids in the Subarctic Pacific?
6. What factor affect changes in biological characteristics of Pacific salmon? These characteristics include growth, size at

maturity, age at maturity, ocean distribution, survival, and abundance? (This is also a critical question for all key species of the Subarctic Pacific.)

- 7a. How do responses to regime state differ among potential dominant species? How do abundances, migratory patterns, and stock-recruitment relationships change? Is the response of key species to regime change characteristic and consistent over several cycles?
- 7b. What limits primary production during each regime?
8. What are the causes and consequences of spatial shifts in pelagic ecosystems?

Table 1 Tentative allocation of Key Scientific Questions among Task Teams.

Task Teams	Key Scientific Questions										
	1	2a	2b	3a	3b	4	5	6	7a	7b	8
BASS		YY	Y	YY	Y		YY	YY			
REX		YY	Y	YY	Y	YY		YY	YY		YY
MODEL	YY		Y		Y	Y	Y	Y		YY	
MONITOR		Y	YY		YY						Y
(NPAFC)*							YY	YY			Y

Tentative agenda for CCCC-IP Workshop to develop CCCC Integration Plan

1. Reconfirmation of Program goals
 - Review, revision and addition of Key Scientific Questions
 - Allocation of Key Scientific Questions among Task Teams
 - North Pacific Ecosystem Status Report as one of the Program goals/products
2. Evaluation of structure of the CCCC Program, including Task Teams
3. Procedure of integration
 - Work Plans for Task Teams
4. Review of progress
 - Review of progress in Program Implementation by referring to the Work Plans for task Teams
5. Work flow and time schedule

REPORT OF BASS TASK TEAM

The Basin Scale Studies (BASS) Task Team met on the morning of October 7, 2001, to review the past year's activities and to plan activities for 2002. The Co-Chairmen, Drs. Andrey S. Krovnin and Gordon A. McFarlane, welcomed participants (*BASS Endnote 1*) and outlined the objectives of the meeting. The agenda was approved as presented (*BASS Endnote 2*).

Activities and accomplishments in 2001

A 2-day BASS/MODEL Workshop on *Quantification of a food web model for the subarctic gyre systems* was convened March 5-6, 2001, in Honolulu, Hawaii, U.S.A. The workshop was productive and results are published in the PICES Scientific Report No. 17.

A 1-day BASS/MODEL Workshop on *Ecosystem models for the subarctic Pacific gyres* (developed at the March 2001 workshop) was convened in conjunction with the Tenth Annual Meeting in Victoria. Twenty-one participants reviewed work to date and developed and tested trophic change scenarios using ECOSIM.

The Iron Fertilization Experiment Panel (IFEP) met October 6, 2001, and the report of their meeting is appended as *BASS Endnote 4*. The Panel focused their discussion on the results of the successful Japanese iron enrichment experiment in western subarctic Pacific, in July 2001, and on planning for the Canadian SOLAS iron enrichment experiment to take place at Station P, in July 2002.

Proposed inter-sessional activities

Participants recommended convening a joint BASS/MODEL Workshop on *Using models to test hypothesis on effects of climate change on the North Pacific subarctic gyre system* in conjunction with the Symposium on *North Pacific transitional areas* in April 2002, in La

Paz, Mexico (*BASS Endnote 3*). The final data synthesis of marine mammal and bird information should be completed prior to the workshop. Following the inter-sessional workshop, BASS should prepare the two baseline models, including the results and interpretation of hypothesis testing and data inventory, for publication in the PICES Scientific Report Series.

Proposed activities at PICES XI

Fisheries managers have been moving toward ecosystem considerations in their management. Understanding the interrelationships among species in an ecosystem is an integral part of developing this approach. BASS proposed a 1-day (or half-day) Topic Session on *Role of predation in the regulation of populations*¹, co-sponsored by FIS, be held at PICES XI.

With the successful linking of the NEMURO model to the eastern and western gyre ECOPATH/ECOSIM models, participants discussed linking basin-scale events to coastal ecosystems. It was noted that this is also a focus of the International GLOBEC Program. BASS proposed that the BASS/MODEL/REX Task Teams co-sponsor a workshop with GLOBEC at PICES XI to *Examine approaches for linking basin scale models to coastal ecosystem models*². Participants recommended convening this joint workshop to complete hypothesis testing, and to continue parameterizing the western gyre models, in particular finalizing the boundary area for the gyre. It was also suggested, if possible, to calibrate and validate the NEMURO model using the data available for station A7, which is more appropriate for the western gyre.

¹ Became the BIO/FIS/CCCC Topic Session on *Responses of upper trophic level predators to variability in prey availability: An examination of trophic linkages*

² Deferred by the Science Board to PICES XII

Requests for travel

BASS requests support for 1 scientist to attend the inter-sessional BASS/MODEL Workshop in La Paz, Mexico, and 1 scientist to attend the joint BASS/MODEL/REX Workshop at PICES XI.

Other business

One conclusion of the BASS/MODEL modeling exercise is that it is very clear that scientists have a poor understanding of the life histories and interrelationships of key species inhabiting the subarctic Pacific gyres. Improved

understanding of the factors that control abundances requires additional research.

Election of Co-Chairmen

Dr. McFarlane (Canada) will remain as the BASS Co-Chairman for the coming year to provide continuity during the final phase of BASS/MODEL joint activities. Participants requested the Co-Chairmen of CCCC to approach member countries for nominations for a second Co-Chairman to replace Dr. Krovnin (Russia).

BASS Endnote 1

Participation List

Members:

Gordon A. McFarlane (Canada, Co-Chairman)
Masahide Kaeriyama (Japan)
Andrey S. Krovnin (Russia, Co-Chairman)
Thomas Loughlin (U.S.A.)
Akihiko Yatsu (Japan)

Observer

Richard J. Beamish (Canada)
Paul J. Harrison (Canada)
Hidehiro Kato (Japan, Co-Chairman of MBMAP)
Jacquelynne R. King (Canada)
Shigenobu Takeda (Japan, Co-Chairman of IFEP)

BASS Endnote 2

BASS Meeting Agenda

1. Review accomplishments in 2001
2. Overview of joint BASS/MODEL Workshop on *Quantification of a food web model for the subarctic gyre systems* in Honolulu, U.S.A. (March 2001)
3. Overview of joint BASS/MODEL Workshop at PICES X
4. Report of Iron Fertilization Experiment Panel
5. Review of other inter-sessional activities
6. Discuss plans for 2002
7. BASS workshop theme for 2002
8. Discuss need for joint workshop(s) with MODEL/REX
9. Proposed inter-sessional activities
10. Requests for travel to future meetings
11. Discuss possible joint activities with GLOBEC Modeling FOCI at the GLOBEC Open Science Meeting in Qingdao
12. Other new business
13. Election of new Co-Chairmen

BASS Endnote 3

Proposed BASS/MODEL Workshop

Title: BASS/MODEL Workshop on *Using models to test hypotheses on effects of climate change on the North Pacific subarctic gyre system*

Convenors: Gordon A. McFarlane (Canada) and Bernard A. Megrey (U.S.A.)

Date/Location: April 2002, La Paz, Mexico (in conjunction with the Symposium on *North Pacific transitional areas*)

Objectives/justification: As the CCCC Program enters its synthesis phase, modeling will play a more prominent role in CCCC activity. BASS and MODEL have successfully determined that using ECOPATH/ECOSYSTEM as a modelling approach is a viable tool for organizing our understanding of the marine ecosystems of the subarctic gyres. Joint BASS and MODEL activity has successfully established working linkages between NEMURO and ECOPATH/ECOSIM and is poised to begin testing ecosystem hypotheses. In preparation for a possible joint PICES/GLOBEC session in Qingdao at PICES XI, BASS and MODEL

would like to convene a joint workshop to use models to test hypotheses on effects of climate change and variability on the North Pacific subarctic gyre system.

Specific objectives include examining:

- decadal-scale forcing or productivity in the two gyres and the effects on abundance;
- effects of management (i.e. fishing) scenarios on the decadal-scale forced productivity; and
- effect of climate change scenarios on trophic relationships and productivity in both gyres.

Locating the venue in La Paz, Mexico, in conjunction with the symposium on *North Pacific transitional areas* is seen as a cost-effective way to assure wide participation, and would lead to a more balanced scientific representation from the nations of the North Pacific. Mexico is a potential new PICES member, and holding the meeting in La Paz would provide an early opportunity to draw Mexican scientists into PICES activity.

BASS Endnote 4

Report of Iron Fertilization Experiment Advisory Panel

The meeting was held from 08:30-17:30 hours on October 6, 2001. The Co-Chairman, Dr. C.S. Wong, called the meeting to order and welcomed the participants (*IFEP Endnote 1*). The Advisory Panel reviewed the draft agenda and it was adopted (*IFEP Endnote 2*). The meeting focused mainly on the results of the successful Japanese iron enrichment experiment in July 2001, and planning for the Canadian SOLAS iron enrichment experiment to take place at Station P in July 2002.

Summary of Japanese iron enrichment experiment in the western subarctic Pacific

A preliminary iron enrichment experiment was conducted during the FRV *Kaiyo-maru* cruise in June-August 2001. The next larger scale

experiment in the western gyre is planned for August-September 2003.

Five goals of the overall project were:

1. to measure the response of bacteria, phytoplankton, and zooplankton in terms of species, standing stocks and rate processes to the iron addition;
2. to measure the draw-down of CO₂ and the carbon export flux;
3. to study the interaction between biogeochemical processes in the surface water during the phytoplankton bloom and the production of climate gases in the atmosphere;
4. to study the relationship between phytoplankton (diatom) production and the higher trophic level (salmon); and

5. to assess the influence of atmospheric iron supply on the characteristics of the plankton ecosystem in the western subarctic Pacific.

This first iron enrichment experiment was rather rushed since funding was received in February 2001, the ship allocated in April, and the experiment conducted in June. It included only 16 scientists. The experiment provided the most dramatic phytoplankton response of any of the HNLC iron enrichment experiments done to date.

