REPORT OF OPENING SESSION

The meeting of October 19th was called to order by the Chairman, Dr. William G. Doubleday, who welcomed delegates, observers and researchers to the Seventh Annual Meeting.

Dr. Doubleday called upon Lieutenant Governor Fran Ulmer to welcome participants on behalf of the State of Alaska.

On behalf of Governor Knowles and myself, welcome to Alaska! As Lieutenant Governor, I am honored to have the opportunity to introduce you to the 49th State. I am proud that Alaska is the site of the Seventh Annual Meeting of PICES. It is also a great testimony to the spirit of 1998 - the Year of the Ocean - that we can gather such an impressive number of talented scientists from around the world to discuss pressing marine science issues.

The Governor and I truly do appreciate scientific symposia such as this. Fisheries is one of the major components of the Alaskan economy, the largest private sector employer in the state, and integral to the Alaskan way of life. Many Alaskans depend on fisheries resources as a source of sustenance, as a livelihood, and as a major contributor to our quality of life.

The Governor and I have both been personally involved in fisheries issues: the Governor was a member of the North Pacific Fishery Management Council prior to taking office as Governor. Also, I have been one of three U.S. commissioners on the North Pacific Anadromous Fish Commission since 1994, and will be serving two-year terms as vice-president and then president over the next four years.

Speaking of the North Pacific Anadromous Fish Commission, I am very encouraged that a proposed Memorandum of Understanding between PICES and NPAFC will be going before the two bodies for approval. It sets up a framework for increased cooperation and coordination on marine scientific research, data exchange, and related activities such as environmental studies. By working together on a regular basis and continually sharing information, both organizations will benefit. I am committed to fostering a close relationship between the two groups.

Opportunity for concurrent or overlapping meetings? PICES is here in Fairbanks this month, and next year I understand will be meeting in Russia. NPAFC will be meeting in a few weeks in Moscow, and will be in Alaska for its 1999 meeting. Wouldn't it be great if we could all be in one place at one time? Maybe in 2000?

One of the guiding principles of our administration is basing decisions on sound science. So, we both pay close attention to what you - the scientists - have to say about managing fisheries off Alaska.

Alaska is proud of its natural resources and, in particular, its marine and fishery resources. Alaska contains 70% of the U.S. continental shelf; 47,300 miles of marine coastline; 28% of the U.S. EEZ. I would like to give you some idea of the magnitude of the fishery harvests taken annually off the coast of Alaska:

- *Since 1978, harvests averaged 140 million salmon per year.*
- *More than 1 million metric tons of Pollock are caught annually - the largest fishery in the world.*
- *240 million pounds of snow crabs were harvested in 1998.*
- *Dutch Harbor-Unalaska is the largest fishing port in the U.S. in both volume and value.*

- *More fish (in volume) are landed in Alaska than in all the other states combined.*

Being blessed with abundant fishery resources also carries a tremendous amount of responsibility:

- *Alaska is unique among all states nationwide for our level of involvement in fishery management: the State of Alaska has lead management responsibility for all shellfish (e.g., crabs, shrimps, scallops, clams, etc.), salmon, and herring fisheries off the coast of Alaska. In addition, Alaska is responsible for management of state-waters groundfish fisheries, and we contribute to the federal management of offshore groundfish fishery resources through the North Pacific Fishery Management Council process. We also manage some of the nation's most prestigious freshwater fisheries.*

- *We are well aware of the recent media and scientific reports that show that many of the world's fisheries are in trouble. Overfishing and habitat destruction are often pinpointed as the reasons. The collapse of Atlantic cod stocks provides a glaring North American example. So, clearly the stakes for fishery management are very high.*

- *Avoiding the pitfalls repeated again and again elsewhere requires that we learn from these past experiences and that we act upon them in a responsible manner. Meetings such as this one are integral to the learning process. If we do not gather together the scientific experts to share knowledge and build upon the science, then we do not have the ability to learn from past mistakes.*

This is why ecosystem-based research programs such as GLOBEC (Global Ecosystem Dynamics) is so critical. PICES initiated planning for an interdisciplinary program called the PICES-GLOBEC International Program on Climate Change and Carrying Capacity (CCCC), now in the implementation phase, provides for comparative approaches to studying the relationships between fisheries and ecosystems.

Alaska is proud of our use of sustainable yield principles in fishery management:

- *Conservation is required under the Alaska State Constitution. Alaska's constitution, unique among the 50 states, has an article solely devoted to the management of natural resources. It mandates that renewable resources "shall be utilized, developed and maintained on the sustained yield principle."*

- *The Alaska Department of Fish and Game manages fisheries, while the Alaska Board of Fisheries is responsible for allocating yield among users. The clear separation of authority for conservation management from authority to allocate among users is one of the strengths of Alaska's management system.*

- *Alaska has a long and successful track record of managing and conserving fishery resources. Alaska's fishery program is built on the principles of conservative management, sound science and habitat protection. Marine fisheries are usually managed for a fixed harvest rate that represents a harvestable annual fraction of the resource that can be taken without jeopardizing the long-term health of the resource. Salmon fisheries are typically managed toward an escapement goal for returning adults.*

- *Alaska did not always have healthy salmon stocks. Prior to statehood, overfishing was a major factor in the*

declines of the Alaska salmon fishery. In 1959, statewide harvests totaled only about 25 million salmon - a level equivalent to less than 20% of current sustained production. Since statehood, stocks slowly rebuilt and harvests improved. Since 1978, annual salmon harvests have averaged 140 million fish. Alaska takes pride in this accomplishment.

