INTERNATIONAL NORTH PACIFIC
FISHERIES COMMISSION

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Alec W. Brindle (from October 1989)
James W. Brooks (to March 1989)
Steven Pennoyer (from March 1989)
Richard B. Lauber

JAPAN

Kenjiro Nishimura
Atsushi Tokinoya
Junzo Sasaki
Kazuo Shima (to September 1989)
Koji Imamura (from September 1989)

SECRETARIAT

Bernard E. Skud, Executive Director
Katsumu Hanafusa, Assistant Director
LETTER OF TRANSMITTAL

In compliance with Article III 1.(g) of the International Convention for the High Seas Fisheries of the North Pacific Ocean and Rule 17 of the Rules of Procedure, it is my pleasure as Chairman of the International North Pacific Fisheries Commission to present my compliments to the Contracting Parties and their Commissioners and to transmit herewith the report described below.

This report summarizes the activities of the International North Pacific Fisheries Commission during the year from the adjournment of the 35th Annual Meeting on November 4, 1988 through to the adjournment of its 36th Annual Meeting, held in Seattle, Washington, from November 7 through November 9, 1989. It contains a summary of the 36th Annual Meeting, a brief resume of activities during the interim between annual meetings, and summaries of investigations which the three national fishery research agencies conducted under the planning and coordination of the Commission. The views expressed in these research summaries are those of the authors and not necessarily those of the Commission. Annual reports of the Commission are printed separately in the English and Japanese languages. The accuracy of translation is the responsibility of the Secretariat.

CLEMENT V. TILLION
CHAIRMAN
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Letter of Transmittal</td>
<td>5</td>
</tr>
<tr>
<td>I.  INTRODUCTION</td>
<td>5</td>
</tr>
<tr>
<td>II. REPORT OF THE 36TH ANNUAL MEETING--1989</td>
<td>6</td>
</tr>
<tr>
<td>1. Time and place of meeting</td>
<td>6</td>
</tr>
<tr>
<td>2. Participants</td>
<td>6</td>
</tr>
<tr>
<td>3. Agenda</td>
<td>6</td>
</tr>
<tr>
<td>4. The first plenary session</td>
<td>6</td>
</tr>
<tr>
<td>5. Procedures</td>
<td>10</td>
</tr>
<tr>
<td>6. Consideration of administrative matters</td>
<td>10</td>
</tr>
<tr>
<td>(a) Report of the Chairman</td>
<td>10</td>
</tr>
<tr>
<td>(b) Reports submitted by the Secretariat</td>
<td>10</td>
</tr>
<tr>
<td>(c) Other administrative actions</td>
<td>11</td>
</tr>
<tr>
<td>7. Considerations of matters of research</td>
<td>11</td>
</tr>
<tr>
<td>8. Activities of the Commission concerning salmonids</td>
<td>11</td>
</tr>
<tr>
<td>(a) Background</td>
<td>11</td>
</tr>
<tr>
<td>(b) Salmonid research</td>
<td>11</td>
</tr>
<tr>
<td>9. Review of the high seas driftnet fishery</td>
<td>19</td>
</tr>
<tr>
<td>10. Activities of the Commission concerning non-anadromous species</td>
<td>20</td>
</tr>
<tr>
<td>11. Activities of the Commission concerning marine mammals</td>
<td>24</td>
</tr>
<tr>
<td>13. Officers elected for 1990</td>
<td>25</td>
</tr>
<tr>
<td>14. Closing remarks at the final plenary session</td>
<td>26</td>
</tr>
<tr>
<td>APPENDIX 1. List of Participants</td>
<td>28</td>
</tr>
<tr>
<td>APPENDIX 2. Agenda</td>
<td>32</td>
</tr>
<tr>
<td>APPENDIX 3. Auditor's Report</td>
<td>33</td>
</tr>
<tr>
<td>III. ADMINISTRATIVE REPORT for 1989</td>
<td>38</td>
</tr>
<tr>
<td>IV. THE RESEARCH PROGRAM</td>
<td>42</td>
</tr>
<tr>
<td>A. Research by Canada in 1989</td>
<td>42</td>
</tr>
<tr>
<td>B. Research by Japan in 1989</td>
<td>47</td>
</tr>
<tr>
<td>C. Research by the United States in 1989</td>
<td>56</td>
</tr>
</tbody>
</table>

Publications of the International North Pacific Fisheries Commission
The International Convention for the High Seas Fisheries of the North Pacific Ocean was brought into force by Canada, Japan and the United States on June 12, 1953. The purpose of the Convention was to ensure that the fishery resources of the Convention area were maintained at the level of maximum sustained productivity. The Convention established the International North Pacific Fisheries Commission, which is composed of three national sections, each consisting of not more than four members appointed by the governments of the respective Contracting Parties. The Commission meets at least once annually and conducts its business between meetings through its permanent Secretariat in Vancouver, Canada.

In April 1978 the Convention was amended by a Protocol that became effective February 15, 1979 and provided for the maintenance of the International North Pacific Fisheries Commission which in turn would:

(a) provide for scientific studies and for coordinating the collection, exchange and analysis of scientific data regarding anadromous species, including data regarding the continent of origin of these species, and provide a forum for cooperation among the Contracting Parties with respect to these species; and

(b) pending the establishment of an international organization with broader membership dealing with species other than anadromous species, provide a forum for cooperation among the Contracting Parties with respect to the study, analysis and exchange of scientific information and views relating to the stocks of non-anadromous species of the Convention area, including information and views relating to all relevant factors affecting these stocks, the promotion of scientific research designed to fill gaps in knowledge and the compilation and dissemination of statistics and records.

In 1986, the three Contracting Parties accepted the recommendation by the Commission to amend the Annex to the Convention. The details of the amendment, which became effective on May 23, 1986, were presented in the 1986 Annual Report and are summarized as follows:

1. Regarding the mothership salmon fishery: fishing in the eastern half of the Bering Sea high seas salmon fishery will be phased out in three years; in the western half of the Bering Sea high seas salmon fishery, it will be phased out completely by 1994. The total mothership fleet days in the U.S. 200 nautical mile fishery zone will be 140 for 1986 through 1993. For 1994 and thereafter, the mothership fleet days will be 144 with an earlier closure of the fishery.

2. Regarding the landbased fishery: the present eastern limit will be moved to the west by 1 degree. This limit may be modified in accordance with the result of strengthened scientific studies to be initiated with the beginning of the 1986 season.

Through Memoranda of Understanding, Canada, Japan and the United States of America also agreed to strengthen scientific research studies on anadromous Salmonidae in the Convention area as well as cooperation in the field of enforcement.
II. REPORT OF THE 36TH ANNUAL MEETING--1989

1. TIME AND PLACE OF MEETING
The 36th Annual Meeting of the International North Pacific Fisheries Commission was held in Seattle, Washington from November 7 to 9, 1989 under the chairmanship of Commissioner Clement V. Tillion of the United States. During the week immediately preceding the plenary sessions of the Commission, meetings of the Standing Committee on Biology and Research and its various sub-committees were held. Commissioner Steven Pennoyer of the United States chaired those meetings and Dr. Loh-Lee Low of the United States acted as scientific convenor. The Standing Committee on Finance and Administration met November 6 to 8, with Commissioner Alec W. Brindle of the United States as Chairman.

2. PARTICIPANTS
Persons participating in the 36th Annual Meeting are listed in Appendix 1 of this report, which also shows committee assignments. Changes in Commission membership which occurred during the year are indicated in the Administrative Report for 1989 (Part III of this Annual Report). As in past years the Commissioners of each national section were assisted by a number of advisers and experts. At the invitation of the Commission, the International Pacific Halibut Commission was represented by an observer who also acted as a consultant on matters pertaining to halibut. The total number of participants was 111, including 26 from Canada, 27 from Japan, 44 from the United States, 4 staff members of the Secretariat, 1 observer, 5 interpreters, and 4 temporary employees.

3. AGENDA
The agenda for the 36th Annual Meeting, as adopted by the Commission, is Appendix 2 of this part of the report. The sections of this report which follow cover the Commission's actions in relation to each item on the agenda.

4. THE FIRST PLENARY SESSION
The first plenary session of the 36th Annual Meeting, chaired by Commissioner Clement V. Tillion of the United States, was held on November 7, 1989 in the Stouffer Madison Hotel, Seattle, Washington. At this session, which was open to the public, there were addresses of welcome, statements by the national sections, introduction of delegations, and an address by the Chairman.

The Honourable Sam Smith, President of the Seattle City Council, addressed the meeting and welcomed delegates to the United States:

"It is my pleasure to welcome you to the City of Seattle. I assume that you will be considering issues relating to the Fishing Industry, a subject about which we are deeply concerned. I know you share many of the interests which are on our minds and therefore, it should be a rewarding meeting.

I want you to know that our City is one of the most livable in the world because when the Good Lord was creating this country, he made the rest of the United States, then there was this little corner in the Northwest where he did his finest architecture—so we have Seattle.

I wish you a very successful meeting.

The Honourable Rolland A. Schmitten, Northwest Regional Director for National Marine Fisheries Service (NOAA), addressed the meeting and welcomed the delegates to the United States:

"Good Morning, let me welcome you to Seattle, nicknamed the "Emerald City" and certainly the gem stone of the Pacific Northwest. It is nice to see again so many friends and colleagues who are involved in the international management of our fisheries resources.

I'm Rolland Schmitten, the Northwest Regional Director of the National Marine Fisheries Service. We are an agency within NOAA (National Oceanic and Atmospheric Administration). The U.S. Department of Commerce is our parent organization. Our mission is the management of living marine resources and their habitat. I have nine western states in my jurisdiction. Our management and enforcement responsibilities extend throughout the fisheries conservation and management zone as established by the Magnuson Fishery Conservation and Management Act and other Federal laws. We, as an agency, are totally supportive and committed, through our science advisors and the Commissioner position held by my counterpart from Alaska, Mr. Steven Pennoyer, to the International North Pacific Fisheries Commission.

For a moment, let me share the significance of the fishing industry to the Pacific Northwest and, in particular, Washington, your host state.

- In 1988 the Washington State fishing industry contributed $3.1 billion in direct and indirect impacts, that is up from $1.1 billion in 1985, and accountable over 36,000 jobs.
- Sixty percent of the total edible seafood catch from the United States fisheries conservation zone was taken by the Washington-based fleet in 1987.
- Export of fishery products by Washington-based vessels constitute well over half those reported for the entire nation.

Yes, without a doubt—the fishing industry is big business in the State of Washington, and yes, the fisheries future for all of our countries depends on the wisdom and commitment to INPFC and the wisdom of its leaders.

As our fisheries world continues to shrink through technology, and as world demands for our fisheries resources continue to increase, it will require prudent management to allow a full measure of catch while still protecting our fishery resources for future generations. Stock assessment and conservation is, and always will be, an
important part of INPFC. Even though other organizations have entered into the fisheries management arena, your organization, by right of seniority with its thirty-six years of leadership in fisheries negotiations and research, continues to be an extremely important player in the international resolution of fishery management issues in the North Pacific.

Currently in the Pacific and North Pacific there is one issue that is paramount, one that needs the leadership of an organization such as yours; an issue that threatens the very foundation of salmon and marine mammal conservation; that is, the high seas interception of salmon stocks by driftnet fisheries.

In the past three years, the documented illegal removal of salmon by certain driftnet fleets has continued to increase. This year the Government of the United States entered into agreements with three countries as a start toward greater protection of salmon on the high seas. This is a good beginning, but further progress will require the sustained efforts of all concerned countries. I urge this body to exercise its leadership in this most divisive issue. I am confident that we will find, as we have in many other contentious issues, a mutually acceptable solution. We are all international shareholders in the fisheries resources of the North Pacific and it benefits all of us to insist upon wise management.

INPFC has a long and creditable history of being problem solvers, and your contributions to fisheries research and the promotion of conservation has directly contributed to the health and wealth of all Pacific rim countries. I trust you will find Seattle a pleasant place to conduct your business.

I wish you well in your deliberations and hope that you continue to foster a spirit of good will and cooperation. Our offices stand prepared to serve you in any way that will be helpful.

Commissioner Kenjiro Nishimura, Chairman of the Japanese National Section, addressed the session as follows:

It is my great honour to address to you on behalf of the Japanese National Section at the 36th Annual Meeting of the International North Pacific Fisheries Commission.

The venue of the Annual Meeting of the Commission has returned to Seattle after a long time. I come to Seattle for the first time in about 10 years, witnessing remarkable development in economy including fisheries, society and culture, I would like to express my respect for your efforts in many fields.

First, the Japanese national section wishes to express its welcome to Mr. Steven Penney and Mr. Alec W. Brindle of the U.S. who are attending the INPFC Annual Meeting as commissioners for the first time, INPFC has a history of about 40 years. We sincerely look forward to their contributions to the Commission. We also would like to wish former commissioners Mr. James W. Brooks and Dr. Dayton L. Alverson well in their future endeavour.

As to the Japanese national section, Mr. Koji Imanura is a newly appointed commissioner in place of Mr. Shima. We are sure of his contribution to the Commission.

Because of U.S. domestic problems, the Japanese mothership salmon fishery could not operate in the U.S. 200-mile zone this year, the same as last year, even though it is the legitimate fishing right under the International Convention for the High Seas Fisheries of the North Pacific Ocean. Therefore the circumstances still continue in which the significance of the existence of the Commission is questioned. Exactly one year ago, at the INPFC Annual Meeting, Japan and Canada acknowledged that this cooperative scheme by Japan, the U.S. and Canada has functioned effectively over the many years to conserve and manage salmon of North American origin and that it is essential to maintain this cooperative scheme. Based on this recognition, Canadian and Japanese national sections urged the U.S. in a form of a joint statement to take all the necessary remedial actions at the earliest possible time before the beginning of the next fishing season, that is 1989 fishing season.

Although a series of inter-Governmental meetings among Japan, Canada and the U.S. were held between the last year's Annual Meeting and April of this year, the U.S. has never acted positively. Consequently, the U.S. did not take any remedial actions for this fishing season and the Japanese mothership salmon fishery was forced to operate under the very severe conditions. This is really regretful.

Japan has requested the U.S. Government to hold an inter-Governmental meeting among Japan, Canada and the U.S. on the occasion of this Annual Meeting to resolve the problems before the next year's fishing season, however it is indeed regretful that any positive reaction has not yet been obtained. At this occasion, Japan strongly requests the U.S. Government for its positive response without any further delays.

The next item is regarding the resource management of pollock in the Bering high seas. Japan considers the issue be treated based on scientific information among all related countries including fishing countries. From this point of view, Japan proposed to hold an international meeting this summer on scientific research cooperation and coordination regarding fishery in the Bering high seas. However neither the U.S. nor Canada could attend and it was regretful. Three major fishing countries concerned, namely Japan, Poland and Korea participated in the meeting and very valuable views were exchanged among them. The results of this meeting have been reported to the absent countries including the U.S. and Canada. Japan wishes earnestly that such activities be enlarged and developed.

Now, I would like to talk about the squid driftnet fisheries. Firstly I would like to state Japan's basic position about the fishery. For the management of this fishery, we consider it essential to avoid emotional or irrational discussion, and feasible measures should be taken after due scientific discussions based on data obtained and after reviewing the actual conditions of the fishery as an industry. Japan prepares to take such management measures.

Secondly, Japan sent 10 Japanese scientific observers on board squid driftnet fishing vessels last year, and has started a U.S.-Canada-Japan cooperative monitoring program since this year. We are pleased and assured that the scientists of these three countries mutually recognize the significant scientific discussion that have been held regarding the segregation of squid and salmon, matters relating to incidentally taken resources, marine debris, observer programs, etc. We do hope heartily that the scientific discussions will be continued in the Commission in the future.

However, in the middle of the scientific discussion at the INPFC meeting with the U.S. and Canadian scientists, which should be useful for the future, the same countries, the U.S. and Canada proposed a resolution to the General Assembly of the United Nations on November 2, 1989 which included extreme measures such as an immediate total ban of the driftnet fishing method. We really regret that such an action was taken by the two countries because we have grave concern that the political and emotional discussion tends to prevail at the United Nations without deepening the understandings of the actual conditions of the driftnet fisheries and that the discussion at the United Nation does not contribute to the actual solution of the problem. Taking this opportunity, Japan urges concerned countries to cope with this matter on calm and realistic stand point.

It is true that there are some differences of opinions among Japan, Canada and the U.S. in relation to the matters described earlier and other problems, which are generated due to the different background
of the fisheries in the North Pacific. However, we are confident that we need to maintain the auspices of the INPFC, which has a history of nearly 40 years, to solve various problems with mutual confidence and cooperative relationship. We hope that this year's Annual Meeting will provide effective and fruitful results as in the past.

Commissioner Pierre Asselin, Chairman of the Canadian National Section, addressed the session as follows:

I should like to join with my fellow commissioners and members of the Canadian National Section in thanking our Chairman, Mr. Smith from the City of Seattle and Mr. Schmitter of the National Marine Fisheries Service for their warm words of welcome. In addition, I should like to acknowledge some new Commissioners to INPFC. Welcome to Mr. Alec W. Brindle of Seattle who replaces Dr. Alverson on the U.S. National Section. Also on the U.S. delegation, welcome to Mr. Steve Pennoyer who replaces Mr. J.W. Brooks. Welcome also, to Mr. Koji Imanura who is replacing Mr. Shima of the Japanese National Section. While we shall miss these former Commissioners, we warmly greet our new colleagues who will be assisting with the important and often difficult matters before us.

In our opinion, Mr. Chairman, we are at a highly significant point in the history of North Pacific fisheries relations and the international arrangements between our countries. Over the past year we have seen unprecedented international concerns voiced over the matter of high seas driftnet fishing and these concerns now are high on the international agenda, as reflected in the Commonwealth Declaration on the Environment and current considerations in the United Nations. In Canada there is an extremely high level of national concern regarding driftnet fishing and there are strong demands being voiced for effective international action. For example, those concerns were voiced yesterday in The North Pacific Driftnet Proclamation issued by the Province of British Columbia and the states of Alaska, Washington, Oregon, Idaho, California and Hawaii.

Canada's concerns relate to the incidental catch of Canadian-origin salmonids in squid driftnet and salmon-directed fisheries, the large catch of birds, marine mammals and other species in driftnet gear and its non-selective nature. As in the past, we continue to focus on the incidental catch of steelhead and Yukon origin chinook and fall chum salmon in Japanese salmon-directed fisheries. We also vigorously oppose the so-called "pirate" fisheries which are targeting on salmonids, and the illicit marketing and import-export schemes dealing in salmon caught in such operations. As you know, Canada and the USA have been cooperating in joint enforcement efforts aimed at illicit salmon harvesting activities and several cases are now before the courts. We also have concerns regarding lost and discarded fishing gear and the matters of ghost fishing and hazards to navigation and marine life from such gear.

In addition, Canada wishes to repeat the objections which were strongly voiced last year with respect to the northern boundary of Japan's squid fishery, and adjustments of the boundary under domestic Japanese regulation. We have on several occasions, caught salmonids well south of the 46 degree N. latitude limit of the boundary and feel that such a boundary does not provide adequate protection for North American salmonids. While 1989 investigations on this subject were somewhat encouraging, the high seas distribution of salmon and squid are subject to considerable interannual variation and the matter is still a concern to Canada.

There is still a need to expand our scientific knowledge of the biology and oceanography of the North Pacific and address such pressing matters as global climate change. Accordingly, Canada has sponsored and encouraged development of a new scientific organization for the North Pacific and we continue to endorse that initiative. We wish to point out that this organization, known to some as "PICES", is envisioned as a purely scientific body with no management role.

Mr. Chairman, given the growth of population in Pacific Rim countries, the spectacular economic growth in the area, and the resulting increased demand for fish and fish products, we are now at the turning point. In this context, Canada supports proposals inviting North Pacific Rim nations to participate in a broader fisheries management organization which would address common issues, including high seas driftnet fishing. Such an organization which could address the full spectrum of fisheries management issues would be highly desirable. By taking this position Mr. Chairman, we do not wish to imply that we consider INPFC unimportant or that it has not been fulfilling an important function. On the contrary, Canada considers INPFC to be most important. Our point here is that if we are to move to a new organization or modify INPFC, then we must do so smoothly without disruption, preserving what we have while designing something new. We therefore support all efforts to preserve the integrity of INPFC while vigorously exploring new multinational arrangements. Canada attaches particular importance to international cooperation in conservation of the living resources of the sea, including stocks adjacent to 200-mile zone. We view the fishing countries duties in this respect as a key factor in our efforts at generally sustainable development and more particularly, a regime of sustainable fisheries.

Also on the matter of scientific knowledge, we note with interest the discussion of scientific symposia topics in the Standing Committee on Biology and Research last week. Canada identified the need for a symposium on the biology, distribution, and stock assessment of flying squid and other species captured in high seas driftiness. We are most pleased to know that the USA and Japan have supported that initiative in principle.

Mr. Chairman, a very great deal has happened and continues to happen with regard to new arrangements and understandings regarding the fisheries of the North Pacific. Canada, the USA and Japan have agreed to cooperate on control, monitoring and enforcement arrangements for the squid fishery which, in our opinion is a major first step in cooperative efforts to address mutual concerns. We wish to compliment Japan sincerely for agreeing to these arrangements and are anxious to continue such discussions to facilitate the 1990 program and strengthen the measures implemented in 1989. We welcome discussion of initiatives such as observer coverage, cooperative research, fleet position reporting using the latest technology and related monitoring and enforcement arrangements. In the same vein, we wish to compliment the USA for the progress made in arrangements which Korea and Taiwan have regard to the driftnet fishery. Canada also, has initiated negotiations with Korea and will be actively pursuing such initiatives over the coming months. In addition, we are interested to learn about ongoing USA-USSR discussions and the implications of those discussions.

At our last Annual Meeting Canada was pleased that Japan and the USA agreed to our initiative to form a network to exchange information and facilitate cooperation between our nations on the matter of illegal salmon export and marketing schemes. At this session Mr. Chairman, we would like to explore how our countries might further cooperate in addressing this most important problem.

Finally, I would like to observe that the very difficult issues that we have before us can only be addressed through the spirit of international cooperation and understanding. In the face of mounting world opposition to the practice of driftnet fishing it is most important that we find solutions while respecting the generally agreed principles.
of the law of the sea and international law and practice. Through international cooperation and innovation we may be able to find alternate fishing technologies which are more selective and serve as alternatives to present practices.

Commissioner Richard B. Lauber, spokesman for the United States National Section, addressed the session as follows:

It is an honour and pleasure for me to welcome you here to Seattle and make some remarks on behalf of the United States National Section. As we begin this 36th annual meeting, let us reflect upon the cooperative measures that have been developed and implemented by this Commission. They have been useful in narrowing the differences that we have regarding the conservation and management of Pacific salmon resources on the high seas. However, the United States maintains that significant problems remain regarding the Commission’s effectiveness in the conservation of not only salmon resources, but all other marine resources affected by high seas fishing activities. We trust that during the next few days we will take advantage of this opportunity to explore these problems in greater detail with our Canadian and Japanese counterparts. We especially seek ways to address these problems through cooperative undertakings. For example, we support the recommendation of the Subcommittee on Salmon with respect to cooperative research to develop salmon forecasting methods based on sampling near the Aleutian Islands and in the Bering Sea.

In the meantime, let me join with my colleagues in welcoming new INPFC Commissioners, including Mr. Koji Inamura of Japan, and Mr. Alec Brindle and Mr. Steven Pennoyer of the United States. We look forward to working with these new associates, as well as our veteran Commissioners during the days ahead. Our best wishes go out to the departing Commissioners, including Mr. Shima of Japan, and Dr. Alverson and Mr. Brooks from the United States. I would also like to recognize a former Canadian Commissioner in the audience-Mr. Donovan Miller and the former Executive Director of INPFC-Mr. Clifton Forrester.

This past year has witnessed the development of new undertakings regarding the high seas driftnet fisheries of the North Pacific. Notable among these has been the long-awaited initiation of cooperative scientific monitoring programs and enforcement measures for Japan’s high seas squid driftnet fishery developed by our governments. While these undertakings were not done under the auspices of this Commission, the United States National Section is generally pleased with the cooperation of the Japanese government and fishing industry in implementing the 1989 cooperative observer programs for this fishery, especially with regard to the deployment of the U.S. scientific observers, and we look forward to reviewing the data obtained by both North American and Japanese observers during the fishing season. However, Japan’s driftnet fisheries for salmon, squid, and tuna/billfish, remain of very great concern to a broad sector of U.S. interests, many of whom are calling for an immediate end to high seas driftnet fisheries. Thus, we believe it is absolutely critical to follow-up the initial 1989 efforts with (1) an expanded observer program in 1990 to secure statistically reliable data on these fisheries, and (2) expanded cooperative enforcement activities, including the deployment of satellite transmitters on Japanese driftnet fishing vessels.

In addition to those measures implemented by our governments, we also wish to draw attention to the arrangements undertaken by the United States with the Republic of Korea and the authorities on Taiwan pursuant to the U.S. Driftnet Act of 1987. As a result of agreements concluded with these countries in late summer, driftnet fishery scientific monitoring and enforcement initiatives are being implemented. Details of those agreements have already been transmitted to Japan and Canada through diplomatic channels. We trust that these agreements, together with the understandings reached between our governments, will provide needed information regarding the effects of extensive high seas driftnet fishing practices upon the North Pacific marine environment and provide better enforcement of time and area restrictions and other regulations developed to minimize interceptions and illegal harvests of valuable Pacific salmon and steelhead resources.

We also wish to report on the results of recent bilateral talks between the United States and the Soviet Union held in Leningrad this past September. We are pleased to note that U.S. and Soviet representatives agreed on the principles that would form the basis for a new convention for the conservation of Pacific anadromous resources on the high seas. The convention proposed terms discussed reflect the view of the two sides that high seas fishing for Pacific salmonoids is irrational and wasteful. We are encouraged that the terms for the convention include significant enforcement measures aimed at preventing the unauthorized harvest of Pacific salmonoids on the high seas. The convention is designed to provide for broader multilateral participation than those regimes currently in place. Thus, the two governments agreed to consult on the terms of the proposed convention in the near future with the governments of Japan and Canada.

At that same U.S.-Soviet meeting, both sides concurred that the level of unregulated pollock fishing in the central Bering Sea, when combined with regulated pollock fisheries in the respective U.S. and Soviet zones, greatly exceeded the allowable biological catch of the entire Bering Sea pollock resource. In an attempt to assess ways to have the total pollock fishery in the central Bering Sea regulated in a manner that would eliminate any adverse impact on the pollock stocks in the adjacent U.S. and Soviet 200-mile zones, the two sides agreed to establish a bilateral group called the Bering Sea Fisheries Advisory Body. This body is to meet later this month in Seattle to develop options for actions that may be taken to reach agreements to control the unregulated fisheries. Because of the special status of the Bering Sea to the United States and the Soviet Union as its only coastal states, it is likely that both sides will explore all available areas for bilateral cooperation before responding to any proposals regarding the establishment of an multilateral organization for this unique region.

All the undertakings I have mentioned thus far hold promise in our efforts to seek greater information about high seas fisheries in the North Pacific that continue to affect a wide variety of marine resources of concern to the United States, including marine mammals, seabirds, and, of course, U.S.-origin salmon and steelhead trout. However, we remain concerned that only limited management measures have been adopted by Japan to regulate the squid driftnet fishery and the large-mesh tuna/billfish driftnet fishery. In addition, we are distressed about Japan’s unilateral actions in establishing boundary restrictions without proper consultation with the contracting parties to the INPFC. This latter action raises serious questions about Japan’s lack of due consideration to its duties under customary international law to cooperate with other states in taking appropriate measures for the conservation of high seas living marine resources, including Pacific salmon resources and steelhead that are under U.S. jurisdiction.

