NORTH PACIFIC MARINE SCIENCE ORGANIZATION

(PICES)

ANNUAL REPORT

SIXTH MEETING

PUSAN, REPUBLIC OF KOREA

OCTOBER 14 - 26, 1997

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REPORT OF OPENING SESSION

The meeting of October 20th was called to order by the Chairman, Dr. William G. Doubleday, who welcomed all delegates, observers and researchers to the Sixth Annual Meeting. Dr. Doubleday called on Minister Jung Jay Joh of the Ministry of Maritime Affairs and Fisheries to make a statement on behalf of the Republic of Korea.

Mr. Chairman, Executive Secretary, distinguished delegates, ladies and gentlemen!

It is a great pleasure for me to have this opportunity to present my welcome speech to all of you, at this opening session of the Sixth Annual Meeting of the North Pacific Marine Science Organization. On behalf of the Korean Government and as the Minister of Maritime Affairs and Fisheries, I would like to extend my warm welcome to all the delegates from Canada, the People's Republic of China, Japan, the Russian Federation, the United States of America and the Republic of Korea to the marine city of Pusan. We are very happy and proud to host this Sixth Annual Meeting here in Pusan.

I would also like to congratulate you all on being able to share valuable scientific knowledge and information on the North Pacific marine sciences through this meeting. As we all know, PICES was established in March 1992 to promote and coordinate marine research in the North Pacific Ocean and adjacent seas. It is also well known that PICES has been actively involved in implementing the United Nations Convention on the Law of the Sea, particularly section 2, International Co-operation and Part 13, Marine Scientific Research. Launched with objectives of global values, PICES has been successful in its main tasks and responsibility. However, I would like to emphasize the importance of eliminating the duplication of research which may have happened individually or nationally in the past. Such duplication is an unwelcome and costly waste of scientists' energy and time.

As you may have already heard, the Korean Government had established the Ministry of Maritime Affairs and Fisheries (MOMAF) in August 1996 by merging marine related governmental agencies and functions spread in various Ministries. This merger was affected largely as a result of the UN Convention on the Law of the Sea which came into force in 1994. It may be too early for us to comment comprehensively on the success of the new Ministry. However, with one year's experience the Ministry has already shown the possibility that marine affairs can be managed more efficiently through the mechanism of an integrated system, particularly in the field of marine environment protection.

For example, comprehensive regulatory process can be established and implemented by the integration of various national laws and regulations to effectively conserve the marine environment and to utilize marine resources sustainably in the Korean coastal waters. With respect to marine sciences, we are confident that the new Ministry will be able to accelerate the promotion, coordination and integration of Korea's marine science. On a similar note, as the Minister of MOMAF, I would like to take this opportunity to express the intention of the Republic of Korea to continue to participate in all the activities of PICES.

Having much interest in the North Pacific Ocean, member countries of PICES have the responsibility to conserve and nurture this great ocean because it is our most important common property. Therefore, I would like to urge member countries to take all necessary legal, technical and conservation measures and to share information and knowledge on the North Pacific Ocean.

Mr. Chairman and distinguished delegates, since you have a lot of work to do this week, I would not impose upon more of your precious time. Finally, I wish all of you to contribute to PICES Sixth Annual Meeting with fruitful work so as to make it another outstanding and successful meeting.

Dr. Doubleday called upon Dr. John C. Davis to make a statement on behalf of the Canadian Government.

Minister Joh, Mr. Chairman, honoured guests, colleagues, ladies and gentlemen, on behalf of the Government of Canada and the Canadian Delegation, I want to say how pleased we are to participate in the Sixth Annual PICES Meeting here in Pusan, Korea. We particularly wish to thank the Government of Korea, The Ministry of Maritime Affairs and Fisheries, the local organizing committee, and all those who have worked so hard to host this meeting and organize all the events. We are sure that all your diligent efforts will greatly help make this meeting a great success. We also wish to thank Dr. McKone and the members of the PICES Secretariat as well as you, Mr. Chairman for all your work to make this meeting a success.

On behalf of the Minister of Fisheries and Oceans from Canada, The Honourable David Anderson, and of the Canadian Delegation that is here with us, I whish to tell you how important the work of the PICES Organization is from a Canadian perspective. PICES fosters information exchange, collaboration among our countries and serves as an important opportunity to identify scientific issues of importance in the North Pacific Ocean. Our world is rapidly changing, population is increasing and is expected to approximately double within the next fifty years. The oceans will become increasingly important in meeting the food, transportation and natural resource requirements of the future.

At the same time, the ocean and its resources will become increasingly threatened by human activity and resource exploitation. It is therefore essential that we address concerns regarding pollution and environmental degradation, red tides and toxic algal problems, natural resource status, impacts of resource exploitation, integrated coastal planning, applications of new science-based methods and maximization of the potential of the oceans while addressing sustainable use of natural resources.

Never before has there been more public awareness of how changes in the ocean can influence human activities. The current El Niño events have made the concept of "El Niño" almost a household word and I have been struck by the awareness of this phenomenon wherever I travel. Clearly, people are now starting to realize the importance of events related to the ocean and the atmospheric processes that are coupled with the ocean. For those of us here, the public will increasingly be turning to us to explain what is going on in the North Pacific Ocean and how weather, agriculture, fisheries and ocean conditions may be affected by changes in the ocean. You, as the leading scientific minds engaged in the study of the North Pacific will have a major role to play in studying and informing our nations about the implications of changes in the North Pacific and thus PICES will play an increasingly important role in the years to come.

Mr. Chairman, Canada is particularly pleased to be here in Pusan as we have been developing warm and increasingly close scientific relations with our Korean colleagues. In January of the year, our Prime Minister, The Honorable Jean Cretien, and the largest foreign delegation ever to visit Korea, held important meetings here in Seoul and many important agreements were signed. Amongst them were a memorandum of understanding and a letter of understanding for scientific collaboration with Pukyong National University here in Pusan which is leading to a strong scientific relationship between our respective countries. In addition, we also have a very well developed collaborative relationship with the Korea Ocean Research and Development Institute, KORDI, which is

producing valuable cooperative work. Through this experience and through exposure to the warmth, energy and hospitality of the Korean people, we have made many friends and colleagues and our scientific relationship is blossoming. For this reason, we know that this meeting will be highly successful through the efforts, hospitality and energies of our Korean hosts, and through the efforts of all of you from our contracting parties who will be working together this week to make this Annual Meeting a great success.

Dr. Doubleday called upon Dr. Satsuki Matsumura to speak on behalf of the Japanese Government.

Mr. Chairman, honorable Minister, ladies and gentlemen, it is my pleasure to be here as the part of Japanese delegation. I would like to extend thanks on behalf of Japanese government, ocean science community and on my behalf to the Korean government and the Local Organizing Committee members for providing us with this wonderful opportunity to interact with all PICES colleagues. As a matter of fact, the importance of North Pacific Ocean has created an increasing scientific interest in the recent years. In view of the role played by the ocean on the Earth environment, we have to put more effort into understanding the regional processes for local interest as well as to contribute to the general understanding of the ocean phenomena.

As all of us are aware, there are two important science targets in the context of understanding the role of ocean in the global environment and basin scale productivity. One is the marine ecosystems and the other is carbon circulation between atmosphere and ocean. We have a responsibility, as marine scientist, to address the growing problems of the increase in atmospheric carbon dioxide and decreased solubility of carbon dioxide due to the elevation of water temperature that could have a disastrous effect on the marine ecosystem. It should be our endeavor to see that the delicate balance of the ecosystem and ocean-atmosphere systems does not break down through mindless human activities. We have to generate information on such critical processes and evolve strategies to prevent a disastrous scenario from taking place in interest of mankind.

The ocean has been a great life support system for human survival by providing food, natural resources, and most importantly by playing a role as a climate controller and carbon dioxide buffer. Against this background, there is an urgent need for studying the oceanographic processes, physical, chemical, biological as well as the ecosystem dynamics in the North Pacific through active cooperation of all PICES countries.

At the last meeting, I was very happy to inform all present of the successful launching of the earth observing satellite ADEOS that was supposed to be a vital source of remote sensed ocean color data. Unfortunately, the satellite was stopped sending data last June. It was accidental. I am very encouraged by the successful NASA launching of SeaWiFS last August. Although there may be some problems with SeaWiFS, we are receiving good quality ocean data. Undoubtedly, it would go a long way in the development of remote sensing based monitoring of the marine ecosystem in general and marine biological processes in particular. These results, I hope, will give us an idea about how important these tools are to understand the ocean processes, moreover, we are likely to realize how important it is to undertake the cooperative studies between countries to use the potential of these data.

PICES is entering a second generation under the new chairman. Each committee's activities are progressing by pursuing the basic goals of the organization. Someone may say the ocean is getting smaller through satellite observations, but we should be aware of the fact that ocean is to large to be studied by just one country. I sincerely hope PICES will continue to act as a link for joint efforts by countries of this region.

Finally, thank you once again to all Korean colleagues for providing us with such good opportunity.

Dr. Doubleday called upon Mr. Han-Di Guo, acting for head delegate Mr. Jian-San Jia, to make a statement on behalf of the Chinese Government

I would like to thank Dr. Doubleday for his kind introduction. I am very honored to be able to deliver a speech on behalf of the Chinese Delegation. First of all, we want to sincerely thank the Korean Government of their excellent organizing work of the PICES Sixth Annual Meeting and their kind support to the meeting.

The Chinese Government has always supported bilateral and multilateral exchange and cooperation in science and technology with all the countries in the world. Today, environment deterioration, energy shortage and the other problems have caused concerns for the world as they threaten human life. To solve these problems, there needs to be a wide range of international cooperation as well as mutual exchange of scientific and technical personnel, information and data.

The ocean and sea occupy 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, energy and financial resources into marine scientific research. Inputs of these kinds will increase in the future, and many global marine research projects such as the global ocean system dynamics, and ocean observation system, are bilateral and multilateral cooperative projects that require participation by scientist from different countries.

The research is aimed at not only the ocean environment, but also the interaction of sea, land, meteorology and their effect on the global climate and climatic change, and the effect on the fauna and flora and ecology and the utilization of resources, as well as the effect of human activities on the oceans.

China, as a coastal nation of the North Pacific, is one of the major world marines fishing counties, which has actively participated in all related activities of the region. Under the circumstances of limited available land resources, making full use of the oceans will be an area of future development potential. Therefore, research on protection of the oceans by China and other member countries and international scientific and technical cooperation to realize the aims of this Organization will play a very important role in the future. We hope, through the active cooperation of all member nations, we will carry out more scientific research in the North Pacific region in order to collect and exchange scientific research data effectively and rationally.

We hope that, through this meeting, all participants can not only discuss and exchange information or research activities, but also promote cooperation and friendship. Finally, I wish this Annual Meeting a complete success.

Dr. Doubleday called upon Mr. Kook-Jeon Ahn to make a statement on behalf of the Ministry of Maritime Affairs and Fisheries Republic of Korea.

Mr. Chairman, distinguished delegates, ladies and gentlemen. I am very pleased and honoured to make a statement on behalf of my Government.

First of all, I welcome you all to Pusan, here in Korea, for this Sixth Annual Meeting of PICES. Also, I would like to extend my sincere thanks to the PICES Secretariat which has worked hard to prepare all the documents so nicely.

As we know, the North Pacific Ocean sustains some of the world's most productive living marine resources. It is also know that much of the potential living resources biomass has recently stared to decline. Ocean scientific research and related studies have become more vital to our improved understanding of how to wisely manage the abundance of living resources in relation to changes in the

environment. PICES was established as an International Organization in 1992 and has been operating successfully since then. For the next decades, in order to build sustainable fisheries and clean up the marine environment, we should assess the status of marine resources, through stock assessments and population dynamics research, so that we can present a scientific basis for policy decision making. Taking advantage of this occasion, I would like to express Korea's firm support for the goals and objectives of PICES.

These days, climatic change is evident in many areas of the world. Although it is well known, nobody seems to know exactly what to do about this substantial phenomenon. A strong research capacity is necessary to ensure continuity and on-going improvements to existing service, and a sound observational and monitoring capability is vital to the success of PICES. Especially, integration and sharing of environmental data and scientific information are critical to the fulfillment of PICES goals. These are not easy to achieve, but we should continue our efforts and not give up. Our wish now is that this meeting of PICES will be successful in providing a favorable and satisfying forum for every participant here. Also I look forward to many productive outcomes of the meeting.

Finally, I hope that all of you will enjoy this meeting and have a good time during your stay here in Pusan.

Dr. Doubleday called upon Dr. Lev N. Bocharov to speak on behalf of the Russian Federation.

Mr. Chairman, distinguished delegates, ladies and gentlemen, On behalf of my Government I would like to thank the Republic of Korea for hosting the Sixth Meeting of PICES. My further thanks go to the Local Organizing Committee and the PICES Secretariat for preparation of this meeting.

At this, already sixth, Meeting, with a great deal of assurance, we can talk about the influence of PICES on the advances of marine science in the countries of the North Pacific. PICES has gained authority as an organization that promotes new ideas and initiatives and where scientific results can be discussed and assessed. The most distinguished feature of the PICES approach is an ecosystem study of all arising problems, as for example, the reconstruction of pelagic communities, or the decrease of the survival rate of Pacific salmon during sea life, or the decline of pollock and growth of herring stocks.

In his speech at the opening ceremony of the Fifth PICES Meeting one of the founder of PICES Dr Wooster said that we must remember about establishing effective links with potential user organizations as international fishery commissions. In Russia we share this opinion and hope that the effort in this direction will be continued in a greater extent.

Probably, the new information technology would change the way we communicate and collaborate now. Maybe, in the near future we could exchange our ideas, data and results in a "virtual" meeting in the cyberspace. TCODE is working on this. However, I think, even in that time we would need to meet each other during coffee breaks in a realistic space. Because it would help us to keep the atmosphere of mutual respect and understanding. We enjoy this atmosphere at all our Meetings and I would like to thank the Governing Body and the Secretariat of PICES for this.

Thank you to our Korean hosts. I look forward to a productive meeting in this beautiful country. It is my pleasure on behalf of the Russian Federation Government to confirm that Russia is ready to host the 8th Meeting of PICES in 1999.

Dr. Doubleday called upon Dr. Vera Alexander to provide a few words on behalf of the U.S. Government.

Distinguished Chairman, the Honorable Minister, distinguished delegates, I am both honored and delighted to be here, speaking on

behalf of the United States delegation. First, I wish to thank our Korean hosts for welcoming the Sixth Annual Meeting of PICES to Pusan, and for the excellent arrangements here.

PICES is now very active in developing scientific research programs, a step forward from earlier activities, which centered around reviewing and discussing scientific results and issues. This responds directly to a primary purpose of PICES - to facilitate the accomplishment of research is the northern North Pacific Ocean which requires or is best done through international cooperation. Of course, communication also is an important role for PICES. But with tangible results, our national participation will be validated.

The problems we are addressing are global and urgent. Their solution will provide guidance for developing policy and strategies. However, PICES is only interested in the scientific aspects, even though there will be practical benefits as well. Of greatest importance, though, is the potential for developing young scientific talent by bringing an international team of our future scientific leaders together to address the scientific problems in the north Pacific Ocean. If PICES can nurture young scientists, the long-term environmental security of the North Pacific Ocean will be advanced and, with this, the hope of sustainable use will become realistic.

There are many large programs either ongoing or under development for the North Pacific Ocean. The ability of PICES to provide focus can play a big role, as well as the opportunity for improved international coordination and cooperation.
I anticipate significant advances at this meeting. Indeed, there already have been such advances through the Climate Change and Carrying Capacity workshop and planning activities which took place over the past few days. What can be considered more important than the carrying capacity in our shared ecosystems, and responses to climatic variations?

Once again, thank you to our hosts for their warm welcome. I look forward to a productive meeting.

Dr. Doubleday thanked the Minister and all the delegates for their remarks and spoke on behalf of PICES.

Honourable Minister, distinguished delegates, colleagues, ladies and gentlemen, I would like to begin my remarks by thanking our hosts, the Republic of Korea for their hard work in arranging the sixth annual meeting of PICES in Pusan. The meeting site, the Grand Hotel in Pusan is well chosen. From its door we see each day the importance of the sea to Korea. The beautiful beach is supports recreation and tourism, just offshore is seaweed aquaculture, and farther offshore can be seen nightly fishing for squid and the passing of the ships of international commerce.

Sometimes the unseen hours spent in preparation are not fully appreciated because they are not visible, but I am sure there are many in the audience who have prepared past PICES meetings or other similar meetings who understand what is involved and will join with me in expressing PICES' thanks. Many thanks to our hosts for bringing PICES to Pusan!

PICES is a young organization, but we have achieved much in our short history. Through its workshops and symposia, PICES has disseminated knowledge of the physical processes and modeling of the Subarctic north Pacific and its marginal seas, of exchanges between continental shelf waters and the adjacent ocean, and of structure and dynamics of its marine ecosystems.

We have built up a framework program, the Climate Change and Carrying Capacity Program to focus and coordinate research around the north Pacific on the effect of climate variation and change on marine ecosystems. At this meeting we are moving forward from planning to implementation.

Perhaps most important, we have brought together hundreds of oceanographers and biologists from around the Pacific Rim in a multidisciplinary forum for marine science. The contacts between scientists from our member states are now leading to joint research programs to advance knowledge in fields of mutual interest.

PICES member states share a great ocean. We must know and understand the Pacific Ocean if we are to understand why the seas around it grow warmer and colder and why some fish stocks increase while others decline.

PICES scientists are working together to understand how variation in the climate of the north Pacific ocean influences marine ecosystems and fishery resources. To make our work more complete, we must also work together to understand how the ocean and atmosphere of the north Pacific cause climate variations. We need to bring atmospheric scientists into the PICES community to join our oceanographers in advancing knowledge and understanding of the Pacific Ocean climate system. PICES should play an active role in climate research. PICES should also link its research with worldwide programs of climate research, because the climate system is a global system of ocean and atmosphere.

In marine science, we cannot control nature to implement the kind of controlled experiments that are possible in laboratories. We have to base our observations and hypothesis tests on the natural variation of natural systems. 1997 has seen the beginning of a very large El Niño event. Already there are sea surface temperature anomalies of more than 3 degrees off North America. At the same time, and probably related, there is a negative anomaly of two degrees off Northeast Asia. This strong climate signal gives us a special opportunity to observe climate effects on marine ecosystems. PICES should seize the opportunity offered by this El Niño event by observing the ocean and its ecosystems and providing a forum for scientists all around the Pacific to present and debate what they learn from the 1997-98 El Niño.

Increasingly, PICES scientists are collaborating in joint research projects. This is commendable, but joint programs by PICES member states to study shared waters and shared ecosystems would bring still greater benefits by coordinating sampling over natural ecosystems and water masses.

We have an exciting program of joint sessions and symposia this week with many interesting papers. I hope that all scientists will take full benefit from this sixth annual meeting of PICES to renew and extend contacts and friendships with colleagues from other nations and other disciplines and to learn from the work of others presented here. Best wishes for a successful conference.

Dr. Doubleday introduced Prof. Kuh Kim to give the keynote lecture. Prof. Kim discussed CREAMS (Circulation Research of the East Asian Marginal Seas), an international research program among Japanese, Korean and Russian scientists, conducted expeditions in the East Sea/Sea of Japan in 1993-1997. Precise CTD and chemical data were collected in the entire basin and long-term currents were measured at depth of 1000 m, 2000 m and 3000 m. Satellite drifters and ALACE were deployed for Lagrangian observations at surface, 350 db and 1000 db. New classification of water masses such as High-salinity Intermediate Water, Central Water, Deep Intermediate Water, Deep Water and Bottom Water are introduced. Strong currents in the range of 10-50 cm/s were observed, which fluctuated in the time scales of a few days to weeks. Comparisons with selected historical data show a warming for the entire water column below 200 m since 1950. During the same period dissolved oxygen concentration decreased significantly below 1500 m, but increased around 1000 m, indicating a possibility of reduction in deep and bottom water formation and new formation of central water at the same time. Hydrography and circulation in the East Sea/Sea of Japan are

similar to oceanic structures, the understanding of which is not only of regional interests but has global application. CREAMS in 1993-1997 has been exploratory in science and international cooperation. CREAMS -II is planned in 1998-2002, centered in intensive observations in 1999-2000, to advance understanding on physical processes of water mass formation, subsequent circulation and its interaction with warm currents.

REPORT OF GOVERNING COUNCIL MEETINGS

The Governing Council met on October 20, 23 and 26, under the Chairmanship of Dr. William G. Doubleday. Drs. W. Doug McKone and Alexander Bychkov served as rapporteurs.

All Contracting Parties were represented at the three sessions (Endnote 1). The Chairman of the Science Board, Dr. Makoto Kashiwai, and Dr. John L. McGruder, Chairman of the Finance and Administration Committee, were in attendance during part or all of each session.

At the first session, the Chairman welcomed the delegates and noted that for this meeting Mr. Han-Di Guo was representing the People's Republic of China, Mr. Kook-Jeon Ahn was representing the Republic of Korea and Mr. Kazumi Hagino was representing Japan. The Chairman reviewed the agenda and proposed the order in which to take up the various items. Dr. John Davis proposed the adoption of the agenda without change; seconded by Dr. Hyung-Tack Huh. This report summarizes the treatment of each agenda item during the course of the three sessions.

The Chairman asked Parties to confirm their members who would attend the Finance and Administration Committee meeting (see Endnote 1 of the Report of the Finance and Administration Committee).

Agenda Item 1. Preliminary Report on Administration

The Executive Secretary summarized the activities of the Secretariat during the previous year (Endnote 2). Fees were received by the Secretariat from all Parties during the year. There were a number of changes in Council, Committees and Working Groups. Canada was thanked for improvements of the Secretariat facilities at the Institute of Sciences, Sidney, British Columbia.

Agenda Item 2. Relations with other international organizations and observers from such organizations

Letters of invitation to attend PICES VI were sent to the agreed list of Organizations and the following sent observers:

Asian Pacific Economic Cooperation (APEC), Marine Resources Conservation Working Group – Mr. J. Roderick Forbes
North Pacific Anadromous Fish Commission (NPAFC) – Dr. Richard J. Beamish
Global Ocean Ecosystem Dynamics (GLOBEC) – Dr. Ian Perry
Scientific Committee on Ocean Research (SCOR) – Prof. Shizuo Tsunogai

Agenda Item 3. Membership and observers from other countries

No official representatives from non-member countries were present as observers at this year's meeting. No non-member countries expressed interest in joining PICES during 1997.

Agenda Item 4. Election of Vice-Chairman

The Chairman Dr. William Doubleday called for nomination for Vice-Chairman of Council in accordance with the Rules of Procedure. Dr. Hyung-Tack Huh of the Republic of Korea was unamously declared re-elected for a second term. The delegates congratulated Dr. Huh on his election. Dr. Huh expressed his thanks for the support given by Council members.

Agenda Item 5. Proposed change to Rules of Procedure 16 (i)

Council discussed Rule of Procedure 16 (i) that provides for a newly elected Chairman of a Scientific Committee to not take office for two months following an election. The Chairman pointed out that the current Rule creates confusion in the Secretariat immediately

following the Annual Meeting when decisions must be made on the organization of the next Annual Meeting. The departing Committee Chairman is hesitant to make decisions that might be better undertaken by the incoming Chairman and the incoming Chairman considers that he has no authority to make any decisions. Council approved the following change by replacing the phrase *on the first day of the second month following election* to allow the incoming Chairman to take his position immediately following the Annual Meeting as follows;

Rule 16 (i)

The Chairman of each of the permanent Scientific Committees shall be elected by the Committee concerned from amongst its members for a term of three years, shall assume office *at the conclusion of the Annual Meeting at which elected*; and shall not be eligible for re-election for the immediate succeeding term;

Council approved the Rules of Procedure amendment as proposed (97/A/4).

Agenda Item 6. Report of Finance and Administration Committee

The Finance and Administration Committee met under the Chairmanship of Dr. John L. McGruder, who presented the report to the Governing Council (see F&A Report for text). The report was approved by Council.

Appointment of Executive Secretary

The process for appointment of an Executive Secretary was approved by Council as amended by the Finance and Administration Committee. Similarly, the position description for advertisement of the position was accepted as proposed by the Finance and Administration Committee. Council agreed that all Parties would advertise the position in their own country. The Chairman, in consultation with the Executive Secretary, will select a short list of five candidates from among the applicants for circulation to delegates. A Selection Committee composed of the Chairman, Dr. William G. Doubleday, Dr. John C. Davis, Dr. Satsuki Matsumura, Dr. Lev N. Bocharov, Dr. Hyung-Tack Huh, Dr. James W. Balsiger and a person to be named by the People's Republic of China, from each of the six Parties was struck to interview the short list of candidates at PICES VII. The Executive Secretary is instructed to develop a statement of qualifications, in consultation with the Chairman, for use by the Selection Committee (97/A/3).

Audited accounts for financial year 1996

At the recommendation of the Finance and Administration Committee, the Governing Council accepted the audited accounts for 1996 and agreed to continue with Flader and Greene Chartered Accountants as auditors for one more year (Decision 97/A/1). China proposed that the Auditor should be changed periodically to ensure that the audit is done with vigour. Council instructed the Executive Secretary to obtain bids from other auditing firms for review by the Finance and Administration Committee in 1998 in order to allow Council to consider replacing the auditor at next year's Annual Meeting.

Estimated accounts for financial year 1997

The estimated accounts from October 1 to December 31 were reviewed by the Finance and Administration Committee and adopted by Council (97/A/2).

Council noted that Science Board recommendations were not available until F&A had completed its meetings, which means that recommendations could not be taken into account in consideration of the budget for the following year. Council agreed that the Finance and Administration Committee should review all financial matters before they are put before Council. Next year's schedule should be modified to allow all other financial matters except those arisen from Science Board to be considered at a meeting before the final Science

Board Meeting. The schedule should allow the Finance and Administration Committee to review those financial matters proposed by Science Board after its last meeting and present any revised budgetary recommendation resulting from Science Board's recommen-dations at the last meeting of Council.

Budget for financial year 1998

The total budget increased to CDN $521,000. Council approved the transfer of CDN $12,000 from the 1996 Working Capital surplus to keep the total contributions from Parties at the 1997 level of CDN $509,000. Upon the recommendation of the Finance and Administration Committee, Council approved fees for Parties of CDN $84,800, the same level as 1997 (Decision 97/A/2(1)).

The United States proposed that the Governing Council of PICES approve a one-time requirement for the United States to contribute up to 115% of the amount of its national contribution to PICES in 1998. This is possible under section 5(1) of the PICES Financial Regulations. The excess is to be used to defray costs associated with PICES VII, which is to be held in the United States. This is allowable under United States government regulations, and will allow the United States to provide necessary support for the Annual Meeting. The additional contribution will be set by the Chairman and the Executive Secretary in consultation with the United States, prior to the start of the 1998 fiscal year.

Council approved the proposal for the United States to contribute up to 115% of the amount of national contributions on a one-time basis to provide financial support for PICES VII in Alaska.

Forecast budget for financial year 1999

Council received the forecast budget for 1999 as an information item for Parties (Decision 97/A/2(2)).

Trust Fund

At the recommendation of the Finance and Administration Committee, Council did not approve the proposed Financial Regulation 6 change which would have established a procedure to provide annual contributions to the Trust Fund (Decision 97/A/). The Trust Fund is estimated to be CDN $99,296 at the end of 1997.

Working Capital Fund

The Working Capital Fund is estimated to be CDN $53,624 at the end of 1997. Council approved a transfer of CDN $12,000 to the General Fund to maintain the 1998 fees at the same level as in 1997. Thus, the Working Capital Fund will have an estimated residual surplus of CDN $41,624 at the end of 1997. The Executive Secretary is instructed to hold the remaining surplus in a separate account for review at next year's Annual Meeting of the Finance and Administration Committee (Decision 97/A/2(3)).

Home Leave Relocation Fund

The status of the Home Leave Relocation Fund was reviewed. No action was taken by Council on this matter. Guidelines for relocation are to be presented by Executive Secretary at the next meeting.

Future Meetings of the Organization and subsidiary bodies, including time and place for the Sixth and Seventh Annual Meetings

Council approved the recommendation that PICES VII be held from October 14-25, 1998, in Fairbanks, Alaska. Council also accepted the invitation of the Russian Federation to hold PICES VIII.

Agenda Item 7. Report and recommendations of Science Board

Council approved the Science Board Report. Details are given in the Appendix.

1. Planned and proposed future meetings in 1998-1999

   Council approved inter-sessional meetings (Decision 97/S/1) and proposed Workshops and Working Group meetings to be held at PICES VII.

2. Reports and recommendations on relations with other organizations and programs

   a. Council reviewed the proposed Memorandum of Understanding with ICES, and wish to address this document by correspondence during the next year. (Decision 97/S/2a)
   b. Council requested the Secretariat to explore the possibility of developing an MOU with the International Pacific Halibut Commission (IPHC). (Decision 97/S/2b)
   c. Council reviewed the proposal by the Chairman of the Committee on Scientific Research and Statistics (CSRS) of the North Pacific Anadromous Fish Commission (NPAFC), received through e-mail by the FIS Chairman, for PICES to provide catch statistics for member countries for non-anadromous species and agreed that the Chairman respond positively to the proposal at the NPAFC meeting in Victoria. Council agreed that an MOU with NPAFC should be completed before developing an agreed procedure and requirement for obtaining and providing the catch statistics. (Decision 97/S/2c)
   d. Council approved the additions to the Standing List of Organizations as proposed by Science Board and added United Nations Environment Program (UNEP) to the list. (Decision 97/S/2d)
   e. Council approved that the Chairman send a letter to CREAMS accepting their proposal to hold a workshop in conjunction with PICES VII. The letter will request that an observer from PICES participate in their February 1998 Planning Meeting. (Decision 97/S/2e)

3. Proposed PICES publications: 1997-1998

   Council accepted the list of publications proposed and noted that should the cost of the BASS Symposium Proceedings exceed the funds available, publication will be delayed. (Decision 97/S/3)

4. Proposed new Technical Committees and Working Groups

   a. Council approved the SB recommendation to disband WG 9. (Decision 97/S/4a)
   b. Council reviewed the terms of reference for WG 12 and agreed to revise terms of reference as appended. (Decision 97/S/4b)
   c. Council approved a new POC Working Group 13 on "CO_2 in the North Pacific". (Decision 97/S/5a)
   d. Council approved a new BIO Working Group 14 on "Effective Sampling of Micronekton to Estimate Ecosystem Carrying Capacity". (Decision 97/S/5b)

5. PICES-GLOBEC CCCC Program Implementation Panel

   a. Council approved the new statement of purpose for the CCCC Program. Council approved the proposed terms of reference as amended. Council approved the proposed structure of the Implementation Panel. (Decision 97/S/6a)
   b. Council approved a new MONITOR Task Team under the CCCC/IP. (Decision 97/S/6b)

6. PICES supported travel

   a. Council agreed to cover financial support costs for travel of Dr. Chang-Ik Zhang (FIS Chairman) to attend the SCOR 105 Working Group meeting in Hobart, Australia, and Ms. Patricia Livingston (CCCC IP Co-Chairman) to attend the First GLOBEC Open Science Meeting in Paris France. (Decision 97/S/7a)
   b. Council agreed in principle to Science Board's proposals to support travel by speakers and experts in 1998. Council noted that funds may not be sufficient to support all the requested travel, and agreed that the Science Board Chairman would prioritize the list, and the Chairman and the Executive Secretary would support as many priority participants as funding would permit. (Decision 97/S/7b)

7. Council agreed to co-sponsor a Pandalid Shrimp Symposium in 1999 with the North Atlantic Fisheries Organization (NAFO) and the International Council for the Exploration of the Seas (ICES). Funding support was not requested as part of the proposal. (Decision 97/S/8).

Agenda Item 8. Any Other Business

Council instructed the Executive Secretary to extend the Assistant Executive Secretary's contract for one year to April 30, 2000. (Decision 97/A/5)

Appendix

A. Decisions

97/A/1: Auditor

Council accepted the audited accounts for 1996 and agreed to continue with Flader and Greene as auditor for one more year.

97/A/2: General Account

Council accepted the financial statements for the audited accounts of 1996 and the estimated accounts of 1997 and agreed to the following actions:

1. *1998 Budget*. The budget of $521,000 was approved. $12,000 was transferred from the Working Capital Fund to reduce the total contribution to $509,000, keeping the 1998 fees at $84,800, the same level as in 1997.
2. *Forecast 1999 Budget*. The forecast budget for 1999 was reviewed and will be further considered during PICES VII.
3. *Working Capital Fund*. The estimated surplus in the fund is $53,624. Council approved a transfer of $12,000 to the General Fund for 1998 to keep the fees at the same level as in 1997. Council instructed the Executive Secretary to retain the residual surplus of $41,624 in a separate account.

97/A/3: Executive Secretary

Council approved the procedure for appointing the Executive Secretary and the job description for advertisement by Contracting Parties. Candidates will be interviewed at PICES VII. The successful candidate will be invited to stay for the Annual Meeting at the expense of PICES and the desirable starting date is December 1, 1998.

97/A/4: Rules of Procedure

Council approved a change to Rule 16 (i) as follows:

The Chairman of each of the permanent Scientific Committees shall be elected by the Committee concerned from amongst its members for a term of three years, shall assume office *at the conclusion of the Annual Meeting at which elected*; and shall not be eligible for re-election for the immediate succeeding term.

97/A/5: Assistant Executive Secretary

Council agreed to extend the Assistant Executive Secretary's contract for one year to April 30, 2000.

97/A/6: Future Annual Meetings

Council accepted the proposal of the United States to host the Seventh Annual Meeting in Fairbanks, Alaska, October 14-25, 1998. The Russian Federation will host the 1999 meeting. The date and place of the meeting in Russia is to be determined at next year's Annual Meeting.

97/S/1: Inter-sessional Workshops and Working Group meetings

The following inter-sessional meetings are to be convened:

a. POC Second Okhotsk Workshop in Nemuro in November 1998.
b. MODEL Workshop in California in March 1998.
c. WG 8 Jiazhou Bay Workshop in Spring 1998, if host country approval is not received by January 31,1998, the workshop will be held in Masan/Chinhae Bay, Republic of Korea, in September 1998.
d. WG 12 meeting on the western side of the Pacific. Place to be determined in consultation with the Secretariat.

97/S/2: Relations with other Organizations and Programs

a. Review Memorandum of Understanding (MOU) with International Council for the Exploration of the Sea (ICES) by correspondence during 1998.
b. Explore developing MOU with International Pacific Halibut Commission (IPHC) in 1998.
c. The MOU with the North Pacific Anadromous Fish Commission should be approved by both Parties before developing any agreed procedure and requirement for providing catch statistics.
d. Revise the Standing List of Organizations (Appendix D).
e. Chairman send letter to Circulation Research of the East Asian Marginal Seas (CREAMS) accepting their proposal to hold a Workshop in conjunction with PICES VII.

97/S/3: The following reports are to be published:

a. Bering Sea: Physical, Chemical and Biological Dynamics review volume to be published by Alaska Sea Grant
b. Progress reports of WGs 8-12 and the Report of the Study Group on PICES Communications in Annual Report
c. Proceedings of the BASS Symposium in a peer-reviewed journal if funds permit, otherwise to be delayed to next fiscal year.
d. CCCC Task Team Reports, REX 97 Workshop and MODEL 98 Workshop; WG 10 Report in PICES Scientific Report Series
e. Revised PICES Handbook
f. Multilingual Nomenclature of Place and Oceanographic Names in the Region of the Okhotsk Sea (publication costs borne by Marine Information Research Center, Japanese Hydrographic Association)

97/S/4: Future of Working Groups

a. WG 9 "Subarctic Pacific Monitoring" will be disbanded.
b. Revised terms of reference for WG 12 were approved(Appendix B (i)).

