NORTH PACIFIC MARINE SCIENCE ORGANIZATION

(PICES)

ANNUAL REPORT

NINTH MEETING

HAKODATE, HOKKAIDO, JAPAN

OCTOBER 20-28, 2000

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REPORT OF OPENING SESSION

The Opening Session was called to order at 9:00 am on October 23. The Chairman, Dr. Hyung-Tack Huh, welcomed delegates, observers and researchers to the Ninth Annual Meeting. Dr. Huh introduced the Mayor of Hakodate, Mr. Hiroshi Inoue, who greeted participants on behalf of the host city.

Mr. Chairman, distinguished Delegates, ladies and gentlemen:

It is my great pleasure to have this opportunity of personally offering a few words of greeting. First, on behalf of the citizens of Hakodate, I would like to express my warmest welcome to all of you. It also gives us great pleasure to greet all the participants here in Hakodate from all over the world to the PICES Ninth Annual Meeting.

With the 21st century just ahead, we, human beings, are faced with serious problems such as an increasing human population, decreasing food resources, anticipated food shortage, and global environmental problems. So, worldwide interest in the ocean has been increasing day by day.

Under these circumstances, it is appropriate that the PICES Ninth Annual Meeting be held here so all the participants can report on the results of their research and exchange views regarding marine environment change, useful utilization of living resources, and the impacts on ecosystems by human activities such as fishing. I also believe that this meeting will have a great significance in promoting the development of marine science.

This Future University of Hakodate, venue for this meeting, opened in April this year with the objective of developing human resources so that they can play active role in the forefront of today's information intensive society. I sincerely hope that you will actively exchange views and information in the novel, futuristic and open atmosphere of the university.

In conclusion, I offer to the PICES Ninth Annual Meeting my best wishes for success. Also, I would like to express my gratitude to the members of PICES and related organizations such as the Ministry of Foreign Affairs, who have made special efforts to make this meeting possible in Hakodate. Thank you for your attention.

Dr. Huh asked Mr. Yukiya Amano, Deputy Director-General for Arms Control and Scientific Affairs, Ministry of Foreign Affairs, to welcome participants on behalf of the Japanese Government.

Thank you Dr. Huh for your very kind introduction. Distinguished Delegates, participants, ladies and gentlemen:

I am honored to have the opportunity to welcome you all today. I would like to express my sincere welcome to all participants, especially those who have traveled long distances and spared valuable time from their very busy schedules to attend this meeting. I would like to say a few words on behalf of the Japanese Government at the start of the PICES Ninth Annual Meeting.

One of my duties in the Ministry of Foreign Affairs of Japan is to promote both bilateral and multilateral cooperation in science and technology. Recent years' progress in the field of science and technology has opened up new intellectual frontiers. At the same time, as the development in information and communication technologies have underpinned the development of globalization, progress in the field of science and technology has had a substantial influence on economic and industrial activities as well.

Such broad influences brought about by the progress in science and technology may cross

beyond national borders reaching the entire international society. The international community is now confronted with various global issues that can no longer be solved by a single nation. Some examples of these issues include environmental problems, the population explosion, energy supply, food security, and so on. Against this background, the world is following with great expectation and interest, the progress of science and technology.

As things are being globalized, it is a prerequisite for realizing the peace and prosperity of the international community to tackle these global and common issues of the international community. To solve these global issues, it is also necessary to make all the scientific and technological expertise available through international cooperation. Recently research projects in the field of science and technology are getting larger, such as the international Space Station, human genome and others. No country alone can easily afford to cope with current issues. International cooperation in science and technology is also indispensable to make use of effective funds and scientific knowledge.

Under these circumstances, Japan intends to play a positive role commensurate with its status in the international community through bilateral and multilateral cooperative activities in the field of science and technology. These are the basic thoughts based on which Japan has been making efforts to promote international cooperation in the field of science and technology, and that through international agreements with about 40 countries.

Now to focus on marine science. This is a very old theme of science. The sea, which covers 70% of the surface of the Earth, has existed far longer than human beings. The sea has always been deeply connected with human life. The North Pacific region has a lot to do with the global environment and climate change. As our life in Japan depends on the sea for fisheries, transportation and many other things, it is important for our country to promote various scientific marine research in this region.

In marine scientific research, international cooperation is a prerequisite. Specifically, regarding marine scientific research in Japanese waters, it is essential to cooperate with the countries in this region. PICES has been highly valued by Japanese marine science researchers as an important forum to exchange information among scientists in the North Pacific region. It is an indispensable organization for marine scientists who conduct research on the North Pacific region including the area around Japan, while actively participating in PICES activities.

PICES is currently holding its ninth meeting. Since we had the first PICES Meeting in Victoria in 1992, PICES has steadily expanded its activities by sharing scientific knowledge, and providing a forum to exchange information among marine scientists from the member countries in the various fields of marine science. Next year we will mark the tenth anniversary of PICES. I hope that we can exchange information on various plans to commemorate the anniversary at this meeting.

I hope that PICES activities will develop in the future and contribute to the solution of global issues, particularly those relating to humanity. The purpose of the PICES Meeting is not only to discuss and to exchange information and knowledge, but also to form a well-fabricated network of scientists. I believe this network will make our research activities efficient.

Lastly I wish to extend my gratitude to Dr. Huh and the citizens of Hakodate. Thank you very much.

Dr. Huh then called upon Dr. William G. Doubleday to make a statement on behalf of the Canadian Government.

Mr. Chairman, your Worship the Mayor of Hakodate, honoured guests, distinguished Delegates and scientific colleagues:

On behalf of Canada and the Canadian delegation, I wish to thank the Government of Japan and the City of Hakodate for inviting us here to a city with a long and strong connection with the sea.

Canada is a strong supporter of PICES. We are encouraged by the way PICES shares data and ideas across the disciplines of marine science. We must build on the success of PICES to expand this cooperation and increase the data we share.

World scale cooperative ocean monitoring systems are gaining momentum. Argo is underway and Canada is joining other countries deploying Argo drifting buoys in the North Pacific. PICES should play a key role in Argo implementation in the North Pacific. PICES should also play an active role in implementing GOOS, the Global Ocean Observing System in our area. We believe that PICES should have a single monitoring committee covering all aspects of North Pacific ocean monitoring.

PICES has expanded its cooperation with other organizations and is beginning to involve climatologists in our community. The North Pacific CO_2 Data Synthesis Symposium and associated Workshop held in conjunction with the Ninth Annual Meeting last week is a good example of progress in this area. We should continue to expand the PICES community to address issues of coastal and ocean management and to develop close links with climate programs such as CLIVAR.

The cooperation of fisheries commissions with PICES in sponsoring the Beyond El Niño Conference on Pacific Climate Variability and Marine Ecosystem Impacts is a sign of the growing recognition and influence of PICES. The joint symposium with NPAFC next week is another sign of the increasing importance of PICES. The excellent program and high level of participation at this meeting demonstrate that PICES continues to grow as a focus for all kinds of marine science in the North Pacific. Let us work together to continue this growth! Thank you.

Dr. Huh called upon Mr. Qian-Fei Liu, to make a statement on behalf of the Chinese Government.

Mr. Chairman, distinguished guests, ladies and gentlemen:

First of all, I want to sincerely thank the Japanese Government for the excellent organization of the PICES Ninth Annual Meeting and generous support to the Meeting. I am very honored to be able to deliver a speech on behalf of the Chinese delegation.
The Chinese government has always supported bilateral and multilateral exchange and cooperation in science and technology with all the countries in the world. Today, environmental deterioration, energy shortage and other problems have caused concerns from the whole world as they are threatening human life. To solve these problems, there needs to be a wide range of international cooperation as well as mutual exchange of scientific information.

The ocean occupies more than 70% of the total surface area of the Earth and it has a close relationship with human existence. Human beings have put a lot of time and resources into marine scientific research. These inputs will be increased in the future and many global marine research projects require the participation of different countries.

The oceanic research is aimed at not only the ocean environment, but also the interaction of the ocean and meteorology and their effect on the global climate, fauna, flora, ecology, and human activities related to the oceans. China, as a coastal nation of the North Pacific, is one of the major world oceanic scientific research countries with major marine fisheries. Under the circumstance of limited available resources, making full use of the ocean resources will be of future potential development. Therefore, all member states will play a very important role in

the future oceanic studies. I hope, through active cooperation, we will conduct more scientific research in the North Pacific region to promote scientific progress. I hope that all the participants will join in becoming the force to push the future cooperation in this region.

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

Dr. Huh called upon Mr. Lae-Hyung Hong to make a statement on behalf of the Republic of Korea.

Mr. Chairman and distinguished Delegates, ladies and gentleman:

It is a great honor for me to have the opportunity to give an address on behalf of the Korean Delegation. I would like to thank the Japanese Government, the Hakodate local government and PICES staff for inviting us to this lovely place.

Over the last decade, we saw many important events which were crucial for the ocean community. For example, the UN Conference on Environmental and Development and the UN Convention on the Law of the Sea give much greater implications and responsibilities to us to strengthen and develop marine related activities in an effective manner. That's why we are interested in PICES.

I firmly believe that PICES has made progress since 1992 in quantity as well as quality. With regards to the program of PICES, we are pleased to see that PICES is concentrating on timely and appropriate issues such as El Niño and the relation between climate change and the marine ecosystem. We hope that PICES will greatly contribute to the societies of oceanography, fisheries, and other marine related fields.

The Korean Government and scientists will be highly supportive of cooperative studies promoting and coordinating marine science in the North Pacific Ocean. Moreover, we hope that PICES will progress to contribute to regional economic growth by applying its marine scientific knowledge.

It is also my pleasure to take note that our government will host the 5th IOC/WESTPAC Scientific Symposium in August 2001, in Seoul, as a follow up to the 4th IOC/WESTPAC session held in Seoul, in March 1999. I hope that this symposium will provide an opportunity for us to share the result of PICES programs with other international organization in the North Pacific area.

Lastly, the Korean Delegation wishes all participants at the PICES Ninth Annual Meeting success in their scientific undertakings. Thank you very much.

Dr. Huh called upon Dr. Lev N. Bocharov to speak on behalf of the Russian Federation.
Dear Mr. Chairman, Honourable Mr. Inoue, Mayor of Hakodate, Mr. Amano, distinguished Delegates, ladies and gentlemen:

First of all, I would like to take the opportunity to say many thanks to the host country of the PICES Ninth Annual Meeting, to the Government of Japan, and to the Local Supporting Committee for the hard work in arranging this event. This meeting is very important for the scientists from North Pacific countries. Especially, I want to express my gratitude to the PICES Secretariat, whose work is equally successful on the both sides of the Pacific Ocean - in Japan and Russia, in the U.S.A. and Korea, in Canada and China.

PICES IX has already started its work and we must just wish for its successful continuation. But next year PICES will be holding an unusual Annual Meeting. Firstly, the meeting will be held in the PICES Secretariat' home country – Canada. Secondly, it will be the jubilee Tenth Anniversary Meeting. And we shall have to summarize the results of the first decade of PICES' existence. But some things we can already say now.

PICES' work has become very active. This year PICES already held two impotent events. One was the CCCC/MODEL Workshop on Lower Trophic Level Modelling in Nemuro, Japan. The other one was the Beyond El Niño Conference on Pacific Climate Variability and Marine Ecosystem Impacts in La Jolla, U.S.A., this spring. I think they gave new insights into the influence of climate extremes on living marine resources.

The cooperation with other International marine organizations became more active too – with the International Pacific Halibut Commission, the North Pacific Anadromous Fish Commission, etc.

Moreover, this year, my institute, the TINRO-Centre which hosted PICES VIII in Vladivostok, celebrated its 75th anniversary. So taking this opportunity, I say many thanks to Dr. Huh, the PICES Chairman, and to the PICES Secretariat for their warm congratulatory letters.

I believe that this year, PICES has given birth to one more good tradition here in Hakodate. The scientists from different countries will meet the students and fishermen of Hokkaido and share with them their scientific experience about marine living resources. We all wish to maintain the Ocean for the future generations and do our best for it. The scientific activity is a creative process, and the future of mankind must be built not by consumption, but by creativity.

I wish the PICES Ninth Annual Meeting a big creative success, which is impossible without wide international cooperation. Thank you.

Dr. Huh called upon Dr. Vera Alexander to make a statement on behalf of the U.S. Government.

Mayor Inoue, Mr. Amano, Chairman Huh, distinguished participants:

I speak on behalf of the United States Delegation to express our deep indebtedness to our hosts for providing us with an outstanding venue and support for the Ninth Annual Meeting of PICES. This promises to be an outstanding meeting.

As the end of the first decade of its life approaches, PICES has, we believe, fulfilled a potential which less than ten years ago was only a dream - to bring together the active leading scientists, both young and old, to address scientific problems of the North Pacific which can only be approached on a multi-national basis. PICES is doing this, and doing it well. Also, it is good to bring together scientists with differing scientific cultures, to develop mutual understanding and friendship. The exchange of information is flourishing.

Our hosts in Japan have selected an appropriate site for this meeting. Hakodate is an outstanding choice – a prime fishing hub and a world-class fisheries education and research center. Scientists from here have been among the first to recognize the importance of knowledge about the marine ecosystem and climate to understanding fish stocks. Many of the outstanding marine and fisheries scientists have received their training here, and their web of international contacts is broad and long-standing. Also, we are meeting at a new university, dedicated to the future. So is PICES, as we look forward to the approaching second decade.

Once again, we are excited about the productive, stimulating and even exciting week to come. We will move PICES forward one more step. Special recognition must go to the Japanese government, to Hokkaido, Hakodate, the Local Support Committee, and to our Japanese colleagues who have worked hard and long to assure the success of this meeting. Last but not least, the PICES Secretariat has done the usual excellent job in making sure that all details are taken care of. Thank you.

Dr. Huh asked Dr. Tadashi Inada to provide a few words on behalf of the Japanese Government.

Honourable guests and participants:

On behalf of Japanese marine scientists, I welcome all of you to Japan and Hakodate. I hope your trip to Hakodate was smooth and enjoyable.

This is the second PICES Annual Meeting held in Japan. The first time, we had it in Nemuro, the city of fishery at the easternmost of Japan and situated in the subarctic water. This time, we are here in Hakodate, the city of fishery, marine industry, marine sciences and sightseeing, at the southern boundary of subarctic water. Thus, you can expect nice seafood at night sessions.

In the preparation and arrangement of this meeting, we have had great support from Hakodate City and the members of the Local Supporting Committee. Also, we must thank the Hakodate Future University, as they offered their campus for our venue.

I believe PICES was established, as a Pacific ICES, to promote and co-ordinate marine sciences toward the wisdom for the best use of marine living resources in the North Pacific. This is also one of the goals for the Fisheries Agency and Fisheries Research Institutes under it. Increasing human population and increasing needs for food supply, and anticipated global climate changes, demand the best available solution as soon as possible. The PICES-GLOBEC "Carrying Capacity and Climate Change", so called 4C's Program, is the first and direct action plan of PICES toward this goal. The scientific question addressed by the 4C's Program is "How do the North Pacific marine ecosystems respond to climate changes, and how will the carrying capacity of important marine living resources be affected by it?"

This question is very difficult to answer by the science of a single discipline. The huge extent of the North Pacific makes it difficult to solve these questions by the effort of a single country. The need for co-operation is strengthened by the facts coming out through the implementation of the 4C's Program.

This past February, the PICES Lower Trophic Level Modeling Workshop was held in Nemuro. At this workshop, modelers and other scientists from all PICES countries met to discuss the technical problems of modeling, parameter setting, and observational data to verify the models. It was a fruitful workshop as a PICES activity.

Another important issue is the connection between regional ecosystems. Subarctic zooplankton move over-winter in the deeper layer and are transported at least one thousand kilometres by currents. In the case of fishes living in the subarctic region, for example, salmon also migrates between the coast of Japan and the Bering Sea and live on zooplankton in those areas. These migrants connect ecosystem dynamics spanning thousands of kilometers. Thus in order to reach the goal of the 4C's Program, we need not only to make inter-comparisons among regional ecosystem models, but also need to connect them by advection and migration.

The 4C's Program must begin the third phase of its implementation, where intense integration and synthesis will occur. One of the most important characteristics of PICES as a scientific organization is its function in inter-disciplinary and international co-ordination and co-operation. Thus we are here to develop tight inter-discipline, international and also intra-national co-operation. I believe important steps shall be made through this Annual Meeting.

Before ending my speech, I would like to relay Dr. Kashiwai's promise to recover and to pass his best regards to all of PICES friends. Thank you for your kind attention.

Dr. Huh thanked the Mayor Inoue, Mr. Amano and all the delegates for their remarks and spoke on behalf of PICES:

Honorable Mayor of Hakodate, Mr. Hiroshi Inoue, Mr. Yukiya Amano of the Japanese Ministry of Foreign Affairs, distinguished participants, ladies and gentlemen:

On behalf of PICES, I would like to extend a warm welcome to all of you to the Ninth Annual Meeting of PICES. It has been generally said that the New Millennium is the Era of the Pacific, and I am very excited by the fact that the first annual meeting of PICES in the new millennium is held in this beautiful City of Hakodate. I feel very comfortable to be here this morning as this is my second visit to Hokkaido. I believe that everybody from overseas particularly those who were in Nemuro in 1994 at the Third Annual Meeting will be reminded of the warm hospitality of the Hokkaido people. I, therefore, would like to express my special thanks to the citizens of Hakodate and commend the hard work of the Local Supporting Committee in preparing this Meeting.

PICES is now eight and a half years old, still young, but has grown as a strong international scientific organization with active participation of hundreds of scientists and government representatives from the nations in the North Pacific. Dr. Vera Alexander, Vice-Chairman of PICES, said last year that PICES "is a mature organization", and Dr. William Aron, then a delegate of the U.S.A., said in 1994, that PICES is "a formidable intellectual enterprise" when we were only two and a half years old. Well, I am not 100% sure about these comments, but I certainly believe that PICES has now become the main forum for advancing and coordinating international marine sciences in the North Pacific, and will continue to play a major role in providing the scientific underpinning for decisions regarding the sustainable use of marine resources of the North Pacific Ocean.

During the last inter-sessional period, PICES has made many recognizable accomplishments through meetings, publications, strengthening relationships with other international organizations, soliciting action plans, and so on. Among more than ten PICES-arranged meetings, the Beyond El-Niño Conference, held in La Jolla, U.S.A. last March, appeared to be one of the most successful events. The Conference was the first large inter-sessional meeting organized by PICES. It was well attended by scientists from member states and also from other Pacific Rim nations such as Mexico, Peru, Chile, Columbia and New Caledonia. We are very much indebted to Dr. Warren Wooster and his Steering Committee members for the excellent conference.

As for publications, I believe it is worth mentioning that the papers from 1999 Science Board Symposium were published last month as a Special Issue of Progress in Oceanography *under the theme of "The Nature and Impacts of North Pacific Climate Regime Shifts". The papers from the Beyond El-Niño Conference are also in progress of being published next year as the 3rd PICES Special Issue of* Progress in Oceanography. *We would like to continue to have this series of publication, as it is one of the best ways to communicate research results and accomplishments of PICES to the scientific community.*

Strengthening relationships with other international organizations and programs has been among the top priorities for PICES. This year has been quite successful in this regard as we have found many allies such as IATTC (Inter-American Tropical Tuna Commission), IPHC (International Pacific Halibut Commission), ISC (Interim Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean), NPAFC (North Pacific Anadromous Fish Commission) and SCOR (Scientific Committee on Oceanic Research) to join PICES in co-sponsoring the Beyond El-Niño Conference. The joint workshops by NPAFC/ PICES on "Salmon and Climate Variability" and by ICES/PICES on "Zooplankton Ecology" exemplify the close cooperation between international bodies in advancing the marine sciences in the North Pacific.

As many people have already pointed out, PICES is now a strong, vibrant and very important ocean science organization, and its scientific prowess is widely recognized. PICES has made its own tradition, spirit and style of collaboration. With its effectiveness and scientific constituency, I hope that PICES will continue to gain momentum in the scientific community and to meet the challenge ahead of us in the coming years.

I am very pleased to see that we have a very exciting and diverse scientific program for the Annual Meeting. The program includes subjects of vital importance to the oceans community, covering a wide range of topics such as CO_2 cycle, subarctic gyre processes, plankton ecology and trophic pathways, sea birds and mammals, iron fertilization, ecosystem models, effects of climate variability on fish, large scale circulation, etc. I would like to recognize the significant contribution of Ms. Patricia Livingston and her troop, members of the Science Board, in making this excellent program.

It is a truly encouraging thing to see an ever-increasing number of participants at our Annual Meetings. Thanks to everybody for coming to Hakodate. I am particularly thankful to the Pacific Oceanological Institute of Russia and the Pukyung National University of Korea for sending their research vessels with big groups of scientists and students to Hakodate on the occasion of this Ninth Annual Meeting of PICES.

Before closing my remarks, I would like to recollect the memory of the late Prof. Kiyotaka Ohtani of the Hokkaido University. Prof. Ohtani, who passed away last year, made a great contribution to PICES. He had been deeply involved in PICES activities, particularly in the publication of "Dynamics of the Bering Sea" which is one of the best books PICES has published so far. We miss him very much as we gathered here in his hometown, Hakodate.

I would also like to share our concern for the illness of Dr. Makoto Kashiwai of the Hokkaido National Fisheries Research Institute. Dr. Kashiwai, the former Chairman of Science Board, has been one of the most enthusiastic supporters of PICES. He was suddenly hospitalized and had an operation last week. I hope you would join me in wishing him a fast and complete recovery.

Finally, I would like to recognize the support of organizations and people for which we are very much thankful: the City of Hakodate, the Japanese Ministry of Education, the Ministry of Foreign Affairs, the Japanese Fisheries Agency, the Environmental Agency of Japan, the Japan Science and Technology Corporation, the Future University of Hakodate, and Prof. Yutaka Nagata of the Marine Information Research Center.

I wish the meeting a full success and all participants a memorable time in Hakodate. Thank you.

Dr. Huh then introduced Ms. Patricia Livingston, the Science Board Chairman, to review PICES' scientific accomplishments in 2000.

The year 2000 saw continued progress in the area of international collaborative field and laboratory work by the PICES scientific community. A PICES-sponsored interdisciplinary cruise aboard a research vessel "Professor Gagarinsky" was organized by the Pacific Oceanological Institute (Vladivostok, Russia) to study ecosystem structure and dynamics of the northern Japan/East Sea. Integration of the results from the 1999 international Vancouver Harbour Practical Workshop by scientists of our Marine Environmental Quality Committee's Working Group 8 on Practical Assessment Methodology will take place in one of the topic sessions at this year's Annual Meeting. All collected data will be compiled and published as a PICES Scientific Report in 2001. Similarly, the Physical Oceanography and Climate Committee's

Working Group 13 on Carbon Dioxide in the North Pacific continued to make significant progress in improving measurement quality for the carbonate parameters by carrying out a series of between laboratory comparisons of measurement technique. This year's inter-comparison, followed up by a technical workshop in Tsukuba, was focused on the measurement of total alkalinity in seawater. Finally, the PICES-GLOBEC Climate Change and Carrying Capacity Program (CCCC) continued its two-year study to initiate continuous plankton recorder (CPR) monitoring in the North Pacific and showed interesting results with regard to a latitudinal gradient in maturation timing for winter-spring dominant copepods. PICES continues to discuss how to maintain this monitoring as a long-term PICES effort.

International collaborations of PICES are expanding. PICES scientists participated in a joint ICES/PICES mini-symposium at a meeting of the ICES Zooplankton Ecology Working Group in spring 2000. Plans for a jointly sponsored large symposium on zooplankton ecology by ICES, PICES and GLOBEC are now underway. The North Pacific Anadromous Fish Commission (NPAFC) and PICES jointly sponsored an international workshop on "Factors affecting production of juvenile salmon" in Tokyo just after the PICES Annual Meeting in Hakodate. The Census of Marine Life and the International Pacific Research Center will co-sponsor with PICES an international workshop on "Impact of Climate Variability on Observation and Prediction of Ecosystem and Biodiversity Changes in the North Pacific". This workshop will help us make significant advances in producing a PICES Ecosystem Status Report and to begin collaborations to advance a North Pacific monitoring and prediction system that will match the goals of the Census of Marine Life program and the International Oceanographic Commission's Global Ocean Observing System (GOOS).

In the spring of 2000, PICES and several international organizations sponsored the "Beyond El Niño" Conference. This highly successful scientific conference provided substantial evidence for North Pacific ecosystem variability at interannual and decadal time scales and insights on the implications of these variations for fishery management. Selected papers from the conference will be published in a Special Issue of Progress in Oceanography scheduled to come out later in 2001. The proceedings from the 1999 Science Board Symposium was published this year as a Special Issue on "North Pacific Climate Regime Shifts" in that same journal, Vol. 47 (2-4).

Many other PICES scientific efforts were documented in 2000 by the publication of results in the PICES Scientific Report series: Volume 13 represents Bibliography on Oceanography of the Japan/East Sea, Volume 14 summarizes results of Working Group 11 on Predation by Marine Birds and Mammals in the Subarctic North Pacific Ocean, and Volume 15 has the proceedings of the 1999 PICES-GLOBEC CCCC Program REX and MONITOR Workshops and the 2000 MODEL Workshop.

The PICES-GLOBEC CCCC Program continues its work on integrating and stimulating national GLOBEC research efforts in the North Pacific. MODEL has been very successful in beginning the development of a standardized lower trophic level model that can be applied to a variety of regions for intercomparison and coupling with upper trophic level models. The work on validating their NEMURO lower trophic level model will continue in the coming years. The Regional Experiments (REX) Task Team is presently focusing on comparative work on herring in the North Pacific. They just completed a workshop on "Trends in Herring Populations and Trophodynamics" and are planning an expansion of their work to consider trends in size-at-age for a number of fish species in 2001. REX and Basin Scale Studies (BASS) Task Teams are collaborating with MODEL

Task Team to begin integrating their work into coupled biophysical models.

PICES has several directions for its future scientific efforts. We need to find ways to promote more interaction with regional and international programs of the most interest to PICES scientists. In particular, there are many regional programs in the North Pacific that involve several PICES nations. PICES has an opportunity to bring its ecosystem perspective to these regional programs and provide assistance in coordinating research in these areas. There are many large international programs in the marine science area and PICES will be focusing its efforts on cooperation with those that are in the best interest of the PICES scientific community and of greatest benefit to PICES member nations. One of our biggest challenges still lies in promoting and coordinating international research efforts in the open North Pacific. The initiation and continuation of collaborative research efforts in this area will benefit all PICES nations that border this important area. Finally, providing scientific results that are useful to marine policy makers of the North Pacific is our ultimate goal.

Ms. Livingston introduced Dr. Takashige Sugimoto to give the keynote lecture. Dr. Sugimoto addressed the subject of *Recent advances of studies and key questions on the Kuroshio-Oyashio ecosystem* providing a comprehensive overview of the research efforts, results, and questions of this important region. He discussed influence of wind intensity versus density stratification, southward intrusion of the Oyashio, long-term variations in ocean circulation in the subarctic North Pacific, and interannual-interdecadal variations of the plankton biomass and fish populations in the northwestern Pacific. Recent activity and future plan of Japan GLOBEC and GLOBEC-like studies of the Kuroshio-Oyashio ecosystem were also introduced.

REPORT OF GOVERNING COUNCIL MEETINGS

The Governing Council met from 1530-1730 on October 23, from 1530-1800 on October 27, and from 1000-1300 on October 28, under the chairmanship of Dr. Hyung-Tack Huh. Drs. Alexander S. Bychkov and Stewart (Skip) M. McKinnell served as rapporteurs.

All Contracting Parties were represented at the three sessions (*GC Endnote 1*). The Chairman of the Science Board, Ms. Patricia Livingston, was in attendance during part of each session.

Agenda Item 1. Opening remarks

At the first session, the Chairman welcomed the delegates and noted that for this Annual Meeting Mr. Qian-Fei Liu represented Mr. Zheng-Ping Tang (China); Dr. Tadashi Inada represented Dr. Makoto Kashiwai (Japan); Mr. Takayuki Koike represented Mr. Yukiya Amano (Japan); and Dr. Jin-Yeong Kim represented Mr. Jae-Man Yoo (Korea).

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. William G. Doubleday proposed the adoption of the agenda without changes, seconded by Dr. Lev N. Bocharov. 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 Eighth Annual Meeting (*GC Endnote 3*).

Agenda Item 4. Relations with relevant international organizations

At the Eighth Annual Meeting, Council endorsed the annual revision of the Standing List of International Organizations and Programs, and a selected subset of organizations and programs that are considered to have the highest priority for PICES with respect to scientific cooperation in the year 2000 (Decision 99/S/6). The Science Board Chairman and Executive Secretary reported on interactions with the relevant organizations and programs since last year's meeting (see the Report on Administration and Science Board Report for details). Council noted significant progress in relations with the IGBP Core Projects (GLOBEC and JGOFS), ICES, and regional fisheries organizations, especially NPAFC. Canada suggested the importance of collaborating with CLIVAR, GOOS and ARGO because it integrates PICES activities with global climate change programs.

Council approved the revised list of International Organizations and Programs recommended by Science Board and identified priorities for interaction in 2001 (see Decision 00/S/5 and *GC Appendix C* for details).

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

Global Ocean Observing System (GOOS) - Dr. Ned Cyr
Global Ocean Ecosystem Dynamics (GLOBEC) - Dr. Francisco Werner
International Argo Science Team - Dr. Dean Roemmich
International Council for the Exploration of the Sea (ICES) - Dr. Keith Brander
International Geosphere-Biosphere Program (IGBP) - Dr. Manuel Barange
International Pacific Halibut Commission (IPHC) - Dr. Stephen R. Hare
Intergovernmental Oceanographic Commission (IOC) - Dr. Ned Cyr

IOC Sub-Commission for the Western Pacific (WESTPAC) - Dr. Maarten Kuijper
Joint Global Ocean Flux Study (JGOFS) - Dr. Toshiro Saino
North Pacific Anadromous Fish Commission (NPAFC) - Dr. Vladimir Karpenko
Scientific Committee on Oceanic Research (SCOR) - Dr. Shizuo Tsunogai

Agenda Item 5. Membership and observers from other countries

The Secretariat did not receive proposals from non-member countries to accede to the PICES Convention in 2000.

At the Eighth Annual Meeting, Council adopted the resolution reflecting an interest in having Mexico accede to the PICES Convention and instructed the Chairman to pursue this matter by sending a letter to appropriate authorities in the Mexican Government, and by making high-level personal contacts (see Decision 99/A/5). The Executive Secretary reported that this approach was reconsidered as during discussions at the Beyond El Niño Conference in La Jolla last March, leading Mexican scientists strongly suggested postponing of a formal invitation/ communication process at the government level until new people are appointed at the relevant agencies following the election in Mexico. This will likely occur in March-April 2001. It was recommended that the most appropriate way to start the process before the end of the current six-year government period is inviting directors of major research institutions to the PICES Ninth Annual Meeting. Some of these directors are appointed by independent mechanism (other than the general government change) and should remain in their positions for several more years. They can appreciate the importance and relevance of PICES and, through next year, encourage government officials to initiate formal approach.

In August 2000, Dr. Francisco Javier Mendieta Jimenez (Director General, Centro de Investigacion Cientifica y Ensenanza Superior de Ensenada/Centre of Scientific Investigations (CICESE)), Dr. Mario Martinez Garcia (Director General, Centro de Investigaciones Biologicas del Noroeste/Centre of Biological Investigations (CIBNOR)), and Dr. Adolfo Gracia Gasca (Director General, Circuito Exterior s/n Ciudad Universitaria) were invited as observers from Mexico to attend the PICES Ninth Annual Meeting. Responses from CICESE and CIBNOR were received, both expressing great interest in PICES activities and in maintaining direct contact with PICES. On behalf of CICESE's Director General, Dr. Jesus Paniagua explained that due to financial and other constraints, CICESE could not send a representative to participate in the PICES Annual Meeting, and extended a formal invitation for PICES officers to visit this largest oceanographic institute in Mexico. Dr. Garcia indicated that he is unable to participate personally, but Dr. Sergio Hernandez Vazques, Director of the CIBNOR Graduate Program, will be representing him at the meeting.

The Chairman recommended that Dr. Hernandez should sit in as an observer at the Council and F&A meetings, and that proposal was accepted by Council. Dr. Hernandez thanked Council members for allowing him to observe and confirmed the interest of Mexican scientists to join PICES and suggested that the next step should be to hold a meeting in Mexico, in spring 2001, involving the directors and leading scientists from major Mexican research institutions and PICES representatives.

In response to this invitation from Mexico, Council approved a visit of the Science Board Chairman and the Executive Secretary to inform Mexican scientists and scientific organizations about PICES. Official negotiations with the Mexican Government will be pursued if sufficient interest is expressed (Decision 00/A/6).

The Executive Secretary informed Council that Mexican scientists had continued to be involved in PICES activities. Seventeen scientists attended the Beyond El Niño (BEN) Conference

on Pacific Climate Variability and Marine Ecosystem Impacts organized by PICES (March 23-26, 2000, La Jolla, U.S.A.), three of which received partial travel support from the BEN grant provided by SCOR. Dr. Daniel Lluch-Belda (CICIMAR) served as one of the session convenors for this conference. Two Mexican scientists submitted papers for PICES IX.

Agenda Item 6. Proposed changes to Handbook for Chairmen and Convenors

At the Eighth Annual Meeting, the Science Board identified seven major categories of changes that should be made to the PICES Handbook for Chairmen and Convenors (see Science Board Report for details). The proposed changes, drafted by the Science Board Chairman, were discussed and revised during PICES IX at the Committees/Program business meetings. Council reviewed the changes accepted by the Science Board and found that they were consistent with the existing Rules of Procedure and Financial Regulations. Council approved the recom-mended changes to the Handbook with minor editorial modifications (Decision 00/A/7).

Agenda Item 7. PICES Intern Program

Council discussed the results from the first year of the PICES Intern Program approved at the Eighth Annual Meeting (Decision 99/A/7), and concluded that PICES and member countries benefit from the Intern Program, and that it should be continued.

Council reviewed the Guidelines for application and selection procedure and at the recommendation of U.S.A., adopted the following amendment (Decision 00/A/8(i)):

A member country that has had an intern in any year is eligible to have an intern in the following two years only if there are no applicants from other member countries.

The Executive Secretary reported that no nominations for PICES Intern in 2001 were received from the national Delegates by the date of the first Governing Council meeting at PICES IX (October 23, 2000), but several member countries indicated a desire to submit nominations. Council approved that the deadline for applications for the Intern Program be extended to February 1, 2001 (Decision 00/A/8(ii)).

PICES was able to start the Intern Program in 2000 because Canada and U.S.A., in addition to their annual fees, contributed $7,500 and $7,000, 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 2001 budget or FY 2002 forecast budget. 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. Dr. Doubleday, without making firm commitments, confirmed a willingness of Canada to contribute in 2001 if funds become available at their fiscal year end, but indicated that Canada does not intend to be the sole contributor indefinitely and suggested that the PICES Intern Program should gradually be built into the annual budget. Council did not reach a consensus on this proposal and member countries will continue to consider ways to fund the Program. The Chairman will send letters inviting voluntary contributions to support the Intern Program in 2001 and further (Decision 00/A/8(iii)).

Agenda Item 8. Report of Fund-Raising Committee

The Fund-Raising Committee (FRC) was established in 1999 to seek external funding consistent with the goals of the Organization (Decision 99/A/8). It was assumed that FRC will operate by correspondence, but the Committee members agreed that to commence and facilitate its activities, FRC should meet during the Ninth Annual Meeting. The first meeting of the Fund-Raising Committee was held Oct. 22, 2000 under the chairmanship of Dr. Richard J. Marasco, who presented the

report to the Governing Council (see FRC Report for text).