Japan has explained its efforts to regulate the squid driftnet fishery, including the use of a limited license entry system. However, the Japanese regulations enacted to date do not mitigate serious problems associated with the fishery regarding the amount of fishing effort expended in recent years, as made evident in the vast number of fishing operations, the extensive amount of gear deployed during the fishing season, and the growing trend of larger sized vessels in the
fishery. This is because the government of Japan has issued lengthier fishing permits to a greater proportion of the licensed fleet and has not taken any measures to limit the amount of gear that its vessels may use. This raises serious conservation concerns for both target and non-target resources affected by the fishery. To add heightened anxiety, little is known about the abundance of these resources and catch quotas have never been established, as in the case for other fisheries under management regimes. Thus, the government of Japan continues to condone a high seas fishery for resources which are little understood. Many fear that there are deadly effects associated with this fishing practice which may be far reaching to a wide variety of non-target species. Fortunately, this irrational and irresponsible action has been followed by Japan's Asian neighbours: namely Taiwan and Korea. We believe that the problems raised by Korean and Tai-wanese driftnet fishing activities have come back to haunt Japan's coastal salmon fishing interests, in the form of interceptions of Japanese-origin salmon. We are disturbed to note that this problem is not limited to Japanese-origin salmon: there is evidence indicating that interceptions of salmon and steelhead from other Pacific-rim countries of origin have occurred. The carefully established inshore salmon conservation and management programs of these countries are jeopardized by such interceptions.

In the meantime, Japan's mothership and land-based salmon fishery remain a significant issue of great concern to all of us gathered here. At last year's annual meeting in Tokyo, the Japanese national section proposed that Japan's mothership salmon fishery be allowed to convert to a land-based-type operation. We understood that this proposal reflected Japan's desire to discontinue the use of the one remaining mothership because of uneconomic conditions brought about by decreased salmon quotas and the unavailability of marine mammal incidental take permits for Japanese mothership salmon fishermen in the U.S. exclusive economic zone. We are prepared to resume consultations on this proposal for the 1990 fishing season with our Japanese and Canadian counterparts in conjunction with all other cooperative initiatives that were begun this year, and in 1986.

In closing, I note that because of the serious conservation issues posed by high seas drift-net fishing activities, the United States has worked hard to bring the issue to international attention, as reflected by the introduction of a United Nations resolution co-sponsored by the United States, Canada, and others. We are heartened that our concerns have been shared by Canada and numerous other countries around the world. We welcome opportunities to work closely with Japan and Canada to address the problems raised by this fishing technique. Only full cooperation by Japan might work to dispel perceptions held by many in the United States and elsewhere that high seas driftnet fishing is a despoiler of the living marine resources of the North Pacific. However, no country is without blame when it comes to the environment, and we all must bear responsibilities for future generations. Thus, we seek areas of closer cooperation and greater understanding among the INPFC contracting parties and trust that our concerns are given due consideration through the expansion in 1990 of the cooperative driftnet fishery programs that were initiated this year by our governments.

Mr. Clement V. Tillion, Chairman of the Commission, addressed the meeting as follows:

As chairman, let me extend a heartfelt welcome to all of you gathered here to attend the 36th Annual Meeting of the International North Pacific Fisheries Commission.

On behalf of the Commission, I would like to extend a special welcome to our new Commissioners. We are pleased to see that Mr. Imamura has joined the Japanese Section, in place of Mr. Shima. In the United States Section, Mr. Pennoyer and Mr. Brindle are attending this meeting as alternate Commissioners replacing Mr. Brooks and Dr. Alverson, respectively. I know I speak for all of us in expressing warm appreciation for the valuable contributions of Mr. Shima, Mr. Brooks and Dr. Alverson and in saying that we look forward to working with Mr. Imamura, Mr. Pennoyer and Mr. Brindle in the days ahead.

I am sure the Commission will need the expertise, talent, and energy of all of us— as you are aware, the Commission now finds itself in a situation of great complexity. We must now cope with the growing international attention that has focused on all uses of drift nets on the high seas, including a number of such fisheries prosecuted by states not party to the Convention. Taking these concerns in mind, we need to continue to work diligently towards full realization of the Commission's goals. In particular, the Commission has made important contributions to our knowledge of anadromous and other species in the North Pacific. Ensuring that such scientific work continues is a goal which deserves the full support of each of us here and our respective governments. I hope that we can persevere in this invaluable work in the changing times ahead.

Let me conclude my remarks by once again welcoming you to Seattle. I trust that we will enjoy our stay here and have very productive meetings.

5. PROCEDURES

The Commission continued, without changes, procedures followed at past annual meetings.

6. CONSIDERATION OF ADMINISTRATIVE MATTERS

(a) Report of the Chairman

The Commission adopted the address given by Mr. Clement V. Tillion of the United States at the opening plenary session as the Chairman's report to the Commission for 1989.

(b) Reports submitted by the Secretariat

The following actions were taken on reports submitted by the Secretariat which had been referred to the Standing Committee on Finance and Administration.

i. Auditors' report for the fiscal year ended June 30, 1989.

ii. Details of items in the auditors' report for the 1988/89 fiscal period.

The auditors' report (Appendix 3 of this report) was approved as was retention of KPMG Peat Marwick, as auditors.

iii. Budget estimate for the fiscal year beginning July 1, 1990 and budget forecast for the fiscal year beginning July 1, 1991. The Commission recommended that a budget totalling $471,000 (Canadian funds) be adopted for the fiscal year beginning July 1, 1990. Each Contracting Party is to contribute a one-third share ($157,000). The committee presented to the Commission a budget forecast totalling $539,000 (Canadian funds) for the fiscal year beginning July 1, 1991. The budget forecast is provided for the guidance of national sections and is not to be considered for adoption until the 37th Annual Meeting in 1990.


The committee reviewed the Administrative Report submitted
by the Secretariat (Section III of this report) and recommended its acceptance by the Commission.

v. Status of receipt of information pertinent to Articles II 1.(e) and IX 2.

In discussion of this item the committee agreed that national sections should continue submission of reports as in previous years.

(c) Other administrative actions

The Commission confirmed that the first plenary session of the 37th Annual Meeting of the Commission be held on Tuesday, November 6, 1990, in Vancouver, Canada, and endorsed the committee's recommendation that the 38th Annual Meeting be held in Tokyo, Japan, with the first plenary session on Tuesday, November 5, 1991.

The Commission also accepted the invitation of the United States National Section to hold the 39th Annual Meeting in Anchorage, Alaska, with the first plenary session commencing on Tuesday, November 3, 1992.

7. CONSIDERATION OF MATTERS OF RESEARCH

The Commission requires its Standing Committee on Biology and Research to arrange for research on various problems and to report on the results of that research. At the 1989 Annual Meeting the committee utilized three sub-committees to assist in the conduct of its work. These were: the Sub-Committee on Salmon, the Sub-Committee on Marine Mammals, the Sub-Committee on Non-Anadromous Species which included two panels (Bering Sea and Northeast Pacific) to consider matters related to groundfish, king and tanner crab and the marine debris. The Report of the Standing Committee on Biology and Research contained appendices prepared by these sub-committees and reference is made in the following sections to the report and certain of its appendices.

Progress in publication of research and other material by the Commission was reviewed by the committee.

The Report of the Standing Committee on Biology and Research was adopted at the third plenary session. At the time of adoption there were comments concerning information contained in the report and all national sections expressed their pleasure at the quality of the scientific information in the report. The Commission agreed to retain the present schedule for conduct of work of the Standing Committee on Biology and Research.

8. ACTIVITIES OF THE COMMISSION CONCERNING SALMONIDS

(a) Background

Responsibilities with respect to salmon were assigned to the Commission through the Protocol amending the Convention. Specifically, the Commission was to (1) provide for scientific studies and for coordinating the collection, exchange and analysis of scientific data regarding anadromous species, including data regarding the continent of origin of these species, and provide a forum for cooperation among the Contracting Parties with respect to these species; and (2) coordinate scientific studies to determine the continent of origin of anadromous species migrating in the waters south of 46° north latitude, and following three years of such studies make recommendations if appropriate relating to the conservation of salmon of North American origin. To aid in these responsibilities the Contracting Parties agreed to establish a scientific program to coordinate scientific research activities in the Convention area.

(b) Salmonid Research

The Standing Committee on Biology and Research is responsible for planning and coordinating the research on anadromous salmonids required by the Convention and the analysis and reporting of that research. The committee referred matters concerning salmonids to a Sub-Committee on Salmon with terms of reference as adopted by the Commission at the 1978 Annual Meeting. In its report to the Commission, the Standing Committee on Biology and Research reported on certain findings of the Sub-Committee on Salmon as follows:

(i) Studies on continent of origin and distribution of salmonids pertinent to Article III 1(d)

The sub-committee reviewed new information gained on continent of origin of salmonids south of 46°N, and updated the summary of information on this subject that has appeared in recent sub-committee reports. North American sockeye, chum, pink, and coho salmon and steelhead trout are known through tagging studies to occur southwest of 46°N, 175°W. In addition, scale pattern analyses have detected North American sockeye, chum, coho, and chinook salmon in these waters. The status of knowledge varies greatly with species.

Research activities in waters south of 46°N included the following:

(a) High seas sampling and tagging

In the area south of 46°N and between 160°E and 175°W, 6,112 salmonids were tagged and released in 1989 by six Japanese research vessels, as compared to 6,642 released by five vessels in 1988. A U.S. scientist participated in a cruise of a Japanese research vessel operating in the area southwest of 46°N, 175°W. Research was conducted on ways to increase the percentage of fish caught that could be tagged and released. As a result the percentage of salmonids caught that were tagged and released was substantially higher (53%) than the 30.6% reported by this vessel last year. The U.S. in cooperation with the U.S.S.R. tagged and released 84 fish in this area in 1989.

The fishing masters of the 20 vessels sampled in the Japanese land-based port sampling program reported that no fish with missing adipose fins were caught and no scales were taken as planned.
Proposed sampling of the Japanese land-based fishery for chinook scales was not accomplished. The United States member asked if there were a solution to the problem of obtaining more biological samples from the land-based driftnet fishery area, which are needed to determine continent of origin of salmonids south of 46°N. The Japanese member explained that they are collecting additional scale samples from chinook salmon caught during research vessel operations, but that fishing effort is limited and it is hard to increase the absolute number of fish sampled.

(b) Tag recoveries

There were 14 new Asian coastal recoveries (six chum, six coho, and two pink salmon) and one new North American coastal recovery (one steelhead trout) of disc tags from 1989 and earlier releases south of 46°N and between 160°E and 175°W. In addition, 14 coded-wire tagged steelhead trout of North American origin were recovered in this area in 1989. One of these, a fish from the Quinault River in Washington caught on June 23 at 42°44′N, 163°32′W, represents a significant westward range extension (4° longitude) for North American salmonids. Totals of 1,000 choho, 1,000 chinook, and 127 steelhead were examined by Japan during port sampling of the land-based driftnet fishery in 1989, and 0 coho, 0 chinook, and 0 steelhead with missing adipose fins (0, 0, and 139 in 1988) were found.

(c) Scale pattern analysis

A new scale pattern analysis of coho salmon by Japan indicated that coho salmon of Asian origin dominated in the northwestern Pacific west of 175°W. However, estimated proportions of coho salmon of North American origin as high as 21.3% in waters southwest of 44°N, 175°E, were not consistent with past tagging results.

(d) Parasite studies

Chinook salmon: The brain parasite, Myxobolus arcticus, which is thought by Japan to be an indicator of Asian chinook salmon, has been found in a total of 114 fish collected from the area southwest of 46°N, 175°W during 1987 and 1988. Based on information from this parasite Japanese scientists estimated that at least 50% of the chinook salmon in catches in the North Pacific south of 50°N and west of 170°W were of Asian origin. However, Canada concluded that the use of this parasite for identification of continent of origin of chinook salmon is premature, because presence and prevalence of the parasite has not been examined in Asian and in many North American stocks.

Steelhead trout: One hundred eighty-eight steelhead trout infected with freshwater trematodes (Plagiorchis shawi or Nanophyetus salmincola or both) that indicate U.S. Pacific Northwest origin (Washington to northern California, including Idaho) were detected in samples collected southwest of 46°N, 175°W in 1983-1987. These fish were caught as far west as 167°21′E.

(e) Estimated and reported catch of steelhead trout

A U.S. scientist used catch and fishing effort data from Japanese research vessels in combination with commercial effort data to estimate the average number of steelhead caught by the Japanese landbased driftnet fishery. These estimates were then compared to the reported catch of the landbased fleet.

(2) Salmonid and flying squid distribution studies

Ten documents received by the Sub-Committee on Salmon reported on distribution of salmonids in and near the area of the squid driftnet fishery:

A Canadian vessel fishing eleven gillnet and seven longline stations in the area 38-49°N, 136-160°W in July and August 1989 near the northern boundary of the fishery caught no salmon.

Four Japanese research vessels fished stations in the central North Pacific in July-November 1988 to clarify the distributional ecology of flying squid and the extent of overlap with salmonid distributions. The major areas of concentration of flying squid and salmonids were considered to be separated, and differences in water temperature profiles were noted.

Four Japanese research vessels conducted driftnet surveys of flying squid stocks in the central North Pacific in 1989. No salmon were taken by one vessel fishing south of 37°N in April and May. Salmonids were taken north of the squid fishery area by another vessel in June and August, and 131 salmon were caught by a third vessel in July and August between 38°-44°N, 172°E-177°W. The fourth vessel fished in September-October (report pending).

The distribution of salmonids in waters surrounding the newly established northern boundaries of the squid driftnet fishery in July and August was examined using data obtained by squid and salmon driftnet research vessels from 1978-1988. The Japanese authors found the rate of occurrence of salmonids on the south side of the boundary to be lower than to the north in areas of similar sea surface temperatures. Occurrence of salmonids in research vessel catches south of the July-August boundaries was infrequent.

A U.S. scientist analyzed data from 17 research cruises conducted between 1983 and 1987 along the northern boundary of the squid driftnet fishery area. An east-to-west cline in catch per ton of salmonids (primarily chum and coho salmon) was noted, with higher CPUE to the west. An additional document pertained to time trends in distributions of temperature and southernmost distributions of salmonids.

Eleven Japanese observers on board ten Japanese squid driftnet fishing vessels in June-November 1988 collected data on 464 driftnet operations. Eighty-four salmonids were caught in the months June, August, September, and October.

Although considerable new data are now available on salmonid-squid distribution, the Sub-Committee members agreed that data were minimal and that additional research was needed. Canada and the United States expressed a continuing concern over the potential interception of salmonids along the northern boundary of the fishery. Japan suggested that the extent of salmonid distribution south of the northern boundary was less than that believed by Canada and the United States.

(3) Other research to determine distributions and origins of salmonids in the North Pacific Ocean and Bering Sea

The observed number of steelhead trout returned to the Japanese motherships was compared to estimated catches derived from Japanese research vessel catch and effort data. The United States also presented estimates of total hatchery production of steelhead smolts along the coast of North America from 1960 to 1987. Characteristics of the oceanic migration and distribution of steelhead trout were summarized and modeled.

The possibility of forecasting returns of Asian sockeye, pink, and chum and Bristol Bay sockeye salmon was investigated by Japan using a long-term series of CPUE data from gillnet operations at six locations in the North Pacific Ocean and Bering Sea. Three of the locations are within the U.S. 200-mile zone.

Estimates of stock composition of Japanese, Kamchatkan, and various Alaskan chum salmon stocks in the South Alaska Peninsula fishery were made by Japan and the United States, using data collected in an Alaska Department of Fish and Game study.

(4) Exchanges of statistics, data and samples

The sub-committee noted that 17 documented exchanges of samples and information had taken place since the last annual meeting.
to support research analyses by member country scientists. Exchanges of fishery statistics and exchanges of basic data from research vessel operations are up to date.

(5) Publications on salmonids

The sub-committee reviewed the status of preparation of two joint comprehensive reports. A U.S. author submitted a draft of the report on distribution and origins of steelhead trout. It is anticipated that the joint report will be completed by November 1990. The United States will complete its portion of the report on continental origins of salmonids in waters south of 46°N by November 1990.

The sub-committee called attention to the 1989 Ph.D dissertation of the late Dr. Colin Harris, entitled "The effects of international treaty changes on Japan's high seas salmon fisheries, with emphasis on their catches of North American sockeye salmon, 1972-1984." This is a topic of both historic and current value to the Commission.

(6) Other business

(a) Steelhead trout nomenclature

The sub-committee members agreed to adopt the nomenclature of the American Fisheries Society for the steelhead trout, namely that the scientific names of Salmo gairdneri and Salmo mykiss be changed to that of the single species Oncorhyncus mykiss, and that the common name be steelhead trout.

(b) Marine mammal permit process for Japanese salmon research vessels

The process of applying for a small take permit under the U.S. Marine Mammal Protection Act was discussed as it would apply to salmon research vessels operating within the U.S. 200-mile zone.

(c) Canadian aerial surveillance of flying squid drift net area

The sub-committee noted the report on Canadian air surveillance of the region near the July northern boundary (43°N) of the regulated flying squid fishery area during July 1989.

(7) Research plans for 1990

Tentative research plans were reviewed; associated sample and data requests are presented in Appendix I(A). In accordance with Article X of the Convention and the 1986 MOU on Research, these plans represent a coordinated effort to determine continental origins of salmonids, with special emphasis on the landbased salmon fishery area. Recommendations regarding research are summarized in the following section.

(8) Recommendations of the Sub-Committee on Salmon

(a) Research on origins of salmonids south of 46°N

The sub-committee recommends that the Standing Committee on Biology and Research convey to the Commission the concern of the sub-committee that the level of research activities by national sections may still be insufficient to provide information to the Commission in accordance with the terms of the 1986 Memorandum of Understanding on Research. The following recommendations are made to increase the level of information available to the Commission:

(i) The national sections have agreed to increase research activities with regard to salmonids (1986 MOU on research, Section I a).

The Sub-Committee on Salmon recommends that: tagging effort south of 46°N be increased, extra scales be collected from individual fish including chinook, coho, and sockeye salmon, a comprehensive program to collect scales from salmonids caught in the landbased drift net fishery be undertaken to provide material for scale pattern analyses, and a greater portion of research vessel sampling effort be allocated to areas of higher expected salmonid CPUE. The Sub-Committee on Salmon also recommends that steelhead trout with missing fins be tagged and released after recording data on date, location, and missing fins; snouts of steelhead trout with missing adipose fins caught west of 165°E be retained; and snouts of all species of salmon missing the adipose fin be retained.

(ii) Research on the overlap in the distributions of salmonids and squid in Convention waters has increased dramatically in 1989. However, greater understanding of the mechanisms related to the overlap is required and therefore the sub-committee recommends that research be continued and expanded with respect to oceanographic conditions, distributions of salmonids and squid and their prey by time and area, and incidence of salmonids in the area of the squid drift net fishery.

(b) Salmonid research north of 46°N

Relationships have been demonstrated between the abundance of salmon in key areas in the North Pacific Ocean and Bering Sea, and inshore returns of salmonids to Asia and North America. However, forecasting of the abundance of inshore returns of salmon is critical to conservation measures required to manage stocks of salmon. In addition, this research provides information on the availability of scale and other biological samples from salmonids in the U.S. 200-mile zone portion of the mothership fishery area. In order to better forecast the abundance of inshore salmon returns, and maintain the continuity of available samples, the sub-committee recommends that research vessel sampling with gillnets and longlines be continued in the area around the Aleutian Islands and in the Bering Sea and that the United States and Japan initiate cooperative research to develop forecasting methods based on sampling in this area.

(c) Ad Hoc Salmon Research Coordinating Group

The sub-committee recommends that if required the Ad Hoc Salmon Research Coordinating Group meet in March 1990, and that the agenda be confined to matters relating to research planning and coordination.

Following the presentation of the Report of the Standing Committee on Biology and Research, a spokesman for each national section made comments respecting salmonid research and non-anadromous species as follows:

Japanese comments:

The Japanese National Section has carefully studied this report. The Japanese National Section would like to express on this occasion our heartfelt gratitude to those scientists of the three nations and the members of International Pacific Halibut Commission who have participated in the deliberations of the Standing Committee on Biology and Research, as well as to the Secretariat and the interpreters who have worked very hard in order for our meeting to progress smoothly. With these thanks, we agree to support the adoption of this report.

Now, let me take this opportunity to make comments on the contents of this report.

First, I would like to make comments on the salmon issue. The Sub-Committee on Salmon recommends (1) the intensification of research effort to determine the continent origin of salmonids south of...
from July to October 1988 and from December 1988 to March 1989. For the survey conducted in winter months, in particular, the U.S., Canadian, Polish and Chinese scientists participated in the survey and we are pleased that the survey was very significant in further intensifying the international cooperation. We are confident that the information collected by these joint surveys would make a significant contribution to the accumulation of biological information on pelagic pollock in the Aleutian Basin. In addition, the Japanese scientists for the first time attempted to assess the stock of pollock in the entire Bering Sea. This study was conducted based on the best available data and assumptions and we believe that the results obtained by this study are the best we can obtain now in understanding the stock condition of pollock in the entire Bering Sea.

In the international symposium on population dynamics of Gadids held during the annual meeting, many excellent papers were presented. I would like to express our heartfelt respect to the senior scientists of the three countries, the Secretariat for their effort in planning and organizing the symposium, and also to the precious effort extended by the scientists who gave presentations at the symposium which were quite informative to all of us.

Regarding the high seas squid driftnet fisheries, Japan has been intensifying its study and research system for the fishery and squid and as a part of that effort, as we did in 1988, we dispatched four research vessels this year and also increased the manpower of the Oceanic Squid Section of the Far Seas Fisheries Research Laboratory which was established recently. We also placed scientific observers on board 10 commercial squid driftnet fishing vessels at our own initiative in 1988 and we reported the results obtained by the observer program including conditions of incidental take of marine mammals and sea birds to the Commission this year. As to the distribution and occurrence of salmonids in the vicinity of the new northern boundaries for July and August which were revised this year, we reviewed it using all available data obtained by salmon and squid research vessels since 1978 and determined that although salmonids may be distributed in waters south of new northern boundaries, its abundance is extremely low. In addition, a U.S. study which is reported this time clearly shows that, even in the same latitude, the abundance of salmonids is low in waters east of 175°W. These research results endorse our present position, which is to promote rational utilization of a high seas resource, flying squid, while avoiding the incidental take of salmonids as much as possible.

Furthermore, Japan responded to the concern of the U.S. and Canada and accepted a total of 14 U.S. and Canadian scientific observers on board the Japanese squid driftnet fishing vessels according to the agreement of April this year. Together with information collected by the Japanese observers, it is certain that the amount of information available to the fishery will increase remarkably this year. Nevertheless under the current circumstances, without waiting for the analysis of these data, some accuse the driftnet fishery for destroying the ocean ecosystem and protest for an immediate total ban of driftnet fisheries, which is totally unacceptable to Japan.

With respect to Dall's porpoise incidentally taken by the Japanese salmon fisheries, we are pleased to see, due to the effort extended for many years by the U.S. and Japanese scientists, that various aspects about the species have been unveiled, including biological parameters relating to reproduction and mortality, mean incidental take rate, present biomass and its yearly fluctuation. We believe that information on Dall's porpoise is the most completed of all the porpoises distributed in the North Pacific.

The U.S. submitted a report to the Sub-Committee on Marine Mammals regarding the long term fluctuations in abundance of Dall's porpoise in the northwest Pacific Ocean and based on this information,
no decreasing trend of stock abundance was observed. We consider that this report endorses the view recognized by the U.S. and Japanese scientists that the incidental take of Dall’s porpoise by the salmon fisheries does not affect adversely the stock. We will continue monitoring the stock condition with research vessels and will carefully watch the trend of the stock condition.

Before closing, I would like to mention the marine debris issue. Japan continued its research effort and conducted sighting surveys of marine debris in the North Pacific as well as experimenting on the changing configuration of lost nets in the ocean. According to the results of the experiment, it was found that lost or discarded nets will not continue catching fish forever, rather they lose their fishing ability in about 20 days after the cast when the length of the net is about 2 km.

Lastly, we wish for further development of research activities concerning the fisheries resources of the North Pacific, and agree on the adoption of the B&R report. We also would like to express sincere appreciation to the scientists who prepared the report, as well as the Secretariat and interpreters for their kind cooperation.

**Canadian comments:**

Mr. Chairman, Canada has reviewed the report of the Standing Committee on Biology and Research. We note with satisfaction that progress has been made on a number of scientific issues since our last Annual Meeting. However, we also note the need to continue, and in some cases expand, our efforts on unresolved matters. We would like to make the following comments on the report:

The interception of salmonids of Canadian origin in the high seas squid drift net fishery continues to be of concern. Nevertheless, we are pleased to note that significant efforts have been made by all three Contracting Parties over the last year to deal with this issue. However, much work remains to be done. We do not have an adequate understanding of the factors that control the distribution of salmonids and squid on the high seas and consequently, their degree of overlap in the area of the squid drift net fishery.

There is growing evidence for large salmonid catches immediately north of the northern boundary of the squid drift net fishery at certain times and locations. It is clear to Canada that the incidental catch of salmonids in the squid drift net fishery is still a major problem and one that requires our immediate attention. In addition, Canadian surveillance information indicates that fishing by vessels of unknown Asian origin to the north of the boundary for the Japanese drift net fishery continues to be a problem and we urge all Contracting Parties to increase their efforts to obtain information on the national and catches by these vessels.

We must also ensure that we have a reliable method of monitoring the incidental catch of salmonids in squid drift net fisheries. Canada was very pleased with the initiation of an observer program in the commercial squid drift net fishery in 1989. This program, involving all three Contracting Parties of INPFC, was a major step forward in dealing with our concerns. We are also pleased that it has been agreed that Canada, Japan and the United States will begin developing plans, immediately after our Annual Meeting, for the 1990 observer program for the squid drift net fishery.

Canada is pleased to note the large number of salmonids that continue to be tagged on the high seas and also as juveniles before moving into the ocean. Information gained from the recovery of marked fish tells us a great deal about the distribution of North American and Asian origin stocks. For example, one tag recovery reported this year resulted in a significant extension of the western boundary of the distribution of North American origin steelhead trout. Further, the recovery of marked fish is essential for validating the results of other techniques for determining the continent of origin.

We are pleased with the development of alternative stock identification techniques using scale pattern, parasitic and genetic markers. Canada is particularly excited about development of the nuclear DNA stock identification technique at our Nanaimo laboratory. We are certain that one or more of these stock identification techniques, will soon be the method of choice for determining the distribution of North American and Asian origin salmonids in the North Pacific Ocean and the Bering Sea.

In particular, we note the need to obtain samples for genetic and parasitic analyses from all major Asian and North American salmonid stocks. Further, it is necessary to obtain scale samples from as many salmonids as possible that are caught on the high seas in research and commercial operations. We urge the three Contracting Parties to make all necessary efforts to obtain these samples.

Mr. Chairman, our final comment related to salmonid issues deals with the incidental catch of salmon and steelhead trout in United States domestic groundfish fisheries in the Bering Sea. Canada believes that these fisheries have the potential to intercept large numbers of Canadian origin Yukon River chinook and chum salmon. Consequently, we were very pleased to learn that the United States has put in place legislation that will result in observers being placed on commercial domestic groundfish vessels operating in the Bering Sea beginning in the 1990 fishing season.

With respect to non-anadromous species, Canada is pleased to note the coordinated efforts by both Contracting and non-Contracting Parties to examine the pollock resources in the international waters of the Aleutian Basin. We urge all parties to pursue these efforts, particularly concerning the potential linkages of pollock stocks in this area with those in other areas of the Bering Sea. The importance of these stocks and their interrelationships with other species places a high priority on research in this area.

On another issue, Canada notes with approval that during 1988 the incidental mortality of halibut in joint venture fisheries declined to the lowest level since 1977. However, we are concerned that the monitoring of halibut incidence in fisheries of the Bering Sea and Gulf of Alaska has been declining and urge the United States to implement programs which will ensure that incidental mortality of halibut in these areas remains at the low level observed in 1988.

Canada was pleased with the continuing efforts directed at ocean debris, particularly lost or discarded fishing nets. We commend the Japanese section on their continuing efforts to determine the extent to which lost or discarded drift nets continue to catch fish and impact on stocks, particularly salmon in the northeast Pacific Ocean. We urge all Contracting Parties to increase efforts aimed at eliminating the problem of ghost fishing. To this end, we urge the Contracting Parties to increase their efforts at developing alternate fishing gear for flying squid.