Overview of the Subarctic Pacific Iron Experiment for Ecosystem Dynamics Study (SEEDS 2001)

Experiment

An *in situ* iron enrichment experiment was conducted in the western subarctic gyre of the North Pacific (48.5°N, 165°E) from July 18 to August 1, 2001. The experiment consisted of a single addition of 350 kg of iron as FeSO₄ with an inert tracer gas SF₆, over an 8 x 10 km patch with a mixed layer depth of 10 m. The iron release track was up and down along a north/south line generating a radiator pattern relative to the central buoy due to surface currents. The injection was completed on July 19, and followed by two weeks of observations. The patch moved ~ 100 km from the beginning to the end. Drogues were used to follow the patch for ~ 24–48 h, and were repositioned every two days.

Iron

Prior to release, dissolved iron concentrations in the ambient surface seawater were extremely low (<0.05 nM). At the first underway transect throughout the patch after the iron release, significant increase of dissolved iron (1.9 nM, mean value calculated using all measurements of first underway transect in the patch; maximum 6.0 nM) was observed, and most of dissolved iron was in the colloidal fraction in the mixed layer. Dissolved iron concentrations subsequently decreased rapidly, and the loss rate gradually decreased. High particulate iron concentrations (>1 nM) were observed throughout the experiment.

Biological responses

The first biological response to the iron enrichment was the increase in photochemical quantum efficiency (Fv/Fm) of phytoplankton on day-3 from the enrichment. Chlorophyll *a* increased from day-6 and reached 20 mg m⁻³ on day-10. The maximum differences between outside and inside the patch were 19.5 mg m⁻³ in chlorophyll *a*, and 11.7 μM in nitrate. Dominant phytoplankton species before the fertilization and outside the patch was pennate diatom *Pseudonitzschia pungens*. But in the patch, phytoplankton rapidly increased and large-sized (>10 μm) centric diatoms, mainly *Chaetoceros debilis*, were observed. Non-depletion in nitrate until the end of the observation, and shallower euphotic layer depth than the mixed layer observed on day-12, suggested that phytoplankton was light-stressed at the end of the experiment. Salmons and small squids abundance, collected by trawl sampling, were not changed between inside and outside of the patch, but northern mackerels were abundantly collected only in the patch.

pCO₂

The underway pCO₂ system with high measurement frequency (1-minute interval data logging) with real-time monitor facilitated tracing the enrichment patch with biological draw down of pCO₂. The pre-experiment condition of the iron enriched area showed uniform pCO₂. The change of pCO₂ inside the patch was observed after 5 days of the iron enrichment. The draw down of pCO₂ expanded up to 146 μatm after 11 days of the enrichment.

Export flux

Export flux was measured using drifting sediment traps (Knauer type). The depths of the traps were 20, 40, 60, 100 and 200 m from the sea surface. The trap inside the patch was applied and recovered at about 2-day intervals. The reference trap outside the patch was applied and recovered at about 4-day intervals. The majority of the trapped material was fecal pellet of zooplankton. Increase of export flux was observed after 7 days of the enrichment. Wind-driven deviation of the inside-patch trap occasionally occurred, which made it difficult to

estimate the export flux accurately, however, the increasing of the export flux inside the trap was apparent. Longer observation of the iron-enriched patch is needed to see the fate of accumulated organic carbon after the end of diatom blooming.

Bottle incubation experiments

Bottle incubation experiments on board were also conducted to elucidate the effects of iron concentration and temperature on the growth of phytoplankton and nutrient utilization. Subsurface seawater samples taken on day-2 were spiked with FeCl₃ ranging from 0 to 2 nM, and incubated at 5, 9, 13 and 18°C for 14 days. The bottle incubation revealed that the increase in chlorophyll *a* was almost the same between *in situ* and *in vitro*, but the draw-down of nutrients was much faster *in vitro* than *in situ*. The specific growth rate increased with the amount of spiked FeCl₃, and was also the function of incubation temperatures.

Planning session for Canadian SOLAS iron enrichment experiment in July 2002

Key issues to focus on in this experiment are:

1. What is the influence of Fe enrichment on the production of climate active gases? This is the central novelty of the Canadian SOLAS iron enrichment project.
2. What is the fate of carbon and carbon export? This question is also central to SOLAS because of CO₂ flux, and it is of general interest because of poorly restrained export in previous iron enrichment experiments.
3. What is the plankton community's (ecosystem) response to iron enrichment?

4. What happens with iron chemistry, ligand production, and fate of iron?

Discussions centered on technical preparations such as iron and SF₆ tanks, drogues, iron injection and following the patch.

Overview of NSF proposal

Scientists from U.S.A. would like to take part in both the east and western gyre iron enrichment experiments. The highlights of the proposal submitted to NSF are as follows:

- Characterize the community and water chemistry within and adjacent to the iron-enriched patch over a time period of several weeks (20-50 days) after the initial enrichment;
- Test a series of sub-hypothesis using on-deck incubation studies;
- Assess the phenotypic differences of newly-isolated dominant subarctic Pacific diatoms in laboratory culture experiments; and
- Model the planktonic response to changes in iron concentrations and chemical speciation in the iron-enriched patch over a time period of several weeks after the initial fertilization.

Should we establish a SOLAS component of PICES?

Discussions focused on a proposal for an iron working group since the iron work was underway, and would benefit from a North Pacific coordinated effort leading to conclusive results and inter-gyre comparisons in the next three years. The idea of an iron working group was presented to the CCCC Implementation Panel, but it was not put forward to the Science Board.

IFEP Endnote 1

Participation List

Members:

Robert Bidigare (U.S.A.)
William Cochlan (U.S.A.)
Paul J. Harrison (Canada)
Isao Kudo (Japan)
Vladimir Shulkin (Russia)
Atsushi Tsuda (Japan)
Shigenobu Takeda (Japan, Co-Chairman)
Mark Wells (U.S.A.)
C.S. Wong (Canada, Co-Chairman)

Observers:

Melissa Chierici (Canada)
John F. Dower (Canada)
Agneta Fransson (Canada)
Keith Johnson (Canada)
Andrew Leising (U.S.A.)
Maurice Levasseur (Canada)
Patricia Livingston (U.S.A., SB Chairman)
Adrian Marchetti (Canada)
Yukihiro Nojiri (Japan)
Wendy Richardson (Canada)
Hiroaki Saito (Japan)
Nelson D. Sherry (Canada)
Nes Sutherland (Canada)
Charles Trick (Canada)
Frank Whitney (Canada)
Emmy Wong (Canada)

IFEP Endnote 2

IFEP Meeting Agenda

1. Round-table introduction of attendees
2. Adoption of agenda
3. Adoption of first Panel Report of IFEP held in Tsukuba, Japan
4. Review of relevant background work, e.g. eddy transport of iron
 - Where is HNLC water? ENSO factor
 - Iron distribution and possible transport to HNLC waters
 - CO₂ uptake/Fe enrichment in an eddy
5. Review of time-table of international Iron Enhancement Experiments in the subarctic Pacific
6. Review of July Canadian SOLAS iron enrichment planning meeting
7. Summary of Japanese Iron Enrichment Experiment results (SEEDS 2001)
8. SOLAS preparations at IOS
9. Overview of NSF proposal by Wells et al.
10. Should we establish a SOLAS component of PICES?
11. Planning session for the Canadian Fe enrichment in July 2002

REPORT OF MODEL TASK TEAM

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The meeting of the MODEL Task Team was held from 0830-1230 hours on October 7, 2001. The Co-Chairmen, Drs. Bernard A. Megrey and Michio J. Kishi, called the meeting to order and welcomed the participants (*MODEL Endnote 1*). The Task Team reviewed the draft agenda and it was adopted (*MODEL Endnote 2*).

Report card

The Task Team was asked to discuss its activities in light of the goals of the CCCC Program and the terms of reference for MODEL. There was lively discussion on the accomplishments of MODEL over the past several years. MODEL was charged with advancing conceptual/theoretical and modeling studies and supporting the activities of BASS and REX by developing modeling tools. The development of the NEMURO model was seen as a major accomplishment, and that is currently serving as the foundation and basis of collaborations with BASS and REX. NEMURO, as a modeling tool, addresses all of the CCCC central scientific issues at some level. MODEL has collaborated with BASS by developing a working linkage between the lower tropic level NEMURO with a model of higher trophic level interactions in the subarctic gyre systems. MODEL has collaborated with REX by developing a linkage between NEMURO and a herring growth model. In both of these examples, the goal is to understand issues related to the four main Central Scientific Questions from the CCCC/GLOBEC Implementation Plan:

- *Physical forcing*: What are the characteristics of climate variability? Can interdecadal patterns be identified? How and when do they arise?
- *LTL response*: How do primary and secondary producers respond in productivity, and in species and size composition, to climate variability in

different ecosystems of the subarctic Pacific?

- *HTL response*: How do life history patterns, distribution, vital rates, and population dynamics of higher trophic level species respond directly and indirectly to climate variability?
- *Ecosystem interaction*: How are subarctic Pacific ecosystems structured? Is it solely through bottom-up forcing, or are there significant intra-trophic level and top-down effects?