The Committee worked closely with the Science Board and the Secretariat to identify high priority scientific projects requiring funding/additional support. Council approved the theme recommended by the Fund-Raising Committee, "To advance scientific knowledge of the ocean environment", and the following six projects that were proposed for attention in 2001 (Decision 00/A/9):

- Develop a North Pacific Ecosystem Status Report;
- Establish an international zooplankton monitoring program for the North Pacific;
- Convene a Workshop/Symposium series on "Effect of human and climate interaction on fish production";
- Initiate capacity building on marine ecosystems;
- Support young scientist participation in scientific meetings; and
- Friends of PICES: acquisition of funds that could be used by the Organization to support various programmatic activities.

Agenda Item 9. 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. The Tenth Annual Meeting will be hosted by the Secretariat at the location of PICES I, in October 2001 (Decision 99/A/4).

Council discussed and approved various activities being planned to commemorate the anniversary (see F&A Report for details). The FY 2001 budget does not include 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 Executive Secretary will send a request to member countries and agencies for voluntary contributions to support the Tenth Annual Meeting and activities related to the PICES' tenth anniversary.

Agenda Item 10. Election of Chairman and Vice-Chairman

According to the Rules of Procedure (Rule 7), the Chairman and the Vice Chairman shall be elected from amongst the Delegates for a term of two years and each shall be eligible for re-election only once for a successive term. They shall take office at the conclusion of the Annual Meeting at which elected. Dr. Hyung-Tack Huh of Korea and Dr. Vera Alexander of U.S.A. were elected the Chairman and Vice-Chairman, respectively, at the PICES Seventh Annual Meeting, in 1998, and their terms would come to an end at this year's meeting.

Dr. Alexander replaced Dr. Huh as Chairman to call for nominations for Chairman of Council. A single candidate, Dr. Hyung-Tack Huh, was nominated and unanimously declared as Chairman for a second term (Decision 00/A/10).

Dr. Huh called for nominations for Vice-Chairman of Council in accordance with the Rules of Procedure. Dr. Vera Alexander was nominated by Russia and seconded by Canada. She was unanimously elected as Vice-Chairman for a second term (Decision 00/A/10).

Delegates congratulated Dr. Huh and Dr. Alexander on their re-election. Dr. Huh and Dr. Alexander expressed their thanks for the support given by Council.

Agenda Item 11. Appointment of Finance and Administration Committee Chairman

According to the Rules of Procedure (Rule 15), the Chairman of the Finance and Administration Committee (F&A) shall be appointed by the Council from amongst the Committee's members for a term of two years and shall be eligible for re-appointment only once for a

successive term. He/she shall take office at the conclusion of the Annual Meeting at which elected. Dr. Richard J. Marasco of U.S.A. was appointed as the F&A Chairman at the PICES Seventh Annual Meeting, in 1998, and his term would come to an end at this year's meeting.

The Finance and Administration Committee advocated that Council re-appoint Dr. Marasco for a second term. Council accepted this proposal and re-appointed Dr. Marasco as the F&A Chairman (Decision 00/A/11).

Agenda Item 12. Report and recommendations of the 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). The report was approved by Council.

12.1 Audited accounts for fiscal year 1999

At the recommendation of the Finance and Administration Committee, Council accepted the audited accounts for 1999. Council agreed to retain the existing auditor *Flader & Greene* for another year (Decision 00/A/1).

12.2 Annual contributions

Council discussed the payment schedule of annual fees to the Organization, and approved the recommendation that the Executive Secretary send a letter to member countries commending them for improved performance in submitting annual contributions in 2000, 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 00/A/3).

At the suggestion of Canada, Council agreed to allow installment payments if members are unable to make single payments at the beginning of the year.

12.3 Budget

12.3a Estimated accounts for fiscal year 2000

The estimated accounts for FY 2000 were reviewed by the Finance and Administration Committee and approved by Council (Decision 00/A/2).

12.3b Budget for fiscal year 2001

Council approved the proposed FY 2001 budget of $606,000. The amount of $58,200 will be transferred from the Working Capital Fund to the General Fund to reduce the total required contribution to $547,800, setting the 2001 fees at $91,300 per Contracting Party (Decision 99/A/2(i)).

12.3c Forecast budget for fiscal year 2002

The FY 2002 forecast budget of $624,000 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 X (Decision 99/A/2(ii)).

12.3d Working Capital Fund

Council noted that in FY 2000, external funding for various activities initiated by PICES was significantly greater than in previous years, and thanked the Science Board Chairman and the Secretariat for their effective fund-raising efforts. Voluntary contributions and grants received this year for financing special activities and credited to the Working Capital Fund are reflected in the Report on Administration (*GC Endnote 3*)

The Working Capital Fund is forecast to be $228,230 at the end of 2000. Council approved a transfer of $58,200 to the General Fund to reduce the fees for each Contracting Party, and a transfer of $23,740 to the Trust Fund to recover all 2000 expenditures and restore the Trust Fund to a level of $100,000. After these transfers, the Working Capital Fund will total $146,290, including the $100,000 mandatory balance and

the amount of $46,290 to be used to cover potential costs for events being planned to commemorate the PICES Tenth Anniversary (Decision 00/A/2(iii)).

12.3e Home Leave and Relocation Fund

The status of the Home Leave Relocation Fund was reviewed. It was noted that all expenditures in FY 2000 were offset by bank interest earned by the Fund. The Fund will be at its maximum level of $110,000 at the end of the fiscal year.

12.3f Trust Fund

Council was pleased by the fact that this year the Trust Fund was used not only to bring Chinese, Russian and young scientists to the Annual Meeting, but for a variety of activities. These included a partial support for the pilot project on "Ecosystem Study of the Japan/East Sea" (PICES JES cruise), a research grant to Working Group 12, and financing the Intern Program. The 2000 expenditures will be compensated only partially by the voluntary contributions by Canada and U.S.A. for the Intern Program, a personal contribution by Dr. Hyung-Tack Huh, and a grant from SCOR for PICES IX (for details see *GC Endnote 3*).

The Trust Fund is forecast to be $76,260 at the end of 2000. The approved transfer of $23,740 from the Working Capital Fund will recover all 2000 expenditures and restore the Trust Fund to a level of $100,000 (Decision 00/A/3(iii)).
Working Capital Fund surpluses have permitted the Trust Fund to be replenished for the last several years. Council confirmed that the practice of transferring surpluses from the Working Capital Fund to the Trust Fund should continue in future years. Simultaneously, PICES should explore other options for the Trust Fund replenishment, or activities that are currently supported by the Trust Fund will need to be reduced accordingly.

GC Appendix A. Decisions

Agenda Item 13. 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 the Appendices A-D.

Agenda Item 14. Time and place of future Annual Meetings of the Organization

At the recommendation of the Finance and Administration Committee and Science Board, Council reconsidered dates for the Tenth Annual Meeting in Victoria, Canada, and agreed that the meeting be held October 5-13, 2001 (Decision 00/A/4(i)).

Council approved the proposal by the People's Republic of China to host the Eleventh Annual Meeting in 2002. The date and the place of PICES XI will be confirmed at next year's Annual Meeting. The Executive Secretary will send a letter indicating a willingness to provide $40,000 to partially cover meeting costs for PICES XI. Further discussion on this matter will proceed during the 2002 budget preparation (Decision 00/A/4(ii)).

Council accepted the proposal of the Republic of Korea to explore the possibility of hosting the Twelfth Annual Meeting in 2003, and notify PICES on its final decision by the end of 2000 (Decision 00/A/4(iii)).

Agenda Item 15. Other business

Russia proposed that Council consider forming an Editorial Group to speed up Council's work at the Annual Meeting.

00/A/1: Auditor

Council accepted the audited accounts for 1999 and agreed to retain *Flader and Greene* as auditor for another year.

00/A/2: Budget

Council accepted the estimated accounts for 2000 and agreed to the following actions:

i. *2001 Budget*
The budget of $606,000 was approved. The amount of $58,200 will be transferred from the Working Capital Fund to reduce the total required contribution to $547,800, setting the 2001 fees at $91,300 per Contracting Party.

ii. *Forecast 2002 Budget*
The forecast budget for 2002 was reviewed and will be further considered at PICES X.

iii. *Inter-fund Transfers*
A transfer of $58,200 from the Working Capital Fund to the General Fund for 2001 was approved. A transfer of $23,740 from the Working Capital Fund to the Trust Fund was approved to recover all 2000 expenditures and restore the Trust Fund to a level of $100,000. After these transfers, the Working Capital Fund will total $146,290, including the $100,000 mandatory balance and $46,290 in voluntary contributions for PICES X Anniversary.

00/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, 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).

Council agreed to allow installment payments if annual fees cannot be paid in a lump sum at the beginning of the year.

00/A/4: Future Annual Meetings

i. Council agreed to hold the Tenth Annual Meeting in Victoria, Canada, from October 5-13, 2001.

ii. Council approved the proposal by the People's Republic of China to host the Eleventh Annual Meeting in 2002. The date and the place of PICES XI will be confirmed at next year's Annual Meeting. The Executive Secretary will send a letter indicating a willingness to provide $40,000 to partially cover meeting costs for PICES XI. Further discussion on this matter will proceed during the 2002 budget preparation.

iii. Council accepted the proposal of the Republic of Korea to explore the possibility of hosting the Twelfth Annual Meeting in 2003, and expect to be notified of the final decision by the end of 2000.

00/A/5: PICES Tenth Anniversary

Council endorsed the proposed special events related to the Tenth Annual Meeting (see *F&A Report* for details). Voluntary contributions and funds obtained from the 2001 Ocean Exhibition will be used to support these activities.

00/A/6: Membership

In response to an invitation from Mexico, Council approved a visit of the Science Board Chairman and the Executive Secretary to Mexico to inform scientists and scientific organizations about PICES. Official negotiations with the Mexican Government will be pursued if sufficient interest is expressed.

00/A/7: Changes to Handbook for Chairmen and Convenors

Council approved the changes to the PICES Handbook for Chairmen and Convenors proposed by the Science Board.

00/A/8: PICES Intern Program

i. The following amendment to Guidelines for application and selection procedure was adopted:

   A member country that has had an intern in any year is eligible to have an intern in the following two years only if there are no applicants from other member countries.

ii. Council approved that the deadline for applications for the 2001 PICES Intern Program be extended to February 1, 2001.

iii. Council agreed to ask the Chairman to send letters inviting member countries to make voluntary contributions to support the PICES Intern Program in 2001.

00/A/9: Fund-Raising Committee

Council approved the theme adopted by the Fund-Raising Committee, "To advance scientific knowledge of the ocean environment", and six projects identified for attention during 2001 (see *FRC* and *F&A Reports* for details).

00/A/10: Election of Chairman and Vice Chairman

Dr. Hyung-Tack Huh of Korea and Dr. Vera Alexander of U.S.A. were elected as Chairman and Vice-Chairman, respectively, for a second term.

00/A/11: Appointment of Finance and Administration Committee Chairman

Dr. Richard J. Marasco of U.S.A. was appointed as the Chairman of the Finance and Administration Committee for a second term.

00/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. A WG 13/TCODE CO_2 Data Integration Test Workshop, January 22-24, 2001, Sidney, B.C., Canada;
b. A BASS/MODEL Workshop on "Quantification of a food web model for the eastern Pacific gyre", March 5-6, Honolulu, Hawaii, U.S.A.;
c. A 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 Inter-national Pacific Research Center), March 7-9, 2001, Honolulu, Hawaii, U.S.A.;
d. An International Argo Science Team Meeting (co-sponsored by PICES), March 20-22, 2001, Sidney, B.C., Canada;
e. WG 13/TCODE CO_2 Data Integration Implementation Workshop, May 14-16, 2001, in Tokyo, Japan;
f. A MODEL Workshop to implement improvements to the PICES NEMURO Model, spring/summer 2001, Japan or U.S.A.;
g. A NEAR-GOOS/ODC Forecasting Workshop (co-sponsored by PICES), August 2001, Seoul, Korea (in conjunction with the Fifth IOC/WESTPAC Scientific Symposium);
h. A WG 15 Workshop on "Taxonomy and identification of HAB species", October 5-6, 2001, Vancouver, B.C. Canada (in conjunction with PICES X);
i. A BASS/MODEL Workshop to review ecosystem models for the Subarctic Pacific gyres, a MODEL/REX Workshop to implement improvements and to include higher trophic levels to the PICES

NEMURO Model, and a REX Workshop on "Temporal variations in size at age for fish species in coastal areas around the Pacific Rim", October 2001 (immediately prior to PICES X), Victoria, B.C., Canada;

j. A 1-day CLIVAR/PICES Workshop, October 2001 (immediately prior to PICES X), Victoria, B.C., Canada;
k. A PICES/CREAMS/ONR Workshop on "Recent progress in studies of physical processes and their impact to the Japan/East Sea ecosystem", spring 2002;
l. A PICES/ICES/GLOBEC International Symposium on "The role of zooplankton in global ecosystem dynamics: comparative studies from the World Oceans", spring 2003, Europe.

00/S/2: Travel support

PICES will provide full travel support (or equivalent) for:

a. One keynote speaker for the PICES X Opening Session and four invited speakers for the Science Board Anniversary Symposium;
b. One invited speaker per Scientific Committee and Program for topic sessions at the PICES Tenth Annual Meeting;
c. Five scientists to attend various CCCC Task Team Workshops;
d. One invited scientist with expertise in molecular biology of phytoplankton to attend the WG 15 Workshop on "Taxonomy and identification of HAB species", October 5-6, 2001, in Vancouver, B.C. Canada;
e. One WG 16 member to attend the American Fisheries Society Symposium on "Climate and aquatic biological resources", August, 2001, U.S.A.;
f. One Japanese and two North American scientists to attend the WG 13/TCODE CO_2 Data Integration Test Workshop, January 22-24, 2001, in Sidney, B.C., Canada;
g. Two scientists to attend the International Argo Science Team Meeting, March 20-22, 2001, in Sidney, B.C., Canada;
h. Two scientists to attend the NEAR-GOOS/ODC Forecasting Workshop, August 2001, in Seoul, Korea;
i. One person to attend the SCOR General Meeting in October 2001, in Mar Del Plata, Argentina.

00/S/3: Publications

The following publications were approved for 2001:

a. Final reports of WG 8 on Practical Assessment Methodology (with CD-ROM) and WG 12 on Crabs and Shrimps, Proceedings of the 2000 CCCC Task Team Workshops, and Report of the PICES Census of Marine Life Workshop in the PICES Scientific Report Series;
b. Progress reports of WG 13 on CO_2 in the North Pacific, WG 14 on Effective Sampling of Micronekton, WG 15 on Ecology of Harmful Algal Blooms in the North Pacific, and WG 16 on Climate Change, Shifts in Fish Production, and Fisheries Management in the 2000 Annual Report;
c. Selection of papers presented at the Beyond El Niño Conference in a special issue of *Progress in Oceanography*;
d. Proceedings of the North Pacific CO_2 Data Synthesis Symposium in a report published by the Center for Global Environmental Research (CGER) of the National Institute for Environmental Studies, Japan, and in the PICES Scientific Report Series;
e. Review and results from the 1999 and 2000 PICES method inter-comparisons for carbonate parameters in a bilingual (Japanese/English) report published by the Center for Global Environmental Research (CGER) of the National Institute for Environmental Studies, Japan, and in the PICES Scientific Report Series.

00/S/4: Future of current Working Groups and new PICES groups

a. WG 8 on Practical Assessment Methodology has completed its work and will be

disbanded;

b. WG 12 on Crabs and Shrimps will remain for one more year to complete collation, editing and publication of its final report in 2001 (no further meetings of the Working Group are required);
c. WG 13 on CO_2 in the North Pacific will conclude its work in 2001 and prepare a final report for publication in 2002;
d. WG 14 on Effective Sampling of Micro-nekton, WG 15 on Ecology of Harmful Algal Blooms in the North Pacific, and WG 16 on Climate Change, Shifts in Fish Production, and Fisheries Management will remain for two more years;
e. A 1-year Study Group will be organized to consider the needs for implementation of the North Pacific Ecosystem Status Report and Regional Analysis Centers (see *Appendix B* for terms of reference). Membership in the group shall consist of the Science Board Chairman, one representative from each of the Scientific and Technical Committees and Scientific Program, one representative of the GOOS community and one member of the PICES Secretariat.

00/S/5: Relations with other organizations and programs

The annual revision of the Standing List of International Organizations and Programs was endorsed in order to facilitate relations with other organizations and programs, and to identify priorities for interaction in the coming year (see *Appendix C* for the revised list).

00/S/6: PICES Wooster Award

Council approved the establishment of the annual PICES Wooster Award. The Award is named in honour of Professor Warren S. Wooster, the principal founder and the first Chairman of PICES, and a world-renowned researcher and statesman in the area of climate variability and fisheries production. (See *Appendix D* for details).

00/S/7: Resolution on assisting monitoring activities in the PICES region

The following resolution adopted by the Science Board was approved:

Two PICES pilot projects using voluntary observing ships (VOS) in the North Pacific to monitor physical, chemical and biological parameters have had good results. PICES supports these projects and their continuation. Recognizing the urgent need for basin scale monitoring, beyond that encompassed within the existing programs, Science Board encourages the development of observing programs with dense regional coverage of parameters using VOS and similar cost-effective ecosystem observing systems. PICES will develop procedures for promoting such programs under its monitoring framework.

GC Appendix B. Terms of Reference for the Study Group on North Pacific Ecosystem Status Report and Regional Analysis Centers (RAC)

1. Devise a detailed outline for the first North Pacific Ecosystem Status Report;
2. Identify key contributors (individuals and organizations) to the Report;
3. Identify existing data sources for inclusion in the Report;
4. Examine the process and implications of how those data would be synthesized into the Report;
5. Estimate the production, printing, and distribution costs of the document;
6. Examine the function, products and positive and negative implications of RACs.

GC Appendix C. 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)
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
CREAMS*	Circulation Research in the East Asian Marginal Seas
ECOR	Engineering Committee on Oceanic Resources
FAO	Food and Agriculture Organization
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
IPHC*	International Pacific Halibut Commission
ISCTNP*	Interim Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean
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
PSC	Pacific Salmon Commission
SCOPE	Scientific Committee on Problems of the Environment
SCOR*	Scientific Committee on Oceanic Research
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

2000 Additions to list:

AFS CAR*	American Fisheries Society Program on Climate and Aquatic Resources
CoML*	Census of Marine Life Program
GCOS*	Global Climate Observing System
GEM*	Gulf Ecosystem Monitoring Program
IPCC*	International Panel on Climate Change
PSG	Pacific Seabird Group
PORSEC	Pacific Ocean Remote Sensing Conference
SAHFOS*	Sir Alister Hardy Foundation for Ocean Science

GC Appendix D. PICES Wooster Award

The PICES Wooster Award is named in honour of Professor Warren S. Wooster, the principal founder and the first Chairman of PICES, and a world-renowned researcher and statesman in the area of climate variability and fisheries production. The Award 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 will consist of a plaque with the recipient's name engraved on it. A large plaque will be maintained at the PICES Secretariat with the names of all the Award winners over the years. The recipient will also receive financial support to attend the PICES Annual Meeting at which the Award is given.

The main criteria for choosing recipients are sustained excellence in research, teaching, administration or a combination of the three in the area of North Pacific marine science. Special consideration will be given to individuals who have worked in integrating the disciplines of marine science. Individuals who were or are currently actively involved in PICES activities are preferred but the Award may be given to any suitable candidate, including those from outside PICES member countries.

Nominations will be solicited annually from the PICES community although the award may not be given every year if a suitable candidate is not found. Nominations must be received no later than May 1 of each year. The Selection Committee will consist of the PICES Science Board and the PICES Chairman, and the Award will be given by the PICES Chairman at a banquet during the PICES Annual Meeting. Nominations of individuals not selected would be rolled over to the next year in order to keep a large pool of potential candidates.

Nominations should include the following information: nominee's name, institutional affiliation and title, address and biographical resume, and statement of justification for the nomination.

GC Endnote 1

Participation List

Canada
William G. Doubleday
Laura Richards

Japan
Tadashi Inada (Alternate Delegate)
Takayuki Koike (Alternate Delegate)
Koji Harunari (Advisor)
Tokio Wada (Advisor)

People's Republic of China
Qian-Fei Liu (Alternate Delegate)
Zheng-Lin Wei (Alternate Delegate)

Republic of Korea
Lae-Hyung Hong (Alternate Delegate)
Jin Yeong Kim (Alternate Delegate)

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

U.S.A.
Vera Alexander
Richard J. Marasco
William T. Cocke (Advisor)

Others
Hyung-Tack Huh (Chairman, PICES)
Alexander S. Bychkov (Executive Secretary) (Rapporteur)
Stewart M. McKinnell (Asst. Executive Secretary) (Rapporteur)
Patricia Livingston (Chairman, Science Board)
Sergio Hernandez Vazquez (Observer, Mexico)

GC Endnote 2

Agenda

1. Opening remarks.
2. Adoption of agenda.
3. Preliminary report on administration.
4. Relations with relevant international organizations.
5. Membership and observers from other countries.
6. Proposed changes to Handbook for Chairmen and Convenors.
7. PICES Intern Program.
8. Report of Fund-Raising Committee.
9. Tenth anniversary of PICES.
10. Election of Chairman and Vice-Chairman.
11. Appointment of Finance and Administration Committee Chairman.
12. Report of Finance and Administration Committee:
    - 12.1 Audited accounts for FY 1999;
    - 12.2 Annual contributions;
    - 12.3 Budget:
        a. Estimated accounts for FY 2000
        b. Budget for FY 2001
        c. Forecast budget for FY 2002
        d. Working Capital Fund
        e. Home Leave and Relocation Fund
        f. Trust Fund
13. Report of Science Board.
14. Time and place of future Annual Meetings of the Organization.
15. Other business.

GC Endnote 3

Report on Administration for 2000

1. National contributions

According to Financial Regulation 5(ii), all national contributions to PICES are payable by

the first day of the financial year (January 1) to which they relate. Dues for 2000 were paid as follows:

Japan	November 30, 1999
U.S.A.	January 18, 2000
Canada	February 9, 2000
Korea	June 1, 2000
China	August 29, 2000
Russia	November 2, 2000

2. External funding

This year serious efforts have been made to get outside funding for various activities initiated by PICES. The following reflects contributions and grants received or under consideration:

a. Five organizations, Inter-American Tropical Tuna Commission (IATTC), International Pacific Halibut Commission (IPHC), Interim Scientific Committee for Tuna and Tuna-like Species in the North Pacific (ISC), North Pacific Anadromous Fish Commission (NPAFC) and Scientific Committee on Oceanic Research (SCOR)), contributed a total of $73,000 for the *Beyond El Niño Conference on Pacific Climate Variability and Marine Ecosystem Impacts* that was held in March 2000;
b. SCOR provided a grant of $13,340 (US $9,000) to support travel of Chinese and Russian scientists to the PICES Ninth Annual Meeting;
c. The Chairman of PICES, Dr. Hyung-Tack Huh made a personal donation of $10,000 to the Trust Fund;
d. A grant of $32,000 (US $21,800) was received from the Alfred P. Sloan Foundation to convene a PICES Census of Marine Life Workshop and to publish a Workshop Report in the PICES Scientific Report series;
e. The National Marine Fisheries Service (NOAA, U.S.A.), Fisheries and Oceans Canada (Ottawa) and the Pacific Research Institute of Fisheries and Oceanography (TINRO-Center), agreed to provide $44,000 (US $30,000), $10,000 and $1,460 (US $1,000), respectively, to support PICES X special events;
f. A proposal was submitted in September 2000 to the Asia-Pacific Network (APN) for a one-year pilot project entitled "APN/PICES ECOPAC: Capacity Building in Climate and Marine Ecosystem Study" (funding period from April 1, 2001 to March 31, 2002).

3. Inter-sessional meetings

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

a. A 4-day CCCC/MODEL Workshop on *Lower Trophic Level Modeling*, January 31–February 3, 2000, in Nemuro, Japan (co-sponsored by the Japan International Science and Technology Exchange Center and Nemuro-city);
b. A 4-day *Beyond El Niño Conference on Pacific Climate Variability and Marine Ecosystem Impacts*, March 23-26, 2000, La Jolla, U.S.A. (co-sponsored by IATTC, IPHC, ISC, NPAFC and SCOR);
c. A 3-day ICES (International Council for the Exploration of the Sea)/PICES Workshop on *Zooplankton Ecology of the North Atlantic and North Pacific*, April 17-19, 2000, Honolulu, U.S.A.;
d. A 3-day CREAMS (Circulation Research in the East Asian Marginal Seas)/PICES Workshop on *Oceanography of the East Asian Marginal Seas*, May 15-17, 2000, Vladivostok, Russia;
e. A 1-day mini-Symposium on *Marine Ecological Studies in the Bering Sea and eastern North Pacific* (to mark the 2000 cruise of the T/S *Oshoro-maru*), July 19, Sidney, Canada (co-sponsored by the Hokkaido University and the Institute of Ocean Sciences);
f. A 4-day Symposium/Workshop on *North Pacific CO_2 Data Synthesis* (including the second PICES/WG 13 method inter-comparison for carbonate parameters), October 18-21, 2000, Tsukuba, Japan (co-sponsored by the Core Research for

Evolution Science and Technology of the Japan Science and Technology Corporation (CREST/JST) and the Marine Information Research Center (MIRC) of the Japan Hydrographic Association, and hosted by the National Institute for Environmental Studies);

g. A 2-day Planning Workshop on *Designing the Iron Fertilization Experiment in the Subarctic Pacific*, October 19-20, 2000, Tsukuba, Japan (co-sponsored by the Central Research Institute of Electric Power Industry (CRIEPI) and MIRC);

h. A 2-day series of CCCC Task Team Workshops: BASS Workshop on *Development of a Conceptual Model of the Subarctic Pacific Basin Ecosystem(s)*, MODEL Workshop on *Strategies for Coupling Higher and Lower Trophic Level Models*, MONITOR Workshop on *Progress in Monitoring the North Pacific*, and REX Workshop on *Trends in Herring Population Dynamics and Trophodynamics*, October 20-21, 2000, Hakodate, Japan (co-sponsored by the Ministry of Education of Japan);

i. A 1-day Technical Workshop on *Basis for Estimating the Abundance of Marine Birds and Mammals, and the Impact of their Predation on other Organisms*, October 20, 2000, Hakodate, Japan (co-sponsored by the Japanese Fisheries Agency);

j. A 1-day joint NPAFC/PICES Workshop (hosted by NPAFC) 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.

4. *Publications (FY 2000)*

- The 1999 PICES Annual Report was published and circulated in January;
- A poster and the First Announcement for the Ninth Annual Meeting were printed and distributed in January;
- Vol. 8 nos. 1 and 2 of PICES Press were distributed in January and June;
- A Book of Abstracts for the Beyond El Niño Conference was prepared for circulation at the meeting in March;
- The Final Announcement for the Ninth Annual Meeting was distributed in June;
- The 2000 PICES Directory was updated and circulated in June;
- PICES Scientific Report No. 13: Bibliography on Oceanography of the Japan/East Sea, was published in May and distributed in June;
- PICES Scientific Report No. 14: Predation by Marine Birds and Mammals in the Subarctic North Pacific Ocean (final report of WG 11), was published and circulated in September;
- PICES Scientific Report No. 15: PICES Climate Change and Carrying Capacity Program/Report on the 1999 MONITOR and REX Workshops, and the 2000 MODEL Workshop on Lower Trophic Level Modelling, was published and distributed in September;
- A Book of Abstracts for the Ninth Annual Meeting was prepared for circulation at the meeting in October;
- A special issue of *Progress in Oceanography* on North Pacific Climate Regime Shifts (selected papers from the 1999 Science Board Symposium) was published in October and distributed at the Ninth Annual Meeting;
- A poster for the PICES Tenth Anniversary Meeting was printed in September to be distributed by the end of November;
- PICES Scientific Report No. 16: Review and Results from the 1999 PICES/WG 13 Technical CO_2 Intercalibration Workshop, will be published as a bilingual (English-Japanese) report by the end of this year.

5. Travel and representation at other organization meetings

- Dr. Skip McKinnell, Asst. Executive Secretary, attended the IPHC (Inter-national Pacific Halibut Commission) Annual Meeting in Seattle, U.S.A., in January, to present a PICES/IPHC MOU on scientific cooperation;

- Dr. Alexander Bychkov, Executive Secretary, and Ms. Christina Chiu, Administrative Assistant, travelled to Hakodate and Tokyo, Japan, in February, to discuss Annual Meeting preparations with the Local Organizing Committee and Japanese Government representatives;
- Dr. Skip McKinnell attended the second Annual Workshop on Ocean Ecology of Juvenile Salmonids in Seattle, U.S.A., in February;
- Dr. Hyung-Tack Huh, PICES Chairman, Ms. Patricia Livingston, Science Board Chairman, and the staff of the PICES Secretariat travelled to La Jolla, U.S.A., in March, to hold the Beyond El Niño Conference on Pacific Climate Variability and Marine Ecosystem Impacts;
- Travel support was provided for Drs. Paul H. LeBlond and Warren S. Wooster (SSC Co-Chairmen), 8 invited speakers, and 11 scientists from countries with economy in transition (paid by BEN SCOR grant) to attend the Beyond El Niño Conference on Pacific Climate Variability and Marine Ecosystem Impacts in La Jolla, U.S.A., in March;
- Dr. Hyung-Tack Huh attended the Fifth Intergovernmental Meeting of NOWPAP (North Pacific Action Plan) in Incheon, Republic of Korea, in March (paid by Korean Government);
- Dr. Alexander Bychkov attended the JGOFS (Joint Global Ocean Flux Study Project) Open Science Conference and JGOFS Scientific Steering Committee Meeting in Bergen, Norway, in April (paid by JGOFS);
- Dr. Hyung-Tack Huh attended the International Implementation Planning meeting for ARGO Floats in the Pacific Ocean and Adjacent Regions in Tokyo, Japan, in April, to give a statement on behalf of PICES;
- Drs. Tsutomu Ikeda, Charles B. Miller and Jeffrey M. Napp attended the ICES/PICES Workshop on Zooplankton Ecology of the North Atlantic and North Pacific in Honolulu, U.S.A., in April;
- Dr. Alexander Bychkov and Ms. Christina Chiu attended the International Fisheries Commission Pension Society Meeting in Seattle, U.S.A., in April;
- Dr. Skip McKinnell travelled to Stockholm, Sweden, and Copenhagen, Denmark, in May, to meet with the Scientific Director of GIWA and the General Secretary of ICES, to discuss areas of mutual interest and future cooperation between PICES and these two organizations (partial support);
- Dr. Alexander Bychkov went to Vancouver, Canada, in June, to visit the NPAFC (North Pacific Anadromous Fish Commission) Secretariat and meet with Mr. Yuichi Kusumoto, Consul-General of Japan;
- Dr. Hyung-Tack Huh attended IOC's (Inter-Governmental Oceanographic Commission) Assembly in Paris, France, in June (paid by Korean Government);
- Ms. Patricia Livingston travelled to Paris, France, in July, to participate in the reviewing of the IOC OSLR (Ocean Science in Relation to Living Resources) Programme (paid by IOC);
- Dr. Skip McKinnell attended the ICES Annual Science Conference in Brugge, Belgium, in September (partial support);
- Travel support was provided to 3 invited speakers (Drs. Francisco Werner, Scott Rumsey and Steven Martell) for the MODEL Workshop on Strategies for Coupling Higher and Lower Trophic Level Models in Hakodate, Japan, in October;
- Travel support was provided to 3 scientists (Ms. Galina Pavlova, Ms. Justine Afghan and Mr. W. Keith Johnson) to participate in the second PICES/WG 13 method inter-comparison for carbonate parameters, in Tsukuba, Japan, in October;
- Dr. Hyung-Tack Huh, Ms. Patricia Livingston, staff of the Secretariat and the PICES Intern travelled to Hakodate, Japan, in October, to hold the Ninth Annual Meeting;
- Full or partial travel support was provided to 8 invited speakers to attend the Ninth Annual Meeting in Hakodate, Japan, in October;
- Full or partial travel support from the Trust

Fund and PICES IX SCOR grant was provided to 6 Chinese, 4 Russian and 4 young scientists;
- Travel support was provided to 2 invited speakers (Drs. Niall O'Maoileidigh and Mark Willette) for the 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, Japan, in October;
- Dr. Hyung-Tack Huh, Alexander Bychkov and Skip McKinnell attended the NPAFC Eighth Annual Meeting in Tokyo, Japan, in October-November.

6. 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 in 2000:

- GLOBEC (Global Ocean Ecosystem Dynamics Project of IGBP) co-sponsored a topic session on *Recent Findings and Comparisons of GLOBEC and GLOBEC-like Programs in the North Pacific Ocean* at the PICES Ninth Annual Meeting in October 2000, and accepted a proposal of PICES to organize and co-sponsor a major ICES/ PICES/GLOBEC Symposium on Zooplankton Ecology in spring 2003;
- JGOFS participated in planning and co-sponsored a topic session on *North Pacific Carbon Cycling and Ecosystem Dynamics* at the PICES Ninth Annual Meeting in October 2000;
- After a successful ICES/PICES Workshop on *Zooplankton Ecology of the North Atlantic and North Pacific*, in April 2000 (in conjunction with the meeting of the ICES Working Group on Zooplankton Ecology), ICES accepted a proposal of PICES to organize and co-sponsor a major ICES/ PICES/ GLOBEC Symposium on Zooplankton Ecology in spring 2003;
- NPAFC co-sponsored a conference *Beyond El Niño Conference on Pacific Climate Variability and Marine Ecosystem Impacts* organized by PICES in March 2000, and 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 October 2000;
- SCOR co-sponsored a conference *Beyond El Niño Conference on Pacific Climate Variability and Marine Ecosystem Impacts* organized by PICES in March 2000, and provided a grant of $13,340 (US $9,000) to support travel of Chinese and Russian scientists to the PICES Ninth Annual Meeting;
- PICES was invited by IOC to participate in the reviewing of the IOC OSLR (Ocean Science in Relation to Living Resources) Programme;
- A PICES/IPHC MOU on scientific cooperation was developed, presented at the 2000 IPHC Annual Meeting and signed in January 2000, and in March 2000, IPHC co-sponsored a conference *Beyond El Niño Conference on Pacific Climate Variability and Marine Ecosystem Impacts* organized by PICES;
- IATTC and ISC co-sponsored a conference *Beyond El Niño Conference on Pacific Climate Variability and Marine Ecosystem Impacts* organized by PICES in March 2000;
- PICES was invited to participate in developing a new Strategic Paper for NEAR GOOS (North East Asian Regional Global Ocean Observing System) and to co-sponsor a NEAR-GOOS Forecasting Workshop in August 2001;
- A statement on behalf of PICES in support of the ARGO project was delivered at the International Implementation Planning meeting for ARGO Floats in the Pacific Ocean and Adjacent Regions in Tokyo, Japan, in April;
- PICES co-sponsored a CREAMS Workshop on *Oceanography of the East Asian Marginal Sea* in May 2000, and supported a cruise on ecosystem study of the Japan/East

Sea organized by the Pacific Oceanological Institute (Vladivostok, Russia) in October 2000.

7. PICES Intern Program

At the PICES Eighth Annual Meeting (October 1999), the Governing Council approved the PICES Intern Program (Decision 99/A/7) and its commencement in 2000. In addition to their annual fees, Canada and U.S.A. contributed $7,500 and $7,000 respectively, to the Trust Fund to finance the Intern Program. Mr. Gong-Ke Tan (People's Republic of China) was selected as the first Intern in March 2000. An offer was made to Mr. Tan on April 6, 2000, and the notification of acceptance was received on April 10, 2000. The recommended period of appointment from June 22 to December 15, 2000, was meant to give him the opportunity to be involved in all major PICES activities including the organizing of the PICES Ninth Annual Meeting in Hakodate, Japan, this October. The duration of the Intern's term is limited by funding and, to a certain extent, by Canadian visa regulations.

8. Electronic Communication

The PICES Home Page will be completely re-designed and updated by the end of this year.