Canada was pleased to note the success of the symposium on "Applications of Stock Assessment Techniques to Gadids" which took place during this year's annual meeting. We continue to support the symposium concept and look forward to Tokyo in 1991 when the topic will be "Biology, Distribution, and Stock Assessment of Flying Squid and Other Species Captured in the High-Seas Driftnet Fishery".

Finally, Mr. Chairman we endorse the recommendations contained in this report and support its adoption.

**United States comments:**

The United States Section has reviewed the report of the Standing Committee on Biology and Research and has the following comments to make:

The United States wishes to emphasize the need for more accurate information on distribution of Asian and North American salmon and steelhead stocks not only in the area of Japan's landbased driftnet
Japanese comments:  

There are two topics related to Agenda Item 8, namely, the alternate fishing grounds and the conversion of the fishing methodology. However, I would like to make these statements under Agenda Item 11.

The Japanese National Section has fully reviewed the results of the discussion of the Sub-Committee on Salmon incorporated in the Report of the Standing Committee on Biology and Research which was adopted earlier.

Scientific research to determine the continent of origin of anadromous species migrating in the waters south of 46°N has advanced remarkably by the intensified research activities of the scientists of each nation, and especially we understand that new information on the distribution of salmon was obtained as a result of the increased number of tagged and released fish and from the study of parasites.

However, in the field of scale pattern analysis, the progress of the research has lagged behind due to the questions related to the standard sample and inadequacy of the offshore samples, especially chinook and sockeye salmon.

Since 1978, Japan has given up the opportunity of catching a substantial amount of Asian origin salmon, and especially after 1986, due to a request which was not scientifically supported, Japan was forced to shift the eastern boundary of the landbased salmon fishery towards the west by 1° in undertaking its operation. Therefore, we earnestly hope that the continent of origin of the salmon should be determined as early as possible and that we can conduct rational operations in accordance with the mode of distribution of the resources.

However, based on the studies conducted this year, we believe that further research and studies are needed in order to clarify the continent of origin of salmon. Therefore, at this Annual Meeting, Japan will not propose an amendment of the Annex related to this agenda item.

Canadian comments:

Mr. Chairman, we would like to note that many of our substantive comments with regard to Article III 1.(d) were contained in our response to Agenda Item 7. However, some merit elaboration.

Although we continue to obtain new information every year on the continent of origin of salmonids caught in waters southwest of 46°N, 175°W, Canada is concerned that the rate at which this information is being acquired may not be sufficient for the Commission to make decisions in accordance with the 1986 MOU on Research. This is not to say we can't do it, but rather that we must be diligent and create an atmosphere that allows our scientists to complete their work. We do note with considerable satisfaction the progress that has been made over the last year in terms of the number of salmonids that have been tagged in the North Pacific Ocean. The majority of tags have been applied on cruise of Japan's salmon research vessels. We appreciate the efforts of Japanese scientists in this area. We were also pleased to learn that Japan plans to continue the port sampling program for the landbased salmon drift net fishery in 1990. Finally, we note with satisfaction the progress that has been made by all three nations in developing the analytical and laboratory techniques necessary for using scale pattern, parasitic and genetic markers to determine the continent of origin of salmonids caught on the high seas.

Although we have made progress in several areas we are still encountering problems obtaining adequate samples in many cases. Canada believes it is essential that we obtain more scale samples, particularly chinook salmon scale samples, from the Japanese landbased fishery. These samples can come from the catch of research vessels or through port sampling programs, but they must be collected in greater numbers than in the past. We also urge all three contracting parties to make every effort to obtain more representative samples from all major spawning concentrations of salmonids in North America and Asia. This is required to support ongoing studies of continent of origin for salmonids based on scale pattern, parasitic and genetic characteristics. In this regard Canada is very anxious to continue to support Japan's study of brain parasites of chinook salmon.
We hope that this study will assist us in better describing the ocean distribution of North American and Asian chinook salmon and the degree of overlap between the two.

Mr. Chairman, Canada acknowledges that we still have much to do before we have a definitive understanding of the ocean distribution of North American and Asian origin salmonids in the waters southwest of 46°N and 175°W. However, we would also like to point out the considerable progress that has been made on this issue over the last several years by all three member nations. It is Canada's belief that the completion of studies now underway combined with adequate sampling of high seas fisheries and major spawning concentrations of salmonids will allow us to meet our commitments as described in the 1986 MOU on Research.

United States comments:

The United States urges Japan to implement the recommendation of the Sub-Committee on Salmon to (1) increase tagging effort south of 46°N, (2) to collect extra scales from individual fish including chinook, coho, and sockeye salmon, (3) to undertake a comprehensive program to collect scales from salmonids caught in the landbased driftnet fishery, and (4) to allocate a greater portion of research vessel sampling effort to areas of higher expected catch per unit effort. The B&R Report this year once again notes that the level of expanded research is insufficient to provide the information needed in accordance with the 1986 Memorandum of Understanding on Research.

The United States notes that while there were significant improvements in tagging methodology in 1989, there were fewer operations and lower catches in the research vessel sampling, and consequently, the total number of salmonids tagged and sampled south of 46°N declined. The United States is concerned that Japan proposes to further decrease sampling effort in 1990. It is imperative to increase the 1990 sampling to meet requirements of the 1986 MOU and provide adequate information prior to the 1991 fishing season.

The United States is disappointed by the failure of the port sampling program in Japan resulting in part from the refusal of the landbased fishermen to provide samples for continent of origin research.

For the past two years, we have suggested ways to increase sample sizes of scales for continent of origin studies of chinook salmon. Sample sizes are still inadequate for chinook, sockeye, and coho salmon. It is our view that scale sample sizes must be increased in 1990. Sampling aboard landbased driftnet vessels will be the most effective way to achieve desired sample sizes in those areas where the vessels fish. To obtain scale samples from areas east of the present landbased fishery, research vessel sampling must be intensified.

The U.S. Section also requests that Canada and Japan expedite the exchange of scale samples and associated biological data so that our scientists can move ahead quickly with the agreed upon methodology and analytical techniques.

A responsibility of the Commission, under Article III 1.(c) of the Convention, is to recommend, when necessary, amendment of the Annex to the Convention. The Annex deals primarily with aspects of the Japanese salmon fishery operations in waters of the Convention area. During discussions of this item, which appeared on the Commission's agenda, comments were made by each national section as follows:

Japanese comments:

This year, 1989, marked the fourth year that the Japanese salmon fishery operated under the new Annex amended in 1986 and two Memoranda of Understanding. However, it is regretful that the situation still remains which threatens the continuation of the Convention and raises questions concerning the raison d'etre of the Commission.

Despite such circumstances, Japan extended maximum effort to maintain the INPFC regime, and following last year, this year Japan faithfully fulfilled its commitment on the provision in the Annex to the Convention and on the matters described in the Memoranda of Understanding on research and enforcement. Nevertheless, because the Japanese salmon fishery was denied access to the U.S. 200-mile zone, Japan could not implement Annex 1.(d) and a part of the Memorandum of Understanding on scientific research. Accordingly, we were unable to collect valuable data for two consecutive years. Needless to say, this failure is solely attributable to the U.S. Again, Japan strongly urges that efforts be taken to rectify the current situation, so that the provisions in the Annex can be properly implemented. Also, we would like to state that the rectification of this situation is a necessary condition for the adequate implementation of the Memorandum of Understanding on scientific research and enforcement.

In the opening remarks, the U.S. stated that it supports the recommendation of the Sub-committee on Salmon with respect to cooperative research to develop salmon forecasting methods based on sampling near the Aleutian Islands and the Bering Sea. In fact, Japan has dispatched scientific research vessels for many years to Aleutian waters at a specific time each year and conducted gillnet surveys which contributed significantly to the forecasting of the Bristol Bay sockeye run.

However, shortly before the initiation of the survey this year, unlike the previous years, we could not obtain the cooperation of the U.S. on receiving a permit for the incidental take of marine mammals, so that we could not conduct gillnet surveys in the U.S. 200-mile zone. Needless to say, we are gravely disturbed by this situation, and I should like to point out the fact that it was impossible to conduct once again the research which is so valuable to the U.S. because of the U.S. domestic problem.

Japan wishes to continue deploying scientific research vessels in the future in the North Pacific, including the U.S. 200-mile zone, however we think it imperative for the problem of scientific research which arose this year to be solved at the earliest date possible.

The Commission, during discussion of an agenda item related to salmonid research, considered other fisheries in the Convention area and their effect on anadromous species. Comments were made by each national section as follows:

Japanese comments:

Mr. Chairman, I would like to express our view regarding the concern, which is voiced by the U.S. and Canada, over the potential incidental take of salmonids and marine mammals in large quantity by the squid driftnet fishery. Since we already have addressed this matter at the opening session, I will not go into detail. However, we think it imperative to first collect and analyze the necessary data and then to have scientific discussions about the management of this fishery. In fact, we have expanded our data collection effort significantly in the past few years, we initiated an observer program in 1988 and expanded it both in quality and in quantity to be a joint observer
program by the U.S., Canada and Japan in 1989. Furthermore, the amount of data obtained by research vessels has been increasing every year, and I heard that the scientific discussion on the segregation of squid and salmonids was intensified at the B&K of this year. We are also very much interested in data obtained by a Canadian research vessel this year, which indicated that no salmon by-catch was observed in waters south of new northern boundaries.

Although we are expected to accumulate further data to finally obtain understanding by the U.S. and Canada, the research results to date indicate that efficient utilization of squid resources is possible while minimizing the by-catch of salmonids to insignificant level.

As to the incidental take of marine mammals, study of the stock and the impact assessment of the incidental take of Dall’s porpoise have achieved a significant progress, and data on other species of marine mammals which have potential of being taken incidentally have been collected rapidly in recent years.

Mr. Chairman, these facts demonstrate that this Commission is the forum which has been engaged in the most serious and sincere discussions on the incidental take by the squid driftnet fishery. Japan is gravely concerned that despite the effort spent by the scientists of the U.S., Canada and Japan, there are some allegations that there is no Japanese research effort nor the scientific discussions at the INPFC regarding incidental take. We heard that an extreme allegation, based on misunderstandings, is wide-spread in the North America, that is that Japanese squid vessels mainly target at salmon and they never harvest squid if caught they are a by-catch of small amount. Since the U.S. and Canada had observers on the Japanese squid fishing vessels, we expect that the U.S. and Canada would stand by their basic position, which places great importance on scientific evidence, and will spend effort to correct these allegation and misunderstandings in their nation. If we cannot expect such effort, the question may arise, what is the rationale for requesting the placement of observers by the U.S. and Canada. We strongly urge that a rational approach should be taken by the U.S. and Canada, which are the leading nations in the field of fisheries science and science of environment.

Furthermore, Japan regulates the number of trawl vessels operating in the Bering high seas and we received a report that the by-catch of salmonids by such operations is extremely rare. However, we would like to understand the actual situation more accurately by taking various actions, including research sampling of fishing vessels, by research vessels and by the placement of observers, in addition to the reports by the fishing vessels. We urge the U.S. to reinforce its research activities regarding the interception of the Japanese origin salmonids by the U.S. trawlers.

**Canadian comments:**

The impact of all high seas driftnet fisheries for squid and other species is a matter of deep concern to Canada. The potential for increased incidental catch of Canadian salmonids in these fisheries has been heightened by the change in the northern squid fishery boundaries made by the Government of Japan in 1989. Japanese and Canadian research has demonstrated that squid and salmonids can be caught at the same location. Despite some indications that the incidental catch of salmonids in the squid driftnet fishery may have been low in 1989, the potential interception of significant numbers of Canadian origin salmonids in the northern boundary area of the squid fishery remains a continuing concern to Canada. Interannual variability in oceanographic conditions influences salmon distribution and migrations, and salmonids have been caught in the squid fishery area in other years.

We believe that the greatest danger to Canadian salmonids comes from the illegal fishing activities of non-Contracting members, which, when directed towards the capture of salmon rather than squid, can have grave consequences to Canadian salmonid stocks. We urge all three Contracting members to cooperate in curbing the activities of these vessels.

Recent information provided by the Government of Japan from observer reports on the Japanese squid driftnet fishery in 1988 has revealed a significant bycatch of marine mammals and other species. Canadians are profoundly concerned about the impact of this fishery on those animals. We urge Japan to collect information on the catch, bycatch and discards of species in the Japanese squid driftnet fishery and to provide this information, along with a standardized measure of effort, by $1^\circ\times1^\circ$ degree blocks.

Canada continues to be concerned about the expansion of the midwater trawl fisheries for pollock in the international waters of the Aleutian Basin. The catch in this fishery is equal to that in the eastern Bering Sea. We reiterate our concern that Canadian salmonids, particularly Yukon River chum and chinook can be taken in this expanding and uncontrolled fishery. Canada is pleased with the cooperative scientific work of all Parties in dealing with the Aleutian Basin and the research of the interrelationships of pollock and other species.

Canada still believes that evaluation of measures initiated to reduce salmonid interceptions requires complete data from all fisheries, including U.S. domestic fisheries. This concern also applies to interception of species such as halibut as well as other groundfish species. We urge all Contracting members to collect and share information on this fishery.

Finally, Canada emphasizes our intention to participate in a cooperative program to place observers on Japanese squid driftnet vessels during the next fishing season. We invite the participation of scientists of the Contracting member nations in any Canadian research cruises to the high seas during 1990 and we urge that the Contracting parties coordinate research cruises operating in the area of the squid driftnet fishery in 1990.

**United States comments:**

The United States remains deeply concerned that the extensive high seas driftnet fisheries targeting squid and tuna/millfish in the central North Pacific pose a tremendous potential danger to a wide variety of non-target species, including anadromous species, marine mammals, sea birds, and other marine resources of concern to the United States. Observer sampling results in 1988 on some squid driftnet vessels have highlighted the broad spectrum of species encountered in the squid driftnet fishery. Moreover, the United States is still concerned over the potential interception of salmonids along the northern boundary of the Japanese squid driftnet fishery. Evidence of large catches of salmon and steelhead in the vicinity of the northern boundary at certain times and locations was discussed in the Biology and Research meetings.

The United States is generally pleased with the cooperation of the Japanese Government and fishing industry in implementing the 1989 cooperative programs for the squid driftnet fishery, especially with regard to the deployment of the U.S. scientific observers. Only by implementing even more extensive cooperative research, monitoring and enforcement programs in 1990 can Japan hope to address concerns about the potential dangers of its high seas driftnet operations.

The level of cooperative research and observer sampling in the Japanese driftnet fisheries must be significantly expanded to gather the necessary scientific data that is urgently required to fully assess the impact of these fisheries on marine ecosystems in the North Pacific. In addition, those countries whose nationals conduct high seas driftnet fisheries must increase dedicated research efforts, including surveys, and share data and discuss pertinent studies in a forthcoming and timely manner. As Japan is the only INPFC contracting party con-
ducting a high seas driftnet fisheries in the Convention area, the Government of Japan must be responsive to requests for information on these fisheries, especially those posed under the auspices of this Commission.

Regarding enforcement matters, the United States Section was pleased to note the expansion of fishery patrols in the high seas driftnet area. Despite this increased effort and the new northern boundaries, 22 Japanese fishing vessels were found in areas closed to both salmon and squid driftnet fishing operations this year.

Under agenda item 7, the United States has already expressed its views that pollock fishing in the "donut hole" area of the Bering Sea impacts on U.S. stocks and must be curtailed.

9. REVIEW OF HIGH SEAS DRIFTNET FISHERY

The Commission endorsed the following statement which was prepared by a working group representing the three national sections, on the exploration of alternative gear for the squid fishery:

The Commission charges the Standing Committee on Biology and Research, and a select Steering Committee, with responsibility to examine alternate fishing technologies and related topics for the high seas driftnet fisheries. The initial terms of reference for this effort are to study, analyze, and exchange scientific information on the following topics:

1. Selectivity of driftnet gear and bycatch considerations;
2. Driftnet catch relative to oceanographic conditions;
3. Review of available information on improvement of squid driftnetting technique and on other squid fishing techniques;
4. Consideration of the possibility of utilizing the improved or alternate fishing technique;
5. Consideration of the problem of lost and discarded fishing gear and solutions to this problem;
6. Identification of research needs and technology development requirements to address these topics.

The Steering Committee, for the purposes of this effort, shall be composed of a Commissioner, the senior member scientist, and selected advisors and experts from each national section. Interim meetings of the Steering Committee shall be arranged by correspondence. The Committee shall prepare a report annually for the Commission on the above matters, which will be reviewed under Agenda Item 10.

Japanese comments:

Mr. Chairman, the Japanese National Section wishes to endorse the proposal which was just described by the U.S. side, and I would like to take this opportunity to discuss the Japanese squid driftnet fishery.

Japan has been explained repeatedly that the fishing operations by the Japanese squid driftnet fishery and the illegal fishing operations targeting at salmon by non-member countries are totally different. In the first half of this year, we have witnessed many cases regarding the illegal salmon fishing operations by a third country, which we believe endorsed and validated the explanation that we had given. Therefore, it is quite regretful that there still remains the view that such illegal operations are mixed with our fishery and accuse Japanese fishery.

Japan wishes to continue our effort in restraining such illegal operations by non-member countries by closely exchanging information with the U.S. and Canada by measures taken by Japan including the ban of imports of salmon products from the specified countries.

With respect to the Japanese squid driftnet fishery, as we have stated under different agenda items, we continue our effort in enforcing the fishery by imposing regulations on the fishermen which minimize the potential of by-catch of salmon to an insignificant level and prohibit retaining of salmon if caught. I shall emphasize here that the Japanese squid fishermen do fishing for squid and do not target on salmon. We hope that the U.S. and Canada fully understand this point and make efforts to rectify the malicious propaganda that Japanese squid vessels conduct disorderly and illegal operations and the wrong public perception which was formed by such allegations.

Canadian comments:

Mr. Chairman, the high seas squid driftnet fishery has become a major environmental and economic public issue. In Canada, people are aware of the issue and are concerned about the wastefulness of this fishery. In particular Canadians are concerned about the adequacy of management, the magnitude of the incidental catch and the lack of information on the ecology of the species captured. As humans become aware of the importance of other animals to their existence, Canadians are less able to tolerate the random exploitation of any living resource.

These views are not new to our Government. We have conducted research on squid driftnet fisheries since 1979 and on the high seas squid driftnet fishery since 1986. Our Minister of Fisheries and Oceans stopped all squid driftnet fishing within the Canadian 200-mile fishing zone as a result of information obtained from this research. Over the past year we have worked hard to establish programs to obtain an accurate estimate of the numbers of salmon, marine mammals and sea birds intercepted in the squid driftnet fisheries. We appreciate the cooperative efforts of Japan and the U.S.A. in carrying out similar studies. We particularly appreciate the efforts of Japan in the initiation of a cooperative observer program on Japanese squid driftnet fishing vessels.

Canada was pleased that Japan and the United States agreed to our proposal to engage in discussion regarding formation of a special working group on driftnet fishing and alternate fishing technologies. We believe that a special focus on this topic is required and that we must make all efforts to facilitate discussion of this important topic between the Parties. Such a group will foster information exchange on the topic and lead to cooperative research and technology investigations. It is important that these discussions take place soon, prior to the 1990 fishery, so that the outcome of such discussions could be incorporated in our 1990 programs.

United States comments:

United States also endorses the formation of the proposed driftnet steering committee.

Regarding the high seas driftnet fisheries of Japan, the United States has already expressed its view under agenda item 9.

Concerning high seas driftnet fisheries of non-contracting parties, the United States notes that agreements were reached with representatives from Taiwan and the Republic of Korea concerning conduct of their fisheries. The Agreements specify the fishing area, provide for installation of real-time automatic satellite positioning devices on driftnet vessels, guidelines for fishing gear, fishing operations, transshipment at sea, vessel identification, enforcement, visits and verification by U.S. authorities, deployment of patrol vessels, observance monitoring of driftnet retrievals, and management of the driftnet fleet. The Agreements specify that certain provisions, such as the specific details of transmitter installation and observer
The Republic of Korea has indicated that its squid driftnet fleet consisted of approximately 150 vessels in 1989. Nonetheless the authorities on Taiwan previously reported that its driftnet fleet consisted of 166 vessels, they have recently provided alarming information that its high seas driftnet fleet consists of some 240 fishing vessels with 11 support/transport vessels. We have been aware that many of Taiwan's driftnet fishing vessels carry two types of driftnet gear, thus complicating enforcement and monitoring. The United States remains concerned that the size of the high seas driftnet fleets poses considerable problems for the conservation of living marine resources.

In 1989, the United States obtained further evidence of the extensive illegal fishing for salmon in the Convention area by non-contracting parties. This illegal fishing not only results in a large catch of North American and Asian salmon and steelhead, but may also incidentally take large numbers of marine mammals, seabirds and other species. Economic loss to fishermen of the Convention area other than anadromous species. The Convention also provides that Contracting Parties shall work towards the establishment of such an international cooperative research, monitoring and enforcement efforts in the Convention area. Economic loss to fishermen of the Convention area other than anadromous species. The Convention also provides that Contracting Parties shall work towards the establishment of such an international cooperative research, monitoring and enforcement efforts in the Convention area.

The United States welcomes the progress made in 1989 in obtaining information on the bycatch in the high seas driftnet fisheries. However, we remain concerned over the potential for large mortalities of marine mammals, seabirds, salmon and other non-target species caused by high seas driftnets. It is imperative therefore to expand cooperative research, monitoring and enforcement efforts in 1990 to better understand and control the effects of driftnetting on living marine resources.

10. ACTIVITIES OF THE COMMISSION CONCERNING NON-ANADROMOUS SPECIES

Articles of the amended Convention provide that the Contracting Parties shall work towards the establishment of an international organization with broader membership (than the three Contracting Parties) dealing with species of the Convention area other than anadromous species. The Convention also provides that pending the establishment of such an international organization, the Commission would provide a forum for cooperation among the Contracting Parties with respect to the study, analysis and exchange of scientific information and views relating to all relevant factors affecting the stocks of non-anadromous species of the Convention area, the problems associated with marine debris, the promotion of scientific research designed to fill gaps in knowledge and the compilation and dissemination of statistics and records.

The forum within the Commission for consideration of non-anadromous species is the Sub-Committee on Non-Anadromous Species. Within this sub-committee two panels deal with matters concerning the Bering Sea and the northeast Pacific.

At its 1989 meeting the sub-committee received, amended, and adopted reports which had been prepared in advance by pre-designated rapporteurs for the two panels. The following is a summary of the various proceedings of the panels and the sub-committee.

(1) Bering Sea

The Bering Sea Panel reviewed results of commercial fisheries, stock assessments, and research on groundfish in the eastern Bering Sea and Aleutian Islands region, and king and Tanner crab and other species of crab of potential commercial importance in the Bering Sea.

The committee noted that the following points were emphasized in the panel's report:

(a) Nature of the fishery

(i) In 1977, the United States extended its fishery jurisdiction and assumed responsibility for management of fishery resources within a 200-mile zone bordering its coastline. Fisheries in the Bering Sea/Aleutians management areas of U.S. waters operate under a number of area-time and catch restrictions designed to prevent overfishing of the crab and groundfish resources in these regions and to minimize incidental catches in the groundfish fisheries of such high value species as Pacific halibut, crab, and salmon. When the groundfish management plan was established for the Bering Sea/Aleutians regions, an optimum yield (OY) of 1.4 to 2.0 million t was established and catches are still constrained to this range. The good condition of the groundfish resource has allowed the total allowable catches (TACs) to be established at the upper end of this OY range (2.0 million t) each year since 1984. In 1988 for the first time, all of the TAC was allocated to U.S. domestic and joint venture fisheries and there were no non-U.S. directed fisheries in U.S. waters.

(ii) Total estimated catch of groundfish and squid taken by all fisheries in the Bering Sea and Aleutians Islands region, excluding international waters, during 1988 were 1,825,801 t, about 104,000 t more than in 1987. The U.S. domestic fishery took 33% of the total catch and the U.S. joint venture fishery the remaining 67%. Pollock accounted for over 70% of the catch followed by yellowfin sole (12%) and Pacific cod (11%). In addition, a U.S. longline fishery took 2,190 t of Pacific halibut.

(iii) Since 1980, a non-U.S. midwater trawl fishery for pelagic pollock has rapidly expanded in the Aleutian Basin of the Bering Sea. The development of this fishery coincided with reductions in catch quotas to non-domestic fisheries in the U.S. and U.S.S.R. 200-mile zones. The vessels of Japan, Republic of Korea, Poland, U.S.S.R. and People's Republic of China have operated in these international waters and caught 1.0 million and 1.3 million t of pollock in 1986 and 1987. Total catches are not available for 1988 but Japan took 750,000 t from these waters in 1988.

(iv) Incidental catches of Pacific halibut in Bering Sea/Aleutians groundfish fisheries in 1988 were estimated to be 3,755 t, the highest level since 1981.

(v) The 1989 fishery for red and blue king crab opened in September with guidelines harvests of 16.5 and 1.7 million pounds, respectively. These are higher than the 1988 guideline harvests of 5.8-9.2 and 0.7-1.5 million pounds. About 6.9 million pounds of C. bairdi and 148 million pounds of C. opilio were taken in 1989, which exceeded the 2.2 and 135 million pounds taken in 1988.
(vi) Total incidental catches of crabs in U.S. joint venture fisheries in 1988 were 88,000 king crab, a 37% decrease from 1987 and the lowest since 1977. The incidental catch of Tanner crab was 3.1 million, 56% lower than 1987 but the third highest recorded since 1980. Of this total 76% were opilio Tanner crab and 24% bairdi Tanner crab.

(b) Status of stocks

(i) The exploitable biomass of halibut in 1988 was estimated to range from 109,100 to 148,000 t coastwide in North American waters, and from 6,600 to 9,000 t in the Bering Sea/Aleutians. The coastwide biomass remains near the historical high level of 143,500 t in 1986. The constant exploitation yield for 1988 was estimated to range from 24,400 to 38,000 t for the setline fishery coastwide in North America and from 2,400 to 3,800 t for the Bering Sea/Aleutians region.

(ii) Estimates of acceptable biological catches (ABC) for other principal groundfish by U.S. and Japanese scientists for the combined eastern Bering Sea and Aleutian Islands region are compared below:

<table>
<thead>
<tr>
<th>Species</th>
<th>U.S.</th>
<th>Japan</th>
</tr>
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<tbody>
<tr>
<td>Pollock</td>
<td>1,291.4</td>
<td>2,010.0</td>
</tr>
<tr>
<td>Pacific cod</td>
<td>209.2</td>
<td>396.4</td>
</tr>
<tr>
<td>Yellowfin sole</td>
<td>278.9</td>
<td></td>
</tr>
<tr>
<td>Greenland turbot</td>
<td>7.0</td>
<td></td>
</tr>
<tr>
<td>Arrowtooth flounder</td>
<td>134.5</td>
<td></td>
</tr>
<tr>
<td>Rock sole</td>
<td>222.5</td>
<td></td>
</tr>
<tr>
<td>Other flatfish</td>
<td>184.0</td>
<td></td>
</tr>
<tr>
<td>Sablefish</td>
<td>9.0</td>
<td>6.2-8.4</td>
</tr>
<tr>
<td>Pacific ocean perch complex</td>
<td>19.9</td>
<td></td>
</tr>
<tr>
<td>Other rockfish</td>
<td>1.6</td>
<td></td>
</tr>
<tr>
<td>Atka mackerel</td>
<td>24.0</td>
<td></td>
</tr>
</tbody>
</table>

Pollock abundance in the eastern Bering Sea remains above the average level since 1977, but model projections indicate that biomass is declining. Although there are no signs that catch in the international waters has had an appreciable impact on the abundance of the exploitable biomass in the eastern Bering Sea, U.S. scientists recommended that catches be restricted to the lower end of the ABC range because of concern over possible impacts of catches in the international zone of the Aleutian Basin on the eastern Bering Sea population. No ABC was recommended for the Bering Sea/Aleutians region. Based on the assumption that there are independent stocks in the eastern Bering Sea, Aleutian Basin, and western Bering Sea, Japanese scientists estimated ABC values of 2.01 million t for the eastern Bering Sea, 1.58 million t for the Aleutian Basin, and 0.5 million t for the western Bering Sea. U.S. scientists expressed the view that the stock structure in the Bering Sea is unknown, and the assumptions used in making the estimates of biomass and yield need to be examined through surveys and other studies. Consequently, U.S. scientists could not support the Japanese estimates of biomass and yield. Japanese scientists, however, pointed out that this is a first attempt to make a stock assessment for the entire Bering Sea. They believe they used the best available data and most appropriate assumptions at this stage in our knowledge and that their estimates of biomass and yield for the entire Bering Sea are the best currently available.