Habitat protection is also an integral part of Alaska's natural resource management program:

- *Alaska has chosen to forego the economic benefits from other activities such as hydropower development in order to sustain salmon resources for future generations. For example, although the option of constructing and operating large-scale, hydropower facilities on both the Susitna River and the Yukon River were closely examined, neither was built. The salmon resources and fisheries of these river systems were major reasons that Alaska chose the no-dam option.*

- *Alaska has strict regulations governing development activities, such as road building and mining, to protect vital spawning and rearing salmon streams. Alaska has a Forest Practices Act requiring buffer zones from logging along salmon streams to prevent erosion and protect spawning and rearing habitat. Water discharge, such as sewage and other potential pollutants, are closely regulated to ensure high water quality.*

- *In 1973 the state instituted a limited entry system to protect Alaska's fisheries resources from overexploitation. This limited the number of fishers who could enter the fisheries, and established a fixed measure of effort, allowing managers to more accurately determine the effects of management decisions. With a fixed amount of gear, harvest rates were more stable, resulting in a more orderly and predictable fishery.*

Given the generally healthy status of Alaska's fisheries, these conservation safeguards, and habitat protection, it would be easy for us to sit back and rest comfortably and think that the collapses of other fisheries worldwide cannot occur here in Alaska. But they can!

In 1998 some salmon returns to western Alaska were very low. Although escapement goals were met, fisheries were drastically reduced resulting in economic disasters for some communities whose primary incomes and subsistence lifestyles depend on fishing. And these poor returns came on top of poor returns in 1997.

Parental spawning stocks for these low returns in 1997 and 1998 were healthy. Weak salmon returns were due to reduced returns per spawner, and not the result of low levels of parental escapement. So, clearly it is <u>not</u> sufficient to meet escapement goals and to expect that our job is finished.

Preliminary analyses of salmon age classes from western Alaska in 1997 and 1998 suggest a role of the marine environment. Also, returning salmon were often smaller than average and arrived unusually late. Migratory pathways appeared to have changed, and there was evidence of higher incidences of parasitism and predation. Fish under stress are less vigorous and more vulnerable. Undoubtedly, escapement levels, freshwater rearing conditions, and early marine life contribute to the strength of salmon returns. However, a growing body of evidence now indicates that marine conditions later in the life of salmon also contribute to run size.

We do know that the marine ecosystem is changing. As the old adage goes, "the only thing constant is change itself". The 1997/98 El Niño/Southern Oscillation was the strongest since the record-breaking 1982/83 El Niño. By some measures, it was the strongest. It started earlier and lasted longer than any El Niño on record. Coastal sea levels and sea surface temperatures in the eastern North Pacific and Bering Sea were generally very high. I am very much looking forward to the results of your day-long workshop on the 1997-98 El Niño.

In 1997 and 1998, for the first time we witnessed through satellites large regions of turquoise water in the Bering Sea. Apparently, the combination of warm surface temperatures, low winds, and very shallow mixing of ocean waters led to nutrient-depleted conditions. Extensive blooms of coccolithophores - a small phytoplankter more typical of subarctic or even subtropical regions, caused the turquoise water color. If the Bering Sea ecosystem changed at the base of the food web so profoundly that you could see it from space, what effects did it have throughout the ecosystem?

Also, in 1997 and 1998, we witnessed many shifts in the geographic distribution of species. In response to warmer temperatures many subtropical species (e.g., tuna, ocean sunfish, and Pacific white-sided dolphins) ranged further north than in normal years. If conditions benefited species that prefer warmer waters, what happened to species that prefer cooler waters more typical of Alaska?

In addition to very recent changes in the marine system, clearly changes have been occurring over the decades:

- *Most shrimp populations and many crab populations declined sharply in the 1980s.*
- *Stellar sea lions steadily decreased in numbers in the Aleutian Islands and Eastern Gulf and they are currently listed as endangered. Causes of these long-term declines are unknown but believed to be connected with available food supplies.*
- *Some seabird populations have been declining over recent decades as well. Some species of sea birds were further stressed in 1997, with die-offs of short-tailed shearwaters, black-legged kittiwakes, and common murres. Apparently, the coccolithophores blooms reduced visibility and prey availability to the seabirds.*

We now know that many changes in the Gulf of Alaska and Bering Sea are intimately linked to changes in the Aleutian Low Pressure System in winter. Some shifts in the productivity of species groups appear linked to the Aleutian Low. Salmon production in Alaska and the Pacific Northwest appear to be linked to the Aleutian Low in opposite ways: conditions favoring Alaskan salmon disfavor salmon in the Pacific Northwest, and vice-versa.

However, there remains much that we still do not understand. Are we currently in a regime shift between conditions that favor Alaskan salmon to a regime that favors shrimps and crabs? And what is the mechanism that leads to general associations of fish production with the Aleutian Low? These are just two of the many questions. Your work and that of your colleagues around the world will help answer these critical questions.