The conclusion was that, compared to 5 years ago, MODEL has made excellent and significant progress towards the ultimate goal of the CCCC Program: *to forecast the consequences of climate variability on the ecosystems of the subarctic Pacific.*

MODEL achievements to date

- Held a successful series of workshops:
 - MODEL Workshop on *Strategies for coupling higher and lower trophic level marine ecosystem models*, October 11, 2000, Hakodate, Japan (in conjunction with PICES IX)
 - BASS/MODEL Workshop on *Quantification of a food web model for the subarctic gyre systems*, March 5-6, 2001, Honolulu, Hawaii, U.S.A.
 - BASS/MODEL Workshop to *Review ecosystem models for the subarctic Pacific gyres*, October 5, 2001, Victoria, British Columbia, Canada (in conjunction with PICES X)
 - MODEL/REX Workshop to *Include higher trophic levels in the PICES NEMURO model*, October 6, 2001, Victoria, British Columbia, Canada (in conjunction with PICES X)
- Published Scientific Reports No. 15 (2000) and No. 17 (2001)

- Submitted two proposals to funding agencies outside of PICES:
 - Proposal on *Impact of climate change of marine fish production in the subarctic North Pacific Ocean* to the National Center for Ecosystem Analysis and Simulation (not funded)
 - Proposal on *Developing an ecosystem model to predict changes in the North Pacific associated with climate change to the Heiwa Nakajima Fund* (funded)
- Implemented several improvements to NEMURO
 - Addition of diagnostic calculations (P/B, C/B, Ecotrophic Efficiency)
 - Validation to Station P
 - Addition of zooplankton vertical migration
 - Effect of including a microbial loop approximation
 - Sensitivity analysis and data assimilation (Station A7)
 - Addition of carbon fluxes
 - Acquired SST time-series (1951-1988) from Station P
 - Acquired equations to permit calculation of light at the surface
 - Modify primary production equations to explicitly include MLD to permit simulation regime shift scenarios
- Developed alternative formulation of NEMURO equations (Dr. Vladimir Zvalinski, Russia)
- Extend NEMURO model
 - Add Fe limitation to phytoplankton production
 - Add microbial food web
 - Split ZL into copepods and euphausiids
 - Add sinking rate of phytoplankton to detritus pool
 - Parameterize NEMURO to a coastal region
 - Continue developing methods to link NEMURO to ECOPATH/ECOSIM
 - Continue developing methods to link NEMURO to models of fish growth
- Carry out NEMURO diagnostics
 - Validate model output against data for station A7 and the Bering Sea
 - Perform side-by-side comparison of the NEMURO Box Model and NEMURO MATLAB model to same equations and data
- Develop spatially explicit approach
- Modify NEMURO as required to accommodate BASS and REX needs
- Work toward embedding NEMURO into larger scale 3-D ocean model
- Establish links with other programs such as GODAE, WCRP, CLIVAR

Membership and selection of MODEL Co-Chairman

The term of MODEL Co-Chairman, Dr. Michio Kishi, was lapsing, and there was discussion as to who might take his place. It was mentioned that MODEL needed to maintain the momentum in its activity, and it would be advantageous to select someone with a solid background of past model activities, goals, and interactions with other components of the CCCC Program. The Chairman of the Science Board and the Co-Chairmen of the CCCC Implementation Panel would approach a few individuals to see if they might be interested.

Dr. Toshio Katsukawa was introduced as a new member representing Japan. Ms. Patricia Livingston (U.S.A.) resigned and Dr. Thomas C. Wainwright volunteered to serve and will be recommended to the CCCC Implementation Panel.

MODEL plans

- Plan and conduct
 - An inter-sessional MODEL/REX Workshop to build a NPZF (nutrient-phytoplankton-zooplankton-fish) version of the PICES NEMURO model (*REX Endnote 2*)
 - An inter-sessional BASS/MODEL workshop on *Using models to test hypothesis on effects of climate change on the North Pacific subarctic gyre system* to complete work on linking NEMURO to ECOPATH/ECOSIM (*BASS Endnote 3*)

MODEL recommendations

- Convene a joint MODEL/REX Workshop in January 2002, in Nemuro, Japan, to extend the NEMURO model to include herring and perhaps other planktivorous fish species (*REX Endnote 2*). PICES to support travel of two people to attend the workshop. No travel request will be made for the PICES Eleventh Annual Meeting in Qingdao, People's Republic of China.
- Encourage opportunities for more CCCC Task Team interaction to coordinate and implement their plans. At PICES XI, Task Team meetings should not overlap in time.
- Begin communication between MODEL and GLOBEC Focus Group 3 (Modeling and Forecasting) to plan a joint meeting in Qingdao. A topic of mutual interest (i.e.

open ocean-coastal coupling or methods to couple LTL-HTL models) should be determined via e-mail by the summer of 2002.

- Request access to the PICES server to post and access working documents related to MODEL activities.
- Ms. Patricia Livingston to be replaced by Dr. Thomas C. Wainwright as the U.S. member on the MODEL Task Team.
- Dr. Michio J. Kishi (Japan) to be replaced by Dr. Francisco E. Werner (U.S.A.) as MODEL Co-Chairman. Dr. Megrey will remain as Co-Chairman for one more year to provide some continuity in the work of the Task Team, at which point a new Co-Chairman from the western Pacific should be appointed.

MODEL Endnote 1

Participation List

Members:

Toshio Katsukawa (Japan)
Michio J. Kishi (Japan, Co-Chairman)
Bernard A. Megrey (U.S.A., Co-Chairman)
Vadim V. Navrotsky (Russia)
Yury I. Zuenko (Russia)

Observers:

Gennady A. Kantakov (Russia)
Sukyung Kang (Korea)
Hiroaki Saito (Japan)
Jake Schweigert (Canada)
Igor I. Shevchenko (Russia)
S. Lan Smith (Japan)
Thomas C. Wainwright (U.S.A.)
Francisco E. Werner (U.S.A.)

MODEL Endnote 2

MODEL Meeting Agenda

1. Review accomplishments in 2001
Introduction of new members
Overview of BASS/MODEL joint Workshop on *Quantification of a food web model for the subarctic gyre system*
Overview of BASS/MODEL joint Workshop at PICES X
Overview of REX/MODEL joint Workshop at PICES X
Review of inter-sessional activities
Proposals submitted and funded
2. Discuss plans for 2002
Plans for MODEL/REX Nemuro Workshop
Discuss need for joint workshop(s) with REX, MONITOR, or BASS
Proposed inter-sessional activities
MODEL workshop theme for 2002
3. Requests for travel to future meetings
4. Discuss possible joint activities with the GLOBEC-INT modeling efforts at the GLOBE Open Science Meeting in Qingdao
5. Other business
6. Selection of new Co-Chairman

REPORT OF MONITOR TASK TEAM

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Overview of activities during PICES X

The MONITOR Task Team convened three sessions during PICES X: (1) the *Continuous Plankton Recorder* Advisory Panel meeting (*MONITOR Endnote 1*); (2) a MONITOR Workshop on *Recent progress in monitoring the North Pacific*; and (3) the MONITOR Task Team business meeting. Discussion topics included action items arising from the 2001 PICES/CoML/IPRC Workshop on *Impact of climate variability on observation and prediction of ecosystem and biodiversity changes in the North Pacific*, further discussion of presentations at the MONITOR Workshop, strategies for designing and maintaining long-term ocean monitoring programs, and development of MONITOR's recommendations to PICES.

MONITOR recommendations to the CCCC-IP

MONITOR strongly endorses the concept of a PICES North Pacific Ecosystem Status Report. Such a report will demonstrate to users and national funding agencies the importance of low frequency change in the ocean. It will also provide stimulus and design guidelines for developing regional programs, some of which (e.g. EVOS/GEM) have large, secured funding bases, but are seeking expertise and precedents in monitoring system development.

MONITOR proposes to convene an inter-session workshop on *Voluntary observing systems* in early 2002, in Corvallis, Oregon, or Seattle, Washington, U.S.A., and requests travel support for 3 scientists (out of a probable attendance of 20). Topics include:

- Define/describe a "basic suite" of North Pacific ecosystem monitoring variables and measurement locations; and
- Measurement technologies for platforms of opportunity.

At PICES XI (October 2002, Qingdao, People's Republic of China), MONITOR proposes to convene a full-day workshop (or two half-day workshops) addressing two topics (either or both could be held jointly with the GLOBEC Open Science meeting):

- *Requirements and methods for "early detection of ocean changes"* and
- *Monitoring from moored and drifting buoys*

MONITOR continues to endorse the PICES CPR (Continuous Plankton Recorder) North Pacific Pilot Program (*MONITOR Endnote 1*), and supports addition of value-added measurements such as surface and sub-surface water properties, visual observations of seabirds and mammals, and analytical links to remote-sensed variables such as ocean color and sea surface elevation to the Program.

MONITOR recommends close liaison with Coastal GOOS and NEAR-GOOS, and specifically inviting representatives of these programs to the upcoming MONITOR workshops.

MONITOR supports PICES' cooperation with the Data Buoy Co-operation Panel (DBCP), and the establishment of a *North Pacific Data Buoy* Advisory Panel sponsored collaboratively by PICES and DBCP (see *GC Appendix C* for terms of reference).

Themes for PICES XI and joint activities with GLOBEC

Two workshop themes for next year's MONITOR workshop were proposed and accepted:

Requirements and methods for "early detection of ecosystem change": What variables need to be measured to detect changes to new ocean "regimes"? Are these site-specific or generalizable? In addition to being a CCCC

objective, and a proposed addition to the MONITOR Workplan, this topic is similar to the one proposed as a session in the GLOBEC Open Science Meeting.

Technologies for monitoring from moorings: As time on manned research vessels becomes increasingly scarce and expensive, other monitoring platforms need to be explored. Moored and drifting buoys offer the potential for improved spatial and temporal coverage, especially of open ocean locations. What sensors are available now? What could become available in the near future? What are the options and limitations for data storage and transmission?

Further development of the CPR time-series

MONITOR discussed ways to broaden the suite of measured variables, evolving the CPR Pilot Program toward a diverse “measurements of opportunity along repeated lines”. Suggestions included additional flow-through sensors mounted on the ship, visual observations of birds and mammals, subsurface sampling using XBT and/or XCTD, and coordination/data sharing with other existing North Pacific programs. An inter-session workshop *Voluntary observing systems* was proposed to examine new and existing vessel-based sensor technologies.

Time-series at risk

Participants noted the following programs that were either likely to be canceled or were about to undergo substantial change:

- PMEL mid-shelf mooring in the Bering Sea;
- Japanese time-series station KNOT in the western gyre;
- Japanese summer cruises in the North Pacific are experiencing cutbacks in the number of ships and number of sea-days. Lines along 170°E and 175°30'E are already being dropped; and
- Mexican IMECOCAL has only 3 more years of funding, and is limited by the size of its present vessel.

Liaison with Data Buoy Cooperation Panel

MONITOR endorsed a PICES linkage with the WMO-IOC Data Buoy Cooperation Panel, via the POC Committee.