(iv) Pacific cod abundance has increased substantially since the late 1970s and remains near the peak level of about 1.0 million t. Both U.S. and Japanese scientists considered Pacific cod to be in excellent condition. U.S. scientists expressed concern about uncertainties in recruitment and recommended a lower ABC than Japanese scientists.

(v) Abundance of yellowfin sole remains at peak levels and is able to provide yields well above MSY levels.

(vi) Greenland turbot is the groundfish species of most concern because of extremely poor recruitment since the early 1980s. U.S. scientists recommended that ABC be reduced to 7,000 t, which approximates recent catch levels, to protect the adult population but to allow some incidental catch in other fisheries.

(vii) Arrowtooth flounder abundance is at an observed historical high level. This species is mainly taken as a by-catch in fisheries for other species and is, therefore, lightly exploited relative to estimates of ABC.

(viii) Rock sole abundance has increased rapidly during the 1980s and recruitment continues strong. This species is in excellent condition and is expected to remain so.

(ix) The abundance of "other flatfish", mainly Alaska plaice and flathead sole, is currently high and is expected to remain high.

(x) Abundance of sablefish has improved during the 1980s but remains below the levels of the 1960s. This increased abundance may have peaked in 1985 or 1986 and longline survey data indicates that abundance is now declining. Estimates of ABC by Japanese and U.S. scientists were similar.

(xi) The abundance of Pacific ocean perch was also much reduced in early years of the fishery, has improved during the 1980s, but remains well below the abundance in the 1960s. ABC values are maintained at a conservative level to provide for some rebuilding of the stock.

(xii) There is uncertainty in the present size of the exploitable biomass of Atka mackerel. Abundance is believed to be low but increasing from the recruitment of a strong year class. Recommended harvest levels were increased moderately to account for this recruitment.

(xiii) It appears that during the early or mid-1980s, a major recruitment event occurred that has resulted in improved recruitment in most of the crab stocks. Abundance of legal male red king crab showed a significant 86% increase between 1988 and 1989, but this increase was probably the result of a holdover of legal sized crab rather than from recruitment. This increase in abundance resulted in a more than doubling of the 1989 guideline harvest. The St. Matthew Island population of blue king crab remains near an average level and abundance of juveniles is high, while the Pribilof Islands population is at a historical low level and no fishery was permitted in 1989 on this latter population. The abundance of legal male bairdi King crab continues to increase. It was much higher in 1989 than 1988 and the recruitment of juveniles also appears to be good. The 1989 harvest was 6.9 million pounds compared to 2.2 million pounds in 1988. The condition of the opilio crab resource remains good and population abundance stable. Preliminary statistics indicate that 148 million pounds were harvested in 1989, compared to 135 million pounds in 1988.

(c) Aleutian Basin pollock

A rapidly growing fishery for pelagic pollock has developed in the international zone of the Aleutian Basin. Catches in the international zone were 1.0 and 1.3 million t in 1986 and 1987 respectively, similar to catches of pollock in the eastern Bering Sea.
It is known that pelagic pollock spawn in the Basin, but few pollock less than about age 5 are found in the Aleutian Basin and an important question is the origin of Basin pollock and their relationship to pollock on the eastern Bering Sea and other continental shelves. These questions are the subject of major studies by Japan and the United States. Results of Japanese and U.S. acoustic and midwater trawl surveys in summer 1988 and winter 1989 show that pollock are broadly distributed at generally low densities in the Basin. However, high densities are encountered at certain times and areas of the Basin. Pollock appear to begin schooling in the western portion of the international zone in October, after which the schools grow and then gradually move eastward along the southern edge of the international zone. Later, dense concentrations of spawning pollock were encountered in the southeast Basin in the vicinity of Bogoslof Island. Sampling for age 0 pollock during summer months indicates that they are not abundant in the Aleutian Basin and are mainly located in the eastern Basin near the eastern Bering Sea shelf.

(d) *Research activities*

(i) Japan conducted a longline survey on sablefish and other species in the Aleutian region, eastern Bering Sea, and Gulf of Alaska in 1988 and 1989 in cooperation with the United States. Japan also conducted a longline survey in U.S.S.R. waters to compare abundance estimates in these waters with those in the eastern Bering Sea. Japan and the United States also conducted acoustic-midwater trawl surveys of pelagic pollock in the Aleutian Basin in summer 1988 and winter 1989. The United States conducted a standard bottom trawl survey of groundfish on the eastern Bering Sea continental shelf, the 10th consecutive year of these surveys.

(ii) Japan plans an acoustic survey of pelagic pollock in the Aleutian Basin in May to September 1990. The United States will conduct its standard groundfish bottom trawl survey on the eastern Bering Sea continental shelf again in 1990.

(2) *Northeast Pacific*

The Northeast Pacific Panel reviewed results of commercial fisheries and research on groundfish, squid, and marine debris in the northeast Pacific.

The committee noted that the following points are emphasized in the panel's report:

(a) *Nature of the Fishery*

(i) Under the provisions of the 1977 Territorial Seas and Fishing Zones Act, Canada has allocated production surplus to Canadian needs to other nations, subject to area and catch limitations. Catch limitations of 98,000 t and 99,000 t of hake were in effect during 1988 and 1989, respectively.

(ii) Provisions for the allocation of production surplus to U.S. needs are contained in the Fisheries Conservation and Management Act of 1977. Total optimum yields established by the North Pacific Fishery Management Council for groundfish in the Gulf of Alaska were 260,102 t in 1988 and 228,246 t in 1989. Total allowable catches off Washington-Oregon-California set by the Pacific Fishery Management Council were 467,800 t in 1988 and 366,200 t in 1989.

(iii) In 1988, Japanese fishing vessels could not operate within the U.S. 200 mile zone because there was no allocation of catch quotas in the northeast Pacific. The groundfish fishery was conducted by five longliners and one on-bottom gillnetter in international waters. The total catch was 390 t. Rockfish and sablefish accounted for 64% and 16%, respectively, of the catch.

(iv) Canadian landings other than halibut decreased 5% to 66,495 t in 1988. Trawl landings were 55,650 t. Principal species were rockfishes (25,731 t), Pacific cod (10,999 t), hake (6,054 t), and flatfish (5,868 t). Total landings by other gear (trap, longline, and handline) were 10,845 t. Principal species were sablefish (5,080 t), dogfish (3,177 t), rockfish (1,556 t), and lingcod (914 t). Canadian landings of shrimp in 1988 were 3,163 t, crab landings were 1,506 t, and tuna landings were 86 t.

(v) Excluding Pacific halibut, the total Gulf of Alaska groundfish catch in 1988 was 142,221 t. The catch consisted primarily of pollock (55,800 t), followed by Pacific cod (30,946 t), sablefish (29,867 t), slope rockfish (13,771 t), flatfish (8,494 t), and thornyheads (2,786 t). 91,638 t were caught in the Washington-California area.

(vi) Vessels from the Polish People's Republic caught 26,385 t of hake in the Canadian portion of the Vancouver Area in 1988. Polish catches in 1988 were estimated to be 18,338 t off Washington-California (99% hake).

(vii) Vessels from the U.S.S.R. caught 13,330 t of hake in the Canadian portion of the Vancouver Area in 1988.

(viii) The total estimated catch in the Canadian joint-venture fishery in 1988 was 50,182 t of hake, 227 t of pollock, 113 t of rockfish, and 37 t of other species.

(ix) The total estimated catch in the U.S. joint-venture fishery in 1988 was 3,771 t in the Gulf of Alaska and 135,980 t off the Washington-Oregon-California coast.

(x) The incidental catch in the U.S. joint-venture fishery in the Gulf of Alaska was 147 Pacific salmon, 131 king crab, and 10,643 Tanner crab. Off Washington-California, 16,200 salmon were caught.

(x) The catch of squid by the Japanese squid driftnet fishery in the central and western North Pacific Ocean was 157,773 t in 1988.

(b) *Status of stocks*

(i) Total longline catch by North American halibut vessels in the northeast Pacific increased to 42,661 t in 1988. In the Gulf of Alaska, the estimated incidental catch of halibut in joint-venture fisheries in 1988 was 56,445 t, the lowest catch since 1977. Although the halibut biomass remains near historically high levels, biomass has decreased to 129,000 t in 1988. Maximum sustainable yield was estimated at 48,800 t.

(ii) U.S. scientists recommend an ABC of 6,000 to 17,600 t for the slope rockfish assemblage, an ABC of 3,800 to 8,200 t for shelf rockfish, and an ABC of 3,800 t for thornyheads. Canadian scientists report that there has been no substantive reconstruction of Pacific ocean perch stocks in the Canadian zone. Recommended yields for Pacific ocean perch range from 3,350 to 5,470 t. Recommended yields of other slope rockfish off Canada range from 2,860 to 8,120 t. Recommended yields of shelf rockfish range from 2,250 to 3,150 t.

(iii) Both Japanese and U.S. scientists agree that the sablefish resource in the Gulf of Alaska is in good condition. Japanese scientists suggest an ABC for the Gulf of Alaska of 25,800 to 34,900 t and U.S. scientists suggest that ABC is 24,900 to 36,300 t. Canadian scientists report that the condition of the sablefish stock in the Vancouver-Charlotte Region is good. Recommended yields range from 2,900 to 5,000 t for 1990.

(iv) Pollock stocks in the Gulf of Alaska, as assessed by U.S. scientists, continue to decline, due to the lack of a strong year-class since 1979. A preliminary estimate of age 2+ abundance from the hydroacoustic study is 325,000 t. U.S. scientists recommend an ABC range of 10,000 to 37,500 t.
Japanese and U.S. scientists feel that the Pacific cod stock in the Gulf of Alaska is in good condition. Japanese scientists recommend an ABC of 164,500 t, and U.S. scientists recommend an ABC of 60,569 t for the Gulf of Alaska. Canadian scientists reported that the abundance of Pacific cod in the Charlotte-Vancouver Region is above average and yields are estimated to be 3,700 t for 1990.

Because of the low abundance and harvest of Atka mackerel, this species has been combined into the other fish category for 1989.

U.S. scientists estimate the ABC for flatfish in the Gulf of Alaska to be 722,000 t. Catches in 1988 were less than 2% of this amount. Canadian scientists estimate rock sole abundance to be at high levels with yields of 100 to 1,000 t, and English sole and Dover sole abundance to be at moderate levels with yields of 700 to 800 t and 800 to 2000 t, respectively.

Giant grenadier abundance decreased 19% in 1988. Catch rates of Pacific grenadier in 1988 were the lowest recorded.

Japan conducted drift net and jig surveys in the central and western North Pacific in 1988 and 1989 to examine the distribution, movement and population structure of flying squid. In 1989, the diurnal migration and spawning behaviour of flying squid were examined, and the relationship between the distribution of squid and other species was assessed. In addition, experimental fishing with two commercial gillnets, one with a floatline at the surface (0 m) and another with a floatline under the surface (3 m), was conducted for a comparison of fishing efficiency for flying squid and other fishes. The experiments also tested the effectiveness of the gillnets in allowing the escape of incidentally caught sea birds. Experimental fishing for flying squid off Canada has been conducted since 1979. In the 1989 survey, neon flying squid were encountered at sea surface temperatures of 14.2°C to 22.1°C. No salmonids were caught during the survey.

Canadian scientists report that the abundance of Pacific herring in the Charlotte-Vancouver Region increased slightly in 1989. The projected biomass for 1990 is 205,600 t for the Charlotte-Vancouver Region. Canadian scientists recommend an annual harvest rate of 20% of the biomass estimated.

The estimated yield of hake for 1990 for the Vancouver-Conception Area ranges from 180,000 to 245,000 t.

Marine Debris
Sighting surveys conducted by Japanese scientists in 1988 covered a distance of 236,600 nautical miles. Fishing nets accounted for only 0.9% of the 36,849 items sighted, and other fishing gear accounted for 11.4%. Drifting nets may start forming a mass after 3 days. Canadian scientists reported 89 sightings of derelict gillnets in 1989, and only 6 sightings in 1988.

Research Activities
Canadian field research studies were directed primarily at projects involving rockfishes, sablefish, hake, lingcod, Pacific cod, English sole and dogfish. Field studies to examine the impact of groundfish species on the abundance of herring in the Vancouver Area were continued. Species assemblage surveys and stomach analyses of groundfish were also conducted in the Charlotte Area.

Japan did not conduct groundfish surveys in the northeastern Pacific in 1989.

A summary of the surveys conducted by the United States in the Gulf of Alaska in 1989 is as follows: spawning walleye pollock

Hydroacoustic/midwater trawl survey; pollock ichthyoplankton survey; bottom trawl survey; sablefish longline survey; rockfish hydroacoustic survey. In addition, the United States conducted a cooperative longline survey with Japan.

Off Washington-California, the United States conducted an ichthyoplankton/bottom trawl survey of sablefish and Dover sole, a sablefish indexing survey, and a bottom trawl/hydroacoustic survey of important groundfish species.

Research activities during 1989 by the International Pacific Halibut Commission were as follows: collection of fishery statistics and biological samples from the commercial catches; investigation of the relationship between otolith and fish weight; and a tagging study off Oregon.

Canadian research plans for 1990 are not finalized.

Japan has no research plans for groundfish in the northeast Pacific in 1990.

During 1990, the United States plans to conduct the following studies: Gulf of Alaska triennial bottom trawl survey; pollock ichthyoplankton survey; spawning pollock hydroacoustic/trawl survey; sablefish longline survey; rockfish hydroacoustic survey; and oceanographic surveys. In addition, the United States plans to participate in a cooperative pollock ichthyoplankton survey with the U.S.S.R.

Off Washington-California the United States plans for 1990 include a sablefish abundance survey off the California coast and tagging of juvenile sablefish.

Recommendations from the Sub-Committee on Non-Anadromous Species
The Standing Committee on Biology and Research approved the recommendations of the Sub-Committee on Non-Anadromous Species pertaining to working group meetings and other aspects of its responsibilities and noted particularly the sub-committee's concern over delay and/or deferment in publication of scientific material.

International Symposia
The Committee was pleased to note the success of the symposium on Applications of Stock Assessment Techniques to Gadids which took place during the 1989 meeting.

The Committee considered the following topic as a possible subject for a symposium to be held during the 1991 meeting in Japan: Biology, distribution and stock assessment of flying squid and other species captured during the high seas squid drift net fishery.

Statements by the national sections on non-anadromous species were included in each section's comments on the Report of the Standing Committee on Biology and Research. In addition, a spokesman from each national section commented on Agenda Item 14: Progress in the establishment of an international organization dealing with non-anadromous species (Article IV).
Japanese comments:

Japan, the U.S. and Canada have agreed, pursuant to Article IV of the Convention, to work towards the establishment of an international organization with broader membership dealing with species of the Convention area other than anadromous species. In 1987, at the time of the Annual Meeting, in view of the necessity of cooperation for the proper conservation, management and research of pollock resources in the Bering Sea, Japan made a concrete proposal to hold a preparatory meeting in Tokyo in February in 1988, with all concerned countries participating, to discuss the establishment of an international organization dealing with the pollock resources in the North Pacific. In response, although Canada basically supported that proposal, the meeting was not realized because the U.S. did not support the proposal.

Japan still maintains the following view regarding this matter: we believe that the procedure to first establish an international organization dealing with the pollock in the Bering high seas, then broaden its scope, would be the most suitable for the establishment of an international organization as provided in Article IV of the Convention.

Japanese fishing vessels have fished for pollock in the Bering high seas in recent years and they caught about 750,000 t of fish last year. We were informed that Korea, Poland and the People's Republic of China are also engaged in operations in this area.

Since the fishery in the Bering high seas is an important fishery for the countries concerned, we believe that we should utilize the resources in the Bering high seas appropriately now and ensure rational and effective utilization in the future. That is why we consider it necessary to establish immediately an international organization which deals with the non-anadromous species and in which all the countries concerned participate. For this reason, we think it necessary that all the countries concerned should participate in such consultation. However, since this fishery has developed recently and scientific information is limited, it is imperative for us to accumulate scientific information regarding this fishery. We believe that this recognition is shared by other countries concerned as well. From this perspective, Japan proposed to all the countries concerned to convene an international meeting in late August on scientific research cooperation and coordination regarding the fishery in the Bering high seas. In consequence, Polish, Korean and Japanese scientists participated in the meeting, which was very successful and productive. We are encouraged that, in the report of the meeting, a consensus has been reached over the necessity to hold such a meeting periodically in the future with the participation of all the countries concerned.

Japan earnestly hopes that such activities involving all the countries concerned will be expanded and developed in the future, and we consider that we need to establish and maintain a cooperative relation among countries concerned regarding the study and exchange of information on pollock in the North Pacific, centering around the Aleutian Basin.

In concluding, I should like to point out the fact that to date, the U.S. has discussed this matter only with the U.S.S.R., however Japan thinks it appropriate to address this matter with the participation of all the countries concerned. We should like to request the U.S. to reconsider such an approach.

Canadian comments:

Mr. Chairman, Canada strongly supports the implementation of Article IV. It is clear from the scientific reports submitted at this meeting that there is an increasing catch of non-anadromous species and an increase in fishing effort for these species by countries that do not belong to INPFC. Canada is concerned, Mr. Chairman, that we are not collecting the scientific information that is required to ensure that these fisheries are developed in a manner that will ensure both a stable industry and a stable food supply for the participating nations. Acquiring this information is time consuming and expensive. We believe the most efficient method of obtaining these data for all members of INPFC, is to implement Article IV.

As you know, Mr. Chairman, Canada also supports the establishment of a new international science organization to study the biology and oceanography of the North Pacific. We support the establishment of this new organization because we recognize that the ocean environment exerts a powerful effect on our fisheries and indirectly on our climate. We believe it is important, even urgent, that we begin to improve our understanding of how the ocean environment affects fish communities. Again, Mr. Chairman, we feel that the most effective way of carrying out this research, is cooperatively with the countries that fish the North Pacific Ocean.

We will actively pursue the implementation of Article IV and the establishment of a new North Pacific science organization during 1989 and we invite Japan and the U.S.A. to join us in this effort.

United States comments:

The United States Section continues to support the concept of the establishment of an international scientific organization with broad membership to deal with species other than anadromous species as stated in Article IV of the INPFC Convention. We wish to commend the significant efforts of Canada in hosting the recent meetings aimed at forming such an organization.

The United States Section is pleased to note that the next drafting session on the establishment of the proposed organization will be hosted by the United States during the week of December 11, at the University of Washington in Seattle. The drafting session was recommended at the Second Intergovernmental Conference that was held in November 1988 at Sidney, British Columbia.

On a related matter, we were pleased by the valuable exchange of information at the recent Groundfish Symposium sponsored by INPFC. We were impressed with the diversity and high quality of papers presented at this year's Symposium and the wide representation of scientists working on North Pacific marine research.

11. ACTIVITIES OF THE COMMISSION CONCERNING MARINE MAMMALS

At the 33rd Annual Meeting, the Commission decided to discontinue the Ad Hoc Committee on Marine Mammals and instructed the Standing Committee on Biology and Research (B&R) to assume the responsibility for matters concerning marine mammals. The Steering Committee for B&R recommended the creation of a Sub-Committee on Marine Mammals to deal with these matters and proposed terms of reference as working procedures in future years. These recommendations were approved by the Commission.

The Sub-Committee on Marine Mammals reviewed and discussed 1989 research on marine mammals in accordance with its terms of reference. The sub-committee report summarizes research conducted by member nations and research coordinating activities.
(1) Studies Pertinent to Article X

One mothership with 56 catcherboats operated north and south of the U.S. 200-mile zone in 1989. Japan reported a total of 49 Dall’s porpoise in 960 operations (approximately 316,800 standard 45 m tans), a considerably lower take rate than previous years. The land-based salmon fishery incidentally took 282 Dall’s porpoise in 2370 operations (702,000 unstandardized tans). The U.S. reported abundance estimates and trends for Dall’s porpoise in the western North Pacific Ocean.

Japan reported 2,145 Dall’s porpoise were incidentally taken by the high seas squid fishery in 29,613 operations in 1987. These data are obtained from the fishing masters. There was discussion concerning definitions of “take” for northern fur seals and it was agreed that the definitions should be resolved before the next fishing season. Eleven Japanese observers were placed aboard 10 Japanese squid vessels to record bycatch and other data. Incidental take of northern fur seals, Pacific white-sided dolphins and Dall’s porpoise were presented by month by 1°x5° areas, during 464 operations (533,618 tans).

Canada reported results of marine mammal sightings and incidental take in research drifts during a July-August cruise in the eastern North Pacific in 1989. Two common dolphins were caught. Japan reported on marine mammal sighting surveys and incidental take in driftnet operations conducted during research cruises in the squid fishing area in 1988 and 1989. Marine mammal take included northern fur seals, Dall’s porpoises, northern right whale dolphins, and Pacific white-sided dolphins. In addition, studies of the distribution and abundance of marine mammals were conducted aboard four Japanese research vessels in August-September, 1988. Distributional differences in cetacean species were reported.

(2) Research Plans for 1990

Preliminary research plans on marine mammals presented by Japan included continuation of collection of incidental take data, sighting surveys in areas similar to those covered in 1989, collection of biological samples from incidentally taken marine mammals. Also proposed are studies of marine mammals in the squid driftnet fishery area involving research cruises and observers on commercial vessels. Canada stated there would be a research cruise to study the overlap of squid with other species, including marine mammals. The U.S. stated that research cruises would be undertaken, if possible, to study distribution, abundance and habitat of marine mammals in the squid fishing area.

(3) Recommendations

(a) The Sub-Committee RECOMMENDS that a rapporteur be appointed to summarize pertinent documents submitted by national sections. Linda Jones (USA) was selected.

(b) The Sub-Committee RECOMMENDS that scientific discussions be held during the Sub-Committee meetings in conjunction with the annual meetings and that a research coordinating meeting be held if necessary.

Spokesmen from the National Sections presented the following comments on the Commission’s activities concerning marine mammals:

Japanese comments:

Since the part of the issues relating to this agenda item has already been described under agenda items 7 and 9, we will not repeat them here. However, we would like to comment that it is regretful that we could not conduct joint research with the U.S. because the Japanese mothership salmon fishery could not operate inside the U.S. 200-mile zone this year, which is the same situation as the last year.

Canadian comments:

In our opening statement and our comment on Agenda Item 10, Canada voiced concerns about the ecological impact on marine species—be they invertebrates, fish, mammals or birds, of the high seas driftnet fisheries. This agenda item deals specifically with the research programs on Japan’s salmon fisheries and their incidental harvest of marine mammals in those fisheries. We are pleased to note that the reported incidental take of Dall’s porpoise in Japan’s mothership and land-based salmon fisheries combined has decreased significantly from 1,259 in 1987 to 331 in 1989. We understand that the major reason for this decrease has been declining fishing effort in these fisheries. We note that, at the same time, and due to the lack of a marine mammal permit, cooperative research on both salmonids and marine mammals within the U.S. 200-mile zone has also been decreasing; the prospects for such research in 1990 also do not appear to be promising. We continue to require more detailed knowledge on the factors controlling abundance of both salmon and marine mammals in this geographic area.

United States comments:

The United States endorses the continued efforts by Japan to obtain and provide information on the incidental take of marine mammals and to conduct sighting surveys on marine mammal species throughout the driftfishery areas. In light of the extensive fishing effort by high seas driftnets that catch large numbers of marine mammals and seabirds, the United States urges Japan to continue efforts to obtain information important to determining the effects of the combined driftnett fishing activities on marine mammal and seabird populations.

12. PUBLICATIONS OF THE COMMISSION

The Commission publishes an Annual Report, a Bulletin, and a Statistical Yearbook. The Annual Report and Bulletin are published in separate English and Japanese versions of identical content. Information on the current status of these three publications is given in the Administrative Report section and on the back cover of this Annual Report.

13. OFFICERS ELECTED FOR 1990

The Commission elected the following officers for 1990 in accordance with its Rules of Procedure:

Chairman of the Commission:  
Mr. Pierre Asselin of Canada  
Vice-Chairman of the Commission:  
Mr. Kenjiro Nishimura of Japan  
Secretary of the Commission:  
Mr. Clement V. Tillion of the United States  
Chairman of the Standing Committee on Biology and Research:  
Ms. Nancy S. Marshall of Canada
Chairman of the Standing Committee on Finance and Administration:

Mr. Michael Z. Florian of Canada

Terms of all officers of the Commission begin with the adjournment of the annual meeting and continue until the adjournment of the subsequent annual meeting.

14. CLOSING REMARKS AT THE FINAL PLENARY SESSION
Concluding statements were made by a spokesman for each of the national section as follows:

Closing remarks by Commissioner Junzo Sasaki on behalf of the Japanese National Section:

At the closing session of the 36th Annual Meeting of the International North Pacific Fisheries Commission, I would like to make some remarks.

This year's Annual Meeting was again convened under extremely difficult circumstances as last year.

We have experienced two consecutive fishing seasons in which the Japanese mother ship salmon fishery was denied access to the U.S. 200-mile zone, which is the legitimate fishing right under the Convention, because of domestic circumstances of the U.S. However we have not seen any positive response from the U.S. toward rectification of this situation. Furthermore, we regret that we could not hold an Inter-Governmental meeting of the three countries during this year's Annual Meeting concerning the conversion of mother ship operation to a land-based type operation, which we have been requesting since last year.

We strongly urge the U.S. to take prompt and positive actions that are necessary to resolve this problem.

Next, I would like to address the pollock fishery in the Bering high seas. At this Annual Meeting, the Japanese scientists presented a positive attempt to estimate biomass and the allowable biological catch of pollock in the entire Bering Sea. At present, the U.S. scientists stated that they could not support Japanese view because they needed to examine the assumptions used for the assessment. However, in the past, regarding the stock assessment of pollock and other species in the U.S. 200-mile zone, we have experienced that although the U.S. and Japanese scientists, at the beginning, had different views on the stock condition, we finally reached a consensus on most stock conditions as a result of promoting Japan-U.S. joint surveys. We expect to have the same experience in the study of pollock in the entire Bering Sea, including the Bering high seas. In any case, Japan wishes to continue and expand its effort under the principle that the matter relating to the pollock fishery in the Bering Sea should not be discussed only by specific countries but that it should be addressed with the participation of all the countries concerned.

Lastly, regarding the squid drift net fishery, Japan will continue to intensify its effort in the collection and analysis of data necessary for the fishery, and based on such scientific information, we will continue dialogue with other countries who are interested in this topic. We hope that the U.S. and Canada will understand our position and again we strongly request them to take a calm and realistic approach to this matter.

In concluding, I would like to commend precious efforts extended by those concerned to accomplish the goal within a meeting period of 2 weeks, which seems longer but is short. I would like to also express appreciation among others to the scientists of the three countries, interpreters and staff of the Secretariat for their precious endeavours.

Finally, I would like to wish all of you good health and endeavours in the future and close my remarks.

Closing remarks by Commissioner Pierre Asselin on behalf of the Canadian National Section:

At the conclusion of this Annual Meeting we find ourselves in a most difficult position. There is unprecedented worldwide concern with respect to drift net fishing and in Canada there are strong demands for effective international action. Canadians are concerned about the incidental catch of Canadian-origin salmonids in squid drift net and salmon-directed fisheries, the large catch of birds, marine mammals and other species in drift net gear and its non-selective nature. Further, the Canadian Section has voiced concern about the incidental catch of steelhead and Yukon-origin chinook and fall chum salmon in Japanese salmon-directed fisheries as well as our opposition to recent adjustment of fishing patterns within the 45°N latitude boundary by Japan. In addition Mr. Chairman, we continue to be concerned about lost and discarded fishing gear, the fact that such “ghost nets” may continue to fish, and the topic of marine debris and its hazard to marine life and dangers to navigation. Indeed, at this meeting, we have presented information illustrating the quantities of such gear that have been found on British Columbia beaches.