REPORT OF SCIENCE BOARD

The Science Board met on October 22 (12:30-13:30), to develop recommendations to the Governing Council on the initial items on the agenda. The second meeting was held on October 25 (18:00-21:00), to work on items with financial implications for the year 2001 and beyond. All remaining issues were discussed on October 27 (15:30-18:00), and October 28 (09:00-10:30). Dr. Skip McKinnell, served as rapporteur for the last two meetings. (See *SB Endnote 1* for list of participants.)

October 22, 2000

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

Review of procedures for Best Presentation Award (Agenda Item 3)

The Chairman reminded Science Board members, CCCC Co-Chairmen and TCODE Chairman of procedures for nominating speakers for Best Presentation Awards, and of the need to identify winners promptly, particularly for sessions end on Friday morning, so that award certificates are prepared in time for the Closing Session.

Committee Chairmen reported that they had difficulty obtaining up-to-date e-mail lists for their members and recommended that the Secretariat update the e-mail address list on the PICES web site as frequently as possible.

Changes to Handbook for Chairmen and Convenors (Agenda Item 4)

Science Board discussed the proposed revisions to the PICES Handbook for Chairmen and Convenors. These included adding a definition of Advisory Panel, extra guidance for posters, clarification that presentation and poster awards are to be directed toward young scientists, annual meeting themes and advance solicitation of topic sessions, new working group terms of reference, revised terms of reference for the MONITOR Task Team, descriptions of the areas of responsibility of Scientific Committees, more details on the duties of the SB chairman, and a provision for travel payments from the PICES Trust Fund.

Science Board members noted that it might be difficult to give an award for best presentation at the Science Board symposium to a young scientist because these speakers are often more established scientists. Therefore, Science Board recommended that Best Presentation Awards should be only directed toward young scientists speaking at sessions sponsored by Committees and Programs. Because it may be difficult for Committees to decide who qualifies as a young scientist, Science Board also recom-mended that in future, the PICES abstract submission form should include a check box where contributors could identify whether they wished to be considered for a Best Presentation Award, but also noting that young scientists should be 35 years of age or younger.

BIO made slight changes to the paragraph describing the committee's areas of responsibility. Changes to the Handbook were accepted as proposed and, after approval by Council, will be published in a forthcoming revision of the Handbook.

PICES VIII Governing Council decisions and Science Board recommendations (Agenda Item 5)

Science Board reviewed the status of PICES VIII Governing Council decisions involving Science Board and Science Board recommendations and accepted the list as written (*SB Endnote 3*).

October 25, 2000

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

Inter-sessional workshops, Working Group and CCCC Program meetings (Agenda Item 6a)

a. A WG 13/TCODE CO_2 Data Integration Test Workshop, January 22-24, 2001, Sidney, B.C., Canada;
b. A BASS/MODEL Workshop on "Quantification of a food web model for the eastern Pacific gyres", March 5-6, 2001, Honolulu, Hawaii, U.S.A.;
c. A 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, Honolulu, Hawaii, U.S.A.;
d. An International Argo Science Team Meeting (co-sponsored by PICES), March 20-22, 2001, Sidney, B.C., Canada;
e. A WG 13/TCODE CO_2 Data Integration Implementation Workshop, May 14-16, 2001, Tokyo, Japan;
f. A MODEL Workshop to implement improvements to the PICES NEMURO Model, spring/summer 2001, Japan or U.S.A.;
g. A NEAR-GOOS/ODC Forecasting Workshop (co-sponsored by PICES), August 2001, Seoul, Korea (in conjunction with the Fifth IOC/WESTPAC Scientific Symposium);
h. A POC/CREAMS/ONR Workshop on "Recent progress in studies of physical processes and impact to the Japan/East Sea ecosystem", spring 2002;
i. An ICES/ICES/GLOBEC International Symposium on "Role of zooplankton in global ecosystem dynamics: Comparative studies from the World Oceans", spring 2003.

Travel support requests for 2001 (Agenda Item 6b)

a. CCCC Program:
   - 2 scientists to attend the inter-sessional BASS/MODEL Workshop;
   - 2 scientists to attend the REX Workshop at PICES X;
   - 1 REX scientist and 2 MODEL scientists to attend the inter-sessional MODEL Workshop;
   - 1 MONITOR scientist to attend the MONITOR workshop at PICES X.

   Science Board discussed the CCCC requests and recommended that a total of 5 scientists be supported by PICES for all their workshops. The CCCC Program could decide at a later date which workshops should receive the support.

b. TCODE/WG 13:
   - 3 scientists (1 Japanese, 2 North American) to attend the CO_2 Data Integration Test Workshop;
   - 2 scientists to attend the CO_2 Data Integration Implementation Workshop.

   Science Board discussed the TCODE/ WG 13 request and recommended that a total of 4 scientists should be supported by PICES, and the groups could decide how best to allocate the travel between the workshops.

c. 4 invited speakers to attend PICES X Anniversary Symposium;
d. 1 invited speaker per Scientific Committee and Program for topic sessions at the PICES X;
e. 1 invited scientist with expertise in molecular biology of phytoplankton to attend the WG 15 Workshop on "Taxonomy and identification of HAB species", October 5-6, 2001, in Vancouver, B.C., Canada;

f. 1 additional invited speaker for the BIO Topic Session;
g. 2 scientists to attend the NEAR-GOOS/ODC Forecasting Workshop;
h. 1 WG 16 member to attend the American Fisheries Society Symposium on "Climate and aquatic biological resources".
j. Trust Fund travel requests:
   - 2 MBMAP members from Russia to attend the PICES X;
   - 2 WG 15 members to attend PICES X;
   - 1 Russian or Chinese POC member to attend the International Argo Science Team meeting;
   - CCCC - Dr. Nikolai Naumenko (Russia) to attend the REX Workshop at PICES X.

Science Board discussed and endorsed travel requests (items c-j).

Proposed list of publications for 2001 and 2002 (Agenda Item 6c)

a. PICES Scientific Report Series for 2001:
   - Final Report of WG 8 on Practical Assessment Methodology;
   - Final Report of WG 12 on Crabs and Shrimps;
   - Proceedings of the 2000 CCCC Workshops;
   - Report of the PICES Census of Marine Life Workshop;
   - Report on the 1999 and 2000 PICES CO_2 method inter-comparisons (minor cost to PICES).

b. PICES Scientific Report Series for 2002:
   - Proceedings of the PICES X Anniversary Symposium;
   - Proceedings of the 2001 CCCC Workshops;
   - Final Report of WG 13 on CO_2 in the North Pacific.

c. Special journal volumes for 2001:
   - *Progress in Oceanography* - selected papers from the Beyond El Niño Conference.

d. Special journal volumes for 2002:
   - *Progress in Oceanography* - selected papers from 2001 BIO Topic Session;
   - *Fisheries Oceanography* - papers from the 2000 NPAFC/PICES Juvenile Salmon Workshop;
   - *Marine Environmental Research* - papers resulted from the 1999 MEQ Practical Workshop.

Science Board endorsed publishing the above items. Science Board Chairman noted the request by the Secretariat that material from the CCCC Workshops should be submitted to the Secretariat by February 1 to be published in the PICES Scientific Report Series in a timely fashion. Committee Chairmen were reminded to designate guest editors and to develop a publication timetable for papers destined for primary journals.

Other items with financial implications (Agenda Item 6d)

a. PICES Wooster Award (*GC Appendix D*);
b. Logistics support for PICES WG 13 $^{13}C/^{12}C$ inter-laboratory method comparison.

Science Board agreed that the both items above should be supported, with a limit of support for item 2 of US$1,000.

Science Board discussed some non-financial aspects of the Wooster Award and recommended that PICES may not wish to give the award every year, and that the names of individuals who were nominated, but not chosen for the award, would be kept until the following year to maintain a pool of potential candidates.

<u>October 27, 2000</u>

Science Board discussed items relating to working groups, the PICES X program, relations with other programs and other matters.

Future of Working Groups and Scientific Programs (Agenda Item 7b)

Science Board recommended:

a. WG 8 on Practical Assessment Methodology has completed its work and should be disbanded;
b. WG 12 on Crabs and Shrimps should remain for one more year to complete its final report in 2001 (no further meetings of the Working Group are required);
c. WG 13 on CO_2 in the North Pacific should conclude its work in 2001 and prepare a final report for publication in 2002;
d. WG 14 on Effective Sampling of Micronekton, WG 15 on Ecology of Harmful Algal Blooms, and WG 16 on Climate Change and Fisheries Manage-ment should continue for two more years.

New PICES groups (Agenda Item 7c)

Science Board recommended that a Study Group on North Pacific Ecosystem Status Report and Regional Analysis Centers (RACs) be established for a period of 1 year. The terms of reference were significantly revised from those originally proposed. Some members reported that RACs were considered potentially controversial. Science Board decided that the positive and negative implications of RACs should be considered before proposing the details of how these might be implemented. (*SB Endnote 4*).

The CCCC/MONITOR Task Team proposed that PICES establish a PICES-GOOS Steering Group. The proposal was not endorsed as Science Board considered that there was sufficient overlap between what was being proposed with the existing terms of reference of the MONITOR Task Team, and with the recommended Study Group on North Pacific Ecosystem Status Report and RAC.

Relations with other programs and organizations (Agenda Item 7d)

The annual revision of the standing list of international organizations and programs (GC *Appendix C*) was endorsed to facilitate the interaction between PICES and other programs. This list indicates high priority organizations/programs with which PICES should regularly send representatives. New programs added this year include SOLAS, PORSEC, Gulf Ecosystem Monitoring Program and the Pacific Seabird Group.

Committees and programs identified the following programs as the highest priority:

BIO: ICES (WGZE), GLOBEC, GOOS
MEQ: ICES, AMAP, SCOR/GEOHAB
FIS: AFS Program on Climate and Aquatic Resources, IPCC, ICES
POC: CLIVAR, Argo, CREAMS, WESTPAC, NEAR-GOOS, JGOFS, GOOS, GCOS
CCCC: GLOBEC, GOOS, NEAR-GOOS, GEM, SAHFOS, CoML
TCODE: GLOBEC, GOOS, JGOFS

The discussion of interaction between PICES and NPAFC focused on a proposed series of Salmon and Climate workshops (*SB Endnote 5*). Science Board endorsed the proposal. The REX Workshop on "Temporal variations in size-at-age for fish species in coastal areas around the Pacific Rim" prior to PICES X was mentioned as a possible topic of interest to NPAFC researchers and that NPAFC should be invited to participate, particularly since the NPAFC will be meeting in the same location at approximately the same time of year. An NPAFC representative potentially could be named as a co-convenor to encourage participation by NPAFC scientists.

A proposal for a PICES, ICES and GLOBEC co-sponsored Symposium on Comparative Zooplankton Ecology to be held in Europe in 2003 was endorsed. Financial responsibilities for this workshop would be negotiated during the next 1-2 years.

PICES Tenth Annual Meetings (Agenda Item 8)

The following list of topics for sessions at PICES X was endorsed:

Science Board

The Science Board Symposium will be designated as a PICES X Anniversary Symposium entitled "Ten Years of PICES science: Decadal-scale scientific progress and prognosis for a regime shift in scientific approach" (¾ day). (*SB Endnote 6*). A proposal for a symposium on marginal seas was deferred to a later year.

CCCC Program

a. A decade of variability in the physical and biological components of the Bering Sea ecosystem 1991-2001 (½ day);
b. CCCC IP Meeting and results of GLOBEC and GLOBEC-like programs (with emphasis on possible 1999 regime shift) (½ day).

BIO Committee

Plankton size classes, functional groups, and ecosystem dynamics: causes and consequences (1 day).

FIS Committee

Migration of key ecological species in the North Pacific Ocean (1 day).

MEQ Committee

a. Physical, chemical and biological interactions during harmful algal blooms (MEQ/BIO/POC) (½ day);
b. Sediment contamination – the science behind remediation standards (½ day);
c. Physical oceanography to societal valuation: Assessing the factors affecting coastal environments (½ day);
d. Emerging issues for MEQ: A 10 year perspective (½ day).

POC Committee

a. The physics and biology of eddies, meanders and rings in the PICES region (POC/BIO/FIS) (1 day);
b. Coastal ocean physical processes responsible for biological productivity and biological resources distribution (½ day).

Poster Sessions

Recognizing the success of the format of the poster sessions at the Beyond El Niño Conference, Science Board recommends that one or more similar events be organized at PICES X. The poster session, with refreshments served, would occur following the oral presentations.

CCCC workshops and Working Group meetings

a. Joint CCCC Workshop – all Task Teams (½ day);
b. BASS/MODEL Workshop to review ecosystem models for the Subarctic Pacific gyres (1 day);
c. REX Workshop on "Temporal variations in size-at-age for fish species in coastal areas around the Pacific Rim" (1 day);
d. REX/MODEL Workshop to implement improvements and include higher trophic levels to the PICES NEMURO Model (½ day);
e. WG 15 Workshop on "Taxonomy and identification of HAB species", Vancouver, B.C. (2 days);
f. WG 13, 14, 16 meetings (1 day);
g. MBM, WG 15 meetings (½ day);
h. PICES/CLIVAR Workshop.

Theme for PICES XI (Agenda Item 9)

The suggested theme for PICES XI is "Technological advances in marine scientific research" but the choice should be discussed with the host country. The Science Board Symposium will be developed using the theme. Committees are recommended to develop topics using this theme but Science Board did not consider this as mandatory. (See *SB Endnote 7* for theme description.)

High priority scientific projects (Agenda Item 7e)

Science Board discussed high priority scientific projects that may require external funding. Three were mentioned as having the highest priority: (i) develop a North Pacific Ecosystem Status Report, (ii) establish an International Zooplankton Monitoring Program for the North Pacific, and (iii) plan and convene a series of symposia/workshops on "Effect of human and climate interaction on fish production". Proposals for the last 2 items will be developed during the coming year. The need for a coordinated ecosystem research effort in the Japan/East Sea was discussed and the POC Chairman agreed to work on preparing a proposal.

Resolution on assisting monitoring activities in the PICES region (Agenda Item 7g)

The following resolution was adopted by the Science Board:

Two PICES pilot projects using voluntary observing ships (VOS) in the North Pacific to monitor physical, chemical and biological parameters have had good results. PICES supports these projects and their continuation. Recognizing the urgent need for basin scale monitoring, beyond that encompassed within the existing programs, Science Board encourages the development of observing programs with dense regional coverage of parameters using VOS and similar cost-effective ecosystem observing systems. PICES will develop procedures for promoting such programs under its monitoring framework.

Strategic workplans and progress (Agenda Item 7a)

The list of potential themes for future Annual Meetings was added to the SB Strategic workplan (*SB Endnote 7*).

Other business (Agenda Item 10)

a. Proposed membership changes - CCCC Program

Makoto Kashiwai (Japan) to replace Suam Kim (Korea) as CCCC Co-Chairman;

David L. Mackas (Canada) and Sei-ichi Saitoh (Japan) to replace Bruce Taft (U.S.A.) and Yasunori Sakurai (Japan) as MONITOR Co-Chairmen;

Hidehiro Kato (Japan) and Thomas R. Loughlin (U.S.A.) to serve as BASS members;

Peter S. Ross (Canada) and George L. Hunt (U.S.A.) to serve as MODEL members;

Phil Mundy (U.S.A.), Douglas F. Bertram (Canada) and William J. Sydeman (U.S.A.) to serve as MONITOR members;

Yutaka Watanuki (Japan) to serve as a REX member.

b. Committee meetings attendance

Science Board noted widespread incomplete national representation at Committee meetings and recommended that member countries ensure that they are represented at all Committee meetings.

c. Science Board Symposium

Science Board recommended using the closing of the Science Board Symposium as an opportunity to introduce and describe how the meeting will be conducted during the remainder of the week, especially using visual aids to describe the meeting structure.

d. Best Presentation Award

The Science Board Award for Best Presentation went to Dr. Shingo Kimura (Japan) for his paper on "Biological production process associated with frontal disturbances of the Kuroshio and the Kuroshio Extension". The first Science Board award for Best Poster went to Dr. Tetsuya Takatsu (Japan) for the poster on "Dominant year-classes in brown sole *Pleuronectes herzensteini*".

e. Closing Session

Science Board recommended reducing the scope of the closing session to the announcement of awards, themes, and proposed topics for the next Annual Meeting (the theme and topics would be announced by Science Board Chairman).

SB Endnote 1

Participation List

Patricia Livingston (Chairman, Science Board)
Tsutomu Ikeda (Chairman, BIO)
Douglas E. Hay (Chairman, FIS)
John E. Stein (Chairman, MEQ)
Vyacheslav B. Lobanov (Chairman, POC)
Suam Kim (Co-Chairman, CCCC)
David Welch (Co-Chairman, CCCC)
Robin M. Brown (Chairman, TCODE)
Stewart M. McKinnell (Asst. Executive Secretary)

SB Endnote 2

Agenda

October 22, 2000 (12:30 – 13:30)

1. Welcome and opening remarks.
2. Adoption of agenda.
3. Review of procedures for Best Presentation Awards.
4. Changes to Handbook for Chairmen and Convenors.
5. PICES VIII Governing Council decisions and Science Board recommendations.

October 25, 2000 (18:00 – 21:00)

6. Reports of Scientific and Technical Committees, CCCC Implementation Panel, Working and Study Groups with regard to items having financial implications for 2000 and beyond:
   a. Inter-sessional meetings proposed for year 2001 and beyond;
   b. Travel support requests for year 2001;
   c. Proposed list of publications for 2001 and 2002;
   d. Other items with financial implications.

October 27, 2000 (15:30-18:00) and October 28, 2000 (09:00 – 10:30)

7. Reports of the Science Board Chairman, Scientific and Technical Committees, CCCC Implementation Panel, Working and Study Groups with regard to other items:
   a. Brief summary report of the group's activities in the past year (including progress with regard to Strategic Workplan items);
   b. Future status of existing groups (changes in duration of active status, membership, terms of reference);
   c. Proposed list of future groups along with terms of reference and a list of potential members;
   d. High priority scientific projects to be forwarded to fundraising committee:
      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".
   e. Relations with other international programs/organizations;
   f. Proposed recommendations and draft text on other items that would be included in the Science Board Report to the Governing Council (e.g., recommendations for letters of support to various research efforts);
   g. Other items.
8. PICES Tenth Annual Meeting:
   a. PICES X Anniversary Symposium;

b. Science Board Symposium, Topic Sessions and Workshops.
9. Selection of PICES XI Annual Meeting theme.
10. Other business.
11. Adoption of SB Report and recommendations to the Governing Council.

SB Endnote 3

Progress on PICES VIII decisions and Science Board recommendations

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

The following inter-sessional meetings were convened:

a. CCCC/MODEL Workshop on *Lower Trophic Level Modeling*, January 31–February 3, 2000, in Nemuro, Japan (co-sponsored by the Japan International Science and Technology Exchange Center and Nemuro-city);
b. *Beyond El Niño Conference on Pacific Climate Variability and Marine Ecosystem Impacts*, March 23-26, 2000, La Jolla, U.S.A. (co-sponsored by IATTC, IPHC, ISC, NPAFC and SCOR);
c. ICES/PICES Workshop on *Zooplankton Ecology of the North Atlantic and North Pacific*, April 17-19, 2000, Honolulu, U.S.A.;
d. CREAMS (Circulation Research in the East Asian Marginal Seas)/PICES Workshop on *Oceanography of the East Asian Marginal Seas*, May 15-17, 2000, Vladivostok, Russia;
e. Symposium/Workshop on *North Pacific CO_2 Data Synthesis* (including the second PICES/WG 13 method inter-comparison for carbonate parameters and joint meeting of PICES WG 13 on CO_2 in the North Pacific with TCODE and JGOFS/NPTT), October 18-21, 2000, Tsukuba, Japan (co-sponsored by the Core Research for Evolution Science and Technology of the Japan Science and Technology Corporation (CREST/JST) and the Marine Information Research Center (MIRC) of the Japan Hydrographic Association, and hosted by the National Institute for Environmental Studies);
f. Series of CCCC Task Team Workshops: BASS Workshop on *Development of a Conceptual Model of the Subarctic Pacific Basin Ecosystem(s)*, MODEL Workshop on *Strategies for Coupling Higher and Lower Trophic Level Models*, MONITOR Workshop on *Progress in Monitoring the North Pacific*, and REX Workshop on *Trends in Herring Population Dynamics and Trophodynamics*, October 20-21, 2000, Hakodate, Japan (co-sponsored by the Ministry of Education of Japan);
g. Technical Workshop on *Basis for Estimating the Abundance of Marine Birds and Mammals, and the Impact of their Predation on other Organisms*, October 20, 2000, Hakodate, Japan (co-sponsored by the Japanese Fisheries Agency);
h. First joint NPAFC/PICES Workshop (hosted by NPAFC) on *Factors Affecting Production of Juvenile Salmon: Comparative Studies on Juvenile Salmon Ecology between East and West North Pacific Ocean*,will take place immediately after PICES IX, October 29, 2000, Tokyo, Japan.

99/S/2: Travel support

a. One speaker per Committee or Program to attend PICES IX. Speakers have been identified and funding provided;
b. Up to two Co-Chairmen of Working Groups to meet inter-sessionally. Funding was not requested;
c. Science Board Chairman to attend the ICES Scientific Symposium. Ms. Patricia Livingston was unable to attend;
d. One person to attend the SCOR Annual Meeting, October, 2000, Washington, DC.

Due to close scheduling of the annual meetings of the two organizations, a PICES representative was unable to attend.

99/S/3: Publications

a. Bibliography on Oceanography of the Japan/East Sea, final report of WG 11 on Food Consumption by Marine Birds and Mammals and Proceedings of the 1999 MONITOR and REX Workshops and 2000 MODEL Workshop published as PICES Scientific Reports No. 13, 14 and 15 respectively.
b. Progress reports of WG 8 on Practical Assessment Methodology, WG 12 on Crabs and Shrimps and WG 13 on CO_2 in the North Pacific published in the 1999 Annual Report.
c. Selection of papers from the 1999 Science Board Symposium on "The nature and impacts of North Pacific climate regime shifts" published in a Special Issue of *Progress in Oceanography*, Vol. 47 (2-4).
d. 40 manuscripts submitted for publication in the Beyond El Niño Conference Special Issue of *Progress in Oceanography*.
e. Results from the 1999 and 2000 PICES method inter-comparisons for carbonate parameters will be published in a bilingual (Japanese/English) report published by the Center for Global Environmental Research (CGER) of the National Institute for Environmental Studies, Japan, and in the PICES Scientific Report Series in spring 2001.

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

a. WG 8 on Practical Assessment Methodology convened the MEQ Topic Session at PICES X on "Environmental assessment of Vancouver Harbour" and completed collation of results from the 1999 MEQ Practical Workshop. The WG 8 final report will be published as PICES Scientific Report in 2001. A special issue of *Marine Environmental Research* based on results from the 1999 MEQ Practical Workshop is planned for publication in 2002.
b. WG 10 on Circulation and Ventilation in the Japan/East Sea was disbanded. The WG 10 final report was not completed.
c. WG 11 on Consumption of Marine Resources by Marine Mammals and Birds was disbanded. The WG 11 final report was published as PICES Scientific Report No. 14.
d. WG 12 on Crabs and Shrimps completed collation of results. The WG 12 final report will be published in 2001.
e. Dr. Richard D. Brodeur accepted responsibility as Co-Chairman for WG 14 on Effective Sampling of Micronekton. The first formal WG 14 meeting will be organized at PICES IX in Hakodate.

99/S/5: New PICES groups

a. WG 15 on the Ecology of Harmful Algal Blooms in the North Pacific is beginning its work.
b. WG 16 on Climate Change, Shifts in Fish Production, and Fisheries Management is beginning its work.
c. Advisory Panel on the Continuous Plankton Recorder will meet for the first time.
d. Advisory Panel on Marine Mammals and Birds will meet for the first time.

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

a. PICES and IPHC signed an MOU on scientific cooperation in January 2000.
b. NPAFC, IPHC, ISC, IATTC and SCOR co-sponsored the Beyond El Niño Conference on "Pacific climate variability and marine ecosystem impacts".
c. GLOBEC co-sponsored a topic session on "Recent findings and comparisons of GLOBEC and GLOBEC-like programs in the North Pacific Ocean" at the PICES Ninth Annual Meeting in October 2000, and accepted a proposal of PICES to organize and co-sponsor a major ICES/PICES/GLOBEC Symposium on

Zooplankton Ecology, in spring 2003.

d. JGOFS participated in planning and co-sponsored a topic session on "North Pacific carbon cycling and ecosystem dynamics" at the PICES Ninth Annual Meeting, in October 2000.
e. After a successful ICES/PICES Workshop on "Zooplankton ecology of the North Atlantic and North Pacific", in April 2000, ICES accepted a proposal of PICES to organize and co-sponsor a major ICES/ PICES/GLOBEC Symposium on Zooplankton Ecology, in spring 2003.
f. 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 October 2000.
g. PICES co-sponsored a CREAMS Workshop on "Oceanography of the East Asian Marginal Sea", in May 2000.
h. PICES Chairman attended the International Implementation Planning meeting for ARGO Floats in the Pacific Ocean and Adjacent Regions in Tokyo, Japan, and delivered a statement on behalf of PICES in support of the ARGO project.
i. Assistant Executive Secretary met with the Scientific Director of GIWA to discuss areas of mutual interest and potential cooperation between PICES and GIWA.
j. Assistant Executive Secretary met with ICES General Secretary to discuss progress in ICES/GOOS relations, ICES interests in Argo and proposed ICES/PICES/GLOBEC international symposium on zooplankton ecology.
k. PICES was invited by IOC to participate in the reviewing of the IOC OSLR (Ocean Science in Relation to Living Resources) Programme.

SB Endnote 4

North Pacific Ecosystem Status Report and Regional Analysis Center

North Pacific Ecosystem Status Report

Rationale:
Throughout the world, many regional marine management organizations are trying to move towards ecosystem-based management, particularly with regard to the management of marine fisheries. We have not yet reached the stage where we can quantitatively include our understanding of the dynamics of marine ecosystems directly into the traditional stock assessment advice that is usually given to such management organizations. However, there is now a strong trend towards at least providing such organizations with reports that might be thought of as ecosystem status reports. These reports compile our knowledge about the status and trends of various ecosystem components and may also summarize what we know about the relationship between these trends and changes in the productivity of various fisheries. Such reports have been compiled for the Great Lakes region in North America, Chesapeake Bay, the Great Barrier Reef, Puget Sound, the North Sea, and the eastern North Pacific shelf areas of Alaska and British Columbia.

PICES provides a way for scientists involved in monitoring and researching the status and trends of many North Pacific ecosystem components to join their knowledge and data together to benefit all the PICES nations bordering the North Pacific. Our Working Groups and CCCC Program have been compiling information on many of these components. Similarly, the major fishery organizations of the North Pacific compile status and trends information specific to their species of interest. It is likely to be of mutual interest for us to update our information and provide ongoing scientific advice to PICES nations about the status of the North Pacific and the role of climate variability on fish production. Collaboration with our colleagues in NPAFC, ISC, IPHC, and IATTC (and other groups that focus on particular fish stocks) in the production of this document will be a move to provide

decision-makers and the interested public with integrated advice about our shared ocean.

Format:
This report would include sections on physical oceanography and climate indices, nutrients, phytoplankton and zooplankton production, micronekton, small pelagic fish, crabs and shrimps, salmon, halibut, tuna, marine mammals and birds, marine environmental quality, etc. The exact format, content, and level of detail would need to be decided by a steering group consisting of representatives of each of the organizations. However, we envision that east and west comparisons of key species groups and environmental variables will be a focus.

Resources Required:
Compiling the necessary data and analyses from the many individuals and groups that will be involved in this project will require a substantial commitment. Minimum staffing to obtain existing data and compile the report would be one full-time specialist at the PICES Secretariat. Report production, printing, and web access would also require extra funding. Ideally, the report would be strengthened by additional long term monitoring efforts and analytical assistance of the proposed GOOS Regional Analysis Centers. These Centers would receive climate, oceanographic, and fisheries data from national and international sources and on a regular basis would prepare descriptions of the current state of the ecosystem and recent and longer term changes therein, including climate forcing, ocean physical conditions and circulation, and abundance and distribution of various biological components of the system. To the extent that available data and understanding of the system permitted, forecasts would be made of probable future conditions of these same ecosystem components. The products of the now-casting and forecasting analyses would be regularly provided to participating countries and organizations and would be made widely available on the web. Results of the analyses would also be used for improving the observational system.

Proposal to develop a PICES Regional Analysis Center

The Living Marine Resources (LMR) Panel of GOOS concluded that one way to optimize the products that might be generated from its recommended monitoring activities could be achieved through the development of Regional Analysis Centers. The following description is taken from the draft LMR-GOOS Strategic Design:

> *The treatment of data resulting from the LMR components of GOOS will require bringing them together with relevant physical and other data in a holistic analysis of the ecosystem of interest Such analyses are essential elements of monitoring systems. They could be made in regional analysis centers, where scientists of appropriate disciplines from participating countries would undertake the work. Work in these centers could also serve a central role in capacity building.*
>
> *Such analysis centers would receive climate, oceanographic, and fisheries data from national and international sources and on a regular basis would prepare descriptions of the current state of the ecosystem and recent and longer term changes therein, including climate forcing, ocean physical conditions and circulation, and abundance and distribution of various biological components of the system. To the extent that available data and understanding of the system permitted, forecasts would be made of probable future conditions of these same ecosystem components. The products of the now-casting and forecasting analyses would be regularly provided to participating countries and organizations and would be made widely available on the web. Results of the analyses would also be used for improving the observational system.*

The LMR Panel considered that each RAC would develop a suite of products and methods to deliver products to users, based on regional

biological and physical conditions and on capacities for data analysis, interpretation and dissemination. Where appropriate, products of the monitoring, analysis, and interpretation could be disseminated effectively through a well designed web site hosted by a RAC. These web-based products would contain a hierarchy of information detail. At the most general level, "red-flash alerts" of changing ecosystem conditions, status of stocks reports, and maps of relevant ocean features would be available for decision makers and those concerned with the general condition of the ocean. A second level would include information products useful for resource managers, such as stability and wind mixing indices, bycatch/incidental mortality estimates, length and age structures, and community structure. At a third, most detailed level, resource scientists and researchers would have access to raw formatted data, available through links to institutions responsible for the observations.

It was proposed that PICES, along with other international programs and organizations, should initiate discussions of the design and possible implementation of such centers in their regions of interest. These discussions should include assessment of present exchange arrangements for climate, oceanographic, and fisheries data relating to those regions.

From a PICES perspective RACs would provide a meaningful way for PICES to participate in GOOS and, incidentally, to obtain additional funding from member states as part of their GOOS participation. Furthermore, it would enable PICES to develop an appropriate advisory role, analogous to that of ICES, by providing its members with periodic holistic assessments of the state of the marine ecosystem. Such advice would be objective and apolitical, with no one country having control of the data or the output.

Proposal for a Study Group

In order to move forward it is proposed that a PICES Study Group be established 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; and
- Examine the function, products and positive and negative implications of RACs

Membership in the group shall consist of Science Board chairman, one representative from each of the standing, technical and Scientific Committees and Scientific Programs, one representative of the GOOS community and one member from the Secretariat.

SB Endnote 5

Proposal for a series of Salmon and Climate workshops

Rationale:

Due to their commercial importance, complex life histories, and multiple ways in which environment might affect salmon production, it seems that a series of workshops that seeks to understand the complexity of salmon and climate interactions would be beneficial to understanding and ultimately predicting environmentally induced changes in salmon production. An initial workshop focusing on juvenile salmon ecology and climate interactions has been planned for fall 2000 between NPAFC and PICES. Further workshops might also include Atlantic/Pacific comparisons and thus NASCO and ICES would be co-convenors along with NPAFC and PICES.

As with the ICES Cod and Climate Study, this series of workshops would be undertaken to address either the role of climate in influencing a particular life history stage or to explaining the role of climate in a particular salmon production change. GLOBEC research and associated models, monitoring, and comparative approaches would be included to bring an integrated approach to the problem.

Potential collaborating organizations: ICES, NASCO, NPAFC, PICES

Frequency of workshops: to be decided depending on interest, but perhaps every 2-3 years.

Product: joint report

SB Endnote 6

PICES X Anniversary Symposium

Ten Years of PICES Science: Decadal-Scale Scientific Progress and Prognosis for a Regime Shift in Scientific Approach. Convenors: Patricia Livingston (SB), Tsutomu Ikeda (BIO), Douglas E. Hay (FIS), John E. Stein (MEQ), Susan E. Allen (POC), David W. Welch (CCCC) and Thomas C. Royer (TCODE).

This Science Board Symposium is 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 will be given 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 will consolidate current information and frame new and better questions for future investigation.

A look to the future of marine science in the North Pacific will be provided through thought-provoking invited talks, given by distinguished scientists with connections outside PICES, on various topics, which could range 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 are welcomed at the accompanying poster session.

Invited talks and selected contributions will be published in the PICES Scientific Report Series, in spring 2002.

SB Endnote 7

PICES Annual Meeting themes

PICES XI theme - *Technological advances in marine scientific research*

This annual meeting theme is dedicated to the potential for implementation of technology to advance the scientific activities conducted by PICES researchers. Technological advancements are occurring in a variety of research areas (biology, biomass assessments, physical and biological oceanography, etc.). For examples advances in stock identification techniques are occurring in the areas of the microscopic laser ablation technology, new nuclear DNA techniques, and smart tags, including acoustical tags for fish and mammals, etc. For stock assessments there are some new developments in the areas of laser technology and associated data analyses technology that can scan the upper 20-30m from aircraft, some other techniques that use other parts of the spectrum, and satellite technology. There are continuing developments in acoustical assessments, such as long-range sidescan SONAR and much more. Some of the greatest advancements may be occurring in the realm of physical oceanography, and the smart drifters being developed. There are also new chemical techniques being developed to assess the distribution and assessment of stable organochlorines, which may have implications for marine mammals and human health. This emphasis on technological advancements also would include new developments in information technology.

In conjunction with the science meeting there could be a high tech trade show where some firms that are in the business of providing high tech equipment to the PICES scientific community would have an opportunity to demonstrate their wares.

Potential themes for future Annual Meetings

- Integration: Linking the scientific disciplines to understand ecosystems
- Human dimensions
- North Pacific links to global processes/ issues
- Ecosystem protections/sustainable ocean use
- Coastal issues
- Progress in prediction
- Scientific foundations (hypothesis driven, data-rich research, improvements in methodology)
- Understanding ecosystem processes
- Implementation of the findings of the 3rd Assessment IPCC Report

REPORT OF BIOLOGICAL OCEANOGRAPHY COMMITTEE

The meeting of the Biological Oceanography Committee was held from 1330-1730 hours on October 22, 2000, and from 0900-1300 on October 25, 2000. The Chairman, Dr. Tsutomu Ikeda, called the meeting to order and welcomed the participants (*BIO Endnote 1*). The Committee reviewed the draft agenda and it was adopted (*BIO Endnote 2*) as presented.

Business arising from PICES VIII (Agenda Item 3)

Dr. Ikeda circulated reports on:

a. PICES Science Board/Governing Council responses to 1999 proposals from BIO. All items were approved as proposed except:
   - WG 15 on Ecology of Harmful Algal Blooms was sponsored solely by MEQ (did not need additional sponsorship by BIO, which already currently sponsors WG 14 on Effective Sampling of Micronekton and Advisory Panel on Marine Birds and Mammals);
   - Request for additional members of WG 14 has not yet been fully implemented.

b. Inter-sessional correspondence and requests:
   - Arctic Climate Impact Assessment wants experts nominated from PICES, but there were no suggestions from BIO;
   - New annual PICES Wooster Award for cumulative achievement. BIO members felt that the award criteria are appropriate and sufficiently broad, but PICES may eventually want to establish additional awards in other areas;
   - Candidates for access to resources raised by the Fund-Raising Committee (see Agenda Item 6);
   - Visibility of poster presentations. Dr. Ikeda reported that this year's meeting format has time for poster summaries during the oral presentation sessions.