In 1998, we had disastrously low salmon returns to western Alaska. A regime shift? Maybe, maybe not. The total salmon harvest statewide was 144 million fish. This catch is actually just above the long-term average since 1978 when the last regime shift occurred! So, if there was a new regime shift, it clearly did not affect all Alaskan salmon stocks in the same way.

While the overall total was near the recent 20-year average, salmon stocks are managed separately according to a science-based assessment and management program. Thus, it matters a whole lot whether one stock experiences record returns in 1998 or if it experiences very poor returns that cause economic disaster for the region. Of course, it also matters if they come back as pink salmon worth 16¢ per pound or Chinook salmon worth $1.80 per pound!

In many quarters there is a growing interest in and focussed on the Bering Sea and North Pacific ... recognition that we need to make sense of all these research efforts and fashion a comprehensive understanding of the Bering Sea ecosystem. For example, recent joint effort of NMFS, ADF&G, and Interior: "Bering Sea Ecosystem - A Call to Action" and many other efforts.

We are at a critical juncture: unparalleled opportunity to craft the finest ocean science program in the world. Opportunity lies in significant new funding possibilities:

- *EVOS money: EVOSTC has collected public input, now must come to a unanimous decision on balance of habitat acquisition vs. research; setting up a framework for a long-term research endowment, to keep a finger on the pulse of ocean conditions, monitor indicator species, monitor contaminant levels, etc.*

- *Dinkum Sands money (about $6.6 million/year).*

- *1998 western Alaska salmon disaster funds for research: $7 million for research and prevention.*

- *Pacific Salmon Fund - proposed new federal fund to complement new state funding for conservation and restoration needs in Pacific Northwest and Alaska: requesting $200 million/yr. for 6 yrs. (($50 million each to Alaska, California, Washington and Oregon). Each state has created a science panel; a regional science panel would be created to provide regional guidance, review regional results, and address inter-jurisdictional and cross-boundary habitat concerns and regional biological issues.*

Role of North Pacific Research Board (NPRB)? (Latest information coming out of the budget process in Washington D.C. is that while NPRB will technically exist, it will receive no funding or statutory mandate.) Immediate role of 1998 Bering Sea Task Force:

- *1998 Bering Sea Task Force -- Among the other related efforts, the state is taking action to try to pull some of the existing knowledge together. Following the disastrous returns of salmon to the Bering Sea area this year, Governor Knowles named seven Alaskans to an interim task force to lay the groundwork for a formal scientific review of the probable causes of the disaster and ways in which the state can respond. The Governor has asked me to chair the task force, and has appointed six other widely respected individuals with expertise in science, government and traditional knowledge in the Bering Sea and communities affected by the 1998 salmon disaster, including:*

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Steve Pennoyer	*Regional Administrator, Director, National Marine Fisheries Service*
Frank Rue	*Commissioner, ADF&G*
Robin Samuelson	*North Pacific Fishery Management Council*
Arliss Sturgulewski	*Advisory Council for the School of Fisheries and Ocean Sciences, UAF*
Harry Wilde, Sr.	*Mayor of Mountain Village*

Vera Alexander *Dean, School of Fisheries and Ocean Sciences, UAF*

Purpose:

- *To review the disastrous 1998 Bering Sea salmon returns including scientific information and research on changing ocean conditions, climate and other environmental factors affecting the survival and productivity and conservation of Bering Sea salmon and other fish populations.*

- *To catalogue the various entities which undertake marine and anadromous fish research in the North Pacific/Bering Sea, and report on their funding sources, research missions and normal reporting mechanisms.*

- *To make recommendations about creation of a science panel to review and integrate existing scientific and traditional knowledge of Bering Sea conditions and identify future Alaska research needs in order to improve the state's ability to anticipate and respond to changes in the productivity of salmon and other ocean species.*

We will prepare a report for the Governor detailing our findings and recommendations in approximately four months.

Conclusion:

- Obviously, we have much to learn about the function of the ecosystem before we can effectively build ecosystem considerations into our management programs. It is critical that we begin to move away from single-species management that ignores the ecosystem of which species are a part. To move forward requires understanding that develops from good science. And that is just what this conference is all about: to develop an understanding of ecosystem function and bring that knowledge to bear on fisheries management decision processes.

- *Critical to developing the sound science that we must base our decisions on is establishing strong working relationships between the organizations and scientists that are doing the research, ensuring that needed research is adequately funded, and creating avenues for sound science to get to the policymakers and managers.*

- *I urge you to help bridge the gap between the world of science and all its knowledge, and the general public. I hope each and everyone of you will adopt a decisionmaker, a legislator or governor, a member of the press, etc., to help them understand what is accomplished or learned here in Fairbanks. To help demystify the research process. To help people understand the relationship of El Niño and ocean currents and phytoplankton blooms and food supplies and the abundance of salmon and the prey/predator species relationships, and all the other things you research and write about that are so totally unclear to most people.*

- *You cannot complain about how law makers and law enforcers make poor decisions not based on science, if you as researchers sit by passively and expect that politicians will know what they need to know, when they do not and they cannot without your help.*

- *I encourage you to find new ways to convey your results to each other as well as to the public, by using information technology to organize and distribute the information you produce. Perhaps there should be some sort of virtual library that catalogues and cross references and coordinates research results by region, species, etc., which*

will help internal and external collaboration.

