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**SOUTH PACIFIC COMMISSION**

**TWENTY-SECOND REGIONAL TECHNICAL MEETING ON FISHERIES**

Noumea, New Caledonia, 6—10 August 1990

**REPORT**

Noumea, New Caledonia, 1990

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**ACRONYMS**

<b>AIDAB</b>	Australian International Development Assistance Bureau
<b>CIDA</b>	Canadian International Development Agency
<b>CRGA</b>	Committee of Representatives of Governments and Administrations
<b>CZM</b>	Coastal Zone Management
<b>DSFDP</b>	Deep Sea Fisheries Development Project
<b>DWFNs</b>	Distant Water Fishing Nations
<b>EC</b>	European Community
<b>FAD</b>	Fish Aggregation Device
<b>FAO</b>	Food and Agriculture Organization of the United Nations
<b>FFA</b>	Forum Fisheries Agency
<b>FFC</b>	Forum Fisheries Committee
<b>FHPP</b>	Fish Handling and Processing Project
<b>GPS</b>	Global Positioning System
<b>ICLARM</b>	International Center for Living Aquatic Resources Development
<b>ICOD</b>	International Centre for Ocean Development
<b>IFREMER</b>	Institut français de recherche pour l'exploitation de la mer
<b>IFRP</b>	Inshore Fisheries Research Project
<b>IMR</b>	Institute of Marine Resources
<b>IPFC</b>	Indo-Pacific Fisheries Council
<b>NMFS</b>	U.S. National Marine Fisheries Service
<b>NRIFSF</b>	National Research Institute of Far Seas Fisheries (Japan)
<b>OFCF</b>	Overseas Fisheries Cooperation Foundation (Japan)
<b>ORSTOM</b>	Institut français de recherche scientifique pour le développement en coopération
<b>PIMR</b>	Pacific Island Marine Resources Project (USAID)
<b>PIMRIS</b>	Pacific Island Marine Resources Information System
<b>QDPI</b>	Queensland Department of Primary Industries
<b>RPHFF</b>	Regional Post-harvest Fisheries Facility for the Pacific

RTFB	Regional Tuna Fisheries Database
RTMCP	Regional Turtle Management and Conservation Programme
RTMF	Regional Technical Meeting on Fisheries
RTTP	Regional Tuna Tagging Project
SAGA	Scientific Advisory Group on Albacore
SCD	Standing Committee Database
SCTB	Standing Committee on Tuna and Billfish
SIG	Special Interest Group
SPAR	South Pacific Albacore Research Group
SPRADP	South Pacific Regional Aquaculture Development Programme
SPREP	South Pacific Regional Environmental Programme
SPRTRP	South Pacific Regional Tuna Research Project
TBAP	Tuna and Billfish Assessment Programme
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
USP	University of the South Pacific
WPFCC	Western Pacific Fisheries Consultative Committee

## I. INTRODUCTION

The Fourteenth South Pacific Conference (Rarotonga, Cook Islands, 1974) approved the principle of an annual technical meeting on fisheries. The Twenty-ninth South Pacific Conference (Guam, 1989) emphasised the importance member countries attach to this meeting and provided for the Twenty-second Regional Technical Meeting on Fisheries to be held in Noumea, New Caledonia in 1990.

The Regional Technical Meeting on Fisheries provides the only opportunity for senior fisheries officers from all member countries to meet and discuss technical aspects of fisheries development, and through the exchange of experience, ideas and information, to identify mutual needs and problems which can best be met by a regional approach. The meeting directs the work of the Commission's Fisheries Programme by reviewing and commenting on existing or proposed activities, and formulating new initiatives where required.

The Twenty-second Regional Technical Meeting on Fisheries was held at South Pacific Commission headquarters, Noumea, New Caledonia from 6 to 10 August 1990.

## **II. AGENDA**

1. Opening address
2. Administrative arrangements
3. Approval of agenda and timetable
4. General review of SPC Fisheries Work Programme
5. Report on Work Programme Activities
  - 5.1. **Coastal Fisheries**
    - (i) Inshore Fisheries Research Project
    - (ii) Fisheries Information Project
    - (iii) Fish Handling and Processing Project
    - (iv) Deep Sea Fisheries Development Project
  - 5.2. **Oceanic Fisheries**
    - (i) Tuna and Billfish Assessment Programme overview
    - (ii) Review of Western Pacific tuna fisheries
    - (iii) Regional Tuna Tagging Project
    - (iv) Albacore Research Project
    - (v) Fisheries Statistics Project
    - (vi) Consideration of Report of Third Standing Committee on Tuna and Billfish (SCTB3)
    - (vii) Report on Second Consultation on Arrangements for South Pacific Albacore Management
  - 5.3. **Training**
    - (i) Regional Fisheries Training Project
      - Workshop on Organisational Management for Senior Fisheries Personnel
      - Post-harvest Training
      - Extension Skills Training
    - (ii) Review and possible further development of the SPC Pacific Island Fisheries Officers Course
    - (iii) Proposal for Pacific Island Fisheries Manpower Development Study
6. Fisheries Programme — Establishment
  - (i) Attachment of Overseas Fisheries Cooperation Foundation (OFCF) Fisheries Specialist to SPC
  - (ii) Proposal for the establishment of a Women-in-Fisheries Programme
  - (iii) Restructuring of Coastal Fisheries Programme
7. SPC Fisheries Projects for Lome IV funding consideration
8. The establishment of a regional post-harvest fisheries facility for the Pacific
9. Co-ordination of SPC work on ciguatera
10. Enhancement of Pacific Island invertebrate fisheries by restocking