Report of WG 14 on Effective Sampling of Micronekton (Agenda Item 4)

Dr. Richard D. Brodeur noted that this year's WG 14 meeting was first meeting with adequate attendance and therefore should be viewed as the start date for this Working Group. A WG 14 progress report is attached as *BIO Endnote 3*. Some countries and topics remain unrepresented. Dr. Brodeur suggested some nominees for additional members, and especially noted the need for an Asian Co-Chairman.

Micronekton has been operationally defined (on similarity of size, motility and probable sampling method) as including euphausiids, juvenile fish, small midwater fishes, pelagic decapods (shrimps), and small pelagic cephalopods (squids). Large chaetognaths and gelatinous zooplankton were considered but not included, as the main sampling problem is fragility rather than mobility. WG 14 will review past work on micronekton sampling and ecology. For several of the taxa, much of this work is scattered and old with few young scientists are working on these taxa. The Working Group will prepare a final written report for the 2003 Annual Meeting. Dr. Brodeur provided an outline of the probable format and content of the report.

The main topics will be:

a. Biomass and species composition patterns (by large-scale region, similar to those selected by WG 11 on Consumption of Marine Resources by Marine Birds and Mammals);
b. Sampling methodologies and difficulties;

Additional topics:

c. Life history and demographic rates;
d. Food web connections and rates.

WG 14 requests a full day meeting at the PICES

Tenth Annual Meeting in Victoria, in 2001, and will likely propose a 1-day workshop or topic session for the 2002 or 2003 Annual Meeting.

Review of BIO Strategic Plan (Agenda Item 5)

Dr. Ikeda circulated an outline of goals for BIO Strategic Plan and current activities toward these goals:

a. Improve cooperation with other PICES components: joint topic sessions with CCCC, POC, MBM Advisory Panel were convened at PICES IX;
b. Enhance interaction with relevant international organizations: a joint ICES/ PICES/GLOBEC Symposium on Comparative Zooplankton Ecology will be held in spring 2003 (see Agenda Item 8 below and *BIO Endnote 4*);
c. Increase involvement in specific recognized scientific issues: participation in a recent workshop on "Designing the iron fertilization experiment in the Subarctic Pacific", in Tsukuba, Japan;
d. Improve community attendance and participation in PICES Committees, Task Teams and Working Groups: remains a problem area;
e. Improve inter-sessional work via email leading to shorter and more efficient annual meetings: more emails not necessarily leading to shorter meeting;
f. Increase travel support for student participation at Annual Meetings: PICES is providing partial support for some students and young scientists, but BIO unable to document extent or details.

Science Board issues (Agenda Item 6)

The Science Board Chairman introduced a number of new topics to the Committees at the Annual Meeting and requested BIO comments on the following:

a. North Pacific Ecosystem Status Report. BIO felt that this is a good idea and should be dual tracked to a referred journal, and to a public-friendly segment within the PICES website, also noting that funds for data manager would be helpful.
b. PICES-GOOS Regional Analysis Center. While CCCC Monitor Task Team is the contact group, BIO felt that it requires a considerable support for overall objective, but expressed some concern about its timing. Dr. Ikeda reported on a proposed Study Group structure (including one member from BIO).
c. Ongoing North Pacific monitoring. BIO felt that the CPR pilot project, externally funded for 2000 and 2001, appears to be working well.
d. Existing CCCC Task Teams. BIO felt that these teams have been running quasi-autonomously within CCCC, but closer links and reporting to permanent committees might be useful.
e. Workshop or symposium series on "Effect of human and climate interaction on fish production": a possible area of collaboration with NPAFC. No particular comments from BIO.
f. Changes to the Handbook for Chairmen and Convenors. BIO members agreed to revise the terms of reference of BIO Committee by replacing the final sentence with "…*scientific advice on ecological roles of lower and higher trophic level organisms on fisheries*".
g. PICES XI theme. Themes BIO member favored amending to *North Pacific links to [regional and] global processes*. BIO agreed that the topic should be of importance to the PICES XI host country (not known yet).

Relations with international organizations (Agenda Item 7)

Dr. Ikeda circulated a list of organizations currently seeking PICES representation at their meetings, and (noted by asterisk) which of these presently are attended. BIO was content with present ranking, and specifically identified ICES (WGZE), GLOBEC and GOOS as the highest

priority program for cooperation.

Joint ICES/PICES/GLOBEC Symposium on Comparative Zooplankton Ecology (Agenda Item 8)

Dr. Ikeda reported that an ICES/PICES Zooplankton Ecology workshop was held April 2000, in Honolulu. BIO was represented by Dr. Ikeda (other PICES participants are Drs. Charles B. Miller and Jeffrey M. Napp), who wrote an extended meeting report that was published in PICES Press 8(2). There is a proposal for a broader Symposium on Com-parative Zooplankton Ecology, to take place in 2003, probably in Europe (See *BIO Endnote 4*). PICES would be an equal co-sponsor (with ICES and GLOBEC) and suggested Dr. Ikeda as PICES convenor, and Drs. Ikeda and William T. Peterson as PICES representatives on the Steering Committee. Other responsi-bilities of PICES (e.g. travel and venue costs, publication, administrative support) will be negotiated over the next 1-2 years. BIO felt that the topic is useful and in line with PICES objectives. There was discussion about the need for expanded global involvement (especially the southern Pacific) but otherwise the symposium was supported as proposed.

Report from Marine Birds and Mammals Advisory Panel (Agenda Item 9)

The Panel Co-Chairman Dr. Hidehiro Kato distributed a written report to BIO members (*BIO Endnote 5*). The main items in this report include a summary of the MBM Technical Workshop (October 20, 2000), planned activities for the next annual meeting including an evening Panel meeting, nominees for MBM participation in PICES/CCCC Task Teams, and the Panel's scientific issues and activities including seeking national funding to attend annual meetings, compiling and cataloguing time series metadata, initiating a seabird observer program in association with the CPR program, an east *vs*. west diet comparison, filling in data gaps in the WG 11 report. BIO discussed the cost and technology for at-sea monitoring with the CPR program (and other vessels of opportunity), and strategies for dealing with size mismatch between the small zooplankton caught with CPR and larger prey items of most seabirds.

Sessions at future Annual Meetings (Agenda Item 10)

BIO Topic Sessions at PICES X: BIO recommends convening a full day session on "Plankton size-classes, functional groups and ecosystem dynamics: causes and consequences" (see *BIO Endnote 6*). Prior to the Annual Meeting, Dr. Michael M. Mullin proposed that scientific sessions are more valuable if they are more interactive (more discussions and questioning). BIO discussed ways to overcome the problem under the present situation of time constraint. Suggestions included reserving time at the end of session for group discussion, reserving a portion of the BIO business meeting for open-to-all discussion of one or more topics, or an evening dinner session with discussion.

Joint sessions at PICES X: BIO accepted proposal of convening a full-day session jointly with POC and FIS on "The physics and biology of eddies, meanders and rings in the PICES region" (*POC Endnote 4*), and a ½-day session jointly with MEQ and POC on "Physical, chemical and biological interactions during harmful algae blooms" (*MEQ Endnote* 4). Dr. Patricia A. Wheeler reported that BASS propose an inter-sessional workshop to examine the feasibility of using ECOPATH/ ECOSIM as a tool to model higher trophic level components of the Subarctic gyre system.

Science Board Symposium at PICES X: BIO recommended the topic on "Ecosystem processes in marginal seas of the North Pacific", with Drs. Timothy R. Parsons (Canada), Vyacheslav P. Shuntov (Russia), Tetsuo Yanagi (Japan) and Yasunori Sakurai (Japan) as potential convenors.

Best Presentation Award (Agenda Item 11)

BIO members met at 1300 on 27 October. Nominations were tabulated for the BIO Best

Presentation Award. Based on these nominations, BIO selected a short list of four candidates and voted for Dr. Christine T. Baier, for her paper (with M. Terazaki) entitled "Effects of chaetognath predation on copepod communities on the southeast Bering Sea shelf".

Other topics (Agenda Item 12)

Report of the Iron Fertilization Experiment Panel

Dr. Paul J. Harrison reported on a 2-day workshop on "Designing the iron fertilization experiment in the Subarctic Pacific" held in Tsukuba, immediately prior to PICES IX, noting a considerable research is planned or proposed for next few years by Canada, Japan and U.S.A. on field experiments in eastern and western subarctic Pacific.

Requests for travel funding for PICES X

- 2 scientists (1 from U.S.A. and 1 from UK) to attend the BIO Topic Session;
- 2 MBM Advisory Panel members from Russia to attend the meeting.

Publications

Funding request for publication for 2002 – selected papers from the 2001 BIO Topic Session in a special issue of *Progress in Oceanography*.

BIO Endnote 1

Participation List

Canada
David L. Mackas (rapporteur)
Kenneth L. Denman
Paul J. Harrison

Japan
Tsutomu Ikeda (Chairman)
Takashige Sugimoto
Atsushi Tsuda

People's Republic of China
Ya-Qu Chen

Republic of Korea
Woong-Seo Kim

Russian Federation

U.S.A.
Patricia A. Wheeler

Others
Douglas F. Bertram (MBM, Canada)
Hidehiro Kato (MBM, Japan)
William Sydeman (MBM, U.S.A.)
George L. Hunt (MBM, U.S.A.)
Maurisse Levasseur (observer, Canada)
Natalia T. Dolganova (observer, Russia)
Victoria V. Nadtochy (observer, Russia)
Alexander I. Boltnev (observer, Russia)
Vladimir I. Zvalinsky (observer, Russia)
Charles B. Miller (observer, U.S.A.)
Jeffrey M. Napp (observer, U.S.A.)
Wen-Tseng Lo (observer, China Taipei)

BIO Endnote 2

Agenda

22 October 13:30-17:30

1. Welcome and introduction of members.
2. Approval/modification of agenda.
3. Business arising from last year's meeting.
4. WG 14 report.
5. Review of BIO Strategic Plan.
6. Science Board issues.
7. Relations with relevant international organizations.
8. ICES/PICES/GLOBEC Symposium on Comparative Zooplankton Ecology.

25 October 09:00-13:00

9. Advisory Panel on Marine Birds and Mammals report.
10. Proposals for the special topic for PICES Annual Meeting 2001.
11. Voting for 2000 BIO Best Presentation Award.
12. Any other topic.
13. Draft of report to Science Board.

BIO Endnote 3

Progress Report of the Working Group 14 on Effective Sampling of Micronekton

The Working Group meeting on October 22, 2000, was chaired by Dr. Richard D. Brodeur (U.S.A.) and 5 members of WG 14 were in attendance. It was noted that there were no Chinese or Korean members and Russia, Canada, and Japan were represented by only a single WG 14 member. PICES should act to guarantee participation by these nations in subsequent WG 14 meetings.

Introductions

All attendees introduced themselves and their interests in WG 14. (* indicates WG member)

Kenneth Coyle* (U.S.A.) - euphausiids
George L. Hunt (U.S.A.)- represented the Marine Birds and Mammals Advisory Panel
Naoki Iguchi* (Japan) - euphausiids
Tsutomu Ikeda (Japan, observer, BIO Chairman) - represented BIO Committee
Kouichi Kawaguchi (Japan) - mesopelagic fishes
Moriyuki Kotori (Japan) - chaetognaths
David L. Mackas* (Canada) - euphausiids
Vadim F. Savinykh* (Russia) - mesopelagic fishes

History of WG 14

Dr. Brodeur gave a brief overview of the genesis of WG 14. The idea was originally approved by BIO in 1997. The original goal of the Working Group was to examine various collection techniques currently being used to sample micronekton. BIO subsequently expanded this mandate to encompass an overall assessment of our current understanding of micronekton biology and their role in the North Pacific. The Working Group was originally planned to begin in 1999, in Vladivostok, but neither of the original Co-Chairmen were able to attend. Dr. Brodeur was asked at that time to take over the chairmanship of the group due to the inability of the original Co-Chairmen to continue in that capacity. It was agreed that he would chair this Working Group and that the first official meeting would be held in Hakodate in 2000.

Terms of Reference

Dr. Brodeur reviewed the Terms of Reference for WG 14:

1. to evaluate sampling gear and problems, propose improvements, recommend collaborations among PICES countries for gear inter-comparisons.

2. to obtain and tabulate data on consumption and biomass of micronekton, stratify by region and taxa, quantify level of confidence to guide future research priorities and provide information to the CCCC Task Teams (e.g. MONITOR, MODEL, BASS) for future PICES activities.

Definition of Micronekton

A discussion ensued as to how WG 14 will define micronekton for its purposes. It was pointed out that there are a variety of definitions based variously on size, swimming ability, Reynolds numbers, etc. The basic question revolved around whether to include adult euphausiids and other large zooplankton which border on micronekton since this would significantly increase the scope of WG 14. It was decided that since WG 14 will focus primarily on oceanic rather than shelf communities, micronekton will be defined to

include: mesopelagic fishes, squids, pelagic shrimps and mysids, plus adult euphausiids. Juvenile coastal fishes will not be considered as micronekton, although many of the sampling gears developed for oceanic species will be applicable to them.

Past studies of micronekton and availability of existing data

Dr. Brodeur pointed out that although a substantial micronekton literature exists, it is not widely available and often old. Important starting points might include the 1988 two volume set from the joint NSF-JSPS Honolulu Symposium, edited by Drs. Nemoto and Pearcy, plus a special volume of *Biological Oceanography* devoted to micronekton, also edited by Dr. Pearcy. A review paper by Beamish et al. in a 1999 PICES special issue of *Progress in Oceanography* on mesopelagic fishes could also serve as a starting point for these organisms.

Sampling problems

A discussion ensued regarding sampling problems that the group might want to address. As a way of beginning, Dr. Brodeur suggested that the Working Group conduct an e-mail survey of various micronekton researchers both inside and outside the PICES region in order to establish what gears and techniques for sampling micronekton are currently in use around the world. Such a survey should also include the opportunity for respondents to identify collection problems associated with various gear-types. It was also noted that the survey should ask why various agencies collect micronekton, since there was a feeling among WG 14 members that in many cases micronekton are primarily by-catch, and are rarely targeted explicitly.

Other possible sampling techniques show some promise for studying micronekton, including the use of video cameras and ROV's. These techniques may prove particularly useful for understanding the behaviors of micronektonic species, especially those that spend part of the diel cycle very close to the bottom (e.g some mysids and euphausiid species) where they are unavailable to traditional sampling gear. It was suggested that combinations of nets, acoustics and cameras might be the optimal solution.

Proposal of new members

There will be some need to augment the membership of the WG 14 to account for gaps in expertise and/or national representation. Some suggestions were made for new members and a new Co-Chairman with their areas of expertise and nationality listed below:

Kouichi Kawaguchi (mesopelagic fishes – Japan) – proposed Co-Chairman
Tomohiko Kikuchi (decapoda- Japan)
Yasunori Sakurai or John Bower (squid – Japan)
Vladimir I. Radchenko (mesopelagic fishes – Russia)
Victor V. Lapko (midwater community – Russia)
Nikolay M. Mokrin (squid – Russia)
William G. Pearcy (all micronekton – U.S.A.)
Michael P. Seki (all micronekton – U.S.A.)

Plan for final Working Group Report

Dr. Brodeur proposed a draft Table of Contents for the WG 14 final report to BIO. A discussion arose as to whether the group wanted to aim for a publication quality product that would serve as a "state of our existing knowledge" document about micronekton in the North Pacific. Dr. Brodeur will raise the issue with BIO. The report is planned to:

a. emphasize dominant species in each group likely to account for 90% of the biomass and mainly those species which occur in the upper 1000 m;
b. examine geographic zonation using the biogeographic zones determined by WG 11 (there was some discussion of the number of zones and the boundaries of each);
c. consider the nature and importance of seasonal variations in size, biomass and distribution;
d. examine life history and demographic rates;
e. analyze predator-prey relationships and rates (diet composition, amount eaten, predators

and predation rates, parasites, etc.); trophic budgets may provide an alternate estimator of micronekton biomass pools;

f. examine sampling considerations (what works, what does not, nets and acoustics); and
g. provide recommendation for future research.

Cooperation with other programs

There was a discussion of the Acoustgear 2000 Workshop held immediately prior to the PICES Tenth Annual Meeting in Hakodate. Dr. Brodeur was one of the organizers of this workshop, which brought together many researchers to discuss advances in acoustic and net sampling for marine organisms. Several papers were presented on micronekton, which were directly applicable to the goals of WG 14. The Working Group also talked about possibly co-sponsoring a workshop on cross-shore trophic transfer of euphausiids and other micronekton for the PICES Annual Meeting in 2002.

Planned WG 14 activities for the upcoming year:

- carry out an email survey of researchers currently collecting micronekton;
- review literature on micronekton studies and circulate key papers to all WG 14 members (an attempt will be made by Dr. Kenneth Coyle to translate recent Russian review paper);
- assemble biomass/distribution estimates from the literature;
- compile a list of current research/survey activities by PICES member countries.
- convene a full-day meeting at next year's PICES Annual Meeting in Victoria (if the Working Group can not ensure sufficient attendance at that meeting, BIO will be asked for funds for meeting at some more convenient time);
- request travel funds for an inter-sessional meeting between PICES X and PICES XI, including invitation of key researchers outside WG 14 who possess expertise that the Working Group may be missing.

BIO Endnote 4

ICES/PICES/GLOBEC Symposium

Title: The role of zooplankton in global ecosystem dynamics: Comparative studies from World Oceans
Date: Spring 2003
Location: TBA
Co-Convenors: Roger Harris (UK) and Tsutomu Ikeda (Japan).

A Scientific Steering Committee will be established with two members each nominated by ICES (TBA), by PICES (Drs. Tsutomu Ikeda (Japan) and William T. Peterson (U.S.A.)) and by GLOBEC (Drs. Roger Harris (UK) and Serge Poulet (France)) to assist the local organizers in planning the symposium.

There is a need for North Pacific-North Atlantic comparison of various aspects of zooplankton ecology to deepen our understanding of the lives of zooplankton and their roles and functions in the marine ecosystem under the scenario of global climate change. This 2-3 day symposium will provide an opportunity to examine these aspects of zooplankton. Some specific topics to be covered are:

- Physical variability and zooplankton population dynamics;
- Role of zooplankton in biogeochemical cycles;
- Climate influences – what are the long-term data sets telling us?
- Comparative life histories/life cycles of zooplankton populations within and between North Atlantic and North Pacific;
- Progress in molecular biology of zooplankton;
- The role of microzooplankton in marine resources.

It is expected that the meeting will result in a publication of the best papers in a special issue

of an international journal.

BIO Endnote 5

Progress Report of the Advisory Panel on Marine Birds and Mammals

The first meeting of the Marine Bird and Mammal Advisory Panel was held from 1400-1800 hours on October 22, 2000. The Co-Chairmen, Dr. Hidehiro Kato and Dr. Douglas F. Bertram, called the meeting to order and welcomed the participants. The Panel reviewed the draft agenda and it was adopted as presented.

Agenda

1. Introduction and history of the formation of the MBMAP (Dr. George Hunt).
2. Terms of Reference – review.
3. Membership/representation in CCCC Task Teams by MBMAP members.
4. Possible projects:
   a. Time series metadata available for MBM in the PICES region;
   b. Seabird observers on CPR program;
   c. East – West diet comparison.

Participants

Members:

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

Observers:

Alexander I. Boltnev (Russia)
Robert W. Furness (UK)
George L. Hunt (U.S.A.)
Jeffrey L. Laake (U.S.A.)
Larry B. Spear (U.S.A.)

MBM Workshop

A 1-day Workshop on "The basis for estimating the abundance of marine birds and mammals, and the impact of their predation on the other organisms" was held at PICES IX to review the methods and approaches to estimate the consumption of prey by marine birds and mammals in the North Pacific Ocean. Eleven papers were presented, and up to 35 people attended. Discussion was lively and resulted in enhanced communication and exchange of methods between scientists from several disciplines. We sincerely thank our 4 invited speakers (Drs. Robert Furness, Jeffrey Laake, Larry Spear, and Andrew Trites) for their presentations, and PICES and the Japanese Fisheries Agency for very generous support of participants in this Workshop.

PICES X sessions

MBMAP requests a ½-day meeting during PICES X. This meeting should be scheduled to minimize overlap with CCCC Task Team meetings and workshops.

Request for travel funding

MBMAP requests PICES to provide support for two members from Russia to attend PICES X.

Interaction with CCCC Program

MBMAP recommends that the following members serve on CCCC Task Teams:

BASS - Hidehiro Kato and Thomas Loughlin
MODEL - Peter Ross
MONITOR - Douglas Bertram and William Sydeman
REX - Yutaka Watanuki

Recommendations

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

1. The Panel recognizes the need for all members to attend PICES Annual Meetings and participate in MBMAP and CCCC Task Team discussions. National funding for members to attend session should be sought.
2. The Panel proposes to catalogue important time series of marine bird and mammal reproductive and dietary studies in the PICES region (in a METADATA format)

and to disseminate this information within the PICES community to provide evidence for upper trophic-level responses to oceanographic and climate events. Data types potentially available include timing of breeding, growth rates of chicks and reproductive performance (all indicators of prey abundance), and diet composition including types and size of prey consumed.

3. The Panel recommends to develop under the auspices of PICES a program of seabird and cetacean observations to complement the CPR program initiated under the guidance of the MONITOR Task Team.
4. The Panel intends to develop over the next 3 years 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 of marine birds and mammals in relation to climate change events.
5. The Panel recognizes that there are data gaps in the Working Group 11 report, and where feasible, it would be valuable to assemble new information to update the report.

BIO Endnote 6

PICES X BIO Topic Session

Plankton size classes, functional groups and ecosystem dynamics: causes and consequences. Convenors: Angelica Pena (Canada), Toshiro Saino (Japan) and Patricia A. Wheeler (U.S.A.).

The plankton are composed of different functional groups. The phytoplankton, for example, are comprised mostly of small organisms (<~5mm equivalent diameter) that are supported largely by recycled nutrients and contribute little to the biological CO_2 pump. The diatoms (>~5mm) use nitrate, silica and the trace element iron. They are the usual bloom organisms and contribute much of the sinking flux of organic carbon. Other organisms, such as calcifying coccolithophorids, use calcium carbonate rather than silica in their skeletal structures: when they take up carbon as carbonate and sink out of the surface layer, they actually raise the surface pCO_2 thereby retarding the oceanic uptake of CO_2. These different functional groups in turn support different functional groups of zooplankton - such as microzooplankton and mesozooplankton, through differential grazing. The relative abundance of these functional groups depends strongly on physical and chemical processes - which themselves are modified in a changing climate. We invite talks on the dynamics governing planktonic functional groups, and on the causes and consequences of their changing on various timescales.

Selected papers will be published in a special issue of *Progress in Oceanography*. Authors desiring to be included in the publication should bring manuscripts to the Annual Meeting in Victoria. If review and final revision can be completed by March 1, 2002, publication might be scheduled before PICES XI, in October 2002.

REPORT OF FISHERIES SCIENCE COMMITTEE

The first meeting of the Fisheries Science Committee (FIS) was held from 1330-1430 on October 22, 2000, and the second from 0900-1300 on October 25, 2000. On both dates the Chairman, Dr. Douglas E. Hay, called the meeting to order and welcomed the partici-pants. The first meeting was not well attended with only 3 FIS members present. As a consequence and because of the requirement to adopt an agenda, the discussion of several key items was postponed until the second meeting.

The second meeting was well attended with 9 FIS members and representation from all countries (see *FIS Endnote 1*) plus observers. The Chairman reviewed the original agenda and noted that several changes were required as FIS was asked to comment on the status of a draft WG 12 report, and to discuss items forwarded from the Chairman of the Science Board (*FIS Endnote 2*).

Only agenda items with substantive comments are included in this report.

Implementation of PICES VIII recommendations (Agenda Item 6)

At PICES VIII, FIS recommended the formation of a Working Group on Climate Change, Shifts in Fish Production, and Fisheries Management. This Working Group (WG 16) held its first meeting at PICES IX. The FIS Topic Session on squids and short-lived fishes was convened at PICES IX.

Review and status of WG 12 on Crabs and Shrimps (Agenda Item 8)

Dr. Robert S. Otto (WG 12 Co-Chairman) presented an updated draft report from the Working Group 12 on Crabs and Shrimps. Some of the difficulties in the completion of this report were explained to FIS. In subsequent discussion, concerns were expressed by the FIS Chairman and members regarding the delay in receiving the final report, and mentioned that during the Eighth Annual Meeting, a final report was anticipated by April 2000. FIS noted that the draft report, as presented in October 2000, contained many valuable improvements over previous drafts, and FIS indicated the importance of this information to PICES. FIS recommends that WG 12 complete the final report by June 1, 2001. If the Working Group cannot finalize the report within this time, FIS will assign members of FIS to edit the interim report and submit it as the final report.

Progress report of WG 16 on Climate Change and Fisheries Management (Agenda Item 9)

Dr. Tokio Wada (WG 16 Co-Chairman) presented a WG 16 progress report (*FIS Endnote 3*). The report was reviewed, discussed and the recommendations were accepted.

FIS Topic Session *vs*. FIS Paper Session (Agenda Item 14)

On October 22, FIS discussed the format and relationship between the FIS Topic Session (two half-day sessions) and the FIS Paper Session (one half-day session). In previous PICES meetings the FIS Paper Session consisted of unsolicited papers on a broad range of topics from fish genetics and taxonomy to population dynamics. For 2000, the number of papers submitted as oral contributions to the Topic Session (squids and short-lived fishes) exceeded the time available in the Topic Session. Therefore, rather than make arbitrary decisions about which papers to accept for presentation, the FIS Topic papers were delegated for presentation in the FIS Paper Session. As a result, the Topic Session consisted of 3 half-day sessions. FIS agreed that this was a suitable procedure for paper selection and may be appropriate for future meetings.

Sessions at future Annual Meetings (Agenda Item 13)

FIS reviewed suggestions for topic sessions in 2001. Proposals submitted from US members included topics of (i) migration of marine resources, including a variety of taxa species such as tuna, salmon, turtles, squid, pomfret, marine mammals, etc.; and (ii) effects of predation on marine fishes. Another topic suggested by China was on (iii) larval survival and early life of fishes. FIS concluded that the proposal from China should be considered in the next year, as a possible topic for consideration in 2002, when the PICES Eleventh Annual Meeting is held in China. Subsequent discussion favored the topic of "Migration of key ecological species in the North Pacific Ocean" (*FIS Endnote 4*), but some members wanted to see the inclusion of a predation component. FIS will leave the wording of the topic announcement to the conveners but requests that the topic should emphasize the results of migration (or tagging) studies and not the developing technology in this field. FIS recommends 4 conveners for this topic: 2 from North America and 2 from Asia. Tentative recommendations are: Drs. Vladimir A. Belayev (Russia), George W. Boehlert (U.S.A.), James Irvine (Canada), and Akihiko Yatsu (Japan).

A Topic Session on "The physics and biology of eddies, meanders and rings in the PICES region" was proposed as a joint POC/BIO/FIS session (see *POC Endnote 4*). This proposal was received on October 25, after the last FIS meeting, but all subsequent replies from FIS members supported this suggestion, so it was endorsed. FIS will nominate a co-convener for this session.

Science Board issues (Agenda Item 15)

The Science Board Chairman introduced a number of new topics at the Annual Meeting and requested FIS comments on: (i) a proposal for a North Pacific Ecosystem Status Report and Regional Analyses Center; (ii) a PICES X Anniversary Symposium and a PICES X Science Board Symposium; (iii) a series of Salmon and Climate workshops; (iv) PICES XI theme and annual themes for future meetings; (v) proposed revisions to the Handbook for Chairmen and Convenors; (vi) PICES Wooster Award; (vii) an international workshop in March, 2001 on "Impact of climate variability on observation and pre-diction of ecosystem and biodiversity change in the North Pacific"; and (viii) a proposed joint NEAR-GOO/ODC Forecasting Workshop. Information about most of these topics was not available prior to the Annual Meeting.

i. Most discussion concentrated on the proposal for a Study Group to examine the merits of an Ecosystem Status Report (ESR) and Regional Analyses Centers (RAC). Some FIS members felt that both concepts required more explanation. During the discussion it was noted that earlier proposals had considered ESRs and RACs separately. The ESR proposal was circulated prior to PICES IX (by email) and responses by FIS members to the concept of an ESR were positive. Therefore, some members felt that while the ESR concept may have merit and worthy of further examination by a Study Group, but they were not prepared to endorse the RAC concept without further information. In a vote, where the choices were for a Study Group to (a) examine both ESR and RAC, (b) ESR only, (c) RAC only, and (d) none of the above, the majority of FIS members endorsed (b) - for a Study Group to examine the concept of the ESR - but without reference to the RAC.

ii. FIS expressed serious concern that two Science Board Symposia may lead to conflicts with other topic sessions, and supported the proposal that the PICES X Science Board Symposium will be designated as a PICES X Anniversary Symposium entitled "Ten Years of PICES science: Decadal-scale scientific progress and prognosis for a regime shift in scientific approach".

iii. FIS endorsed the idea for a series of Salmon and Climate workshops, but suggested that

the wording should be changed to indicate that the workshops be developed cooperatively with the respective agencies.

iv. FIS supported "Technological advances in marine scientific research" as a theme for PICES XI. With respect to the list of potential themes for future Annual Meetings, FIS suggests an additional theme: Implementation of the findings of the 3rd Assessment IPCC Report.

v. FIS briefly noted the proposed changes in the Chairman's Handbook, and will comment later, after PICES IX.

vi. FIS accepted the establishment of the annual PICES Wooster Award and recommended slow and cautious develop-ment, noting that there are 6 nations in PICES and the scientific achievement in all counties must be recognized.

Requests for travel support (Agenda Item 4)

FIS recommended that PICES support an Asian member of WG 16 to attend the Symposium on Climate and Aquatic Biological Resources to be sponsored by the American Fisheries Society (AFS) in Phoenix, Arizona, in August 2001. Attendance in this AFS meeting by an Asian member of WG 16 will provide a vital and important link between climate-change research activities in Asia and North America. The perspectives gained by participation in such a meeting will have direct benefits to the activities and substance of WG 16 and the profile of PICES at the AFS meeting.

New Working Groups (Agenda Item 12)

As FIS currently has two active working groups, it is not likely that support could be raised to develop a new group in 2000.

Best Presentation Award (Agenda Item 16)

The FIS Best Presentation Award was given to Dr. Bambang Semedi for his paper entitled "An approach of DMSP/OLS satellite imagery and GIS technology to study the dynamics of Pacific saury migration" (co-authors with S.I. Saitoh, K. Yoneta, and H. Kiyofuji).

Members and observers also discussed the selection of the "Best Paper Award" from all papers presented by young scientists participating in the FIS Topic and Paper Sessions in 2000. A procedural problem in Hakodate is the selection of the best paper by mid-afternoon on Friday, October 27. The FIS Paper Session concludes at 1300 and the winner of the best paper will be announced during the Closing Session that begins shortly thereafter. With the short interval between sessions, the winner must be chosen. To be fair, the selection committee should consist of people who had attended presentation of all papers. No FIS members or observers present were able to make that commitment. Therefore, it was agreed that for year 2000 this responsibility should be passed on to the conveners of the Topic Session.

FIS Endnote 1

Participation List

Canada
Richard J. Beamish
Laura Richards

Japan
Kohji Iida
Takashi Minami

People's Republic of China

Republic of Korea
Suam Kim
Chang-Ik Zhang

Russian Federation

U.S.A.
Gordon Kruse
Richard D. Brodeur (for George Boehlert)

Observers
Vladimir Belyaev (Russia)
Xuewu Guo (China)
Yukimasa Ishida (Japan)
Shizuo Iwata (Japan)
Cheolsu Kim (Korea)
Jin-Yeong Kim (Korea)
Patricia Livingston (SB Chairman)
Gordon A. McFarlane (Canada)
David Meerburg (Canada)
Yoshikazu Nakamura (Japan)
Vadim Savinykh (Russia)
Go Takayama (Japan)
Ling Tong (China)
Victor Tsiger (Japan)
Tokio Wada (Japan)
Akihiko Yatsu (Japan)
Hideo Yoshida (Japan)

FIS Endnote 2

Agenda

1. Welcome and introduction of members.
2. Discussion and approval or revision of agenda.
3. Discussion of financial implications of proposed inter-sessional meetings (work-shops, working groups and other).
4. Travel support and cost implications.
5. Publications of reports and cost implications.
6. Review of the implementation of PICES VIII decisions.
7. Review of the FIS Strategic plan: accomplishments and changes.
8. Review the status and draft report of WG 12 on Crabs and shrimps.
9. Progress report of the WG 16 on Climate Change and Fisheries Management.
10. Co-sponsored meetings and relations with other organizations, fisheries organizations or commissions and PICES program.
11. Scientific items of interest - member reports.
12. New Working Groups.
13. Proposals/topics/issues for the session topic for PICES X (October 2001).
14. FIS TOPIC sessions (solicited papers on specific topic) AND FIS PAPER sessions (unsolicited papers on fisheries topics). What selection criteria do we use when we receive more abstracts that we can support in the PICES program?
15. Review of items forwarded from Science Board.
16. Discussion of Best Presentation Award.
17. Discussion of any other arising issues.
18. Draft of report and summary of FIS recommendations to Science Board.

FIS Endnote 3

Report of WG 16 on
Implications of Climate Change to Fisheries Management

The Working Group 16 met in the morning of October 22, 2000. The eight members from Canada, Japan, Korea and U.S.A., and some participants from REX and BASS Task Teams attended the meeting (*WG 16 Annex 1*). After welcoming remarks and briefing of the background of the Working Group by Dr. Richard J. Beamish, all participants introduced themselves.

The Working Group reviewed the following accomplishments before the Ninth Annual Meeting: (i) summary of the personal background and interests into WG activities for each member, and (ii) providing short reports on

the fisheries and species which will be affected by climate changes. Dr. Beamish reported that the American Fisheries Society plans a symposium on Climate and Aquatic Biological Resources in August 2001. He also mentioned that the 3rd global warming report would be released in June 2001 by IPCC.

Based on the summary reports, the Working Group listed up over 20 species as candidates that should be examined, and then discussed the criteria for choosing the target species. WG members agreed to choose the commercially important species that are appropriate for detecting climate impacts, as well as the species that are common and ecologically important.

WG discussed on the work plan in 2001 and 2002 (*WG 16 Annex 2*). It was approved that the Co-Chairmen meet in Canada, in March 2001, to begin assembling the data and carrying out a preliminary analysis. This initial report will be circulated to participants and members with specific requests for their input.

WG recognized that its representatives should attend the symposium on Climate and Aquatic Biological Resources to present the preliminary products and exchange the information on the mechanisms linking climate changes to changes in the populations dynamics. WG recommended that PICES support the travel cost for an Asian member to attend the symposium (*WG 16 Annex 3*).

WG agreed to have a half-day workshop and a half-day meeting just prior to PICES X. WG should present the actual climate impacts and hypothesized mechanisms for each target species in the workshop, and should summarize the workshop results and discuss on the contents of the final WG report in the meeting. WG further considered that an intersectional meeting should be held in April to May 2002 in Asian side to follow up the workshop and initiate drafting the WG report.

WG 16 Annex 1

Participation List

Canada
- Richard J. Beamish (Co-Chairman)
- James Irvine
- Jacquelynne R. King

Japan
- Muneharu Tokimura
- Tokio Wada (Co-Chairman)
- Akihiko Yatsu

People's Republic of China

Republic of Korea
- Suam Kim

Russian Federation

U.S.A.
- Steven R. Hare

Observers
- Vladimir Belyaev (Russia)
- Douglas E. Hay (FIS Chairman)
- Gordon A. McFarlane (Canada)
- Yukimasa Ishida (Japan)
- Masahide Kaeriyama (Japan)
- Takashi Minami (Japan)
- Sukyung Kang (Korea)
- Thomas R. Loughlin (U.S.A.)