- *I think that this conference is a very important step toward this difficult task. I wish you all a very successful meeting, and I personally look forward to your findings and recommen-dations. Thank you.*

Dr Doubleday thanked the Lieutenant Governor and asked Dr. William Fox to welcome participants on behalf of the United States of America.

Thank you, Dr. Doubleday, for your kind introduction. On behalf of the United States, it is my pleasure to welcome my friends and colleagues from Canada, China, Japan, the Republic of Korea, and Russia to this Seventh Annual Meeting of the North Pacific Marine Science Organization (PICES). I am pleased that the United States is hosting this meeting in Alaska - a state with unparalleled ties to the ocean and the natural resources it contains. Judging from the program and the distinguished scientists in attendance, this promises to be an important meeting in the evolution of this organization.

I greatly appreciated the invitation from the two U.S. Delegates, Vera Alexander and Jim Balsiger, to speak to you today. Under the leadership and direction provided by Warren Wooster and Bill Doubleday, the first and second Chairmen of this organization, PICES has come a long way since its inception in the early 1990s. It is indeed encouraging to see that PICES has progressed from activities in its early days which focussed on reviewing scientific issues to its current efforts to develop cooperative scientific research programs addressing the vital marine science issues of our day.

A great deal of credit for the current success of PICES should go to the PICES Secretariat which has been very ably administered by the outgoing Executive Secretary, Dr. Doug McKone, and his excellent support staff including the Assistant Executive Secretary, Dr. Alex Bychkov, Administrative Assistant Ms. Chiu, and the Secretary, Ms. McAlister. Thanks, Doug, for your invaluable efforts in support of PICES and its mission.

I am pleased to represent the National Oceanic and Atmospheric Administration (NOAA) at this meeting. I am the Senior Scientist for the National Marine Fisheries Service (NOAA Fisheries), the component of NOAA which addresses the conservation and management of U.S. living marine resources. NOAA Fisheries has been an active participant in PICES from its outset and is highly supportive of the cooperative research being promoted in this organization since it fosters an interdisciplinary approach that is key to understanding the ecosystems which support marine life.

In the United States, NOAA Fisheries scientists collect and analyze scientific data on living marine resources, marine ecosystems, and the benefits they provide to our country. NOAA Fisheries uses these data to prepare scientific reports and technical presentations to fishery managers, industry and environmental groups, and the public, as well as the scientific community. These reports are NOAA Fisheries' foundation for developing sound policies governing the use and conservation of living marine resources and protecting their habitat.

To meet the requirements of the 1996 U.S. Sustainable Fisheries Act, NOAA Fisheries recently published a Strategic Plan for Fisheries Research which outlines future NOAA Fisheries research priorities, many of which are complementary to work taking place in PICES. This is particularly evident with regard to NOAA Fisheries research in

support of fisheries conservation and management. Research is taking place in the following areas:

1. *biological research concerning the abundance and life history parameters of fish stocks,*
2. *social and economic factors affecting abundance levels,*
3. *interdependence of fisheries or stocks of fish,*
4. *identifying, restoring, and mapping essential fish habitat, and*
5. *analyzing the impact of anthropogenic factors and environmental changes on fish populations.*

I would make special note of NOAA Fisheries efforts to increase research into social and economic factors which impact on the status of our living marine resources. Addressing these factors as well as the biological factors which have traditionally dominated fisheries research is necessary to gain a more complete understanding of our fisheries in support of sustainable management policies.

The PICES Seventh Annual Meeting takes place at an auspicious time for international marine science. During this International Year of the Ocean, NOAA has joined with our partners around the globe in celebrating the oceans and its many riches. The Oceans Exposition which recently concluded in Lisbon, Portugal, attracted people from all over the world who came to learn and share experiences about the ocean. Thanks to this event, many countries are taking a fresh look at oceans issues and public awareness concerning the importance of the oceans has increased to a remarkable extent.

In the United States, we brought together all of our major ocean interest groups for the National Ocean Conference which took place in Monterey, California, during June 1998. The conference participants represented the vast spectrum of U.S. citizens with an interest in oceans issues -- government officials, port authorities, environmental organizations, scientists, and fishermen.

The importance of ocean issues was highlighted in remarks made at the conference by the President, Vice President, and the First Lady. Nine major U.S. Oceans initiatives were announced at the Conference. Six of these focus on specific ocean topics, such as building sustainable fisheries and protecting coral reefs, and three focus on tools for observing, exploring, and utilizing ocean data - topics of vital interest to the work being undertaken in PICES.

With regard to the geographical area of interest to PICES, namely the North Pacific Ocean, the United States and Japan last week co-hosted the Asia-Pacific Economic Cooperation (APEC) Oceans Conference in Hawaii. The Conference brought together high-level officials representing the oceans interests of APEC member economies (including all the Contracting Parties in PICES) in order to promote regional cooperation on issues ranging from protection of the marine environment to exploration of the sea.

The Conference addressed three major themes:

1. *balancing coastal development and resource conservation;*
2. *ensuring safe and sustainable fisheries; and*
3. *understanding the oceans and seas.*

As a result of last week's conference, I am confident that APEC member economies will be able to work more effectively to tackle the considerable challenges which lie ahead in these three areas. Obviously, the oceans issues being addressed in APEC are of relevance to PICES, and I urge both organizations to continue coordinating with each other, and explore avenues for

cooperation to maximize benefits and avoid duplication of effort.

