

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS



INDO-PACIFIC FISHERIES COUNCIL

PROCEEDINGS

8th SESSION

COLOMBO

CEYLON

6—22 December 1958

SECTION I

**IPFC Secretariat, FAO Regional Office
for Asia and the Far East
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OPENING ADDRESS BY THE HON. MR. P.H. WILLIAM DE SILVA,
MINISTER OF INDUSTRIES AND FISHERIES, CEYLON,
AT THE EIGHTH SESSION OF THE INDO-PACIFIC
FISHERIES COUNCIL

**Mr. Chairman, Delegates, Ladies and
Gentlemen,**

It gives me great pleasure to be here today to open the eighth session of the Indo-Pacific Fisheries Council.

On behalf of the Government of Ceylon I extend a warm welcome to delegates, officials and visitors from other countries who have come here for this conference. I trust that all of you will enjoy your stay in Colombo and hope that you will have time to see something of the rest of this Island before you leave.

Looking round at my distinguished audience here today, I have not the slightest doubt that this conference is going to be a very profitable one to all concerned. Discussions and deliberations among fishery workers in a group such as this cannot fail to be both rewarding and stimulating, thus generating the enthusiasm so necessary for attacking the many difficult problems before us.

The fishing industry in Ceylon is just emerging from a state of arrested development. Techniques and methods of a hundred years ago are used more or less unchanged today. There is a wide gap between what our people do now and the possibilities offered by modern science. It is only by the application of modern scientific techniques that we can develop and utilize to the full our national resources, and raise the standard of living of our people. A well-developed fishing industry will provide avenues of employment as well as food, both of which are vital problems to our rapidly growing population. Fish is particularly important to us as a source of food as it supplies in a form acceptable to our people the much needed protein which is known to be lacking in our diet. We look forward, with the help of this Council, to making good the arrested development in the past.

Ceylon has a coastline of over 1,000 miles and is placed advantageously overlooking a vast ocean which stretches unbroken down to the Antarctic across the entire southern hemisphere. Yet our fishing industry produces only about half this Island's requirements of fish.

Contributing factors towards this sad state of affairs are ignorance of the seas beyond a few miles from the coast, small scale fishing operations by individuals without sufficient capital and the use of primitive craft and gear.

We cannot afford to maintain for long our obsolete fishing craft and gear but it is extremely difficult to effect changes in the traditional methods adopted by our fishing population. In this difficult but essential task it is heartening to receive the advice and assistance of those who have successfully coped with similar problems in other countries.

In recent years our country has received considerable assistance from the parent body of this Council, namely the Food and Agricultural Organization of the United Nations. Through this agency, services of skilled technical personnel have been made freely available to us. In addition, generous gifts of nets, motors and boats have enabled us to make some progress towards modernizing our fishing industry.

I note with pleasure the intensely practical approach of this Council towards the fisheries problems of the Indo-Pacific Region, and the bold step of organizing panels and committees to guide an international group of scientific workers along a common path. This is a very practical application of the fact that the fisheries of all Indo-Pacific countries are closely linked. A scientist from Ceylon has participated in a recent seminar in Bangkok which sought to correlate studies of a particular fish, the mackerel, by workers in different countries. This session has scheduled a symposium on fish behavior which cannot be studied effectively by workers in one country alone. Through these and other projects this Council is performing the useful and essential function of coordinating research on an international scale to the undoubted benefit of each member country, I therefore hope that every encouragement will be given the Council to expand its activities.

I wish the Council all success in its deliberations and I have great pleasure in declaring open the 8th Session of the Indo-Pacific Fisheries Council.

MESSAGE OF WELCOME BY THE HON. PRIME MINISTER
OF CEYLON, MR. S.W.R.D. BANDARANAIKE, TO THE
EIGHTH SESSION OF THE INDO-PACIFIC FISHERIES
COUNCIL

**Mr. Chairman, Honorable Delegates,
Ladies and Gentlemen,**

I have great pleasure in welcoming you on behalf of the government and people of Ceylon, on the occasion of your participation in the Eighth Session of the Indo-Pacific Fisheries Council.

For the second time this year the Food and Agriculture Organization has seen fit to choose Ceylon as host country for an international conference, the first being the FAO Seminar on Land Settlement that has only just concluded its Sessions at Gal Oya. We appreciate this honour and shall strive to provide whatever facilities we have at our disposal for use by the agencies of the United Nations.

We have in our midst, today, a distinguished gathering of Fisheries Administrators and Experts from several countries. Their contribution at this Forum will be eagerly awaited, and I am certain that the deliberations of this Session will prove of great value not only to Ceylon but also to all other nations in achieving the final objective of efficient exploitation linked with the conservation of marine resources.

I wish the deliberations of the Eighth Session all success and sincerely hope that all participants will find their stay in Ceylon both profitable and pleasant.

ADDRESS BY DR. B.R. SEN, DIRECTOR-GENERAL OF THE FOOD
AND AGRICULTURE ORGANIZATION
OF THE UNITED NATIONS

Mr. Chairman, Ladies and Gentlemen,

Once again, the need to be at the other end of the world prevents me from being with you. The holding of the FAO Regional Conference for Latin America has taken me to Santiago. At the same time, however, my belief that I should personally attend these highly important Regional Conferences has given me some knowledge of the problems that you will be tackling at this meeting. For at the recently conducted Tokyo meeting, considerable attention was paid to the fisheries problems of the Region, and I know that a great deal of work was passed on for your attention.

A particular point was made of the necessity of planning fisheries expansion in careful relation to expansion in other sectors of the economy, and I know that you are charged with advising your governments on how this should be done. The conference resolved that a primary objective was the speedy increase of fish supplies for domestic markets, and set out three main lines along which it believed this could be done. You are here today to decide just how to

implement this decision. Finally, the conference pointed out the desirability of joint examination of problems in order to give guidance to fisheries departments. You are taking part in just such a joint examination.

At the opening of last year's conference in Bandung, I was able to tell you of an increase in FAO's help in the provision of fisheries technicians in the region. I am delighted to be able to tell you that this help has been still further increased, and if plans for next year are carried out, will be increased even more.

Finally, I must express FAO's gratitude to the Government of Ceylon for its generous offer to be host to this meeting. My fisheries advisers tell me that particular attention is to be paid this year to the mechanization of fishing, and I cannot help feeling that it is appropriate that this subject should be discussed in Ceylon; the country in which much of FAO's pioneer work in this field was carried out.

I wish you a happy and successful conference.

CABLE MESSAGE FROM DR. D.B. FINN, DIRECTOR OF THE FAO
FISHERIES DIVISION, ROME

CHAIRMAN, INPAFICO, COLOMBO

PLEASE CONVEY GREETINGS AND BEST WISHES DELEGATES 8TH
SESSION STOP ESPECIALLY HOPEFUL OUTCOME YOUR INTENSIVE
STUDIES OF RESOURCE APPRAISALS ESPECIALLY MACKEREL
COMMERCIAL PRODUCTION PROBLEMS AND GEAR COMMERCIAL AND FISH
MARKETING - FINN -

ADDRESS BY THE CHAIRMAN OF THE INDO-PACIFIC
FISHERIES COUNCIL—DR. KATSUZO KURONUMA,
CHIEF, FRESHWATER FISHERIES, RESEARCH
LABORATORY, FISHERIES AGENCY, TOKYO

It is my happiest duty first of all to express sincere thanks to the government of Ceylon for their hospitality and for the excellent facilities provided for us to hold the Eighth session of the Indo-Pacific Fisheries Council in this beautiful City of Colombo. To the Council I would offer my heartfelt thanks for having afforded me the honor of acting as your Chairman during the period 1957-1958.

The Indo-Pacific Fisheries Council having a deep interest in the development and proper utilization of the living aquatic resources of the Indo-Pacific area and desiring to further the attainment of these ends through international cooperation was established in 1949 based on the Agreement drafted in Baguio in the Philippines in February, 1948. Holding now the Eighth Session of the Council in this year of 1958, we may say that the Council has written 10 years of history. According to one of our old sayings in Japan, the passing of a ten-year period must have achieved one cycle of work. In this sense I am very sure that our Indo-Pacific Fisheries Council has accomplished an impressive amount of work along the line of the Baguio Agreement during the past 10 years and I find it difficult to catalogue even a minor portion of these accomplishments.

Today, we have come together here in this auditorium of the Royal College to discuss many subjects in accordance with the directives which were given at the Council's Seventh Session at Bandung and all the problems we are to deal with are placed before you in a number of documents prepared by the Secretariat. I would, however, like to mention a few points pertaining to the Council's work which should receive some consideration.

I do not need to say that fisheries form a complex subject and may be conveniently divided into three headings: research, administration and operations. I would like to make a strong plea particularly for research work in fisheries. The word research sounds very fine and attractive to the researchers but that is not enough. The research work should be interesting to the researcher personally but that again is not enough. What I want to emphasize is that research should be able to produce results that will be usable by the industries or by the administration.

It is very important to ensure that the research subjects are clearly identified and the problems evaluated in relation to the industries before the research program is implemented.

The second point I wish to mention on this occasion is a need to investigate how we can apply research results in practice. The free exchange of ideas and knowledge is of course very important in striving to achieve the final goal of the Council, i.e., proper utilization of the living aquatic resources.

But it is, I think, a starting point and certainly not the end. Therefore, I do not hesitate to stress that the discussion of technical matters should be undertaken always keeping in mind how these matters could be finally put into practice.

In closing, allow me once again to pay tribute to the great kindness of the Government of Ceylon in making our meeting possible and to express on behalf of you all our grateful thanks for the painstaking labour of the Organizing Committee.

AGENDA FOR THE EIGHTH SESSION OF THE INDO-PACIFIC FISHERIES COUNCIL

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| <ol style="list-style-type: none"> 1. Business of the Meeting <ol style="list-style-type: none"> 1.1 Adoption of Agenda 1.2 Report on Credentials 1.3 Nominations <ol style="list-style-type: none"> 1.31 Technical Committees 1.32 Council Correspondents 2. Statements of Delegations 3. Report of Executive Committee <ol style="list-style-type: none"> 3.1 Membership 3.2 Relations with International & other Organizations 3.3 Council's Report to FAO 3.4 Publications and Editorial Policy 3.5 Financial and Budget Report 3.6 Implementation of Council Instructions and Recommendations 4. Amendments to the Agreement and Rules of Procedure | <ol style="list-style-type: none"> 5. Reports of Technical and Sub-Committees <ol style="list-style-type: none"> 5.1 Technical Committee I 5.2 Technical Committee II 5.3 Sub-Committee on <i>Hilsa</i> 5.4 Sub-Committee on <i>Rastrelliger</i> 5.5 Sub-Committee on <i>Chanos</i> 5.6 Sub-Committee on Marketing 6. Reports on the Indo-Pacific Fisheries Year 7. Time and Place of 9th Session 8. Election of Chairman and Vice Chairman 9. Symposium for 8th Session 10. Proposals for Symposium for the 9th Session 11. Other Business <ol style="list-style-type: none"> 11.1 Principles of Fisheries Policy 11.2 Terminology in relation to the Council and its Committees |
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CHAPTER I. COUNCIL PROCEDURE

Opening Ceremony

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| <ol style="list-style-type: none"> 1. The Eighth Session of the Indo-Pacific Fisheries Council was opened by the Honorable the Minister of Industries & Fisheries, Mr. P.H. William de Silva in the main auditorium of the Royal College, Colombo, at 0930 hours on Monday, 6th December, 1958. 2. The Chairman, Dr. K. Kuronuma, in asking the Honorable the Minister to declare the Session officially open, thanked the Government of Ceylon for the gracious invitation to hold this Session in Colombo and expressed the deep appreciation of the Council for the arrangements made for the reception of the Delegations and Observers and for the excellent facilities provided. 3. The Honorable the Minister for Industries and Fisheries in an address recorded in the introduction to this record, officially declared the Eighth Session of the Indo-Pacific Fisheries Council to be open. 4. A message of greeting to the Council recorded in full in the introduction to this record was received from the Honorable the Prime Minister of Ceylon, Mr. S.W.R.D. | <p>Bandaranaike and was transmitted to the Council by the Honorable the Minister for Industries and Fisheries.</p> <ol style="list-style-type: none"> 5. A message from Dr. B.R. Sen, Director General, Food and Agriculture Organization of the United Nations, was transmitted to the Council by Mr. Thet Su, Deputy Regional Representative of the Director General, FAO Regional Office for Asia and the Far East. Dr. Sen's address is also recorded in the introduction to this record. 6. A message was also received from Dr. D.B. Finn, Director, Fisheries Division, Food and Agriculture Organization of the United Nations and was transmitted by Dr. A.G. Black, FAO Country Representative in Ceylon. Dr. Finn's message is given in the introduction to this record. 7. Before presenting the Chairman's address to the Council, Dr. Kuronuma welcomed the delegation from the Government of the Federation of Malaya and requested the Delegate for the Federation of Malaya, Mr. Soong Min Kong, to convey to his |
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Government an expression of the Council's sincere pleasure concerning the adherence of the Government of the Federation of Malaya to the Baguio Agreement.

8. In his address to the Council, the Chairman expressed his appreciation of the honor conferred upon him by the Council in electing him for the period 1957-1958.

Noting that 10 years had elapsed since the drafting of the Baguio Agreement, Dr. Kuronuma drew attention to the importance of ensuing that fisheries research should clearly identify its problems and evaluate them in relation to the industry, and also that every effort should be made to apply research results in practice.

STATEMENT FROM MEMBER GOVERNMENTS

9. In presenting the statement on behalf of the Government of Australia, the Delegate indicated that both Commonwealth and State authorities administer fisheries, whaling and pearling, and that in general, legislation concerning these activities is the responsibility of the Commonwealth in extraterritorial waters and of the States in territorial waters and inland fisheries. Fisheries research is maintained by both Commonwealth Government and by some State Departments and Universities. Commonwealth funds have been set aside as a Fisheries Development Trust Account and a development plan for the Papua New Guinea Fisheries has been approved. Australian Fishermen's Cooperatives are an established feature of the industry. The Australian Government follows with interest the work of FAO and IPFC.
10. Welcoming the Delegates to the Eighth Session of the Council, the Delegate for the Government of Ceylon expressed the hope that the occasion would serve to give them first-hand knowledge of Ceylon's fisheries and of the Government's programme for development. Emphasizing the special interest to Ceylon of the deliberations of the Council, it was pointed out that Ceylon imports nearly three times as much fish as she produces and to achieve self-sufficiency in 10 years would require a five-fold increase in local production. Self-sufficiency is the main objective of Ceylon fisheries policy and a program for the amelioration of the lot of the 80,000 fishermen is being developed.
11. Special provision has been made to provide finance for fisheries development including the purchase of mechanized boats and for

- purchase and repair of modern gear. Co-operative Societies can obtain loans, and four training centers for fishermen in co-operative practice and fishing methods have been set up. A Fisherman's Compensation Scheme covering death or injury is already in operation and proposals for a Fishermens' Provident Fund are under consideration.
12. Attention is being given to the construction of houses and roads and improvements to the beaching grounds and markets are being carried out. Attention is also being given to problems of cold storage, the processing of by-products and other aspects of the secondary phase of the industry. Development of off-shore and deep-sea fisheries is being encouraged. Considerable progress has been made in developing the inland fisheries by the introduction of suitable fish species and plans are being implemented to develop brackish water fish production. The ancient Pearl Fishery has been revived after a lapse of 30 years and considerable emphasis is placed on research into the problems of the industry.
13. The Delegate for the Government of the Republic of France expressed the pleasure of his Government in participating in the work of the Council, the work of which was of demonstrably great value. He emphasized the importance of the personal contacts between the various specialists coming from the member countries and expressed the view that the subjects considered by the Council were of primary interest in the development of the fisheries of the region. The work of previous Sessions had made very clear the importance on the standardisation of research

methods as an essential condition for the reliable comparison of the results obtained in the various countries. France offered her complete collaboration in the work of Eighth Session of the Council.

14. The Delegate for India briefly reviewed the work being undertaken in fisheries development in his country, particularly in relation to experimental fisheries, the extension of fish culture projects and the mechanization of fishing craft. Of particular importance was the attention being given by his Government to the training of Government officers and fishermen. Information surveys in fish marketing were in progress.
15. In India the fisheries survey programs have been expanded and a Central Board of Fisheries, under the chairmanship of the Union Minister of Food and Agriculture, had been set up to coordinate and integrate programs of fisheries development and research. A Special Expert Committee on Fisheries Education was conducting an examination of the training requirements, and a high level of cooperation was being maintained between the Union and State Governments, the United Nations specialized Agencies, Colombo-Plan, United States TCM Administration and the Indo-Norwegian Project.
16. Reviewing the significance of the fisheries industry in his country, the Delegate for Japan paid tribute to the IPFC and the Government of Ceylon for the arrangements made for the 8th Session of the Council. The fishery industry of Japan was confronted by many problems, and many workers were engaged in research and survey studies to seek solutions to these problems. The Japanese Government was providing training facilities in the field of fisheries for students from many countries in the region, and was firmly determined to develop and expand these facilities and to cooperate to her best ability with other countries to ensure healthy progress of the fishery industry of the region.
17. Expressing his pleasure in participating in the Eighth Session of the Council, the Delegate for the Republic of Korea expressed sincere appreciation for the heart-felt hospitality and excellent facilities given by the Government of Ceylon. He said that the Republic of Korea was always conscious of her duty of safe-guarding her national sovereignty and maintaining world freedom and fully realized the importance of the objectives of the Council, assuring the Council of his country's desire to contribute towards the attainment of the Council's objectives.
18. Despite inexperience, hardships and aggression Korea had achieved remarkable and steady development during the past decade. The fishery industry was on the road to recovery through the utilization of modern fishing equipment. Noting that there were still many problems to be solved the Korean Delegate expressed his country's confidence that even more would be accomplished during the coming years and he believed that the deliberations at this Council Session would be fruitful and beneficial to the peace-loving people of the free world.
19. In his statement the Delegate for the Federation of Malaya expressed appreciation for the excellent arrangements made by the Government of Ceylon. Noting that his Government had been closely associated with the work of the Council through the participation in the U.K. Delegations at earlier Sessions, the Delegate said that more than ever Malaya looked to the Council for inspiration and guidance, and promised all cooperation with the Council and its members. Reviewing action taken by his Government to increase fish production, he emphasized the importance of mechanization of fishing craft, the introduction of synthetic fibers, provision of loans to the industry through Cooperatives, the reorganization of fish marketing and the provision of cold storage facilities at strategic points. Work was being undertaken further to develop the inland fisheries both by stocking natural waters and through fish culture. The Delegate for the Federation of Malaya said that his Government was contributing to the cost of the Fish Culture Research Institute in Malacca, and local research staff was being recruited particularly in connection with *Rastrelliger* studies and investigations on the shell-fish industry.

20. The Delegate for the Netherlands briefly reviewed the program of work being undertaken through the Fisheries Extension Services in Netherlands New Guinea, including advice and assistance in connection with group fishing practice, operation, maintenance and repair of mechanized fishing boats and the dissemination of information on improved methods of operation of existing fishing gear and the introduction of new materials. The development of fresh-water fisheries was being actively undertaken on a basis of imported species of high food value both for release in natural waters and for fish culture.
21. The Delegate for Thailand expressed his sincere appreciation on behalf of his Government for the opportunity to participate in the present Session in Colombo. Drawing attention to the beneficial aspects of the work of the IPFC, he pointed out that many problems still required solution. His Government was taking active steps in the development of fish culture and the development of systems of management of the inland fishery resources. Thailand had concentrated much effort in developing the sea fisheries through mechanization of fishing craft, the introduction of synthetic fibers and other means. Marketing facilities were being improved but there was still great scope for further exploitation of the marine resources on a rational basis.
22. Thailand was now concerned with an extensive program of oceanographic survey in the Gulf with which was connected plans for a further comprehensive survey to determine the prospects for development of the off-shore fisheries. The Government of Thailand was anxious to cooperate in all possible ways to further the work of the Council and greatly appreciated the action of the Council in helping to develop the *Rastrelliger* Training Center recently conducted in Bangkok. The Delegate expressed the hope that the Council would continue its interest in such training centers as these were powerful tools for use in developing systems of management of the fisheries of the region.
23. The Delegate for the United Kingdom said that Her Majesty's Government again welcomed the opportunity afforded by the Sessions of the Indo-Pacific Fisheries Council for joint discussion of fisheries problems of the region and for personal contacts between the representatives of the member governments. Fisheries developments in Hong Kong were largely in the direction of exploration and exploitation of off-shore trawling grounds and the institution of training programs to qualify fishermen as skippers, coxswains and engineers. Mechanization of the fishing fleet was making rapid strides and the pond culture of fish was a flourishing industry. There was an expanding demand for cultivated oysters and a comparatively new export trade in prawns was increasing. In addition to exploratory fishing, regional hydrology and plankton surveys were being undertaken by the Fisheries Research Unit and studies on the biology of prawns and the effects of industrial pollution on in-shore waters were progressing. The U.K. Delegate also said that marine and fresh-water fisheries in Sarawak and North Borneo were of great importance to the economy of these territories and developmental plans were being implemented. North Borneo is perhaps unique in that it produces an exportable surplus of marine products.
24. The Delegate presented a brief review of the work undertaken at the Fish Culture Research Station at Malacca, Federation of Malaya, stating that all but eleven of the 82 acres of ponds are now cleared and in use. The soil of the ponds is infertile, acid, laterite clay of a type common in the tropics and experiments are being carried out on the effect of graduated limestone dosage to obtain control over the acidity of the ponds and to determine whether there is any relationship between the limestone dosage and the fish yield. Studies in inorganic fertilizers and vegetation changes are in progress and preliminary results on cross breeding of strains of *Tilapia mosambica* are producing extremely interesting results.

25. A review of the status of the fishing industry of Singapore was also given referring particularly to the development of trawling and the increase in fishing boat mechanization. A mobile fisheries unit providing instructions in the maintenance and repair of fishing boats was active and a storm-warning service through local radio broadcast had been set up. The training of school boys in the fishing villages was being tested through a pilot scheme in order to select apt pupils for further training in advanced fishing methods.
 26. Expressing his Government's sincere and sympathetic interest in the problems of the Region and assuring the Council of his Government's view that great benefit is obtained from the exchange of scientific information and through personal contacts, the Delegate for the U.S.A. drew the attention of the Council to the fact that American exploratory research in the Central Pacific Ocean was drawing to a close. The final exploratory project was the oceanographic, biological and tuna survey of the general vicinity of the Marquesas Islands for which field the work was complete and the final reports are now being prepared. The research program is shifting to give greater attention to increasing the efficiency of fishing and the main objectives were prediction of variations in the tuna resources, the reduction of scouting time and the increasing of fishing efficiency on a basis of tuna behavior studies and related studies on bait fishes.
 27. Expressing warm thanks to the Government of Ceylon for its work in organizing the 8th Session of the Council, the Delegate for Vietnam said that his Government followed with great interest the Council's activities. In 1957, his Government had amalgamated the sea and inland fisheries services as a department under the Ministry of National Economy. In its plan for the exploitation of aquatic resources his Government attached particular importance to material and financial aid to fishermen, the modernization of catching techniques and the mechanization of fishing craft. Training in fisheries subjects both at home and abroad was receiving considerable attention and a large credit fund had been reserved for the use of fishermen's cooperatives. Attention was being given to the construction of properly equipped fish harbors and action was being taken to attract capital into the secondary phase of the industry by the development of quality control and the introduction of new processes.
 28. The Government of Vietnam was paying close attention to the development of fresh and brackish water fisheries, particularly in connection with *Chanos* and the distribution of fry of fresh water pond fish.
- Statements from observer Organizations**
29. The South Pacific Commission through its observer informed the Council that it continued to attach great importance to the work of the Council in bringing together people from the same region for discussion and exchange of knowledge which would result in the development of an evaluation of the resources of the region and indicate their developmental potential.
 30. The Observer for the Ceylon Association for the Advancement of Science conveyed cordial felicitations to the Council. Recognizing the many services the Indo-Pacific Fisheries Council has rendered, his Association extended its warm congratulations and hoped that the Council deliberations would meet with every success.
 31. The Observer for the University of Ceylon conveyed greetings and hoped that the 8th Session of the IPFC would be successful. The University was grateful for the opportunity to be represented at this meeting. The University trains, with the limited facilities at its disposal, fishery biologists, who will eventually aid in the development of the fisheries of Ceylon and has more than a mere academic interest in the deliberations of the I.P.F.C. The discussions at this meeting will help to indicate the lines along which the enormous resources of the Ocean around Ceylon can be most profitably conserved and exploited for the benefit of our people.
 32. At the Chairman's request the Secretary read out a letter received from Dr. N.K. Panikkar, Member of the Executive Committee, expressing his regret at being

unable to attend the Eighth Session and wishing the Council every success in its deliberations.

Election of Vice-Chairman

33. As neither the Vice-Chairman, Dr. Tham Ah Kow, nor Executive Committee Member, Dr. N.K. Panikkar, were able to attend, the Chairman requested the Council to take action to elect a Vice-Chairman. Mr. D.T.E.A. de Fonseka was nominated by the Delegate for the Federation of Malaya seconded by the Delegate for France. The Delegate for Australia moved, seconded by the Delegate for U.S.A. that nominations should be closed. This motion having been put and carried, Mr. D.T.E.A. de Fonseka was declared elected Vice-Chairman of the Council.
34. The Delegate for the Republic of Korea gave notice of a proposal for the suspension of the Rules of Procedure, particularly Section VII, paragraph 2 relating to the assumption of duty by the newly-elected Vice-Chairman in order to permit him to assist in the work of the Executive and Steering Committees.
35. This proposal, having been seconded by the Delegate for Australia, was approved by the Council.

Steering Committee

36. The Council constituted a Steering Committee for the conduct of the meeting consisting of:

Chairman of Council

— Dr. K. Kuronuma

Vice Chairman

— Mr. D.T.E.A. de Fonseka

Chairman of Technical
Committee I

— Mr. Soong Min Kong

Chairman of Technical
Committee II

— Mr. L.F. Tisseverasinghe

Representative of the Ceylon Delegation
and Organizing Committee

— Mr. A.S. Mendis

Secretary of the Council

— Mr. J.A. Tubb

Membership

37. The Executive Committee's report indicated that the membership of the Council consisted of 17 Member Governments, the Government of the Federation of Malaya having signified its adherence to the Council's Agreement in September, 1958.

Report on Credentials

38. In accordance with Section III of the Rules of Procedure a report on credentials submitted by Delegates and Observers to the Eighth Session of the Council was presented.
39. Officially accredited representatives of Member Governments participating in the Council's Session were 12 delegates, 9 alternates, 25 advisers and 5 experts. Member Governments on behalf of whom delegates were present were Australia, Ceylon, France, India, Japan, Korea, Federation of Malaya, Netherlands, Thailand, UK, USA and Vietnam.
40. Accredited representatives of the following observer-organizations were also present:—
 1. Ceylon Association for the Advancement of Science
 2. Gal Oya Development Board, Ceylon
 3. South Pacific Commission
 4. United Nations Technical Assistance Board
 5. University of Ceylon.

Report of the Executive Committee

41. The Council considered the Report of the Executive Committee in the light of recommendations and comments made in the submission to the Council from the special ad hoc Sub-Committee consisting of Mr. Garth I. Murphy, Mr. Soong Min Kong and Mr. Tran Van Tri, appointed by the Chairman to examine the Report.

Relation with FAO

42. The Council noted with appreciation that most of the Seventh Session recommendations to FAO had been implemented and that the liaison maintained with the Fisheries Division had strengthened by the services of the Technical Secretaries, Dr. G.L. Kesteven, Mr. C. Beever, Dr. M.R. Khan, Mr. S.J. Holt, Mr. H. Kristjonsson

and Mr. Y. Miyake. It was noted also that liaison had been maintained with the sister organization, the General Fisheries Council for the Mediterranean, particularly through the exchange of publications and information.

43. The Council expressed its appreciation of the invitation from the Director-General, FAO to be represented at the Second World Fisheries Boat Congress to be held in Rome from 5-10 April, 1959 and expressed interest in the World Scientific Meeting on the Biology of Sardines to be held in September, 1959.

44. The Council noted with considerable satisfaction the interest in its activities expressed by Delegates at the FAO Far East Regional Conference held in Tokyo in October, 1958. Specific references to the recommendations of this Conference are given in Chapters 2 and 3.

Relations with other Organizations

45. The Council endorsed action taken by the Executive Committee and Secretariat in connection with the Council's relations with other International and National Organizations and recommended that all possible steps be taken to maintain this system.

Council's Report to FAO

46. The Council endorsed the action taken by the Executive Committee in the preparation and submission of a report to the Food and Agriculture Organization after the Seventh Session held at Bandung and recommended that the Secretariat should transmit copies of subsequent reports to Member Governments for information.

Implementation of Seventh Session Recommendations

47. In addition to the comment given the Council endorsed action taken by the Executive Committee to implement the recommendations of the Council's Seventh Session held in Bandung and expressed appreciation to the Secretariat for the work carried out during the inter-session period.

Documentation for the Eighth Session

48. The Council endorsed action taken by the Executive Committee and Secretariat in the preparation and distribution of documents for the Eighth Session but requested that in future every effort should be made to distribute Session Documents as early as possible before the commencement of the Council's Session.

Nomination of Technical Committees

49. The nominations received from Member Governments in respect of Technical Committees I and II and their respective Panels and of the special Sub Committees were accepted by the Council (See Appendix II).
50. Chairman and Rapporteurs of these Technical Committees, Panels and special Sub-Committees are indicated in Appendix II.

Council Correspondents

51. Nominations for Administrative and Bibliographic Correspondents were received from Member Governments at the commencement of the Session. These remain as for the preceding inter-session period except as indicated in Appendix II.
52. The Delegate for Australia proposed that in view of the FAO program for expanding the coverage and distribution of the Current Bibliography of Fisheries Science, there was no necessity for the Council to continue its bibliographic activities in the field of fisheries biology, marine science and fisheries technology after the meeting of the Ninth Session, and that no further nominations of Bibliographic Correspondents would be sought.
53. This proposal was seconded by the Delegate for France and adopted. The Council also adopted a consequential recommendation that FAO should consider and take action to produce a complete Bibliography covering Fisheries Science, Marine Biology, Statistics, Craft and Gear, Technology, Processing, Marketing and Socio-Economics, and that the organization should take appropriate steps to coordinate their activities in this regard with the United States Fish and Wild Life Service in connection with the publication "Commer-

cial Fisheries Abstracts" and current measures being taken in respect of the American Bibliographies relating to Inland Sports Fisheries.

Technical Committee Meetings

54. On a motion by the Delegate for USA, seconded by the Delegate for India, the Council recommended that the Secretariat should be instructed to explore ways and means to ensure that the Technical Committees and special Sub-Committees should meet at least once between plenary sessions.
55. In addition to this primary recommendation it was proposed by the Delegate for Vietnam that the possibility of holding sub-regional meetings should be explored.
56. It was agreed that the views of Member Governments should be sought and the Secretary should prepare a digest of these opinions which would be circulated to the Governments concerned.

Reports of Technical and Special Sub-Committees

57. The Council adopted the reports of Technical Committees I and II and the reports of the special Sub-Committees. The resolutions arising from the work of the Committees during the Session were examined in detail by the Delegations in Joint Committee and having been finalized were adopted by the Council in Plenary Session. (See Chapters 2 and 3)

Financial and Budget Report

58. The Council adopted the Statement on Financial and Budget Estimates as submitted in the Executive Committee's Report. It was further decided that a Statement of the Estimated Expenditure of the Council for the period following a proposed Plenary Session should be circulated to Member Governments along with the proposed Agenda for the Plenary Session not less than 60 days in advance of this Session.

59. This estimated expenditure should be annotated giving as far as possible a detailed analysis of expenditure under the four main items and it should be pointed out that such expenditure proposals might be subject to modification by the Council in Plenary Session in accordance with further information which might then be available for presentation to the Council by the Secretariat.

60. The Council adopted a recommendation submitted by the ad hoc committee on Budget Proposals that, at the next Conference of the FAO, Member Governments might request FAO to make a definite appropriation in respect of IPFC publications and that the members of the Council should be advised of FAO's decision as early as possible before the next plenary Session of the existence of such an appropriation. The Council in Plenary Session should then decide priorities of publication in respect of Council Documents.

61. The Council recommended that the Budget Estimate for 1960-61 should be presented to the Director General, FAO.

62. The Council adopted a recommendation from the ad hoc committee on Budget Proposals that the Secretariat should seek ways and means of reducing expenditure in connection with interpretation services where possible through the employment of locally available Interpreters. Provision should nevertheless be made for expenditure adequate to ensure the employment of overseas Interpreters if such local Interpreters were not available. In addition the Council considered that if the proposal for inter-session Technical Committee Meetings was acceptable to Member Governments, provision should be made for Council expenditure in connection therewith and that such expenditure might in practice be covered by savings effected by the utilization of local interpretation services.

63. IPFC Statement of Expenditure for 1958 (January — September)

	Expenditure US \$	Budget Allocation 1958/1959 US \$
A. EXECUTIVE COMMITTEE TRAVEL	921.00	3,000.00
IPFC 27th Executive Committee Meeting, Saigon, Vietnam, 21—24 May 1958		
Chairman: Dr. K. Kuronuma (Japan)		
Fares	570.00	
Subsistence	105.00	
Terminals	8.00	
Vice-Chairman: Dr. Tham Ah Kow (U.K. Sing.)		
Fares	160.00	
Subsistence	70.00	
Terminals	8.00	
Member: Dr. N.K. Panikkar (India)		
— absent —		
B. PRINTING	879.72	4,000.00
600 copies C.A.B. No. 20	215.52	
" " " No. 21	151.32	
" " " No. 22	117.90	
	<u>484.74</u>	
1,300 copies IPFC procs. 6th Meeting, Sections II and III		
Ind. Rups. 8395-0-0 — 1957 budget = 1368.67		
1958 " = 394.98		
= US \$ 1,763.65		
C. MEETING (estimate)	2,700.00	2,700.00
8th IPFC Session, Colombo, Ceylon, December 6-22, 1958		
Local expenditure at Colombo, Ceylon	300.00	
Crating of documents, overtime and other incidental expenditure in Bangkok before the meeting	200.00	
Part interpretation services of 2 interpreters (estimate)	2,200.00	
(Costs shared with FAO Conference on Principles and Policies of Land Settlement, Gal Oya)		
D. MISCELLANEOUS ITEM (up till 30 Sept.).....	529.14	2,000.00
(1) Postage, telegrams	282.71	
(2) Equipment —	242.10	
Stationery and supplies		
Postage expenses paid on behalf of IPFC by Regional Information Office, New Delhi		
— Ind. Rups. 20-71 = US \$ 4.33		

64. **1959 Program of Expenditure**

The FAO Conference, Rome, November 1957 approved a biennial budget for the Council as follows:

1958-59 A. Travel — Executive Committee	US \$ 3,000
B. Printing	4,000
C. Meeting	2,700
D. Miscellaneous Expenses	2,000
Total	<u>US \$ 11,700</u>

1959 Programme65. **Item A. Travel**

Sufficient funds will remain under this head to permit two meetings of the Executive Committee during 1959, savings have been effected due to the inability of Dr. N.K. Panikkar to attend the 27th meeting held in Saigon.

66. **Item B. Printing**

Payments of outstanding charges in respect of the 6th Proceedings have been met largely by funds carried over from 1957, but approximately US \$500 will have to be drawn from the 1958-59 allocation to finalize the accounts.

67. **Printing of the 7th Proceedings, now in progress will cost approximately US \$2,500, including distribution costs, and four issues of the Current Affairs Bulletin during 1959 will cost approximately US \$500, leaving an anticipated balance of US \$500 to meet the cost of printing of part of the Proceedings of this (8th) Session. Publication of the remaining part may therefore have to be deferred until the next budget period.**68. **Item C. Meetings**

It is anticipated that costs chargeable against the Colombo Session will approximate US \$500, the remaining sum of US \$2,200 will be required to meet the costs of the French-English interpretation service, covering 2 persons for approximately 16 days @ US \$35.00 per diem plus single fares Colombo-Geneva. As no session of Council will be convened during 1959, there will be no expenditure under this head.

69. **Item D. Miscellaneous Expenses**

This item is fairly stable from year to year and covers postage, telegram and cable charges, stationery and a small amount of office equipment.

70. **Proposed Budget Estimate 1960-61**

A. Travel — Executive Committee	US \$ 3,500
B. Printing	6,000
C. Meetings	2,700
D. Miscellaneous Expenses	1,500
	<u>US \$ 13,700</u>

71. **Item A. Travel**

Provision is made for one Executive Committee Meeting during 1960 and two during 1961. Expenses for payment of per diem to members of the Executive Committee during pre-and post Session meetings are included.

72. **Item B. Printing**

Provision is made as follows:

Outstanding commitment	
8th Session Proc.	US\$ 2,000
Printing & Distribution,	
9th Session Proc.	2,500
C.A.B., 8 issues 1960-61	1,500
Total	<u>US \$ 6,000</u>

73. **No provision has been made for the printing & distribution of Special Publications, Handbooks and Manuals, nor of reprinting the Council's Agreement and Rules of Procedure as amended. The availability of such material for printing will depend in large measure upon the distribution of the workload during 1959-1961 at Fisheries Division, FAO. The advice of the Director has been sought on this matter.**74. **Item C. Meetings**

As for 1958-59, direct expenditure in relation to the meeting is estimated at US \$500 and that for interpretation services at US \$2,200.

75. **Item D. Miscellaneous Expenditure**

As indicated above, no charge in this item need be anticipated.

Council's Symposium76. **The Council adopted the report on the Eighth Session Symposium "Fish Behavior with particular reference to Pelagic Shoaling Species" by the Convener, Dr. F.D.**

Ommanney, noting that the results of studies on fish behavior were applicable to the industry through the development of fishing equipment and increasing the catch efficiency of existing fishing equipment, through the location of fish concentrations and through the formulation of management programs. Fisheries Biologists still lack much of the ordinary fisherman's knowledge of fish behavior and accurate field observations properly recorded should be made. Care should be taken that conclusions in relation to fish behavior under natural conditions should not be based solely upon observations made on fish in aquaria.

77. After considering recommendations received from the Technical Committees, the Council decided that the Symposium subject for the Ninth Session should be "How to formulate programs of fisheries research and technological improvements particularly in fish handling required for the implementation of national policies for fisheries development, and methods of assessing progress on these programs". Mr. D.J. Gates (Australia) was elected Convener.

Amendments to the Agreement

78. The Council adopted the proposal by the Government of India of an amendment to the Agreement to permit the Council's Plenary Sessions to be held at intervals of two years. The proposal was seconded by the Delegate for Ceylon and the voting was as follows: 11 delegations in favor; 1 against, with two communications in favor received in writing by the Secretariat; 3 countries abstained from communicating their opinions to the Council. The 13 votes in favor of the amendment gave the required majority.
79. The Delegate for the Netherlands tabled a proposed amendment of the Agreement which would permit future amendments of the Agreement to be passed on a basis of a two thirds majority of Member Governments represented at a Session. The Secretary was instructed to circularize Member Governments to this matter.

Organization of the Council's Work

80. The Council adopted a recommendation submitted by the Delegate for France that Member Governments should include in their official opening Statements a list of the important problems, given in the order of priority that each country would like to see assigned to them by the Council; that these opening Statements should be transmitted to the Secretariat at least 60 days before the forthcoming Council Session; that the program of work of the Technical Committees should be based on these lists of problems together with the recommendations from the previous Session and that provisional programs including these two features should be submitted to the Council in Plenary Session.
81. The Council resolved that in view of the fact that much of the Council's work is of a continuing nature, it is felt desirable that Delegations from Member Governments should include at least one member who has had previous experience in Council Sessions. Member Governments are accordingly requested to give consideration to this matter when the question of appointing delegations to attend Council Plenary Sessions or Technical Meetings is under review.
82. In further discussing the recommendation set out in paragraph 54 of this chapter, the Council accepted the recommendation from the Delegate from India that the proposal should be forwarded to Member Governments of the Council with indication of the administrative and financial implications. The Council requested that the views of Member Governments should be presented at the 9th Session of the Council.
83. The Council directed the Secretary to explore the possibility of arranging for meetings of the Technical Committees to commence a few days in advance of the first plenary meeting of each Council Session in order to review work and finalize the report on the Technical Committees activities conducted during the inter-session period.

84. The Council considered that this procedure would enable the Committees to give more detailed attention to the items on their respective agendas during the Council Session and in this way, increase the efficiency of the Committees operations.
 85. In connection with the coordination of work of the Technical Committees and Panels and to ensure continuity through the inter-session period and the succeeding session, the Council recommended for the attention of FAO that each Technical Secretary should be present at successive sessions of the Council. If this could not be arranged, then it would be advantageous if the Staff Member assigned as Technical Secretary for any inter-session period could be present at the following session.
 86. The Council placed particular emphasis on the need for continuity of representation and strongly urged Member Governments to give serious consideration to the two proposals set out above.
 87. The Council recommended that the organization of the Technical Committees into panels should continue as for previous sessions and inter-session periods. It further recommended that the ad hoc committees on *Rastrelliger*, *Hilsa*, Fish Culture in Rice Fields and Marketing should be reconstituted to operate during the inter-session period and the 9th Session of the Council.
 88. The Council further decided that in order to clarify the position of the Technical Secretaries, the special ad hoc Sub-Committees should be considered as operating under the aegis of the particular Technical Committee to which their subject matter had an obvious bias and that reports and recommendations from these Sub-Committees derived during a Council Session should be included in the report of the appropriate Technical Committee. Having been presented to the Council in Plenary Session these reports should be regarded, for the purpose of Rules of Procedure, Section X, para 3, as having been presented through the Executive Committee.
 89. The Council recognized the particular requirements of biologists in the field statistics and recommended that at the 9th Plenary Session, Technical Committee I should appoint two biologists who could participate in discussions of Technical Committee II, Panel C, on statistical matters.
 90. On the matter of correspondence during the inter-session period, the Council recommended that copies of all documents distributed or exchanged should be made available in sufficient numbers at each session for the use of new Committee members.
 91. The Delegate for Vietnam proposed a recommendation, which was accepted by the Council, that Delegates on returning to their respective countries, should emphasize particularly one or more of the Council's recommendations which they consider would be implemented by their Governments and they should particularly seek authorization and means to implement these selected recommendations.
- Time and Place of Ninth Session**
92. No invitation having been received from Member Governments, the matter was referred to the Executive Committee in accordance with the provisions of the Rules of Procedure, Section II. The Council adopted a recommendation that the Ninth Session should be held during the last quarter of 1960.
- Election of Chairman and Vice Chairman**
93. On the nomination of the Delegate for Korea seconded by the Delegate for Federation of Malaya, Mr. Tran Van Tri (Viet Nam) was elected Chairman of the Council for the inter-session period and the next succeeding Session.
- Participation in International Meetings**
94. The Council noted that included in IPFC/C58/WP 22, Schedule of Meeting of Interest to IPFC, were meetings in which the Council could profitably participate through appointment of observers wherever possible. In this regard the Council directed the Secretariat to circularize the Member Governments with the reports of such observers including a list of documents

presented and discussed at the concerned meetings. Member Governments could then directly contact the organizers of the meetings to obtain documents in which they might be interested.

Principles of Fisheries Policy

95. The Council agreed that there was need to define the basic principles for the formulation of fisheries policy and requested the Secretariat to prepare a questionnaire on this subject for consideration by Member Governments and on a basis of the replies to this questionnaire, Occasional Paper 57/3 and Addenda and such other information as could be made available, to prepare for submission to Member Governments.

Indo-Pacific Fisheries Year

96. The Council decided that the concept of a "particular year" be dropped from consideration. In so doing, the Council expressed its adherence to the basic philosophy of the Indo-Pacific Fisheries Year, namely, that the collection of adequate statistics is an urgent matter, and should be pursued with all possible speed by Member Governments.

Formal Resolutions of Thanks

97. On a motion by the Delegate for KOREA the Council adopted a resolution as follows:
"That the Council records its grateful appreciation of the generous hospitality and the excellent facilities which have been so graciously extended by the Government and people of Ceylon to the Council, to the Delegations from Member Governments and to other participants attending the Eighth Session and directs that this expression of appreciation be formally communicated to the Prime Minister of Ceylon"
98. On a motion by the Delegate for VIETNAM the Council adopted a resolution as follows:
"Le conseil exprime ses sincères remerciements à Son Excellence le Ministre des Industries et des Pêches, Mr. P.H. William de Silva, d'avoir honoré de sa présence les ceremonies de l'inauguration de la 8ème Session de l'IPFC,

ainsi qu' au personnel du Ministère des Industries et des Pêches de son assistance et de sa collaboration durant les séances dudit Conseil".

99. The Delegate for UNITED KINGDOM proposed and the Council adopted the following resolution:

"The Council desires to place on record an expression of its very sincere appreciation of the excellent arrangements made and the facilities provided for the Council's Session by the Organizing Committee and also to record most grateful thanks on behalf of the Council and the individual members participating in the Eighth Session, for the personal assistance, hospitality and close attention to their well-being by the individual members of the Organizing Committee."

100. The Delegate for FEDERATION OF MALAYA proposed and the Council adopted a vote of sincere appreciation to the Principal and Registrar of the Royal College, Colombo, for their generous action in making available for the use of the Council the entirely satisfactory accommodation within the College.
101. The Delegate for THAILAND proposed and the Council adopted a hearty vote of thanks to Dr. Katsuzo Kuronuma for his excellent service to the Council as Chairman and for the painstaking attention which he has devoted to the affairs of the Council since the Seventh Session in Bandung.
102. The Delegate for FRANCE proposed and the Council adopted;

"que nous votions des remerciements au Directeur General de l'Organisation pour l'Alimentation et l'Agriculture pour l'interêt profond et continu qu'il a montré envers les affaires du Conseil. Je propose aussi que nous votions dans le même sens vis-a-vis des personnes de la Division des Pêches de la FAO qui ont fait fonction de Secrétaires Techniques pendant la période d'inter-session et durant la huitième session, fonctions qu'ils ont si bien remplies et qui ont été précieuses au Conseil."

103. The Delegate for UNITED STATES OF AMERICA proposed and the Council adopted a Vote of Appreciation for the services of the Council's Secretariat and for the manner in which the instructions of the Council had been carried out and for the servicing of the Eighth Session.

Attention was drawn particularly to the very valuable and efficient service rendered to the Council by local Secretariat personnel assigned to assist the Council's Secretariat by the Ceylon Department of Industries and Fisheries.

CHAPTER 2. - RESOURCES

The Council reviewed the recommendations made by the Seventh Session of the Council with respect to the subjects assigned to Technical Committee I. For each topic account was taken of the progress of work reported in Working Paper 18 (which records the correspondence between committee members in the inter-session period), and in the relevant documents (Working Papers, Technical Papers and Contributed Publications) before the Council, and also reported verbally by the members of the Committee. The further actions recommended on the basis of this review are described below, together with decisions regarding new topics and proposals discussed by the Council. Technical Committee I attempted, as requested by the Chairman, to relate discussions closely to the practical problems confronting industry and governments, and would wish to do this more systematically at future sessions, on the basis of the identification by Delegations of their countries' main problems.

Reference Books

The Council examined the draft of a section of the "Handbook of Field Methods in Fisheries Biology" prepared by FAO Fisheries Biology Branch, and suggested that although it is useful for such a book to contain accounts of most well-tried methods, it should also give an indication of which method of several available for the same purpose is recommended for general use, and might be adopted as a standard, at least provisionally. The account of standard methods of water analysis circulated by FAO to the committee during the inter-session

period, for comment, is very helpful; it should be generally distributed, and might form a pattern for accounts of methods in other fields. It was suggested that consideration be given by the authors of such accounts to the desirability of beginning each with an introductory section dealing with the means of attacking particular problems, and grouping together the set of methods used in attempting to solve each problem.

The Council was informed of progress made by FAO in preparation of other compilations of methods, and discussed the procedure by which mimeographed drafts could be reviewed by the Council so that amendments might be suggested which would make them conform more closely to the Council's requirements. It has been suggested that the Editor should, for technical reviewing, enlist the aid of most qualified and experienced persons in each field, wherever they might be, and then, when their suggestions have been incorporated in the text, the revised draft should be submitted to the Chairman of the Council who would request, for each book, a person or group of persons, working within the Region, to study the draft with regard to its suitability for use by the Council, and advise him accordingly. These suggestions would then be forwarded to the Editor for incorporation in the published version. Notwithstanding the statement to the contrary contained in the Summary Report of the 7th Session of the Council, the Committee wishes to record its unanimous belief that, such compilations of methods should be called "Manuals", and

to avoid further confusion the term "Handbooks" be applied to compilations of results, as is the common usage. Combinations of the two might be referred to as "Reference Books".

Age determination of fish

The Council noted the difficulties involved in age determination of fishes in the tropics. In some instances, however, there are annual or semi-annual changes in the environment of sufficient magnitude to cause check marks in hard parts. Research workers are urged to take advantage of these whenever possible.

The Committee also noted the possibility of conducting studies on population dynamics without determining the age of the fishes. Reference is made to the report on the *Rastrelliger* Training Center (Working Paper 28) 1958 for further details. Finally the Council noted the possibility of determining the age of fish on basis of changes in body proportion with age.

The Council noted with interest that FAO is contemplating preparation of a general review of the question of age determination. The Council recommends that Biology Branch, Fisheries Division, Rome, be requested to proceed with all possible speed in the preparation of a review with particular reference to tropical problems and recommends that the report include the following:-

- I. Definition and discussion of the applications of age and growth data to practical fishery problems.
- II. Discussions of all possible methods of age determination in the tropics.
- III. With reference to (1) above descriptions of alternate methods of solving problems that normally require age and growth data for their solution.
- IV. Clear definitions of areas for further scientific investigation looking towards solution of the basic problems. These will serve as guides to the scientific programs of the several member countries.

The Council awaits with interest the publication of the report. It is hoped that member nations will report results in this area as their research is completed.

Standardization of Plankton Nets

The Council noted with pleasure that UNESCO had made available a grant sufficient to cover the cost of 12 Marutoku B-type zooplankton nets. The Secretary was instructed to obtain these nets and send one to each member country which is not already in possession of such a net, and which will be able to use it, either for comparison with other kinds of gear during the next inter-session period or, lacking such other gear, to begin plankton survey. The nets should be sent directly to the persons at addresses listed below, together with an explanation of the recommended mode of use.

AUSTRALIA	- Mr. O.J. Tranter, CSIRO, Cronulla, Sydney.
CEYLON	- Director of Fisheries, Fisheries Research Station, Galle Face, Colombo.
FRANCE	- Mr. Legand, Institut Français d'Océanie, B.P. No. 4, Noumea, New Caledonia.
INDIA	- Dr. S. Jones, Chief Research Officer, Central Marine Fisheries Station, Mandapam Camp, South India.
INDONESIA	- (Secretary to ascertain from Committee Member).
FEDERATION OF MALAYA	- Director of Fisheries, Department of Fisheries, Penang, Malaya.
NETHERLANDS	- Dr. J. Verwey, Director, Zoologisch Station, Den Helder, Netherlands. (Alternative: Dr. K. Vaas, Leiden or Prof. G.B. Baerends, Groningen).
PAKISTAN	- (Secretary to ascertain from Committee Member).
UNITED KINGDOM	- Director, Fisheries Research Unit, University of Hong-Kong.
VIETNAM	- M. le Directeur des Pêches du Vietnam, 116 Rue Phan Dinh Phung, Saigon.

The Council recommends that Marutoku B-type nets be used during the period between the 8th and 9th Sessions of the Council to conduct experiments designed to obtain comparative data regarding the effectiveness of different kinds of plankton nets in

catching zooplankton organisms, fish eggs and also fish larvae. The results of such experiments should be reported to the 9th Session, at which time the next step in standardization of sampling gear should be discussed.

At least one comparative experiment should be conducted with the Marutoku B— net and each other kind of net in use by each country. In particular comparisons should be made with the Clarke—Bumpus net (adopted by Australia, France and New Zealand for TASMAPAC and subsequent cooperative investigations in the South Pacific) the one meter net used by POFI, the Hensen net used in the Philippines and elsewhere, and the Discovery net used in Hong Kong.

In each experiment a minimum of 10 stations should be worked. At each station two normal hauls should be made with each net, from bottom to surface or, in deeper water, from 150 m. to surface. The haul with the Marutoku B—type net should be vertical, and at a speed within the range 0.4 to 2.0 m/sec. and preferably 0.6 to 1m/sec.

Results should be presented as mean total number of fish eggs, total number of fish larvae and total displacement volume of plankton (excluding any organisms exceeding 1 cm. in length, which should be recorded separately) in each replicate pair of hauls for each net at each station, expressed both as per m³ of water filtered and as per m² surface of water column.

Information about each comparison should include at least station position, date and time of haul, weather conditions and depth of water.

The method of treatment of the catches (removal from net, preservation, sorting, estimation of displacement volume) will be described by the committee member for Japan in a note which he has undertaken to prepare and circulate, and which will follow the procedure commonly used in that country.

Member countries, such as the Philippines and U.S.A. who are already in possession of comparative data, are requested to submit an analysis of them to the 9th Session of the Council.

The Council decided to make no recommendations regarding gear specifically for

sampling fish larvae and phytoplankton until the results of the trials with the zooplankton nets are available.

The Council endorsed the recommendation of the *Rastrelliger* Training Center (Working Paper 28) that full advantage be taken of all possibilities of cooperation with commercial vessels of all kinds in obtaining information about plankton abundance. It is recommended that FAO should make available prototypes of the simple modification of the Hardy Plankton Indicator, in order that countries having opportunities to arrange for the use of such a gear by fishing vessels or other craft may construct copies of it locally.

Identification of fish and plankton

The Council noted with pleasure that most member countries have now published check-lists of fishes, and others have them almost complete. The Council urged members who have either not published lists so far, or have revised their earlier lists to submit copies to the Biology Branch of FAO Fisheries Division. The Council also requests the Fisheries Division of FAO to publish its proposed check-list, (which should include names of all commercially important aquatic animals) at least in draft form, before the 9th Session of the Council.

The Council discussed the need for illustrated keys for important plankton species in the region. Pending the publication of such keys by countries having the staff and facilities for this work, the Delegate for the U.S.A. undertook to arrange for preparation of a short annotated list of references to available publications useful for plankton identification, and to circulate it to the members of the Council.

It is hoped that the Council will be able to use its good offices to assist workers in certain member countries in finding means of having their identifications checked. The Delegate for the Netherlands suggested that workers experiencing difficulties in the identification of freshwater forms might contact the Zoological Laboratory of the University of Leiden.

Population dynamics

The Council reaffirmed the importance of methods of assessing the relations between fish stocks, the yields obtained from them and the methods and intensity of fishing, and recognised

the role of these methods in providing a focal point for biological, and technical studies of fishing industries. It believes that the proposed new Journal of Population Dynamics would help to stimulate research in this field and facilitate the exchange of ideas between scientists engaged in it.

The Council looks forward to the early publication of the report and papers of the Joint Scientific meeting of ICNAF, ICES and FAO in Lisbon 1957, and noted progress in population studies reported by some member countries, all of which are requested to continue to inform the Council of their work on fishing and stock assessments, and particularly with regard to river populations and cultivated stocks.

Fish culture in general

General reports on this topic, which was reviewed at length were received from Malaya, Thailand and U.S.A. The Council stressed the importance of fish culture research in the region and recommends that Member Governments be asked to consider how the work of the Council might be made more effective in this field and make proposals in this respect for consideration at the 9th Session of the Council. Distribution by FAO of the review by E.D. Le Cren on the application of science to inland fisheries is awaited with interest.

Diurnal feeding rhythms

It was noted that no further work on this subject, to which the Seventh Session of the Council had made particular reference under the general heading of fish culture, had been carried out. The Council is of the opinion that it is not of such importance as to warrant its special attention, and does not, therefore, recommend further action with respect to it by members of the Council.

Soil composition in fish ponds

It is understood that the draft of a paper on this subject by A.G. Wurtz of France has been completed and the committee looks forward to its publication.

The Council reviewed the report on the work done by India and noted the work on acid soils carried out at the Fish Culture Research Station, Malacca, reported in the opening statement of the U.K. Delegation. The investigation of soil structure and compo-

sition in relation to fish production is important, but it requires highly specialized techniques and equipment, so that several member countries are not able to undertake such studies at the present time. The Council urges that India continues its work in this field and requests that the results obtained, together with information about techniques used, be reported to the 9th Session of the Council.

Problems arising from the Introduction of Non-Indigenous Fishes

The Council recognized that the present subject extended to undesirable fish, whether indigenous or non-indigenous. The spawn taking of Chinese-carp successfully carried out in Japan during 1957 and 1958 took the attention of the Council which also noted the problems arising in the area particularly concerning *Tilapia mossambica* and common carp (*Cyprinus carpio*).

Rigid control of the introduction of non-indigenous species is considered necessary, and adequate research should precede action in this matter. A statement on this subject by the Australian Delegate stated that the introduction of aquarium fish is becoming increasingly important in Papua/New Guinea and the information available on habits is insufficient to ensure that the fish, if liberated in natural waters, will not become a serious menace to other aquatic forms of life—for example, *Lebistes* is described as a harmless fish with potential as a biological control for mosquitoes. However, it is known to attack small fish of good edible varieties and therefore could be termed noxious.

In tightening up control by the Australian Government of introduction of exotic species, the following varieties have recently been excluded from import licences granted in the Territory of Papua/New Guinea:—

Millions Fish	<i>Lebistes reticulatus</i>
Bumble Bees	<i>Brachygobius doriae</i>
Angel Fish	<i>Pterophyllum</i> spp.
Black Tetras	<i>Gymnocorymbus ternetzi</i>
Lamp Eyes	<i>Aplocheilichthys</i> <i>microphthalmus</i>
Penguins	<i>Thayeria obliqua</i>

Although these varieties which can be imported from New South Wales into the Territory may be harmless in temperate climates, in tropical Australia and New Guinea they

may be considered a menace to natural waters. More information on these species and other exotic varieties would enable regulations to be planned more satisfactorily. Member countries are requested to submit relevant data to the Secretariat for the information of countries concerned.

The Council recommends to Member Governments that:

- i. considerable research should be carried out before any legislation in respect of introduction of non-indigenous species of fish is enacted.
- ii. research on *Tilapia mossambica* should be continued, both in fishponds and natural bodies of water, and the results reported to the next Council Session.
- iii. where possible research should be undertaken on common carp (*Cyprinus carpio*) with particular attention to specification of the varieties dealt with and the countries from which they originated, with the aim of finding criteria to determine which variety is most suitable for particular habitats. The results should be reported to the next Council Session.
- vi. research should be continued on the spawning of Chinese Carp, with special reference to the production of their fry.

Weed Control

The Council reviewed the status of the question in various member countries. Aquatic weed control does not appear to be a serious problem in Japan and Vietnam but may be of local significance in Malaya, Ceylon, India and U.S.A. In India the choking of inland water areas with aquatic weeds has considerably retarded the progress of fisheries development.

The Council recommends that further work be carried out to evolve a suitable and economic method of controlling growth of weeds in fish ponds. Interested Member Governments may study further or examine whether the grass carp (*Ctenopharyngodon idellus*) would be useful in keeping down the growth of submerged aquatic weeds in their countries.

Member Governments are requested to continue to report to the Council the results of their work in this field until such time as the Council considers the time is appropriate for a further general review of the matter.

Stocking of natural swamps and other economically unproductive waters

No new documents were available to the Council relating to the proposal made at the 7th Session of the Council to encourage stocking with hardy local species such as *Puntius javanicus* as a preliminary step in developing freshwater fisheries in these areas.

The council was informed however that in Malaya, where *P. javanicus* is becoming a popular culture species, stocking of ponds and mining pools after removal of predatory fishes with insecticides, has been initiated, though it is too early to say whether this rough stocking will be entirely successful.

In Ceylon stocking with *Trichogaster pectoralis* in swampy low-lying areas, irrigation canals and ditches leading to paddy fields has in some areas been successful. Rough stocking with *Tilapia mossambica* has also been successful in certain village tanks.

The results of the activities mentioned above, and of other experience with rough stocking, should continue to be reported to the Council.

Fish Culture in Rice Fields

Considering the importance of this method for increasing the production of freshwater fish in the Region, as well as the inadequacy of information on the subject obtained hitherto, the Council deems it desirable to see the Rice Field Fish Culture Sub-Committee strengthened through the effective participating in its work of other member countries at present practising rice field culture, and proposed that the Secretary be instructed to solicit nominations from the Member Governments concerned. The Council reaffirmed the recommendations adopted at the 7th Session relating to the main principles on which methods of rice fields fish culture should be based, the effect of insecticides on fish and the inter-action of rice and fish i.e. the influence of rice on the growth of fish, the influence of fish on rice yield. The Council noted that documents were before it which

reported action with respect to all three items, and wished now to place priority on obtaining information concerning the comparison of fish and rice production in paddy fields.

The Council would again draw the attention of FAO to the inter-dependence, in countries where rice field fish culture is practised, of the problems of rice cultivation and fish culture. Progress is possible only where organizations dealing with rice cultivation and fish culture, respectively, work hand in hand both at the national and the international levels.

Mr. Le Van Dang (Vietnam) was elected Chairman of the Sub-committee and asked to take the initiative in obtaining replies to the questionnaire which had been circulated in the past inter-session period. Members of the Sub-committee were asked to cooperate with the convenor in this task and the Council recommended that delegates, in their reports to their governments, should make special mention of this matter.

Nutrition of fish under cultivation

It was noted that although FAO had not been able yet to prepare the comprehensive review of this subject requested by the 7th Session, it hoped to do so during the next inter-session period. The Council attaches considerable importance to this topic, but because of its complex character the particular aspect of nutritive values of different foods to particular fish species was selected as that to which work in the next inter-session period might be directed. The nutritive value is expressed in terms of growth of fish or yield obtained and should be considered in relation to the composition of the food, and the choice of suitable foods to be encouraged in the natural environment, or to be stocked or given artificially. Papers on nutritive value of natural and artificial foods and quantities eaten by cultivated fish are solicited for the 9th Session of the Council. It is believed that discussion at the 9th Session should not only clarify a subject of direct interest to the Council, but would contribute to the preparatory work for the meeting on broader aspects of fish nutrition which FAO proposes to convene in 1961.

Chanos

The report of the Chanos Sub-committee on techniques of reducing fry mortality requested at the 7th Session of the Council had not been

prepared. From the documents submitted it appeared that there already exists a considerable body of knowledge about this subject, but more active steps need to be taken by extension services to inform operators about such techniques and apply the experimental results in practice.

The synopsis prepared by Mr. Schuster at the request of FAO was welcomed and it is hoped that after any necessary revision this would be published. The Council was sorry to note that information is still lacking concerning *Chanos* research and cultivation in Taiwan.

Member Governments are requested to submit reports on new developments in *Chanos* fisheries to the 9th Session of the Council. It was decided, however, to suspend the activities of the Chanos Sub-committee pending promulgation by the Council of a plan of action with regard to the broad problems of fish culture, as suggested under that general heading in this report.

River-basin Development

The Council considered the present status of the problem in different member countries and the Delegate from Japan emphasized its importance. Particularly in Malaya and India, tree stumps in their beds have considerably retarded the development and exploitation of fisheries in reservoirs. The Delegate from Vietnam stated that Thailand, Cambodia and Vietnam, having contiguous waters, construction of barrages in one country would affect the riverine fisheries of others. It was observed that in U.S.A. there is comprehensive legislation to the effect that it is obligatory on the part of the river valley projects to provide necessary funds for development and protection of fisheries in the rivers.

The Council recommends that Member Governments be apprised of the importance of this problem. Surveys should be carried out on notice being given of impending construction of dams, and the sites should be cleared before water is allowed to accumulate, in order to facilitate subsequent exploitation of the reservoir. The Council stressed the need for continuing biological surveys after the completion of the project. Legislation should in each case be enacted to ensure that such surveys are carried out, that their costs are borne by the Development Authority and that

recommendations arising from them are given due and proper consideration. The results of such surveys should provide the basis of action by the Government Agency concerned, designed to protect existing fisheries or develop new ones. The attention of Governments and International Agencies concerned is drawn for example, to this need with respect to the Lower Mekong Basin Development Project, which will affect the fisheries of four countries.

Water Pollution

The Council discussed the problem of pollution resulting from mining operations, manufacturing industries, agricultural use of insecticides, town sewage and discharge of oil and other wastes from vessels and the adverse effects of these on inland and coastal fisheries in several member countries. Although the problem is not very acute at the present moment, the danger is increasing and the Council apprehends that it will assume serious proportions in the near future in view of the increasing technical developments in member countries. It is therefore necessary to protect the interest of fisheries well in time, and the Council recommends that Member Governments be urged to take early steps to enact legislative measures to this end.

Hilsa

Hilsa forms an important commercial fishery in Burma, India and Pakistan. The Indian Delegate drew the Council's attention to the status and the problems of *Hilsa* fisheries in his country and also the work that is now being carried out by the National *Hilsa* Research Unit. Studies of age and size composition, of the stage of maturity and of morphometric and meristic characters in large samples of *Hilsa* from all river systems and the Saurashtra coast are being conducted. Tagging experiments are also in progress. Catch statistics in respect of *Hilsa* fisheries are being collected from different regions. The Council observed that Pakistan has also undertaken studies on the *Hilsa* fisheries. So far as known there had been no progress in Burma on this problem and the Council proposed that Burma might reconsider setting up a research unit at an early date.

It is proposed that the *Hilsa* Sub-Committee should continue its work along the lines laid down at previous Council Sessions.

The need is stressed for close contact between the workers of the member countries concerned to ensure adoption of uniform methods and techniques in *Hilsa* investigations. Technical papers and reports on the subject are solicited for discussion at the next Session of the Council.

Rastrelliger

The Council was pleased to note that its request that FAO should arrange a Seminar to train technical officers had been implemented by the conduct of an International Training Center on the Methodology and Techniques of Research on Mackerel *Rastrelliger* the report of which was presented to the Committee.

It is recommended that member countries fishing for *Rastrelliger* implement without delay the proposals contained therein for standard techniques of research on *Rastrelliger*. The Council noted that these proposals are entirely consistent with Article III of the Council Agreement.