WG 16 Annex 2

Work Plan in 2001 and 2002

Nov. 2000 WG choose target species by electronic communication;

Mar. 2001 Co-Chairmen meet in Canada to assemble the data and carry out a preliminary analysis;

June 2001 Preliminary report sent to members for comment and input;

Aug. 2001 Members input to be incorporated into preliminary report;

Aug. 2001 WG representatives attend the symposium on Climate and Aquatic Biological Resources to present the preliminary products and exchange the information on the mechanisms linking climate changes to changes in the populations dynamics;

Sept. 2001 Revised preliminary report returned to members;

Oct. 2001 WG hold a half-day workshop and a half-day meeting in PICES X to present actual climate impacts and hypothesized mechanisms for each target species, and to summarize the workshop results and discuss on the contents of the final WG report;

May 2002 Interim WG meeting in Asian side to follow up the workshop at PICES X and to initiate drafting the WG report.

Annex 3

Recommendations to FIS Committee

1. Provide travel support for an Asian member to attend the symposium on Climate and Aquatic Biological Resources organized by the American Fisheries Society in August 2001.
2. Help to arrange a half-day workshop and a half-day meeting at PICES X, in October 2001, to present actual climate impacts and hypothesized mechanisms for each target species in the workshop, and to summarize the workshop results and discuss on the contents of the final WG report.

FIS Endnote 4

PICES X Topic Session

Migrations of key ecological species in the North Pacific Ocean. Convenors: Vladimir .A. Belayev (Russia), George W. Boehlert (U.S.A.), James Irvine (Canada) and Akihiko Yatsu (Japan)

Migrations of marine organisms in the North Pacific occur on a variety of spatial and temporal scales, from diel vertical migrations to annual (or longer) foraging or reproductive migrations. Over the past decade, a great deal of new information has come to light on the dynamics of migration, in part due to new technologies such as electronic tags. This session will examine migrations of key ecological species important to fisheries in the North Pacific. Migrations of exploited species -- for example bluefin tuna, albacore, salmon, squid, saury, mackerel and pomfret -- may be compared with movements of the lower trophic level organisms on which they prey. What role do migrations of protected species such as turtles, marine mammals, and seabirds play in the interactions with fisheries? Papers and posters in this full-day session will cover the most recent information on what is known about these migrations -- their pathways, seasonal and interannual dynamics, and relationship to physical forcing -- as well as new tools available to study migrations.

REPORT OF MARINE ENVIRONMENTAL QUALITY COMMITTEE

The meeting of the MEQ Committee was held from 1330-1700 hours on October 22, 2000, and from 0900-1130 hours on October 25, 2000. The Chairman-designate, 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*).

Sessions at future Annual Meetings (Agenda Item 6)

MEQ Topic Sessions at PICES X: MEQ recommended convening the following sessions:

Sediment contamination – the science behind remediation standards. Convenors: Steve Samis (Canada) and Dong-Beom Yang (Korea). (½ day)

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.

Emerging issues for MEQ: A 10-year perspective. Convenors: Richard F. Addison (Canada) and Ming-Jiang Zhou (China). (½ day)

PICES' tenth anniversary is a suitable occasion on which to look forward to issues which MEQ will face over the next decade. This session will build on the PICES X special symposium and will focus in greater detail on evaluating the importance of emerging issues of pollution (e.g., "new" chemicals), marine resource use (e.g., the shift from commercial fishing to mariculture; offshore oil and gas or mining development), and projected impacts of onshore development on coastal systems.

Physical oceanography to societal valuation: Assessing the factors affecting coastal environments. Convenors: Julia K. Parrish and John E. Stein (U.S.A.). (½ day)

The Pacific Northwest Coastal Ecosystems Regional Study (PNCERS) is a five year, multi-investigator, multi-disciplinary explo-ration of the natural and human-mediated factors affecting the health and sustainability of estuarine and nearshore environments in Oregon and Washington. Individual research projects include the physical oceanography of nearshore-estuarine linkages, the use of salmon, seabirds, and benthic invertebrates as bio-indicators of system change, and the dichotomy between human uses and expectations of the local marine environment. This session would highlight the results of individual projects as well as those emerging from cross-disciplinary efforts. The latter include how spatio-temporal patterns of mesoscale circulation translate into differential crab and oyster production, the use of hydroacoustically determined biomass estimates as predictors of upper trophic distribution and

abundance, and the development of indicators and indices of system integrity. Although PNCERS concentrates on a part of the California Current System, the comprehensive approach, including bottom-up, top-down, and human-mediated factors, is a model for future programs throughout the North Pacific.

MEQ contributed papers. Convenor: John E. Stein (U.S.A.). (½ day)

Joint session at PICES X: MEQ proposed a joint session with POC and BIO:

Physical, chemical and biological interactions during harmful algal blooms. Convenors: Hak-Gyoon Kim (Korea), F.J.R. (Max) Taylor (Canada), and Vera L. Trainer (U.S.A.). (½ day)

Physical processes play vital roles in the coastal environments in which HABs develop. The degree of vertical mixing strongly determines whether diatoms or flagellates will predominate. The former is favoured by high surface nutrients resulting from upwelling and small-scale turbulence. The latter can exploit stratification with low surface nutrients and a relatively shallow nutricline. Blooms are frequently advected by along-shore buoyant plumes from seed sites and frontal aggregations are common. The nature of the light regime is also a critical factor. The goal of this session will be to foster co-operation between physical and biological oceanographers.

MEQ sessions at future Annual Meetings: Two possible themes for future PICES meetings were considered:

a. Harmful algal blooms in eutrophic conditions;
b. Long-range transport of chemical contaminants on trans-Pacific scales.

Requests for funding: WG 15 proposed to hold a Practical Workshop on "Taxonomy and identification of HAB species" just prior to PICES X, and MEQ requests travel support for one scientist with expertise in molecular biology of phytoplankton to attend the Workshop.

Relations with other organizations, programs and projects (Agenda Item 4)

ICES: Dr. Richard F. Addison reported that the proposed joint meeting between the ICES Working Group on the Biological Effects of Contaminants and PICES MEQ had to be postponed because ICES was unable mount a workshop on data management which was to be the focus of the meeting. During later discussions on the programme for PICES X, a Topic Session on sediment quality (*Sediment contamination – the science behind remediation standards*) was proposed to which some ICES representative would be invited.

GIWA: Dr. Skip McKinnell reported that GIWA appeared to be dormant and seemed likely to remain so. MEQ would take no further action but Dr. McKinnell would continue to stay in touch with GIWA.

AMAP: No action required at this stage.

Best Presentation Award (Agenda Item 3)

Profs. Ming-Jiang Zhou (China) and Makoto Shimizu (Japan) agreed to assess the presentations. They recommended that the MEQ Best Presentation Award be given to Drs. Kazufumi Takaynagi and Kazumasa Hirakawa for their paper entitled "Water quality criteria to manage sustainable aquaculture in Japan".

Election of Chairman (Agenda Item 2)

Dr. Alexander V. Tkalin had resigned as MEQ Chairman to take up other duties. A single candidate, Dr. John E. Stein (U.S.A.) was nominated and unanimously elected as the new MEQ Chairman.

MEQ Strategic Plan (Agenda Item 5)

It was agreed that Drs. Stein and Addison would update the MEQ Strategic Plan (*MEQ Endnote 3*). The preamble was revised and future concerns would include:

- Ecological and environmental impacts of aquaculture;
- Impacts of trawling on benthic habitat;
- Contaminant accumulation and transport by migratory species;
- Emerging chemicals of concern.

Science Board (Agenda Item 7)

i. MEQ supported in general the develop-ment of a North Pacific Ecosystem Status Report as a high priority PICES project. Dr. Addison will represent MEQ on a 1-year Study Group to consider the needs for implementation of the North Pacific Ecosystem Status Report and Regional Analysis Center.
ii. MEQ noted the importance to establish an International Zooplankton Monitoring Program for the North Pacific. Prof. M.J. Zhou will represent MEQ interests in a group working on the program.
iii. MEQ wishes to build stronger co-operation with SCOR to allow interactions between WG 15 and the GEOHAB programme.

Report of Working Group on Practical Assessment Methodology (Agenda Items 8, 9, 10)

MEQ endorsed the WG 8 report presented by Ms. Carla M. Stehr (*MEQ Endnote 4*) and considered WG 8's recommendation for funding to support an assistant to organize the Vancouver Workshop data for publication in the PICES Scientific Report series. Later, the Committee was informed by Science Board that this would not be feasible. The Committee noted that this was the last meeting of WG 8 and congratulated the Working Group on its work in organising the MEQ Practical Workshop and Ms. Stehr and Dr. Toshihiro Horiguchi in convening a very successful Topic Session on the Environmental Assessment of Vancouver Harbour.

Report of Working Group on Ecology of Harmful Algal Blooms in the N. Pacific (Agenda Item 11)

The WG 15 report (presented by Prof. Max Taylor) is attached as *MEQ Endnote 5*. Individual country reports are available only in hard copy format (except for that of China). WG 15 proposed convening a session (jointly with POC and BIO) on "Physical, chemical and biological interactions during harmful algal blooms" at PICES X, and organizing a 2-day Practical Workshop on "Taxonomy and identification of harmful algal bloom species" immediately prior to the Annual Meeting. MEQ endorsed WG 15's recommendations and will carry them forward to Science Board.

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

Prof. Makoto Shimizu and Dr. Horiguchi reviewed MEQ Scientific Sessions at PICES IX. The Committee expressed its thanks to the local organizers for arranging interesting and instructive sessions and providing travel support for invited speakers. The Committee also noted that Prof. Shimizu would be retiring this year, and expressed its thanks for his contribution to MEQ activities, and offered its best wishes for his retirement. Prof. Shimizu will represent MEQ on the Organizing Committee for the Science Board Symposium on "Ecosystem processes in marginal seas of the North Pacific" to be held at PICES X.

MEQ Endnote 1

Participation List

Canada
Richard F. Addison (rappourter)
Steve C. Samis

Japan
Makoto Shimizu
Masataka Watanabe

People's Republic of China

Republic of Korea
Dong-Beom Yang

Russian Federation
Tatiana A. Belan
Lev M. Gramm-Osipov
Alexander V. Tkalin

U.S.A.
John E. Stein (Chairman)
Michael C. Watson

Observers
Irina G. Agafanova (Russia)
Dmitry L. Aminin (Russia, WG 15)
Stelvio M. Bandiera (Canada)
Elizabeth A. Bornhold (Canada)
Toshihiro Horiguchi (Japan, WG 8)
Jong-Geel Je (Korea, WG 8)
Lyndal L. Johnson (U.S.A.)
Sam Guen Lee (Korea)
Sathy A. Naidu (U.S.A.)
Maurice Levasseur (Canada, WG 15)
Colin D. Levings (Canada, WG 8)
Tatiana Yu. Orlova (Russia, WG 15)
Carla M. Stehr (U.S.A., WG 8)
C.G. Satuito (Japan)
F.J.R. (Max) Taylor (Canada, WG 15)
Vera L. Trainer (U.S.A., WG 15)
Tian Yan (China, WG 15)
Ming-Jiang Zhou (China, WG 8)

MEQ Endnote 2

Agenda

1. Opening and introduction of members, adoption of the agenda and appoint rapporteur. (All)
2. Select a new MEQ Chairman. (All)
3. Select MEQ members to serve as reviewers for the Best Presentation Award.
4. Discuss working relations of PICES with other international organizations. (All)
5. Review MEQ Strategic Plan. (All)
6. Proposals for future MEQ scientific sessions. (All)
7. Discuss the role of MEQ in high priority scientific projects: (All)
   i. North Pacific Ecosystem Status Report;
   ii. International zooplankton monitoring program for the North Pacific;
   iii. Workshop/Symposium series on "Effects of human and climate interactions on fish production".
8. Review of WG 8 (on Practical Assessment Methodology) report. (Stehr)
9. Status report on WG 8, plans for publishing data and papers. (Stehr and Levings)
10. Discuss publication of Vancouver workshop papers in a peer-reviewed journal. (All)
11. Review of WG 15 (on Ecology of Harmful Algal Bloom in the North Pacific) report. (Taylor and Orlova)
12. Report on MEQ Scientific Sessions at PICES IX. (Shimizu and Horiguchi)
13. Draft report to Science Board.
14. Other matters.

MEQ Endnote 3

Strategic Plan (updated October 2000)

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) was established (Development of Common Assessment Methodology for Marine Pollution) 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-sessional activities: (i) Environ-mentally 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.

At PICES VII in Fairbanks, U.S.A. (1998), MEQ discussed the report of WG 8 on preparation for the Practical Workshop in Vancouver Harbor 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 dyna-mics 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 topics 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 inter-national 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 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.

<u>The future</u>

MEQ Endnote 4

Report of Working Group 8 on
Practical Assessment Methodology

The results of the Vancouver Harbour Practical Workshop were presented at a special session at PICES IX (11 papers and 2 posters). Topic included sediment chemistry, chemistry in biota, and biological parameters, and data on biota ranged from community structure to effects on individuals. The quality of the results encouraged further planning for a peer-reviewed publication.

WG 8 Meeting agenda

1. Develop format of WG 8 Final Report on the Vancouver Harbour Practical Workshop.
2. Develop format of primary publication of Workshop's results.
3. Prepare recommendations to MEQ Committee.

Results

The WG 8 Final Report will be published in the PICES Scientific Report series. Ms. Carla M. Stehr and Dr. Toshihiro Horiguchi agreed to lead preparation of the report. The proposed format includes:

a. Project description that will contain history of the Workshop preparation and general "scene setting" of Vancouver Harbour (e.g. circulation, use, fishery closures etc.);
b. Work plan;
c. Section containing extended abstracts of each paper presented at PICES IX and data sets not discussed at PICES IX (abstracts to be prepared by all authors and sent electronically to Ms. Stehr or Dr. Horiguchi by Dec. 1, 2000);
d. Data tables in MS Excel format;
e. Conclusions and recommendations. Technical conclusions will be based on extended abstracts. A set of recommendations on how to run a future workshop would be included. Information on the problems and successes may also be presented.

WG 8 considered the need for further analyses, specifically sediment and liver dioxins (especially for site B50, where there were unexpected results).

Primary publication

The WG 8 Co-Chairman, Dr. John E. Stein, reported that he had received preliminary approval from the Editors of *Marine Environmental Research* (Elsevier) to publish the WG 8 results as a special issue. First drafts ready for refereeing to be with guest editor(s) (so far unidentified) by April 1, 2001. The proposed content of the special issue (which may change as authors begin to write the papers) is as follows:

a. Preface/introduction (shorter than in PICES Report)
b. Sediment chemistry – toxics, TOC, etc. (Stehr, Stein, Tkalin, Uno?)
c. Biota chemistry – toxics and lipids (bivalves) (Stehr, Tkalin, Uno)
d. CYP 1A (Bandiera, Addison) - (maybe combined with 'e' below)
e. Bile, hepatic lesions and X-cells (Myers, Stehr) (may include Vtg data)
f. Fish population data (Levings)
g. Molluscan imposex and TBT data (Horiguchi, Li)
h. HABs (Yan, Sutherland)
i. Fish, bivalve and benthic communities (Belan, Levings, Je, Yoon)
j. Synthesis (all participants, unattributed)

WG 8 requested that US$5,000 be made available for computer support to NOAA, Seattle for manipulation of Excel files for the PICES Scientific Report.

MEQ Endnote 5

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

The Working Group 15 held its first formal meeting from 0900 to 1230 hours and from 1330 to 1600 on October 22, 2000. The meeting was attended by 15 members from Canada, China, Japan, Korea, Russia and U.S.A. (*WG 15 Annex 1*). The proposed agenda for the meeting (*WG 15 Annex 2*) was adopted.

Assessment of HAB problems in the coastal waters of PICES countries (Agenda Item 1)

The Working Group 15 was created to facilitate studies in harmful algal blooms (HABs) in the member countries of PICES. This need was recognized at the previous PICES Annual Meeting in Vladivostok, Russia in 1999. The WG 15's first task has been to evaluate current knowledge of the extent and severity of HABs in these countries and to that end representatives of each of the countries presented reports summarizing the nature and state of knowledge (species, location, intensity and consequences) of HABs in their regions. To put these reports in perspective, a few prefatory remarks have been made by Prof. F.J.R. (Max) Taylor.

In the past few decades the study of HABs has become a multidisciplinary field of its own, combining taxonomy, phytoplankton ecology (nearly all are caused by photosynthetic microplankton, with *Noctiluca* being a notable exception), limnology, toxicology, public health, epidemiology, economics and aquaculture. At the IX International Conference in Hobart, Tasmania, this year, there were 500 participants from 45 countries. The scope of phenomena and causative organisms has undergone a dramatic expansion, leading to a flood of reports that have caused considerable concern in most coastal countries. HABs can be broadly subdivided into two types: those that harm marine fauna and those that cause potentially fatal human health problems. HABs can be fundamentally subdivided into those harming marine organisms and those that are hazardous to humans.

Marine fauna mortalities

Harmful algae can kill fish, seabirds and marine mammals, either through oxygen depletion, the release of toxins or through food chain transfer and accumulation. This is particularly an economic concern in aquaculture operations. For example, the pioneering, successful cultivation of yellowtail and red bream in the Seto Inland Sea of Japan was plagued by recurring blooms of raphidophyte algae, notably species of *Chattonella*. This also brought the role of eutrophication into focus since this has been known to produce an increase in HABs. In the PICES region this has been demonstrated not only in Japan but also in China and Korea. Fish killing dinoflagellates are also known from the PICES region. Major deaths of seabirds and sea lions have occurred in Monterey, California, in recent years, and elsewhere whales have died from toxins in their food, analogous to human health hazard.

Human health hazards

Humans can be affected by HABs primarily through eating contaminated seafood (shellfish or fish). Toxins produced by HAB species are accumulated by marine organisms feeding on them. The toxins are primarily neurotoxins although gastro-intestinal symptoms often precede them. The toxins act primarily on membrane permeability of sodium or calcium. For example, while saxitoxin blocks sodium channels and blocks nerve transmission ciguatoxin causes them to remain open, resulting in depolarization. The primary forms of HAB-related human intoxications in the North Pacific are:

a. paralytic shellfish poisoning (PSP) caused by saxitoxins;
b. diarrheic shellfish poisoning (DSP) caused by okadaic acid, dinophysisyoxin and pectenotoxins;
c. amnesic shellfish poisoning (ASP) caused by domoic acid; and
d. ciguatera fish poisoning (CFP) caused by ciguatoxin, ostreopsistoxin and possibly maitotoxin.

These are caused chiefly by dinoflagellates but ASP is linked to several species of the diatom genus *Pseudo-nitzschia*.

Summary of the National Reports (Agenda Item 2)

The National Reports on currents knowledge of HABs problem have been presented by all PICES member countries. These reports serve as the baseline on which WG 15 is going to build other activities. The first conclusion to be drawn is that all countries have significant HAB problems and may be worsening in some. Japan experienced costly fish kills in fish farms in the Seto Inland Sea due to chloromonad flagellate blooms, which have also been problematic to salmon farmers in British Columbia. The losses have run into the millions of dollars. Korea is plagued by dinoflagellate-related fish kills as is Hong Kong. China has experienced severe losses from HABs in its extensive shrimp farming activities. Eutrophication has been implicated in the Inland Sea, Hong Kong and Korean localities and shrimp farms are inherently eutrophic.

PSP is present in all PICES countries and particularly severe in western Canada, Alaska (extending as far south as California) and probably Russia. In Japan, PSP appears to have spread since the 1970s from the north down both the east and west coasts. In Korea toxicity has been known from the south coast since the 1970s. DSP has been recorded in Japan but there are few records elsewhere. Since the symptoms of the latter are difficult to distinguish from bacterial contamination it is only the presence of okadaic acid in shellfish that confirms DSP. In most PICES countries this is not tested for. ASP is well established on the west coast of the United States where it has mainly affected seabirds and marine mammals. Ciguatera fish poisoning, found in tropical and subtropical reef systems is a significant problem in Hawaii, is recorded from imported fish in Hong Kong and can be expected in offshore South China Sea locations.

Some coastlines, such as the eastern Bering Sea, are evidently understudied and field monitoring and research in HABs is usually not co-coordinated between adjacent countries even though the phenomena do not respect national boundaries.

Recommendations for 2001 activities (Agenda Items 3 and 5)

During the next year, WG 15 is planning to produce a series of maps showing the location of HABs in the PICES region. The initial maps will indicate historic knowledge of all HAB events in each PICES country. Since ICES is also producing such maps for its region (including the west coast of North America) it seems logical to follow the same format so that they can be additive, eventually contributing to a global picture.

In mid-2000, a questionnaire, based on the ICES equivalent, was sent to each country to serve as the start of a PICES HABs database. The suggested historical maps should be part of the database, which can then be updated by annual event reports.

These should be part of the database, which can then be added to by annual event reports, as is the case in the ICES region. In addition a questionnaire was sent to each country to serve as the start of a PICES database.

The Working Group proposed holding (jointly with POC and BIO) a session at PICES X on "Physical, chemical and biological interactions during harmful algal blooms". Drs. F.J.R. (Max) Taylor (Canada), and Vera L. Trainer (U.S.A.) were suggested as potential convenors, and one more convenor from Asia could be determined later, if the session approved by MEQ.

The Working Group also recommended (subject to approval by MEQ and Science Board) convening a 2-day Practical Workshop on "Taxonomy and identification of harmful algal bloom species" for experienced analysts from each country to ensure that all identifications of harmful species will be based on the same criteria. Many of the species are common to most of the participating countries. It is planned

that the workshop will be held at the University of British Columbia in Vancouver, just prior to PICES X.

WG 15 reviewed the list of organizations and programs for collaboration and identified SCOR GEOHAB, IOS/WESTPAC HAB, and ECOHAB as the highest priority programs for interaction.

Steps toward the co-ordination of research, particularly fieldwork, in adjacent waters should be encouraged and facilitated.

WG 15 Annex 2

Participation List

Canada
- Paul J. Harrison
- Maurice Levasseur
- F.J.R. (Max) Taylor (Co-Chairman)

Japan
- Yasuwo Fukuyo
- Ichiro Imai

People's Republic of China
- Tian Yan

Republic of Korea
- Chang-Hoon Kim

Russian Federation
- Dmitry L. Aminin
- Tatiana Yu. Orlova (Co-Chairman)

U.S.A.
- Donald M. Anderson
- William Cochlan
- David Garrison
- Vera L. Trainer
- Mark L. Wells

Observer
- Young-Shil Kang

WG 15 Annex 1

Agenda

1. An introduction. (F.J.R. (Max) Taylor)
2. National reports on HAB events in PICES countries:
   - Canada (Paul J. Harrison and F.J.R. (Max) Taylor)
   - China (Tian Yan)
   - Japan (Yasuwo Fukuyo)
   - Korea (Young-Shil Kang)
   - Russia (Tatiana. Yu. Orlova)
   - U.S.A. (Vera L. Trainer)
3. Discussion to plan joint activities.
4. Forum on new results:
   - Tian Yan, Mingjiang Zhou, Meng Fu, Yunfeng Wang, Rencheng Yu, and Jun Li "Inhibition of egg hatching success and Larvae survival of the scallop, *Chlamys ferreri*, associated with exposure to cells and cell fragments of the dinoflagellate, *Alexandrium tamarense*"
   - Chang-Hoon Kim "Bloom dynamics, physiology and PSP toxin production of *Alexandrium* species and *Gymnodinium catenatum* in the Korean coastal waters**"**
   - Vera L. Trainer "US West Coast Monitoring project"
   - Maria T. Maldonado, Eden L. Rue, and Mark L. Wells "The Role of trace elements in domoic acid production by *Pseudo-nitzschia* spp."
   - Donald M. Anderson "Biogeography of the Toxic Dinoflagellate Genus *Alexandrium*"
5. General discussion and recommendations to PICES.
6. Closing remarks.

REPORT OF PHYSICAL OCEANOGRAPHY AND CLIMATE COMMITTEE

The meeting of the Physical Oceanography and Climate Committee was held from 1330-1730 hours on October 22, 2000, and from 0900-1230 on October 25, 2000. The Chairman, Dr. Vyacheslav B. Lobanov, called the meeting to order and welcomed the participants (*POC Endnote 1*). Dr. Susan E. Allen served as rappourter. The Committee reviewed the agenda and it was adopted as presented (*POC Endnote 2*).

Business arising from PICES VIII (Agenda Item 3)

Dr. Lobanov reported on the status of decisions taken at PICES VIII in 1999. An annotated Bibliography of the Oceanography of the Japan/East Sea has been published as the PICES Scientific Report No. 13. PICES co-sponsored the CREAMS-2000 Workshop on Oceanography of the East Asian Marginal Seas held May 15-17, in Vladivostok. Proceedings of the Workshop are currently under editorial preparation for publication. The North Pacific CO_2 Data Synthesis Symposium, co-sponsored by PICES and JST/CREST, and a joint WG 13/TCODE/JGOFS-NPTT meeting were organized in Tsukuba, Japan, just prior to the PICES Ninth Annual Meeting. The POC Topic Session on "Large-scale circulation in the North Pacific" and the joint with BIO Topic Session (co-sponsored by JGOFS) on "North Pacific carbon cycling and ecosystem dynamics" were convened at PICES IX. Communication with Argo and CLIVAR projects had begun and contacts with NEAR-GOOS continued. This resulted in an invitation for PICES experts to attend a joint NEAR-GOOS Ocean Dynamic and Climate Forecasting Workshop to be held in August 2001, in Seoul, Korea (in conjunction with the Fifth IOC/WESTPAC Scientific Symposium) and in recommendation to organize a joint PICES/CLIVAR Workshop immediately prior to PICES X, in October 2001.

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

POC Topic Session at PICES X: POC recommended convening a ½-day session on "Coastal ocean physical processes responsible for biological productivity and biological resource distribution" (*POC Endnote 3*).

Joint sessions at PICES X: POC recommended convening a full day topic session jointly with BIO and FIS on "The physics and biology of eddies, meanders and rings in the PICES region" (*POC Endnote 4*). POC also accepted a joint session with MEQ and BIO on "Physical, chemical and biological interactions during harmful algae blooms" (see MEQ Report for description).

Science Board Symposium at PICES X: "Ecosystem Processes in Marginal Seas of the North Pacific" was proposed as a topic for the Science Board Symposium.

Annual Meeting Theme at PICES XI: "Technological advances in marine scientific research" was supported as a theme for the PICES Eleventh Annual Meeting, in 2002.

New Working Groups/Advisory Panels (Agenda Item 9)

The Working Group 13 on CO_2 in the North Pacific will complete its activity in 2001 and prepare a final report for publication in 2002. No new working groups were proposed for 2001, but the following suggestions were discussed for 2002:

a. WG on North Pacific biogeochemical data integration and synthesis;
b. WG on Coastal ocean physical processes responsible for biological productivity and biological resources distribution;

c. WG on Mesoscale water dynamics and its implication to biological processes.

These proposals will be considered further by correspondence and at the PICES Tenth Annual Meeting.

Proposals with financial implications (Agenda Item 5)

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

a. A 3-day WG 13/TCODE CO_2 Data Integration Test Workshop, January 2001, Sidney, B.C., Canada;
b. A 3-day WG 13/TCODE CO_2 Data Integration Implementation Workshop, May 2001, Tokyo, Japan;
c. A joint (with CREAMS, ONR or other) Japan/East Sea Ecosystem Workshop, spring, 2002.

Requests for travel funding:

a. 3 experts to attend the WG 13/TCODE CO_2 Data Integration Test Workshop, January 2001, Sidney, B.C., Canada;
b. 2 experts to attend the WG 13/TCODE CO_2 Data Integration Implementation Workshop, May 2001, Tokyo, Japan;
c. 1 scientist to attend the Fifth IOC/ WESTPAC Scientific Symposium, August 2001, Seoul, Korea;
d. 1 scientist to attend the 3rd International Argo Science Team meeting, March 2001, Sidney, B.C., Canada;
e. 2 experts to attend the NEAR-GOOS/ ODC Forecasting Workshop, August 2001, Seoul, Korea, (proposal from MONITOR Task Team supported by POC).

Relations with other organizations and programs (Agenda Item 8)

POC revised the list of organizations and programs for collaboration and agreed to add PORSEC (Pacific Ocean Remote Sensing Conference) and SOLAS (Surface Ocean Lower Atmosphere Study). CLIVAR, Argo, CREAMS, JGOFS, WESTPAC, GOOS, GCOS and NEAR-GOOS were identified as the highest priority program for cooperation. It was also suggested to support implementation of Argo program in the North Pacific (Dr. Kuh Kim) and to advise PICES community attending the Fifth IOC/WESTPAC Scientific Symposium to be held in Seoul, in August 2001 (Dr. Sang Kyung Byun). POC will pass these recommendations to the Science Board.

Best Presentation Award (Agenda Item 11)

The nominee received most votes for the POC Best Presentation Award is Dr. Anatoliy Salyuk (Russia) for his paper entitled "Exchange of deep and bottom water in the Kurile Basin, Sea of Okhotsk, with Pacific".

POC Strategic Plan (Agenda Item 4)

No modification was proposed.

Progress Report from WG 13 on CO_2 in the North Pacific (Agenda Item 6)

Dr. Yukihiro Nojiri, Co-Chairman of the WG 13 on CO_2 in the North Pacific, reported on the WG activity since last PICES Annual Meeting and future plans (*POC Endnote 5*). POC accepted the WG 13 progress report and approved the recommendations.

Science Board items (Agenda Item 7)

High priority scientific projects

POC reviewed the proposed PICES high priority scientific projects and discussed its role in their implementation.

POC supported in general the development of a North Pacific Ecosystem Status Report and requested clarification on what kind of center should be organized to implement the project and what resources are required. After a presentation by Dr. Sonia Batten, POC agreed to support an International Zooplankton Monitoring Program for the North Pacific and recommended to include more physical

parameters in the monitoring and to involve physical oceanographers in data analysis and interpretation process. POC requested more information on need for a workshop series on "Effect of human and climate interactions on fish production". In addition to these three projects, POC suggests to the Science Board to consider a pilot project on "The Japan/East Sea Ecosystem Study" as one of PICES high priority scientific projects.

PICES Wooster Award:
POC supported this proposal with modification that the Award need not be given every year.

POC Endnote 1

Participation List

Canada
Susan Allen (rappourter)

Japan
Yasuhiro Sugimori
Nobuo Suginohara
Takeshi Uji

People's Republic of China

Republic of Korea
Kuh Kim
Sang Kyung Byun

Russian Federation
Sergey Gladyshev
Vyacheslav Lobanov (Chairman)

U.S.A.

Observers
Sonia Batten (UK)
Robin Brown (Canada)
William Crawford (Canada)
Albert Hermann (U.S.A.)
Gennady Kantakov (Russia)
Victor Kuzin (Russia)
Yutaka Nagata (Japan)
Nikolay Naumenko (Russia)
Yukihiro Nojiri (WG 13 Co-Chairman)
Vladimir Pischalnik (Russia)
Nikolay Rykov (Russia)
George Shevchenko (Russia)
Bruce Taft (U.S.A.)
Sergey Tarasyuk (Russia)
Max Taylor (Canada)
Takashi Yoshida (Japan)
Yuriy Zuenko (Russia)
Vldimir Zvalinskiy (Russia)

POC Endnote 2

Agenda

1. Opening remarks and introduction.
2. Approval/modification of the agenda.
3. Business arising from PICES VIII (Vladivostok, 1999).
4. POC Strategic Plan: accomplishments and changes.
5. Proposals for 2001 with financial implications (inter-sessional meetings, travel support, publications).
6. WG 13 progress report.
7. PICES high priority scientific projects and role of POC in their implementation.
8. Relations with other international scientific organizations/programs.
9. Proposals for new working groups.
10. PICES X and PICES XI Annual Meetings: topic sessions and meeting themes.
11. Other items.
12. Draft of report and summary of POC recommendations to Science Board.

POC Endnote 3

PICES X POC Topic Session

Coastal ocean physical processes responsible for biological productivity and biological resource distribution. Convenors: Susan E. Allen (Canada) and Yuri I. Zuenko (Russia).

Of the many physical processes occurring in the coastal ocean some have disproportionately strong affects on biological processes. This session invites papers that present new results on coastal physical processes that determine: (1) nutrient concentrations in the euphotic zone, (2) spatiotemporal variability in water stability and mixing layer depth, (3) retention, advection, aggregation or dispersal of plankton, fish and other marine organisms or (4) regulation of predator-prey interactions. Interdisciplinary papers are encouraged but purely physical papers with clear biological applications are also sought.

POC Endnote 4

PICES X POC/BIO/FIS Topic Session

The physics and biology of eddies, meanders and rings in the PICES region. Convenors: William R. Crawford (Canada), Jeffrey J. Polovina (U.S.A.) and Takashige Sugimoto (Japan).

Mesoscale processes in North Pacific, such as eddies, meanders and rings, have been examined in the past decade to determine the physical dynamics contributing to their formation, motion and decay, but the biological implications of these features are uncertain. In many cases, repeated oceano-graphic cruises, and satellite observations have enabled the tracking of individual eddies and meanders as well as the passive and active association of some species with these features. This session explores the important physical and biological processes of eddies, meanders and rings in the PICES region, and considers how they may affect production of local biota and fisheries.

Selected papers from this session (oral and posters) will be published in a special issue of *Journal of Oceanography*. Authors desiring to be included in the publication should bring completed manuscripts to the Annual Meeting in Victoria. If review and final revision can be completed by March 1, 2002, publication might be scheduled before PICES XI, in October 2002.

POC Endnote 5

Progress report and recommendations of WG 13 on CO_2 in the North Pacific

The joint meeting of WG 13 on CO_2 in the North Pacific with TCODE and JGOFS NPTT (North Pacific Task Team) was held October 20-21, 2000, in the Epochal Tsukuba Congress Center, Tsukuba, Japan, immediately after the North Pacific CO_2 Data Synthesis Symposium. A brief summary of the symposium appears as *WG 13 Annex 1*.

The meeting was attended by representatives from Canada, Japan, Korea, Russia, and the United States of America. After a welcome by the Co-Chairmen, Dr. Richard Feely (PMEL, U.S.A.) and Dr. Yukihiro Nojiri (NIES, Japan), the first day of the meeting was devoted to a series of scientific and technical presentations and discussions of future plans.

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. There is

a considerable contrast in the ecosystems producing organic carbon and $CaCO_3$ particles, one of the factors determining the CO_2 sink strength in the ocean, between the eastern and western North Pacific. The contrast is likely due to the difference in the nutrient supply from the subsurface to the surface euphotic layer (i.e. resulting from the physical forcing which affects mixed layer depth) and in the atmospheric input of iron and other substances.

The presentations addressed a number of topics concerning the oceanic carbon dioxide system in the North Pacific. Dr. Nojiri summarized collaborative research conducted by scientists onboard the M/S *Skaugran* and *Alligator Hope* from 1995-2000 and at the KNOT time-series station in the western North Pacific. He described the major seasonal variations of the sources and sinks for carbon dioxide north of 35°N. This region of the North Pacific is a large net sink for CO_2 (~0.24 PgC yr^{-1}) with large wintertime sources in the convective overturn regions of the western North Pacific and the Aleutian Islands, and large spring and summertime sinks in the northwestern Pacific and Bering Sea regions due to high nutrient concentrations and new production. Dr. Nojiri discussed plans for future VOS ship and time-series observations in the North Pacific and recommended an expansion of efforts into the subtropical Pacific.

Dr. Akihiko Murata (JAMSTEC, Japan) reported on several JAMSTEC cruises conducted in the Bering Sea and Arctic Ocean. These summertime surveys of pCO_2, total dissolved inorganic carbon (DIC) and total alkalinity (TAlk) revealed significant sinks (pCO_2 < 250 µatm) in the northern Bering Sea due to new production; whereas, in the Arctic Ocean pCO_2 values decreased with decreasing temperatures.