97/S/5: The following new Working Groups were established:

a. WG 13 on "CO_2 in the North Pacific" (see terms of reference Appendix B (ii))
b. WG 14 on "Effective Sampling of Micronecton to Estimate Ecosystem Carrying Capacity" (see terms of reference Appendix B (iii))

97/S/6: CCCC Program and CCCC Task Teams

a. A revised statement of purpose and terms of reference and structure were approved(Appendix C (i, ii and iii)).
b. A new MONITOR Task Team reporting to the CCCC/IP was established(Appendix C (iv)).

97/S/7: Travel Support

a. PICES will cover the cost of Dr. Chang-Ik Zhang to attend the SCOR 105 Working Group meeting and Ms. Patricia Livingston to attend the First GLOBEC Open Science meeting.
b. Science Board Chairman should prioritize the proposed list of requested travel support. The Executive Secretary should provide as much support as funds permit.

97/S/8: PICES co-sponsor the Pandalid Shrimp Symposium in 1999 with NAFO and ICES.

B. Working Group Terms of Reference

i) Working Group 12: Crabs and Shrimps (revised)

1. Consider those crabs, shrimps and lobsters that are utilized in a commercial, subsistence or recreational fisheries. This may include introduced species if they are directly important or impact human utilization of any other marine species;

2. Identify organizations and key contacts from each that are performing scientific work on the distribution, recruitment, larval transport, migration, population dynamics, and influences of environmental conditions for crabs and shrimp;

3. Identify data that are available that would assist in the analyses of factors affecting abundance trends;

4. Review and exchange current knowledge and data concerning factors affecting abundance and survival of crabs, shrimps and spiny lobsters and identify key scientific questions regarding reasons for abundance fluctuations.

ii) Working Group 13: CO_2 in the North Pacific

1. Review the present level of knowledge on the processes controlling CO_2 in the North Pacific, and identify the gaps and problems;

2. Review the existing methodology of the CO_2 measurements including the prepara-tion of standards and reference materials, and advise on the intercalibration and quality control procedures;

3. Identify and encourage ongoing and planned national and international CO_2-related scientific programmes in the North Pacific region, including long-term time-series observations;

4. In coordination with TCODE, identify available and suitable data sets on the oceanic CO_2 system, and recommend the mechanisms of data and information exchange;

5. Develop a symposium, workshop or an annual meeting session on the CO_2 study in the North Pacific.

iii) Working Group 14: Effective Sampling of Micronekton to Estimate Ecosystem Carrying Capacity

1. Evaluate current sampling methods and identify problems, especially for the simultaneous determination of micro-nekton and their prey;

2. Propose and evaluate solutions to the micronekton sampling problem, in general and as relevant for CCCC Program;

3. Recommend collaborative field efforts among PICES member countries to intercalibrate/compare present and future micronekton sampling methods;

4. Obtain and tabulate available data on the consumption and biomass of micronekton from the North Pacific for use in energy flux calculations. Stratify the data by region and functional groups/taxa, and provide a

qualitative estimate of the level of confidence in each of these estimates to identify areas where future research is necessary;

5. Review the proposal and make recommendations concerning the proposed joint BIO/FIS workshop to follow-up on selected aspects of micronekton studies discussed at topic session on micronekton at PICES VI.

C. PICES-GLOBEC CCCC Program

i) Statement of Purpose (revised)

The CCCC Program addresses how climate change affects ecosystem structure and the productivity of key biological species at all trophic levels in the open ocean and coastal North Pacific ecosystems. There is a strong emphasis on the coupling between atmospheric and oceanic processes, their impacts on the production of major living marine resources, and how they respond to climate change on time scales of seasons to centuries.

The new set of Terms of Reference reflects the present activities and goals of CCCC Program and execution of out the Implementation plan.

ii) Terms of Reference (revised)

1. Integrate and stimulate national activities on the effects of climate variations on the marine ecosystems of the Subarctic North Pacific through a coordinated implementation plan and oversight of the plan;

2. Determine how the work of PICES Scientific Committees and WGs can most effectively support the CCCC Program, and recommend the establishment of subsidiary groups to provide expert advice as necessary;

3. Identify existing or foreseen national and international research programs with which the CCCC Program could be coordinated, and determine how this can most effectively be achieved;

4. Provide scientific direction for liaison with other regional and global organizations in pursuit of the goals similar to the CCCC.

iii) Structure for Implementation Panel (revised)

1. Co-chairmen of Implementation Panel (two);

2. Task Teams (four, each with co-chairmen): BASS, MODEL, REX, MONITOR;

3. Executive Committee: IP co-chairmen, co-chairmen from each Task Team plus one each from non-represented countries or national GLOBEC programs and selected international organizations such as NPAFC. International organizations to be represented shall be selected in consultation with the Chairman of PICES;

4. National members – representatives of national GLOBEC programs otherwise not represented plus others to make up a total of three (including co-chairs, Task team co-chairs, and Executive Committee) from each country;

5. Representatives – Chairmen of Science Committees, TCODE, selected WGs, and representatives of selected international groups such as JGOFS;

6. Task Teams – membership to the extent possible from the above categories, plus others as necessary to provide necessary expertise.

To the extent possible, members in these categories should be proposed by the Executive Committee in consultation with Science Board, with countries being asked to approve and support.

iv) MONITOR Task Team Terms of Reference

1. Review existing activities of PICES member nations and to suggest improvements in the monitoring of the Subarctic Pacific to further the goals of the CCCC Program;

2. Consult with REX, BASS and MODEL Task Teams and TCODE on the scientific basis for designing the PICES monitoring system. Questions of standardization and intercalibration of measurements, particularly in the area of biological collections, should be addressed;

3. Assist in the development of a coordinated monitoring program to detect and describe events, such as El Nino, that strongly affect the Subarctic;

4. Report to CCCC IP/EC on the monitoring in the Subarctic to be implemented in the international Global Ocean Observing System (GOOS) or other related activities.

D. Revised Standing List of International Organizations and Programs

IOC	Intergovernmental Oceanographic Commission
ICES	International Council for the Exploration of the Sea
IPHC	International Pacific Halibut Commission
APEC	Marine Resources Conservation Working Group (MRC), Asia Pacific Economic Cooperation
NASCO	North Atlantic Salmon Conservation Organization
NAFO	North Atlantic Fisheries Organization
NPAFC	North Pacific Anadromous Fish Commission
PSC	Pacific Salmon Commission
SPREP	South Pacific Regional Environmental Program
FAO	Food and Agriculture Organization
WMO	World Meteorological Organization
ICSU	International Council of Scientific Unions
ECOR	Engineering Committee on Oceanic Resources
IASC	International Arctic Science Committee
SCOR	Scientific Committee on Oceanic Research
SCOPE	Scientific Committee on Problems of the Environment
START	South Asian Regional Committee for the System for Analysis, Research and Training

Additions to list

IATTC	Inter-American Tropical Tuna Commission
APFIC	Asia-Pacific Fisheries Commission
SPC	South Pacific Commission
ISCTNP	Interim Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean
IGOSS	Integrated Global Ocean Services System
IODE	International Oceanographic Data and Information Exchange
GOOS	Global Ocean Observing System
GOOS-LMR	GOOS Living Marine Resources
NEAR-GOOS	North East Asian Regional GOOS
WESTPAC	Cooperative Study of the Western Pacific, IOC Sub Committee for the Western Pacific
GIPME	Global Investigation of Pollution in the Marine Environment
NOWPAP	Northwest Pacific Action Plan
GESAMP	Group of Experts on Scientific Aspects of Marine Pollution
UNEP	United Nations Environment Program
CLIVAR	Climate Variability and Predictability
WCRP	World Climate Research Program

IGBP	International Geosphere-Biosphere Program	WOCE	World Ocean Circulation Experiment
JGOFS	Joint Global Ocean Flux Study		
GLOBEC	Global Ocean Ecosystem Dynamics		

Endnote 1

Participants

Canada
John C. Davis (delegate)

China
Mr. Han-Di Guo(alternate delegate)
Mr. Qian-Fei Liu (advisor)
Mr. Yong Li (advisor)

Japan
Satsuki Matsumura (delegate)
Kazumi Hagino (alternate delegate)

Republic of Korea
Kook-Jeon Ahn (alternate delegate)
Hyung-Tack Huh (delegate)
Seong-Ho Song (advisor) (Oct. 25)

Russian Federation
Lev N. Bocharov (delegate)
Igor Shevchenko (advisor)

U.S.A.
Vera Alexander (delegate)
James W. Balsiger (delegate)
Dorothy Bergamaschi (advisor) (Oct. 22)
Mark Wildman (advisor)

Others
William G. Doubleday (Chairman, PICES)
Warren S. Wooster (Former Chairman, PICES)
W. Douglas McKone (Executive Secretary) (Rapporteur)
Alexander Bychkov (Assistant Executive Secretary)(Rapporteur)
John L. McGruder (Chairman, Finance and Administration Committee) (Oct. 22)
Makoto Kashiwai (Chairman, Science Board)
Chang-Ik Zhang (Chairman, FIS Committee) (Oct. 25)

Endnote 2

Report on Administration for 1996-97

Council, Committees and Working Groups

1. Payment of national contributions

All annual dues are payable by January 1 each year. Dues were paid as follows:

Canada	December 1996
United States	January 1997
People's Rep. of China	March 1997
Japan	April 1997
Republic of Korea	May 1997
Russian Federation	October 1997

2. National Delegations

Japan
Mr. Akio Suda replaced Mr. Teruyoshi Inagawa as delegate to Council.

People's Republic of China
Mr. Jian-San Jia replaced Mr. Cong-Meng Liu as delegate to Council.

3. Committees and Working Groups

Canada
Dr. Howard J. Freeland replaced Dr. John F. Garrett on POC

Dr. Mike Henderson replaced Dr. Jake Rice on FIS

Dr. Doug Hay was named to FIS

Dr. Paul J. Harrison replaced Dr. Tim R. Parsons on BIO

Dr. John Pringle replaced Mr. R.C.H. Wilson on MEQ

Japan

Mr. Akira Mizutani replaced Mr. Hiroshi Karube on F&A

Dr. Nobuo Suginohara replaced Prof. Yutaka Nagata on POC

Dr. Akihiro Hara replaced Dr. Kiyotaka Ohtani on FIS

Dr. Ichiro Yasuda replaced Dr. Kimio Hanawa on WG 9

Dr. Ichiro Hara replaced Dr. Tokimasa Kobayashi on TCODE

Dr. Toshio Nagai replaced Dr. Tadao Tatsuno on TCODE

4. Observers

Invitation letters were sent to inter-Governmental and non-Governmental organizations on the agreed standard list. Organizations that accepted our invitation are:

- Asia Pacific Economic Cooperation (APEC), Marine Resources Conservation Working Group: Dr. J. Roderick Forbes
- Scientific Committee on Oceanic Research (SCOR): Prof. Shizuo Tsunogai
- North Pacific Aanadromous Fish Commission (NPAFC): Dr. Irina Shestakova
- Global Ocean Ecosystem Dynamics (GLOBEC): Dr. Ian Perry

5. Travel and representation at other organization meetings

a. Dr. Makoto Kashiwai, Ms. Pat Livingston and Dr. Doug McKone attended the North Pacific Anadromous Fish Commission Meeting in Vancouver in March.

b. Dr. Doug McKone and Ms. Christina Chiu attended the Pension Society Meeting in Victoria in May.

c. Dr. Alexander Bychkov attended the International Pacific Halibut Commission Meeting in Victoria in April.

d. Dr. Doug McKone travelled to the Republic of Korea to discuss the PICES Annual Meeting in April.

e. This year the Secretariat is providing funds to bring 11 Russian and 11 Chinese scientists to the Annual Meeting using funds from the Trust Fund and funds allotted to help the Republic of Korea meet their Annual Meeting expenses that were not needed as they found funds internally. This is the first time that PICES has used Trust Funds to, mainly, support appointed members of Committees and Working Groups to attend PICES meetings.

Communication

1. Publications

List of publications produced this year:

a. The Annual Report was published and circulated in January.

b. A poster for PICES VI was printed and distributed in January.

c. PICES Press newsletters was circulated in January and July.

d. The First Announcement for the Sixth Annual Meeting was circulated in January.

e. The 1997 Directory was updated and circulated in January.

f. Scientific Report No. 7 (Summary of Workshop on Conceptual/Theoretical Studies and Model Development and the 1996 MODEL, BASS and REX Task Team Reports) was published in April.

g. The Final Announcement for the Sixth Annual Meeting was distributed at the end of May.

h. A program and abstracts for scientific sessions was prepared for circulation at the Annual Meeting.

i. A brochure "PICES The First Five Years (1992-1997)" was published in September.

2. Electronics Communication

a. PICES Home Page was completely redesigned during the year and the "framed" version was installed in August. Ideas and contributions are being solicited from Science Board, other Scientific and Technical Committees, the CCCC Program and Working Groups to improve the contents of the Home Page.

b. On-line registration and abstract submission for PICES Annual Meetings through the PICES Home Page has been implemented for the first time this year starting in January. As of September, 56% of registrations and 21% of abstracts were submitted this way for PICES VI.

c. Ordering of PICES publications has been available through the Home Page since January. As of September, 40 requests have been received, 33 from scientists from PICES countries and 7 from scientists from non-PICES countries.

d. Based on a request of WG 10, an ftp area has been set up on the server to allow members of this Working Group to exchange binary documents in order to prepare their final report for POC. This facility can be made available to other Groups upon request to the Secretariat.

e. The Secretariat continues to distribute a list of future meetings, information on new books and initiatives in marine science to more than 900 scientists.

Secretariat Matters

1. Administration/Financial

a. The Secretariat contracted help to improve communications and help reduce costs on the long term (see Electronic Communications above).

b. The Secretariat developed a Handbook on guidelines to help Chairmen of the various Committees, Working Groups and Convenors of scientific sessions fulfill their tasks.

c. Improved methods for handling registration and abstract submission for the Annual Meeting are still being developed by the Secretariat. The aim is to simplify the system while trying to reduce costs.

d. The Secretariat develop a data base of information from a questionnaire on Communication that was circulated by the Communication Study Group set up by Science Board.

e. The PICES Press newsletter was completely redesigned and the content was improved this year.

2. Space, Facilities and Equipment

a. The Government of Canada finished making the changes to the PICES facilities to provide more space that meet office standards. The facilities should be adequate to meet the needs over the next few years.

b. The Secretariat started to replace obsolete computer equipment this year. Unexpectedly, a laserjet printer had to be replaced as well. The Secretariat explored the possibility of renting laptop computers but was unable to find a supplier at a reasonable cost. A new laptop was purchased to replace one that was damaged beyond repair during last year's meeting.

REPORT OF SCIENCE BOARD

The Science Board met on October 19 (17:30-18:30) to review the order of the agenda and set up tasks for Scientific and Technical Committees agendas and on October 25 (08:30-18:30) for the main discussion. (See Endnote 1 for participants.)

The Chairman Dr. Makoto Kashiwai called the meeting of the 19th to order and welcomed the members of Science Board and observers, and especially Dr. Chang-Ik Zhang (FIS Chairman), the newest member of the Board. Dr. Kashiwai outlined the objectives of the meeting, the timetable for reports on Committees and Group activities, and significant issues for discussion. The agenda was circulated prior to the meeting. The Chairman reviewed the agenda and asked for changes and additions. After the recommended changes were incorporated, the agenda was approved (Endnote 2).

The Scientific and Technical Committee, and the CCCC Implementation Panel Chairmen presented agendas for their meetings (Endnote 3). Additional items important for future general discussion were determined and recommended to be included into agendas. The Guidelines for the Science Board meeting from the draft Handbook for Chairmen and Convenors were briefly presented and the Executive Secretary proposed that these be partly adopted for use at this year's meeting.

The Chairman opened the meeting of the 25th and proposed the order in which to take up the various items. The Science Board discussed the Handbook for Chairmen and Convenors; reviewed the findings and recommendations of the Scientific Committees, Implementation Panel for the CCCC Program, TCODE, WG 9 and Study Group on PICES Communications; discussed implementation of PICES V and PICES IV decisions, and Science Board decisions from 1996; made arrangements for future activities and planned a program for the Seventh Annual Meeting; discussed relations with other Organizations and Programs; and made recommendations to Governing Council.

Handbook for Chairmen and Convenors

Handbook for Chairmen and Convenors (Endnote 4) was prepared by the Secretariat and Science Board Chairman, to briefly specify the function and composition of the various PICES Committees and Groups, and outline the duties and responsibilities of their Chairmen and Convenors of the meetings organized or sponsored by PICES. Science Board approved the Guidelines in principle and recommended their circulation to Committee and Working Group Chairmen for use at annual and intersessional meetings. The Executive Secretary should develop the changes in the Rules of Procedure required for consistency with these Guidelines, for consideration by the Governing Council at PICES VII.

Reports and recommendations of the Scientific and Technical Committees, CCCC-IP/EC and Working Groups

Reports of the Scientific and Technical Committees, the Implementation Panel, WG 9 and Study Group were presented by their Chairmen and are summarized below (see reports for the full text). Although both TCODE and the CCCC/IP report to Science Board, for the purposes of the Annual Report, their accounts have been given more visibility under their own heading.

Fishery Science Committee (FIS) - Dr. Chang-Ik Zhang

The Committee met on October 22, 1997 under chairmanship of Dr. Chang-Ik Zhang. Dr. Anne B. Hollowed served as rapporteur.

Dr. Robert Otto summarized the activities of WG 12. He submitted a report of the inter-sessional workshop on Crabs and Shrimps held in Nemuro, Japan, September 9-18, 1997. Dr. Otto discussed several recommendations and concerns of WG 12. The major accomplishments of WG 12 were summarized. The WG prepared a comprehensive review of the major crustacean stocks in the North Pacific. The group identified the major zoogeographic provinces where crustacean species are found. Future WG 12 activities will focus on: a) processes underlying production of crustacean populations, b) comparative analyses of the variety of life history strategies used by crustacean stocks in the North Pacific, and c) methods of assessing crustacean stocks. FIS members reviewed the progress report of WG 12 and accepted it for publication in the PICES Annual Report. It was noted that, if possible, a draft report should be submitted prior to the next FIS meeting. The Committee recommended that the next 4-day meeting of WG 12 should be located in the western side of Pacific and the Co-chairmen of WG 12 in consultation with Science Board Chairman and PICES Secretariat would determine a suitable location for this meeting. FIS accepted the revised terms of reference for the Working Group and recommended encouraging the Chinese and North Korean scientists to participate in WG 12.

The status of the WG 3 inventory was reviewed. Dr. W. Doug McKone noted that all information has been received and will be put on the PICES web page in the near future.

FIS supported the proposal for a Science Board symposium on the 1997-98 El Niño to be sponsored by POC and the BASS Task Team. Dr. Gordon Kruse (FIS) will identify an individual with a background in fisheries science who will serve as a co-convenor for this symposium. FIS endorsed the proposal for a REX Symposium/Workshop on small pelagic species and climate change in the North Pacific to be convened immediately prior to the PICES VII meeting. The Committee approved the Model Task Team proposal to convene a small workshop on lower trophic level modeling just prior to PICES VII. FIS also recommended that the time should be set aside for the CCCC Program to hold scientific sessions and that the topic session for 1998 should be research findings of GLOBEC and GLOBEC-like interdisciplinary research programs in the North Pacific. Time allotted to FIS Topic Session and the CCCC/IP Meeting should be combined to allow for a one-day topic session on this theme.

FIS Chairman Dr. Zhang reviewed the report of the activities of the SCOR Working Group 105. FIS recommended that PICES should provide funds for the FIS Chairman to participate in the next meeting of the SCOR WG in Hobart, Australia, January 1998.

FIS discussed the proposal by NPAFC to add fisheries catch statistics of non-anadromous fish to the NPAFC statistical yearbook. FIS supported NPAFC's suggestion to produce a database of fishery statistics for all PICES member nations and encouraged Governing Council to identify a mechanism for data exchange.

FIS reviewed a few proposals for the development of new Working Groups. The Committee recommended that no new Working Groups should be formed until WG 12 is closer to completing their activities.

FIS recognized the success of the joint BIO/FIS symposium on micronekton and encourages the symposium organizers to convene an intersessional workshop to follow-up on selected aspects of micronekton studies. FIS recommended that the inter-calibration and sampling standardization activities proposed could be considered by the CCCC MONITOR Task Team.

The winner of the FIS Best Presentation Award was Dr. Jin-Yeong Kim (Korea) for the paper entitled “Spawner-recruit relationship of anchovy, *Engraulis japonica*, and environmental factors in the southern waters of Korea”.

Physical Oceanography and Climate Committee - Dr. Paul H. LeBlond

The Physical Oceanography and Climate Committee met on October 22, 1997, under the chairmanship of Dr. Paul H. LeBlond. The Chairman appointed Dr. Howard J. Freeland as rapporteur.

Drs. Yutaka Nagata and Vyacheslav B. Lobanov presented the Multilingual (Japanese-Russian-English) Nomenclature of the Places and Oceanographic Names in the region of the Okhotsk Sea. POC was satisfied with the progress and emphasized the need for simple and unambiguous (rather than linguistically sophisticated) equivalencies. The expected completion of this task is April 1998. The Marine Information research Centre (Japan) will cover publication coasts of the Nomenclature to appear both as PICES and MIRC report.

Dr. Christopher N.K. Mooers outlined progress and the major activities of WG 10 on Circulation and Ventilation in the Japan/East Sea. The content of the final report was summarized. A draft report is scheduled to be circulated to POC members for external review by April 1, 1998, and the final report should be submitted to PICES for publication by July 1, 1998.

POC recognized the scientific value of CREAMS and its achievements on the ocean environment and climate change and sees it as a successful example of international cooperation among PICES member countries, and strongly supports CREAMS-II in 1998-2002 as its continuation. POC recommended that Science Board endorse CREAMS-II as a valuable component of research programs within the PICES framework.

A proposal to organize the 2nd Okhotsk Sea Workshop was raised at the POC meeting in 1996 and was supported by Science Board, but deferred to be reconsidered in 1997. Dr. Nagata proposed that a 4-day workshop to be held in November 1998, in Nemuro, Japan. Co-convenors would be Drs. Y. Nagata, V. Lobanov and L. Talley. POC strongly supported this meeting and recommended as such to Science Board. The Committee also suggested that PICES consider supporting two invited speakers from its special meeting fund.

BASS recommended that WG 9 be reconstituted with new terms of reference and new membership as "MONITOR Task Team" under the CCCC-IP. The terms of reference were presented to POC, and POC was very supportive.

POC proposed the following activities for PICES VII:

i. "El Niño: preliminary look" as a Science Board Symposium. POC Co-Convenor: Howard J. Freeland (Canada).
ii. "Decadal variability of North Pacific Climate" as a 1-day POC topic session, Co-Convenors: James E. Overland (U.S.A.) and Masahiro Endoh (Japan). The Committee also suggested that PICES consider supporting two invited speakers to attend the meeting.
iii. "CO_2 in the N. Pacific" as a 1-day joint POC/BIO topic session. POC Co-Convenor: Shizuo Tsunogai (Japan).

POC examined the proposed terms of reference for a new working group on "CO_2 in the North Pacific". POC supported this idea and proposed to Science Board that CO_2 Working Group follow WG 10.

The Committee debated the request for translation of a new book "Complex Studies of the Okhotsk Sea Ecosystem" from Russian into English. While supportive the idea, POC also suggested that Science Board provide policy guidance on the publication of translations, brochures, and other material.

The winner of the POC Best Presentation Award was Dr. Young-Jae Ro (Korea) for the paper entitled "Recent investigation of the polar fronts of the East Sea by CTD profiling and ADCP tracking".

Biological Oceanography Committee - Dr. Tsutomu Ikeda

The BIO Committee met on October 22, 1997, under the chairmanship of Acting Chairman Prof. Michael M. Mullin.

Drs. George Hunt and Hidehiro Kato presented the WG 11 progress report. The Working Group has tabulated estimated energy consumption by species of birds and mammals of various categories of prey in each of several sub-regions of the Bering Sea. The WG 11 will meet at the time of PICES VII (estimated 4 days needed), but will not have a complete draft of a report for the BIO Committee then. Some governments have appointed WG members and then not paid for travel, and one appointed member has been uncooperative. Dr. Hunt recommended that a letter of reprimand be sent.

Drs. Jeff Napp and Richard D. Brodeur proposed a new Working Grop on micronekton to be sponsored jointly with FIS. They presented draft terms of reference, and modifications were suggested by the Committee to link the focus more closely to other PICES activities. It was recommended to establish a Working Group and hold a two-day meeting immediately prior to PICES VII.

Dr. Kenneth L. Denman proposed a joint Working Group with POC on CO_2 in the North Pacific, and presented the terms of reference agreed to by POC. He also suggested a joint POC/BIO topic session at PICES VII on the role of the North Pacific and shelf seas in the CO_2 budget. With respect to priorities for the two proposed Working Groups, the Committee put the micronekton Working Group as the higher priority by a slight margin.

The Committee considered 12 possibilities for its topic session at PICES VII, including 9 suggested last year. Voting by countries, the Committee recommended as a topic session "Controlling factors for lower trophic levels (especially phytoplankton stocks)". Possible co-convenors included Drs. Vera Alexander, Akira Taniguchi, and Paul J. Harrison. The Committee also recommended a topic session co-sponsored with POC on CO_2 in the North Pacific (Dr. C.S. Wong is a possible co-convenor), and a topic session co-sponsored with MEQ on contaminants and populations dynamics of higher trophic levels (Dr. Linda Jones to consider possible convenors). The Committee also supported the POC/BASS proposal that the Science Board considered for its topic session the manifestations of El Niño 1997/98, since this topic bridges interests of all Scientific Committees.

The Committee reviewed papers and posters in the BIO/FIS topic session and the BIO paper session, and recommended that Dr. Atsushi Tsuda receive the Best Presentation award for his paper, "Life cycles of *Neocalanus flemingeri* and *N. plumchrus (calanoida, copepoda)* in the western Subarctic Pacific". The Committee also strongly recommended that the practice of making such awards continue.

A presentation was made on an international symposium on Management and Mitigation of Harmful Algal Blooms, and PICES support was requested. The Committee recommended non-monetary support by PICES. The Committee approved Dr. Jones' recommendation that Science Board establish a group to determine what PICES' role should be (if any) in increasing understanding of harmful algal blooms.

The issue of translating a Russian book on the Okhotsk Sea was discussed. PICES has earlier considered translating data tables, but the Russians apparently insisted that the whole book be translated, or nothing. The Committee was positive on non-monetary help in encouraging such translation, but was against monetary help (at least from BIO's perspective).

Marine Environmental Quality Committee - Dr. Richard F. Addison

The Marine Environmental Quality Committee met on October 22, 1997, under the

chairmanship of Dr. Richard F. Addison. Dr. C. Michael Watson was appointed as rapporteur.

Dr. John E. Stein reported on progress of WG 8. The revised Jiaozhou Bay Workshop workplan was accepted. During discussion of procedure for getting approval of Chinese authorities, both Profs. Ming-Jiang Zhou and Jia-Yi Zhou recommended against any formal approach through embassies. It was agreed that the MEQ Chairman should draft a letter for signature of the PICES Chairman noting (a) that approval had already been requested (spring 1997, but no reply yet); (b) emphasize comparative nature of Workshop – it is not an assessment of pollution in Jiaozhou Bay; (c) request approval no later than January 31, 1998, for planning purposes. Dr. Kwang-Woo Lee (Korea) offered to host a workshop at Masan/Chinhae Bay area if no Chinese approval by January 31. He felt that it could be mounted by September 1998, in Korea. Russians also offered to host workshop in Vladivostok area. The Committee agreed that PICES VII should have at least one overview paper from the workshop plus whatever other data are ready for presentation.

Five topics were discussed and proposed for PICES VII in order of priority (Convenors to be identified:

i. Contaminants in high trophic level biota - linkages between individual and population responses (joint MEQ/BIO);
ii. Science and technology for environmentally-sustainable mariculture;
iii. Marine oil spills: case studies in assessing biological and ecosystem effects;
iv. What are the mechanisms of toxicity of HAB toxins and the processes by which pollution affects the population dynamics of harmful algal species?
v. Metal speciation and biogeochemical cycles.

The Committee discussed future directions of MEQ after Jiaozhou Bay and agreed on the following topics for discussion at the next MEQ meeting, or before: (i) Future activity re harmful algal blooms (paper to be prepared by Drs. J. Stein and U. Varanasi, jointly with BIO) and (ii) GIWA proposal (paper to be prepared by Dr. R. Addison). Dr. Addison will provide a report on possible actions necessary from the GIWA proposal by January 31, 1998. The Secretariat will circulate the report to the Chairman and Chairman of Science Board for review and consideration as to what actions PICES may wish to take.

The Committee discussed about the International Symposium on Management and Mitigation of Harmful Algal Blooms, and agreed in principle, but without support for funding.

The winner of the MEQ Best Presentation Award was Dr. Dmitry L. Aminin (Russia) for the paper entitled “Use of fluorescent probes for biochemical monitoring of environmental contamination”.

Implementation Panel on CCCC - Ms. Patricia Livingston

The CCCC-IP Panel met on Tuesday, October 21, 1997. Agenda for the meeting is attached. The Panel heard and accepted reports from the MODEL, REX, and BASS Task Teams. The proposals developed by REX, BASS, and MODEL for symposia and workshops to be held during 1997/1998 were discussed and accepted. The Panel received information about the current status of cooperation with other programs such as those of IPHC, ICES, IGBP, and NPAFC. The proposed terms of reference, statement of purpose, and structure for the Implementation Panel was discussed, revised and accepted by the group. A proposal for a new MONITOR Task Team and its terms of reference were discussed, revised, and accepted by the group. It was decided that a TCODE representative should be on the new task team. The group decided that CCCC-IP should contribute regularly to the PICES newsletter. The CCCC-IP heard a report from Mr. Robin Brown (TCODE) regarding data management and exchange issues of IGBP/GLOBEC. It was decided that Mr. Robin Brown and one of the CCCC-IP co-chairmen would draft a letter to each of the national GLOBEC programs in the

PICES area to determine the status of their data management and exchange policies.

The PICES CCCC/IP recommended:

1. WG 9 be reconstituted with new terms of references and membership as a MONITOR Task Team under the CCCC/IP.
2. A new set of terms of references and rules for IP member selection be adopted. The previous terms of reference for the CCCC Program referred to the development of an Implementation Plan. This new set of terms of references reflects the present activities and goals of the CCCC Program in actually carrying out the Implementation Plan.
3. Dr. Bruce Frost is approved as the CCCC representative to JGOFS North Pacific Task Team. Drs. Bernard Megrey (U.S.A.) and Michio Kishi (Japan) be approved as additional members of MODEL Task Team.
4. A new, peer-reviewed scientific report series of PICES be initiated.
5. Anticipated publications in the PICES Scientific Report Series are (a) BASS 1997 Symposium; (b) Task Team Reports, REX 1997 Workshop, and MODEL 1998 Workshop.
6. Proposed Workshops and symposia for 1998:
    a. BASS should hold a one-day symposium sponsored by Science Board during the next Annual Meeting that will allow a preliminary identification of impacts of the 1997/1998 El Niño event;
    b. REX should hold a two-day combination workshop and symposium on climate effects on small pelagic species to be convened just prior to PICES VII;
    c. REX should hold a one-day scientific session at PICES VII that highlights research findings of GLOBEC and GLOBEC-like programs in the North Pacific (1/2-day FIS topic session, 1/2-day CCCC-IP session);
    d. MODEL should hold a three-day workshop on lower trophic level process models in March 4-6, Tiburon, CA, U.S.A. (already approved 1996). CCCC/IP suggested that PICES consider travel support for 3 scientists.
    e. MODEL should hold a two-day follow-up workshop on lower trophic level process models just prior to PICES VII.

Technical Committee on Data Exchange - Mr. Robin Brown

The Technical Committee on Data Exchange met on Oct 18 and Oct 23 under the chairmanship of Mr. Robin Brown. Participation was fairly good (all PICES parties represented).

TCODE has undertaken the assembly of two significant data inventories (Inventory of Long Time Series and Inventory of Internet Resources) which are now available on the PICES web server and in printed form from the PICES Secretariat. The Inventory of Long Time Series was described in a recent article in PICES Press.

The Inventory of Long Times Series provides a description of long-term data sets that might be relevant to climate change in the North Pacific. The inventory contains details on the area covered, measurements made and (when possible) publications that describe these data. Instructions on how to access these data (including uniform resource locators or URL's) are provided. There is no attempt to actually assemble these data - users are provided with "pointers" to the primary data holders. TCODE has solicited entries through TCODE members and from other PICES Working Groups and Committees, including MEQ and WG 11. If additional time-series data in these subject areas are forthcoming, it will be necessary to create additional subject areas. There is additional effort required (by PICES participants as well as TCODE members) to maintain, update and complete this inventory).

The Inventory of Internet Resources provides information on: international marine research programs (national and international program offices); real-time oceanographic and meteoro-

logical data sources; climate data, climatologies and visualization tools; on-line technical manuals and reports; numerical models/ocean forecasts; and mapping and bathymetric data and related software. A prototype of this inventory is now available on the PICES web server (also available as a printed document from the PICES Secretariat). Additional work is needed to add entries to these existing categories and to create new categories (where requested or required).

TCODE Work Plan for 1997/98 includes:

1. Updates and additions to Inventory of Long Time Series, including additional subjects areas (contaminants, birds, marine mammals) if this information is provided by MEQ and WG 11 members.
2. Updates and additions to Inventory of Other Internet Resources, including new subject areas suggested by other Committees.
3. Assemble inventory of GLOBEC (and GLOBEC-like projects), including investigators, institutions and activities (with REX), and ship activities/schedules.
4. Assemble descriptions of 1997/98 El Niño observation plans for all PICES nations (in conjunction with NPAFC, if possible).

Working Group 9 on Subarctic Monitoring - Dr. Bruce A. Taft

The Working Group met on October 17 and 18, 1997, to discuss implementation of the previous recommendations (*96/S/4*) and new monitoring initiatives. Science Board reviewed the WG 9 Report and accepted it for publication in the Annual Report (see Endnote 5).

Study Group on PICES Communications - Mr. Robin Brown

Science Board reviewed the Communication Study Group Report and accepted it for publication in the Annual Report (see *Endnote 6*). Science Board recommends that the Secretariat and Committees implement the PICES Communication Study Group recommendations.

Implementation of PICES V Decisions

a. PICES-GLOBEC CCCC Program (*96/S/1*)
The REX Task Team workshop was held immediately prior to PICES VI (Oct. 17 and 18) to review the present status of national research programs and to identify areas for cooperative research experiments in support of the CCCC Program.

The MODEL Task Team workshop will be held March 4-6, 1997, at the Bay Conference Center, Tiburon, California to compare lower trophic level physiological process models (Co-Convenors: Sinjae Yoo (Korea) and Dick Dugdale (U.S.A.)). Based on Science Board recommendation TT Co-Chairmen will arrange the participation of experience modellers in addition to users of the results of models.

b. Publications 1996-1997 (*96/S/2*)
The Working Group 5 final report was published in the 1996 Annual Report (January 1997).

The Working Group 9 progress reports 1 and 2 were published in the 1996 Annual Report (January 1997).

Summary of the workshop on Conceptual/Theoretical Studies and Model Development and the 1996 MODEL, BASS and REX Task Team Reports were published in the PICES Scientific Report No. 7 (April 1997).

c. PICES Inter-session Meetings 1996-1997 (*96/S/3*)
The second meeting of Working Group 10 was held in Fukuoka, Japan, on January 31 to February 3, 1997, immediately following the Second International CREAMS (Circulation of Regional East Asian Marginal Seas) Symposium. The aim of the meeting was to advance the development of the WG 10 Report. The preliminary paired "Findings and Recommendations" were published in the PICES Press (July 1997).

The Working Group 12 meeting was held September 8-12, 1997, in Nemuro, Japan. The main targets were (a) to compile a multispecies compendium as to what appears to be driving population abundance fluctuations and what research is underway or planned in member countries, and (b) to prepare a list of organizations and key scientific experts along with their area of expertise from each member country.