All member countries, and especially those having important fisheries or conducting research on mackerels, are requested to study the more general recommendations (other than those dealing with subjects covered by separate proposals in this report) contained in the report of the Training Center and report on the feasibility of their implementation to the 9th Session of the Council.

Certain recommendations from the Training Center are for action by FAO, and it is hoped that FAO will be able to undertake this work.

Particular attention is drawn to the proposal that participating countries should send records of their length sampling operations to the Council's Secretariat for compilation and publication in suitable manner. The form given in the Training Center Report should be used for this purpose.

The *Rastrelliger* Sub-Committee elected Mr. Sant Bandhukul (Thailand) as Convenor for the next inter-session period and the 9th Session of the Council. He, with the Technical Secretary, was requested to do everything possible to draw the attention of the workers and institutions concerned to the proposed methods, encourage their adoption, follow the development of *Rastrelliger* research and arrange for preparation of a comprehensive report on

the implementation of the recommendations, to be presented to the 9th Session of the Council. All members of the *Rastrelliger* Sub-Committee are asked to cooperate in this task, and Member Governments are requested to facilitate their work.

The Council noted that the Training Center would have benefited by the participation of scientists from Member Countries fishing for mackerels other than *Rastrelliger* species. To encourage wider participation in the development of methods of research in this field it is proposed that the terms of reference of the Sub-committee be broadened to include all *Scombroid* fish, and that its title be modified accordingly.

The Council believes that the need will arise in future for further opportunities of reviewing progress in this work, especially as research programs are only just now starting in some of the participating countries. It is recommended, therefore, that consideration be given by the member countries and by FAO to finding means by which research workers, (including for continuity, at least some of the participants in the Center), can in about three years time meet to appraise the results obtained from the application of the proposed techniques of study. Such a meeting should be conducted as a workshop at which results would be compared and analyzed further if necessary.

It is important that all workers concerned with *Rastrelliger* research be informed, directly and in detail, about the decisions of the Council in this matter. It is therefore recommended that the report of the Training Center, with the relevant Sections of this report appended, be published by FAO as soon as possible and widely distributed within the region. It should also be sent to interested workers elsewhere, particularly those concerned with scombroid fishes.

Mugil

No progress was reported in the reviewing of the status of work on this group and planning a program of action by the Council with respect to it. The Committee urges the Rapporteur for this topic (Mr. J.D. Bromhall, Hong Kong) to complete his synopsis as soon as possible and circulate it to members of Technical Committee I before the 9th Session

of the Council so that they may propose appropriate action by the Council at that time. The Council noted with considerable interest the early results of experiments on artificial breeding of *Mugil* in Korea and solicits further reports at the 9th Session.

National resources for the study of basic productivity of the sea

Work has been done in this field during the past inter-session period by Australia, France, Japan and the U.S.A. Among the ways of measuring primary production the Council noted that the Carbon-14 technique is the only one which could at present be used by other member countries, because it is cheap, and skilled experts are not needed for the field work, nor complex instruments for the analysis, since central agencies can now supply standard materials and provide a counting service. In the Indo-Pacific Region two important ways of practising the technique are already in use—one in Hawaii, one in Australia and both in New Caledonia.

France proposed to compare these techniques, and to work on standardization of one or several of them, in New Caledonia by using Stiemann Nielsen's method with materials from the International Agency in Copenhagen as a reference, provided that funds could be made available for this purpose. It is hoped that a small grant might be obtained from UNESCO or another organization to facilitate this work. The Council noted that the Symposium on Methods of Measuring Primary Production at Bergen in 1957, was unable to suggest standard methods. In these circumstances the Council recommends that Member Governments having facilities and staff available at present for this work continue it and report their progress at the 9th Council Meeting, in particular those aspects which bear on the problems of standardizing the method for routine use.

Faunal Changes

This item was considered and deleted from the list of topics for future action as it had been adequately dealt with in other portions of the report.

The Council noted, however, that it was difficult to consider the topic without adequately detailed catch statistics. Such statistics are basic in all programs of fisheries research,

development and management as well as being vital to economists and others.

The Council, therefore, decided that, during the Ninth Session, two members of Technical Committee I would be asked to join Panel C of Technical Committee II during discussions on statistics. Arising from the joint discussions which would give adequate recognition to the special requirements of fisheries biology in the preparation of statistical programs, the Council might then be in a position to establish a more comprehensive procedure in relation to its work in this field.

Trawling

The Council noted that experimental and commercial trawling is being undertaken by many member countries and recommended strongly that size compositions of the catches of the main species be always recorded, in order to form a basis for stock assessments and future research.

Oceanography

It was noted that Japan, Australia, France and U.S.A. have published their oceanographic data and distributed them in the region. The Fisheries Research Unit of Hong Kong University has accumulated files of hydrographic data since 1954 from surveys in the territorial waters, and in the shelf region in a sector one hundred miles off shore from Hong Kong, to study the influence of the discharge of the Pearl River; consideration will be given by the Hong Kong Fisheries Research Unit, to the possibility of publishing these data in mimeograph form for distribution. The Secretary was instructed to enquire from member countries what other data are in existence and which have not been published or exchanged between member countries, and to report on the possible ways through which dissemination of this data to intended parties could be achieved. Due consideration should be given to the discussions taking place outside this Council with regard to the compilation of oceanographic data on a world basis, and the Secretary is asked to prepare a report on progress in this field for consideration at the 9th Session of the Council.

Tuna

Except in France, Japan and the United States, where ambitious programs of study on tuna biology have been undertaken the pro-

gress in other countries is not considerable. The tuna fishery is being expanded in Australia, where a biologist has been appointed to work on tuna. The Council noted that in Malaya exploratory fishing for tuna in off shore waters is to be carried out by a Colombo Plan expert. The Council recommends that Member countries continue to report to the Council new developments in the status of tuna fisheries and research, and reaffirms its recommendation that the one-degree square should be the basic unit for the collection and presentation of tuna catch statistics.

Sardines

The Council had previously been informed of the World Scientific Meeting on the Biology of Sardines and Related Species to be convened by FAO at Rome in the autumn of 1959, and it had before it the operational plan for that meeting. The Council was asked to propose an author for a species synopsis for *Sardinella* in the tropical eastern Indo-Pacific, and suggested the name of Mr. Li Kwan Ming. It was pointed out by the member for U.K. (Hong Kong) that the time now remaining was very short but he would ask Mr. Li to complete a draft of his synopsis by midyear if possible. The Secretary of the Sardine meeting should correspond directly with Mr. Li with regard to the arrangement of the synopsis.

The Stock and Area paper requested for the eastern Indo-Pacific area could be assembled by individual countries concerned contributing sections describing the situation with regard to their own industry. It was observed that in most countries there was no worker studying sardines, and that generally sardines were caught in mixed fisheries. Sardine research was however believed to be in progress in Indonesia and the Philippines. It was suggested that the Secretary of the Sardine meeting should contact workers there, and also Dr. R.V. Nair, at Mandapam, who was working on the taxonomy and general biology of this group in the region.

The 9th Session of the Council should consider the inclusion of sardine studies on the agenda of Technical Committee I, and it is hoped the Report of the sardine meeting would be available as a methodological guide.

UNESCO

The Council examined WP 13, Projects and Proposals relating to the IPFC Region and was unable to express an opinion on the pro-

jects as the supporting documents were not available. The Council directed the Secretariat to keep Member Governments apprised of developments.

APPENDIX

Record of exchanges made by Technical Committee I in the inter-session period since the Seventh Session

INTRODUCTION

In the period since the Seventh Session of the Council, the Committee work as such has been effected exclusively by correspondence. The Technical Secretary prepared circular letters addressed to all members of the Committee to "...deal with matters that have been brought before the Committee; ... report action taken by FAO and ... note on current research activities in other areas, relation to subjects of interest to the Committee; ..." The first of these letters was dispatched in August, 1957. Unfortunately many copies of this letter seem to have gone astray. Many Committee members when asked for a reply stated that they had not received the letter. The second circular letter was dispatched in June 1958. In addition to the foregoing, the Chairman of the Committee sent out a general request for reports on work done in the various fields, and Chairman of Panels and Sub-Committees have made similar requests. The material which follows is a compilation of these several originating letters and of the replies received.

1. METHODOLOGY

General

1957: "...The Council decided to request the FAO Fisheries Division to prepare a broad detailed categorization of methods together with a description of methods considered suitable for adoption by member countries, for the consideration of Technical Committee I during the period between the 7th and 8th Sessions of the Council."

A schedule of methods for which it was proposed that descriptions should be prepared was distributed to and considered by the Committee. This schedule is given as

Appendix I. Whilst in general Committee members stated their views that the list was comprehensive, the opinion was expressed that an effort should be made to formulate the principles that should guide determination of the methods to be used.

The Committee was informed of progress being made by the Biology Branch of FAO Fisheries Division in the preparation of manuals; obviously these have a close bearing on this problem. Draft of the "Manual on Field Methods in Fisheries Biology" will be available at the current Session of the Council. This will be available only in sufficient number to provide one copy per delegation, it being expected that each delegation will nominate an individual to act as member of the Editorial Panel to comment on this draft. It is hoped that these comments can be received within a couple of months and that the Manual could go for printing before the middle of 1959. It is hoped that the Manual will be published in loose-leaf form and in a format that will make it durable for the field circumstances under which it would be used. The "Manual on Laboratory Methods in Fisheries Biology" is nearly complete and draft of it will be sent to the Editorial Panel during January or February. A draft of the "Manual on Fisheries Science" will follow shortly after. A "Manual on Sampling in Fisheries Biology" and the manual "Methods in Research in Population Dynamics" are under preparation.

Age determination of fish

1957: "...recommend the use of age-determination techniques wherever possible, in population analysis research because these were relatively inexpensive."

The Committee was informed that Biology Branch, F A O, contemplated preparation of a general review of this question.

(Japan) Studies on the annual marks of the calcified tissues of fishes including scales, otoliths and vertebral segments were carried out at the Governmental Fisheries Research Laboratories. Research workers of universities also examined scale rings of the tunas (bluefin, yellowfin, bigeye, and albacore), salmon (chum, red, and pink), and yellowtail. Extensive researches have been conducted mainly by the staffs of the Fisheries Research Laboratories to determine age of the sardine, herring, anchovy, salmon and saury. In the aim of determining age of the yellow sea bream, a few workers developed mathematical analyses of the length composition. (Dr. Kuronuma) Researches from new angles will be required in addition to the contemporary or orthodox methods.

(Malaya) Your proposal to prepare a review of the methods of age determination is timely and much appreciated. I have no paper for submission on this subject.

(U.S.A.) We have not advanced our thinking in this respect since the last meeting, and therefore will not submit a paper. We do have considerably more information particularly on the success of aging through tagging and are prepared to participate in discussions in this area.

(U.K., Singapore) No work on age determination has been carried out but data on the weight/length relationship in many types of locally caught fish have been collected. On this subject the Ex. Co. of IPFC at the last meeting at Saigon in May 1958 recommended that this subject might be referred to UNESCO to explore the possibility of granting a Fellowship to a qualified fishery worker to work at suitable centers on this problem, in order to ensure some advance in the knowledge on this subject.

(U.S.A.) We have engaged in intensive efforts to age tunas by using hard parts, such as scales, otoliths and vertebrae. Our tentative conclusion is that the method is not reliable, and the results cannot be legitimately used for determining growth rates and certainly cannot be used in erecting population dynamics

equations. We have been successful in ascertaining the growth rate of albacore and skipjack by means of tags, and reports will be prepared within the next year on these results. We do not concur that age determination techniques should be used for population analysis in tropical waters simply because they are relatively inexpensive. Poor or inconclusive results are never inexpensive despite their easy accumulation. Recent developments of new type of tags at Pacific Oceanic Fishery Investigations, in particular the dart or harpoon tag which we used too successfully on tunas, suggest that population problems in tropical waters can be most effectively solved by tagging programs. Such programs may seem expensive, but in the final analysis they will most likely be least expensive.

(Australia) In addition to studies on flathead, flounder, barracouta and mullet, using otoliths and scales, a comparison is being made of baleen, overies and ear-plugs for determining the age of whales. Age determination studies in an Australian tropical fish *Lates calcarifer*, which occurs elsewhere in the Indo-Pacific, reveals that two 'breaks' or annuli are formed on the scales each year. These correspond to two crises in the fish's year when feeding is difficult, namely the flooding of rivers at the onset of the wet season, and the retention of the fish in pools and waterholes on the floodplains or in the beds of the rivers which cease to flow in the dry season. This indicates the need to take care in interpreting the annuli of the scales of fish, particularly in tropical regions. This study should be published soon.

Standardization of plankton nets

1957: "...In order to facilitate the adoption of a standard zooplankton net, the Council instructed the Secretariat to explore ways and means of securing funds from UNESCO or some other agency to purchase sufficient such nets (say 100) for distribution to member countries in such numbers as may be necessary, on the understanding that member countries "receiving them would report the results of their use to the next or subsequent session.

The Council decided to review the desirability of adopting a standard phytoplankton net, in the light of reports on the use of the tentative standard zooplankton net."

The Committee was informed that UNESCO has agreed to provide a small number of these nets. An order is being placed for them and the Secretary of the Council has been asked to inform UNESCO of the addresses to which these should be sent.

(Pakistan) No work has yet been done on the standardization of plankton nets in this country.

(Japan) An example of the studies so far available for the inter-session period was an attempt at comparing efficiency of two kinds of plankton net with the same mouth opening but different in length, one being NORPAC type and other, Marutoku type. The investigation was carried out by the Tokai Regional Laboratory during August and September 1958 on the way of the IGY Oceanographic Observation of the northwestern Pacific Ocean, west of 170°W, north of 30°N. (Dr. Kuronuma) The Council may wish the Rastrelliger Center to develop the methodology in the adoption of standardized net, and the member countries assigned to experiment the net to report their work to the Council through the Secretariat.

(Malaya) Standardization is welcome.

(Singapore) No work on standardization of plankton nets has been carried out and it is proposed to await the holding of the Rastrelliger Seminar at Bangkok after which it is hoped the Marutoku-B type net would be made available for some preliminary work. The Ex. Co. of IPFC decided in May 1958 that Mr. Tubb should ask UNESCO to purchase the nets forthwith and keep them at Bangkok for distribution after the Rastrelliger Seminar.

(U.S.A.) We have not followed the recommendations of the Committee for adopting the "Marutoku-B" type plankton net, except when we have engaged in cooperative research programs. In these instances we continue to use our 1-meter net as a standard, supplementing the hauls with "Marutoku" type net. Basically we object to using the small net for routine

sampling in the central Pacific because it does not catch enough material for adequate quantitative comparisons. This problem is particularly distressing when attempts are made to assess the abundance of fish larvae quantitatively.

(Australia) Clarke-Bumpus nets are used for zoo-plankton and investigations are being made of their sampling error. Centrifugation of water samples is used for quantitative phytoplankton and nets and Hardy-type indicators are used for qualitative work. The efficacy of the centrifuging technique is now being studied. For the time being this Division intends to continue using the Clarke-Bumpus plankton net, which has been found satisfactory for our purposes. I hope we shall be kept fully informed on this matter.

Taxonomy

1957: "...The Council would, therefore, urge member countries to publish check lists of fishes giving the scientific names as well as the equivalent local and common names and to revise those already in existence, bearing in mind the needs of the fisheries biologist".

The Committee was informed that Biology Branch, FAO, would prepare for the Committee an account of the Branch's work on scientific and common names, together with a statement on the name lists in the possession of the Branch and a bibliography of Indo-Pacific check-lists. This work has not yet been done.

(Malaya) The proposed work is timely. If Mr. Rosa will indicate the type of information required, I would be glad to provide lists from the Federation of Malaya.

(Dr. Kuronuma) Mr. Rosa's catalogue will be most anxiously awaited.

(Singapore) A check list of local fishes giving the scientific names as well as the local equivalent is being prepared.

(U.S.A.) A handbook of the fishes of Hawaii by Dr. W.A. Gosline and V.E. Brock is completed and should be published by the fall of 1958.

(Australia) A Check-List of the Fishes of New Guinea has been written and is now being published. A Handbook of Australian Fishes

is in preparation, about one-third having been published. A Handbook of New Guinea Fishes is in preparation and will be finished in 1959.

(Indonesia) A list of common commercial fishes of Indonesia has been prepared for the 8th IPFC meeting.

Population dynamics

1957: "... The Council felt that, whilst studies on population dynamics had hitherto been carried out only in the fields of sea fisheries and lake fisheries, the time was ripe for the extension of such studies to fish populations under cultural conditions".

The Committee was supplied with an interim report of the work of the Lisbon meeting and copy of a paper from the biologists of the Lisbon meeting to the technologists at the FAO International Fishing Gear Congress. The Committee may be interested in the proposal for the establishment of an International Journal of Fishery Dynamics, details of which will be furnished by the Technical Secretary at the meeting.

(Japan) Staffs of the Regional Fisheries Research Laboratories have laid their efforts on the population study of the important marine fishes. The species dealt with includes the herring, sardine, anchovy, salmon (chum, red, and pink), saury, tunas (bluefin, yellowfin, bigeye, and albacore), skipjack, mackerels, croakers, yellow sea bream, cod, Alaska pollack, flat fishes, and common squid. Age and length compositions of the commercial catch have been estimated for these species. The mortality rates, growth rate, and other parameters of the exploited fish stocks were also estimated for abundant fishes such as sardine in coastal waters as well as bottom species in the East China Sea. For marine fisheries amounts of fishing effort in number of trips have been annually published by the Statistics and Survey Division, Ministry of Agriculture and Forestry. Through the surveys conducted by Regional Laboratories, more detailed information of the efforts have been collected for some of the important fisheries. As to the sardine, results of the egg census have been reported every year from the Tokai Regional Laboratory. (Dr. Kuronuma) The summary report of the Lisbon meeting (FAO/57/

7/4054 and 5132) listed technical papers numbering 93 submitted to the meeting. It will be highly appreciated if these papers or digestion of the paper were circulated to the member countries of the Council.

(Singapore) No work on this subject has been carried out. It is hoped that work could be initiated in the near future.

(U.S.A.) The Council recommended that studies on population dynamics be extended to fish populations under cultural conditions. The Pacific Oceanic Fishery Investigations is currently studying the problem of optimum stocking rates of adult *Tilapia mossambica* for maximum production of fry. Under the scheme envisaged at POFI fry will be removed from the adult spawning ponds as soon as they are no longer cared for by the adult. Thus only one facet of *Tilapia* culture is involved in these first experiments.

(Australia) This is a fundamental thread running through many of the investigations and a special officer is now being sought to co-ordinate and extend our activities. The only work in progress during the year has been an analysis of work done during 1954-57 in Lake Macquarie, a marine dominated coastal lake in New South Wales. No fish culture, other than hatching, is carried on in Australia; ad hoc work is being done in New Guinea, but studies of population dynamics have not yet been attempted.

2. PLANNING AND PROSECUTION OF RESEARCH

Inland

The Committee was informed that a paper by Mr. E.D. Le Cren on the application of science to inland fisheries, which had been prepared under contract to the FAO International Inland Fisheries Meeting at Helsinki in 1956, was being printed and would appear as FAO Fisheries Study No. 8. This paper is not yet available for distribution but a copy of it will be available at the meeting for examination by the Committee.

Fish culture in general

1957: "... Member Governments were urged to apprise the Council of further studies carried out on this subject."

The paper on the use of impounded waters which is being prepared by Biology Branch, FAO, is still in preparation.

(Thailand) The common carp is gaining popularity as a pond fish in Northern Thailand. *Tilapia mossambica* retains its popularity in N.E. Thailand. *Pangasius* has received the attention of the farmers in the Central Plain. Raising *Clarias batrachus* in ponds for Bangkok markets is increasing. Fingerling and young *Clarias* are now provided by the fish agents and the Bangkok Fisheries Station to pond owners in Bangkok. The fish are sold after 6-7 months. The cultivation of *Chanos* is progressing slowly on account of the non-availability of funds for pond construction. In 1956, after the completion of the Chao Phya Dam across the Chao Phya River at Chainat, small carps known as pla-soi, followed by bigger fishes, assembled at the downstream side of the Dam. This led to a proposal to study the effect of the Dam on fish life. As a result a fisheries unit was established in 1957 to have the task of studying the fish and fisheries of the Chao Phya River. Searching for fry and fingerling grounds of *Pangasius* and other major carps and *Chanos* is still carried on by the Department of Fisheries. A preliminary test on the use of pituitary gland to hasten the ripening of gonads of *Pangasius* was made at the Bung Borapet Fisheries Station in August 1958. The work will continue in 1959. A method for the hatching of eggs of giant goramy has been developed since 1957. It was considered to be an improved one. The fry obtained was 86.6 out of 100 eggs hatched. *Leptobarbus hoeveni* known as Pla Hang Daeng, was found to possess strong pharyngeal teeth closely similar to those of Chinese grass carp. Tests at the Bung Borapet Fisheries Station confirmed that the fish of 6 inches in length would start eating submerged plants. A plan to stock the fish in the irrigation tanks in N.E. Thailand was approved. The work will start in 1959.

(Malaya) During the last year the Federation of Malay has been concentrating on the stocking of disused mining pools and swamps with *Puntius javanicus* and *Tilapia mossambica*. These pools invariably carry stocks of predatory fishes such as *Ophiocephalus* and *Clarias*. The 'modus operandi' is to clear these pools first with Shell 'Endrex' a most

potent insecticide and piscicide. A concentration of 0.008 p.p.m. of 'Endrex' has been found to be convenient for the purpose and mining pools of up to 20 ft. in depth have been treated successfully. Shell 'Endrex' has also been successfully used for harvesting Chinese carp from mining pools, some up to five acres in extent and 30 ft. deep, where operations with a seine net would well-nigh be impossible. Shell 'Endrex' is much cheaper to use than 'Derris', and in shallow ponds, of 3 to 4 ft., the pond was fit to receive fish again after 10-14 days. This is also the normal period allowed for when a pond has been poisoned with 'Derris'. The stocking of these mining pools with *Tilapia* and *Puntius javanicus* have been much appreciated by the local population, and in some of the mining villages *Tilapia* are appearing in the village markets.

(Dr. Kuronuma) Dr. Job's paper on the use of impounded waters is awaited. Japanese National Congress for Inland Fisheries studies will hold the 1958 Annual Meeting in October, when the works carried out during the inter-meeting period will be discussed on the basis of the resolution attained in 1957 meeting. If time permits I shall summarize the discussion of the meeting and report to the Council Session. Starting from March 1958 the fisheries survey has been conducted on the Lake Akiba, an impounded water of main-flow type on the River Tenryu, Honshyu, Japan. The survey has been carried out since 1954 on the three impounded waters established on the same river in the order of Hiraoka, Sakuma and Akiba, and the survey on the Lake Akiba, the lowest in river, will conclude our 5 years' study on the fisheries survey on those three reservoirs. The survey covers the subjects of limnology (temperature, oxygen, carbon dioxide, pH, turbidity, transparency, level fluctuation, bottom material etc.), biology (plankton and benthos) and fish (species, size composition, food habit, spawning etc. based on the materials experimentally fished by gill-net, trap, long-line and angling). The other fisheries work carried out on the Lake Sagami, also an impounded water, will complete in October 1958 the experimental gill-netting of two years period. In this experimental fishing the four sets of net each with different mesh size were operated monthly at nine selected stations in the lake. The catches of fish obtained in this experiment will be analyzed into species combination,

mesh selection of species and fish size, local and seasonal change of the catch, catch per unit effort, food habit, etc.

(France) Il est un problème qui mériterait, je crois une certaine attention, c'est celui de la création de races sélectionnées des espèces utilisées en pisciculture. Sauf pour la Carpe commune, je ne sache pas que rien ait été fait à ce sujet pour les diverses espèces d'eau chaude. C'est certainement possible pour un grand nombre d'entre elles, sauf, naturellement pour celles dont la reproduction ne s'effectue pas en eaux closes (Carpes chinoises et indiennes). La sélection constitue un moyen d'augmenter les rendements qui a l'avantage sur d'autres, tels que la fertilisation des étangs ou le nourrissage artificiel, de ne pas exiger du pisciculteur, un surcroît de travail et de dépenses. Nous avons commencé en Afrique un travail de sélection sur certaines espèces de Tilapia (*T. melanopleura*, *T. nilotica*) dont les premiers résultats ne peuvent pas encore être publiés, mais qui semblent devoir être intéressants.

(U.S.A.) The current session of the United States Congress has passed a Bill (Public Law 85-342) authorizing and directing the establishment of research and experimentation on the rearing of fish in rice fields. The essentials of this law are as follows:

1. To determine species of fishes most suitable for culture on a commercial basis in shallow reservoirs and flooded rice lands;
2. To determine methods for production of fingerling fishes for stocking in commercial reservoirs;
3. To develop methods for the control of parasites and diseases of brood fishes and of fingerlings prior to stocking;
4. To develop economical methods for raising the more desirable species of fishes to a marketable size;
5. To determine, in cooperation with the Department of Agriculture the effects of fish-rice rotations, including crops other than rice commonly grown on rice farms, upon both the fish and other crops; and

6. To develop suitable methods for harvesting the fish crop and preparing it for marketing, including a study of sport fishing as a means of such harvest.'

At the present time the U.S. Fish and Wildlife Service is formulating a program to meet these objectives. Preliminary studies will be conducted during FY 1959, and it is hoped that a fully active program will be well under way during FY 1960.

(Australia) The results of experimental work on stocking of farm dams and studies on the biology of tench are being published.

Nutrition of fish under cultivation

1957: "...The Council suggested that FAO could help to stimulate work on this subject by preparing a comprehensive review. The Council urged Member Governments to report progress on this subject in the Current Affairs Bulletin."

The general paper on this subject requested by the Council has not been begun but Biology Branch, FAO, expects to be able to prepare this in the next inter-session period.

(Malaya) Dr. G.R. Fish, of the Fish Culture Research Station, Malacca, has been working on this problem and will have material for presentation at the Eighth Session.

(U.S.A.) We are at present engaged experiments concerning nutrition of tilapia under intense cultivation. The results are not far enough advanced to form the basis of a contributed paper. However, we will be prepared to participate in any discussions that are pertinent.

(Dr. Kuronuma) The present subject carried a variety of problems as I have repeatedly expressed elsewhere, and still wish to prepare among us the classification of the study subjects involved in this broad category. A small piece of work carried out in my Laboratory may be helpful to fish nutritionists who desire to know exactly how much nutritious substance (for instance N) which was fed to them was actually eaten and digested. We have added

a known amount of Cr_2O_3 to the fish food which was fed to the fish under experiment; the faecal material of the fish was carefully collected and the amount of Cr_2O_3 as well as nutritious substance contained in the faeces was examined. Knowing that Cr_2O_3 is not digested by fish and also that the ratio of the chemical and nutritious substance in food and faeces, we could determine how much nutritious substance was absorbed by the digestive organ of the fish.

(France) Des travaux ont été faits en Afrique sur l'alimentation artificielle des *Tilapia* en pisciculture. Ils ont fait l'objet d'un certain nombre de communications au Symposium tenu à Brazzaville en juillet 1956. Mr. Dill, qui assistait à ce Symposium, doit les avoir en sa possession. Il me paraît particulièrement important d'examiner la capacité d'une espèce donnée à utiliser une alimentation artificielle en fonction de la nourriture naturelle dont elle dispose dans l'étang.

(U.S.A.) The Pacific Oceanic Fishery Investigations is currently testing several diets on *Tilapia* in order to ascertain the optimum diet from the point of view of cost and production for adult *Tilapia* being held as brood stock or fry production. Results of this program will not be available for at least six months.

(India) See Appendix II.

Soil composition in fish ponds

1957: "... The Council recommended that more data should be assembled regarding the various techniques involved in sampling and examining bottom deposits, and that a clear and simple interpretation of the results of such surveys should be reported."

A paper by Dr. A.G. Wurtz, of Paraclet, France, will be available this meeting.

(Thailand) No study yet.

(India) A research unit has been established under the Second Five-Year Plan program of the Central Inland Fisheries Research Station to carry out investigations on soil composition in relation to fish production in fish ponds. The work is at present mainly confined to a number of fish farms in different

areas of soil structure in Orissa State. Determination of soil reaction and available micro-nutrient status of the soil in 48 tanks managed by the State Fisheries Department and in 24 fish farms distributed all over the 13 districts of the State showed that mostly the soils are either slightly alkaline (pH 7.0-8.0) or slightly acidic (pH 6.0-7.0). In same areas, viz., Keonjhar, Dhenkanal, Angul, Berhampur, Belgunta and Bolangir tank, soils showed relatively more alkaline reaction (pH 7.8-8.2) while Naupara (Puri) soil pH was less than 6.0. Available phosphorus was rather poor in all the areas except Athmallik, Berhampur, Sambalpur and Naupara and available nitrogen fluctuated irregularly bearing no correlation with available phosphorus.

A series of manuring experiments conducted in 24 ponds at the Linghipur fish farm showed that the soil, though slightly acidic (pH 6.3-6.6), does not appear to respond to liming at doses 200 lb./acre and 600 lb./acre. Observations after one month of adding the lime showed that there was practically no increase in soil pH, all the soils remaining slightly acidic as before. This evidently showed that the reserve soil acidity was considerably high, even a dose of 600 lb./acre of lime being unable to make the soil reaction slightly alkaline. It was also noted that even a heavy liming was not able to increase the soluble inorganic phosphate of the water by releasing the absorbed phosphate of the soil. This may however be accounted for by the fact that the available soil phosphate itself is very low.

Just after liming some increase in soluble alkalinity was observed as compared to that in control ponds, both for low liming and heavy liming. A marked increase in alkalinity to about 300 ppm. was observed in ponds treated with high lime and high organic manure, but this increase was only temporary. At the end of September the total alkalinity in all the ponds came down to about 60-70 ppm. Addition of phosphatic fertilizers at high dose (600 lb./acre) of organic manures (cowdung 30,000 lb./acre) increased the soil phosphate appreciably. It is interesting to note that lime played an important role in increasing the available soil phosphate. Thus the increase of available soil phosphate for combinations (1) high lime and high phosphate and (2) high lime and low phosphate, was greater than that for low lime and high phosphate.

To study the growth rate of the major carps Rohu, Catla and Mrigal under different soil conditions, 12 selected tanks in the State of Orissa and six tanks in Madhya Pradesh have been stocked with carp fingerlings Rohu, Catla, Mrigal in the ratio 1 : 1 : 1 as far as practicable. The Orissa tanks have been stocked at the rate of 2000 fingerlings per acre. Observations made so far on soil quality show that both in Orissa and in Madhya Pradesh soil reaction is generally either slightly acidic or slightly alkaline. The available phosphorus is rather poor in piscicultural soils of Orissa while for Madhya Pradesh soils, phosphorus status is quite fair. Available soil nitrogen is quite appreciable both in Orissa and in Madhya Pradesh.

(Malaya) Dr. Wurtz's report will be welcome.

(Dr. Kuronuma) Dr. Wurz's treatise is waited. Our study on this subject is still in the preparatory stage to familiarize the many factors involved and prepare experimental facilities as well as qualified workers.

Problems arising from the introduction of non-indigenous fishes

1957: "... Member Governments in possession of information on possible control measures in respect of less desirable fish species were urged to apprise the Council of such information.

(Thailand) Non-indigenous fish species introduced are Chinese carps and *Tilapia mossambica*. *Tilapia mossambica* had been reported in 1958, as being harmful to rice seedlings in the coastal area of Chantaburi Province, when the fish ponds were flooded and some fish escaped into the rice nursery areas.

(U.S.A.) In response to your letter of 25 September, I have assembled the following brief list of references pertinent to the control of fish species.

Applegate, V.C., J.H. Howell, A.E. Hall, Jr. and M.A. Smith, 1957. Toxicity of 4,346 chemicals to larval lampreys and fishes. U.S. Fish and Wildlife Service, Spec. Sci. Report-fish. No. 207, March 1957.

Ball, R.C., 1945. A summary of experiments in Michigan lakes on the elimination of fish populations with rotenone, 1934-1942. Trans. Amer. Fish. Soc., Vol. 75 (1954), pp. 139-145, fig. 1.

Bridges, W.R., 1958. Sodium cyanide as a fish poison. U.S. fish and Wildlife Service, Spec. Sci. Report-Fish. No. 253, February 1958.

Greenbank, J., 1940. Selective poisoning of fish. Trans. Amer. Fish. Soc., Vol. 70 (1940), pp. 80-86.

Krumholz, L.A., 1948. The use of rotenone in fisheries research, J. Wildlife Management, Vol. 12, No. 3, July 1948, pp. 305-317.

Shields, J.T., 1957. Experimental control of carp reproduction through water drawdowns in Fort Randall Reservoir, South Dakota. Trans. Amer. Fish. Soc., Vol. 87 (1947), pp. 23-33.

Not listed in SSR No. 207 are two chemicals which show great promise for practical control of sea lamprey larvae; these are 3, 4, 6-trichloro-2-nitrophenol and 3-trifluoromethyl-1-4-nitrophenol. By promise, I mean that they have passed the laboratory tests with flying colors and also passed field tests of a pilot plant scale with flying colors. The chief flaw, of course, in physical or chemical control of undesirable species is that it is a practical certainty that such control will have to be repeated indefinitely. This suggests that even if methods are developed, they will not be practical except when applied in waters under intensive cultivation, or in the instances where exceedingly valuable fisheries, such as the Great Lakes trout, are threatened with extinction. Obviously, permanent solutions must fall in the realm of biological control, an unexplored field with respect to fishes, so far as I know.

(India) The Standing Fisheries Research Committee constituted by the Government of India reviews periodically the problems of the introduction of non-indigenous species of fishes in India. The mirror carp (*Cyprinus carpio*, brought into India some time back) is thriving well all over India. Generally at altitudes higher than 2000 ft. the Research Committee has recommended its introduction in all cultivable waters. *Tilapia mossambica* was

introduced recently into India. In view of the fact that carp culture is highly organized in many parts of India, particularly in the Indo-Gangetic Plain and in view of the possible adverse effect, which indiscriminate introduction of *Tilapia* may have on carp culture, it is considered by the Fisheries Research Committee that *Tilapia* should not be introduced in closed basins but may be introduced only in areas specified by the Committee where scope for carp culture is limited and from where the fish may not by natural causes spread to the adjoining areas and the Committee has recommended that steps should be taken to eradicate *Tilapia* from other areas outside those prescribed in which it may have been introduced already, excepting in experimental centers approved by the Union Ministry of Food and Agriculture. The scientific work so far carried out does not justify the extension of the areas at present permitted for *Tilapia* culture. The future investigations by the Central Fisheries Research Stations and State Governments concerned will be with specific reference to the effect of culture of *Tilapia* on the culture of carps, and culture of *Tilapia* as a forage fish. A pure strain of common carp *Cyprinus carpio* was recently obtained from Bangkok and experiments are being conducted on this fish at Cuttack Sub-Station of the Central Inland Fisheries Research Station. This fish is freely breeding at low elevations. Cultural techniques suited to local conditions have been evolved and experiments on the fish are in progress. Attempts are being made to get a consignment of Chinese Grass Carp for weed control experiments.

(Malaya) The Federation of Malaya has over a period of years introduced a number of non-indigenous fishes for cultivation. There are actually no problems arising out of the introduction. Our main problem has rather been how to make the introduction more successful; in other words how to extend their culture in areas where they are needed. Of the labyrinthine fishes, the most successful is of course *Trichogaster pectoralis* and it is found growing abundantly in our swampy rice-fields on the west coast. They have not been able to establish themselves on the east coast of Malaya, because the rice-fields and swamps dry out during certain times of the year. *Tilapia mossambica* has met with varied success. Chinese pond keepers prefer to stick to Chinese

carp but here again the problem of a regular supply of fry from China is one that will always remain, until science can point the way to induce the three species, viz. *Ctenopharyngodon idellus*, *Aristichthys nobilis* and *Hypophthalmichthys molitrix* to spawn in this climate. *Catla catla* have been imported from India and cultivated in Chinese ponds under the same conditions as Chinese carp. They were found to compare favorably in growth-rate with Chinese carp and there is a growing demand for them from pond-owners. However, there is still a high mortality rate during transit by air from Calcutta. This, together with the high cost of air freight from Calcutta, would bar any likelihood of a regular trade, for some time to come. The Indonesian ikan mas or 'Si-nonya' has also been tried out here by the department. The strain has however been lost due to crossing with the local common carp. Another Indonesian import, viz. *Puntius javanicus* has been successfully bred in departmental ponds and some 20,000 fry have already been distributed. It is gaining rapidly in popularity among the Malay and Chinese pond-owners, because they accept grass cuttings and tapioca leaves readily. They attain a weight of 200-450 grams in one year and fetch a good price in the local market, as it is so much like one of our river fishes *Puntius schwanefeldii*. A supply of *Tilapia Melanopleura* sent through the kind offices of Mr. Boon of Thailand failed to survive predators (*Ophiocephalus* and *Clarias*) which obtained entrance into the pond.

(U.S.A.) Biological control of exotic species has received little serious attention. Chemical control has been investigated seriously only with respect to the sea lamprey, which invaded the Great Lakes. Exhaustive screening of chemicals has uncovered one or two compounds which appear to be specific to sea lamprey larvae. Further, it appears that it will be economically feasible to eradicate the sea lamprey with these chemicals. So far as I know, there have not been any other overt attempts to locate control chemicals. However, research on the use of copper sulfate and sodium arsenate in connection with other studies suggests that various species of fish have different tolerance levels and that chemical control might be a practical approach. Manipulation of the environment by lowering the water levels of reservoirs at critical times seems to offer some promise for carp control. The

technique is to ascertain the time of spawning and then draw down the reservoir a few feet, stranding and killing the eggs. Biological controls such as introducing suitable parasites or predators have not been investigated, so far as I know. Additional techniques showing some promise in insect control, that is releasing in the wild, large numbers of the undesirable animals that have been sterilized through radiation in order that mating will be unsuccessful, have not been considered with respect to fishes, so far as I know. There probably are other approaches and many of them might be quite successful, at least judging by the sometimes spectacular results achieved by entomologists.

(Japan) The Japanese Government is not in a position to give any information regarding this subject, because no steps have been taken so far in Japan to control the introduction of the exotic species of fish. (Dr. Kuronuma) In the country we have witnessed the natural spawning of Chinese carps (grass-carp and silver-carp) during the past several years. In 1957 the fish fry of these two species were obtained under artificial aids amounting to 20,000. In 1958, due to unusual drought, we have failed in the work and were able to obtain fry numbering only 2,000. The record of our experience in these two years will be partly reported to the Council Session.

(U.S.A.) In the U.S. and Hawaii legal control of the introduction of exotic species rests with the States and Territory. In the instance of Hawaii, no species of plant or animal may be imported without specific permission from the Territorial government. Many states, California for example, go beyond this and have blanket legislation prohibiting the transportation within the state of live fishes for stocking and prohibiting such stocking unless permission is given by the responsible officials. Despite this legal basis, it is virtually impossible to prevent the movement of fishes within state boundaries, primarily because of the enforcement problem. Control of importations from without the state or territory is somewhat easier, especially if commercial shipping firms must be involved as in the case of Hawaii, and because commercial access routes are frequently monitored by agricultural inspectors. If you analyze the situation from a practical point of view, it is obvious that fishes are not likely to be transported great distances by private parties for

introduction to new areas. Logistics and procedures are simply too complex. This tends to give the administrator natural control of the situation with respect to states, territories and large geographical areas. Once, however, a species has been authorized for a given geographical area, distribution within the area is then out of the administrator's control, for it is too easy for individuals to move fish for short distances and it would take a prodigious amount of law enforcement to preclude the possibility. The administrator must therefore count on complete dispersal within his geographical area when he authorizes the importation of an exotic fish. Finally, there is the problem of the tropical fish trade which is worldwide and subject to little, if any, monitoring and regulation though a legal basis for such action frequently exists. This trade in effect destroys any barriers that might exist or be erected, though in temperate countries does not present a serious problem because most species will not survive in the wild. In conclusion, it might be possible to control entry of fish species to countries, states, territories or discrete geographical areas through a system of inspection at access points. Internal control does not seem susceptible to regulation unless a costly specialized enforcement apparatus is developed.

(Australia) The Commonwealth Government, through the Department of Health, exercises control over the importation of live fish into Australia. The Commonwealth authorities are concerned with the importation of diseased fish. All live fish are inspected by a quarantine officer of the Commonwealth Department of Health and he must issue a landing permit before entry of the fish will be allowed. The various State Fisheries Authorities also prohibit the entry of certain fish into the respective States. The State Authorities are interested in ensuring that the indigenous fauna are protected from predatory fish, and any imported fish belonging to a predatory species may be classed as a prohibited import. A fisheries biologist examines all consignments of imported live fish to determine whether any species are predatory and may also be asked to give advice concerning fish diseases. The general procedure is along the following lines: the fish are examined by a fisheries biologist and a quarantine officer and a permit to land is granted or withheld. The Customs officer at the wharf

is advised accordingly. If a permit to land is not issued, then the Customs prohibition of the importation of that fish is automatic. It may be said that the only type of fish imported into Australia in the last 20 years for the stocking of streams and lakes, has been trout from New Zealand. Australia does, however, import quite large numbers of aquarium fish from the tropics, and a tight control is exercised over these consignments to prevent undesirable species being introduced by private persons, on the assumption that it would be possible for aquarium fish to be released subsequently into streams if not wanted by their owner. Before aquarium fish are released from Commonwealth control after arrival, a State Government Ichthyologist advises the Chief Commonwealth Quarantine Officer concerning the species, and if appropriate, any that are considered undesirable are removed.

River-basin development

1957: "... The Council recommended that early surveys should be carried out on notice being given of impending construction of dams, and that dam sites should be cleared before water was allowed to accumulate in order to protect fish species already present, and to facilitate the early exploitation of the reservoir stocks"

The Committee was informed of a special meeting on integrated river development schemes which was being organized by the United Nations. Documentation of this meeting for distribution to the Committee has not yet been obtained. The Committee was also informed of the Symposium of the International Union for the Conservation of Nature and Natural Resources. Copies of one of the background papers of this meeting will be available during the Council Session and as soon as a report of the Symposium is prepared, copies will be sent to Committee members.

(Thailand) A Preliminary Report on the fish survey of the Meping River will be ready for publication in 1959. It is expected that this report will furnish additional information for the Irrigation Department, which is the authority for the Hydro-electric development

of the Meping River at Yanhee. The officials of the Department of Fisheries and the Irrigation Department were instructed to furnish the available information on fish behaviour to the fishery expert of FAO Mekong Development Mission.

(India) The problem of development of the river basins particularly the large number of vast multi-purpose reservoirs which are being constructed all over the country, is receiving considerable attention in India. A Lacustrine Unit established recently at the Central Inland Fisheries Research Station has carried out a rapid survey of the various reservoirs all over India and the Unit has now been posted at the Tungabhadra reservoir in Mysore State to carry out investigations directed towards development of the fisheries of such reservoirs. The Damodar Valley Corporation, which has four large reservoirs under its control, has undertaken to organize fisheries development in the reservoirs. Extensive stocking of one of the reservoirs with major carps is being carried out and experimental exploitation is also being conducted.

(Malaya) Copy of the report on IUCN Symposium in Athens is welcome.

(Japan: Dr. Kuronuma) See item on Fish culture in General. The report of the IUCN Symposium in Athens will be highly appreciated by us at the Council Session. I wish again to insist to bring the subject of the Lower Mekong River Basin Development to the discussion of the Council Session. In this respect the Council may wish to hear the present status of the problem from either Secretariat or Member Governments concerned with the development.

Water pollution

1957: "... The Council... urged Member Governments to keep this problem constantly under review, and to ensure that action could be effectively taken before serious damage was caused."

The Committee was informed of participation by Biology Branch, FAO, in meetings convened by the Economic Commission for Europe, to discuss European water pollution problems. Copies of documents from those meetings were supplied to the Committee. A further meeting recently took place at which

proposals were made for the establishment of international river pollution control boards. Copy of these proposals will be sent to Committee members when available.

(Thailand) No study has been made on water pollution. It has been observed that the canals of the city of Bangkok are now deprived of *Pangasius fry* and fingerlings due to the polluted conditions of the canals.

(Japan) After World War II as a result of industrial development and expansion of city life, coastal fisheries have often been hampered by water pollution. In the Regional Fisheries Research Laboratories, Prefectural Experimental Stations and Universities, investigators estimated such factors as dispersion of sewage and industrial waste; influences of these materials upon aquatic organisms through tracing of stained water mass; culture experiments; observation of faunal change; chemical analyses of water and bottom mud. Based upon these physical, chemical and biological investigations, efforts have been laid on estimation of the loss in the commercial fisheries. (Dr. Kuronuma) Despite the fact that the problem of water pollution is not so serious in the greater part of the region at the present moment, I believe it is now a proper time for the Council to take a step to formulate a program on this subject keeping intimate contact especially with ECAFE and WHO. The cases of ill effect to the fish life of water pollution are indeed countless in my country though its magnitude differs from case to case. Under such circumstances I believe it very important for each member country to consider (1) to establish a solid national program (legislative) for the conservation of water quality before the progress of the industry, (2) localization of industrial development as a part of national policy, (3) encouragement of scientific research not only to abate the ill effect of pollution but to convert the waste products to our beneficial uses. In my Laboratory the data have been accumulated concerning the effect of agricultural insecticides to the fish and other aquatic organisms, and two papers will be submitted to the Council session as a contribution.

(India) The All-India Institute of Hygiene and Public Health has been carrying out extensive surveys of river pollution in different parts of the country. A Water Pollution Unit has been established at the Central

Inland Fisheries Research Station recently and this Unit is at present conducting studies on the effects of factory effluents on the river fisheries at Kamp one of the big industrial cities in India. Seven main sampling stations have been established where samples of water, plankton, biota and fish fauna are being collected.

(Malaya) Water pollution as a result of alluvial mining for tin is a problem in our rivers on the West Coast. In areas where such pollution is heavy, there is a change in fish fauna from the riverine carp to the catfish type of fishes. A more serious pollutant is the discharge of effluents from latex factories, where the effluents may contain acids or ammonia. This problem has not as yet assumed national importance.

Weed control

1957: "...The Council recommended that further information on the general subject of weed clearing in ponds should be collected. Interested Member Governments were urged to carry out further experiments in order to assess the amount of plant material consumed by the Chinese Grass Carp and the relative suitability of the different common plants as sources of food for this fish.

(India) A research unit for conducting investigations on control of submerged aquatic weeds has been established at the Central Inland Fisheries Research Station. This unit has carried out a survey of such waters and is at present conducting experiments with various chemicals. The details of experiments are given below.

Experiments in earthenware gumlas showed that *Salvinia*, *Pistia* and *Lemna* are completely killed by powerine and h.s.d. applied at the rate of 75–100 gls. per acre under condition of bright sunshine, the killed plants decomposing and dissolving in water in about 3–5 weeks. In the case of *Salvinia* a lower concentration of 50 gls. per acre was also effective. If, however, there is rain before the plants were completely killed, there was a tendency for the plants to revive. The effect of these oils on water hyacinth was not so marked even when two treatments at 75–100 gls. per acre were given within ten days. Though the leaves were affected, the plants revived gradually again.

The effect of these oils on fish life is under study.

The principle of starving out the underground parts of water lily was applied in a pond of 0.32 acre choked with the plant. The floating leaves were cut about 1–1½ ft. below the water surface during the first week of October. By four subsequent clearances of 29%, 19%, 32% and 1.4% (in terms of the number of leaves present at the outset) of fresh leaves which came up, the pond could be kept thoroughly clean in two months' time. Even though four months had passed after complete clearance, the plant has not reappeared, indicating thereby that the underground parts have been completely killed. The cost of labour at 60 man hours for the 0.32 acre pond worked out at about Rs. 45/- per acre.

Hydrilla and *Naias* grown in cement cisterns were treated with nigrosine at the rates of 100 and 250 lbs. per acre. Though the water in these cisterns remained black for 3–3½ months, there was only a slight arrest in the growth of the plants from the second to the third month after treatment, compared to vigorous growth of the same plants in an untreated cistern. When the water cleared in the treated cisterns at the end of 3½ months, the weeds started growing vigorously again, thereby showing that nigrosine is not a very effective shading agent. Preliminary trials in aquaria and cisterns with fernoxone, Dicotox, 2, 4-D at various doses did not yield encouraging results.

Experiments conducted at Calcutta previously had indicated that superphosphate at 150–500 ppm. (single application or in instalment at close intervals) killed submerged weeds like *Hydrilla* and *Vallisneria* almost completely. Any unaffected plant which remained was cleared manually. The experiment was repeated at Cuttack on *Hydrilla* and *Naias* grown in cement cisterns. Within a few days after treatment a bloom of algae appeared in the treated cisterns and 90–95% of the plants were killed within 2–2½ months. Thereafter the algae bloom disappeared and the surviving *Hydrilla* multiplied rapidly from underground parts, while *Naias* did not reappear.

Much the same result was obtained when commercial urea was applied on *Hydrilla* and *Naias* grown in cement cisterns at the rates of 250–500 ppm. (in one instalment) and 300 ppm. in 12 instalments. However the algal bloom

which appeared was thicker and the destruction of plants more complete than in the case of superphosphate. Small shoots started coming up in the cisterns treated with 250 and 300 ppm. only at the end of 3½ months, when the water cleared. In the cistern treated with 500 ppm. no shoots appeared even after 4½ months, though some underground parts of *Hydrilla* still remained in the mud.

With lower concentration (50–125 ppm.) of the fertilizer 50–90% control of *Hydrilla* was obtained under the same conditions and in a field experiment conducted in a pond choked with *Hydrilla* and *Naias* 50 ppm. of the fertilizer killed 50–60% of the submerged weeds. In the pond there was partial mortality of fish two days after treatment owing to the depletion of oxygen in the early morning hours. Some of the distressed fish caught and released in freshwater revived quickly.

Preliminary experiments in earthenware gumlas indicate that ammonium sulphate at 100 ppm. is useful in cleaning *Hydrilla ceratophyllum* and *Pistia* and a large percentage of *Vallisneria* and *Lemna*. Further experiments in different concentrations have to be carried out before drawing definite conclusions.

Comparative estimates of cost of clearing weeds by manual labor and by chemical treatment (sodium arsenite) revealed that in manual labour 720 man-hours each at a cost of Rs. 180/- per acre had to be put in, which works out to Rs. 240/- per acre per annum, whereas in chemical treatment one application every six months at a cost of about Rs. 40/- which works out to Rs. 80/- per acre per annum was sufficient, the cost per acre foot for one application being Rs. 13/- to Rs. 15/-.

(U.S.A.) Under the sponsorship of the Territory of Hawaii, Division of Fish and Game, *Tilapia mossambica* has been introduced into irrigation reservoirs for weed control with generally good success. The problem of weed control in irrigation ditches is somewhat more complicated. The results to date suggest that *Tilapia mossambica* has been an effective means of controlling submerged aquatic vegetation in reservoirs where the vegetation was fairly soft bodied such as *Potamogeton* or *Anacharis*. Experimental work is currently under way utilizing two other species of tilapia which, at least under laboratory conditions, will eat much

coarser vegetation. These two species are *Tilapia zilli* and *T. melanopleura*. The results to date suggest the possibility of maintaining impoundments relatively free of aquatic growth, providing the impoundments do not contain predatory fishes which will serve to seriously reduce the abundance of tilapia species. However, the experimental work with species other than *T. mossambica* has been under way for such a short time that nothing can be said of a conclusive nature about the usefulness of these other species for this purpose. The control of aquatic vegetation in irrigation canals and ditches is a more complicated problem since the tilapia species are essentially pond fish and will not remain in rapidly flowing ditches in sufficient concentrations to have any real effect on the aquatic vegetation. The use of loricariid catfishes and/or algae-feeding freshwater gobies has been suggested where such vegetation is soft bodied such as various species of algae. No satisfactory fish has been suggested where the vegetation is more robust. In certain ditches, notably those with earthen sides and bottom, and where the current is reasonably swift, the coarser vegetation does constitute a major problem. Often the use of chemical control methods is prevented by the fact that the water in the ditch is not only used for purposes of irrigation but also for domestic purposes as well.

General inland fisheries

1957: "... The Council recommends that in such areas, the stocking of natural swamps and waters with a handy species such as *Puntius javanicus* may be a preliminary step towards developing freshwater fisheries."

(Australia) Advice is given to inland bodies (e.g. Snowy Mountain Hydro-Electric Authority) but no experimental programs are in progress.

Brackish waters and Dromic Species

Chanos

1957: "... It recommended that the Sub-Committee ... should collect the necessary information on any techniques used in member countries which reduce this mortality and make an appropriate report at the next Session of Council."

Mr. W.H. Schuster has prepared a synopsis of information available on this species. The synopsis will be available as one of the papers for this Session of the Council.

(Malaya) There is no culture of *Chanos* in Malaya. Neither has fry been found on our coasts.

(Japan: Dr. Kuronuma) I would again suggest exploring a way through which the information on *Chanos* fisheries will be available from Taiwan. It is expected that the Vietnamese Government will report her successful capture of *Chanos* fry in her sea water during the earlier months of 1958, and we hear that the Government will continue her efforts to collect the fry and further to advocate pond-culture of the fish particularly in the delta region of the lower Mekong.

(Dr. Fish, *Chanos* Sub-Committee) Substantial progress, resulting in techniques which reduce *Chanos* fry mortality from over 50% to less than 10% during the initial stages of culture, was reported in the Proceedings of the 7th Session. Much of this progress is due to work done in the Philippines. The results of experiments on the provision of adequate food for the fry showed how the natural algal food supply in nursery ponds could be encouraged to develop greatly by the application of organic and inorganic fertilizers, and that, if required, this natural food could be successfully supplemented with certain protein-rich additives. It was also reported from Indonesia that a reduction in the existing fry mortality rates of up to 80% in the early stages could be obtained by modifying the design of nursery ponds and by careful eradication of predators. Few reports of such research during the inter-session period has been received. In many countries, e.g. Papua, New Guinea, Ceylon, Malaya, there is very little or no culture of *Chanos* practised although it is likely that fry may be found along certain of these shores. Much interest has been shown by several authorities, however, in *Chanos* culture and it seems probable that more data on this problem will be available in due course.

(India) The problem of reducing the mortality of *Chanos* fry in nurseries has been receiving general consideration in centres in India where milkfish culture is being actively carried out. Experiments on the following

main lines of approach were conducted at the Central Marine Fisheries Research Station.

1. **Natural mortality** has been found to be very great in the early fry of 13-20 mm. length (i.e. where the post-larval transformation is incomplete). This becomes higher still as the fry lose much of their resistance in spite of careful handling during the different stages of collection, transport and ultimate transfer to a somewhat different environment.

2. **Mortality due to change in environmental factors.** Preliminary studies on the physiology of the fry (Job, 1957) and also unpublished observations based on work in progress indicate that the fry of *Chanos* do require a relatively warmer environment than the open sea in order to maintain the intensity of their metabolic process. Incidentally, this also seems to be one of the contributing factors for directing the movements of the fry towards the shallower tidal creeks.

3. **Intraspecific and Interspecific predation.** Accidental introduction of predator larvae, such as those of *Elops* and *Therapon*, which invariably occur along with *Chanos* fry, is possible in all commercial stocking operations. The extent to which these predator larvae can take a toll of the fry is illustrated by the experimental observation that a *Therapon* (about 20 mm. long) consumes a maximum of 13 *Chanos* fry over a period of 24 hours. The same is true of the 'leptocephalus' larvae of *Elops* which prey upon *Chanos* fry of nearly their own size and, at the same time, are hard to eliminate because of their highly transparent body.

Experiments have also revealed that when *Chanos* fry of different sizes are stocked together, the larger ones chase and kill the smaller fry resulting in the ultimate survival of mostly the larger group.

The studies so far have not been quite conclusive as to offer any specific solution to this important problem of reducing the mortality. Nevertheless, they indicate the following essential lines on which further work will be fruitful.

- (i) More efficient removal of predators prior to the introduction of fry into nursery ponds.
- (ii) Segregation of the fry in nurseries according to different size groups.

(iii) Preventing abrupt changes in ecological characteristics, particularly the temperature. A better understanding of the physiology of the fry, particularly their metabolic requirements, reaction towards salinity and temperature gradient, is essential.

(iv) An immediate and more practical method adopted in some of the marine and brackish water fish farms of India is by utilizing mostly fingerlings for stocking the ponds and thereby circumventing some of the difficulties of nursery management. For collecting the fingerlings from shallow creeks and lagoons, besides the method described by Ranganathan and Ganapathy (1949, *Indian Farming*, 10 (9): 368-374) a local gear known as 'konda valai' (a long piece of cotton twine net, about 10 m. x 1 m. with spreader sticks at equal intervals) is used in conjunction with scare lines at either end. When the net is dragged along the bottom of the creek the fish are lured into the net from where they are transformed into suitable containers by means of small hand nets. For transporting the fingerlings the standard type of containers require an additional supply of oxygen. Therefore, a tow-box with velon netting on four sides and the top has been devised at this research station by Dr. S.V. Job and successfully used for live fish transport. The fingerlings are transferred into the tow-box at the collection center itself and towed in the water to the stocking place.

This practice, while applicable only for places where sufficient numbers of fingerlings can be collected and where means of water transport are available offers practical advantages in (a) minimizing time and expenses involved in the elaborate preparation and management of nurseries, and (b) in ensuring a greater percentage of survival from the fingerling stage onwards when they seem better capable of adjustment to pond conditions as well as in dodging predators.

Other publications on *Chanos* not reported earlier:

Chandy, M. (1956) On the oesophagus of the milkfish *Chanos chanos*. (Forsk.) J. Zool. Soc. India, 8 (1): 79-84.

Chacko, P.I. and S. Mahadevan (1956) Collection and culture of the milkfish *Chanos chanos* (Forsk.) in and around Krusadai and Rameswaram Island. Fish. Sta. Report and Yearbook, April 1954-March 1955, Govt. Press, Madras; 145-154.

Job, S.V. (1957) The routine active oxygen consumption of the milkfish. Proc. Indian Acad. Sci., 45:254-273.

Tampi, P.R.S. (1957) Some observations on the reproduction of the milkfish *Chanos chanos* (Forsk.). *Ibid* 46:254-273.
--- (1958) On the food of *Chanos chanos* (Forsk.). Indian J. Fish. 5:107-117.

Mugil

1957: "... In view of the lack of knowledge relating to the spawning and early stages of development in certain species of mullet, it recommends that particular attention be directed towards the prosecution of such research in member countries."

The synopsis awaited from Mr. Bromhall is not yet available.

(Malaya) Mr. Bromhall's report will be welcome.

(Japan: Dr. Kuronuma) Mr. Bromhall's report has been awaited for the past two inter-session periods.

Hilsa

1957: "... The desirability for active workers in this field to be given the opportunity to meet to exchange news and discuss the standardization of experimental methods was stressed."

The Technical Assistance project on *Hilsa* in Pakistan was completed in 1958. Copies of the report will be made available to the Committee when the report is released.

(India) The investigations on *Hilsa* fisheries initiated in the National *Hilsa* Research Unit, established at the Central Inland Fisheries Research Station at Calcutta, were continued during the period. Observations were carried out in the rivers Hooghly, Rupnarain, Padma, Ganga, Brahmaputra, Barak, Mahanadi, Godavari, Krishna, Cauvery and Narmada and on the Saurashtra Coast. Two *Hilsa* Fishery Centers were established during the period for the collection of catch statistics from the rivers Padma, Godavari and Krishna. The Estuarine and Riverine Sections and the Chilka Lake Investigations Unit of the Central Inland Fisheries Research Station have organized the collection of *Hilsa* catch statistics from the areas of their operations and the Central Marine Fisheries Research Station has arranged to collect the statistics of marine landings of *Hilsa*. Efforts are being made to cover the remaining areas through the co-operation of the State Governments.

There has been an unusual scarcity of *Hilsa* in the catches of many of the rivers since 1956. In the river Hooghly where detailed investigations are under way, it has been observed that the plankton population has also been at a very low level since 1956. In the river Cauvery, abundant catches of *Hilsa* were landed in the months of July-August in 1956 and 1957. This appears to be related to the unusual flooding of the river below the anicuts on account of the surplussage from the Mettur reservoir.

The age and size composition and the stage of maturity of the commercial catches in all the rivers are being studied. To determine the success of spawning and the abundance of larvae and young fish in the rivers, periodic surveys are being carried out in the river Hooghly and these surveys will soon be extended to other rivers also.

Morphometric and meristic characters of large samples of *Hilsa* from all the river systems and from the Saurashtra coast were studied for demarcating the populations. The analysis of data carried out so far indicate that most rivers have independent or semi-independent populations. Detailed analysis of the data is in progress. Tagging experiments have recently been initiated with a view to studying the migrations and intermingling of populations, if any, as also the mortality rates.

A sample of *Hilsa* specimens, preserved in formaldehyde was received from Burma for racial studies. On account of the rather poor state of preservation of the specimens a detailed comparative study of the non-meristic characters was found difficult. The meristic characters are, however, being studied.

(Malaya) Mr. Talbot's report will be of interest, although we have no *Hilsa* fishery.

(Japan: Dr. Kuronuma) Mr. Talbot's report is welcome.

Marine

Trawling

1957: "... Member Governments were urged to utilize the *Current Affairs Bulletin* of the Council for the exchange of information on this subject."

(Japan) As to the fishery in the East China Sea, the most prolific trawling ground adjacent to Japan, researches have indicated a remarkable species selectivity of the fishery. From this fact it may not be safe to conclude that depletion in the amount of catch always reflects a decrease in the population size of that species. In some other regions, cruises of research vessels were successful in discovering new trawling grounds.

(Malaya) Quite extensive trawling operations were carried out by the Fisheries departmental vessels the M.V. KEMBONG and the M.V. MANIHINE of the Marine Research Station, Singapore. I believe these works have not been published. The areas covered were the Straits of Malacca, area off the northern tip of Sumatra and the East Coast of Malaya and parts of the South China Sea, adjacent to the coasts of Sarawak and North Borneo.

(Australia) Investigations on flounder and flathead have been completed and the results are being prepared for publication. The Commonwealth Government has under consideration a plan to purchase a modern trawler to carry out tests of the potential trawling grounds in the Great Australian Bight.

(Indonesia) Exploration for shrimp grounds and the adoption of the shrimp trawl has been conducted with the research vessel MUNA. (a) April 1957: South-east of Kalimantan, 30 hours, 30 hauls, 233 kg. shrimp, 1,680 kg. fish (Tandjung Pasir); (b) Sept.-Oct. 1957: North of

Central Java, 60 hours, 80 hauls, 1,691 kg. shrimp, 643 kg. fish, the best haul, was a 60-minute haul with 386 kg. shrimp and 20 kg. fish; (c) April-June 1958: East coast of Sumatra, 128 hours, 155 hauls, 80 kg. shrimp and 3,082 kg. fish. Papers which will be submitted to the 8th IPFC Session are: (a) Technical papers on: Craft and gear utilized in the *Rastrelliger* Fisheries; *Rastrelliger* landing 1954-1957; Standardization of plankton nets. (b) Symposium papers on: "Fish behavior with special reference to pelagic shoaling species": on "*Lemuru*" (*Clupea* sp.), and on "*Lajang*" (*Decapterus* sp.).

National resources for the study of basic productivity of the sea

1957: "... The Council noted that a symposium on the "Measurement of Primary Production in the Sea" would be held in Bergen, Norway, in September 1957 and decided to formulate recommendation on this subject only after full consideration had been given to the views expressed and conclusions arrived at during this symposium."

The Committee was furnished with a report by Mr. Laevastu on his participation in the ICES/UNESCO Symposium on basic production, which took place in Bergen in 1957, and a report on his participation at the meeting of the Hydrographic Committee of ICES. The Technical Secretary will be able to give at the meeting an account of his participation at the 1958 meeting of the UNESCO International Advisory Committee on Marine Sciences and the meeting of the ICSU Scientific Committee on Oceanic Research.

(Japan) Recently quantitative studies of vitamin B₁₂ and radiochemical methods using carbon 14 have been applied to determining basic productivity of the sea adjacent to Japan. Workers in several universities have carried out fundamental studies including pure culture and metabolisms of phytoplankton to contribute to development in this line of science.

(Malaya) The reports by Mr. Laevastu are timely and will no doubt be of great help to our research officers.

(Australia) This is one of our major projects and work is proceeding along two main lines (1) a survey of various Australian waters

for phytoplankton, zooplankton, benthos, pigments, nutrient salts, and rate of photosynthesis (14c O₂ studies); (2) laboratory and field studies designed to improve methods and to give more accurate interpretation of results. The aim of the work is to assist the discovery of areas which might sustain fish populations and to assist the interpretation of fluctuations in fish abundance.

Faunal changes

1957: "... The Council would urge Member Governments to use the *Current Affairs Bulletin* of the Council to keep one another informed of such fluctuations."

(Japan) In regard to some of the major species in the waters around Japan, distribution and amount of the commercial catch have more or less changed in recent years. For instance, fishing grounds of the herring and large-sized sardine have moved northward; while the commercial landings of some species such as the anchovy, saury and horse mackerel have tremendously increased. A small scale but remarkable faunal change related with oceanographical modification took place in boat seining grounds off the Pacific coast of Honshu. During the last ten years or more, except 1957, the fishery operated in the area landed a great amount of very young anchovy. In the exceptional year, the commercial catch chiefly consisted of the young sand-lance instead of the anchovy, while the coastal waters extended over the fishing ground in the results of the Kuroshio current having moved further south than usual. Referring to an extensive faunal change, however, scientific investigations are under way to see if the anomaly in these fisheries is really related with a long-term climatic modification.

(U.S.A.) The U.S. Fish and Wildlife Service has had under way at Stanford University for the past two years an investigation, the aim of which is to relate meteorological changes to changes in the fisheries. Activity to date has been focused on developing approaches and assembling the necessary meteorological information. It is anticipated that published reports of this investigation will begin to appear in a year or two.

Studies conducted by POFI on the factors responsible for seasonal and annual variations in the abundance of skipjack tuna in Hawaii suggest that changes in the fish abundance can be related to changes in the ocean circulation. Good skipjack tuna fishing in Hawaii seems to be related to downstream California current type water bathing the island so that where this water mass does not influence the Hawaiian Islands area, a very poor skipjack season results. Though it is not now possible to specify the precise meteorological events that lead to such changes, it is quite certain that fluctuations in the weather are the basic cause. Considerable research is necessary to tie the weather and fish in a functional manner, but it appears to be possible and very worth-while for success would permit a measure of prediction.