Galina Pavlova (POI, Russia) informed on the Russian-German KOMEX expeditions in the Sea of Okhostk. Sediment cores were analyzed for pore water chemistry and sediment mineralogy. Large sea plumes of methane gas coming from the bottom sediments were observed at depths ranging from 380 to 600 m. Large bivalves were found in the region of the gas seepage.

Dr. Paul Quay (UW, U.S.A.) reported on isotopic measurements of seawater DIC in the Pacific Ocean. Approximately 825 stations in the Pacific have been analyzed for seawater DIC $^{13}C/^{12}C$ isotope ratios. High ratios were observed at about 45°S in South Pacific, with lower ratios towards the north and south of this latitude band. Surface concentration changes since the 1970s indicated an oceanic uptake of anthropogenic CO_2 of approximately 2.0 ± 0.5 PgC yr^{-1}. Laboratory inter-comparison studies were suggested at the international level. It was recommended that a collaborative method inter-comparison study has a high priority to enable future CO_2 measurements by PICES nations to be comparable and correct.

Dr. C.S. Wong (IOS, Canada) reviewed ongoing and future CO_2 research programs in Canada. The Line P time-series is occupied about 3 times per year with hydrocasts and moored sediment traps. Ship of opportunity between Japan and Canada, and between Canada and Australia using VOS run approximately 6 times per year. Canada will participate in an international CO_2 ocean sequestration experiment off Hawaii in fall 2001 and plans are underway for an Fe fertilization experiment at Ocean Station P.

Robin Brown (IOS, Canada), Alex Kozyr (CDIAC, U.S.A.), Paulette Murphy (NODC, U.S.A.), and Toru Suzuki (MIRC, Japan) reported on the status of ocean CO_2 data sets for the member countries. In the United States and Japan ongoing efforts are being made to provide inventories and, in some cases, final data on the World Wide Web. Other countries are making similar plans for data integration and distribution. A plan was developed to initiate an international North Pacific CO_2 data synthesis activity, which will be planned and carried out in collaboration with the PICES TCODE and JGOFS NPTT.

The second day was devoted to discussions of the methods inter-comparison and to the formulation of recommendations (see below). The Working Group felt that it was important to emphasize the objective of improving the overall quality oceanic CO_2 measurements in the North Pacific. Dr. Andrew Dickson (SIO, U.S.A.) reported on the results of the PICES-sponsored international method inter-comparison study for dissolved inorganic carbon and total alkalinity, which began in 1999 and continued through 2000. At the first CO_2 Technical Workshop in April 1999 (see PICES 1999 Annual Report and PICES Press, Vol. 8(1), for details), it was agreed that this year's study would focus on the measurement of total alkalinity (TAlk) in seawater. Four samples were distributed for analysis by the participating laboratories (1 from Canada, 7 from Japan, 1 from Korea, 1 from Russia, and 3 from the United States) and were analyzed using acid supplied by the Scripps Institution of Oceanography. The results were discussed at the second CO_2 Technical Workshop held in Tsukuba on October 20, 2000. This workshop was attended by 24 scientists including both members of the participating laboratories and some observers. The results were significantly better than they had been in 1999. With the exception of two laboratories, the Talk values (when normalized to a common reference material) were in good agreement with each other (means within 2 µmol/kg of the assigned value; standard deviations of these laboratories ranged from 2-4 µmol/kg). This result is typical for laboratories with experience in this measurement, and indicates the increased skills of the various participating laboratories acquired over the past year. Nevertheless, it is essential to maintain an awareness of potential inter-laboratory calibration problems, and the sources of these were discussed at length during the Technical Workshop. A full report, detailing both the 1999 and 2000 exercises is in preparation and should be completed in early 2001. The various workshop participants expressed an interest in continuing further such exercises at about a 2-year interval. PICES plans to explore ways of doing this in the future. Dr. Dickson recommended that each laboratory develop an approach that independently calibrates the total alkalinity system so that the Certified Reference Materials (CRMs) can be used as an independent check on the calibration.

Plans for future WG 13 activities

- As a continuation of its method inter-comparison activity, the Working Group will plan and carry out an international inter-comparison of seawater DIC $^{13}C/^{12}C$ isotope ratio measurement techniques by exchanging test samples to be analyzed in the various participating laboratories before June 2001.
- The Working Group will initiate a North Pacific CO_2 data synthesis activity in collaboration with the JGOFS NPTT and PICES TCODE. Activities planned for 2001 include the compilation of an inventory of CO_2 data available for the North Pacific, planning and organization of a 3-day CO_2 Data Integration Test Workshop to be held in January 2001, in Sidney, B.C., Canada, and a 3-day CO_2 Data Integration Implementation Workshop to be held in May 2001, in Tokyo, Japan.
- The Working Group will collaborate with other PICES Committees to organize a new Working Group on North Pacific Biogeochemical Data Integration and Synthesis.
- The Working Group will continue, where possible, to plan and coordinate international efforts and research programs aimed at studying CO_2 in the North Pacific. This activity is assuming an increasing importance as PICES countries such as Japan, Canada, Russia, and the United States plan new research programs into aspects of the carbon cycle. As an example of this, scientific interactions within the PICES Working Group 13 and the international IGBP Global Carbon Cycle Study Plan is encouraged to improve collaborations between scientists who are working on CO_2 in the North Pacific. IOC/SCOR CO_2 Panel is preparing a proposal about the design of Ocean Carbon Observation System and

emphasizing the importance of regional international forum and PICES was supported as one of the excellent forum.

Recommendations to PICES

- Provide logistics support for seawater DIC $^{13}C/^{12}C$ isotope ratio inter-comparison study (PICES is a cosponsor with NIES and SIO).
- Convene a joint WG 13/TCODE CO_2 Data Integration Test Workshop in Sidney, B.C., Canada, in January 2001, and provide travel support for one Japanese and two North American scientists to attend the meeting;
- Convene a joint WG 13/TCODE CO_2 Data Integration Implementation Workshop in Tokyo, Japan, in May 2001, and provide travel support for two scientists to attend the meeting;
- Continue to provide the forum for the international coordination of ocean carbon cycle research in the North Pacific.

Plan for publication

- Review and results from the 1999 and 2000 PICES method inter-comparisons for carbonate parameters in a bilingual (Japanese/English) report published by the Center for Global Environmental Research (CGER) of the National Institute for Environmental Studies, Japan, and in the PICES Scientific Report Series, in spring 2001 (minor expenses for PICES);
- Proceedings of the North Pacific CO_2 Data Synthesis Symposium in a report published by the Center for Global Environmental Research (CGER) of the National Institute for Environmental Studies, Japan, and in the PICES Scientific Report Series, in spring 2001 (minor expenses for PICES);
- WG 13 final report in the PICES Scientific Report Series, in spring 2002:
  - Present scientific status;
  - Summary of 1st and 2nd DIC/TAlk inter-comparisons, and progress of ^{13}C inter-comparison;
  - Technical and scientific aspects of data integration, including desirable metadata for CO_2 and related species, guideline of CO_2 data quality assurance, data format for the integrated database;
  - Recommendation for the future observation.

Proposed schedule for WG 13 activities in 2001

Method Inter-comparison

Prepare samples for a seawater DIC $^{13}C/^{12}C$ isotope ratio inter-comparison study:
January

Distribute samples to participants:
April/May

Return results to organizers and report results to WG 13 Co-Chairmen:
June

Report results at WG 13 meeting in Victoria;
October

Data Inventory

Prepare North Pacific CO_2 data inventory:
ongoing

CO_2 Database and Integration

Convene a CO_2 Data Integration Test Workshop in Sidney, B.C., Canada:
January

Convene a CO_2 Data Integration Implementation Workshop in Tokyo, Japan:
May

WG 13 Annex 1

North Pacific CO_2 Data Synthesis Symposium Summary

The North Pacific CO_2 Data Synthesis Symposium, which preceded the PICES WG 13/TCODE/NPTT meeting, was held October 18-19, 2000, in the Epochal Tsukuba Congress Center, Tsukuba, Japan. The Symposium was co-sponsored by PICES and JST/CREST and was hosted by NIES. More than 60 scientists and administrators attended this two-day scientific session.

The first day of the symposium was devoted to the synthesis of basin-scale observations and time-series measurements. Dr. Richard Feely (U.S.A.) opened the session with an update of the ongoing synthesis of the Pacific Ocean WOCE/JGOFS Global CO_2 survey. He reported on the progress of the international synthesis effort to provide the oceanographic community with a unified internally consistent carbon data set. He also showed how he and his colleagues were using the cruise-to-cruise certified reference material (CRM) results and the crossover stations to propose individual cruise adjustments for each the carbon parameters. The revised data set shows remarkable coherency between cruises even though many laboratories were involved in making the measurements.

Drs. Christopher Sabine (U.S.A.) and Nicolas Metzl (France) gave similar talks on the synthesis of the JGOFS data from the Indian and Southern Oceans. Dr. Sabine discussed his work on comparisons of observations versus model estimates of anthropogenic CO_2 inventories in the Indian Ocean, and Dr. Metzl reported on temporal and spatial variability of CO_2 fluxes in the Southern Ocean, south of the Indian Ocean.

Drs. John Dore (U.S.A.), Nickolas Bates (U.S.A.; this talk was given by Dr. Sabine), Yukihiro Nojiri (Japan) and Keiri Imai (Japan) reviewed the results of the measurements at the HOT, BATS and KNOT time-series stations in the North Pacific. Based on seasonal amplitudes of nutrients and dissolved inorganic carbon the northwestern Pacific KNOT time-series data indicate significantly larger variations of primary production than other regions of the North Pacific.

On the second day of the symposium the focus was on data synthesis and integration. Dr. Kitack Lee (U.S.A.) gave a presentation on his analysis of the global interannual variability of air-sea fluxes of CO_2 based on regionally and seasonally varying pCO_2sw-temperature relationships and interannual anomalies in sea surface temperature and winds. The results indicate much smaller variability of CO_2 fluxes (0.4 PgC yr^{-1}) than is observed atmospheric inversion models or the ocean biogeochemical model results. Dr. Paulette Murphy (U.S.A.) presented her analysis of the M/S *Skaugran* data, which indicated that 9-10 samplings per year were required to provide an adequate representation of pCO_2 distributions in the Subarctic Pacific. Dr. Masao Ishii (Japan) presented his estimate of net community production (38 mmol m^2 d^{-1}) based on DIC and pH measurements in the central and western equatorial Pacific, and Dr. Ludger Mintrop (Germany) summarized the efforts to synthesize the WOCE/JGOFS data in the North and South Atlantic under the CARINA Project. Efforts of data management and data base technology were also described during this symposium. In addition to 17 oral presentations, 12 papers were presented as posters.

REPORT OF THE IMPLEMENTATION PANEL ON THE CCCC PROGRAM

The Implementation Panel on Climate Change and Carrying Capacity Program (CCCC/IP) met from 0900-1300 hours on October 20, from 1400-1730 hours on October 21, from 13:30-17:30 hours on October 22, and from 09:00-13:00 on October 26, 2000. At the CCCC Workshops Plenary sessions, the Panel heard overviews of activities planned for the CCCC Workshops from the Task Team Chairmen, and results and recommendations from the Workshops (*CCCC Endnote 1*). Progress reports for 2000 and recommendations for activities in 2001 were received after the Task Team business meetings on October 22 (*CCCC Endnotes 2-5*). A session on October 26 involved a series of four invited talks and general discussion.

The Panel discussed issues with financial implications for PICES in 2001 and recommends:

Publications

Reports of the 2000 CCCC Task Team Workshops be published in a single volume of the PICES Scientific Report Series.

2001 Workshops

The following meetings should be convened inter-sessionally:

- a 2-day BASS/MODEL Workshop on "Quantification of a food web model for the eastern Pacific gyres" (March 2001, Honolulu, U.S.A.; Convenors: Gordon A. McFarlane, Andrey S. Krovnin, Bernard A. Megrey & Akihiko Yatsu);
- 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, Honolulu, U.S.A.; Convenors: Patricia Livingston & Vera Alexander);
- a MODEL Workshop to implement the improvements in the PICES NEMURO Model (venue, date and duration are subject to obtaining non-PICES funding support; Co-Convenors: Michio J. Kishi & Bernard A. Megrey).

The following meetings should be convened prior to the PICES Tenth Annual Meeting:

- a 1-day REX Workshop on "Temporal variations in size at age for fish species in coastal areas around the Pacific Rim" (Convenors: William T. Peterson & Douglas E. Hay);
- a ½-day REX/MODEL Workshop to include higher trophic levels to the PICES NEMURO Model (Convenors: William T. Peterson, Scott Rumsey, Michio J. Kishi, & Bernard A. Megrey);
- a 1-day BASS/MODEL Workshop to evaluate the results of the inter-sessional workshop models of the eastern and western subarctic gyres and of methods of simulating dynamic processes. (Convenors: Gordon A. McFarlane, Andrey S. Krovnin, Michio J. Kishi & Bernard A. Megrey).

2001 scientific sessions

A 1-day CCCC Topic Session on "Climate change impacts of the 1998/99 regime shift in the North Pacific Ocean and Bering Sea" be convened at the PICES Tenth Annual Meeting. There was some discussion as to whether the wording should be broadened to include all of the 1990s, but no decision was reached. Final wording was left for the Science Board to consider.

Travel support

PICES provide financial support for:

- 1 REX and 2 MODEL scientists to attend the inter-sessional MODEL workshop;
- 2 scientists to attend the BASS/MODEL inter-sessional workshop in Honolulu;
- 1 scientist to attend the MONITOR workshop at PICES X;
- 2 scientists to attend the REX Workshop at PICES X.

Approval of new members

Science Board approve the following membership changes in the CCCC Program:

- Makoto Kashiwai (Japan) to replace Suam Kim (Korea) as CCCC Co-Chairman;
- David L. Mackas (Canada) and Sei-ichi Saitoh (Japan) to replace Bruce Taft (U.S.A.) and Yasunori Sakurai (Japan) as MONITOR Co-Chairmen;
- Charles B. Miller (U.S.A.) to replace Warren S. Wooster as CPR Chairman;
- Hidehiro Kato (Japan) and Thomas R. Loughlin (U.S.A.) to serve as BASS members;
- Peter S. Ross (Canada) and George L. Hunt (U.S.A.) to serve as MODEL members;
- Phil Mundy (U.S.A.), Douglas F. Bertram (Canada) and William Sydeman (U.S.A.) to serve as MONITOR members;
- Yutaka Watanuki (Japan) to serve as a REX member.

Relations with other Organizations, Programs, and Projects

As with last year's meeting, the Panel identified GOOS and GLOBEC as continuing high priorities, but viewed the development of closer links with the Sloan Foundation's Census of Marine Life initiative as a promising area to support.

Best Presentation Award

The CCCC Best Presentation Award was given to Dr. Shoko Hotta for her paper on “Factors affecting the growth of chum salmon in the western North Pacific revisited”.

CCCC Endnote 1

CCCC Workshops Plenary Agendae

CCCC Workshops Plenary Session #1, Friday, October 20, 2000

09:00-09:15 Opening remarks (D. Welch & S. Kim)
09:15-09:25 Overview of BASS workshop and activities (G.A. McFarlane & A.S. Krovnin)
09:25-09:35 Overview of MODEL workshop and activities (M.J. Kishi & B.A. Megrey)
09:35-09:45 Overview of MONITOR workshop and activities (B.A. Taft & Y. Sakurai)
09:45-09:55 Overview of REX workshop and activities (W.T. Peterson, T. Kobayashi & V.I. Radchenko)
09:55–10:05 Review of NPAFC-PICES Workshop objectives (V. Karpenko, NPAFC)
10:05-10:30 Coffee/tea break
10:30-11:00 BASS Keynote speaker – Jeffrey J. Polovina "Investigating marine ecosystem dynamics with Ecosim"
11:00-11:30 MODEL Keynote speaker – Kenneth A. Rose "A review of the use of individual-based models as upper trophic level modelling tools"
11:30-12:00 MONITOR Keynote speaker – Ned Cyr "An overview of the LMR-GOOS strategic design"
12:00-12:30 REX Keynote speaker – Fritz C. Funk "Abundance and historical trends of herring in Alaskan waters"

CCCC Workshops Plenary Session #2, Saturday, October 21, 2000

14:00–14:15 Report of BASS Workshop and recommendations

14:15–14:30 Report of MODEL Workshop and recommendations
14:30–14:45 Report of MONITOR Workshop and recommendations
14:45–15:00 Report of REX Workshop and recommendations
15:00–15:15 BIO-MBM Workshop summary
15:15–15:45 Coffee/tea break
15:45–16:45 Status of National GLOBEC Programs (10 minutes maximum per country)
R.I. Perry, Canada
W.T. Peterson, U.S.A.
R. Wang, China
V.I. Radchenko, Russia GLOBEC-like programs
T. Sugimoto, Japan
Suam Kim, Korea
16:45–17:00 Report on GLOBEC International: Manuel Baranges
17:00–17:10 Report on GLOBEC-Int WG: Retrospective & Time Series Analyses - R. Ian Perry
17:10–17:20 Report on GLOBEC-Int WG: Process Studies - David L. Mackas
17:20–17:30 Report on GLOBEC-Int WG: Modelling – Francisco Werner
17:30–18:00 Discussion

CCCC Endnote 2

BASS Task Team Report

The BASS Task Team met in the morning of October 22, to review 2000 activities and plan activities for 2001. The Co–Chairmen welcomed participants and outlined the objectives of the meeting. The agenda was approved without changes.

2000 activities and accomplishments

A 2-day BASS workshop on "Development of a conceptual model of the subarctic Pacific Basin Ecosystem(s)" was convened prior to the Ninth Annual Meeting in Hakodate (October 20 and 21, 2000). The workshop was well attended and highly successful.

At PICES VIII, BASS jointly with REX proposed convening a session entitled "Subarctic Gyre processes and their interaction with coastal and transition zones." This was adopted by Science Board as the theme for their symposium at PICES IX.

The Advisory Panel on An Iron Fertilization Experiment in the Subarctic Pacific Ocean (IFEP) convened a 2-day Planning Workshop on "Designing the iron fertilization experiment in the Subarctic Pacific" in Tsukuba, Japan, prior to the PICES Ninth Annual Meeting (October 19-20, 2000). The objective of the workshop was to initiate planning for the experiment, including logistics, ships, and funding, etc. The workshop was very successful thanks to 19 excellent presentations and the spirited discussions from the 36 participants. The Panel also met during the evening of October 25. A report of the IFEP appears as *BASS Annex 1*.

2001 planned activities and recommendations

BASS proposed convening a 2-day workshop to examine the feasibility of using ECOPATH/ ECOSIM as a tool to model higher trophic level components of the subarctic gyre system. The workshop will be held in March, 2001, in conjunction with the PICES/Sloan/ IPRC Census of Marine Life Workshop. The specific objectives include: (i) synthesizing all trophic level data to a common format, (ii) beginning to examine trophic relationships in both gyres using ECOPATH/ECOSIM/ ECOSPACE, and (iii) examining methods of incorporating the PICES NEMURO lower trophic model into the analysis. Co–convenors are Gordon A. McFarlane (Canada), Andrei S. Krovnin (Russia), Bernard A. Megrey (U.S.A.), and Akihiko Yatsu (Japan). BASS requests that PICES support 4 invited participants to attend the workshop.

BASS proposed a 1-day workshop to be held just prior to the Tenth Annual Meeting to evaluate the results of the inter-sessional workshop models of the eastern and western subarctic gyres and of methods of simulating dynamic processes.

BASS proposes a 1-day joint BASS/REX symposium to be held at the Tenth Annual Meeting. Two possible topics were suggested: (i) Underlying mechanisms controlling the expansion and contraction of Pacific sardine populations in the Pacific Ocean; and (ii) Was there a regime shift in 1998/1999? Early physical and biological indications.

BASS endorsed a proposal by IFEP to convene a ½-day workshop or meeting at the Tenth Annual Meeting to refine the experimental design of the 2002 and 2003 experiments using information from the preliminary experiment in the western subarctic gyre in 2001 and Southern Ocean experiments in 2000/2001.

BASS Annex 1

Report of the Advisory Panel on Iron Fertilization Experiment

The Advisory Panel on An Iron Fertilization Experiment in the Subarctic Pacific Ocean (IFEP) met in the evening of October 25. The Co-Chairman, Dr. Shigenobu Takeda, welcomed the members of the Panel and observers (*IFEP Endnote 1*) and called the meeting to order. The agenda was reviewed and accepted without changes.

A 2-day IFEP Planning Workshop on "Designing the iron fertilization experiment in the subarctic Pacific" was convened in Tsukuba, Japan, prior to the PICES Ninth Annual Meeting (October 19-20, 2000). A report of the Workshop appears as *IFEP Endnote 2*. The objective of the workshop was to initiate planning for the experiment, including logistics, ships, funding, etc. The workshop was very successful thanks to 19 excellent presentations and spirited discussion among 36 participants.

Dr. Takeda introduced the schematic diagram of subarctic plankton ecosystem that includes new biological and geochemical processes reported during the workshop. He also listed similarity and differences in physical, chemical and biological characteristics between the eastern and western subarctic Pacific. Such differences have a close relationship with the zonal gradients in atmospheric iron deposition.

From the results of the workshop, Dr. Paul J. Harrison proposed a central hypothesis for the iron enrichment experiments in the subarctic Pacific. The hypothesis was adopted by IFEP after modification according to the suggestions and comments from Drs. Kenneth Coale and Phillip W. Boyd, and other members (*IFEP Endnote 3*). The experiment should be driven by a scientific hypothesis and is to test the hypothesis on natural ecosystem and geochemical cycles, therefore the word "ferti-lization" would be replaced by "enrichment".

IFEP recognizes that it is very important to have a close linking between the Canadian and Japanese program. It is considered that scientists and ships from both Canada and Japan should perform the eastern and western experiments as a collaborative program to make the east-west comparison stronger by using the same methodology and team. The experiment needs the participation of American scientists and ships as well as scientists from other PICES countries to maintain the international activity achieved during the workshop. Due to the number of scientists that are needed to measure a wide variety of parameters, the experiment will require more than two ships. The R/V *J.P. Tully* (Fisheries and Ocean Canada) and R/V *Kaiyo-Maru* (Fisheries Agency, Japan) or T/S *Oshoro-Maru* (Hokkaido University, Japan) will be the base ships, both in the eastern subarctic experiment in July/Aug 2002 (Stn. P) and in the

western subarctic experiment in August 2003 (45-50ºN, 160-165ºE). The R/V *Hakuho-Maru* (University of Tokyo, Japan) is also available to perform the survey for studying the long-term responses in October 2003. A preliminary experiment in the western subarctic in June-August 2001 is also planning to use the R/V *Kaiyo-Maru*.

The Panel discussed the timeline of proposals for research and ship time. The IFEP members from each country were asked to gather information such as what they could measure/ contribute to prepare the proposals as an international program. The information will be distributed to colleagues who are interested in participating.

IFEP recommends using a web site on the PICES home page to improve communication between IFEP members and other scientists (group of American scientists) who are proposing to participate the Canada-Japan experiments.

After the successful IFEP planning workshop, the IFEP felt strongly that the next step should be to convene a half-day mini-workshop or meeting at the PICES Tenth Annual Meeting in Victoria. This workshop would refine the details of the experimental design for 2002 and 2003 with information about a preliminary experiment in the western subarctic gyre in 2001 and Southern Ocean experiments in 2000-2001.

IFEP Endnote 1

Participation List

Canada
Paul J. Harrison

Japan
Isao Kudo
Shigenobu Takeda
Atsushi Tsuda

People's Republic of China

Republic of Korea

Russian Federation
Lev M. Gramm-Osipov

U.S.A.
Kenneth H. Coale
William P. Cochlan

Observer
Philip W. Boyd (UK)
Kenshi Kuma (Japan)
Maurice Levasseur (Canada)
Hiroaki Saitoh (Japan)
Sei-ichi Saitoh (Japan)
Mitsuo Uematsu (Japan)

IFEP Endnote 2

Report on IFEP Planning Workshop

Designing the Iron Fertilization Experiment in the Subarctic Pacific

Venue: Tsukuba, Japan, October 19-20, 2000
Conveners: C.S. Wong and Shigenobu. Takeda
Co-Sponsors: PICES and the Japan Central Research Institute of Electric Power Industry (CRIEPI)

Objectives of the workshop

a. To establish the current knowledge about the role of iron in limiting phytoplankton production in the subarctic Pacific;

b. To identify the specific questions that should be answered by the *in situ* iron fertilization experiment in the subarctic Pacific; and
c. To initiate planning for the experiment, including logistics and funding, etc.

Scientific Sessions

1. *General overview of IronEx and SOIREE, iron chemistry and biology in seawater*
2. *Physics in the North Pacific and Fe addition techniques*
3. *Biology in the North Pacific and IronEx*
4. *Chemistry in the North Pacific and IronEx*

The workshop was very successful thanks to 19 excellent presentations and the spirited discussion from the 36 participants.

What do we know from IronEX I andIronEX II and SOIREE, etc.

- Iron limitation is clearly present in populations of phytoplankton in HNLC regions.
- Iron enrichment de-couples larger phytoplankton from the meso-zooplankton community.
- Evidence for carbon export in SOIREE is not clear. There may have been export of carbon, yet retention of iron. Evidence for carbon export in IronEX is clearer.
- Response in SOIREE was much slower than the response in IronEX.
- There is now more interest in the effect of iron enrichment in different macro-nutrient-limited regimes, specifically in low NO_3 regimes where N-fixation dominates N-uptake.
- A ship-based study of light limitation of iron enrichment in the SOIREE region showed that light limitation is present at 100 m.
- There is some interest in long-term addition experiments of low levels of iron.
- The role of meso-scale eddies is intriguing at Stn P. They may offer a way to track a patch of water for years, but the phytoplankton community in an eddy may be atypical of the Gulf of Alaska. Eddies also have no surface water expression and so their relevance to an iron enrichment experiment is not clear.
- The European community has just sent the *Polarstern* to the southern ocean (in the Atlantic sector) to do a SOIREE-type experiment over a longer time (CARUSO).

What do we still need to know?

- There is a need to study Station P and the NW Pacific, but other regions need to be studied as well.
- The fate of primary production (carbon): POC export flux, DOC, respiration and response of higher trophic levels (is there an increase in fish production?). The time scale is over a year, so the model approach is needed).
- What are the roles of ligands? What members of the community produce and take up ligands?
- Does zinc affect other enzyme processes?
- Need DMS/DMSP studies and other climate change biogases. Previous iron enrichment studies have measured DMS production. Should have both ships and aircraft for sampling. At Station P, ocean levels of DMS are very high and atmospheric levels are low.
- Need to know the factors that influence the carbon-to-nutrient-and-other trace metal export ratios.
- Iron might end up below the mixed layer during long-term commercial projects. It might become available the next summer after winter mixing.
- Would long-term iron enrichment drive a system toward another limitation (N, Si, Zn, Co, etc)?
- What is the impact of long-term iron enrichment on fish? Governments may see the fish production as a secondary benefit of the iron enrichment, so this question will be asked. The public may see this as a problem, due to “wrong” species benefiting, such as pennate diatoms that produce domoic acid. (These are not questions that can be addressed with the current experiment)

- What are the chemical processes associated with iron saturation and super-saturation of seawater?
- How does Fe(II) stay around so long in Fe enrichment patches?
- What are the major grazers on diatoms and how do they respond when diatom (pennate/centric) abundance increases?
- Understanding the dynamics of plankton ecosystem, export carbon flux and climate related gases to the iron enrichment is appropriate for the requests of Government and Industry who are seeking scientific information to asses the effect on future global atmospheric CO_2 and environmental impacts.

What do we hope to learn from an iron enrichment experiment at Stn P and WSG?

What are the similarities and differences in the plankton ecosystem response to iron fertilization in the subarctic Pacific? There is a special interest in the east-west North Pacific comparison, which includes differences in dominant species (pennate/centric diatoms) and export flux (Org-C/Opal/$CaCO_3$).

Canadian Program (extracted from the Canadian SOLAS Proposal)

Canadian scientists are proposing to fertilize a 64 km^2 patch of ocean near Stn P in the NE subarctic Pacific during July/Aug 2002. Iron will be added 3 or 4 times during the three week experiment and a wide variety of physical, chemical and biological parameters will be measured. In particular, the expected increase in phytoplankton biomass and the subsequent carbon flux out of the photic zone, the drawdown in CO_2, and the production of other climate change gases such as DMS we will be carefully documented.

There are several reasons why an iron enrichment experiment should be conducted at Stn P in the NE subarctic Pacific. Stn P or Ocean Station Papa (50°N 145°W) has a 40 year time series of physical, chemical, and biological parameters and thus it has one of the longest open ocean time series in the world. Three large intensive sampling programs have provided detailed information, especially on biological rate process studies (SUPER, WOCE, and Canadian JGOFS). This large published data set/time series will provide an excellent background to assess the annual and interannual natural variability for evaluating the magnitude of the response to the iron addition experiment. The subarctic North Pacific represents a latitudinal gradient between the polar (Southern Ocean) and equatorial regions and therefore an iron addition experiment at Stn P will allow a comparison among the three large HNLC regions and between the eastern and western gyres in the subarctic Pacific.

The subarctic NE Pacific has different physical, chemical and biological properties than the other two HNLC regions (Southern Ocean and Equatorial Pacific). In particular, it has a very shallow summer mixed layer depth, a strong, shallow pycnocline and low currents which should help to keep the iron patch intact and ensure the success of the experiment. The biodiversity of the plankton is different from the equatorial Pacific and Southern Ocean and therefore the response to the iron addition and the flux of carbon out of the photic zone may be different.

Unlike the equatorial Pacific, Stn P is in close proximity (3 days) to major research laboratories at the Institute of Ocean Sciences and the University of British Columbia and therefore it should be easier to document the longer term recovery from the iron addition. If the detailed documentation of the ecosystem response to a singe iron addition is successful, this will allow us to proceed to the next phase, repeated iron additions and the longer term monitoring that this will require.

<u>Key questions</u> that have not been entirely resolved by previous iron enrichment experiments, are:

1. How does the change in biodiversity and foodweb structure differ for markedly

different ecosystems which have been perturbed by an iron addition?
2. What is the drawdown of CO_2 and especially the flux of carbon to the deep ocean?
3. How does the production of ligands influence the iron chemistry and the longevity of the phytoplankton bloom?
4. How does zooplankton grazing influence the formation of the bloom and the carbon flux (e.g. fecal pellet production)?
5. What is the long-term response and recovery of the ecosystem following an iron addition?
6. What is the magnitude of production of other climate change gases such as DMS during the bloom and how is the production influenced by phytoplankton species, microbial processes and grazing?

Objectives

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 drawdown of CO_2 and the flux of carbon to depth.
3. To study the relationship between ligand production and the associated changes in the iron chemistry and their influence on the longevity of the phytoplankton bloom.
4. To assess the influence of zooplankton grazing on the phytoplankton bloom formation and carbon flux.
5. To follow the long-term response and recovery of the phytoplankton bloom.
6. To quantify the production of various climate change gases during the iron enrichment experiment and assess the factors which influence the production of these biogases.

Biological Oceanographic sampling

The upper 150 m will be sampled vertically (6-8 depths) each day using 12 acid-cleaned PVC samplers on a CTD/water sampler rosette system at the patch center (determined by SF_6 levels) and in the surrounding waters. Real-time vertical profiling of temperature, salinity, transmissivity, chlorophyll *a* fluorescence and underwater irradiance (PAR, 400-700 nm) will be carried out. Discrete water samples will be analysed for:

- chlorophyll *a* (size-fractionated, >20, 5-20, 2-5 and 0.2-2 µm)
- heterotrophic bacterial abundance
- microzooplankton abundance
- phytoplankton abundance (flow cytometry, epifluorescence and light microscopy).

Additional samples will be incubated on deck to measure rates of:

- primary production (14°C, 24 h incu-bation, simulated *in situ* and size-fractionated as for Chl-*a*)
- bacterial production
- microzooplankton grazing

Mesozooplankton abundance will be assessed from 150-0 m vertical hauls. The Th:U activity ratio of particles in the upper water column will be collected using a submersible pumping system.

Geochemical measurements

Two types of sampling will be done: hydrocasts and underway sampling from the vessel's non-toxic seawater supply (intake 5 m subsurface) and analysed by fluorometry (calibrated with discrete chlorophyll *a* samples every two days, corrected for quenching during daylight hours), and using a bubble-segmented automated nutrient analysis system, respectively. Underway samples for dissolved iron will be conducted from a clean towed batfish sampling system, and samples for pCO_2 will be drawn from the vessel's non-toxic seawater system. Phytoplankton samples for the single-cell flavodoxin assay will be pre-concentrated onboard ship and later analysed shoreside. Sampling will be conducted by:

- Towed batfish: Continuous sampling will be made from a towed batfish with a clean pump and tubing for the following measurements (This is not a pumping undulating fish):
  - Conductivity/salinity sensor
  - SF_6
  - fCO_2, pH
  - nitrate

- iron
- chlorophyll-*a* (fluorometer)

- Hydrocasts by rosette CTD/Niskin samplers
  - T, S
  - O_2
  - Chlorophyll *a*
  - Macro-nutrients (N, P, Si) by auto-analyzer
  - Iron by chemiluminescence
  - Particulate iron size-fractions, total iron, dissolved iron
  - SF_6
  - DIC, TA, pH
  - DOC, DON, POC
  - DMS

- Free-drifting sediment traps (at 50 m intervals, 50-600 m) deployed and retrieved at 3 day intervals to obtain samples for detritus organic C, N, P, Si, PIC, Fe, Cd, Al, rare earth elements, Th/U ratios, coccolithophore counts, and planktonic species, and scanning electron microscope pictures.

- Deckboard perturbation experiments
  Algal carbon, growth rates and C:Chl *a* ratios, etc.

Drs. Wong and Harrison hope to have one or two strings of moored sediment traps, plus free floating traps. Moored traps would be at the control site. Floating traps would hopefully follow the patch. It will be difficult to keep the patch and traps together, but there is a real need for trap data to try to quantify and characterize export. Free-floating sediment traps may perform differently than moored traps. Therefore we should have free-floating traps in and out of the Fe patch.

There is a need to know more about micro-zooplankton and to know the effects of ligands and climate change biogases (including but not limited to DMS, CO_2, N_2O). SOIREE showed enhancement of nitrous oxide at the top of the thermocline. There will be aircraft-based sampling of gases and aerosols above the Fe patch. The experiment expects to have access to the R/V *J.P. Tully* for four weeks, but anticipates sampling over a longer time if back-to-back cruises using a second vessel can extend sampling over 6 weeks. Cruises could be separated by several weeks if the patch could be found on the second cruise. Iron limitation at Stn P in July to August is severe, so project will be conducted during this period. The project will be part of the Canadian SOLAS project.

Summary of Japanese programs

Japanese scientists are proposing to conduct a preliminary experiment of about 40 days duration in June-August 2001, using the R/V *Kaiyo Maru* in the Western Subarctic Gyre. The next effort is anticipated for August to mid-September 2003 using either the R/V *Oshoro-Maru* or the R/V *Kaiyo Maru* to initiated the SF_6/Fe patch and conduct the basic study. In October 2003, the R/V *Hakuho Maru w*ill be used for intensive sampling and measurements and assessing long-term responses. Sampling will occur in the Western Subarctic Gyre in the region 45-50ºN, 160-165ºE:

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 drawdown of CO_2 and the flux of carbon export;
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 iron supply on the characteristics of the plankton ecosystem in the western subarctic Pacific.

The proposal would be funded by:

- The Science and Technology Agency (2001-2005);

- Ministry of Education, Science and Culture (2001 Basic Science, 2002-2004 Scientific project with high priority);
- NEDO grant.

Japan SOLAS is still in the preparation stage. A study of the influence of natural atmospheric iron supply on the characteristics of the plankton ecosystem in the western subarctic Pacific will be one of the important topics. (Long cruise staying at a station in the high dust season in spring.)