Liaison with GOOS

The Living Marine Resources Panel of international GOOS has merged with Coastal GOOS. Planning for monitoring in continental margin regions is developing well. The prospects for active ecosystem monitoring of the open ocean are less clear. Representatives of an expanding regional program (GEM) stressed the important present and future role of PICES in providing expert advice and example in the design of ocean monitoring programs. MONITOR recommends close liaison with Coastal GOOS and NEAR-GOOS, and specifically inviting representatives of these programs to future meetings.

Interactions with the PICES Advisory Panel on Marine birds and mammals

This group of scientists is very interested in placing observers on ship-of-opportunity platforms, including those used by the CPR Pilot Program. Drs. Hidehiro Kato and Sei-ichi Saitoh presented results of a feasibility study on video censoring of marine mammals. Detection rates from video replays are at present much lower than those by experienced live observers.

North Pacific Ecosystem Status Report

Creation of such a report was a major recommendation from the PICES/CoML/IPRC Workshop on *Impact of climate variability on observation and prediction of ecosystem and biodiversity changes in the North Pacific*, and continues to be broadly endorsed by MONITOR attendees. Major discussion points were:

- The report should be updated regularly (not just a one-time assessment), should include analysis and interpretation as well as data, and should attempt to cover “physics-through-fish”.

- Several regional precedents and prototypes were noted, including the annual CalCOFI report, the annual Canadian PSARC “State of the Ocean” report (<http://www.pac.dfo-mpo.gc.ca/sci/psarc/OSRs/Ocean%20Status%20Reports.htm>), and reports by the European Oslo and Paris Commission (OSPAR) on the North Atlantic (<http://www.ospar.org>). Data from Japanese time-series off Hokkaido (Line A) and in the oceanic North Pacific (Hokkaido University summer cruises) are being made available in electronic format.
- Some of the PICES TCODE website links need to be updated.
- On the possible form and function of PICES Regional Analysis Centres (RACs), participants noted that data-producers are more likely to contribute to a RAC if they are able to use it, and the need for search and visualization tools was indicated. One good example is the combination of web-based data and tools being developed by the Human Genome Project.

Scientific and funding strategies for starting and maintaining long-term observation programs in the North Pacific

This was a broad and open-ended concluding discussion touching on several of the above topics. Issues included:

- Risks and benefits of programs dependent on multilateral “partnerships”;
- Attention spans of funding agencies versus time scales of ocean variability;
- Standardization issues: spatial and temporal variations in sampling and analysis methodologies; and

- Linkages to shorter-term process and modelling studies.

MONITOR “Report Card” - progress toward our objectives

Identify existing coastal and open ocean observations: Good progress (see PICES Scientific Report 18), but need closer links to TCODE and regional programs on data availability.

Develop and promote long-term observation programs inside or outside GOOS: Good progress within the PICES community, but need outreach to users. Should PICES take a lead for basin scale efforts?

Inter-calibration and standardization: Fair progress, but need to decide the “basic suite” of measurements before putting major effort into protocols. Changes in methodology run a risk of orphaning existing time-series.

Report from SAHFOS

Dr. P. Christopher Reid, Director of SAHFOS, gave a brief report on changes observed in North Atlantic zooplankton by CPR results. The principle observation is that recent decades, particularly the 1990’s, show a northward displacement of the boundary between cold temperate species (e.g., *Calanus finmarchicus*) and warm temperate species (e.g., *Calanus helgolandicus*). The extent and intensity of this change are impressive and consonant with expected effects of global warming.

MONITOR Endnote 1

Report of Continuous Plankton Recorder Advisory Panel

The meeting convened from 13:30-17:30 hours on October 5, 2001. The participation list appears as *CPR Endnote 1*.

Meeting summary

Dr. Sonia D. Batten reported on completion of the second year of CPR sampling on the Valdez to Los Angeles line (5 transects from April through September this year) and on a Vancouver to Japan line (1 transect in June). Sampling was successful and the results are scientifically informative. Continued funding for 2003 appears likely from the EVOS Trust Council, but is not definitely promised as yet. The Panel recommends that PICES approve addition of one or two bird-mammal observers on the Vancouver to Japan run for 2003. The Point Reyes Bird Observatory will undertake to provide trained observers for one trip on a trial basis. The principal investigators will approach the shipping company for cooperation. Success will lead to proposals for funding to extend this project to later years. Discussion of techniques for enhancing instrumentation for volunteer observing ships (VOS) guides the Panel to recommend that PICES sponsor a small workshop on VOS instrumentation. A brief report on recent evaluations of Atlantic CPR results was offered by Dr. P. Christopher Reid of SAHFOS.

Report on current CPR work

A clear and sophisticated report was received from Dr. Batten on the second year of CPR results, principally from the north-south line from Valdez to Los Angeles. Towing was largely successful (~95% of planned samples) on six roughly monthly transits in 2001. Every fourth sample has been counted for dominant species and species groups of zooplankton and larger phytoplankton, together with color evaluation for chlorophyll. Results again show a north-south trend in timing of development in interzonal migrating copepods (*Neocalanus* and *Eucalanus* species), given stages in the annual life cycle being reached earlier to the south than

to the north. There appear to have been differences in abundance and timing of seasonal events between 2000 and 2001. However, evaluation of the interaction between timing of sampling, timing of events and actual interannual differences will require further analysis. Evaluation of the east-west line is in progress. As planned by the CPR Panel at its 2000 meeting, sample collection was extended into the Asian coastal zone in 2001.

One north-south sample series was analyzed entirely, all samples were counted. This spatial data series was examined for auto-correlation and none was found. In the terminology used in the report, the "decorrelation length scales" were very short. This is somewhat surprising, since the recorder sampling process should produce a mechanical running average among adjacent samples and, thus, some auto-correlation regardless of abundance patterns along the ship track. Consideration of this data set will continue. Dr. Batten reported that a paper on the North Pacific CPR results has been submitted to *Fisheries Oceanography*.

Funding

The Panel discussed plans for continued funding of the CPR survey in 2002 and beyond. A proposal is under review by the EVOS Gulf of Alaska Ecosystem Monitoring and Research Program (GEM). Discussion from EVOS representatives indicates that funding is reasonably likely, although not assured. It is hoped that the 2002 funding will provide a bridge to longer-term funding under the GEM. Funding from the same source is anticipated by Dr. Thomas C. Royer to support a thermosalinograph and fluorometer system on the tankers that are towing the CPR.

The Panel also recognized the desirability of incorporating more agencies and nations to support the CPR program. Some support is already coming to the east-west line from sources directed by Prof. Takashige Sugimoto of Japan. The Panel will seek to continue that.

Submission of proposals to Fisheries and Oceans Canada and NOAA-U.S.A. was discussed and may proceed.

There was discussion of the importance of changes in the operation of the tanker fleet. Tankers owned by ARCO have been sold to Polar Tankers, and are now used by ARCO-BP on a lease basis. This change requires some re-negotiation of the agreement to tow CPRs on the Valdez-Los Angeles line in 2002 and beyond. The importance of undertaking negotiations through the standardized SAHFOS process was emphasized. The work is done by Captain Peter Pritchard who has extensive experience with shipping companies and with shipboard personnel.

Bird-mammal observers

Drs. William Sydeman and David Hyrenbach of Point Reyes Bird Observatory (PRBO) presented the possibility of adding observers to the CPR Program to make standard bird abundance estimates along the ship tracks. The census technique is standardized, following guidelines established some years ago by Mark Tasker for the North Sea. Drs. Sydeman and Hyrenbach felt that PRBO could provide observers for initial work in 2002 without additional funding. The Panel is enthusiastic about this. The feasible scale of trial observations appears to be placement of an observer or two just on the east-west run from Vancouver to Japan. The Panel agreed to attempt this. Dr. Batten will approach the ship operators, seeking an agreement in principle, to include seabird observers on the 2002 east-west run. If this is successful, funds will be sought for more extensive seabird counting in 2003 and beyond.

Improved instrumentation

There was an extended discussion of the possibilities for generating enhanced data series from ships of opportunity (SOOPs), also known in the meteorological community as volunteer observing ships (VOS). VOS seems the preferable acronym and is adopted here. There is now an extensive suite of equipment for making along track observations from either

towed, sea-chest or masthead instrumentation. The following partial list shows how extensive the possibilities are:

- Thermosalinographs
- Periodically self-activating XBT's and XBCT's (WOCE system, D. Cutchin)
- Fast repetition rate fluorometry (phytoplankton production potential)
- Simple fluorometry (chlorophyll)
- Bridge wing LIDAR fluorometry (upper ocean pigment profiles)
- Continuous Plankton Recorders (CPR, in use, modernized versions including multiple depth samplers available)
- Optical plankton counting (zooplankton counted by size category)
- Acoustic zooplankton abundance (problematic, especially at 17 to 20 kts)
- Video Plankton Recorder (VPR, C. Davis)
- Continuous underway Fish Egg sampler (CUBES, D. Checkley)
- Automated, repetitive nutrient analysis (nitrate, phosphate, others)
- Solar isolation
- Water column spectral irradiance
- Total light attenuation and absorbance at multiple wavelengths (e.g., Wetlabs AC9)
- Partial Pressure of dissolved CO₂
- And others!

After extended discussion, the Panel recommended that PICES sponsor a small workshop on VOS instrumentation. This recommendation has the following stipulations:

The focus of the workshop will be on existing state-of-the-art instrumentation. Participants should involve manufacturers and users already deploying suitable instruments, including those with current VOS packages. Concerns include the potential of instruments to produce stable data (unchanging for given instrument types at identical field values over intervals up to a century). Data collection schemes (computerized data assimilation), instrument integration, and untended reliability are key issues. The second of these points led to a suggestion that participants be invited from some or all of the following groups (subject to revision):

- Paul Allen - sea chest instrumentation for cruising yachts
- Otis Brown, Miami - cruise ship program
- Nancy Wheatley, Royal Caribbean Cruises, Inc.- instrumentation of Alaska Inside Passage cruise ships
- Tom Rossby, URI - instrumentation of *Oleander* on New York-Bermuda run
- Tom Hayward and Greg Mitchell, SIO - enhanced CalCOFI instrumentation
- MBARI - instrumenting AUV's

Since current interest is centered along the North American coast, the workshop would probably best be held there, but Asian participation would be desirable. A total of about 25 participants are expected at a workshop to be held in spring of 2002. If the PICES Governing Council approves this recommendation, the Panel will seek funding from American and Canadian sources. The Panel will be looking to establish a basis at the same time for funding of an actual advanced instrumentation package for VOSs.