The problem of adequate catch statistics is pertinent here. We have been handicapped because prior to World War II catch statistics were not complete and adequate in Hawaii. This has restricted our investigations to the post-war period. If I may be permitted to an editorial comment, establishment of a system for gathering and recording accurate catch statistics is an absolute essential and should receive priority over any other type of fishery investigations. There is practically no fishery study that can be conducted successfully in the absence of good catch statistics.

(Australia) During the past six years, 10-12 new records of fish from temperate waters have been made in Tasmania. In addition, there has been a southerly extension of the King prawn into Tasmanian waters.

Oceanography

1957: "... decided to request Member Governments to consider the feasibility of sending their salinity and water temperature data to the Secretariat to be published and made available to all member countries."

See reference above, under 2.32, to the meetings of IACOMS and SCOR.

(Japan) For the purposes of obtaining data required for study of marine resources and predictions of fishery conditions in Japanese waters, oceanographical observations have been conducted for a number of years inclusive of

1957 by Regional Fisheries Laboratories belonging to the Central Government in co-operation with the Experimental Stations of Prefectural Governments. In addition, different types of oceanographical observations have been carried out at regular intervals of period by the Meteorological Agency aiming at marine meteorological investigation and by the Hydrographic Office, Maritime Safety Agency, for securing safety in navigation. In various respects of the surveys, the Fisheries Research Institutions are keeping in touch with those Agencies. It has been emphasized that methodological improvement and reorientation of oceanographical studies should be required in order to contribute to marine fisheries. For these purposes meetings of many research workers from various institutions and laboratories were convened several times during 1957 by the Ministry of Agriculture and Forestry with constructive conclusions having been drawn from discussions on the problems.

(U.S.A.) The Pacific Oceanic Fishery Investigations is issuing on a current basis a monthly chart of sea surface temperatures in the north-eastern Pacific. The area of the chart extends from 180° east to the Pacific coast and south to 20° N. These charts are based on Merchant Marine records and are issued approximately 10 days after the close of the observation period, that is the 20th of the month in question. In addition, we have established a number of sea temperature and salinity monitoring stations in the Central Pacific. These time series will be published as data accumulates. This material, of course, is very pertinent to the subject of faunal changes discussed above and is absolutely essential if the relationship between weather, ocean and fish is to be unravelled.

(Australia) Our data are published quarterly as Station Lists and Cruise Reports. We feel there is no need to send anything to the Council as the data are already made available to the libraries in member countries.

(Thailand) Regional project on the marine investigation of the South China Sea and the Gulf of Thailand under the technical and economic assistance of ICA as requested by the Government of Vietnam and Thailand, will start in 1959.

Tuna

1957: ... recommended the adoption by Member Governments of the principle of the 1° square as a basis for organizing the collection of catch statistics."

(Japan) The Nankai Regional Fisheries Research Laboratory conducted surveys on the commercial fishery of four major species of tunas and tagging experiment of the albacore in the Pacific and Indian Oceans along with oceanographical condition in the areas. From view points of the fishing biology it is worth noting that different groups of the fish seem to inhabit different current systems, and that strength of year classes fluctuates remarkably from one another.

(Malaya) I have no material to bring up. It might interest you to know that the Federation Government has obtained a tuna expert, Mr. Y. Momokawa, from Japan, under the Colombo Plan, to make a survey of our tuna resources. He will carry out long-line fishing for tuna with the departmental vessel, the 72 ft. M.V. KEMBONG. Long-line fishing gear has been ordered from Japan and will be arriving in six weeks' time.

(Australia) The tuna programme is being expanded. For example, a "Fisherman's Asdic" (Kelvin Hughes) has been fitted to the tuna research vessel and the instrument (with a range of two miles) will be used to search for off-shore schools. With the recent appointment of a hydrologist especially for fisheries problems, the relation between fish occurrences and environmental conditions will receive increased attention. Work is continuing on the correlation of tuna occurrences with movements of offshore water masses.

(Indonesia) With the research vessel BIMA some experimental fishing with the longline gear has been done on the West Coast of Sumatra during the months September-October 1957. Rastrelliger fish were used as bait while yellowfin was the most abundant species caught. A survey on the tuna fishery with trolling is still in progress.

(U.S.A.) POFI tuna research is reported in full in the attached Annual Report. Work being conducted by other American institutions will no doubt be included in the Rapporteur's report. Though redundant, it might be worth

repeating here that POFI has embarked on an ambitious program on tuna behavior research. This program is aimed at accumulating the knowledge needed to increase the efficiency of catching tuna. At the present time we are exploring an underwater observation chamber, which we have fitted to one of our vessels. This chamber permits us to observe the behavior of tunas during the course of fishing.

Rastrelliger

1957: "... The Council decided to request FAO to initiate arrangements to conduct a special short seminar to train technical officers in the standard techniques recommended in IPFC/C57/CP 1. ... The Council agreed to request FAO to assist in drafting a provisional programme of work for the expert for circulation to interested Member Governments for approval."

The International Training Center on the Methodology and Techniques of Research on *Rastrelliger* has been conducted, as requested by the Council. A report of the Center will be presented by the Technical Secretary at the meeting.

(Pakistan) Amongst the mackerel, *Rastrelliger* has very little importance as it is found in very small numbers in Pakistan waters. This has already been reported previously and hence no work on this species has been undertaken in this country. The research is in a very initial stage in this country. A research station is under construction at the Karachi Fish Harbor and the staff is also being trained so as to start work as soon as the facilities are available.

(Malaya) The Federation Government is sending three research officers to the Center in Bangkok. They are all new to fisheries research and will no doubt derive much benefit from the Center. Two of them, Mr. Selvarajah and Mr. Merican, have just returned from a three weeks' course at Tokyo on "The Application of Radio-isotopes to Research" under the auspices of UNESCO.

(Indonesia) During the inter-session period, data on the landings of *Rastrelliger* and its fishing gear were collected, primarily to be

used for the *Rastrelliger* training center in Bangkok this year. In March 1958 samples of *Rastrelliger* were received from the Philippines. Indonesia has already sent samples to Singapore, India and the Philippines.

(Australia) This fish is rare even on the tropical north coast of Australia and it is not intended to carry out research upon it.

Seaweeds

1957: "... Workers in this field were urged to submit their names and addresses as well as the titles of their papers for listing in the *Current Affairs Bulletin*."

(Indonesia) Samples of "agar-agar" collected from different areas in Indonesia were sent to the Rijksherbarium, Leiden (Holland) and some to Australia to be identified.

3. APPLICATION OF RESEARCH RESULTS

The following is an extract from the second circular letter from the Technical Secretary:

" In Dr. Kuronuma's letter to me, acknowledging the first circular letter, he makes a strong plea for orientation of our research work to practical problems. He points out that it is not sufficient that the research work should be interesting to the researcher personally but should be able to produce results that will be usable by the industry. You may remember that at the Seventh Session we had some discussion of this point and I think that it is not out of place to point out that at other councils the discussions that take place relate as closely as possible to the practical problems confronting the industry and the administrators. In fact in certain of the councils the discussions are initiated by the submission to the scientific committees of questions formulated by the administrators on behalf of themselves or of the industry. These questions may be simply in the form of what size should such and such species be caught, and, what size mesh should be authorized for the capture of fish of that size? I believe it would be useful if Committee members would try to identify problems of this kind relating to the fisheries of their countries and

perhaps at the Council's session the agenda of the Committee might be framed on the basis of a review of such questions submitted by Committee members."

(Malaya) I heartily agree with Dr. Kuronuma's views, and I agree that a review of such problems as confronting the fisheries administrator, at the Council's session, would be profitable to all concerned.

(Japan: Dr. Kuronuma) I shall emphasize again that fisheries research work should not only be interesting to the researcher personally but also should be able to produce results that will be usable by the industry. The identification of the research subjects will be highly necessary before the adoption of the subjects for prosecution.

(Singapore) I agree with your view that it would be useful for Committee members to try to identify problems relating to the fisheries of their countries and present them for discussion at the Council's Session. If there is no time to do so at the Council Session they could then be put on the agenda of the next Council Session. This would certainly help to keep the administrators in the various member countries interested and to help them to appreciate the value of the IPFC. I would therefore suggest that you might wish to take this point up with Mr. Tubb to see if it is possible to initiate action now for the forth coming meeting at Colombo.

4. FISH BEHAVIOR SYMPOSIUM

(Japan: Dr. Kuronuma) The title of the symposium proposed for the 8th Session was determined at Bandung as "Fish behavior with special reference to pelagic shoaling species". In the decision of the title of the symposium as such I remember that we have considered it necessary to cover the fish behaviour demonstrated by them living not only in open natural bodies of water but also by those which are confined in fish-ponds. The idea was based on the notion, I remember, that the scope of the symposium will not be restricted to Panel B (Sea Fisheries). The Prospectus for the Symposium on Fish Behavior (FAO/58/6/4429) analyses the subject very clearly in principle and in method of research. As the principal objects of the fish behavior study the Prospectus has emphasized, I was impressed, the "search

for fish (to catch)" and "characteristics of a population .. dynamics in terms for number and biomass". I do not need to mention that the understanding of fish behaviour is one of basic knowledge to manage the fish-pond of higher productivity for the consideration of water supply, application of food, construction of pond as well as harvest of the products.

(Singapore) The plan set out in the prospectus on the Symposium on Fish Behavior is very good.

(Australia) The question of Australian representation at the next IPFC meeting has not been settled and we have therefore taken no steps to prepare any material. I was extremely pleased to see under Section II of the Prospectus that attention will be paid to questions (i) and (ii). It is most important that the first question be kept in mind lest any investigation drifts into purely academic research. With our present state of knowledge, fish behaviour programs prosecuted at fisheries laboratories must include much fundamental experimentation. However, it is necessary that clearly-defined practical objectives be kept in view.

5. REPORT TO TECHNICAL COMMITTEE I FROM THE GOVERNMENT OF KOREA

The following report is a paraphrase of a more elaborate document submitted by the Bureau of Fisheries, Republic of Korea to the 8th Session of the Indo-Pacific Fisheries Council.

Taxonomy: A list including 833 species of fish has been prepared by the Director of the Central Fisheries Inspection Station. The method of classification adopted is that used by Berg.

Age Determination: Scale studies reading to the age determination of 3 important species of fish are at present being undertaken. The fish studies are the Alaska Pollock, *Theragra chalcogramma*; Corvena, *Pseudosciaena manchuria* and Snapper, *Pagrosomus major*.

Plankton Study: Quantitative vertical collections of plankton have been undertaken at the Central Fisheries Experiment Station since 1945 using the Marutoku-A45 plankton net.

Seaweed: A publication has been issued listing 366 species of marine algae and including the standard Korean names

together with the names in the dialects of the Kyunggi Province and of the districts in which the species are mainly collected.

Tuna: Exploratory fishing for Tuna has been undertaken by a 230 ton vessel which operated through the Straits of Malacca and in the Indian Ocean in the vicinity of Andaman Islands.

Two other vessels have already left to study tuna occurrence in the Southern Pacific.

The trawl fisheries: The report includes a description of the gear and methods used in fishing for the Alaska Pollock, operated in the Korean inshore waters. Statistics of catch by area, by month and by year are given.

Mullet: A description is given of the artificial spawning and rearing of gray mullet at the Mokpo Fisheries Station. Data on rate of hatching, water requirements and rate of growth are given together with some notes on feeding and on the future of mullet culture in Korea.

Water Pollution: Notes on effect of coal ash discharge into Chinhae Bay are given and it was indicated that such a process had adversely affected the inshore marine fauna, apparently owing to increased turbidity of the water and the deposits of fine ash on the bottom, which inhibited the growth of benthic organisms.

Inland Fisheries: Production in metric tons of 7 species of freshwater fish during the period 1951-57 are given together with an estimate of the area of inland water suitable for fish culture which in 1956 was approximately 556,000 acres.

Oceanography: Studies on the temperature and temperature variations on inshore water, on the variation of salinity of the eastern sea of Korea and studies to identify water masses with a view to relating these water masses to particular type of fisheries are being undertaken.

Shrimp Fisheries: A description of the results obtained by the use of Gulf of Mexico shrimp trawls is given but it is emphasised that the early experiments were in con-

nection with training in the use of gear. It is planned to use this type of equipment for exploratory fishing in waters deeper than are at present being exploited.

CHAPTER 3. TECHNOLOGY AND ECONOMICS

The Technical Committee II examined IPEC/C58/WP 6 together with IPFC/C58/WP 6 Corr. No. 1 and Addendum (1) and (2) and was of the view that this document represents a fairly comprehensive account of the activities of the Council, Member Governments and F.A.O. during the last inter-session period in the implementation of the various recommendations made by the Council at its 7th Session in the field of Fisheries Technology and Economics. The Committee revised WP No. 6 in the light of the Corrigendum and Addenda received. The revised version of WP 6 was circulated as IPFC/C58/WP 6: Rev. 1.

The activities of the Committee during the current Session are described in this chapter which records the evaluations of the information contained in the documents listed above as well as recommendations for further activities during the next inter-session period.

In addition, the Committee has expressed its views and made recommendations on certain other matters, such as the mechanism for efficient and effective implementation of the Council's recommendations, publications of the Council and the Indo-Pacific Fisheries Year.

The Committee presented its report and proposed that this be considered by the Council for adoption.

GENERAL

Examining the various documents presented to this Session, the Council expressed the opinion that there was considerable imbalance in the development of the various phases and aspects of the fisheries industry in this region. While relatively strong emphasis was laid on increased production of fish, the facilities for handling, transportation, processing and marketing continued to be unsatisfactory and inadequate. The Council was also of the opinion that such inadequacy was obviously a strong deterrent in itself to further increase in production.

The Council also observed that plans for the development of fisheries were not always coordinated with similar plans for development in other sectors of national economy.

The Council stressed the need for coordinated development of the various aspects of the fisheries industry as well as a coordination of fisheries development programs with those for other sectors of national economy.

1. CRAFT AND GEAR

(a) The Council noted that in the fields of craft and gear some further progress had been achieved during the last inter-session period by a number of countries in the region. The shortage of qualified and experienced technological experts available to Member Governments for the supply of advice in these two closely related fields had, however, resulted in the continued failure by a number of countries to overcome long outstanding difficulties with which they were faced. With a view to effecting some measure of coordination and a wider exchange than is at present possible of readily available information on the progress achieved in certain of the countries which could be advantageously adopted by their less advanced neighbors, the Council decided to ask FAO, if it could explore ways and means of increasing the establishment of the Regional Office in Bangkok by the appointment of one further Fisheries Officer who might be expected to specialize in craft and gear. Following visits to each of the Member Government countries, the officer in question would soon become conversant with what was taking place in the region, after which he would be in a position to know what was applicable elsewhere and how any projects that might be considered desirable could best be brought about. It was felt, furthermore, that many of the problems which face Member Governments, and, which are of far reaching importance among the fisherfolk of the particular countries concerned, could be resolved with on-the-spot advice given by this Technical Secretary to the individual fishery workers.

(b) On the question of design and construction of improved types of fishing craft with due consideration to economics, the Council noted with satisfaction that a second World Fishing Boat Congress is scheduled to take place in Rome during April, 1959. In view of the importance of this subject, and, bearing in mind the success and practical value of the publication "Fishing Boats of the World" which resulted from the first Fishing Boat Congress, the Council decided that the Secretariat should

write to Member Governments enquiring whether it was their intention to send a representative and, if so, whether it would be possible for the officer concerned to keep a watching brief on the interests of the Council.

(c) An account of the work done by FAO in India and Ceylon on the development of mechanized beach landing craft designed to pass through moderate surf was studied in the form of Working Papers Nos. 5 and 27. It was appreciated that work to date had been of a trial nature and, as further conclusions were expected to be reached during the forth-coming inter-session period, it was decided that FAO should be requested to present its report at the next session of the Council. The FAO expert present explained how there is a vast difference between beach landing craft required to pass through surf and the type of vessel required to be beached in sheltered bays or in areas where there is little or only light surf; the latter class of boat being much cheaper to build. It was decided that the Council should obtain from Member Governments an indication as to whether they were interested in either beach landing and/or surf boats and, if so, details of the conditions under which such craft would be required to be used.

(d) The problem of vocational training for boat builders and the work of the FAO assisted training center in Cochin, India, as well as the progress made in a number of other countries, were discussed at length. The recommendation at the seventh session of the Council has been that training should be provided to enable boatbuilders to read working drawings and to produce boats from those plans. On further reconsideration, the Council now thought that whereas the earlier recommendation was applicable in the rather more advanced countries in the region, in the less advanced countries the real need in the first instance was to train boatbuilders in modern carpentry work. The Council accordingly decided to urge Member Governments to appoint suitable well qualified men as Craft Technicians, in the establishments of their Fishery Departments, to carry out this training work at the appropriate levels. The FAO might assist by supplying copies of literature from the various courses which it had either sponsored or assisted and Technical Assistance reports.

(e) At the previous session of the Council, FAO had been requested to study the possibility of producing a reference book on the techniques of construction of small fishing boats. The FAO officers present at the current session explained how although there is already a considerable amount of literature available, none of this has yet been incorporated in a book. The acquisition of funds and, also the period of time required, for producing such a book would present problems. The Council accordingly decided instead to request FAO to release whatever material it may have, if necessary, in mimeograph or pamphlet form.

(f) The Council expressed its satisfaction in the efforts underway in the region for mechanization of fishing craft and expressed the hope that Member Governments will intensify their efforts in this field. Whilst it was appreciated that the installation of engines in fishing boats was an important advance, the Council felt that in order to reap the full benefit the mode of operation must also be suitably modified and intensified (i.e., to extend the range of fishing grounds and to handle more or new types of gear).

(g) The introduction of mechanical aids to assist in the handling of fishing gear was discussed and details were provided of a number of different types of equipment (e.g., line haulers, capstans and winches) which could be introduced in even quite small mechanized boats, in countries where these are not yet being utilized. In this connection, the Council noted with interest that the proceedings of the "International Fishing Gear Congress" sponsored by FAO in Hamburg during October, 1957, would soon be available in printed form.

(h) A number of papers on the subject of improvement of fishing gear were studied; particular attention was paid to the use of light fishing which although important in the eastern sector of the region has still been largely neglected in the western sector, and, the introduction of the new types of high opening trawls developed and widely used in Northern Europe during the last decade. The Council expressed the hope that Member Governments would make available to their fishery workers the necessary funds required to test these forms of gear, both of which when used in conjunction with sensitive echosounders had produced excellent results elsewhere.

(i) The Council was briefly informed of the deliberations at a Symposium on "Improved Types of Fishing from Small Mechanized Boats" held in Cochin, India, between the 28th and 31st October, 1958, which had been inaugurated by the Director of Fisheries, Kerala State. The papers from this Symposium were considered to be of considerable value throughout the region and the Council therefore decided that the Government of India should be approached with a request that, in all cases where the stencils are still available, further copies of the papers may be produced for distribution to Member Governments.

(j) The Council decided that the use of recording echosounders of the modern improved types should be encouraged particularly in exploratory and experimental fishing, from Government boats in the first instance. Small portable, low cost, echosounders which operate from batteries are readily available.

(k) Only one paper was received on the subject of gear preservation and this was studied with close interest. Attention was drawn to the importance of fixing tannin chemically after tanning treatment, or else to protect it by tarring (i.e., coal tar diluted by kerosene in a 3 : 1 mixture).

(l) The increasing use of synthetic fishing twines throughout the region, particularly nylon drift and bottomset gillnets which have been found to be vastly superior to natural fiber nets, was noted as being of the greatest importance. Large scale introduction of synthetic fiber nets is however being delayed by lack of capital among the fishery operators and in some instances by currency and import restrictions. To date Governmental loan schemes have been applied mainly to the purchase of engines and for boat building. - The Council recommended that due consideration should in future be given to extending such credit facilities for the purchase of modern gear.

(m) The Council noted from reports that while weather forecasting services were operated in almost all the countries in the region, such information often is not readily available to the fishermen as they do not possess wireless receiving sets.

(n) The training of fishermen in navigation, seamanship and engine operation was a subject that received much attention. The

Council expressed its approval of the measures already taken by most Member Governments to provide the necessary training facilities and expressed the hope that this would be expanded still further.

(o) There were, however, indications that in several countries of the Region, fisheries development and the consequent increase in production of badly needed additional supplies of fish protein, was being seriously hampered by the rigid enforcement of either outmoded legislation or legislation applicable to other classes of vessels (e.g., large ocean going shipping and/or craft normally engaged in the carrying of fare-paying passengers). Such action has resulted in impracticably high standards being set for the certification of fishermen coxswains and engineers, for the safety requirements laid down such as the number and type of life-saving appliances to be carried on board fishing vessels, and harbor entry and clearance procedure.

(p) The Council considered that it was its duty to point out to Member Governments that the enforcement of any measures which rendered it necessary for fishermen to recruit certificated personnel from outside the fishing industry not only tended to delay progress but also introduced new social problems and was, in any case, usually unnecessary. Professional fishermen with their traditional skill of seamanship, and ability to return to port under sail should the engine fail, are not normally a source of trouble to the Government administrator. The practice in most countries is to accept a modified form of certification with a lower standard than that applicable to other categories of vessels, which is valid for bona fide fishing boats only. These standards are then gradually raised over a period of years as the benefits from mechanization result in a higher standard of living, with a better educational background, for the operatives in the industry. Similar relaxation of the standards of safety requirements adopted for fishing boats is also recommended.

(q) The Council noted with satisfaction that the recommendation for the publication of a bibliography on fishing gear and methods made at the seventh session had been implemented by FAO and the book duly distributed.

It was decided that the work of Technical Committee II on Craft and Gear during the next inter-session period should be continued on the following phases :-

- (i) Improvement of craft
 - (a) Design and construction with due consideration of economics.
 - (b) Mechanization of fishing craft.
 - (c) Vocational Training for boat-builders.
- (ii) Mechanized handling of fishing gear.
- (iii) Improvement and preservation of gear.
- (iv) Training of fishermen in navigation, seamanship and engineering.

FOOD TECHNOLOGY

(a) Although the Council has in the past made various recommendations for the improvement of the quality of cured fish in this region and Member Governments have undertaken certain activities in this respect, the quality for cured fish has not so far been precisely defined with particular reference to this region. In the absence of such definition, the efforts for the improvement of quality have not always been properly directed. After considerable deliberation on this question, the Council agreed that quality for cured fish in so far as the Indo-Pacific region is concerned must recognize consumer preference, in the Member Countries, for varying degrees of putrefaction and/or fermentation insisting at the same time however, that the products should be free from factors physiologically harmful to human beings.

The Council emphasized that the order for measures for the improvement of the cured fish industry to be effective, steps should first be taken to ascertain the quality of the various products as produced at present and the causes responsible for any lowering of quality, should such be the findings. As the defects in the industry are defined in precise terms and suitable measures for eliminating such defects are found out, practical steps should be promptly taken in applying suitable remedial measures.

In respect of research conducted in the region in fish curing, the Council made the following observations :

- (i) efforts for developing techniques for determining quality have been directed to methods which may not

find application in the determination of quality as defined in the foregoing paragraph;

- (ii) although a considerable amount of research has been undertaken in the techniques of fish salting relatively less emphasis has been put on the techniques of drying, storage, handling and packaging;
- (iii) there is a dangerously wide gap between research and application of research results in the industry.

The Council recommended that research should be encouraged only where the problems have been clearly defined and there is a pressing need for a solution of such problems. The Council particularly stressed the need for meticulously examining the priority to be assigned to various problems. The Council recommends to Member Governments that prompt and adequate measures should be taken to apply results of research in the industry.

Discussing the possibilities of artificial drying, the Council agreed that the desirability of such drying should be considered where wastage of fish caused by unfavourable weather and the necessity for expeditious drying of large quantities of fish during short periods of heavy landings may justify the introduction of mechanical drying. Care must be taken that such mechanical dryers are of very simple design, can be fabricated locally and do not call for heavy investment. In this connection it was pointed out that in order to meet the consumer preference for certain degrees of putrefaction in dried fish, fish dried in artificial dryers may, in the earlier stages of drying, have to be aged for suitable periods to ensure the development of the desired degree of putrefaction. It was also suggested that, where applicable, Member Governments might like to consider the advantages of employing artificial drying for quickly reducing the initial moisture content in fish below the critical level in order to arrest spoilage which takes place above this critical level. The fish so partially dried could subsequently be further dried in the sun.

It was agreed that considerable damage of cured fish during storage and shipment is caused due to re-absorption of moisture.

It was observed that this wastage, to a large extent, could be avoided by packaging dry fish in relatively moisture-proof materials. In

this connection, the Council suggested that Member Governments might like to investigate the possibilities of using paraffin-lined paper bags or gunny sacks lined on the inside with bitumen.

Recognizing that improper sanitation in the fish curing and drying yards in the region are responsible to a considerable extent for the poor quality of the products, Council recommended to the Member Governments to encourage the fish curing yards to introduce simple and practical measures of sanitation. These might include simple measures for provision of running water, general cleanliness, and drying of fish on racks or raised platforms made out of indigenous material. The Council was convinced that fish flour in its strictest sense (deodorized, de-colored and de-fatted fish powder), does not seem to have any significant possibilities in the region at present. Good quality fish meal might be acceptable to some countries of South-East Asia where fishery products with pronounced flavor, such as fish sauce and fish paste, are already popular items of diet. However, consumer preference and resistance to new products as well as economic considerations might make it desirable to process surplus fish, wherever available, into forms which are already accepted by the consumer.

(b) Arising out of the discussions on fish flour for human consumption, considerable attention was paid to the possible production of fish meal. The Council observed that offals and trimmings from fresh fish and cured fish industry are not of sufficient quantity to warrant establishment of a fish meal industry. The Council further observed that production of fish meal from whole fish for poultry and animal feeding would be justified only where fish is produced in certain areas during periods of very short duration in quantities far in excess of the capacity of the existing facilities to utilize such extra quantities for human consumption.

(c) The Council was strong in its views that the establishment of the fish meal industry must be preceded by a very careful examination of the economics involved. The Council studied with interest the two documents (Technical Paper No. 3 and 17) submitted by Indonesia describing investigations conducted in the canning of fish. The Council drew these two Technical Papers to the attention of those member countries where canning is of impor-

tance. The Council recognized the limited possibilities of fish canning for catering to the home markets in the region. The needs of the Defence Services might in certain countries call for developing fish canning on a limited scale. Where available resources and an organized fishery justify production of canned fishery products, such as canned tuna and shrimp for export markets, the industry may be encouraged. However, in view of the inherent difficulties in the procurement and operation of canning machinery in this region and in obtaining continued supplies of tinplate and in the marketing of the finished products, the organization of the industry should be promoted in partnership with established concerns in countries where canning of fish is well developed.

(d) The Council read with great interest Technical Paper No. 9 describing investigations on Boiled Fish which is a commercial product in Thailand, Malaya, Vietnam and some other countries in South-East Asia. The Council agreed that Boiled Fish represents a very simple and practical means for preserving fish for short periods. In consideration of the general economy of the region, and the limitations of transportations and handling facilities, the Council was convinced of the possibilities of developing this product in other countries of the region. In this respect the Council agreed that a comprehensive report on the product will be a helpful guide for the Member Governments in their consideration of the possibilities of developing this product. The Council therefore directed the Secretariat to take adequate measures for the early publication of such a document in cooperation with FAO.

(e) The Council reviewed its recommendation made at its 7th Session to FAO for organizing a Regional Training Center in fish processing and preservation. Considering the economic and dietetic importance of cured fish in the region and further considering the present needs of the fish curing industry for expeditious improvement, the Council agreed that it would be desirable for the proposed Training Center to limit itself to Fish Curing in Humid Tropics with special reference to the Indo-Pacific region, instead of covering the wide field of fish processing and preservation. The Council suggested that this Training Center should primarily aim at defining as precisely as possible, the defects in the fish curing industry and in suggesting suitable remedial measures.

The Council recommended that participants of this Training Center should be selected from those fishery officials in the member countries who are actively engaged in research in fish curing and in the administration of the fish curing industry. The Member Governments were requested to send, where possible, two participants, one from the field of research and the other from administration.

In preparation for this Training Center, Member Governments should compile all available information:

- (i) for the preparation of as complete an account as is possible of the fish curing industry, furnishing information, among other factors, on manpower, plants and equipment, capital investment, quantity of raw material utilized, processing methods, varieties and quantities of final products, methods of handling, storage and packaging, consumer preference for various products, price of these products as compared to those of other protein foods;
- (ii) an account of research so far conducted in the various aspects of the fish curing industry; and
- (iii) an account of the measures so far implemented and/or contemplated for improving the fish curing industry.

In this connection, the Council pointed out that information collected for the "Fishery Products Manual" in accordance with the proforma distributed by FAO at the 7th Session of the Indo-Pacific Fisheries Council could be profitably utilized at the Training Center.

(f) The Council re-examined its recommendations made at the 7th Session to FAO for a Regional Consultant in Fish Processing and Preservation to be stationed in Bangkok, and agreed that this recommendation should be further re-examined at the Training Centre on Fish Curing for Humid Tropics recommended at the current session.

(g) The Council noted that very little progress was made in the preparation of the "Fishery Products Manual". Notwithstanding the materialization of the Training Center

requested in the foregoing paragraphs and in recognition of the fact that a factual account of the fish curing industry in the region was a primary step towards improvement of the industry, the Council decided to concentrate during the next inter-session period on the preparation of the Fishery Products Manual. It urged the Member Governments to cooperate with the Council and FAO in this respect.

3. STATISTICS

(a) The Council reviewed its recommendation at the 7th Session on the need for the development of suitable sampling techniques for the collection of fishery statistics in this region and was of the view that the forthcoming Training Center in Fishery Statistics due in Bombay early in 1959 would, to a considerable extent, satisfy this need.

This Council therefore recommended that the Member Governments take full advantage of this Training Center. It also urged the Member Governments to utilize the services of the participants who will have been trained at this Center, in the practical application of the sampling techniques in their respective countries for collection of statistics.

The Council reviewed its recommendations made at the 7th Session for a Group Country Project in Fishery Statistics and was of the view that such a project should be deferred until after the forthcoming Statistics Training Center in Bombay is completed and the Member Governments have had an opportunity to examine the reports submitted by the participants from their respective countries.

The Council examined the relative merits of collecting fishery statistics by a Central Statistical Organization and by fisheries departments with their own staff. Information was made available on the systems of centralized collection of statistics in Australia where one single organization is responsible for the collection of official statistics relating to primary as well as secondary industries and on the system in Japan where primary statistics of Agriculture, Forestry and Fisheries are collected by one single organization.

Considering the limitations of technically trained personnel, of equipment, and of funds available, the Council suggested that Member Governments might consider the desirability of

centralized collection of statistics. It was however specially stressed that such centralized statistical organizations should have on their staffs officers specially trained in the collection of fishery statistics and that such officers should be made available for collection of statistics in fisheries in preference to those in other fields.

Arising out of discussions of the FAO Handbook for preliminary fishery surveys, a point was made that this handbook had not, in most cases, reached the personnel connected directly with the conduct of fishery surveys. The Council requested FAO to ensure a wider distribution of this handbook and the Member Governments to promote its use, wherever possible. It further requested the FAO to establish direct contact with the fishery workers in the region to ascertain their experience in the use of this Handbook.

The Council examined the proposal made by Economics Branch FAO Fisheries Division for a Fishery Surveys Training Center for the countries of the Indo-Pacific region and expressed the view that such a Training Center was desirable. The Council recommended that the Training Center should deal with the subject of formulating coordinated program for fisheries development and that the participants in the Training Center should consist of Fisheries Officers who are directly concerned with the planning of fisheries development programs in their respective countries.

(c) The Council noted in this connection the recommendations made at the 4th FAO Regional Conference for Asia and the Far East regarding the organization of Seminars for representatives of fisheries services and of the general economic policy and planning agencies of governments and recommended that the Training Center should also take into account matters intended for consideration at the proposed Seminars.

Reiterating its stand on the essentiality of reliable and comprehensive fisheries statistics in the planning of a coordinated development of fisheries, and being conscious of the limitations of trained personnel, equipment and funds, the Council repeated its recommendations to the Member Governments for implementing at least a minimum programme of statistics. This minimum program as outlined at the 7th Session is:

- (i) Census of the number of fishing vessels operating in member countries, the number of fishermen engaged in the industry and fishing methods used, together with cold storage and processing facilities.
- (ii) Collection of statistics on overall fish production together with statistics on utilization and trade in respect of species of major economic importance.

The Council further requested the Member Governments to make available to the Council for examination at its next Session, their reports on the implementation of this minimum programme.

4. SOCIO-ECONOMICS

(a) The Council studied the Report submitted to the Session by FAO on the International Training Center in Fishermen's Cooperatives and Administration held in Australia during December 1957 and January 1958. The Council expressed its appreciation to FAO for successfully completing this Training Center. In this respect the Council urged Member Governments to make full and effective use of the services of the participants in furthering fishery cooperative activities in their countries.

The Council examined the Report on the Surveys of Fishermen's Cooperatives in the IPFC region contained in Volume 2 of the Report on the Training Center and noted that in most countries of the region there has been little spontaneous growth of Fishermen's Cooperative Societies, and the impetus to the organization of such societies has come chiefly from Governments. The Council further noted that in view of the educational, social and economic standards of fishermen in the region, there was an urgent need for intensification of extension work in the member countries for an expeditious development of Fishermen's Cooperatives.

The Council observed that for successful operation of cooperative societies, the following are the essential requirements :—

- (i) close cooperation of members ;
- (ii) efficient management ;
- (iii) economic turnover.

The Council was further of the view that membership of Fishermen's Cooperative Societies should be homogeneous and that wherever possible, the Societies should expand their activities to include marketing of catches of their members.

The Council urged Member Governments to assist Fishermen's Cooperative Societies in fulfilling the requirements mentioned above, by educating the fishermen and providing loans where necessary. Governments assisting these societies should, however, exercise a minimum of control over them.

The Council was of the view that where organization of Cooperative Societies for undertaking marketing of fish and fishery products were not possible at present, the Government might consider the promotion of autonomous bodies as a temporary measure to undertake these activities until such time as the fishermen organized themselves effectively.

Examining the Report on the function of the middleman contained in Volume 2 of the Report on the International Training Center in Fishermen's Cooperatives and Administration, the Council expressed the view that the Report is primarily based on preliminary observations made during a study currently in progress in India (Bombay), Hong Kong and Malaya. The Council recommended that the study in these countries should be completed and that further extension should be considered after a report on this study has been examined. The Council also emphasized the necessity of close collaboration between Universities and other institutions with the Fishery Departments in pursuing this study.

In consideration of the various controls exercised by middlemen in the fisheries industry, the Council reiterated the urgency of freeing the industry from exploitation by middlemen where such exploitation is known to exist, through the supervision of services by Governments, Cooperative Societies or Government-sponsored agencies where such services can be taken over from middlemen without impairing efficiency or increasing costs.

(6) The Council noted that the Factual Survey of Credit Facilities to Fishermen is not complete, since information has not yet been furnished by some Member Governments. The Council decided to complete this report and

requested the Member Governments to furnish the required information expeditiously. In order to extend the scope of the study, the Council further requested Member Governments to supply information on sources and terms of available non-governmental credit facilities. In this connection the Council requested FAO to make a suitable questionnaire available to Member Governments at an early date.

The Council expressed its interests in the Technical Meeting on Fishery Credit contemplated for 1960. Although a prospectus for the meeting is not yet available, the Council hoped that the meeting would give adequate attention to the problems of credit for the fisheries industry in the Indo-Pacific Region. In this connection the Council was of the opinion that a report resulting from its activities on compilation of factual information on fishery credit facilities in the Region would constitute a useful contribution to the Meeting.

5. FISH MARKETING

The Council noted that although recommendations were made at the 7th Session for a complete factual account of fish marketing conditions in the region, during the last inter-session period it was possible to collect information only on the role of governments in fish marketing. The Council further noted that the information made available to the Council in this respect was incomplete in so far as certain Member Governments were not able to furnish the information sought. In view of the incompleteness of the report, the Council was unable to draw any conclusions. However, it made the following preliminary observations:

- (i) That under the situations that exist in the various member countries and in view of the inability of the Fishermen's Cooperative Societies to undertake fish marketing entirely on their own, varying degrees of Government participation in fish marketing is necessary at the present stage. Such participation should, however, be in the form of assistance and guidance to organizations sponsored by Governments, but enjoying satisfactory degree of autonomy

and provide for, where circumstances permit, the eventual operation of such organizations on a cooperative basis.

- (ii) No clear picture emerged as to the requirements of technically trained personnel, the availability of such personnel and the facilities for training.
- (iii) The quality grading and control particularly for the export trade should be promoted wherever possible. The imposition of such controls should, however, be preceded by adequate measures for publicity and education and should provide necessary inspection and analytical services.

The Council studied the first draft of the Bibliography on Marketing for the Indo-Pacific Region (Draft) compiled by FAO and expressed its appreciation of the assistance given by FAO in this connection. The Council suggested that the final version of the bibliography might contain a subject index together with cross references to authors and that annotations to the references should be included, where possible.

Having regard to the state of fish marketing in the Region and recognizing the urgency for removal of the imbalance which exists between production and consumption of fish, the Council felt that a short Training Center in which experienced fishery officials directly connected with fish marketing in the member countries would participate, will help to define the defects in the industry, and to formulate measures for removal of such defects. In this connection, the Council requested FAO to organize such a Training Center as early as possible, preferably not later than 1960 and requested the Member Governments to participate in such a Training Center.

In preparation for this Center, the Council requested the Member Governments to compile available detailed information and supplement them where possible on the various aspects of the fish marketing industry, notably distribution of fish by seasons and zones, handling, transportation and storage facilities, wholesale and retail marketing facilities and organization, volume of trade in fish and fishery

products, particularly the dried fish trade, for home markets as well as export markets, price variations and spreads at different stages of handling, availability of capital for the industry, role of Government and private enterprise in the industry, government program and policies for development to fish marketing, and their relation with the policies for development of other aspects of the fishery industry as well as other sectors of the national economy, and availability of trained personnel for implementing various development programs for fish marketing.

In this respect the Council also requested FAO to prepare suitable questionnaires and distribute them to the Member Governments well in advance of the scheduled date for the Seminar, so that participants could come prepared with necessary information.

The Council directed the Marketing Sub-Committee to maintain close liaison with FAO in the preparation of these questionnaires.

The Council recommended the following program in fish marketing for the next inter-session period:—

- (1) completion of the survey of the role of the governments in fish marketing;
- (2) compilation of factual accounts of transportation facilities in fish marketing made available by Governments and private enterprise;
- (3) a survey of the requirements, in the light of the national programs and policies for the development of fish marketing, of trained personnel, the availability of such personnel and the facilities that exist in member countries for their training.

The Council requested FAO's assistance in the preparation of suitable questionnaires in connection with its programs of activities in fish marketing as mentioned above.

APPENDIX

REPORT OF TECHNICAL COMMITTEE II

INTRODUCTION

CRAFT AND GEAR :

1. Improvement of Craft :
 - 1.1 Design for fishing vessels
 - 1.2 Construction of fishing vessels
 - 1.3 Mechanized surf-landing craft
 - 1.4 Vocational training for boatbuilders
 - 1.5 Handbook on construction of small craft
 - 1.6 Appraisal of progress on surf-boat
 - 1.7 Meeting of FAO naval architects on surf-boat
2. Mechanization of Craft :
 - 2.1 Growth of mechanization
 - 2.2 Engines of mechanization
 - 2.21 Types of engines
 - 2.22 Make of engines
 - 2.23 Prices of engines
 - 2.24 Operation of engines
 - 2.25 Repair and maintenance
 - 2.251 Fishermen's ability to maintain engines
 - 2.252 Spare parts
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REPORT OF TECHNICAL COMMITTEE II

(Period between the 7th and 8th Sessions of the Council)

INTRODUCTION

The Council at its 7th Session in Bandung, Indonesia, 13-27 May 1958, made several recommendations directed to its Member Governments and/or the Food and Agriculture Organization (FAO). These recommendations concerned improvement of conditions in the fields of fishing craft and gear, preservation and processing of fish, handling, transportation and marketing of fish, fisheries statistics and fisheries socio-economics.

Following the usual procedure, the Technical Committee II attempted during the inter-session period under review to promote activities in the member countries, in line with those Council recommendations directed to Member Governments. Recommendations directed to FAO were taken up with that Organization by the Council Secretariat.

This report is based on information made available to the Committee from time to time by its members on the results of their efforts and those of the governments and private parties in the member countries of the Council and on information supplied by the Council Secretariat on actions taken by FAO. It will be understood that the report as presented does not necessarily represent the complete picture of research and development activities that have taken place in the concerned fields in the member countries. Relevant information may also be found in the 'Report on the Status of the Industry', Working Paper No. IPFC/C58/WP8, also presented at the current Session of the Council. The Committee's report should therefore be read in conjunction with the latter report. Further, members on the Committee from several countries were not able to send information. Failure to send such information is not to be construed as an absence of activities in the concerned member countries. In certain cases, at least, the members on the Committee were over-worked and could not, in spite of best endeavours, manage to send information on activities which may have taken place.

In general, however, the Committee was relatively more active during the period under review than on previous occasions. This may, to a considerable extent, be a result of the

services of Technical Secretaries made available by the Food and Agriculture Organization. In order to accelerate activities in the member countries, these Technical Secretaries engaged their efforts in establishing direct and more frequent contact of Committee members with the Council Secretariat and amongst themselves on the one hand and with fishery workers in their respective countries on the other hand. They issued periodic circular letters to the members of the Committee and its panels. These letters reported actions taken by the Council Secretariat and FAO in respect of the Council recommendations and transmitted information furnished by Committee members on action taken in member countries. They also contained notes, as and where possible, on current research and development activities in other areas relating to subjects of interest to the Committee and its panels. These letters created appreciable response from the members.

Recorded below is the position as at 30 September 1958 in respect of the various recommendations of the Council made at its 7th Session.

CRAFT AND GEAR

(PANEL A)

1. Improvement of Craft

Activities in this field, as in others in the member countries varied within wide limits in their extent and intensity, depending on their national programs and policies for the development of fisheries as well as of their general economy. While in some countries the indigenous craft was not yet studied from the point of view of design, in others, improved craft had already been designed, tested and commercially introduced.

In general, such improvements concerned chiefly the small fishing craft (less than 5 tons) which constitute the great majority of the fishing fleet in the member countries. These improvements were also primarily concerned with making the craft suitable for mechanization which was being very actively pursued in these countries.

1.1 Design for fishing vessels

A multi-purpose fishing boat, 46 ft. in length, was designed in *Australia* on radical lines. Its distinguishing features in design are: (i) exaggerated rake of stem, and (ii) hard chine which disappears at a point approximately 1/3 of the o.a. length aft of the stem. The forebody of the vessel to this point is of steam bent timbers and normal round hull construction. Trials with the completed vessel have shown that the chine construction provides for increased stability and the construction of the forebody eliminates the pounding which is normally associated with a full chine hull in a head sea.

This vessel has been designed for participating in: Danish seining, otter trawling, live bait, pole fishing, purse seining and trapping.

The use of such a vessel is expected to allow for continued production throughout the year and for the taking, during seasonal abundances, of different species of fish in a limited fishing area, with the attendant economy of operation and the advantage of fishing from one's home port. The positioning of accommodation, engine room, live bait-rope wells, fish hold, etc., was so arranged that with a payload of 25 tons of fish the extreme limits of load waterline provide for sufficient reserve buoyancy assuring safety in a seaway.

In *Ceylon*, some fishermen took to conventional western type small fishing boats. Some of these were reconditioned naval craft; one was a reconditioned Danish boat which formerly had belonged to the Ceylon Department of Fisheries and was later sold to a fisherman, and another was a new 27 ft. boat built by a local fisherman. Two more new fishing boats were built according to designs prepared by a Swiss naval architect who is a resident in the Island. These were constructed in the architect's boatyard.

A recently established boat building yard had, according to its own design for a 26 ft. boat, built 4 boats of local timber and laid hulls for four more. Each boat cost Rs. 11,600 complete with a Lister LD 2 engine. This price represented a lower cost of production. Two such boats had been in operation since April 1958 and were reported to have given good results. In addition, one Japanese and one

Danish type vessel were under construction in two different yards.

One outrigger canoe was constructed with a specially wide hull, sufficient to take a 5-7 h.p. Coventry Victor marine Diesel engine, but in all other respects it was similar to the conventional outrigger canoe. This boat had already been commercially operated over a year with encouraging success and there were plans for constructing another boat with the same changes in design.

The local flat-bottomed canoe was adapted to mechanization by introducing a keel and a stern post. In view of the rounded lines of stern, a 4-ft. stern tube instead of the conventional 2-ft. one was used.

In *India* the commercial introduction of the improved 'Pablo' and 'Dan' boats as designed by FAO continued with progressively increasing speed. With the assistance of FAO experts, attempts continued for evolving further improvements in the design for these and other indigenous boats.

Such improved boats constructed, either at improvised boatyards of Fisheries Departments or at private boatyards were made available to fishermen by Union or States Governments on hire-purchase system. The boats ranged from 22 ft.-32 ft. in length, cost approximately 10-15 thousand Rupees each inclusive of engine and operated mainly gillnets or driftnets designed by an FAO expert.

The improvements of fishing craft in the maritime States of *India* were directed towards designing and construction of new types of fishing craft powered with Diesel engines and outboard motors. FAO Naval Architects and experts of the Indo-Norwegian Project were working in the development of new designs for mechanized fishing craft suitable for operation in the different coastal areas, viz. Bombay, Mysore, Kerala, Madras, Andhra and Orissa. A few boats incorporating certain improvements were constructed under the guidance of FAO Naval Architects and are proving satisfactory. The indigenous craft used by fishermen in Bombay area were found suitable for mechanization although some alterations in the lines of the existing fishing boats originally designed for sailing was deemed necessary. "Satpati" type of boats, the tank testing of which was done at the Central Water and Power

V-bottom. The boat was also completely decked. The boats used by local fishermen have a round bottom and are not decked. It was demonstrated that the experimental boat rolls much less than the local craft.

Minor changes in the structure were also introduced in certain cases. In Hong Kong, the conventional "A" bracket to support the long projection of the propeller shaft was eliminated. Some vessels were built with steel rudder stocks and blades instead of the cumbersome wooden arrangements previously employed. Some boats also had well constructed wheelhouses.

In the Colony's Fisheries Division vessel No. 2, two tapered wooden fillets were fitted on either side of the keel. In addition, the edges of the stern chock were also rounded off, this being an elementary but important job which is not normally done in the native junk building yards. Carefully conducted speed trials, both before and after the introduction of these alterations, were carried out.

1.2 Construction of fishing vessels

The usual materials were used in the construction of the vessels. Ballast in the form of concrete was used. Forward of amidships light concrete of coke-screenings was poured in the bottom of the boat to provide a clean finish along the bilge and maintain proper trim, the engine room being well forward.

With the use of electrically operated circular saw, band saw, planer and drill, etc. at its Ban-Pae Marine Station, the Department of Fisheries, Thailand, effected a 30% economy in the timber used for boat construction. At the same station a steam chamber was used for bending timber. In local boat building yards timber is generally bent by heating over open fire and by weighing the plank with heavy stones. A similar steam chamber was also designed and successfully used in Hong Kong.

In India, some government-sponsored boatyards also demonstrated economy in timber by using power tools. The indigenous boat building industries in these countries, however, have not yet introduced such mechanization for cutting timber.

Use of cheaper wood like Ainee (*Artocarpus hirsuta*) and Bin teak (*Lagerstoemia lanceolata*) was being adopted to lower the overall cost of constructing fishing boats in India.

In the construction of small fishing craft in Japan, greater attention was paid in the selection of timber and the use of galvanized tacks and bolts.

In Malaya, power tools were used in the construction of fishing boats with consequent saving in labour cost but no appreciable saving in timber.

1.3 Mechanized 'surf-landing' craft

A symposium entitled "The Boat and the Beach" was held at Quilon, India, between 3-8 March 1958. Organized jointly by the Government of India and the Indo-Norwegian Project, Quilon, India, the Symposium attempted to assess the progress so far made in India in the development of a surf-landing craft and to consider further measures that would be necessary in this respect.

The Symposium agreed that further work was necessary for evolving a satisfactory surf boat. It was also agreed that the general economics of mechanized beach-landing fishing craft with regard to hull, engine, maintenance, and expected earnings should be looked into.

The assistance of the Central Water and Power Research Station was requested in conducting tests with models of surf boats already designed and in conducting a survey of the surf conditions on the Indian Coasts.

A Summary Report on the Symposium is presented at the Current Session of the Council as a Working Paper (IPFC/C58/WP5).

Construction of a 24-ft. surf-landing boat designed by FAO was due to be completed in Ceylon by the end of September 1958. The original plans called for an off-centre installation of the engine. During construction it was found that such installation would have created several problems in the operation of the vessel and it was decided to install the engine in the centre line. Trials with this vessel were expected to commence in October 1958.

A Japanese boat building expert, employed by a Philippine Fishing Company, has been constructing boats which are suited for beach landing. The propeller shaft can be raised when necessary.

1.4 Vocational training for boat-builders

The Central Fisheries Technological Research Station, Cochin, India, organised two

training courses for States fishery officials in the designing and construction of fishing vessels (see p. 3, para 2-3). The officials so trained may in turn train boatbuilders.

In Japan, technical courses were held three times a year, lasting ten days each time. The courses were held each time at a different fishing center. General expenses of these courses were borne by the Central Government. In addition, shipyards building fishing boats accepted apprentices for training in boatbuilding.

Under a recently started scheme in Malaya, 15 boys with no previous experience were taken for training in boatbuilding.

Experts assigned to Thailand by Japan under Colombo Plan were training the boatbuilders employed by the Department of Fisheries, Thailand and stationed at its Marine Research Station at Ban Pae.

1.5 Hand book on the techniques of constructing small fishing boats

No information available.

1.6 Appraisal by FAO of progress in the development of surf-landing craft

No appraisal yet prepared.

1.7 Meeting of FAO Naval Architects on surf-landing craft

A part of the request was met by the symposium entitled 'The Boat and the Beach' held in India (see IPFC/C58/WP5 presented to the current session of the Council).

2. Mechanization of craft

2.1 Growth of mechanization

The growth of mechanization is shown in Table I. In a majority of the member countries, mechanization proceeded with satisfactory speed. Countries with rapid growth of mechanization had well coordinated plans involving modifications in the designs and construction of the indigenous craft to make them suitable for mechanization; training of fishermen in the operation and maintenance of mechanized craft and in the handling of improved gear; and availability of mechanized craft to the trained fishermen on hire purchase system. In some of these countries, fishermen themselves were enterprising.

TABLE I. Growth of Mechanization

Country	Size of mechanized fleet in number of vessels		Rate of Growth (%)
	Year: 1956	1957	
Australia	—	—	—
Burma	—	—	—
Cambodia	—	—	—
Ceylon	—	74	—
French Territories (New Caledonia)	—	25	4.0
India	—	1,200	10.8
Indonesia	—	1,263	12.5
Japan	123,318 *	128,023	4.0
Korea	—	—	—
Malaya	5,641	6,283	11.5
Netherlands New Guinea	—	40	—
Pakistan	—	—	—
Thailand	1,032	1,531	40.5
U.K.: Hong Kong	1,475	2,173	47.4
Singapore	—	644	12.0
USA: Hawaii	—	—	—
Other territories	—	—	—
Vietnam	—	200	30.0

— Information not received by the Committee

* Small craft (less than 5 tons) only

The entire fishing fleet in *French New Caledonia* consisting of 20-30 vessels is mechanized. The sail for the fishing cutters, even as an auxiliary means of propulsion has been abandoned.

The slow development of mechanization in some member countries was a result of several factors; notable among them were: lack of coordinated plans; absence of vessels suitable for mechanization; and in some cases lack of foreign exchange for importation of engines.

In a majority of the member countries the mechanized boats were gill-or drift-netters. In certain countries, notably Hong Kong, Malaya and Thailand, such boats also operated trawls, purse seines and traps.

In Malaya, Philippines and Thailand, mechanized boats were employed for towing unmechanized boats to and from fishing grounds.

In Ceylon, outboard motors were used in the mechanization of outrigger canoes of both dug-out and planked construction. The high free board of the canoes made it necessary to have motors with extended shafts. The experiments to mechanize 'catamarans' (log rafts) with outboard engines were also successful to a limited extent and 4 engines had been sold to fishermen through Government.

In Japan, 1957 statistics recorded 403,023 boats registered as fishing craft. Of these 39% were powered. Powered small craft below 5 tons numbered 128,295 or 83% of total powered fishing fleet. However, they formed only 17% of total gross tonnage of the powered fishing fleet.

The strength of the powered small craft increased from 123,318 vessels at the end of 1956 to 128,295 by the end 1957 representing an increase of 7,999 in gross tonnage and 4,977 in horse power.

2.2 Engines for mechanization

2.21 Types of engines

Inboard petrol, Diesel and semi-Diesel engines as well as outboard engines were employed for mechanization of fishing vessels. Fishing boats powered by steam engine numbered only 40 in Japan, perhaps the only country in the region using this type of power. The great majority of the engines were inboard diesels of 10-15 h.p.

There were 77,607 small craft (below 5 tons) in *Japan* with electric ignition engines. Hot bulb engines were mostly used in this country on craft belonging to the 5-50 tons class which represented 28% of the powered fleet. Diesel engines were installed in 21% of powered fleet. In the *Philippines*, petrol engines, varying from low to as much as 60 h.p., were commonly used for 'banca' (dug-out) fishing vessels. Outboard motors formed a good share of mechanization of small 'bancas', especially after liberation.

Outboard motors were in general used when the vessel was not suitable for mechanization with inboard engine and when fishing trips were of short duration not exceeding a few hours.

2.22 Makes of engines

As many as 48 (perhaps, more) different makes of inboard engines and 10 of outboard engines were in use in the region. In the colony of Singapore alone there were inboard engines of 28 different makes and outboard engines of 9 (see Table II).

TABLE II. Makes of engines used in mechanization of fishing craft

	Number of different makes	
	Outboard	Inboard
Australia	—	—
Burma	—	—
Cambodia	—	—
Ceylon	2	7
French Territories	—	—
India	—	—
Indonesia	—	9
Japan	—	—
Korea	—	—
Malaya	5	14
Netherlands New Guinea	—	—
Pakistan	2	—
Philippines	—	—
Thailand	—	—
U.K.: Hong Kong	—	—
Singapore	9	28
USA: Hawaii	—	—
Other Territories	—	—
Vietnam	—	—

— Information not received by the Committee.

Japan used engines manufactured in the country. *India* had just produced a marine Diesel engine which was being tried. All other countries imported their requirements of engines.

Choice of an engine did not depend on its performance; the primary considerations being availability, price, previous experience with any particular engine in a country and the country's import-export trade relations. Availability of spare parts, repair and maintenance services was secondary in the selection of engines, particularly in the countries where mechanization of fishing craft was of recent introduction and where aid-giving agencies supplied such engines.

Appreciable interest was shown in Ceylon in air-cooled engines.

2.23 Prices of engines

Prices for the same engine in different countries varied within appreciable limits. A 4-h.p. outboard engine cost from about US \$ 175 in *Malaya* to over 300 in *Ceylon* while a 10-h.p. inboard Diesel engine cost from about 1,000 in *Malaya* to 1,350 in the *Philippines*. Compared to the income of the fishermen, the prices for engines were in general high except in countries where no or very low import duty existed e.g. *Hong Kong, Singapore*. In countries with satisfactory foreign exchange situation, prices were markedly lower than in those with foreign exchange difficulties.

In some of the countries where fishermen experienced difficulties in procuring engines, relief was either given or contemplated by lowering import duty, or with partial subsidy by Government or by providing for hire-purchase by the fishermen.

2.24 Operation of engines

Fishermen, in general, learnt quickly to operate engines with which they might not have been familiar before. In a majority of cases, they were assisted by government-sponsored programs of demonstration, or well organized courses of training.

2.25 Repair and maintenance

2.251 Fishermen's ability to maintain engines

In countries where mechanization was of recent introduction, fishermen were gradually learning to look after minor repairs. This development in certain cases (India) was a result of government-sponsored training programs.

2.252 Spare parts

In countries where mechanization was of recent introduction, particularly in those with foreign exchange difficulties, spare parts were restricted in their availability. Importers in such cases used almost the entire allocation of foreign exchange in importing engines and little, if any, of spare parts. The limited quantities of spare parts in these cases were available only in the big cities. In cases of break-downs, fishermen from outlying areas, from where the great majority of the fishermen operate, were obliged to make costly trips to the cities.

The *Singapore* Fisheries Division's Mobile Unit sold spare parts at wholesale prices to fishermen in out-lying areas thus saving them the expenses for trips to the city.

2.253 Workshop facilities

Existing workshop facilities, particularly in those with mechanization recently introduced, were overloaded with the normal repair and maintenance of engines installed in harbour craft, merchant marine and lane vehicles, etc.

In some countries (*Ceylon, India, Indonesia, Pakistan*) government-sponsored workshops, especially for marine engines installed in fishing fleet, were either already established (*Ceylon*) or were underway (*India, Indonesia and Pakistan*). These workshops were, however, centralized while the fishing bases are scattered over long coasts.

2.254 Repair and maintenance expenses

Accurate records were not in general kept in a majority of cases; most of the information supplied was based on mere guesses. In *Japan*, where the records were relatively accurate, the annual repair and maintenance expenses were roughly 10% of the initial cost of the engines. In the *Philippines* such expenses ran about 5% for new engines and about 30% for surplus or second-hand engines. *Indonesia* reported these expenses to have run as high as 20-25%.

These high expenses were attributed to a lack of adequate experience of fishermen in the handling of marine engines, restricted availability of spare parts, and high cost of repair services.

No information was available on whether or not failure to obtain prompt repair services resulted in loss of fishing time.

2.26 Effectiveness of mechanization

2.261 Extension of fishing grounds

In *India* the majority of the mechanized craft have extended their field of operation beyond the fishing grounds usually exploited by non-mechanized boats. In case of drift-net fishing the mechanized boats go as far as 50 miles off the coast whereas the non-mechanized boats hardly go beyond 20 miles.

In *Japan*, *Indonesia*, *Malaya*, *Philippines* and *Singapore*, mechanized craft operated 10-50 miles further out into the sea than the non-mechanized craft. In *Thailand*, mechanized and non-mechanized gillnetters operated on the same grounds within 10-20 miles from shore while purse seine fishery which lies further into the sea was exploited only by powered vessels. In the *Philippines*, the introduction of powered towing boats made it possible for non-mechanized craft to fish in waters which they had not been able to exploit before.

2.262 Extension of operating time

The mechanized craft became relatively independent of moderate weather conditions but not of rough or monsoonic weather. In *Ceylon*, the powered vessels operated for a higher number of days in a year than sailing vessels which during certain periods were obliged to lie in port due to failing wind. Where the fishery in *Malaya* was independent of tidal currents, powered vessels operated for 180-220 days a year as against 150-180 days by non-powered vessels. In the rest of the member countries except *Indonesia*, mechanized and non-mechanized vessels operated for about the same number of days in a year. In *Indonesia*, due allegedly to complications in the preparations at shore for trips, the mechanized 'mayang' operated for about 240 days a year as against 270 days by its non-mechanized counterpart.

In *India*, mechanized craft can fish for 22 to 24 days in a month whereas non-mechanized craft operate for 16 to 18 days in a month. The mechanized craft fish for nearly 70% of the time away from port against nearly 40% for non-mechanized craft. This, however, depends much upon the type of fishing. In *Orissa*, the

average fishing for mechanized craft are 8 to 10 against 4 to 6 by non-mechanized craft.

In general, small mechanized vessels (less than 5 tons), operating gillnets, driftnets, or traps, made only overnight trips. In *Japan* and *Thailand*, however, such trips lasted one to three days depending on seasons and the distances of the grounds from the home ports. Large vessels (*Japan* and *Philippines*) made trips extending from a week to over two months. In the *Philippines* such vessels operating in distant grounds returned to their home port after 15-45 days depending on the distance of the grounds and the time taken to fill the holds. In ring-net fishing in the *Philippines*, mechanized units returned home after 5 days actual fishing to dry, tan and mend their cotton nets.

2.263 Increase in handling of gear or in active fishing

In *Singapore*, mechanized drift-netters operated longer nets than did the non-mechanized craft. In other countries, small mechanized gill-and/or drift-netters, operating on same grounds as non-mechanized craft and making only overnight trips did not, in general, engage the time saved in trips to and from ground, in operating additional quantities of gear. Instead, they stayed longer at port. In other cases such vessels making trips to distant grounds along shore or out to the sea, the time spent in actual fishing was practically the same as for the non-mechanized vessel, since a greater proportion of the time away from port was spent in covering distances. Powered trawlers, purse seiners and ring netters operating in near areas made more hauls, drags or sets than their non-powered counterparts operating on the same grounds.

2.264 Economics of operation

In *Japan*, a survey of the economics of operations by various types and sizes of fishing craft was conducted in 1956. The survey was based on 125 non-powered boats sampled at the rate of 1:900 and 135 powered boats (each less than 5 tons) sampled at the rate of 1:450. The data obtained are recorded in Table III.

TABLE III Operation economics of mechanized and non-mechanized craft in Japan

Item	Non-mechanized craft	Mechanized craft
1. Number of fishing trips	144.5	191.6
2. Number of fishermen	440.3	732.4
3. Total fishing time (hr.)	2,424.0	4,868.0
4. Gross earnings (yen)	178,114.0	447,877.0
5. Capital investment (yen)	149,429.0	380,941.0
6. Operating expenses (yen)	115,850.0	222,093.0
7. Estimated wages of family workers (yen)	87,165.0	155,157.0
8. Net Income (yen)	28,685.0	66,936.0

In respect of other member countries, data were not available for comparing the cost of operation and consequently, the cost of production of fish by mechanized and non-mechanized craft. Such data would help in determining whether or not non-mechanized craft should be left undisturbed to operate in inshore waters, or they should be subjected to a stiff struggle for existence in competition with powered craft or whether powered craft should operate only in waters which cannot be exploited by non-mechanized craft.

2.2641 Increase in the catch

It was reported that mechanized craft landed 2-3 times as much fish as did its non-mechanized counterpart. Such increased quantities were not a result of powered propulsion of the vessel alone. It is difficult to estimate to what extent these increases were due to power, and to improved, enlarged and/or increased gear. In several cases mechanized craft operated gear made of synthetic fibers. As already indicated, mechanized drift-netters in Singapore operated longer nets.

2.2622 Improvement in the quality of catch

Where comparable e.g. operating on same grounds, using similar gear, and the same time of absence from port and the catch handled on board the same way, the quality of fish landed by mechanized and non-mechanized craft did not vary significantly.

2.2643 Earnings of mechanized vessels

According to limited information available, the gross earnings of mechanized craft were 3-4 times that of a comparable non-mechanized craft while the net earnings of the former varied from 1½-2 times that of the latter.

2.2644 Earnings of fishermen on mechanized vessels

In certain cases, fishermen were engaged on fixed wages (Singapore, Philippines). No figures were available on wages of the crew in the two classes of vessels. Where fishermen operated on share basis and where some data were available, the indications were that the average income of a fisherman on a mechanized craft ranged from 2-3 times that of a fisherman on a comparable non-mechanized craft.

2.265 Employment created by capital invested in mechanization

Except for some preliminary indications, no information was available in the member countries on the relative efficiency of capital, invested in mechanized and non-mechanized craft, in the creation of employment. In *India*, a 25-ft. mechanized gill or drift-netter cost about Rs. 12,000 to build and equip and another Rs. 3,000 a year to operate. A non-mechanized craft of the same type and size cost Rs. 3,000 to build and equip and another Rs. 500 a year to operate. The mechanized boat was operated by a crew of four and the non-mechanized boat by one of ten.

It will be seen from these figures that capital invested in non-mechanized craft provided employment for over four times as many as when invested in mechanized craft. However, these figures from India, where mechanization of fishing craft is in its early stages, were strictly preliminary.

2.266 Government assistance in mechanization

Extensive assistance was given by Member Governments to the mechanization of fishing craft in their respective countries. Such assistance ranged from a coordinated program covering various aspects and phases of mechanization, to mere technical advice. A summary of measures taken in the member countries is recorded in Table IV.

TABLE IV. Government assistance in mechanization
of fishing craft

Country	Nature of assistance
Australian Territories	—
Burma	—
Cambodia	—
Ceylon	<ul style="list-style-type: none"> i) Reduction in import duty for engines to 2.5% (preferential) and 17.5% from 12.5% and 27.5%. ii) Hire purchase facilities; 33% down, rest payable in 24 equal monthly instalments. iii) Loan up to Rs. 15,000 with purchased equipment as security, payable in 5 years.
French Territories	
India	<p>Government subsidy of 25% on boats and 33.3 to 50% on engines. Loans also advanced to fishermen directly or through cooperatives. In addition, coordinated project providing for (i) construction of vessels according to designs prepared by FAO experts, (ii) equipping these vessels with engine and gear, (iii) training of fishermen under supervision of FAO experts in the handling of craft, engine, gear, as well as the catch, and (iv) making these vessels available to trained fishermen on hire-purchase basis.</p> <p>Six such training centers were at the time of reporting operating in India.</p>
Indonesia	<p>Rp. 10 million allocated annually for construction of mechanized fishing vessels which are given to fishermen through co-operative societies on hire purchase basis.</p>
Japan	<p>Subsidy by Central and/or Prefectural Governments for auxiliary equipment e.g. fish finder, wireless apparatus etc. Adequacy of credit facilities for fishermen from banks or private funds, no longer makes elaborate government financial assistance necessary.</p>
Korea	—
Malaya	<p>Low interest loans made through cooperative societies; one-third of these loans are written off, if repaid within three years.</p>
Netherlands Territories	—
Pakistan	<p>Marine engines received as aid under ICA of the United States of America given to fishermen on hire-purchase basis.</p>
Philippines	<p>Under reparations agreement with Japanese fishermen allowed to purchase from that country large size mechanized boats on instalment payment in 20 years.</p>

TABLE IV (continued)

Country	Nature of assistance
Thailand	Initial 25% down payment made by Government directly to private firms which, by agreement, supply engines to government-approved fishermen on hire-purchase basis. The deposit by the Government refundable by the firms within six months.
U.K. (Hong Kong)	—
(Singapore)	Loans.
U.S.A.	—
Vietnam	US\$ 350,000 received as aid under ICA of the United States of America spent in assisting fishermen in the procurement of engines and gear.