The MEQ Committee and WG 8 had planned to hold a Practical Workshop on Methods to Assess Pollution Impact in Jiaozhou Bay in May/June 1997. Preliminary arrangements had been made to use facilities at the Institute of Oceanology for the Workshop. As a result of communication and funding (outside PICES) problems it was not possible to organize the Workshop in 1997.

d. Implementation of WG 9 Recommendations (*96/S/4*)
See WG 9 Report (Endnote 5).

e. Cooperation with SCOR: WG105 (*96/S/5*)
Dr. Chang-Ik Zhang, Chairman of the Fishery Science Committee, was appointed as a member of the SCOR Working Group 105 on The Impact of World Fisheries Harvests on the Stability and Diversity of Marine Ecosystem.

f. PICES Perspectives, Interagency coordinating mechanism (*96/S/6*)
So far, the Secretariat has not received any indications that Contracting Parties have developed an interagency coordinating mechanism to facilitate the coordination of broad participation in PICES activities. Science Board is, however, aware of informal coordinating mechanisms in all PICES Parties.

g. Access for Cooperative Research (*96/A/8*)
So far, PICES has not received any requests to assist in obtaining the permission for access to undertake a cooperative research in Parties' EEZ.

Implementation of PICES IV Decisions

a. Geographic Features of the Okhotsk Sea Region (*95/S/3*)
The expected completion of "Multilingual Nomenclature of Place and Oceanographic Names in the Region of the Okhotsk Sea" is April 1998. The Marine Information research Centre (Japan) will cover publication coasts of the Nomenclature to appear both as PICES and MIRC report.

b. Completion of WG 3 Inventory (*95/S/6*)
According to the Governing Council Decision (*93/S/10*) WG 3 was instructed to compile an inventory of scientists working on key pelagic fishes in various geographic areas of the PICES region. The inventory was completed for Canada, China, Japan and U.S.A. before the Working Group was disbanded. This year Korea and Russia have provided the Secretariat with a list of their scientists studying pelagic fishes. Science Board recommends the Secretariat complete the WG 3 inventory and place it on the PICES Home Page.

c. Participation at Scientific Meetings (*95/S/3,4*)
The Secretariat drafted the schedule for the PICES Sixth Annual Meeting based on recommendation to spread out business and scientific meetings and circulated it to the members of Science Board. The version published in the final announcement and placed on the PICES Home Page takes into account all provided comments. Science Board reviewed participation in business meetings and found that the scheduling results in good participation.

In the beginning of September all contributors were notified on the acceptance of their papers for oral or poster presentation. They were requested to confirm by Sept. 19 if they will be able to

attend the meeting to present their paper or, in case of the poster presentation, to provide the Secretariat with the name of an associate who will be responsible for the paper. Science Board reviewed the process and recommended that the latter practice be discontinued.

Science Board stated that authors are encouraged to provide extended abstracts and they must bring at least 50 copies. Science Board requests the proposed Publication Study Group be given the task to consider ways to increase compliance with making available extended abstracts before presentation of their paper.

d. Application of PICES Guidelines for oral and poster presentation (*95/S/9*)
Guidelines for oral and poster presentations were sent to all contributors together with a letter of acceptance.

e. Best Presentation Awards
Science Board recommends continuing the Best Presentation Award practice having one award for each Scientific Committee and one for Science Board. The Secretariat should find funds ($50-70 CND per award) to support this practice.

The Best Presentation Award for the Science Board/BASS Symposium was awarded to Dr. Paul J. Harrison (Canada) for the paper entitled "Phytoplankton dynamics in the northeastern subarctic Pacific Ocean: bottom-up and top-down model".

Implementation of 1996 Science Board Decisions

a. Committee Membership (Annual Report 96, p.31)
Dr. Tsutomu Ikeda (Japan) was re-appointed to BIO Committee, but Dr. Timothy R. Parsons (Canada) on BIO Committee was replaced by Dr. Paul J. Harrison. Dr. George L. Hunt (U.S.A.) was appointed to REX Task Team and Dr. Linda Jones (U.S.A.) to MODEL Task Team.

b. High Resolution Bathymetry for PICES Region (Annual Report 96, p.31)
The Secretariat sent a letter to the U.S. Delegates requesting assistance to identify an appropriate contact in U.S. agencies to obtain access to high-resolution bathymetric data in the PICES region. The response indicates that the U.S. program dealing with bathymetric data is the NOAA National Geophysical Data Center (NGDC). The NGDC maintains a comprehensive bathymetric data set for public use that can be obtained in digital format on CD-ROMs at a nominal cost.

c. Book on Complex Studies of the Okhotsk Sea Ecosystem (Investigations on the Ecosystem of the Okhotsk Sea) (Annual Report 96, p.31)
The Secretariat contacted VNIRO to obtain figure legends and table headings from this book so that they can be translated into English, but was informed that VNIRO prefers to translate the whole book with some financial support from PICES. The Secretariat requested and received abstracts for all papers included in the book and estimated a cost of publication.

Science Board considered the proposal and referred it to the proposed Publication Study Group.

d. Relations with other Organizations (Annual Report 96, p.30)
SCOR WG 105 (see Implementation of PICES V Decisions, item e.)

PICES co-sponsored the ICES Symposium on the Role of Physical and Biological Processes in the Recruitment Dynamics of Marine Population. The Symposium was held September 22-24, 1997, in Baltimore, Maryland, U.S.A. Dr. Dan Ware represented PICES on the Scientific

Advisory Committee for this ICES Symposium.

PICES Seventh Annual Meeting

The Seventh Annual Meeting will be held in Fairbanks, Alaska, U.S.A. in October 1998. The program of the meeting will include sessions of invited and contributed papers organized by the indicated committees on the following topics (see *Endnote 7* for proposal):

a. **Science Board Symposium**: "The impacts of the 1997/98 El Niño event on the N. Pacific Ocean and its marginal seas". Co-Convenors: Howard J. Freeland (POC, Canada), William Peterson (BIO, U.S.A.) and TBD (FIS). The symposium should include reports on the changes of the physical and chemical environments, and the resulting impacts on the biological system including the entire ecosystem from the plankton to the commercial fisheries.

   As the papers presented in PICES VII on the subject of the 1997/98 El Niño will, of necessity, be of a preliminary nature, another symposium was proposed as a means to expose data sets to public view and to encourage partnerships and co-operation among the PICES scientists. Science Board recommends that Drs. Paul H. LeBlond and Warren S. Wooster investigate opportunities to sponsor a major symposium on the 1997/98 El Niño in 1999 or 2000 in cooperation with other international organizations. The group will report to the Science Board Chairman and decision will be taken at the next Annual Meeting. Following the second symposium a volume of proceedings should be produced that will document the impact of the El Niño event on the regions of interest to PICES Nations.

b. **Topic Sessions**
   BIO Topic Session: "Controlling factors for lower trophic levels (especially phytoplankton stocks)"; Co-Convenors: Vera Alexander (U.S.A.), Akira Taniguchi (Japan) and Paul J. Harrison (Canada);

   POC Topic Session: "Decadal variability of the North Pacific climate"; Co-Convenor: James E. Overland (U.S.A.) and Masahiro Endoh (Japan);

   POC/BIO Joint Topic Session: "CO_2 in the North Pacific"; Co-Convenors: Shizuo Tsunogai (Japan) and C.S. Wong (Canada)

   MEQ Topic Session: "Science and technology for environmentally-sustainable mariculture"; Convenor: John E. Stein (U.S.A.)

   MEQ/BIO Joint Topic Session: "Contaminants in high trophic level biota - linkages between individual and population responses"; Co-Convenors: Richard F. Addison (Canada) and Linda Jones (U.S.A.)
   FIS/CCCC Joint Topic Session: "Climate change and carrying capacity of the North Pacific: recent findings of GLOBEC and GLOBEC-like programs in the North Pacific"; Co-convenors: Anne B. Hollowed (U.S.A.), Ian Perry (Canada) and Takashige Sugimoto (Japan).

c. **Workshops and Working Group Meetings just prior to PICES VII**
   REX Symposium/Workshop (2 days): "Small pelagic species and climate change in the North Pacific Ocean". Steering Committee: Douglas Hay (Canada), Qi-Sheng Tang (China), Tokio Wada (Japan), J. Kim (Korea), Vladimir I. Radchenko (Russia) and L. Jacobson (U.S.A.); This Symposium/Workshop should be held in cooperation with GLOBEC-SPACC.

   MODEL Workshop (2 days): "Lower trophic level modelling follow-up workshop". Co-Convenors: Sinjae Yoo (Korea) and Richard Dugdale (U.S.A.);

   Working Group 8 Meeting (2 days);
   Working Group 11 Meeting (4 days);

Working Group 13 Meeting (2 days);
Working Group 14 Meeting (2 days)

d. **Annual Meeting Schedule**
Science Board and the Secretariat discussed the 1998 Annual Meeting schedule and agreed that the Committee business meetings should be scheduled Thursday afternoon October 22. The CCCC/IP meeting should be scheduled the morning of October 22.

Intersessional Meetings

Science Board reviewed the proposed intersessional meetings and made recommendation (see Decision ***97/S/1***). The following meetings are to be convened:

a. The MODEL Task Team Workshop on lower trophic level physiological process models should be held March 4-6, 1998, at the Bay Conference Center, Tiburon, CA, U.S.A. Co-convenors: Sinjae Yoo (Korea) and Richard Dugdale (U.S.A.).

b. The second 4-day Okhotsk Sea Workshop should be held in November 1998 in Nemuro, Japan. Co-Convenors would be Yutaka Nagata (Japan), Vyacheslav B. Lobanov (Russia) and Lynne D. Talley (U.S.A.).

c. MEQ Practical Workshop should take place for approximately two weeks in May/June 1998, in the Jiaozhou Bay (Quindao, China) or in September 1998, in the Masan Bay - Chinhae Bay region (Korea). Science Board recommended that the Chairman send letter to the Ministry of Agriculture and the State Oceanographic Administration (China) requesting approval for the Chinese Academy of Sciences to host the Workshop at the Institute of Oceanology at Qingdao. In the event that appropriate approval is not received by January 31, 1998, PICES should accept an offer from Korea to host the Workshop in the Masan Bay - Chinhae Bay region.

d. The 4-day meeting of WG 12 should be held in the western side of Pacific, a suitable location for this meeting would be determined by the WG Co-Chairmen in consultation with Chairman of Science Board and PICES Secretariat.

Relations with Other Organizations and Programs

a. The Secretariat reported that Governing Council has approved (*94/A/3*) a standing list of Organizations that are officially invited to participate in PICES activities. Letters inviting attendance at the Annual Meeting are sent by the Secretariat to these Organizations each year. Science Board recommends that Council expands the PICES Standing List to include Inter-Governmental Organizations and national and international research Programs, whose activities are of interests to PICES (see ***97/S/2d***, Appendix D).

b. Science Board reviewed a draft MOU with ICES prepared jointly by PICES and ICES Secretariat and recommends its approval by Council (see ***97/S/2a***).

   Science Board recommends that the Secretariat explore the possibility of developing a MOU with IPHC (see ***97/S/2b***).

c. PICES received three requests on co-sponsorship and financial support: on the International Symposium on Oceanic Fronts and Related Phenomena, on the Sixth International Congress on History of Oceanography and on the International Symposium on Management and Mitigation of Harmful Algal Blooms. Science Board reviewed all requests and recommends no financial support.

   Proposal of FIS Committee that PICES co-sponsors the ICES-NAFO Pandalid Shrimp Symposium in 1999 was discussed and Science Board recommends that PICES

sponsor the symposium without funding (see ***97/S/8***).

Discussion on this matter led to recommendation that the Secretariat in consultation with Science Board will develop Guidelines for co-sponsorship of conferences over the next year for consideration and approval by Governing Council at PICES VII.

d. Science Board recognises the scientific value of CREAMS and its achievements on the ocean environment and climate change and sees it as a successful example of international cooperation among PICES member countries, and strongly supports CREAMS-II in 1998-2002 as its continuation. Science Board recommends Governing Council endorse CREAMS-II as a valuable component of research programs within the PICES framework. Science Board recommends that the Chairman write a letter accepting the CREAMS proposal to hold a workshop in conjunction with PICES VII. The letter should include a request to send a POC member, as an observer to the CREAMS planning meeting in February 1998 as PICES is interested in the direction of the research. The observer would report the results of the meeting to PICES (see ***97/S/2e***).

e. Science Board discussed the proposal by the Chairman of the Committee on Scientific Research and Statistics (CSRS) of the North Pacific Anadromous Fish Commission (NPAFC) to add fisheries catch statistics of non-anadromous fish to the NPAFC statistical yearbook. Science Board considered the NPAFC proposal regarding fish statistics and recommended that Council respond positively, indicating that after conclusion of a MOU, the two organizations should jointly work out requirements and procedures for developing a statistical database (see ***97/S/2c***).

Proposed Travel

Science Board recommends Governing Council to approve financial support for the following scientists to participate in international meetings on behalf of PICES (see ***97/S/7a***):

i. Dr. Chang-Ik Zhang (FIS Chairman) - SCOR WG 105 meeting in Hobart (Australia) in January 1998;
ii. Ms. Patricia Livingston (CCCC IP Co-Chairman) – First GLOBEC Open Science Meeting in Paris (France) in March 1998;

Science Board recommends to Council that the following requests for support be considered among others that may arise (***see 97/S/7b***):

i. two invited speakers for the Second Okhotsk Sea Workshop in Nemuro in November 1998;
ii. one Chinese scientist, one Russian scientist and one non-PICES expert for the MODEL Workshop in California in March 1998;
iii. two invited speakers for the POC Topic session at the PICES VII Annual Meeting;

PICES Publications

a. Science Board reviewed a list of proposed publications and made recommendation (see Decisions ***97/S/3***).

b. Science Board reviewed the proposal of the CCCC Implementation Panel to initiate a new peer-reviewed scientific report series of PICES and proposal of POC to set translation policies for PICES and led to conclusion that PICES should create a Publication Study Group with the following terms of reference:
   1. Review questions of publication policy;
   2. Review questions of translation policy;
   3. Review desirability of establishing a peer review publication;
   4. Review desirability of establishing a PICES editorial board; and
   5. Review other matters concerning PICES publications.

   Members of the Publication Study Group, which should report to PICES VII, are Drs.

Warren S. Wooster (Chairman), William G. Doubleday, Makoto Kashiwai, and Paul H. LeBlond.

PICES-GLOBEC CCCC Program Implemen-tation Panel

The proposed statement of purpose, terms of reference and structure for the Implementation Panel were discussed, accepted by Science Board and recommended to Council for approval (see Decision ***97/S/6a***, Appendix C (i)-(iii) to Council minutes).

New Technical Committees and Working Groups

Science Board discussed the future of the existing Working Groups and the proposed new Working Groups and Task Teams and made recommendations to Council (see Decisions ***97/S/4, 97/S/5*** and ***97/S/6b,*** Appendix B (i)-(iii) and Appendix C (iv) to Council minutes).

Data Management for CCCC Program

Science Board recommends that the TCODE Chairman and one of the CCCC/IP co-chairmen draft a letter to each of the national GLOBEC programs in the PICES area to determine the status of their data management and exchange policies.

Preparation for Election of Science Board and Committees Chairmen

At PICES VII, October 1998, Chairmen of Science Board, BIO, MEQ and POC will be replaced. Science Board proposed that all Chairmen prepare a draft of a review of activities during his/her term of office and a proposal of strategic workplan for the next three years by intersessional communication for discussion at PICES VII prior to the election of new Chairmen. The discussion and revision of the strategic workplan should be completed during the Committee meeting and be reported to the Science Board for approval.

Science Board Recommendations

Discussion of Scientific and Technical Committee, Working Group and the CCCC Implementation Panel reports along with other issues considered led to a set of Recommendations for presentation to Council for approval (see Appendix to Council minutes, Decisions of Council).

Scientific Program

An interdisciplinary one-day BASS Symposium was organized by the Science Board to review contemporary knowledge of physical forcing and ecosystem response at all trophic levels, with a view to exploring the differences in response on the two sides of the Pacific. The following papers were presented and Dr. Paul Harrison won the Best Presentation Award for this session.

Ecosystem dynamics in the eastern and western gyres of the subarctic Pacific. Co-convenors: Richard J. Beamish (Canada), Suam Kim (Korea), Makoto Terazaki (Japan) and Warren S. Wooster (U.S.A.).

Y. Sekine
: On the variation in subarctic circulation in the North Pacific.

P.J. Harrison, P. Boyd, S. Takeda, D.E. Varela & T. Odate
: Phytoplankton dynamics in the northeastern subarctic Pacific Ocean: bottom up and top down control.

M.J. Kishi & B.W. Frost
: Ecosystem dynamics in the eastern and western gyres of the subarctic Pacific - lower trophic modelling.

A Taniguchi
: Possible differences in structure at lower trophic level of ecosystems in the eastern and western subarctic Pacific.

D.L. Mackas & A. Tsuda
: Mesozooplankton in the eastern and western subarctic Pacific: community structure, seasonal life history, and interannual variability.

R.D. Brodeur, S. McKinnell, K. Nagasawa, W. Pearcy, V.I. Radchenko & S. Takagi
Epipelagic nekton of the North Pacific subarctic and transition zones.

R.J. Beamish & K.D. Leask
Midwater fishes of the North Pacific gyres: their ecology, distribution and abundance.

A.M. Springer, V.P. Shuntov, V. Vladimirov, A. Kuzin, A. Perlov & J.F. Piatt (presented by G. van Vliet)
Marine birds and mammals of the western and eastern subarctic gyres of the North Pacific).

Endnote 1

Participants

Makoto Kashiwai (Chairman, Science Board)
Tsutomu Ikeda (Acting Chairman, BIO)
Chang-Ik Zhang (Chairman, FIS)
Richard F. Addison (Chairman, MEQ)
Paul H. LeBlond (Chairman, POC)

Other
Robin Brown (Chairman, TCODE)
Yutaka Nagata (Co-Chairman, CCCC/IP)
Patricia Livingston (Co-Chairman, CCCC/IP)
Bruce A. Taft (Chairman, WG 9)
William G. Doubleday (Chairman, PICES)
Warren S. Wooster (Chairman ex officio, PICES)
W. Doug McKone (Exec. Secretary, PICES)
Alexander Bychkov (Asst. Exec. Secretary, PICES)
Lev N. Bocharov (Russia)
Satsuki Matsumura (Japan)
Igor Shevchenko (Russia)

Endnote 2

Science Board Agenda
October 19 and 25, 1997

1. Welcome and Opening Remarks
2. Adoption of Agenda and Timetable
3. Tasks for Scientific and Technical Committees agendas
4. Handbook for Chairmen and Convenors
5. Reports of the Scientific and Technical Committees, CCCC-IP/EC and Working Groups
   - 5.1. Fishery Science Committee
   - 5.2. Physical Oceanography and Climate Committee
   - 5.3. Biological Oceanography Committee
   - 5.4. Marine Environmental Quality Committee
   - 5.5. Implementation Panel on CCCC
   - 5.6. Technical Committee on Data Exchange
   - 5.7. Working and Study Groups
     - 5.7.1. Working Group 9 on Subarctic Monitoring
     - 5.7.2. Study Group on PICES Communications
6. Reports and Recommendations on Implementation of PICES V Decisions
   - 6.1. PICES-GLOBEC CCCC Program (*96/S/1*)
   - 6.2. Publications 1996-1997 (*96/S/2*)
   - 6.3. PICES Inter-session Meetings 1996-1997 (*96/S/3*)
   - 6.4. Implementation of WG 9 Recommendations (*96/S/4*)
   - 6.5. Cooperation with SCOR: WG105 (*96/S/5*)
   - 6.6. PICES Perspectives, Interagency coordinating mechanism (96/S/6)
   - 6.7. Access for Cooperative Research (96/A/8)
7. Reports and Recommendations on Implementation of PICES IV Decisions
   - 7.1. Geographic Features of the Okhotsk Sea Region (95/S/3)

7.2. Completion of WG 3 Inventory (95/S/6)
7.3. Participation at Scientific Meetings (95/S/3,4)
7.4. Application of PICES Guidelines for oral and poster presentation (95/S/9)
7.5 Best Presentation Awards

8. Reports and Recommendations on Implementation of 1996 Science Board Decisions
   8.1. Committee Membership (Annual Report 96, p.31)
   8.2. High Resolution Bathymetry for PICES Region (Annual Report 96, p.31)
   8.3. Book on Biological and Fisheries Aspects of the Okhotsk Sea (Investigations on the Ecosystem of the Okhotsk Sea) (Annual Report 96, p.31)
   8.4. Relations with other organizations (Annual Report 96, p.30)

9. Proposed Scientific Sessions and Symposia for PICES Seventh Annual Meeting
   9.1. Science Board Symposium
   9.2. Topic Sessions
   9.3. Schedule 1998 Annual Meeting

10. Planned and Proposed Future Meetings / 1998-1999
    10.1. Plan of and preparation for meetings / Decisions 1996 MODEL Task Team Workshop (early 1998, California, U.S.A.)
    10.2. Okhotsk Sea Workshop (June 1998, Nemuro, Japan) [POC and CCCC-IP]
    10.3. MEQ Practical Workshop (spring, Qingdao, China) [MEQ]
    10.4. Proposed future meetings / for Decisions 1997

11. Reports and Recommendations on Relations with Other Organizations and Programs
    11.1. Cooperation with international research programs (96/S/6)
    11.2. Memorandum of Understanding with
        11.2.1. International Council for the Exploration of the Sea
        11.2.2. International Pacific Halibut Commission
    11.3. Policy for co-sponsorship of conferences and response to the funding requests for conferences
    11.4. Proposed Travel

12. Proposed PICES Publications / 1997-1998
    12.1. Bering Sea Review Volume
    12.2. BASS-97 Symposium
    12.3. REX-97 and MODEL-98 Workshops
    12.4. Working Group 9 Report
    12.5. Working Group 10 Report
    12.6. Working Group 11 Report
    12.7. Working Group 12 Report
    12.8. Communication Study Group Report
    12.9. Multilingual Nomenclature in the Okhotsk Sea Region
    12.10. Investigations on the Ecosystem of the Okhotsk Sea (translation from Russian)
    12.11. PICES Handbook and Handbook for Chairmen and Convenors
    12.12. PICES Press and PICES CCCC Newsletters
13. Proposed new Technical Committees and Working Groups
14. Data Management for CCCC Program
15. Preparation for Election of Science Board and Committees Chairmen
16. Summary of Science Board recommendations to Governing Council
17. Closing remarks

Endnote 3

Composite Agendas of Scientific and Technical Committee Meetings

Technical Committee on Data Exchange
October 18, 09:00-17:30; October 23, 13:30-17:30

1.1 Introduction of members
1.2 Review of PICES meeting plan/TCODE meeting objectives
Review TCODE meeting times
Meetings of other committees and Issues (assign individuals to report back); requirements for Science Board meeting
Annual Report
Recommendations for Science Board
Review relevent activities in other committees and Working Groups
1.3 Approval of Agenda and addition of New Items
1.4 Review of Progress on issues from last year
1.4.1 Inventory of Long Time Series
1.4.2 Other Internet Resources
1.4.3 Communications Study Group
1.5 Bering Sea Metadatabase (Megrey)
1.6 MIRC - new agency in Japan
1.7 Data Management for CCCC Program
1.8 New business
1.9 Work Plan for 1997/1998
1.10 Recommendations to Science Board

Physical Oceanography and Climate Committee
October 22, 08:30-17:30

1. Welcome to new members
2. Approval of agenda
3. Minutes of last meeting
4. Business arising from last year's meetings: (pp 107-110 in last year's annual report)
   a. WOCE Pacific Workshop publication
   b. State of the Ocean
   c. Bathymetry information
   d. Other
5. Okhotsk Multilingual Nomenclature (Nagata and Lobanov)
6. WG 10 Report (Byun and Mooers)
7. Sea of Okhotsk Symposium in Nemuro (Nagata)
8. The future of WG 9 - disband or create a permanent committee?
9. Training courses on marine data and information management (Martynov)
10. Brochure with possible title "Application of Satellite Remote Sensing over the North Pacific" (Martynov)
11. Trans-Pacific Kuroshio-Oyashio influences - how to address? As WG? As part of CCCC- BASS?
12. 1998 Symposium Topic
    - POC/BIO session on CO_2 in the N. Pacific?? (Tsunogai)
    - The 97/98 El Niño in the North Pacific?? (Freeland)
13. New Working Group topics - WG on CO_2 (and other tracers?) in the N. Pacific?? (Tsunogai)
14. Organization of scientific presentations.
15. Other topics
16. Draft of report to Science Board.

Fishery Science Committee
October 22, 13:30-17:30

1. Discussion and approval of agenda of FIS Committee meeting
2. Review of the implementation of PICES V decisions
   2.1 Review and comment the WG 12 Report
   2.2 WG 3 Inventory
   Russian member of FIS should provide the names of their scientists working on pelagic species to complete WG 3 inventory (95/S/6)
3. Scientific items of the interests
   3.1 Review the scientific activity in the CCCC Program and the reports of REX, BASS and MODEL
   3.2 FIS role in the CCCC Program and the international GLOBEC members should identify the main scientific activities which are related to the CCCC Program and the international GLOBEC
   3.3 SCOR WG 105 activity

3.4 Review the work of PICES WG 12, and discussion of the WG recommendation for the next year
3.5 Relationship with regional fisheries organizations or commissions
3.6 Possibility to establish another working group

4. Proposals for the session topic for PICES VII
5. Discussion of Best Presentation Award from FIS
6. Discussion of any other arising issues

Marine Environmental Quality Committee
October 22, 13:30-17:30

1. Welcome and introduction of members
2. Minutes of previous meeting (Nanaimo)
3. Report of WG 8 meeting (Pusan)
4. Discussion of Qingdao Practical Workshop
   a. scientific aspects
   b. funding implications
5. Report on MEQ Scientific Session (Pusan)
6. Report on Joint BIO/MEQ Scientific Session (Pusan)
7. Input of long time series data to TCODE
8. Any other business

CCCC Program/Implementation Panel
October 21, 13:30-17:30

1. Task Team Progress Reports
   - 1997 accomplishments
   - 1998 planned activities
   - Progress towards meeting implementation plan goals
2. Status of cooperation with other programs
   - IPHC
   - ICES GLOBEC
   - IGBP GLOBEC
   - NPAFC
3. Proposals for CCCC Program changes/updates
   - Structure (Terms of reference, new Task Teams, executive committee & task team composition)
   - implementation plan revision (content, target dates for phases)
   - Use of CCCC time at Annual Meeting
   - more science content?
4. Communication
   - CCCC newsletter (proposed outline attached)
   - PICES CCCC web page content
   - history ,description, and terms of reference of CCCC Program
   - current composition of the group
   - task team reports
   - Science plan/implementation plan
   - updated regional program tables (update frequency?)
   - upcoming events
   - articles for other GLOBEC newsletters
5. Presentations
   - PICES CCCC Data Management and Exchange - Robin Brown (TCODE)

Endnote 4

Handbook of Guidelines

I. Introduction

The primary purpose of this Handbook is to describe the duties and responsibilities of Chairmen and Convenors of the various Scientific Committees, Groups, Symposia, Topic and Paper sessions and any other meetings established, organized, or sponsored by the North Pacific Marine Science Organization (PICES). Further, a secondary purpose is to briefly specify the function and composition of these Committees and Groups. The Handbook is intended to identify necessary tasks and working procedures, assist in the efficient organization and completion of tasks (including the conduct of meetings) and, as a result, help facilitate, improve, and enhance the work of the Organization. These Committees and Groups include Science Board, Scientific and Technical Committees, Working and Study Groups, Task Teams and various other expert groups set up by the Governing Council.

Some of the responsibilities and functions of the Committees and Working Groups and their Chairmen are defined in the Council's Rules of Procedure. These Rules can only be changed with the agreement of Council by giving two months notice or agreement of Council (Rules of Procedure 20). Proposals must be submitted as a recommendation to Council at the Annual Meeting, which, if accepted, would take effect upon adoption, by the Council.

II. Science Board

The Board consists of the Chairmen of the permanent Scientific Committees together with a Chairman elected by the Board (Rules of Procedure 14(i), 16(iii)) for a three-year term from among the Delegates, Alternate Delegates, experts, and advisors (Rules of Procedure 14 (i)). Parties to the Convention not represented on the Committee can appoint a member. The Science Board has the responsibility to provide the Council with recommendations on various aspects of scientific interest and carrying out the Council's scientific work including giving guidance to the Scientific Committees and Groups. The Science Board shall:

1. Have general oversight over:
    a. the scientific interest of Council and its scientific works;
    b. the programs of research recommended by Council;
    c. the arrangements for carrying out Council's scientific work and the programs of research recommendations or coordinated by it; and
    d. the arrangements for discussing all the foregoing matters at the Council's meetings, including the organizing of special scientific meetings.

2. Be responsible for advising Council on all matters mentioned in sub-paragraph (1).

3. Give guidance as it may deem necessary to Scientific Committees and Groups as to the performance of their functions.

4. Review and make recommendations to Council concerning proposed transmittal of scientific advice to Parties to the Convention or an international body that requested such advice.

5. Consider at each Annual Meeting of Council the reports from all the scientific and *ad hoc* Committees and Groups and report thereon to the Council with special reference to any expenditures involved; and

6. Advise Council on publications subject to the availability of funds.

(See Rules of Procedure 14 (ii) a, b, c, d, e, and f for more details).

Annual Meeting

1. Chairmen of Scientific and Technical Committees, Working Groups that report to Science Board, and Scientific Programs such as the CCCC shall prepared the following information for the Science Board meeting:
    a. a summary report that includes highlights of their meeting which have been reviewed by the members;
    b. an annual report be prepared and circulated to members for final review and comment by the end of the Annual Meeting. The revised report should be provided to the Secretariat no later than one month after the Annual Meeting;
    c. a draft of all proposed recommendations to Council that will be included in the Science Board report;
    d. proposed Topic and Paper sessions and Symposia for the next Annual Meeting that includes a short paragraph of the goals of the sessions suitable to be put in the First Announcement;
    e. a proposed list of future scientific and Working Group meetings that includes time and venue;
    f. a proposed list of PICES publications for the next year;
    g. a proposed list of any new special groups along with terms of reference;

and

h. draft text for any other items that would be expected to form part of the text of the Science Board report.

2. The Secretariat in conjunction with the Science Board Chairman will develop a draft outline for the Science Board Report based on the agenda, no later than one month before the Annual Meeting. The outline would be circulated to all SB Members for review and comment. A second draft of the report based on information provided to the Secretariat from the various meetings of all the Committees, Programs (CCCC) and Science Board Working Groups during the Annual Meeting will be circulated at the start of the SB meeting as a focus for discussion. Chairmen must give the Secretariat draft material as soon as possible (i.e. preferably 2 days before but no later than the morning before the SB meeting) to put into the draft outline of the SB Report.

3. During its final meeting, Science Board will review, approve and submit the report to members of Council (i.e. 0830 the next morning) for their review in preparation for the Council meeting in the afternoon.

III. Scientific and Technical Committees

There are currently four Scientific Committees and one Technical Committee (see Appendix 1). Each Scientific Committee elects a Chairman from amongst its members for a period of three years. The Chairman takes office at the conclusion of the Annual Meeting at which elected. Each Party to the Convention appoints no more than three members to a Scientific Committee and two members to a Technical Committee.

The Committees are responsible for keeping under review and coordinating scientific investigations in the subject or area defined by the Committees responsibility. The Chairman's responsibility involves:

1. Chairing meetings.

2. Preparing agenda for meetings.

3. Communicating with Committee members and ensuring that work is carried out in accordance with the program and to obtain records thereon.

4. Compiling a general review of the work done and results achieved.

5. Annually furnishing Science Board with a summary report of the Committee's deliberations and recommendations together with an annotated estimated of their financial needs.

(See Rules of Procedure 16, 17 and 18 for more details).

The Secretariat maintains a current list of members of each Committee. The Chairman is informed whenever a Party to the Convention appoints or replaces members to a Committee

IV. Working Groups

A Working Group (WG) is a group of experts that is established with specific terms of reference, by Council, based on the recommendation of Science Board. Most WGs report to Scientific Committees, other directly to Science Board. Most WGs meet annually to undertake specific tasks within their terms of reference. Each Party to the Convention decides on the names and number of scientists that it wishes to appoint as members. Science Board selects the Chairman from among its members and he/she serves in the position for the duration of the WG. The Secretariat maintains a current list of members of each Working Group. The Chairman is informed whenever a Party to the Convention appoints or replaces members to a Working Group. The Working Group:

1. Normally functions for not more than three years.

2. Makes a progress report at the Annual Meeting.

3. Prepares a final report at the end of its task.

4. Maintains close contact with the parent committee to ensure the task is undertaken as envisioned.

The responsibility of the Chairman is to ensure that the specific task assigned to the WG by Council is carried out. This involves:

1. Making plans for meetings of the Group including preparation of an agenda and work schedule in consultation with the other members.

2. Chairing meetings.

3. Annually, overseeing the preparations of the Group's report to its parent Committee.

V. Scientific Programs

The guidelines for the CCCC Program are being developed over the next year.

VI. Membership and Elections

1. The Parties appoint members in Scientific Committees, Working Groups and Technical Committees. The official membership of each Scientific Committee is limited to three per Party and two for each Technical Committee. Working Group membership is not limited.

2. The members of Scientific Programs and other Groups are suggested by Science Board and appointed by the Parties.

3. The Chairman of Science Board is elected by the Board from amongst the Delegates, Alternate Delegates, experts, and advisors and shall not seek re-election for the immediate succeeding term.

4. Chairmen of Scientific Committees are elected from amongst their members. Chairmen shall not seek re-election for the immediate succeeding term.

5. Science Board in consultation with the Chairman of Council appoints the [first] Chairmen of Technical Committees, Working Groups, Scientific Programs and Other Groups from among the members of such Groups. [Succeeding Chairmen are elected from among the members.]

6. Chairmen of Science Board, Scientific Committees, Technical Committees and Scientific Programs and other Groups serve three years terms and take office immediately following the Annual Meeting in which they are [elected or appointed.]

7. The Chairmen of Working Groups serve for the life of the Group, which usually does not exceed three years.

8. The Executive Secretary is responsible for carrying out the election of all Chairmen at the Annual Meeting in which the term of the incumbent ends. Nominations will be called for election of Chairman and a secret ballot will be used when more than one candidate stands for the office. The Executive Secretary will count the votes and inform the members of the winning candidate.

9. Except in the case of Science Board elections, members from any Party have only one single vote among them for candidates in the election.

VII. Scientific Sessions

1. Scientific sessions are organized by Scientific Committees and by Science Board. In the case of the Scientific Committees, they consist of invited and/or contributed papers on topics selected by the Committee (Topic Sessions) or contributed papers (Paper Sessions) relevant to the interests of the Committee. Sessions of one

Committee are often scheduled in parallel with those of another. Scientific sessions organized by the Science Board are usually on selected topics deemed to be of interest to all committees and are usually scheduled without competition from other sessions.

2. Scientific Committees have the responsibility to organize sessions they sponsor, including designation of convenors for their Topic Session. Committee Chairmen normally convene their Paper Sessions or designate other Committee members to undertake this responsibility.

3. Convenors of Topic Sessions have the responsibility to select papers for oral or poster presentation and schedule papers for those sessions; contributed papers to the Paper Sessions assigned to the Committee are selected for oral or poster presentation and are scheduled by the Committee Chairman. Science Board has the responsibility to organize sessions it sponsors, including designating the Convenors who select and schedule papers for oral or poster presentation for those sessions.

4. Convenors should be identified and their names and method of contact given to the Secretariat as soon as possible preferably within one month after the end of the Annual Meeting.