United States, SOFEX (by Kenneth Coale)

- Experiment will be along 170 west, near SO-JGOFS site.
- Experiment will use SeaSoar type of device that pumps water to ship.
- SO-JGOFS found jump in silicate at Polar front near 62S, with increase south of front. SOFEX will do experiments N and S of front, to see which type of species is enhanced in each region (*Phaeocystis* and diatoms).
- Big complement of scientists and studies. There are ten more scientists than berths on ship. Lack of ship bunks is a general problem in iron enrichment cruises. For example, samples will be frozen for later analysis by Edie Rue and will run the only ligand study.
- SOFEX will need to find the northern patch after a week or more, and plan to use lagrangian drifters to keep track of the patch.

Methodology

- Need to standardize sampling methods to enable comparison among experiments in different HNLC regions. List of dominant species and their biomass is useful for the comparison. Export production is difficult to get quantitative samples?
- First step is the application of previous IronEx methodology ($FeSO_4$, initial concentration level, Fe infusion timing, etc.) and then we may go to new method such as the use of chelated iron (iron lignite), long-period and low-level iron supply, etc.
- Should add DMSP to list of samples.
- Micro-zooplankton are important grazers and dilution experiments are necessary to quantify coupling of primary production and grazing.
- Fe organic ligand study has technical problems.
- Analyses of biogases in the atmosphere are important, but how?
- Bag experiments have limitations. Small bags might not represent the ocean. Large bags are too difficult to manage. However there should be some role for bag experiments.
- Use of organic chelated iron (iron lignite) may provide carbon source for hetero-trophic organisms.
- Stable isotope study will be done in SOFEX to see the proxy of paleo-oceanographic environment.
- After silicate in surface water will be used up, a re-infusion of Fe will give us some idea of the long-term change in dominant species.

Logistics issues

- The Stn P project needs a second ship. Kenneth Coale recommended that a U.S. ship may be available if a group of American scientists were to propose to participate. The US SOLAS program would be one way to generate support. It would help to have a Canadian-Japanese proposal ready. US scientists must start to prepare proposals now for Stn P 2002 cruise.
- A Canadian or US airplane would be useful for tracking the Fe patch. An airplane with a hyperspectral sensor would be really useful.
- ADEOS-2 will be launched soon. It will be useful (similar to SEAWIFS).

IFEP Endnote 3

Proposed experimental summary

The North Pacific is characterized by relatively uniform distributions in temperature, salinity, macronutrients and light yet strong zonal gradients in atmospheric iron deposition exist between the eastern and western gyres.

We **hypothesize** that:

1. The difference in episodic iron deposition gives rise to distinct phytoplankton communities that characterize these biogeochemical provinces.
2. The biogeochemical response of any given province (air-sea flux of biogases, export flux of carbon) is driven by episodic events such as iron deposition.

To test these hypotheses (and offers as part of this program) an iron perturbation experiment, on the scale of the entire community is required such that the community response and resultant geochemical signal can be measured

Scientific questions

What is the fate/longevity of the bloom with an emphasis on ligand production and the response of the grazers (micro and mesozooplankton)?
What is the magnitude and characteristics of particles (Carbon flux) sinking at the end of the bloom?
What is the production of various climate change biogases (DMS, N_2O, methane, etc.) during and after the bloom?

CCCC Endnote 3

MODEL Task Team Report

The meeting of the MODEL Task Team was held from 0900-1230 hours on October 22, 2000. The Chairmen, Drs. Bernard A. Megrey and Michio J. Kishi called the meeting to order and welcomed the participants (*MODEL Annex 1*). The Task Team reviewed the draft agenda and it was adopted (*MODEL Annex 2*). During the meeting, participants: (i) Generated a list of desirable modifications to the PICES NEMURO Model (NEMURO), (ii) Met with the REX Task Team to discuss strategies for linking NEMURO to an upper trophic level herring model, (iii) Generally discussed options to link NEMURO to upper trophic level models, and (iv) Had a presentation on ECOSIM and discussed options for linking NEMURO to ECOSIM.

<u>Plan of Work</u>

- NEMURO Extensions
  - 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
- NEMURO Diagnostics
  - Code diagnostic and performance measures into NEMURO such as P/B, C/B ratios and ecotrophic efficiency calculations
  - Validate model output against data for each regional location
  - Perform side-by-side comparison of NEMURO Box Model and NEMURO MATLAB model to same equations and data
- Spatially Explicit Approach
  - Extend 1-D coupled model per above
  - Work toward eventually embedding NEMURO into larger scale 3-D ocean model similar to Kawamiya, Kishi and Suginohara (2000a) and Kawamiya, Kishi and Suginohara (2000b). (*MODEL Annex 3*)
- Linkages with other CCCC components

  - Modify NEMURO per needs of REX and convene a joint workshop to achieve extension of NEMURO to include higher trophic levels
  - Devise scheme to link NEMURO with ECOPATH/ECOSIM with the aim towards meeting the objectives of BASS
- Establish links with other programs such as GODAE, WCRP, CLIVAR
- Modifications of NEMURO as required to accommodate BASS and REX needs.

Workshop proposal and requests for travel funding

Title: Workshop to implement improvements to the PICES NEMURO Model
Likely location: North America
Likely date: Spring 2001
Convenors: Michio J. Kishi & Bernard A. Megrey

Objectives/Justification: In the past year, significant progress has been made on developing a PICES lower trophic level marine ecosystem model. This has mainly been a result of a highly focused international workshop held in Nemuro, Japan, in January 2000. At the workshop the model was built and it is currently operational. Improvements in the model since the workshop have been slow. At the same time interest in the PICES NEMURO Model from other CCCC Task Teams is growing and collaborative projects between MODEL, BASS and REX are planned to expand NEMURO to include higher trophic level components. For these co-operative endeavors to be successful more diagnostic work is required before the model can be useful.

MODEL would like to convene a small workshop (6-8 people) to carry out validation, calibration and regional comparison exercises on the NEMURO Model. The participants would consist of a core group of individuals who have been the driving force behind the design and implementation of NEMURO.

Funding requests: PICES provide travel support for 4 scientists to attend the workshop.

2000 achievements

- Successful CCCC/MODEL Workshop on *Lower Trophic Level Modeling*, (co-sponsored by the Japan International Science and Technology Exchange Center and Nemuro-city) convened January 31–February 3, 2000, in Nemuro, Japan;
- PICES Nemuro lower trophic level model of the marine ecosystem was created;
- Report of the 2000 CCCC/MODEL Workshop was published in the PICES Scientific Report No. 15;
- Article on the 2000 CCCC/MODEL Workshop was published in PICES Press.

2001 recommendations

- Convene a MODEL workshop to implement improvements to the PICES NEMURO Model;
- Increase interaction with BASS and REX to support their modeling initiatives through cooperative modeling workshops;
- Present these workshop proposals to the Science Board as a coordinated package of integrated activity underscoring the cooperation and interdependencies;
- Allocate time at the next Annual PICES Meetings for joint CCCC inter-sessional meetings;
- Encourage opportunities for more CCCC Task Team interaction (joint CCCC Task Team meetings are needed, so in Victoria, the Task Team meetings should be at non-overlapping times and places);
- Request that the PICES Secretariat provide

assistance to help MODEL build a web page to present NEMURO code, data and results; and

- Developed a plan to carry out a review of the CCCC Program relative to the objectives stated in the original Implemen-tation Plan, the current status of the program, and desirable future directions.

MODEL Annex 1

Participation List

Canada
Daniel M. Ware

Japan
Michio J. Kishi (Co-Chairman)

People's Republic of China

Republic of Korea

Russian Federation
Yuri I. Zuenko

U.S.A.
Bernard A. Megrey (Co-Chairman)

Observers
Sergio Hernandez (Mexico)
Sarah Hinckley (U.S.A.)
Sukyung Kang (Korea)
Gennady A. Kantakov (Russia)
Hiroshi Kuroda (Japan)
Andrew Leising (U.S.A.)
Cisco Werner (U.S.A.)
Kenneth Rose (U.S.A.)
Masako Saitoh (Japan)
S. Lan Smith (Japan)
Yasahiro Yamanaka (Japan)

MODEL Annex 2

Agenda

1. Introductions
2. Adoption of the Agenda
3. Achievements of the past year
4. Plan of work
5. Future workshop proposals
6. Improved interaction with BASS and REX
7. Recommendations

MODEL Annex 3

References

Kawamiya, M., M. Kishi, and N. Suginohara. 2000a. An ecosystem model for the North Pacific embedded in a general circulation model. Part I: Model description and characteristics of spatial distributions of biological variables. Journal of Marine Systems 25:129-157.

Kawamiya, M., M. Kishi, and N. Suginohara. 2000b. An ecosystem model for the North Pacific embedded in a general circulation model. Part II: Mechanisms forming seasonal variations of chlorophyll. Journal of Marine Systems 25:159-178.

CCCC Endnote 4

MONITOR Task Team Report

Continuous plankton recorder field program

The N. Pacific Continuous Plankton Recorder (CPR) pilot program was initiated in early 2000. Sampling was carried out on five north-south tracks and on one east- west track. The overall data recovery was very high (98%). Spatial resolution along the tracks was 18 km. Along track surface temperature data were also collected. As of early October 2000, sample processing has been completed for the March and April/May north-south tows and the preliminary analysis of these data was reported. *Neocalanus plumchrus* is one of the dominant copepods of the subarctic Pacific. It was present in the March samples from just outside Prince William Sound to 41°N but with no marked peaks of abundance. The majority of individuals were stage-2 copepodites. In April *Neocalanus* abundance was generally higher than in the previous month with maximum densities occurring between 44º and 54ºN. There was a clear gradient in the apparent stage of development with most of the northern individuals still present as stage-2 copepodites whereas over 60% had reached stage-5 in the southern samples. Such a gradient might be expected, since the duration of development probably depends on temperature, but these data are the first to show this spatial relationship. Preliminary analysis of the zooplankton community structure has revealed distinct differences along the length of these two tows. The more coastal samples, off Prince William Sound and California, showed some similarities to each other and were clearly distinct from the more oceanic samples. Samples from the offshore region showed marked evidence of clustering. Further analysis will document the key species contributing to these differences. The demonstration of the existence of communities suggests that that the sampling resolution attained on these tows is adequate to characterize regional community composition. Funding exists to collect and analyze a second year of pilot-program measurements.

The MONITOR Task Team recommends that PICES strongly back the principal investigators in their efforts to find long-term funding support for this important monitoring program. The Task Team also recommends that letters of appreciation be written by PICES to the two participating shipping companies commending the extraordinary support that they have provided for this program. It was pointed out by the Task Team that interpretation of the zooplankton data would be enhanced if ancillary environmental data were collected. Specific suggestions were: (a) the collection of sea-chest temperature data; (b) collection of sea-chest water samples for salinity determination; and (c) underway measurement of fluorescence data.

The Report of Advisory Panel on Continuous Plankton Recorder is attached as *MONITOR Annex 1*.

Ocean tracking network for the coastal ocean

Many marine animals remain confined to the continental shelf ecosystem for a significant fraction of their life history. For example, after entering the ocean from freshwater, Pacific salmon smolts generally move northward following the narrow continental shelf of North America. Sampling studies have shown that east of the Aleutian Is. chain all juvenile salmon remain over the shelf. The stocks that migrate northwestward move offshore when they reach the end of the Alaskan Peninsula. Some stocks of coho and chinook smolts remain as year-round residents of the coastal zone. Other stocks of Pacific salmon move south along the shelf. The different migration pathways probably have important implications as to survival of the stocks. Because the continental shelf is narrow, the migration corridor for the juveniles is a long thin region which can be monitored at many locations at relatively low cost. Monitoring of the movements can be done utilizing newly developed acoustic technology. Miniature uniquely identifiable pingers can be inserted in individual fish (or mammals). The pinger signals from each fish can be detected by moored receivers within a range of 0.6 - 1.0 km. As the shelf on the West Coast is usually less than 20 km wide, a string of 20-30 receivers

spanning the shelf and the upper continental slope out to 500 m depth should be capable of detecting all tagged animals crossing its path. About twenty acoustic listening lines could be deployed that would stretch from California to the Aleutian Is. This observing system could address the following scientific objectives:

a. Determine the migration pathways of multiple species of animals and their rates of migration along the shelf;
b. Establish which stocks of salmon move to the offshore Pacific or remain on the shelf;
c. Establish the feeding grounds for shelf-resident marine animals;
d. Determine the period of time animals remain as coastal residents in various sections of the coast expected to be significantly affected by climate change;
e. Establish movement patterns for immature and maturing salmon by tagging these animals in the ocean one or more years prior to their return to their natal rivers.

The Task Team recommends that PICES recognizes the potential scientific benefits of the acoustic monitoring array and urges that PICES promote the timely evaluation of this proposal within the community to establish proof of concept.

Preservation of existing North Pacific monitoring programs

The Task Team identified three programs that were either likely to be canceled or were about to undergo substantial change:

a. Station #2 Mooring. A biophysical mooring (designated station #2) has been main-tained for the last five years southwest of the Pribyloff Is. This time series data set has been used extensively to describe the variability of environmental conditions in this region. It is slated to be terminated this year. The Task Team recommends that PICES lobby in the scientific community for the continuance of this valuable time series.
b. Bering Sea Section at 180º. The Japanese shipboard program in the N. Pacific is in transition. The *R/V Oshoro-Maru* will not continue to occupy the section at 180. The ship will occupy a 165ºW section, which will improve the coverage. The Japan Fishery Agency will take over the occupation of the 180º sections. There is concern that the quality of measurements set by the University of Hokkaido may not be maintained under this new arrangement. The 180º section is a key section with a long tradition of state-of-the-art observations. The Task Team recommends that PICES urge that every effort is made by the Japan Fisheries Agency to provide a data set comparable in quality to the *R/V Oshoro-Maru* measurements.
c. Japanese Prefectural Monitoring of the Seas Adjacent to Japan. For the last 40 years the Japan Fishery Agency has supported a prefectural monitoring program in the coastal seas of Japan. Shipboard measurements are made from the coast out to 60 nautical miles. One of the justifications for this program is that the data are used for forecasting of coastal fishing conditions. An additional benefit is that it is very valuable climate data set. The Japan Fishery Agency has proposed a 50% cut in funds for this program. There is no identified alternative source of funds to maintain the program. The Task Team recommends that PICES call for an assessment of the effects of this proposed action on climate studies in this critical region.

PICES/GOOS interaction

The Task Team discussed at length the role of regional organizations, such as PICES, in planning and implementation of the Global Observing System (GOOS). It was pointed that it would be useful to consider the type of interaction that other regional organizations, such as ICES, have developed. An ICES Steering Group was set up "...to prepare an action plan for how ICES should take an active role in the further development and implementation of GOOS at a North Atlantic regional level with special interest in fisheries

oceanography". This Steering Group recommended that an observing system be developed with two elements: an Atlantic component focused on climate and a regional component focused on ecosystem dynamics the North Sea with emphasis on the need to improve management of fish stocks.

The Task Team recommends that PICES set up a Steering Group to define the direction that PICES should take in integrating their regional interests with GOOS. This Group would consider issues such as the identification of existing observing systems in the N. Pacific which could contribute toward a regional PICES GOOS, new observations required to complete the system, and possible eventual establishment of a Regional Analysis Center (RAC), along the lines suggested by LMR-GOOS. The Steering Group would comment on the possible benefits to PICES countries of providing an annual ecological assessment of the state of the North Pacific - as envisioned in the concept of a PICES RAC. The Steering Group would meet intersessionally and report to the Science Board at PICES X.

NEAR-GOOS Planning Workshop

PICES has recommended to NEAR-GOOS that they expand the types of data that they collect and archive. At present they only deal with physical oceanographic and meteoro-logical data. In order to serve the climate community well they need to include biological and chemical data. In August 2001, a NEAR-GOOS Forecasting Workshop (in conjunction with the Fifth IOC/WESTPAC Scientific Symposium) is planned to consider the strategy for better serving their scientific constituency in the future. They have requested that PICES be a joint sponsor of this workshop. In particular, because they do not have any in-house expertise in the area of data management of chemical and biological oceanographic data, they will require outside help in these areas.

The Task Team recommends that PICES work with the workshop planners to ensure that they have the necessary expertise for a successful workshop. This may require providing travel support for several PICES scientists to take part in the discussions.

Gulf Ecological Monitoring (GEM) program

In 1999 the Exxon Valdez Oil Spill Trustee Council dedicated a fund of $120 M to support a program of research and monitoring in the northern Gulf of Alaska in perpetuity. The Trustee Council invites the scientific community of PICES to participate in the planning and implementation of this program. Because GEM represents a major contribution to monitoring in the PICES region, it was recommended that the MONITOR Task Team always includes a scientist representing this program.

MONITOR Annex 1

Report of the Advisory Panel on Continuous Plankton Recorder Survey in the North Pacific

The PICES Advisory Panel on Continuous Plankton Recorder (CPR) met during the evening of October 25. A list of those attending is attached (*CPR Endnote 1*).

The present Continuous Plankton Recorder Program

A report was distributed by Dr. Sonia D. Batten of Sir Alister Hardy Foundation for Ocean Sciences (SAHFOS), Plymouth, UK, on progress to date with CPR monitoring in the subarctic Pacific. A copy of that report is attached (*CPR Endnote 2*).

In brief, the initial year of sampling involved runs of the MV *Polar Independence*, a crude oil carrier, south from Valdez, Alaska, to Long Beach, California, in March, April-May, mid-June, July and August, 2000. One run by the MV *Skaubryn*, a container ship, was made from Vancouver toward Japan with CPR towing only to 155^{o}E (just south of the tip of Kamchatka). Processing of the silks is more than half finished, starting at the earliest dates. A main result is that the winter-spring dominant copepods, the so-called "interzonal migrators" show a latitudinal gradient in maturation timing, completing preparation for summer-autumn diapause faster at lower than at higher latitudes. This is not unexpected, but has never been documented before. A temperature recorder towed with the CPR produced a good summary of SST along the track. No report is yet available from the east to west run. The Panel agreed that the reported results represent a substantial success for the program's first year.

Since discussions with the shipping companies about schedules for 2001 are to begin shortly, we considered changes that might improve the science. Our only suggestion is to reorder sampling on the east-west line so that the western coastal section approaching Japan, including shelf areas, is covered. Since a standard set of "mechanisms" won't cover this, we proposed sacrificing a central portion of the line to achieve this. It is recognized that this will cause CPR sampling to occur in the EEZs of both Russia and Japan, which may require permits from those countries.

Members, particularly the Chairman, were curious to know exactly how the CPR program was funded. It was explained that the initial two years of funding ($250,000, half the initial request) are from the so-called Dinkum Sands money, the product of a court settlement between the State of Alaska and the U.S. federal government. These funds are currently managed under the North Pacific Marine Research (NPMR) program by the Institute of Marine Science, University of Alaska Fairbanks, on behalf of the North Pacific Research Board (NPRB), which has not yet been constituted. The NPRB was established to handle the part of this court award that has been devoted to environmental research. The project is very likely to obtain approval for a 1-year extension after the first two years of work under the original grant are complete. CPR and projects of the NPMR are described at http://www2.sfos.uaf.edu:8080/npmr.

<u>Future CPR and related monitoring in the subarctic Pacific</u>

The Panel must begin work soon on funding for a follow-on program to this initial CPR study. The Panel agreed that a minimum improvement for long-term monitoring will involve a substantially modernized recorder or similar device. It should incorporate some much more rapid, more automated form of plankton enumerator such as an OPC. Probably, only data of much reduced systematic precision would be possible from any such enumerator, but their rapid output of data has its own value. The real requirement is a research program to design an optimized, modern monitoring approach to the subarctic Pacific. We anticipate that this approach will continue the use of vessels of opportunity. Discussion of potential components of a "fully found" vessels-of-opportunity program included:

- depth-cycling CPR, video plankton recorder, OPC;
- depth-cycling CTD and possibly nutrient analyzers;
- LIDAR and similar sensors that might be deployed from an outboard bridge wing;
- bird and mammal observers.

George Hunt was particularly enthusiastic about the potential of homeotherm watchers, and will prepare a document outlining that potential.

The Chairman and others will begin a search for support of this development effort. Several possible sources of support were discussed, but it is premature to report on them to the Science Board. This effort will be the main purpose and activity of the CPR Panel for some time to come.

Other monitoring efforts

Dr. Takashige Sugimoto reported on a vessel-of-opportunity program operated from the University of Tokyo Ocean Research Institute (ORI). Sampling is from the Norwegian flag vessel M/V *Skaugran*, a "ro-ro" container carrier operated by the same company as the M/V *Skaubryn*. This effort takes high frequency temperature and chlorophyll fluorescence measures from cooling water intakes. A filter sac is tied across a tap from this intake and filters plankton during night periods on trans-Pacific runs. These filters are preserved in formaldehyde and returned to ORI. Plankton are drained, weighed wet and returned to preservative as a taxonomic record. The biomass estimates, scattered through the year and all across the North Pacific are plotted and contoured. No work has been done yet on plankton systematics. If arrangements can be made for the M/V *Skaugran* to tow a CPR, a cross-comparison of these techniques can be generated. For the moment, however, these programs are operating in isolation.

Gennady Kantakov provided some details of two monitoring programs operated out of his institute, SakhNIRO, Russia. These are collections made from ferries crossing from Sakhalin to Hokkaido and from Sakhalin across the northern tip of the Sea of Japan to the continent. SakhNIRO would like PICES to be aware of this monitoring, and the CPR Panel forwards that interest to the Science Board. Some of the results extend backward, although with breaks, to 1924. A recent program deploys a MacLane (see www.mclanelabs.com) zooplankton pump sampler that automatically collects up to 50 samples (250 liter maximum of water filtered) over an interval up to one year. This sampler has been in place in La Perouse Strait since July 2000.

CPR Endnote 1

Participation List

Canada
David L. Mackas

Japan
Takashige Sugimoto

People's Republic of China

Republic of Korea

Russian Federation

U.S.A.
Richard D. Brodeur
Charles B. Miller (Chairman)
Jeffery M. Napp

Observers
Christine Bain (U.S.A.)
Sonia D. Batten (UK)
George L. Hunt (U.S.A.)
Naoki Iguchi (Japan)
Gennady Kantakov (Russia)
Phil Mundy (U.S.A.)
Kaoru Nakata (Japan)
Bruce Taft (MONITOR Task Team)
Makoto Terazaki (Japan)

CPR Endnote 2

CPR sampling of the North Pacific in 2000

Background

At the MONITOR Workshop at the PICES Eighth Annual Meeting, it was announced that funding had been received to start a 2-year CPR program in the NE Pacific. In the original April 1999 proposal, we had intended to sample 2 transects 6 times each a year, from Valdez, Alaska, to Long Beach, California, and from Vancouver westwards into the Bering Sea. Since we received 50% of the asked-for funding, there were discussions at the workshop as to the best way to use the money to obtain a good temporal and spatial coverage. We resolved on towing the north to south transect 5 times between spring and late summer and the east to west transect just once, in June, to coincide with the probable Line P cruise.

Most of the funding would be spent on the taxonomic enumeration of the samples which therefore defined the number of samples that could be processed (about 450 per year). The decision was made to initially analyze every 4th sample (72 kms apart) except for the June north-south tow where every 2nd sample would be analyzed (36 kms apart). Additionally, every shelf sample would be analyzed. At the end of the year, once sampling success was known and some idea of the data obtained was available, it would be possible to analyze extra samples on particular tows to reach the target of 450.

Sampling in 2000

SAHFOS contacted two shipping companies which operated on the desired routes and received their support for the program. Polar Tankers Inc. (originally ARCO Marine Inc.), who towed the initial pilot survey for SAHFOS in 1997, operated the crude oil carrier *Polar Independence* from Valdez to Long Beach throughout 2000. Seaboard Inter-national Shipping Company Ltd operated the container ship *Skaubryn* from Vancouver to Japan and were happy to tow a CPR on any of these trips. Both companies gave considerable support and assistance to SAHFOS, for example the towing davit had to be fitted to the *Polar Independence* whilst it was at anchor, outside of the oil terminal. Polar Tankers Inc. were also happy to allow a technician to accompany one of the tows. Seaboard International Shipping Company Ltd. arranged for transport of the CPR to and from Vancouver at a reduced rate through associated companies. These efforts were over and above helping with logistics through communicating ship schedules as soon as was practicable.

All of the towing for 2000 is now complete, and all of the samples and hardware are back at SAHFOS. The table below summarizes the dates of sampling, the number of samples obtained and the current status (as at the end of September) of the sample processing. Some explanatory notes are also given below the table. A map of the monthly tows is also shown in Figure 1 – many of the routes overlap, however some idea of variability in towing between months can be gained.

Considerable success was achieved this year - whilst the CPR is a robust sampling device and SAHFOS is experienced at running a CPR

Table

Tow	**Identifier**	**Date of sampling**	**Number of samples collected**	**Number of samples processed**	**Status of taxonomic enumeration**
Long Beach to Valdez	5AC	21/22 March	45	12	Processing complete
	6AC	22-24 March	37	10	
	7AC	24/25 March	47	12	
	8AC	25/26 March	43	16	
Valdez to Long	9AC	29 April-1 May	36	13	Processing complete

Beach	10AC	1/2 May	43	11	
	11AC	2-4 May	45	12	
	12AC	4/5 May	47	12	
Long Beach to 48ºNorth	13AC	8-10 May	49	0	Towed by mistake[1]
	14AC	10/11 May	49	0	
Valdez to Long Beach[2]	15AC	17/18 June	45	23	Processing underway
	16AC	19/20 June	39	20	
	17AC	21/22 June	49	25	
Vancouver to Japan (until 155ºEast)	1VJ	24-26 June	49	14	Preliminary processing complete, awaiting quality control
	2VJ	26/27 June	31[3]	7	
	3VJ	27-29 June	47	12	
	4VJ	29/30 June	47	12	
	5VJ	30 June- 2 July	49	13	
	6VJ	2/3 July	49	12	
Valdez to Long Beach[4]	18AC	19/20 July	40		Yet to be processed
	19AC	20/21 July	43		
	20AC	21/22 July	45		
	21AC	22/23 July	34		
	22AC	23/24 July	26		
Valdez to Long Beach[5]	23AC	23/24 August	45		Yet to be processed
	24AC	24-26 August	45		
	25AC	26/27 August	46		
	26AC	27/28 August	45		
	27AC	28/29 August	18		

Notes:

1. Captain mis-read instructions for June, and launched 2 tows before realising. These samples have been archived.
2. Owing to mistaken tow in May, only 3 of the 5 mechanisms were available for June tow (4 plus one spare were loaded).
3. A tear in the silk meant there was reduced sampling on this section – about 16 samples lost.
4. Since a technician was on board we used the spare to extend the towing a bit further.
5. Since this was the last tow, used the spare to extend towing. Conditions allowed further sampling into Prince William Sound.

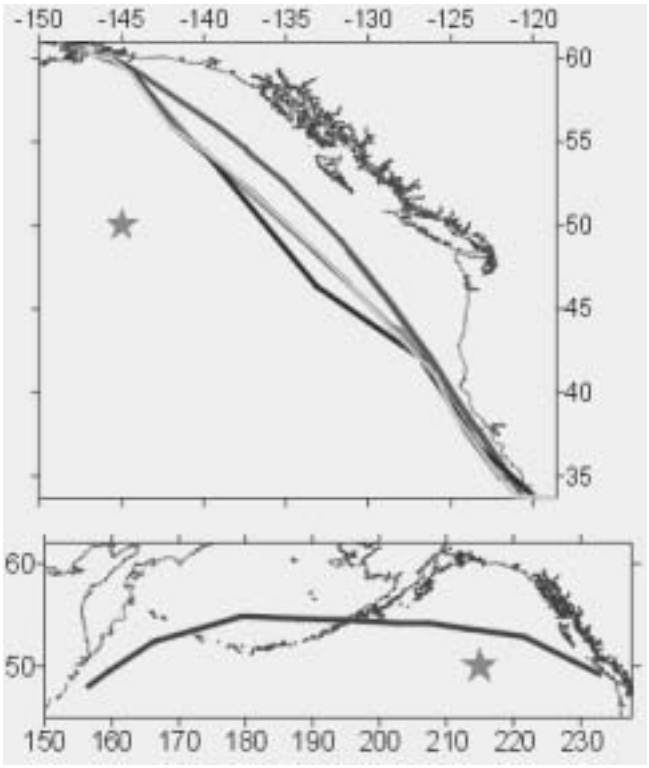

Fig. 1 Monthly tows in 2000: sampling was carried out on five north-south tracks (March – August) and on one east- west track (June-July). Station Papa (✯) is shown for reference.

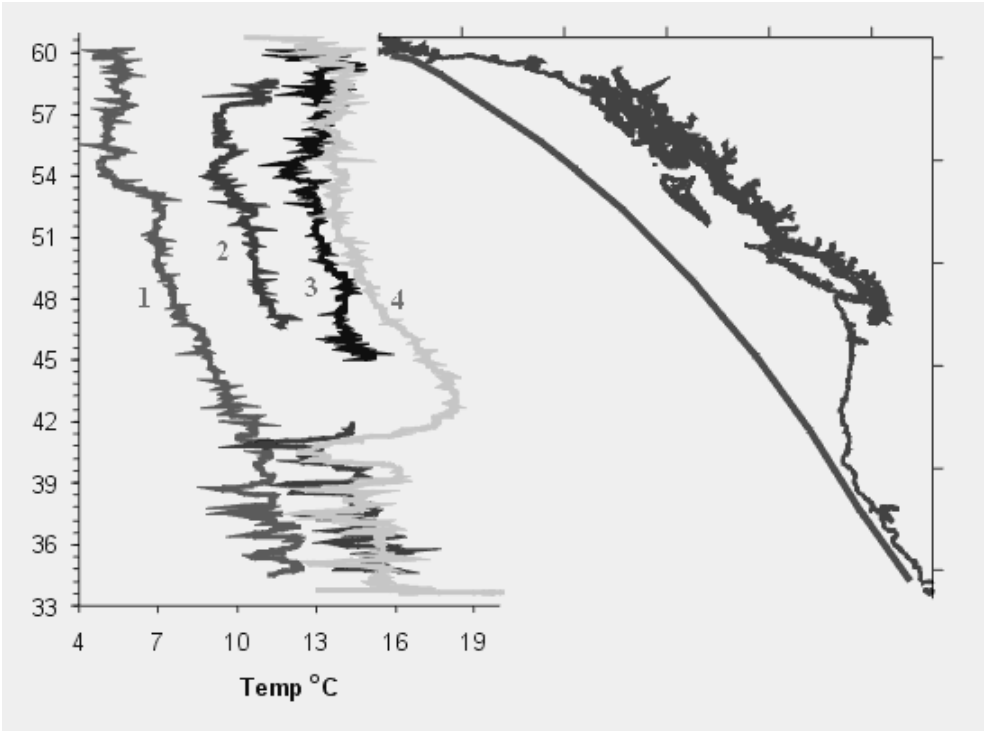

Fig. 2 Temperature logger results obtained in March (1), June (2), July (3) and August (4) of 2000. A "typical" tow is shown for guidance.

survey the success rate in the Pacific was better than we would have predicted.

In addition to sampling the plankton, SAHFOS also mounted a temperature recorder on the CPR towing between Valdez and Long Beach. This device, manufactured by VEMCO, whilst not giving precise temperature data, is inexpensive, reliable and capable of recording the expected range in temperatures from Alaska to California throughout the year. Some problems with setting up the time delay for the expected start of towing meant that not every tow had a full temperature record, however, for some of the tows temperature was recorded every 10 minutes. These data (Fig. 2) provide useful information on temperature structure at this large scale.

Analysis and feedback

Data for the first two tows are complete and checked, and so these data form the basis for some preliminary analyses which was presented at the PICES IX MONITOR meeting. A total of 68 different phytoplankton taxa and 79 zooplankton taxa have been distinguished on these spring samples. Taxonomic resolution varies from separate stages of copepods in the case of *Neocalanus plumchrus* to phylum level in the case of fish larvae. A description of standard CPR processing will also be given during the meeting.

Some distribution patterns of *Neocalanus* are already evident and some assessment of spatial resolution at the zooplankton community level can also be made. There has been some debate amongst the analysts in SAHFOS during processing as to the resolution of *Neocalanus plumchrus* and *N. flemingeri* and advice from the Advisory Panel will be sought. We are also now in a good position to predict the number of samples that will be processed for 2000 according to the original protocol (probably 350) which leaves around 100 additional samples to be selected for processing. Some input from the Panel would be welcome.

In a few months SAHFOS will begin discussion with the shipping companies as to their schedules for 2001. If there are to be any recommended changes made to the sampling strategy then this would also be welcome.

CCCC Endnote 5

REX Task Team Report

The REX Task Team met from 0900-1230 hours on October 22, 2000. The Co-Chairman, Dr. William T. Peterson, called the meeting to order and welcomed the participants (*REX Annex 1*).

2000 accomplishments

The report of the 1999 REX Workshop on "Herring and euphausiids population dynamics" was published in the PICES Scientific Report No. 15.

A 2-day REX Workshop on "Trends in herring populations and trophodynamics" was convened prior to the Ninth Annual Meeting in Hakodate (October 20 and 21, 2000). The workshop was well attended and highly successful.

At PICES VIII, REX jointly with BASS proposed convening a session entitled "Subarctic Gyre processes and their interaction with coastal and transition zones." This theme was adopted by the Science Board for their symposium at PICES IX.

2001 planned activities and recommendations:

REX is interested in working with MODEL to add one upper trophic level component (herring) to the PICES NEMURO Model. To facilitate this activity, members of REX will work together to summarize parameters needed to model herring growth. Under this plan, the Task Team would convene virtual meetings over e-

mail. MODEL is proposing an inter-sessional workshop to implement improve-ments and include higher trophic levels to the PICES NEMURO Model, and REX would like to send representatives to such a meeting.
REX also recommend that some papers on modeling of herring dynamics become part of a ½-day joint workshop with MODEL to be held just prior to the Tenth Annual Meeting. This workshop will consider progress toward incorporating herring energetics in the NEMURO Model.

REX proposed a 1-day workshop on "Temporal variations in size-at-age for fish species in coastal areas around the Pacific Rim" to be held just prior to the Tenth Annual Meeting. The workshop will focus on size-at-age for fish species other than herring. Examples of fish species that we hope to consider include salmonids, clupeids (sardines, and anchovies), gadoids (hake and pollock), halibut, mackerels, etc. Temporal and special changes in pattern in size-at-age among species will be examined relative to climate variability/climate change. Environmental factors affecting at size-at-age will be also discussed. It is likely that this effort would continue for one-two years beyond PICES X. Since the next two PICES meetings will be held at "southern" locations, REX would like to encourage papers on "warmer water fishes" such as sardines, mackerels and anchovies.

The following inter-sessional activities are recommended:

a. Begin an e-mail discussion on herring size-at-age for all stocks with an eye towards producing a PICES Scientific Report on this topic -- a review of size-at-age for all herring stocks around the Pacific Rim. This could be a unique way of looking at regional responses to basin-scale forcing and serve as a model for study of other fish species. By focusing on size-at-age, we can look at effects of climate change on fish from the perspective of changes in ecosystem productivity. Dr. Nicolai Naumenko (Russia) was requested to prepare data and present paper (at the 2001 REX Workshop) on size-at-age for Russian herring stocks. This will complete our compilation of size-at-age data for herring around the Pacific Rim.
b. Complete a matrix of life history parameters, growth parameters and environmental variables (seasonal cycle of temperature, nutrients, and biomass of phytoplankton and zooplankton) for as many herring stocks as possible. Make the data available to the MODEL Task Team. Consider completing a similar exercise for other coastal fishes where possible. Since these data are variable among years and may be showing long-term trends, produce matrices for the years 1970, 1980, 1990 and 2000.