— Information not received by the Committee.

2.27 Navigation and safety requirements for mechanized fishing boats

Reports were received from certain countries (India and Thailand) of difficulties arising out of the rigid application of Rules and Regulations concerning navigation and safety to mechanized fishing vessels.

In recent years, there was a tendency to apply these rules to the latter and to refuse a consideration of the special circumstances arising out of mechanization of fishing craft. Fishing craft were treated on practically the same footing as merchant ships. Certain constructional requirements for the fishing vessels e.g. complete decking, wheelhouse etc. were insisted upon. Fishing personnel were required to have certificates, yet there were no well defined standards for examination, nor were there properly set up institutions where studies could be made for such certificates; safety rules were also required to be observed rigorously without any consideration to practical possibilities.

Sailing boats of similar designs and sizes have sailed the seas for centuries and even today navigation rules in respect of these vessels are very liberal indeed. Yet, as soon as an engine was installed, the same craft was required to carry a multitude of appliances which in most cases the crew cannot use.

These Rules and Regulations adhered to in the concerned countries, appear to have been compiled from By-laws in force at the beginning of the century in some of the Western countries. Those pertaining to small vessels were probably meant for motorcraft plying in big ports. These could not possibly have been meant for mechanized fishing craft which were non-existent in the concerned countries at the time the navigation rules and regulations were compiled. These rules were, in all likelihood, meant to apply in their broadest sense taking a common sense view of the local conditions, craft, trade and hazards.

2.3 Training for Fishermen

In *Burma*, a center was established at Mergui for training local fishermen in fishing with mechanized craft. A local boat, 45 ft. long, 13 ft. wide and 3 ft. draft, was converted to a trawler for the training operations. Another boat, much smaller was mechanized for training in longlining. A fishery official was sent to Canada for training. On return to *Burma*, this official is expected to train fishermen. The *Burmese* Government has requested a 50-ft. combination purse seiner and longliner, and a 60-ft. trawler from Colombo Plan. It is planned to use these vessels, when received, for training purposes.

In *Ceylon*, 4 education centers were in operation where fishermen were taught new

methods of fishing. There were six boats attached to these centers and fishermen were taught, under supervision of FAO and Colombo Plan experts, to operate drift net, longline and shark line. Demonstrations on the use of these gear were also given on the Fisheries Department exploratory and training vessels, *Canadian* and *North Star* as well as on fishermen's own boats.

A training course, lasting 3 weeks, in the operation and maintenance of outboard motors and marine Diesel engines had been completed and a second course was underway.

With fellowships awarded by the Government of Japan under Colombo Plan, 12 local fishermen were to be sent on a course of training in modern small boat fishing operations in Japan. Selections were made from active fishermen who had had sufficient educational background to benefit from such an overseas training.

With assistance from FAO the Government of *India* organized during 1955-57 four centers for training fishermen in navigation, operation of mechanized fishing boats, modern gear and equipment. During 1958, two more training centers were established.

So far, 240 fishermen had already received training and about 120 more were under training at the time of reporting. On completion of a 6-month training course, the illiterate fishermen were able to use compasses, dividers and charts effectively and to operate small powered fishing vessels equipped with gurdies and gill nets. They were also able to maintain engines and make up and repair nets.

During the training, the participants received an allowance of Rs. 50 each per month and on completion of the training, small mechanized boats (25 ft.) were given, through a cooperative society, one to a team of four of the trained fishermen, on hire-purchase basis.

It is reported that fishermen so trained earned, after deducting a substantial part of their catch to pay for the boat, gear and equipment on an instalment system and for operational expenses, 2-3 times as much as their fellow fishermen who still used traditional 'catamarans', canoes and local types of gear.

Counterpart assistants to the FAO experts assigned for the first two centers were trained

to take over new centers as they opened. These assistants who were biologists and had little knowledge of fishing, very quickly learnt to operate the training program.

In *Indonesia*, the Sea Fisheries Service in cooperation with the Navigation Service organized during 1957 a series of three courses for training fishermen in navigation and in the operation of mechanized fishing craft and gear. Each course lasted three months, the participants in 1957 numbered 80. In past years several hundred participants had completed these courses successfully.

The training in navigation had three phases: (i) local navigation, (ii) inter-island navigation, and (iii) navigation out to 60 miles into the sea.

The training in operation and maintenance of engines had two phases: (i) elementary course in operation (drivers), and (ii) intermediate course in maintenance (mechanics).

In addition, a school of middle standard which imparts special training in fisheries, particularly to children from fishing communities, has been in operation at Tegal for several years. The children at this school learn, in addition to languages, arithmetic, etc., elementary fisheries biology, navigation, operation and maintenance of craft and engine, making and maintenance of gear, handling and preservation of fish and other subjects necessary for professional fishermen. In addition, a school of the same type was opened at Ambon two years ago and another at Medan in 1958.

In *Japan*, training for fishermen was arranged by fishermen's cooperatives with government assistance, where necessary. In cases of advanced training courses, the cooperatives arranged for State examinations to be held for those who wished to obtain licenses.

In *Malaya*, the Fisheries Department ran courses lasting three months during which fishermen were trained as helmsmen and engine drivers and became competent to maintain and repair engines. No training in the handling of gear had so far been given in Malaya.

In the *Netherlands New Guinea*, the fishermen were taken on board the Fisheries Division's cutter and two motor boats for training in navigation, and handling of engines and gear. In addition, there is a school in

Hollandia for navigation where along with others, fishermen may receive training.

Training for *Philippines* fishermen was provided in fisheries school, both public and private. There are several fishery schools of secondary level established in some provinces of the country.

Two courses of training for fishermen were organized in *Thailand* jointly by the Fisheries Department and Fish Marketing Organization. The Navy, the Customs and the Harbor Department also assisted. During each course, the 35 participants were taught navigation, safety at sea and handling of marine engines. On successful completion of the training the participants received certificates of competency as navigators (fishing boat) issued by the Harbor Department.

In *Hong Kong*, the Fisheries Division ran regular classes for training of fishermen as skippers, coxswains, and engineers. On completion of training, the participants sat for examinations and if successful, received appropriate certificates issued by the Marine Department.

In *Singapore*, young fishermen aged 18-20 years received training in deep-sea fishing on board a Japanese fishing vessel belonging to a local firm. The trainees were under contract with the firm for three years during which time it was hoped, they will have gained sufficient experience in deep-sea fishing. During the training period, the participants received a monthly wage of St. \$ 60, an extra allowance of \$ 12 and free meals.

The Fisheries Division's Mobile Unit gave instructions and demonstrations to fishermen in the repair and maintenance of engines installed in their boats.

Recently, a comprehensive training scheme with head-quarters at Tg. Kling was commenced. The subjects taught include elementary fisheries biology, fish culture, operation of fishing craft and engines, navigation and safety at sea, making up and maintenance of gear, and preservation and processing of fish.

3. Improvement and Preservation of Gear

3.1 Improvements in design

In *Japan*, a new type of kite for otter trawls was developed. In trawling operations

conducted during December 1957 to April 1958, it was confirmed that the net aided with the kite could open its mouth as much as 4 meters in height, resulting in about 30% increase in prawn catch over another operated without the kite which could not open its mouth to more than 1.5-2 m. resulting in failure to catch some of the demersal fish, particularly prawn that might swim about in layers a little above the bottom.

A description of the kite and results of experiments with it, were first described at the FAO International Fishing Gear Congress held in Hamburg in October 1957. A paper has since been published and the full reference is:

Takayama, S. and T. Koyama (1958). Studies on trawl net-I. A net-mouth stretcher working on kite principle. *Bull.*

Tokai Reg. Fish. Res. Lab., No. 19, 1-26 pp. (See also IPFC/C58/TECH 8).

An otter trawl designed along the lines of a native-type pair trawl but with square wings was constructed by the Hong Kong Fisheries Division. This net was operated during April-June 1957. Various combinations of sweep wire length, type of ground rope, number of floats etc. were tried. The efficiency of this net was compared with that of an already-proven small Australian type shrimp otter trawl which was operated simultaneously on the same fishing grounds.

3.2 Improvements in Materials

Synthetic fibers for net making continued to gain in popularity. In Japan, synthetic fibers replaced cotton by 75%. After demonstration of its superior catching power, longer life, and no need for preservation, the demand for nylon became much more in certain countries (Ceylon, India, and Pakistan) than could be met.

In *Ceylon*, a fair quantity of webbing, twine and fishing line made of Kuralon, a synthetic fiber cheaper than but equally efficient as nylon, was imported by the trade, chiefly from Japan. In the same country artificial units were used for longlines.

In *India*, the high price for nylon which is beyond the reach of average fishermen, has proved a strong deterrent to the fiber's universal acceptance. In Bombay, the use of nylon is

still limited to drift nets. Its use in 'dol' or fixed nets which is still the main gear in Bombay State is not possible owing to large investment required for these nets.

As the fishermen do not have enough funds to invest in the synthetic fiber, the State Governments formulated schemes to make available this material to fishermen on subsidized basis.

In *Korea*, Kuralon nets have since 1957 replaced cotton nets on the one-vessel purse seiners. The catches have increased and Kuralon nets have been found superior to and more economical than cotton nets.

In *India*, a plastic-rubber float for gill-and drift-net was designed, tested and commercially produced by a private firm in Bombay. In the same country, the government-sponsored training centers introduced cement weights of various designs and shapes for bottom-set gillnets.

Except for *Japan*, all other countries either imported their supply of nylon or received it through aid-giving agencies (Ceylon, India, Pakistan). Due to foreign exchange difficulties, some countries (Ceylon, India, Pakistan) could not import adequate quantities of nylon to meet existing demands. National programs and policies for general economic development and the foreign exchange situation in certain countries might not permit regular and adequate importation of the fiber, at least for some years. Locally produced cotton twines for net making were, however, in plentiful supply in these countries.

There were no reports of any contemplated plans in these countries to manufacture nylon for net making.

Due to the high investments required in nylon nets, fishermen in a majority of the countries experienced difficulties in procuring nets made of this fiber. Assistance was given by governments or private agencies with credit (Ceylon, India) and/or facilities for hire-purchase (Pakistan).

3.3 Improvements in construction

A knotless net, made of rot-proof synthetic fibers, became popular, according to a paper presented at the FAO International Fishing Gear Congress, Hamburg, October 1957, by a member of the Japanese delegation.

The net was made by a process in which several single yarns were doubled together with a twist by a machine. Two or more of these doubled yarns were again doubled and twisted into a strand in 'Z' direction. This strand was then wound on the hobbin of the net-making machine. Twines in the knot-less net had an 'S' twist of two-ply strands.

Special features of the knotless net were claimed to include: lighter weight and less bulk since as much as 50% of the raw material could be saved; higher strength; less resistance to currents; ease of handling; no friction; less labour and smaller tackles; no more damage to fish; almost 100% exact mesh size; easier and complete dyeing; and less adherence to dirt and microbes.

By a heat-setting process, the 'S' twist in the twine was fixed in position and the twine became stronger by about 15%. Also, hard fibers became soft and soft fibers could be given suitable hardness.

Through the six fisheries training centers in India, attempts were made to introduce improved knots in nets and proper hanging of the webbing on the headrope.

Imported with the assistance of the United Nations Korean Reconstruction Agency (UNKRA), 36 net-making machines and 10 winders were in operation in Korea. This mechanization considerably reduced the acute shortage of nets first caused by extensive war damage suffered by Korean ports and further aggravated in the last few years as the fishing fleet was restored and expanded by UNKRA's program of aid for the fishing industry.

The East Pakistan Directorate of Fisheries recently imported one net-making machine in addition to the one which had been operating for the past several years.

3.4 Improvements in operation

Use of swivels in the *Indonesia* 'Pontjing prawe', a small longline, was claimed to have resulted in increased catches. Use of light in the operation of "Banrong", an Indonesian lift-net, resulted in increased catches in the Makassar region.

In *Korea*, until 1955, the mackerel fishery had been exploited by two-boat purse-seiners; each one weighed 20 to 40 tons but recently

in line with the policy of increasing catches of mackerels, the one-boat purse seiners have been built.

These boats are bigger than those which operate as purse seiners and are fitted with modern equipment, such as fish finder, direction finder, power block and winch; the speed is 10 knots, 3 knots more than the old fashioned boats. With the new vessels, mackerel fishing can be carried out not only on the offshore waters, 20 to 30 miles, but also in the deep-sea waters, 100-150 miles. The number of the one-vessel seiners has been increasing from year to year. One-boat purse seiners have been found much cheaper to build and more economical to operate than two-boat units.

In Malaya, experiments in the dyeing of nylon nets were carried out using special chemicals and the results were applied to the nylon drift nets which the Fisheries Department employed in comparative fishing experiments.

The Hong Kong Division of Fisheries made experimental trawling over rough ground which local trawlers with their light gear were not able to fish.

3.41 Mechanized handling of gear

In India efforts were made to bring into use such mechanical devices as winches and gurdies in the operation of local nets. Demonstrations were given by experts on various occasions and during training of fishermen.

Mechanized handling of gear e.g. use of line haulers for tuna longline, net haulers for gill nets, drift nets, and purse seines, developed to a certain extent in Japan. Such mechanized handling increased the operation efficiency by three to four times more than in hand manipulation. Mechanized handling of some types of nets increased rather than decreased employment of man-power. Such increase was a result of the ability of a vessel to use far greater quantities of gear than were possible with hand manipulation. In coastal fisheries exploited with set nets and sardine purse seines, plans were under way for introducing mechanized handling of gear, primarily for reducing labour costs without, of course, increasing appreciably the quantities of gear operated.

Attempts for mechanizing the operation of the Malayan purse seine failed as the pursing could not be done quickly and the fish escaped.

It was considered that the rather too large powered boat employed in the operations drove in the wind and tide; this lifted the foot rope of the net and allowed the fish to escape.

Malaya expressed apprehension that mechanized handling of gear might lead to unemployment.

In *Pakistan*, one drum winch was imported and issued to a fishing boat for trials; the results were not yet available. A small trawl winch and a drum winch for trials were being ordered.

Mechanized handling of otter trawls was highly developed in the Philippines, and the man-power to operate the gear was substantially reduced. In ring nets, the hauling of the pursing line by a winch resulted in increased sizes for the net but no appreciable reduction in man-power.

3.5 Introduction of non-indigenous gear

Attempts continued in several countries for the introduction of non-indigenous gear, chiefly of Japanese origin. The various gears tried were: 'boke-ami', bottom-set gillnets, Danish seine, floating longline, Lampara, 'masu-ami', 'muro-ami', 'otoshi-ami', otter trawl, pair trawl, purse seine and tuna longline.

In *Burma*, operations of otter and pair trawls were continued with significant commercial success by the Martaban Company, a joint Burmese and Japanese concern. In *Bombay*, India, a similar concern continued commercial pair trawling. Of particular significance was the fact that trawlers over 100 ft. could operate during the monsoon while the entire local fishing fleet was laid off and that catches were good.

In *Ceylon* floating longline, tuna longline and nylon gill and drift-nets were successfully introduced.

Experimental purse-seining was being conducted in *Ceylon* waters under the supervision of FAO experts with two purse seine boats also donated by FAO.

In *India*, significant results were obtained with bottom-net gillnets. Trawling with small craft (especially for shrimp) on the West Coast showed excellent results. Two-boat purse-seining for sardine and mackerel was also tried on the West coast.

Trammel nets were tried with the help of Colombo Plan fishing experts in Saurashtra waters and were found to offer no significant advantages. In addition, in the maritime States of Bombay, Kerala, Madras and West Bengal, otter trawling, shrimp trawling, purse-seining, mechanized longlining etc. were being tried from vessels provided under the foreign aid.

The 'boke-ami', the lampara, the longline, 'muro-ami' and 'otoshi-ami' were introduced in Indonesia. The operation of the lampara along with light had already established itself in the Makassar region and was spreading to others. The 'muro-ami' had almost become a domestic gear in the Djakarta and Makassar regions and was fast spreading to others.

In Malaya, Danish seining was attempted in 1955 and 1956 off the coasts of Perak and Kedah. A standard 'whiting net' with specially enlarged shoulders and wings was used to permit a fishing depth of not less than 15 ft. The net was fished by the Scottish fly dragging method using three coils a side. The depth of the ground varied from 10-16 fathoms. The catch consisting of *Leiognathus* sp., *Sciaena* sp., *Drepane* sp., *Stromateus cinereus* and some prawns, was not high enough to warrant commercial introduction of the gear.

Beam trawling for prawns was also commenced in Malaya. These trials were continuing.

Otter trawling had already become an established industry in the Philippines. The 'muro-ami' was being successfully operated by the Filipinos. The present 'muro-ami' in Philippine waters is slightly improved over the Japanese gear as originally introduced. This gear regularly landed large catches. The 'otoshi-ami', a trap net and an improved version of the local 'fish corral', were under trial. There is a big company engaged in 'otoshi-ami' fishing. In addition, introduction of other Japanese gear, e.g. tuna longline and purse-seine, was being promoted by the Bureau of Fisheries.

The 'masu-ami' and 'otoshi-ami' whose economic operation had been successfully demonstrated earlier by the Department of Fisheries, Thailand, found no application at all in commercial fishery. Since 1956, Japanese pair trawls were being successfully operated by a private firm. Initial heavy investment in the gear and the craft as well as lack of experience

in the handling of the gear, proved deterrents to its popular acceptance by the local fishermen.

Pair trawls were introduced in Singapore as joint projects with Japanese experts. Four pairs landed about 1,650 tons during 1957. The prospects for an expansion of this fishery appeared good.

In Vietnam, the 'boke-ami' and the 'otoshi-ami' were tried with the assistance of Japanese technicians. The 'boke-ami' did not prove satisfactory while the 'otoshi-ami' gave good results and trials with the latter were continued.

3.6 Symposium on Fishing Techniques

Sponsored by the Government of India, a symposium on 'Improved Types of Fishing from Small Mechanized Boats' was held at Cochin from 28-31 October 1958. The participants were officials of the Union and States Governments who are connected with the program for the development of fishing craft and gear, officials concerned with the six fishery training centers in India, experts of FAO, United States Operations Mission (T.C.M.) Colombo Plan, Indo-Norwegian Project who were on assignment in India in the field of fishing craft and gear, as well as representatives of the fisheries industry.

The Symposium was planned to assess the progress made in the improvement of fishing gear and their operation in India and to plan further measures in this respect.

The discussions during the Symposium were concentrated on: Materials for fishing gear; operation techniques of specific gear e.g. lines, gillnets, round haul nets, trawls and traps; mechanical and electronic fishing aids; relationship between craft and gear; and deck layout.

Practical demonstrations of the operations of longlines, gillnets, shrimp trawls and purse-seines were also planned.

As a part of the demonstrations, exhibits of the different gear, gear materials, deck and electronic equipment etc. were also to be arranged for inspection by the participants.

3.7 Preservation of gear

Preservation of cotton gear continued with 'catechu' extracts of mangrove and other barks as well as with coal tar. Chemical preservatives were used rarely, except in Japan.

Most countries produced their own requirement of bark. *Pakistan* imported catechu; *Japan* imported about 3,000 tons of catechu a year from Borneo. Coal tar was in many cases imported.

The nets were cold treated with 'catechu' and bark extracts while coal tar was applied hot.

Chemical preservatives were often employed in *Japan* along with some other substance which formed a film over the twine. The high prices of chemical preservatives did not make them sufficiently popular with fishermen.

Tests on the effectiveness of several methods for preserving fish net twines were carried out over several months at the Central Fisheries Technological Research Station, Cochin, *India*. The results indicated that preservatives used in combination with each other gave much better results than when used alone. For instance, twines treated with the extract of Indian 'panichikka' (*Diospyros embryopteris*) bark were rotten after 20 days of continuous immersion in warm backwaters, but such treated twines were subsequently dipped in coal tar, it was found that after 57 days of continuous immersion the twines still retained 74% of their original breaking strength. A fuller description of the experiments and the results is presented at the current session of the Council (See IPFC/C58/TECH 1).

Experiments on the preservation of coir ropes also commenced at the same Station.

An improved process for preserving Manila ropes was developed in *Japan*. The Manila fibers were dyed, in the early stages of rope manufacture, by a dipping system, mainly with copper naphthenate compounds. The dyestuff was impregnated into the fibers more thoroughly and did not dissolve in sea water as easily as, when the finished rope was dyed in the usual way by compressor or vacuum system.

In *Hong Kong*, two nylon trawls were treated with phenol-free tar. This made the nets heavier with the result that they stayed on the bottom while being towed and at the same time successfully overcame the problem of mesh deformation previously caused by slipping of knots.

3.8 Bibliography on Fishing Gear and Methods

This Bibliography has been issued as Special Publication No. 4 of the Indo-Pacific

Fisheries Council. It is multilithed and has the same format as in the *FAO World Fisheries Abstracts*, so that, if need be, readers may cut the cards and file them.

3.9 International Fishing Gear Congress

The FAO International Fishing Gear Congress was held in Hamburg between 7-12 October, 1957. It was attended by over 500 participants from about 40 countries, including fishing vessel owners, skippers, gear technologists, biologists, fishery administrators, and manufacturers of fishing gear, auxiliary equipment (winches, echo sounder and other electronic fishing aids) and synthetic fibers.

Among the members of the Indo-Pacific Fisheries Council, Japan took a very active part, having sent a large delegation and presented several of the 111 technical papers discussed at the Congress. The discussions concentrated on: Materials for gear; Rational design and construction of gear; Strategy and tactics of fishing; and Electrofishing.

The technical information resulting from the Congress has been published in book form under the title *Modern Fishing Gear of the World*. The material was edited by FAO and the publishers are J. Arthur Heighway Publications Ltd., Ludgate House, 110 Fleet Street, London, E.C. 40.

4. Availability and Exchange of Weather Information

Most of the member countries have facilities for forecasting weather and for broadcasting weather information. The frequency of the broadcasts varied from country to country and in any one particular country with seasons and weather conditions. In some countries weather information was broadcast regularly everyday along with newscast and more frequently during rough season and, if need be, by special bulletins. In others, weather forecasts were broadcast only in cases of approaching storms. In cases of storm alarms, hour to hour progress reports were broadcast in *Japan*. In the same country, in cases of emergency, fishermen's cooperative societies were directly informed over the phone by local weather stations.

Wireless receiving sets were not, in general, available on board commercial fishing vessels except in *Japan* where also small craft

(below 5 tons) did not carry such sets. In some countries receiving sets were provided by governments at community centers, fish harbors and fish markets. Research vessels in most countries, however, carried these sets.

The weather forecast is announced over the Korean Broadcasting System. Information on weather conditions are obtained through the Central Meteorological observatory in Seoul which collects the meteorological data from its local 21 observatories situated at Kangnung, Chuchen, Seoul, Sosa, Chyuan, Inchon, Ulsung do, Suwon, Chungju, Saisan, Chupoongrun

Pohang, Taeku, Chunju, Kochang, Ulsan, Kwangju, Pusan, Mokpo, Yosu and Chaeju. Fishermen can get the weather information, for example temperature, rainfall, atmospheric pressure, two times a day.

Facilities did not exist for commercial fishing vessels, except for large Japanese vessels, to transmit to shore information on weather. Research vessels in certain cases carried radio-telephone transmission sets. It is not known, however, if such vessels had any arrangements for transmitting weather information to shore.

FOOD TECHNOLOGY

(PANEL B)

5. Fish Curing in Humid Tropics

Research was conducted at various laboratories in the region on the curing of fish and in the handling and storage of cured fish. In general, the results of such research found little, if any, application in the industry. The fish curing industry continued with its primitive techniques and unhygienic practices and turned out products of very low quality. The capacity of the industry also did not increase in keeping with the increased production of fish resulting chiefly from progressive mechanization and enlargement of the fishing fleet.

5.1 Research and investigations

The following publication appeared reporting results of investigations in fish curing in the *Ceylon*:

Gunasekara, C.; N. de Silva and A.W. Lantz (1956). Preservation of fish by salting and drying. *Ceylon Dept. Fish. Prog. Rep. Biol. Tech.*, No. 2: 44-47.

In order to develop a satisfactory commercial curing process for dried salted fish several methods were investigated.

The most satisfactory results were obtained by a process involving the removal of guts and gills and the extraction of slime and blood by dipping in a 10 per cent brine prior to brining in a salt solution maintained at saturation. Salt alone was found to be insufficient to prevent bacterial decomposition. However, this was controlled by the use of 2 per cent citric

acid added to the brining solution. The growth of disease carrying bacteria was controlled in the product by this concentration of citric acid which also prevented the growth of many types of fungi. In addition, citric acid increased the initial rate of salt penetration thus shortening the time during which the fish is most liable to decompose.

The salt-citric acid protection permitted of slow air drying without deterioration; apart from its superiority to direct sun drying, the process was thus made independent of adverse weather conditions.

In addition, experiments on smoking, salting and drying of freshwater fish were undertaken at the Fisheries Department Laboratory. Of the various items produced, smoked Tilapia was well received by the Sinhalese, while salted and/or smoked *Labeo dussumeri* was favoured by the Muslims. The experiments were being continued.

In India, establishment of a Processing Wing attached to the recently established Central Fisheries Technological Research Station at Cochin was sanctioned to accelerate research on fish processing and utilization of fish products. It is also planned for the Wing to evolve quality standards for various fish and fish products. Expert assistance from FAO was due in 1958 for suggesting details of the personnel, equipment etc. for the Station and for training of personnel after they were recruited. The counterpart assistant for the expected FAO expert had already been recruited.

Research on fish curing in India continued at the various existing laboratories of the Union and States Governments. The following papers are among those which were published during the period under review:

- (i) Krishna Pillai, V.; A.P. Valsan and M.R. Nayar (1956). Studies on the chemical quality of cured fish products from the west coast of India. *Indian J. Fish.*, 3 (1): 43-58.

A survey of the major fish curing centers in the Travancore-Cochin and Bombay coasts was undertaken. Samples of salt and cured fish, representative of the different methods practised in the above areas, were collected and analysed for their chemical constituents. Samples were also collected from three important dry fish marketing centers in the country and analysed.

The data indicated wide differences in the quality of the cured products collected from the different localities. The analyses of the salt samples showed that in most cases the composition of salt used by the curers did not come within the tentative standards proposed for salt for fish curing purposes. The poor quality of the cured fish products could possibly be ascribed to the defects in the methods adopted in each area and to the low NaCl content of the salt or alternately to the high percentage of impurities in the salt.

- (ii) Krishna Pillai, V.; A.P. Valsan and M.R. Nayar (1957). Studies on the curing and preservation of 'Choodai'-I. Some aspects of dry salting. *Indian J. Fish.*, 4 (1): 32-46.

Studies were conducted on different aspects of curing of sardines. Data were presented on the changes in the moisture and total volatile nitrogen (TVN) contents of the fish during drying in the sun for different periods under different experimental conditions. In sun-dried sardines the moisture content of the fish had to be kept below 25% in order for it to keep for a sufficiently long period without undergoing spoilage.

The rate of penetration of salt in the case of *S. gibbosa* and *S. albella* at different intervals during drysalting with different proportions of salt was studied. It was observed that, under

normal conditions, optimum salt penetration took place within 20 hours in the case of the former and 26 hours in the case of the latter when salt was used in the proportion of 1:3 to 1:6. With less salt, the period of salting was found to increase. It was further observed that the TVN values of those samples kept long in salt were comparatively high.

Where pressure was applied on the fish while salting, the period required for optimum salt penetration was less. The water from the fish was squeezed out quickly when pressure was applied and this probably helped in quicker and uniform curing.

The TVN and peroxide values of the stored samples were estimated at monthly intervals. The results indicated that when a sufficiently high proportion of salt up to 1:6 by weight of fresh fish was used, the increase in the TVN values was comparatively small.

- (iii) Krishna Pillai, V. and M.R. Nayar (1957). Determination of total volatile nitrogen in cured fish products. *Indian J. Fish.*, 4 (2): 295-303.

The values of total volatile nitrogen TVN obtained from three extracts of different samples of cured fish when distilled under uniform conditions in presence of sodium borate, potassium carbonate and sodium hydroxide, were compared. Experiments were carried out with a view to finding out the extent of variation in the values of TVN with the increase in the concentration of the fish muscle in each of the extracts on distilling with these alkalies. The results of these experimental investigations pointed out that for TVN determination, it is preferable to prepare an aqueous extract of the fish sample wherever possible and to use sodium borate as alkali. The advantage with alcohol extract, however, was that the proteins were precipitated and a clear solution remained.

- (iv) Krishna Pillai, V. (In Press). Experiments on the preservation of fish by pickling. *Indian J. Fish.*, 5 (2).
- (v) Suryanarayana Rao, S.V.; M.R. Nayar and A.P. Valsan (1956). Tetrazolium reduction as an index of spoilage in cured fish. *Curr. Sci.*, 25: 396-97.

- (vi) Suryanarayana Rao, S.V.; M.R. Nayar and A.P. Valsan (1958). Preliminary investigations on the pit curing of fish in India. *Indian J. Fish.*, 5 (1): 160-169.

A study of the process of pit curing of fish which is practised mainly on the east coast of the Madras State was undertaken to determine the optimum conditions for the cure, keeping quality of the cured products and to evaluate the different chemical tests for the detection of spoilage during storage. Mackerel was chosen for the investigations which also included observations on the more common method of wet salting. Pit curing improved the organoleptic properties by imparting a characteristic flavour and softness to the flesh. However, their appearance was rather unfavourable and their keeping quality limited to a few weeks after the cure. Wet salted mackerel on the other hand were found to keep in a good condition up to 2 months.

The beneficial effect or maturation or ripening under semi-anaerobic conditions in pit curing was reflected in the release of large amounts of free amino acid nitrogen during the cure. However, the levels of total Volatile Nitrogen (TVN) which had also increased during the curing period reached more than 500 mg.% (moisture-salt-free basis) after two weeks of storage. The optimum period for the cure was found to be two days in the case of gutted mackerel salted in 1:5 ratio. A comparative study of the changes in TVN Trimethylamine, Formol Nitrogen and Peroxide Value during storage revealed the usefulness of TVN increase as a test for the assessment of quality.

- (vii) Venkataraman, R. (1956). Effect of aureomycin, nitrite and ricinoleate on red halophilic bacteria. *Curr. Sci.*, 25: 190-

Cultures of *Pseudomonas salinaria*, *Ps. cutirubra*, *Bacterium trapanicum*, *B. halobium*, *Micrococcus morrhuae*, *M. roseus halophilus*, *Sarcina litoralis*, *S. morrhuae*, *Halobacterium minutum*, *H. gibbonsii* (N. sp.), and other red halophilic bacteria were grown on salt-milk agar to which known quantities of aureomycin, sodium nitrite and sodium ricinoleate, were added. The final pH was adjusted to 7.5 ± 0.1 . Surface inoculation was made by streaking.

Except *H. gibbonsii*, none of the other red halophiles was affected by even 10 p.p.m. of aureomycin. Growth was profuse and rapid as in the control and no morphological changes were noticed either. It is surmised that the high magnesium content of the medium reverses the action of aureomycin. At 0.1% of NaNO_2 the cocci were not inhibited. At 0.5% some cocci still showed growth. But the rod forms failed to grow at 0.2% NaNO_2 concentration; with sodium ricinoleate at 0.2% level, only rod forms grew and all the cocci were suppressed. It is suggested that for salting hides a combination of 0.2% NaNO_2 and 0.2% sodium ricinoleate be used though this high concentration of nitrite is not recommended for curing fish.

In addition, experiments in pickling of mackerel with salt and ordinary tamarind (*Tamarindus indica*) indicated that this tamarind is a good substitute for *Garcinea cambogea* which is now employed for the commercial Colombo cure. In another experiment, it was observed that incorporation of 0.02% sodium nitrite by weight of fish in the salt while pickling, as also pretreatment of fish with certain other preservative chemicals, could considerably improve the keeping quality of the products. Attempts were also made to prepare pickled products e.g. Russian sardines and marinated herrings, the methods being modified to suit tropical conditions.

Usefulness of certain preservative chemicals in methods of curing other than pickling was also being tried. A few of the preservatives indicated significant results. Pretreatment of fish by a dip in citric acid solution improved the keeping quality of dry cured sardines and pretreatment with propionic acid solution, before salting, made both the dry-cured and wet-cured products resistant to the growth of molds and red halophilic bacteria.

Studies on the shelf-life of samples of dry-cured fish stored in different packing material and under different relative humidity conditions were attempted. Preliminary experiments indicated that triphenyl tetrazolium bromide reduction test may prove to be useful in measuring the spoilage of cured products.

The laminated and deboned dried Bombay Duck product was found superior to the sun-dried variety as the former ensured complete

dehydration, thus facilitating storage over long periods. But, the process proved more expensive than the traditional sun-drying.

At the Model Fishing Community Development Centre at Kota Baru, *Indonesia*, an experimental mechanical dryer for cured fish was installed.

In *Japan*, Central Government Regional Fisheries Research Laboratories as well as non-governmental research institutions belonging to universities or commercial firms, continued research in fish curing. None of the projects, however, were specifically concerned with fish curing in humid tropics. However, the following publications are of general interest

Takei, M. and T. Takahashi (1956). On the preparation of reversibly dried fish meat. *Bull. Tokai Reg. Fish Res. Lab.*, No. 1: 91-97.

Attempts were made to develop a process which would give dried fish meat reversibility, the property to restore the water content when immersed in water as nearly as possible to the level in fresh fish.

The dried meat containing only small quantities of fat absorbed much more water than those rich in fat.

When the dried meat had been treated, before drying, with either sodium citrate, or dibasic sodium phosphate or any of several antioxidants, e.g., butylated hydroxyanisole (BHA), was immersed in water, the water absorbed was less than in raw meat.

On immersing dried meat, which prior to drying was treated for 15 hours, with 0.05% BHA solution containing 2% sodium citrate (or 1% dibasic sodium phosphate), it was observed in many cases that the water absorbed was greater than that in the raw meat.

Toyama, K. and K. Saruya (1955): Method for protection of marine products against deterioration due to oxidation of oil-IV. Application of some antioxidants to salting of salmon. *Bull. Japanese Soc. Sci. Fish.*, 21 (4): 248-52.

.....; T. Tochi and K. Saruya (1956). Method for protection of marine products against deterioration due to oxidation of oil-V. Application of BHA to salting of salmon. *Ibid.*, 22 (3): 198-201.

Ando, K. and K. Saruya (1956). Method for protection of marine products against deterioration due to oxidation of oil-VI. Application of BHA in dry-salting of salmon. *Ibid.*, 22 (3): 202-205.

.....; N. Yamaguchi and K. Saruya (1956). Method for protection of marine products against deterioration due to oxidation of oil-VII. The protection of 'Aramaki' by BHT. *Ibid.*, 22 (6): 383-385.

Experiments were conducted with several antioxidants incorporated in the salt employed for curing (wet and dry-salting) in arresting oxidation of fat during storage of cured fish. Fish treated with butylated hydroxy anisole (BHA) at concentration of 0.01% in the salt representing from 0.005-0.02% of the weight of raw fish, showed no detectable signs of rancidity after 60 days' storage while untreated samples became distinctly rancid in 17 days. Ethyl protocatechuate (EP) and propyl gallate (PG) were less effective than BHA, and a reddish-brown off-color especially in the abdominal parts developed in the products treated with these antioxidants. In experiments with 'Aramaki' (salted salmon) which is kept for long time in contact with salt, it was observed that 2,6-di-tert-butyl-p-cresol (BHT) in concentrations of 0.0025-0.005% of the weight of raw fish was most effective. BHT was more effective than BHA which was effective at a concentration of about 0.0025% but employed in excess of this concentration, imparted a yellow off-colour in the abdominal parts of the products. Isoamyl gallate + citric acid (Linton C) was considered unsuitable since it caused violet off-colour as did propyl gallate.

Tanikawa, E.; T. Motohiro; H. Ishiko; Y. Fujii and K. Yachi (1956). Studies on the complete utilization of squid-XII. On the decomposition velocities of summer and autumn squid meat. *Bull. Fac. Fish. Hokkaido Univ.*, 3 (1): 49-61.

..... and K. Tomita (1956). Studies on the complete utilization of squid-XIII. Relation between freshness of raw squid and the quality of the dried product. *Ibid.*, pp. 165-171.

, Y. Nagasawa; T. Takenchi and T. Sugiyama (1956). Studies on the complete utilization of squid - XIV. Relation between the water content of squid meat and putrefaction during drying. *Ibid.*, pp. 172-184.

Differences were observed in the quality and decomposition velocity of dried, salted or frozen products made from summer and autumn squid. These differences are ascribed to differences in histological features, chemical components, the solubility and the quantity of bound water in the two groups of squid.

Raw squid meat containing more than 20 mg.% of volatile basic nitrogen did not result in products of good quality.

It was observed that during drying of squid meat when the moisture content reached 50-55%, the rate of decomposition becomes 1/10th as much as at higher moisture contents. In normal weather (80% relative humidity, 11 m/sec. wind velocity and a reasonably bright sun), the moisture content of the meat reaches 50-55% quickly enough before any appreciable decomposition can take place. The authors suggest artificial drying during unfavorable weather.

Tsuchiya, Y. and Y. Sato (1956). A rapid method for the determination of moisture content in fish meat-II. Relation between error of estimation and fat content. *Tohoku J. Agri. Res.*, 7 (3): 273-276.

The authors demonstrate that the methyl alcohol dehydration method [(Tsuchiya, Y. and T. Nakano (1954). A rapid method for the determination of moisture content in fish meat. *Tohoku J. Agri. Res.*, 5 (2): 93-97.)] is applicable for determination of moisture in fatty fish within an error of + 1.9%.

Masuda, S. (1957). Studies on the discoloration of oily fishes. Rep. *Western Sea Fish. Res. Inst. (Japan)*, no. 12: 43-59.

Describes a method for measuring the discoloration of oily fishes by an examination of the differences in the optical density of the solution of the color matter in a mixture of methyl alcohol and benzene. Oily fishes dried after boiling were crushed and passed through a sieve of more than forty meshes. Accurately measured quantities (0.5 g.) of the sample were

extracted with an azeotropic mixture (10 cc.) of methyl alcohol and benzene by shaking and subsequent centrifuging. The optical density of the clea solution was measured in a photoelectric colorimeter using S Filter 43. Distilled water was used as a standard.

Tsuchiya, Y.; T. Vakano; T. Wesaki and W. Ara (1957). Studies on the utilization of electro-smoke solutions. *Fish. Sc. Coll., Tokyo Univ. Press*, pp. 855-862 (In Japanese).

(1) Components of electro-smoke solutions prepared from oak, sundry timbers (pine, *Cryptomeria* etc.), orange peel, and rice straw were studied for observing differences in the quality of the electro-smoke obtained from these sources.

(2) It was observed that the bactericidal and bacteristatic properties of the electro-smokes were due to the presence of volatile matters, mainly consisting of formaldehyde and of phenols. It was also observed that the bactericidal components lay in the tar portion of electro-smokes.

(3) Studies on the rancidity of mackerel smoked by dipping in a mixture of salt and electro-smoke solutions, showed that these solutions possessed considerable anti-oxidant properties as did butylated hydroxy-anisole (BHA) and nordihydroguaiaretic acid (NDGA).

In *Malaya* experiments were conducted in the storage of dried fish in cans sealed in CO₂ and air.

Batches of Ikan Bilis (*Stolephorus* sp.), Ikan Gelema (*Sciaena* sp.) and Selar Kuning (*Caranx* sp.) were dried for 1½ days in the bright tropical sun and packed in 4-gallon kerosene cans and sealed in an atmosphere of air and carbon dioxide. Samples were taken out periodically and the fish examined for quality through a taste panel. Bilis remained excellent even after 6 months, both in the air and carbon dioxide pack. The other two varieties deteriorated much quicker in the carbon dioxide pack than in air. The Selar became absolutely unfit for human consumption after about 4 months both in the air and carbon dioxide packs. It was suggested that the keeping of Bilis is attributable to drying to a satisfactory degree before it was packed, the fish due to its small size having completely dried in about 1½ days, and the moisture content in the other two varieties,

which are large in size, were rather high at the time they were packed.

The above experiments and the results are described in a paper (IPFC/C55/TECH 2) presented at the current Session of the Council.

Experiments were conducted at the Technological Laboratory of the *East Pakistan* Directorate of Fisheries on the preparation of improved quality cured fish. The process of full salting and drying as practised in many countries was not satisfactory as in the highly humid climate of East Pakistan, the finished product absorbed considerable moisture, due mainly to the hygroscopic properties of the salt in the product, and deterioration was hastened.

A different method was then tried. The fish was washed, scaled, gutted, once more washed and cut into fillets or strips not exceeding one inch in thickness. These were then soaked in a 15% brine for half an hour to wash out slime and blood. The brined pieces were washed quickly in fresh-water to remove traces of scum or salt, drained and dried in the sun until the moisture content came down to about 20%. The pieces were finally smoked until the moisture content reached about 17%.

Fish cured by a combination of light salting, drying and smoking as mentioned above was found to possess good keeping qualities in humid climate.

In the *Philippines*, a new process for the production of split-salted dried fish was standardized with the production of a high quality salted fishery product. Although the product turned slightly brown on storage in humid climate, there was no sweat on the flesh nor any growth of mold. The product contained no chlorides and sulphates of calcium or magnesium; its sodium chloride content was also lower than in the products obtained by the usual processes.

A paper describing these experiments and the results is presented at the current Session of the Council (See IPFC/C58/TECH 7).

Experiments were performed in Thailand for the production of dried 'hoi Kreng' (Arc shell) meat. The cleaned shell was boiled in 10-16° Be brine for about 10 minutes, the meat shucked and dried in a charcoal heated drying chamber for 2 hours at 50-55°C and for another 10 hours at 60-70°C. At 15% moisture content,

the yield was about 4-5% in weight of fresh shellfish, the fresh meat content being 20% of the fresh shellfish. The dried meat was analysed for protein, fat, moisture, salt and ash. In storage conditions of average 28°C temperature and 70% relative humidity, the product kept well for 1-2 weeks when the moisture content was 26% and for 3-4 months when the moisture content was 16-18%. Mold developed if the product was stored in open air for too long, while stored in a household refrigerator, it kept good for a long time. (See also IPFC/C58/TECH 9).

In order to effect possible improvements, a study was made of the present practices for commercial production of boiled (steamed) fish. Details of the different methods for boiling were recorded, and the products obtained by the different methods analysed. It was observed that fish boiled once in saturated brine for 30 minutes kept good when stored in open air for 2 days, but the fish boiled a second time for 10 minutes kept good for 7 days. When stored in a household refrigerator, there was no detectable signs of spoilage in 14 days but the product became hard and dry due to desiccation. Further experiments for packing the fish in polythene bags are planned. (See also IPFC/C58/TECH 9).

Attempts were made for smoking 'pla-thu' (*Rastrelliger*) by exactly the same method as is commonly applied in Thailand for smoking freshwater fish. The gilled, eviscerated, washed and drained fish treated for 30 hours with smoke generated with sawdust and coconut husk, gave a hard-dried product deep in colour. A product obtained by first drying for 15 hours with charcoal fire (60-70°) in a smokehouse and then smoking for another 15 hours at 50-60°C, had the same dryness as in the previous case, but had much better color. A product obtained by brining at 14° Be or in saturated brine for 30 minutes, prior to drying and smoking, had a cheese-like taste. The products obtained by the different methods were chemically analysed for their contents of protein, fat, salt and moisture. Stored in baskets in open air, the product was attacked in 1-2 weeks by a kind of beetle. In 1-2 months this beetle ate the whole fish or caused it to be powder-like.

The only activity in the *USA Trust Territories* was in respect to curing of *Trochus* meat. This work has been reported in "*Trochus* Fishery of the Trust Territory of the Pacific Islands" by John A. McGowan. The report is available

from the Trust Territory of the Pacific Islands, Agaña, Guam. Very briefly, the report points out that *Trochus* shelled and dried may be stored for a considerable time before consumption.

Preliminary results of experiments in *Vietnam* for preventing rancidity of fats in dried fish with antioxidants e.g. butylated hydroxy anisole, etc., were satisfactory.

5.2 Application of research results

In the States of *Kerala* and *Madras, India*, model curing yards were maintained by the Governments. The curers who obtained space at these yards, either free or on rental, were free to use their primitive techniques for curing, handling and storage. The quality of the products from these yards was consequently unsatisfactory.

Attempts to improve storage of cured fish by constructing suitable sheds were also made in the above two States. Loans were granted to a number of cooperative societies for constructing storage sheds according to designs prepared by the Governments concerned. A long-term program for constructing similar storage sheds for cured fish and other fish products on the West and East coasts at important landing centers, and at wholesale and retail markets were prepared for implementation in gradual stages. The information resulting from investigations was made available to the industry through the Central Fisheries Extension Service and attempts were made to popularize them. Samples of cured fish produced experimentally by different methods of processing were displayed at Fisheries Exhibitions and the methods of preparation of the products explained. Laminated Bombay duck product was also supplied to the trade for local sales and for export to foreign countries.

Financial assistance was given for improving the sanitary conditions of the Government Fish Curing Yards in the States by provision of cement platforms, curing sheds and better drainage facilities.

In *Japan*, application of the results of research conducted by Central Government research laboratories as well as by those of non-governmental and private organizations, was pursued through extension activities of Fishery Departments of Prefectural Governments in cooperation with Prefectural Experimental Sta-

tions which gave practical advice to the industry. Where necessary, technical training courses were sponsored by the Prefectural Institutions for the benefit of local fishermen and small-scale industry.

Attempts were made in *Malaya* to introduce to the East Coast the Chinese methods of producing salted-dried fish, which were widely practised on the West Coast. These methods were demonstrated on the former coast. Early acceptance of these methods by the industry on this coast was expected.

The Technology Section of the Department of Fisheries, *Thailand*, presented a report on 'Quick Determination of Moisture in Cured Fish' at a meeting of agents and exporters of cured fish. The method which is simple, takes about 10 minutes to perform, and can be easily performed by non-technical personnel in the industry for preliminary grading of the cured fish on the basis of moisture content, was also demonstrated at the meeting.

5.3 Quality standards for cured fish

The Government of *India* contemplated gradual introduction of quality standards for cured fish and other fish productions with voluntary cooperation of the industry. Such standards were in preparation.

Quality standards for important fishery products for domestic use as well as for export were in force in *Japan* pursuant to regulations promulgated by the Central Government. These products were: (i) dried products including those of herring, herring roe, cod, shark fin, squid, scallop adductor, abalone, sea cucumber (ii) boiled-dried products including those of herring and salmon; (iii) salted fish of various kinds; and (iv) miscellaneous products including seed oyster, agar-agar, fish meal and marine animal oils.

Quality standards for exportable salted fish introduced in *Thailand* a few years back continued to be in force.

6. Fish Flour for Human Consumption

The Nutrition Division of the Public Health Department in *Burma* was engaged in the development of fish flour for human consumption. It was assisted in this task by an FAO/ETAP nutrition expert.

The cost of fish flour was found prohibitive for the Burmese. On the other hand, they preferred the flavor associated with fish meal but lacking in fish flour. Acceptability tests successfully demonstrated the possibilities of popular acceptance for human consumption of fish meal prepared from anchovies (*Stolephorous sp.*). A private firm with extensive interests and wide experience in Burmese fisheries, was keenly interested in producing fish meal for human consumption. Government permission for this firm to go ahead was withheld on the ground that the processing techniques for the production of the meal were not adequate enough to completely destroy the *Clostridia*.

In India the following paper was published:

Krishna Pillai, V. (1956). A fermentation process for the production of quality fish meal. *Curr. Sci.*, 25 : 293-94.

An earlier observation that fishy odor of shark liver oil was completely removed by agitation of oil with fermenting milk for 36 hrs. suggested the possibility of preventing rancidity development in fish meals by treatment with fermenting milk. Eviscerated and de-scaled fish were minced and stirred with defatted butter

milk (about 1 oz. [8.4 ml.] to 6 lb. [2.72 kg.] of minced fish) and the whole, well mixed with a small quantity of water. The pH was maintained between 4.5 and 5.0 and temperature at 30° to 35°C. (86° to 95°F.) The reaction was continued to take place for 4 hrs. after which the mass was pressed, dried and powdered. For comparison, 3 types of fish meals were made by (1) direct sun-drying of untreated fish, (2) drying of precooked fish and (3) treating fish with fermenting milk, pressing and drying, from 5 different spp. of fish, e.g. *Sardinella albella*, *Sardinella gibbosa*, *Illosha brachysoma*, rays and shark (*Carcharinus sp.*). Preliminary observations indicate that even after 9 to 10 months of storage in glass bottles, the treated fish meals did not develop the characteristic rancid odor. The moisture, fat, total and water soluble nitrogen contents of the meals are given in table below. The results show that the oil content of the meal is reduced by the fermentation treatment. It is suggested that this method of preparing odorless fish meal is suitable for use with cheaper varieties of fish such as sharks and may be used to prepare odorless fish flour for human consumption. An advantage over traditional methods is that the fermentation treatment is cheaper.

Analysis of fish meal made by addition of fermenting milk to fish.

Name of fish from which the meal was made		Moisture %	Fat %	Total %	No protein %	Water soluble N as % of Total N
<i>Sardinella albella</i>	a*	6.1	8.8	—	—	—
— do —	b*	7.0	3.7	13.30	83.13	5.0
— do —	c*	6.4	4.1	14.35	89.68	15.6
— do —	d*	8.3	1.4	—	—	—
<i>Sardinella gibbosa</i>	a	6.4	10.1	11.90	78.38	17.6
— do —	b	9.8	6.0	13.50	84.38	6.2
— do —	c	5.8	6.2	14.00	87.50	10.0
<i>Illosha brachysoma</i>	a	7.2	7.1	—	—	—
— do —	b	6.8	4.4	12.95	80.91	6.0
— do —	c	9.0	3.4	13.30	83.13	10.5
Shark	a	7.2	1.8	14.00	87.50	18.5
— do —	b	5.3	0.8	14.94	93.38	6.8
— do —	c	5.8	0.6	15.08	94.25	18.2
— do —	b	8.4	0.6	14.78	92.38	5.9
— do —	c	9.2	0.3	14.50	90.63	14.2
Ray	a	9.2	3.2	—	—	—
— do —	b	9.9	1.3	14.35	89.68	9.8
— do —	c	7.6	2.2	14.35	89.68	16.1

* a : simple, sun-dried and powdered; b : cooked, pressed, dried and powdered; c : fermented, pressed, dried and powdered; d : solvent extracted, dried and powdered.

At the Technological Laboratory of the Fisheries Department of Bombay some experiments were conducted for the manufacture of fish flour from dry fish and waste liver debris.

Acceptability tests were carried out on laboratory scale. Fish flour prepared from shark and skate flesh by the fermentation process were used in ordinary food preparations like 'chappathies', cakes, biscuits, vermicelli, etc. Up to 20% by weight of fish flour were incorporated in the above food preparations without producing a fishy odor or flavor. Investigations regarding the nutritive and biological value of the products were still underway. Large scale trials to popularize consumption of fish flour as a means to combat protein malnutrition are yet to be undertaken.

Following improvements in food situation in Japan a few years after World War II, all research activities in the development of fish flour for human consumption virtually ceased, although before and during the war an extensive and vigorous program of research was pursued in this field. During the few years after the War when sources of animal protein were in seriously short supply, fish flour was used with wheat flour in baking bread, biscuits etc. Fish paste prepared by fermentation of fish flour was used as spread on bread. At present, however, none of these products is produced in any appreciable quantity.

Perhaps, 'denbu' and 'furikake' are the only two items of processed fish flour still found on the shelves of Japanese grocery stores. The former is fish flour, mostly of cod, cooked with seasonings, e.g., soyabean sauce, salt, sugar and sodium glutamate. In preparing 'furikake' (sprinkles), fish flour is boiled down in one or more of the above seasonings until about dry. This is then completely dried and seaweed powder added to it.

Given below are statistics on the production of fish flour for human consumption in Japan. (Also see Appendix I);

Year	Quantity in Metric Tons
1951	1,148.2
1952	2,979.0
1953	1,857.3
1954	1,249.8
1955	655.5
1956	1,336.8

Tests on the acceptability of good quality fish meal for human consumption were sponsored in Thailand jointly by the Department of Health and the Department of Fisheries. The tests were carried out by trainees of the Thailand - Unesco Fundamental Education Project, under the supervision of the Nutrition Officers of the FAO Far East Regional Office.

Fish meal instead of fish flour was used in the tests as the fish flour was very expensive and as fish products e.g. fish sauce (nam pla) and shrimp paste, which according to western standards have disagreeable odor, are already popular items in the Thai diet.

The meal used in the tests was produced locally from 'pla-thu' (*Rastrelliger* sp.) and some slipmouth at a fully mechanized fish meal plant at Chumphorn nearly 450 miles south of Bangkok. Before the tests, the meal was chemically and bacteriologically analyzed.

Ten grams of the meal (equivalent to 6—6.5 g. protein and 0.5—0.7 calcium) was given daily in school lunch for 5 days a week for one month to 136 school children (7—12 years old) of Nongkorn village, Ubol province, and to 130 children of the Chat Songkram School, Bangkok.

In addition, 25 Bangkok families in the low income brackets and 150 families of Nongkorn village in the Ubol Province, known for its acute shortage of animal protein, received daily rations of 15 g. of the meal per head.

The meal was served to the school children in different preparations including curries, vegetable dishes, and fish pastes, the recipes for which were supplied by the Department of Health, while the families received instructions for the preparation of the dishes according to the recipes.

Between 75—100% of the children in the Bangkok school liked the meal served in four of the six recipes; while 75—90% school children in Nongkorn village almost equally liked six of the seven different preparations in which the fish meal was served; 63% of the families in Nongkorn village favored acceptance of the meal for food while Bangkok families did not care for it at all.

Offered at 4 Bahts* a kilo, only 12% of test subjects were willing to buy the meal.

Further tests were planned, and to improve the quality of the meal further, the producer

*U.S. \$ 1.00 = 20 Bahts approximately

was advised to improve hygiene and sanitation in the plant, modify the processing to ensure complete destruction of pathogenic bacteria, dry the meal to a moisture content of 8%, grind the meal into finer particles, sieve the coarse bone particles off, pack the meal in moisture-proof multi-lined paper bags or tin cans, and not to offer the meal for human consumption if stored for more than six months (see also IPFC/C58/TECH 11).

7. Use of local vegetable oils for canning

In Indonesia, experiments were performed for rendering coconut oil suitable for canning of fish. Attempts were made for lowering the solidification point of the oil by blending it with various proportions of corn oil, cotton seed oil, glycerin, peanut oil, rice bran oil and soya bean oil. Data indicated that, the rice bran oil was the most suitable, having at 10% concentration lowered the solidification point of coconut oil to 10°C which was considered low enough in Indonesia for its use in fish canning. A detailed description of these experiments and results are presented in a technical paper presented to the current Session of the Council (IPFC/C58/TECH 3).

8. Fishery Products Manual

Japan furnished data on six representative products. These were: Shiokara (fermented fish viscera), Satsuma-age or Age-Kamaboko (fried fish jelly product), Fish sausage, Tsukudani (small fish boiled in soya sauce), Katsuo-bushi (dried strips of fish) and Niboshi (boiled and dried fish).

Pakistan furnished information on wet Salted Hilsa and Smoked Prawn.

9. FAO Regional Training Center in Fish Processing

Informal explorations were made for finding a host government for this training center. Should an offer reach FAO soon, the Project might be budgeted for 1960.

10. T.A. Group Country Project in Fish Curing

No Government communicated its reactions to this recommendation.

11. FAO Regional Consultant in Fish Processing

No final decision has been made by Fisheries Division, FAO, on this proposal.

FISHERIES ECONOMICS

(PANEL C)

STATISTICS

12. AUSTRALIA

Australian fishery statistics are reasonably satisfactory. Certain collections are excellent; for example, those covering the pearling and whaling industries, and imports and exports of fish and fish products. Statistics covering catch by species are also adequate. Data relating to disposition of catch are not entirely satisfactory but certain improvements are planned, and it is hoped that existing discrepancies will be rectified. Generally, statistics may be considered under the following headings:—

12.1 Pearling and whaling

Collections made by the Commonwealth Fisheries Division, Department of Primary Industry, under relevant pearling and whaling

legislation, are quite adequate and, in fact, more than sufficient for industry and departmental purposes.

12.2 Scale fish, shark, mollusks and crustacea

In all States, excluding South Australia where no fisheries statistics are collected, collections are made by the various State fisheries authorities. The data is collected directly from the fishermen, processed, then passed to State and Commonwealth Departments interested in such statistics. Since 1951, in accordance with FAO commitments, production and disposition statistics have been published by the Commonwealth in accordance with certain formulae designed by F.A.O. Whilst it has not always been possible to meet certain specific requirements, collections have slowly improved with the result that present Australian statistics, covering production of species

and disposition, are reasonable and sufficient for most purposes. However, statistics relating to fishing effort, production by fishery rather than State, etc., are incomplete. The Commonwealth Bureau of Census and Statistics, in conjunction with the Commonwealth Fisheries Division plus certain State authorities, is keen that this position be rectified. In addition, the collection of fisheries statistics in South Australia is also receiving close attention. The recent assumption of State statistical functions by the Commonwealth should assist materially in improving all fisheries collections. This liaison on fisheries statistics between Commonwealth and State authorities has proved of considerable benefit and will facilitate planned improvements to Australian fisheries statistics.

12.3 Imports and exports of fish and fish products

Statistics covering these items are collected by the Commonwealth Bureau of Census and Statistics. With regard to exports, particularly crustacea, data provided by the Bureau is supplemented by information supplied by the Department of Primary Industry. Information from all sources is quite adequate.

13. INDIA

The General position with regard to collection and processing of fisheries statistics in the country is still unsatisfactory. The

Central Fisheries Research Station at Mandapam had developed its own sampling technique and have collected statistics of marine fishermen, gear, fish landings on a whole country basis. The maritime States continue to collect the figures of fish landings from the fish curing yards.

The sampling technique of assessment of production from inland fisheries is yet to be evolved and figures on the basis of total enumeration are available on regional basis. Even these do not pertain to the same year of observation.

In the absence of a central agency coordinating the statistical organization in the States it has not been possible to have comprehensive figures on the different aspects desired by the IPFC. Figures as available are given below.

13.1 *Number of fishing vessels* : For the whole country as enumerated by Central Fisheries, the figures exclude trawlers which are few in number and are working on an exploratory basis only.

Catamarans	..... 49,132
Boats	..... 20,594
Canoes	..... 22,343
Boats fitted with motors	..... 672

Bombay State

	Below 1 ton	Between 1 & 3 tons	Between 3 & 5 tons	Between 5 & 10 tons	Between 19 & 20 tons	Above 20 tons	Total
Mechanized	Nil	95	79	697	127	1	999
Non-mechanized	5,745	5,966	1,548	960	296	192	14,707

Madras State

Catamarans	... .. 23,161
Boats	... .. 4,716
Power Boats	... .. 38

Andhra State

Catamarans	... .. 18,863
Boats	... .. 6,340

No. of fishermen

Marine fisheries as per sample survey by the Central Fisheries are 221,600.

Bombay State

Active fishermen 52,000
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Madras State

Marine 63,100
Inland 12,745

Chilka lake

Men	...	16,094
Women	...	15,456
Fishermen (Bahania)	...	8,079

Ganga river (Bulandshar to Lalgolaghat)

Men	...	54,283
Women	...	54,208
Children	...	91,055

Mahanadi estuary — 3,747

Jamuna river —

Men	...	30,797
Women	...	20,681
Children	...	34,055

Godavari estuary —

Active fishermen 5,500

13.2 Fishing craft and gear :

Fishing method used for the whole country as per sample survey by the Central Fisheries.

(i) Shore seines	.....	9,823
(ii) Boat seines	.....	37,394
(iii) Bag nets	.....	38,062
(iv) Gillnets	.....	55,225
(v) Drift nets	.....	28,218
(vi) Cast nets	.....	26,807
(vii) Dragnets	.....	10,915
(viii) Fixed wall nets	.....	8,142
(ix) Other nets	.....	9,164
(x) Lines	.....	45,743

Madras State

(i) Boat-seine nets	.....	10,057
(ii) Drift-nets	.....	21,085
(iii) Gillnets	.....	30,503
(iv) Shore seines	.....	1,570
(v) Dragnets	.....	12,248
(vi) Stationary nets	.....	5,987

In the case of inland fisheries, no statistics are available. The mode of fishing being confined to:

- 1) Seining
- 2) Hook and line
- 3) Traps in order of precedence.

13.3 Cold storage facilities

Although additions of cold stores have taken place in various maritime States, the facilities are quite inadequate. Ice factories have however, increased appreciably in number and private enterprise is forthcoming for this indus-

try. Bombay has 81 ice factories belonging to private parties and one ice factory run by the State. It has 22 cold stores belonging to private parties with a capacity of 257 tons and one belonging to the State with a capacity of 50 tons. Ice making capacity of private factories is 1,359 tons per day against 20 tons by the Government factory.

Madras has 27 ice factories with a capacity of 70 tons and one cold store with a capacity of 10 tons. Orissa has 5 ice factories with a capacity of 50 tons and one cold store of 15 tons under erection. Figures for other States have not been available.

13.4 Processing facilities

Fish curing continues to be the principal method of processing in the fish curing yards while most of the inland fish is consumed in the fresh condition.

Bombay — (Comparative figures are available as below).

Total Production of Fish	—	2 lakhs tons
Quantity sold as fresh	—	1.2 lakhs tons
Quantity dried	—	65,000 tons
Quantity salted	—	15,000 tons

Madras — Total production of fish

(i) Inland	40,300 tons
(ii) Marine	67,542 tons
Quantity sold as fresh fish	66,900 tons
Quantity dried & salted	40,400 tons

14. JAPAN**14.1 3rd Fisheries Census**

Since competent and reliable statistical data of fisheries are essential for planning the development of fisheries and its enforcement and other appropriate measures, IPFC has been stressing for some time the importance of making a proper census of fisheries and adopted a resolution at its 7th Session for enforcement of (i) census of the number of fishing vessels in operation, the number of fishermen engaged in the industry and fishing methods used, together with cold storage and processing facilities, and (ii) collection of statistics on overall fish production, together with statistics on utilization and trade in respect of species of major economic importance.

Statistics on fish production and fishing vessels in Japan have been collected for many years, and through the adoption of sampling methods in fish production statistics and registration system in fishing vessels statistics, we have succeeded in obtaining statistical data of almost correct and reliable quality. But in view of the necessity of development of the statistics system and for the purpose of surveying the overall structure of fisheries enterprises in the whole country, including fishing vessels in operation, the number of fishermen engaged, fisheries operations, subsidiary business, etc., a nation-wide fisheries census was initiated in 1941. The census has been enforced ever since every five years.

The 3rd Fisheries Census is scheduled to be conducted this year in the following way. An overall survey should be made in regard to the whole fisheries enterprises amounting to 250,000 in number by about 1,000 statistical researchers attached to 41 Regional Statistics Offices under the Ministry of Agriculture and Forestry in cooperation with the prefectural Governments. The total sum of expenses allotted for the census is about 35 million yen.

The special items of survey in the census this time include the present situation of fishery rights in exercise and fisheries cooperatives in function, which are expected to furnish various important basic data for the proposed national policy of coastal fisheries promotion, the changeover of fishery rights scheduled for 1961 and the improvement of the present fisheries system.

14.2 Survey on the Management of Fisheries Cooperatives

Various fostering and reinforcing measures for fisheries cooperatives have been taken during these several years by the Government. As recommended at the 7th Session of IPFC, the factual survey of fishermen's cooperatives is very important for this purpose. In Japan, as provided for by the Fisheries Cooperative Association Law, a regular inspection is conducted once every year in regard to the affairs of business and account of those cooperatives with capital stock. Later in 1951, an overall survey was carried out on fishermen's cooperatives for the purpose of clarifying their general status which includes statistical data and the trend of development and change.

In view of the remarkable changes which have been taking place in the status of cooperatives, the 2nd overall survey was conducted this year as a link in the chain of the 3rd fisheries census program, and at the same time a statistical survey was enforced in regard to 300 cooperatives which have been randomly sampled by regions and by types out of about 4,400 primary cooperatives. With regard to the 100 cooperatives selected from among those randomly sampled, a dynamic survey is also made on their economic activities of various types.

15. PHILIPPINES

15.1 Minimum Program of Statistics

With regard to the minimum program of statistics adopted by the Council, the Bureau of Fisheries cannot undertake a census of the number of fishing vessels or the number of fishermen engaged in the industry due to lack of funds. However, the Office has complete data on the number of fishing vessels of 3-tons gross or over, the number of fishermen working on these vessels and the fishing methods used. An inventory of fishing methods was undertaken in 1953. Such similar inventory will be undertaken in the near future.

Statistics on overall fish production, together with statistics on utilization and trade in respect of species are as usual complete.

15.2 Raw Material Resource Survey

There is presently being undertaken a project, "Raw Material Resource Survey" covering the four raw material fields, namely, minerals, forestry, agriculture and fisheries. The project contemplates to determine the extent and location of each of the raw materials available in the country depending upon the availability of data including past and current utilization, exports, imports and such data which may shed light on the commercial feasibility of undeveloped raw material resources. Their known potential for exploitation, intermediate and/or end-uses, will be taken into account as basis to determine the specific items of material to be covered.

Facts and figures available from all sources, public and private, will be gathered according to prescribed procedures and forms for analysis and evaluation and put together to be published in a comprehensive compendium.

of facts on raw material resources in the Philippines.

The conduct of the survey is under the responsibility of the Office of Statistical Coordination and Standards, National Economic Council, with the close collaboration of the Office of National Planning, National Economic Council, Industrial Development Center, National Economic Council and the pertinent Offices under the Department of Agriculture and Natural Resources.