11. Issues relating to trochus and pearl shell research
12. One-day workshop on Fish Aggregation Devices (FADs)
13. PIMRIS — A progress report
14. Educational resource materials and teaching assistance to schools
15. SPC initiatives in remote sensing and geographical information systems
16. Fisheries Conservation
  - (i) Coastal Zone Management and its relevance to fisheries development
  - (ii) Regional Marine Turtle Management and Conservation Programme
17. Report on second meeting of Western Pacific Fisheries Consultative Committee and Establishment of Trans-Pacific Fisheries Consultative Committee
18. FAO Consultation on Interactions of Pacific Ocean Tuna Fisheries
19. Reports by other organisations
 

<ul style="list-style-type: none"> <li>• ICOD/CIDA</li> <li>• FAO/UNDP</li> <li>• ORSTOM</li> <li>• USP</li> <li>• Nelson Polytechnic</li> <li>• ICLARM</li> </ul>	<ul style="list-style-type: none"> <li>• FFA</li> <li>• USAID</li> <li>• OFCF</li> <li>• Commonwealth Secretariat</li> <li>• Australian Maritime College</li> <li>• NMFS</li> </ul>
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20. Other business
21. Adoption of report



### III. LIST OF PARTICIPANTS

#### American Samoa

Mr Phil Langford  
Assistant Director  
Department of Marine and Wildlife Resources  
P.O. Box 3730  
PAGO PAGO

Mr A. Fale Tuilagi  
Department of Marine and Wildlife Resources  
P.O. Box 3730  
PAGO PAGO

#### Australia

Dr Russell Reichelt  
Assistant Director (Fisheries Resources Branch)  
Bureau of Rural Resources  
Dept. of Primary Industries and Energy  
G.P.O. Box 858  
CANBERRA, ACT 2601

#### Cook Islands

Mr Julian Dashwood  
Secretary  
Ministry of Marine Resources  
P.O. Box 85  
RAROTONGA

#### Federated States of Micronesia

Mr Peter Sitan  
Executive Director  
Micronesian Maritime Authority  
P.O. Box D  
Kolonias  
POHNPEI 96941

Mr Moses Nelson  
Fisheries Development Officer  
Division of Marine Resources  
Department of Resources and Development  
P.O. Box 490  
Kolonias  
POHNPEI 96941

Mr John Diplock  
Tuna Biologist  
Micronesian Maritime Authority  
P.S. 121, Palikir  
POHNPEI 96941

#### Fiji

Dr Tim Adams  
Acting Director of Fisheries  
Fisheries Division  
Ministry of Primary Industries  
P.O. Box 358  
SUVA

Mr Charles Evening  
 Acting Principal Fisheries Officer  
 Fisheries Division  
 Ministry of Primary Industries  
 P.O. Box 358  
 SUVA

**France**

Mr Renaud Pianet  
 Océanographe biologiste  
 Centre ORSTOM de Nouméa  
 B.P. A5  
 NOUMEA  
 New Caledonia

**French Polynesia**

Mr Bruno Ugolini  
 Chef du département pêche  
 Etablissement pour la valorisation des  
 activités aquacoles et maritimes  
 (EVAAM)  
 B.P. 20  
 PAPEETE, Tahiti

Mr Frédéric Leproux  
 Technicien  
 Etablissement pour la valorisation des  
 activités aquacoles et maritimes  
 (EVAAM)  
 B.P. 20  
 PAPEETE, Tahiti

**Guam**

Mr Gerry Davis  
 Head Fisheries Biologist  
 Division of Aquatic and Wildlife Resources  
 Dept of Agriculture  
 P.O. Box 2950  
 AGANA 96910

**Kiribati**

Mr Teekabu Tikai  
 Chief Fisheries Officer  
 Fisheries Division  
 Ministry of Natural Resources and Development  
 P.O. Box 276  
 BIKENIBEU, Tarawa

Ms Tooti Tekinaiti  
 Fisheries Research Officer  
 Fisheries Division  
 Ministry of Natural Resources and Development  
 P.O. Box 276  
 BIKENIBEU, Tarawa

**Marshall Islands**

Mr Ronald Alfred  
 Fisheries Officer  
 Marshall Islands Marine Resources Authority  
 Ministry of Resources and Development  
 P.O. Box 860  
 MAJURO 96960

**Nauru**

Mr David Agir  
 Senior Projects Officer  
 Department of Island Development and Industry

Mr V. Gadoengin  
 Department of Education

Mr Nelson Tamakin  
 Department of Education

**New Caledonia**

Mr Philippe du Couedic de Kergoaler  
 Chef du service territorial de la marine marchande  
 et des pêches maritimes  
 B.P. 36  
 NOUMEA

Mr Regis Etaix-Bonnin  
 Ingénieur halieute  
 Service territorial de la marine marchande  
 et des pêches maritimes  
 B.P. 36  
 NOUMEA

Mr Aymeric Desurmont  
 Maître Pêcheur  
 Service territorial de la marine marchande  
 et des pêches maritimes  
 B.P. 36  
 NOUMEA

Mr John Patrick Kieran  
 Directeur-Général de l'A.D.M.T  
 Province des Iles  
 B.P. 4387  
 NOUMEA

**New Zealand**

Dr Talbot Murray  
 Research Group Leader  
 Pelagic and Inshore Fisheries Research Group  
 MAF Fisheries  
 Ministry of Agriculture and Fisheries  
 P.O. Box 297  
 WELLINGTON

**Niue**

Mr Sioneheke Leolahi  
 Fisheries Officer  
 P.O. Box 74  
 Government of Niue  
 ALOFI

**Palau**

Mr Noah Idechong  
 Chief  
 Marine Resources Division  
 Bureau of Resources and Development  
 P.O. Box 100  
 KOROR 96940

Mr Pablo Siangldeb  
 Fisheries Officer  
 Marine Resources Division  
 Bureau of Resources and Development  
 P.O. Box 100  
 KOROR 96940

Ms Ann Kitalong  
 Fisheries Biologist  
 Marine Resources Division  
 Bureau of Resources and Development  
 P.O. Box 100  
 KOROR 96940

**Papua New Guinea**

Mr Noel Omeri  
 Assistant Secretary  
 Department of Fisheries and Marine Resources  
 P.O. Box 165  
 KONE DOBU