5. Convenors in consultation with the parent Scientific Committee, provide the Secretariat with the names and method of contact for special invited speakers (currently one for SB and one each for each of the four Scientific Committees) who are to receive PICES financial support. These scientists should be selected based on the premise that they will present an important paper at a Symposium or Topic Session and make a major contribution to the meeting. They should not be scientists that would normally be expected to attend PICES meetings, as their interests are not in the northern North Pacific.
6. Copies of contributed abstracts are to be sent to the Secretariat preferably through the PICES Home Page, e-mail or by fax. Mail should only be used as a last resort. Speakers must provide the Secretariat with abstracts of their presentation before July 1.

7. Convenors must notify the Secretariat of invited speakers to their Topic Session by July 1. Invited speakers should submit an abstract to the Secretariat preferably through the PICES Home Page, e-mail or fax before the end of July.

8. Copies of the abstracts are sent by the Secretariat to the Convenors of Topic Sessions or to the Chairmen of Scientific Committees, as appropriate. The Chairman of Scientific Committees will also receive a list of the Topics Session papers, as appropriate. Science Board Chairman will receive copies of abstracts submitted for Science Board Sessions plus a list of all abstracts received for the Scientific Sessions, that indicates where copies have been sent.

9. All speakers are to provide a designated number of extended abstracts at the time of their talks.

10. The Secretariat will notify the lead author of the acceptance of the paper for oral or poster presentation, and the author is required to confirm (by a certain date) that he/she will attend the meeting to present the paper. Authors of posters will also be required to confirm (by a certain date) whether they or someone acting on their behalf will come to present their poster.

11. Upon receipt of those who will attend the meeting to present their papers orally or by poster, the Secretariat will notify Convenors of Topic Sessions and Committee Chairmen of the results and given a few days to make

any adjustments in their schedules prior to publication in the program.

VIII. Oral and Poster Presentations

1. Introduction

This set of guidelines is developed to promote effective international and interdisciplinary understanding among PICES members who come from different cultures and speak different native languages. Scientists who present papers at meetings have a responsibility to present their information in a way that is easy for the audience to understand.

The guide provides advice and observations on preparing and delivering a scientific presentation at PICES meetings. The focus is on both invited and contributed talks. Studies show that we retain much more of what we see than what we hear and we best retain what we see and hear together. A speaker brings his subject to life for the audience through personal involvement and familiarity with it. Thus, if a scientific talk presents a balance of visual and verbal stimuli, the audience is in the best position to absorb and retain the information presented.

2. Preparation

a. It is very important to the success of the program that authors develop a talk that can be given in the allotted time. Once the presentation has been drafted, authors should rehearse and refine the talk to ensure the central theme is being clearly presented in the allotted time. The more you practise and adjust the talk to fit the time allowed, the better chance that the audience will understand the talk. Remember convenors are entitled to hold speakers to their assigned times.

b. When preparing a talk, consider that you must speak slowly and clearly to be understood. Remember that even a native English speaking audience may find it difficult to follow a fast delivery, and it is disastrous for those whose native tongue is not English. Keep the word choice simple and active, and sentences should be short and to the point.

c. Narrow the focus rather than try to cover a large, complex topic with generalities in a short period. Even if the topic is an overview, pull out one or two of the most important points that support the generality.

d. Before you begin drafting a talk you must define the purpose and topic, and the appropriate depth and scope of the information you will present. A successful scientific talk is based on how clear the subject is presented. In preparing your presentation, ask yourself a few questions (suggestions below), the answers to which you can incorporate in the talk to help bring the subject to life and make it memorable.

   i. Why should other scientists be interested?
   ii. How can I generate some excitement for the subject?
   iii. How might scientists from other disciplines use this information?
   iv. Can I spice up the talk by adding an emphasis, illustrative story or introduce a little humor to the subject.

   The talk should stick to the topic of the submitted abstract. How well you present your material directly impacts on how well it is received.

e. The talk should present your findings sequentially with simple words:

   i. Outline the hypothesis that was tested,
   ii. Ensure that the facts presented build a clear picture of the findings,

iii. Always clearly differentiate between fact and opinion.

f. Prepare a visual piece that can be shown any time to deliver a closing message or summary. One should be able to go through this in no more than a minute or two. A brief conclusion or summary is far better than leaving your audience without a clear message. This will be most helpful if for some reason the allotted time has expired.

g. Mathematical equations and symbols do not necessarily strengthen the aim of the talk. They do slow the pace, make it hard to understand (even for experts) and create an opportunity for confusion. If equations, calculations and symbols are crucial to your talk, consider preparing an extended abstract for later study by those who request it. You can then concentrate on explaining the relevance of the mathematics and symbols. If you must use mathematics, slowly talk your audience through each equation step by step. Do not assume that the audience grasp their relevance.

h. Presenting a talk is a chance to face criticism. If you are defensive of criticism, the presentation will not likely raise interest in discussion by the audience.

Slide and Overhead Preparation

Many public speaking experts contend that visual aids ruin more presentations than they improve. The answer lies in the fact that there is a right way and a wrong way to present visual material. Visual aids are vehicles for enhancing or facilitating the understanding of the spoken word.

1. Devote each slide/overhead to a single fact, idea, or finding. Illustrate major points or trends, not detailed data. Each visual aid shown must enhance, support, exemplify and/or facilitate understanding of the material covered in the talk. Two or three facts or information points per image are best; six are considered the absolute maximum. Each slide/overhead should remain on the screen at least 20 seconds.

2. All information presented should be brief and concise. It should be presented in the most comprehensible format and edited to the minimum number of words possible. Use bold characters and the absolute minimum number of words in titles, subtitles, captions and key phrases.

3. Slides/overheads must be well designed, simple and legible to everyone in the audience. It is worthwhile to consider getting professional help to make slides and overheads. It is important to consider that if the visual aid is not visible and legible to all the audience, it isn't an aid.

   i. In most circumstances do not make slides/overheads from illustrations or tables that were prepared for publication. They are rarely satisfactory.
   ii. Use a uniform bold face type and combine upper and lower case letters. Do not use fancy fonts.
   iii. Use large type for headings and smaller type for subheadings to show relative importance.
   iv. Use contrasting colors where possible for emphasis, distinction and clarity.
   v. Legible font size of letters and numbers for slides/overheads is 24 point on letter size paper.
   vi. A good way to test your material is to stand 30 cm away for every 2.5 cm of original copy width (about 420 cm from a letter size sheet of paper). If you cannot read it at that distance, then your audience will not be able to read it either when it is projected.
   vii. Guide to charts and tables;
      - Word charts (lists) of no more than 36 words per visual piece

(maximum of six lines with six words each).
- Pie charts for percentages.
- Bar graphs (horizontal) or column charts (vertical) for comparisons and rankings.
- Column or line charts for changes over time and frequency.
- Bar graphs and dot charts for correlation.
- Generally, do not use more than one or two curves on a chart; three or four are maximum but only if well separated.
- Only use tables when it is not possible to use charts.
- Each slide/overhead table should not be more than three or four vertical columns or six to eight horizontal lines. Any more information will not be legible.
- Do not use ruled vertical or horizontal lines in a table as they distract the eye and confuse the reader in understanding the information on the slide.

4. Do not load too much visual material into a talk. Use as few slides/overheads as are really needed and can be properly discussed in the time allotted. A general rule is one for each 1-2 minutes of presentation.

Poster Sessions

Poster presentations are as important as oral presentations. Care should be taken to present the material in a clear logical manner. Many of the points made above under "Preparation" and "Slide and Overhead Preparation" should be taken into account as you develop your poster. It is recommended that you read these before developing your poster.

1. Poster boards are set up near to where coffee is served in order to provide easy access during breaks. Authors are requested to be available during these times to explain their work.

2. Provide a list of times, other than during breaks, when you would be there to provide explanation.

3. Unless otherwise notified by the PICES Secretariat posters can remain in place throughout the meeting.

4. The Secretariat will notify each author of the size of the board available. This varies from venue to venue.

Extended Abstract

1. Short abstracts are required to judge papers for oral or poster presentation. In order to facilitate understanding by participants, speakers and poster presenters are required to also provide advance copies of their presentation in the form of extended abstracts. The number of copies to be provided will be in the letter of acceptance of papers for oral or poster presentation.

2. Extended abstracts should not exceed 2,500 words plus tables and graphs. The extended abstract should include:
   a. Title,
   b. Authors name, affiliation, e-mail and mailing address,
   a. What you did,
   b. How you did it,
   c. What you found out, and
   d. What your findings mean.

3. The extended abstracts should reinforce important information, provide summaries and reading lists, and supply-supporting data such as mathematical equations, tables, graphs and detailed relational or organizational information that would help better understand your paper.

Helpful Hints

1. Do not waste time by reading visual aids to the audience instead of giving the talk.

2. Practice makes perfect so practise, practise, practise.

3. Out of consideration for other speakers, stay within the time allotted.

4. Speak slowly and clearly. Keep the word choice simple, active and sentences short. Words should reinforce the visual material.

5. Speak into the microphone towards the audience at all times. If you need to see what is being shown on the screen, have copies with you at the speaker's rostrum. If available, use a hand held microphone to give you flexibility.

6. Do not stand in front of the projection and obstruct the view of the audience from seeing your visual material.

7. Be systematic in presenting overheads. Nothing confuses an audience more than a speaker who is continually searching for overheads.

8. Use a pointer to emphasize what you wish the audience to focus on.

References

This paper draws upon guidelines used by the Oceanographic Society and the American Geophysical Union. Some points are taken from the following references:

1. Morikawa Y., Ookura, I. and Takahashi, T (1990) Skilful Preparation for Scientific Papers Presentations, Kodansha-Scientific, Tokyo. (In Japanese)

2. JIRCAS (1995): For Attractive Science Presentations, to communicate what to be presented 120%, JIRCAS Workshop No. 24, December 12, 1995. (In Japanese)

Appendix 1.

Scientific Committees

Fishery Science Committee (**FIS**)
Physical Oceanography and Climate Committee (**POC**)
Biological Oceanography Committee (**BIO**)
Marine Environmental Quality Committee (**MEQ**)

Technical Committees

Technical Committee on Data Exchange (**TCODE**)

Endnote 5

Working Group 9: Subarctic Pacific Monitoring Final Report

Previous Recommendations

At WG 9-1, 2 a number of proposals for monitoring projects were made. Some of these involved new efforts and others involved enhancements of continuing programs. A summary of the status of these projects follows.

1. Long-term measurement of exchange of water between the Bering Sea and the N. Pacific by electromagnetic measurement (conducting cable) of the southward transport of the E. Kamchatka Current through the Kamchatka Strait.

   Status: No progress.

2. Ecosystem moorings deployed in the western and eastern Subarctic Gyres to describe the dynamics of response of the

ocean and plankton populations to atmospheric forcing.

Status: JAMSTEC is designing a surface mooring to deploy in the Subarctic; the location under consideration is in the Subarctic Current in a region of high spatial variability.

3. There is a continuing XBT program to measure heat content in the Subarctic; recent decreases in sampling density (50%) threaten the usefulness of the data set. No measurements of salinity profile (XCTD) are made.

   Status: No progress on either XBT sampling rate or inclusion of XCTDs.

4. A joint USA/Japan ship-of-opportunity flow-through program to measure surface physical and chemical variables is being run between Vancouver and Tokyo.

   Status: No progress on recommendations to add a meridional track across the eastern Subtropical and Subarctic Gyres and measurement of upper-layer temperature and salinity profiles (XCTDs) along the ship tracks.

New recommendation

Gargett (1997) has presented an hypothesis relating changes in atmospheric forcing to survival of juvenile salmon during their migration after entering the ocean. It is based on the premise that there are changes in the stability of the coastal water column that mediate changes in primary productivity and higher trophic levels which govern the relative abundances of northern and southern salmon stocks. There is no data set that can be used to test this hypothesis. **Recommendation**: Occupy hydrographic sections to measure the stability distribution offshore to 150 km at a minimum of three locations along the eastern boundary (Alaska to California) with high resolution in the coastal zone.

New initiative

There is no systematic large-scale, low-frequency measurement of zooplankton abundance and species distribution in the Subarctic Pacific. A proposal has been made recently by Dr. P.C. Reid of the Sir Alistir Hardy Foundation for Ocean Science to initiate monthly tows with the Continuous Plankton Recorder in the PICES area. The Panel felt that this idea was attractive and should be evaluated by PICES. The usefulness of the data would be enhanced if the recorder could be engineered to change depth to integrate samples vertically. It would be imperative to collect ancillary environmental data, e.g. temperature, salinity, fluoresence.

Endnote 6

Report of the Study Group on Communications

1. Background

At the PICES Fifth Annual Meeting (October, 1996, Nanaimo, Canada) a Communications Perspectives report was submitted by Dr. Makoto Kashiwai to the Governing Council and Science Board (see complete text of the Communications Perspectives article in the 1996 Annual Report, p. 23-24). This report points out that *"effective communication is important to PICES because the work places of participants are widely scattered"* and *"it is important that PICES employ the developing technology in the most effective way to meet its goals and objectives"*. In response to the Communications Perspectives article, Science Board created a

Communications Study Group (ComSG) composed of Dr. Makoto Kashiwai (Science Board Chairman), Dr. Alexander Bychkov (Assistant Executive Secretary, PICES) and Mr. Robin Brown (TCODE Chairman) to review PICES communications needs and practices. The Study Group was requested to report to Science Board at the PICES Sixth Annual Meeting (October, 1997; Pusan, Korea).

2. Terms of Reference

The Communications Study Groups was not provided with detailed terms of reference. At the first meeting, the Group decided to adopt the terms of reference proposed in the Communications Perspectives document:

a. Review existing electronic communication practices and procedures within PICES.
b. Survey the electronic communication capabilities in member states.
c. Determine the communication requirements of PICES participants and identify the present problems in meeting those requirements.
d. Review technological developments of utility to PICES communications.
e. Consider ways whereby participation in PICES activities might be enhanced through an expanded communications network.
f. Develop a communication plan to meet the requirements of PICES participants and of the Organization, within the constraints of present and soon-to-be-available technology, together with estimates of anticipated costs.

3. Activities

The major activities carried out by the ComSG were:

- review of existing PICES communications policies and practices
- analysis of the PICES survey on electronic communication
- review of utilization of the PICES Web server.

The ComSG held two meetings at the PICES Secretariat and conducted the rest of the discussion by e-mail exchange. Discussion and analysis focused on the first three issues in the Terms of Reference.

4. Results

4.1 Review of existing communication practices of PICES Secretariat

4.1.1 Distribution of Reports, Newsletters and other printed information

Postage is used (i) to send non-urgent correspondence and (ii) to distribute bulky reports and printed matter (PICES Annual Reports, Scientific Reports, PICES Press, PICES Directory, Announcements & Posters for PICES Meetings, etc.).

Postage is the biggest portion of PICES communication expenditure. Postage expenses are directly correlated with activities of Committees, Working Groups and CCCC IP/EC. The percentage of postage cost relative to total communication expenditures sharply increased in 1993/94, when PICES began to publish the Scientific Report Series, and has remained reasonably constant during 1994-1997:

Table 1. Postage costs (percent of total Communication budget):

1993	1994	1995	1996	1997 (June)
33.8%	64.8%	63.2%	70.7%	~70%

Expenses are usually high in January - February and June-July due to the distribution of the Annual Report, Scientific Reports, PICES Press and information for the upcoming Annual Meeting.

As mailing costs are significant, PICES maintains two levels of mail service. Official delegates and members of Committees, Working Groups and CCCC Implementation Panel (*about 180 people*) receive all PICES reports and printed material by air mail (relatively fast, but expensive); scientists, organizations and libraries from the General Mailing List (*about 600 members*) receive documents via surface mail (slower, but cheaper). Individual scientists on the General Mailing List do not receive PICES Scientific Reports and Annual Reports automatically, but requests are welcome at the PICES Secretariat.

4.1.2 Courier Services

Courier services are used only for time-sensitive and/or confidential correspondence

for the members of Governing Council, Finance and Administration Committee and Science Board. In addition, courier service is used to deliver time-sensitive material to Annual Meeting Session Convenors when faxing would be more expensive. These constitute a very small percentage of the Communications budget.

4.1.3 Fax Communications

Fax is used (i) to send time-sensitive official documents for the members of the Governing Council, Finance a nd Administration Committee and Science Board, and (ii) to distribute specially formatted documents.

Expenses for fax communication have been declining as more PICES participants gained access to electronic mail. The decline in fax communication costs relative to total communication expenditure is shown below:

Table 2. Fax costs (percent of total Communication budget):

1993	1994	1995	1996	1997 (June)
12.9%	22.7%	17.0%	7.4%	~10%

The costs for fax communication vary significantly among PICES parties (fax rates for Canada and U.S.A. are approximately one-half the costs of faxes to China and Russia; rates for Japan and Korea are in between). Peak expenses are observed in June-August during preparation for the PICES Annual Meeting (sending of agenda and other documents for Governing Council and Finance and Administration Committee, abstracts for Convenors and Science Board members). Fax communications expenses are generally higher when PICES has meetings on the western side of the Pacific.

4.1.4 Electronic Mail and WWW

Electronic mail (E-mail) is used:

- to send all possible correspondence (including attached documents in Word, Excel, etc.)
- to distribute news related with PICES activities (including information on meetings, publications, etc.)
- for registration and abstract submission for PICES meetings.

World Wide Web (WWW) access through Web pages on the PICES WWW server is used for:

- archival information (reference materials, structure and rules of Organization, Annual and Scientific reports, etc.)
- data access information
- news distribution
- registration and abstract submission for PICES meetings
- ordering of PICES publications
- preparation and editing of documents (via ftp area)

Unlike fax and postal distribution, there are no incremental costs associated with e-mail and Internet usage by the Secretariat. The only expenses are for upgrades and maintenance of computer equipment and software. These expenses are part of the Equipment and Contractual Services budgets.

4.1.5 Conclusions and Recommendations

4.1.5.1 ComSG does not see any means of reducing postage costs without considerable effect on PICES goals, and recommends that the present policy of sending all PICES publications to all members of Council, Committees, Working Groups, and the CCCC Program be continued to foster interdisciplinary communication.

4.1.5.2 ComSG supports maintaining the higher cost air mail distribution of documents to members of the PICES Mailing List to ensure that this information is distributed in a reliable, timely and equitable manner to participants in all PICES Contacting Parties.

4.1.5.3 ComSG recommends that the Secretariat continue to "prune" the General Mailing List periodically by sending out response forms. This will help to contain the costs of mailing. Members from the PICES Mailing List should be automatically "enrolled" on the General Mailing List when appointments are ended or when Working Groups disbands.

4.1.5.4 ComSG suggests that Science Board and the Secretariat review the list of libraries that receives the complete set of PICES publications. The list should be noted on the PICES WWW server and in PICES Press. This will allow researchers to gain access to PICES publications through the closest or most appropriate sources within their country.

4.1.5.5 ComSG recommends that the Secretariat continue efforts to reduce expenditures on fax communication as participants gain access to e-mail and WWW, but there is likely little potential for further substantial cost savings. Savings in this area will come from reductions in costs for fax service and from improvements in the exchange of binary files/attachments.

4.1.5.6 ComSG supports the Secretariat's initiative of "ordering" of PICES Reports and documents through the PICES web site and through order forms distributed with PICES Press (see also recommendation 4.2.2.4).

4.1.5.7 ComSG recommends that the PICES Secretariat assemble fully electronic versions of new reports and publications to allow for "print on demand" capability of reports when the initial print run is exhausted.

4.2 PICES Questionnaire on Electronic Communications

4.2.1 Summary of the Survey Results

The PICES Secretariat distributed a questionnaire on electronic communication to all participants at the PICES Fifth Annual Meeting. The results of the survey were analysed by the ComSG, circulated to Committee Chairmen and TCODE members for comment and published in the July, 1997 edition of PICES Press (Vol. 5; No. 2). The following is a short summary of the survey results:

Most PICES participants have access to e-mail and there has been rapid improvements in access to e-mail for Chinese and Russian participants during the last year. There is limited access to WWW in China and Russia (primarily due to high costs), but the situation is changing rapidly. Exchange of binary documents is a continuing problem and the results from the survey were confusing (and often contradictory) on which e-mail systems were capable (or incapable) of exchanging binary attachments. The difficulty (and confusion) over exchange of binary attachments is probably a combinations of problems with incompatible e-mail systems and the skills of the users. An ftp (file transfer protocol) site on the PICES server might provide a "work around" for the problems of binary attachments.

An electronic bulletin board would allow users to post (and read) files and messages relating to

selected topics or subject areas. Bulletin boards can be configured with areas that are accessible to selected users (e.g. members of a Working Group) or open to all participants to both contribute and read. There was limited support for an electronic "bulletin board" function. In particular, there were few respondents who would agree to contribute to such a bulletin board. There may be more support for a bulletin board focussed on specific issues. There was support for an ftp area on the PICES server to support exchange of binary documents. The main suggestion for improving PICES electronic communication was to remove barriers to e-mail and WWW access to colleagues in Russia and China to allow fuller participation. We received suggestions that it was important to keep the contents of the PICES web server up-to-date and provide interesting content, in addition to organizational reference information.

One important result from the survey was the rapid improvements in access to e-mail and WWW for scientists in Russia and China. One of our original conclusions was that PICES should help establish the infrastructure in those countries to improve communications, but this is no longer a valid approach. The infrastructure is now in place and working in these countries and the remaining barriers are primarily due to the high communication costs. These costs may also decline significantly over the next few years.

4.2.2 Recommendations

4.2.2.1 ComSG recommends that the PICES Secretariat establish ftp area(s) for exchange of binary documents.

4.2.2.2 ComSG recommends that PICES attempt to improve the content of the PICES WWW pages. Ideas and contributions should be solicited from Science Board, other Scientific and Technical Committees, the CCCC Program and Working Groups and these groups should be encouraged to take an active role in creating and maintaining (with the assistance of the Secretariat) material in their subject area.

4.2.2.3 ComSG recommends that PICES Committees consider the potential advantages provided by an electronic bulletin board in their activities and that a pilot bulletin board be established on the PICES web server if there is sufficient interest.

4.2.2.4 ComSG recommends that the PICES Secretariat provide a summary of WWW contents and "order form" to be distributed with PICES Press to allow users with limited WWW access to request printed versions of these documents from the Secretariat.

4.3 Analysis of recent activity on PICES webserver

4.3.1 General Usage

At the request of TCODE and the ComSG, the Secretariat started to record WWW access activity. Table 4 summarizes the activity on the PICES Web Server (by country) for the period April 4, 1997 to Aug. 22, 1997 and Table 5 lists some of the most frequently "visited" documents on the PICES Web server:

Table 4. Activity on the PICES Web Server for the period April 4, 1997 to Aug. 22, 1997:

Country	**% of total "visits"**	**Comments**
Canada	30.0	Excludes "ios.bc.ca" address
China	0.2	
Japan	11.0	
Korea	0.4	
Russia	0.8	Includes ".ru", ".su" addresses
U.S.A.	25.0	Includes ".com", ".edu", ".gov", ".mil", ".com", ".net" addresses
Other	32.6	Includes "unresolved" addresses

Table 5. The most frequently "visited" or "requested" documents on the PICES Web Server:

Document	**Numbers of Requests**
Annual Meeting Schedule	291
List of PICES publications(PicesPublications.htm)	228
WWW links (www.htm)	212
Announcement of Annual Meeting (announce.htm)	211
PICES list of Meetings (meetings.htm)	186
Description of Committees (comm.htm)	154
PICES Directory (names and addresses)	141
Structure and Rules of PICES (struct.htm)	139
CCCC Program description (cccc.htm)	135
TCODE Inventory of Long Time series (lttsintr.htm)	114
PICES Administration (admin.htm)	92

4.3.2 Ordering of printed publications

Ordering of PICES publications has been available through PICES web server since Jan. 5, 1997. Forty requests were received as of September 10, 1997, from the following countries:

Canada	6	Taiwan	3
China	4	Denmark	1
Japan	5	Netherlands	1
Korea	1	Germany	1
Russia	1	UK	1
USA	16		

The distribution of requests among different publications is as follows:

PICES Scientific Reports

No. 1 (WG 3 and WG 6) 9
No. 2 (WG 1: The Okhotsk Sea and Oyashio Region) 7
No. 3 (WS on Monitoring Subarctic North Pacific Variability) 18
No. 4 (CCCC: Science and Implementation Plan) 19
No. 5 (WG 7: Modelling on the Subarctic North Pacific Circulation) 14
No. 6 (WS on The Okhotsk Sea and Adjacent Areas) 14
No. 7 (WS on Model Development, MODEL, BASS, REX Reports) 3

The PICES Papers, 1992 7
PICES Scientific Workshop, 1992 7

Annual Reports and PICES Press

1992 7
1993 7
1994 8
1995 11
1996 15
PPress 50

4.3.3 Registration and abstract submission

The PICES Secretariat implemented on-line (WWW) and electronic (e-mail) registration and abstract submission for PICES-VI.

As of September 10, 160 people had registered with 90 registrations submitted via the PICES WWW registration page (56%). The summary of WWW registrations is as follows:

Canada	6/9 (66.7%)	Korea	33/33 (100%)
China	0/12 (0%)	Russia	4/29 (13.8%)
Japan	26/41 (63.4%)	U.S.A.	21/36 (58.3%)

A total of 39 abstracts (20.6%) were submitted by WWW. The methods preferred for abstract submission are shown below:

Country	**by E-mail:**	**By Fax:**	**By WWW page**
Canada	11/14 (78.6%)	0/14 (0%)	3/14 (21.4%)
China	2/3 (66.7%)	1/3 (33.3%)	0/3 (0%)
Japan	27/41 (65.9%)	3/41 (7.3%)	11/41 (26.8%)
Korea	11/47 (23.1%)	20/47 (42.5%)	16/47 (34.4%)
Russia	57/61 (93.5%)	3/61 (4.9%)	1/61 (1.6%)
U.S.A.	12/20 (60.0%)	0/16 (0%)	8/20 (40.0%)

4.3.4 Ftp area for "group" preparation and exchange of documents

At the request of the Chairman of WG 10, the PICES Secretariat set up an ftp area on the PICES server to allow members of this Working Group to exchange binary documents.

4.3.5 Recommendations

4.3.5.1 ComSG recommends that the Secretariat encourage the use of the PICES WWW server by:

- advertising new subject areas (in PICES Press and/or via the General E-mail list)
- advising Committees and Working Groups of services and facilities that are available

4.3.5.2 ComSG recommends that the monitoring of WWW server usage be continued and that regular summary reports be prepared (every 6 months) by the Secretariat in consultation with TCODE. Additional software may be required to assist in the efficient analysis of the activity reports.

4.3.5.3 ComSGrecommends that the Secretariat by monitoring WWW access and summarizing e-mail problems encountered by the Secretariat and Committees identify communication barriers and suggest, in consultation with TCODE solutions to overcome these problems.

5. Expansion of the PICES Communications Network

There are various "group-ware" products available that might (in principle) aid PICES communication and improve collaboration. The functions of "group-ware" include:

i. electronic mail and messaging, including group calendaring and scheduling
ii. conferencing, including shared document and message databases and bulletin boards
iii. group decision support systems, including electronic meeting systems with audio and video conferencing
iv. group document handling, including group editing, group document and image management and document databases
v. workflow management, including workflow process diagramming and analysis and electronic forms processing and routing

Amongst the various components of "group-ware" listed above, items (ii) and (iv) have potential for improving PICES communication in the future. These items would allow for a wider "audience" for discussion on PICES issues. Our present communication structure is based on e-mail exchanges between the Secretariat and Committee Chairs (primarily) and the Committees/ Working Groups exchange e-mail messages amongst themselves. There is limited opportunity for other scientists to participate or contribute to these discussions, except at Annual Meetings and high travel costs limit this. An improved communication system that allowed broader participation in Committee and Working Group discussions via bulletin boards, message/document databases or related technologies could improve PICES operations. The ComSG notes that a large "demand" for this type of system has not yet been demonstrated. There is a stronger demand for group document editing facilities to allow Committees and Working Groups to assemble reports, but implementing specific ftp work areas on the PICES server may satisfy this demand.

The ComSG has not done a study of the detailed costs and implications of implementing these technologies (item 6 of the Terms of Reference) but these products are relatively immature and would be difficult to implement (probably impossible in some PICES Contracting Parties). The organizations that make up PICES will all have their own internal requirements, rules and standards that will be unaltered by any PICES recommendations or standards. Adoption of these advanced products could lead to isolation of PICES participants in countries or organizations that are unable or unwilling to implement such systems. PICES should be careful not to introduce technical barriers in communications in addition to language barriers. The ComSG recommends a much more modest approach, using the basic Internet components (e-mail, ftp and WWW) and developing short-

term, modest solutions to any specific PICES communications problems. These facilities are rapidly propagating to all PICES Contracting Parties. There may be temporary impediments (such as high communication costs) that PICES could reduce or subsidise, but the larger market forces will remove or reduce these barriers in a short period.

Recommendations

5.1 ComSG recommends that Committees and Science Board forward requirements and priorities for enhancements to the PICES electronic communication system to the Secretariat.

5.2 ComSG recommends that Secretariat explore options and costs for implementing the required enhancements to the PICES electronic communications system and report to Science Board.

REPORT OF BIOLOGICAL OCEANOGRAPHY COMMITTEE

The BIO Committee meeting was called to order by Acting Chairman Prof. Michael M. Mullin, who welcomed new member Dr. Paul J. Harrison of Canada (replacing Prof. Tim Parsons). (See Endnote 1 for attendance.)

A report on WG 11 was given by Drs. George L. Hunt and Hidehiro Kato. The WG has tabulated estimated energy consumption by species of birds and mammals of various categories of prey in each of several sub-regions of the Bering Sea. The WG will meet at the time of PICES VII (estimated 4 days needed), but will not have a complete draft of a report for the BIO Committee then. Some governments have appointed WG members and then not paid for travel, and one appointed member has been uncooperative. Dr. Hunt recommends that a letter of reprimand be sent.

There were presentations on the Bering Sea metadata base by Dr. Bernard Megrey and on PICES web server communication and data exchange by Mr. Robin Brown (TCODE).

No report was available from CCCC-REX.

Drs. Jeffrey Napp and Richard D. Brodeur proposed a WG on micronekton (the subject of a BIO topic session at PICES VI), to be sponsored jointly with FIS. They presented draft terms of reference, and modifications were suggested by the Committee to link the focus more closely to other PICES activities. It was proposed to establish a committee and communicate by e-mail, meeting for 2 days at PICES VII. Napp or Brodeur would be one of two co-chairmen. Vote was 12:0:0 (yes/no/ abstain) in favor of this recommendation.

Dr. Kenneth L. Denman proposed a joint WG with POC on CO_2 in the North Pacific, and presented the terms of reference agreed to by POC. Denman would co-chair. He also proposed a joint topic session at PICES VII on the role of shelf seas in the CO_2 budget. On the proposed WG, the Committee voted in favor, 10:0:2.

With respect to priorities for the two proposed WGs, the Committee put the micronekton WG as the higher priority by a slight margin.

The Committee considered 12 possibilities for its topic session at PICES VII, including 9 suggested last year. Voting by countries, the Committee recommended as a topic session "Controlling factors for lower trophic levels (especially phytoplankton stocks)". Possible convenors included Drs. Vera Alexander, Akira Taniguchi, and Paul J. Harrison. The Committee also recommended (10:0:2) a topic session co-sponsored by POC on CO_2 in the North Pacific (C.S. Wong possible co-convenor), and (6:0:6) a topic session co-sponsored by MEQ on contaminants and populations dynamics of higher trophic levels (Dr. Linda Jones to consider possible convenors). The Committee also recommended (9:0:3) that the Science Board considered for its topic session the manifestations of El Niño 1997-98, since this topic bridges interests of all Science Committees.

The Committee reviewed papers and posters in the BIO/FIS topic session and the BIO paper session, and recommended that Dr. Atsushi Tsuda receive the Best Presentation Award for his paper, "Life cycles of Neocalanus...". The Committee also strongly recommends that the practice of making such awards continue.

A presentation was made on an international symposium on management and mtigation of harmful algal blooms, and PICES support was requested. The Committee voted 6:0:4 to recommend non-monetary support by PICES, but against (1:4:7) recommending monetary support. L. Jones recommended that Science Board establish a group to determine what

PICES' role should be (if any) in increasing understanding of harmful algal blooms. Committee approved this suggestion 5:4:3.

Correspondence to U.S. NOAA / NMFS concerning trans-Pacific ship-of-opportunity sampling by Continuous Plankton Recorder (CPR, operated by the Sir Alistair Hardy Foundation for Ocean Science) was discussed. A similar monitoring program using ships' intake water on a Tokyo-Vancouver line was described by Prof. Takashige Sugimoto, and there is a Yellow Sea CPR and U(ndulating)PR program probably starting in 1998, with sorting of samples in Qingdao.

Mullin reminded the Committee that a new Chairman will be elected to serve after PICES VII, so possibilities should be considered.

The issue of translating a Russian book on the Okhotsk Sea was discussed. PICES has earlier considered translating data tables, but the Russians apparently insist that the whole book be translated, or nothing. Concerning non-monetary help in encouraging such translation, the committee voted 7:1:3 in favor, but voted against (1:4:6) monetary help (at least from BIO's perspective).

Scientific Program

The following scientific papers were presented from the BIO Committee sponsored part of the program.

Micronekton of the North Pacific: Distribution, biology and trophic linkages. (BIO/FIS) Co-convenors: Richard D. Brodeur (U.S.A., Kouichi Kawaguchi (Japan) & Qi-Sheng Tang (China).

B.H. Robison. *In situ* studies of micronekton

M. Moku, H. Watanabe, A. Ohno, K. Kawaguchi. Feeding habits and diel vertical migration patterns of the three dominant myctophid fishes in the western subarctic and transitional Pacific

A.A. Balanov. Daily and seasonal feeding dynamics of the two myctophid species, *Stenobrachius leucopsarus* and *S. Nannochir*, in the mesopelagic zone of the Bering Sea

M.T. Wilson. Community ecology of juvenile pollock (*Theragra chalcogramma*) and other micronekton in the eastern Bering Sea during 1987

D.J. Lindsay, M. Minagawa, K. Kawaguchi. Stable carbon and nitrogen ratios of mesopelagic micronekton and their prey

T. Kikuchi. Species composition, vertical distribution, and food habits of the pelagic shrimps in the western North Pacific

Y. Arimoto, A. Kawamura. Importance of micro-nektonic fishes as revealed from the stomach analysis of neon flying squid, *Ommastrephes bartrami*, in the northwestern North Pacific

O. Yamamura. Predation on micronekton by demersal fish

H. Ohizumi, T. Kuramochi, N. Miyazaki. Stomach contents of Dall's porpoises (*Phocoenoides dalli*) in the North Pacific Ocean

Y. Naito. Deep sea foraging of marine mammals and birds

Q.S. Tang. Distribution and relative abundance of some micronektonic fishes in the Aleutian Basin

Harmful algal blooms: Causes and consequences. (BIO/MEQ) Co-convenors: Roderick Forbes (Canada) & Jae-Hyung Shim (Korea).