SOCIO-ECONOMICS

16. INDIA

16.1 General Notes

The Reserve Bank of India is the authority in providing credit facilities for fisheries development and various State Governments obtain credit for the Cooperative Banks from the Reserve Bank, terms and conditions differing according to the purpose and nature of credit. Hitherto the fishermen have not been considered creditworthy and as such the flow of loan has been on the basis of the State Governments standing as guarantee for the loan. Naturally, this has limited the borrowed funds considerably and at present the Government of India, Ministry of Food and Agriculture are negotiating with the Reserve Bank to evolve suitable ways and means for flow of credit through normal banking procedure.

Regarding fish marketing, the responsibility vests with the States and this line has not developed as most of the State Departments of Fisheries are still in the formative stage. In some of the States fish marketing is the responsibility of the Cooperative Department, whereas in a State like Madras, the Fisheries Department has to look after this aspect with officers deputed from the Cooperative Department. On the whole, real progress in marketing is yet to be achieved and the report of Prof. Laidlaw, a visiting expert is now receiving consideration by the Center as well as the States.

The present fish markets are controlled by the Corporations or the Municipalities and the effort to establish sanitary markets has been confined to Bombay, Delhi and Calcutta till now. The Municipalities have their own rules under the act and they seek advice of the

Fisheries Department only in very special cases. Government of India have now agreed to give liberal grants and loans to establish storage facilities and improve markets, and various schemes are under preparation to assist the Municipalities to have suitable fish markets. The question of regulated markets is also being considered. It is visualised that there will be appreciable progress in this direction during the 3rd plan period starting from 1961.

As is well known, the fish passes through a number of hands from producer to the consumer. Government policy is to encourage producers cooperatives and eliminate or regulate the remunerations of the middle-men. Cooperative Departments are organizing producers, cooperatives in almost all the States. These cooperatives are given facilities of trained Business Manager, subsidies in management expenses and godowns, loan of share capital, etc., and encouraged to market the produce jointly. Bengal has introduced a Cooperative Production Scheme for the Sundarbans. Orissa has finalized a scheme of cooperative marketing from the Chilka Lake which has been partly operating for the last 7 years. Similar action has been taken by Saurashtra, Madras and Bombay.

The wholesale markets where a system of auction prevails continue to be in a primitive condition particularly in Calcutta and it is futile for the producers to expect a fair deal from the present set-up. Excepting a licence from the Government of Bengal, there is no regulation of the market and the wholesalers sell fish under extremely insanitary conditions.

The Central Ministry has taken up this question and it is likely that the new fisheries law will take care of this aspect.

Price control: There is at present, no regulation to enforce price control at different levels. There is also no control on export and import except under the general policy of Government revised from time to time, licenses being given to individual cases on their own merits. Export and import duties also are regulated periodically.

Supervision in the markets is confined to the Municipal Health Officer and his staff which is not adequate.

There is little effort as yet to do quality grading but technological research has been taken up by the Central Fisheries as well as the State Departments of Bombay, Madras, Bengal and Orissa to utilize various by-products. Shark liver oil is being produced commercially in all the maritime States. Orissa has been able to finalize the technique for production of agar-agar, and hydrolysed protein. Central Fisheries have evolved a cheap method of producing good quality fish meal. Frozen fish industry has developed in Bombay and Malabar coast. Experiments in freezing and frozen fish storage have been taken up in Orissa and the Central Food Technological Research Institute is carrying out experiments in packaging. India has received assistance from the FAO and other organizations to provide marketing experts who have studied the problem visiting the States individually and have given their advice.

16.2 Factual Survey of Fishermen's Cooperatives

There is little to add to this section subsequent to the reports sent for the training course at Hong Kong. Substantial development of cooperatives in the fisheries sector has not taken place in the country as a whole or on a regional basis.

Bombay has 101 fishermen's cooperatives with a total share capital paid up amounting to Rs. 10,017,454/—. Number members are 25,484 and they have incurred loans as below.

Government loan.....	Rs. 242,240
Cooperative Bank Loan	Rs. 502,250

Madras has 196 cooperatives with a total paid up share capital of Rs. 190,021/— and a membership of 23,855. The loan incurred is Rs. 359,480/—.

16.3 Credit Facilities

The rural credit survey has taken some account of Fishermen's Cooperatives but as yet adequate credit facilities are not available to Fishermen's Cooperatives. Cooperative Banks require adequate security which precludes majority of fishermen's combines to get loan. The State Governments, have, in a few cases, advanced loan against security on gear at their own risk but necessarily such amounts are limited. In Bombay, the rate of interest varies

between 5 to 6½ per cent as charged by Cooperative Banks. Government loans are charged at 5½ per cent. In Madras there are 3 types of loans. Long term loans are for a period of 10 years, medium term loans are for 5 years and the third type is for construction of godowns. In all cases an interest of 5½ per cent is charged.

16.4 Fishermen's Cooperative Societies in Madras State

The Cooperative principle can be applied to all branches of economic life. Just on the model of village rural credit Cooperative Societies for agriculturists, Cooperative Societies for fishermen, inland and marine have been organised, under limited liability basis with the object of acquiring and holding water courses such as rivers and tanks by purchase or lease for catching fish by members jointly or individually; to purchase or hire modern craft and tackle for increasing the catches by deep sea fishing; to purchase or hire quick transport vans for better marketing of fish and for the joint sale of their products. There are 179 Fishermen's Cooperative Societies in Madras State.

The fishermen in Madras State are mostly poor and many of them are indebted to money lenders, merchants and middle men within or outside their community. In their poverty and indebtedness, many fishermen are unable even to own a country craft or tackle, not to speak of any modern equipment for fishing. With a view to relieve them of their indebtedness and to provide them with crafts and tackles a scheme was drawn and approved by the Government. This scheme provides for the grant of long term ten year loans to the fishermen through Fishermen's Cooperative Societies for the following purpose :

- I (a) for clearing partly their prior debts to money lenders ;
- (b) for mainly purchasing fishing equipment such as crafts and tackles and other requisites for fishing ;
- II (a) for purchasing motor vehicles for transport of fish ;
- (b) for purchasing or constructing buildings such as godowns, curing sheds and tanks for the storing or processing of fish or fish products and

- (c) for purchasing, constructing and for erecting machinery, plant or other appliances for demonstration of improved methods of fishing and for the preservation, processing or marketing of fish or fish products.

Only fishermen, who are members of registered Fishermen's Cooperative Societies are eligible for those loans.

Under the scheme each society has been granted loans to 40 members not exceeding Rs. 500/— per member or Rs. 2,000/— per working unit and not exceeding Rs. 20,000/— per society. The loans are granted to fishing units, comprising generally of three or four members on the personal security of two or more members of solvency or on the mortgage of unencumbered immovable property belonging to the borrower or borrowers. The fishing equipment such as craft and tackle purchased out of the loans shall be mortgaged to the Society. The crafts and tackles for the purchase of which the loans have been issued shall be purchased within one month from the date of issue of the final instalment or within 3 months from the date of issue of the first instalment; whichever is less. Loans amounting to Rs. 2.70 lakhs were disbursed to 26 Fishermen's Cooperative Societies and 832 fishermen were benefited by the loans in 1956-57. Out of the loan of Rs. 2.70 lakhs, a portion has been utilized by the fishermen for discharging of prior debts and a major portion has been utilized for purchasing crafts and tackles. A short term loan of Rs. 15,000/— was also given to Periatthalai Fishermen's Cooperative Society as a relief measure to tide over the famine caused by failure of fishing season.

A Fishermen's Cooperative Marketing Society was organized and started on 7.10.58 at Mettur Dam in Salem District. There are about 313 members with a paid up share capital of Rs. 1,755/—. For managing the affairs of the Society and to attend to marketing of fish, writing up accounts, the services of one Senior Inspector and one Junior Inspector of Cooperative Societies are placed at the disposal of the Society free of cost. Loans amounting to Rs. 13,500/— were issued to 118 members for discharging prior debts and for purchasing crafts and tackle during 1956-57. 243 members have taken licences for fishing

in the Reservoir during 1957-58 and all the licencees are members of the society. They market their entire catches through the society since 1957. The daily coverage on the catches is 1,200 lbs including the periods when catches are poor or nil on account of the very high or low level of water in the reservoir.

For the second year of the second five year plan, viz., 1957-58, the Government has sanctioned the following loans and subsidies.

- | | |
|--|---------------|
| 1. Long term loans to 20 Fishermen's Cooperative Societies at the rate of Rs. 12,000/— per society repayable in 10 years. | } Rs. 240,000 |
| | |
| 2. Long term loans to two federations at the rate of Rs. 2,000/— per federations one for S.A. District and another for Kanyakumari District. | } Rs. 4,000 |
| | |
| 3. Long term loans to Cooperative Societies and federations for construction of godowns, curing sheds, etc., at the rate of Rs. 2,000/— per society or federation. | } Rs. 25,000 |
| | |
| 4. Medium term loans to fishermen at the rate of Rs. 200/— per member repayable within 5 years. | } Rs. 40,000 |
| | |
| Subsidy to Cooperative Societies and Federations for construction of godowns etc., at the rate of Rs. 2,000/— per society or federation. | } Rs. 25,000 |
| | |

A major portion has been drawn and disbursed and the balance also will be expended before 31.3.58.

16.41 Assistance to Fishermen's Cooperative Societies

Mechanized boats (called Pablo boats) and nylon nets have been given to the following Fishermen's Cooperative Societies and Federations for deep sea fishing on loan and subsidy basis and the loan portion is recovered in easy instalments without interest.

Name of Society	Pablo boat No.	Value Rs.	Nylon nets and Terylene, Qty, Net Nos. Yds./Lbs.	Webbing supplied Value Rs.
1. Porto Novo Fishermen's Cooperative Society	1	10,000	— 150	— 1,615
2. Sonankuppam Fishermen's Cooperative Society	2	20,000	— 217	— 2,600
3. Killai Fishermen's Cooperative Society	1	10,000	— 150	— 1,450
4. Tinnevely District Fishermen's Cooperative Federation	7	70,000	67 382	17,225 9,544
5. Kasimodu Fishermen's Cooperative Society	2	20,000	6 230	867 2,300
6. Ayothiyakuppam Fishermen's Cooperative Society	1	10,000	3 110	443 1,050
7. Mattankuppam Fishermen's Cooperative Society	2	20,000	6 226	867 2,260
8. Madras District Fishermen's Cooperative Society	2	27,000	10 123	2,257 1,100
9. Colochal Fishermen's Cooperative Society	2	20,000	48 25	8,512 240
10. Ramnad Dt. Fishermen's Cooperative Federation	2	27,000	— 300	— 2,900
11. Tanjore Dt. Fishermen's Cooperative Federation	2	20,000	— 300	— 2,900
12. Pulicat Fishermen's Cooperative Society	1	10,000	30 7	2,408 67
	25	261,000	(—)	61,212 20,401 40,808

Quick transport motor vans have been given to the following societies on hire-purchase basis. There is no subsidy for vans, but the cost is recovered in monthly instalments in a period of 7 years with interest at 4½%.

1. The Ennore Fishermen's Cooperative Societies.
2. The Andikuppam Fishermen's Cooperative Societies.
3. The Tirunelvely Fishermen's Cooperative Federation Ltd., Tuticorin.

4. The Parvatha Rajukula Fishermen's Cooperative Society, Tanjore.

The department also maintains motor vans for hiring out to fishermen for transport of fish from the landing centers to the consuming centers. The following cooperative societies have taken advantage of this facility for the benefit of their members.

1. The Vallambedu Fishermen's Coop. Society.
2. The Kanathur Reddikuppam Fishermen's Coop. Society.

3. The Mettur Dam Fishermen's Marketing Society.
4. The Ennore Fishermen's Coop. Society (in addition to the van purchased by the society on hire purchase system).

16.42 District Fishermen's Cooperative Federations

To develop the activities of the Fishermen's Cooperative Societies, settle matters of common interest such as procuring facilities, purchasing of yarn, logs, boats etc. and in general act as agents of the societies central organizations called District Fishermen's Cooperative Federations have been started at Madras, Tanjore, Ramnad, Tuticorin and Kanyakumari. A Federation for South Arcot District has been registered and will be started soon. A Federation of inland societies in Chingleput and North Arcot Districts is under organization. One of the main objects of the Federations is to provide facilities for modern methods of marketing which will include quick handling, quick transport, preservation of fresh fish, etc. The societies selected and brought under the loan scheme have contributed between Rs. 600/- to Rs. 1,000/- each as share capital to the Federations. In addition to the above share capital Government has also granted share capital loans of Rs. 2,000/- to each of the Federations which are repayable after 5 years in ten half-yearly instalments.

A scheme for the constitution of the Fishermen's Distress Relief Fund modified and approved by the Registrar of Cooperative Societies, Madras is implemented through fishermen's Cooperative Federations. The object of the fund is to grant relief to a member or members of the fishermen's families who meet with accidents disabling them totally to carry on the profession or if he dies while engaged in fishing. The members who join the fund or their families are eligible for cash relief not exceeding Rs. 250/- in each case.

16.43 Housing for Fishermen

Under the Harijan Welfare Scheme a subsidy of Rs. 14,000/- has been sanctioned for constructing 28 houses in Kasikoilkuppam in Chingleput District, where 28 fishermen lost their houses in a fire accident at Rs. 500/- per house. According to the scheme, the cost of a house excluding the site is Rs. 750/- out of which Rs. 500/- is given as subsidy. The balance is contributed by the beneficiary in cash or in the shape of labor. The local Fishermen's Cooperative Society has undertaken the construction of all the 28 houses on behalf of the 28 fishermen who are all members of the Society.

In addition to the financial aid given by Government by way of long and medium term loans; supply of crafts and tackles on loan and subsidy basis; supply of motor vans for transport of fish are hire-purchase basis, i.e., District Cooperative Central Banks also extend credit facilities for periods from one to three years.

The Madras District Cooperative Central Bank helped the following societies in the city.

S. No.	Name of Society	Amt. borrowed	Period of loan
1.	Kasimedu F.C.S.	1) 1,000	15 months
		2) 2,000	15 months
	Fixed deposits of members	Rs. 1,800.	12 months
2.	Mattankuppam F.C.S.	1) 4,050	12 months
		2) 10,000	36 months
		3) 9,745	36 months

In addition to this the Society has secured fixed deposits for periods from five to ten years amounting to Rs. 3,100/- from members and non-members.

3. Royapur F.C.S. 1,000 cash credit.
4. The Madras Dt. Coop. Federation. A cash credit of Rs. 6,400 is sanctioned to the Federation to enable it to buy and stock the requirements of the feeder societies like yarn, sail cloth, coir webbings, etc., etc.
5. Thiruvailukam F.C.S. 3,000
6. Audikuppam Fishermen's Coop. Societies F. D. from non-member 1,000

The Conjeevaram Central Bank has agreed to give loans up to two times the paid up share capital of members.

The Ramnad District Cooperative Central Bank has given Rs. 15,000/- as medium term loans to the Mookaiyur F.C.S.

The fishermen in Madras State are economically, socially and educationally backward and the Cooperative Central Banks generally feel shy to lend to Fishermen's Cooperatives.

But the impression that the loans lent to fishermen's cooperatives will prove bad is

gradually being dispelled as it is proved by experience in Madras city that the Fishermen's Societies do not lag behind other Societies in the matter of fulfilling their obligations. But the supervising staff had to work intensively by visiting their societies daily to achieve this result.

The credit facilities made available to Fishermen's Cooperative societies during the first two years (1956-57 and 1957-58) of the 2nd Five year plan are as follows:—

	1956-57 Rs.	1957-58 Rs.
1. Long term loans	270,000	244,000
2. Medium term loans		40,000
3. Loans for construction of godowns, curing sheds, etc.		25,000
4. Subsidy for construction of godowns, curing sheds, etc.		25,000
5. Hire purchase loans on Pablo boats		194,000
6. Hire purchase loans on nylon webbings and terylene yard		40,808
7. Subsidy on boats		70,000
8. Subsidy on webbings and twine		20,404
9. Other sources of finance		
i) Deposits from members and non-members		5,900
ii) Cash credit from Central Banks		7,400
iii) Loans from Central Banks		29,795
10. Govt. Grant for construction of houses to fishermen at Rs. 500/- per house		14,000

17. JAPAN

17.1 Governmental Financial Assistance for Small Coastal Fishermen

Of the total gross tonnage of about 160,000 powered fishing vessels now in operation in Japan, 95% is occupied by small boats under 20 gross tons. In regard to large fishing boats, under the fisheries reconstruction and rehabilitation program after the war, a speedy increase and improvement has been seen in their number and efficiency. But as regards small fishing boats, though a remarkable increase was shown in their number to cope with the food crisis and aggravated inflation in postwar days, they, after a decade from their construction, are now involved in certain inevitable difficulties such as replacement, improvement of efficiency and capacity, etc.

In the case of large boats, their operators, whose financial status is generally high, can raise funds comparatively easily for the construction through common routes of financing institutions. But it is very difficult for the operators of small boats to borrow such funds. In view of such miserable conditions of small fishermen, the Government has initiated since 1956 a 5-year program of special loan facilitation for coastal fishermen, by which 80% of the expenses for replacement of boats and improvement of their efficiency is to be loaned through the cooperatives of which they are members.

This financial assistance is granted to small coastal fishing boats under 15 meters in length for (1) construction, acquisition or improvement of boat, (2) remodeling of engine, (3) equipment of radio, fish finder or generator.

The grant of loan is decided after due consideration of the proposed benefits of fisheries management and the present business status of the cooperative concerned as well as the

correlation with other fisheries development projects.

The results of this program in 1956 and 1957 are as follows:—

	No. of Cooperatives	No. of boats	Business funds
Applicants:			
1956	303	3,887	2,499
1957	348	3,561	1,697
Granted Cases:			
1956	254	2,791	1,388
1957	340	3,194	1,464
Performances:			
1956	85	482	177
1957	241	1,681 1/	563

1/ includes that number of boats for which loaning was granted in 1956 but whose performance was carried forward in 1957, as well as the member of those whose performance is carried forward in 1958.

18. PHILIPPINES

18.1 FAO Training Center in Fisheries Cooperatives and Administration

Three Philippine Government Officials, two from the Bureau of Fisheries and one from the Agricultural Credit and Cooperative Financing Administration, participated in the FAO Training Center in Fishery Cooperatives and Administration held in Sydney and Adelaide, Australia, from 16 December 1957 to 25 January 1958.

18.2 Functions of Middlemen and Cooperatives

The survey of the functions of middlemen and cooperatives has passed the planning stage. Actual survey, however, cannot be carried out due to lack of funds.

A former Professor of Economics of the University of the Philippines, who helped in laying out the plan for the survey, organized a 15-person group, representing different sectors of the Philippine fisheries industry, e.g., fishing boat owners and/or operators, fish pond owners, fish wholesalers, etc., for an observation tour of the fishery cooperatives and marketing system of Hong Kong from July 9 to 17, 1958.

This is the first of a series of observation trips to be organized for the purpose of acquainting that sector of the public which deals directly with the production and marketing of fish. These projects are aimed at selling the

cooperative idea to these influential group of people so that their support may be depended upon on whatever plans the government may introduce in the future.

The observation-trip, although a private undertaking where expenses were met from a common fund contributed by each participant, had the sanction of the Philippine Government and negotiations were made on a government-to-government level.

18.3 Available Background Information, Publications, etc. on Fishery Cooperatives

In the preparation of the forthcoming Training Center in Fishery Cooperatives and Administration, FAO was supplied with background information, publications, etc. on fishery cooperatives of the Philippines.

18.4 Fishermen's Cooperative and Credit Facilities

Information regarding fishermen's cooperatives were sent to FAO in answer to a questionnaire received by this Office prior to the opening of and in connection with the Training Center in Fishery Cooperatives and Administration held in Australia.

Information on credit facilities will be forwarded to the Chairman, Panel C, Technical Committee II upon completion of report from the pertinent offices of the Philippine Government.

19. REPORT ON GOVERNMENT CREDIT FACILITIES FOR FISHING INDUSTRIES IN THE INDO-PACIFIC REGION

Among the resolutions adopted at the Seventh Session of the Indo-Pacific Fisheries Council in Bandung, Indonesia, in 1957, was one relating to credit facilities for fishermen in the Region. It was recommended specifically that a factual survey of these facilities be undertaken during the inter-session period "with special reference to the present forms of credit, the rates of interest or return, the forms and extent of securities required as well as the effectiveness of the existing credit facilities".

In order to facilitate the collection of relevant information, copies of the attached outline on "Government Credit Facilities for Fishing Industries" with a request to supply factual information under the specific items in the outline were circulated to the members of Technical Committee II, Panel C, by the Technical Secretary (Attachment II).

Information on the specific items of the outline was received from the following countries: Australia, Ceylon, Hong Kong, Indonesia, Pakistan, the Philippines and Thailand. In addition, information of a fragmentary nature was made available by India.

The report presented below is based on information provided by the above countries supplemented by data available from other sources. Naturally, since the survey was confined to government facilities, it does not furnish a complete picture of credit operations. In some countries commercial banking institutions and non-institutional lenders are of substantial importance as credit sources. In Japan, for instance, cooperative credit is well developed and a considerable amount of loans are made to fishermen by the cooperative banking system composed of the Central Bank for Agriculture and Forestry, the prefectural credit federations of fishery cooperative associations, and the loan operations of the cooperative societies themselves. It is hoped that the information provided here for government facilities can eventually be expanded to include commercial and non-institutional credit to make possible an overall appraisal of the credit situation. Before one can proceed to this task it will be necessary to complete the information on government

facilities and for this reason, those countries which have not already complied with the Technical Secretary's request for information are requested to do so within the near future. Upon receipt of the additional information, this report will be revised and a comprehensive account of government credit in the fisheries prepared.

19.1 Legislation

Among the countries on which information is available only the Philippines, some of the States in the Australian Federation, Indonesia and Japan have some form of legislation pertaining to the organization of Government credit institutions and/or to the provision of specific financial assistance by the Government.

In the Philippines, ACCFA*, a Government financed institution for the extension of loans to cooperatives including fishermen's cooperative associations, was established by an Act in 1952. The Philippine National Bank which is partly and the Development Bank of the Philippines which is totally financed by the Government, and which were chartered by special Government Acts, can also provide loans to fishermen.

In Australia, the Commonwealth Government under the "Fishing Industry Act, 1956" has established the "Fisheries Development Trust Account" from which loans to fishermen can be made. The "Government Guarantees Act, 1934-43" and the "Fisheries and Oyster Farms Act, 1935-1957" in New South Wales, the "Loans to Producers Act" in South Australia, and the "Industries Assistance Act" in Western Australia, are legislative measures under the terms of which financial assistance to the fishing industry by the State Government or by Government financed banking institutions can be rendered.

The Farmers and Fishermen's Bank in Indonesia was established by the Emergency Act of August, 1957, and in August, 1958, an Act on the Farmers and Fishermen's Bank was sponsored by the Government and the Parliament, replacing the former Act.

* ACCFA (The Agricultural Credit and Cooperative Financing Administration)

In Japan, the Agriculture, Forestry and Fisheries Finance Corporation Law was established in 1952 to make Government funds available to the primary industries including fisheries. Besides this law, there are several additional acts under the provisions of which Government assistance to the fishing industry can be granted, e.g. funds to cover damages suffered from typhoons and other natural disasters and loans to small-scale fishermen on guarantees by certain financial bodies reinsured by the Government under the provisions of the "Medium and Small Fishermen Finance Guarantee Law".

Although financial assistance is made available to the fishermen in Ceylon, Hong Kong, Pakistan and Thailand, no specific legislation was reported for these countries.

19.2 Extent and Form of the Funds

In Hong Kong, there are three revolving funds two of which are administered by the FMO (Fish Marketing Organization), and one by the Department of Agriculture, Fisheries and Forestry. Under the FMO, a Revolving Loan Fund with a ceiling of HK \$ 800,000 was established from the Organization's reserve funds. The other fund amounting to HK \$ 31,000 donated by CARE has been loaned out for the specific purpose of assisting the shrimp fishermen. The revolving fund administered by the Department of Agriculture, Fisheries and Forestry amounts to £ 50,000 (HK \$ 798,000) which are intended for the mechanization of the inshore fishermen's vessels.

ACCFA of the Philippines administers revolving funds of \$ 50 million (100 million pesos) which are used for loans to agricultural producers and fishermen.

Thailand reports that the revolving funds available for fishery loans amount to 5 million bahts.

The recently established "Farmers and Fishermen's Bank" in Indonesia is reported to have 100 million Rp. for loan purposes.

In Ceylon, a fund is voted annually by Parliament for the purpose of extending loans to the fishing industry. In 1957/58 provision was made up to a sum of Rs. 350,000/-.

In the Federation of Malaya, a revolving fund of M \$ 3 million for loans to fishermen through their cooperative societies was approved in September, 1956. Priority in extending loans

has been given to the east coast of Malaya where a pilot fish marketing scheme has been carried out.

19.3 Purposes for which Credit is Granted

19.31 Credit to Fishermen

Most government loans to fishermen are extended for the purchase of gear and for the acquisition or improvement of fishing craft and engines.

The recently established "Farmers and Fishermen's Bank" in Indonesia is reported to have 100 million Rupiahs for loan purposes as an initial capital.

In Hong Kong, FMO provided loans to fishermen for the purchase of craft and gear and also for any other productive purpose, while the Department of Agriculture, Fisheries and Forestry provides loans solely for the purchase and installation of diesel engines and/or winches.

In the Philippines, the Philippine National Bank (P.N.B.) extends loans to fishermen for the purchase of craft, gear and for operating expenses. The Development Bank of the Philippines provides loans only for the construction of fish ponds. Though ACCFA has the power to provide funds to fishermen according to the statute under which it was established, in present practice it extends loans only to fishery co-operatives and not to individual fishermen.

In Japan, the total sum to be financed by the Agriculture, Forestry and Fisheries Financing plan for fisheries in 1958 amounts to about 4,600 million yen, of which 330 million yen is financed for fishing ports, 3,500 million yen for fishing boats, 120 million yen for fish culture industries 250 million yen for ice-making and refrigerating facilities and 290 million yen for synthetic fiber fishing nets. A gradually increasing trend is seen year after year in the amount of loaning.

Provision of fishing requisites to fishermen on a loan basis is reported by Pakistan and Indonesia. In Pakistan, nylon twine, engines, and wood for building boats are supplied on credit by the Government. In Indonesia, the Special Welfare Scheme of the Central Sea Fisheries Service provides fishing vessels and engines to the fishermen on a hire-purchase basis, while the Farmers and Fishermen's Bank extends loans to fishermen for the purchase of

gear, fish fry, craft, operating expenses and for other fishery purposes.

Thailand provides loans for the purchase of engines, gear and craft as well as for craft improvement.

The Fish Board of Queensland (Australia) assists *bona fide* fishermen with loans for purchase of craft, engines, and gear. Financial assistance is also reported by New South Wales, Victoria (Rural Finance Corporation), Tasmania (Agricultural Bank), and South Australia (State Bank, for the purchase of boats and engines).

In Ceylon, loans are extended to fishermen for the purchase of gear (including materials for the manufacture of gear) or for the purchase and construction of craft and for the mechanization of wind propelled craft. Since August, 1958, a new scheme which provides for the extension of loans up to an amount of Rs. 15,000/- for the purchase of mechanically propelled boats, a reasonable amount of fishing gear, and for the cost of the first year's insurance on the boat, is in operation. Loans are also issued for repairs to fishing gear and craft.

In Japan, loans to fishermen are extended by the Agriculture, Forestry and Fisheries Financing Corporation for the purpose of purchasing or constructing craft, while the provision of loans for operating expenses has been left to co-operative or other credit facilities. The Corporation also extends loans to small fishing firms for the purpose of purchasing fishing craft. Fishery cooperatives and their members, however, are given preferential treatment in the granting of loans.

It was reported that in the State of Bombay, India, loans for mechanization of fishing craft and other developmental purposes were granted to fishermen under "State-Aid to Small-Scale and Cottage Industries Rules, 1935, (as amended up to 28 February 1955)". Fishermen have to form a group of 6 to 10 fishermen who must be members of a local fishermen's cooperative society and do fishing collectively to be eligible for loan grants.

19.32 Credit to Processors, wholesalers and Retailers

There are comparatively few government financial assistance measures for processors, wholesalers and retailers. Government resources are devoted primarily to the furtherance of

cooperative activities. No governmental credits to processors, wholesalers and retailers are reported for Hong Kong and Thailand.

In the Philippines, the P.N.B. extends loans for operating expenses to processors, wholesalers and retailers and also for the purchase of processing facilities, while the Development Bank of the Philippines (D.B.P.) extends loans for equipment for the preservation of fish and fish products.

The Pakistan Industrial Finance Corporation and the Agricultural Bank extend loans to companies for the construction of freezing units, cold storage, ice plants, fish meal plants, etc.

In Indonesia, the Farmers and Fishermen's Bank finances wholesalers and provides funds for assembly operations, for transport facilities, etc. Besides, several funds are also available for the same purpose. These funds are provided by the Institute of Credit Guarantee, and Cooperative Service of the Ministry of Trade.

In South Australia, the State Bank gives loans to approved companies for the improvement of processing facilities.

19.33 Credit to Cooperative Organizations

In Ceylon, loans are issued to fishery cooperatives for the acquisition or construction of craft and the acquisition or manufacture of gear. Loans are also issued for repairs of fishing craft and gear, for marketing operations and for subsistence expenses of members. In a few instances, loans have been issued, too, for the purchase of motor lorries and the construction of sheds for the storage of fishing gear.

In the Philippines, ACCFA at present extends credit only to cooperative organizations (FaCoMa-Farmers' Cooperative Marketing Association and CCE-Central Cooperative Exchange). Facility loans to FaCoMa are used for the construction or purchase of facilities for handling, storage, processing or packing of fish or fish products. Mechanizing loans to both FaCoMa and CCE are used for the purchasing and processing of the catches of their members.

In Hong Kong, FMO extends loans to cooperatives for the construction of homes for their members as well as for the purchase of mechanized transport vessels.

In Japan, the Agriculture, Forestry and Fisheries Financing Corporation gives preference to co-operative associations in lending money for the construction of port facilities, fishing vessels and various facilities such as cold storage, ice and processing plants and for the purchase of synthetic fiber nets.

In the State of Bombay, India, financial assistance to fishermen's cooperative societies is given for establishment of ice and cold storage plants on the basis of one-third of the cost of the plant as subsidy and two-thirds on loan.

In the State of Madras, India, the Government provides the cooperative societies with mechanized boats and nylon nets at subsidized prices in the form of long term, interest free loans in kind. The subsidy on these goods ranges from 25 to 33½ per cent. Motor vans are also supplied on seven-years' credit, and long-term loans for the construction of godowns and curing sheds are provided by the Government to the societies on the basis of 50 per cent loans and 50 per cent subsidy.

Aside from the loans made directly to them, the cooperatives are often used for channeling government loans and assistance in kind to their member fishermen. This function is performed by cooperatives in Pakistan where gear and engines are imported by the Government and loaned to the fishermen and in Indonesia where vessels and engines are provided mostly to members of co-operatives, on a hire-purchase basis, by the Special Welfare Scheme of the Sea Fishery Service and in Japan.

19.4 Proportion of Total Funds Required Represented by the Loan

The proportion of total funds required represented by the loan varies from country to country, and also according to the nature of the loan.

Factors considered are financial standing of the borrower, possibilities of borrowing from other sources, and the size of the funds at the disposal of the government lending institutions.

FMO in Hong Kong provides loans amounting to 80-90 percent of total funds required, the balance to be provided by the fishermen. In the case of loans made by the Department of Agriculture, Fisheries and Forestry, no fixed proportion is stipulated and

each case is decided on its individual merits. It is said that applications are more favourably received from those fishermen who are able to put up more than 50 percent of the capital required.

From Ceylon it is reported that in general the loans cover total cost.

In the Philippines, not more than 80 percent of total funds required are provided for ACCFA facility loans, but for facilities made of steel or concrete, and also for fish containers, 100 percent of cost can be advanced. In the case of commodity loans, 80 percent of cost are provided. For loans made by the Philippine National Bank and the Development Bank of the Philippines, no fixed proportions were reported. In general the amount of a loan depends on the value of the collateral and the loan can be made up to approximately 60 percent of appraised value.

In Thailand, the proportion of total funds required represented by the loan is 60 percent, and in Indonesia, in the case of loans made by the Farmers' and Fishermen's Bank, in excess of 75 percent.

In Japan, the Agriculture, Forestry and Fisheries Financing Corporation normally provides 60 percent of total funds required, but as much as 80 percent can be provided to fishery cooperatives for the purchase of fishing craft. In most cases the minimum or maximum amount per loan is established by law, in accordance with the purpose for which the loan is made, in order to secure equitable distribution of funds and at the same time to make lending operations efficient.

In the State of Bombay, total cost of new engines is granted by the Government on the basis of 50 percent grant and 50 percent loan. The rate of subsidy is reduced to about 40 percent if the engine purchased is of an expensive nature or above 30 h.p.

19.5 Interest Rates

One of the important purposes of government credit facilities is to supply credit at reasonable rates of interest to the industry where institutional credit facilities are scarce and high rates of interest are charged.

In Ceylon, 3 percent interest is charged to individual fishermen, while 2 percent is charged to registered co-operative societies.

In Hong Kong, FMO charges 3 percent per annum on the loans issued to fishery co-operative, and 10 percent per annum on those issued to individual fishermen; while the interest rate on loans for the mechanization of fishing craft made by the Department of Agriculture, Fisheries and Forestry is 6 percent per annum.

In the Philippines, the Philippine National Bank and the D.B.P. charge 6 percent per annum, with a rebate of 1 percent for the loans repaid in time in the case of loans made by the former. The interest on ACCFA loans differ according to their purposes: 8 percent per annum for facility loans, 6 percent for commodity loans, and 7 percent for merchandizing loans.

Eight percent per annum is the interest rate on government loans in Thailand.

In Pakistan, the Government does not charge any interest. In Indonesia, interest rates are 12 percent per annum on both Institute Credit Guarantee and Farmers and Fishermen's Bank loans. The rates are relatively high, since funds for these purposes have to be obtained from other banking institutions. The Cooperative Service of the Ministry of Trade extends credit and loans on easier terms and lower interest.

In Japan, the interest rates on the loans extended by the Agriculture, Forestry and Fisheries Financing Corporation vary according to the purposes of the loans. Interest is 6.5 percent on loans for building fishing port facilities, 7.5 percent on loans for building processing facilities. In cases in which loans are extended for repair or reconstruction of facilities damaged by natural disasters, interest rates are lowered by 0.6 percent.

In the State of Bombay, the interest charged is $4\frac{1}{2}$ percent per annum and a penalty equivalent to $\frac{1}{2}$ percent is imposed in case of non-payment of principal and default of interest.

In the State of Madras, India, interest charged on long term loans to cooperatives is $4\frac{1}{2}$ percent; no interest is charged on the cost of mechanized boats and nylon nets.

19.6 Arrangements for Collateral and Requirements Made of Beneficiaries

Fishermen who, as a rule, own few immovable assets find it difficult to furnish adequate collateral. In most instances, the

security for the loans is the equipment purchased. In other instances, emphasis is on productive and repaying capacity of the borrower, particularly when, as in Hong Kong, the fishermen are required to deliver the catch to a central marketing organization (FMO in Hong Kong) which has adequate information on the credit standing of the fishermen and where effective arrangements for repayments of loans have been instituted.

Loans by the FMO in Hong Kong are issued to any fisherman who owns one or more fishing vessels. Size of loan depends on applicant's actual needs, his ability to repay, his standing with the organization and so forth. So far, only one loan extended for the purchase of trawlers has been secured by a mortgage and the usual arrangements for security are for the individual fishermen borrowers to provide one or more fishermen guarantors. In the case of borrowers being members of credit co-operative societies, the loans are guaranteed by the societies. When the FMO loan exceeds HK \$ 1,000, the Director of Marketing is to be informed by the Department of Marine, should the borrower desire to have a transfer of ownership of his vessel recorded before the loan is fully repaid. Insurance arrangements are made only in special cases when specifically required by the Director of Marketing. Loans extended by the Department of Agriculture, Fisheries and Forestry do not have to be secured by mortgages but have to be guaranteed either by a cooperative or by two fishermen of good financial standing. The Director of Marine is informed that the Government has a financial interest in the boat and the Department of Agriculture, Fisheries and Forestry has to be notified if the fisherman borrower wants to register a change of ownership before the loan is fully repaid. The engine is supposed to be insured by the fisherman for the amount outstanding on his loan.

In the Philippines the criteria for the selection of beneficiaries, applied by the Philippine National Bank, are reported as follows:

- (i) The moral reputation and credit standing of the applicant.
- (ii) The liquidity and solvency of the applicant.
- (iii) Assets offered as collateral.
- (iv) Estimated income of the applicant.

Loans of the Development Bank of the Philippines are granted to those (a) who already own established fish ponds but want to improve them to increase production, and (b) who desire to engage in the fish pond business and have already secured from the Government a ten-year fish pond lease agreement covering the area they want to develop into fish ponds. As to collateral arrangements, mortgages on land, buildings and other fixed insurable assets are usually required by the P.N.B. and the D.B.P. while insured fishing vessels, engines and equipment, and stocks are also used as collateral. In the case of ACCFA loans, security is arranged as follows: facility loans are secured by mortgage on the facility, except in the case of loans for fish containers which are secured by a real estate mortgage or a chattel mortgage on a fishing boat. Merchandize loans are secured by chattel mortgages on assets of FaCoMa or CCE. Commodity loans are secured by the products stored by FaCoMa and the warehouse receipts are filed with ACCFA.

In Pakistan, only *bona fide* fishermen owning fishing boats can be given credit. Allocation committees have been organized to develop procedures for the distribution of credit. Two guarantors are needed for obtaining loans and the boat of the borrower is also mortgaged. At present, the loans are not insured.

In Thailand, the loan is secured by a first mortgage on boats.

In Indonesia, the Special Welfare Scheme of the Sea Fisheries Service extends loans on a hire-purchase basis, while in the case of loans by the Institute of Credit Guarantee, Farmers and Fishermen's Bank a mortgage or other collateral is required together with insurance arrangements.

In Japan, the common practice is to secure mortgages on facilities and fishing craft. Usually four guarantors are required for the loans on fishing craft.

In the State of Bombay loan recipients are required to furnish collateral security equal to double the amount loaned. The mortgage remains in force until the last instalment on the loan and all interest due have been repaid. Vessels for the purchase or construction of which loans have been granted must be insured and an assignment of the policies in favour of the Government must be executed.

In Ceylon, loans to cooperative societies are issued on the basis of the borrower's estimated repaying capacity. Repaying capacity is determined from the operational statements of the societies by further taking into account the estimated increase in income which is expected as a result of the purchase of new equipment or as a result of the repairs made to existing equipment. Loan applications are scrutinized and investigated by the field staff of both the Fisheries Department and the Cooperative Department. Craft and gear which is acquired, constructed or repaired is hypothecated to the Cooperative Provincial Bank. In the case of loans issued to Fishermen's Cooperative Credit and Sales Societies, the individually owned craft or gear of the members acquired, constructed or repaired with the loan as hypothecated by the members to the society as security. Some of the recently registered fishermen's cooperatives are incorporated with unlimited liability. Craft and gear belonging to societies and on which loans are issued are not normally insured.

In the case of loans to individuals, where the loan does not exceed Rs. 500/-, the craft or gear owned or acquired by the borrower is mortgaged to the Government and a personal bond for repayment on time of the debt is furnished in addition. In the case of loans to individuals of Rs. 500/- to Rs. 3,000/-, the borrower is required to mortgage craft or gear in addition to furnishing a personal bond with two sureties for due repayment of the debt. In the case of loans to individuals over Rs. 3,000/- the borrower is required to mortgage land with acceptable title to the Government as security for the repayment of the loan. Loans to individual fishermen for the financing of craft and gear must be insured with an insurance company approved by the Department. Under the new loan scheme for the mechanization of fishing craft introduced in August, 1958, no other security is needed than the boat, the ownership of which is retained by the Government under a hire-purchase agreement. The new scheme aims to make borrowing by fishermen easier, since under previously existing arrangements fishermen had to put up collateral in the form of immovable property for loans in excess of Rs. 3,000/-. The new scheme is intended to serve the dual purpose of providing credit as well as serving as propaganda for

mechanized fishing. Persons to whom these loans are issued:

- (a) must be skilled, industrious and enterprising fishermen who are not satisfied with earning an income just sufficient for subsistence, but are prepared to better their income by the use of new methods and hard work or, in the case of newcomers to the industry, they must be energetic and enterprising persons;
- (b) must be sufficiently outstanding in the fishing community in providing the initial leadership and in furthering the program of mechanization in the fishing community.

Applications for these loans, too, are inquired into and reported on by the field officers of the Fisheries Department.

19.7 Repayment Procedures

In Hong Kong FMO loans normally are not extended for periods of over one year. However, an extension may be granted if borrowers encounter genuine hardships. In the case of larger capital loans, the repayment period may range from five to ten years. Repayments are made by deducting a certain percentage from the proceeds of sales of the borrower's fish through the FMO. The percentage deducted varies from 15 to 20 percent in accordance with the borrower's ability to repay. The by-laws of the association and the loan agreement stipulate the deductions applicable in case of loans to fishermen's cooperatives and their members. In the case of loans made by the Department of Agriculture, Fisheries and Forestry, the duration of the repayment period is two years, but again extensions are granted in cases of genuine hardships. Deduction of 25 percent of the value of fish sold by the borrower through the FMO is made on behalf of the Department of Agriculture, Fisheries and Forestry.

In Ceylon, terms of loans are as follows:

- (a) Acquisition of a mechanically propelled boat under the new scheme.....5 years
- (b) Purchase or acquisition of craft.....3 years
- (c) Mechanization of craft.....3 years

- (d) Purchase or manufacture of fishing gear.....2 years
(Under the scheme of loans to individual fishermen loans for the purchase or manufacture of fishing gear are repayable in one year)
- (e) Repairs to craft or gear.....1 year
- (f) Marketing and subsistence....1 year
- (g) Other equipment, e.g. equipment for the processing of beche-de-mer.....1 year
- (h) Sheds.....1 year
- (i) Motor lorry.....5 years

Payments are made in monthly instalments. Payments are normally received during the months of the fishing season which may extend over 4, 6, 10 or 12 months. In the case of cooperative societies, collections are made through the Cooperative Provincial Banks. In the case of individual fishermen, collections are made through the Department's field staff.

In the Philippines, duration or repayment period varies from case to case. Short-term loans made by the P.N.B. are for a period of 120 days to one year, while long-term industrial loans are for a period of 5 to 10 years. In the case of the D.B.P. loans which are usually for long-term the repayment period is 5 to 10 years. On ACCFA facility loans the repayment period is 10 years for fixed facilities, 5 years for semi-permanent facilities, 3 to 5 years for movable facilities and one year for fish containers. As to the timing of repayment of the ACCFA loans, the Government policy is to have the loan repayments adjusted to the borrower's capacity to pay from the sales of his products.

In Pakistan, the repayment periods are 2 to 3 years for nylon twine, and 3 to 5 years for marine Diesel engine loans. Repayment is made monthly but recoveries are not effected during the monsoon period (June, July, August). The fishing requisites and equipment loaned are distributed through the fishermen's cooperative societies concerned and collections, too, are effected through the societies. In case of any difficulties encountered in the repayment of instalments, the fishermen's cooperative societies are helped by the Department of Fisheries and the Registrar of Cooperative

Societies, who is also empowered to proceed against defaulters. No defaults on loans have been reported as yet.

In the State of Bombay, the repayment of loans commences three months after the loans are made. The loans are repayable in equal monthly instalments over a period of five years, each instalment being payable in the first week of each month. No repayments are required during the monsoon season from June through September.

In Thailand, the repayment period is two years and the payments are made every three months, either directly to the Department of Fisheries or to the Provincial Fisheries Officers.

In Indonesia, in the case of the Institute of Credit Guarantee, long-term loans are for up to six years and loans for operating expenses for three years. In the case of the Special Welfare Scheme of the Sea Fishery Service, the payments are collected by the cooperative organizations, should the borrower belong to one of those organizations. The Farmers and Fishermen's Bank at present extends only short-term loans (for one year or shorter) and in places where fish auctions are held the payments are deducted from the proceeds of the sale of the borrower's fish.

ATTACHMENT I. JAPANESE BIBLIOGRAPHY ON FISH FLOUR FOR HUMAN CONSUMPTION

by

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(Attached to this Bibliography is a copy of Recommendations of Fish Processing Technology, Production of Fish Flour, as contained in the Interim Report of the Council of Food and Nutrition for the Nation, Economic Stabilization Board, Japan, 23 May 1947)

A. Processing Techniques of Fish Flour for Human Consumption

(1) Refining fish flour by solvent extraction.

(a) Hot alcohol extraction for removal of offensive flavor and odor:

- (i) Tokuyama, S. (1930). Japanese Patent No. 87,847. This method has the advantage of removing both water and fat. High cost of extraction is a serious disadvantage.

- (ii) Hoshino, S. and Higashi, H. Japanese Patent No. 97,398. A method using alcohol in combination with other organic solvents.

(b) Cold extraction with solvent such as gasoline or benzene.

- (i) Kato, N. (1935). Japanese Patent No. 112,993.

- (ii) Kato, N. (1936). Japanese Patent No. 115,730, 116,546 and 117,357.

- (iii) Yamamoto, S. and E. Narita (1941). An experimental preparation of the powdered fish of the old-free-sardines for cooking. *Fishery Investigation, Imp. Fish. Exp. Stn.*, 8: 55-56.

(c) Purification by NH_3 .

- (i) Higashi, H. (1943). Japanese Patent No. 154,593. NH_3 gas is passed through the flour; the material is stirred with 5 times its weight of hot water; the

extract removed; the residue is refined fish flour. Although this method is not so perfect as the above two in extraction, most of the disagreeable taste can be readily removed with less expensive arrangements.

- (ii) Nagata, K. (1931). Japanese Patent No. 92,431. A method similar to (c) (i) but uses sodium carbonate instead of NH_3 gas.

(2) Method using malted rice for removal of offensive odor.

- (i) Mechizuki, O. (1927). Japanese Patent No. 79,588.

- (ii) Shoji, S. (1946). Japanese Patent No. 172,083.

(3) Oxidation for bleaching, deodorizing and sterilizing,

- (i) Fujii, T. (1930). Studies on the utilization of hydrogen peroxide. *Nippon Jozo Kyokai Zasshi*, 33: 1118-1119.

- (ii) Mochizuki, O. (1927). Japanese Patent No. 74,887.

- (iii) Oshima, K. and T. Sugawara (1936). On the artificial oxidation of oil in fish meal. *J. Fish.*, 39: 1-12.

(4) Prevention of rancidity with antioxidants.

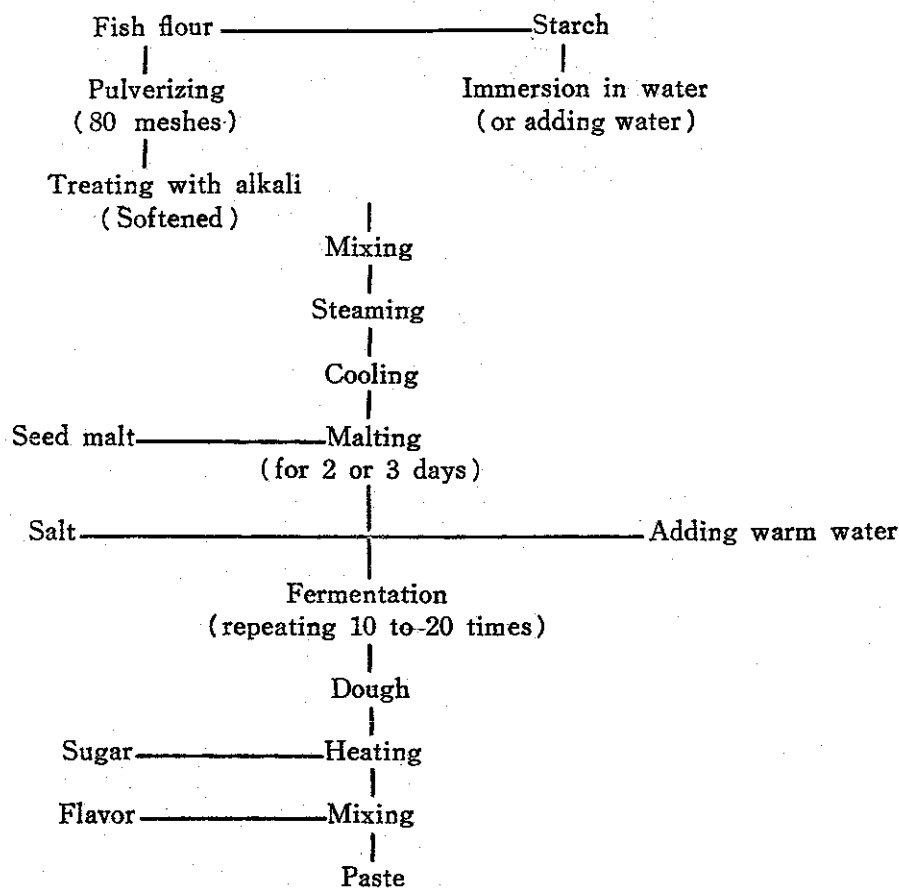
- (i) Kimura, K. and S. Oya (1939). Processing method of antioxidizing fish meal. Japanese Patent (Publ.) No. 4,932.

- (ii) Oya, T., T. Ando and Y. Usui (1939). Studies on the sardine meal-IX. Antioxidation of fish oil with wood-tar. *Bull. Jap. Soc. Sci. Fish.*, 7: 217-219.
- (5) Fish meal which can be reconstituted as fresh fish.
- (i) Tamaru, S. (1928). Japanese Patent No. 76,628.
- (ii) Hirano, H. (1939) On the gelation of fish (A preliminary report). *Bull. Jap. Soc. Sci. Fish.*, 8: 29-40.
- (iii) ——— (1942). Studies on powder of raw fish. *J. Imp. Fish. Exp. Stat.*, No. 12: 53-91.
- Describes method for production of fish flour which, upon adding water, is converted to more or less fresh state. However, this type of fish flour cannot be preserved for a month or more, even when it is perfectly dry.
- B. *Processing Technique of Food with Fish Meal as Material.*
- (1) Preparation of "furikake" and "dembu". No specific scientific references are available (IPFC/C58/WP 6).
- (2) Baby food formula prepared from fish flour. Standard prescribed by the Japanese Association for Baby Food and Nutrition is as follows:

Formula A		Formula B	
Soybean	50%	Starch	70%
Corn starch	41%	Casein	10%
Fish flour	8%	Fish flour	20%
Salt	1%		

- (3) Mixture of fish flour and potatoes or starch.
- (i) Higashi, H., S. Masuda, and E. Narita (1947). Japanese Patent No. 176,216.
- Refined fish meal (ca. 10%) is mixed with starch and heated until dry. The starch content is changed into alpha-starch. Upon adding water, the powdered product, preservable for a length of time, becomes sticky and it good to eat.
- (4) Fish meal paste.
- (i) Higashi, H. and T. Nitta (1948). Japanese Patent No. 179,040.
- (ii) ———, K. Nagakura, and S. Umemoto (1952). Studies on the utilization of fish meal for food. *Bull. Jap. Soc. Sci. Fish.*, 17: 147-156.
- (iii) Nitta, T., Y. Inui and M. Suzuki (1948). The discrimination of fish meal paste and soy bean paste. *Bull. Jap. Soc. Sci. Fish.*, 13: 251-253.
- During the War, fish meal paste was produced for use on bread so as to utilize a large amount of fish as food.

Flow Sheet



Ingredient (%) of Fish Flour Paste

	Paste A	Paste B
Fish flour	23.0	17.8
Starch	23.0	17.8
Salt	14.0	5.9
Water	35.0	16.5
Sugar	5.0	42.0

- (5) Processing fish flour into amino acid or amino acid source. Amino acid source prepared from flour was used as a substitute for soy bean preparation.

Matsumoto, K. and M. Nomura. Experiment of producing a soy bean source substitute from fish meal. *Jozo Shikenjo Hokoku*, 128: 297-308.

C. *Nutritive Values of Fish Meal and Products thereof.*

- (i) Nakae, T. (1939). Fish meal for food-II. Protein of sardine meal *Jozogaku Zassi*, 17: 184-191.
- (ii) ——— (1959). ——— -III. Decomposition of sardine meal by hydrochloric acid. *Ibid.*, 17: 234-237.

- (iii) ——— (1939). ——— -V. Method of decomposition of sardine meal by HCl. *Ibid.*, **17**: 701-708.
 - (iv) ——— (1940). ——— -VI. N-compounds in extract from sardine. *Ibid.*, **18**: 29-35.
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 - (vi) ——— (1940). Fish meal for food-VIII. Precipitation of protein from extracts of fresh sardine. *Ibid.*, **18**: 504-16.
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 - (ix) Tokuyama, S. (1936). Studies on the new utilization on marine fishes-I. Feeding experiments of animals on exclusive diets of bread and biscuit containing the alcohol-extracted fish-flour. *Bull. Inst. Phys. Chem. Res.*, **15**: 818-846.
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INTERIM REPORT OF THE COUNCIL
OF FOOD AND NUTRITION FOR THE NATION
ECONOMIC STABILIZATION BOARD, JAPAN
RECOMMENDATION ON FISH PROCESSING TECHNOLOGY

23 May 1947

Production of Fish Flour

(1) Fish caught abundantly should be used. For this purpose it is recommended that the fish should be processed as much as possible into fish flour. The term fish flour is used to mean powder made from fish which is suitable for human consumption. Unless otherwise specified, the standard of fish flour is tentatively prescribed below :

- (i) Protein.....more than 59%
- (ii) Crude fat..... less than 10%
- (iii) Water content..... less than 10%

However, the product which is prepared from herring, Atka mackerel or arrow-toothed flatfish should contain at least 56% protein, less than 15% crude fat and no alien substance such as sand.

(2) Fish cake so far used for animal feeding should be refined and processed into fish flour or any other form of food for human consumption.

(3) In order to improve the quality of fish flour and thereby to promote human consumption of the product, the following steps should be taken.

- A. To ensure freshness of raw material, mobile processing facilities, such as fish flour factory ship or train should be provided. By-products from fish flour such as boiled juice and fish oil should be thoroughly utilized.

For this purpose model plants will be established at important fishery centers in the country.

- B. Rational use of fish flour should be encouraged.

- (a) in introducing fish flour into the human diet, it would be more suitable to process the flour into some product rather than to supply it as it is ;

- (b) processing of fish flour into paste or some other seasoning should be encouraged ;

- (c) in addition, specially refined fish flour should be used in the formulae for baby food.

- C. Research into processing techniques for fish flour should be encouraged so as to improve the quality. This may include studies on smoke curing of the flour and production of reversible fish flour which can be easily converted into fresh state.

- D. Attention should be paid to minimize production cost of fish flour so as to make it as cheap as possible.

ATTACHMENT II.
 OUTLINE ON
 GOVERNMENT CREDIT FACILITIES FOR FISHING INDUSTRIES

1. **Legislation.**
 - 1.1 Legal enactments under which credit facilities may be made available to fisheries. (Attach copies if possible).
 - 1.2 Extent and form in which funds made available, eg. revolving fund, annual subvention, etc.
 2. **Administering Authorities.**
 - 2.1 Central authority eg. Government Department, Development Authority or Agency, Finance Corporation, Special Bank, Loan Board, etc.
 - 2.2 Provincial, State or local authorities which may be concerned with administration of credit facilities.
 - 2.3 Cooperative organizations which may be involved and nature of their responsibilities.
 3. **Purpose of Credit Facilities : to assist:**
 - 3.1 Fishermen.
 - 3.11 For purchase of gear.
 - 3.12 For acquisition or improvement of craft.
 - 3.13 For any other purposes.
 - 3.2 Merchants, processors and retailers.
 - 3.21 For facilities eg. storage, processing, transport, containers, business premises.
 - 3.22 For any other purposes.
 - 3.3 Cooperative organizations.
 - 3.31 For acquisition of facilities.
 - 3.32 For operating expenses.
 - 3.33 For any other purposes.
 4. **Nature of Assistance Provided in Cases Mentioned Above.**
 - 4.1 proportion of total cost represented by the loan.
 - 4.2 Any grants which may be included.
 - 4.3 Interest rates.
 - 4.4 Security arrangements :
 - 4.41 Under Hire Purchase agreements.
 - 4.42 By mortgage.
 - 4.43 By other collateral.
 - 4.44 Insurance arrangements if any.
 5. **Repayment Procedures.**
 - 5.1 Duration of repayment periods.
 - 5.2 Timing of payments.
 - 5.3 Collection arrangements.
 6. **Criteria and Procedures for the Selection of Beneficiaries.**
 7. **Review of progress achieved so far, including some account of services, facilities and equipment acquired through government credit arrangements, in relation to overall requirements.**
 8. **Outstanding problems and any suggestions as to action which might usefully be taken by IPFC in this connection.**
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CHAPTER 4. PUBLICATIONS

1. Council Proceedings

(i) The Council instructed the Secretariat to take appropriate action to ensure the printing and distribution of the Proceedings of the Eighth Session as expeditiously as possible.

(ii) The Council approved for publication, in full, Technical Papers Nos. 1, 3, 4, 5, 8, 9, 11, 12, 16, 17, 19, 21, 23, 24. The Secretary was instructed to transmit Technical Paper No. 22 to FAO Fisheries Division with the request that it might be edited by the appropriate specialist and returned to the Secretariat for publication in full.

Technical Papers 6 and 7 were to be published in full if the complete manuscript was made available, otherwise these Papers together with Nos. 2 and 10 should be published in abstract. It was recommended that Working Paper No. 5 and Technical Papers 25 and 26 should be published in the *Current Affairs Bulletin*, that Technical Paper No. 14 should be incorporated in the report on the Status of the Industry, that Technical Paper No. 13 should be referred to the Ceylon Fisheries Research Station for publication in their Bulletin, and that Technical Papers 15, 18 and 20 should be returned to the authors. The Council instructed the Secretary to issue, in the Occasional Papers series, Contributed Publications Nos. 8, 20 and 24, being translations of papers originally published in the Indonesian language and with a very restricted distribution. The Council considered it desirable for the Secretariat to take steps to obtain translations of the papers on fisheries subjects published in the Region in languages other than French and English and to arrange the distribution of such translations in the Council's Occasional Papers series.

2. Eighth Session Symposium

Following discussion on the question of publication of the Symposium Papers, the Council decided on a basis of the recommendation from the Delegate for U.K., supported by the Delegate for India, that the Symposium material be forwarded to Dr. G.L. Kesteven on a basis of the second paragraph of his letter dated 4th December, 1958.

The Council confirmed a proposal by the Delegate for U.S.A. that this action should be taken on the understanding that the Symposium material should be published in time for distribution with the other sections of the published proceedings of the Council and that if this was not possible, the Secretariat was instructed to undertake publication of the Symposium Papers which had been presented to the Council during the Symposium Meetings.

It was emphasized that the Council attached considerable importance to the publication and distribution of this section of the proceedings simultaneously with the distribution of the other sections of the proceedings.

3. Current Affairs Bulletin

In order to ensure a steady flow of material for the *IPFC Current Affairs Bulletin*, the Council recommended to the Member Governments to make available as routine matter to the editor their periodic reports on scientific and technical activities in fisheries.

In this connection, the Member Governments might like to consider the desirability of assigning a liaison officer through whom the IPFC will obtain material for the Bulletin. This officer will assemble material in that particular country and send it to the editor of the Bulletin as and when it becomes available. It will be understood that this arrangement is in no way to effect the status of the Administrative Correspondent who will under all circumstances be the means of contact on matters of policy involving the Council and the Government concerned.

The Council was of the opinion that its activities through its Technical Committees would receive added impetus if the nominees to these Committees would make available lists of the scientific workers and administrators active in the various fields of fisheries, and that the Secretariat should work in close liaison with FAO Fisheries Division in connection with the Division's permanent register of such people.

Country lists received from Committee members should be published in the *Current Affairs Bulletin* and where appropriate, the Technical Secretaries would take steps to keep these workers informed of the various measures taken to implement Council recommendations.

4. Reference Books

Notwithstanding the statement to the contrary given in the Summary Report of the Seventh Session, the Council placed on record its unanimous belief that, in order to avoid confusion, reference books containing compilations of methods should be termed "Manuals", whereas the term "Hand-books" should be applied to volumes containing compilations of results and/or tabulations of data. Further it was agreed that compilations of these two might be referred to as "Reference Books".

The Council noted with pleasure the progress being made by FAO in the preparation of

these books of reference and drew attention to the particular suggestions submitted by Technical Committee I and contained in Chapter II of this record.

The Council gave consideration to the question of publication of checklists of fishes and urged Member Governments who have not yet compiled or published lists or have revised their earlier lists, to provide Biology Branch, FAO Fisheries Division with such lists or revisions. Further the Council requested Fisheries Division, FAO to publish, as least in draft form, a checklist which should include the names of all commercially important aquatic animals, before the Ninth Session.

CHAPTER 5. TECHNICAL ASSISTANCE

1. Training Centers.

(i) The Council noted with pleasure that its request that FAO should arrange a training center for technical officers had been implemented by the establishment of the International Training Center on Methodology and Techniques of research on Mackerel (*Rastrelliger*), the report of which was presented to the Council.

The Council noted that certain recommendations arising from this Training Center are for action by FAO and expressed the hope that FAO will be able to undertake this work.

The Council noted that the Training Center would have benefited by the participation of scientists from countries fishing for Mackerels other than *Rastrelliger* and believes that the need will arise for further opportunities of reviewing progress in this work.

The Council recommended that Member Countries and FAO should explore ways and means by which research workers, including at least some of the participants at the recent Center, could meet in about three years' time to appraise the results obtained from the application of the recommendations from the Center and suggested that such a Meeting should be conducted as a workshop at which results would be compared and analysed further if necessary.

(ii) The Council agreed that the forthcoming Training Center in Fishery Statistics, to be held in Bombay early in 1959, would help to meet the requirements of the Seventh Session recommendation for the development of suitable sampling techniques for the collection of fishery statistics in the Region, and therefore, recommended that Member Governments take full advantage of this Training Center.

(iii) The Council expressed the view that a Fisheries Survey Training Center for countries of the Region was desirable and recommended that the Center should deal with the formulation of coordinated programs for fisheries development. The Council recommended that participants at this Training Center should be fisheries officers directly concerned with the planning of fisheries development programs in their respective countries.

(iv) The Council expressed its appreciation to FAO for the successful completion of the International Training Center on Fisheries Cooperatives and Administration held in Australia and recommended that Member Governments should take steps to make full and effective use of the services of the participants to the Center in furthering fisheries cooperative activities in their countries.

(v) The Council expressed the view that there was some need to review the present system of organizing Training Centers, and that except in relation to scientific subjects, the needs of the Region may sometimes be more effectively served by National Training Programs assisted where appropriate by services provided by other aid-giving agencies. The Council also requested the aid-giving Agencies to consider the desirability of organizing Sub-regional Training Centers for groups of 3 or 4 countries with one common language and having similar problems of fisheries.

The Council was of the opinion that international Special Training Centers could be an effective tool in expeditiously defining the salient features of the fisheries industry in this region. It was recommended that participants in such Special Training Centers should be experienced fishery officials actively connected with the field to which a particular Special Training Center may devote itself and that the participants should go to the Center prepared with all available background information, research results and experiences in the implementation of development programs. It was further recommended that arising out of the exchange of views and ideas at such a Center suitable measures would be recommended for remedying the defects in the industry and for effecting a general improvement.

(vi) The Council reviewed its recommendation made at its Seventh Session to FAO for organizing a Regional Training Center in Fish Processing and Preservation. Considering the economic and dietetic importance of cured fish in the Region and further considering the present needs of the fish curing industry for expeditious improvement, the Council agreed that it would be desirable for the proposed Training Center to limit itself to Fish Curing in Humid Tropics with special reference to the

Indo-Pacific Region, instead of covering the wide field processing and preservation. The Council suggested that this Training Center should primarily aim at defining as precisely as possible, the defects in the fish curing industry and in suggesting suitable remedial measures.

The Council recommended that participants to this Training Center should be selected from those fishery officials in the member countries who are actively engaged in research in fish curing and in the administration of the fish curing industry. The Member Governments were requested to send, where possible, two participants, one from the field of research and the other from administration.

In preparation for this Training Center, Member Governments should compile all available information.

- (a) for the preparation of as complete an account as is possible of the fish curing industry, furnishing information, among other factors, on manpower, plants and equipment, capital investment, quantity of raw material utilized, processing methods, varieties and quantities of final products, methods of handling, storage and packaging, consumer preference for various products, price of these products as compared to those of other protein foods;
- (b) an account of research so far conducted in the various aspects of the fish curing industry; and
- (c) an account of the measures so far implemented and/or contemplated for improving the fish curing industry.

2. Aid-giving Agencies

The Council reviewed the account of FAO fisheries activities in this region and expressed its appreciation of the assistance rendered.

The Council did not have for examination any records or activities of other aid-giving Agencies, namely, Colombo Plan Authorities, USOM, and the Indo-Norwegian Foundation, which have been active in this region. The Council would be pleased to receive their periodic reports if these could be made available.

Arising out of the discussions in this aspect, the Council felt that there was a strong need for coordination of activities of the various aid-giving Agencies. The Council suggested that these Agencies might consider the desirability of regional meetings of their representatives for an exchange of ideas and views in order to ensure the most effective utilization of the assistance that might be available.

The Council was strongly of the view that considerable time and funds of the contributing Agencies as well as the recipient countries should be saved if prior to launching any extensive technical assistance programs, an independent survey of the biological, technological and particularly the economic aspects of the industry is organized jointly by the parties concerned, and the nature and extent of the assistance are based on the findings resulting from such a survey.

3. Expert Assistance

In respect of expert assistance, the Council felt that there was a need for close examination of the requests for such assistance in the light of the national program and policy for development as well as of the facilities available in the recipient countries for the effective utilization of such assistance. The Council further felt that it might be desirable for the contributing Agency to indicate the requirements of local facilities in the form of counterpart or understudy, transportation laboratory, equipment, literature as well as counterpart funds. The assistance should normally be made available only when the concerned contributing Agency is satisfied that such requirements as are indicated by it, are available.