Mr Molean Chapau  
 Fisheries Biologist  
 Kavieng Research Station  
 Department of Fisheries and Marine Resources  
 P.O. Box 377  
 KAVIENG

**Solomon Islands**

Mr Sylvester Diake  
 Principal Fisheries Officer (Resources  
 Management)  
 Fisheries Division  
 Ministry of Natural Resources  
 P.O. Box G24  
 HONIARA

**Tokelau**

Mr Foua Toloa  
 Director of Agriculture and Fisheries  
 Office for Tokelau Affairs  
 P.O. Box 865  
 APIA

**Tonga**

Mr Taniela Koloa  
Acting Principal Fisheries Officer  
Fisheries Division  
P.O. Box 14  
NUKU'ALOFA

**Tuvalu**

Mr Satalaka Petaia  
Fisheries Officer  
Fisheries Division  
Ministry of Commerce and Natural Resources  
Vaiaku  
FUNAFUTI

**United Kingdom**

Mr David Salmon  
Senior Natural Resources Adviser  
British Development Division  
in the Pacific  
Private Mail Bag  
SUVA  
Fiji

**United States of America**

Mr William Gibbons Fly  
Office of Fisheries Affairs  
Bureau of Oceans and International  
Environmental and Scientific Affairs  
Department of State  
WASHINGTON

Mr Elisala Pita  
Fisheries Adviser  
South Pacific Regional Development Office  
Agency for International Development  
P.O. Box 218  
SUVA  
Fiji

Dr Sam Pooley  
Honolulu Laboratory  
Southwest Fisheries Centre  
National Marine Fisheries Service (NMFS)  
2570 Dole Street  
HONOLULU  
Hawaii 96822

Mr Raymond P. Clarke  
National Marine Fisheries Service (NMFS)  
2570 Dole St Room 105  
HONOLULU  
Hawaii 96822

**Vanuatu**

Mr Wycliffe Bakeo  
 Director of Fisheries  
 Fisheries Department  
 Private Mail Bag 045  
 PORT VILA

**Wallis and Futuna**

Mr Frederic Delaunay  
 Chef du service de l'agriculture et de la pêche  
 B.P. 19  
 MATA'UTU

**Western Samoa**

Mr Ueta Fa'asili  
 Chief Fisheries Officer  
 Fisheries Division  
 Dept of Agriculture, Forests and Fisheries  
 P.O. Box 1874  
 APIA

**OBSERVERS****Australian Institute of Marine  
Science (AIMS)**

Dr David Mc B. Williams  
 PMB No. 3  
 TOWNSVILLE M.C.  
 Queensland 4810  
 Australia

**Australian Maritime College  
(AMC)**

Dr John Wallace  
 Head of School — Fisheries  
 Australian Maritime College  
 P.O. Box 21  
 BEACONSFIELD  
 Tasmania 7251  
 Australia

**Commonwealth Secretariat**

Mr Semisi Fakahau  
 Fisheries Officer  
 Commonwealth Secretariat  
 Marlborough House  
 Pall Mall  
 LONDON SW1Y 5HX  
 United Kingdom

**Food and Agriculture Organization  
of the United Nations (FAO)**

Mr Robert Gillett  
 Project Manager  
 FAO/UNDP Regional Fishery Support  
 Programme  
 UNDP Private Mail Bag  
 SUVA  
 Fiji

Mr Hideyuki Tanaka  
Project Manager/Regional Aquaculturist  
South Pacific Aquaculture Development  
Project  
UNDP Private Mail Bag  
SUVA  
Fiji

**Forum Fisheries Agency (FFA)**

Mr Andrew Wright  
Research Co-ordinator  
Forum Fisheries Agency  
P.O. Box 629  
HONIARA  
Solomon Islands

Mr Colin Brown  
Fisheries Surveillance Adviser  
Forum Fisheries Agency  
P.O. Box 629  
HONIARA  
Solomon Islands

**International Centre for Ocean  
Development (ICOD)**

Mr Phil Saunders  
Field representative  
International Centre for Ocean Development  
Canadian Cooperation Office  
Private Mail Bag  
SUVA  
Fiji

**Institut français de recherche  
scientifique pour le développement  
en coopération (ORSTOM)**

Mr René Grandperrin  
Responsable du laboratoire  
d'océanographie biologie  
Centre ORSTOM de Nouméa  
B.P. A5  
NOUMEA  
New Caledonia

Ms Esperance Cillauren  
Fisheries Department Research Unit  
ORSTOM  
Private Mail Bag 045  
PORT VILA  
Vanuatu

Mr Bruno Marchandise  
Fisheries Department Research Unit  
ORSTOM  
Private Mail Bag 045  
PORT VILA  
Vanuatu

Mr G. David  
Fisheries Department Research Unit  
ORSTOM  
Private Mail Bag 045  
PORT VILA  
Vanuatu

Mr Erwan Josse  
Biologiste des Pêches  
B.P. 529  
Centre ORSTOM  
PAPEETE, Tahiti  
French Polynesia

**McIntosh Marine Inc.**

Mr Gregory S. McIntosh  
621 Idlewyld Drive  
FORT LAUDERDALE  
Florida 33301  
United States of America

**Nelson Polytechnic School of Fishing**

Captain Angus Scotland  
Head  
Fishing School  
Nelson Polytechnic  
Private Mail Bag  
NELSON  
New Zealand

**Overseas Fishery Cooperation  
Foundation (OFCF)**

Mr Yoshihiro Takagi  
Director  
Planning Division  
Overseas Fishery Cooperation Foundation  
Akasaka Twin Tower East 18th Floor  
2-17-22 Akasaka Minato-ku  
TOKYO 107  
Japan

Mr Masanami Izumi  
Fisheries Expert  
Development Division  
Overseas Fishery Cooperation Foundation  
Akasaka Twin Tower East 18th Floor  
2-17-22 Akasaka Minato-ku  
TOKYO 107  
Japan