Mr. Chairman, one of the most pressing concerns we have relates to the so-called “pirate” fishing vessels from Taiwan and other countries which target on salmon while appearing to be engaged in squid fishing. Canadian surveillance patrols have observed such vessels north of established fishing boundaries with markings obscured and there have been a number of instances where U.S. patrol vessels have been engaged in pursuit of such vessels. It is known that quantities of salmon from such vessels are entering world markets and that the product has been transhipped through locations such as Singapore and Thailand. Canada, the U.S.A. and Japan have been active in addressing this problem and we strongly urge continued and strengthened cooperative enforcement efforts and exchange of information. We were therefore pleased when our three governments agreed to cooperate in this area and we must continue to build upon our understandings reached at the last Annual Meeting. We would also urge that Japan use her influence with other countries engaged in drift net fishing in the North Pacific, stress this common concern regarding illegal salmon harvesting that we share, and urge effective action to curb such practices.

Since the last time that we met there have been a number of significant changes in international arrangements and initiatives related to drift net fishing. For the first time a major observer program involving 32 Japanese and 14 North American observers was put in place in the Japanese flying squid fishery along with a number of monitoring and enforcement arrangements. We wish to express our sincere appreciation to Japan and the Japanese Squid Drift Net Fishery Association for agreeing to these arrangements and for the reception given to our observers. We are anxious to begin discussions to put in place and strengthen arrangements for the 1990 fishing season and feel that such arrangements are in the interest of Japan in providing essential information which will allow objective assessment of the impacts of squid drift net fishing when combined with other information from research initiatives.
Mr. Chairman, in this regard, we are most pleased that we have initiated discussions here regarding formation of a special working group which would address matters related to squid driftnet fishing. One of the prime tasks for this group will be to look at alternate fishing methods and technologies through information exchange and cooperative research in an attempt to address the problem of by-catch and non-selectivity of driftnet gear. We urge vigorous activity of this working group whenever the opportunity arises and would like to see initiatives the group advances put into place prior to next year’s fishing season.

Regarding organizational matters Mr. Chairman, Canada is looking forward to early consultations with Japan, the U.S.A., and the U.S.S.R. on the creation of a new North Pacific fisheries organization. We share a concern with Japan, that those of us who are affected must be included in discussions of such important matters. Likewise, when details of observer arrangements are discussed, such discussions should be triilateral in nature.

With respect to scientific cooperation and organizational arrangements, Canada has been vigorously supporting establishment of a new science organization for the North Pacific involving Canada, China, Japan, the U.S.A. and the U.S.S.R. as proposed charter members. This organization would be a broadly-based scientific body with an interest in oceanography and biological science in the North Pacific and could therefore address such pressing issues as the role of the ocean in influencing global climate change. We wish to stress that such an organization would be strictly scientific and have no management role. A third meeting of the countries involved will be here in Seattle next month and we strongly urge Japan’s support for this very worthwhile initiative.

In considering the outcomes of this meeting Mr. Chairman, we must express appreciation for the efforts of the scientists of the three countries and for the exchange of important information. INPFC continues to be a most important organization and we must not lose sight of its importance. If we are to progress to some new arrangement, we must do so smoothly and without loss of the essential benefits of INPFC. We must not relent in our vigilance and dedication to the pursuit of the goals of INPFC.

In closing we wish to note that Canada considers it essential that our countries continue to cooperate and seek innovative solutions to the problems before us. The extremely high level of public concern and initiatives such as the United Nations General Assembly draft resolution make this cooperation imperative.

We should like to thank the Executive Director and the staff of the Secretariat for their highly professional support at this meeting and the interpreters for a job well done. Mr. Chairman, we should also like to thank you and the U.S. Commissioners for your able chairmanship of the sessions.

Thank you and best wishes to you all for a safe journey home.

Closing remarks by Commissioner Richard B. Lauber on behalf of the U.S. National Section:

As we close this 36th Annual Meeting, I would like to make some remarks on behalf of the United States Section. Each National Section has expressed its considerable views regarding the wide variety of issues facing this Commission. One of these issues in particular has been the focus of heightened attention this past year: namely, the high seas driftnet fisheries of the North Pacific. The United States has been distressed that these fisheries have been conducted so extensively, despite the paucity of information regarding their effects on target and non-target species alike. To add to this problem, regulation and enforcement measures for these fisheries have been marginal. Thus, we believe that expanded management measures are needed, so that, among other things, utmost protection is afforded to all of our salmon and steelhead resources on the high seas. We trust that our respective governments will take these views into account when they meet to consult on and arrange cooperative measures for the 1990 fishing season. It is imperative that during these anticipated consultations, our governments also examine ways to mitigate any harmful effects that driftnet fishing may be posing to a wide-range of living marine resources on the high seas. For our part, the United States Section will urge the U.S. Government to continue to meet, as appropriate, with Korea and Taiwan to implement the cooperative scientific monitoring and enforcement agreements that were arranged under the U.S. Driftnet Act of 1987.

Turning to Japan’s high seas salmon fishery, the United States section has assessed and provided comments regarding Japan’s mothership conversion proposal. We expect that this topic will be discussed further in consultations among our governments. In the meantime, our scientists have once again raised concerns about the slow rate of research that is to be used in determining the continental origin of salmonids in the landbased fishing area. This will likely pose problems next year when our respective governments are expected to meet to negotiate the eastern limit of that fishery.

When reviewing all the issues facing us in the salmon, squid, and tuna/billfish driftnet fisheries, let us not forget that serious problems are still facing us in other fisheries, specifically the unregulated pollock fishery in the central Bering Sea. Thus, the United States Section will be paying close attention to the meetings held between the United States and the Soviet Union to address this critical issue.

In closing, let me recognize the efforts of our scientists, advisors, and experts during this Annual Meeting. They have helped to ensure its success. I would also like to thank our interpreters, who, together with the Secretariat staff, have worked diligently and efficiently. We hope you have all enjoyed your stay in Seattle. We look forward to seeing everyone at next year’s meeting in Vancouver, British Columbia.
APPENDIX 1

LIST OF PARTICIPANTS

36th Annual Meeting--1989
Seattle, Washington, 1989 November 7

Chairman ........................................ Clement V. Tillion
Vice-Chairman .................................... Pierre Asselin
Secretary ......................................... Kenjiro Nishimura

CANADA

Commissioners

Pierre Asselin
Ottawa
Michael Z. Florian
Vancouver

Nancy S. Marshall
Delta
John C. Davis (Alternate)
Sidney

Advisers and Experts

J. Anderson
P. Andrzejewski
C. Atleo
R. Beamish
B. Hackett
M. Henderson
M. Hoffman
B. Leaman
G. McFarlane
L. Margolis
S. McKinnell

D. Meerburg
B. Procopation
L. Richards
M. Saunders
A. Sarna
D. Scott
W. Shaw
L. Souza
G. Turner
A. Tyler
D. Welch

JAPAN

Commissioners

Kenjiro Nishimura
Tokyo

Koji Imamura
Tokyo

Atsushi Tokinoya
Tokyo

Junzo Sasaki
Tokyo

Alternate Commissioners

Kenzo Kawakami

Shigenobu Kato
LIST OF PARTICIPANTS—1989 ANNUAL MEETING

Special Advisor
Shinsuke Hirai

Advisers and Experts
Ministry of Foreign Affairs
Kanji Hanagata
Mikio Numata
Masanori Miyahara
Keizo Emori

Fisheries Agency of Japan
Ryozo Kaminokado
Kazuhiko Nagao
Daishiro Nagahata
Satoshi Torika
Seiji Ohsumi
Jun Ito
Takashi Sasaki
Shigeo Hayase
Yukimasa Ishida
Kei-ichi Mito

Consultants
Masayoshi Narita
Koya Mimura
Toshibi Takada
Masaaki Matsuzawa
Tetsuo Yamamoto
Kazuyasu Kando
Naofumi Yoshiike

UNITED STATES

Commissioners
Clement V. Tillion
Halibut Cove
Richard B. Lauber
Juneau
Steven Pennoyer
Alec W. Brindley
Juneau
Seattle

Advisory Committee
D. Allison
J.L. Bergy
A. Burch
M.T. Coles
S. Cotten
J. Easley
J. Gilbert
W. S. Gilbert
K. Graham
A. Herrmann
P. Islieb
D. Jacobson
G. Jensen
M.S. Lundsten
C.H. Meacham
H. Mitchell
D. Paddock
H. Reilly
J.R. Stephan
A. Sturgulewski
F. Zharoff

Advisers and Experts
W. Aron
R.G. Bakkala
D. Benton
E. Brown
R. Burgner
M. Dahlberg
D. Eggers
R.L. Fisher
H. Geiger
J.C. Hammond
G. Herrfurth
L.L. Jones
W. Karp
L.L. Low
R.J. Marasco
C.P. Meacham
J. Miotke
K. Myers
T. Walker

CONSULTANT-OBSERVER

International Pacific Halibut Commission
J. McGregor
SECRETARIAT

Permanent
Bernard E. Skud
Katsuma Hanafusa
Wakako Morris
Maryke Nap

Temporary
Judy Baxter
Walter Crawford
Barbara Miller
Matthew Pearson

Interpreters
Yae-Joong Kim
Takako Owada
Kayoko Shigematsu
Yoshiko Soeda
Tohyu Yazaki

MEMBERSHIP OF COMMITTEES

1. Standing Committee on Finance and Administration

CANADA
Commissioner-member: Michael Z. Florian
Commissioner-adviser: John C. Davis
Advisers: G. Turner
D. Meerburg

JAPAN
Commissioner-member: Atsushi Tokinoya
Commissioner-advisers: Kenjiro Nishimura
Kenzo Kawakami
Shigenobu Kato
Advisers: Kanji Hanagata
Ryozo Kaminokado
Observers: Daishiro Nagahata
Kazuhiko Nagaoka
Mikio Numata

UNITED STATES
Commissioner-member: Alec W. Brindle (Chairman)
Commissioner-adviser: Richard B. Lauber
Advisers: J. Miotke
J.C. Hammond

Observers: D. Allison
J.L. Bergy
A. Burch
M.T. Coles
S. Cotten
J. Easley
J. Gilbert
W.S. Gilbert
K. Graham
A. Herrmann
P. Isleib
D. Jacobson
G. Jensen
M.S. Lundsten
C.H. Meacham
H. Mitchell
D. Paddock
H. Reilly
J.R. Stephan
A. Sturgulewski
F. Zharoff

SECRETARIAT
Ex officio:
Bernard E. Skud
Katsuma Hanafusa
2. *Standing Committee on Biology and Research*

**CANADA**
- Commissioner-member: Nancy S. Marshall
- Commissioner-adviser: John C. Davis
- Scientist-members: R.J. Beamish, L. Margolis

**JAPAN**
- Commissioner-member: Koji Imamura
- Commissioner-adviser: Junzo Sasaki
- Scientist-members: Seiji Ohsumi, Jun Ito
- Advisers: Takashi Sasaki, Satoshi Torika, Shigeo Hayase, Masayoshi Narita, Yukimasa Ishida, Koya Mimura, Kei-ichi Mito, Toshiyuki Takada, Ryozo Kaminokado, Masaaki Matsuzawa, Kazuhiko Nagao, Tetsuo Yamamoto, Daishiro Nagahata, Kazuyasu Kando

**UNITED STATES**
- Commissioner-member: Steven Pennoyer (Chairman)
- Commissioner-adviser: Clement V. Tillion
- Scientist-members: L.L. Low, R.L. Burgner

**SECRETARIAT**
- *Ex officio* Bernard E. Skud, Katsumasa Hanafusa
1. Opening addresses and introductions.
2. Adoption of agenda.
4. Meeting procedures.
   (a) Attendance at meetings
   (b) Schedule of sessions
   (c) Press policy
   (d) Minutes
6. Submission of reports by the Secretariat.
7. Research results, research planning, and publications.
   (a) Salmonids and oceanography.
   (b) Non-anadromous species (groundfish, squid and king and tanner crab) and marine debris in the Convention Area.
   (c) Marine mammals.
   (d) Publication of research results and statistics.
   (e) International symposia.
8. Actions required for implementation of Article III 1.(d) with respect to salmon.
9. Consideration of other fisheries in the Convention area and their effect on anadromous species, groundfish and marine mammals.
11. Consideration of status of Article X and Annex 1(d) with respect to anadromous species in the Convention area and species of marine mammals caught in fishing for anadromous species.
12. Review of the Annex under Article III 1.(c) and the Memoranda of Understanding on Research and Enforcement, including discussions regarding the effectiveness of these measures.
13. Status of implementation of Articles III 1.(e) and IX 2.
14. Progress in the establishment of an international organization dealing with non-anadromous species (Article IV).
15. Administrative and fiscal matters.
   (a) Accounts and audit
   (b) Financial situation in current fiscal year
   (c) Budget estimate for fiscal year beginning July 1, 1990
   (d) Budget forecast for fiscal year beginning July 1, 1991
   (e) Administrative report for 1989
   (f) Administrative matters
   (g) Schedule of future meetings
   (h) Other matters
17. Other business.
18. Closing remarks.
We have examined the statement of assets and liabilities of the International North Pacific Fisheries Commission as at June 30, 1989 and the statements of income and expenditure and changes in funds and changes in cash for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests and other procedures as we considered necessary in the circumstances.

In our opinion, these financial statements present fairly the financial position of the Commission as at June 30, 1989 and the results of its operations, changes in funds and changes in cash for the year then ended in accordance with accounting principles described in Note 1 to the financial statements applied on a basis consistent with that of the preceding year.

KPMG PEAT MARWICK
Chartered Accountants
Vancouver, Canada
July 29, 1989

<table>
<thead>
<tr>
<th>Asset Description</th>
<th>1989</th>
<th>1988</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash and term deposits</td>
<td>$312,137</td>
<td>245,056</td>
</tr>
<tr>
<td>Interest receivable</td>
<td>2,409</td>
<td>207</td>
</tr>
<tr>
<td>British Columbia sales tax receivable</td>
<td>-</td>
<td>165</td>
</tr>
<tr>
<td>Advances to executive and assistant directors</td>
<td>4,671</td>
<td>10,889</td>
</tr>
<tr>
<td><strong>Total Assets</strong></td>
<td><strong>$319,217</strong></td>
<td><strong>256,327</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Liabilities and Fund Balances</th>
<th>1989</th>
<th>1988</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liabilities:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accrued expenses</td>
<td>$97,295</td>
<td>129,712</td>
</tr>
<tr>
<td>Contributions received in advance from Contracting Parties</td>
<td>148,500</td>
<td>67,900</td>
</tr>
<tr>
<td><strong>Total Liabilities</strong></td>
<td><strong>245,795</strong></td>
<td><strong>197,612</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fund Balances:</th>
<th>1989</th>
<th>1988</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working Capital Fund:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contingency fund</td>
<td>35,635</td>
<td>52,668</td>
</tr>
<tr>
<td>Severance fund</td>
<td>12,787</td>
<td>6,047</td>
</tr>
<tr>
<td>Moving fund</td>
<td>25,000</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total fund balances</strong></td>
<td><strong>73,422</strong></td>
<td><strong>58,715</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Commitments and contingency (Notes 3 and 4)</th>
<th>1989</th>
<th>1988</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>$319,217</strong></td>
<td><strong>256,327</strong></td>
</tr>
</tbody>
</table>

See accompanying notes to financial statements.
# Statement of Income and Expenditure and Changes in Funds

## Year ended June 30, 1989

*With comparative figures for 1988*

<table>
<thead>
<tr>
<th></th>
<th>GENERAL FUND</th>
<th>WORKING CAPITAL FUND</th>
<th>1989 Total</th>
<th>1988 Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Income:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contributions from</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contracting Parties</td>
<td>$407,400</td>
<td></td>
<td>407,400</td>
<td>426,900</td>
</tr>
<tr>
<td>Interest earned</td>
<td>20,186</td>
<td></td>
<td>20,186</td>
<td>16,727</td>
</tr>
<tr>
<td>Levies</td>
<td></td>
<td>7,888</td>
<td>6,740</td>
<td>25,000</td>
</tr>
<tr>
<td>Other (Notes 4 and 6)</td>
<td>20,000</td>
<td></td>
<td>20,000</td>
<td>5,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>447,586</strong></td>
<td><strong>483,304</strong></td>
</tr>
<tr>
<td><strong>Expenditures:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personnel services:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permanent (Note 5)</td>
<td>201,816</td>
<td>(1,258)</td>
<td>200,555</td>
<td>192,785</td>
</tr>
<tr>
<td>Temporary</td>
<td>441</td>
<td></td>
<td>441</td>
<td>1,033</td>
</tr>
<tr>
<td>Benefits</td>
<td>27,343</td>
<td></td>
<td>27,343</td>
<td>21,986</td>
</tr>
<tr>
<td>Overtime</td>
<td>3,452</td>
<td></td>
<td>3,452</td>
<td>3,002</td>
</tr>
<tr>
<td>Severance</td>
<td></td>
<td></td>
<td></td>
<td>8,973</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>233,049</strong></td>
<td><strong>227,779</strong></td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Travel</td>
<td>44,296</td>
<td></td>
<td>44,296</td>
<td>16,144</td>
</tr>
<tr>
<td>Communications</td>
<td>11,306</td>
<td></td>
<td>11,306</td>
<td>13,949</td>
</tr>
<tr>
<td>Contracts</td>
<td>48,303</td>
<td></td>
<td>48,303</td>
<td>41,297</td>
</tr>
<tr>
<td>Printing (Note 5)</td>
<td>61,976</td>
<td>(18,892)</td>
<td>43,084</td>
<td>96,966</td>
</tr>
<tr>
<td>Rentals</td>
<td>30,301</td>
<td></td>
<td>30,301</td>
<td>22,181</td>
</tr>
<tr>
<td>Supplies</td>
<td>8,308</td>
<td></td>
<td>8,308</td>
<td>5,750</td>
</tr>
<tr>
<td>Equipment (Note 2)</td>
<td>39,326</td>
<td></td>
<td>39,326</td>
<td>4,961</td>
</tr>
<tr>
<td>Moving expenses</td>
<td></td>
<td></td>
<td></td>
<td>43,654</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>792</td>
<td></td>
<td>792</td>
<td>2,939</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>244,608</strong></td>
<td><strong>247,841</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>477,657</strong></td>
<td><strong>475,620</strong></td>
</tr>
<tr>
<td><strong>Excess (deficiency) of income over expenditures</strong></td>
<td>(30,071)</td>
<td>28,038</td>
<td>6,740</td>
<td>25,000</td>
</tr>
<tr>
<td><strong>Fund balances, beginning of year</strong></td>
<td>-</td>
<td>52,668</td>
<td>6,047</td>
<td>-</td>
</tr>
<tr>
<td><strong>Transfers:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Budgeted</td>
<td>-</td>
<td>(15,000)</td>
<td>-</td>
<td>(15,000)</td>
</tr>
<tr>
<td>Excess (deficiency)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Note 6)</td>
<td>30,071</td>
<td>(30,071)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Fund balances, end of year</strong></td>
<td>$</td>
<td>35,635</td>
<td>12,787</td>
<td>25,000</td>
</tr>
</tbody>
</table>

See accompanying notes to financial statements.
AUDITOR'S REPORT

STATEMENT OF CHANGES IN CASH
Year ended June 30, 1989
(With comparative figures for 1988)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Contributions from Contracting Parties</td>
<td>$344,500</td>
<td>289,580</td>
</tr>
<tr>
<td>Contributions received in advance</td>
<td>148,500</td>
<td>67,900</td>
</tr>
<tr>
<td>Interest</td>
<td>19,070</td>
<td>17,475</td>
</tr>
<tr>
<td>Repayment of advances to executive and assistant directors</td>
<td>6,228</td>
<td>6,867</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>165</td>
<td>419</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>518,463</strong></td>
<td><strong>382,241</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Use of cash:</th>
<th>1989</th>
<th>1988</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advances to executive and assistant directors</td>
<td>-</td>
<td>12,456</td>
</tr>
<tr>
<td>Personnel services</td>
<td>193,629</td>
<td>175,928</td>
</tr>
<tr>
<td>Travel</td>
<td>44,961</td>
<td>15,330</td>
</tr>
<tr>
<td>Communications</td>
<td>11,306</td>
<td>13,949</td>
</tr>
<tr>
<td>Contracts</td>
<td>49,070</td>
<td>33,439</td>
</tr>
<tr>
<td>Printing</td>
<td>73,299</td>
<td>61,196</td>
</tr>
<tr>
<td>Rentals</td>
<td>30,229</td>
<td>26,267</td>
</tr>
<tr>
<td>Supplies</td>
<td>8,119</td>
<td>5,906</td>
</tr>
<tr>
<td>Equipment</td>
<td>38,741</td>
<td>4,961</td>
</tr>
<tr>
<td>Moving expenses</td>
<td>-</td>
<td>43,654</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td><strong>2,028</strong></td>
<td><strong>3,682</strong></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>451,382</strong></td>
<td><strong>396,768</strong></td>
</tr>
</tbody>
</table>

Excess (deficiency) of source of cash over use of cash

<table>
<thead>
<tr>
<th>1989</th>
<th>1988</th>
</tr>
</thead>
<tbody>
<tr>
<td>67,081</td>
<td>(14,527)</td>
</tr>
</tbody>
</table>

Cash balance, beginning of year

<table>
<thead>
<tr>
<th>1989</th>
<th>1988</th>
</tr>
</thead>
<tbody>
<tr>
<td>245,056</td>
<td>259,583</td>
</tr>
</tbody>
</table>

Cash balance, end of year

<table>
<thead>
<tr>
<th>1989</th>
<th>1988</th>
</tr>
</thead>
<tbody>
<tr>
<td>$312,137</td>
<td>245,056</td>
</tr>
</tbody>
</table>

See accompanying notes to financial statements.

NOTES TO FINANCIAL STATEMENTS
Year ended June 30, 1989

1. Accounting policies:
The financial statements are prepared in accordance with the Handbook of the International North Pacific Fisheries Commission (the "Commission"). With the exception of accounting for holiday pay and overaccruals (see Note 5) these financial statements are prepared in accordance with the 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 funds provided by the Contracting Parties over expenditures and income from levies. This fund is allocated to reserves for contingencies, severance pay and moving expenditures.

(b) Levies:
In accordance with the provisions in the Commission's Handbook an amount is calculated, based on salaries and wages of all employees, which is estimated to be equal to the liability for Canadian income taxes. The amount so calculated is recorded by the Commission in the Working Capital Fund under the caption "levies").
c) Fixed assets:

Fixed assets acquired by the Commission are expensed in the year of acquisition (Note 2).

d) Leases:

Assets required by the Commission under the terms of leases which would be classified as capital leases under generally accepted accounting principles are not capitalized, and the leases are recorded as if they were operating leases and the payments are included with operating expenditures.

e) Income tax:

The Commission is a non-taxable organization under the Privileges and Immunities (International Organizations) Act (Canada).

(f) 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 at the balance sheet date are translated to equivalent Canadian amounts at the current rate of exchange.

g) Holiday pay:

The Commission records the cost of staff holiday pay on a cash payments basis. The financial statements do not include an accrual for holiday pay earned but not yet paid.

2. Equipment:

At June 30, 1989, fixed assets on hand and their original purchase price are as follows:

<table>
<thead>
<tr>
<th>Description</th>
<th>Original Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Furniture and fixtures, purchased between 1976 and 1989</td>
<td>$11,520</td>
</tr>
<tr>
<td>Appliances, purchased between 1979 and 1989</td>
<td>531</td>
</tr>
<tr>
<td>Office equipment, purchased between 1979 and 1989</td>
<td>51,581</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$63,632</strong></td>
</tr>
</tbody>
</table>

Additions to fixed assets during the year which were expensed are as follows:

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Furniture and fixtures</td>
<td>$1,126</td>
</tr>
<tr>
<td>Appliances</td>
<td>281</td>
</tr>
<tr>
<td>Office equipment</td>
<td>37,919</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$39,326</strong></td>
</tr>
</tbody>
</table>

3. Commitments:

(a) As at June 30, 1989, the Commission is obligated under equipment leases to minimum annual payments as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Minimum Annual Payments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>$11,291</td>
</tr>
<tr>
<td>1991</td>
<td>9,343</td>
</tr>
<tr>
<td>1992</td>
<td>9,343</td>
</tr>
<tr>
<td>1993</td>
<td>9,343</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$39,320</strong></td>
</tr>
</tbody>
</table>

Office space is supplied to the Commission by the Government of Canada–Department of Fisheries and Oceans, at no charge.
(b) Pension plan:

Based on an actuarial evaluation as at October 1987, the Commission's past service pension liability has been eliminated.

4. Commitment by Contracting Parties for 1986 extraordinary meeting:

In 1987 the Contracting Parties agreed to contribute an additional $5,000 each to cover the cost of the extraordinary meeting held in 1986. The contributions are payable during any of the 1987, 1988 or 1989 fiscal years. The Canadian payment of $5,000 was received in 1987. The U.S. payment of $5,000 was received in 1988. The Japanese payment of $5,000 was received in 1989 and was recorded as other income.

5. Contingency fund:

(a) In 1989 the Commission applied the 1988 overaccrual of personnel services expense for permanent employees in the amount of $1,258 to the Contingency Fund. The 1989 actual expenditure for personnel services is $201,813 as shown in the statement of income and expenditure.

(b) In 1989 the Commission applied a 1988 overaccrual of printing expenses in the amount of $18,892 to the Contingency Fund. The 1989 actual expenditure for printing expenses is $61,976 as shown in the statement of income and expenditure.

6. Transfer of funds:

In 1989, the Contracting Parties agreed to a transfer of $15,000 from the Contingency Fund to the General Fund to cover the budgeted operating costs for the year. This transfer was approved at the Annual General Meeting in November 1988.

**STATUS OF GENERAL FUND APPROPRIATIONS**

*Year ended June 30, 1989*

<table>
<thead>
<tr>
<th></th>
<th>ORIGINAL BUDGET APPROPRIATIONS</th>
<th>APPROPRIATIONS AS MODIFIED BY TRANSFERS</th>
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<tr>
<td><strong>Personnel services:</strong></td>
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<tr>
<td>Permanent</td>
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<tr>
<td><strong>Total</strong></td>
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<td><strong>$437,500</strong></td>
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See accompanying notes to financial statements.
III. ADMINISTRATIVE REPORT FOR 1989

Bernard E. Skud
Executive Director

1. CONTENT OF THE REPORT
This report provides information on actions of the Commission between the 35th (1988) and 36th (1989) Annual Meetings, describes actions taken with respect to decisions made at the 35th Annual Meeting and summarizes activities of the Secretariat. The period covered is from the adjournment of the 35th Annual Meeting, November 4, 1988 to November 7, 1989.

2. MEMBERS
Membership of the Commission during the period covered this report was as follows:

CANADA
Pierre Asselin
Michael Z. Florian
Nancy S. Marshall
John C. Davis (acting)

JAPAN
Kenjiro Nishimura
Kazuo Shima
(to September 8, 1989)
Koji Imamura
(from September 8, 1989)
Junzo Sasaki
Atsushi Tokinoya

UNITED STATES
Clement V. Tillion
Dayton L. Alverson
(to October 3, 1989)
Alec W. Brindle
(from October 3, 1989)
James W. Brooks
(to March 29, 1989)
Steven Pennoyer
(from March 29, 1989)

3. OFFICERS
Officers of the Commission as of November 7, 1989:
Chairman
Clement V. Tillion of the United States
Vice-Chairman
Pierre Asselin of Canada
Secretary
Kenjiro Nishimura of Japan
Chairman of the Standing Committee on Biology and Research
Steven Pennoyer of the United States
Chairman of the Standing Committee on Finance and Administration
Alec W. Brindle of the United States

4. EDITORIAL REFEREES
Editorial Referees, as of November 7, 1989, are:
Canada               Dr. Richard J. Beamish
Japan                Dr. Seiji Ohsumi
United States        Dr. Loh-Lee Low

5. STAFF
Bernard E. Skud continued as Executive Director and Katsuma Hanafusa continued as Assistant Director. Wakako Morris continued as Administrative Assistant and Jonathan T. Yokoyama continued as Clerk-Translator. Maryke Nap continued as Secretary.