CHAPTER 6. RECOMMENDATIONS

An attempt has been made to consolidate, in this chapter, the Recommendations adopted by the Council during the 8th Session. These recommendations are grouped according to whether they are addressed to Member Governments, FAO, the Executive Committee and Secretariat or the Technical Committees. The recommendations as presented here, have been stripped of unessential phrasing.

A. TO MEMBER GOVERNMENTS

Council Procedure

(i) The Council decided that in view of the FAO program for expanding the coverage and distribution of the *Current Bibliography of Fisheries and Aquatic Sciences*, there was no necessity for the Council to continue its bibliographic activities in the field of fisheries biology, marine science and fisheries technology after the meeting of the Ninth Session, and that no further nominations of Bibliographic Correspondents would be sought.

(ii) The Council recommended that, at the next Conference of the FAO, Member Governments might request FAO to make a definite appropriation in respect of IPFC publications and that the members of the Council should be advised of FAO's decision as early as possible before the next Plenary Session of the existence of such an appropriation. The Council in Plenary Session should then decide priorities of publication in respect of Council Documents.

(iii) The Council adopted an amendment to the Agreement to permit the Council's Plenary Sessions to be held at intervals of two years. The voting was as follows: 11 delegations in favour; 1 against, with two communications in favor received in writing by the Secretariat; 3 countries abstained from communicating their opinions to the Council. The 13 votes in favor of the amendment gave the required majority.

(iv) The Delegate for the Netherlands tabled a proposed amendment of the Agreement which would permit future amendments of the Agreement to be passed on a basis of a two-thirds majority of Member Governments represented at a Session. The Secretary was

instructed to circularize Member Governments on this matter.

(v) The Council recommended that Member Governments should include in their official Opening Statements a list of the important problems, given in the order of priority that each country would like to see assigned to them by the Council; that these Opening Statements should be transmitted to the Secretariat at least 60 days before the forthcoming Council Session; that the programme of work of the Technical Committees should be based on these lists of problems together with the recommendations from the previous Session and that provisional programs including these two features should be submitted to the Council in Plenary Session.

(vi) The Council resolved that in view of the fact that much of the Council's work is of a continuing nature, it is felt desirable that delegations from Member Governments should include at least one member who has had previous experience in Council Sessions. Member Governments are accordingly requested to give consideration to this matter when the question of appointing delegations to attend Council Plenary Sessions or Technical Meetings is under review.

The Council recommended that the proposal for inter session meetings should be forwarded to Member Governments of the Council with indication of the administrative and financial implications. The Council requested that the views of Member Governments should be presented at the 9th Session of the Council.

The Council placed particular emphasis on the need for continuity of representation and strongly urged Member Governments to give serious consideration to the two proposals set out in Chapter 1, para 82 and 86.

The Council recommended that Delegates on returning to their respective countries, should emphasize particularly one or more of the Council's recommendation which they consider would be implemented by their Governments and they should particularly seek authorization and means to implement these selected recommendations.

2. Indo-Pacific Fisheries Year

The Council decided that the concept of a "particular year" be dropped from consideration, and the problem referred to the new Special Sub-Committee on Statistics. In so doing, the Council expressed its adherence to the basic philosophy of the Indo-Pacific Fisheries Year, namely, that the collection of adequate statistics is an urgent matter, and should be pursued with all possible speed by Member Governments.

3. Age Determination of Fish

The Council hoped that member nations will report results in this area as their research on age determination of fish is completed.

4. Standardization of Plankton Nets

The Council recommends that Marutoku B-type nets be used during the period between the 8th and 9th Sessions of the Council to conduct experiments designed to obtain comparative data regarding the effectiveness of different kinds of plankton nets in catching zooplankton organisms, fish eggs and also fish larvae. The results of such experiments should be reported to the 9th Session, at which time the next step in standardization of sampling gear should be discussed. The mode of conducting the experiments and a schedule of the minimum results required are given in Annex 2 of Chapter 2.

Member countries, such as the Philippines and U.S.A., who are already in possession of comparative data, are requested to submit an analysis of them to the 9th Session of the Council.

5. Identification of fish and plankton

The Council urged members who have either not published lists so far, or have revised their earlier lists to submit copies to the Biology Branch, Fisheries Division, FAO.

6. Population Dynamics

The Council noted progress in population studies reported by some member countries, all of which are requested to continue to inform the Council of their work on fishing and stock assessments, and particularly with regard to river populations and cultivated stocks.

7. Fish Culture in General

The Council stressed the importance of fish culture research in the region and recommends that Member Governments be asked to consider how the work of the Council might be made more effective in this field and make proposals in this respect for consideration at the 9th Session of the Council.

8. Soil Composition in Fish Ponds

The Council urges that India continues its work in this field and requests that the results obtained, together with information about techniques used, be reported to the 9th Session of the Council.

9. Introduction of Non-Indigenous Fish

The Council recommends to Member Governments that:

- i. considerable research should be carried out before any legislation in respect of introduction of non-indigenous species of fish is enacted.
- ii. research on *Tilapia mossambica* should be continued, both in fish ponds and natural bodies of water, and the results reported to the next Council Session.
- iii. where possible research should be undertaken on common carp (*Cyprinus carpio*) with particular attention to specification of the varieties dealt with and the countries from which they originated, with the aim of finding criteria to determine which variety is most suitable for particular habitats. The results should be reported to the next Council Session.
- iv. research should be continued on the spawning of Chinese Carp, with special reference to the production of their fry.

10. Weed Control

The Council recommends that further work be carried out to evolve a suitable and economic method of controlling growth of weeds in fish ponds. Interested Member Governments may study further or examine whether the grass carp (*Ctenopharyngodon idellus*) would be useful in keeping down the growth of submerged aquatic weeds in their countries.

Member Governments are requested to continue to report to the Council the results of their work in this field until such time as the Council considers the time is appropriate for a further general review of the matter.

11. Nutrition of Fish under Cultivation

Papers on nutritive value of natural and artificial foods and quantities eaten by cultivated fish are solicited for the 9th Session of the Council.

12. Chanos

Member Governments are requested to submit reports on new developments in *Chanos* fisheries to the 9th Session of the Council. It was decided, however, to suspend the activities of the Chanos Sub-committee pending promulgation by the Council of a plan of action with regard to the broad problems of fish culture, as suggested under that general heading in this report.

13. River Basin Development

The Council recommends that Member Governments be apprised of the importance of this problem. Surveys should be carried out on notice being given of impending construction of dams, and the sites should be cleared before water is allowed to accumulate, in order to facilitate subsequent exploitation of the reservoir. The Council stressed the need for continuing biological surveys after the completion of the project. Legislation should in each case be enacted to ensure that such surveys are carried out, that their costs are borne by the Development Authority and that recommendations arising from them are given due and proper consideration. The results of such surveys should provide the basis of action by the Government Agency concerned, designed to protect existing fisheries or develop new ones. The attention of Governments and International Agencies concerned is drawn for example, to this need with respect to the lower Mekong Basin Development Project, which will affect the fisheries of four countries.

14. Water Pollution

The Council recommends that Member Governments be urged to take early steps to enact legislative measures to protect the interests of the fisheries well in time.

15. Hilsa

The Council proposed that Burma might reconsider setting up a research unit at an early date.

It is proposed that the Hilsa Sub-Committee should continue its work along the lines laid down at previous Council Sessions.

16. *Rastrelliger*

It is recommended that member countries fishing for *Rastrelliger* implement without delay the proposals contained therein for standard techniques of research on *Rastrelliger*. The Council noted that these proposals are entirely consistent with Article III of the Council Agreement.

All member countries, and especially those having important fisheries or conducting research on Mackerels, are requested to study the more general recommendation (other than those dealing with subjects covered by separate proposals in this report) contained in the report of the Training Center and report on the feasibility of their implementation to the 9th Session of the Council.

Particular attention is drawn to the proposal that participating countries should send records of their length sampling operations to the Council's Secretariat for compilation and publication in suitable manner. The form given in the Training Center Report should be used for this purpose.

17. *Mugil*

The Council noted with considerable interest the early results of experiments on artificial breeding of *Mugil* in Korea and solicits further reports at the 9th Session.

18. Study of Basic Productivity

The Council recommends that Member Governments having facilities and staff available at present for this work continue it and report their progress at the 9th Council Meeting, in particular those aspects which bear on the problems of standardizing the method for routine use.

19. Tuna

The Council recommends that Member countries continue to report to the Council new developments in the status of tuna fisheries and research, and reaffirms its recommendation

that the one-degree square should be the basic unit for the collection and presentation of tuna catch statistics.

20. Beach Landing Craft

An account of the work done by FAO in India and Ceylon on the development of mechanized beach landing craft designed to pass through moderate surf was studied in the form of Working Papers Nos. 5 and 27. It was appreciated that work to date had been of a trial nature and, as further conclusions were expected to be reached during the forthcoming inter-session period, it was decided that FAO should be requested to present its report at the next session of the Council. The FAO expert present explained how there is a vast difference between beach landing craft required to pass through surf and the type of vessel required to be beached in sheltered bays or in areas where there is little or only light surf; the latter class of boat being much cheaper to build. It was decided that the Council should obtain from Member Governments an indication as to whether they were interested in either beach landing and/or surf boats and, if so, details of the conditions under which such craft would be required to be used.

21. Training of Boatbuilders

The Council decided to urge Member Governments to appoint suitable well-qualified men as Craft Technicians, in the establishments of their Fishery Departments, to carry out this training work at the appropriate levels.

22. New Gear

The Council expressed the hope that Member Governments would make available to their fishery workers the necessary funds required to test light fishing and high opening trawls.

23. Symposium on Improved Types of Fishing

The Council therefore decided that the Government of India should be approached with a request that, in all cases where the stencils are still available, further copies of the papers of the Symposium on "Improved Types of Fishing from Small Mechanized Boats" might be produced for distribution to Member Governments.

24. Import of Fishing Gear

The Council recommended that due consideration should in future be given by Governments to extending credit facilities for the purchase of modern gear.

25. Certification of Fishing Gear

The Council considered that it was its duty to point out to Member Governments that the enforcement of many measures which rendered it necessary for fishermen to recruit certificated personnel from outside the fishing industry not only tended to delay progress but also introduced new social problems and was, in any case, usually unnecessary.

26. Food Technology Research

The Council recommends to Member Governments that prompt and adequate measures should be taken to apply results of research in the industry.

27. Spoilage of Dried Fish

It was observed that spoilage of dried fish to a large extent could be avoided by packaging dry fish in relatively moisture-proof materials. In this connection, the Council suggested that Member Governments might like to investigate the possibilities of using paraffin-lined paper bags or gunny sacks lined on the inside with bitumen.

28. Sanitation

Recognizing that improper sanitation in the fish curing and drying yards in the region are responsible to a considerable extent for the poor quality of the products, the Council recommended to the Member Governments to encourage the fish curing yards to introduce simple and practical measures of sanitation.

29. Fishery Products Manual

The Council decided to concentrate during the next inter-session period on the preparation of the *Fishery Products Manual*. It urged the Member Governments to cooperate with the Council and FAO in this respect.

30. Statistics Training Center

The Council therefore recommended that the Member Governments take full advantage of the Fishery Statistics Training Center. It also urged the Member Govern-

ments to utilize the services of the participants who will have been trained at this Center, in the practical application of the sampling techniques in their respective countries for collection of statistics.

31. Fishery Statistics

The Council suggested that Member Governments might consider the desirability of centralized collection of statistics. It was however specially stressed that such centralized statistical organizations should have on their staffs, officers specially trained in the collection of fishery statistics and that such officers should be made available for collection of statistics in fisheries in preference to those in other fields.

The Council repeated its recommendations to the Member Governments for implementing at least a minimum programme of statistics.

32. Cooperative Societies

The Council urged Member Governments to assist Fishermen's Cooperative Societies in fulfilling the requirements of:

1. Close cooperation of members.
2. Efficient management.
3. Economic turnover.

by educating the fishermen and providing loans where necessary. Governments assisting these societies should, however, exercise a minimum of control over them.

The Council was of the view that where organization of Cooperative Societies for undertaking marketing of fish and fishery products were not possible at present, the Government might consider the promotion of autonomous bodies as a temporary measure to undertake these activities until such time as the fishermen organized themselves effectively.

33. Survey of Credit Facilities

The Council noted that the Factual Survey of Credit Facilities to Fishermen is not complete, since information has not yet been furnished by some Member Governments. The Council decided to complete this report and requested the Member Governments to furnish the required information expeditiously. The Council requested Member Governments to supply information on sources and terms of available governmental and non-governmental credit facilities.

B. TO F.A.O.

1. Council Procedure

In connection with the coordination of work of the Technical Committees and Panels and to ensure continuity through the inter-session period and the succeeding session, the Council recommended for the attention of FAO that each Technical Secretary should be present at successive sessions of the Council. If this could not be arranged, then it would be advantageous if the Staff member assigned as Technical Secretary for any inter-session period could be present at the following session.

2. Reference Books

The Council examined the draft of a section of the "Handbook of Field Methods in Fisheries Biology" prepared by FAO Fisheries Biology Branch, and suggested that although it is useful for such a book to contain accounts of most well-tried methods, it should also give an indication of which method of several available for the same purpose is recommended for general use, and might be adopted as a standard, at least provisionally. The account of standard methods of water analysis circulated by FAO to the committee during the inter-session period, for comment, is very helpful; it should be generally distributed, and might form a pattern for accounts of methods in other fields. It was suggested that consideration be given by the authors of such accounts to the desirability of beginning each with an introductory section dealing with the means of attacking particular problems, and grouping together the set of methods used in attempting to solve each problem.

The Council was informed of progress made by FAO in preparation of other compilations of methods, and discussed the procedure by which mimeographed drafts could be reviewed by the Council so that amendments might be suggested which would make them conform more closely to the Council's requirements. It has been suggested that the Editor, should, for technical reviewing, enlist the aid of the most qualified and experienced persons in each field, wherever they might be, and then, when their suggestions have been incorporated in the text, the revised draft should be submitted to the Chairman of the Council who would request, for each book, a person or group of persons, working within the Region, to study

the draft with regard to its suitability for use by the Council, and advise him accordingly. These suggestions would then be forwarded to the Editor for incorporation in the published version. Notwithstanding the statement to the contrary contained in the Summary Report of the 7th Session of the Council, the Committee wishes to record its unanimous belief that, such compilations of methods be called "Manuals", and to avoid further confusion the term "Handbooks" be applied to compilations of results, as is the common usage. Combinations of the two might be referred to as "Reference books".

3. Age Determination

The Council recommends that Biology Branch, Fisheries Division, Rome, be requested to proceed with all possible speed in the preparation of a general review of age determination with particular reference to tropical problems; and recommends that the report include the following:-

- (i) Definition and discussion of the applications of age and growth data to practical fishery problems.
- (ii) Discussions of all possible methods of age determination in the tropics.
- (iii) With reference to (i) above, descriptions of alternate methods of solving problems that normally require age and growth data for their solution.
- (iv) Clear definitions of areas for further scientific investigation looking towards solution of the basic problems. These will serve as guides to the scientific programs of the several member countries.

4. Standardization of Plankton Studies

The Council recommended that FAO should make available prototypes of the simple modification of the Hardy Plankton Indicator, in order that countries having opportunities to arrange for the use of such a gear by fishing vessels or other craft may construct copies of it locally.

5. Identification of Fish and Plankton

The Council requests the Fisheries Division of FAO to publish its proposed

check-list, (which should include names of all commercially important aquatic animals) at least in draft form, before the 9th Session of the Council.

6. Bibliography

The Council recommended that FAO should consider and take action to produce a complete Bibliography covering Fisheries Science, Marine Biology, Statistics, Craft and Gear, Technology, Processing, Marketing and Socio-Economics, and that the Organization should take appropriate steps to coordinate their activities in this regard with the United States Fish and Wild Life Service in connection with the publication *Commercial Fisheries Abstracts* and current measures being taken in respect of the American Bibliographies related to Inland Sports Fisheries.

7. Fish Culture

Distribution by FAO of the review by E.D. Le Cren on the application of science to inland fisheries is awaited with interest.

8. Rastrelliger

Certain recommendations from the Training Center are for action by FAO, and it is hoped that FAO will be able to undertake this work.

The Council recommended, therefore, that consideration be given by the member countries and by FAO to finding means by which research workers, (including for continuity, at least some of the participants in the Center) can in about three years' time meet to appraise the results obtained from the application of the proposed techniques of study. Such a meeting should be conducted as a workshop at which results would be compared and analysed further if necessary.

The Council recommended that the report of the Training Center, with the relevant sections of this report appended, be published by FAO as soon as possible and widely distributed within the region. It should also be sent to interested workers elsewhere, particularly those concerned with Scombroid fishes.

9. Regional Office Staff

The Council decided to ask FAO, if it could explore ways and means of increasing the establishment of the Regional Office in

Bangkok by the appointment of one further Fisheries Officer who might be expected to specialize on craft and gear.

10. World Fishing Boat Congress

The Council decided that the Secretariat should write to Member Governments enquiring whether it was their intention to send a representative to the 2nd World Fishing Boat Congress and if so, whether it would be possible for the officer concerned to keep a watching brief on the interests of the Council.

11. Book on Boat Construction

At the previous session of the Council, FAO had been requested to study the possibility of producing a reference book on the techniques of construction of small fishing boats. The FAO officers present at the current session explained how although there is already a considerable amount of literature available, none of this has yet been incorporated in a book. The acquisition of funds and, also the period of time required, for producing such a book would present problems. The Council accordingly decided instead to request FAO to release whatever material it may have, if necessary, in mimeograph or pamphlet form.

12. Boiled Fish

The Council therefore directed the Secretariat to take adequate measures for the early publication of a comprehensive report on Boiled Fish in cooperation with FAO.

13. Preliminary Fishery Surveys

The Council requested FAO to ensure a wider distribution of this handbook on Preliminary Fishery Surveys and the Member Governments to promote its use, wherever possible. It further requested the FAO to establish direct contact with the fishery workers in the region to ascertain their experiences in the use of this handbook.

14. Middleman

Examining the Report on the function of the middleman contained in Volume 2 of the Report on the International Training Center on Fishermen's Cooperatives and Administration, the Council expressed the view that the Report is primarily based on preliminary observations made during a study currently

in progress in India (Bombay), Hong Kong and Malaya. The Council recommended that the study in these countries should be completed and that further extension should be considered after a report on this study has been examined. The Council also emphasized the necessity of close collaboration between Universities and other institutions with the Fishery Departments in pursuing this study.

15. Survey of Credit Facilities

The Council requested FAO to make a suitable questionnaire relating to non-governmental sources of credit available to Member Governments at an early date.

16. Fish Marketing

The Council requested FAO to organize a short Training Center for experienced fisheries officers directly connected with fish marketing in the member countries.

C. EXECUTIVE COMMITTEE AND SECRETARIAT

1. Technical Committee Meetings

The Council recommended that the Secretariat should be instructed to explore ways and means to ensure that the Technical Committees and Special Sub-Committees should meet at least once between plenary sessions.

It was also proposed that the possibility of holding sub-regional meetings should be explored.

It was agreed that the views of Member Governments should be sought and the Secretary should prepare a digest of these opinions which would be circulated to the Governments concerned.

2. Financial and Budget Report

The Council decided that a Statement of the Estimated Expenditure of the Council for the period following a proposed Plenary Session should be circulated to Member Governments along with the proposed Agenda for the Plenary Session not less than 60 days in advance of this Session.

This estimated expenditure should be annotated giving as far as possible a detailed analysis of expenditure under the four main items and it should be pointed out that such

expenditure proposals might be subject to modification by the Council in Plenary Session in accordance with further information which might then be available for presentation to the Council by the Secretariat.

The Council recommended that the Budget Estimated for 1960-61 should be presented to the Director-General, FAO.

The Council instructed the Secretariat to seek ways and means of reducing expenditure in connection with interpretation services, where possible, through the employment of locally available interpreters. Provision should nevertheless be made for expenditure adequate to ensure the employment of overseas interpreters if such local interpreters were not available.

The Council considered that if the proposal for inter-session Technical Committee Meetings was acceptable to Member Governments, provision should be made for Council expenditure in connection therewith and that such expenditure might in practice be covered by savings effected by the utilization of local interpretation services.

Symposium

The Council decided that the Symposium subject for the Ninth Session should be "How to formulate programs of fisheries research and technological improvements particularly in fish handling required for the implementation of national policies for fisheries development, and methods of assessing progress on these programs."

The Council instructed the Secretariat to render all possible assistance to the Convenor (Mr. D.J. Gates) in the preparation of the Symposium.

Amendment to the Agreement

The Delegate for the Netherlands tabled a proposed amendment of the Agreement which would permit future amendments of the Agreement to be passed on a basis of a two-thirds majority of Member Governments represented at a Session. The Secretary was instructed to circularize Member Governments on this matter.

3. Inter-session Technical Committee Meetings

The Council instructed the Secretary to transmit this proposal, with an indication of

financial and administration implications, to Member Governments and request that their views should be presented at the 9th Session.

4. Pre-Session Technical Committee Meetings

The Council directed the Secretary to explore the possibility of arranging for meetings of the Technical Committees to commence a few days in advance of the first plenary meeting of each Council Session in order to review work and finalize the report on the Technical Committees' activities conducted during the inter-session period.

The Council considered that this procedure would enable the Committees to give more detailed attention to the items on their respective agendas during the Council Session and in this way, increase the efficiency of the Committees' operations.

5. Time and Place of Ninth Session

No invitation having been received from Member Governments, the matter was referred to the Executive Committee in accordance with the provisions of the Rules of Procedure, Section II. The Council adopted a recommendation that the Ninth Session should be held during the last quarter of 1960.

6. Participation in International Meetings

The Council noted that included in IPFC/C58/WP 22, Schedule of Meetings of interest to IPFC, were meetings in which the Council could profitably participate through appointment of observers wherever possible. In this regard the Council directed the Secretariat to circularize the Member Governments with the reports of such observers including a list of documents presented and discussed at the concerned meetings. Member Governments could then directly contact the organizers of the meetings to obtain documents in which they might be interested.

7. Principles of Fisheries Policy

The Council requested the Secretariat to prepare a questionnaire on this subject for consideration by Member Governments and on a basis of the replies to this questionnaire, Occasional Paper 57/3 and Addenda and such other information as could be made available to prepare a draft for submission to Member Governments.

8. Standardization of Plankton Nets

The Council noted with pleasure that UNESCO had made available a grant sufficient to cover the cost of 12 Marutoku B type zooplankton nets. The Secretary was instructed to obtain these nets and send one to each member country which is not already in possession of such a net, and which will be able to use it, either for comparison with other kinds of gear during the next inter-session period, or lacking such other gear, to begin plankton survey work. The nets should be sent directly to the persons at addresses listed in Annex I to this report, together with an explanation of the recommended mode of use.

9. Fish Culture in Rice Fields

The Council deems it desirable to see the Rice Field Fish Culture Sub-Committee strengthened through the effective participating in its work of other member countries at present practising rice field culture, and instructed the secretary to solicit nominations from the Member Governments concerned.

10. Oceanography

The Secretary was instructed to enquire from member countries what other data are in existence and which have not been published or exchanged between member countries, and to report on the possible ways through which dissemination of this data to intended parties could be achieved. Due consideration should

be given to the discussions taking place outside this Council with regard to the compilation of oceanographic data on a world basis, and the Secretary is asked to prepare a report on progress in this field for consideration at the 9th Session of the Council.

11. Sardines

The 9th Session of the Council should consider the inclusion of sardine studies on the agenda of Technical Committee I, and it is hoped the Report of the sardine meeting would be available as a methodological guide.

12. UNESCO

The Council examined WP 13, Projects and Proposals relating to IPFC Region and was unable to express an opinion on the projects as the supporting documents were not available. The Council directed the Secretariat to keep Member Governments apprised of developments.

D. TECHNICAL COMMITTEES

Recommendations relating to the subject matter for consideration by Technical Committees I and II and their respective panels and for the special Sub-Committees are contained in Chapters 2 and 3 of this Report.

E. TECHNICAL ASSISTANCE

Recommendations adopted by the Council in relation to technical assistance are contained in Chapter 5 of this Report.

CHAPTER 7 REPORT ON THE STATUS OF THE INDUSTRY

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REPORT ON THE STATUS OF THE INDUSTRY

The Secretariat's report on the Status of the Industry is one of the basic documents for consideration at each session of the Council and Member Governments have, from time to time, been requested to supply information in connection with modern developments and with current problems related to the fisheries industries of their countries.

Owing to restricted travel budgets, it is seldom possible for the Regional Officers to complete visits to all countries within the Region during any given inter-session period. Hence for up-to-date information the office is compelled to rely on data presented by Member Governments.

Much of this data is of course available in departmental and institutional annual reports. However since in the majority of cases, these are delayed at least one year in obtaining approval and in publication and distribution, the data presented therein is frequently obsolete by the time the report is received in the Secretariat.

Some Member Governments have been generous in supplying the Regional Fisheries Office with regular progress reports in connection with their fisheries and these are extremely valuable in preparing this important background paper.

Despite the Council's requests, for official statements indicating the current progress within the industry, during the past inter-session period, the response has been extremely poor and official statements have been received only from Korea, Federation of Malaya, Hong Kong, North Borneo and Singapore.

However, on the basis of the reports of Technical Committees and replies received from Governments in connection with the activities within the various fields covered by the Technical Committees, valuable information has been received. This information is consolidated in the reports of the Technical Committee I and II (IPFC/C58/WP 18 and IPFC/C58/WP 6) and except where official reports are contained herein, the material so presented has not been duplicated in this document.

GENERAL

Throughout the region, there has been increasing interest in mechanization of fishing craft, the introduction and extension of the use of improved methods of fish catching and in the training of fishermen.

Developments in the biological field, particularly in relation to research have not generally been extensive and it has become clearly evident that in the majority of countries, the bias of the Government policy is towards exploitation and utilization.

This is understandable in so far as in all countries in the region, there have been steady population increases and the demand for protein has increased accordingly. This increased protein demand has not been met, on a regional basis, by the increased production either of fish or of protein derived from agricultural sources.

It appears fairly clear that in all countries the main factor retarding appreciable expansion in fishing activities and hence in fisheries production has been that of finance. Governments are rarely in the position of providing even interest-bearing loans of the magnitude which could be absorbed by the fisheries industry, apart from the very real problem of organizing the necessary administrative services to operate such a loan system.

Within the industry itself, the demand for fishing boat engines, mechanized equipment for gear handling, the provision of supplies of synthetic fibers for nets and the establishment of shore facilities for fish handling and storage is increasing annually.

In certain countries, emphasis is being placed on the production of luxury items such as crayfish, shrimp and oysters for export to foreign countries with the consequent improvement in the foreign exchange position.

In the secondary phase of the fisheries industries, the outstanding need is for systems of quality improvement and within this generalized subject fall such problems as improvements of marketing and transport facilities, greater ice supplies and increased cold-storage capacity. In fish processing, some

improvements are already being effected, mainly at the commercial level, in canneries and establishments producing fermented fish sauce and fish paste.

Extra—territorial markets for marine products, particularly the luxury items mentioned above, appear to be expanding and this fact is well recognized by governments within the region when formulating fisheries development policies and program.

AUSTRALIA

Australian marine and fresh water fisheries production in 1956-57 totalled 116,309,669 lb. (52,868 metric tons, compared with 47,644 tons the previous year).

The 1956-57 total comprised (lb.):

Marine Fish	71,812,901
Crustaceans	24,816,216
Mollusks	17,830,172
Fresh Water Fish	1,850,380

Compared with 1955-56, the marine fish catch was up approximately 14 crustaceans slightly down, mollusks slightly up and fresh water fish slightly down.

The greater marine fish catch was due to increases of approximately 38 in South Australia, 36 in Victoria, 28 in New South Wales, and 13 in Tasmania.

These States all had a very good year. In New South Wales the bigger catch was due mainly to an increase of 4,000,000 lb. in the motor trawler catch.

New South Wales, the predominant fishing State, produced approximately 36 of the Australian fisheries catch and Western Australia 17. But about 24 of New South Wales production was oysters, which are farmed, and half the Western Australian catch was crayfish for export. About one third of the South Australian catch and one-fifth of the Tasmanian were crayfish.

Of the 24.8 million lb. crustacean catch, three-quarters was crayfish and one-fifth prawns.

Of 17.8 million lb. mollusk production, 60 was oysters (almost all New South Wales) and 40 was scallops (83 Tasmanian and 17 Queensland). The Queensland scallop catch

of 1.2 million lb. was more than double that of the previous year.

Again in 1956-57 only three fishes formed 10 or more of the total marine fish catch:

	lb.
Aust. Salmon	12,141,678
Mullet	11,244,208
Shark	7,764,931

The interesting feature of the list is the displacement of mullet from its usual first place by Australian Salmon. It was a bumper salmon year and the 12.1 million lb. catch compares with 7.6 million lb. in 1955-56. The mullet and shark catches were steady.

	% Marine Fish Catch	% + or - 1955-56
Aust. Salmon	17	+ 59
Mullet	16	- 5
Shark	11	- 3

Of the three chief trawled fishes, morwong was up from 2,712,715 lb. to 3,895,605 lb., and flathead from 4,958,097 lb. to 5,014,605 lb. The nannygai catch which, when there were only four Sydney-based steam trawlers left operating in 1955-56, fell (by 50 compared with 1954-55) to 495,153 lb. dropped to 437,424 lb.

The erratic barracouta catch was one-third greater than the previous year. Here is how the couta catch has varied in the last six years:

	lb.
1951/52	9,892,102
52/53	9,469,114
53/54	5,261,277
54/55	5,626,676
55/56	3,450,311
56/57	4,602,850

The tuna catch of 2,261,117 lb. was a record. It was almost all taken in New South Wales (1,682,769 lb.) and South Australian (490,000 lb.). A breakdown of the species taken in New South Wales is not available. The South Australian catch was all Southern Bluefin.

The shore-based whaling industry entered its tenth year of operation in June 1958, with assets estimated to be A£2,250,000 and annual output of products in excess of A£2 million.

Pearl and *Trochus* shell production decreased from 5,047,520 lbs. in 1955-56 to 5,042,038 lbs., in 1956-57.

State fisheries departments are conducting research with the biology and occurrence of several species of fish of considerable commercial importance, including grey mullet, red snapper, school mackerel and tuna.

The CSIRO Division of Fisheries and Oceanography is concentrating the great part of its research facilities on extended oceanographical studies and research with fish physiology and behaviour.

Investigations in connection with whaling and the pearl shell fishery are being undertaken by the Division of Fisheries, Department of Primary Industry.

PAPUA AND NEW GUINEA

A promising start in inland fish culture has been made, initially at the subsistence and village levels, but with the possibility of extension into commercial fields.

The Administration is conducting a series of fishing experiments designed to demonstrate the commercial fisheries potential of the waters of the Coral Sea and to attract private enterprise into the industry.

The demonstration is being conducted by the m.v. TAGULA a 60 ft. research vessel, fitted with modern navigational and fishing aids, and equipped with a 5-ton capacity refrigerator, with an additional 5 tons of non-refrigerated holding space.

BURMA

Local administration of the fisheries industries remains in the hands of provincial administrative officers. Technological development and extension service in all phases of the industry is largely the responsibility of the Fisheries Division of the Land and Rural Development Corporation.

The Government has recognized the importance of establishing a Fisheries Department but it is unlikely that finance will be available for such an undertaking for some time to come.

The development of fisheries cooperatives-producer and marketing has been in progress for some years under the aegis of the Department of Cooperatives and Commodity Supplies.

No adequate organization exists for collecting fisheries production statistics nor is there a comprehensive coverage of men, boats and gear engaged.

Programs for the development and extension of fish culture have been in operation for some years but no assessment of the current situation is available.

A Colombo Plan expert is engaged in a small program of craft mechanization and the training of operatives in engine operation and maintenance.

The production of trawl-caught fish from the Gulf Martaban appears to be increasing as the early consumer resistance to marine fish is being overcome.

CAMBODIA

Action now being taken to develop new and improved harbor facilities at Kompong Som is expected to assist in the development of the marine fisheries. From a pre-war estimate of about 10,000 metric tons annually, production is believed to have declined to not more than 5,000 metric tons at present.

Inland fisheries also are believed to have declined to a small portion of the pre-war level, particularly in the region of the Grand Lac. Surveys being undertaken at present, both the larger Mekong River Basin Development Project and a smaller survey directly concerned with the fisheries of the Grand Lac (Tonle Sap) are expected to yield information as to the causes of this decline in production and to suggest means for re-establishing these fisheries.

A statement of the development program of the Service National des Peches was issued in IPFC Occasional Paper 57/3.

CEYLON

The Government's program for fisheries development is proceeding steadily. Considerable advances in the development of improved road facilities from the coast inland, the removal of rocks and reefs which interfere with fishing operations, the establishment of a Fishermen's Accident Compensation Scheme and coordina-

tion with other departments for the continuation of an Air-Sea Rescue Service have been satisfactorily developed.

Steady progress has been made in mechanization of fishing craft. Vallams which were modified to take in engines are now being designed for the installation of engines. This type of craft is yet restricted to the Northern part of the Island. It is intended to fish the Pedro Banks with these vallams. Several outrigger canoes have been successfully mechanized with outboard engines. The new interest-free loan scheme recently authorized permits the granting of loans without any form of security for the purchase of mechanized boats, fishing gear and payment of insurance premiums. Loans up to Rs. 15,000/- are granted to selected full-time fishermen and are repayable, in the case of boats, in 5 years and in the case of fishing gear in 2 years. A parallel scheme for the issue of loans for engines only is also in operation.

The training program for Government Fisheries Officers of the Extension service has continued to develop. At the completion of their training period they are attached to the several fishing craft operated by the Department. These fishing craft are sent to various fishing villages for practical demonstrations of new methods of fishing. Fishermen from these villages are taken out in the boats and taught to operate the gear. They are given full travelling expenses and also given a part of the catch as compensation for loss of fishing time. Fishermen who obtain loans for the purchase of mechanized craft and those who purchased mechanized craft are also given special training by officers of the Department before they commence actual fishing operations.

In addition to the above, social security services including housing facilities and other assistance is being extended through the fishermen's communities.

The Statistical Service and the Research Organization are maintaining their programs of activities.

Considerable development in the exploitation of fisheries of inland waters is taking place and there has been extensive development in fish culture operations including the stocking of impounded waters with several species of edible fish.

The introduction of fishing gear made from synthetic fibers has developed at such a rapid pace that importers ran out of stocks. Shipping difficulties have created an acute shortage of this type of gear and during the past few months the supply has not been sufficient to cope up with the demand.

The Cold Storage Plant at Mutwal is now in full operation. It has a freezing capacity of 12 tons per day and a holding capacity of 500 tons of frozen fish; 10½ tons of block ice are also produced daily.

SOUTH PACIFIC FRENCH TERRITORIES

Fishing in New Caledonia is at present confined to activities directed towards the supply of fresh fish consumption by a population hardly exceeding 60,000. These activities are limited in fact to supplying fish to the population of Noumea and its surrounding areas (about 25,000), the rest of the island being supplied from some other sources. Consequently, such a small scale operation cannot yield precise statistics, taking also into account the scattered condition and the low importance of the sources of production and sales organizations. Only small quantities of fish not consumed fresh are salted and smoked. Almost everywhere fishing is done by angling among the coral reefs. This fact implies that improvement in the situation can be expected only in the development of commercial fishing, together with a suitable export outlet.

Such development has already taken place in the Franco-English Condominium of New Hebrides (Santo Island) in the form of a fishing, canning and export enterprise by joint Franco-Japanese and Anglo-Japanese Companies, with a fleet of 8 Japanese longliners, a cold store in the process of enlargement, a canning factory under construction, a wharf, a slip, a smokehouse and various installations. The precise annual production is not known since the first year's work of the enterprise has not yet ended and since the fleet of fishing boats has increased from 3 in the beginning to 8 at present and is likely to reach a size of 2,000 tons. No statistics on this activity are as yet available.

In French Oceania, mainly Tahiti, the fishing industry is practically of the same level as in New Caledonia, with the difference that it

concentrates more on coastal tuna and skipjack fishing. These fish have just made their appearance in the Noumea Market. It is noted that the population's consumption is much greater and that the Papeete market retails 500 to 1,000 tons of fish yearly for a population appreciably smaller than that of Noumea. This fish is consumed fresh and not chilled or frozen, the deliveries being made daily.

INDIA

Research in all aspects of fisheries has continued at a high level. Of particular interest is the application of the pituitary-gland extract injection system which has been found successfully to induce spawning in several of the species of "major carps". Refinements of techniques are being developed.

"Fish seed" handlings, including fry and eggs now exceed 11 million annually for distribution to under-supplied areas. This "fish seed" is however taken from natural spawning grounds.

Total fish production exceeded one million metric tons in 1956 and there are indications that production is being maintained at a high level. Exploratory fishing is continuing in many areas and new and productive grounds are being discovered, while known grounds are being subjected to a higher degree of exploitation as new fishing methods are introduced and developed and the craft mechanization programs advances.

The Government, on its own initiative and also with assistance of FAO and TCM is increasing its fisheries training program, offering facilities for elementary and advanced training in many aspects of fisheries biology and technology.

With a well-established program covering the biological aspects of fisheries, India is now expanding its program in connection with advances in fisheries technology and steps are being taken to achieve closer coordination between Central and State Governments fisheries programs.

Statistical services and research are reaching a high level and particular attention has been given to the development and application of adequate sampling techniques in zones of the industry where complete statistical coverage is not as yet practicable.

INDONESIA

Introduction

During the present inter-session period, the Republic of Indonesia has been striving for improvements both in the technical field as well as in the provision of material for the purpose of increasing the fish production and thus help to overcome the problem of food shortage. Indonesia's general condition at present, which is unfavorable, hampers the efforts of solving this food problem. In spite of all these difficulties, however, noticeable progress has been made in the attempts at improving the fisheries.

The Government and the people realize that the country's natural structure is such that both sea and inland fisheries are important resources for the population's welfare.

Fish production

Compared with the 1956 sea fishery production of 419,000 tons, the 1957 production of 400,000 tons shows a decrease of 5%. This decreased production is partly caused by the late season and partly by the many rains during the fishing season.

The production of inland fisheries, which amounted to 296,026 tons in 1956 was increased to 321,230 tons in 1957, which means an increase of 8%. This increase is a result of the improvement of the fish ponds and of the enlargement of the fish breeding area. Thus, the total fish production in 1957 has increased by 16,204 tons or approximately 2.15%, compared with that of previous year. Although an increase has been recorded, fishery officials are still dissatisfied with the results and they hope to make a higher increase percentage in the years to come.

Technical Training

As the shortage of officials with technical knowledge is strongly felt in Indonesia, technical training forms one of the main issues. For this reason much attention and efforts have been given to this item.

During the reported period a few new schools were established, such as:

1. The school for inland fishery "mantris" (field workers) at:
 - (a) Singaradja for the Nusa Tenggara Province.
 - (b) Bandjarmasin for the South Kalimantan Province.

- (c) Makassar for the South East Sulawesi Province.
- (d) Kotaagung for the South Sumatra Province.

These schools provide a one year training to students after their primary school education. Nearly all of the students become officials after their training.

2. Senior High School for Inland Fisheries. It is a 4-year course and is for junior high school graduates. For the first couple of years to come, this school will only educate people for the middle rank positions at the Inland Fisheries.

The Sea Fisheries attach more weight to courses and training of cadres in the following fields:

- (a) Biology
- (b) Extension work
- (c) Technology
- (d) Mechanized fishing
- (e) Courses for engine drivers and shippers
- (f) Additional course for office administration.

New Junior Fisheries High Schools have been established in Manado (North Sulawesi) and Ambon (Moluccas) beside the already existing fisheries school in Tegal (Java).

Besides establishing the above-mentioned schools and courses both the Inland Fisheries and the Sea Fisheries have sent fisheries workers abroad (Canada, Japan, Australia, U.S.A.) under the foreign aid program as well as on the State's initiative, for practical training as well as for academic study. And in conclusion, the sea fisheries has welcomed the arrivals of Messrs. L.E. Wakefield of the USOM and Tatsuzo Tonomura, Japanese Cannery Technician, who have been appointed to assist the Indonesian Government in the field of Fisheries Technology.

Mechanization

The Sea Fisheries has been continuing the construction and the distribution of mechanized fishing boats to the fishermen. Progress in the fish production as a result of mechanization has been achieved after a period of experiments. People's requests for mechanized fishing boats have exceeded the Government's capacity to supply them.

The Inland Fisheries have applied 3 liliput dredgers for the repair of supply canals. Two of the dredges are placed in the East Java bandeng-culture center (Gresik and Sidoarjo) and the other one at Indramaju (West Java).

Research

The Inland Fisheries is already in the possession of a new inland fisheries laboratory in Bogor, whereas the sea fisheries service is intending to build a technological laboratory in Djakarta. Besides, inland fisheries circles have erected experimental stations at Sengkang (Sulawesi Selatan and Tenggara Province) and experimental fish ponds at Depok, near Djakarta. New bandeng ponds have also been made in the Belawan area (East Sumatra), at Kota Agung (South Sumatra) and at Pagetan (South Kalimantan).

The bandeng fry for Sumatra was sent directly from Java, whereas that for South Kalimantan was obtained from the Straits of Macassar.

By the Sea Fisheries, various researches have been made, such as longline, shrimp trawl, tuna, purse seine, otoshi-ami and muro-ami fishing.

Research work in the field of fish conservation has been done as usual. Mr. T.H. Butler, of the FAO Dr. Ichsan El Rawi and Dr. Oey Kam Nio have rendered valuable assistance in this research work. The research on agar-agar from all over Indonesia has been started with the help of the Research Bureau of Cronulla (Australia).

An extensive Model Fishing Community Development project was nearing completion at Kota Baru, South-east Kalimantan at the end of 1957 and will provide modern facilities in all phases, production, handling and processing of the industry. Training facilities are included and essential community services such as water supply and electricity are being provided.

Experimental and exploratory fishing for tuna and shrimp is being continued and the extension services aimed at increasing the supply of fish by inland and brackish water fishculture are being maintained at a high level.

An extended program of training in fisheries technology and biology as well as instruction in navigation and engine repair and

maintenance is being implemented. Advantage has been taken of facilities provided by FAO, UNESCO, Colombo Plan and ICA to obtain advanced training in fisheries subjects for selected Government officers.

By the end of 1957, 251 fisheries cooperatives with over 35,000 members had been registered with assets exceeding two million rupiahs.

INDONESIAN STATEMENT ON THE NON-PARTICIPATION IN THE INDO-PACIFIC FISHERIES YEAR

The Government of Indonesia had the honor to emphasize the importance of the establishment of the Indo-Pacific Fisheries Year (IPFY) together with other member countries during the VIIth IPFC Session in Bandung in continuation of the 1955 Session held in Tokyo.

A minimum program for the realization of the IPFY was born in Bandung. After the Bandung Session was over, Indonesia as a member country undertook initial steps, directed to the arrangements of the program, by discussing this important problem with the authorities concerned, which resulted in certain programs to be carried out.

A minimum program in the framework of the IPFY has been composed during the VIIth IPFC Session in Bandung, which covered the following items (a) total fish production of a country, computed regionally by suitable sampling techniques or by total enumeration when possible, together with break-up of fish landings indicating the major commercial species and types of fishing techniques employed, (b) total fishing population (with separate figures for active adult fishermen), and (c) fishing craft and gear employed in fishing with their distribution. This program was to be commenced where possible by the 1st of July 1957, but in any case was not to be delayed beyond January 1958. However, for Indonesia, to obtain the necessary statistical data a more intensive observation effort is required.

It is to be regretted, that in her further attempts Indonesia had to face enormous problems, so difficult to be overcome, that she was compelled not to take part in this important effort by not carrying out the IPFY in practice.

These obstacles are among others:

- (a) the amount of available skilled or trained personnel, to carry out this important work, which covers the entire waters of Indonesia with its coastal length of not less than three times the equator, is far from sufficient to meet this requirement;
- (b) the communication between the islands is quite difficult, so that in order to carry out these efforts, a period of more than one year is needed. There are also certain areas which are yet to be serviced by the various services concerned with this gigantic work;
- (c) the domestic situation in 1958 did not allow the execution of these activities.

As a result of the above-mentioned difficulties which could not be surmounted within this year, the Indonesian Government has been actuated to make the following statement:

- (1) Indonesia deeply appreciates the efforts of the Indo-Pacific Fisheries Council in the field of the IPFY.
- (2) All attempts have been made, but Indonesia has been only able to take the initial steps in 1958, so that this year for Indonesia does not form a year of practice in the layout of the IPFY.
- (3) For domestic use, these preparatory efforts will be maintained and will be further carried out.

- (4) Indonesia is anxious to take part in the following IPFY, since 1958 has been declared as the first IPFY by the Indo-Pacific Fisheries Council.
- (5) Indonesia directs her thoughts to the coming 1962 Agricultural Census, which will be organized by FAO and which accordingly might become an expedient solution for the IPFY problems.

The facts have shown, that however minimum the IPFY program may be, as has been arranged at the Bandung Session, Indonesia needs comprehensive preparations, for by carrying out the program even a little inaccurately just in one district of Indonesia only, it will be sufficient enough to upset the whole scheme and to decrease the important purpose of the IPFY.

It is accordingly to be fully regretted, that Indonesia is not in a position to take part in the IPFY business in 1958 and that she is only limited to the preliminary and initial steps of the whole program. The achievements of other member countries which have already made certain contributions towards the implementation of this important and valuable work, will be of great value in determining our steps in the future.

JAPAN

Maintaining her immense production of over four and three quarters million metric tons, Japan is seeking every avenue to develop and improve her fisheries. Technological research into improvements in craft, gear and methods is being maintained at a high level under a new Fisheries Development Plan designed to carry through until 1975 and incorporating measures for the stabilization of living conditions of farmers, forestry workers and fishermen through increased production and increased earnings.

The five year program of exploratory fishing in the warm Tsu-shima Current will be completed this year and the final report is awaited with interest. The results obtained have been published for use by the fishing industry from time to time and have been of considerable value in increasing production for the area traversed by the current.

Of extreme importance to fish culturists in South East Asia has been the development of a technique for the artificial propagation of Chinese, Silver and Grass Carp. Refinements of techniques are required, but the work, commenced 14 years ago, will result in improved supplies of eggs and fry of these important pond fish.

The total fish production in Japan (except for whale catches) that maintained an annual level of 4.50-4.9 million tons for several years in the past, reached in 1957 5.4 million tons, or about 13 per cent above the previous year, which breaks all the previous records in prewar and postwar days.

An increased production was seen in almost all fish species; especially, the catches of anchovy, mackerel-pike, squid and horse mackerel recorded a striking increase, more than 20 per cent above the previous year. The catches, by coastal fisheries ran up into some 2.6 million tons, those by off-shore fisheries, into some 1.9 million tons and those by high-seas fisheries into some 0.9 million tons which show an increase by 13 per cent, 16 per cent and 10 per cent above 1956 respectively. The major types of fisheries which played an important role in such increased production are squid angling, small type trawl fishing and fish culture industry in coastal waters; mackerel-pike stick-held dip net fishery, two-boat surrounding fisheries, salmon drift-net fishery and mackerel pole and line fishing in off-shore waters; and skipjack pole and line fishing, tuna longline fishing, factoryship type tuna and salmon fisheries in high seas. Among these types, the catches by mackerel pike stick-held dip net fishery amounted to 0.7 million tons or 29 per cent above the previous year, chiefly because of the good migration of stock and the high efficiency of production by large fishing craft of 30-50 tons.

The outlook of this year, 1958, again seems very bright, because an increased production has already been registered from the beginning of the year in regard to skipjack, anchovy, horse mackerel, mackerel and mackerel-pike; and it is expected that the total fish production will exceed the record in 1957 by some 10 per cent.

The fishing fleet as of the end of 1957 consisted of 403,000 vessels (1,572,600 gross tons), of which 26,300 non-powered boats

(12,500 tons) and 2,400 powered boats (3,400 tons) were operated in inland waters; 219,800 non-powered boats (216,800 tons) and 154,600 powered boats (1,340,000 tons) fished in the sea. In comparing the fleet in 1957 with that in 1956, a 4 per cent decrease is seen in the number of boats and 20 per cent increase in the total tonnage; namely, in inland waters 5 per cent decrease in the number and tonnage of non-powered boats, but 8 per cent and 6 per cent increase in the number and tonnage of powered boats respectively, while in the sea 6 per cent and 9 per cent decrease in the number and tonnage of non-powered boats respectively, but 3 per cent increase and 4 per cent increase in the number and tonnage of powered boats respectively. This increase in the number of powered boats of over 200 tons as well as in the number of powered boats of 0-5 tons and 50-99 tons operated in the sea on the one hand and the decrease in the number of all other boats on the other hand show an increasing trend of the motorization of non-powered vessels and the enlargement of fishing boats.

With regard to the equipment of fishing boats, more Diesels are being used by small boats, and more superchargers are being installed in large and medium sized boats. Fishing boats equipped with wireless now number 154,500, and almost all fishing boats, except for those being operated in coastal waters, are provided with wireless stations. Other fishing gear and aids such as synthetic fiber nets and ropes, radio buoys, fish finders, direction finders, radars, lorans, etc. of increasing importance for fishing and navigation are widely used by fishing boats as far as the fisheries management permits.

With regard to the consumption of fisheries products in 1957, of the total amount of consumption, 6 per cent was allocated to feeding uses, and 94 per cent to food. There is an increasing trend of allocating them to food now. Of the total amount of food consumption, 63 per cent was used as raw material of processed products, 23 per cent as fresh fish and 8 per cent as frozen products. There is an increasing trend towards using fish as raw material for fish sausage, canned fish, etc.

The production of canned products in 1957 reached some 14 million standard cases, or about 30 per cent above the previous year. A remarkable increase was seen especially in

the canned products of whale, squid, mackerel-pike, mackerel, and sardine, all of which are popular fish and are harvested in great quantity. The production of fish sausage in 1957 amounted to some 37 thousand tons, or 47 per cent above the previous year, or 9 times increase compared with that in 1954. This shows that a gradual change has recently occurred in the structure of people's consumption and the demand for fisheries products according to the modernization of their mode of living, and that the increased demand for comparatively highly processed products such as fish cake and canned products has established a firm and steady condition in the consumption of fish.

The exports of fisheries products in 1957 constituted only 8.4 per cent of the total yearly amount of fisheries production. Compared with the previous year, the exports of frozen tuna showed an increase by 28 per cent, those of canned products no change, and those of salted or dried products a decrease by 6 per cent; on the whole, almost the same as in the previous year. But this year is expected to have a brighter outlook because the exports of frozen tuna and canned salmon have already shown a very favorable tone from the beginning.

As mentioned above, the fish production of Japan in recent years maintains a high level and has a bright prospect of promotion in the future. The causes of such favorable conditions may include not only the recent good condition of popular fish migrations, but also the improvement of fishing boats, the modernization of the means of production, the positive efforts of fishermen together with the promotive measures of the Government. But the producer price of catches which began to decline last year still continues its downward tendency though the price of fishing materials does not show such sharp downward movement. Besides, tightness in the money market is forcing fishermen to rely strongly on funds through cooperatives or on loans from the agriculture, forestry and fisheries finance funds. Consequently there has occurred a strong cry for rationalization or readjustment of the management, especially of smaller fishermen. There is an increasing tendency in the number of small fishermen who are obliged to work on farms or in other business as a side job. In order to cope with such situations, the Government has undertaken, especially for the

great number of small fishermen operating in coastal waters to improve and rationalize fisheries techniques and production means, technical and financial assistance, the consolidation of fishermen's cooperatives and the improvement of the marketing organization of fisheries products. These measures will be strongly promoted in the near future.

KOREA*

1. Characteristics of Korean Fishing Waters

The fishing waters in the immediate vicinity of Korea are among the best in the world. On the west coast of Korea, which faces China, are the shallow protected waters of the Yellow sea: on the east coast warm and cold currents flowing both north and south bring with them quantities of whale, Alaska pollack, cuttlefish, mackerel-pike and yellow tail. In the Straits of Japan, between the southern tip of Korea and the southern-most Japanese island of Kyushu, migratory fish are easily trapped. In the areas southwest of Chinhae, latitude 35 10' longitude 128 4' and the waters surrounding Ullung-do, latitude 37 31' longitude 130 50', and the area immediately to the south of Cheju-do, latitude 33 20' longitude 126 30' are found great quantities of mackerel, cod, anchovy and hairtail.

Principal areas

The East Sea

The ocean floor shelves off rapidly. Depths of 2,000 meters are found within a few miles of the coast. The bottoms of these coastal waters are rocky and do not lend themselves to dragnetting operations. The deeper outer waters are utilized principally for schoolfishing. Until the recent disappearance of the sardine from these waters, they were the principal source of the Korean sardine catch.

The Southern Coastal Waters

Waters of the Japanese Straits average 125 meters in depth, and shoal to an average of 80 meters in the southern coastal area. Here, too, the ocean floor is rocky and does

not submit to dragnet operations, but the area is suitable for fishing for the oceanic types, abalone and sea urchins.

Yellow Sea

The ocean floor of the Yellow Sea is either sandy or muddy and is, therefore, ideal for dragnet fishing. It is a particularly good area for flounder and other fish found close to the ocean floor. The average depth of this area is about 75 meters.

Water temperatures

Temperature of the surface water surrounding Korea ranges from 0-14°C. in February, to 18-24 in July, according to records of the Fisheries Experiment Station in Pusan. Temperature ranges as recorded varied from north to south in the Japan Sea and from the coastal waters seaward into the Yellow Sea.

Salinity

The salinity of the water surrounding Korea varies from 31 to 34 parts per thousand, the lower salinity being found closest inshore. The salinity varies with the season also, being least in the fall months.

Principal kinds of fish

Among the important species of fish caught in Korean waters are Alaska pollack, hairtail, anchovy, saury pike, yellow croaker, mackerel, horse mackerel, sharks, flatfish sand lance, "Kang dari", whip ray, Tongus fish, cod, red sea bream, mullet, bastard halibut, other croakers, yellow tail, skate ray, Spanish mackerel, flathead, sea eel, puffer, sharp toothed eel, common sea-bass, pomfret, rock fish, "Jun-tchi", black sea gouneles, rock trout, red Gurnard, blue fin tuna, "Ban-chi, eel, big-eyed herring, atka fish, hickory-shad, cottoids, sand fish, and various fishes belonging to the cottoid and Blennie family.

2. Fishing Population

Looking at the fishing population in Korea after the liberation, the number of fishermen increased considerably from 400,000 immediately after the liberation to 780,000 as of 1957. The majority of the fishermen, however, are poor and small scale operators who are engaged in

*Note: The tables submitted with this report are omitted from the present document. They are retained on the files of the Secretariat Secretary.

fishing by small sail boats, laver and oyster culture.

3. Marine Production

The peak year for Korea in the fish catch was 1937, when landings amounted to 2,115,000 metric tons. After 1937, except 1939, the annual catch has been decreasing each year. In 1942, the landings aggregated only 845,782 metric tons (including both South and North Korea's landings). South Korea's catch in 1942 excluding 50,902 tons of sardines, which have now disappeared, was 397,066 metric tons. After the liberation up until 1955, the landings fluctuated. From 1956 however, marine production began to increase, the total catch in 1957 being as much as 403,157 metric tons.

4. Production Facilities

Fishing Vessels

A majority of the Korean fishing vessels are sailing vessels of small tonnage. Out of 37,752 fishing boats reported for 1957, the majority are sailing vessels: only 4,598 were powered vessels. Vessels of small size are generally limited to inshore operations; there is, consequently, a large demonstrable need for larger vessels to exploit the rich off-shore fishing grounds to the south and west of Korea, used to only a minor degree at the present time. The tonnage of the fishing boats for Korea in 1957 is 105,346 tons.

Fishing Ports or Harbors

There are about 60 fishing ports, large or small, along the coast of south Korea which provide fair to good facilities for the fishing fleet. Many of these ports have good mooring and docking facilities and have been improved with breakwaters, sea walls, wharves, and most of the facilities needed for loading and unloading. Very little maintenance and repair work had been done for a number of years, and many of the ports were badly run down especially during the Korean war, but with the Government subsidies and the economic assistance funds by FOA and ICA, most of the major fishing ports have been rehabilitated.

Shipyards

Shipyards are located in most of the major fishing ports. A total of 142 shipyards existed as of December 31, 1958. The yards vary from the simplest beaching facilities, or crude ways for hauling out the smaller boats

for repairs, to very good installations with numbers of ways capable of handling larger vessels of up to 9,600 tons class. Some larger yards, with steel fabricating equipment, well-equipped carpenter shops, machine shops, blacksmith shops and foundries, are capable of fabricating both steel and wooden vessels. Lack of capital and materials in particular has retarded fishing boat construction. Fishing boats have been continuously constructed with fishermen's own funds and/or economic assistance funds. ICA has been spending a large amount of its funds to import material and equipment required for fishing boat construction along with cargo vessel construction, and training technicians.

Boat Supplies

Immediately after the liberation and especially after the Korean war, the fishing fleet suffered seriously from a shortage of repair and operating supplies. A shortage of boat lumber, engine parts, sail canvas, nets and Manila rope were the most serious handicaps to the fleet operations. Boat paints, nails, wire rope, and other supplies have been needed in large quantities. Domestic production of boat supplies has been very low, largely because of the lack of raw material. Fuel and lubricating oils have been occasionally in short supply. But, supply has been fairly good most of the time lately because these materials and equipment have been procured from abroad along with other supplies and manufacturing facilities by the foreign economic assistance agencies such as UNKRA, FOA and ICA.

Type of Gear

The most important types of gear are bottom drag or trawl nets, in all of their various forms, purse seines, drift and set gillnets, beach seines, traps and weirs, longlines and hand lines. Diving, both with and without the use of a mechanical diving suit, is very common.

Net and Rope Production

Production facilities for fishing nets, twine and rope are generally in good condition. There are major fish net and twine-making factories, and in addition, some netting is fabricated at home by hand or by the use of hand-operated machines. A total of 31 fish net factories exist in Korea at present and their production can sufficiently meet the

demand of fish net except nylon and for Kuralon nets. They produced 1,075 metric tons of various types of fish nets in 1957. Nylon and Kuralon fish nets and their materials are imported from abroad because there are only a few nylon fish net factories in Korea.

Rope production facilities are good, but the shortage of Manila fiber and other good fibers has limited domestic rope production to a poor grade made of domestic hemp fibers, of very little value in fishery activities. There are 13 rope factories in Korea with an estimated yearly production capacity of 4,000 metric tons, sufficient for the present estimated fisheries and industrial needs. The rope plants produced a total of 1,474 metric tons of various sizes of rope in 1957. Large quantities of abaca are imported from abroad every year.

5. Marine and fresh water products culture

Oyster culture

Oyster culture is one of the important industries along with laver culture in Korea. Since laver culture farmers cannot make their living from laver culture, due to the limited market for their products, a five year plan for oyster culture is being undertaken to assist in solving this problem and render a great contribution to the industrial economy of the nation.

Oyster culture, in comparison with laver culture, not only involves high installation costs and much labor, but also brings more profit to the fishermen, because oyster collecting devices once prepared can be used for a relatively long period of time. This industry will also play an important role in extending markets and in earning foreign exchange, because oyster products are suited for the taste of the people of the European, American and South East Asian countries.

If 6,500,000 pyung (about 390,000,000 square feet) of seashore suited for oyster culture is cultivated, a large scale industry can develop which could produce about 60,000 tons of oysters and earn about 6,000,000,000 Hwan at the current price.

Cultivation of Shallow Water and Tidal Areas

There are about 1,640,000 acres of tidal and shallow water areas along the south and west

coasts of Korea. A five year program has been undertaken to propagate 4 species of shellfish and 2 species of seaweeds which are commercially valuable. The shellfish and seaweeds will be propagated over 3,268 acres of the areas each year, a total of 16,340 acres during five years. Upon the completion of this program in 1963, a total of 93,600 metric tons of marine products, 91,800 metric tons of shellfish and 1,800 metric tons of seaweeds, valued at 5,600,000,000 Hwan* will be harvested. This plan aims at bringing benefit to the poor fishermen.

Culture of fresh water fish

There exist two national fish hatcheries in Korea, which chiefly distribute carp fingerlings to fish culturists whose number aggregates 48 at present and for release in rivers, ponds and reservoirs. There are 15 main rivers of a total extended length of 6,652 kilometers and vast inland water areas of 55,489,880 square kilometers (natural lakes of 282,238 square kilometers, reservoirs of 1,283,161 square kilometers, and ponds of 430,695 square kilometers) which are mutually suited for fresh water fish to inhabit. Approximately 100 species of fish inhabit the water area, but a little more than ten species among them are suitable for culture for they are commercially valuable. Carp is the major species which are being cultured at present. If those uncultivated rivers, streams, lakes and ponds are utilized for culture of adaptable species of fish, more than 63,000 metric tons of fresh water fish can be easily produced annually. But, the present catch of fresh water fish reaches not more than 2,000 metric tons a year, and only 26 metric tons out of the catch are cultured fishes. It is due to shortage of young fish with incomplete facilities of fish culture. Annual demand of young fish at the present time is approximately 100,000,000; but, 4,500,000 fishes which are equivalent to only 5% of the demanded quantity are available generally from the hatcheries.

The first step toward the goal is to release 100,000,000 young fish on the irrigated rice paddies which are considered to be easy and efficient for fish culture. A year after the release of the fish, 10,500 metric tons of young fish of a year old will be harvested; of the harvested fish of a year old, 5,250 metric tons

* 500 Hwan = US\$ 1.00 at official rates of exchange.

will be sold as fresh fish for food, and the other half will be released again in lakes, ponds and reservoirs. Those fish will be harvested when they become three years old. The national hatcheries will release about 1,500,000 young fish of a year old into the main rivers and streams and will have an annual production of 750 metric tons. It is then planned to hatch fish artificially and release them into the inland water area, where favorable water temperature exists to produce 250 metric tons of fish annually. Finally, 50 hatcheries to be privately operated will be annually installed by granting of Government subsidies in order to produce 2,500 metric tons of fish annually. Thus, upon completion of the five year plan, approximately 40,250 metric tons of fresh water fish will be annually harvested.

6. Manufacturing and Processing

Fish Canning

Fish canning was started in Korea about 50 years ago. The operation of canneries on a large scale business basis began after 1930. Production of canned fish and shellfish reached the peak of 6,106 metric tons in 1940 when Japan needed canned fish so badly because of its military consumption during the world war II. The figure was equivalent to 10% of the total seafood production.

After Korea was liberated from Japan, production of canned fish sharply decreased owing to the nonavailability of tin plate and foreign markets and shortage of funds. During the Korean hostilities, the production of canned fish suddenly increased in order to meet the demand by the military. As a result of the joint efforts by the Government and civilian enterprise in improving techniques and in modernizing production facilities, there exist 38 canneries at the present time, which have a total production capacity of 400 million cases of canned fish annually whereas 300 million cases were produced by 44 canneries which were in existence prior to 1945. However, the exports of canned fish has not been realized as had been expected.

On the other hand, two modern fish canneries have been built and are in operation, one at Po-hang Port and the other on Naro-do Island, with the aid funds of \$324,500 under FY 1954 United Nations Korean Reconstruction

Agency Project. The two canneries will chiefly produce the canned fish for both domestic markets and for export purposes.

Species canned at present include mackerel, horse-mackerel, ligament, ear shell, top shell, sea eel, white clam, red clam, oyster, yellowtail, shrimp, crab, etc.

Can Making Industry

Can making industry in past years which supplies empty tin cans chiefly to fish canners was not as active as it is at present due to insufficient production facilities and shortage of tin plate. Since the Korean War large quantities of canned fish have been consumed by the military. The military furnished the can maker with tin plate; but the empty cans which are used for packing canned products for the domestic market and export purpose are in short supply. In order to increase foreign export of canned fish, the Government is planning to import various can making machines from abroad which will be able to make types of cans that can meet foreign demand.

Agar-agar production

Although agar-agar has accounted for a large portion of the foreign trade since 1945, its industry is now facing severe difficulty for mechanical agar-agar products have recently appeared in the foreign markets. Three modernized mechanical agar-agar plants are under construction with the U.S. International Cooperation Administration fund of \$755,000, two of which will be completed within a few months. The three plants will be able to operate and export their products within this year. Besides these plants, there exists another mechanical agar-agar plant which was constructed in 1956 and is being operated by a private enterprise. The four plants will produce approximately 400 metric tons of agar-agar annually. On the other hand, 300 metric tons of natural agar-agar will also be continuously exported. We are making efforts to improve the quality of agar-agar and cut down the production cost of the natural agar-agar in order to maintain foreign markets for the products. Thus, by exporting a total of 800 metric tons of agar-agar each year, we plan to earn 2 million dollars worth of foreign exchange annually.

Ice Making, Cold Storage and Freezing Facilities

There are 65 ice plants at fishing ports along the coast and major cities of Korea. About one third of the plants are equipped with cold storage and freezing facilities. Their capacities per day are: ice making-approximately 1,500 metric tons, ice storage-24,000 metric tons, freezing-260 metric tons and cold storage 7,670 metric tons. The total annual production of ice can sufficiently meet the demand of the fishing fleet and fish markets.

The freezing of shrimp is a growing industry in Korea because there are large markets for the product in foreign countries.

Salting and Drying

Facilities for salting and drying fish in Korea range from cottage operations, in which the fish are nailed to the fences or hung out on strings, to the large commercial operations where the salting tanks may be as large as 8 feet high and 10 feet in diameter. The Office of Marine Affairs is planning to import modernized dryer facilities in order to prevent waste of marine products at peak seasons.

7. Marketing

Domestic distribution

Most of the Korean catch is sold by auction through fishing guilds at their fish markets. Between them and the consumer are numerous middle men, wholesalers and retailers whose percentage fees, plus transportation costs, increase the retail fish price by 100-150 percent over the price received by the fisherman. At each fishing guild is a consignment sales market (fish market) where members of the guild land their catches for sale. A modern fish market is to be installed in Pusan which is the largest fishing port of Korea. Installation of more fish markets with modern facilities is being planned. Retail fish markets will be also modernized with sanitary facilities.