Speaking of cooperation between regional entities with common interests, I understand that there is a Memorandum of Understanding (MOU) under consideration that would facilitate cooperation between PICES and the North Pacific Anadromous Fish Commission (NPAFC). Since the work of PICES is clearly supportive of NPAFC's efforts to sustainably manage highseas North Pacific salmon stocks, I urge PICES to conclude this MOU with NPAFC.

With regard to the program for this Annual Meeting, I am pleased to see that PICES is addressing topics of vital importance to the oceans community. In the time since the United States last hosted an Annual Meeting in Seattle five years ago, it is evident that PICES has undertaken a wide range of cooperative activities which seek to better understand both short-term phenomena, such as the 1997/98 El Niño event, and long-term phenomena, such as climate change. The 1997/98 El Niño event has galvanized public interest in ocean/atmosphere interactions like nothing before it, so I look forward to the report of this year's timely and relevant Science Board Symposium.

I am particularly excited about the entities within PICES which are addressing long-term oceans research issues, such as the CCCC Program (Climate Change and Carrying Capacity of the North Pacific). The other sessions taking place at this meeting, such as "science and technology for environmentally-sustainable mariculture", and "contaminants in high trophic level biota", are also addressing topics of significance.

In this Year of the Ocean, the Seventh Annual Meeting of PICES provides a valuable forum for furthering oceans research of importance to all nations of the North Pacific. At a time when all Government agencies operate in an environment of limited resources, budgetary constraints, and increasing demands, it is clear that success in our research efforts is dependent on the promotion of partnering activities with entities both within our countries, and internationally with organizations such as PICES. Thank you for your considerable efforts to promote these linkages which will result in a better understanding of our oceans.

Dr. Doubleday called upon Dr. Michael A. Henderson to make a statement on behalf of the Canadian Government.

Lieutenant Governor Ulmer, members of the head table and delegates, the Canadian Delegation is very pleased to participate in the Seventh Annual Meeting of PICES in Fairbanks, Alaska. We look forward to moving ahead on the science agenda of the Organization and the work of FIS, MEQ, POC, BIO, TCODE, CCCC, REX, MONITOR, MODEL and the various Working Groups.

Canada has been a strong supporter of PICES since its inception. We need and use the information generated through the cooperative work of member states of PICES to manage, conserve, protect and ensure the sustainable use of the renewable resources of the North Pacific Ocean. The need for this information is particularly important during the current period where we are seeing very rapid changes in the marine environment of the North Pacific Ocean. The collaborative efforts of all member states in coordinating efforts and providing information is essential. PICES is a strong, vibrant and very important world science organization.

The Canadian Delegation would like to thank all those involved in preparing for and hosting the Seventh Annual Meeting of PICES. We would particularly like to

acknowledge the work of the Secretariat and our Executive Secretary, Dr. Doug McKone, the Local Organizing Committee, the State of Alaska, the University of Alaska Fairbanks, and Dr. Bill Doubleday, the Chairman of PICES.

The Canadian delegation wishes all participants, and observers attending the Seventh Annual Meeting of PICES success in their scientific undertakings.

Dr. Doubleday called upon Mr. Jing-Guang Li, to make a statement on behalf of the Chinese Government.

It is a pleasure for me and the Chinese delegation to come to Fairbanks, Alaska to attend the Seventh PICES Annual Meeting. First of all, I would like to extend, on behalf of the Chinese delegation, our warm congratulation to all who attend this meeting. This meeting will offer us a good opportunity to meet friends from the member states and from other international organizations, to share experiences and to discuss issues in which we all have interest. I would also like to express our sincere thanks to the host, the United States of America, for the excellent work in arranging this meeting. Our thanks should also go to the Local Organizing Committee and the PICES Secretariat for the preparation they have made for this meeting.

PICES is a young organization, but during the past years since it was created, it has played an important role in promoting and coordinating marine scientific research in the North Pacific region. The capability of PICES has been recognized by the member states. We would like to express our appreciation of the efforts and contribution made by Dr. Doubleday, Chairman of PICES, and the Secretariat for the successful performance of PICES' duties and functions.

As we all know that "Agenda 21" adopted at the UN Conference on Environment and Development held in Rio de Janeiro, Brazil, in 1992, states that the marine environment forms an integrated whole that is an essential component of the global life-support system and a positive asset that presents opportunities for sustainable development. Since the Rio Conference in 1992, the Chinese government has been attaching more and more importance to the development and protection of the ocean. In 1994, the Chinese government promulgated "China's Agenda 21 - White Paper on China's Population, Environment and Development in the 21st Century", which listed the sustainable development of ocean resources as one of the priority program areas. In 1995, China published its National Ocean Development Plan, in 1996, formulated "China's Ocean Agenda 21" and in 1998, issued its white paper "The development of China's Marine Programs". All these important documents have formed the policy guidelines for China's marine scientific research, marine resources exploitation, marine environmental protection, coastal management and international cooperation in marine affairs. Sustainable development of the marine environment and its resources has become an important component of China's national development strategy. We believe that our participation in the activities of PICES will help not only to promote the development of marine scientific research in the North Pacific region, but also to realize our national goals with respect to the ocean.