6. INTERIM APPROVALS OF THE COMMISSION
From the adjournment of the 35th Annual Meeting (1988) through November 7, 1989 the following Commission approvals were obtained by correspondence:

(1) Publications
(b) 1986 Statistical Yearbook (Circular Letter No. 1630, May 4, 1989)
(c) The INPFC Handbook (Circular Letter No. 1625, February 15, 1989)

(2) Proceedings of the 35th Annual Meeting
Summary minutes of the Third and Fourth (final) Plenary Sessions and the Distribution List (Circular Letter No. 1623, January 13, 1989). Approval for these minutes was obtained from Canada on February 13, from the U.S. on February 15 and from Japan on June 12, 1989.

(3) Matters concerning the 36th Annual Meeting
(a) Tentative Agenda (Circular Letter No. 1637, August 8, 1989)
(b) Invitation of observers from other interested countries.

The Secretariat asked for submission of requests on this matter for approval by the Commission (Circular Letter No. 1635, July 18, 1989). No requests were received.

7. INTERIM MEETINGS
The following meetings were held:
(1) Working Group on Joint Surveys of the Subcommittee on Non-Anadromous Species
October 30 to November 2, 1988 Tokyo, Japan, chaired by M. Furusawa.
May 15 to 19, 1989 Tokyo, Japan chaired by T. Sasaki.
The reports of these meetings will be submitted to the Sub-Committee on Non-Anadromous Species.

(2) Ad Hoc Salmon Research Coordinating Group
The meeting of the Salmon Research Coordinating Group was held in Tokyo, March 8 to 10, 1989 with participants from each country. M. Kato of Japan chaired the meeting, the report of which will be submitted to the Sub-Committee on Salmon.

8. ACTIONS TAKEN BY THE SECRETARIAT ACCORDING TO DECISIONS AT THE 35TH ANNUAL MEETING OF THE COMMISSION
(1) Information from non-member countries
The following report was received from Poland:
Activities of the Polish Fishing Fleet in the Northeast Pacific by INPFC Statistical Area, 1987 June to December.

(2) Tabling of conventions and treaties concerned with the Convention area
A report on new information tabled with the Secretariat will be submitted to the 1989 Annual Meeting.

9. RECEIPT OF INFORMATION REGARDING ARTICLES III 1.(e) AND IX 2. OF THE CONVENTION
In connection with the Commission's consideration of the status of implementation of Articles III 1.(e) and IX 2. of the Convention, the Secretariat obtained from the national sections information pertaining to 1989, similar to that submitted annually since 1970, and prepared a report summarizing the data.

10. COMMISSION PUBLICATIONS
The Secretariat's activities concerning publications during the period are summarized below. Details of these activities have been submitted to the Commission.

(1) Annual Reports
The 1988 Annual Report in English is in press and will be distributed late in 1989.
Early publication of the Annual Reports depends upon early submission of research summaries and early approval of the manuscript by each national section.

(2) Bulletin
The Japanese version of Bulletin No. 42 (1981 Groundfish Symposium papers) was published and distributed in April, 1989.
The Japanese version of Bulletin No. 46 (Juvenile Salmon) was published and distributed in December 1988.

(3) Statistical Yearbook
The 1985 Statistical Yearbook was published in April, 1989. The 1986 Statistical Yearbook is in press and will be distributed early in 1990. Some of the material has been received for the 1987 Yearbook and for the 1988 Yearbook.

(4) Proceedings of the 35th Annual Meeting
The Japanese version of the 1988 Proceedings was prepared and distributed in October, 1989.

(5) INPFC Handbook
The Handbook will be revised to incorporate amendments to the Annex and new Memoranda of Understanding as well as amendments to the Financial Regulations and the addition of staff regulations. The revised version is scheduled for publication in 1990.

11. FISCAL MATTERS
(1) Accounts and audit
The report of the Commission's auditors, KPMG Peat Marwick, for the fiscal year ending June 30, 1989 (Appendix 3) was transmitted to the Commission with Circular Letter No. 1638 on August 23, 1989 together with a report prepared by the Secretariat giving details of items in the auditors' report.
The Commission's liability bond on Secretariat staff in the amount of $100,000 was continued. This bond is on file in the Secretariat.
(2) Working Capital Fund (WCF)
On June 30, 1988 the WCF totalled $58,715, of which $52,668 was in the Contingency Fund, $6,047 in the Severance Fund and nothing in the Moving Expense Fund. During the 1988/89 fiscal year, there was income to the fund from levies and Japanese payment for the Extraordinary Meeting. On June 30, 1989, the total of the WCF was $73,422 of which $35,635 was for the Contingency Fund, $12,787 for the Severance Fund and $25,000 for the Moving Expense Fund.

(3) 1989/90 Budget
The budget for FY 1989/90 adopted by the Commission at the 1988 Annual Meeting was sent to the Contracting Parties on November 23, 1988 requesting that each country’s one-third share ($146,000) be paid in two instalments. Contributions for the first half of the fiscal year which were payable on July 1, were received as follows:
- Canada: June 19, 1989
- United States: June 19, 1989
- Japan: July 24, 1989

(4) Budget Estimate (1990/91) and Forecast (1991/92)
In accordance with the Financial Regulations, the Secretariat sent, 60 days in advance of the 36th Annual Meeting, the Commissioners a Budget Estimate for 1990/91 and a Budget Forecast for 1991/92 (Circular Letter No. 1639, September 8, 1989).

(5) 1986 Extraordinary Meeting Costs
Each national section agreed to contribute $5,000.00 for the 1986 Extraordinary Meeting. Canada fulfilled its obligation in FY 1986/87, the United States in FY 1987/88 and Japan in FY 1988/89.

12. Agenda for the 36th Annual Meeting
A tentative agenda for the 36th Annual Meeting, prepared by the Executive Director in consultation with the Chairman, was sent to the three national sections on August 8, 1989 (Circular Letter No. 1637), with a request for approval and comments. Japan responded on August 24, and recommended approval, as did the United States on August 30. Canada approved the agenda with a suggested change on September 1—the change was incorporated in the Provisional Agenda that was distributed on September 6, 1989.

13. Facilities
The building occupied by the Secretariat was transferred from the Canadian Department of Fisheries and Oceans (DFO) to the University of British Columbia in May 1988. The two bodies have not yet signed a contract to cover maintenance of the facility. The Secretariat has sought the assistance of DFO in resolving difficulties with the University management. Neither DFO or the University have initiated any improvements and the problems with the lighting fixtures still continue.

14. Staff Activities
During the period, the Secretariat has performed all duties set forth in the Rules of Procedure, Financial Regulations and decisions of the Commission in accordance with the duties of each member of the staff.

The Executive Director and Assistant Director visited the following offices: Canada Department of Fisheries and Oceans in Vancouver and Nanaimo; the U.S. National Marine Fisheries Service in Seattle; the International Pacific Halibut Commission in Seattle; the Fisheries Research Institute and the Institute of Marine Science of the University of Washington in Seattle, and the Pacific Salmon Commission in Vancouver.

The Executive Director continued contact with the University of British Columbia, attending lectures and seminars and meeting with University officials to discuss maintenance problems of INPFC headquarters.

The Executive Director and Assistant Director attended the 65th General Annual Meeting of the International Pacific Halibut Commission held in Vancouver on January 24, 1989.

The Executive Director and Administrative Assistant arranged for meeting rooms for the 1990 Annual Meeting which will be held at the Landmark Sheraton Hotel in Vancouver.

The Secretariat staff met on February 22, 1989 with representatives of the International Fisheries Commission Pension Society in Vancouver to discuss matters concerning the staff benefits and the agenda for the Society’s Annual Meeting.

The Executive Director and Assistant Director attended a meeting of the North Pacific International Chapter of the American Fisheries Society in New Westminster, B.C. on March 7, 1989.

The Executive Director attended a meeting of the Pacific Fishery Biologists in Parksville, British Columbia on March 21 to 22, 1989.

The Executive Director and Administrative Assistant met with representatives of the Pacific Salmon Commission to discuss matters concerning the selection and operation of computers.

The Executive Director and the Administrative Assistant attended the 1989 Annual Meeting of the International Fisheries Commissions Pension Society in Halifax, Nova Scotia on May 15 to 17, 1989. Five North American Commissions were represented.
The Assistant Director attended the 14th Pink and Chum Salmon Workshop in Port Ludlow, Washington on February 22 to 24, 1989.

The International Section of the American Fisheries Society (AFS) asked the Executive Director to convene a session on International Fishery Commissions at the AFS 1989 Annual Meeting in September in Anchorage, Alaska. Participants included the Directors of 5 North American-based commissions and the Director of the North Atlantic Salmon Conservation Organization (Scotland) and a U.S. representative who spoke on the status of PICES.

The Commission was invited to be represented by observers at (a) the Annual Meeting of the Inter-American Tropical Tuna Commission, (b) the Regular Meeting of the International Commission for the Conservation of Atlantic Tunas. No INPFC observers were designated to represent the Commission at these meetings.

The Secretariat has responded to enquiries on a variety of fishery matters and was visited by students, scientists, administrators, and others, including members of the Pension Society.
IV. THE RESEARCH PROGRAM

A. REPORT ON RESEARCH BY CANADA FOR THE INTERNATIONAL NORTH PACIFIC FISHERIES COMMISSION IN 1989

Department of Fisheries and Oceans
Biological Sciences Branch
Pacific Biological Station
April 1989

SALMONIDS

HIGH SEAS SAMPLING AND TAGGING

A research survey was conducted in the North Pacific Ocean aboard the stern trawler, Arctic Harvester, from July 12 to August 22, 1989 to explore the overlap in distribution of salmonids and neon flying squid (Ommastrephes bartramii) (McKinnell et al. 1989). Fishing stations were placed at 2.5° longitude intervals, from 145° to 160°W longitude, along 43°N latitude in July and 46°N latitude in August. Eleven driftnet and seven longline stations were fished. Neon flying squid predominated in the total catch and were encountered in all driftnet sets. Sea surface temperatures where squid were encountered ranged from 14.2° to 22.1°C. No salmonids were caught during the survey. Other species caught in abundance were Pacific pomfret (Brama japonica), blue shark (Prionace glauca), and albacore (Thunnus alalunga). Ninety-two sightings of marine mammals and reptiles were recorded during 138.5 hours of sighting effort.

Canada also conducted observation flights in the vicinity of the July northern boundary of the Asian squid fishery (43°N latitude) in 1989 (McKinnell 1989). Of the 17 vessels cited, eight were observed north of the boundary and of these eight, five were observed north of 44°N latitude. The nationality and registration numbers of these vessels were not discernable.

STOCK IDENTIFICATION

A study was carried out to examine the feasibility of using variation in nuclear DNA as a method of stock identification in chinook (Oncorhynchus tshawytscha) and coho salmon (O. kisutch). The result was the identification of six probes that can be used to detect polymorphisms in chinook salmon and two in coho salmon. Three of the chinook salmon probes appeared to detect population-specific polymorphisms based on an examination of 30 chinook salmon from 6 populations. However, no population-specific polymorphisms were found for coho salmon using 30 fish from five populations. Subsequently, a more extensive survey of chinook salmon variation was implemented involving the screening of 150 fish from five populations from British Columbia and the Yukon Territory and using three of the six probes. The results showed that a single probe could be used to detect polymorphisms that were unique to the populations surveyed. This represents the first time that a biological marker can be used to produce 100% accuracy in stock identification of chinook salmon when multiple stocks are present in the sample.

Juvenile chinook salmon were sampled in the Yukon River basin in 1988 and 1989 to determine the possibility of using parasites as markers for distinguishing among the populations. Seventeen populations, consisting of a total of 750 fish, were sampled in 1988. The same seventeen populations plus four new populations were sampled in 1989 resulting in a total of 1,175 fish. The incidence of parasites was extremely low in all populations for both years. Consequently, parasite markers are not useful for identifying the population of origin from samples of adults taken in river fisheries. However, the lack of parasites in Yukon River chinook salmon may be useful for distinguishing between Yukon and non-Yukon chinook salmon caught in the marine environment.

SEA LIFE OF SALMON

An ongoing, collaborative program between fisheries scientists and biological and physical oceanographers directed at determining the causes of variation in recruitment of several populations of Pacific salmon from Vancouver Island continued in 1989. The program has several major components including estimating the effect of predation by Pacific hake (Merluccius productus), pollock (Theragra chalcogramma) and dogfish shark (Squalus acanthias) on juvenile salmon abundance and determining the relationships between food availability and the migration routes and growth of juvenile salmon in coastal waters. Several physical oceanographic features of the coastal waters through which the juvenile salmon migrate are also being...
examined. Efforts are now being made to determine if there are any correlations between these features and survival of the juveniles to the adult stage.

Another set of studies focuses on the effect of the time, size and location of release of juvenile sockeye (Oncorhynchus nerka) and coho salmon from Vancouver Island on survival to the adult stage. These studies are using coded-wire tags to identify various release groups. Tags will be recovered from fisheries and on the spawning grounds.

A study was initiated in 1989 to determine the effect of smolt size on smolt-to-adult survival for Fraser River sockeye salmon. Results show that survival increases with increases in smolt size. A related study is under way to examine within population variation in first year marine growth for several major British Columbia sockeye salmon populations between 1951 and 1984 and the degree of covariation in early marine growth among populations.

**MARINE DEBRIS**

Canada continued to monitor the North Pacific Ocean in 1989 for presence and location of marine debris. Approximately 140 hours of sighting effort were made during the cruise of the *Arctic Harvester* in the North Pacific Ocean (McKinnell et al. 1989). This effort produced many sightings of debris, particularly styrofoam and plastic fishing floats. A large piece of tangled driftnet was also sighted and retrieved during the cruise. The beaches and coastal waters of British Columbia were also surveyed in 1989 for the presence of lost and discarded fishing gear (Hargreaves and Carter 1989). Eighty-nine separate sightings of lost or discarded driftnet were reported through September 1 in 1989 compared to 6 sightings in 1988 and 25 sightings in 1987. There was no evidence of fish, sea birds or marine mammals in the gear located in 1989. The increase in incidence of sightings in 1989 was at least partially due to an increase in effort devoted to locating the gear. The construction of the driftnets located in 1989 indicated that they were probably from one of the Asian squid fishing fleets.

**LITERATURE CITED**


**NON-ANADROMOUS SPECIES**

The Groundfish Section continued to emphasize multispecies and inter-disciplinary studies in 1989 (Beamish and McFarlane 1989; Beamish et al. 1989; Hay et al. 1989; Ware and McFarlane 1989). Stock assessments with yield recommendations were authored by all major investigations and edited into a single document (Fargo and Tyler 1989). Reports of activities by Program are listed below.

**FLATFISH**

The annual cycle of ovary development was monitored for English sole in the Charlotte Area. This study was initiated in 1986 and has involved several cruises (e.g. Foucher et al. 1989). Preliminary results indicate a fall (Sept.-Oct.) spawning period with an estimated oocyte maturation time of one year. Other work on English sole included validation of the break and burn ageing technique and determination of the instantaneous natural mortality rate at M = 0.30. In addition, recruitment mechanisms were examined using a simulation model that incorporates ocean temperature at the time of spawning (Kruse and Tyler 1989). Another model was developed for exploring year-class production of rock sole in the Charlotte Area. This model includes sea surface temperature at the time of spawning and stock size as independent factors (Fargo and McKinnell 1989).

Stock assessment work was completed for major commercial species. A new analysis estimated sustainable yield at 1000-2000 t for Dover sole in the Vancouver Area. Yield per recruit analysis on Hecate Strait (Charlotte Area) stocks indicated that $F_{0,1} = 0.23$ for rock sole while $F_{0,1} = 0.21$ for English sole. Yield for English sole could be increased by 30% if harvesting were restricted to age 4 and older fish, instead of to age 3 and older.
PACIFIC COD
A research cruise was completed and a port sampling series of ovaries was collected for the study of maturity stages in relation to oocyte development (Foucher et al. 1989). After spawning, oocytes in recovering fish have a modal diameter of 20 - 110 microns. By summer some of these oocytes have increased in diameter so that two modes are evident. Diameter continues to increase until February, when the eggs are released at 1.0 to 1.1 mm. In further analysis, development rates and fecundity for fish in the Charlotte and Vancouver Areas are being compared.

A new model was developed for estimating potential yields of the Charlotte Area stock. Analysis has shown that net recruitment maximizes at a parent stock size of about 4000 t. The model is dependent on recruitment estimates from length and age frequency samples, and a recruitment response-surface estimator that incorporates parent stock-size and northward transport indices. The current potential yield is estimated at 2800-4800 t. The maximum yield from the stock was near 10,000 t, two to three years after a large year-class was produced.

The consequences of known age determination errors on cod-like and rockfish-like species were explored (Tyler et al. 1989). Yield per recruit expectations increased over the true values by as much as 19% if mean size at age was poorly determined. On the other hand, potential yield was significantly underestimated when ageing errors were caused by an overestimate of the natural mortality rate.

HECATE STRAIT PROJECT (Charlotte Area)
Seasonal and annual variation in demersal fish assemblages were examined using results from two summer (1984, 1987) and one winter (1986) trawl surveys in Hecate Strait (Tyler 1989). The fourth systematic trawl survey was completed in 1989. A total of 98 hauls (96 usable) were made and length frequency data were collected for 51 demersal fish species. Statistical analysis of assemblage data is proceeding. In addition, a comprehensive analysis of stomach contents was conducted for all abundant demersal fishes (Westheim et al. 1989). Sandlance has emerged as an important food for nine of the 17 species studied.

Catch rate data for 14 prominent species were examined by weight, number, and size. Overall, species distributions were relatively stable from year to year. Seasonal bathymetric migrations were observed for Dover sole and Spiny dogfish. Pacific cod underwent a dramatic increase in abundance between 1984-1987, and Arrowtooth flounder and rock sole also appeared to be increasing in abundance. In contrast, Pacific sanddab and rex sole showed remarkable stability in their abundance and distribution over the study period.

SABLEFISH
For the fifth year, a survey determining the relative abundance and distribution of pelagic sablefish larvae was conducted during April in the Vancouver Area. A species interaction trawl survey was continued in August to assess the impact of sablefish on hake and herring stocks in the La Perouse region of the Vancouver Area (similar to Shaw et al. 1989b). A coastwide survey of sablefish was conducted in November. The biotic and abiotic factors controlling year-class success were also examined.

Larval sablefish rearing studies were continued. Both gametes collected at sea and those from hormone induced captive brood stock were used successfully. Experiments were conducted to determine the appropriate time of presentation, size, density, and type of food organisms required to successfully bring sablefish through the larval stages.

PACIFIC HAKE
Monitoring and biological sampling of Pacific hake in the Vancouver Area was continued through an extensive offshore observer program. A hydroacoustic survey of offshore hake biomass in the La Perouse region of the Vancouver Area was conducted and the northern extent of the hake summer distribution examined. Hake were found along the 200 m contour extending into Queen Charlotte Sound. Hydroacoustic and swept-volume trawl estimates were also determined for hake in the Strait of Georgia during March 1987.

A species interaction trawl survey (similar to Shaw et al. 1989b) was conducted in August to assess the impact of Pacific hake and other predators on herring survival and recruitment.

SPINY DOGFISH
Processing and analysis of dogfish tag recoveries continued (Smith et al. 1989). The purpose of this experiment is to assess long-term movements, in particular the rate of exchange between the Strait of Georgia and offshore stocks. A longline survey of dogfish abundance in the Strait of Georgia portion of the Vancouver Area was conducted in October.

WALLEYE POLLOCK
Swept-volume trawl and hydroacoustic abundance estimates were determined for pollock in the Strait of Georgia, during March 1987 (Shaw et al. 1989a). Evidence for delineation of pollock stocks in Canadian...
waters was summarized (Saunders et al. 1989).

**ROCKFISH**

Field studies in 1989 included a synoptic sampling cruise for Pacific ocean perch and other slope rockfishes, similar to a 1988 cruise for shelf rockfishes (Gillespie and Stanley 1989). Systematic samples of Pacific ocean perch gill parasites were collected for examination of the seasonal stability of parasite characteristics, used for stock identification. Additional samples were collected from the Charlotte Area for morphometric analysis, to determine if separate substocks exist off the west coast of the Queen Charlotte Islands. Silvergray rockfish from the Charlotte Area were collected for determination of age- and weightspecific fecundity relationships. Yellowtail rockfish samples were collected as part of an ongoing stock delineation study in the Charlotte-Columbia Region. Growth rates, parasites, and electrophoresis of enzyme systems will be employed in this study.

Slope rockfishes are generally declining in abundance, although the 1976 cohort of Pacific ocean perch is recruiting in relatively greater strength than cohorts since 1969. Canary and silvergray rockfish are at low levels of abundance. The first comprehensive age-structured analysis of yellowtail rockfish was conducted on stock units in the Charlotte-Columbia Region. This analysis used a biological and statistical database compiled jointly by Canadian and U.S. agencies. Analysis suggests that recent recruitment in this area may be above average; this finding conflicts with survey results.

A study of the growth process in long-lived rockfish was completed. A generalized model of growth, incorporating both age-specific and time-specific growth changes, was developed. This model preserves asymptotic growth of individuals but accounts for the consistent appearance of older, smaller fish, through an inverse relation of growth and survival rates. A general review of life history theory pertaining to exploitation of *Sebastes* spp. was also completed, and presented to a joint U.S.-Japan symposium on rockfishes. This review stressed the need for consideration of evolved life history characteristics when exploiting these species. A species synopsis of Pacific ocean perch was compiled for inclusion in a background document on effects of global warming on fishery resources off the west coast of Canada.

A new study in 1989 examined the distribution of rockfish over hard (untrawlable) bottom in the Vancouver Area. A modified sunken gill net was used for fishing and detailed hydroacoustic measurements were also made. Rockfish species composition over hard bottom differed from that over trawlable bottom (Matthews et al. 1989a,b). These differences in species composition were also evident in hydroacoustic data collected from two areas.

**LINGCOD**

A new assessment of growth rates and population dynamics was completed for the offshore lingcod stock in the Vancouver Area (Schnute et al. 1989a,b). The analysis suggested that current exploitation rates are not impacting greatly on stock abundance. However, inshore lingcod stocks are at extremely low levels of abundance, probably due to overfishing. Evidence for the decline is based predominantly on commercial catch and effort data and is corroborated by surveys conducted between 1985-88 (Hand and Richards 1989).

**STATISTICS AND SAMPLING**

The principal activity of this Program included maintaining the groundfish catch and effort time series and collecting biological data (length-frequencies, sex, age structures, gonad condition, etc.) by sampling commercial landings. Micro-computer software is now used for processing mandatory logbooks. An interactive program was also developed for combining catch records from sales slip and interviews.

**FISH AGE DETERMINATION**

In 1989 the Fish Ageing Lab provided the Groundfish, Salmon and Herring section with ages for research and management purposes. Approximately 15,000 groundfish and 43,000 herring were aged. The ages of 7,000 salmon were assessed using 20,000 structures. The Lab continued to maintain and form new local, national and international contacts with other agencies involved in fish ageing. These included visitors from Mexico, China, U.S., and other Canadian provinces.

Groundfish projects: The presence of a natural tag on the otoliths of the large 1980 year class of the offshore Pacific hake stock was assessed for use in age validation. Age structure studies were conducted for Pacific cod and pollock, with the results presented at the fall INPFC meeting. The Pacific cod study indicated that fin rays would provide more detailed biological information than the length frequency method. The pollock study showed that different structures may be appropriate for ageing different stocks and extended the maximum age to 28 year Salmon projects: The scale resorption and fin study for chinook was continued to assess the impact of ageing error using the scale method. Multiple sockeye ageing structure samples were collected and processed from several stocks. These samples will be used to assess ageing
criteria and the significance of resorption on scales and otoliths in terms of ageing error. A preliminary structure study for coho was completed on a smolt sample, with some of known-age. The results show that both otoliths and fins (pectoral & dorsal) have good potential as accurate alternative ageing structures for this species.

Other projects: The Lab participated in two cooperative interdepartmental studies: (1) Chinook fins and scales from the Stuart and Nechako Rivers were processed and aged. The results contributed to a data report published by the Nechako River Technical Committee. (2) The ageing structures for 10 freshwater species were processed and aged for a study conducted by the Dept. of the Environment. The resulting age data were published in a report on dioxin and furan contamination by 10 B.C. pulp mills.

LITERATURE CITED


B. REPORT ON RESEARCH BY JAPAN FOR THE INTERNATIONAL NORTH PACIFIC FISHERIES COMMISSION IN 1989

Fisheries Agency of Japan
March 1989

I. SALMONIDS

1. RESEARCH ON BOARD MOTHERSHIPS

The Japanese mothership salmon fishery operated in 1989 with one mothership and 56 catcher boats in total. Thirty-two catcher boats left Hakodate on 28 May, spent 23 days (3-25 June) on the fishing grounds (southern international waters - Area 2a), conducted 21 days of fishing operations, and returned to Hakodate on 30 June. Twenty-four catcher boats left Hakodate on 18 June, spent 15 days (27 June-11 July) on the fishing grounds (northern international waters - Area 4), conducted 12 days of fishing operations, and returned to Hakodate on 20 July. During the 1989 operations, a total of 1,408 fish was measured on board two catcher boats. Because it was impossible to measure fish on the mothership due to narrow working space, the sampling was conducted on board catcher boats, and the maximum number of fish measured per day was reduced from 90 to 20 for sockeye, from 60 to 20 for both coho and chinook, and from 30 to 10 for both pink and chum. The research vessel Wakatake maru conducted investigations in the salmon mothership fishery area in 1989 in order to compensate for the decrease in the number of measurements.

2. RESEARCH ON BOARD RESEARCH VESSELS

Salmonid sampling and oceanographic research were conducted on 11 salmon research vessels (11 in 1988) in the North Pacific Ocean, Bering Sea, and Gulf of Alaska from June through early August. Drift gillnets (both commercial and variable-mesh research gear) were used by nine vessels, and longline gear was used by seven vessels for the purpose of capturing salmonids for tagging. A total of 174 gillnet sets and 243 longline operations was made. Heads of fish with missing adipose fins were retained for examination for coded-wire tags. Head samples were also collected from chinook and coho salmon for research on parasites.

3. FOREIGN SCIENTIFIC OBSERVERS ON BOARD THE MOTHERSHIPS AND RESEARCH VESSELS

In 1989, no U.S. scientific observers were on board the motherships. One U.S. scientist was on board the Shin Riasu maru. Two U.S.S.R. scientists were on board the Hokko maru to conduct Japan-Soviet joint surveys.

4. DISTRIBUTION OF SALMONIDS IN THE WESTERN PACIFIC OCEAN AND THE BERING SEA IN 1989

1989 CPUE indices obtained from variable-mesh gillnet sampling in three regions (North Pacific east and west of 175°E and Bering Sea) were compared to 1972-1988 mean values. The indices for pink salmon were about ten times higher in the Bering Sea and more than two times lower in the North Pacific west of 175°E than the mean values in past years. Chum salmon were about half as abundant as average in the Bering Sea, but abundance was higher than average in the North Pacific east of 175°E. In the North Pacific east of 175°E sockeye salmon were about three times more abundant in 1989 than the mean for previous years, but abundance of sockeye was lower than average in the Bering Sea. The abundance of coho salmon was somewhat lower than average in both areas of the North Pacific, and the abundance of chinook salmon was generally similar to the 1972-1988 mean for all three regions.

5. RELEASE AND RECOVERY RESULTS OF TAGGED FISH

A total of 6,790 salmonids (142 sockeye, 2,750 chum, 2,227 pink, 1,529 coho, 67 chinook salmon and 75 steelhead) was caught and tagged in 1989. Most of the 1989 releases occurred south of 46°N between 160°E and 175°W. A total of 45 new tag recoveries was reported, of which 8, 34, and 3 were made in 1989, 1988, and years prior to 1988, respectively. Results for each species are summarized below.