CPR Endnote 1

Participation List

Members:

Sonia D. Batten (UK)
 David L. Mackas (Canada)
 Charles B. Miller (U.S.A., Chairman)
 Jeffery M. Napp (U.S.A.)
 David W. Welch (Canada)

Observers:

Robin Brown (Canada, TCODE Chairman)
 George L. Hunt (U.S.A.)
 David Hyrenbach (U.S.A.)
 Patricia Livingston (U.S.A., Science Board Chairman)
 Phillip Mundy (U.S.A., GEM)
 P. Christopher Reid (UK)
 Thomas C. Royer (U.S.A.)
 Sei-ichi Saitoh (Japan)
 Robert Spies (U.S.A., EVOS Trust Council)
 William Sydeman (U.S.A.)

(A few more people attending only toward the end of the session were not recorded.)

REPORT OF REX TASK TEAM

The REX Task Team met from 0830-1230 hours on October 7, 2001, to review the past year's accomplishments and to plan activities for 2002. The Co-Chairman, Dr. William T. Peterson, called the meeting to order and welcomed the participants (*REX Endnote 1*).

Accomplishments in 2000 - 2001

The report of the REX Workshop on *Trends in herring populations and trophodynamics* (convened in October 2000, at PICES IX in Hakodate, Japan) was published in the PICES Scientific Report No. 17.

A one-day REX Workshop on *Temporal variations in size-at-age for fish species in coastal areas around the Pacific Rim* was held October 5, 2001, in Victoria, British Columbia, Canada (in conjunction with PICES X). Approximately 40 persons attended the workshop. In total, 11 papers were presented by speakers from USA, Canada, Russia and Japan. Four presentations discussed salmon size-at-age, five considered herring, (one paper was on sardine-herring comparison), one - sablefish and one - chub mackerel.

Planned activities and recommendations for 2002

On the afternoon of October 6, 2001, REX met with MODEL. The main point of discussion was to develop a strategy for how to explicitly incorporate fish into the NEMURO model. The decision was to begin with a simple approach, to model growth of a single individual as a function of temperature and food concentration, using a bioenergetics approach. Focus will be on age-3 and older fishes since the eggs, larvae and juvenile stage live in bays and estuaries. At age-3, herring become members of coastal pelagic ecosystems. REX scientists will produce estimates of various rates including respiration, excretion and feeding as a function of

temperature and food. REX will seek these data for herring but if not available, other clupeids will be drawn upon.

REX reviewed the results of its workshop as well as the plans for the anticipated joint MODEL/REX workshop in Nemuro, Japan (*REX Endnote 2*). REX also discussed ways and means of accomplishing its work at PICES XI in Qingdao. There is a logistical problem with planning for PICES XI as there are only two days scheduled prior to the start of the PICES Annual Meeting rather than the usual three days. The following recommendations were made¹:

1. REX recommended convening a workshop on *Structure of pelagic coastal ecosystems around the Pacific Rim*. The idea of the workshop is to determine the availability of time-series data on seasonal cycles of temperature, nutrients, chlorophyll and zooplankton for as many coastal regions with herring stocks around the Pacific as possible. Since REX wants to work more closely with MODEL in the development of a "Coastal NEMURO" model, we need to

¹ Many of these issues were discussed at the CCCC-IP meeting and again following the PICES X.

- REX will not convene a workshop at PICES XI but will focus on gathering data on seasonal cycles of temperature and plankton during inter-seasonal periods. It was learned at the CCCC-IP meeting that Drs. Takashige Sugimoto and Michio Kishi were assembling these data for a review paper for the book entitled *The Sea*. They agreed to send their manuscript to Dr. Peterson as soon as it was completed. Thus, much of what REX had proposed to do will be undertaken by others.
- Since the Symposium on *North Pacific transition areas* was approved by the Science Board, REX requests funds for at least one overseas person to attend that meeting. REX also requests funds for at least one person to attend the MODEL/REX meeting in Nemuro, Japan, in January 2002.
- REX involvement at PICES XI will include participating in joint PICES/GLOBEC-INT focus group meetings, convening the REX Task Team meeting and attending the CCCC-IP meetings.

identify which regions have the best time-series data sets that can be modeled. Without good data on seasonal cycles of forcing functions we will not be able to determine how well the models are simulating zooplankton and herring dynamics. During discussions, REX listed regions of interest and suggested names of people who can be contacted for information on available data on seasonal cycles of forcing functions. It was agreed that Dr. Peterson would produce a template illustrating how one might present information on seasonal cycles, using data from the Oregon/Washington coastal zone. That template would be distributed to other REX members for comment. January 1, 2002 was suggested as the deadline for this template.

2. REX felt that it would be useful to post data on seasonal cycles of temperature, nutrients, chlorophyll and zooplankton on the PICES website, so that the data were available to a wider audience.
3. REX pointed out the need to make the NEMURO model code available to more PICES scientists, so that a greater number of people could explore the application of the model to coastal regions.
4. REX discussed potential conflicts between PICES activities and GLOBEC activities during the two-day inter-session period between the GLOBEC Open Science Meeting and PICES XI. It was resolved that if there are time conflicts, the proposed

workshop on *Structure of pelagic coastal ecosystems around the Pacific Rim* could be postponed for one year. REX recognized that the task might be too big to be completed within a one-year time frame. The Task Team agreed to let the Co-Chairmen make the decision about a workshop after the CCCC-IP meeting was completed.

5. Dr. Yoshiro Watanabe was recommended to replace Dr. Tokimasa Kobayashi as REX Co-Chairman for the next three years. The three-year term of Dr. Peterson expired but he is prepared to remain as Co-Chairman for one more year to provide some continuity in the work of the Task Team. A new Co-Chairman from U.S.A. or Canada will be selected at PICES XI in Qingdao.

Requests for travel support

REX requests travel support for two scientists: one person to attend the MODEL/REX workshop (*REX Endnote 2*) scheduled for January 2002, in Nemuro, Japan, and one person to attend the PICES Eleventh Annual Meeting. Alternatively, if REX chooses to convene a workshop on *Structure of pelagic coastal ecosystems around the Pacific Rim* at PICES XI, it would be preferable to support travel for two people to PICES XI, and REX would not request travel support for anyone to attend the workshop in Nemuro. A second alternative is to send at least one person to the proposed PICES-sponsored symposium on *North Pacific transitional areas*, to be held in late April 2002, in La Paz, Mexico.

REX Endnote 1

Participation List

Members:

Kenji Asano (Japan)
Douglas E. Hay (Canada)
Brenda L. Norcross (U.S.A.)
William T. Peterson (U.S.A., Co-Chairman)
Vladimir I. Radchenko (Russia, Co-Chairman)
Yoshiro Watanabe (Japan, Co-Chairman)
Yutaka Watanuki (Japan)

Observers:

Harold P. Batchelder (U.S.A.)
Alexander Kaev (Russia)
Mamoru Kato (Japan)
Takashi Minami (Japan)
Patricia Livingston (U.S.A.)
Akihiko Yatsu (Japan)

REX Endnote 2

REX/MODEL Workshop

REX and MODEL will jointly build a Nutrient-Phytoplankton-Zooplankton-Fish (NPZF) model of the North Pacific coastal ecosystem, to examine regional and temporal variation in fish growth. Initial effort will be directed towards herring. The workshop will be planned so that the hypotheses and final data synthesis will be developed before the workshop. The benefits include:

- ability to consider management issues by using the models to provide insights into observed patterns in growth

- examine response to climate change
- facilitate the move towards considering fish embedded in ecosystems
- perform long-term forecasts

In the long-term, stock forecasts will use NPZF models to examine variation in productivity in other planktivorous fish stocks.

REPORT OF THE FINANCE AND ADMINISTRATION COMMITTEE

8

3

The Finance and Administration Committee (F&A) met from 08:30-12:30 hours on October 9, and from 09:00-12:30 on October 11, under the chairmanship of Dr. Richard J. Marasco. Dr. Alexander S. Bychkov acted as rapporteur.

Agenda Item 1. Opening by the Chairman

The Chairman called the meeting to order, welcomed participants and requested an introduction of members for each delegation (see *F&A Endnote 1* for list of participants). He emphasized that the Committee is responsible for reviewing financial and administrative matters in accordance with the Financial Regulations and Rules of Procedure of the Organization, and providing a report to the Governing Council for consideration and adoption.

Agenda Item 2. Adoption of agenda

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

Agenda Item 3. Audited accounts for fiscal year 2000

The Auditor's Report for 2000 (*F&A Endnote 3*) was circulated to all Contracting Parties in March 2001. In the auditor's opinion, the financial statements are an accurate representation of the financial position of the organization as of December 31, 2000.

The Report was reviewed and adopted by the Committee. The Committee recommends that Council approve the Report and retain the accounting firm of *Flader & Greene* as auditor for another year.

Agenda Item 4. Tenth Anniversary of PICES

The Executive Secretary reported on the implementation of Council's decisions made at the Eighth and Ninth Annual Meetings (Decision 99/A/4 and Decision 00/A/5) to commemorate the tenth anniversary of PICES (*F&A Endnote 4*). The Committee commended the Secretariat for the excellent response to these decisions.

Agenda Item 5. Annual contributions

As stated by Regulation 5(ii) of the Financial Regulations, all national contributions to PICES "shall be considered due as of the first day of the financial year (January 1) to which they relate". Late payments create problems for day-to-day operations of the Secretariat, and result in much lower interest income.

The Executive Secretary reported on the 2001 annual fees payment dates. Historical statistics on the payment schedule of annual fees to the Organization were reviewed (*F&A Endnote 5*). The Chairman noted that there has been an overall improvement in the timeliness of payment. Japan urged all member countries to make their annual contributions by January 1, 2002. China explained the reason for not having remitted the 2001 contribution by the time of the Annual Meeting, and indicated that payment will be made as soon as possible.