L. Mackenzie**.** Big problem or minor irritation? The impact of marine biotoxins on aquaculture in New Zealand

J.R. Forbes, E.A. Black. Effects of elevated nutrients from fish farm wastes on phytoplankton productivity

M.J. Zhou. What to focus on HAB (Harmful Algal Blooms) studies in China

D.Y. Kim, J.B. Lee, K.J. Cho, J.A. Lee. The distribution of dinoflagellate cysts in Masan-Jinhae Bay, Korea

H.G. Kim, S.G. Lee, K.H. An. Species succession in the harmful algal blooms in temperate zone associate with eutrophication

R.X. Li, M.Y. Zhu. The harmful algal blooms in shrimp ponds in north China

W.H. Yih, J.S. Yang, H.J. Jeong, J.H. Shim. Recent red tides in Kunsan Inner Harbour - 'the kunsan type red tide'

R.V. Azanza. Harmful algal blooms in southeast Asia

Y.S. Suh, S.D. Hahn, Y.H. Ahn, H.G. Kim. Algal bloom distribution image derived from AVHRR visible and near infrared band data

S.D. Hahn. Algal blooms before 20th century in Korea

Y. Tanaka, A. Tsuda, T. Kimoto, & Harashi. Nutrient balance and distribution of phytoplankton species plus size species revealed via ferry

BIO Committee Paper Session:

K. Tadokoro, T. Sugimoto. West-east comparison of seasonal variation in phytoplankton biomass in the subarctic North Pacific Ocean

T. Sugimoto, K. Tadokoro. Interannual-interdecadal variations in zooplankton biomass, chlorophyll concentration and physical environment in the subarctic Pacific and Bering Sea

Y.S. Kang. Long-term change in zooplankton biomass in the Korean waters

A. Tsuda, H. Saino, H. Kasai. Life cycles of *Neocalanus flemingeri* and *N. plumchrus* (calanoida, copepoda) in the western subarctic Pacific

M.M. Mullin, S.L. Cass-Calay. Vertical distributions of zooplankton and larvae of the Pacific hake (whiting), *Merluccius productus*, in the California current system

N. Shiga, K. Nishiguchi, T. Aono. Comparison of zooplankton communities between the central and western subarctic Pacific Ocean

Y.S. Kang, Y.J. Jo, W.J. Go, S.S. Kim, K.A. Jeon. Distributional characters of salps in relation to oceanographical condition in the Korean waters

Y. Sakurai, H. Kiyofuji, S.I. Saitoh. The effect of changing environmental regimes on *Todarodes pacificus* populations: A possible scenario

S.Y. Hong, H.K. Cha**.** Ecology of Metapenaeus joyneri miers (Decapoda Penaeidae) in the western coast of Korea

D.E. Hay. Effects of climate changes on the smelts (osmeridae) of the North Pacific

Endnote 1

Participants

Canada
Kenneth L. Denman
Paul J. Harrison
David L. Mackas

China
Rong Wang

Japan
Tsutomu Ikeda
Takashige Sugimoto
Atsushi Tsuda

Korea
Sung-Yun Hong
Sinjae Yoo
Woong-Seo Kim (for Jae-Hyung Shim)

U.S.A.
Michael M. Mullin
Linda Jones

Endnote 2

Report of Working Group 11: Consumption of Marine Resources by Marine Birds and Mammals in the PICES Region

PICES Working Group 11 met 14 to 18 October, 1997, in Pusan, Republic of Korea, to estimate the biomass of prey required to support populations of marine birds and mammals in selected regions of the North Pacific Ocean. To accomplish this goal, we assembled data on the distribution and abundance of marine birds and mammals, and the periods of time that these populations remained in the PICES area as a basis for estimating the energy required to support these populations. The quantity and quality of data available for estimating the size of marine bird and mammal populations, food habits and consumption differ greatly in quality and quantity by species and region. The Working Group therefore agreed to focus on the summer months, a period during which data were most complete, and when birds and mammals were less likely to be migrating in or out of the PICES region. We were able to complete, for several of the 14 sub-regions, tabulations of the populations of marine birds and mammals found in that area, energy demand, food habits and food consumption. The time periods in which the data were aggregated varied depending on the biology of the species (June - August for birds, June - September for marine mammals). We propose to complete assessments of marine bird and mammal prey consumption for the remaining sub-regions through inter-session correspondence, and to complete a Final Report of our task at the next Working Group meeting in Alaska in 1998. The Working Group expressed its concern that a number of members central to the production of its report were not able to attend; less than one half of the Working Group members were able to participate in the Pusan meeting. Therefore an additional meeting to work interactively with these individuals is required for assembling our report. We strongly urge that efforts be made to ensure future full participation by working group members.

REPORT OF FISHERY SCIENCE COMMITTEE

Approval of agenda

The meeting was opened by the Chairman, Prof. Chang-Ik Zhang. The meeting agenda was reviewed and approved by all members. The Chairman appointed Dr. Anne B. Hollowed as rapporteur.

The FIS Committee welcomed four new members: Dr. Jang-Uk Lee (Korea), Dr. Michael A. Henderson (Canada), Dr. Douglas E. Hay (Canada) and Dr. Akihiko Hara (Japan).

The Committee briefly discussed the results of the IP and the REX Task Team Workshop on Climate Change and the Carrying Capacity.

Review of WG 12 Report

Dr. Robert Otto summarized the activities of WG 12. He submitted an interim report of the Inter-sessional workshop on Crab and Shrimp held in Nemuro, Japan, September 9-18, 1997. Dr. Otto discussed several recommendations and concerns from WG 12:

1. WG 12 requests that PICES co-sponors the ICES-NAFO joint Special Session: Pandalid Shrimp Symposium in 1999.
2. WG 12 requests funds for a second 4-day interim workshop in 1998.
3. WG 12 noted their concern regarding non-commercial species for which there is limited information. Several of these stocks could potentially be commercially exploited.
4. WG 12 noted that their working group would benefit from the participation of scientists from all PICES regions including China and North Korea. Dr. Qi-Sheng Tang noted that the Chinese member of WG 12 has been working in New Zealand and will remain there for 2 years. He will assist WG 12 in identifying a replacement for the Chinese representative on the WG. Dr. W. Doug McKone noted that PICES made several attempts to improve participation by N. Korea in PICES. So far these attempts have been unsuccessful.

The major accomplishments of WG 12 were summarized. WG 12 prepared a comprehensive review of the major crustacean stocks in the North Pacific. The group identified the major zoogeographic provinces where crustacean species are found. Several members of the WG participated in the REX Workshop and assisted in identifying the major areas for retrospective studies. Future WG 12 activities will focus on: a) processes underlying production of crustacean populations, b) comparative analyses of the variety of life history strategies used by crustacean stocks in the North Pacific, and c) methods of assessing crustacean stocks.

FIS Committee members reviewed the interim report:

1. It was noted that if possible, draft reports should be submitted prior to the next FIS meeting.
2. The FIS Committee endorsed the proposal by WG 12 for PICES' co-sponsorship of the ICES and NAFO Joint Pandalid Shrimp Symposium.
3. FIS encouraged participation of North Korean scientists in WG 12.
4. FIS encouraged Chinese scientists to participate in WG 12.
5. FIS recommended that the next interim meeting of WG 12 should be located in the western Pacific. The Chairman of WG 12 in consultation with the PICES Secretariat will determine a suitable location for this meeting.
6. FIS accepted the revised terms of reference for WG 12.
7. FIS accepted the interim report of WG-12 for publication in the PICES 1997 Annual Report.

WG 3 Inventory

The status of the WG 3 inventory was reviewed. Dr. McKone noted that all information has been received and will be put on the web page in the near future.

Scientific activity in the CCCC Program

Ms. Pat Livingston (Co-Chairman of the CCCC Implementation Panel) reviewed the CCCC Implementation Panel recommen-dations for scientific sessions in 1998.

1. POC and the BASS Task Team requested a joint symposium on identification of impacts of the 1997-98 El Niño event for the PICES VII Annual meeting.

2. The REX Task Team requested a scientific session that highlights research findings of GLOBEC and GLOBEC-like programs for the PICES VII Annual Meeting.

3. The REX Task Team recommended a two-day symposium on climate effects on small pelagic species to be convened prior to the PICES VII Annual Meeting in Fairbanks, Alaska.

4. The MODEL Task Team recommended that a small follow-up meeting on lower trophic level modeling should be convened prior to the PICES VII Annual Meeting.

FIS supported the proposal for a Science Board symposium on the 1997-98 El Niño to be sponsored by POC and the BASS Task Team. Dr. Gordon Kruse (FIS) will identify an individual with a background in fisheries science who will serve as co-convenor for this symposium.

FIS endorses the proposal for a REX symposium on small pelagic species and climate change in the North Pacific to be convened prior to the PICES VII meeting in Fairbanks, Alaska.

FIS approves the Model Task Team proposal to convene a small workshop on lower trophic level modeling.

FIS recommended that time should be set aside for the CCCC Program to hold scientific sessions. FIS recommended that the topic session for 1998 should be research findings of GLOBEC and GLOBEC-like interdisciplinary research programs in the North Pacific. FIS recommended that the time allotted to FIS and the CCCC should be combined to allow for a one-day topic session on GLOBEC and GLOBEC-like research programs.

FIS reviewed four suggestions by Dr. M. Stepanenko:

a. Provide a list of research institutes that conduct CCCC programs.
b. Determine coordinators from each national institute.
c. Present national research programs connected with fisheries.
d. Establish a WG on the coordination of stock assessment activities, inventory assessment methods and determination of priority of methodology developement

FIS recognized that items a and b were already being conducted by the CCCC program. FIS agreed to consider the request for lists of national research programs connected with fisheries. However, FIS requests that Dr. Stepanenko specify the kind of marine research programs that should be listed. FIS believes that some of these programs are already identified, but other programs are not normally listed as activities of the CCCC program. Item “d” was considered by FIS under agenda item 4.6.

SCOR Working Group 105 activity

FIS Chairman Prof. Zhang reviewed the report of the activities of the SCOR WG 105.

1. FIS recommends that PICES should provide funds for the FIS Chairman to participate in the next meeting of the SCOR Working Group in Hobart, Australia, January 1998.

2. FIS encourages participation of PICES members in the SCOR-ICES joint symposium on ecosystem effects of fishing, March 16-19, 1999, in Montpellier, France.

NPAFC proposal

FIS discussed the following proposal by NPAFC submitted by Dr. Loh-Lee Low. NPAFC asked PICES about the possibility of adding fisheries catch statistics of non-anadromous fish to the

NPAFC statistical yearbook. FIS supports NPAFC's suggestion to produce a database of fishery statistics for all PICES member nations. FIS also encourages PICES Governing Council to identify a mechanism for data exchange.

New Working Groups

FIS reviewed four proposals for the development of new working groups. Dr. Jeff Napp presented a proposal for the development of a WG on micronekton (jointly sponsored by BIO). Richard Beamish described his proposal for a working group on climate change and shifts in fish production. Dr. Radchenko reviewed the proposal by Dr. Stepanenko for a working group on stock assessment and methodology development. FIS recommended that no new Working Groups should be formed until WG 12 is closer to completing their activities.

Future symposia

FIS recognized the success of the joint BIO/FIS symposium on micronekton. FIS encourages the symposium organizers to convene an inter-sessional workshop to follow-up on selected aspects of micronekton studies. FIS recommended that the inter-calibration and sampling standardization activities proposed could be considered by the CCCC Monitoring Task Team (if approved).

Best Presentation Award

FIS decided that the voting for FIS Best Presentation Award would be just after the FIS Paper Session on the 23rd. The Award went to Dr. Jin-Yeong Kim for her presentation titled "Spawner-recruit relation-ship of anchovy, *Engraulis japonica*, and its environmental factors in the southern waters of Korea".

Scientific Program

The following scientific papers were presented from the FIS Committee sponsored part of the program.

Models for linking climate and fish. (FIS/BIO) Co-conenors: Michio J. Kishi (Japan, Jang-Uk Lee (Korea) & Patricia Livingston (U.S.A.)

G.H. Kruse. Unraveling relationships between marine environments and fish recruitment: A review of approaches, pitfalls, and potential solutions

J.H. Cowan, Jr., K.A. Rose**.** Linking climate and fish population/community dynamics: examples of the individual-based modeling approach

M. Kawamiya, M.J. Kishi, N. Suginohara. Mechanisms of the seasonal variation of chlorophyll in the North Pacific: A study using an ecosystem model embedded in an ocean general circulation model

K.L. Denman, M.A. Pena. A coupled 1-D biological / physical model of the subarctic Pacific Ocean with Ekman upwelling and iron limitation

J.G. Je, R. Ji, W.S. Kim, M.Y. Zhu, S.J. Yoo. Modeling approaches for estimation of carrying capacity in marine ranching system

S. Ito. An estimation of spawning grounds of skipjack in the tropical western Pacific using an OGCM

T. Wada. A population dynamic model for Japanese sardine (*Sardinops melanostictus*) with a positive feed back loop

S.R. Hare. Prewhitening: a cure for the common correlation

R.I. Perry, J.A. Boutillier. Recruitment fluctuations in smooth Pink shrimp (*Pandalus jordani*) off the coast of British Columbia and their relationships with climate variability

B.A. Megrey. Using nonlinear statistical analysis to examine relationships between features of the environment and recruitment variation in walleye pollock

V.V. Navrotsky. The impact of long-term climate variability on exploited prey-predator system

D.W. Welch, B.R. Ward, B.D. Smith, F. Whitney. Changes associated with the 1989-90 ocean climate shift, and effects on British Columbia steelhead (*O. mykiss*) populations

FIS Committee Paper Session:

W.S. Yang, C.I. Baik, S.S. Kim, S.G. Choi, T.Y. Oh, D.N. Kim. Results of the Bering Sea walleye pollock survey by the Korean RV Pusan 851 during May-June 1997

M. Hirai, T. Goto. Hydrographic structures and their fluctuations of spawning grounds for sardine, *Sardinops melanostictus* in the southern Japan Sea

M. Tokimura, H. Yamada, K. Yamamoto. Distribution and stock condition of major groundfishes in the East China Sea and the Yellow Sea from bottom trawl survey

D.N. Kim, C.I. Baik, S.Y. Hong. Distribution pattern of brachyuran and anomuran larvaein the southeastern Bering Sea in June 1995

I.J. Yeon, C.I. Zhang. Growth and mortality of blue crab, *Portunus trituberculatus*, in the East China Sea

J.Y. Kim, J.U. Lee. Spawner-recruit relationship of anchovy, *Engraulis japonica*, and its environmental factors in the southern waters of Korea

X.S. Jin. Variations of fish community structure in the Yellow Sea and the Bohai Sea

D.Y. Moon, C.I. Baik, J.H. Park, S.J. Hwang, J.B. Kim, H.S. Jo. Incidental catch of juvenile northern bluefin tuna in waters off Korea

Endnote 1

Participants

Canada
- Richard J. Beamish
- Gordon A. McFarlane (for Michael Henderson)
- Douglas Hay

China
- Qi-Sheng Tang

Japan
- Tokio Wada
- Akihiko Hara

Korea
- Jang-Uk Lee
- Suam Kim
- Chang-Ik Zhang (Chairman)

Russia
- Vladimir I. Radchenko
- Mikhail Stepanenko

U.S.A.
- Loh-Lee Low

Endnote 2

Report of Working Group 12
Crabs and Shrimps

Introduction

Working Group 12 (WG 12) held its interim meeting in Nemuro, Japan during the week of September 9, 1997. This was the second meeting of WG 12 but the first in which both North American and Asian members were present. The meeting was facilitated and supported by the City of Nemuro and held at the Nemuro Cultural Center which provided an excellent venue and services.

The working group noted that the PICES region provides approximately 65% of the world's crab landings and 23% of world shrimp landings according to United Nations Food and Agricultural organization statistics (UN/FAO). However large portions of crab and shrimp landings are not identified to species and expertise at the national level is necessary to identify stocks.

The main purposes of the interim meeting were to identify stocks of crabs and shrimps in the PICES region (generally north of 33^{o} North Latitude) and to review trends in abundance. Trends in abundance were cross referenced to zoogeographic provinces to reveal regional patterns. These patterns served as the basis for discussing hypotheses as to the causes for observed trends.

Participants

Canada
- Jim Boutillier
- Glen Jamieson

Japan
- Hideo Sekiguchi

Korea
- Sung-Yun Hong
- In-Ja Yeon
- Chang-Ik Zhang (Chairman, FIS)

Russia
- Boris Ivanov
- Vitaly Rodin (Co-Chairman)
- Yuliya Zaitseva

U.S.A.
- David A. Armstrong
- Robert S. Otto (Co-Chairman)

Observers
- Makoto Kashiwai (Chairman, Science Board)
- Yutaka Nagata (PICES/CCCC Co-Chairman)
- J. Kittaka (Science University of Tokyo)
- Dr. F. Abrunhosa (Science University of Tokyo)
- E.V. Radhakrishnan (Regional center CMFRI, India)
- S. Ivanov (TINRO, translator)
- J. Armstrong (University of Washington)

Attendance at the first WG meeting (1996) was low (Otto, Armstrong, Boutillier and Jamieson). The 1997 attendance was hence a large improvement. While the meeting was successful in this regard, WG 12 members unanimously agreed that it was desirable for scientists from China and North Korea to attend future meetings.

Landing statistics (UN/FAO, 1991-1994) indicate that about 72% of crab landings and 81% of shrimp landings in the PICES region come from Chinese or North Korean waters. WG12 also noted that, due to their trans-boundary nature, the status of several major stocks could not be described without the advice of scientists from China and North Korea.

Review of Terms of Reference

WG 12 considered the terms of reference at the 1996 interim meeting and made recommendations as to changes in them. WG 12 recommendations were not formally acted upon by FIS. Additionally, in 1997 we received information on the Japanese spiny lobster that indicated some importance in the PICES area and further note omission of the California spiny lobster. Accordingly and including 1996

recommendations, **WG 12 proposes the following terms of reference:**

Working Group 12 is established to:

a. Consider those crabs, shrimps and lobsters that are utilized in a commercial, subsistence or recreational fisheries. This may include introduced species if they are directly important or impact human utilization of any other marine species.

b. Identify organizations and key contacts from each that are performing scientific work on the distribution, recruitment, larval transport, migration, population dynamics, and influences of environmental conditions for crabs and shrimp.

c. Identify data that are available that would assist in the analyses of factors affecting abundance trends.

d. Review and exchange current knowledge and data concerning factors affecting abundance and survival of crabs, shrimps and spiny lobsters and identify key scientific questions regarding reasons for abundance fluctuations.

Reasons for changes in the Terms of Reference are given in last year's report.

Review of status of crab and shrimp stocks

A. Overview

The PICES region contains large proportions of the world's crab and shrimp resources. Unfortunately, it is not possible to precisely deduce the importance of these resources from UN/FAO statistics. The PICES region encompasses all of FAO Area 61 (Northeast Pacific), a small part of Area 71 (Eastern Central Pacific) and most of Area 67 (Northwest Pacific). As an approximation, landings from the PICES region would include all landings in Area 61, only U.S. landings from Area 71 and summed landings from Chinese, Japanese, North Korean, South Korean and Russian marine waters from Area 67. This overestimates the importance of the PICES region unless Chinese waters south of 33° North Latitude are provisionally included. Taken in this way, for the years 1990-1994 the PICES region provided 65% of world crab landings and 23% of world shrimp landings.

Reported crab landings in the PICES region increased at an average rate of 28% per year from 1990 to 1994 while those of shrimp were stable. Most growth in crab fisheries took place in China which accounted for 70.8% of PICES region landings over the years from 1990 to 1994. Unfortunately, 70.8% of Chinese landings are listed as unspecified ("nei") crabs. Some apparent increases in landings may be due to improved reporting. It also unclear what proportion of landings derive from aquaculture as opposed to harvest of wild stocks. Similarly, UN/FAO statistics list only unspecified crustaceans for North Korea. By consequence, nothing is known of stocks or stock structure in Chinese waters and the nature of trans-boundary stocks in the Yellow Sea (China-North Korea-South Korea) and the Sea of Japan (Japan-North Korea-South Korea-Russia) is poorly known.

General North Pacific zoological provinces described in Allen and Smith (1988, NOAA Tech. Rept. NMFS 66) for finfish were found useful by WG 12 and served to structure many of its discussions. These apply to shelf and mesobenthyal (200 - 500 m) slope waters only, since zoogeographic provinces in deeper waters are not necessarily the same.

A compendium of 170 overhead projector transparencies that were presented during the meeting was collated and distributed to WG 12 to serve as a basis for future discussions and planning for a subsequent meetings. A brief synopsis of discussions for major stocks follows.

B. Stocks and research approaches and opportunities for experimentation.

1. Crabs

Dungeness Crab (*Cancer magister)* have Cyclic populations north of central California, with peaks and troughs every 8-10 years. Landings 1970-1996 minimum 5,000 t (1974) to maximum of 26,000 t (1977). A collapse of

central California stock occurred 1956-1970 with little recovery since. British Columbia landings are more consistent from year to year and do not display cyclic patterns observed in California to Washington fisheries. Alaskan landings are not in synchrony with contiguous 48 states of the U.S. or with Canada and landings may be market driven over some portions of the historical series. Since patterns differ between zoogeographic provinces, comparative studies may provide insight into mechanisms of population control.

Hypothesized environmental and ecological effects include elevated temperatures, nemertean worm predation on clutches, salmon predation on larvae, and various cyclic phenomena (cannibalism, upwelling, wind stress, geostrophic flow, fishing effort). Habitat and fishing impacts that effect stocks include dredging to maintain navigation channels and for landfills, foreign species introductions (i.e. green crab, *Carcinus maenus*, competition with Dungeness), ghost pot fishing and fishery handling of sublegal males and females. Fishery selects the largest males and there is the possibility of females not getting bred.

The list of factors used to explain changes in Dungeness crab populations is a fair sampling of factors that are thought to control crab populations in general. Additionally, predation on adults, parasitism and epizootic diseases are known to be important in a number of king and Tanner crab populations.

Four species of king crabs are subjects of major fisheries in the PICES region. They differ in there life history characteristics and hence provide for comparative study of the effects of life history characteristics on population stability. For example, red king crab (*Paralithodes camtschaticus)* are annual spawners with relatively high fecundity and small eggs, while blue king crab (*P. platypus)* are biennial spawners with lesser fecundity and somewhat larger eggs. Both species inhabit the Pribilof Islands and other areas where their dynamics may be explored. Throughout most of the Gulf of Alaska and eastern Aleutians, red king crab populations declined in phase from the late 1970s until fisheries were closed in 1983. Populations have been at low levels and fisheries have remained closed since 1983. Populations declines soon after the well recognized regime shift of the late 1970's and offer opportunities for retrospective study as well as comparative study with Asian populations that have differing patterns of abundance over time. Comparative study of Bristol Bay and west Kamchatkan populations may be particularly instructive.

Tanner (*Chionoecetes bairdi)* and snow (*C. opilio)* crabs have broad distributions across several zoogeographic provinces and provide research opportunities similar to those for king crabs. Snow crab range from the Beaufort sea to the sea of Japan and also occur in the northwest Atlantic. Since the snow crab inhabits several zoogeographic provinces and its life history is well known, the species presents excellent possibilities for comparative retrospective analysis. Deep water members of the genus are less well known although there are developing fisheries in both Asia and North America. For example, the Japanese Tanner crab or beni zuwai gani, *Chionoecetes japonicus*, is fished in japanese, South Korean and possibly North Korean waters. Data as presented by the Korean delegates caused some concerned discussion. There appear to be no regulations on this fishery currently, although large catches, 33,000 MT annually and increasing, are reported. In perspective this is the largest known catch of a deep water (>200m) crab species.

The gazami crab (*Portunus trituburculatus)* provides the largest crab fishery in the PICES area. It is found in the Yellow and east China sea in close association with peneid shrimps. This part of the PICES area has a more tropical fauna than the remainder of the region and provides an opportunity to compare the dynamics of crustaceans from temperate or boreal areas with tropical forms. The two faunal groups are separated only by the Korean Peninsula and hence provide a unique opportunity to study comparative effects of climatic variables.

2. Shrimps

Pandalid shrimps are protandric herma-phrodites and larger, older individuals that support fisheries are mostly mature females. Two species dominated trawl fisheries. Ocean pink shrimp, *P. jordani* are distributed from northern California to British Columbia and northern pink shrimp, *P. borealis*, are distributed from British Columbia to the Bering sea. Alaskan trawl fisheries also included *P. goniurus, P. hypsinotus, P. platyceros and Pandalopsis dispar.*

Pandalid shrimp populations and fisheries in Alaska collapsed in the late 1970's and most fisheries remain closed. Very small trawl fisheries for side striped shrimp, *Pandalopsis dispar,* and pot fisheries for spot prawns, *P. platyceros,* still persist in some areas. Spot prawns also are an economically important fishery in British Columbia. The collapse of the pandalid shrimp complex in Alaska was concurrent with the late 1970's regime shift and a sharp increase in predator populations, particularly Pacific cod (*Gadus macrocephalus*) populations. Landings of ocean pink shrimp also declined sharply in the late 1970s and reached their lowest levels in 1983, but in contrast with northern pandalid shrimps, have increased since. Landings of *P. jordani* have undergone two cycles between 1970 and 1995. The recovery of *P. jordani* contrasts sharply with pandalids to the north and is a good topic for retrospective study. Pandalid shrimps occur in the western Bering Sea, the sea of Okhotsk and in the Sea of Japan as far west as Korea providing additional possibilities.

Four species of penaeid shrimps are important in the Yellow Sea. Several of these species are found in southern Japan as well. Peneid shrimps differ from pandalids in that the are not hermaphroditic, are semilparous rather than multiparous and are short lived. Most species complete their life spans in less than two years and frequently within one year, while pandalid shrimps typically live for at least three years and frequently for 7-8 years in northern populations.

There are two stocks of the fleshy prawn, *P. chinensis,* in the Yellow Sea. The Pho Hai Bay stock in Chinese waters and the Korean coastal group both hibernate in the southern Yellow Sea during February and March but return their coastal spawning grounds in spring. The Korean coastal stock spawns April to June, and is fished from September through April. This stock provided the bulk of the Korean shrimp catch during the years 1987 to 1996. Other important peneid species (*P. japonicus, Metapenaeus joyneri, Trachypenaeus curvirostris)* differ considerably in their life history patterns and offer opportunities for comparative studies of environmental effects on recruitment. A joint Korean-Chinese study of stock recruitment relationships in the Yellow Sea is being planned. This study would likely be profitable and has the advantages of occurring in a well defined semi enclosed body of water, and with short lived species for which results of comparative studies or experiments become available quickly.

Plenary Session

A. Recommendation as to the International Pandalid Symposium

Sponsored by ICES and NAFO - seeking joint sponsorship by PICES. The last workshop was in Iceland in 1993 and before that in Kodiak in 1979.
Proposal: The convenors want it to be a world-wide conference, could offer a show of support/advertise the event. It will be paid for by the shrimping industry so no financing is being sought. They hope to make the conference a special session of the regular NAFO meetings scheduled for Sept. 1999 in Halifax, Nova Scotia. Mr. Jim Boutillier was asked to serve as the WG 12 representative to these meetings.

B. Scientists from North Korea are asked to participate in this WG 12. Three to four scientists from N. Korea are expected to participate in the science board group at the next meetings. We ask for participation in WG 12 and a recommendation to that effect will be presented.

C. Requesting participation of Chinese delegates. There has been no response from the Chinese delegates as to the last 2 meetings of WG 12. The WG 12 will submit a letter to Mr. Sheng-Min Ren requesting the following: species composition of Chinese catches, proportion provided by aquaculture, catch and effort trends for the primary crab and shrimp species or stocks. We will also solicit opinions as to reasons for observed trends, concerns about pollution or demographic growth impacts.

A copy of the 1997 meeting compendium of information will be provided to illustrate the types of information WG 12 has been considering.

D. Accepted Terms of Reference with additions. We request that the FIS formally consider our revised Terms of Reference, and either adopt them or provide guidance as to hoe they should be changed.

E. How to proceed in the future?

1. Suggestion of an Interim Meeting. Time of year to be held was discussed respecting conflicts with other meetings held in Europe mid-July, and travel difficulties expressed by several delegates. It is recommended that the possibly of the Chinese hosting the next interim meeting be discussed with FIS. Otherwise all seemed to agree that August next year is the best meeting time.
2. The 1998 interim meeting should focus on the following:
    a. Oceanography and recruitment processes (2 days)
    b. Sampling problems/data analysis, fishery independent sampling (2 days)

REPORT OF MARINE ENVIRONMENTAL QUALITY COMMITTEE

The MEQ Scientific Committee met on Wednesday, October 22, 1997, at PICES VI in Pusan, Republic of Korea. The meeting was convened from 1330 to 1730 hours. (See Endnote 1 for participants.)

Introduction

The meeting was opened by MEQ Chairman Dr. Richard Addison, who welcomed all participants, and asked that each introduce themselves and their affiliations. The Chairman then proposed an agenda (Appendix 1). The proposed agenda was unanimously accepted, and the meeting was called to order.

Harmful Algal Blooms (HAB): presentation by Mr. J. Roderick Forbes, Co-convenor of HAB Session

Mr. Forbes explained that a large number of international and local organizations outside PICES are actively studying HABs. A good example of this is the Asian Pacific Economic Cooperation (APEC). Although there has been much research on HABS to date, these phenomena continue to steadily increase worldwide. There is still a distinct gap between research, management implications and mitigation.

In September-October of 1998, the International Oceanographic Commission (IOC) and APEC will convene a symposium to deal with this lack of continuity with HAB problems. The meeting, entitled "International Symposium on Management and Mitigation of Harmful Algal Blooms" will be held either in the Philippines, or at the East-West Center at the University of Hawaii Manoa Campus, Honolulu. Mr. Forbes has asked that PICES endorse and support this symposium, and is also specifically requesting that MEQ formally serve as a co-supporter. In addition, Mr. Forbes is asking MEQ/PICES to sponsor three scientists to attend and participate in the proposed IOC/ APEC meetings, (total estimated cost; US$14.5k).

MEQ responded that the PICES Science Board is currently developing a more formal and consistent mechanism as to how PICES should respond to such requests from various outside international bodies. Therefore, MEQ agreed to consider the request over the next few weeks, with Dr. Addison rendering our decision to Mr. Forbes at a later date.

(Following discussions at the PICES Science Board, it was decided that PICES would support this meeting in principle, but that funds would not be available from PICES to support the meeting financially.)

Action: Dr. Addison to contact Mr. Forbes

Bering Sea Ecosystem Biophysical Metadatabase Project: presentation by Dr. S. Allen Macklin, Co-Project Manager, NOAA

Dr. Macklin explained NOAA's metadatabase project for the Bering Sea. "Metadata" refers to data about data, rather than to the actual data per se. The mission of the project is to locate and assemble an inventory of the extensive biological and physical data which exists for the Bering Sea ecosystem, develop these into an indexed, annotated catalog (metadatabase), and make the metadatabase available to the public through various mechanisms, including the World Wide Web. The metadatabase references only the existence of data and information products. Thus, researchers do not have to submit their actual data; but should merely describe the content, quality, condition, spatial and temporal characteristics of the data. The data are organized according to Federal Geographic Data Committee (FDGC) standards, and will be made available for public access via search engines on the World Wide Web. Dr. Macklin hoped that MEQ/PICES and their various colleagues will contribute as much as

possible to the Bering Sea metadatabase, and stressed that the actual data itself will remain under the control of the researcher or similar source person. The program is especially interested in contaminant-related data, and will be receptive to any other types of information relevant to the Bering Sea.

Dr. Addison led a brief discussion of this issue, and asked (1) whether or not NOAA was aware of the various other databases like this which exist, and (2) whether or not the various databases are compatible. MEQ agreed to study the issue further, and to advise Dr. Macklin of our decision after the PICES meeting.

Action: Dr. Addison to contact Dr. Macklin

Brief review of minutes from MEQ meeting, PICES V

To help familiarize newer attendees with the recent history of MEQ and its activities, Rapporteur Dr. C. Michael Watson briefly recounted highlights of the minutes from the previous year's meeting at Nanaimo, B.C., Canada (PICES V). He recounted the two MEQ research tasks originally planned for the Western Pacific in conjunction with Working Group 8, which were: (1) the proposed practical workshop at Jiaozhou Bay (Qingdao, Shandong Province, People's Republic of China), for harmonization of research and analytical methodologies among the six PICES member countries, and (2) the proposal to holistically examine a pollution gradient outward from the mouth of the Changjiang River in the East China Sea, to establish baseline data prior to the substantive changes in benthic ecology and species diversity which will occur after the construction of the Three Gorges Dam.

Dr. Watson then explained that for the time being, MEQ has discontinued its research plan for the Changjiang estuary, because of its very resource-intensive nature and the highly politicized climate currently surrounding the Three Gorges Project. Thus, the proposal for the Jiaozhou Bay Workshop is now MEQ/WG 8's sole focal research project for the near term.

Since the Workshop's conception at Nemuro, (PICES III), MEQ had anticipated a three-year time frame for carrying out the actual research on site. After the Nanaimo meetings last October (PICES V), two most likely favorable time periods for conducting the Workshop were proposed: These were to be either May-June, 1997, or September, 1997 just prior to PICES VI in Pusan. But because of funding problems, the need to transport specialized equipment and materials over the great distances involved, and the time constraints necessary to secure official sampling permission, the Workshop plan has had to be delayed until 1998.

He also briefly reviewed other highlights of MEQ's business meeting at PICES V/Nanaimo, in which three MEQ Topics were proposed for the PICES VI symposia in Pusan. These included (1) a Joint MEQ/BIO Session on HAB, (2) a session on the Pollution Impacts of Aquaculture, and (3) a continuing session on our common MEQ theme, "Processes of Contaminant Cycling." MEQ's "Best Paper Award" from PICES V was won by Dr. Y. Gao, of Rutgers University for her paper entitled: "Cycling of contaminants through the atmosphere: long range transport vs. regional deposition".

Discussion and acceptance of minutes from PICES V

After brief discussion, the informal overview of last year's MEQ Meeting's minutes were accepted as read.

Report of Working Group 8, PICES VI: Dr. John E. Stein (Co-Chairman, WG 8)

Several days prior to the MEQ meeting, WG 8 met on October 17-18 in Pusan. These WG 8 sessions focused on updating and improving the MEQ Practical Workshop Plan, addressing the various issues and questions outlined below: WG 8 also identified a list of likely participants from each country, and prepared a detailed list of information and equipment necessary for the workshop. Dr.

Stein summarized WG 8's recent workshop-related activities as follows:

A. Jiaozhou Workshop Bibliography: Realizing that more information was needed prior to arriving at a final study design, during 1996-97 various members of WG 8 and MEQ have been working closely with Prof. Ming-Jiang Zhou in Qingdao, to gather existing baseline scientific information on biota, contaminants and related factors in the Jiaozhou Bay - Laoshan Bay ecosystem. During this period, a significant number of relevant papers were identified and obtained by Prof. M.J. Zhou, Drs. Colin Levings, and John E. Stein. These were then organized into a detailed and extensive bibliography, which was sent to MEQ/WG 8 members earlier this year.

B. Modifications to the Workshop Plan:
   (a) Scientific Design: The Scientific Design was made more pragmatic and refined in a manner which should ensure a successful workshop. The overall objective of the Jiaozhou Workshop will remain "harmonization of Techniques" among the participating PICES scientists. The specific focus will be on biological and ecological effects, and on evaluating methods used to compare such effects. Mollusks and benthic fish species will be the primary organisms of interest.

   (b) Research Time Line: The proposed time line for the MEQ Practical Workshop is now May-June, of 1998. The essential plan is to carry out the work at that time, and to begin to prepare research reports during the ensuing year. An editor will be assigned to the project, specifically for organizing the results for presentation at PICES VIII. It is also hoped that preliminary workshop results will be available to present at PICES VII (Fairbanks).

C. Funding Needs: Dr. Stein reported that PICES Finance Committee has allocated $20k as partial support for research and equipment related aspects of the Jiaozhou workshop. However, PICES expects member countries to fund all travel and per diem for their respective participating scientists. WG 8 is seeking to secure some added travel funding from outside sources, but the likelihood is not favorable at this time. However, Dr. Addison indicated that it is likely PICES will still be able to fund some travel to Qingdao for a very small number of selected Russian and Chinese scientists, if no other monies can be found in the interim.

D. Administrative Needs for Practical Workshop: Obtaining formal permission from the Chinese Government is an important factor in assuring the viability of the Workshop. MEQ/PICES must be sure to obtain the necessary approval from the Chinese Government. The issue of obtaining this approval was discussed at length, and MEQ and WG 8 agreed that the most effective mechanism is for the PICES Governing Council to send identical letters of application to both the Ministry of Agriculture of China and the State Oceanographic Administration of China.

E. Possible Alternate Workshop Site: In the event that official permission for the Jiaozhou Workshop might somehow not be granted in time, discussion briefly focused on possible alternate Workshop sites. The most appropriate fallback site was agreed to be the Masan Bay - Chinhae Bay area in the Republic of Korea, where the marine ecosystem, fishery and mariculture resources, and anthropogenic stressors are similar in many ways to Jiaozhou Bay. MEQ colleagues from Korea indicated that obtaining necessary governmental permission for PICES to conduct a workshop in Korea would take about one month.