Transportation, in general, controls the fresh fish market. By long distance hauling by rail, communities on the main line, and ports with main line connections, are fairly well served. Delivery, however, even by railroad is slow and the amount of fish that can be shipped is limited. Many ports and towns depend on boat & truck, for deliveries of fresh fish and other

fishery products. Distribution of fresh fish by these means is generally unsatisfactory, although suitable for salted, dried, canned fish and other processed marine products. Processed marine products are available in practically every food store throughout Korea. In order to supply seafood promptly from the fishing port without loss of the quality, the Government is planning to import some refrigerated cars to transport the fish.

Exports of Marine Products

Marine products which is second to mining products in Korea in earning foreign exchange play an important role in the national economy. The marine products which are exported to Japan, Hong Kong, Singapore, Free China, Ryukyu, Ceylon and the United States are of 25 species. The main species among the products exported are live fish, and dried catfish which are mostly exported to Hong Kong and Japan. Agar agar used to be exported to Hong Kong, but at present mechanical agar-agar are exported to the United States, West Germany and Hong Kong. Fisheries exports will be promoted in the future because the Government is making all possible efforts to expand foreign markets and to improve the quality of fisheries products.

8. Structure of the Fisheries Administration

Office of Marine Affairs

The Bureau of Fisheries was set up and organized directly under the Ministry of Commerce and Industry when the Government of the Republic of Korea was inaugurated on August 15, 1948. The Bureau of Fisheries was placed under the jurisdiction of the Office of Marine Affairs on February 17, 1955 due to the reform of the Government organizations to unify the administration of marine affairs. The Office of Marine Affairs is a semi-autonomous government agency under the Ministry of Commerce and Industry comprising three bureaus, i.e., Bureau of Fisheries, Marine Transportation and Installation. The Bureau of Fisheries is organized into five sections:

General Affairs Section

Management of personnel, budget and accounting, Government-owned property, Law and Regulations.

Administration Section

Establishment of fisheries policy, fisheries statistics, supervision of fishermen's organization, fisheries financing, supply of fisheries material and equipment, and fish net and rope making.

Fishing Section

Direction of fishing, conduct of fisheries, investigation of fishing grounds, study of production of fishing gear and equipment, management of boat construction, supervision of fishing port construction, and issuance of fishing licenses.

Processing Section

Supervision of general processing, foreign, trade, can production, ice manufacturing and storage plant construction, production of fish meal and fish oil, issuance of licenses for fisheries manufacturing and management of culture of aquatic animals and plants.

Coast Guard Section

Patrolling of fisheries conservation zone and protection of beacons.

Regional Offices and Branch Offices

There are nine regional offices of marine affairs, one in each province with the exception of Cholla Namdo Province, where exist two regional offices directly under the Central Office of Marine Affairs in Seoul. These regional offices and branch offices have fisheries sections or sub-sections, with functions similar to the Central Bureau of Fisheries.

Fisheries Inspection Stations

Fifteen inspection stations are located in the coastal areas, including the Central Fisheries Inspection Station located in Seoul to inspect processed marine products, investigate the packaging of marine products and check on sales and transportation of processed marine products.

Fisheries Experiment Station

There is one large main fisheries experiment station in Pusan and branch stations located at Chumunjin, Pohang, Cheju-do, Yosu, Mokpo and Inchon. The stations have six research vessels. Besides the stations, there exist two fish hatcheries one at Chihae and the other at Chung-pyung. The Government has

appropriated a large amount of funds for the stations this year since the stations play a very important role in improving the fishing industry. The two hatcheries are raising mainly carp and tilapia which were brought from Thailand five years ago.

9. Fisheries Cooperative Organizations

The organizations are incorporated to the articles of the Korean Fisheries Organizations Law. Their purposes are in general joint purchase of fisheries material and equipment, marketing member's catch, installation of joint facilities and financing. There are three types of fishermen's organizations:

Fishing Guilds

There are 168 fishery guilds at fishing villages or ports along the coast throughout Korea. These are essentially community fishing cooperatives for the procurement of fishing supplies and consignment and marketing of the catch.

Unions of Provincial Fishing Guilds

These unions are located one in each province except in Cholla Namdo Province where two unions exist; a total of 9 unions of fishery guilds are established throughout Korea. The unions make loans to individual guilds for conducting their activities in operations beyond the capacity of individual guild.

Fishery Associations

The fishermen (boat owners) who operate the same type of fishery also form Fishery Associations. The culturists or processors of marine products who conduct same types of production business also organize the fishery associations for their mutual interests. There are 18 such fishery associations including diving-unit fishery associations, motor dragnet fishery associations, deep sea fishery association, deep sea tuna longline fishery association, purse seiners' association, three set net fishery associations, sail dragnet fishery association, anchovy fishery association, fish culturist's association, oyster culture association, agar-agar manufacturing association and canners' production association.

The Korea Central Fisheries Federation

As a central body of the fishermen's organizations, the Central Fisheries Federation is

organized and located in Seoul. All unions of fisheries guilds and associations are members of the Federation. Aside from the functions of the guilds, unions of guilds and associations, the federation has established an insurance policy for fishermen to assist them when their boats meet sea disasters.

10. Deep-sea Tuna Long Line Fishing

M.S. CHINAM-HO of the Jaidong Industrial company made her maiden voyage to Indian Ocean in June, 1957 to participate in the demonstration fishing operation project under ICA aid program of Fiscal Year 1957. Fifteen days of fishing operations of the vessel resulted in catching approximately 50 metric tons of various species of tuna. The vessel also collected valuable data on the fishing grounds of the Indian Ocean. The vessel left again on January 21, 1958 for her second fishing voyage for the tuna fishing grounds off the Samoa Islands of the United States Territory. The Jaidong Industrial Company has made a contract with the Van Camp Company as to the fishing operation of the vessel and sale of its catch. The Van Camp Co. has its canneries on the island. In addition to M.S. CHINAM-HO, the M.S. HAEYUN-HO left for Samoa Island for tuna catching.

11. Technical Training and Education

Korea has 15 fisheries educational institutions at present. The Pusan Fisheries College, on the coast several miles northeast of Pusan is the main advanced fisheries school in Korea. The college has five courses such as fishing, aquatic biology and culture, aquatic chemistry and manufacturing, shipbuilding and fisheries economics courses. It has approximately one thousand students.

There are fourteen other fisheries schools at the major fishing ports through Korea at the high school level with a total of over 4,000 students. These schools teach fishing techniques, seamanship, seafood curing or processing and fish culture. So far approximately 6,000 students have graduated from the school.

Various foreign aid programs have brought several fisheries exports to this country after the liberation and especially after the Korean War

to help build and or rehabilitate various fisheries production facilities such as ice plants, fish canneries, shipyards, etc., and to teach fisheries techniques.

The Bureau of Fisheries has been making strong efforts to send Korean fisheries technicians abroad to learn advanced techniques of foreign countries. Only four have so far been to the United States to study and observe seafood manufacturing, freezing, fishing operation and fisheries management under the U.S. ICA training program. In the near future another trainee is to participate for training in trawling under the FAO/ETAP Fellowship program of 1958.

The Office of Marine Affairs also runs a short term training school within the country to train technicians: a training school on the operation and handling of Diesel engine is being operated in Pusan.

FEDERATION OF MALAYA 1957*

General

The fishing industry of the Federation of Malaya has made rapid strides and may no longer be described as a backward peasant industry. Mechanization and industrialization have proceeded apace to an extent where developments may compare, albeit in a small way, with those of the bigger nations.

The principal fishing ground exploited by local fishermen extend from inshore waters and comprise a belt of not more than thirty-five miles of water round the Peninsula. Traditionally the inshore waters, especially those in the Straits of Malacca, have been fished intensively with a great variety of gears including fishing stakes, beach seines, boat seines and drift-nets. In the offshore waters there is an equal array of proven and productive gears, amongst which may be mentioned the purse seine and sunken long lines on the West Coast and the traditional Malay lift net (pukat tangkok) and boat seine (pukat payang) on the East Coast.

There has not been any major type of new gear introduced into Malaya, but there have been modifications of existing gears to adjust them to the use of motor driven craft. The most productive of these is the purse seine which is now used for catching the Malayan shad, or

*Note: The tables submitted with this report are omitted from the present document. They are retained on the files of the Secretariat Secretary.

ikan terubok, and the Malayan chub mackerel, or ikan kembong. A modified form of this net has also been used since 1956 on the East Coast (Trengganu and Pahang) for catching the Malayan anchovy, the ikan bilis. This modified purse seine is gaining popularity as it enables operation on the anchovy shoals well out to sea, instead of having to wait for the shoals to come inshore, as is necessary in the case of beach seines, or pukat tarek which are hauled in from the beach. In addition, mechanized craft have been used with increasing success for the Malay lift net, the pukat tangkol, the Malay boat seine, the pukat payang and the Chinese beach seine, the pukat taubang or pukat kenka. Until recent years the fishing fleet never fished more than 35 miles from the coast, except on the rarest occasions. But today fishing craft are found fishing regularly 65 to 75 miles away from their base. Mechanization at sea is being followed up with similar developments ashore. Such developments as the use of mechanical ice crushers at fish packing plants, the use of derricks and hoists for bringing fish ashore, the use of refrigeration and chilled ice-water storage for holding fish from periods of glut to periods of shortage, and the canning of fish in multi-purpose canneries all point to a healthy process of evolution. While the use of outboard motors on traditional craft is still widespread, the development of healthy inboard Diesel-engined craft is gaining momentum and at the end of 1957 there were 1,494 such craft licensed and operating as compared with 996 in 1956.

Weather conditions for the year under review have followed the normal pattern. On the East Coast, particularly in Kelantan and Trengganu, fishing activities were very limited during January and February because of the monsoon. However, conditions improved considerably from then onwards with the result that for the higher grades of fish, there is always a consumer demand which will depend again on the supply position of these grades, rather than on the availability of fish supply in general. This factor of consumer preference has always been one of great significance in Malaya where the population is diverse and types of fish available are so varied.

Ice was available throughout the country at an average price of M\$30 per ton to the industry. In places where transportation was difficult, the charges were generally higher. The

opening of the East Coast Railway stimulated the export of high grade fish from Tumpat to Singapore. Similarly, the opening of the Maran Road connecting the East Coast with Kuala Lumpur by a short route has stimulated the fisheries of North Pahang and Trengganu and lorries loaded with fish in ice are a regular feature on this road when the fishing season is open. Further, the improvement of road communication between Kuala Trengganu and Kota Bahru has also greatly stimulated the export of fresh fish from Besut and Kuala Trengganu to Kota Bahru.

The total landings for the year were 110,863 tons against 111,000 tons for 1956, the lower landings recorded for the West Coast being compensated for by increased landings for the East Coast.

Structure of the Industry

The basic structure of the industry has changed little, but there is now a growing awareness of the value of cooperative effort, a direct result no doubt of the new Government policy of encouraging the formation of co-operatives in all primary industries. On the whole it may be said that fishermen operate with borrowed money and the man who provides capital has control of the fish. He in turn, distributes the fish to the major consuming centers and the rural districts through consignment agents. There are a large number of registered companies owning boats and gears and employing their fishermen on a share basis; there are also considerable numbers of private boat owners and small gear operators who sell their catch to purchasing agents ashore, often closely linked with an advance payment system. On the North-West Coast, a "secret auction" or system of whispering tender prevails. On the East Coast there is a system of open bidding at the landing points on the beaches. At the major urban centers of Alor Star, fish landings for the whole of the East Coast from Kelantan to East Johore were higher than that for 1956. On the North-West coast, it was reported that the continued presence of jelly fish had spelled the failure of the bag net fishery. This coupled with a period of stormy weather due to the South-West monsoon, caused an appreciable fall in landings compared with previous years. In the South-West zone however, fishing conditions were satisfactory throughout the year, particularly with the drift-net fleet

of Malacca and Pulau Ketam; the latter were in fact reported to have doubled their catches as compared with previous years. The Malayan shad or ikan terubok again failed to appear this year and this together with the poor catches of Malayan chub mackerel or ikan kembong, led to great financial distress among operators of the purse seine fleet at Pangkor and Kuala Kedah. Indeed, it was anticipated that many nets would be laid up in 1958 if the poor fishing conditions, which began in 1956 and were attributed to clear water and changes in direction of currents, were to continue into 1958. The North-East monsoon set in early in November followed by strong winds and heavy seas, with the result that most of the fishing stakes off Southern Pahang and Johore were vacated very early by the fishing operators on these stakes. It will be remembered that similar exceptional bad weather conditions swept these coasts in November 1956 causing the loss of 53 lives among the operators of fishing stakes. As a result of this disaster a regulation has been introduced which requires the operating staff of fishing stakes off Johore and Pahang to vacate them before 10th November. This was a normal precaution which had worked well. Some relaxation of this ban, however, is required in the case of fishing stakes lying to the lee of islands off the Pahang and Johore coasts and stops were in hand to cope with these.

The average retail prices of the higher grades of fish remained fairly constant throughout the year whilst the lower grades showed a small downward trend in June, July and August, which coincided with heavy landings of the Malayan chub mackerel (ikan kembong) at Pangkor. This downward trend however was not maintained and prices for the lower grades thereafter rose to a slightly higher level compared with prices for 1956. It is thus clear that heavy landings of the lower grades of fish can only affect prices within those grades and that Ipoh, Kuala Lumpur, Malacca and Singapore, where are wholesalers who, by a system of daily telephone calls to their consignment agents, maintain a balance in the distribution phase of the trade. It is a common fallacy to describe the wholesale agents as forming a monopolistic fish ring. This could not be further from the truth, for the handling and distribution of fish in Malaya, where it is a highly perishable commodity, is a most competitive business. However, the physical handling and distribution is from up to date.

The Salt Fish Industry

The salt fish industry on the East Coast continued to find ready markets during the year, the bulk of exports being sent by sea from Kuala Trengganu and Kuantan to Singapore. Considerable quantities too were sent by lorry transport to Kuala Lumpur for eventual distribution to the urban centers on the West Coast. On the West Coast, the production of the Malayan chub mackerel (ikan kembong) was not sufficient to meet local demand for fresh and boiled kembong, hence there was little surplus for preparation of salted kembong. Boiled kembong continued to be in great demand and with the expansion of refrigeration and cold room facilities on the West Coast, the product was being marketed in all the inland towns and new villages.

Utilization

An analysis of the utilization, import of fish from other territories and the export to other territories shows that the Federation of Malaya had a net available supply of 903,888 piculs out of a total production in the Federation of 1,862,503 piculs. Of the total domestic production, 348,449 piculs were processed to make salted and dried fish. Another 193,796 piculs were utilized as agricultural fertilizer or as pig and duck food; 90,238 piculs of small shrimps were processed to make blachan, and 197,500 piculs were utilized for making dried prawns. This gives a total of 829,983 piculs of wet fish taken from the total production for normal processed products. Fresh fish was imported from a number of places. Higher grades were imported from Singapore to the extent of 34,144 piculs. Into Malacca and Port Swettenham and some of the nearby smaller towns a total of 22,909 piculs was imported from Sumatra, the bulk of this fish consisting of the Spanish mackerel "ikan tenggiri" and "ikan terubok." Other sources including present shipments brought in by sea and lorry shipments from South Thailand accounted for 52,592 piculs. The total imports of fresh fish were therefore 109,645 piculs. Exports were mainly to Singapore and this amounted to 237,950 piculs, the bulk of this fish was of the middle and lower grades, and is utilized largely by the laboring population of the Colony. Fish exported to other destinations outside the Federation of Malaya was 329 piculs.

Mechanization

Whilst the structure of the industry has not changed to any great extent, in so far as the financing of the industry and ownership

of craft and gear are concerned, the increase in the number of powered boats has continued as is shown in the following table:

	<i>Landings Tons</i>	<i>Number of Fishermen</i>	<i>Number of Gears</i>	<i>Powered Boats</i>	<i>Non-Powered Boats</i>
1949	104,880	71,403	21,139	327	21,793
1954	109,934	49,532	18,654	4,052	17,789
1955	109,422	61,212	17,606	4,550	18,879
1956	111,083	50,690	19,427	5,641	17,730
1957	110,863	49,443	21,276	6,283	17,541

It will be noticed that there was a continued reduction in the number of non-powered boats and the number of fishermen, followed by an increase in the number of gears. This indicates that the efforts of the Department to diversify the fishing effort of the fishermen is slowly bearing fruit. In the past there has been too much reliance upon a single gear to provide fishermen with their livelihood, but during the past two years an attempt has been made, with some success, to persuade fishermen to own a series of gears, so that they may adapt their effort to the changing seasons. The number of powered boats is about 27 per cent of the total registered number of boats, but it must be noted that quite a number of the registered boats consist of very small craft operating in estuarine and very shallow in-shore waters, or which are engaged only in part-time fishing and these do not offer a potential for mechanization.

General features of mechanization in the different zones

In the North-East zone which comprises Kelantan and Trengganu the most notable feature was the rate of mechanization which continued unabated. Bigger boats are being built and engines with higher h.p. are being installed. Outboards have practically given way to inboard Diesels in Kelantan, Besut and Kuala Trengganu areas. They are, however, still being used in the Kemaman/Dungun area particularly at those villages which lack safe anchorages for the bigger types of engined boats. Of the types of Diesels in use the most popular is the Japanese Yanmar Diesel of 4 H.P. to 24 H.P. Of the British engines, Lister of 20-30 H.P. are popular.

Mechanization came rather late to Pahang in the South-East zone, but even here the number of Diesel-engined boats increased from 17 in 1956 to 37 in 1957. Similar increases were recorded for East Johore. The number of outboard engined boats remained static.

On the West Coast, there was a general increase in powered-boats in Kedah, Penang, Perak, Selangor and West Johore. In Selangor there was an increase of 21 per cent over the number in 1956. Malacca and Negri Sembilan totals showed a slower rate of mechanization whilst the large increase in Selangor was due to rapid conversion of the Tanjong Sepat and Pulo Ketam drift-net fleet to power.

As a result of the degree of mechanization achieved there is now a great tendency for fishermen to move round the coasts following the seasons. Two purse seine (pukat jeroot) boats, one from Kedah and the other from Port Swettenham fished off Trengganu during the year, one condition being that the boats should operate in waters beyond the twenty fathom line and fish for moving shoals of the Malayan chub mackerel, the ikan kembong. Both boats failed miserably, the reason given being that the fish were in loose shoals. Fishing with the use of lures (tuas) to aggregate fish shoals appear still to be the only successful method in dealing with most of the pelagic species on the East Coast. It might be mentioned that these lures are widely used by Polynesian fishermen in the East Indian Archipelago. Similarly twenty-one bubu and handline Diesel-engined boats moved to the North-West zone from Besut and Kuala Trengganu before the monsoon broke on the East Coast in October. These boats based themselves in Penang and Kuala Muda and were

able to exploit the well known redsnapper (ikan merah) grounds to the West and North-West of Pulau Perak. These grounds have for years been the fishing grounds of Chinese longline fishermen from Penang, but are at present under-exploited because of a shortage of fishing crew. The present development of bubu-fishing with Malay crew from the East Coast is therefore noteworthy and indeed timely and deserves close study, especially as it is known that the grounds are also being fished during the North-East Monsoon by longliners based at Singapore. A powered sekechi from Kuala Trengganu operated fish traps (bubu-fishing) from Kuala Selangor during the year.

The rapid mechanization of fishing boats poses a number of problems particularly on the East Coast. There is a need for expert guidance to be given boat builders in the design of the hull and the installation of engines in order that full beneficial results may accrue to the industry. There is also an urgent need to evolve a suitable type of beach-landing craft for fishing villages on the exposed coasts. This latter question is important if the fishermen in these villages are to derive benefits from mechanization with Diesels. They have for the time being to fall on the ubiquitous outboard engine with its enhanced cost of operation. It is understood that a request under United Nations Technical Aid has already been submitted by R.I.D.A. for the services of a naval architect to assist in the design of suitable types of boats for the R.I.D.A. dockyard in Trengganu. On the question of suitable beach-landing craft, this department is currently in communication with the FAO Naval Architect, Mr. Traung, who has similar problems on hand for Ceylon, India and Pakistan. Another pressing problem is the need for shore facilities which must develop quickly. In many of the fishing villages there is also an urgent need to build suitable Jetties and other facilities to service these powered boats.

Fishermen's Cooperative Societies

The Federal Fisheries Committee whose report was accepted by the Federal Legislative Council in 1956, made two major recommendations. Firstly, that cooperation was to be

promoted throughout the country in all phases of the industry and trade, in order to stimulate thrift and capital improvement. Secondly, that a fund should be available to the Ministry of Agriculture to provide capital assistance to cooperative societies. A sum of \$3 million has been made available for this purpose and a part of it was used for the training of Assistants to guide in the education of fishermen in cooperative principles and in the organization and running of cooperative societies.

A direct result of these recommendations was that great effort was made to promote the formation of fishermen's cooperative societies during the year under review. It was decided because of similarities in the methods of fishing employed and in the capital structure of the industry that a firm start be made in the North-East zone to include North Pahang up to Kuantan. Accordingly, after a month's preparatory training at the Petaling Jaya Cooperative College, the field staff in the Northeast zone were fully committed to assist ing staff of the Department of Cooperative Development in encouraging firstly the formation of fishermen's cooperative societies, one in each of the fishing villages, and latterly in helping the assessment of the value of various gears which were then pooled in as capital assets of the societies. Thirtyone Fishermen's cooperative Credit and Marketing Societies have now been registered on the North-East coast. These societies have formed themselves into the East Coast Fishermen's Cooperative Transport and Marketing Union with Headquarters in Kuala Trengganu and in November and December this Union started a pilot scheme for the joint marketing of fish from the Kuantan area to the inland towns of Temerloh and Mentakab. Eventually Kuala Lumpur will be the main objective. Owing to various difficulties the Union did not begin paying out loans under the Scheme of Assistance to fishermen through cooperative societies, until about September. By December 31st the Union had paid out \$229,909 to 74 groups with a total of 377 fishermen. Distribution of this payment by cooperative societies is summarized below:

<i>Name of Society</i>	<i>No. of group</i>	<i>Number of members</i>	<i>Amount of loans granted</i>
Tanjong Lumpur	11	33	\$34,980
Mengabang Telipot F.C.S.	7	53	31,500
Telaga Nanas F.C.S.	3	25	35,000
Kijang F.C.S.	2	32	30,700
Ayer Tawar F.C.S.	5	15	12,370
Sobrang Takir F.C.S.	7	63	28,800
Telong F.C.S.	3	24	9,430
Sungai Ular F.C.S.	28	76	22,537
Kerteh F.C.S.	3	23	12,722
Oalam Rhu F.C.S.	1	8	11,300
Kampog Sebak F.C.S.	1	8	10,000
Kuala Besut F.C.S.	3	17	26,600
Grand Total	<u>74</u>	<u>377</u>	<u>\$229,909</u>

Whilst full attention on the formation of fishermen's cooperatives was focussed on the North-East coast, a few fishermen's cooperative societies on the West Coast which were in existence before the acceptance of the Federal Fisheries Committee's Report, continued to function. These societies have not as yet received aid under the \$3 million Scheme due to a shortage of the necessary trained staff to supervise the Scheme. The Fishermen's Co-operative Society at Kuala Muda continued to function but incurred a loss in 1957. The Malay Cooperative Society at Kampong Pancher, Perak, which was formed specifically for the farming of cockles reported satisfactory progress. Its venture into boatseine fishing (pukat payang) has not however met with the success anticipated. In Selangor the Sementa Cooperative Society, the only Fishermen's Society in the State, continued to make modest but steady progress. The Society was established in 1952 expressly for the preparation and marketing of shrimp paste. It has a small factory and has been extremely successful in obtaining good prices for its product in the Kuala Lumpur markets. The two Fishermen's Cooperative Societies in Negri Sembilan namely that at Pasir Panjang and Telok Kemnang continued to market their members' catches at fishstalls in the Port Dickson market. At Malacca excellent progress was made by the Hengwha fishermen's (Chinese) Cooperative Credit and Marketing Society Ltd. The Society operated a fishing materials purchase scheme for the direct purchase of hemp twine from Italian manufacturers through a commission agent. This was estimated to save the Society some \$10,000 a

year. The Society also operated a fuel purchase scheme during the year, a contract having been signed with the Shell Company to supply the Society with 80,000 gallons of Diesoline per annum at the wholesale price of 58 cents per gallon against the retail price of 62 cents per gallon. Similarly the Society has successfully negotiated with the Malayan agent for Japanese "Yanmar" engines and the agent for Petter engines for substantial discounts which will be passed to the members. The largest single expenditure incurred by the Hengwha fishing fleet is the purchase of ice which totals some \$7,000 per month. The Society is now looking into the question of building its own ten-ton ice-plant. A suitable piece of State land has, it is understood, been obtained for the purpose. The estimated cost of plant equipment and installation is \$90,000 to which must be added \$30-\$40,000 for buildings and land.

Fishermen's Training

The Fishermen's Training Course in care and maintenance of engines and in helmsmanship which was started in 1953 with Rural and Industrial Development Authority funds and continued in 1956 with departmental funds, was maintained during the year. The course which was previously held at the Junior Technical Trade School, Penang, and the premises of the Local Masters & Gunners' Institute, Penang was transferred to the departmental workshop in Glugor in 1957; 42 Federation fishermen participated in two courses. Of these 16 obtained the Helmsmanship Certificate of Competency and 38 the Engine Repair and Maintenance Certificate. The small number of

passes in the Helmsmanship Certificate Examination was due to some of the trainees being under-age for the examination. A few were debarred either because of lack of the required sea-time or because of failure in the stringent eye test which necessarily includes that for color vision.

In addition to the above trainees, two members of the staff of Government Departments one from the Marine Department and one from the Telecommunications Department were accepted for training in engine maintenance and repairs. Both passed the examination.

Kelantan Fish Marketing Scheme

The Kelantan Fish Marketing Scheme at Bachok which was originally financed with a grant of \$194,200 from the Colonial Development and Welfare Fund, but since taken over by the Department and run with Federal funds from the middle of 1956 continued during the year under the Deputy Manager who was directly responsible to the Director of Fisheries. The amount of fish handled was 1,176 piculs compared with 1,016 piculs for 1956. The Scheme, however, continued to meet with strong opposition from middlemen during the course of the year. Whilst the Scheme cannot be said to be a financial success, one of the chief aims of the Scheme, that of influencing fish prices so that fishermen in the Bachok area may obtain a fair price for their fish has been achieved. The Scheme branched out during the year into preparation of salt-fish, belachan (shrimp paste), budu (a local fermented fish paste) and "bilis sauce" in anticipation of good sales during the monsoon months. However, owing to continued landings of fresh fish in good quantities throughout the monsoon months from fishermen based at Pulau Redang, the sale of budu and saltfish was poor. Similarly, although the shrimp paste produced was of high quality and its preparation was based on the same method as that used by the best manufacturers in Penang, sale was disappointing as the local Kelantan people preferred the less expensive, albeit lower grade, local product. Suitable markets will therefore have to be found for this shrimp paste on the West Coast.

The Scheme has now been in existence for two and half years, and although it cannot be considered a success, it has provided much

insight into the intricate problems of fish marketing in Kelantan. It is the intention that the building and other facilities afforded by the Scheme be eventually taken over by the East Coast Fishermen's Cooperative Transport and Marketing Union when this is firmly established.

Relationship with R.I.D.A.

One of the recommendations of the Federal Fisheries Committee was that R.I.D.A. should gradually cease to provide capital loan to the fishing industry and that this should be taken over by the \$3 million Aid Scheme. There has consequently been a tailing off in R.I.D.A. aid which was called upon only in those areas where the \$3 million Aid Scheme had not commenced operation. This R.I.D.A. aid was given only Pahang, Johore, Kedah, Penang and Malacca, during the year. In Negri Sembilan R.I.D.A. aid was continued particularly in fishponds, and eleven new applications were dealt with. At the same time an intensive follow-up investigation made by the Department has shown that in the past R.I.D.A. projects have had varied success. Of 42 ponds listed, 14 were reported successful, 15 abandoned and 13 either not operated commercially or had been disposed of by sale or rental. Thus it may be stated that approximately one-third of R.I.D.A. pond projects have proved successful, one-third have totally failed and one-third maintained below the level of commercial intensity. Of the Malay pond projects, the two main factors responsible for failure the lack of attention to predator were control and insufficiency of fertilizer treatment. Out of a sample of 20 Malay projects no less than nine were found to be abandoned and only two claimed success. The Chinese carp projects, however, invariably combine with pig breeding and they concentrate on the culture of Chinese carp. They all met with general success. Out of nine ponds, seven obtained success and one had grossed \$4,000 or three times his loan amount.

In view of the varied success attained, no doubt a result of the lack of fundamental knowledge on the technical aspects of pond culture among the Malay raayat, the Department continued with the pond culture course it started in 1956. In 1957 a course on pond culture was held in Ampangan (Negri Sembilan) on 10th and 11th December and was attended by 10 pond owners.

Brackishwater Fisheries; Prawnponds and Cockle Culture

The entire coastline in the North-West region particularly that of Penang, Kedah and Province Wellesley has been surveyed during the year in an endeavour to find a suitable site for an experimental prawn-pond. In general the mangrove swamps in this region appear to be too high for the purpose. As prawn pond construction involves heavy costs of bunding, it is unlikely that private enterprise will invest in the industry until it can be shown to be an economic proposition.

Prawnponds are, however, an important feature of Singapore fisheries, and it has been estimated that something like 230 tons of prawns and fish are produced annually from 1,300 acres of ponds constructed from mangrove swamps round the islands.

It is therefore clear that there is tremendous potential for development of prawn ponds in the Federation, particularly in the mangrove belts of Southern Johore, Selangor and Perak. With the improvement in emergency conditions, it is believed that there is keen interest among prawn pond operators in Singapore to extend operations into South Johore. If this is true it should be welcome as it will help to initiate what has become an important industry in neighboring countries like Indonesia and the Philippines where thousands of acres of mangrove swamps have been converted into ponds for the culture of prawns and fish.

The department has under its Development Plan a project for the setting up of a brackish water fish culture station in Johore. This should help in accelerating the development of prawn ponds in the Federation.

An important postwar development in Malayan fisheries has been the culture of *Anadara granosa*, the Malayan cockle. It was round about 1948, that the headman of Bagan Panchor, a fishing village off Kuala Jarum Mas, first experimented in the sowing of seed cockles obtained from the natural cockle bed at Kuala Jarum Mas, on the patch of muddy foreshore in front of his village. The experiment was a great success as the young cockles registered phenomenal growth rates in the newly laid out areas compared with those in the natural bed. Since that time the culture of cockles spread rapidly throughout the mangrove areas

of the West Coast, with the encouragement and advice of the Fisheries Department. The progress recorded in past years has continued.

In Perak there are now some 2,000 acres of muddy foreshore under cultivation and the bulk of the cockles consumed in Malaya are produced here. The cultivation of cockles has made an almost unbelievable difference to the general standard of living in the villages along the mangrove fringes over the past ten years. The people employed as collectors earn a better living than most fishermen and although the work is hard the income is regular. The estimated production for Perak for the last six years is as follows:

Production of cockle in Perak

(mainly from culture beds)

		Piculs
1952	...	27,030
1953	...	36,300
1954	...	32,670
1955	...	44,750
1956	...	78,309
1957	...	88,711

The areas under cultivation are the mud flats of Gula, Larut and Matang. For 1958, there is every indication that production will show further increases. In Penang too, cockle culture spread rapidly from 1950 onwards, first with imported seed cockles from Kuala Selangor and Kuala Jarum Mas and later with supplies from the natural beds of Kuala Jalan Bahru and Sungei Pinang on the West Coast of the island. To date, temporary occupation licences have been issued for all available suitable sites on Penang Island and the culture has now spread to Pulau Aman and to the Province Wellesley coast. The total area under cultivation in Penang is estimated at 600-700 acres with an annual production for 1957 of 20,000 piculs. Apart from these there is also a small production from the natural grounds off Selangor, particularly Beting Gopal. Thus the total production of cockles for the Federation for 1957 is estimated at some 110,000 piculs, a figure more than twice that recorded for 1938 (last published data available before the War), which stood at 43,000 piculs. The bulk of this production was consumed in the major towns of the West Coast and in Singapore. A small quantity was exported to the East Coast via Kuantan. In 1956, the recorded export of

shellfish, which consisted mainly of cockles, to Singapore was 2,973 tons valued at \$502,425 wholesale. The corresponding figure for 1957 is expected to be some 3,700 tons. As a direct result of this increased production, the canning of cockles in soya sauce which was demonstrated by the Department at Kuala Kurau before the War, was taken up by two canneries, one in Penang and the other in Singapore. The Singapore cannery drew its supplies of cockles in the form of cooked cockle-meat packed in ice, from Kuala Kurau.

The extension of cockle culture to other States has received attention, both at policy level and on the ground. In the North-West Region four trials were carried out, namely at Kuala Kedah, off Tanjong Dawai, at Kuala Perlis and at Kuah, on Pulau Langkawi.

It was found that seed cockles grew at a phenomenal rate at Kuala Kedah but the area for cultivation was limited. Further trials will now be made on the exposed sea-shore to see whether wave action during the South-West monsoon will allow of this development here or not. Tanjong Dawai was a failure as few live cockles were recovered and they were generally in poor condition.

Kuala Perlis was suitable but again the sheltered area available is limited. The problem here is the same as in Kedah, i.e. trials will need to be made to see if the exposed fore-shore along the coasts can be utilized. Kuah registered a failure as few live cockles were recovered.

In the South-West zone, seed cockles were sent out late in the year from Penang to Sementa off Selangor, but it is too early as yet to say if the experiment will register success. Two attempts were made to send seed cockles to Johore during the year. Both met with failure as the seed cockles died on the way.

In the South-East zone, two experiments were started of Tanjong Lumpur near Kuantan. In the first, the seed cockles sent from Penang were destroyed by rays as a lot of crushed shells were recovered. In the second, the seed cockles showed good growth until the onset of the monsoon bringing with it a huge influx of flood waters. The cockles were discovered to have been killed by this influx of fresh water. It is clear therefore that in the case

of the Kuantan estuary and other similar locations on the East Coast, cockle culture can only be successful in the period between the monsoons. This raises the problem of having to import seed cockles every year from the West Coast. However, since cockles are marketed at 30 cents a katty in Kuantan against 10-15 cents a katty on the West Coast, it may yet be an economic proposition to start a cockle industry on the East Coast based on regular imports of seed cockles from the West Coast.

Fresh water Fisheries

The additional staff recruited for Fresh Water Fisheries in 1956 enabled a much more extensive program of work to be carried out in 1957 than was previously possible. Of the additional staff, one junior fisheries assistant was posted to Malacca, and two were posted to each of the States of Trengganu, Pahang and Negri Sembilan to undertake advisory and survey work and the stocking of open waters in those States. This work has produced a clearer picture of the possibilities and limitations of fish culture work in rural areas and has resulted in renewed interest in the rearing of fish. The remaining fresh water staff continued to operate from the Headquarters at Penang where they have continued with survey and extension work in North-West Malaya and have carried out further work on stocking ponds, irrigation schemes and dams. The first indications of success in these experiments appeared during the year as Sepat siam (*Trichogaster pectoralis*) appears to have established itself in the Kubang Pasu canal systems in the North-West, whilst in the South-west, *Tilapia mossambica* has established itself in Gedang Tebat near Sri Menanti, a natural swamp adjoining padi fields. It is reported that *Tilapia* are now regularly seen in these fields. In addition, Sepat siam has been successfully introduced into Sungei Balang Dua sawaks in Johore. In all a total of 12,025 Sepat siam (*Trichogaster pectoralis*), 15,648 *Tilapia mossambica*, 90 Kalui (*Osphronemus goramy*), 4,270 Lampam Jawa or Tawes (*Puntius javanicus*), 50 Ketutu (*Oxyeleotris marmoratus*), 100 Chow Hu (*Ctenopharygodon idellus*) and 1,280 Lee Koh (*Cyprinus carpio*) were distributed during the year, several more varieties than had been distributed in 1956. The numbers of Lampam Jawa or Tawes and of Lee Koh

which were distributed are of particular significance as the breeding of these two types of fish was carried out at the Tapah Federal Fry Breeding Station for the first time. The department also sent 380 Sepat siam and 32 Kalui to New Guinea at the request of the Australian Government in order to help in the establishment of fish culture there. Similarly 200 Sepat siam were sent to the Central Fisheries Department, Ministry of Food and Agriculture, Government of Pakistan on 10th July 1957 at the request of ICA through the U.S. Consul in Penang.

Further importation totalling 10,000 *Catla* fry were made during 1957 in order to continue with observation studies on this fast growing fish. In addition to the above in the latter part of the year a start was made on the clearing and re-stocking of abandoned mining pools with fast-growing fishes. This work involves the elimination of all predatory fishes from the pools, which are potentially a very promising source of fresh water fishes for the rural population in the tin mining areas. A newly recruited Fisheries Officer (Research) carried out a series of experiments to test the efficacy of various insecticides, namely "Shell" Endrex, "Shell" Dioldrex and "Shell" Aldrex in clearing ponds of fishes and laboratory results were successfully applied in the field. Eight mining pools in Kaki Bukit (Perlis), Taiping and Batu Gajah, of a total area of 8½ acres were cleared of predatory fishes and subsequently stocked with *Tilapia* and *Puntius javanicus*.

As part of the Department's policy to expand the services available to persons who are interested in fish culture, land has been acquired near Kuala Kangsar for building a Regional Fry Breeding Station from which fry will be distributed and at which experiments can be carried out on the spawning and rearing of local fish from the nearby Perak River. The Federal Fish Breeding Station at Tapah has been extended and goats and Sindhi crossed calves have been introduced as a source of fertilizer for the ponds.

Survey of fish ponds, mining pools

A survey of existing fish ponds and mining pools in the district of Larut and Matang, Kuala Kampar, Temoh, Tapah, Bidor Mambang Di-Awan was made during the year.

Fish Breeding

The techniques of spawning the Common Carp and *Puntius javanicus* acquired by the four Junior Fisheries Assistants in Indonesia, where they were sent to undergo a fish culture course, were demonstrated successfully at the Tapah Fish Breeding Station to other Fisheries Assistants who had not gone overseas. At the Bayan Lepas farm, Penang, local pond keepers were introduced to the Indonesian method of breeding the common carp.

The breeding of *Puntius javanicus* was carried out successfully during the year for the first time at the Tapah Fish Station. One male and three females were employed and a total of 29,300 fry was successfully reared to 2 in — 3 in for distribution to pond owners.

Course on Prawn Pond operations

All the Fisheries Assistants (Fresh water) were given a course on prawn pond operations in Singapore from 21st-27th June 1957 by Dr. Tham Ah Kow, Chief Fisheries Officer, Singapore.

Culture of Udang Galah

(*Macrobrachium carcinus*)

The Department has during the year carried out experiments on the culture of Udang Galah, a freshwater prawn known scientifically as *Macrobrachium carcinus*. This much sought after prawn is found in most of the rivers and swamps of Malaya and fetches very high prices in the local market. The experiments have not been a success and will be continued in 1958.

Assistance to ex-Special Constables and others

The Department assisted a group of ex-Special Constables at Kampong Sahom, Kampar, in reconditioning old fish ponds which were excellently laid out by the previous owners. Labour was diverted from the Fish Station at Tapah for the work. On completion, the ponds were stocked with *Tilapia mossambica*, Kalui, common carp, *Puntius javanicus* and Chinese grass carp and were then handed back to the ex-Special Constables to look after. Staff from the department continued to visit the ponds and to advise on the management.

Field staff of the department also rendered assistance to a pond owner at Baling to rid his ponds of predatory fish and to restock

it with *Puntius javanicus*, common carp and Kalui.

Experimental work carried out during the year

(a) Fishing experiments

During 1957 all the Departmental vessels were fully engaged to the limits of the financial allocation made for operating them. Besides routine survey and inspection work of varied program of experimental work was carried out. In the North-east zone **M.V. TENAK**, prior to being transferred to Penang, was engaged in exploratory drift-net fishing experiments in deeper waters than fished by local fishermen. The vessel was also used to encourage longlining among Malay fishermen in the waters beyond Pulau Perhentian, with considerable success. Following its transfer to the North-west zone, **M.V. TENAK** was used for investigations into the possibilities of using chemicals as a means of driving dolphins away from areas where pukat jeroot was being operated as dolphins cause considerable damage to the nets when they attack the catch.

M.V. TONGKOL continued the work on bubu-fishing in waters 40-50 miles from land. This work started in 1956. The difficulties in finding suitable floats and markers for traps were finally overcome and the necessary work preliminary to carrying out comparative experiments between traditional and modified bubu (fish pots) with a view to improving the efficiency of traditional traps has been completed.

In the North-west zone comparative experiments to determine the advantages of nylon fishing nets over the traditional cotton and ramie nets in drift-net fishing were carried out and will be continued in 1958.

(c) Dolphin meal

During the year a total of twelve small dolphins (average body weight just over 30 katties each) were received from Kedah where they were caught by pukat jeroot. These were processed in the Department's fish meal plant. A fairly simple method of processing them was found after a first trial, the bodies are flensed and then butchered, the meat being cooked then boned roughly, minced and sun dried; the dried minced meal can then be put through a hammer mill. The bones, with attached

meat are sun dried, crushed and put through the hammer mill. The two processes, although simple involve quite a lot of labor. The meat meal is apparently suitable for animal feed and the Agriculture Department is carrying out feeding trials. Two analyses of this meal were made; they were roughly the same and the results of the second are given below:

	% dry basis	% as received
Moisture	—	7.70
Ash	3.66	3.38
Protein	85.99	79.37
Fat	6.59	6.08
Analysis of ash	% on ash	% as received
CaO	7.20	0.27
P ₂ O ₅	39.51	1.34

The estimated wholesale price for this meal is 46 c per katty.

The bone meal is reported as being suitable for use as a fertilizer as regards nitrogen and phosphate content but as lacking in potash.

The Department obtained a yield of approximately 15 per cent by body weight of meat and 2 per cent of bone meal. It would appear therefore that one picul of raw dolphin is worth just over \$ 7.00 when processed; the process is therefore not an economic possibility. Oil from the blubber is a possible additional source of income but the income from this would be small and it is unlikely that this would make the processing of dolphins economically possible.

(c) Fish Icing Experiments

A series of experiments designed to test the marketing side of the industry's often repeated statement that iced fish invariably loses weight in transit and storage were carried out on two of the cheaper types of fish; ikan kembong (*Rastrelliger Sp.*) and ikan gerut-gerut (*Pomadasyss hasta.*)

The fish was weighed before icing and then packed in boxes similar to those in common use in the markets using a similar icing technique. The fish was then drained and weighed at six hourly intervals.

The experiments showed that as long as the fish remained in good fresh condition there was a gain in weight of roughly 5 per cent in most cases. While there was considerable vari-

ation in these increases, in no case was a loss in weight recorded.

In order to follow marketing practice as closely as possible the fish was iced only after landing (up to eight hours after it was caught). Consequently there was some deterioration in quality and some of the weight increase was lost after about 24 hours in ice.

It is however apparent that provided that fish is properly iced as soon as possible after landing there will be an increase in weight between the time of landing and the retail sale since very little fish is more than 36 hours out of the sea when retailed.

Administration of fishing stakes

Fishing stake is one of our most important gears in the North-west, South-west and South-east regions. Its operation, however, leads to many disputes with net fishermen, as derelict poles are left on the seabed and these foul the nets. The settling of disputes between these two groups of fishermen has therefore been a perennial problem to the Department. In conformity with a recommendation of the Federal Fisheries Committee, steps have been taken by several States during the year, with the advice of the Department to improve legislation on the licensing of fishing stakes. In general there is now a limitation to the number of licences issued and an increase in the amount of deposit held against a licence for removal of derelict poles.

In the South-west zone, particularly off Selangor, there is an acute shortage of mangrove poles for fishing stakes and this problem is likely to spread to other areas. The Department has consequently approved the experimental trial of the Japanese set-net (Otoshi-ami). One of these will be operated by private interests off Selangor and one off Kedah. It is felt that should this net prove successful it will pave the way for the gradual elimination of fishing stakes and all their concomitant administrative problems.

Training Staff

Staff of the Department have been sent for training locally and overseas. A number of Fisheries Assistants underwent a course on co-operative development at the cooperative College in Petaling Jaya. Four were sent overseas for a fish-culture course in Indonesia. The Deputy Manager of the Kelantan Fish Marketing

Scheme attended an FAO/ETAP course of training on Fishery Cooperatives and Administration in Australia. Those Fisheries Assistants having to deal with administration were sent to the Police College at Kuala Kubu Bahru to undergo a course in court procedure and the criminal procedure code. Canadian Colombo Plan Aid was secured for sending a trainee for gear technology to be eventually posted as Principal of the Marine Fisheries School, and for sending two Fisheries Assistants for a course on Fisheries Cooperatives and Administration in Canada. These trainees are expected to leave for training in early 1958.

Prevention of Loss of Life at Sea

A scheme for the rescue of fishing boats was introduced immediately before the outbreak of the monsoon in October. Under this scheme fishermen were asked immediately to notify the Police of cases of boats capsizing or missing at sea. Further, fishermen were notified over the radio of impending strong winds. The scheme has been successful in so far as the relaying of news by the Police was concerned. Because of the heavy surf at river mouths, exits of motor boats on rescue had not always been possible. One life was reported to have been lost as a result of the monsoon. This happened to a pukat tangkol boat which capsized off Kuala Pahang.

Development of Offshore Fishing Bases

The rapid development of mechanization in Kelantan and Trengganu has enabled fishermen to fish during a great part of the monsoon months. There is now an urgent need to develop offshore bases from which they can operate. The Pulau Redang group of islands have long been frequented by fishermen from Kelantan and Trengganu during the monsoon months and as many as 500 fishermen and their families have recently been over. To cope with this development two long-houses were constructed during the year under the supervision of the Fisheries Officer, North-east, on Pulau Pinang in the Pulau Redang group. The project was financed with State and Federal funds. Further development in the form of a jetty, ice and fuel store, and net and fishdrying racks is required and this has been provided for in the 1956-60 Development Plan. Apart from Pulau Redang, another island fishing base which should soon be developed to serve Pahang and East Johore is Pulau Tioman. The Department

is currently making investigations into requirements on this island.

Colombo Plan Aid

Canadian Colombo Plan Aid has been enlisted for the supply of refrigeration equipment for five ice-factories on the North-east coast. These factories will be established at a number of centers to serve fishermen's cooperatives and will eventually be taken over and run by the Cooperative Marketing and Transport Union, which has already been established. Supplies of cheap ice should go a long way towards furthering the objective of economic disposal of East Coast fish in the urban markets on the West Coast.

Visits Overseas

The Director of Fisheries accompanied the Minister of Agriculture on his official visit to Japan in September, as the guests of the Japanese Government. They were shown various aspects of the Japanese fisheries but concentrated attention chiefly on tuna-fisheries and fisheries education in general. A direct result of this visit is a plan to introduce tuna fishing into the Federation of Malaya. Negotiations are in hand for establishing the necessary facilities on Penang Island.

Research

The Government of the Federation contributed to the Singapore Regional Fisheries Research Station up to 31st March 1957 when the Station was closed down owing to lack of financial support from the participating territories.

The Fish Culture Research Institute at Malacca was completed during the year and was officially opened on 21st August 1957 by the High Commissioner, Sir Donald MacGillivray. It is a regional station to serve all British territories as well as the Federation of Malaya and these territories will be asked to contribute towards the recurrent costs, the capital costs for the buildings and the ponds which amount to £ 250,000 having been met from Colonial Welfare and Development Fund. Since the date of independence, administration of the affairs of the Institute has been transferred directly to the Secretary of State for the Colonies. Dr. C.F. Hickling, Fisheries Adviser to the Secretary of State, arrived in Malacca in November and is now the Acting Director of the Institute.

The research section of the Headquarters of the Department which was kept in abeyance pending development of the Singapore Regional Fisheries Research Station and the Fish Culture Research Institute was resuscitated at the close of the year by the filling of three Division I posts with locally born Honors graduates in Science from the University of Malaya and London University. At the same time the Division I post of Distribution and Marketing Officer was filled by an Asian who is an Honors graduate in Economics of the University of Malaya.

Cockle Research

During the year the temporary Research Development Officer appointed in late 1956 continued with his study in Penang on problems associated with the cockle industry. He has made population studies, both at the culture beds and the natural beds and taken physical and chemical observations such as temperature and salinity. Biological observations on growth, gonad development, spatfall and toleration to salinity ranges have also been made. Drift bottle experiments have been conducted to determine the pattern of the tidal drifts in order to prove or disprove the assumption that the natural beds on the West Coast of Penang derive their spawn from the culture beds on the East Coast. The Officer has since been appointed to one of the permanent research posts on the Headquarters establishment.

Research on Piscicides

The extensive program which the department initiated for the stocking of disused mining pools with desirable types of food fishes poses the problem of eradication of predatory fish such as aruan (*Ophiocephalus* sp) and Keli (*Clarias batrachus*) both of which are natural fauna of these pools. Experiments were therefore conducted to find a cheap and efficient piscicide. The Chinese pond keepers make use of tea seed cake and derris root (tuba) for the purpose. However both are expensive. A cheap and effective piscicide has now been found in "Shell" Endrex at a concentration of 0.007 p.p. million. This is now extensively used by the Department for the purpose, and is most economical.

Items of General Interest

During the course of the year, there was a significant reduction in the number of boats

operating from Port Swettenham and Malacca on the fresh fish barter trade with Sumatra. This is particularly so with operations from Port Swettenham.

Nylon fiber or a mixture of nylon and other synthetic fiber is now used exclusively by drift-net fishermen from Pulau Ketam. Their catches have more than doubled previous years' landing and they attribute it to the new Japanese synthetic drift-nets.

A conference of Division I officers of the Headquarters staff and the Chief Fisheries Officer, Singapore was held in December. The Conference was opened by the Minister of Agriculture and was held to discuss the implementation of a program for the study of the *Rastrelliger* (kembong) fishery based on that put forward by the Indo-Pacific Fisheries Council.

The Director of Fisheries attended the IX Pacific Science Congress held in Bangkok in November-December.

During the year the Department took part in a number of civics courses and members of the staff visited all parts of the country to give advice and demonstration on all aspects of the Department's work.

The Kedah Fish Committee appointed by the State Government consisting of Government Officials and Representatives of the Fishing Industry completed its report on the present stage of the fishing industry in Kedah with recommendations for improving conditions, and this report has been submitted to the Kedah Government.

Mr. M.L. Parry, Fisheries Officer, Federation of Malaya, spent six months on a survey of the Johore fishing industry before his retirement under the Malayanization Scheme. His report is now under consideration by the Johore Government.

Malayanization

Three senior officers of the Department including the Director retired during the year under the Malayanization Scheme. Four local officers with Honors degrees in Natural Science and Economics have been recruited to fill vacancies on the Headquarters establishment.

Financial Provision

The total cost to the Federation of Malaya for annually recurrent expenditure and personal

emoluments of the Pan-Malayan Department of Fisheries was \$645,752. The amount voted for the Regional Marine Research Station as the share of the Federation of Malaya was \$73,371, making a total of Federal expenditure of \$719,123. There was no State expenditure. The revenue collected in respect of fishing, fishing gear and boats etc. was \$288,247.

Statistics The detailed tables submitted with this report are omitted from the present document. They have been retained on the files of the Secretariat Secretary.

FEDERATION OF MALAYA 1958

(January - August)

Essential statistics covering the whole of the Federation such as numbers of gears in operation, number of fishermen, and boats have not been compiled and will only be available after the end of 1958, when the annual report of the department is written. However the salient features for the period are as under:—

Production

The most important feature is the change-over from traditional ramie drift-nets in the fishery off Selangor, Malacca and Johore to Japanese synthetic fiber drift-nets of the Tavailon-nylon type. These have increased landings substantially in respect of this gear, thereby causing an appreciable drop in the prices of fish normally caught by this gear namely *Scomboromorus* Spp. and *Chirocentrus dorab*. However the increased landings which were then double their previous landings for the same period, more than compensate for the lowered prices.

The change-over started from late 1957 and by August 1958, a fleet of some 1,600 units of drift-net boats changed over to Japanese synthetic fiber nets off Johore, Selangor and Malacca. The total capital involved in this replacement is of the order of well over \$2,000,000 all of which have been provided by the industry itself without Government assistance.

Mechanisation

The increased income arising from increased catches has stepped up mechanization of fishing boats in these areas and at the end of August some 350 new boats with inboard Diesel and about 150 boats with outboard engines have been registered.

Fishermen's Cooperatives

A further sum of \$470,000 was released by the Federation Government for loans to Fishermen's Cooperative Societies on the East Coast. A number of Fishermen's Cooperative Societies have started to market their catches jointly in the major towns of the East Coast.

Fishermen's Training

Courses in navigation and engine maintenance and repairs have been continued.

Researches

The Research Division of the Department has continued with its studies on the following problems:-

- (a) Cockle culture.
- (b) Stocking of disused mining pools with desirable types of fishes.
- (c) The *Rastrelliger* fishery.
- (d) Salinity pattern of the North Malacca Straits from Angsa Bank to Penang from samples collected regularly at Lighthouses.

Fresh water Fisheries

A survey is being carried out on the numbers and size of fish ponds and also the types of fish reared, throughout the country. So far some 700 ponds have been catalogued.

Research on Piscicides

Shell "Endrex" which was found to be such a cheap and effective piscicide was used extensively during the year for clearing disused mining pools and ponds of predatory fishes mainly (*Ophiocephalus* and *Clarias*). The trade preparation "Endrex" contains the active principle Endrin at a concentration of two lbs Endrin per Imperial gallon. This "Endrex" is used on ponds and mining pools, at a concentration of 0.008 p.p.m. of Endrin and was very effective. Its cheapness can be gauged by the fact that a pool of about 10 acres in extent and varying in depth from 1 to 22 ft. needed only \$84/- worth of "Endrex" to poison it.

A total of 65 mining pools of a total acreage of 108 acres have been treated with "Endrex" and stocked with *Puntius javanicus* and *Tilapia mossambica*.

In many areas these pools are being regularly fished and *Tilapia mossambica* are now appearing in the village markets.

Further stocking will be carried.

Marketing Section

The marketing section of this Department has carried out a Federation-wide survey on the movement of fresh fish supplies. The survey team consisted of the Distribution and Marketing Officer as head, a Fisheries Assistant Special Grade, and two Statistics Clerks from the Headquarters. The team was also assisted by Statistics Clerks and a few Fisheries Assistants in respective Fisheries Zones. The team started out on 5th May, 1958 and it took about two and a half months to complete its field work.

The daily data collected were figures showing amount of fresh fish handled by fish wholesalers or consignors in the main marketing and producing centers in the Federation over the month of April 1958. These daily data were obtained from the receipts and sales records kept by the wholesalers or/and consignors themselves. They were then transferred on to two forms specially prepared for the purpose by the Department. These data are now in the process of tabulation by the Headquarters staff of the marketing section. The tabulations when completed will show the following:-

- (1) Fish supplies handled by so many wholesalers in such and such center from April 1st to April 30th, 1958 by sources of supply in katties or piculs.
- (2) Fish supplies handled by so many wholesalers in such and such center from April 1st to April 30th, 1958 by types and sources of supply.
- (3) Average quantity handled by each wholesaler in such and such center during the month.
- (4) Re-consignment by so many wholesalers in such and such center by destinations.

The survey is expected to yield fundamental information regarding the volume of fresh fish trade (over a period of one month)

that goes through the wholesale fish markets in the Federation; hence the importance of each wholesale center and the directions of fish movements. The quantitative data thus obtained from the survey will provide a basis for studies of marketing problems in the Federation.

NETHERLANDS NEW GUINEA

There have been no reports of major developments except that an active program of fishing craft mechanization is being implemented.

Using native dugout canoes, outboard motors have been fitted in a number of cases and the use of this means of propulsion has resulted in an appreciable increase in the quantities of fish caught.

A program covering the improvement of native fishing gear, exploration of fishing grounds and an intensive survey of the pearl oyster fisheries is being implemented.

PAKISTAN

The construction of the Karachi Fish Harbor is well-advanced and it is expected to be completed by 1960. Modern facilities for fish landing and handling, cold storage and marketing are being provided as well as arrangements for boat and engine repair and maintenance.

A consignment of 70 Diesels for installation in fishing boats has been received and marks an important step forward in the vessel mechanization program.

In East Pakistan arrangements are in train to conduct a three year survey of the fishing grounds of the Bay of Bengal. A 73 ft. 6 in. exploratory fishing vessel is under construction.

Problems of fresh fish marketing in Karachi are being resolved through the installation of two cold storage plants and the construction of 22 modern-fish stalls appropriately distributed.

Approval has been granted for the construction of a Marine Biological Laboratory on the Karachi sea-coast to study marine fauna conduct research into the problems connected with the development of the fisheries and ancillary industries of the area.

There is a rapidly growing awareness among the fishermen of the qualities of nylon and related synthetic fibers for fishing nets. The present demand is in excess of the amount of foreign exchange which can be allocated for the purchase of these materials.

Reclamation of Derelict Water Areas in East Pakistan (by Dr. Nazir Ahmad, Director of Fisheries, East Pakistan): To combat the effects of diminishing supplies of fish and production from inland waters at less than the maximum sustainable yield, the Director of Fisheries of Pakistan has initiated a scheme for the rehabilitation and development of derelict inland water areas. The scheme is expected to extend over 5 years at a cost of Rs. 7.7 million and to bring into production 15,000 acres of derelict water. Estimates of area expenditure, production and revenue from 22 of the 90 unit areas are listed, totalling 6,282 acres, with a yield of 55,056 maunds, valued at Rs. 1,183,017/- for an expenditure of Rs. 897,378/-.

Formerly plentiful, fish is now getting scarce in East Pakistan. The natural result is that the consumers, who love to take fish with rice are forced either to eliminate it altogether or to effect drastic reduction of this item from the daily dietary. In East Pakistan with its extensive network of rivers and streams, *bheries*, *beels*, *baors*, *ponds*, *barrow-pits*, paddy-fields and estuarine creeks, there is immense scope for developing fisheries. According to a preliminary survey carried out by the Directorate of Fisheries, there are 239,135 impoundments, including 4,016 *beels* (inland lakes). Some of these water areas are from 50 to 60 square miles.

For various reasons, the production potential is not being achieved. Of fish producing waters 95,029 ponds and 2,045 beels are lying derelict, and the rest are not maintaining maximum sustainable yield due to faulty management. These water areas which could have contributed considerably in fighting the food shortage are now lying fallow and aggravate the spread of water-borne diseases.

The Directorate of Fisheries is executing with success a number of schemes aimed at increasing fish production. Recently the Directorate has started operation of an ambitious scheme to extend over 5 years and to cost Rs. 7.7 million, under which it is proposed to reclaim 15,000 acres of derelict water area.

For administrative purposes the entire area has been divided into 90 units, each comprising about 160 acres. Work on 8 units was started last year, 40 units are being taken up this year and the rest will be reclaimed during the next year. The unitwise basis of the working program is meant to ensure more methodical distribution of work to obtain the best economic results. Moreover the units will be distributed in such a manner so that all areas of East Pakistan get equal attention in fisheries development program.

Each unit will be commercially self-sufficient and economically independent. The expenditure and income have been so distributed among the units that the success or failure of a particular unit will not vitally effect the

working of the other units and the number of units can be appropriately increased or decreased without substantial change in the main scheme.

The expenditure incurred in the execution of the scheme is expected to be recovered with profit by the sale of the fish produced in these fisheries. After the first five years the work will be continued and with the initial development phase over, the expenditure will decrease resulting in greater profit. The scheme envisages production of 270,000 maunds of fish valued at 8.1 million rupees at the most conservative estimates.

A brief resume of the units is given below:-

UNITS UNDER DEVELOPMENT 1957-1958.

District	Unit	Area acres	Expenditure Rs.	Production (est.) maunds	Estimated Revenue, Rs. (to 1962)
Jessore :	Bahular Baor	645	134,138	5,400	162,000
	Joydia Baor	535	89,669	4,000	120,000
	Habulla Rustampur Baor	76	47,030	1,750	56,000
Dacca :	Naryanganj	18	24,450	1,006	35,210
Bogra :	Raktadaha Beel	500	83,076	6,600	99,000
	Narail Beel and Shakharia danga	150	43,492	2,700	48,200
Rangpur :	Bamandanga Beel	70	25,036	1,065	36,000
Kushtia :	Chand Beel	100	22,700	615	24,600
	Ganges-Kobadak Lake	33	15,318	875	26,250
	Chandona Doha	70	18,500	516	22,500
	Bhanderdah	180	36,544	850	38,000
Mymensingh :	Shampur Mora Beel	230	41,235	1,665	49,957
	Baleswar-Kutiakuri Beels,				
	Chowka Baor	100	17,844	850	25,500
	Diara Nadi	200	41,424	1,650	57,050
	Sharbamangal Dova, Betai and Khama Beels	170	26,822	1,400	42,000
Dinajpur :	Dinajpur	12	1,500	90	3,150
Sylhet :	Fateganj Beel	170	22,680	3,000	36,000
	Anduganj Beel	270	36,284	4,200	50,400
	Koibara fishery	83	14,916	1,600	19,200
	Palui Beel	1,700	91,470	9,000	135,000
	Aralikona Beel	870	67,284	5,000	75,000
	Moragong fishery	100	15,966	1,200	21,600

PHILIPPINES

Fisheries production is reported to have increased from 254,000 to 404,000 metric tons in 1956 and 1957 respectively, including both fresh water, brackish and marine products.

Plans have been completed for the continuation of the extended program of research in marine fisheries developed under the guidance of a FAO/ETAP expert.

The increasing catch has stimulated further interest in the establishment of modern fish canneries.

An extensive Raw Material Resources Survey, concerned with primary products, minerals, timber, agricultural products and fisheries products is in progress as a coordinated effort between the several government departments concerned.

Supplementary to the important *Chanos* culture industry, the Bureau of Fisheries has established a "Fry Bank" program to permit the stocking and development of lakes, rivers and other public waters where there is evidence of depletion.

The Government's fisheries training program is expanding and a number of "pensionados" have been sent to USA and Japan for training in biology, gear construction and use, repair and maintenance of electrical fishing aids and other subjects.

Preliminary studies on pond culture of a *teuthid* fish locally known as "samoral" or "padas" reveal excellent possibilities for development.

Improved methods of oyster culture are increasing production in the rich oyster grounds of Bacan Bay.

THAILAND

Substantial progress has been made by the Thai fisheries industry during the past decade. Mechanized boats increased from 121 in 1947 to 1,082 in 1956; the quantity of gear in use in the Gulf of Thailand increased from 4,148 to 11,439; the annual catch increased from 154,000 metric tons to almost 213,000 tons; exports of salted fish soared from 2,882 tons to almost 20,000 tons.

The Government's programs of stocking inland waters has likewise progressed remark-

ably-the number of fish distributed to ponds and lakes increased from 112,000 in 1947 to about 6 million in 1956.

Although the Gulf of Thailand has yet to be thoroughly surveyed for its potential commercial value, experts believe that on the basis of present catch from peripheral areas the entire Gulf holds great promise. Plans are being finalized for a comprehensive survey of the Gulf, contracted through ICA and the Scripps Institute of Oceanography on the request of Vietnam and Thailand. The Japanese are already at work in the Indian Ocean off the West Coasts of Thailand and have sent in vessels, equipment and experts to develop the fisheries of the continental shelf whose edge is about 60 miles off the coasts.

It is hoped that per capita consumption which is now about 20 lb. per annum, can be raised to 35 lb.

About 600 people in the village of Nongkorn in the Ubol Province recently took part in an experiment that may have a radical effect upon the diet of this particularly protein-hungry part of Thailand. Under the supervision of FAO nutritionists, 150 families received a daily ration of 15 g. of fish meal. They were instructed in its use and given simple recipes supplied by the Thai Health Department.

The flour, which also is a good source of calcium, is produced at Chumporn, 468 miles from Bangkok, by the Fish Marketing Organization, and is made from "pla tu" and some "slipmouth" fish. The factory can turn about 28 tons of fish into 5 tons of flour every day and can use the smaller fish which previously had little or no market.

Action is now being taken to provide shortwave ship-to-shore radio services for the fishing fleet and to assist in the provision and operation of modern fish-finding equipment on the fishing vessels.

Plans to develop and extend facilities for fisheries training at Kasetsart University are under consideration, and Fisheries Department's training program for fisheries operatives in navigation safety at sea and engine operation, repair and maintenance is continuing.

Facilities for training in boatbuilding have been installed and are operating at Ban Pae Marine Station.

UNITED KINGDOM

BRUNEI

Little information is available concerning the development of the fisheries industries of this State. Data on production and on personnel and equipment engaged in the industry do not appear to have been compiled.

The fishing operation undertaken are mostly very primitive, the boats used are small, propelled by sail or paddles and the gear is mainly of locally available materials. Some imported cotton is used in the construction of nets and lines.

The Government of the State of Brunei has advised the Secretariat of the Council that it is not in the position to participate in the Council's activities. However, Council documents and publications are transmitted for information.

SARAWAK

As yet no comprehensive national fishery policy has been formulated and it is unlikely that such a policy will be drafted until the appointment of a fully qualified Fisheries Officer to take charge of the Fisheries Branch of the Department of Agriculture.

Fisheries development activities have proceeded along the lines of simple extension projects such as loans to assist fishermen to instal inboard engines in their boats and the distribution of fish fry to encourage the development of fresh water fisheries.

Consolidating legislation has been introduced in relation to marine fisheries.

No research programs have as yet been drafted or initiated.

NORTH BORNEO

(1) Freshwater Fisheries.

The total number of fish ponds in the Colony at the end of 1957 was 617 totalling 34.9 acres. About 5 acres of fish ponds were built during the first eight months of 1958.

Total production of fish ponds in the Colony was estimated to be about 12 tons for year 1957. Some 25% of this yield were Chinese carp (*Ctenopharyngodon idellus*, *Aristichthys nobilis* and *Hypophthalmichthys molitrix*) and

the remaining 75% *Tilapia* (*T. mossambica*) and common carp (*Cyprinus carpio*) and with a very small proportion of Sepat Siam (*Trichogaster pectoralis*) and Gorami (*Osphronemus goramy*). Pond fish fetch good prices in the inland markets—from \$1.20 to \$2.00 per katty—provided that they are sold alive and are reasonably large sized.

Tilapia and common carp are the species commonly cultured in small ponds, while in the larger ponds Chinese carp and male *Tilapia* ("Monosex" culture) are kept.