**Queensland Department of  
Primary Industries**

Mr Peter J. Neville  
Director  
Division of Fisheries and Wetlands Management  
Queensland Department of Primary Industries  
GPO Box 46  
BRISBANE  
Queensland 4001  
Australia



Mr Cliff R. Bunning  
Queensland Department of Primary Industries  
GPO Box 46  
BRISBANE  
Queensland 4001  
Australia

Mr Richard Fell  
Consultancies and Business Development Branch  
GPO Box 46  
BRISBANE  
Queensland 4001  
Australia

**RDA International Inc.**

Dr Stanley Swerdloff  
Fisheries Development Project  
RDA International Inc.  
801 Morey Drive  
PLACERVILLE  
CA 95667  
United States of America

**Solander (Pacific) Limited**

Mr John Matson  
Manager  
Solander Pacific Ltd  
GPO Box 178  
SUVA  
Fiji

**Trade Records Analysis of  
Flora and Fauna in Commerce  
(Oceania) Inc.**

Mr Frank Antram  
TRAFFIC Oceania  
P.O. Box 799  
MANLY  
NSW 2095  
Australia

**Université française du Pacifique  
Sud**

Mr Gerard Orfila  
Université française du Pacifique Sud  
B.P. G4  
NOUMEA  
New Caledonia

**University of the South Pacific**

Prof. R. South  
Professor of Marine Studies  
University of the South Pacific  
P.O. Box 1168  
SUVA  
Fiji

## CONSULTANTS

Mr James Crossland  
James Crossland and Associates  
15 Wharf Road  
Herne Bay  
AUCKLAND  
New Zealand

Mr Paul D. Gates  
FAD Project Co-ordinator  
C/- Western Pacific Regional Fisheries  
Management Council  
1164 Bishop Street  
HONOLULU  
Hawaii 96813

Lt Richard L. Boy  
US Coast Guard  
c/- Commandant (G-ECV)  
2100 Second Street SW  
WASHINGTON D.C. 20593  
United States of America

## PRIVATE INDIVIDUALS

Mr Jacques Moret  
Architecte naval  
B.P. 2602  
NOUMEA  
New Caledonia

## SPC SECRETARIAT

Mr Atanraoi Baiteke  
Secretary-General

Mrs Hélène Courte  
Director of Programmes

Mr Bernard Smith  
Fisheries Co-ordinator

Dr Antony Lewis  
Chief Fisheries Scientist

Dr John Hampton  
Principal Fisheries Scientist

Mr Garry Preston  
Senior Inshore Fisheries Scientist

Mr Paul Dalzell  
Inshore Fisheries Scientist

Mr Alastair Robertson  
Fisheries Education and Training Adviser

Mr Michel Blanc  
Fisheries Training Associate

Mr Steve Roberts  
Fish Handling and Processing Officer

Mr Paxton Wellington  
Masterfisherman

Mr Peter Cusack  
Fisheries Development Officer

Mr Jean-Paul Gaudechoux  
Fisheries Information Officer

Mr Tim Lawson  
Fisheries Statistician

Mr Peter Williams  
Assistant Fisheries Statistician

Mr Jeffrey Stander  
Tuna Systems Manager

Mr David Itano  
Fisheries Scientist (RTTP)

Mrs Helen Wolfgramm-Page  
Secretary/Fisheries Co-ordinator

Mrs Marie-Ange Bao  
Secretary to the meeting

Mrs Kay Legras  
Project Assistant/Inshore Fisheries Research

Mr Paul Holthus  
Project Officer (SPREP)

Mr Peter Thomas  
Protected Areas Management Officer (SPREP)

Ms Neva Wendt  
(formerly Environmental Education Officer  
– SPREP)

Mr Patrick Cowan  
Manager Interpretation/Translation Section

Ms Dominique Toulet  
Interpreter

**Ms Valerie Hassan**  
**Interpreter**

**Mr Claude Colomer**  
**Interpreter**

**Mr Pierre Pellerin**  
**Translator**

**Ms Christine Youssef**  
**Translator**

**Ms Anne Dubois**  
**Secretary/Interpretation/Translation Section**

## **IV. SUMMARY OF DISCUSSIONS**

### **AGENDA ITEM 1—OPENING ADDRESS**

1. The Secretary-General, Mr Atanraoi Baiteke, formally opened the meeting, welcomed the delegates, and thanked donor agencies for the support and funding supplied.

### **AGENDA ITEM 2—ADMINISTRATIVE ARRANGEMENTS**

2. The Fisheries Co-ordinator, Mr Bernard Smith, gave a brief outline of the meeting protocol and administrative arrangements.

#### **Appointment of Chairman and other Office Bearers**

3. Following the procedure of rotating the chairmanship alphabetically between member countries, Mr Peter Sitan of the Federated States of Micronesia was appointed Chairman and Dr Tim Adams of Fiji Vice-Chairman. Mr Julian Dashwood of the Cook Islands thanked the Secretary-General for his opening address and stressed the usefulness of the RTMF to delegations for meeting colleagues.

### **AGENDA ITEM 3—APPROVAL OF AGENDA AND TIMETABLE**

4. The draft agenda and timetable as presented by the Secretariat were approved.

### **AGENDA ITEM 4—GENERAL OVERVIEW OF SPC FISHERIES WORK PROGRAMME**

5. The Programme activities were detailed in WP.1. The Fisheries Co-ordinator gave an overview of the Fisheries Programme. Fisheries is now the largest programme in SPC and accounts for about one third of its total workload. In 1988 the Coastal Fisheries and Tuna and Billfish Assessment Programmes were restructured into a single unit. This unit was in the third year of operation and benefits would be seen through presentations during the meeting. Most of the 38 positions were substantively filled. The only area of concern was the TBAP core staff. There was still a budget deficit despite strong donor support. This had meant that two senior staff positions had remained unfilled. TBAP had expanded considerably; thus there was a need to fill one of these senior posts. All donor governments had increased funding.