F. Summary of Plan for MEQ /WG 8 Practical Workshop: It was unanimously resolved that MEQ will conduct its Practical Workshop in the Western Pacific in 1998, or not at all. The first choice for this workshop will be Jiaozhou Bay. But because of the present uncertainty

about obtaining permission at Jiaozhou Bay, MEQ decided to (a) set a deadline of January 31 for receiving formal permission from the Chinese authorities, and (b) as a fallback position, allocate an alternate site for the workshop, in case we are not able to utilize Jiaozhou /Laoshan Bays at Qingdao. This alternate site would be the Masan Bay-Chinhae Bay region, Republic of Korea.

MEQ/PICES will immediately reapply for formal Workshop permission from China.

G. Presentation of Workshop Results: Discussion then arose about how MEQ should present preliminary results from the Practical Workshop, during PICES VII (Fairbanks; 1998)). It was agreed that MEQ schedule a presentation at Fairbanks which will outline the research design and nature of the workshop, documenting what took place. Although the format will be left "open", room will be made for a concurrent presentation of available preliminary results from the workshop.

Action: Profs. M.J. Zhou and J.Y. Zhou to identify contacts in PRC agencies;
Dr. Addsion to draft letter for Dr. Doubleday's signature;
Dr. Addison to draft letter to Dr. K.W. Lee re: "fallback" workshop in Korea

Input of long time-series data to PICES Technical Committee for Data Exchange (TCODE)

As a follow-up to our MEQ discussions about TCODE last year at PICES V, Dr. Addison explained that TCODE Inventory of Long Time series is now implemented on the PICES Web server (http://pices@ios.bc.ca/data/longterm/ lttsintr.htm). In somewhat the general fashion of the Bering Sea meta-database discussed earlier, TCODE is merely an inventory which identifies data, but does not contain the actual data, per se. TCODE is primarily interested in developing an inventory of long time series data, with special relevance to various large and comprehensive ongoing marine science research programs. Some of the key on-line deliverables of TCODE would include such services as: (a) sources of real time data, (b) on-line technical manuals for marine sciences, (c) marine science software services, (d) mapping /bathymetric data, and similar research /policy tools.

TCODE's main data categories thus far have focused on biological oceanographic observations, physical /chemical oceanographic observations, fisheries and meteorology. TCODE is requesting whether or not MEQ would recommend that a specific category, "contaminants", also be included, to encompass data on marine environmental quality and pollution. After discussion, MEQ agreed to have Dr. Addison explore the issue further with TCODE, and to render an appropriate response on behalf of MEQ at a later date.

Action: Dr. Addison to contact Mr. Robin Brown

Report on MEQ Scientific Sessions, PICES VI - Processes of Contaminant Cycling

Dr. Dong-Beom Yang summarized the various MEQ Scientific Sessions. The Topic Session, "Processes of Contaminant Cycling" included six scheduled presentations, and the Contributed Papers Session included eight, of which three (all from Russia) were withdrawn. The eleven papers which were presented covered a range of subjects, these included overviews of the extent of metal contamination around the Korean coast (K.W. Lee), general contaminant distribution in the Changjiang estuary (J.Y. Zhou) and radionuclides in the East Sea (Sea of Japan) (D.S. Moon). Prof. Zhou also introduced a newly-published, comprehensive research text he has edited, entitled "Sources, transport and environmental impact of contaminants in the coastal and estuarine areas of China", from which he presented excerpts of selected relevant chapters.

More specific studies of the extent of contamination included investigations of alkyltins

around a salmon farm in Western Canada (L. Harding) and the accumulation of metals and organochlorines around Vladivostok (A.V. Tkalin). Processes of contaminant distribution were covered in papers of organochlorines in the Arctic (R.F. Addison), physical oceanographic conditions in the vicinity of mariculture operations in Japan (S. Toda), biological productivity in Hangzhou Bay as influenced by the Changjiang River discharges (X.R. Ning) and biogeochemical cycling of Phosphorus (M.W. Han). D. Aminin described new approaches to determining the effects of contaminants, and L. Gramm-Osipov described models of the speciation of metals in natural waters. The MEQ Poster Session was also especially enlightening, and much valuable information was presented, especially by our Russian and American colleagues.

In general, the sessions were better attended and the presentations more polished than in previous years, and one paper (Aminin, et al.) described joint research by authors from Korea and Russia. Dr. Aminin was later awarded the prize for the best paper to be presented at the MEQ session.

The Chairman thanked Dr. D.B. Yang on behalf of the MEQ Committee for his work in organising an interesting and informative session.

The joint MEQ-BIO session on harmful algal blooms was scheduled to have sixteen papers, five of these were withdrawn. The session included overviews of the HAB problem from around the Pacific (New Zealand, Philippines and Southeast Asia in general, and Korea, Japan and China). The potential factors which controlled or initiated HAB were discussed, and one paper (S. Hahn) showed that around the coast of Korea HAB have occurred almost since records first began a few years B.C.

Proposals for MEQ Scientific Sessions, PICES VII (Fairbanks, U.S.A., 1998)

Dr. Addison led a discussion to set forth MEQ's proposed topics For PICES VII, which began with a short survey of some of the respective needs and interests of the various participating PICES nations. Various topics proposed and discussed as possible future sessions for MEQ included: oil pollution and spill response, marine resource subsistence of endemic peoples, human activities which affect HABs, specific mechanisms of toxicity of various algal species, ecological risk assessment, mariculture problems in Asia, speciation of metals as a function of biogeochemical cycling and bioavailability, and similar themes.

MEQ noted that participation in some of our prior scientific sessions have not attracted an equal balance of scientists from all PICES member nations. Part of this problem is due to travel costs over great distances. MEQ strongly recommends that PICES more actively seek to rectify these attendance and participation problems. To best attract and maintain a broader and more representative scientific audience, MEQ should increasingly combine our research perspectives on contaminants with other relevant PICES committee sessions. A good example of this is the current joint MEQ/BIO HAB session at PICES VI.

After appropriate discussion, MEQ recommended the following sessions for PICES VII:

1. A session outlining the research design and preliminary results of MEQ's Practical Workshop (Jiaozhou Bay; see previous WG 8 discussion).

2. Contaminants in high trophic level biota; linkages between individual and population responses. There is now considerable evidence that while we can show an impact of contaminants on individuals, there is little substantive evidence at the population level. Why is this? -- is it just a question of the detection of population effects? Or are compensatory mechanisms operating to "buffer" the population from individual impacts? If so, are these phenotypic or genotypic? Apart from providing a joint focus for MEQ and BIO, this topic seem particularly suited to an Alaskan venue for PICES, because much of the evidence comes from "wildlife" studies, especially on marine

mammals (and often Arctic or sub-Arctic marine mammals) and birds.

3. Science and technology for environmentally sustainable mariculture. This session will explore the following question: How do we measure "ecosystem health", particularly in the context of impacts of mariculture? This session should ideally be organized jointly with other committees, but for logistic reasons -- resulting from the timetable of PICES VI -- it is simply not possible to arrange this. This point is to be discussed at the next Science Board meeting.

4. Marine oil spills: case studies in assessing biological and ecosystem effects.

5. HAB toxins: mechanisms of toxicity, and the processes by which pollution affects the population dynamics of harmful algal species

6. Metal speciation and biogeochemical cycles. (To be considered as a focus for contributed papers.)

Future Activities and Focus for MEQ

The MEQ agreed to play a strong inter-sessional role in drafting three discussion papers, on topics of interest to it and other committees. These "white papers" would provide much of the basis for decisions on MEQ's activities over the next few years.

These three topics will be: (1) "Environmentally Sound Mariculture: Status and Technology Needs", (2) "Harmful Algal Blooms (HABs): Causes, Consequences and Mitigation", and (3) MEQ /PICES Interactions with GIWA?: A Feasibility Study". Discussion culminating in the first two decision elements centered around draft proposals prepared by Drs. Varanasi and Stein, and focused on the interdisciplinary nature and global importance of both mariculture and HABs. The GIWA (Global International Waters Assessment Project) discussion was led by Dr. Addison. Summaries of these three proposed topics are as follow:

Mariculture: In the North Pacific there is a long history in the use of mariculture to produce seafood and more recently to recover depleted stocks. Reliance on mariculture of fish and invertebrate species to meet some of the demand for seafood in PICES member countries is likely to increase. This and the concomitant concern about impacts on coastal ecosystems from mariculture activities has heightened the need to develop technologies to promote environmentally sound mariculture, better understand environmental impacts of mariculture, and develop effective monitoring and environmental mitigation approaches. It was proposed and agreed upon to commission a report on current mariculture practices: ongoing research and technology development, existing and suspected environmental impacts, current mitigation efforts and technology needs. This report would constitute the initial step in developing a science plan by the MEQ that would serve as the basis of PICES member country scientists to coordinate and develop complementary research programs on development of technology for environmentally sound mariculture.

Action: Drs. Varanasi and Stein

HABs: The world-wide incidence of blooms of toxic algal species may be increasing. How do the processes of eutrophication and HABs affect marine environmental quality? Our knowledge of the biology and toxicology of harmful algal species is rudimentary and our understanding of the natural and anthropogenic forcing factors that induce a HAB event is inadequate. Thus, the ability to effectively predict and possibly mitigate the environmental and economic impacts from toxic algal species is lacking. It was proposed and agreed upon to commission a report to develop a science plan to coordinate efforts to better understand the ecology of harmful algal species in the North Pacific marine environment, and improve the ability to predict harmful algal blooms to minimize impacts on fishery resources. In addition to investigating causes and consequences of HABs the plan would also address improving monitoring approaches and the potential for environmentally sound mitigation measures.

Action: Drs. Stein and Varanasi

GIWA: Dr. Addison introduced future MEQ-relevant issues raised by a recent paper by Bewers and Pernetta, which outlines the objectives and intended results of the Global International Waters Assessment Project (GIWA). The GIWA Program is currently being proposed to the Global Environment Facility (GEF), under its International Waters Portfolio. For the North Pacific Portions of GIWA, the authors specifically seek contributions and support from PICES and its member nations. In their view, PICES /MEQ should play a coordinating role in developing information on the status of the North Pacific environment. Dr. Shimizu brought up the point that compared to nearshore areas and marginal seas, there is a relative dearth of pollution data for the open ocean. If the focus of GIWA is wholly open ocean, it would seem inappropriate for MEQ at this time. However, MEQ agreed that obtaining more information on pollution in the open ocean is a worthy topic for future research, probably best realized in joint efforts with other PICES committees like BIO and POC. Dr. Tkalin and others pointed out that several agencies (e.g., GEMP, WESTPAC) are already doing global environmental studies, and that the GIWA proposal would not necessarily cover new ground. After some discussion, MEQ suggested that although it lacks the resources for involvement at this time, possibly PICES could assume a peripheral "contractor" role with GIWA, perhaps via a graduate student hired specifically for this purpose and housed within the PICES Secretariat. MEQ also needs more information about the relationship between GIWA and other United Nations programs, and the level of resource demand such involvement will place on PICES.

Since PICES will have to reply to the GIWA initiative, Dr. Addison undertook to prepare a draft review of the paper and draft reply for circulation to MEQ members early in January. Dr. Kilho Park will make some enquiries of his contacts in the UN agencies about the staus and intent of the GIWA project, for icorporation into the draft response. This draft would be amended to reflect comments received from MEQ and would be forwarded to the PICES Chairman to form the basis of a reply to UNEP.

Action: Drs. Addison and Park

Other business

The general concept of sponsoring both a "topic session" and a "paper session" at annual MEQ /PICES symposia was briefly revisited. After discussion, MEQ members recommended that we continue to adopt this dual session concept in convening PICES VII. Several members questioned whether or not PICES should begin to establish and publish its own scientific journal, in order to better disseminate our findings to the research community. This was judged to be too expensive and time-intensive to be practical at this time. Rather, it was suggested that MEQ and PICES require that each participating author bring a minimum of 50 copies of their respective papers to their sessions at the time of presentation.

Policy and planning issues regarding PICES Working Groups were also discussed. At some point in the near future, changes in the focus of future research topics being planned by MEQ will require the formation of additional WGs. It is unclear to MEQ whether or not a given PICES Scientific Committee may have more than one WG at a time. This issue will require further clarification from the PICES Governing Council.

Adjournment

The MEQ Scientific Committee concluded its meetings for PICES V, and was adjourned by Chairman Dr. Addison at 1730 hours on Thursday, October 17, 1997.

Scientific Program

The following scientific papers were presented from the MEQ Committee sponsored part of the program.

Processes of contaminant cycling. (MEQ) Convenor: Dom-Beom Yang (Korea)

K.W. Lee, H.S. Kang, S.H. Lee. Trace elements in the Korean coastal environment

J.Y. Zhou. Brief introduction to "Sources, transport and environmental impact of contaminants in coastal and estuarine areas of China"

A.V. Tkalin. Accumulation of trace metals, radionuclides and organic chemicals in the Japan Sea mussels

S. Toda. Mariculture and the environment: the importance of water movements

R.F. Addison. Trends in organochlorine residue concentrations in Arctic ringed seals from Holman, NWT from 1972 to 1991: what do they tell us about processes of organochlorine transport and distribution

L.M. Gramm-Osipov, S. Belkovskaja. Physico-chemical modelling by computer of interaction river waters with seawaters for solution some geometrical and ecological problems

D.S. Moon, M.H. Lee, C.W. Lee. The distribution characteristics of anthropogenic radionuclides in the East Sea (Sea of Japan)

D. Aminin, I. Agafonova, S.H. Kahng, J.R. Oh, S.H. Lee. Use of fluorescent probes for biochemical monitoring of environmental contamination

M.W. Han, J.H. Shim. Biogeochemical cycle of organic phosphorous in coastal sediments of Deukrayang Bay, Korea

L. Harding. Levels of organotin in water, sediments and oysters (*Crassostrea gigas*) at aquaculture sites in British Columbia

X.R. Ning, Z. Liu, J. Shi, Y. Cai. The biological productivity front in the Changjiang estuary and Hangzhou Bay, and its ecological effects

Endnote 1

Participants and Observers

Canada
Richard F. Addison (Chairman)

China
Jia-Yi Zhou

Japan
Makoto Shimizu

Korea
Dong-Beom Yang
Kwang Woo Lee
Hak Gyoon Kim

Russia
Lev M. Gramm-Osipov
Alexander V. Tkalin

U.S.A.
Usha Varanasi
Paul Kilho Park
C. Michael Watson (rapporteur)

Observers
Colin D. Levings (WG 8) (Canada)
J. Roderick Forbes (Canada)
Jong-Geel Je (Korea)
Hee-Sook Kang (Korea)
Jae-Ryoung Oh (Korea)
Ming-Jiang Zhou (WG 8 Co-chairman) (China)
John Stein (WG 8 Co-chairman) (U.S.A.)
S. Allen Macklin (U.S.A.)
Arkady V. Alekseev (Russia)

Endnote 2

Report of Working Group 8
Practical Assessment Methodology

The meeting of WG 8 was convened at 09:00 on October 17, 1997 (see Appendix 1 for participants and observers). Dr. John Stein pointed out that Dr. Brenda Sanders had tendered her resignation from the Group for medical reasons.

Dr. Colin Levings agreed to serve as rapporteur.

The meeting agenda (Appendix 2) was reviewed and approved. The overall objective of the meeting was to review and refine the draft workplan for convening a Practical Workshop in Jiaozhou Bay, Qingdao, China, aimed at harmonizing approaches and methods among PICES countries when assessing ecological impacts of polluting.

Considerable time was dedicated to refining the workplan (Annex 4). As a result of the discussions, Annex 5.3 in the Working Group report from PICES V was removed from the current draft. This Annex (5.3) will be retained as part of the background information file of the Working Group. Comments from Prof. M.J. Zhou were of particular value. He also gave a very informative review of the sampling and oceanographic investigations that had been conducted to date in Jiaozhou Bay. In addition, he reviewed the list of questions about logistics for the Workshop that has been developed at PICES V. He provided written responses to almost all the questions. Prof. M.J. Zhou gave the name of Ms. Tian Yan, (address: Institute of Oceanology, Chinese Academy of Science, 7 Nanhai Road, Qingdao 266071; phone: (86-532) 287-9062-6121 (office); fax: (86-532) 287-0882; email: tianyan@ms.qdio.ac.cn), as a contact for further details on arrangements and facilities at Qingdao.

The Working Group developed recommendations (Annex 2) to the MEQ Committee, which noted that the remaining funding for the workshop should be solicited from PICES member country agencies. If appropriate other international agencies could be approached; however, this approach was concluded to have a lower probability of success. The recommendations are followed by background information (Annex 3) on the development of the revised draft of the workplan (Annexes 4 and 5).

The draft meeting report and recommendations to the MEQ Committee were approved by the working group for submission to the MEQ.

Dr. Stein mentioned that colleagues had asked if there was any interest among WG participants in developing either a PICES journal or approaching an existing journal as a medium for publishing papers presented at the meetings. If so, perhaps this concern could be carried through via the WG to the Science Board. However, the members present thought that the present system of extended abstracts was satisfactory; publishing symposium/special session papers by one of the approaches above was not discussed.

The meeting was adjourned at 15:30 on October 18, 1997. Dr. Stein and Prof. M.J. Zhou thanked the members for their work, and especially thanked Dr. Jong-Geel Je for inviting the group to a wonderful lunch at a local fugu restaurant.

Appendix 1

Participants and Observers

Canada
Richard F. Addison
Colin Levings*

China
Ming-Jiang Zhou* (Co-Chairman)

Japan
Makoto Shimizu

Russia
Alexander Tkalin*

U.S.A.
John E. Stein* (Co-Chairman)

Observers
Jia-Yi Zhou (China)
Hak-Gyoon Kim (Korea)
Jong-Geel Je (for Dong-Beom Yang*)
L.M. Gramm-Osipov (Russia)

* WG 8 Implementation Group for the Practical Workshop

Appendix 2

WG 8 Working Group Meeting Agenda
October 17 and 18, 1997

Goal of meeting: Revise and refine work plan for the Practical Workshop. Develop strategy for securing funds needed to conduct the workshop.

Start time: 9:00 AM

1. Welcome and Logistics: Stein
2. Introductions of Members and Observers: Stein
3. Appoint Rapporteur
4. Review progress since PICES 5, Nanaimo: Stein and Levings
5. Review and modify workplan, revise workshop timeline: all members
   a. Workplan review and revision:
      i. Background on Workshop Development
      ii. Workplan
         Purpose
         Objective
         Specific Goals
         Study Parameters
         Criteria for Selection of Sites
         Biological and Chemical Analyses (App. 5.3 - 5.5)
         Expected Products
      iii. Logistics for analysis of samples during practical workshop at host lab
      iv. Analysis of samples following workshop, not at host lab
      v. Data Management, statistical analyses, report preparation, etc.
      vi. Budget
   b. Revise timeline for implementing the Practical workshop Flow Chart (Annex 5.1)
   c. Discuss sources of funds to support workshop and strategy for acquiring funding
6. Develop recommendation to MEQ Committee
7. Consideration, review and approval of the recommendations and meeting report
8. Closure of the meeting

Appendix 3

Recommendation to MEQ Committee

WG 8 recommends that the MEQ Committee accept the modified plan (Annexes 3 to 5) for the Practical Workshop developed during the WG meeting that preceded PICES VI (Pusan, Korea). The revisions to the workplan were made in further recognition of the need of PICES countries to work toward harmonizing approaches and methods for assessing marine pollution effects.

During PICES V, the Governing Council approved funds to support operational expenses of the Workshop, whereas the funds to support participation (travel expenses) of member country scientist sin the Workshop had not been secured. WG 8 recommends that the most viable option for securing funds is for MEQ committee members to seek the travel funds for their participating scientists through their member countries.

The Working Group reconfirmed that this workshop is a necessary step in establishing scientific cooperation for future collaborative efforts and in the harmonization of approaches of PICES member countries in assessing the broader scale impacts form human activities on North Pacific marine habitats essential to living marine resources.

Background on Workshop Development

PICES WG 8 (formerly WG 2) has discussed approaches to fulfilling its terms of reference at meetings in Seattle, Nemuro, Qingdao, and Nanaimo (coinciding with the PICES Second, Third, Fourth and Fifth Annual Meetings). Briefly, the aim of WG 8 is to promote the collection and exchange of information about approaches PICES member countries use by assessing the biological impact of marine pollution. The WG8 agreed to approach this by organizing a *practical* Workshop, during which participants could work together to evaluate methods used to assess ecological effects of pollution. The format of the Workshop is being developed along the lines of the successful Intergovernmental Oceano-graphic Commission/Group of Experts on the Effects of Pollutants (IOC/GEEP) workshops whose results have been published in Marine Ecology Progress Series (vol. 46 (1988) and vol. 91 (1992)) and in the Journal of Experimental Marine Biology and Ecology (vol. 138 (1990)).

Jiaozhou Bay, China, was selected for this workshop, because extensive data sets describing biota and contamination in the Bay are available from the Institute of Oceanology, the State Oceanic Administration (SOA), and other institutions and Universities, and there are laboratory facilities on the Bay, including a joint Korea/China Center. The bay is influenced by a range of human activities that will allow the evaluation of methods that are being used in PICES countries to assess the biological effects of pollution. For these reasons, Jiaozhou Bay is a good site to examine harmonization of methods used by PICES member countries for assessing biological effects.

In regards to the logistics for conducting the workshop, Prof. Ming-Jiang Zhou has extended an invitation to use the facilities and research vessels of the Institute of Oceanology, Academia Sinica, for the workshop. In addition, Dr. D.B. Yang from Korea Ocean Research and Development Institute (KORDI) has subsequently confirmed that the joint Korea/China Center in Qingdao may be able to offer additional facilities. The facilities are critical in carrying out a core set of analyses during the workshop, thus allowing first-hand observation and exchange in a wide range of techniques being used in assessing biological effects.

An informal Workshop Implementation Team was formed by the MEQ and WG 8 at the PICES Fourth Annual meeting. The team has had ongoing correspondence, and an informal *ad hoc* meeting of some of the North American

members was held in Seattle in June 1996 to develop a work plan. Implementation team members tentatively identified the kinds of sampling and analyses to be carried out and suggested possible participants from all the PICES member countries. This draft list and tables outlining the suite of analyses proposed was sent to the Workshop Implementation Team members in Russia, Japan, China and Korea that were unable to attend the *ad hoc* meeting. Their review, advice and suggestions were sought and comments incorporated into a revised draft workplan as appropriate. The revised workplan was further refined and formally adopted by WG 8 at PICES V, Nanaimo, Canada (October 1996). At PICES V, the MEQ submitted the Workplan to the Science Committee and the plan was subsequently approved by the Governing Council. The Governing Council also approved PICES funds to support operational expenses for conducting the Workshop in Qingdao, China. By April 1997, literature searches on Jiazhou Bay had been conducted, a bibliography developed, and several key papers were translated to English, and distributed to members. Unfortunately, approval to conduct the workshop in Jiaozhou Bay and the necessary funding to support travel of participating scientists were not obtained in time to carry out the workshop in 1997. At PICES VI in Pusan, it was anticipated that final revisions to the workplan would be made following discussions with scientists from the laboratories in Qingdao.

Practical Workshop Workplan

Purpose:

Work towards harmonizing approaches and methods used in assessing ecological impacts of human activities on the environmental quality of North Pacific marine ecosystems.

Objective:

To work cooperatively in assessing ecological impacts of contaminates on benthic invertebrate and fish communities.

Specific Goal:

To evaluate and compare methods used to assess ecological effects of chemical contaminant exposure.

Study Site:

Six sites within Jiaozhou Bay, China, and one reference site in close proximity to the bay (potentially Laoshan Bay). The sites in Jiaozhou Bay are shown in Figure 1 and were selected according to criteria in Annex 1. The sites to be evaluated were also selected based on geographic location, existing background information, ongoing monitoring, and logistics such as proximity to appropriate laboratory facilities in the Qingdao area.

Workshop:

1. The workshop will commence with a reconnaissance survey to assess the feasibility of obtaining sediment samples and fish and invertebrate specimens necessary to evaluate the methods being tested (see flowchart in Annex 2). Discussions will also be held with local monitoring staff, other investigators, and fishers. Duration of this preliminary work will be 1 week; 2-4 people of variety of backgrounds will work with the Chinese scientists. Daily activity reports might be sent out by email by Prof. M.J. Zhou to workshop participants. During a brief period after the reconnaissance survey (1 week), the workshop design will be refined based on information collected during the reconnaissance survey. The cooperative workshop will begin 1 to 2 weeks after the reconnaissance survey.

2. Biological responses to be evaluated will include; benthic community structure; sediment quality (bioassays), demersal fish health and condition, oyster chambering, gastropod imposex, biota age and size relationships; and biochemical changes (e.g., cytochrome P-4501A induction, acetyl-cholinesterase inhibition, bile metabolites) (see Annexes 3 and 4). These data

will also be used for interpretation of organism, population, and community responses. As appropriate, replicate samples will be collected to allow scientists to analyze the same sample to assess reproducibility. The biological responses will be evaluated in the context of exposure to different classes of chemical contaminants such as polycyclic aromatic hydrocarbon (PAHs), pesticides, chlorinated hydrocarbons, selected metals and organotins (e.g., TBT).

3. During the cooperative activities there will be up to 24 participants, approximately 4 from each PICES member country. This effort may be augmented by other scientists at their expense.

4. Analyses will be carried out cooperatively at the Institute of Oceanology, the Korea/ China Joint Center, and the Yellow Sea Fisheries Institute in Qingdao. In addition routine analyses (e.g., aging) that do not involve cooperative evaluation will be conducted at laboratories in Qingdao. If feasible and necessary, evaluations will be conducted at other laboratories. Data Coordinator will be Dr. John Stein (or designee), who will be responsible for preparing data collection sheets and incorporating measurements and calculations into a data base.

5. The workplan is being developed to encourage comparison and harmonization of methods currently being used by scientists in PICES countries for evaluating ecological effects of pollutants. It is anticipated that a suite of methods will be identified which will complement existing evaluation methods being used in various PICES countries. All work is being designed to be scientifically sound and publishable.

6. The preferable time for the Workshop is May to early June 1998, or possibly between mid-September and the end of October 1998 (see timeline, Annex 5). The workshop will consist of a one week reconnaissance survey and 2 weeks of cooperative activities.

7. It will be necessary to have wrap up meetings for the workshop. In October 1998 at PICES VII we would review preliminary results and discuss the format of a descriptive report on the field work possibly to be published in the PICES Scientific Report series. It is proposed to have a more complete discussion of results during the PICES VIII meeting in October 1999. Final publication of results in the scientific literature, as appropriate, to follow soon after.

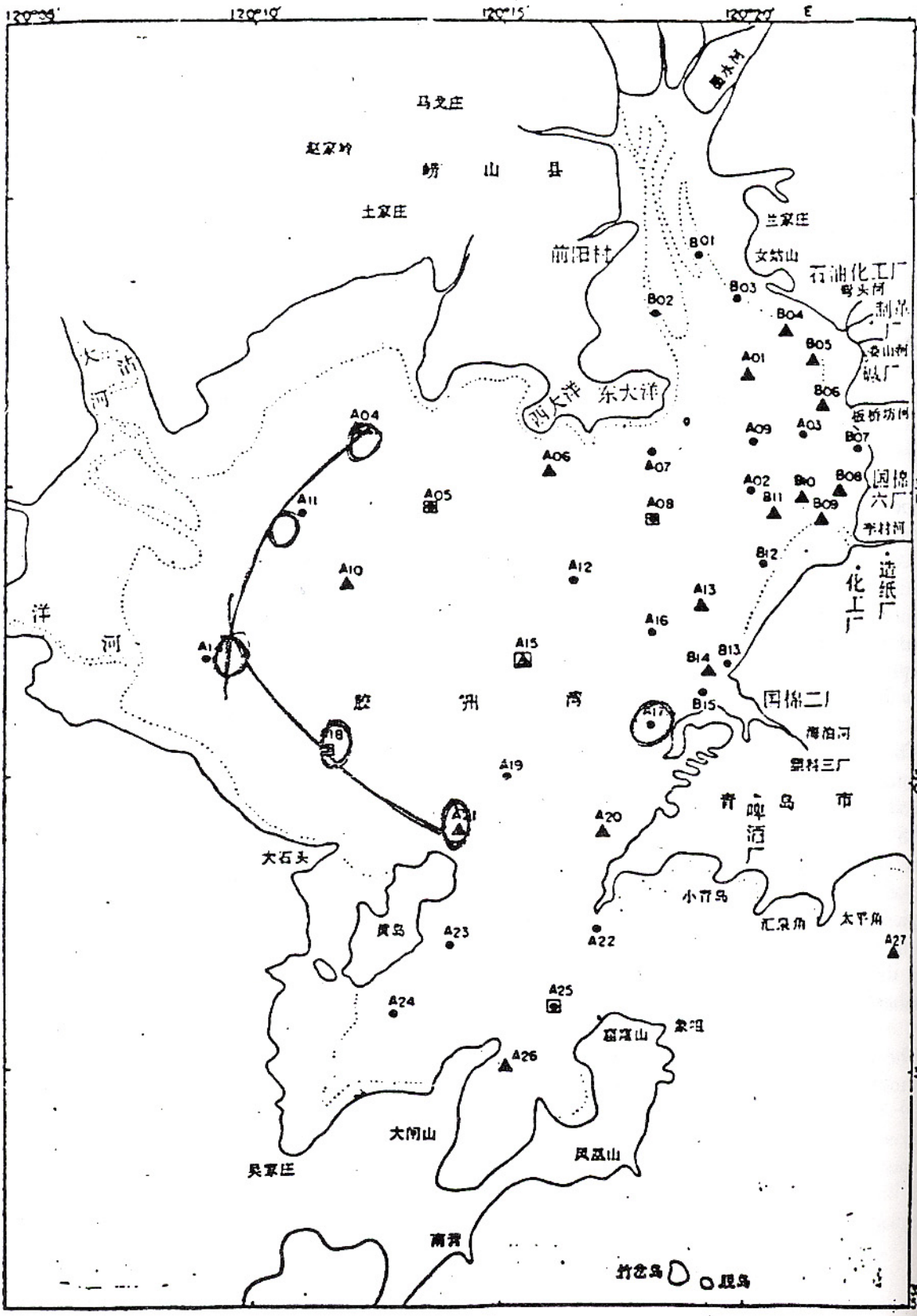
Figures and Tables in Annexes expand on the information presented above and include: a chart of proposed sampling sites; Sampling-site selection criteria; a flowchart for the Workshop and follow-up activities; methods to be evaluated and responsible investigators; and a timeline for implementing and conducting the workshop; and the workshop budget.

Expected Products of Jiaozhou Bay Practical Workshop

1. An improved appreciation by PICES participants of the approaches and techniques used by other member countries to assess the effects of marine pollution, and improved mutual understanding and technology transfer among scientists from PICES countries.

2. The generic results should be applicable to other coastal areas in the PICES region. The data will be archived and made available to PICES country scientists. A series of papers evaluating the methods for characterizing the effects of pollution on aspects of the ecology of Jiaozhou Bay is anticipated.

Figure 1. Chart of Jiaozhou Bay China, showing proposed sites for evaluating methods to assess ecological effects. Specific site locations will be determined during the reconnaissance efforts that will precede the practical workshop.



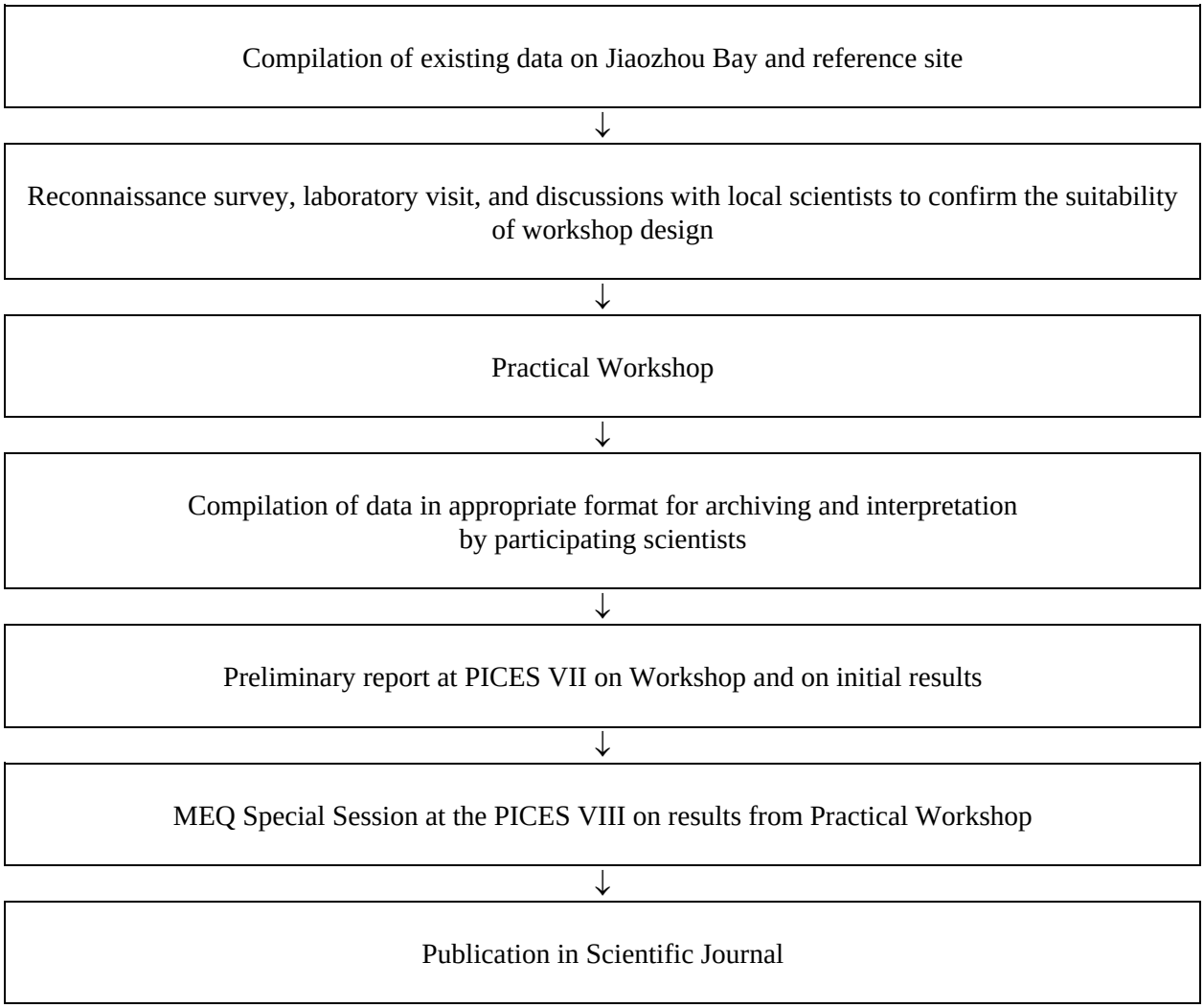
Annex 1

Criteria for selection of sites in Jiaozhou Bay and the reference site, e.g., Laoshan Bay.