I am pleased to note that there will be a Science Board Symposium on the Impacts of the 1997/1998 El Niño event on the northern Pacific Ocean and its Marginal Seas during the meeting, and the Chairman has just said that there will be an International Conference on El Niño in the year 2000. These are activities of great significance. We all know that El Niño and La Niña have serious impacts on the world,

especially on the countries along the Pacific Rim. This year, China experienced the most severe floods since 1954, which is believed to be closely related to the anomalies of the ocean processes in the Pacific. Some other countries along the Pacific Rim have also suffered greatly from natural hazards in the past decades. Therefore, we hope that the study of El Niño-La Niña and the study of their impacts on climate, agriculture and marine ecosystem will become one of the top priority areas of PICES in the years to come.

Once again, I would like to thank our host and the Secretariat for their hospitality and their hard work. I wish the meeting a great success.

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

Mr. Chairman, distinguished delegates, Local Organizing Committee members, ladies and gentlemen. It gives me great pleasure to have the opportunity to be here as part of the Japanese delegation. On behalf of the Japanese Government, Japanese colleagues and myself, I wish to express our warmest gratitude to our US colleagues for their enthusiastic efforts in hosting the Seventh Annual Meeting of PICES in Fairbanks.

I would like to take this opportunity to re-emphasize the background and spirit behind this forum, and take a look at the eventful years we have left behind. Recognizing the importance of North Pacific as a major part of World Ocean and its short-term and long-term impact on the human societies around the region, this organization was formed comprising of the six member countries around the North Pacific, to act on the shared sense of national interest, and to promote science in understanding the processes and role of the North Pacific Ocean on regional and global phenomena.

As oceanographers we all realize that we have a responsibility to address the growing problems of the increase in atmospheric carbon dioxide and the elevation of water temperature that have a disastrous effect on the marine ecosystem. The ocean has been a great life support system for human survival by providing food and natural resources, acting as a medium for transportation, and most importantly, by playing the role of climate controller and carbon dioxide buffer. We do not currently know if there is an effect of human activity on the global ocean phenomena such as El Niño. However, there have been signs of influence of El Niño on biological oceanographic phenomena in the North Pacific and it appears to cause changes in the delicate balance of the ocean-atmosphere system and the marine ecological system. Since we cannot stop some of the human activities as they are meant to sustain the increasing population, we should find the way for conservation of our environment by adopting proper management strategies.

It is heartening to note that PICES activities have been growing through the years. Many interesting results have come up under the program of each Science Committee. We are also developing scientific cooperation with other international organizations and committees. It is also quite encouraging to note that many of the techniques adopted for ocean science related investigations have been progressing well through the years. Moreover, demand for oceanographic investigations is increasing rather fast during recent years, in view of a growing resolve on the part of governments round the world to conserve the global environment. A number of earth observation satellites are presently in orbit collecting valuable data for oceanography. Many satellites will be launched in the

coming years by different countries. Investigations will also be undertaken by oceanographic cruises that are better equipped through the introduction of new instrumentation for collecting useful data at sea. However, the vastness of the ocean does not allow any one organization to deal with research problems in the regional and global scale because of limited research resources. That is why the effective links and bonds of common interest are the true bases of promotion and development of ocean science. PICES being a scientific forum is devoted to make this a reality by cooperative works not only amongst its member countries but also with other organizations with identical objectives.

I am confident that all of us are well aware of our responsibility. Every Science Committee and Working Group is interacting and making real progress in different branches of ocean science. It is evident from our short history that we can realize the goals of PICES by our common resolve. I believe this Seventh Annual Meeting of PICES is an achievement to rejoice for all of us, especially for the founding Chairman, Dr. Wooster. I am sure all of us will have a great time during this meeting discussing many valuable results and come up with many new ideas to be pursued in the future.

It is my pleasure to announce here on behalf of the Japanese government that we would like to host the Ninth PICES Annual Meeting in 2000 in Japan.

I would like to express thanks once again to all of our US colleagues for providing us with such a wonderful opportunity to be here in Fairbanks.

Dr. Doubleday called upon Dr. Jhin-Kyoo Chae to make a statement on behalf of the Republic of Korea.

Mr. Chairman, distinguished delegates, ladies and gentlemen. It is great pleasure for me to be here as part of the Korean delegation. I would like to extend thanks, on behalf of the Korean government and our ocean science community, to the US Government and the Local Organizing Committee for providing us with this wonderful opportunity of meeting in Fairbanks, Alaska, to interact with all PICES colleagues. As you know, the North Pacific Ocean is one of the world's most productive living marine resources areas, but it is also known that much of the potential living resources bio-mass has recently started to gradually decline. Although climatic change by El Niño is evident in many areas of the world in recent years, nobody seems to know exactly what to do about the phenomenon. So, 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.

Today, environment deterioration, energy shortage and 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. In this regard, the Korean Government has always supported multilateral exchange and cooperation in science and technology with all countries in the world. As PICES was born not so long ago as an inter-governmental organization, its existence could be challenged without efficient management. A strong research capacity and effective management are necessary to ensure continuity and on-going improvements of PICES. Specifically, integration and sharing of scientific data and environmental information are critical to the fulfillment of PICES' goals. These goals are not easy to accomplish, but we should continue our efforts to achieve the prosperity of PICES.