6. The Training Project had been transferred to Fiji and Mr Michel Blanc recruited to the Fisheries Training Associate position.

7. The Fisheries Programme budget for 1990 was 5.4 million dollars, only \$330 000 of which came from core funds. The Fisheries Co-ordinator thanked the United Kingdom, France, the United States of America, Australia, New Zealand and the many other donor agencies which assist, in particular the Commission of the European Communities, ICOD, FAO/UNDP, the Commonwealth Secretariat and the Commonwealth Foundation, for their continued support. The Fisheries Co-ordinator emphasised the close working arrangements with FFA and thanked its Director, Mr Philipp Muller, for his support. He also thanked the FAO/UNDP Regional Fishery Support Programme, ORSTOM, IFREMER, USP and the Queensland Department of Primary Industries.

8. The Fisheries Co-ordinator stated that the success of the Fisheries Programme depended ultimately on staff and thanked all.

9. The Fisheries Co-ordinator briefly outlined Secretariat action taken on the recommendations from last year's RTMF. A summary of this was contained in WP.10.

## **AGENDA ITEM 5—REPORT ON WORK PROGRAMME ACTIVITIES**

### **AGENDA ITEM 5.1—COASTAL FISHERIES**

#### **(i) Inshore Fisheries Research Project**

10. The work of this project was presented by the Senior Inshore Fisheries Scientist and the Inshore Fisheries Scientist, who briefly summarised key points of interest outlined in WP.1.

11. The project aims to provide a support service on request to individual SPC member countries and has concentrated mainly on field surveys, particularly for beche-de-mer and pearl shell. The project also supplies management advice and participates in several regional activities as well as co-ordinating information exchange. Considerable attention is paid to training, but this is by attachment rather than formal courses.

12. Six countries (Kiribati, Palau, Niue, Tuvalu, the Federated States of Micronesia and Papua New Guinea) expressed their support of the IFRP, following remarks concerning continued funding by the United Kingdom Representative, Mr Salmon.

#### **(ii) Fisheries Information Project**

13. The Fisheries Information Officer briefly described his work and stressed three important issues:

- (a) The *Fisheries Newsletter*—a document oriented towards practical information rather than technical or scientific articles or issues;
- (b) Special Interest Groups—most countries are now aware of the establishment of SIGs with two already established (beche-de-mer and pearl oyster) and a third on ciguatera well underway. The Fisheries Information Officer stressed the need for contributions from members to enable the SIGs to function properly; and
- (c) PIMRIS—SPC's role in PIMRIS was detailed in WPs 9 and 27.

14. The Representative of New Caledonia mentioned the backlog of the *Fisheries Newsletter* and stressed the urgent need to clear this, as the French issues were always published after the English.

#### **(iii) Fish Handling and Processing Project**

15. The Fish Handling and Processing Officer thanked the United Kingdom for its continued support and funding for the Project which was presently half-way through the three-year period ending in January 1992. He also thanked ICOD.

16. The Fish Handling and Processing Officer described the main activities of the year and highlighted the key activities over the last 12 months. A thorough evaluation of the proposed Regional Post-harvest Fisheries Facility for the Pacific would be discussed in detail under Agenda Item 8, WP.5, and developments in projects to support women from coastal communities had led to a proposal for a Women-in-Fisheries Programme, to be discussed in detail under Agenda Item 6 (ii), WP.17.

17. The Fish Handling and Processing Officer ran or organised workshops for Papuan region women in fish processing and marketing in Papua New Guinea, a beche-de-mer processing workshop in Vanuatu, and a fish chilling workshop in the Cook Islands.

18. Projects to be completed and requests pending included a Tokelau fish processing and marketing project, scheduled for September; a study tour to fish technology institutes in Latin America; a workshop to increase the skills of fish retailers for the new fish market in Noumea, New Caledonia (Southern Province); and for Papua New Guinea, a workshop to improve inspection skills for export products.

19. The first in the Fish Handling and Processing video series *An icy tale* and *A chilling story* had been disseminated and were enjoying excellent response. Countries were invited to send scripts in their local languages to SPC for tapes to be produced for use in-country.

20. The Representatives of Tokelau, Papua New Guinea, Tuvalu and Vanuatu thanked the FHPO for the work undertaken by the FHPP in their countries. Further, the Representative of Vanuatu stressed the material benefits to Vanuatu's beche-de-mer industry that had resulted from the visit of the FHPO.

#### (iv) Deep Sea Fisheries Development Project

21. The Fisheries Development Officer presented the work of the DSFDP and drew attention to some staff changes over the last year with the departure of the last FDO and long serving SPC Masterfisherman Paul Mead. Two of the Masterfishermen were presently in the field—Mr T. Rata and consultant Mr P. Watt.

22. Project activities scheduled in the near future included small-scale longlining in Western Samoa, deep slope fishing at outer islands in Kiribati, and FAD rigging and deployment in Palau, the Cook Islands and Nauru.

23. Gear development sub-projects in Kiribati and Tonga had now been completed. Work on technical reports on gear development activities, including small-boat tuna longlining and an improved vertical longlining system, had now begun; a detailed construction handbook for the gear components developed in Tonga to handle multiple vertical longlines was near completion.

24. In response to a request from the Representative of the Northern Mariana Islands, a comprehensive survey of deep-bottom fish resources was undertaken through a trial fishing programme employing a variety of gears and techniques, with the aim of attempting to assess the potential for increasing production to meet growing market demand.

25. The meeting was informed that Masterfisherman T. Rata was presently stationed at the Papua New Guinea National Fisheries College at Kavieng, where he was completing the final phase of a provincial deep-bottom fishing training programme. He previously worked in East New Britain and Madang Provinces.