- 5 to 7 meter depth (the majority of Jiaozhou Bay)
- ”muddy sediment”
- potential different pollution sources
- intertidal invertebrates present (e.g. gastropods)
- avoid dredged areas or shipping lanes
- at least two sites with fish present
- comparable oceanography (estuarine circulation)
- aquaculture bivalve species similar
- similar wild mollusc species (e.g.*Crassostrea gigas*)

Annex 2

Flowchart for Practical Workshop



Annex 3

Methods for determining ecological effects of contaminant exposure

Methods to be Evaluated	Current participants
For molluscs:	
•chambering (oyster)	Canada (Levings)
•imposex (gastropod)	Korea (Oh), Japan (TBD), China (Zhou)
•age/size relationships, growth rate	China (Zhou)
Biomarkers: •genetic damage (comet assay)	US (Stein)
For benthic fish:	
•health and condition (condition factor, HSI, GSI, tissue lipids)	US (Stein)
•age/size relationships	China (Zhou)
Biomarkers: •CYP1A	Canada (Addison)/ US (Stein)/ Korea (Yang)
•AChE (brain/muscle)	Canada (Addison)/Korea (Yang)
•Bile metabolites	US (Krahn)
For benthic community:	
•abundance/diversity	Russia (Tkalin)/China (Zhou)/Korea (Je)
•sediment quality (bioassays)	Canada (Levings)/China (Zhou)

Abbreviations:
AChE = Acetylcholinesterase
CYP1A = cytochrome P4501A
GSI = gonadosomatic index
HSI = hepatosomatic index
TBD = to be determined

Annex 4

Information Needed for the Practical Workshop

Biological Parameters	**Information needed**
Species identification	observation at time of collection (use photographs)
Length and weight	measurements conducted at time of collection
Sex	observation at time of collection
Age	collection of otoliths or shells
Maturation stage	observation at time of collection, gonad weight, for gonadosomatic index
Stomach fullness	observation at time of collection, weight of contents
Stomach taxonomy	stomach samples preserved
Condition factor	whole body, liver, and gutted body weight at time of necropsy
Other observations:	observable lesions, parasites, deformities, etc.; observations conducted at time of collection (use photographs)
Sediment Characteristics	observations on sediment characteristics (use photographs); TOC, TON, grain size, minerology, metals and organic contaminants
Water characteristics	measurements conducted at time of collection; temperature, salinity, dissolved oxygen, turbidity, nutrients
Sample identification[1]	sample number, date collected, site location, method of collection, DGPS, water depth, etc., observations conducted at time of collection

[1] The numbering scheme will be devised to ensure that all samples are handled "blind" by the researchers conducting analyses (i.e., without the participants knowing the origin of the sample).

Abbreviations:
DGPS = Differential Global Positioning System
TOC = total organic carbon
TON = total organic nitrogen

Annex 5

Timeline for Jiaozhou Bay Practical Workshop

Oct. 1996	Contact with Head of China PICES Delegation (completed).
Oct. 1996	Approval by PICES Science Board and Governing Council of funds to partially support the workshop.
Dec. 1, 1996	Data compilation on biology, oceanography, and pollution; and the translation and distribution of some key papers were initiated (contract established in consultation with M.J. Zhou). (partially completed April 1997)
Oct. 1997	WG 8 met at PICES VI to refine workplan and discuss logistics.
Jan. 31, 1998	Necessary approvals granted, and any modifications to workplan made.
Feb. 15 1998	Deadline for notification of participating scientists of start date for workshop.
Mar. 15, 1998	Final draft workshop timetable to be completed by participants and/or designates; budget finalized.
Apr. 15, 1998	Supplies for workshop on site.
May/Jun. 1998	Practical Workshop 1. week preliminary survey, laboratory visit, discussions with scientists in Qingdao 2. week cooperative workshop
Jul. 30, 1998	Summary report of workshop activities completed by participants will constitute the draft of the final report for WG 8 activities.
October 1998	Present or develop at the PICES VII working group meeting the following: - preliminary results - follow-up analyses - data archive and distribution procedures - proposed publication format - designation of report editor - one comprehensive (40 mins) presentation on the workshop as part of MEQ session.
Dec. 1998	All workshop results available to participants.
Jun. 1999	Complete statistical analyses and interpretation of findings, participants begin preparation of reports to be presented at PICES VIII.
Oct. 1999	Presentation of workshop findings at PICES VIII meeting, complete papers submitted for compilation as workshop report.

Annex 6

Estimated Costs for Jiaozhou Bay Practical Workshop (CDN$)

1. Travel	
8 participants (4 each Canada and US) round trip air fare ($1,500 each person)	$12,000
16 participants (4 each from China, Russia, Japan and Korea) round trip air fare $500 each person	$8,000
2. Accommodation and meals	
a. Laboratory visit and reconnaissance Survey: 3 participants for 7 days ($100 dollars/day/person)	$2,100
b. Practical Workshop 24 participants for 15 days ($100 dollars/day/person)	$36,000
3. Vessel costs (fishing vessel charter, fuel for research vessel)	
a. Fishing vessel 14 days @ $300 per day	
b. Fuel for research vessel $300	$4,500
4. Supplies and shipping (laboratory supplies, reagents, disposable equipment, transport of equipment, air cargo expenses)	$14,000
5. Contract for literature review on Jiaozhou Bay ($1,000 expended to date)	$1,500
TOTAL ESTIMATED COST:	**$78,100**
Funds Contributed by PICES (for Items 3-5)	$20,000
Funds Needed from PICES Member Countries	$54,100

Publication costs, costs of any subsequent travel or "wrap-up" conferences are not included above. In previous IOC/GEEP workshops, all these items have been considered desirable, although most of the costs have usually been borne by individual investigators or their agency. It is proposed that the “wrap-up” symposium be conducted as part of PICES VIII. Availability of PICES travel funds will be important to insure that participants can attend PICES VII and VIII, so that an initial assessment of the workshop can be conducted and additional planning for report preparation can take place (PICES VII), and that the "wrap-up" conference (PICES VIII) will be well attended.

REPORT OF PHYSICAL OCEANOGRAPHY AND CLIMATE COMMITTEE

The meeting was opened at 08:30 on Oct 22, by the Chairman, Prof. Paul H. LeBlond (Canada). Dr. Howard J. Freeland acted as rapporteur.

Items following from last year's meeting were considered first.

WOCE Pacific Atlas

Dr. Howard J. Freeland outlined progress: Dr. Lynne D. Talley has funding from U.S. National Science Foundation; other national organizations as well as PICES may be approached for assistance. POC members generally supportive of PICES involvement with publication and/or distribution of Atlas, but no specific proposal available.

State of the Ocean

PICES Press picked up on the suggestion made by POC last year for periodic updates on the state of the ocean. Summaries on ocean conditions in the western and eastern Pacific as well as the Bering Sea have appeared and are scheduled to continue. Appreciation and approval for these contributions was expressed by POC members. PICES press encouraged to expand coverage to other areas, such as western Pacific marginal seas.

Bathymetric Information

Dr. Thomas C. Royer reported that following last year's request for enhanced ocean bathymetry data, TCODE has included an inventory of bathymetric data sources on the PICES web site [http://pices.ios.bc.ca]. A print-out of the TCODE inventory of Web Sites was circulated.

Bering Sea Metadatabase

Mr. Allen Macklin reported on this program, designed to document data holdings (but not the data themselves) on the Bering Sea. Accessible at web address
http://www.pmel.noaa.gov/Bering/mdb/

Okhotsk Nomenclature

Prof. Yutaka Nagata and Dr. Vyacheslav B. Lobanov reported on progress on the multilingual (Japanese-Russian-English) Okhotsk Sea nomenclature. POC members emphasized the need for simple and unambiguous (rather than linguistically sophisticated) equivalencies. The Marine Information Research Centre (Tokyo) will cover publication costs of the Nomenclature to appear both as a PICES Scientific Report and a MIRC report.

WG 10 Report

Co-chairman Dr Christopher N.K. Mooers outlined progress. Major activities over the past year have been a Workshop, held in Fukuoka, Japan, January 31-February 2, 1997, proceedings of which were published in PICES Press, July 1997; setting up an online, updatable Japan/East Sea bibliography (on the PICES Web site); convening a symposium on "Circulation and Ventilation of Marginal Seas" at PICES VI; group meeting in Pusan immediately before the Annual Meeting of PICES. Preliminary findings and recommen-dations of WG 10 are also posted on the PICES Web Site. A draft report is scheduled to be circulated to POC members for external review by April 1, 1998. Final report, to be submitted for publication as part of the PICES Scientific Report Series, expected July 1, 1998. Co-chairmen Dr. Mooers and Dr. Sang-Kyung Byun were thanked for their work in leading WG 10.

Future of WG 9

POC endorses the recommendation made by the BASS Task Team for reconstituting WG 9 with new terms of reference and new membership as a "Monitoring Task Team" under the CCCC-IP.

Support for CREAMS

POC unanimously endorsed the following statement in support of the Circulation Research of East Asian Marginal Seas program: "POC recognizes the scientific value of CREAMS and its achievements on the ocean environment and climate change and sees it as a successful example of international cooperation among PICES member countries, and strongly supports CREAMS-II in 1998-2002 as its continuation. POC recommends that the Science Board endorse CREAMS-II as an essential component of research programs within the PICES framework."

Second Okhotsk Sea Workshop

A recommendation for this workshop arose from the first Okhotsk Sea workshop in Valdivostok. POC recommended last year that a workshop be held in the summer of 1998. Prof. Yutaka Nagata outlined plans for a 4-day workshop to be held in Nemuro, Japan, in November 1998 - after the fishing season, but before it gets too cold. Co-convenors would be Prof. Nagata, Drs. Vyacheslav B. Lobanov and Lynne D. Talley, and the workshop would focus on physical aspects of the oceanography of the Sea of Okhotsk, where there has been much recent progress. Financial support will be provided by the City of Nemuro; the only request to PICES is for travel for two invited speakers. POC strongly supported plans for this meeting and request for travel support.

Remote Sensing Training Course and brochures

Dr. Andrey Martynov requested POC's consideration of two topics. In his absence, Dr. Seelye Martin spoke about Dr. Martynov's plans for a brochure on "Applications of Remote Sensing to Oceanography in East Asian Marginal Seas", similar to an existing brochure published by the European Space Agency for the Mediterranean Sea. POC members were favourable to the idea in principle; they suggested that such a project should be coordinated with Space and Oceanic Agencies of neighbouring countries before being brought to the consideration of PICES.

Dr. Vyacheslav B. Lobanov spoke to Dr. Martynov's second suggestion, for training courses on remote sensing to be held in Vladivostok for Russian participants. Would PICES help with funding the participation of international experts? While there was general support for the idea of training courses, there were questions whether single-country courses should have a high priority. Suggestions for attracting expert lecturers were made: for example, from participants at the forthcoming PORSEC meeting in Qingdao; through WESTPAC-IOC, which already has a program of technical courses. In the absence of a definite proposal, POC could not arrive at a recommendation. The Chairman will write to Dr. Martynov, reflecting the above points.

Translation

POC debated the request for translation of "Complex Studies of the Okhotsk Sea Ecosystem" from Russian into English. While supportive of the idea, POC also requested that Science Board provide policy guidance on the publication of translations, brochures, and other material.

New Working Group

POC supports the terms of reference proposed by BIO for a Working Group on CO_2 in the North Pacific.

PICES Seventh Annual Meeting

POC proposes the following activities for PICES VII:

1. "El-Nino: preliminary look", jointly proposed with BASS as a Science Board Symposium. POC convenor: Howard J. Freeland.
2. "Decadal variability of North Pacific climate" as a POC topic session. This is to address the issue of the reality of of "Regime Shifts" and how to recognize and characterize them. Co-convenors: Masahiro Endoh and James E. Overland.
3. "CO_2 in the North Pacific" as a joint POC-BIO topic session. Co-convenors: Shizuo Tsunogai and TBA.

Best Presentation Award

The "Best Presentation Award" was made on the basis of nominations received from the audience at POC Topic and Symposium sessions. The winner was Dr. Young-Jae Ro of Korea.

Scientific Program

The following scientific papers were presented from the POC Committee sponsored part of the program.

Circulation and ventilatin of North Pacific marginal and semi-enclosed seas. (POC) Co-convenors: Sang-Kyung Byun (Korea) & Christopher N.K. Mooers (U.S.A).

Y.J. Ro, J.C. Lee, D.K. Lee. Recent investigation of the polar fronts of the East Sea by CTD profilings and ADCP trackings

Y.I. Zuenko, Y.V. Novikov. Thermal structure of the North-western Japan Sea upper layer: Climate and variability

J.Y. Yun, K. Kim, K.S. Lim. Effects of the North Korean cold water on the distribution of the physical properties in the East Sea near the coastal boundary

M.A. Danchenkov, A.A. Nikitin, V.P. Pavlychev. Branches and meanders of the Tsushima Current north of 40 N

C.N.K. Mooers, H.S. Kang. Simulation of Japan (East) Sea (JES) circulation

V.I. Kuzin, E.N. Golubeva. G.A. Platov. Short-range prognostic calculation of the Sea of Japan (East Sea) circulation

N.M. Pestereva**.** Long-term forecast of monthly sums precipitation in June for western coast of the Japan Sea

S.H. Son, D.K. Lee, S. Yoo. The pigment distribution in the East Sea/Japan Sea observed by coastal zone color scanner

G.I. Shapiro. Deep sea-shelf water exchanges at the shelf edge

V.V. Navrotsky. Mechanisms of influence of coastal and shelf waters on the open sea bioproductivity

S. Ito, H. Otobe, D. Inagake, M. Murakami. Intermittent intrusions of the internal tidal waves in the Sanriku coastal bays and its relations to the offshore circulations

C.N.K. Mooers, J. Wang. Seasonal circulation of Prince William Sound

T. Yoshida, K. Ishikawa. Some oceanographic features of the Okhotsk Sea derived from historical hydrographic observations

S.V. Gladyshev. Salt, ice and dense water production in the northern Pkhotsk Sea coastal polynyas in winter 1995-1996

S. Martin, R. Drucker, K. Yamashita. The variability of ice and brine production in the Okhotsk Sea polynyas

I. Yasuda, S.I. Ito, Y. Shimizu. Cold core anti-cyclonic eddies east of the Bussol' Strait

V.B. Lobanov, L. Mitnik, N. Bulatov. Some features of mesoscale and small scale wter dynamics in the southern Okhotsk Sea seen by the ERS-1 synthetic aperture radar

N.A. Dashko. The variability of precipitation in a monsoon climate of the Japan and Okhotsk Seas

M.Y. Zhou, F.L. Qian, S.M. Li, M. Li, C. Wu. Geographical and temoral variation of

sensible and latent heat fluxes in the ocean area near China

K. Taira. Activities toward NEAR-GOOS at Japanese universities

S.D. Hahn, Y.S. Suh, Y.H. Ahn, J.H. Kim, J.H. Park. Real time water temperature mappings and services for NEAR-GOOS activity

T. Yoshida, N. Hasegawa, Y. Kurihara. Present status on NEAR-GOOS real time data base at the Japan Meteorological Agency

K.R. Kim. East Sea (Japan Sea) ventilation: a chemist's point of view

S. Tsunogai, S. Watanabe. Ventilation of Japan Sea water studied with chemical tracers

C.T. Chen, A. Bychkov. An anoxic Sea of Japan by 2200

H.J. Freeland. The impact of El Nino event on the BC coast

K. Hanawa, T. Yasuda. Retrospective analysis of sea surface wind fields over the north Pacific during the period of 1899-1995

F. Wang. The deep western undercurrent near the Philippines

M. Endoh, G. Yamanaka, Y. Kitamura. Time scale of tracer diffusion in the North Pacific intermediate layer

K. Lee, T. Takahasi, S. Doney, R.A. Feely. No evidence for large interannual variations in global oceanic CO_2 uptake

V.I. Kuzin, V. Moiseev. Seasonal variations of the North Pacific hydrological characteristics based on climatical data diagnosis

Endnote 1

Participants and Observers

Canada
Howard J. Freeland (rapporteur)
Paul H. LeBlond (Chairman)

China
Ming-Yuan Zhou

Japan
Masahiro Endoh
Nobuo Suginohara

Korea
Kuh Kim
Jae-Yul Yun

Russia
Sergey V. Gladyshev
Vyacheslav B. Lobanov

Observers
Alexander Bychkov (Asst. Exec. Secretary, PICES)
Sang-Kyung Byun (Co-chairman, WG 10)
Allen Macklin (U.S.A.)
Seelye Martin (U.S.A.)
Christopher N.K. Mooers (Co-chairman, WG 10)
Yutaka Nagata (Japan)
Thomas C. Royer (TCODE representative)
Grigory I. Shapiro (Russia)
Bruce A. Taft (Co-chairman, WG 9)
Shizuo Tsunogai (Japan)

Endnote 2

Report of Working Group 10
Circulation and Ventilation in the Japan Sea (East Sea) and its Adjacent Areas

Major Activities

Workshop in Fukuoka, Japan (January 31 to February 2, 1997)
PICES Press article
Online (WEB), Dynamic (i.e., Updatable) JES Bibliography
Online (WEB), Draft WG 10 Report
PICES VI / POC Topic Session

Preliminary Findings & Recommendations
(Revised October 21, 1997)

F1. A high-level of scientific background information exists (especially due to CREAMS), but a comprehensive understanding of the general circulation and ventilation that is sufficient to support fully the needs of future studies regarding the climate variability and change, pollution, fisheries, ecosystems, and biogeochemical fluxes has not yet been achieved. For example, while CREAMS has discovered strong mesoscale and submesoscale variability in the deep layers, a fundamental understanding of the circulation and ventilation of intermediate and deep layers of the JES does not yet exist. As another example, the upper layer mesoscale variability of JES is not well enough observed and understood to provide accurate several-day synoptic maps of fronts, jets, and eddies in the upper layer.

R1. Proceed to achieve the necessary level of understanding and encourage the coordination of PICES-GLOBEC, PICES-JGOFS, etc. activities with PAMS/JECSS, CREAMS II, IOC-WESPAC, NEAR-GOOS, and their follow-ones.

F2. The level of regional scientific communication and cooperation is excellent.

R2. Future international studies should build upon the recent CREAMS and fisheries science experience, expertise, and infrastructure, including NEAR-GOOS.

F3. Major scientific issues in ocean dynamics, in general, and marginal semi-enclosed seas, in particular, can be addressed in JES, especially with NEAR-GOOS in prospect. For example:

- The influence of mesoscale variability on the mean flows and mean transports of properties.
- The influence of major topographic anomalies (e.g., deep basins and high rises) on coupling upper layer, intermediate layer, and lower layer mean and transient flows.
- The ventilation of intermediate and deep layers on seasonal, interannual, and interdecadal time scales.
- The interaction between wind-driven and buoyancy –driven circulation.

R3. Encourage development of such studies (e.g., CREAMS II) on an international basis. The use of CFCs and radionuclides as tracers is quite promising for studying ventilation and intermediate and deep level circulation. Analysis of sediment coves for alternating oxic and anoxic conditions is promising for the analysis of decadal and centennial variability.

F4. The entire JES must be studied as a connected dynamical system, both horizontally and vertically. However, free access to EEZs is the greatest limitation to international studies of the entire basin.

R4. PICES should endorse the general plan of research discussed in this report and use Article 247 of UNLOS to ensure EEZ access. [Research vessels should possibly fly the PICES or UN (IOC) flag]. Future international studies (e.g., CREAMS II) should be encouraged to follow the

procedure established by the PICES Governing Council for PICES endorsement to ensure free access to the EEZs of the JES.

F5. Numerous valuable datasets are held in a "proprietary" (i.e., national security "classified") status which is a limiting factor, especially for retrospective studies.

R5. PICES should work to improve the data exchange situation, e.g., through funding for Russian scientists that will enable them to provide unique synoptic datasets and historical time series. Establishment of a regional database, on and international basis, would facilitate analytical and modeling studies.

F6. JES circulation, chemistry, and biology are linked to adjacent seas and their river discharges, spawning grounds, etc.

R6. Future multidisciplinary JES studies need to include links to adjacent seas, especially the East China Sea and Yellow Sea, and possibly the Sea of Okhotsk.

F7. Simulation and nowcast/forecast modeling of JES circulation and ventilation to a broadly useful level of accuracy is a challenging but probably feasible task over the next decade.

R7. JES modeling activities should be evolved to interact well with observational studies and monitoring for mutual benefit; e.g., design of observational networks, hypothesis development, model evaluation, and nowcast/forecast system development. And organized model-observations and model-model comparison activity in conjunction with CREAMS II and NEAR-GOOS should be considered to facilitate rapid progress. There may be a role for PICES to play in coordinating this activity.

F8. Mesoscale and submesoscale variability has a strong influence on the distribution of plankton and fish, especially in the vicinity of the subpolar front and jet. Since there is interannual variability in the mesoscale variability, interannual variability of the biota is anticipated. Similarly, since tidally induced mixing in shallow water has an impact on the marine ecosystems, and since there are seasonal and longer time scale variations in the shallow water mass characteristics, these sources of shallow water physical variability apparently influence the marine ecosystems.

R8. A new working group to examine the biological response of the JES to physical variability should be considered.

F9. The U.S.A. plans to participate in field experiments and modeling studies of the JES over the next five years, in coordination with Japanese, Korean, and Russian scientists of the CREAMS Program. This new effort, called CREAMS II, provides an unprecedented "critical mass" of activity that will present many opportunities for other scientists conducting complementary studies.

R9. The Japanese, Korean, and Russian governments are encouraged to match the USA effort with an acceleration of support for CREAMS II and complementary research projects. To achieve its greatest potential, CREAMS II is encouraged to adapt a policy of open participation.

F10. Important activities and initiatives are underway or planned to monitor the inflow through the Korean/Tsushima Straits and the outflow through Tsugara Strait, using submarine cables, ADCPs aboard ferry boats, and CTDs. There is a Russian and Japanese project to utilize the TASC submarine cable between Nakhadka, Russia and Naoetsu, Japan for JES monitoring; it has indicated strong variability on a several-week time scale which needs interpretation.

R10. Monitoring systems for the inflow through Tatarski Strait and outflow through Soya

Strait should be considered. Also, the interpretation of the TASC data, together with auxiliary data, should be evaluated for its potential utility as part of a multi-component monitoring system.

F11. The EEZ of North Korea (DPRK) encompasses one of the most critical subdomains for the JES circulation and ventilation. Hence, it is essential to involve DPRK in future studies of JES.

R11. Continue to invite DPRK to participate in PICES meetings. DPRK participation may be most feasible for PICES VIII, to be held in Vladivostok.

F12. Research programs in other regions (e.g., Mediterranean Sea, Labrador Sea, and Irish Sea) may have generic value for understanding the JES circulation and ventilation, and designing strategies for observing and modeling JES.

R12. Invite scientists from other regional seas programs to speak at future PICES meetings so that information exchange may be facilitated.

F13. The JES is a nearly closed system, and, as such, offers the opportunity for physicists, chemists and biologists to develop strategies for a mutually consistent description of physical and biogeochemical transport processes. Apparently, the JES carbonate and silicate systems differ from those of the North Pacific, and are thus, of intrinsic interest. The airborne transport and deposition of particles must be considered, and the transport of suspended matter from the East China Sea/Yellow Sea must also be considered.

R13. The transport processes should serve as a focus for the next generation of JES studies after CREAMS II, both for their intrinsic importance to JES biogeochemistry and their stimulation of a high level of physical understanding of the regime.

F14. Ice processes, both thermodynamical and dynamical, have an important influence on JES circulation, ventilation, and water mass formation in the northern JES (Tatarskiy Strait), along the Primorski coast, and in Peter the Great Bay.

R14. Ice processes need to be incorporated in future studies of the JES circulation and ventilation.

F15. Evidence is increasing that synoptic atmospheric forcing is important to the circulation and ventilation of JES, including surface heating/cooling as well as wind stress. However, the importance of synoptic scale evaporation and precipitation have yet to be ascertained.

R15. Encourage the exploration of synoptic atmosphere-ocean coupling, especially the development of synoptic air-sea exchange datasets.

F16. Time series from coastal stations, satellite data, repeated hydrography, and atmospheric surface climatologies have revealed rich variability and provided insights into the physical nature of JES. The few existing time series of direct current observations have revealed surprising variability.

R16. Encourage the development of long-term current monitoring sites at strategic locations in the JES.

F17. The chemical oceanographers have utilized a variety of chemical tracers to develop box models for exchange processes and transfer rates in the JES that can be evaluated and utilized by physical and biological oceanographers.

R17. Physical oceanographers should attempt to reconcile their observations and models with the chemical oceanographers' description of exchange processes and estimates of ventilation rates.

F18. Physical and chemical data indicate that the JES vertical structure and ventilation depths (i.e., from a 2-layered to 3-layered and return to 2-layered system) have changed (i.e., T increased; DO decreased in the bottom layer) over the past 60 years. Hence, there is conclusive evidence for climate variability and/or change on time scales of a century.

R18. The JES is an efficient regime for developing monitoring strategies for (and documenting and discriminating) climate variability and/or change, placing the physics, chemistry, and biology on a mutually consistent basis.

Schedule for completing WG 10 Report

Nov. 15, 97 –	Contact authors for outstanding contributions
Jan. 1, 98 –	Remaining draft contributions are due
Jan. 15, 98 –	Draft report circulated to WG 10 for internal review and updating
Feb. 15, 98 –	WG 10 comments and updates are due
Mar. 1, 98 –	Drs. Byun & Mooers meet for editorial review
Apr. 1, 98 –	Final draft report sent to POC for external review
Jun. 1, 98 –	POC comments received
July 1, 98 –	Submit revised report for publication

REPORT OF THE TECHNICAL COMMITTEE ON DATA EXCHANGE

The committee met on October 18 and October 23, 1997, in Pusan, Korea, in conjunction with the 1997 PICES Annual Meeting. (See Endnote 1 for attendance.)

1. Introduction of members

The Chairman opened the meeting by requesting attendees to introduce themselves (agenda item 1.1). He then summarized the objectives of this TCODE meeting which were to complete the agenda during the initial, one-day session and to review and amend the TCODE annual report at the second session to be held on Thursday, October 23. Dr. William Karp volunteered to act as rapporteur.

TCODE members were asked to attend various PICES committee and working group meetings during the week, and report back on issues of interest to TCODE at the Thursday meeting (Agenda item 1.2). The draft meeting agenda was reviewed and the chairman requested changes, corrections, and additions (1.3). The agenda was amended with several items under "New Business" (agenda item 1.8).

2. Review of progress on issues from last year

2.1 Inventory of Long Time Series

The inventory is available through the PICES home page and is organized by subject area. Printed copies are also available directly from the PICES office. An article written by the TCODE chair and published in PICES press describes the inventory in some detail. Entries from Korea are lacking, but Dr. Sangbok D. Hahn agreed to provide some material as soon as possible. The Chairman requested that members review entries for accuracy and continue to provide updates and additions. Members were encouraged to work with all relevant agencies in their home countries to identify suitable data sets and prepare entries for the inventory. As the inventory grows, it may become necessary to identify new subject areas for organizing the entries.

Dr. Thomas C. Royer suggested that potential users of data sets identified in the inventory might need guidance in appropriate use of the data. Members agreed that such guidance might often be appropriate but that it may be difficult to obtain suitable commentary from owners of data sets. It may be advisable to request comments on this issue from other PICES committees. The committee agreed that inventory entries should provide references for publications which provide guidance on data use, particularly for data sets which consist of model output.

In response to concerns that scientists in some member countries are not aware of the inventory, the Chairman encouraged TCODE members to help develop awareness.

2.2 Other Internet resources

The Chairman has assembled an extensive list of Internet resources of interest to the PICES community and provided links to these resources through the PICES home page. He requested input from committee members regarding additional entries in this list. Members agreed to review the list and provide corrections, additions and recommendations for new categories. Links on El Niño topics, and satellite image information from the NASA SeaWIFS project were discussed.

2.3 Communications Study Group

A PICES Communications Study Group was established in 1997 and was tasked with reviewing all aspects of communi-cations with the organization and providing

recommendations. The TCODE Chairman served on this committee, together with the chair of the science board and Dr. Alexander Bychkov of the PICES Secretariat. Mr. Robin Brown summarized the study group's report to the committee. In reviewing the report, TCODE noted that the existing mail/fax/ e-mail/Internet system works well, given the complexity of PICES communications responsibilities and the limited availability of advanced communications technologies in some member countries. It was noted that e-mail is now almost universally available to PICES scientists and that, consequently, e-mail communication within the organization has expanded rapidly during the last year.

TCODE recommended that innovative communications technologies be adopted by PICES only after careful consideration, and that Internet bulletin boards be established only in response to specific requests from Committees or Working Groups.

2.4 Bering Sea Metadatabase (Megrey/ Macklin - U.S.A.)

Dr. Bernard Megrey of the U.S. National Marine Fisheries Service gave a presentation on a project to assemble this database which is managed by Mr. Allen Macklin and himself. The project is funded by the National Oceanographic and Atmospheric Administration's Envi-ronmental Services Data Information Management (ESDIM) office for a three-year period at a total funding level of US$275,000.

The goal of the project is to advance understanding of the structure and function of the Bering Sea ecosystem through the development of a collaborative research tool for fisheries oceanography and ecosystem investi-gations. The intent is to provide an inventory of relevant data with metadata descriptions which describe the content, quality, condition, and spatial and temporal characteristics of the data. The metadatabase will be accessed through the world wide web and will incorporate a sophisticated search capability.

Dr. Megrey indicated that project personnel have been actively seeking entries for the metadatabase. A form has been designed to ensure that individuals submitting entries provide all the necessary information. A large number of scientists have been contacted by mail and e-mail. TCODE members were requested to provide assistance in identifying institutions and individuals in Korea, Japan, China, and Russia who may have databases suitable for inclusion in this project.

TCODE indicated its continued support for this project, encouraged committee members to provide assistance in identifying institutions and individuals who may have databases suitable for inclusion in the project, and agreed to investigate possibilities for integration of this metadatabase with the PICES inventory of long term time series data sets during the next year.

3. MIRC *Marine Information Research Center - Japan*

Information was provided on this organization which has recently been established by the Japan Hydrographic Association under the leadership of Prof. Yutaka Nagata**.** MIRC will complement the data collection and storage activities of the Japan Oceanographic Data Commission (JODC) by providing high quality data products for researchers and promotion of a wide range of data services.

4. Data management for CCCC Program

The TCODE Chairman attended a workshop sponsored by the IGBP Data and Information Systems group in April 1997. Data collected during IGBP projects (which include GLOBEC projects) were discussed. Subsequently, Mr. Brown attended a meeting of the GLOBEC Scientific Steering Committee in England and reported on the workshop and GLOBEC data management issues. Upon returning from the meeting in England, the TCODE Chairman prepared a report for members of his committee

and solicited recommendations regarding the role of PICES in the management of data collected during the CCCC project.

After lengthy discussion, TCODE recommended that national committees and offices should be responsible for assembling inventories of data and data products collected by the CCCC projects and that PICES should coordinate this activity by encouraging national offices to assemble and provide such inventories. Access to inventories and data sets should be provided through the CCCC home page.

5. New business

5.1 Comments on the Terms of Reference for proposed Working Group on CO_2

TCODE supports the terms of reference for this proposed Working Group.

5.2 North Pacific Meteorological Buoy panel

Mr. Brown explained that the Canadian meteorological agency (Environment Canada – Atmospheric Environment Service) was seeking the names of agencies to contact regarding this possible activity. It is not envisaged that PICES will have a role in the data coordinating committee if it is established. TCODE members provided Mr. Brown with agency names (and contact points or individuals) for their respective countries.

5.3 Proposed rule changes for Technical Committees

The committee was informed of a proposal to amemd PICES rules of procedure to limit the term of technical committee chairmen to three years, and restrict a single individual from serving two consecutive terms as chair. The committee recommends that the Science Board consider this proposal carefully, and pay particular attention to costs which may be associated with frequent changes in the chair of technical committees. TCODE's ability to function effectively is directly linked to the commitment of the chair to the work of the committee, the resources provided by the chair's home institution, and the chair's ability to maintain committee activities over relatively long time periods. Any procedure for selecting TCODE chairs should take into account the extensive commitment of time and institutional resources required.

5.4 Links to other organizations, activities and projects

At the request of the Science Board Chairman, TCODE assembled the following list describing the participation of TCODE members:

Project/Activity	Participant
IGOSS (Integrated Global Ocean Sensing System)	Hahn/KODC; Nagai /JODC
IODE (International Oceanographic Data Exchange)	Hahn/KODC; Nagai /JODC
GOOS (Global Ocean Observing System)	(none)
GOOS-LMR (Living Marine Resources)	(none)
NEAR-GOOS (North East Asia Regional GOOS)	Hahn/KODC; Nagai /JODC
GLOBEC (Data Management)	Brown
JGOFS (esp. Data Management Task Team)	Brown (small amount of interaction)
ICES - FAST (Fisheries Acoustics Science and Technology)	Karp (inactive member)
ICES - FTFB (Fishing Technology and Fish Behavior)	Karp (inactive member)

5.5 Advance notification of research vessel cruises

PICES scientists continue to express concern that advance notification of research cruises is not always readily available. Consequently, researchers may miss opportunities to request participation or collection of samples or data.

It was noted that JODC has a web-searchable database for planned research cruises of the Japanese National Oceanographic Program but that the listings are not comprehensive. In addition, the University of Delaware maintains a web-based inventory of planned cruises which includes UNOLS and some NOAA plans. The Chairman agreed to provide the University of Delaware with the names of contacts in PICES countries who may be able to provide additional cruise schedules. Committee members agreed to seek contacts in their respective countries. The Committee agreed to work with REX (Dr. Anne Hollowed) to assist in the assembly of a database of PICES-GLOBEC (and GLOBEC-like) projects and activities for distribution on the PICES Web Server. This database will include some details on ship scheduling for these programs.

5.6 Proposed MONITOR Task Team (CCCC)

The committee reviewed the Terms of Reference for the proposed task group and supports the formation of this group.

5.7 New digital bathymetry databases

Dr. Royer discussed POC's keen interest in bathymetric data. NASA now has an interpolated global bathymetry available but the database is to big for it to be useful to many scientists. Dr. Royer pointed out that in order to be really useful for PICES scientists, it would be necessary to create subsets of these data to cover regions of interest to PICES. There was some discussion of the possibility for TCODE to prepare and distribute such subsets from the PICES Webserver. Dr. Nagata (MIRC-Japan) indicated that MIRC might be able to respond to special requests to perform tasks of this type. Dr. Royer will identify individuals responsible for managing these data sets at the agencies concerned and communicate with Dr. Nagata.

5.8 International Year of the Ocean

Dr. Hahn suggested that TCODE recommend that PICES take action to formally recognize the United Nations declaration establishing 1998 as the International Year of the Ocean. The committee endorsed his suggestion.

6. Work Plan for 1997/1998

The TCODE work plan for 1997/1998 includes the following elements:

- Updates and additions to the Long-Term Time Series Data Set Inventory
- Improvement and extension of the list of Internet resources of interest to PICES scientists
- Exploration of the possibilities for merging the PICES Long Term Time Series Data Set Inventory with the Bering Sea Ecosystem Biophysical Metadatabase
- Provision of assistance in assembly of the Bering Sea Ecosystem Biophysical Metadatabase through establishment of appropriate contacts in PICES member nations.
- assemble descriptions of 1997/1998 El Nino monitoring plans and distribute this information via the PICES web server.

Endnote 1

Participants and Observers

Canada
Robin Brown (Chairman)

China
Ling Tong

Japan
Ichiro Hara
Toshio Nagai (October 18 only)

Korea
Sangbok D. Hahn
Kee Soo Nam (October 23 only)

Russia
Lev N. Bocharov
Vyacheslav Lobanov (or Igor Rostov)
Igor Shevchenko

U.S.A.
William A. Karp
Thomas Royer

Observers
Alexander Bychov (Asst. Exec. Secretary, PICES)
Loh-Lee Low (U.S.A.)
Allen Macklin (U.S.A.)
Bernard Megrey (U.S.A.)
Yutaka Nagata (Japan) (for T.Nagai on October 23)

REPORT OF THE IMPLEMENTATION PANEL ON THE CCCC PROGRAM

The CCCC/IP Panel met on Tuesday, October 21, 1997, at 1:30PM. Agenda for the meeting is attached. The Panel heard and accepted reports from the MODEL, REX, and BASS Task Teams. The proposals developed by REX, BASS, and MODEL for symposia and workshops to be held during 1997/1998 were discussed and accepted. The Panel received information about the current status of cooperation with other programs such as IPHC, ICES, IGBP, and NPAFC. The proposed terms of reference, statement of purpose, and structure for the Implementation Panel were discussed, revised and accepted by the group. A proposal for a new MONITOR Task Team and its terms of reference were discussed, revised, and accepted by the group. It was decided that a TCODE representative should be on the new task team. The group decided that CCCC/IP should contribute regularly to the PICES newsletter. The CCCC/IP heard a report from Robin Brown (TCODE) regarding data management and exchange issues of IGBP GLOBEC. It was decided that Robin Brown and one of the CCCC/IP Co-chairmen would draft a letter to each of the national GLOBEC programs in the PICES area to determine the status of their data management and exchange policies.