The Committee recommends that Council direct the Executive Secretary to send a letter to member countries commending them for improved performance in submitting annual contributions in 2000-2001. The Chairman suggested that Committee members advise their respective governments on the benefits of paying contributions on time.

Agenda Item 6. Budget

a. Estimated accounts for fiscal year 2001

The Committee reviewed and discussed the estimated accounts for *FY 2001*. There is to be a projected surplus of \$1,300. The Committee recommends that Council accept the estimated expenditures for *FY 2001*.

b. Budget for fiscal year 2002

The Committee reviewed the proposed *FY 2002* budget of \$623,000 (*F&A Endnote 6*) and recommends its approval by Council. A modest increase of about 3% over the previous year is consistent with the guideline accepted at the PICES Eighth Annual Meeting (Decision 99/A/2(ii), 1999 Annual Report, p. 30), and would maintain a constant budget after adjusting for inflation. The Executive Secretary noted that the total Consumer Price Index (CPI) was 2.8% in August 2001, as published by Statistics Canada on behalf of the Bank of Canada. The Canadian delegation stated that the actual CPI for 2002 could be higher than 2.8%.

A transfer of \$59,000 from the Working Capital Fund is recommended to reduce the total annual contribution to \$564,000, setting the 2002 fees at \$94,000 per Contracting Party (3.0% higher than in *FY 2001*).

The proposed budget does not include expenditures for the Intern Program or production of the North Pacific Ecosystem Status Report (a high priority PICES scientific project currently under discussion by the Science Board).

The Japanese delegation suggested that, as many member countries are under severe financial conditions, the budget of international organizations should be the minimum necessary. Therefore, the Japanese Government is requesting that many international organizations keep their nominal budget increase equal to zero, and that PICES cannot be an exception.

c. Forecast budget for fiscal year 2002

The *FY 2003* forecast budget of \$639,000 was examined by the Committee and is submitted to Council for information only. Consistency with guidelines adopted by Council in 1999 (Decision 99/A/2(ii)) necessitates setting the 2003 fee at \$96,800 per Contracting Party and requires a transfer of \$58,200 from the Working Capital Fund. The Committee believes that the practice of transferring surpluses from the Working Capital Fund to the General Fund is a viable approach to balance accounts. However, it was noted that the projected 2002 miscellaneous income of \$51,100 is lower than the required transfer.

The *FY 2003* budget will be further considered at PICES XI.

d. Interest and other income

During a fiscal year, the amount of funds in PICES accounts may be increased by miscellaneous income (tax rebates, income tax levies from foreign staff and bank interest), voluntary contributions and grants.

Miscellaneous income in 2001 was about \$50,000. It is likely to remain at the same level in 2002. The Committee also noted significant voluntary contributions and outside funding for various activities initiated by PICES.

e. Working Capital Fund

The estimated miscellaneous income credited to the Working Capital Fund in *FY 2001* is about \$41,600. In addition, the *FY 2001* budget surplus of \$1,300 will be transferred to the Fund at the end of the fiscal year. Voluntary contributions and grants received for financing special events in 2000 and 2001, and credited to the Working Capital Fund, are reflected in the Report on Administration (*GC Endnote 3*).

The balance in the Working Capital Fund is forecast to be about \$196,700 at the end of 2001.

The Committee recommends that the amount of \$59,000 be transferred to the General Fund and \$16,600 be transferred to the Trust Fund. After these transfers, the Working Capital Fund will total approximately \$122,400, including the \$12,300 contributed by the National Marine Fisheries Service (NOAA, U.S.A.) to finance the North Pacific Ecosystem Status Report through the proposed PICES Visiting Scientist Program.

f. Home Leave Relocation Fund

The status of the Home Leave Relocation Fund was reviewed. It was noted that expenditures in *FY 2001* would be offset by bank interest earned by the Fund and in part by the transferred income tax levies. The Fund will be at its maximum level of \$110,000 by the end of the fiscal year. No relocation expenses are expected in *FY 2002*.

g. Trust Fund

In *FY 2001*, approximately \$50,000 from the Trust Fund will be used to finance the Intern Program, to bring young scientists from all PICES member countries and scientists from countries with “economies in transition” to the PICES Tenth Annual Meeting, and to support WG/TT activities. These expenditures are compensated partly by the voluntary contributions from Canada and U.S.A. for the Intern Program, travel grants from the Scientific Committee of Oceanic Research (SCOR) and Fisheries and Oceans Canada (DFO), and bank interest. Total income is estimated at a level of \$38,400. As a result, the Trust Fund will be reduced by about \$11,600. A transfer of \$16,600 from the residual Working Capital Fund surplus to the Trust Fund is recommended to recover all 2001 expenses and restore the Trust Fund to a level of \$105,000 at the end of the fiscal year (this amount includes \$5,000 provided by DFO for Canadian academics and not used in 2001).

Without voluntary contributions and transferring the residual surplus from the Working Capital Fund, the 2002 Trust Fund will be reduced to about \$68,000. Working Capital Fund surplus transfers have allowed the Trust Fund to be

replenished for the last several years. It is unlikely that surpluses of this magnitude will exist in the future, so activities supported by the Trust Fund will be reduced accordingly, unless other sources of funds can be found.

Agenda Item 7. Fund-raising activity

The Executive Secretary reported on fund-raising efforts in 2001. External and additional funding received for various activities initiated by PICES is reflected in the Report on Administration (*GC Endnote 3*).

The Fund-Raising Committee (FRC) was established in 1999 to seek external funding consistent with the goals of the Organization (Decision 99/A/8). The F&A Committee recommends that Council disband the FRC Committee and assign its functions to the F&A Committee. To facilitate fund-raising activities, the Science Board has to be tasked with the responsibility of providing fully developed project proposals.

Agenda Item 8. PICES Intern Program

The Committee agreed that PICES and member countries benefit from the Intern Program, and that it should be continued.

PICES was able to continue the Intern Program in 2001 because, in addition to their annual fees, Canada and U.S.A. contributed \$10,000 and \$12,000, respectively, to the Trust Fund to finance the Program. At the moment, there is no special allocation for the Intern Program in the proposed *FY 2002* budget and forecast *FY 2003* budget. Moreover, Science Board is concerned that financing the Intern Program from the Trust Fund means reducing Trust Fund support for other activities. Permanent funding of the Intern Program requires replenishing the Trust Fund on a regular basis or developing some other mechanism to support it. Canada suggested that the PICES Intern Program should gradually be built into the annual budget. Russia and the United States supported this suggestion. China expressed a desire to finance the Program from voluntary contributions and/or the Trust Fund. This view was shared by Japan. Korea was

silent on the subject. The Committee did not reach a consensus on Canada's proposal.

Although the member countries made no firm commitments, Canada and the United States indicated a willingness to contribute if funds become available at fiscal year end.

Agenda Item 9. PICES Visiting Scientist Program

The Committee reviewed the proposed Visiting Scientists Program and suggested several editorial changes. Japan indicated that the implementation of the Program should not increase the budget. The Committee recommends that Council approve the Visiting Scientists Program (*GC Appendix B*).

Agenda Item 10. Schedule and financing of future Annual Meetings of the Organization

The dates and place of the Eleventh Annual Meeting were approved by correspondence. PICES XI will be held October 18-26, 2002, in Qingdao, People's Republic of China.

At the Ninth Annual Meeting, Council also approved the offer of the Republic of Korea to explore the possibility of hosting the Twelfth Annual Meeting, and notify PICES on its final decision by the end of 2000 (Decision 00/A/4(iii)). A letter from the Korean Ministry of Maritime Affairs and Fisheries indicated a willingness in hosting PICES XII. The Committee hence recommends that the Twelfth Annual Meeting be held October 17-25, 2003, in Seoul. Sufficient budgetary information should be provided as soon as possible, to facilitate *FY 2003* budget planning.

In keeping with the six-year rotation cycle, the United States of America should be invited to explore the feasibility of hosting PICES XIII, and inform the Secretariat on this matter by the end of year 2001. The most desirable dates for the meeting are October 15-23, 2004.

Because of the long duration and large size of the Annual Meetings (between 400-500 participants in recent years), they are becoming

too expensive to hold solely within the general budget. Venue rental, equipment rental, social events and printing costs, etc., have been rising steadily. One way to reduce costs is by charging a registration fee. Not only will it provide financing for the Annual Meeting, it will also impose a certain commitment on the participants for their decision of whether to attend or not, which is very important for the planning of the meeting. At present, financial and human resources are wasted because of casual registrations and cancellations.

The Committee recommends charging a registration fee for the future PICES Annual Meetings. The proposed fees are reflected in the following table:

Type	CDN \$
Early registrants	100
One-day fee	75
Late registrants	150
Students	40

Fees will be collected by the Secretariat and credited to the Working Capital Fund. These funds will be used to support the Intern Program and high priority projects.

Agenda Item 11. Assistant Executive Secretary position

The Executive Secretary informed the Committee that according to the PICES operational procedures, the term of office for the Assistant Executive Secretary is three years and may be extended or renewed at the discretion of Council. Dr. Stewart M. (Skip) McKinnell was appointed as the Assistant Executive Secretary, effective September 7, 1999, and his term will come to an end in September 2002, immediately prior to PICES XI. The Committee recommends that Council offer Dr. McKinnell a second term.

Agenda Item 12. Space, facilities & services

Space and certain general administrative services are traditionally provided to the Secretariat by the Government of Canada through Fisheries and Oceans Canada (DFO).

The agreement commenced April 1, 1992, and continues indefinitely with a review every three years. Since 1998, PICES has been paying a comprehensive fixed cost of \$4,000 per year for office space and janitorial/maintenance/mail/network services at the Institute of Ocean Sciences (IOS). Postage and phone/fax bills have been paid separately upon receipt of an invoice, and this part of communication costs was at a level of \$21,000-23,000.

This year, PICES and DFO signed a new agreement that covers the period between April 1, 2001, and March 31, 2004. According to this agreement, PICES pays an annual sum of \$23,000 (in quarterly payments of \$5,750 due on the 1st day of April, July, October and January), which includes a solid figure for postage (\$18,500), phone/fax (\$2,500) and janitorial/maintenance services (\$2,000).