Stocking of natural swamps and rivers with *Tilapia* has been particularly successful in the districts of Papar, Tenom, Keningau and Tambunan; the fish have done much to improve the nutrition of the local people.

In pond culture trials the two local species namely: Ikan Belian (*Labeobarbus tambra*) and Ikan Limbungan (*Leptobarbus hoeveni*) were found unsuitable, while Ikan Biawan or Kissing Gorami (*Helostoma temmicki*) showed promise.

Artificial breeding of the Common carp, using the Javanese method, has been successfully applied since early 1958 at the Government Central Fry Breeding Station, Tuaran.

(2) Marine Fisheries.

With the exception of the recent introduction of trawl fishing in the Marudu Bay area, there has been little change in marine fishing in other parts of the Colony, where it is mainly confined to small scale operations inshore and in estuaries.

Trawl fishing in Marudu Bay commenced in June, 1958. One trawler of 90 tons gross tonnage and of Philippines origin was granted a licence to operate there for an initial period of six months. Very good catches have been reported from this fishing ground, but the greater part of these catches consisted of low quality fish.

Mechanized fishing boats, using both inboard and outboard engines, are becoming increasingly popular. There was a marked increase of outboard fishing boats on the West Coast in 1957. A total of \$14,000/— in loans was granted to fishermen by the North Borneo Credit Corporation for the purchase of engines and fishing gear in 1957.

Export of marine products, mainly in the forms of dried fish and prawns, and trochus shells, in 1957, was recorded as 1,213.03 tons and \$1,224,596/— in value which is about 200 tons and some \$400,000/— lower than in the previous year.

HONG KONG

The total quantity of fish landed was slightly more than during the previous year and, at the same time, the highest figure since 1945. Recorded below are details of the quantity and value of fish sold through the Fish Marketing Organization. These figures include the controlled landings of foreign (Japanese) fish.

Year	Fresh Fish		Salt/Dried Fish		Total	
	Piculs (Tons)	Value \$	Piculs (Tons)	Value \$	Piculs (Tons)	Value \$
1956/57	608,058 (36,194)	43,238,947	88,788 (5,285)	4,521,485	696,846 (41,479)	47,810,432
1955/56	572,194 (34,059)	33,350,140	89,968 (5,355)	3,854,090	662,162 (39,414)	37,204,430

The increased landings were mainly due to the good seasons enjoyed by a large number of mechanized junks, particularly the junk trawlers and large longliners. Fish prices during the two previous years (1954/55 and 1955/56) had been the lowest on record but fortunately for the fishermen, these improved considerably during the year under review. The average price per picul for fresh fish increased from \$58 to \$71 (an increase of 22.4%) while that for salt/dried fish went up from \$43 to \$51 (or 18.62%). During the year the mechanized fleet increased from 968 to 1,524 vessels, an increase of 629.

The estimated total production from fish ponds was 6,900 piculs (i.e. 410.7 tons) valued at \$1,400,000. Figures for the previous year (1955-56) were 4,950 piculs (294.6 tons) valued at \$800,000. Due to the difficulties in obtaining fry from China, Hong Kong dealers exported only 5,932,309 fry during the year (as compared with 23,397,683 in 1955-56 and 25,146,950 in 1954-55).

During the year, 1,596,302 catties (i.e. 950.2 tons) of fresh oyster meat valued at \$1,280,000 was harvested from the Deep Bay beds. (Figures for 1955-56 were 15,763.2 piculs (938.3 tons) valued at \$1,300,000). The bulk of this oyster meat was processed and exported to U.S.A. 703,560½ catties (418.8 tons) of fresh frozen shrimp valued at \$1,604,150 (as against

only 63,895 catties valued at \$132,414 in 1955/56) were also exported. 11,000 catties of fresh shrimp (6.5 tons) valued at about \$23,231 (as against 10,398 catties valued at \$20,814 in 1955/56) were processed into slices and noodles for export. 61,822 catties of silver shrimp worth \$21,415 (as against 116,971 catties worth \$42,555 in 1955/56) were processed into sauce and paste for export. 37,238 catties (22.2 tons) of spotted fish valued at \$90,565 (as against 36,315 catties worth \$83,770 in 1955/56) were shipped overseas. A total of 4,100 blister pearls were cultivated at Kato during the course of a commercial pilot scale experiment. These were sent to Japan for processing. Fishermen working in the Tolo Harbour area, harvested about 98,240 catties (58.5 tons) of Fan Mussels valued at approximately \$200,000.

SINGAPORE

The inshore fishing grounds of Singapore are extremely limited. The expansion of the offshore fisheries is however steadily progressing. The production of local fishing units increased from 9,500 tons in 1956 to 13,500 tons in 1957. Local companies are operating pair trawlers chartered from Japanese companies. The results of these operations are satisfactory and the demand for offshore fish is gradually increasing. At present eight trawlers are in operation and forty apprentices are being trained. Arrange-

ments to increase the trawler fleet to twenty vessels are being made. The total catch of these 8 trawlers amounted to 1,650 tons in 1957.

2. Many of the drift-netters are now replacing their ramie nets with nylon nets to increase their production. The instruction in the maintenance and repair of engines given to these drift netters during the last few years appears to be bearing fruit. They have been able to increase their fishing time and range of operations. The catches of these drift netters increased from 850 tons in 1956 to 1,800 tons in 1957 although the number of units in operation was not increased. This large increase in catch may be due to a higher availability of *Scomberomorus* spp. (Spanish mackerel) resulting from the higher availability of *Stolephorus* spp. (Anchovy) on which *Scomberomorus* spp. feed.

3. The catches of the fixed traps (the kelongs) also increased considerably from 4,860 tons in 1956 to 6,540 tons in 1957 as a result of greater availability of *Stolephorus* spp. (Anchovy). The number of kelongs in operation was increased in 1957. No marked changes were noted in respect of other fisheries.

4. Prices of fresh fish in Singapore have been kept steady during the greater part of 1957 in spite of increasing demand. Towards the end of 1957 a downward trend in the prices of certain types was noted. This downward trend continued into the first half of 1958.

5. Assistance to fishermen in the purchase of fishing materials at bulk prices was maintained through the Fishing Materials Purchase Account. The Fisheries Mobile Unit continued its operations in instructing the fishermen on the maintenance and repair of their fishing boat engines. A storm warning service was also initiated through local radio broadcasts. The water supply service to fishing boats was also maintained. Facilities were also provided for the loading of crushed ice and fuel into fishing vessels.

6. A pilot scheme for training boys in schools in fishing villages in subjects relevant to fishing operations was initiated. The subjects taught include:

- (a) Elementary hydrology and marine biology.

- (b) Construction and repair of fishing nets and gears.
- (c) Operation of various types of fishing nets and gears.
- (d) Building and repair of small boats.
- (e) Engine maintenance and repair.
- (f) Rule of the Road at Sea.
- (g) Preservation of fish.

Such instruction is considered necessary in order to select boys who have an aptitude for fishing so that they could eventually be selected for further training in offshore fisheries.

UNITED STATES OF AMERICA PACIFIC TERRITORIES

Results derived from data and information collected by the Pacific Oceanic Fisheries Investigation have resulted in important developments with increased catches in the equatorial and adjacent waters of the Pacific.

Studies of fish school behavior are yielding information of considerable practical value and, in conjunction with oceanographic and plankton studies, are aimed at the development of a prediction service.

Shortage of suitable bait fish in some of the areas prompted experiments in the transplantation of numbers of Marquesan sardines. Early indications suggest that these introductions have a good chance of becoming established and so providing a much needed supply of bait for live-bait tuna fishing in areas hitherto under-exploited.

Oceanographic studies from a helicopter have been initiated. Valuable for swiftly locating fish schools and thence advising fishing vessels in the vicinity, this type of aircraft also offers useful facilities for achieving certain scientific objectives including estimates of fish school abundance, collection of water samples and measurement of sea temperature.

Preliminary trials indicates that the operational costs of the helicopter surveys are somewhat less than half that for similar ship surveys and there is an appreciable saving in time, while successive "stations" can be occupied with minimum time-lapse.

VIETNAM

In 1957 the fisheries administrative organizations, formerly operating as two separate Services concerned respectively with Marine and Inland Fisheries, were amalgamated into a Fisheries Directorate. Simultaneously a comprehensive development plan was formulated and steps taken to implement the primary phase of the plan.

Jointly with the Government of Thailand, assistance was sought through ICA to conduct a detailed survey of the aquatic resources of the

Gulf of Thailand. On a basis of this survey, plans for the exploitation of these resources will be developed.

Fisheries cooperative societies are well established, with a total membership of over 5,000 in 33 societies. Government provides advice and controls the issuance of loans to these societies.

An extensive programme for the development of inland fisheries particularly those associated with the periodical flooding of the Mekong River is being implemented.

APPENDIX : I
LIST OF DELEGATES AND OBSERVERS

<i>Member Governments Country</i>	<i>Names</i>	<i>Designation</i>	<i>Address</i>
Australia	Mr. D.J. Gates (Delegate)	Senior Research Officer	Commonwealth Fisheries Office, Department of Pri- mary Industry, Barton, Canberra, ACT, Australia.
	Mr. J. Starey (Alternate)	3rd Secretary	Australian High Commis- sion, 2nd Floor, Grand Oriental Hotel, Colombo 1, Ceylon.
Ceylon	Mr. D.T.E.A. de Fonseka (Delegate)	Director	Dept. of Fisheries, P.O. Box 531, Colombo, Ceylon.
	Mr. L.F. Tissera- singhe (Alternate)	Assistant Director	— do —
	Dr. S.W. Ling (Expert)	FAO/ETAP Fish Cul- turst	c/o FAO Mission Office, P.O. Box 1505, Colombo, Ceylon.
	Dr. L. Berube (Expert)	Director	Canadian Fisheries Project, Colombo Plan, P.O. Box 531, Colombo, Ceylon.
	Mr. E.R. Kvaran (Expert)	FAO/ETAP Marine Fisheries Superinten- dent	c/o FAO Mission Office, P.O. Box 1505, Colombo, Ceylon.
	Mr. E.R. Barlind (Expert)	FAO/ETAP Fisheries Engineer	— do —
	Mr. C. Fernando (Expert)	Economist	Planning Secretariat Co- lombo 1, Ceylon.
	Mr. G. Crane (Adviser)	Manager	Fisheries Plant Rock House Lane, Colombo 15, Ceylon.
	Dr. G.H.P. de Bruin (Adviser)	Research Officer	Department of Fisheries, P.O. Box 531, Colombo, Ceylon.
	Mr. G.N. de Silva (Adviser)	Statistical Officer	— do —
	Dr. T.P. Goonewardene (Adviser)	Research Officer	— do —
	Mr. S.R. Asirwatham (Adviser)	Asst. Commissioner of Cooperatives (Fish. Div.)	Cooperative Dept., Echelon Square Colombo 1, Ceylon.

<i>Member Governments Country</i>	<i>Names</i>	<i>Designation</i>	<i>Address</i>
Ceylon (continued)	Mr. C. Gunasekera (Adviser)	Research Chemist	Department of Fisheries, P.O. Box 531, Colombo, Ceylon.
	Mr. L.D. Gunasekera (Adviser)	Assistant Manager	Fisheries Plant Rockhouse Lane, Colombo 15, Ceylon.
	Mr. H.H.A. Indrasena (Adviser)	Superintendent, Fresh Water Fisheries	Department of Fisheries, P.O. Box 531, Colombo, Ceylon.
	Dr. N. Mahadeva (Adviser)	Research Officer	— do —
	Mr. A.S. Mendis (Adviser)	Research Officer	— do —
	Mr. V.L.C. Pietersz (Adviser)	Assistant Director of Fisheries	— do —
	Mr. T.G. Pillai (Adviser)	Superintendent, Brackish Water Fisheries	— do —
	Mr. S. Sivalingam (Adviser)	Research Officer	— do —
	Mr. V. Selveratnam (Adviser)	Engineer	Fisheries Plant Rock House Lane, Colombo 15, Ceylon.
	Mr. C. Chanmugam (Adviser)	Assistant Secretary	Ministry of Industries & Fisheries, New Secretariat, Colombo 1, Ceylon.
	Mr. M.S. Perera (Adviser)	Member, Fisheries Advisory Board	Sirimahal, 42 Lady de Soysa Drive, Uyana, Moratuwa, Ceylon.
	Sir Philip Rodrigo (Adviser)	— do —	Wasaia Walauwa, Rodrigo Place, Colombo 15, Ceylon.
France	Mr. V. Suppiah (Adviser)	— do —	Thondaimannar, Ceylon.
	Mr. M. Angot (Delegate)	Marine Biologist (Office de la Recherche Scientifique et Technique d'outre-Mer)	Institut Francais d'Océanie, Noumea, P.O. Box 4, New Caledonia.
India	Dr. B.S. Bhimachar (Delegate)	Chief Research Officer	Central Inland Fisheries, Research Station, 66 Upper Circular Road, Calcutta 9, India.
Japan	Dr. K. Kuronuma (Delegate)	Chief	Fresh Water Fisheries Research Lab, Hinomachi, Tokyo, Japan.

<i>Member Governments Country</i>	<i>Names</i>	<i>Designation</i>	<i>Address</i>
Japan (continued)	Mr. M. Natsume (Alternate)	1st Secretary	Japanese Embassy, Co- lombo, Ceylon.
	Mr. I. Chiba (Adviser)	3rd Secretary	Japanese Embassy, Co- lombo, Ceylon.
	Mr. S. Jimboh (Adviser)	Colombo Plan Fisheries Expert	Fisheries Dept., Box 531 Colombo, Ceylon.
	Mr. K. Ishii (Adviser)	- do -	- do -
Korea	Mr. Pyong Sik Son (Delegate)	1st Secretary	Korean Embassy, Saigon, Vietnam.
	Mr. Sang Kyu Nam (Alternate)	Chief	Fisheries Section, Office of Marine Affairs, Seoul, Korea.
	Mr. H. Timmis (Adviser)	O.E.C. Fisheries Expert	UNC/OEC, A.P.O. 301, San Francisco, California, U.S.A. (Inter Area).
Federation of Malaya	Mr. Soong Min Kong (Delegate)	Director	Fisheries Dept., P.O. Box 459, Penang, Malaya.
	Mr. Abdul Halim Abu Yamin (Alternate)	Acting Fisheries Officer, North East, Fed. of Malaya.	c/o Fisheries Dept., Kuala Trengganu Federation of Malaya.
Netherlands	Dr. J.J. Schuurman (Delegate)	Lecturer in Fresh & Brackish Water Fish- eries.	Agricultural University, Wageningen, Nether- lands.
	Mr. C.T.F. Thirkow (Alternate)	2nd Secretary	Royal Netherlands Lega- tion, 29 Gregory's Road, Colombo 7, Ceylon.
Thailand	Mr. Wit Yorsaengrat (Delegate)	Deputy Director General	Fisheries Dept., Ministry of Agriculture, Rajadamnern Avenue, Bangkok.
	Mr. Sant Bandhukul (Alternate)	Secretary	- do -
U.K. (for Hong Kong)	Dr. F.D. Ommanney (Delegate)	Director	Fisheries Research Unit, Pokfulam Road, Universi- ty of Hong Kong, Hong Kong.
	Mr. W.D. Orchard (Alternate)	Fisheries Officer	Dept. of Agric., Fish. and Forestry, Kom Tsum Street, Laichikok, Kow- loon, Hong Kong.

<i>Member Governments Country</i>	<i>Name</i>	<i>Designation</i>	<i>Address</i>
U.K. (for Hong Kong) (continued)	Mr. I. Petersen (Adviser)	Marketing Officer	Cooperative & Marketing Dept., Tung Kun Street, Yaumati, Kowloon, Hong Kong.
	Mr. Y.K. Chau (Adviser)	Research Officer	Fisheries Research Unit, Pokfulam Road, Universi- ty of Hong Kong, Hong Kong.
U.S.A.	Mr. G.I. Murphy (Delegate)	Director	Pacific Oceanic Fishery Investigations, Fish and Wildlife Service, P.O. Box 3830, Honolulu, Hawaii.
Vietnam	Mr. Nguyen Nhu Nghi (Delegate)	Chief of Fisheries In- dustry	Direction of Fisheries, Ministry of National Economy, 116, Rue Richaud Saigon Vietnam.
	Mr. Tran Van Tri (Alternate)	Chief of Water Re- sources Exploitation Service	- do -
	Mr. Le Van Dang (Adviser)	Fisheries Inspector In- land Fisheries	- do -
	Mr. R.J. Schoettler (Adviser)	USOM Fisheries Expert	c/o American Embassy, Box 32, Saigon, Vietnam.

OBSERVER ORGANIZATIONS AND NON-MEMBER GOVERNMENTS

<i>Observer Organizations and Non-Member Governments</i>	<i>Name</i>	<i>Designation</i>	<i>Address</i>
Ceylon Association for the Advance- ment of Science	Dr. C.H. Fernando (Observer) Mr. E.L. Samarasinghe		Dept. of Zoology Univ. of Ceylon, Colombo 3, Ceylon. — do —
UNTAB	Mr. J. Corry (Observer)	Resident Representa- tive of the T.A.B., Ceylon	45, Alfred House Gardens, Colombo 3, Ceylon.
University of Ceylon	Mr. P. Kirtisinghe (Observer) Dr. A.C.J. Weerakoon (Observer)	Lecturer Lecturer	Dept. of Zoology Univ. of Ceylon, Colombo 3, Ceylon. — do —
South Pacific Commission	Mr. M. Angot	Marine Biologist (Office de la Recherche Scientifique et Tech- nique d'outre-Mer)	Institut Français d'Océanie Noumea, P.O. Box 4, New Caledonia.
Gal Oya Deve- lopment Board, Ceylon	Mr. M. Kurumoorthy	O.I.C. Fisheries	Gal Oya Development Board, Amparai, Ceylon.

FOOD AND AGRICULTURE ORGANIZATION

<i>Name</i>	<i>Designation</i>	<i>Address</i>
U Thet Su	Deputy Regional Representative	FAO Regional Office for Asia and the Far East, Maliwan Mansion, Phra Atit Road, Bangkok, Thailand.
Mr. G. Mulgrue	Regional Information Adviser	— do —
Dr. A.G. Black	FAO Country Representative for Ceylon	FAO Mission Office, 75 Alfred House Gardens, P.O. Box 1505, Colombo, Ceylon.
Mr. R. Gurtner	FAO/ETAP Naval Architect	12106-3, 70 Fleet Road (Opposite College Grounds) Ernakulam, Kerala, India.
Mr. C. Illugason	FAO/ETAP Master Fisherman	c/o Director of Fisheries, Mysore, Bangalore, India.
Mr. H. Miyamoto	FAO/ETAP Fisheries Technologist	Central Fisheries Technological Station, XXI/29 Kochangadi, Cochin 5, Kerala State, India.

IPFC SECRETARIAT

<i>Name</i>	<i>Designation</i>	<i>Address</i>
Mr. J.A. Tubb	Secretary of the IPFC	Regional Fisheries Officer, FAO Regional Office for Asia and the Far East, Maliwan Mansion, Phra Atit Road, Bangkok, Thailand.
Mr. S.J. Holt	Technical Secretary, Tech. Com. I	Chief, Research Programs Section, Fisheries Biology Branch, FAO, Viale delle Terme di Caracalla, Rome, Italy.
Mr. H. Kristjonsson	Technical Secretary, Tech. Com. II, Panel A	Chief, Fishing Gear Section, Technology Branch, Fisheries Division, FAO Viale delle Terme di Caracalla, Rome, Italy.
Dr. M.R. Khan	Technical Secretary, Tech. Com. II, Panel B	Assistant Regional Fisheries Officer, FAO Regional Office for Asia and the Far East, Maliwan Mansion, Phra Atit Road, Bangkok, Thailand.

<i>Name</i>	<i>Designation</i>	<i>Address</i>
Mr. Y. Miyake	Technical Secretary, Tech. Com. II, Panel C	Fisheries Economist, Economics Branch, Fisheries Division, FAO Viale delle Terme di Caracalla, Rome, Italy.
Mrs. A. Soulier	Conference Officer	Technical Assistant, Fisheries Division, FAO Regional Office for Asia and the Far East, Maliwan Mansion, Phra Atit Road, Bangkok, Thailand.
Mr. P. Tolstoy	French/English Interpreter	c/o Mr. Obolensky, 9, Rue Robert Estienne Geneva, Switzerland.
Miss. E. Hedinger	— do —	5, Chemin de Malombre, Geneva, Switzerland.

ORGANIZING COMMITTEE

Mr. D.T.E.A. de Fonseca

Mr. L.F. Tisseverasinghe

Mr. C. Channugam

Mr. A.S. Mendis

Mr. W.A. Solomonsz

APPENDIX II.
IPFC NOMINATIONS FOR THE PERIOD BETWEEN
8th & 9th SESSIONS

Note: At the 8th Session of the Council the following Member Governments were not represented: Burma, Cambodia, Pakistan and the Philippines. Nominations to the various Technical Committees, Panels, Sub-Committees etc. have been carried over from the 7th Session. Indonesia intimated by letter during the 8th Session its nominations.

<i>Member Governments</i>	<i>Administrative Correspondents</i>	<i>Bibliographic Correspondents</i>
AUSTRALIA	The Secretary, Department of External Affairs, Canberra, Australia.	Mrs. L.M. Willings, Division of Fisheries and Oceanography, CSIRO, P.O. Box 21, Cronulla, N.S.W., Australia.
BURMA	The Secretary, Ministry of Agriculture & Forests, Union of Burma, Rangoon, Burma.	U Ba Kyaw, Executive Officer, Division of Fisheries, Land & Rural Development Corporation, Corner of Dal-housie and Thompson Street, Rangoon, Burma.
CAMBODIA	Monsieur Sao Leang Chef, de Division des Pêches de Kandal, Direction des Eaux et Forêts, Phnom Penh, Cambodia.	Monsieur R. Lafont, Charge, l'Institut de Recherches Piscicoles, Phnom Penh, Cambodia.
CEYLON	Director of Fisheries, Department of Fisheries, P.O. Box 531, Colombo, Ceylon.	Director of Fisheries, Department of Fisheries, P.O. Box 531, Colombo, Ceylon.
FRANCE	Le Directeur de l'Office de la Recherche Scientifique et Technique d'Outre-Mer, 20-rue Monsieur, Paris VII, France.	Le Directeur de l'Office de La Recherche Scientifique et Technique d'Outre-Mer, 20-rue Monsieur, Paris VII, France.
INDIA	Dr. N.K. Panikkar, Fisheries Development Adviser, Department of Agriculture, Ministry of Food & Agriculture, New Delhi, India.	Dr. D.V. Bai, Director, Institute of Science, Mahatma Gandhi Road, Fort Bombay, India.
INDONESIA	Mr. R.M. Soepanto Koesoemowinoto, Chief, Technical General Division, Sea Fisheries Service, 12 Djalan Kerapu, Djakarta, Indonesia.	Mrs. S. Boediningsih Soenjoto, Secretary, National IPFC Committee of Indonesia, Sea Fisheries Service, 12 Djalan Kerapu, Djakarta, Indonesia.
JAPAN	Mr. Y. Ohkawara, Chief Economic & Social Section, United Nations Bureau, Ministry of Foreign Affairs, Chiyoda-ku, Tokyo, Japan.	Dr. N. Sasaki, Data and Statistics Section, Fisheries Agency, 2-2 Kasumigaseki, Chiyoda-ku, Tokyo, Japan.
KOREA	Mr. Chee Choul Keun, Director, Fisheries Bureau, Office of Marine Affairs, Seoul, Korea.	Mr. Nam Sang Kyu, Chief, Fishing Section, Bureau of Fisheries, Office of Marine Affairs, Seoul, Korea.

<i>Member Government</i>	<i>Administrative Correspondent</i>	<i>Bibliographic Correspondent</i>
FEDERATION OF MALAYA	Mr. Abdul Rahman Hamidon, Assistant Secretary, Ministry of Agriculture Kuala Lumpur, Federation of Malaya	Mr. Soong Min Kong, Director of Fisheries Malaya, Fisheries Department, P.O. Box 459, Penang Federation of Malaya.
NETHERLANDS	Mr. W.A. Mackenzie, Inspector of Sea Fisheries, Department of Agriculture & Fisheries, Hollandia, Netherlands New Guinea.	Dr. K.F. Vaas, Cobetstraat, Leiden, Netherlands.
PAKISTAN	Dr. M.R. Qureshi, Director, Central Fisheries Department, Fish Harbour Buildings, West Wharf, Karachi-2, Pakistan.	Dr. M.H. Qadri, Department of Zoology, University of Karachi, Karachi, West Pakistan.
PHILIPPINES	Mr. C. Martin, Chief, Fisheries Research Division, Bureau of Fisheries, M.H. del Pilar Street, Manila, Philippines.	Mr. I.A. Ronquillo, Fishery Biologist, Fisheries Research Division, Bureau of Fisheries, M.H. del Pilar Street, Manila, Philippines.
THAILAND	Mr. Boon Indrambarya, Director-General, Department of Fisheries, Rajadamnern Av., Bangkok, Thailand.	Mr. Jinda Thiemmedh, Faculty of Fisheries, Kasetsart University, Bangkok, Bangkok, Thailand.
U.K. (for Singapore, Borneo & Sarawak)	U.K. Liaison Officer with U.N. Organizations, First Secretary, British Embassy, Bangkok, Thailand (29).	Dr. F.D. Ommanney, Director, Fisheries Research Unit, Pokfulam Road, University of Hong Kong, Hong Kong.
U.K. (for Hong Kong)	Director, Department of Agriculture, Fisheries & Forestry, Kom Tsun Street, Laichikok, Kowloon, Hong Kong.	Director, Department of Agriculture, Fisheries & Forestry, Kom Tsun Street, Laichikok, Kowloon, Hong Kong.
U.S.A.	Mr. Garth I. Murphy, Director, Pacific Oceanic Fishery Investigations, P.O. Box 3830, Honolulu, Hawaii (3).	Mr. J.E. King, Fishery Research Biologist, POFI, P.O. Box 3830, Honolulu, Hawaii.
VIETNAM	Le Secrétaire d'Etat à l'Economie Nationale, 59 Boulevard Gia Long, Saigon, Vietnam.	Dr. Ngo Ba Thanh, Directeur des Pêches Secrétariat à l'Economie Nationale, B.P. 340, Saigon, Vietnam.

IPFC TECHNICAL COMMITTEE I-PANELS A & B

Member Governments	Technical Committee I	Panel A (Inland Fisheries)	Panel B (Sea Fisheries)
AUSTRALIA	Dr. G.F. Humphrey, Chief Division of Fisheries & Oceanography, CSIRO, Box 21, Cronulla N.S.W., Australia.	Dr. A.G. Nicholls, Senior Research Officer Division of Fisheries and Oceanography CSIRO, Box 21, Cronulla, N.S.W., Australia.	Dr. J.M. Thomson Senior, Research Officer Division of Fisheries & Oceanography CSIRO, Box 21, Cronulla, N.S.W., Australia.
BURMA	U. Ba Kyaw, Executive Officer, Division of Fisheries, Land Rural Development Corporation, Corner Dalhousie & Thompson Street Rangoon, Burma.	(No nomination)	U. Tint Hlaing Division of Fisheries, Land Rural Development Corporation, Corner Dalhousie & Thompson Street, Rangoon, Burma.
CAMBODIA	(No nomination)	M. Sao-Leang Chef de Division des Pêches de Kandal, Direction des Eaux et Forêts Phnom Penh, Cambodia.	(No nomination)
CEYLON	Director of Fisheries, Fisheries Research Station, P.O. Box 531, Colombo, Ceylon.	Mr. A.S. Mendis, Research Officer, Fisheries Research Station, P.O. Box 531, Colombo, Ceylon.	Mr. S. Sivalingam, Research Officer, Fisheries Research Station, P.O. Box 531, Colombo, Ceylon.
FRANCE	Mr. J. Lemasson, Centre Technique Forestier Tropical, 45 Bis Avenue de la Belle, Gabrielle, Nogent-sur-marne (Seine) France.	Mr. J. Lemasson, Centre Technique Forestier Tropical, 45 Bis Avenue de la Belle Gabrielle, Nogent-sur-marne (Seine) France.	Mr. M.P. Legand, Marine Biologist, Laboratoire d'Océanographie de L'Institut Français d'Océanologie, I.F.O. B.P. & Noumea, New Caledonia.
INDIA	Dr. B.S. Bhimachar, Chief Research Officer, Central Inland Fisheries Research Station, 66 Upper Circular Road, Calcutta 9, India.	Mr. K.H. Allkunhi Research Officer, Central Inland Fisheries, Cuttack, Orissa, India.	Dr. S. Jones, Chief Research Officer, Central Marine Fisheries Station, Mandapam Camp, P.O. S. India.
INDONESIA	Mr. Hasanuddin Saanin, Chief, Laboratory for Inland Fisheries, 1 Sempur, P.O. Box 51, Bogor, Indonesia.	M.R. Gelar Wiraatmadia, Chief, Education Division, Inland Fisheries, 17 Djalat Selabintana, Sukabumi, Java, Indonesia.	Mr. Mochamad Unar, Assistant Biologist, Sea Fisheries Service, 12 Djalan Kerapu Djakarta, Indonesia.
JAPAN	Dr. K. Kuroonuma, Chief, Fresh Water Fisheries Research Laboratory, Hinomachi, Minamitamagun, Tokyo, Japan.	Dr. K. Kuroonuma, Chief, Fresh Water Fisheries Research Laboratory, Hinomachi, Minamitamagun, Tokyo, Japan.	Mr. Z. Nakai, Chief, Marine Resources Section, Tokai Regional Fisheries Research Laboratory, Tsukishima, Chuo-ku, Tokyo, Japan.

<i>Member Government</i>	<i>Technical Committee I</i>	<i>Panel A (Inland Fisheries)</i>	<i>Panel B (Sea Fisheries)</i>
KOREA	Mr. Chee Choul Keun, Director, Bureau of Fisheries, Office of Marine Affairs, Seoul, Korea.	Mr. Chung Moon Ki, Chief, Fisheries Inspection, Station, Office of Marine Affairs, Seoul, Korea.	Mr. Chee Choul Keun, Director, Bureau of Fisheries, Office of Marine Affairs, Seoul, Korea.
FEDERATION OF MALAYA	Mr. Soong Min Kong, Director of Fisheries, Fisheries Dept., P.O. Box 459, Penang, Federation of Malaya.	Mr. A.B.O. Marican, Fisheries Research Officer, H.Q. Fisheries Dept., P.O. Box 459, Penang, Federation of Malaya.	Mr. D. Pathansali, Fisheries Research Officer H.Q. Fisheries Dept., P.O. Box 459, Penang, Federation of Malaya.
NETHERLANDS	Dr. J.J. Schuurman, Van Iddekingeweg 56 Groningen, Netherlands.	Mr. J. de Vries, Department of Agriculture and Fisheries, Hollandia, Netherlands, New Guinea.	Mr. W.A. Mackenzle, Inspector of Sea Fisheries, Department of Agriculture & Fisheries, Hollandia, Netherlands, New Guinea.
PAKISTAN	Dr. N. Ahmad, Director of Fisheries, Government of East Bengal, Eden Building, Dacca, East Pakistan.	Mr. K.A. Husain, Warden of Fisheries, 2 Sanda Road, Lahore, West Pakistan.	Mr. A.G. Hussain, Deputy Director, Central Fisheries Department, Fish Harbour Bld. West Wharf, Karachi 2, West Pakistan.
PHILIPPINES	Mr. I.A. Ronquillo, Fishery Biologist, Fisheries Research Division, Bureau of Fisheries, M.H. del Pilar Street, Manila, Philippines.	Mr. P. Acosta, Fish Culturist, Inland Fisheries Division, Bureau of Fisheries, M.H. del Pilar Street, Manila, Philippines.	Mr. I.A. Ronquillo, Fishery Biologist, Fisheries Research Division, Bureau of Fisheries, M.H. del Pilar Street, Manila, Philippines.
THAILAND	Mr. Prida Karnasut, Chief, Division of Inland Fisheries, Department of Fisheries, Rajadamnern Av., Bangkok, Thailand.	Mr. Ariya Sidhimunka, Head, Inland Fisheries Station (Bung Borapet) Nakornasawan, Thailand.	Mr. Sant Bandhukul, Fisheries Officer, Department of Fisheries, Rajadamnern Av., Bangkok, Thailand.
U.K.	Mr. Y.K. Chau, Senior Research Officer, Fisheries Research Unit, Pokfulum Road, University of Hong Kong, Hong Kong.	Dr. G.R. Fish, Fish Culture Research Institute Batu Berendam, Malacca, Federation of Malaya.	Dr. F.D. Ommanney, Director, Fisheries Research Unit, Pokfulum Road, University of Hong Kong, Hong Kong.
U.S.A.	Director, Pacific Oceanic Fishery Investigations, Fish and Wildlife Service, P.O. Box 3830, Honolulu, Hawaii.	(No nomination)	Director, Pacific Oceanic Fishery Investigations, Fish and Wildlife Service, P.O. Box 3830, Honolulu, Hawaii.
VIETNAM	Mr. Le Van Dang, Fisheries Inspector Inland Fisheries, Direction of Fisheries, Ministry of National Economy, 116, Rue Richaud, Saigon, Vietnam.	Mr. Cao Thien Bui, Chef du Service de Pisciculture, B.P. 340, Saigon, Vietnam.	Dr. Ngo Ba Thanh, Directeur de Pêches du Vietnam, B.P. 340, Saigon, Vietnam.

L.P.F.C. TECHNICAL COMMITTEE II-PANELS A, B & C

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Member Government	Technical Committee II	Panel A (Craft and Gear)	Panel B (Food and Technology)	Panel C (Socio-Economics and Statistics)
AUSTRALIA	Mr. F.F. Anderson, Director, Commonwealth Fisheries Office, Dept. of Primary Industry, Barton, Canberra, ACT, Australia.	Mr. F.F. Anderson, Director, Commonwealth Fisheries Office, Dept. of Primary Industry, Barton, Canberra, ACT, Australia.	Dr. J.R. Vickery, Division of Food Preservation & Transport, CSIRO, Homebush, N.S.W., Australia.	Mr. A.C. Bogg, Senior Research Officer, Fisheries Division, Dept. of Primary Industry, Canberra, ACT, Australia.
BURMA	U Ba Kyaw, Executive Officer, Division of Fisheries, Land & Rural Development Corporation, Corner Dalhousie & Thompson Street, Rangoon, Burma.	U Ba Kyaw, Executive Officer, Division of Fisheries, Land & Rural Development Corporation, Corner Dalhousie & Thompson Street, Rangoon, Burma.	(No nomination)	(No nomination)
CAMBODIA	(No nomination)	(No nomination)	Mons. M.R. La Font, Charge, l'Institut de Recherches Piscicoles, Phnom Penh, Cambodia.	Mons. Sao Leang, Chef de Division des Peches de Kandal, Direction des Eaux et Forets, Phnom Penh, Cambodia.
CEYLON	Mr. L.F. Tisseverasinghe, Asst. Director, Fisheries Research Station, P.O. Box 531, Colombo, Ceylon.	Mr. L.F. Tisseverasinghe, Asst. Director, Fisheries Research Station, P.O. Box 531, Colombo, Ceylon.	Mr. C.E. St. C. Gunasekera, Research Chemist, Fisheries Research Station, P.O. Box 531, Colombo, Ceylon.	Mr. V.I.C. Pietersz, Asst. Director, Fisheries Research Station, P.O. Box 531, Colombo, Ceylon.
FRANCE	Mr. R. Serene, Adviser, Institut Oceanographique de Nha Trang, Station Maritime de Cauda, Nha Trang, Vietnam.	(No nomination)	(No nomination)	(No nomination)
INDIA	Mr. K. Chidambaram, Department of Agriculture, Ministry of Food and Agriculture, New Delhi, India.	Mr. K. Gopinath Pillai, Director of Fisheries, Kerala State, Trivandrum 3, India.	Mr. R. Venkataraman, Central Fisheries Technological Station, Cochin, India.	Dr. C.V. Kulkarni, Director of Fisheries, Tarporewala Aquarium, Marine Drive, Bombay, India.

Member Government	Technical Committee II	Panel A (Craft and Gear)	Panel B (Food and Technology)	Panel C (Socio-Economics and Statistics)
INDONESIA	Mr. G.M. Charidje Kasuma, Deputy Head, Sea Fisheries Service, 12 Djalan Kerapu, Djakarta, Indonesia.	Mr. R. Soenarto, Chief Fishing Technique Research Division, Sea Fisheries Service, 12 Djalan Kerapu, Djakarta, Indonesia.	Mr. Soenarto Darmoredjo, Technological Research Officer, Sea Fisheries Service, 12 Djalan Kerapu, Djakarta, Indonesia.	Mr. Eddiwan, Chairman, Federation of Indonesian Fisheries Cooperatives, 12 Djalan Kerapu, Djakarta, Indonesia.
JAPAN	Mr. N. Oka, Chief, Data and Statistics Section, Fisheries Agency, Kasumigaseki, Chiyoda-ku, Tokyo, Japan.	Mr. S. Takayama, Chief, Fishing Gear and Method Section, Tokai Regional Fisheries Research Laboratory, Tsukishima, Chuo-ku, Tokyo, Japan.	Dr. H. Higashi, Chief Marine Product Utilization Section, Tokai Regional Fisheries Research Laboratory, Tsukishima, Chuo-ku, Tokyo, Japan.	Mr. N. Oka, Chief, Data and Statistics Section, Fisheries Agency, Kasumigaseki, Chiyoda-ku, Tokyo, Japan.
KOREA	Mr. Rhee Im Do, Chief, Central Fisheries Research Station, Pusan, Korea.	Mr. Rhee Im Do, Chief, Central Fisheries Research Station, Pusan, Korea.	Mr. Rhee Bong Nae, Chief, Processing Section, Central Fisheries Research Station, Pusan, Korea.	Mr. Chee Choul Keun, Director, Bureau of Fisheries, Office of Marine Affairs, Seoul, Korea.
FEDERATION OF MALAYA	Mr. J.S. Scott, Deputy Director of Fisheries, H.Q. Fisheries Dept., P.O. 459 Penang, Federation of Malaya.	Mr. R.C. Cole, Fisheries Officer, North-West, Fisheries Dept., P.O. Box 459 Penang, Federation of Malaya.	Mr. V. Selvarajah, Fisheries Research Officer, Fisheries Dept., P.O. Box 459 Penang, Federation of Malaya.	Mr. Abdul Halim, Ag. Fisheries Officer, North-east, Kuala Trengganu, Trengganu, Federation of Malaya.
NETHERLANDS	(No nomination)	Mr. W.A. Mackenzie, Inspector of Sea Fisheries, Dept. of Agriculture and Fisheries, Hollandia, Netherlands New Guinea.	(No nomination)	(No nomination)
PAKISTAN	Dr. M.R. Qureshi, Director of Fisheries, Central Fisheries Department, Fish Harbour Bid., West Wharf, Karachi 2, West Pakistan.	Mr. M.A. Burney, Fisheries Gear Technologist, Central Fisheries Department, Fish Harbour Building, West Wharf, Karachi 2, West Pakistan.	Mr. S.A. Ali, Deputy Director, Directorate of Fisheries, Comilla, East Pakistan.	Mr. S.A. Jaleel, Assistant Director, Central Fisheries Dept., Fish Harbour Building, West Wharf, Karachi 2, West Pakistan.
PHILIPPINES	Mr. C. Martin, Chief, Fisheries Research Division, Bureau of Fisheries, M.H. del Pilar Street, Manila, Philippines.	Mr. S.B. Rasalan, Fishery Technologist, Marine Fisheries Division, Bureau of Fisheries, M.H. del Pilar Street, Manila, Philippines.	Mr. J.I. Sulit, Chemist, Fisheries Research Division, Bureau of Fisheries, M.H. del Pilar Street, Manila, Philippines.	Mr. J. Montemayor, Fishery Statistician, Fisheries Research Division, Bureau of Fisheries, M.H. del Pilar St., Manila, Philippines.

Member Government	Technical Committee II	Panel A (Craft and Gear)	Panel B (Food and Technology)	Panel C (Socio-Economics and Statistics)
THAILAND	Mr. Tuanthai Bamrajarinpai, Chief, Division of Fisheries Investigation, Dept. of Fisheries, Rajadamnern Av. Bangkok, Thailand.	Mr. Sanan Ruamraksa, Head, Fish Section, Department of Fisheries, Rajadamnern Av. Bangkok, Thailand.	M.C. Kosol Suriyathit Suriyong, Head, Technology Section, Department of Fisheries, Rajadamnern Av. Bangkok Thailand.	Mr. Klan Suwanrat, Head, Statistics Section, Department of Fisheries, Rajadamnern Av. Bangkok, Thailand.
U.K.	Mr. W.D. Orchard, Fisheries Officer, Department of Agriculture, Fisheries and Forestry, Kom Tsun St., Laichikok, Kowloon, Hong Kong.	Mr. W.D. Orchard, Fisheries Officer, Department of Agriculture, Fisheries and Forestry, Kom Tsun St. Laichikok, Kowloon, Hong Kong.	Mr. I. Petersen, Marketing Officer, Cooperative Marketing Department, Tung Kun St., Yaumati, Kowloon, Hong Kong.	Mr. C.Y. Chu, Asst. Research Officer, Fisheries, Research Unit, Pokfulum Rd., University of Hong Kong, Hong Kong.
U.S.A.	Mr. G.I. Murphy, Director, Pacific Oceanic Fishery Investigations, Fish & Wild Life Service, P.O. Box 3830, Honolulu, Hawaii.	Mr. A. Akana, Pacific Fishery Investigations, Fish & Wild Life Service, P.O. Box 3830, Honolulu, Hawaii.	(No nomination)	(No nomination)
VIETNAM	Mr. Tran Van Tri, Chef du Service d'exploitation des Ressources Aquatiques, B.P. 340, Saigon, Vietnam.	Mr. Tran Van Tri, Chef du Service d'exploitation des Ressources Aquatiques, B.P. 340, Saigon, Vietnam.	Mr. Nguyen Nhu Nghi, Chef du Service des Industries des Peches, B.P. 340, Saigon, Vietnam.	Mr. Pham Ngoc Dong, Chef du Service Socio Economique des Peches, B.P. 340, Saigon, Vietnam.

Member Government	Fish Marketing Sub-Committee	Hills Sub-Committee	Rashtreeya Sub-Committee	Chanos Sub-Committee	Fish Culture in Rice Fields Sub-Committee
AUSTRALIA	Mr. C.G. Setter, Assistant Director Common Wealth Fisheries Office, Dept. of Primary Industry, Barton, Canberra, A.C.T., Australia.	(No nomination)	(No nomination)	Dr. A.M. Rapson, Division of Fisheries, (Papua & New Guinea), Port Moresby, Territory of Papua & New Guinea, Australia.	(No nomination)
BURMA	(No nomination)	U Ba Kyaw, Executive Officer, Division of Fisheries, Land & Rural Development Corporation, Corner Dalhousie & Thompson St., Rangoon, Burma.	(No nomination)	(No nomination)	(No nomination)
CAMBODIA	(No nomination)	(No nomination)	(No nomination)	(No nomination)	(No nomination)
CEYLON	Mr. L.D. Gunasekera, Asst. Manager, Mutwal Fisheries Project, Rockhouse Lane, Colombo 15, Ceylon.	(No nomination)	Dr. T.P. Goonewardena, Research Officer, Dept. of Fisheries, P.O. Box 331, Colombo, Ceylon.	Mr. T.G. Pillai, Supdt. Brackish Water Fisheries Research Station, P.O. Box 531, Colombo, Ceylon.	Mr. H.H.A. Indrasena, Supdt. Fresh Water Fisheries Research Station, P.O. Box 531, Colombo, Ceylon.
FRANCE	(No nomination)	(No nomination)	(No nomination)	(No nomination)	(No nomination)
INDIA	Mr. P.I. Chacko, Asst. Director of Fisheries, Govt. of Madras, Madras, India.	Dr. T.V.R. Pillay, Research Officer, Central Inland Fisheries Research Station, 66 Upper Circular Street, Calcutta 9, India.	Dr. G. Seshappa, Asst. Research Officer, Central Marine Fisheries Research Station, Mandapam Camp, P.O. South India.	Mr. P.R.S. Tampp, Asst. Research Officer, Central Marine Fisheries Station, Mandapam Camp, P.O. South India.	Mr. C.P. Varma, Fisheries Development Officer, Patna, India.

Member Government	Fish Marketing Sub-Committee	Hitsa Sub-Committee	Raurelliger Sub-Committee	Chanos Sub-Committee	Fish Culture in Rice Fields Sub-Committee
INDONESIA	Mr. R. Soekarno, Chief, Socio-Economic Division, Inland Fisheries Service, 2 Nusantara, Djakarta, Indonesia.	(No nomination)	Mr. V. Soesanto, Chief, Biological Section, Sea Fisheries Service, 12 Djalat Kerapu, Djakarta, Indonesia.	Mr. R.M. Tjptoa-minoto, Chief, Inland Fisheries, East Java Province, Surabaja, Indonesia.	Mr. M. Ahjar, Chief, Inland Fisheries Service, West Java Province, 17 Djalat Wastu Rentjana, Bandung, Indonesia.
JAPAN	Mr. N. Oka, Chief, Data and Statistics Section, Fisheries Agency, Kasumigaseki, Chiyoda-ku, Tokyo, Japan.	(No nomination)	(No nomination)	(No nomination)	Dr. K. Kurohuma, Chief, Fresh Water Fisheries, Research Laboratory, Hinomachi, Minamitami-gun, Tokyo, Japan.
KOREA	Mr. Kim Myung Nyun, Chief, Processing Section, Bureau of Fisheries, Office of Marine Affairs, Seoul, Korea.	(No nomination)	(No nomination)	(No nomination)	(No nomination)
FEDERATION of MALAYA	Mr. Heong Kok Hee, Distribution & Marketing Section, H.Q. Fisheries Department, P.O. Box 459, Penang, Federation of Malaya.	(No nomination)	Mr. D. Pathansali, Fisheries, Research Officer, H.Q. Fisheries Dept., P.O. Box 459, Penang, Federation of Malaya.	(No nomination)	Mr. A.B.O. Merican, Fisheries Research Officer, H.Q. Fisheries Department, P.O. Box 459, Penang, Federation of Malaya.
NETHERLANDS	(No nomination)	(No nomination)	Mr. W.A. McKenzie, Inspector of Fisheries, Dept. of Agriculture and Fisheries, Hollandia, Netherlands New Guinea.	(No nomination)	Mr. Reeskamp, Dept. of Agriculture and Fisheries, Hollandia, Netherlands New Guinea.

Member Governments	Fish Marketing Sub-Committee	Hilse Sub-Committee	Renvelliger Sub-Committee	Chanos Sub-Committee	Fish Culture in Rice Fields Sub-Committee
PAKISTAN	Mr. S.A. Jaleel, Assistant Director, Central Fisheries Department, Fish Harbour Bld., West Wharf, Karachi 2 West Pakistan.	1. Dr. Nazir Ahmad, Director of Fisheries, Govt. of Bengal, Eden Buildings, Dacca, (E. Pakistan). 2. Dr. M.R. Qureshi, Director of Fisheries, Central Fisheries Dept, Karachi 2, Pakistan.	(No nomination)	(No nomination)	Mr. A.R.K. Zohairi, Deputy Director, Directorate of Fisheries, Eden Building, Dacca, East Pakistan.
PHILIPPINES	Mr. J. Montemayor, Fishery Statistician, Fisheries Research Division, Bureau of Fisheries, M.H. del Pilar St., Manila, Philippines.	(No nomination)	Mr. I.A. Ronquillo, Fishery Biologist, Fisheries Research Division, Bureau of Fisheries, M.H. del Pilar St., Manila, Philippines.	Mr. H.R. Rabanal, Fishery Culturist, Inland Fisheries Division, Bureau of Fisheries, M.H. del Pilar St., Manila, Philippines.	(No nomination)
THAILAND	(No nomination)	(No nomination)	Mr. Sant Bandhukul, Fisheries Officer, Department of Fisheries, Rajadamnern Av., Bangkok, Thailand.	Mr. Frida Karnasut, Chief, Division of Inland Fisheries, Department of Fisheries, Rajadamnern Av., Bangkok, Thailand.	(No nomination)
U.K.	Mr. I. Petersen, Marketing Officer, Cooperative Marketing Dept., Tung Kun Street, Yau-mati, Kowloon, Hong Kong.	(No nomination)	(No nomination)	(No nomination)	(No nomination)
U.S.A.	(No nomination)	(No nomination)	(No nomination)	(No nomination)	(No nomination)
VIETNAM	Mr. Nguyen Van Tich, Chef de Bureau Socio-Economique de Pêches, B.P. 340, Saigon, Vietnam.	(No nomination) (No nomination)	(No nomination) (No nomination)	Mr. Le Van Dang, Inspector of Inland Fisheries, B.P. 340, Saigon, Vietnam.	Mr. Le Van Dang, Inspector of Inland Fisheries, B.P. 340, Saigon, Vietnam.

CHAIRMEN AND RAPORTEURS

IPFC TECHNICAL COMMITTEE I

	Chairman	—	Mr. Soong Min Kong	(Fed. of Malaya)
	Rapporteur	—	Dr. B.S. Bhimachar	(India)
PANEL A				
	Chairman	—	Mr. A. S. Mendis	(Ceylon)
PANEL B				
	Chairman	—	Mr. G.I. Murphy	(U.S.A.)

IPFC TECHNICAL COMMITTEE II

	Chairman	—	Mr. L.F. Tisseverasinghe	(Ceylon)
	Rapporteur	—	Mr. V.L.C. Pietersz	(Ceylon)
PANEL A				
	Chairman	—	Mr. W.D. Orchard	(U.K. -Hong Kong)
PANEL B				
	Chairman	—	Mr. C.E. St. C. Gunasekera	(Ceylon)
PANEL C				
	Chairman	—	Mr. Abdul Halim	(Fed. of Malaya)

SUB-COMMITTEES

Fishmarketing				
	Chairman	—	Mr. I. Petersen	(U.K. -Hong Kong)
Hilsa				
	Chairman	—	Dr. T.V.R. Pillay	(India)
Rastrelliger				
	Chairman	—	Mr. Sant Bandhukul	(Thailand)
Chanos				
	Chairman	—	(Activity suspended for inter-session period)	
Fish Culture in Rice Fields				
	Chairman	—	Mr. Le Van Dang	(Vietnam)

APPENDIX III LIST OF DOCUMENTS

INCIDENTAL PAPERS: General Information — IPFC 8th Session-issued in advance
unnumbered.

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|--------------|---|--|
| IPFC/C58/INC | 1 | Provisional List of Delegates and observers. |
| | 2 | List of Documents. |
| | 3 | IPFC Nomination Forms. |
| | 4 | Provisional Program. |
| | 5 | Tours for Indo-Pacific Fisheries Council Delegates. |
| | 6 | General Information. |
| | 7 | IPFC Nominations for period between 8th & 9th Sessions. |
| | 8 | Program for Official Opening Ceremony of the 8th Session IPFC. |
| | 9 | Opening Statements. |

WORKING PAPERS:

- | | | |
|-------------|-----------|---|
| IPFC/C58/WP | 1 | A Motion for the Amendment of the Agreement and Rules of Procedure. |
| IPFC/C58/WP | 2 | Provisional Agenda and Annotations. |
| | 2 (Fr.) | Ditto in French. |
| | 3 | The Work of the Indo-Pacific Fisheries Council and its Relation to National Fisheries Policies. |
| | 4 | United Nations Conference on the Law of the Sea. |
| | 5 | The Boat and the Beach. |
| | 6 | Report of Technical Committee II (between 7th & 8th Sessions). |
| | *6 Add: 1 | Appendix for Technical Committee II. Report by the Fishing Section, Bureau of Fisheries-Korea. |
| | 6 Cor: 1 | Amendments to Technical Committee II. Report (page 51-52). |
| | 6 Add: 2 | Additions to Technical Committee II. Report Statistics & Socio-economics. (page 53-67). |
| | 6 Rev. 1 | Report of Technical Committee II — Part A Period between 7th & 8th Sessions of the Council (revised). |
| | 7 | Communication concerning a Central Agency for 14C determination (Measurements of primary production in the Sea) at Charlottenlund, Slot, Denmark. |
| | 8 | Report on the Status of the Industry. |
| | 8 Add: | Addition to the above. General Situation of Japanese Fisheries 1958 (page 49-51) |
| | 9 | 4th FAO Regional Conference for Asia and the Far East. |
| | 10 | Proposed Method of Operation of Council and Technical Committees during the Session. |
| | 11 | Report of the Executive Committee. |
| | 12 | Indo-Pacific Fisheries Year. |
| | 13 | Projects and proposals related to the Indo-Pacific Region (UNESCO). |
| | 14 | FAO Indo-Pacific Training Center in Fisheries Statistics. |

- 15 Report of the Sub-Committee on Fish Marketing. Review of Government Fish Marketing Activities in the Indo-Pacific Region.
- 16 FAO Indo-Pacific Training Centre in Fishery Cooperatives and Administration.
- 17 Provisional Agenda — Technical Committee II
- 18 Record of exchanges made by Technical Committee I in the inter-session period since the 7th session of the Council with regard to the subjects under discussion at the 7th Session, Part A.
- *18 Add: 1 The Reports to Technical Committee I, 8th Session IPFC, Colombo, by the Fishing Section, Bureau of Fisheries—Korea.
- 18 Add: 2 General note on the Procedures of Technical Committee I and on the status of its work.
- 19 Questionnaire on edible Mollusks.
- 20 FAO Fisheries Activities in the Region.
- 21 Note for IPFC on Training Centers.
- 22 Schedule of Meetings of interest to IPFC.
- 23 Symposium: Improved types of fishing from small mechanized boats.
- 24 Report of the Chairman of the Working group on Fish Culture in Rice Fields.
- 25 Synopsis of Biological data on milk fish, *Chanos chanos* (Forsk.) 1775.
- 26 Report of the Work of the Hilsa Sub-Committee during the period after the 7th Session of the Indo-Pacific Fisheries Council.
- 27 Note on the present position regarding the development of a surf going beach landing fishing boat in India.
- 28 Report of the International Training Center on the Methodology and Techniques of Research on Mackerel (*Rastrelliger*) Bangkok, Thailand 20 October - 28 November, 1958, by S.J. Holt.
- 29 Notes for Technical Committee II.
- 29 Add: 1 Extract from Summary Record of the 6th Session IPFC, Japan.
- 30 Summary Record of 1st Session, Technical Committee I.
- 31 Summary Record of 1st Session, Technical Committee II.
- 32 Technical Committee II - Elections.
- 33 Operational Plan for the World Scientific meeting on the Biology of Sardines and related species.
- 34 The Work in fishery economics and statistics in 1960 and 1961.
- 35 Programme for Technical Committee II.
- 36 Classified List of Documents.
- 37 Plan of work for Technical Committee I.
- 37 Rev. 1 Ditto (revised)
- 38 Summary Record of the 2nd Session, Technical Committee II.
- **39 Draft prospectus for a proposed Fishery Surveys Center for the countries of the Indo-Pacific Region.
- 40 Secretary's Report on Credentials.
- 41 Report by the Sub-Committee on Marketing.

*Note: In very limited supply.

**In very limited numbers.

WORKING PAPERS: (continued)

IPFC/C58/WP	42	Technical Committee I Report-Part B — (Draft)
	43	Statement by the Delegate for Korea regarding the Report on the Indo-Pacific Fisheries Year.
	44	Report of the Ad Hoc Committee to consider the Executive Committee's Report.
	45	Resolution on Bibliographies by the Delegate for Australia.
	46	Resolution by the Delegate for USA on Technical/Sub-Committee Meetings.
	47	Summary Record of 3rd Session. Technical Committee II.
	48	Record of meeting of Ad-Hoc Committee on Budget Proposals.
	49	Proposal for the Amendment of the Agreement submitted by the Delegate for the Netherlands.
	50	Report of Technical Committee II—Part B.
	51	Proposed by the Delegate for France-Operation of Technical Committees.
	51 Rev: 1	Ditto (revised)
	51 Rev: 1	(fr.) Ditto (French)
	52	Recommendations—proposal by the Delegate for Vietnam.
	53	The Organization of the Central Fisheries Technological Research Station, Cochin, India, and Outline of the Program of Work in the Station.
	54	IPFC Publications.
	55	Report of Editorial Committee.
	56	Technical Committee I-Proposal regarding Committee Meetings, Sub-Committees & Panels.

FILM SHOWS:

Dec. 11th.	Kuremona Manryo	Colour	28	Mins.	FAO No. 194
	Pride and Progress	Black & White	30	"	Ceylon
	Fish Spoilage Control	Colour	10	"	FAO No. 120
	Outboard Fishermen of the U.S.A.	Colour	27	"	FAO No. 251
Dec. 19th.	Californian Tuna Fishermen	Colour	25	"	New Caledonia.
	The Trawl in Action Pt. I	Black & White	15	"	Ceylon
	Pt. II	Black & White	30	"	Ceylon
	Fishermen of Negombo	"	25	"	Ceylon
	Shark Fishing	"	15	"	FAO No. 319
	Wonders of the Depths	"	15	"	Ceylon
	Slides—Grass Carp				Dr. K. Kuronuma.

TECHNICAL PAPERS: Note:— Where Abstracts and/or Summaries have been provided they have been embodied in the paper.

		Subject
IPFC/C58/TECH	1	Experiments on Fishing Net Preservation..... H. Miyamoto and A.T. Shariff
	2	Storage of Dried Fish..... J.S. Scott
	3	Lowering the Solidification Point of Coconut Oil H. Hardjohutomo
		Craft and Gear
		Food Technology
		Food Technology

IPFC/C58/TECH			Subject
	4	Note sur la préparation de farine de poisson à partir des résidus provenant de la fabrication des graisses de poissons d'eau du Cambodge : Utilization directe dans l'alimentation des volailles de farine non deshuilée R. Lafont	Food Technology
	5	Some Aspects of Cockle (<i>Anadara granosa</i> L.) Culture in Malaya D. Pathansali & Soong Min Kong	Sea Fisheries
	6	Production of Dehydrated Fish Meat J.I. Sulit, D.L. Galvez and F.R. Gonzales	Food Technology
	7	Studies on the Processing and Storage of Dried split-salted <i>Bisugo</i> (<i>Nemipterus</i> spp.)... J.I. Sulit and S.V. Laron	Food Technology
	8	Fishing Efficiency of Otter Trawl aided with a Kite Shigene Takayama	Craft and Gear
	9	Notes on Fisheries Technological Research in Thailand K. Suriyong, B. Kasemsarn, S. Panjamapirom, P. Nittayachinta and U. Sunthornvipat	Food Technology
	10	Common Economic and Commercial Fishes of Indonesia Mohammad Unar and M. Sachlan	Biology
	11	Notes on Tests in Thailand on the Acceptability of Good Quality Fish Meal for Human Consumption Uthai Bisalyaputra and Kosol Suriyong	Food Technology
	12	Utilization of Fish Liver Residues C. Gunasekera	Food Technology
	13	General Features and Productivity of the Wadge Bank. Contribution No. 3 The Ariids (Cat fishes) S. Sivalingam	Sea Fisheries
	14	Reclamation of Derelict Water Areas in East Pakistan N. Ahmad	Inland Fisheries
	15	Some Statistical Data on Fisheries in Indonesia K. Koestedjo.	Socio Economic & Statistics
	16	Preliminary Report on Transportation of <i>Chanos</i> -Fingerlings with Aerating System R. Roestami Djajadiredja	Fish Culture
	17	Preliminary Experimentation on the Use of Coconut oil in Canned Fish and the Suitability of Processing Methods Soejarwidodo.	Food Technology

		Subject
IPFC/C58/TECH 18	The Transportation of <i>Chanos</i> Fingerlings and their Mortality R. Mardjoko Tjiptoaminoto and M. Sachlan.	Fish Culture
19	Some Observations on <i>Chanos</i> Culture in Fresh Water R. Roestami Djajadiredja and Ruchiat Amidjaja	Fish Culture
20	Relation between Fish Culture in Rice Fields and Malaria Gelar Wiraatmadja & R. Djambur.	Fish Culture
21	The Use of Endrin as a Piscicide in Mining Pools and Fish ponds in Malaya M.K. Soong & A.B.O. Merican	Fish Culture
22	Fisheries Finance in Japan..... Kohei Teshima	Socio Economics
23	The Motorization of Fishing Craft at Vietnam Tran Van Tri	Craft & Gear
24	Contribution à l'étude du Nuoc-mam condensé au Vietnam Nguyen Nhu Nghi	Food Technology
*25	Underwater Electric Lamps for Light Fishing H. Kristjonsson	Craft & Gear
26	Considerations on Fishermen's Training P.A. Lusyne	Socio Economics

SYMPOSIUM PAPERS: "SYMPOSIUM ON FISH BEHAVIOR"

IPFC/C58/SYM 1	Prospectus for the Symposium on Fish Behavior ..
2	Preliminary Results of Underwater Observations of Tuna Schools and Practical Applications of these Results D.W. Strasburg and H.S.H. Yuen
3	Fish Behavior and the Planktonic Environment: The Role of Field Observations R.S. Glover
4	Les migrations de Poissons dans les Eaux douces Tropicales Africaines J. Daget
5	Symposium on Fish Behavior. Analysis of Behavior in Commensalism.
6	The Commercial Value of Studies on Fish Behavior with Particular Reference to Lake Victoria R.S.A. Beauchamp
7	Some Preliminary Observations on the Avoidance of Obstacles by Herring (<i>Clupea Harengus</i> L) .. J.H.S. Blaxter, F.G.T. Holliday & B.B. Parrish.

* In very limited numbers

- 8 Some Notes on Establishment and Maintenance of Atlantic Herring
 (*Clupea Harengus* L) in Aquaria
 B.B. Parish, J.H.S. Blaxter + F.G.T. Holliday
- 9 A Contribution to the Study of Fish Behavior
 S.G. Zusser
- 10 Research on the Behavior of Atlantic Salmon at the Biological Station,
 St. Andrews, N.B.
 M.H.A. Keenleyside
- 12 Notes on: The Elementary Actions
 G.L. Kesteven.
- 13 Reactions of Fish to Stimuli
 F.R. Harden-Jones.
- 14 Notes on: The Basis, Control and Integration of Behavior
 G.L. Kesteven
- 15 The Experimental Study of Behavior in Fish
 F.E.J. Fry.
- 19 Notes on: The Patterns of Behavior
 G.L. Kesteven.
- 20 Some Terms used in Behavior Research
 G.L. Kesteven.
- 21 Fish Behavior with Special Reference to Pelagic Shoaling Species:
 Lajang (*Decapterus* sp.)
 Soemarto.
- 22 On the Behavior of Lemuru, *Sardinella Alleeia* (RAF) at Bali Strait
 R. Soerjodinoto.
- 23 Some Knowledge on Behavior of Fish Schools
 M. Nomura
- 24 Report on the Symposium.

Note:

Nos 11, 16, 17, 18 allocated to papers which eventually were not presented.

CONTRIBUTED PUBLICATIONS: Please note that the following publications have been made available to the Council in limited supply. These have been distributed as widely as possible. When numbers of copies have been small, distribution has been limited to heads of Delegations only.

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| IPFC/C58/CP | 1 | Films on Fisheries and related Subjects-Mimeo FAO/58/1/337, 1957, Rome (Revised) |
| | 2 | Zooplankton — Factors affecting its Abundance and Distribution, with special consideration to the relation to phytoplankton and fisheries by T. Laevastu. Mimeo, FAO/58/4/2529, FAO Fisheries Div. Rome. March 1958. |
| | 3 | The oceanographical conditions for life and abundance of phytoplankton considered with respect to fisheries by G.L. Kesteven and T. Laevastu. Mimeo, FAO/58/5/3749, FAO Fisheries Div. Rome, May 1958. |

- 4 Economic survey of Pla-Tu salting Industry 1956. Agricultural Economic Division, Ministry of Agriculture, Bangkok, Thailand, 1958.
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- 8 Lists of A. Manufacturers of nylon yarn and other synthetic fibres
B. Manufacturers and/or suppliers of nets, nettings and twines made of Nylon or other synthetic fibres
C. Manufacturers and/or suppliers of fishing lines made of Nylon or other synthetic fibre materials.
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- 12 Indoor Drying of salt fish in South Brazil-Mimeo, FAO Fisheries papers No. 13, August 1958.
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- 16 Some problems for Biological Fishery Survey and Techniques for their solution. International Commission for the Northwest Atlantic Fisheries Special Publication No. 1, 1958.
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| IPFC/C58/M | <ol style="list-style-type: none"> 1. Minutes of the official opening of the Eighth Session of the Indo-Pacific Fisheries Council. 2. Minutes of the First Plenary Meeting - Dec. 8 3. Minutes of the Second Plenary Meeting - Dec. 8 4. Minutes of the Third Plenary Meeting - Dec. 9 5. Minutes of the Fourth Plenary Meeting - Dec. 11 6. Minutes of the Fifth Plenary Meeting - Dec. 12 7. Minutes of the Sixth Plenary Meeting - Dec. 15 8. Minutes of the Seventh Plenary Meeting - Dec. 16 9. Minutes of the Eighth Plenary Meeting - Dec. 19 10. Minutes of the Ninth Plenary Meeting - Dec. 19 11. Minutes of the Final Plenary Meeting - Dec. 22 |
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CEYLON GOVERNMENT PUBLICITY BUREAU:

Ceylon (Guide Book)
 Map of Ceylon
 Map of Colombo Fort & Environs
 Under water Ceylon (pamphlet)
 Ceylon (pamphlet)¹²⁸

- IPFC/C58/P
1. Message of welcome by the Hon'ble Prime Minister of Ceylon, Mr. S.W.R.D. Bandaranaike.
 2. Opening address by the Hon'ble M.P., P.H. William de Silva, Minister of Industries & Fisheries, Ceylon.
 3. Address by Dr. B.R. Sen, Director General of the Food and Agriculture Organization of the United Nations.
 4. Address by the Chairman of the Indo-Pacific Fisheries Council. Dr. K. Kuronuma.
 5. Cable message from Dr. D.B. Finn, Director of the FAO Fisheries Division, Rome.
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