BASS Task Team Report

Co-Chairmen: Dr. R.J Beamish and Prof. M. Terazaki

The BASS Task Team report for the 1997 meeting consists of a summary of the annual meeting and a summary of the symposium. Our major activity in 1997 was the symposium which we will finalize for publication in 1998. The final publication will be a comprehensive summary of the physical and biological components of the ecosystems of subarctic Pacific gyres. It is our expectation that this summary will provide a background for research that identifies the important information needs. The subarctic Pacific gyres tend to receive less attention that the coastal areas. Yet they are an extremely productive component of the North Pacific. Bass members expect that the symposium proceedings will stimulate scientists to study the subarctic Pacific gyres and will encourage more scientists to participate in future BASS meetings.The annual BASS meeting was held on October 19, 1997. The following are the minutes of the meeting.

Symposium - BASS members reviewed the structure of this year's symposium. It was agreed that the panel review be replaced by a panel facilitated discussion of the major recommendations for research and coordination from the authors of the papers. Immediately following the symposium, the organizing committee will summarize the discussion in the form of recommendations from BASS. BASS members feel that the papers in the symposium should be published in a reviewed journal if possible, but there is value in keeping the papers together in one volume.

El Niño - BASS members felt strongly that PICES ensure that attention is given to the 1997/1998 El Niño event by 1) Facilitating collaborative open ocean data collection, 2) Holding a symposium that will allow a preliminary identification of impacts and that BASS participate in the planning of the symposium. PICES should consider holding a joint symposium with NPAFC at a mutually convenient date and location. BASS recognized that there will be a need for more detailed analyses of the El Niño event that could be a topic for future PICES meetings.

<u>Coordination of existing and future high seas field studies and work plan</u>

There was an extensive discussion of the role of BASS in the development of high seas sampling programs. It was agreed that national contacts and a representative from NPAFC would be identified by the co-chairs and the PICES Secretariat will collect, update, and distribute the information. BASS will use the results of the symposium to

identify research issues and key east-west comparisons. Recommendations for future research resulting from the symposium will be summarized in a discussion paper prepared by the organizers and will be the basis for the development of a long-term work plan for BASS.

Intercalibration of plankton data

Intercalibration studies of plankton and nutrient sampling methods should be encouraged. It was noted that intercalibration may be more feasible that specification and enforcement of "standard" methods.

Air Sea interaction

The Task Team discussed air-sea interaction research and its relevance to BASS objectives. Points included:

- Recent technological developments for large scale observation (satellite scatterometry for wind speed, satellite altimetry for evolving surface current fields).

- Potential application to core BASS research topics such as seasonality of mixed layer dynamics, water properties, biological productivity, and transport.

- Recognition that the large spatial scale of some atmospheric phenomena provides a possible coupling and integration mechanism among PICES regions.

Highlights of discussion session at close of BASS Symposium: Ecosystem Dynamics in the Eastern and Western Gyres of the Subarctic Pacific

The following highlights were recorded from the comments of the speakers and participants at the session held to conclude the BASS Symposium.

Modeling and Physical Oceanography

More small scale examination of the mixed layer is needed including information on changes over short time intervals and dynamics of the mixed layer to improve understanding and consideration in ecosystem models; Models need to be improved which consider day to day variability in the mixed layer, and we need better information on regional, seasonal and interannual variation of mixed layer depth. Also, there is no systematic large scale appreciation of how the stability of the water column is changing. Existing data can be re-analyzed as maps based on temperature may be misleading.

We also need to look at climate effects on mixed layer depth and then consider biological effects, incorporate them in our models, and add bacterial, iron and other components;

It will be important for BASS to understand how climate variations cause interannual and decadal changes and also how they affect East and West gyres. There is a need to understand climate forcing and consider its effects;

Ocean Chemistry and Primary Productivity

Iron plays a major role in productivity although interactions of Fe, light, photosynthesis are not understood in winter.

We do not understand why large diatom species become important in winter despite high Fe requirements and light limitation and we need to understand Fe chemistry and have Fe profiles at different seasons. Information on Fe sources is needed and we need to explain temporal changes in NO_3 and SiO_4. The effects of Fe limitation on bacteria is not understood and the dynamics of bacterial/heterotrophic production need study. Finally, information on the biogeochemical dynamics of particulate matter.

Transport mechanisms such as dust transport from the Gobi desert and other aerial transport phenomena need study in order to determine how substances enter the ocean. High productivity in the Western gyre is also influenced by macronutrient addition and ocean mixing - processes such that in years when surface temperature is low due to mixing zooplankton

production is enhanced. Influx of northern waters and expansion and shrinking of dominant ocean currents appear important in determining production; The Gulf of Alaska, off Sitka, may be a useful place to study process fluxes and see how nutrients enter the area; Application of satellite technology for study, monitoring species composition of zooplankton, examination of macrocrustacea that have a single annual breeding season and the role played by fast growing gelatinous salps, and study of episodic events may be very important research topics;

Important basin scale zooplankton research topics include expanding the comparisons between Eastern and Western Gyres to include zooplankton species composition, seasonal timing and study of life history strategies. We need to understand what eats different species of zooplankton and understand the relationship between production of fish and micronecton. We also need to try to observe oceanic as well as El Niño events, oceanic and coastal effects and see how they propagate offshore and affect zooplankton;

Fish Species

We need to examine seasonal variability in surface fish data as much of the current information results from summer catch records. Winter data needs to be incorporated and perhaps can be obtained by trawl, seine or other survey methods including the application of acoustics and telemetry; There is a need for reliable biomass estimates using the above and other techniques. In addition we need to understand small scale variability in fish distribution and abundance in relation to spatial, temporal and vertical considerations; More information is needed on surface fishes of the Eastern Pacific to fill in gaps in knowledge; Mid-water fish communities provide good opportunities for scientific discovery and possibly offer commercial possibilities due to the very large biomass of fishes about which relatively little is known. Standard methods and standard gear types need to be adopted and tested and there is a need for a workshop on this topic, possibly at Vladivostok. Collaborative sampling programs could provide fish specimens that could be analyzed at low cost by students to gain needed information;

Seabirds and Marine Mammals

Although a considerable seabird data base exists, it needs to be updated and expanded to incorporate other sources of information that are available. Some areas of the North Pacific are not well surveyed and data tends to be more coastal than offshore in the gyres. There is a need to expand the data base to see how things vary with season, time and area. Observations and recommendations from the working group dealing with seabirds and marine mammals need to be considered along with these findings; Bird and mammal scientists need to be part of the planning of major studies as there is a possibility that top level organisms may be important indicators of changes in the ocean. Higher trophic level organisms may respond quickly to changes in conditions but may exhibit more instability than other trophic levels. Organisms such as birds may be useful to study changes in North-South conditions.

Overall Considerations

It is difficult to sort out the interactions of all the trophic levels. Perhaps a good approach is to try to understand things on a small scale basis and then use this information to try to solve large scale problems through application of the information.

The symposium summary was prepared by Dr. John Davis and we thank him for his careful and thorough report. Following the symposium the authors of the papers agreed to revise their manuscripts to ensure there was a balanced comparison of eastern and western subarctic gyres. The revised drafts will be reviewed by coordinators from the organizing committee and papers are expected to be published in the reviewed literature. A summary paper will be included that will be authored by Drs. R. Beamish and W. Wooster.

MODEL Task Team Report

Co-Chairmen: Dr. Sinjae Yoo (Korea) & Dr. Ian Perry (Canada)

The general objective of the MODEL Task Team is to advance the development of the conceptual, theoretical and modeling studies needed to achieve the goals of the PICES CCCC program. The specific roles of the MODEL Task Team are:

1. to encourage, facilitate, and co-ordinate modeling activities within the member nations with respect to the goals and objectives of the program;

2. to promote and facilitate linkages among the modeling activities taking place at the component levels, for example, to promote linkages among physical, lower trophic level, and upper trophic level models;

3. to identify and encourage modeling activities in areas or subjects which may be important but not yet well studied or integrated into existing models of the North Pacific;

4. to interact with the field programs to provide an integrating context for planning these programs, for analysing results, and for comparisons among regions.

The MODEL Task Team recognised that many modeling activities are already taking place regarding North Pacific physics and biology, for example, Japan, U.S., Canada, and China all have funded GLOBEC and/or GLOBEC-like modeling studies. Many of these countries also have active JGOFS programs, each with their own modeling studies regarding plankton production. However, what seems to be lacking is awareness and communication among these activities, and the possible linkages among physical and biological modelers and linkages with field programs, all of which are necessary to improve the entire modeling effort in the North Pacific. Therefore, the MODEL Task Team has taken as its primary roles to:

· facilitate communication among modeling studies, and with field programs, regardless of whether they are formal activities associated with the CCCC program;
· identify and stimulate areas of modeling that are significant to the CCCC program but which are not presently being addressed; and
· assist the field programs of the CCCC program (e.g. REX, BASS) with their model-related requirements.

The following represents a summary of the activities of the MODEL Task Team as agreed during PICES V (in Nanaimo, October 1996), and the actions taken during 1997 to accomplish each of these activities. Also included are the proposed activities for 1998.

1. ***Provide an opportunity to explore simple mass-balance models***, as a means to develop a framework to compare the various Regional ecosystems as defined in the CCCC Implementation Plan. Dr. Daniel Pauly (University of B.C. and ICLARM, Manila) made an invited presentation on the ECOPATH modeling framework at the Implementation Panel meeting of PICES V.

2. ***Convene a topic session at PICES VI to compare and contrast results from regional applications of these mass-balance models.*** A session titled "Models for linking Climate and Fish" was convened at PICES VI in Pusan, Korea. It did not include any presentations of mass-balance models, but did include other models, including individual-based models, statistical models, recruitment models, and coupled physical - biological models.

   1998 Workplan: Develop a proposal for a workshop (to be held in 1999, possibly in association with REX) on ecosystem comparisons, using modeling approaches as conceptual frameworks.

3. ***Contact North Pacific circulation modelers to explore making their model results widely available to the PICES community.*** Circulation modelers have been contacted, and all were enthusiastic about making their

models and results more widely available. Inventories and descriptions of these North Pacific circulation models have been prepared, including contacts for access to results. This will be available on a page within the PICES web site shortly. The MODEL Task Team will encourage modelers and observationalists in the North Pacific who may need model outputs to visit and contribute to this web page.

1998 Workplan: Expand this web page to include biological models and modeling activities within the PICES areas, so as to serve as a "Clearing House" for modeling activities in the North Pacific. For example, there are now a number of funded national GLOBEC programs which have modeling studies operating in the North Pacific, some of which are not now involved in PICES. The intent of the web page is to get them involved in the CCCC Program. The page will include GLOBEC and non-GLOBEC modeling activities associated with physical and biological processes at all trophic levels in the North Pacific. .

4. ***Convene a small workshop in 1998 to compare lower trophic level physiological models***. This workshop is planned for early spring, 1998, in Tiburon, California, hosted by San Francisco State University (Convenors: Sinjae Yoo and Dick Dugdale). Its primary objectives are
   a. to review recent findings and conceptual issues in lower trophic level processes;
   b. to identify critical issues and differences of various process models;
   c. to inter-compare the leading process models that are likely to be used within the CCCC program;
   d. to identify when divergent model results are due to difference in the process models used rather than difference due to ecological processes.

   1998 Workplan: A short follow-up workshop to the above was proposed. Reason: As a result of the workshop in spring 1998, changes and further comparisons to these lower trophic level models may be needed. This follow-up workshop provides and opportunity to examine and compare these changes, plus complete the publications arising from the workshops. Proposed place: Two days in association with PICES VII.

   1998 Workplan: Develop (likely on the new web page) an inventory of important but often missing components of models, for example: parameterization of vertical mixing and vertical diffusion; representations of vertical migration by zooplankton, etc. This could also include recognition and development of inter-changeable sub-models that could be exchanged among various larger models.

The MODEL Task Team also endorsed the following statement:

> *The MODEL Task Team recognises the need for better understanding of causes and characteristics of decadal-scale ocean – atmosphere variations of the North Pacific – to recognise and predict possible "regime shifts", and urges PICES (through POC and other relevant bodies) to take steps to improve this understanding.*

REX Task Team Report
Co-Chairmen: Drs. Anne B. Hollowed, Vladimir I. Radchenko, and Tokio Wada

The REX Task Team convened a workshop October 17-18, 1997. The purpose of the workshop was to review the status of national research programs and to identify areas for cooperative research experiments in support of the CCCC Program. Over 50 scientists participated in the workshop representing approximately 40 research institutions.

In the REX workshop, we examined the possibility of applying the comparative approach to answering the scientific questions posed in the Climate Change and Carrying Capacity Implementation Plan. Participants were asked to consider the possibility of designing experiments

that could be conducted in distant regions of the North Pacific with the expressed intent of testing hypotheses regarding climate impacts on the carrying capacity.

The symposium began with a review of the GLOBEC and GLOBEC like research programs planned or on-going in each of the six PICES member nations. Subsequently, participants discussed coastal research programs in breakout sessions targeting forcing, lower trophic level response, higher trophic level response and ecosystem response. The higher trophic level response breakout sessions were further divided into four major species groups: salmon, mid-water and demersal fish, pelagic fish, and crustaceans.

Participants were asked to review the four key scientific questions presented in the CCCC Implementation Plan:

1. What are the characteristics of climate variability, can interdecadal patterns be identified, how and when do they arise?

2. How do primary and secondary producers respond in productivity, and in species and size composition, to climate variability in different ecosystems of the subarctic Pacific?

3. How do life history patterns, distributions, vital rates and population dynamics of higher trophic level species respond directly and indirectly to climate variability?

4. How are subarctic Pacific ecosystems structured? Do higher trophic levels respond to climate variability solely as a consequence of bottom up forcing? Are there significant intra-trophic level and top down effects on lower trophic level production and on energy transfer efficiencies?

The participants were asked to develop hypotheses related to the four CCCC questions as they related to the topic of the breakout session. Participants were also asked to discuss existing or potential research approaches to test these hypotheses. The regions and target species that would be best suited for comparative research experiments were identified. Finally, the barriers to implementing the experiment were discussed.

REX Task Team Recommendations

1. We recommend that the REX workshop report should be published in the PICES annual report or the PICES scientific report series. This report will contain a master list of all of the recommendations stemming from the workshop breakout sessions.

2. PICES member nations should compile a catalog of historical samples and data sets which are not yet analyzed or readily available. This activity will be conducted by the REX Task Team.

3. The REX Task Team supports the establishment of a monitoring task team within the CCCC program. We hope that this task team will address standardization of sampling and analysis methods for comparative studies suggested by REX.

4. We recommend that a two-day symposium and workshop on climate effects on small pelagic species should be convened prior to the PICES VII Annual meeting in Fairbanks, Alaska.

5. We recommend that a scientific session that highlights research findings of GLOBEC and GLOBEC-like programs in the North Pacific should be convened as part of the PICES VII Annual Meeting.

REPORT OF THE FINANCE AND ADMINISTRATION COMMITTEE

The Committee met on Oct. 20 and 21 under the Chairmanship of Dr. John L. McGruder, and Drs. W. Doug McKone and Alexander Bychkov acted as rapporteurs (See Endnote 1 for list of participants).

Agenda Item 1. Opening by the Chairman

The Chairman called the meeting to order and welcomed the participants, stressing that the job of the Committee was to review financial and administrative matters in keeping with the Rules of the Organization and to provide a report to Governing Council for consideration and adoption.

Agenda Item 2. Adoption of agenda

The Committee reviewed the agenda. Dr. John C. Davis proposed adoption of the agenda without change; seconded by Ms. Dorothy Bergamaschi.

Agenda Item 3. Appointment of Executive Secretary

A procedure for appointing the Executive Secretary was reviewed by the Committee. A minor change in timing was added and the procedure was approved and recommended to Council.

The position description for advertisement of the Executive Secretary position was reviewed. The Committee discussed the salary level and recommends to Council that it be set at CDN $63,300 - 93,200. Further, the Committee recommends that the successful candidate should be invited to stay for the Annual Meeting at the expense of PICES and the desirable starting date should be December 1, 1998.

The U.S.A. proposed that a review of the level of the Executive Secretary job should be undertaken. Canada agreed to work with the Executive Secretary to complete the task before the interviews are carried out at next year's Annual Meeting.

The Executive Secretary was asked if he would be prepared to overlap his replacement by one month at the end of his contract in order to ensure an orderly transfer of authority. He said "he would be happy to help in any way that he could to minimize any difficulties caused by the change".

Agenda Item 4. Proposed change to Financial Regulation 6

The Committee reviewed the proposed Financial Regulation 6 change to establish a procedure to provide annual contributions to the Trust Fund. The Russian Federation and the U.S.A. were prepared to support the proposal. Canada, Japan and Korea were prepared to support a modified proposal if the total contributions remained at the 1997 level. The People's Republic of China was prepared to support the Trust Fund only if the contributions were voluntary. They also stated that they will make a voluntary contribution to the Trust Fund of CDN $5,000 in 1998 in appreciation for the support provided in 1997. After much discussion, the Parties agreed to reject the proposal to annually budget for contributions to the Trust Fund.

Agenda Item 5. Audited Accounts for Financial Year 1996

The Auditor's Report was reviewed by the Committee (Endnote 2). The People's Republic of China was concerned that some of the budget line item expenditures exceeded the allotments and suggested that future expenditures should be held within the levels provided. It was pointed out the Executive Secretary has discretion to exceed the allotments by 10% and in consultation with the Chairman by 20% (Financial Regulation 4 (iii)). The Committee

Chairman remarked that the total expenditures did not exceed the total annual allotment; there was a small surplus in the 1996 audited accounts. The Chairman also pointed out that the Executive Secretary must be given flexibility to manage the funds within line items in order to meet the requirements as they develop over the year.

The Committee recommends that Council approve the Auditor's Report and on the endorsement of the Executive Secretary recommends that Flader and Greene be retained as auditor for another year.

Agenda Item 6. Budget

a. Estimated Accounts for Fiscal Year 1997

The Committee reviewed the estimated accounts for 1997 and a question was raised as to why there was a significant surplus in the Special Meeting line. The Executive Secretary indicated that there were problems with receiving clearance from the People's Republic of China to hold the proposed Workshop, resulting in an estimated surplus of CDN $25,000.

The Committee would like to bring to the attention of Council that financial requirements of the Science Board (Rule 17 (v)) are not available for the Committee to review and provide recommendations before presenting the F&A Report to Council. The Committee recommends that Council consider this problem with the view to allowing F&A time to consider their proposals in relation to recommending a total annual budget for the year.

b. Budget for Financial Year 1998

A line by line review of the draft 1998 budget was conducted with much discussion amongst the participants. Adjustments were made to a number of line items resulting in a total agreed budget of CDN $521,000. The Committee also agreed that the contribution level should remain at CDN $84,800, the same as 1997. To maintain the same contribution level, the Committee recommended a transfer of CDN $12,000 from the Working Capital Fund to the General Fund. The Committee recommends that Council accept the proposed budget, holding the fees to the same level as in 1997.

c. Forecast Budget for Financial Year 1999

This item was examined by the Committee and is recommended for information to Governing Council without need to adopt the forecast budget.

d. Working Capital Fund

The Executive Secretary reported the Working Capital Fund is estimated to have a surplus of CDN $53,624 at the end of 1997. The Committee discussed various proposals for distributing these funds and recommends to Council that CDN $12,000 be used to keep each Party's 1998 contribution level the same as in 1997. The Committee recommends that Council instruct the Executive Secretary hold the residual surplus of CDN $41,624 in a separate account for review by the Finance and Administration Committee during next year's Annual Meeting.

e. Trust Fund

The Executive Secretary reported that the Trust Fund is estimated to be CDN $99,296 by December 31, 1997.

f. Home Leave Relocation Fund

The Executive Secretary reported that this fund reached the maximum CDN $110,000 allowed on June 30 as a result of the levy funds to top up the short fall. The People's Republic of China requested that the Executive Secretary contact the Government of Canada to obtain the rules for paying removal expenses of employees and make it available at next year's Annual Meeting.

Agenda Item 7. Space, facilities and equipment

The Executive Secretary reported the Canadian Government made a change to the facilities by splitting the storage area into an office and a storage facility. The Executive Secretary thanked the Canadian Government and indicated the facilities should be sufficient for needs over the next few years.

The Executive Secretary reported that the main office printer and one of the office computers have been replaced due to breakdown and obsolescence. The Executive Secretary explored last year's F&A recommendation to rent a portable laptop for meetings. This service is not available and a laptop was purchased to replace one that was damaged beyond repair when loaned during the previous Annual Meeting.

The People's Republic of China requested that the Secretariat provide an itemized inventory list of existing equipment and a capital assets plan at the next annual meeting.

Agenda Item 8. Future meetings of the Organization and subsidiary bodies, including time and place for the Seventh and Eighth Annual Meetings

The Committee reviewed possible dates for the Seventh Annual Meeting in Alaska in 1998 and recommends to Council that the meeting be held October 14-25. The Committee recommends that Council approve the Russian Federation offer to host the Eighth Annual Meeting.

Agenda Item 9. Other business

U.S.A. proposed to lengthen the Assistant Executive Secretary contract by one year to allow continuity with replacement of the Executive Secretary and to be available to plan the Annual Meeting in Vladivostok as the Assistant's contract ends April 30, 1999. The Committee recommends that Council instruct the Executive Secretary to extend the contract by one year, to April 30, 2000.

Appendix 1

NORTH PACIFIC MARINE SCIENCE ORGANIZATION - PICES

Executive Secretary Position

Applications are invited for a five-year appointment to the position of Executive Secretary of the North Pacific Marine Science Organization (PICES).

The purpose of the Organization is to promote and coordinate marine scientific research in order to advance scientific knowledge of the area concerned (i.e. the northern North Pacific and adjacent seas especially northward from 30 degrees North Latitude) and of its living resources, including but not necessarily limited to research with respect to the ocean environment and its interactions with land and atmosphere, its role in and response to global weather and climate change, its flora, fauna and ecosystems, its uses and resources, and impact upon it from human activities; and to promote the collection and exchange of information and data related to marine scientific research in the area concerned.

The Organization's main bodies - the Governing Council and Science Board - meet annually, and more often if necessary. Member States currently are Canada, the People's Republic of China, Japan, the Republic of Korea, the Russian Federation, and the United States of America. English is the working and official language of the Organization.

The Secretariat is located at the Institute of Ocean Sciences, Sidney, British Columbia and provides services to the Organization in the exercise of its duties and functions.

Description of the Position and Duties

The Executive Secretary is the Organization's chief administrative officer and must be

impartial in promoting and coordinating the interests of all Contracting Parties. The Executive Secretary is responsible for the management of the Organization's office, staff and funds, which are presently at the level of CDN$500,000 - $600,000 contributed equally by the Member States; conducts business on behalf of the Organization; arranges annual and other meetings of the Organization and its constituent bodies and committees; prepares annual budget estimates and forecasts; annual financial statements, and other documents as required; invests funds that are surplus to immediate needs; handles correspondence; prepares minutes of Governing Council, Science Board, and Finance and Administration Committee; prepares an Annual Report of the Organization for distribution to the Member States; and publishes the annual report and other scientific publications as required by the Organization. The successful candidate must be self-motivated and be responsible for administration and staff of the Organization; work with the Chairman of Council, Science Board, Scientific Committees, Working Groups, and other bodies.

The Executive Secretary is assisted by an Assistant Executive Secretary, Administrative Assistant, and a Secretary.

The term of office is a minimum of five years and may be renewed at the discretion of Council.

Qualifications and Essential Experience

Applicants must be a citizen of a Member State of PICES at the time of assuming office. Preference will be given to a Ph.D. or equivalent experience in one of the marine science disciplines from a recognized university. The applicant must have significant experience in conducting and managing scientific research or significant administrative experience with international cooperative scientific programs and with scientists from a number of countries. This experience relates particularly to marine scientific research and marine scientists.

Applicants should also have experience in or detailed knowledge of the operations of intergovernmental organizations, including demonstrated experience in the selection and supervision of staff, and experience in the preparation of financial budgets and management of funds.

Applicants should have experience in the organization of large and small meetings and the provision of secretarial support, especially to scientific committees and groups, must submit examples of their writing, and be prepared to provide further examples if interviewed.

Applicants must be fluent in both spoken and written English and will be asked to write a paragraph or two if interviewed for the job. Fluency in another language of a member country would be a benefit. A knowledge of marine science activities in the northern North Pacific region is desirable.

Salary and Benefits

The annual salary and benefits of the staff of the Organization are guided by but not limited to the host state (Canada) public service salaries for equivalent responsibilities. The salary is negotiable, in the range of CDN$ 63,300-93,200, commensurate with qualifications and experience. The salary is subject to the equivalent of Canadian income tax.

The Organization participates in:

1. Group Pension Plan with spouse and survivor benefits,
2. Canada Pension Plan,
3. Employment Insurance Plan,
4. British Columbia Medical Plan,
5. Group Extended Health Benefits Plan,
6. Group Dental Insurance Plan,
7. Group Long-Term Disability Plan, and
8. Group Term-Life Insurance Plan.

Non-Canadian applicants can be exempt from membership in some of the plans depending on

circumstances. Cost to the successful applicant would vary depending on the exemptions.

Payment will be made for moving expenses for the employee and family to the headquarters at the start of employment and return at the end of employment, in accordance with the host state public service guidelines.

Each year annual vacation leave and holidays traditionally celebrated by the host state public service are provided, as well as sick leave. Internationally recruited staff and their dependents are entitled to two paid calendar weeks home leave every two years.

Application Procedure

An application should include a covering letter, and resume written by the applicant. At least three references from persons with a knowledge of the applicant's qualifications and experience are required; it is desirable that at least one reference be from a country other than that of the applicant. Applicants should indicate in their letter a suitable starting date and acceptable salary level. A desirable starting date would be December 1 1998.

Deadline for applications is June 1, 1998

Applicants placed on a short list should expect to be interviewed at the PICES Annual Meeting in Alaska in October 1998. The successful candidate should be prepared to stay to the end of the Annual Meeting at the expense of PICES.

The applicant and writers of references should send their submissions marked Personal and Confidential directly to either:

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Endnote 2

Auditor's Report to the Organization

Flader and Greene
Chartered Accountants
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We have audited the statement of financial position of the North Pacific Marine Science Organization as at December 31, 1996, 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, 1996, and the results of its operations and the changes in financial position for the year then ended in accordance with generally accepted accounting principles.

Sidney, B.C. Canada
February 14, 1997

Flader and Greene
Chartered Accountants

Statement I

Statement of Assets and Liabilities
December 31, 1996

	1996	1995
ASSETS		
Current Assets		
Cash and term deposits	$ 388,666	$ 384,330
LIABILITIES AND FUND BALANCES		
Current Liabilities		
Accounts payable	$ 20,561	$ 10,228
Funds held for contracting parties - Note 6	$ 50,000	$ 184,800
	$70,561	$195,028
Fund Balances		
Working Capital Fund	$ 110,014	$ 130,418
Trust Fund	$ 107,608	$ 58,884
Home Leave Relocation Fund	$ 100,483	-
	$ 318,105	$ 189,302
	$ 388,666	$ 384,330

Statement II

Statement of Operations and Changes in Fund Balances
For the Year Ended December 31, 1996

	General Fund	Working Capital Fund	Trust Fund	Home Leave Relocation Total	1996 Total	1995 Total
Fund Balances, beginning of year	$ -	$ 130,418	$58,884	$ -	$ 189,302	$ 233,382
Sources of Funds						
Contributions from Contracting Parties	448,800	-	50,000	60,000	558,800	495,716
Transfers from Working Capital Fund	-	(30,418)	-	30,418	-	(100,000)
Interest and other income – Note 5	-	6,472	7,817	27,312	41,601	34,139
Fund Balances, before expenditures	448,800	106,472	116,701	117,730	789,703	663,237
Expenditures						
Personnel services	269,368	-	-	-	269,368	240,198
Travel	37,390	-	9,093	-	46,483	43,957
Communication	26,654	-	-	-	26,654	24,403
Contractual services	10,290	-	-	-	10,290	11,081
Printing	37,606	-	-	-	37,606	22,831
Supplies	6,339	-	-	-	6,339	3,822
Equipment - Note 3	10,026	-	-	-	10,026	21,273
Annual General Meeting expenditures	20,738	-	-	-	20,738	65,864
Vladivostok Workshop	23,311	-	-	-	23,311	27,598
Relocation	-	-	-	17,247	17,247	12,083
Miscellaneous	3,536	-	-	-	3,536	875
	445,258	-	9,093	17,247	471,598	473,935
Net Funds Available	3,542	106,472	107,608	100,483	318,105	189,302
Transfers to Working Capital Fund	(3,542)	3,542	-	-	-	-
Fund Balances, end of year	$ -	$ 110,014	$ 107,608	$ 100,483	$ 318,105	$ 189,302

Notes to Financial Statements
December 31, 1996

1. Purpose of Organization

The North Pacific Marine Science Organization 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 dependents to the seat of the Secretariat and removal after period of employment has ended, and provide home leave for international staff.

b) Capital Assets

Capital assets acquired by the Organization are expensed in the year of acquisition. (Note 3).

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 finance position date.

3. Equipment

At December 31, 1996, capital assets on hand and their original purchase price are as follows:

Furniture and fixtures	$33,411
Computer equipment	69,469
	$102,880

The assets were expensed in the year of acquisition.

4. Commitments

Office space and services are provided to the Secretariat to the Organization by the Government of Canada through the Department of Fisheries and Ocean. This agreement commenced April 1, 1992 and continues indefinitely with a review every three years. The fixed cost for office space is $2,000 per year. Services provided are invoiced quarterly.

5. Interest and other income

	Working Capital Fund	Trust Fund	Home Leave Relocation Fund
Interest income	$ 6,472	$ 7,817	$ -
Income tax levies	-	-	23,391
GST rebates	-	-	3,921
	$ 6,472	$ 7,817	$ 27,312

6. Funds held for Contracting Parties

	1996	1995
United States, Funds Held	$ -	$ 50,000
Japan, Funds Held	50,000	50,000
Japan, Funds Held for 1996 Fees	-	20,240
Japan, Prepaid Fees for 1996	-	64,560
	$ 50,000	$ 184,800

7. Comparative Figures

Certain comparative figures have been reclassified to conform to the presentation used in the current year.

Endnote 3

Budget for Fiscal Year 1998

Source	**Contributions**
Contributions from six Contracting Parties	509,000
Category	**Allotment**
Personnel Services	282,000
Travel	75,000
Communication	27,000
Contractual Services	16,000
Printing	42,000
Supplies	6,000
Equipment	10,000
Annual Meeting	41,000
Workshop	20,000
Miscellaneous	2,000
Total	521,000
Transfer from Working Capital Fund	12,000
1998 Total Allotment	**509,000**
1998 Annual Fee for each Party	**84,800**

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LIST OF ACRONYMS

ADCP	Acoustic Doppler Current Profiler
ALACE	Autonomous Lagrangian Circulation Explorer (float)
APEC	Asian Pacific Economic Cooperation
ASEAN	Association of Southeast Asian Nations
BASS (TT)	Basin Scale Studies
BIO	Biological Oceanography Committee
CCCC	Climate Change and Carrying Capacity Program
CERN	Center for European Particle Research
CPR	Continuous Plankton Recorder Program
CREAMS	Circulation Research of the East Asian Marginal Seas
CSR	Cruise Summary Reports
CTD	Conductivity, Temperature, Depth profiler
EC/IP	Executive Committee / Implementation Panel for CCCC
ECOR	Engineering Committee on Oceanic Resources
FAO	Food and Agriculture Organization
FEB RAS	Far Eastern Branch of Russian Academy of Sciences
FERHRI	Far Eastern Regional Hydrometeorological Research Institute
FIS	Fishery Science Committee
GLOBEC	Global Ocean Ecosystem Dynamics Programme
GOOS	Global Ocean Observing System
GST	Goods and Services Tax
HAB	Harmful Algae Blooms
IACP	Institute of Automation and Control Process
IASC	International Arctic Science Committee
IATTC	Inter-American Tropical Tuna Commission
IBP	Institute of Biology and Pedology
ICCAT	International Commission for the Conservation of Atlantic Tuna
ICES	International Council for the Exploration of the Sea
ICSU	International Council of Scientific Unions
IGPB	International Geosphere Biosphere Programme
IMB	Institute of Marine Biology
IMG&G	Institute of Marine Geology and Geophysics
IO RAS	Institute of Oceanology Rasiian Academy of Sciences
IOC	Intergovernmental Oceanographic Commission
IODE	International Oceanographic Data Information Exchange (IOC)
IP	Implementation Panel for CCCC
IPHC	International Pacific Halibut Commission
ITSU	International Coordination Group for the Tsunami Warning System in the Pacific
IUGG	International Union of Geodesy and Geophysics
JEBAR	Joint Effect of the Baroclinicity and Bottom Relief
JECSS	Japan East China Sea Study
JFA	Japan Fisheries Agency
JGOFS	Joint Global Ocean Flux Study (IGPB)
JODC	Japanese Oceanographic Data Center

KamchatNIRO	Kamchatka Research Institute of Fisheries and Oceanography
KORDI	Korea Ocean Research and Development Institute
LOICZ	Land Ocean Interaction in the Coastal Zone
MBARI	Montery Bay Aquarium Research Institute
MEDS	Marine Environmental Data Center
MEQ	Marine Environmental Committee
MODEL (TT)	Conceptual / Theoretical and Modeling Studies
MOU	Memorandum of Understanding
NAFO	Northwest Atlantic Fisheries Organization
NASCO	North Atlantic Salmon Conservation Organization
NOAA	National Oceanographic and Atmospheric Administration (U.S.A.)
NODC	National Oceanographic Data Center
NOP	National Oceanographic Program
NPAFC	North Pacific Anadromous Fish Commission
NSFC	National Science Foundation of China
ODC	Oceanographic Data Center
OECD	Organization for Economic Cooperation and Development
PAMS	Pacific Marginal Seas Studies
PIBOC	Pacific Institute of Bioorganic Chemistry
PICES	North Pacific Marine Science Organization
PIG	Pacific Institute of Geography
PNA	Pacific North America
POC	Physical Oceanography and Climate Committee
POI	Pacific Oceanological Institute
PSC	Pacific Salmon Commission
RAFOS	Listening float (SOFAR spelled backwards)
REX (TT)	Intercomparison of Regional Scale Studies
RHLF	Relocation and Home Leave Fund
ROK	Republic of Korea
SakhNIRO	Sakhalin Research Institute of Fisheries and Oceanography
SCOPE	Scientific Committee on Problems in the Environment
SCOR	Scientific Committee on Ocean Research
SOGI	Sakhalin Oil and Gas Institute
SOI	State Oceanographic Institute
SOPAC	South Pacific Applied Geoscience Commission
SPREP	South Pacific Regional Environment Programme
STA	Science and Technology Agency Japan
TCODE	Technical Committee on Data Exchange
TINRO	Pacific Research Institute of Fisheries and Oceanography
TT	Task Team
UNCED	United Nations Conference on Environment and Development
UNCLOS	United Nations Convention of the Law of the Sea
UNEP	United Nations Environment Program
UNESCO	United Nations Educational, Scientific, and Cultural Organization
UNOLS	University National Oceanographic Laboratory System
VNIRO	Russian Federal Research Institute of Fisheries and Oceanography
WCF	Working Capital Fund
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
WWWP	World Wide Web Page