On October 4, 2000, PICES was officially notified by network security staff at Fisheries and Oceans Canada that the domain name “@ios.bc.ca” would be discontinued effective December 31, 2000. PICES requested and received an extension to October 15, 2001. The main consequences for PICES was that its website and e-mail would cease to function as of

that date. Three alternatives were discussed with DFO staff: (i) PICES joining the Fisheries and Oceans Canada domain “@pac.dfo-mpo.gc.ca”; (ii) DFO supporting an independent PICES domain; and (iii) PICES using a commercial Internet service provider. The latter of these alternatives was the obvious choice for a variety of reasons. On December 8, 2000, PICES applied to legal authorities at IANA, the “.int” domain registry (the domain name “.int” had been established specifically for international organizations), to determine if PICES qualified and, if so, to register “@pices.int” as our domain name. Approval and registry of the domain name was an inefficient process but finally occurred in June 2001, just before our new website and e-mail addresses became active on June 11, 2001. The old site and names remained valid until October 15, 2001. The initial cost of equipment and installation was \$2,700. The monthly cost of operation is \$140. This compares with \$2,000 annually that was formerly paid to DFO for network services.

Agenda item 14. Adoption of F&A Report and recommendations to Council

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

F&A Endnote 1

Participation List

Canada

Elisabeth Marsollier
Laura Richards
Peggy Tsang

Japan

Nagahisa Uki
Tokio Wada
Hiroko Watanabe

People’s Republic of China

Qian-Fei Liu
Hong-Mei Xin

Republic of Korea

Hye-Jung Kim
Jin-Yeong Kim

Russia

Lev N. Bocharov
Alexander A. Kurmazov
Igor I. Shevchenko

U.S.A.

Elizabeth Tirpak
William L. Sullivan

Other

Vera Alexander (Vice-Chairman, PICES)
Hyung-Tack Huh (Chairman, PICES)
Richard J. Marasco (Chairman, F&A)
Alexander S. Bychkov (Executive Secretary)

F&A Endnote 2

F&A Committee Meeting Agenda

1. Opening by F&A Chairman
2. Adoption of agenda
3. Audited accounts for fiscal year 2000
4. Tenth anniversary of PICES
5. Annual contributions
6. Budget
 - a. Estimated accounts for fiscal year 2001
 - b. Proposed budget for fiscal year 2002
 - c. Forecast budget for fiscal year 2003
 - d. Interest and other income
 - e. Working Capital Fund
 - f. Home Leave and Relocation Fund
 - g. Trust Fund
7. Fund-raising activities
8. PICES Intern Program
9. Proposed PICES Visiting Scientist Program
10. Schedule and financing of future Annual Meetings of the Organization
11. Assistant Executive Secretary position
12. Space, facilities and services
13. Other business
14. Adoption of F&A Report and recommendations to Council

F&A Endnote 3

Auditor's report (2000) to the Organization

Flader and Greene
Chartered Accounts
9768 Third Street
Sidney, B.C.,
Canada. V8L 3A4

To the Council of the North Pacific Marine Science Organization

We have audited the statement of financial position of North Pacific Marine Science Organization as at December 31, 2000 and the statement of operations and changes in fund balances for the year then ended. These financial statements are the responsibility of the organization's management. Our responsibility is to express an opinion on these financial statements based on our audit.

We conducted our audit in accordance with generally accepted auditing standards. Those standards require that we plan and perform an audit to obtain reasonable assurance whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation.

In our opinion, these financial statements present fairly, in all material respects, the financial position of the organization as at December 31, 2000 and the results of its operations and changes in fund balances for the year then ended in accordance with generally accepted accounting principles.

Sidney, B.C.
March 22, 2001

Flader & Greene
Chartered Accountants

**NORTH PACIFIC MARINE SCIENCE ORGANIZATION
STATEMENT OF FINANCIAL POSITION
AS AT DECEMBER 31, 2000**

ASSETS	2000	1999
CURRENT ASSETS		
Cash and short term deposits	\$ 495,200	\$ 496,116
Accounts receivable	45,801	-
Prepaid expenses	1,460	3,802
	\$ 542,461	\$ 499,918
LIABILITIES		
CURRENT LIABILITIES		
Accounts payable	\$ 25,601	\$ 7,317
Funds held for contracting parties (Note 3)	91,300	88,600
Funds held for Beyond El Nino conference	-	46,848
	\$ 116,901	\$ 142,765
FUND BALANCES		
WORKING CAPITAL FUND	\$ 215,392	\$ 158,402
TRUST FUND	100,000	88,751
HOME LEAVE RELOCATION FUND	110,168	110,000
	\$ 425,560	\$ 357,153
	\$ 542,461	\$ 499,918

**STATEMENT OF OPERATIONS AND CHANGES IN FUND BALANCES
FOR THE YEAR ENDED DECEMBER 31, 2000**

	General Fund	Working Capital Fund	Trust Fund	Home Leave Relocation Fund	2000 Total	1999 Total
FUND BALANCES , beginning of year	-	\$ 158,402	\$ 88,751	\$ 110,000	\$ 357,153	\$ 371,777
SOURCES OF FUNDS						
Contributions from Contracting Parties	531,590	-	14,500	-	546,090	519,000
Budgeted transfer to General Fund	58,400	(58,400)	-	-	-	-
Contributions and grants	-	164,746	23,343	-	188,089	-
Interest and other income (Note 4)	-	43,118	4,182	4,650	51,950	39,550
FUND BALANCES , before expenditures	589,990	307,866	130,776	114,650	1,143,282	930,327
EXPENDITURES						
Personnel services	286,297	-	-	-	286,297	230,913
Travel	74,713	-	21,519	-	96,232	112,740
Communication	29,252	-	-	-	29,252	29,477
Contractual services	15,893	-	-	-	15,893	12,052
Printing	57,030	-	-	-	57,030	56,934
Supplies	6,984	-	-	-	6,984	6,755
Equipment	10,877	-	-	-	10,877	4,757
Annual Meeting	43,454	-	-	-	43,454	60,878
Workshops	31,904	73,006	-	-	104,910	39,998
Relocation	-	-	-	4,482	4,482	15,548
Miscellaneous	3,355	-	-	-	3,355	2,878
PICES X Anniversary	-	27,661	-	-	27,661	-
Intern program	-	-	18,060	-	18,060	-
Special projects	-	-	12,000	-	12,000	-
Unrealized losses on foreign exchange	1,235	-	-	-	1,235	244
	560,994	100,667	51,579	4,482	717,722	573,174
NET FUNDS AVAILABLE	28,996	207,199	79,197	110,168	425,560	357,153
TRANSFER TO WORKING CAPITAL FUND (Note 5)	(28,996)	28,996	-	-	-	-
INTERFUND TRANSFERS (Note 6)	-	(20,803)	20,803	-	-	-
FUND BALANCES , end of year (Note &)	-	\$ 215,392	\$ 100,000	\$ 110,168	\$ 425,560	\$ 357,153

**NORTH PACIFIC MARINE SCIENCE ORGANIZATION
NOTES TO THE FINANCIAL STATEMENTS
DECEMBER 31, 2000**

1. PURPOSE OF ORGANIZATION

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

2. ACCOUNTING POLICIES

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

(a) Fund Accounting

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

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

The Home Leave Relocation Fund was established in 1996 to pay relocation and home leave expenses of new employees and their dependents to the seat of the Secretariat and removal after period of employment has ended, and to provide home leave for international staff. This fund is set at \$110,000.

(b) Capital Assets

Capital assets acquired by the Organization are expensed in the year of acquisition.

(c) Income Tax

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

(d) Foreign Exchange

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

3. FUNDS HELD FOR CONTRACTING PARTIES

The funds held for contracting parties are advance contributions from Japan for their 2001 fees.

4. INTEREST AND OTHER INCOME

	Working Capital Fund	Trust Fund	Home Leave Relocation Fund
Interest income	\$ 8,114	\$ 4,182	\$ 4,650
Income tax levies	26,971	-	-
GST rebates	8,033	-	-
	\$ 43,118	\$ 4,182	\$ 4,650

5. TRANSFER TO WORKING CAPITAL FUND

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

6. INTERFUND TRANSFERS

Pursuant to decision 00/A/2(iii) of the Governing Council, \$20,803 was transferred to the Trust Fund.

7. WORKING CAPITAL FUND SURPLUS

Pursuant to decision 00/A/2(i) of the Governing Council, \$58,200 of the funds held in the Working Capital Fund will be transferred to the General Fund to reduce 2001 contributions.

8. COMMITMENTS

General administrative and communication services are provided to the Secretariat of the Organization by the Government of Canada through the Department of Fisheries and Oceans. This agreement commenced April 1, 1992 and continues indefinitely with a review every three years. The fixed cost for services is \$4,000 per year. Services provided are invoiced quarterly.

F&A Endnote 4

Tenth Anniversary of PICES

The Convention for a North Pacific Marine Science Organization entered into force on March 24, 1992, and the PICES First Annual Meeting was held in October 1992, in Victoria, Canada. At the Eighth Annual Meeting, Council decided that the Tenth Annual Meeting will be hosted by the Secretariat at the location of PICES I, in October 2001 (Decision 99/A/4). At the Ninth Annual Meeting, Council discussed and approved various activities being planned to commemorate the anniversary. It was noted that the *FY 2001* budget does not cover these items, and voluntary contributions and funds obtained from the 2001 Ocean Exhibition should be used to cover potential costs for special events associated with PICES X (Decision 00/A/5).