Our wish now is that this meeting of PICES will be successful in providing a favorable and satisfactory forum for every participant here. Also, I look forward to many productive decisions from the meeting. I hope that all scientists will take full advantage of this Seventh Annual Meeting of PICES to renew and extend contacts and friendships with colleagues from other nations and other organizations, and to learn from the work of others present here.

Best wishes for a successful conference.

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

Mr. Chairman, distinguished delegates, PICES Secretariat members, Local Organizing Committee members, ladies and gentlemen. It is a pleasure for me and the Russian delegation to have an opportunity to meet again with all the participants at this Seventh Annual Meeting of PICES.

On behalf of my government and the Russian delegation, I would like to thank the United States and PICES for inviting us to participate in the Seventh Annual Meeting and particularly note the very good work of the Secretariat, the Executive Secretary, Dr. Doug McKone, the Local Organizing Committee, the State of Alaska, the University of Alaska Fairbanks, and Dr. Bill Doubleday, the Chairman.

The great Russian scientist and thinker Vladimir Vernadsky said that "the people may maintain their existence and inviolability of their bodies by assimilating other organisms or the products of these organisms. Humans cannot produce all necessary food requirements by themselves. They must look for food sources in the environment". The marine environment is not only the source of food for the coastal country peoples, it is an essential part of the global life support system. In Russia, the importance of investigating the different living marine resources was recognized long ago. In the past 80 years more than five thousand fisheries investigations were conducted by our country. The total expenditure accounts for more than 100 billion dollars. Now all the results of this work belong to all mankind. And we attach a big importance to the opportunity of continued scientific exchanging in the field of ocean environment studies and marine resources investigations.

It should be noted that at this meeting, a Science Board Symposium will be devoted to the 1997/1998 El Niño event and its impacts on the Northern Pacific Ocean and the Marginal Seas, including its living resources.

The prosperity of the Far-Eastern regions of Russia is highly dependent on the effective development and utilization of living marine resources, and the effects of environmental changes which may impact on the economy of the region.

We hope that the efforts of our Organization will help improve the coordination of the marine and fishery politics of the Pacific coastal countries. Future global progress is connected to the successful development of the ocean, and we are ready to do maximum efforts in this direction. The authority of PICES is growing and its activities are being coordinated with other international organizations on fishery and ocean investigations.
The experience of holding this PICES meeting in Alaska and previous years' meetings will be useful for us in arranging the Eighth PICES Annual Meeting in Russia. So I, as a representative of my government and Vladivostok scientists, invite all those who have come to this meeting to also come and participate in the PICES Annual Meeting in the Far East of Russia in 1999.

On behalf of the Russian delegation I wish this meeting every success and hope there are many fruitful discussions and useful results for all the participants. I would like to express thanks once again to the United States, State of Alaska, and Fairbanks, for the hospitality, and providing us with this wonderful opportunity to attend the Seventh PICES Annual Meeting.

Dr. Doubleday called upon Dr. James W. Balsiger to provide a few words on behalf of the US Government.

Mr. Chairman, Ms. Lieutenant Governor, Dr. Fox, distinguished delegates, ladies and gentlemen. I am honored and privileged to be here today to present these remarks on behalf of the United States and the United States delegation.

We are pleased to be here in Fairbanks to participate in the Seventh PICES Annual Meeting. As part of the host country delegation, I am particularly happy to see PICES continue to gain momentum in the scientific community and to see that Fairbanks, Alaska, is now part of the force. I must be careful not to take personal credit, since the Secretariat, and especially Vera and her local troops, have handled all of the logistics. Thanks go to them.

Seven years is a good start. We can be proud of the progress that has been made under the PICES banner. I am not going to list the symposia and conferences that PICES has sponsored, but note that PICES support is increasingly being sought to co-sponsor international meetings. For example, as co-sponsor of the Pandalid Shrimp Fisheries Symposium to be hosted by the Scientific Council of the Northwest Atlantic Fisheries Organization, and as co-sponsor with the Tuna Commission for an El Niño follow-up workshop.

ICES is 100 years old. At this meeting of PICES we will consider a Memorandum of Understanding (MOU) with them to guide the development of scientific exchange between our two organizations. We will also look at an MOU with the North Pacific Anadromous Fish Commission. There are many more examples, but my point is that PICES is recognized now for the scientific prowess its member parties can provide to the world.

After seven years we will see a few changes. Dr. Warren Wooster told me earlier this week that this might be his last PICES Annual Meeting. I do not believe that, of course, but it will be quite a change when he is missing from the back row of most working sessions, committee and council meetings. We will soon have our third Chairman and our second Executive Secretary. I would like to mention the contribution of the Science Board and recognize the significant achievements that body has made — and note that Dr. Makoto Kashiwai is also at his last meeting as Science Board Chairman. We must give thanks to these people and many more for their tireless efforts to ground PICES in proper procedures, good strategies and solid science.

The good news is that because they (and PICES) have been so successful, we will not have difficulty in attracting talented people to follow them. PICES is indeed a good place for good scientists to meet and do their work.