A proposal was received to consider the topic "Phytoplankton, zooplankton and nekton synchrony in the use of the spring bloom event in the North Pacific" for the REX Workshop in 2002. The idea is that several PICES scientists have noted delays in the seasonal peaks in zooplankton biomass. Given the interest by REX scientists in herring, we would produce a review of spawning timing of herring stocks around the Pacific in relation to timing of the spring bloom and timing in peaks in zooplankton biomass. The first step in moving along this theme is to inventory the herring spawning timing, primary production and chlorophyll and secondary production information. Though our initial focus would be on herring, we would include other pelagic fishes as appropriate.

Requests for travel funding

REX request travel support for Dr. Nikolai Naumenko to attend the REX Workshop at the Tenth Annual Meeting. REX also request funding for two scientists to attend the inter-sessional MODEL Workshop. This latter request will be very minimal if the workshop is held in the U.S.A. or Canada. If the workshop is held in Nemuro, it is anticipated that all travel

expenses will be covered by the Japanese government.

REX Annex 1

Participation List

Canada

Japan
Tokimasa Kobayashi (Co-Chairman)

People's Republic of China

Republic of Korea

Russian Federation

U.S.A.
Brenda L. Norcross
William T. Peterson (Co-Chairman)

Observers
Funk, Fritz (U.S.A.)
Douglas E. Hay (FIS Chairman)
Takashi Minami (Japan)
Nikolai Naumenko (Russia)
Jake Schweigert (Canada)
Yoshiro Watanabe (Japan)

REPORT OF THE TECHNICAL COMMITTEE ON DATA EXCHANGE

The meeting of the Technical Committee on Data Exchange Committee was held from 0900-1300 hours on October 25, 2000. The Chairman, Mr. Robin M. Brown, called the meeting to order and welcomed the partici-pants (*TCODE Endnote 1*). The Committee reviewed the draft agenda and it was adopted as after revision (*TCODE Endnote 2*).

Old business

The Chairman reported on the successful joint TCODE/WG 13/JGOFS NPTT Workshop held in Tsukuba, Japan, on October 20 and 21, prior to the main PICES meeting. Preliminary inventories of marine carbon data (especially pCO_2, Total CO_2 and Total Alkalinity) were presented by Japan, U.S.A. and Canada. There were also some presentations demonstrating attempts to merge these diverse datasets to form a basin-wide database. The results from this work proved that datasets from different laboratories can be combined for basin-scale studies, if care is taken during the data assembly process.

WG 13 requests TCODE assistance in completing the inventories of these three data types for PICES nations. This inventory will be included in the WG 13 final report and could also be posted on the PICES web site. The following specialists (Table 1) volunteered to circulate the metadata requirements and collate the inventories from individual countries:

Table 1. List of contacts

Data type	Collator/Metadata Requirements	National Contacts
pCO_2	Alex Kozyr (CDIAC, U.S.A.)	Robin Brown (Canada) Richard Feely (U.S.A.) Sachiko Oguma (Japan)
Total Alkalinity	Andrew Dickson (SIO, U.S.A.)	Robin Brown (Canada Richard Feely (U.S.A.) Sachiko Oguma (Japan)
Total CO_2	Andrew Dickson (SIO, U.S.A.)	Robin Brown (Canada) Dick Feely (U.S.A.) Sachiko Oguma (Japan)

Little progress on improvements and updates to the to TCODE Web pages on PICES Web site was reported. TCODE members will be asked to review the entries for accuracy and completeness and forward corrections/additions to the Chairman. The Committee agreed to place special emphasis on the Inventory of Long Time Series Data, given the prominent role these play in PICES scientific work. A representative from the Marine Birds and Mammals Advisory Panel expressed strong interest in contributing entries for their subject area. The Committee also agreed to incorporate some of the location maps and summaries prepared by the MONITOR Task Team. Dr. Igor Shevchenko reported that a "mirror" of the PICES web site has been established in Russia at http://www.tinro.ru/ pices.ios.bc.ca. Users in Russia should be able to access this "mirror" site at lower cost and with higher performance.

The Electronic Poster Session at PICES IX attracted little attention and interest. While the Committee strongly supports this concept, they also realized that this session needs additional promotion within PICES to raise awareness. The Committee also recognized that on-site facilities play an important role in the success of such a session. There is a strong demand for high-speed Internet access to demonstrate web

pages and web-based applications. The Chairman agreed to determine what facilities are available at the Victoria Conference Centre (venue for the PICES Tenth Annual Meeting) and circulate this to PICES members, prior to a final decision on a TCODE sponsored electronic poster session for PICES X. Drs. Toru Suzuki (Japan), Igor I. Shevchenko (Russia) and Thomas C. Royer (U.S.A.) agreed to play an active role in promoting and organizing the Electronic Poster Session for PICES X. The Committee recommended that a focus should be a "showcase" for National and Regional Data Centres in the PICES nations.

Sessions at future Annual Meetings

Electronic Poster Session at PICES X: *Regional and National Data Centres.* Convenors: Thomas C. Royer (U.S.A.), Igor Shevchenko (Russia) and Toru Suzuki (Japan).

Computer-based demonstrations of data management activities in the PICES area, focussing on the holding and capabilities of the various National and Regional Data Centres, but also including other project-based data management initiatives. The goal of the poster session is to improve awareness of data resources available in the PICES region. This will require high-speed Internet capability to provide interactive access to the web-sites.

Inter-sessional Workshops

The Committee agreed to co-convene the following inter-sessional workshops:

a. A 3-day WG 13/TCODE CO_2 Data Integration Test Workshop, January 2001, Sidney, B.C., Canada

   This small workshop will assemble a small group of CO_2 data specialists to review sample datasets and assess and review the problems of data integration. The results from this workshop will be used to structure a larger workshop in Tokyo (May, 2001) where the datasets will be brought together.

b. A 3-day WG 13/TCODE CO_2 Data Integration Implementation Workshop, May 2001, Tokyo, Japan.

   At this meeting, the datasets from three PICES nations will be assembled into a basin-wide dataset. This will require a larger group of scientists and CO_2 data specialists, but support for this workshop from Japanese funding sources is likely.

Requests for travel funding

Support is requested from PICES for 3 scientists (one from Japan, two from U.S.A.) to attend the CO_2 Data Integration Test Workshop, and for 2 scientists to attend the CO_2 Data Integration Implementation Workshop (in addition to funding provided by agencies in Japan).

Relations with other organizations, programs and projects

The Committee recommended that the EVOS (Exxon Valdez Oilspill) Trustee Counsil, which supports the GEM (Gulf Ecosystem Monitoring) Program and the Pacific Seabird Group be added to this list. GLOBEC, GOOS, JGOFS were identified as the highest priority program for cooperation.

Best Presentation Award

Due to the small number of submissions, no award is given for the TCODE session this year.

Science Board issues

Salmon and Climate Workshops (with NPAFC and other agencies)

The Committee had no comment on this proposal.

PICES X Anniversary Symposium

The Committee reviewed and accepted the proposed outline for PICES X Anniversary Symposium. Dr. Thomas Royer volunteered to act as the TCODE representative in the organization of this Symposium.

PICES X Science Board Symposium
The Committee reviewed and accepted the proposed outline for the PICES X Science Board Symposium on "Ecological processes in the marginal seas of the North Pacific".

PICES XI Theme
The Committee reviewed and strongly supported the proposed theme for PICES XI on "Technological advances in marine scientific research", but recommended that the announcement be expanded to include other topics such as data access, integration and visualization; numerical modelling, data telemetry, Autonomous Underwater Vehicles etc. The Committee felt that the draft outline of this session shows a strong fisheries bias and might not attract contribution in these other areas.

Revisions to Handbook for Chairmen and Convenors
The Committee recommended acceptance of the proposed changes.

PICES Wooster Award
The Committee supported this proposal, but suggested that the area of achievement that is recognized should be broadened to "significant scientific contributions to North Pacific Marine Science".

Census of Marine Life Workshop
The Committee strongly supported this initiative and recommended that PICES use this venue to clarify the goals and objectives for ecosystem monitoring in the PICES region. It seems clear to the group that coordination of North Pacific ecosystem monitoring is a key task for PICES over the next few years and we should take full advantage of this workshop.

NEAR-GOOS Forecasting Workshop
The Committee was unclear on the potential value of the requested travel support to PICES.

Science Board Strategic Plan
The Committee accepted the Strategic Plan as presented.

TCODE Work Plan for 2000/2001 (PICES IX – PICES X)

GLOBEC Data Management
The Committee will ensure that inventories of GLOBEC data from PICES nations are forwarded to the International GLOBEC Program Office. The TCODE Chairman will represent the PICES CCCC Program on the GLOBEC Data Management Task Team.

TCODE/WG 13 CO_2 Data Integration
The Committee will participate in the assembly of the data inventory (to be published in the WG 13 Final Report) and in two proposed inter-sessional CO_2 Data Integration workshops.

PICES Web Pages
TCODE will upgrade and improve the PICES Inventory of Long Time Series Data, with assistance from other groups.

Electronic Poster Session for PICES X
The Committee will organize an electronic poster session at PICES X (subject to scheduling and logistics restrictions).

TCODE Endnote 1

Participation List

Canada	Robin M. Brown (Chairman)

Japan
Toshio Nagai
Muneharu Tokimura

People's Republic of China
Ling Tong

Republic of Korea
Hae Seok Kang

Russian Federation
Igor I. Shevchenko

U.S.A.
Bernard A. Megrey (rapporteur)
Thomas C. Royer

Observers
Yutaka Nagata (Japan)
Sachiko Oguma (Japan)
Yoshioki Oozeki (Japan)
Toru Suzuki (Japan)
William Sydeman (U.S.A.)

TCODE Endnote 2

Agenda

Meeting dates:
October 20, 2000 in Tsukuba, Japan
(Joint WG 13/NPTT/TCODE)
October 25, 2000 in Hakodate, Japan
(Annual TCODE meeting)

1. Introduction of members
2. Adoption of agenda (opportunity to add agenda items)
3. Review progress on 2000 Workplan
   a. Joint TCODE/JGOFS NPTT/ WG 13 Workshop
   b. Maintenance and improvements to TCODE web pages
   c. MONITOR Task Team – assistance with web pages
   d. Electronic Poster Session at PICES IX
4. Updates on data management activities in PICES nations
5. GLOBEC – CCCC Data Management
   a. GLOBEC Program Office – Data management activities
   b. GLOBEC Data Inventory
   c. GLOBEC Data Archival
6. Proposals with financial implications
7. Projects needing financial support from PICES
   a. North Pacific Ecosystem Status Report
   b. International zooplankton monitoring program for the North Pacific
   c. Workshop/symposium series on "Effect of human and climate interactions on fish production"
8. New business (additional items added at the meeting)
   a. Salmon and Climate Workshops (with NPAFC and other agencies)
   b. PICES X Anniversary Symposium
   c. PICES X Science Board Symposium on "Ecological processes in the marginal seas of the North Pacific"
   d. PICES XI theme – "Technological advances in marine scientific research"
   e. Chairman's Handbook revisions
   f. Proposed PICES Wooster Award for annual scientific achievement for "mature" researcher
   g. High priority programs for cooperation
   h. Census of Marine Life Workshop
   i. NEAR-GOOS Forecasting Workshop
   j. Science Board Strategic Plan
9. TCODE Workplan for 2001

REPORT OF THE FINANCE AND ADMINISTRATION COMMITTEE

The Finance and Administration Committee (F&A) met from 1400-1730 hours on October 24, and from 1400-1730 on October 26, under the chairmanship of Dr. Richard J. Marasco. Drs. Alexander S. Bychkov and Stewart (Skip) M. McKinnell acted as rapporteurs (see *F&A Endnote 1* for list of participants).

Agenda Item 1. Opening by the Chairman

The Chairman called the meeting to order and welcomed the participants. He emphasized that the job of the Committee is to review financial and administrative matters in accordance with the Financial Regulations and Rules of Procedure of the Organization, and to provide a report to the Governing Council for consideration and adoption.

Agenda Item 2. Adoption of agenda

The Committee reviewed and adopted the agenda without change (*F&A Endnote 2*).

Agenda Item 3. 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". Untimely payments create problems for day-to-day operations of the Secretariat, and result in much lower interest income in PICES accounts.

At the Eighth Annual Meeting, the Committee and Council already discussed historical statistics on the payment schedule of annual fees to the Organization (Decision 99/A/3). In November 1999, a formal letter was sent to each Contracting Party indicating the importance of prompt payment of annual contributions and requesting payment by the first day of the PICES fiscal year.

The Executive Secretary reported the payment dates of the 2000 annual fees. He noted some improvements in submitting annual fees, but indicated that only one country had paid the annual contribution by January 1, 2000 (see *GC Endnote 3*).

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, and advising on the benefits of paying contributions on time. Canada further proposed allowing installment payments if annual fees cannot be paid in a lump sum at the beginning of the year.

The F&A Chairman provided a comparison of national annual contributions by some PICES member nations to PICES, ICES (International Council for the Exploration of the Sea) and NPAFC (North Pacific Anadromous Fish Commission), as information for guidance of the Organization.

Agenda Item 4. Audited accounts for fiscal year 1999

The Auditor's Report for FY 1999 (*F&A Endnote 3*) 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 5. Budget

a. Estimated accounts for fiscal year 2000

The Committee reviewed and discussed the estimated accounts for FY 2000. It was noted that the estimated surplus of $19,500 is due to unexpected contributions to the Beyond El Niño Conference and deferral of costs associated with a journal publication to 2001. The Committee recommends that Council accept the estimated expenditures for FY 2000.

b. Budget for fiscal year 2001

The Committee reviewed the proposed FY 2001 budget (*F&A Endnote 4*) and recommends its approval by Council. The budget of $606,000 is 2.7% above the FY 2000 budget of $590,000. This modest increase is consistent with the guideline generally accepted at the Eighth Annual Meeting (see Decision 99/A/2(ii)). The transfer of $58,200 from the Working Capital Fund reduces the total annual contribution to $547,800, setting the 2001 fees at $91,300 per Contracting Party (3.0% higher than in 2000). The amount of $58,200 includes $26,200 of the Working Capital Fund surplus and the grant of $32,000 from the Alfred F. Sloan Foundation that will be used to finance the PICES Census of Marine Life Workshop and subsequent report.

It was noted that the proposed budget is not sufficient to cover expenditures for the Intern Program and various high priority PICES scientific projects currently under consideration by the Science Board (see Science Board Report for details).

The Japanese Government considers that, as many member countries are under severe financial conditions, in order to continue financial contribution to international organizations, the budget of international organizations should be the minimum necessary. Therefore, the Japanese Government is requesting to many international organizations to keep basically *nominal zero increase* of budget, and PICES cannot be an exception.

Canada requested that significant budget changes or unusual deviations among years should be described in footnotes and financial tables.

c. Forecast budget for fiscal year 2002

The FY 2002 forecast budget of $624,000, prepared under guidelines adopted by Council in 1999 (Decision 99/A/2(ii)), was examined by the Committee and is submitted to Council for information only. The FY 2002 budget will be further considered at PICES X.

d. Interest and other income

During a fiscal year, the amount of funds in PICES accounts may be increased by miscellaneous income (GST rebate, income tax levies from foreign staff and bank interest) or voluntary contributions or grants.

Miscellaneous income in 2000 was greater than in 1999, mainly because more interest was earned due to improved timeliness of annual contributions. The Committee also noted a significant increase in voluntary contributions and external funding for various activities initiated by PICES. This is the result of fund-raising efforts by the Science Board and the Secretariat.

Canada suggested that in the future, monies that are constrained to certain projects must be identified as such so that it is clear how much discretionary funds are available.

e. Working Capital Fund

In FY 2000, the estimated miscellaneous income credited to the Working Capital Fund is about $42,500. In addition, the FY 2000 budget surplus of $19,500 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 that are credited to the Working Capital Fund are reflected in the Report on Administration (*GC Endnote 3*).

The Working Capital Fund is forecast to be $228,230 at the end of 2000. The Committee recommends that the amount of $58,200 (comprising $26,200 of the estimated Working Capital Fund surplus and a grant of $32,000 from the Sloan Foundation) be transferred to the General Fund, and that the residual surplus of $23,740 be transferred to the Trust Fund. After these transfers, the Working Capital Fund will total $146,290, including the $100,000 mandatory balance and $46,290 in voluntary contributions for the PICES Tenth Anniversary.

The Committee also recommends reformatting the table on estimated income and expenditures to identify clearly the constraints on contributions and grants.

f. Home Leave Relocation Fund

The status of the Home Leave Relocation Fund was reviewed. It was noted that all expenditures in FY 2000 were offset by bank interest to adjust the Fund to a target maximum level of $110,000 at the end of the fiscal year.

g. Trust Fund

The Executive Secretary reported that in FY 2000, approximately $53,000 from the Trust Fund will be used to bring Chinese, Russian and young scientists to the PICES Ninth Annual Meeting, to support the pilot project "Ecosystem Study of the Japan/East Sea", to provide a grant to Working Group 12, and to finance the Intern Program. These expenditures will be compensated only partially by the voluntary contributions by Canada and U.S.A. for the Intern Program, a personal contribution by Dr. Hyung-Tack Huh, a grant from SCOR for PICES IX, and bank interest (for details see *GC Endnote 3*).

The Trust Fund is forecast to be $76,260 at the end of 2000 (the Fund was reduced by about $10,500 in FY 1999 and is estimated to decrease by about $12,360 in FY 2000). The Committee recommends that the residual Working Capital Fund surplus of $23,740 be transferred to the Trust Fund to recover all 2000 expenditures and to restore the Trust Fund to a level of $100,000.

Japan enquired about why the proposed expenditures from the Trust Fund to support travel to the Annual Meeting are greater in 2001 than in 2000. The Executive Secretary indicated that the total expenditures for travel in 2000 were actually greater, but part of that was supported by SCOR funding. This source of travel funds has not been confirmed for 2001 although a proposal to SCOR has been made. The Executive Secretary noted that should these funds arrive, the amount taken from the Trust Fund would be decreased.

Working Capital Fund surpluses 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 need to be reduced accordingly, unless other sources of funds can be found.

Agenda Item 6. Report of the Fund-Raising Committee

The Fund-Raising Committee met from 1400-1730 hours on October 22, under the chairmanship of Dr. Marasco, who presented the report and recommendations to the Finance and Administration Committee.

The Committee supports the theme adopted by the Fund-Raising Committee, "To advance scientific knowledge of the ocean environment", and five projects identified for attention in 2001 (see Fund-Raising Committee Report for text). The Committee also recommends the addition of a sixth project proposed by Canada, and entitled "PICES support of young scientist participation in scientific meetings".

Agenda Item 7. Tenth anniversary of PICES

The Convention for a North Pacific Marine Science Organization entered into force on March 24, 1992, and the First Annual Meeting was held in October 1992, in Victoria, Canada. In October 2001, PICES will hold its Tenth Annual Meeting. This Anniversary Meeting will be hosted by the Secretariat at the location of PICES I (Decision 99/A/4).

The Executive Secretary reported on various activities being planned to commemorate the anniversary and potential costs for special events associated with PICES X:

1. The total cost to support 1 keynote speaker for the Opening Session and 4 invited speakers from outside of the PICES community for the Science Board Anniversary Symposium is estimated to be about $15,000.
2. Invitations, without financial commit-ments, will be sent by the Secretariat to the founders of PICES. Lists of names will be sent by member countries to the Secretariat by November 15, 2000.
3. The total cost for the PICES book on the history of the scientific exploration of the North Pacific, is estimated to be about $100,000. Funds totaling $45,000 have been provided by the National Marine Fisheries Service (NOAA, U.S.A.), leaving a currently unfunded amount of $55,000. Funds to complete the project will be sought by the Secretariat following the Annual Meeting.
4. A total of $3,500 will be paid from the 2000 budget to organize an ocean exhibition to be held in conjunction with PICES X. The exhibition has a potential to raise $24,000 in income.
5. An open house may be held on scientific research vessels during PICES X. If member countries are planning to send a vessel to the open house, they should notify the Secretariat by December 1, 2000. The feasibility of this activity should be evaluated further by the Secretariat and Canada. Members of the Committee will be informed of the result of this study.
6. A public communication/lecture series may be held in conjunction with PICES X. It was suggested that TV stations and/or newspapers should be approached to raise public awareness. Canada offered to assist by providing communications support.
7. A welcoming reception and a banquet for 400 people is expected to cost $40,000.

The Committee supports the items suggested by the Secretariat. It is noted that the FY 2001 budget does not include these items. Voluntary contributions and funds obtained from the 2001 Ocean Exhibition will be used to support these activities. The Committee recommends that Council send a request to member countries and agencies for voluntary contributions to support these special events.

Agenda Item 8. PICES Intern Program

At the Eighth Annual Meeting, Council approved the PICES Intern Program (Decision 99/A/7) and its commencement in 2000. The Intern Program was advertised within PICES member countries immediately after the meeting, and the Executive Secretary received two nominations prior to the deadline. Mr. Gong-Ke Tan (People's Republic of China) was selected as the first Intern in March 2000. The recommended period of appointment from June 22 to December 20, 2000, is meant to give him the opportunity to be involved in all major PICES activities including the organizing of the PICES Ninth Annual Meeting in Hakodate, Japan. The duration of the Intern's term is limited by funding and, to a certain extent, by Canadian visa regulations.

The Executive Secretary reported that the presence of an additional professional increased the capacity of the Secretariat to support the work of PICES. At the same time, Mr. Tan's work with the Secretariat allowed him to gain experience in the operations of an intergovernmental scientific organization, and to further his professional development as a marine scientist and manager. The Committee concluded that the first results demonstrate that PICES and member countries benefit from the Intern Program, and that it should be continued.

PICES was able to start the Intern Program in FY 2000 because Canada and U.S.A., in addition to their annual fees, contributed $7,500 and $7,000, 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 2001 budget and forecast FY 2002 budget. Assuming a 6-month term for the Intern, total expenses for the Program including stipend and travel, are between $16,000-18,000 (depending on the Annual Meeting location). If this amount was included in the annual budget, each country will be responsible for an additional *ca*. $3,000, which is already about the agreed 3% increase of the annual contribution. Moreover, Science Board is concerned that financing the Intern Program from the Trust Fund means reducing Trust Fund support for other activities. Permanent funding for the Intern Program requires replenishing the Trust Fund on a regular basis or developing some other mechanism to support it.

Although the member countries made no firm commitments, Canada indicated a willingness to contribute if funds become available at fiscal year end. Canada does not intend to be the sole contributor indefinitely and suggested that the PICES Intern Program should gradually be built into the budget. There was a lack of consensus on the inclusion of this program into the annual budget and members will continue to consider ways to fund it. The Committee recommends that Council invite member countries to make voluntary contributions to support the PICES Intern Program in 2001.

In August, PICES Delegates were reminded that according to the Guidelines for Selection Procedure, they should invite and review applications for the 2001 PICES Internship from their home country and submit their nominations to the Executive Secretary by the date of the first Governing Council meeting at PICES IX (October 23, 2000). Since no nominations were received and several member countries indicted a desire to submit nominations, the Committee recommends that the deadline for applications be extended to December 7, 2000.

Agenda Item 9. Proposed changes to Handbook for Chairmen and Convenors

At last year's meeting in Vladivostok, the Science Board identified changes that should be made to the PICES Handbook for Chairmen and Convenors, and the Science Board Chairman was instructed to draft these changes for consideration by the Scientific and Technical Committees and the CCCC Program at their business meetings during PICES IX.

The Committee reviewed the changes proposed by the Science Board, and determined that they are consistent with the existing Rules of Procedure and Financial Regulations. The Committee recommends that Council approve the changes to the Handbook after some editorial changes are made.

Agenda Item 10. Time and place of future Annual Meetings of the Organization

At the Eighth Annual Meeting, Council agreed to have the Secretariat host the Tenth Annual Meeting in Victoria, Canada (Decision 99/A/4). Later, by correspondence, the dates October 7-17, 2001 (with the Opening Session on October 10, Wednesday), were accepted for PICES X. Immediately prior to the Ninth Annual Meeting, the Victoria Conference Centre informed the Secretariat of a possibility to start the meeting two days earlier (with the Opening Session on October 8, Monday). The Committee reviewed the choices and recommends to Council that PICES X be held October 5-13, 2001.

PICES received a few letters from the People's Republic of China expressing interest in hosting the PICES Eleventh Annual Meeting in 2002. The dates and place of the meeting are not identified yet. After reviewing the funding request received from China and the history of PICES contributions, the Committee recommends that Council approve the proposal by the People's Republic of China to host the Eleventh Annual Meeting and indicate a willingness to provide $40,000 to partially cover meeting costs.

The Executive Secretary pointed out that at PICES III, Council adopted the practice of

advance planning over three years to improve budgeting and arrangement for the Annual Meetings (Decision 94/A/6). He further suggested that in keeping with the six-year rotation cycle, the Republic of Korea should be invited to explore the feasibility of hosting the Twelfth Annual Meeting in 2003. Korea indicated a willingness to consider hosting PICES XII and will notify the Secretariat of its final decision by the end of 2000. The Committee recommends that sufficient budgetary information should be provided to facilitate FY 2002 budget planning.

Agenda Item 11. Space, facilities & services

Space, general services and communications are provided to the Secretariat by the Government of Canada through the Department of Fisheries and Oceans (DFO). This agreement commenced on 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/services at the Institute of Ocean Sciences (IOS).

In 1998, the Canadian Government provided new accommodation for the PICES Secretariat at IOS. It was expected that this higher profile and larger space should be sufficient for the Secretariat's needs over the next few years. But as a result of implementing the PICES Intern Program, the number of people in the Secretariat increased and new arrangements must be made. The Committee recommends that PICES approach Canada on this issue.

DFO intends to discontinue the domain "ios.bc.ca" that PICES has been using for its e-mail and website on December 31, 2000. The Committee recommends that discretion be given to the Executive Secretary to deal with the e-mail/website issue in the most cost-effective and efficient way.

Agenda Item 12. Other business
Appointment of F&A Chairman

The Executive Secretary reported that Dr. Marasco (U.S.A.) was appointed as the F&A Chairman at the PICES Seventh Annual Meeting in 1998, and his term would come to an end at PICES IX. According to the Rules of Procedure (Rule 15), the Chairman of the Finance and Administration Committee shall be appointed by the Council from amongst the Committee's members for a term of two years and shall be eligible for re-appointment only once for a successive term. In that regard, Dr. Marasco stated that if the Committee was satisfied with his performance, he would be prepared to serve for a second term. The Committee recommends that Council re-appoint Dr. Marasco as the F&A Chairman.

Agenda item 13. 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
- William G. Doubleday
- Laura Richards

Japan
- Tadashi Inada
- Takayuki Koike
- Koji Harunari
- Tokio Wada

People's Republic of China
- Qian-Fei Liu
- Zheng-Lin Wei

Republic of Korea
- Lae-Hyung Hong
- Jin-Yeong Kim

Russia
- Alexander A. Kurmazov
- Igor I. Shevchenko
- Vadim L. Minin

U.S.A.
- William T. Cocke

Other
- Vera Alexander (Vice-Chairman, PICES)
- Richard J. Marasco (Chairman, F&A)
- Alexander S. Bychkov (Executive Secretary) (Rapporteur)
- Stewart (Skip) M. McKinnell (Asst. Executive Secretary) (Rapporteur)

F&A Endnote 2

Agenda

1. Opening by F&A Chairman.
2. Adoption of agenda.
3. Annual contributions.
4. Audited accounts for fiscal year 1999.
5. Budget:
   a. Estimated accounts for fiscal year 2000
   b. Proposed budget for fiscal year 2001
   c. Forecast budget for fiscal year 2002
   d. Interest and other income
   e. Working Capital Fund
   f. Home Leave and Relocation Fund
   g. Trust Fund
6. Report of Fund-Raising Committee.
7. Tenth anniversary of PICES.
8. PICES Intern Program.
9. Proposed changes to Handbook for Chairmen and Convenors.
10. Time and place of future Annual Meetings of the Organization.
11. Space, facilities and services.
12. Other business.
13. Adoption of F&A Report and recommendations to Council.

F&A Endnote 3

Auditor's Report (1999) 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, 1999 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, 1999 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.
February 29, 2000

Flader and Greene
Chartered Accountants

STATEMENT OF FINANCIAL POSITION
AS AT DECEMBER 31, 1999

ASSETS

	1999	1998
CURRENT ASSETS		
Cash and short term deposits	$ 496,116	$ 365,201
Accounts receivable	-	12,000
Due from contracting parties	-	7,376
Prepaid expenses (Note 3)	3,802	-
	$ 499,918	$ 384,577

LIABILITIES

CURRENT LIABILITIES		
Accounts payable	$ 7,318	$ 12,800
Funds held for contracting parties (Note 4)	88,600	-
Funds held for Beyond El Nino conference (Note 5)	46,848	-
	142,766	12,800

FUND BALANCES

WORKING CAPITAL FUND	158,400	162,621
TRUST FUND	88,752	99,156
HOME LEAVE RELOCATION FUND	110,000	110,000
	357,152	371,777
	$ 499,918	$ 384,577

STATEMENT OF OPERATIONS AND CHANGES IN FUND BALANCES
FOR THE YEAR ENDED DECEMBER 31, 1999

	General Fund	Working Capital Fund	Trust Fund	Home Leave Relocation Fund	1999 Total	1998 Total
FUND BALANCES, beginning of year	$ -	$ 162,621	$ 99,156	$ 110,000	$ 371,777	$ 357,312
SOURCES OF FUNDS						
Contributions from Contracting Parties	516,000	3,000	-	-	519,000	514,409
Budgeted transfer to General Fund	58,000	(58,000)	-	-	-	-
Interest and other income (Note 7)	29,968	3,331	2,654	3,597	39,550	37,351
FUND BALANCES, before expenditures	603,968	110,952	101,810	113,597	930,327	909,072
EXPENDITURES						
Personnel services	230,913	-	-	-	230,913	280,215
Travel	81,584	3,500	27,656	-	112,740	113,604
Communication	29,477	-	-	-	29,477	16,832
Contractual services	12,052	-	-	-	12,052	17,353
Printing	56,934	-	-	-	56,934	45,998
Supplies	6,756	-	-	-	6,756	6,311
Equipment	4,757	-	-	-	4,757	10,996
Annual Meeting	57,878	3,000	-	-	60,878	37,440
Workshops	39,998	-	-	-	39,998	-
Relocation	-	-	-	15,548	15,548	6,375
Miscellaneous	2,878	-	-	-	2,878	2,171
Unrealized losses on foreign exchange	244	-	-	-	244	-
	523,471	6,500	27,656	15,548	573,175	537,295
NET FUNDS AVAILABLE	80,497	104,452	74,154	98,049	357,152	371,777
TRANSFER TO WORKING CAPITAL FUND (Note 8)	(80,497)	80,497	-	-	-	-
INTERFUND TRANSFERS (Note 9)	-	(26,549)	14,598	11,951	-	-
FUND BALANCES, end of year (Note 10)	$ -	$ 158,400	$ 88,752	$ 110,000	$ 357,152	$ 371,777

NOTES TO THE FINANCIAL STATEMENTS
DECEMBER 31, 1999

1. PURPOSE OF ORGANIZATION

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

2. ACCOUNTING POLICIES

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

(a) Fund Accounting

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

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

The Home Leave Relocation Fund was established in 1996 to pay relocation and home leave expenses of new employees and their dependants to the seat of the Secretariat and removal after period of employment has ended, and provide home leave for international staff. This fund is set at a maximum of $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. PREPAID EXPENSES

Prepaid expenses include expenditures for the Beyond El Niño Conference in 2000**.**

4. FUNDS HELD FOR CONTRACTING PARTIES

The funds held for contracting parties are advance contributions from Japan for their 2000 fees.

5. FUNDS HELD FOR BEYOND EL NIÑO CONFERENCE

Funds have been advanced to the organization for conference expenses to be incurred in 2000. The funds held have been converted to Canadian dollars and consist of contributions from:

IATTC	$ 15,925
ISC	14,923
NPAFC	16,000
	$ 46,848

6. COMMITMENTS

General administrative and communications 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 costs for services are $4,000 per year. Services provided are invoiced quarterly.

7. INTEREST AND OTHER INCOME

	General Fund	Working Capital Fund	Trust Fund	Home Leave Relocation Fund
Interest income	$ -	$ 3,331	$ 2,654	$ 3,597
Income tax levies	25,757	-	-	-
GST rebates	4,211	-	-	-
	$ 29,968	$ 3,331	$ 2,654	$ 3,597

8. 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.

9. INTERFUND TRANSFERS

Pursuant to decision 99/A/2(iii) of the Governing Council, $14,598 was transferred to the Trust Fund.

Pursuant to the decision of the Governing Council, $11,951 was transferred to restore the Home Leave Relocation Fund to a maximum level of $110,000.

10. WORKING CAPITAL FUND SURPLUS

Pursuant to decision 99/A/2(i) of the Governing Council, $58,400 of the funds held in the Working Capital Fund will be transferred to the General Fund to reduce 2000 contributions.

11. UNCERTAINTY DUE TO THE YEAR 2000 ISSUE

The Year 2000 Issue arises because many computerized systems use two digits rather than four to identify a year. Date-sensitive systems may recognize the year 2000 as 1900 or some other date, resulting in errors when information using year 2000 dates is processed. In addition, similar problems may arise in some systems, which use certain dates in 1999 to represent something other than a date.

The effects of the Year 2000 Issue may be experienced before, on, or after January 1, 2000, and, if not addressed, the impact on operations and financial reporting may range from minor errors to

significant systems failure, which could affect an entity's ability to conduct normal business operations. It is not possible to be certain that all aspects of the Year 2000 Issue affecting the entity, including those related to the efforts of contracting parties, suppliers, or other third parties, will be fully resolved.

F&A Endnote 4

Budget for fiscal year 2001

Category	**Allotment**
Personnel Services	296,000
Annual Meeting	40,000
Special Meetings	61,000
Travel	80,000
Printing	63,000
Communication	34,000
Equipment	7,000
Supplies	7,500
Contractual Services	14,000
Miscellaneous	3,500
Total	606,000

Source	**Contribution**
Contributions from six Contracting Parties	547,800
Transfer of Working Capital Fund surplus	26,200
Grant from Alfred P. Sloan Foundation	32,000
Total	606,000

2001 Annual Fee for each Party	**91,300**

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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
ALACE	Autonomous Lagrangian Circulation Explorer (float)
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
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
CRIEPI	Central Research Institute of Electric Power Industry, Japan
EC/IP	Executive Committee / Implementation Panel for CCCC
ECOHAB	The Ecology and Oceanography of Harmful Algal Blooms
ECOR	Engineering Committee on Oceanic Resources
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
GEM	Gulf Ecosystem Monitoring 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
GOOS-LMR	Living Marine Resources Panel of GOOS
HAB	Harmful Algal Blooms
IASC	International Arctic Science Committee
IATTC	Inter-American Tropical Tuna Commission
ICES	International Council for the Exploration of the Sea
ICSU	International Council of Scientific Unions
IFEP	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

ISCTNP	Interim Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean
JFA	Japan Fisheries Agency
JGOFS	Joint Global Ocean Flux Study (IGPB)
JODC	Japanese Oceanographic Data Center
JST/CREST	Japan Science and Technology Agency/Core Research for Evolution Science and Technology
LOICZ	Land Ocean Interaction in the Coastal Zone
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
NOWPAP	Northwest Pacific Action Plan
NPAFC	North Pacific Anadromous Fish Commission
ODC	Oceanographic Data Center
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
PSC	Pacific Salmon Commission
PSG	Pacific Seabird Group
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
SPC	South Pacific Commission
SPREP	South Pacific Regional Environmental Program
STA	Science and Technology Agency Japan
START	South Asian Regional Committee for the System for Analysis, Research and Training
TCODE	Technical Committee on Data Exchange
UNEP	United Nations Environment Program
UNESCO	United Nations Educational, Scientific, and Cultural Organization
WCRP	World Climate Research Program
WDC-A	World Data Center - A
WESTPAC	Sub-Committee for the Western Pacific Intergovernmental Oceanographic Commission
WG	Working Group
WMO	World Meteorological Organization
WOCE	World Ocean Circulation Experiment