26. Consultant P. Mead spent a month in Nauru, during which he completed an echo-sounding survey of potential FAD sites and successfully identified and charted three suitable areas.

27. The long-standing backlog of DSFDP country reports was steadily being cleared. An improved drafting and publication process will prevent such a backlog recurring.

28. Masterfisherman Paxton Wellington gave a presentation on the gear development sub-project in Kiribati and described the trials with a small-scale longline.

29. Mr Wellington was writing the report on these activities. He believed that small-scale longlining has limited application given catch rates and vessel size. To make it viable there needs to be access to high value export markets. A 10 m boat fishing 300–500 hooks would appear to be the minimum required.

30. The Representative of Kiribati thanked the DSFDP for the work undertaken there.

## **AGENDA ITEM 5.2—OCEANIC FISHERIES**

### **(i) Tuna and Billfish Assessment Programme overview**

31. The Chief Fisheries Scientist presented an overview of the activities of the Tuna and Billfish Assessment Programme, pointing out that tunas comprise 95 per cent of Pacific Islands fish landings and that the waters of several Pacific Island nations represent some of the richest tuna fishing grounds in the world.

### **(ii) Review of Western Pacific tuna fisheries**

32. The Chief Fisheries Scientist then reviewed catch trends in the Western Pacific tuna fisheries and commented on the estimated total tuna catches for 1989 and catch by gear type for the three main commercial gears used in the fishery, i.e. longline, pole-and-line and purse seine. He then went on to review the latest information available on the status of skipjack, yellowfin and bigeye tuna stocks and discussed estimated sustainable catch levels.

### **(iii) Regional Tuna Tagging Project**

33. The Chief Fisheries Scientist reported on the establishment of the Regional Tuna Tagging Project, its aims and operations, and also gave details of the associated In-Country Tagging Project which commenced in June 1989 in Solomon Islands. He presented figures for both tagged fish and recoveries — 41,000 tuna (57% skipjack, 40% yellowfin) had been tagged by the regional and in-country projects. Other items reviewed were co-operative tuna biology studies conducted with the Institut français de recherche scientifique pour le développement en coopération (ORSTOM) and the Far Seas Fisheries Research Laboratory (Japan), and the continued monitoring of billfish catches in the Pacific. Dr Lewis concluded his presentation with a slide display of the research operation on board the RTTP chartered vessel.

34. One of the TBAP Fisheries Scientist then explained the operations of the related Group Seine/Tagging programme whereby he was able to tag tunas onboard a Japanese group seine vessel operating in the waters of the Federated States of Micronesia. He presented a detailed explanation of the group seine fishing operation.

35. The Representative of the Federated States of Micronesia offered his thanks and expressed appreciation for a difficult job well done; this was reiterated by the Representative of Solomon Islands, who also expressed his thanks to AIDAB for providing funding support for the In-Country Tagging Project.

36. The Chairman thanked the TBAP for its work on behalf of member countries and expressed his confidence in the future good management of this project.

37. On behalf of FFA, Mr Andrew Wright expressed his appreciation of the close working relationship between SPC and FFA concerning tuna-related matters over the past 12 months. He particularly valued the joint efforts in regard to the Regional Tuna Database, co-operative work on South Pacific albacore and the observer programme and data analysis associated with the multilateral Treaty on Fisheries with the United States.



38. The Chairman then expressed his hope that this collaboration and co-operation would continue to the mutual benefit of the two organisations and, subsequently, member countries.

39. The Representative of Kiribati then thanked the TBAP staff for their work, but expressed concern that the confidential in-country reports in regard to purse seine activity be made available in a timely fashion.

#### **(iv) Albacore Research Project**

40. The Principal Fisheries Scientist explained the work of the Albacore Research Project. He detailed the development of this fishery over the past few years and the movement of various national fishing fleets in and out of this fishery. He explained that the increased interest in the albacore fishery among SPC member countries came about largely because of the activities of Asian driftnet vessels.

41. The Principal Fisheries Scientist explained the involvement of SPC and SPAR in gathering data on albacore with a view to undertaking a detailed stock assessment in support of a management regime, and explained the various initiatives undertaken, the establishment of two scientific posts in SPC, specifically related to albacore, port sampling, and observer programmes. He also pre-viewed the albacore tagging research cruises which were expected to operate over three to four months in the next fishing season, and explained the role of each albacore data source in developing mathematical models for this stock in the Pacific.

#### **(v) Fisheries Statistics Project**

42. The Fisheries Statistician reported on the principal activities in the project, namely, maintaining the Regional Tuna Fisheries Databases, publication of the SPC *Regional Tuna Bulletin*, assisting member governments with fishery statistics systems, and statistical support for other SPC fisheries projects.

43. The main work of the project continued to be the maintenance of the Regional Tuna Fisheries Database (RTFB). Under this activity several countries are assisted with the processing of daily catch and effort log sheets collected under access agreements with DWFNs, or from domestic vessels. After processing, trip summaries and data diskettes are returned to the countries. The data, combined with those from member countries, are used for the monitoring and research activities of the TBAP.

44. In 1988, SPC began compiling data on trans-shipment and unloading activities. Provision of trans-shipment data over the past year was problematic. However, it was envisaged that such data from a number of countries would be provided to SPC on a regular basis in the future.

45. The project had recently undertaken the maintenance of two new regional tuna fisheries databases i.e. the Standing Committee Database (SCD) and the South Pacific Albacore Research (SPAR) Database. The Fisheries Statistician outlined the different roles and operations of the SCD and the SPC RTFB and explained that difficulties remained in obtaining DWFN data. Only Taiwan had supplied longline data to date. Data from Indonesia, Philippines, USA, Korea and Japan remained outstanding.

46. Other activities included compilation of preliminary estimates of the total tuna catch during 1989 by the major fleets operating in the Western Pacific and the compilation and distribution of albacore data, as well as assistance with in-country databases.

47. Distribution of the SPC *Regional Tuna Bulletin* had been delayed due to increased workload of the SPC printery but the resolution of this problem was being investigated.