The following summarizes implementation of Council's decisions:

1. A letter was sent to member countries and agencies requesting voluntary contributions to support PICES X and activities related to the PICES' tenth anniversary. Voluntary contributions from National Marine Fisheries Service, NOAA, U.S.A. (\$71,350), Fisheries and Oceans Canada (\$10,000), National Oceanic and Atmospheric Administration, U.S.A. (\$15,350), TINRO-Center, Russia (\$1,460), and the PICES IX Local Organizing Committee, Hakodate, Japan (\$2,780) were received and used for financing PICES X special events during 2000 and 2001. To reduce PICES expenses for the Annual Meeting, Fisheries and Oceans Canada (Pacific Region) generously offered to host the Welcoming Reception and provide computers, audio-visual equipment, and staff for technical and logistical support.
2. Full or partial travel support was provided to the keynote speaker of the Opening Session (Dr. Warren Wooster), 5 invited speakers for the Science Board Anniversary Symposium, and 20 invited speakers (paid by PICES and co-sponsoring programs and organizations) for scientific sessions at PICES X.
3. Invitations, without financial commitments, were sent by the Secretariat to the founders of PICES, based on lists of names provided by member countries. After U.S.A. transferred special funds to PICES to support participation of US VIPs in PICES X, travel arrangements for them were made by the Secretariat. All VIPs were invited to the Chairman's Reception.
4. The Ocean Exhibition, organized in conjunction with PICES X, raised a revenue of \$9,000.
5. The special PICES Anniversary Book: *Historical Atlas of the North Pacific Ocean: Maps of discovery and scientific exploration 1500-2000*, was published in August and distributed at PICES X. The book received excellent reviews and was selected as "Peak of the Week" by *The Globe and Mail* (October 6, 2001). The total cost of the book was estimated at a level of \$100,000. The expenses were substantially reduced (to about \$54,000) by signing an agreement with *Douglas & McIntyre*, allowing the publisher to produce additionally a minimum 7,000 copies for sale in Canada (2,500), U.S.A. (3,500) and UK (1,000). The remaining expenses were covered by a donation received from the National Marine Fisheries Service (NOAA, U.S.A.).
6. After evaluating the feasibility of an open house on scientific research vessels during PICES X, the event was cancelled.
7. Media was approached to raise public awareness about the Organization and the PICES Tenth Annual Meeting. Fisheries and Oceans Canada (Pacific Region) provided communications support by issuing a News Release.

The public was invited to attend the following events on themes facing the North Pacific:

Paul Kennedy, Host and Producer of the popular CBC Radio *Ideas* program, led a lecture and discussion on “Exciting developments in learning from the Oceans” at the Lester B. Pearson College on October 6. The program was featured via an interactive webcast on *www.racerocks.com* with Pearson College students also on location at Race Rocks. Race Rocks was announced as Canada’s first Marine Protected Area under the *Oceans Act* on September 14, 2000.

Dr. Nathan Mantua, from the Joint Institute for the Study of the Atmosphere and

Oceans, located at the University of Washington, gave a talk on “Biotic consequences of climate variations: A review of empirical evidence for strong biophysical interactions in the North Pacific” on October 12, at the University of Victoria.

Dr. Vera Alexander, Vice-Chairman of PICES and Dean of the School of Fisheries & Ocean Sciences at the University of Alaska, prepared a lecture on “Trouble in the northern North Pacific? As the wind blows...”. Fisheries and Oceans Canada scientist Dr. Richard J. Beamish, internationally-renowned researcher, challenged conceptions about fish and the marine environment in his lecture “Changing how we think about fish”.

F&A Endnote 5

Payment schedule of national contributions¹

	CANADA	CHINA	JAPAN	KOREA	RUSSIA	U.S.A.
1992 ²	June 9, 92	Sept. 29, 92	Mar. 23, 92			Apr. 24, 92
1993	Dec. 14, 92	July 30, 93	Mar. 12, 93			Jan. 8, 93
1994	Feb. 22, 94	Mar. 14, 94	Jan. 28, 94			Feb. 14, 94
1995	Jan. 5, 95	May 29, 95	Mar. 4, 95		July 18, 95	Mar. 21, 95
1996	Feb. 21, 96	May 23, 96	Jan. 12, 96	July 9, 96	Feb. 21, 96	Feb. 29, 96
1997	Dec. 20, 96	Mar. 27, 97	Apr. 21, 97	May 6, 97	Oct. 8, 97	Jan. 20, 97
1998	Feb. 3, 98	May 8, 98	Jan. 13, 98	Dec. 5, 98 Jan. 6, 99³	July 22, 98	May 7, 98
1999	Nov. 30, 98	Nov. 26, 99	Mar. 29, 99	Aug. 16, 99	Dec. 13, 99	Jan. 27, 99
2000	Feb. 9, 00	Aug. 29, 00	Nov. 30, 99	June 1, 00	Nov. 2, 00	Jan. 18, 00
2001	Jan. 24, 01	Not received as of Oct. 1, 01	Dec. 13, 00	Aug. 23, 01	May 18, 01	Jan. 3, 01

¹ bold italics denote late payment

² partial year from March 23-December 31, 1992

³ partial payment in 1998, remainder paid in 1999

F&A Endnote 6**Budget for fiscal year 2002**

Category	Allotment
Personnel Services	\$ 304,000
Annual Meeting	50,000
Special Meetings	58,000
Travel	78,000
Printing	69,000
Communication	32,000
Equipment	7,000
Supplies	7,500
Contractual Services	14,000
Miscellaneous	3,500
Total	\$ 623,000

Source	Contribution
Contributions from six Contracting Parties	564,000
Transfer of Working Capital Fund surplus	59,000
Total	\$ 623,000

2002 Annual Fee for each Party**CDN \$ 94,000**

LIST OF PARTICIPANTS



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LIST OF ACRONYMS

ACIA	Arctic Climate Impact Assessment Program (ACIAP of AMAP)
AFS CAR	American Fisheries Society Program on Climate and Aquatic Resources
AMAP	Arctic Monitoring and Assessment Program
APEC	Marine Resources Conservation WG (MRC), Asia Pacific Economic Cooperation
APFIC	Asia-Pacific Fisheries Commission
Argo	International Program for deployment of profiling floats
BASS (TT)	Basin Studies (Task Team)
BIO	Biological Oceanography Committee
CCCC	Climate Change and Carrying Capacity Program
CIBNOR	Centro de Investigaciones Biologicas del Noroeste
CICESE	Centro de Investigacion Cientifica y de Educacion Superior de Ensenada
CICIMAR	Centro Interdisciplinario de Ciencias Marinas
CLIVAR	Climate Variability and Predictability Program
CoML	Census of Marine Life Program
COP	Coastal Ocean Program
CPR	Continuous Plankton Recorder Program
CREAMS	Circulation Research of the East Asian Marginal Seas Program
DBCP	Data Buoy Cooperation Panel
EC/IP	Executive Committee / Implementation Panel for CCCC
ECOHAB	The Ecology and Oceanography of Harmful Algal Blooms
EVOS	Exxon Valdez Oilspill Trustee Council
FAO	Food and Agriculture Organization
FIS	Fishery Science Committee
FOCI	Fishery Research Oceanography Coordinated Investigations program
GCOS	Global Climate Observing System
GE-BCDMEP	Group of Experts on Biological and Chemical Data Management and Exchange Practices
GEM	Gulf of Alaska Ecosystem Monitoring and Research Program
GEOHAB	Global Ecology and Oceanography of Harmful Algal Blooms
GESAMP	Group of Experts on Scientific Aspects of Marine Pollution
GIPME	Global Investigation of Pollution in the Marine Environment
GIWA	Global International Waters Assessment program
GLOBEC	Global Ocean Ecosystem Dynamics Programme
GODAE	Global Ocean Data Assimilation Experiment
GOOS	Global Ocean Observing System
HAB	Harmful Algal Blooms
HTL	Higher Trophic Level
IATTC	Inter-American Tropical Tuna Commission
ICES	International Council for the Exploration of the Sea
ICSU	International Council of Scientific Unions
IFEP	PICES Advisory Panel on Iron Fertilization Experiment
IGOSS	Integrated Global Ocean Services System
IGPB	International Geosphere Biosphere Programme
IOC	Intergovernmental Oceanographic Commission
IODE	International Oceanographic Data Information Exchange (IOC)

IPCC	International Panel on Climate Change
IPHC	International Pacific Halibut Commission
IPRC	International Pacific Research Center
IRI	International Research Institute for Climate Prediction, Columbia University
ISCTNP	Interim Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean
JGOFS	Joint Global Ocean Flux Study (IGPB)
JODC	Japanese Oceanographic Data Center
LTL	Lower Trophic Level
MBMAP	PICES Advisory Panel on Marine Birds and Mammals
MEDS	Marine Environmental Data Center
MEQ	Marine Environmental Committee
MIRC	Marine Information Research Center
MODEL (TT)	Conceptual / Theoretical and Modeling Studies (Task Team)
MONITOR (TT)	Monitor (Task Team)
MOU	Memorandum of Understanding
NAFO	North Atlantic Fisheries Organization
NASCO	North Atlantic Salmon Conservation Organization
NEAR-GOOS	North East Asian Regional GOOS
NIES	National Institute for Environmental Studies, Japan
NOAA	National Oceanographic and Atmospheric Administration (U.S.A.)
NODC	National Oceanographic Data Center
NPAFC	North Pacific Anadromous Fish Commission
NPESR	North Pacific Ecosystem Status Report
PICES	North Pacific Marine Science Organization
PNCERS	Pacific Northwest Coastal Ecosystem Regional Study
POC	Physical Oceanography and Climate Committee
PORSEC	Pacific Ocean Remote Sensing Conference
PSARC	Pacific Scientific Advice Review Committee, Fisheries and Oceans Canada
PSC	Pacific Salmon Commission
PSG	Pacific Seabird Group
RAC	Regional Analysis Center
REX (TT)	Regional Experiments (Task Team)
SAHFOS	Sir Alister Hardy Foundation for Ocean Science
SCOPE	Scientific Committee on Problems of the Environment
SCOR	Scientific Committee on Oceanic Research
SEBSCC	Southeast Bering Sea Carrying Capacity Program
SPACC	Small Pelagic Fishes and Climate Change Program of GLOBEC
SPC	South Pacific Commission
SPREP	South Pacific Regional Environmental Program
TCODE	Technical Committee on Data Exchange
UNEP	United Nations Environment Program
UNESCO	United Nations Educational, Scientific, and Cultural Organization
WCRP	World Climate Research Program
WESTPAC	Sub-Committee for the Western Pacific Intergovernmental Oceanographic Commission
WG	Working Group
WMO	World Meteorological Organization
WOCE	World Ocean Circulation Experiment