I listened closely to the comments of both Lieutenant Governor Ulmer's remarks and then of Dr. Fox. They each make a strong case for the need for the broader community to understand the complexity of the oceans. The broader community includes the commercial fishers, the subsistence people and the non-consumptive users. Did you expect to see the day when ocean carrying capacity research would escape the esoteric musings of a collection of egghead

scientists? Well it has. It is on the top of the agenda at the Governor's office in Juneau. PICES has indeed come of age and has a role to play in the critical scientific questions of the day.

I look forward to a productive and enjoyable meeting. I thank you all for traveling to Fairbanks.

Dr. Doubleday thanked Lieutenant Governor Fran Ulmer, NOAA representative Dr. William Fox and all the delegates for their remarks and spoke on behalf of PICES.

Lieutenant Governor Ulmer, NOAA Science and Technology Director Fox, University of Alaska Chancellor Wadlow and President Hamilton, distinguished delegates, colleagues, ladies and gentlemen, I would like to begin my remarks by thanking our hosts, the United States of America for their hospitality in hosting this meeting, and the University of Alaska Fairbanks for their hard work in supporting the Seventh Annual Meeting of PICES in Fairbanks. While Fairbanks may seem far from the sea, its weather comes form the sea and the salmon that swim in the Chena River have spent years in the Bering Sea and the Pacific Ocean, so the influence of the sea is felt here in the heart of Alaska. The scientists from the main campus of the University of Alaska at Fairbanks have contributed strongly to PICES since its beginning. The Seventh Annual Meeting of PICES is an opportunity for scientists from PICES member states to strengthen contacts with their colleagues in Alaska and for Alaskans to learn about PICES and its work.

The hours spent in preparation for a meeting like ours are not fully appreciated because they are not visible to the participants. Those in the audience who have prepared past PICES meetings or other similar meetings understand what is involved and will join with me in expressing PICES' thanks. Many thanks to our hosts for bringing PICES to Fairbanks!

1998 is the International Year of the Oceans. The United Nations has formally recognized the importance of the oceans for mankind by this declaration. The Seventh Annual Meeting of PICES also shows the growing importance of the oceans. We anticipate over 300 participants at this meeting, continuing the steady growth of PICES.

Last year I spoke of the 1997/98 El Niño event which was gathering strength during our Sixth Annual Meeting. I urged PICES to seize the opportunity of major climate anomalies to advance understanding of the relation between ocean climate changes and the dynamics of the ocean's living resources. The El Niño event was exceptionally strong, with major impacts on the North Pacific Ocean, its living resources and the weather in countries bordering the PICES area. At this meeting we will see an overview of El Niño's effects on the physical and biological systems of the Pacific Ocean and adjacent seas. PICES is leading, with the participation of other organizations, plans for a major symposium in the year 2000 to examine in depth the implications of this El Niño event.

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. The joint meeting of JGOFS North Pacific Task Team with PICES this year is an important step in the right direction.

We should go further in this direction. The speed, with which temperature anomalies associated with the 1997/98 El Niño spread to high latitudes, underlines the importance of interactions between the ocean and atmosphere in the PICES area. PICES should play an active role in climate research. This will require us to bring scientists who study the linked ocean-atmosphere system into the PICES community. PICES should also link its research with worldwide programs of climate research, because the climate system is a global system. PICES should develop a positive role in the Global Climate Observing System by asserting a regional role in GOOS in the North Pacific.

Increasingly, PICES scientists are collaborating in joint research projects. This is commendable, but joint programs by PICES member states to study shared waters, shared ecosystems, and issues of common concern would bring still greater benefits by bringing greater resources to bear on important questions.

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 Seventh 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. Don't forget the coffee breaks and the evenings. The informal contacts and discussions among colleagues made possible by our Annual Meetings are just as important as the formal presentation of papers in the meetings.

Best wishes to all of you for a successful conference!

Dr. Doubleday introduced Dr. William G. Pearcy to give the keynote lecture. Dr. Pearcy discussed "What is the Carrying Capacity in the North Pacific for Salmonids?" He noted that these are exciting times for science in the dynamic North Pacific. The regime shift of the late 1970s had a profound effect on the ecosystem, including large increases in zooplankton, necton and salmon catches. Although many changes have been documented, how ecosystem changes are linked, directly or indirectly, to the growth and survival of salmonids is still very poorly understood. Research is urgently needed to describe the key mechanisms. Catches of salmon in the North Pacific during the 1980s and 1990s averaged about 800,000 T, a historic maximum. Over the last 20 years, declines in the average size at a given age have been abundantly shown around the Pacific Rim. We have approached the carrying capacity of oceanic waters of the North Pacific for salmon even though only a fraction of the primary production and zooplankton biomass is being utilized by salmon. What does the future portend for salmon? Since we have been experiencing record production in recent years, changes to either warmer or cooler conditions are not auspicious. If the warm sea temperature of the early and late 1990s continue, temperatures and increased buoyancy of the mixed layer may lower ocean productivity, salmon growth and the area inhabitable by salmon. We also need to have a better understanding of the interactions between wild and hatchery salmon and how hatchery fish affect growth, reproduction, and survival. Therefore, I recommend that PICES take the initiative and 1) sponsor a symposium by scientists to discuss and evaluate this issue; and 2) form a Working Group to explore the national and international implications of lower carrying capacity of the ocean "commons", and to evaluate the effect of hatcheries releases on the production and value of salmon and on the future of wild stocks.