48. Statistical support for other SPC fisheries programmes had also been an important activity over the last year.

49. The Representative of New Zealand pointed out that the problems in supplying data to the SPC were recent and these should soon be remedied.

50. The Representative of Australia expressed support for the work of the Statistics Project and the Standing Committee's recommendations.

51. The Representative of Kiribati enquired why two DWFNs were not participating in the RTMF and whether they would be present at the SCTB.

52. In response the Fisheries Statistician outlined the discussions in this regard at the last SCTB and the steps taken to ascertain the attitudes of DWFNs.

53. The Representative of Papua New Guinea acknowledged the importance of the data from foreign fishing vessels, but expressed his country's concern at the practical difficulties in obtaining them.

54. The Chairman stated that the South Pacific Forum had agreed that DWFNs should provide information on both high seas and territorial zone catches.

55. The Representative of Kiribati enquired about the relationship between SPC and the Japanese NRIFSF.

56. The Fisheries Statistician explained that the data was supplied to SPC by NRIFSF on the understanding that this was for scientific use only and therefore could not be made available to SCTB members.

57. The Representative of Kiribati expressed the view that it was not fair that Japan had membership of SCTB but did not provide data as requested.

58. In response the Fisheries Statistician explained that the Japanese SCTB members are scientists and not able to endorse the release of data.

59. The Chairman then called for recommendations on database needs, noting that the meeting had expressed continued concern over this matter.

60. The Representative of Australia recognised that problems remained in obtaining data for the SCTB database and suggested that the meeting recommend that the DWFNs be approached to rectify this problem.

61. The Chairman subsequently requested that an action item be formulated in this regard.

#### **(vi) Consideration of Report of Third Standing Committee on Tuna and Billfish (SCTB3)**

62. A summary of this meeting was given in WP.4. The Chairman went through the various topics discussed by the meeting and drew attention to the 24 action items arising from the 1989 SCTB2. The Chairman then drew the meeting's attention to the two recommendations from the SCTB3 and invited discussion on these. These were:

**SCTB Recommendation 1** — The SCTB, noting that the present TBAP technically expires in September 1991, strongly recommended its continuation on a longer term basis. It further recommended that a strategic plan for the next five-year period (1992–96) be prepared to guide the future direction of this programme and proposed that SCTB be authorised to develop a draft document for consideration by the 1991 RTMF. It was emphasised that the draft plan should reflect the current programme directions and initiatives, and use as a starting point the existing TBAP mission statement. The draft plan would be produced by a small drafting group composed of the SCTB Chairman, SPC's Chief Fisheries Scientist and the delegates from New Zealand and Papua New Guinea.

**SCTB Recommendation 2** — The SCTB, in recognising the increasing need for a comprehensive assessment of yellowfin stocks in the Western Pacific region, proposed a scientific workshop on yellowfin, tentatively scheduled for 1992, and recommended that a special working group, operating on a similar basis to SPAR and fostering collaborative research action among group members, be established to develop a work plan and arrangements for a workshop.

63. The Chairman invited discussion on these two recommendations.
64. The Representative of New Zealand sought clarification concerning the nature of action items and recommendations arising from SCTB.
65. The Fisheries Co-ordinator stated that action items are for the guidance of Standing Committee participants, whereas recommendations arising from the Standing Committee require the approval of the RTMF.
66. The Representative of Australia stated that if Recommendation 1 was endorsed by the present meeting action would be required before the 1991 RTMF.
67. The Representative of New Zealand added that the advantage of a five-year plan as stated in the recommendation is the sense of continuity it ensures and the guidance it provides for funding agencies in monitoring the long-term direction of the TBAP.
68. The Representative of France suggested that Recommendation 1 be approved and adopted. The Representative of Australia supported this sentiment.
69. The Representative of Australia also expressed support for Recommendation 2 and expressed the view that the choice of SPAR as a model was appropriate. This was supported by the Representative of France.
70. The Representative of Kiribati expressed concern that there might be problems in obtaining access to DWFN data if the SPAR model were adopted.
71. The Representative of New Zealand expressed the view that SPAR had in fact facilitated the exchange of information and therefore would serve as a useful model. Further, both Japan and the United States were concerned about the status of stocks of yellowfin in the Western Pacific and therefore were likely to prove co-operative.
72. The meeting then approved the two recommendations from SCTB3 and adopted the following recommendations:

### **Recommendation No. 1**

The meeting, noting that the present Tuna and Billfish Assessment Programme technically expires in September 1991, endorsed the Standing Committee on Tuna and Billfish's strong recommendation that the Tuna and Billfish Assessment Programme be continued on a longer term basis, adopted the Standing Committee on Tuna and Billfish proposal that a strategic plan for the next five-year period (1992–96) be prepared to guide the future direction of this programme and authorised the Standing Committee on Tuna and Billfish to develop a draft document for consideration by the 1991 Regional Technical Meeting on Fisheries. It was agreed that the draft plan should reflect the current programme directions and initiatives, and use as a starting point the existing Tuna and Billfish Assessment Programme mission statement.

### **Recommendation No. 2**

Recognising the increasing need for a comprehensive assessment of yellowfin stocks in the Western Pacific region, the meeting adopted the recommendation by the Standing Committee on Tuna and Billfish that a scientific workshop on yellowfin be convened, tentatively scheduled for 1992, and endorsed the establishment of a special working group, operating on a similar basis to the South Pacific Albacore Research Group and fostering collaborative research action among group members, to develop a work plan and arrangements for a workshop.

73. The Representative of Western Samoa asked for clarification on the difference between the TBAP and the South Pacific Regional Tuna Research Project (SPRTRP) referred to in WP.31.

74. In response, the Fisheries Co-ordinator explained that the SPRTRP was one of two projects submitted by the Fisheries Programme for funding consideration to the European Community under Lome IV, that discussion on this was scheduled later in the agenda and that the proposal could be withdrawn if the meeting so directed.