Sockeye salmon
Four new recoveries of sockeye salmon included one high seas recovery, one maturing fish released in the Gulf of Alaska and recovered in British Columbia, and two maturing fish released in the western North Pacific and recovered in west Kamchatka.

Chum salmon
All four 1989 recoveries of chum salmon were made on the high seas. The additional 26 coastal recoveries in 1988 and previous years included 22 caught in Japanese coastal areas - 15 from releases of maturing fish in the
Bering Sea and seven (3 immature, 4 mature) from the North Pacific, one maturing fish released in the central Bering Sea and recovered in the Tatana River, near Nenana, Alaska, two released as immature fish in the North Pacific and recovered in west Kamchatka and Sakhalin, and one maturing fish released in the North Pacific and recovered in the Kol River, Sakhalinsky Bay, U.S.S.R.

**Pink salmon**

Four new recoveries of pink salmon included one released and recovered at the same location in the Bering Sea, one recovered in the ocean off the southern tip of the Kamchatka Peninsula, and two recovered in east Kamchatka from releases in the western North Pacific.

**Coho salmon**

In 1988 six coho salmon tagged in the central North Pacific in late June and early July were recovered in east Kamchatka in the Avacha River (2 fish), Ust'-Kamchatka (2), and the Kamchatka River (2).

**Steelhead trout**

One steelhead released in the central North Pacific (42°30'N, 176°30'W) in June 1988 was recovered in the Sol Duc River, Washington.

6. **OTHER STUDIES ON DISTRIBUTION AND ORIGIN**

(1) Scale pattern analysis

A maximum likelihood procedure was used to estimate the proportions of Asian and North American coho in offshore samples collected in 1985. Scale samples collected by Japanese salmon research vessels in the North Pacific west of 160°E in June and west of 165°E in July 1985 were used as the Asian standard. Scales of mature coho from five Alaskan rivers in 1985 were used as the North American standard. The estimated proportions of Asian fish in the offshore samples (689 age 2.1 fish collected at 42°N-54°N and 160°E-155°W in June-July) were 71.9-98.5% at 42°N-46°N and 160°E-175°W in June, 74.1-96.6% at 42°N-52°N and 175°E-180° in July, and 16.2% at 46°N-54°N and 160°W-155°W in July.

In 1986, Cluster analysis was used to determine sets of 1986 scale pattern variables that best grouped samples of age 0.3 and 0.4 chum from Japan (7 locations), U.S.S.R. (9 locations), and North America (17 locations). The results indicated that four sets of scale pattern characters, (L1, L2), (L1, L2, L3), (C1, L1, C2, L2), and (C1, L1, C2, L2, C3, L3), of age 0.3 fish and one set of characters (L1, L2) of age 0.4 fish provided clusters that corresponded closely to the two major geographical areas, Asia and North America.

An evaluation of the precision of stock composition estimates requires the consideration of two sources of sampling error, i.e., that of the baseline data and that of the mixed fishery data. The precision of maximum likelihood estimates has been evaluated by the following methods: (1) asymptotic covariance matrix derived from Fisher's information matrix, (2) simulation or bootstrap resampling, and (3) infinitesimal jackknife. Methods (1) and (3) account only for variability in the mixed sample. Method (2) can account for both types of variability, but requires a considerable amount of computing. The authors expanded on method (1) and derived a variance estimator that includes both sources of error.

(2) Chinook parasite studies

Two brain myxosporean parasites, *Myxobolus arcticus* and *M. neurobius*, were used as biological tags to identify the continental origins of chinook caught on the high seas (40°N-58°N, 146°E-137°W) in 1988. Of 498 fish examined from the high seas samples in 1988, 142 (28.5%) were infected with *M. arcticus*, and *M. neurobius* was not found. Based on the geographical distribution of chinook infected with *M. arcticus* in the North Pacific and Bering Sea in 1988, the authors concluded that immature fish of Asian origin were widely distributed in the North Pacific west of 157°W, and that maturing Asian fish were caught as far east as 178°30'W during the early summer. At least 50% of catches in the North Pacific south of 50°N and west of 170°W were estimated to be of Asian origin.

7. **OTHER STUDIES ON SALMONIDS**

(1) Study of the effectiveness of "barbless hooks"

As recommended by the 1988 Sub-Committee on Salmon, a study of the effectiveness of barbless hooks in reducing hooking injury to the fish and in increasing the number of fish released during tagging operations was conducted aboard a Japanese salmon research vessel in 1989.

(2) Study of the fish with missing adipose fins

No fish with a missing adipose fin were found in the catches of 20 salmon fishing vessels which landed at Hanaaki Port in June 1989.

(3) Behaviour studies

A study of short-term variation in swimming (horizontal direction) of sockeye and chum salmon was conducted on board a Japanese research vessel in the central Bering Sea (55°N-60°N, 178°E-173°W) from mid-June to early July in 1988.
A study of daily variation in feeding of sockeye and chum salmon was based on the analysis of stomach contents of fish caught at eight different times of day during research gillnet surveys in the central Bering Sea from mid-June to early July, 1987-1988.

A tracking survey using biotelemetry was conducted on board a Japanese salmon research vessel from 12 June to 5 July 1989 in the North Pacific Ocean (43°N-46°N, 175°W-177°W). A depth information transmitter was attached to one chum and 4 coho salmon and the fish were tracked for about 58, 21, 38, 24, and 133 hours, respectively. Data on horizontal and vertical behaviour were collected.

(4) Forecasting study on salmon returns

The possibility of forecasting salmon returns by correlating CPUE values obtained from commercial-type gillnet operations of Japanese salmon research vessels (1972-1988) with the numbers of salmon returning to coastal areas or with the coastal catch was examined. Based on these results, the authors pointed out the necessity of test fishing in areas that are considered important for forecasting (two out of three areas in June and one out of three areas in July are within the U.S. 200-mile zone).

(5) Shumagin/Unimak studies

Based on the results of tagging experiments conducted by the Alaska Department of Fish and Game in 1987, the interception of Japanese chum by the U.S. fishery in Shumagin/Unimak waters in June was estimated. Because Japanese chum salmon would have experienced a longer period between release and capture than North American chum, time-dependent mortality and tag shedding were taken into consideration in this analysis. Estimated stock proportions of Japanese chum were 0.9-7.9% in Unimak waters and 18.4-35.3% in Shumagin waters. The results corresponded fairly well with the results of a previous scale pattern analysis. The average number of Japanese chum caught by the U.S. fishery in 1980-1988 was estimated to be 4,000-114,000 in Unimak waters and 17,000-53,000 in Shumagin waters (a total of 21,000-167,000).

8. Oceanographic Research

Oceanographic conditions in the northwestern Pacific Ocean in summer 1989 were monitored during salmon research vessel operations. Observations were made at 214 stations in June and 176 stations in July. The southward and eastward extension of the Western Subarctic Water (defined as having temperatures of 3°C or less at 100 m depth) was weaker than normal in both June and July. Surface water temperature was normal in June, but somewhat lower than previous years in July.

II. RESEARCH ON MARINE MAMMALS CAUGHT INCIDENTALLY BY SALMON GILLNET FISHERIES.

1. COLLECTION OF INFORMATION ON INCIDENTAL CATCH OF MARINE MAMMALS

(1) Mothership salmon gillnet fishery

There were 960 catcher boat operations (316,454 tans) conducted during the 1989 mothership salmon fishery which occurred outside the U.S. 200-mile zone, with 49 Dall's porpoise taken incidentally (43 in the southern and 6 in the northern mothership salmon fishery area).

(2) Landbased salmon gillnet fishery

In the land-based salmon gillnet fishery, 781,176 tans were used and 282 Dall's porpoise were taken incidentally.

(3) Salmon research vessels

Nine salmon research vessels caught 3 Dall's porpoise and 3 northern fur seals during 174 gillnet operations (13,847 tans) from June to August.

2. COLLECTION OF BIOLOGICAL SAMPLES OF DALL'S PORPOISE

No biological samples were collected from porpoise caught by the mothership fishery. Fourteen Dall's porpoise (13 dalli-type and 1 truei-type) were collected from the land-based salmon driftnet fishery, and brought to Kushiro port as frozen samples. Biological measurements for those specimens were made, and cranial bones, teeth, gonads, etc. were collected. One salmon research vessel brought back two Dall's porpoises, and measurements and sampling similar to that in the landbased fishing area were obtained.

3. SIGHTING SURVEYS FOR ESTIMATION OF ABUNDANCE OF MARINE MAMMALS

Eleven salmon research vessels and a dedicated vessel for marine mammal research carried out 390 days of sighting surveys (28,000 miles).

4. RESULTS OF ANALYSIS ON SIGHTING SURVEYS OF MARINE MAMMALS CONDUCTED IN 1989

Sighting surveys for marine mammals were conducted by Japan using four research vessels in the North Pacific Ocean between 30°N and 45°N latitude from the Pacific coast of Japan to the US 200 mile zone during August and September 1988. The objective of the cruises was to obtain information on the distribution
and abundance of marine mammals. Usually two researchers and 2 to 10 crew members were on watch at any one time on each vessel. The angle from observer to animals was estimated by angle boards; distances less than 0.5 nm were estimated by eye, while greater distances were estimated by the speed and time of closing to animals. On- and off-effort sightings are included in the analyses of the range of each species. During 13,556 nm of systematically placed transects, nineteen species of marine mammals were recorded. The surface water temperatures in the surveyed area ranged from 10°C to 28°C. Dall's porpoises were the dominant marine mammals north of 40°N. Northern right whale dolphins, Pacific white-sided dolphins and northern fur seals occurred in the southern range of the surveyed area, in surface water temperatures below 22°C. Dall's porpoise occurred in the coldest temperatures. The area south of 40°N was inhabited by common dolphins, striped dolphins, spotted dolphins, spinner dolphins, short-finned pilot whales, and Risso’s dolphin, in temperatures over 18°C. Pilot whales occurred at the warmest temperatures. Cetacean species were sighted at temperatures 3° or 4° higher in the western Pacific than in the eastern Pacific Ocean. This possibly reflects the difference in the sub-surface oceanographic structure, as the thermocline is closer to the surface and has a sharper gradient in the western Pacific Ocean. Some cetaceans appeared to be concentrated in certain areas, suggesting the presence of separate stocks.

III. GROUNDFISH RESEARCH

1. RESEARCH ON BOARD COMMERCIAL VESSELS

Pollock were sampled for size composition on board North Pacific trawlers and landbased dragnet vessels which fished in the Bering High Sea in 1989, and frozen samples and structures for aging (otoliths and scales) were collected for subsequent study.

2. GROUNDFISH RESEARCH ON BOARD RESEARCH VESSELS

(1) The Bering Sea and Aleutian Islands Region

Japan conducted the following three research activities on groundfish resources in 1989 using a research vessel of the Fisheries Agency of Japan and chartered commercial vessels:

(a) Longline survey on groundfish stocks

Japan conducted for the first time surveys on groundfishes stock using on-bottom longline jointly with the U.S.S.R. within the U.S.S.R. waters during winter and autumn, 1989. The winter survey was conducted by chartered North Pacific longliner, Fukuyoshi maru No. 26 and the autumn survey was also conducted by a chartered vessel, Ebisu maru No. 88. The winter survey was conducted in the area from Cape Navarin to waters off Cape Olyutorskii from January 10 to February 19, 1989, and the autumn survey was conducted in Anadyr Bay and off Cape Navarin. The objectives of the surveys were to collect information on distribution, abundance and body length composition, etc., of groundfish stocks on the outer continental shelf and continental slope (depths between 100 m and 1,000 m) in the area from Navarin to Olyutorskii within the U.S.S.R. 200 miles zone. In addition, the observations of water temperature by XBT, the observations of speed and direction of current by supersonic current meter, and the observations of weather conditions, oceanographic conditions, and sea ice were made, to collect information on the ocean environment and fishing grounds.

This research was designed to be comparable to the results obtained from the Japan-U.S. joint longline survey which has been conducted within the U.S. 200 miles zone of the eastern Bering Sea since 1982. Therefore, the method used for the research was basically the same as the method which has been established by the Japan-U.S. joint longline survey.

According to the results of research conducted during January and February 1989, Pacific cod were found to be the dominant species to depths of 500 m while the giant grenadier was dominant in catches at greater depths. In contrast to this, the number of sablefish and Greenland turbot caught during the survey was only 57 and 61, respectively, abundances of these species were extremely low.

The results of research conducted during January and February 1989 indicated that the abundance of Pacific cod in the area surrounding Cape Olyutorskii had a tendency to be slightly higher in number of fish and weight of catch than that in the Navarin-Olyutorskii area. The abundance in depths between 100 m and 200 m was greatest, and the abundance decreased with depth, and no distribution of Pacific cod was observed in depths of 500 m and deeper. The highest abundance was observed in depths between 100 m and 200 m of the area surrounding Cape Olyutorskii (20.19 fish/hachi) (86.6 kg/hachi).

According to the results of research conducted in October, 1989, the abundance of Pacific cod in both numbers of fish and weight of catch was greatest in depths between 100 m and 200 m off Cape Navarin, and no distribution of Pacific cod was observed in depths of 400 m and deeper. The abundance of Pacific
In comparison with the average body length in depths between 100 m and shallower which spread out mainly in Anadyr Bay was 6.75 fish (27.7 kg)/hachi, and although no large difference was observed between this value and 7.88 fish/hachi in depths between 100 m and 200 m which spread out in outside of the Bay, the weight was fairly low indicating that the length composition of Pacific cod which live mainly in the Bay had a tendency to be slightly smaller than the length composition of Pacific cod which live outside of the Bay.

In comparison with the abundance of Pacific cod in waters off Anadyr-Navarin obtained in October 1989, and the results obtained from Japan-U.S. joint longline surveys conducted in the eastern Bering Sea during the summer of 1988, the abundance of Pacific cod in the Anadyr-Navarin area, the number of fish was lower than that in the eastern Bering Sea, but the weight was almost the same as that of Pacific cod in a partial area of the eastern Bering Sea.

The length composition of Pacific cod caught during the January and February surveys in 1989 ranged from 32 cm to 106 cm, the mode was 62 to 64 cm, and the average length was 62.5 cm. In addition to this, the average body weight by fish was 3.40 kg. By sub-area, the proportion of large-sized individuals in the length composition in the area surrounding Cape Olyutorskii was greater than that in the Navarin-Olyutorskii, and the average length of Pacific cod in the area surrounding Cape Olyutorskii was 64.7 cm and the average weight in the Navarin-Olyutorskii area was 61.6 cm. This difference was also observed in the average body length, the average body weight of Pacific cod in the area surrounding Cape Olyutorskii was 3.81 kg and was considerably heavier than that (3.24 kg) in the Navarin-Olyutorskii area.

The length composition of Pacific cod caught during the October survey in 1989 ranged from 34 cm to 108 cm, and the mode was 66 to 68 cm, and the average length was 69.1 cm. The average body weight was 4.54 kg. In comparison with the results obtained from the January and February surveys in 1989, the proportion of large-sized fish obviously increased substantially. By depth, the average body length of Pacific cod in depths of 100 m and shallower in the Bay of Anadyr and depths between 200 m and 300 m was 64.1 cm and 64.4 cm, respectively, but the length composition in mid-depths between 100 m and 200 m was mostly for large-sized fish which have modes from more than 60 cm to 70-72 cm, and the average body length was 73.4 cm and the average body weight was 5.22 kg. In comparison with the average body length in depths between 100 m and 200 m during January and February 1989, the average body length in depths between 100 m and 200 m obtained from the survey conducted in October 1989 was about 10 cm larger than that. This difference was not explained by growth rate of Pacific cod from March to September the large-sized fish observed in October were considered to be distributed in waters off the area surveyed.

In comparison with the length composition of Pacific cod in two areas of the northwestern (U.S.S.R. area) and eastern (U.S.A. area) Bering Sea, the proportion of the small-sized fish was slightly greater than that in the eastern Bering Sea, and the average length and average body weight of Pacific cod was 62.5 cm (3.40 kg) in the northwestern Bering Sea and 64.7 cm (3.71 kg) in the eastern Bering Sea. The length composition obtained from the surveys in the northwestern Bering Sea conducted in October 1989 was different from the length composition obtained from the surveys conducted during January and February 1989, and the proportion of large-sized fish was considerably higher than that in the eastern Bering Sea.

The Japanese-U.S. joint longline surveys which had been conducted in the eastern Bering Sea and Aleutian Islands region in the past, was conducted by the North Pacific longliner Tsune maru No. 31 in 1989. However, it was decided that this survey would be conducted by the Alaska Fishery Science Centre, National Marine Fisheries Service, U.S. Department of Commerce alone, and it was decided that the Fisheries Agency of Japan would not be directly involved in this survey.

(b) Cooperative winter U.S.-Japan acoustic midwater trawl survey of pelagic pollock in the Aleutian Basin

The Japanese research vessel Kaiyo maru, Fisheries Agency of Japan, conducted the surveys on pollock stock of the Aleutian Basin from December 1988 to March 1989. This survey was conducted in a manner which used jointly the acoustic survey and midwater trawl survey. This survey was conducted as a joint survey by the U.S. and three concerned organizations: scientists from Canada, Poland, and the People's Republic of China, in addition to the U.S.A. participants.

During the survey, a total of 24 sampling operations by the midwater trawl net was conducted. Almost all samples were pollock. Although pollock were collected at almost all stations, the catch per hour towing was extremely high in the Bogoslof Area of the north side of Umnak Island, and was fairly low in the high sea areas. Although CPUE values were low, even in the Basin within the U.S. 200 miles zone other than the Bogoslof Area, and there was no difference from that in the high seas, but relatively high CPUE was observed.
in the area adjacent to the continental shelf in the eastern Bering Sea and on the north side of Atka Island in the Aleutian Islands.

The body length of pollock in the Aleutian Basin ranged from 34 cm to 60 cm, the mode was 48 cm to 49 cm. The mode of females was 50 cm to 51 cm, and the mode of males was 48 cm to 49 cm, and was slightly smaller than that of females. In comparison with the length compositions of pollock which combined male and female in high sea areas and in waters within the U.S. 200 miles zone, the mode and average length of pollock in the high seas was 47 cm to 48 cm and 48.0 cm, respectively, and was slightly smaller than the mode (48 cm to 49 cm) and average length (48.4 cm) in the U.S. 200 miles zone. Pollock less than 40 cm in length which occurred slightly within the U.S. 200 miles zone of the Basin were caught in waters adjacent to the continental shelf.

Of a total of 744 individuals which were examined for stomach contents, 54% had empty stomachs. Judging from the stomach contents of 341 individuals in which stomach contents were examined, the frequency of occurrence of euphausiids was greatest (54%), followed by squids (16%).

During the surveys, ripe and running pollock were collected only at the north side of Umnak Island. Although almost all male fish were in the maturing stage and 80% of female fish were in the prematuring stage. From a changing tendency of GSI value and maturing stage, spawning of pollock in the Aleutian Basin in 1989 was estimated to be initiated in the southeastern Aleutian Basin around late February.

Although the inter-ship calibration of quantitative echo sounder system was conducted with the U.S. research vessel Miller Freeman three times, only one survey was effective, due to weather conditions. However, the estimate of density rate of the systems of both countries was in agreement with 0.89, and the effectiveness of both systems was confirmed.

Analysis of data obtained by the quantitative echo sounder system is now under way at the National Research Institute of Fisheries Engineering.

(c) Cooperative summer Japan-U.S. acoustic midwater trawl survey of pelagic pollock in the Aleutian Basin

A survey was conducted with the purposes of estimating biomass and obtaining information on the biology of pollock distributed in the Aleutian Basin and on the continental shelf during the summer, measuring the water temperature of the environment, and collecting zoo-plankton. The survey used jointly the mid-trawl and quantitative echo-sounder system as used in the previous year. Japan conducted a comprehensive test of the quantitative echo sounder system using the chartered land-based dragnet trawler Seiju maru No. 28 off Hachinohe in mid-July, as used in the previous year, and after favourable results were obtained, the research vessel conducted surveys in the eastern Bering Sea from mid-July. In addition, this survey was conducted jointly with the National Research Institute of Far Seas Fisheries, National Research Institute of Fisheries Engineering and the Alaska Fisheries Science Centre, U.S. Department of Commerce.

Data collected are now being analyzed by Japan and the U.S.

(2) The Northeastern Pacific Ocean

Japan did not conduct surveys for groundfish in the northeastern Pacific Ocean in 1989.

Although the longline surveys which had been conducted by Japan and the U.S. jointly in the Gulf of Alaska since 1979 are now under way using the North Pacific longliner Tsune maru No. 31 in 1989 by exactly same scale as used in the previous year, it was decided that the survey would be conducted by the Alaska Fishery Science Centre, National Marine Fisheries Service, U.S. Department of Commerce alone, and the Fisheries Agency of Japan was not directly involved in this survey.

IV. RESEARCH ON SQUIDS IN THE OPEN SEA

1. SURVEYS ON FISHING ACTIVITIES

The Fisheries Agency of Japan received reports on catch from 463 squid driftnet fishing vessels in 1988, and 460 squid driftnet fishing vessels in 1989. In 1989, scientific observers who were on board 32 squid driftnet fishing vessels, engaged in the collection of data and samples on the catch of squids and incidental take of fishes, marine mammals, seabirds, and sea turtles of each fishing vessel in the areas of 35° to 46°N, 170°E to 145°W from June to November. Data collected were compiled by the computer, and CPUE (catch number per tan) values by 10 days by month, by area and by water temperature are now being calculated for major species. The samples collected are now being analyzed by the research organizations concerned.

2. RESEARCH ON BOARD RESEARCH VESSELS

Squid sampled by the surveys of four research vessels, Shoyo maru, Kanki maru No. 3, Hoyo maru No. 78, and Hokuho maru in 1988 were analyzed. For flying squid, it is known that there are generally four different length composition groups (extra large, large, small, and extra small), and a characteristic distribution
was recognized by the size of body length and by sex and in south to north direction. That is to say, the small size group which consists of over a half of the total catch occupied mainly waters south of 42°N during June and July, and the large size group (mostly female) occurred abundantly in waters north of 42°N. During August and September, a similar tendency of distribution was shown, but small size group and extra small size group only occurred in each station of 42°N, southernmost of areas surveyed, and in waters north of 42°N, large-sized individuals occurred more frequently in areas further to the north. The proportion of the catch (in number) of extra small size group and small size group (88%) increased in waters south of 43°N during October and November, and extra large size group scarcely occurred all through the areas surveyed. Judging from the relationships with oceanic conditions, flying squids were mainly distributed in waters where water masses of 10°C and higher reached to waters of 40 m to 200 m and deeper. Based on the analytical results, it is considered that water masses of 10°C and higher in the surface and mid-layers determine the distribution of flying squids.

For the flying squid survey in 1989, a total of 4 research vessels, Hokuho maru, Wakatori maru, Shoyo maru, and Kanki maru No. 3 engaged in the surveys. The survey period was 200 days, almost the same as the previous year. Of those, data on squid obtained from the surveys conducted by two research vessels, Hokuho maru and Wakatori maru were analyzed. In the surveys on spawning of flying squid conducted by Hokuho maru, larvae of flying squid and mature squid were collected in the northwestern Hawaiian Islands during April and May. In addition, based on the results of the survey on catch by time period conducted by Wakatori maru during July and August, no difference of catch by time period such as evening to midnight and midnight to dawn was not recognized. Shoyo maru conducted a survey on distribution of flying squid and salmonid in areas surrounding to the new northern limit line. In addition, Kanki maru No. 3 conducted a survey on catch by driftnets set at 3 m depth from the sea surface, and according to the preliminary analysis, CPUE of flying squids at 3 m depth from the surface was the same as at the surface and the incidental take of Pacific pomfret and seabirds observed was low. The detailed analytical results obtained from Kanki maru No. 3 is scheduled to be reported at the 37th INPFC Annual Meeting.

In the surveys on research vessels in 1988 and 1989, few salmonids were caught. Salmonids caught were mainly chum and coho salmon. Pink, steelhead, chinook and sockeye salmon were also caught incidentally. In 1988, most salmonids were caught in waters north of the northern limit line of the squid driftnet fishery, and there was no substantial catch of flying squid with salmonids in the same area. That is to say, flying squids were distributed in waters where water masses of 10°C and higher reached to waters of 40 m to 200 m and deeper, while salmonids were distributed in waters where water masses of 10°C and higher does not exceed 40 m depth and where water masses of 3°C to 6°C reached to 50 m to 100 m and deeper. In the surveys conducted during July to August 1989, the surveys on catch were conducted at 14 stations and 127 chum and 4 coho salmon were caught in waters north of the northern limit line, but the distributions of salmonids and flying squid were almost separate at a border of 13°C of surface water temperature. Furthermore, based on data obtained by the research vessels in the past 10 years, the distribution of salmonids and flying squids in waters surrounding the new northern limit line for the squid driftnet fishery were analyzed. In waters surrounding the new northern limit line which was established for the purpose of expanding the fishing for large-sized flying squid during July and August, flying squids were distributed differently than salmonids, and salmonids mainly occurred in waters north of the new northern limit line. Therefore, the distribution of salmonids in waters south of the newly established northern limit line was estimated to be negligible.

Marine mammals caught incidentally by the flying squid research vessels in 1988 were five Northern fur seals, and of these, three Northern fur seals were immediately released because they were alive. In addition, one Dall's porpoise, two common dolphins, and two Northern right whale dolphins were dead when caught. In 1989, Wakatoi maru caught 4 Northern fur seals (2 alive, 2 dead) and 2 Pacific white-sided dolphins.

V. STUDY ON MARINE DEBRIS

1. SIGHTING SURVEY ON MARINE DEBRIS

In 1989, the Fisheries Agency of Japan conducted sighting surveys on marine debris using a total of 45 vessels. They were research or inspection vessels of the Agency, training ships of fisheries high schools and universities and commercial cargo vessels. The survey area was mainly the North Pacific Ocean and was extended to the Sea of Japan, the Yellow Sea, the East China Sea, the Bering Sea, the South Pacific Ocean and the Antarctic Ocean as well. The sighting distance was approximately 220,000 nautical miles in total, and a total of about 31,499 marine debris were found. The component ratio of marine debris found was styrofoam
(26.0%), other plastics (21.5%), sea weed (20.7%), fishing gear other than nets (12.0%), drifting logs (5.6%), pieces of wood (5.2%), glass products (2.4%), metals (1.4%), fishing nets (0.7%) and others (4.4%), and these values were almost the same as in other years.

2. DISTRIBUTION AND ABUNDANCE OF MARINE DEBRIS RELATED TO NORTHERN FUR SEALS IN THE NORTH PACIFIC OCEAN AND BERING SEA

The Fisheries Agency of Japan conducted sighting surveys on northern fur seals and marine debris using the research vessel Shunyo maru (393 GT) in the North Pacific Ocean and Bering Sea from June 3 to August 11, 1989. During all survey periods, 44 pieces of fishing net (gillnet: 10 pieces, trawl net: 33 pieces, mixed gillnet and trawl net: 1 piece) and 4 pieces of rope were collected in the North Pacific Ocean. Almost all pieces of trawl net observed were concentrated in the northeastern Hawaiian Islands. The results endorsed that of computer simulation which showed an eddy of the surface current in this area. Although flying fish (4), shark (1), and unidentified fish (5) were entangled to these pieces of fishing net, no entanglement of sea turtles and northern fur seals, etc. was observed.

3. SURVEY ON MOVEMENT OF FISHING NETS AFTER THEY ARE LOST

The Fisheries Agency of Japan conducted the following surveys using the chartered research vessel Kanki maru No. 3 (247 GT) for a total of 65 days from May 8 to May 22 and from June 12 to July 14, and from June 15 to June 31 in 1989 in waters of 27° to 45°N, 146° to 176°E in order to determine the actual conditions of "ghost fishing".

(1) Changes in the shape of nets

The Fisheries Agency of Japan conducted surveys on shape changes of experimental nets (40 tons of gillnet knitted with 115 mm nylon monofilament thread). It was observed that the length of experimental net generally has a tendency to become shorter, as time passes, and it is considered that the released net starts forming a lump 3 days after the net is casted. In addition, the size of lump changes smaller exponentially as time passes.

(2) Tracking the driftnet

Experimental nets released in the northeastern waters off the Ogasawara Islands generally moved in an anti-clockwise direction with an eastward component to the movement. The average drifting speed after 42 days was about 10 nautical miles/day.

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C. REPORT ON RESEARCH BY THE UNITED STATES FOR THE INTERNATIONAL NORTH PACIFIC FISHERIES COMMISSION IN 1989

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March 1989

INTRODUCTION

Research conducted by the United States on fisheries resources within the INPFC Convention area in 1989 that are of particular interest to INPFC are summarized here.

HIGH SEAS SALMONID RESEARCH

High Seas Sampling, Tagging, and Tag Recovery

In 1989 the U.S. and the U.S.S.R. cooperated in a high seas sampling and tagging program that was similar to the programs of 1983-1986 and 1988 (Walker et al. 1989). A purse seine vessel was used for capture of fish for tagging. In 34 sets of the purse seine, 403 salmon (47 sockeye, 243 chum, 106 pink, 5 coho, and 2 chinook) were tagged. Approximately 21% of the tagged fish were released southwest of 46°N, 175°W in April-June, 50% were released northwest of 46°N, 169°W in May-June, and 29% were released near the Shumagin Islands (55°N, 159°W) in July. Fourteen U.S.-U.S.S.R. high seas salmonid tags were returned between October 1988 and September 1989 (Myers 1989). One recovery in Nyisky Bay extended the known southern range of immature North Sakhalin chum salmon from 43°30'N to 43°03'N.

A U.S. scientist participated in the cruise of the Japanese research vessel Shin riasu maru during June-July 1989 (Davis 1989). Twenty-five longline sets were made in the North Pacific Ocean southwest of 46°N, 173°W and the catch was 1,284 salmonids. Seventeen steelhead trout missing the adipose fin were caught, and one carried a coded-wire tag. An overall average of 53% of the salmonids caught were tagged and released. This percentage was substantially higher than the 31% reported by this vessel last year. Observations on short term hooking mortality of chum salmon showed that 100% (n=18) of lightly hooked fish survived for at least 23 hours after tagging. Among fish that were deeply hooked, 65% (n=23) without the hook removed and 80% (n=5) with the hook removed survived for at least 23 hours after tagging. Shipboard experiments to determine if a wire tag detector could reliably determine the presence of coded-wire tags in the snouts of salmon showed that the detector worked with 100% reliability.

Effects of Treaty Changes on High Seas Salmon Fisheries

A doctoral dissertation on the effects of the U.S.S.R.-Japan Treaty and the North Pacific Treaty on Japan's high seas salmon fisheries was completed (Harris 1989). The study includes: (1) a description and history of the Japanese high seas salmon fisheries and of the international conventions affecting them, (2) a review of catches, fishing effort, and CPUE by the high seas salmon fisheries, (3) a compilation of information on abundance of regional stocks around the Pacific Rim for all five major salmon species, (4) a summary of the INPFC salmon research program to determine origins of salmonids in the Japanese high seas fishery area, (5) estimates of the high seas fisheries' catches of North American sockeye (1972-1984) and analysis with respect to 1977-78 changes in the regulatory regime, and (6) assessment with respect to the 1986 North Pacific Treaty Annex revision and its 1991 renegotiation.

Steelhead Trout Studies

Steelhead trout caught in the North Pacific Ocean during June-July 1984-1987 were examined for one or both of two parasites, Plagioporus shawi and Nanophyetus salmincola, which indicate U.S. Pacific Northwest (Washington to northern California, including Idaho) origin of the fish (Dalton 1989a). The estimated frequency of fish infected with P. shawi was 6% (22 of 396) in 1984 and 1% (5 of 562) in 1985. The estimated frequency of fish infected with N. salmincola in 1984-1987 was 27% (22 of 83), 36% (100 of 277), 45% (140 of 311), and 54% (114 of 211), respectively. The overall annual prevalence (90% Confidence Interval) of N. salmincola in the central North Pacific steelhead population was 45% (30-61%) in 1986 and 53% (43-63%) in 1987. A t-test indicated no significant difference in this annual prevalence.
Probable infection prevalence ranges for adult steelhead from the U.S. Pacific Northwest and from North America as a whole were 58-63% and 47-51%, respectively (Dalton 1989b).

Steelhead catch and effort data from Japanese salmon research vessels were used in combination with commercial (landbased and mothership) effort data to estimate the average number of steelhead caught by the Japanese high seas commercial salmon fleets in 1981-1986 (Light 1989a). These estimates were then compared to the observed catch of the mothership fleet and the reported catch of the landbased fleet to evaluate the accuracy of the reported catches. The average number of steelhead returned to motherships for sampling by U.S. foreign fishery observers in 1984-1986 (298 fish) was only 28% of the estimated average (1,056 fish), indicating that observed catches may not be reliable. Average reported catches for the landbased fishery in 1981-1986 (19,511 fish) were 89% of the expected average catches (21,591 fish). Estimated catches may not be comparable to reported catches because of low abundance of steelhead in the fishery areas and differences between research and commercial fishing effort.

Information on the number of steelhead smolts released annually (1960-1987) from hatchery production facilities along the Pacific coast of North America was summarized by Light (1989b). Smolt releases increased from 2.8 million fish in 1960 to 30 million fish in 1987, and averaged 24.6 million in the decade 1978-1987. Contributors to this average production were Idaho (42%), Washington (28%), Oregon (18%), California (9%), British Columbia (3%), and Alaska (0.2%). Facilities in the Columbia River basin accounted for nearly two-thirds of the average coastwide production. An average 738,000 adults would be produced annually from these smolt releases, assuming a 3% smolt-to-adult survival rate for hatchery-reared fish. This figure is close to an earlier estimate by U.S. scientists of the coastwide abundance of adult hatchery fish (approximately 800,000 fish), and indicates that hatchery-produced steelhead contribute substantially to the total population of adult steelhead returning to coastal areas of North America annually (1.6 million).

Biological and oceanographic information was compiled to produce a comprehensive description of steelhead distribution and migration from the entry of smolts into the sea to the return of adults to freshwater, including continued oceanic migrations of fish after spawning (Light et al. 1989). After reaching the ocean in the spring, juvenile steelhead from North America move quickly offshore and distribute themselves in pelagic waters of the Gulf of Alaska where they remain throughout their first year at sea. In the following year, steelhead characteristically move northward and westward from spring through summer then southward and eastward from autumn through winter. This pattern is repeated by steelhead for all remaining years at sea. Post-spawning steelhead also follow this general migration pattern, but do not travel as far west as pre-spawning fish in spring or summer. In coastal waters steelhead are found principally within 10 m of the surface, though they sometimes travel to greater depths. The southern limit of steelhead migration is about 38°N latitude (Area E6038 in spring). The northern extent of their distribution occurs slightly north of the Aleutian Islands (south of 56°N), but temperature does not appear to correlate with this boundary. Information from tagging studies shows little or no difference in ocean distribution among stocks, groups, or races. Information on Asian stocks is lacking, but their oceanic migration patterns probably mirror those of North American fish.

Sampling for Coded-wire Tags

Release and recovery information for 483 coded-wire tagged (CWT) salmonids was reported by Dahlberg et al. (1989): 272 recoveries in late 1988 and 211 recoveries from January through September 1989. In 1988, 10 coded wire tags were recovered from 194 steelhead trout missing the adipose fin. Three of 5,308 coho salmon examined in 1988 were missing the adipose fin; one of the three fish was CWT. Through September 1989, 17 coded-wire tags were recovered from 202 steelhead trout and four coho salmon missing the adipose fin; none of the salmon contained a coded-wire tag. Both the 1988 and 1989 fish were taken from longline and gillnet catches on board Japanese salmon research vessels. One chinook salmon containing a CWT was recovered by U.S. scientists on board a Soviet research vessel in summer 1989.

Of 12,262 salmonids examined in 1988 by U.S. groundfish observers, 350 had the adipose fin missing. Of the 350, 317 CWT were detected and decoded, 274 from chinook salmon, 42 from coho salmon and one from a steelhead trout. Tag recoveries decreased by 22% from 404 in 1987 to 317 in 1988 although only 9% fewer salmonids were examined by observers in 1988 than in 1987. The greatest change in tag recoveries came from the Bering Sea-Aleutian area where no CWT fish was recovered in 1987. Three CWT chinook salmon of British Columbia origin were recovered in the eastern Bering Sea during September-November, 1988. Tag recoveries decreased from 4 in 1987 to 2 in 1988 in the Gulf of Alaska. The Pacific Coast area produced 313 recoveries in 1988 compared
to 400 in 1987. The first CWT steelhead recovered from the trawl fisheries was released into the Columbia River in May, 1987 and recovered at 47°39'N, 124°52'W in August 1988.

The first recovery of a coded-wire tag from a chinook salmon sampled in the U.S. domestic trawl fishery was from a fish released in the Nitinat River, B.C. in May 1987, and recovered in the Bering Sea in March 1989 at 58°25'N, 153°06'W.

Two coded-wire tagged fish extended the geographical range of steelhead trout. One fish released from the Elwha River, Washington slightly extended the western limit of distribution of U.S. origin steelhead to 44°30'N, 167°28'E. The second fish released in the Quinault River, Washington, extended the range markedly further. This fish was captured on longline gear deployed from a Japanese research vessel in June 1989 at 42°44'N, 163°32'E, which is approximately 5,370 km from the mouth of its natal stream. The previous west-most limit of U.S. origin steelhead trout was from a CWT fish released into the Columbia River in May 1982, which was later caught at 42°51'N, 167°32'E in July 1983. The western limit of distribution of British Columbia origin steelhead trout is marked by the recovery of a coded-wire tag from a fish released in the Campbell River, British Columbia, and caught at 45°53'N, 167°21'E in June 1984.

The recovery rate of coded-wire tags from steelhead trout missing the adipose fin changed markedly in recent years. During the period 1981-85, nearly 60 percent of the steelhead missing the adipose fin contained a tag. In comparison, the recovery rate fell to 5 percent in 1988 and then increased slightly to 8 percent in 1989. Nine of the 11 CWT steelhead recovered in 1988 were caught on longline gear and conceivably could have been externally tagged and released. However, the probability of recovering a double tagged fish a third time is very small (Dahlberg et al. 1989).

**HIGH-SEAS SQUID FISHERIES RESEARCH**

Two NOAA Fisheries research vessels conducted a joint survey of the North Pacific subarctic frontal zone (SFZ) in 1989. Research operations included marine mammal and seabird transects, XCTD, XBT and CTD casts, neuston, zooplankton, IKMT and midwater net tows, longline deployment, and a calibrated hydroacoustic system. The objectives of the joint cruise were to quantify the distribution of marine mammals, seabirds, cephalopods, and fishes in relation to the physical environment of the SFZ.

Data from 17 Canadian, Japanese, Taiwanese, and Republic of Korea research vessel cruises conducted between 1983 and 1987 were examined for salmonid catches along the northernmost 1/2 degree latitude of the Japanese squid driftnet fishing area. A total of 325 salmon and 2 steelhead trout were caught in 11 of 30 driftnet operations, resulting in an overall catch of 2.55 salmonids per kilometre of drift net. Chum and coho salmon comprised 59% and 34%, respectively, of the total salmonid catch. The proportion of sets west of 175°W encountering salmon was 55%, compared to 11% east of 175°W longitude. Catch per ton (50 m panel of drift net) in the western and eastern regions was 0.155 and 0.008, respectively, representing a twenty-fold difference between regions. When the data were stratified further by sea surface temperature interval, the zonal cline in salmonid incidence persisted.

Analyses of oceanographic data along the 175°30'E meridian in the North Pacific Ocean from the Japanese research vessel *Hokusei maru* indicated a general cooling trend since 1978 in water temperatures at the surface and at 100 m. The downward trend in SST was also reflected in data based on merchant vessel weather reports. The time-series of driftnet data showed a movement south in the southernmost distribution of salmonids along the 175°30'E transect and a significant upward trend in catch per unit effort of salmonids at all but the northernmost sampling station along the transect. Differences in the 1984-88 average catch per ton of salmonids between the 44°50'N and 43°N stations indicated that the recent northward shift of the Japanese time/area regulations for the squid driftnet fishery during August will result in increased harvest of salmonids, given recent trends in ocean conditions.

**MARINE MAMMAL RESEARCH**

In 1989, U.S. biologists were aboard high seas commercial squid driftnet vessels to observe the incidental take of marine mammals. A total of 791 driftnet retrievals were observed in the Japanese squid driftnet fishery and 9 retrievals on other foreign vessels. U.S. biologists also participated in cruises aboard research vessels of Japan, Taiwan, the Republic of Korea and Canada, observing driftnet retrievals and collecting sighting data on marine mammals. Aboard the NOAA R/V *Miller Freeman*, studies of the distribution of marine mammals, seabirds, and prey were conducted during a 6 week cruise from 1 October to 13 November in the high seas squid fishing area. Oceanographic data were collected to study the relationships between the oceanographic conditions and distributions of various species. Data will be compared.
to results of a similar study conducted in 1987.

**CRAB RESEARCH**

The 1989 eastern Bering Sea (EBS) trawl survey (June 4 to August 14) was conducted aboard the F/V Ocean Hope III and the R/V Alaska. The survey consisted of 439 successful trawl tows and covered 145,000 nm². Sampling procedures were identical to those of previous surveys. This report includes population estimates for red king crab (*Paralithodes camtschatica*), blue king crab (*P. platypus*), Tanner crabs (*Chionoecetes bairdi* and *C. opilio*) and hair crab (*Erimacrus isenbeckii*).

Estimated abundance of legal male red king crab was 11.9 million crabs, +31% (at the 95% confidence interval), and represents a significant increase of 86% from last year’s estimate. Pre-recruit (110-134 mm carapace length, CL) males showed a non-significant increase of 47%. The abundance of juvenile (<109 mm CL) males and of females above the median size at maturity (89 mm CL) showed no significant change. The population is showing continued lack of recruitment and appears to be decreasing.

The estimated abundance of legal male blue king crabs in the Pribilof District was 225,000 crabs, ±120%, a non-significant change from last year. The abundance of juvenile (<109 mm CL) males and total females increased by a factor of 3, although this change was not statistically significant. The Pribilof District fishery was not opened in 1989. In the Northern District, abundance of legal males showed a non-significant increase of 78% and was estimated to be 1.48 million crabs, ±41%. Pre-recruits and females showed large but non-significant increases by factors of 2 and 3, respectively. Both stocks are still at historically low levels.

Over the past year, *C. bairdi* showed significant increases in abundance for pre-recruit (110-134 mm carapace width, CW) males (+71%) and small females (<85 mm CW, +77%). Large females showed no significant change. The abundance of large males (≥135 mm CW) increased by 130% and was estimated to be 42.3 million crabs, ±20%. This population has increased by over a factor of 10 since 1985.

The population of *C. opilio* in the Bering Sea ranges from the Bering Straits to Unimak Island. Large male crabs >101 mm CW remained stable and were estimated to be 187.1 million crabs, ±14%. Males smaller than this limit and large females (≥50 mm CW) showed no significant changes.

Very few juvenile or female hair crab have been taken during the survey, so abundance estimates reflect primarily the distribution of large (≥90 mm CL) males. A major centre of abundance exists in the Pribilof Islands area and a minor one just north of the Alaska Peninsula, with low densities in between. The abundance of female and large male hair crab showed no significant changes from last year. The estimated abundance of large males was 0.4 million crabs, ±53%, and is now at the lowest level ever recorded. In contrast, the abundance of small males increased by 210%, continuing a trend from 1985.

Oceanic conditions in the EBS were anomalously warm from 1977 through 1984, excluding 1982. In 1985, June bottom temperatures returned to the 30 year mean and have remained stable since. Since that time, both species of Tanner crab have shown drastic population increases, and blue king and hair crab have shown possible but indefinite increases in juvenile abundance. These signs indicate that major recruitment events may have occurred within these populations in one or more years during the early to mid-1980’s, possibly coincident with the return to more normal water temperatures.

**GROUNDFISH RESEARCH**

The Alaska Fisheries Science Centre (AFSC) of NOAA conducted or cooperated in 13 groundfish surveys in 1989 from the Bering Sea to off California. The AFSC has followed a plan of assessment in which surveys are intensified on a rotating basis between the three major geographical regions: Bering Sea, Gulf of Alaska, and the Pacific coast. The emphasis in 1989 was in the Pacific coast region. A description of all survey activities follows.

**Bering Sea**

Two surveys were conducted in the Bering Sea in 1989. One was an acoustic assessment of pelagic pollock in the Aleutian Basin during the winter spawning period and the second a standard annual assessment survey of groundfish and crab in the eastern Bering Sea (EBS).

1. **Aleutian Basin Pollock Survey** - Fisheries on the pelagic population of pollock in the Aleutian Basin have intensified in recent years and the catches in this region now equal or exceed those in the EBS. The origin and abundance of these Basin pollock (which only consist of age 4 and older adults) and the ultimate fate of the young from their spawning are subjects of cooperative research that has been initiated by the United States and other nations. A second U.S. echo integration-midwater trawl survey of spawning pollock was conduc-
towed in the Aleutian Basin and over the outer continental shelf of the EBS during January-March, 1989. Approximately 6,000 nm of transects were surveyed acoustically and 27 midwater trawls made aboard the NOAA R/V Miller Freeman to identify the echo sign and collect biological samples. Densities of pollock were extremely low except in the Bogoslof Island area where a large spawning concentration was encountered, as was the case in the winter 1988, and on the EBS shelf near St. George Island and northwest of Unimak Island. In addition to the density information, various data and samples were also collected such as fish weight, maturity, ovary weight, stomach contents, and age structure and tissue samples to study the biology and stock structure of Basin pollock. Studies were also conducted to intercalibrate the acoustic systems on the Miller Freeman with those on the Japanese research vessel Kaiyo maru which was also surveying Basin pollock.

2. Eastern Bering Sea Crab-Groundfish Survey - A standard portion of the EBS continental shelf has been surveyed each year since 1979 to assess the abundance and biological condition of the crab and groundfish. This standard survey was again conducted from early June to early August, 1989 aboard the chartered vessels Alaska and Ocean Hope. The survey covered 390 stations and collected catch and biological data on all species. Other studies accomplished during the survey were side-by-side comparative fishing experiments to calibrate relative fishing efficiencies between the two survey vessels and a cooperating U.S.S.R. research vessel, an examination of by-catch rates of crab and halibut in areas of special interest, tagging of crab and Pacific cod, and preservation of stomachs for feeding habit analysis. The U.S.S.R. R/V Babusinka cooperated in the survey by sampling 169 stations in the standard survey area and collected biological samples from mid-May to early July.

Gulf of Alaska

Seven surveys or studies were conducted in the Gulf of Alaska in 1989. These were directed mainly at studies of pollock and sablefish.

1. Shelikof Strait Hydroacoustic Survey of Pollock - The spawning concentration of pollock in Shelikof Strait was assessed again in 1989 using echo integration-midwater trawling techniques. This survey has been conducted each year since 1980 with the exception of 1982. In 1989, two replicate surveys were made of the Strait (March 14-19 and March 27-30) aboard the NOAA R/V Miller Freeman. About 1,600 nm of trackline was surveyed acoustically and 21 tows made with a midwater trawl to determine the density and sex, length, weight, maturity, and age composition and the ovary weight and stomach contents of the pollock. Biomass estimates from the survey (290,000 t) indicate that the Shelikof spawning population remains at a low level. In 1989, areas outside of Shelikof Strait were also surveyed. These were Davidson Bank where no significant signs of pollock were found, off Chirikof Island where about 32,000 t of pollock were located, and Marmot Bay which contained about 2,400 t of pollock.

2. Fisheries Oceanography Coordinated Investigations (FOCI) - This is a multi-discipline, multi-agency study of Shelikof Strait pollock and the environment in which they spawn and grow. The purpose of this study is to relate environmental conditions to the survival of eggs and larvae and success of year classes. The two NOAA components involved in these studies are the AFSC and the Pacific Marine Environmental Laboratory. Four cruises aboard the NOAA R/V Miller Freeman in spring 1989 supported this program. The first Miller Freeman cruise, in early April, surveyed the distribution and abundance of pollock eggs, making several passes through the area of maximum abundance to characterize the seasonal spawning curve. Experiments on egg development and predation were performed aboard. The second cruise, in late April, was designed to investigate transport, condition, and survival of pollock eggs and larvae from Shelikof Strait spawning grounds. The third cruise, in mid-May, included data collection for larval mortality estimates, an examination of the Alaska Coastal Current and nearshore water, collection of CTD data at moorings deployed in April 1989, and a continuation of the existing time series of biological and physical data collection. The fourth cruise, in late May-early June, involved data collection for abundance and mortality estimates of larval pollock.

3. Groundfish Trawl Survey in the Central Gulf of Alaska - This survey was conducted from August 31 to October 18 aboard the chartered vessel Pelagos and covered waters of the central Gulf. The survey was designed to augment data from the 1984 and 1987 triennial bottom trawl surveys in the Gulf and to help assess any impacts from the Exxon Valdez oil spill on groundfish and shellfish outside Prince William Sound. Other objectives of this survey were to determine the distribution, abundance, and biological characteristics of principal groundfish species and to extend sampling to embayments along the Alaska and Kenai Peninsulas and Kodiak Island not previously surveyed.

4. Sablefish Longline Survey - This was the third annual AFSC longline survey of sablefish along the upper continental slope of the Gulf of Alaska which is designed to replace the longline surveys that have been
conducted by Japan in this region for many years. The 47 traditional longline stations extending from the eastern Aleutian Islands to Dixon Entrance were sampled aboard the chartered vessel Ocean Prowler from June 26 to September 12. Some additional stations were also sampled in major gullies throughout the Gulf of Alaska.

5. Juvenile Sablefish Survey in Southeast Gulf of Alaska - During March and April, the abundance of juvenile sablefish was assessed in inside waters of southeastern Alaska aboard the NOAA R/V Murie II. During September—October, a study was initiated to estimate the catchability coefficient of longline gear used to assess abundance of adult sablefish. The study was carried out in Chatham Strait aboard the NOAA R/V Townsend Cromwell. The study involved tagging sablefish before the start of a commercial longline fishery and monitoring the recapture of tagged sablefish from the fishery.

6. Study of Catchability of Survey Longline Gear - During September—October, a study was initiated to examine seasonal maturity, distribution, abundance, and community structure of slope groundfish. The 1989 survey added late winter and early fall data sets to this collection. Objectives included descriptions of the biological characteristics of sablefish and Dover sole populations with respect to depth, assessment of the feasibility of area-swept and egg production estimates of sablefish spawning biomass, and determination of the biological characteristics for commercially important groundfish species. Fishing operations extended from 44°08' N to 45°21' N lat. and from 100 to 700 fm. Forty one predetermined stations were sampled with bottom trawl hauls in February-March and 52 were sampled in early fall. Length, weight, maturity stage...
data and otoliths were collected for sablefish, Dover sole, shortspine thornyhead, and arrowtooth flounder. Muscle tissue samples were collected from Dover sole for an investigation of water content and flesh quality.

4. Trawl Dynamic Studies - The AFSC has begun to routinely monitor the width of bottom trawl openings during groundfish surveys to more accurately estimate area swept by the trawl. These measurements have shown a great deal of variability due mainly to depth of fishing and length of cable out. From November 30 to December 9, an experiment was conducted aboard the chartered fishing vessel Pat San Marie in the Straits of Georgia to study the effects of this variability on catchability of the trawls and methods of reducing the variability. Restricting lines tied between the towing cables were found to be effective in eliminating the trawl width variation. Sample sizes were inadequate to detect significant differences in catchability between trawls fished in wide and narrow configurations.

**Observer Coverage of Groundfish Fisheries**

In 1988, the Alaska Fisheries Science Centre deployed 284 U.S. fisheries observers to sample aboard vessels from Japan, Republic of Korea (ROK), U.S.S.R., Poland, and the People’s Republic of China (PRC). The purpose of placing scientific observers was to collect data and samples for fisheries and stock assessments, and monitor compliance to U.S. fishing regulations. An overall observer coverage (foreign vessel days sampled by observers) of 94% was achieved in 1988. This represented 14,892 days that observers sampled aboard foreign vessels that spent 15,866 vessel days on the fishing grounds. Observer coverage by major fishing regions was 94% in the Bering Sea-Aleutian region, 92% in the Gulf of Alaska region, and 96% in the Washington-Oregon-California region.

**Bering Sea-Aleutian Island Groundfish Fishery**

In 1988, the increased fish allocations given to fully U.S. domestic operations led not only to the elimination of foreign fishing operations, but also to extensive changes in joint venture operations (JVP). The JVP allocations for walleye pollock (Theragra chalcogramma) and Atka mackerel (Pleuragrammus monopterygius) were reduced (23% and 36%, respectively) while the allocations for yellowfin sole (Limanda aspera), other flounders, and Pacific cod (Gadus macrocephalus) increased 17%, 62%, and 19%, respectively. This led to different fishing strategies.

United States vessels delivered 1.301 million t of groundfish to foreign processing vessels operating in JVP fisheries. The 1988 catch was a 4% decrease from the 1987 catch. Pollock (64%), yellowfin sole (16%), other flatfishes (9%), Pacific cod (8%), and Atka mackerel (1.5%) were the major targets of the joint ventures.

The 1988 incidental catch of salmon by the joint venture fisheries was estimated to be 9,380 salmon (35 t). The comparative data for 1987 were 3,386 salmon in the foreign fishery and 10,848 fish in the joint venture fisheries. Chinook salmon (Oncorhynchus tschawytscha) (60%) and chum salmon (O. keta) (39.5%) accounted for most of the JV salmon catch.

The incidental catch of halibut (Hippoglossus stenolepis) was 1,590,700 (2,579 t). This was a 94% increase, by number, over the total halibut catch in 1987, but only a 1% increase by weight.

The incidental catch of Tanner crab decreased substantially from 1987. The incidental catch of 88,083 crab represented a decrease of 40%. Red king crab accounted for 94% of the catch, with blue king crab, 6%, and golden king crab (Lithodes aequispina) making up the remainder.

**Gulf of Alaska Groundfish Fishery**

During 1988, no quota was available for foreign fishing in the U.S. 200-mile EEZ in the Gulf of Alaska region. The catch of groundfish by U.S. trawlers participating in JVs was 3,800 t, about 88% less than in 1987. The incidental catch of salmon also decreased 88% in the JV fisheries in 1988–from 1,221 to 147 fish. Chinook salmon made up 60% of the catch, chum salmon accounted for the remainder. The JV fisheries took 56,445 halibut in 1988 compared to 196,900 in 1987. The incidental catch of Tanner crab in the JVs increased 94%; from 5,496 crab in 1987 to 10,643 crab in 1988. Two species of Tanner crab, C. bairdi (99.98%) and C. opilio (0.02%) accounted for the entire Tanner crab catch. In 1988, the JVs caught 131 king crab compared to 69 crab in 1987. Red king crab accounted for 100% of the catch.

**Washington-Oregon-California Pacific Whiting (Hake) Fishery**

The 1988 foreign Pacific whiting (Merluccius productus) fishery landed 18,041 t of whiting (98% of the total groundfish catch). The JV fisheries landed 135,800 t; 99.9% of the total catch. The 1988 catch of whiting by the foreign fishery was 63.7% smaller than that of 1987; the 1988 catch by the JVs was 28.1%
greater than the JV catch in 1987. The total 1988 incidental catch of salmon in the Pacific whiting fisheries (foreign and JVs) was 16,200 fish. This was a 22\% increase over the salmon by-catch of 1987, and was the second highest catch of salmon since implementation of the MFCMA in 1977. Chinook salmon made up 89\% of the foreign incidental catch; coho salmon (O. kisutch) accounted for 9\%, and chum salmon made up the remainder. In the JV fisheries, chinook salmon accounted for 82\% of the salmon by-catch, coho salmon composed 18\%, and chum and pink salmon (O. gorbuscha) made up the remainder. No steelhead was caught incidentally in 1988.

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