75. The Representative of Western Samoa expressed his concern over the submission of this project without prior RTMF approval.

### **(vii) Report on Second Consultation on Arrangements for South Pacific Albacore Management**

76. Dr Tim Adams, Representative of Fiji, presented a report on the Second Consultation on Arrangements for South Pacific Albacore Fisheries Management, held at the Forum Fisheries Agency headquarters in Solomon Islands in March 1990. It was attended by Forum and South Pacific Commission member countries and territories, together with representatives of several distant water albacore fishing nations.

77. Progress towards agreement at the Honiara meeting appeared to be good. It was more or less agreed early on that the regime should consist of both an overall management body and a subsidiary scientific advisory group, together with secretariat support.

78. The scientific representatives sat separately and came up with a fairly comprehensive recommendation on the structure and functions of a scientific advisory group. This was discussed in plenary session and the common ground reached was set out in the final meeting record. The existing SPAR formed a good basis for extrapolation, and was recommended as the interim scientific advisory body until the full Scientific Advisory Group on Albacore (SAGA) could be set up.

79. Progress towards agreement on the structure and functions of the overall management body, and on the secretariat, was not so quick. There was a full exchange of views on the subject, but a number of differences remained to be resolved. These would be discussed at the Third Consultation which is due to be held at SPC headquarters in mid-October 1990.

80. Matters for further discussion included: 1) the actual purposes or guiding principles of the regime, 2) the relationship between the regime and driftnetting, 3) preserving the legitimate interests of coastal states and DWFNs, 4) the legal nature of measures adopted by the management body, 5) the method of decision-making, 6) the formation of the secretariat, 7) the membership of the regime and 8) the legal form of the regime.

81. Apart from the progress on the Scientific Advisory Group, few substantive issues were agreed by all parties. However, it was decided that the regime would encompass the entire geographical range of the South Pacific albacore stock. Until this range was absolutely determined this would include, at the very least, the entire area of existing South Pacific albacore fisheries.

82. All parties also agreed that the management body would adopt management measures, taking into account advice from the scientific group, which might include catch limits, closed seasons, catch allocations, closed areas, fishing effort, gear restrictions and size limits. Other means to effect management would include information and reporting requirements, and might include surveillance and enforcement.

83. Although the allocation of secretariat duties was not agreed, the functions of the secretariat did not appear to be controversial. All agreed that the secretariat should be impartial, and include a mandate to act in the interests of all parties. The need for an effective dispute settlement mechanism was also expressed.

84. The Representative of FFA took the opportunity to inform the meeting that the Agency was presently co-ordinating efforts to persuade DWFNs to associate themselves with the protocols of the Wellington Convention, and that at the recent meeting of the South Pacific Forum the importance of encouraging Taiwan to become involved in discussion relating to a management regime for South Pacific albacore fisheries was recognised.

## **AGENDA ITEM 5.3—TRAINING**

### **(i) Regional fisheries training project**

#### *Workshop on Organisational Management for Senior Fisheries Personnel*

85. The SPC Fisheries Education and Training Adviser referred representatives to WP.1 and went on to discuss in more detail the Workshop for Senior Fisheries Personnel, and extension training activities, including the Extension Development Workshop; he outlined plans for future activities in these areas.

86. The Fisheries Education and Training Adviser further explained that during the first three days of the meeting the Director of Staff Training of QDPI would conduct personal interviews with all delegates to ensure that the contents of the Workshop for Senior Fisheries Personnel exactly reflected participants' needs.

87. The Director of Staff Training of QDPI later reported on the outcome of these interviews and presented the proposed Workshop content and procedures.

88. The Representatives of Papua New Guinea, the Federated States of Micronesia and Tuvalu thanked SPC, QDPI and ICOD for their roles in providing regional fisheries training and noted that their countries looked forward to the continuation of such courses.

#### *Post-harvest Training*

89. The Fisheries Education and Training Adviser outlined the Post-harvest Training Project and referred representatives to WP.20. He gave an update on progress, to the effect that preparation for this training was well advanced, but funding had not yet been identified.

90. Discussion on the Post-harvest Training Project followed. The Representative of Solomon Islands expressed support, but emphasised that this training should be of practical use in rural situations and pointed out that in Solomon Islands the main concern was with eliminating spoilage and wastage in subsistence fisheries rather than processing fish for market. The Representative of Kiribati mentioned that his country would like to see training in fish processing included.

91. The Fisheries Education and Training Adviser explained that with 18 countries likely to attend, needs would vary considerably and the course would therefore be divided into modules to meet all the participants' needs. He assured the Representative of Solomon Islands that participants would return to their home countries with the particular skills required as well as some materials, and that follow-up visits by tutors would ensure that the training provided would suit the real needs in the countries.

### *Extension Skills Training*

92. The meeting did not discuss this topic, which is summarised in Paragraph 91.

### **(ii) Review and possible further development of the SPC Pacific Island Fisheries Officers Course**

93. The Fisheries Education and Training Adviser then referred the meeting to WP.18 and outlined proposed changes to the Nelson Course syllabus in the areas of refrigeration and fish handling, the diesel section and the computer section.

94. The Representative of Vanuatu, commenting on the issue of revising the Nelson course syllabus, considered that the computer section of the course might be irrelevant to ni-Vanuatu participants. However, he pointed out that such training needs could be met in-country should the need arise.

95. The Fisheries Education and Training Adviser then outlined the background and rationale for the possibility of upgrading the Nelson Course to a Certificate Course in Fisheries Technology in conjunction with USP, in light of the fact that the USP Diploma in Tropical Fisheries Course was presently under review and there was a recommendation that it be upgraded and diversified.

96. Professor Robin South of USP expressed his satisfaction with the Fisheries Education and Training Adviser's outline of the University's review of the Diploma in Tropical Fisheries Course and confirmed that consideration was being given to establishing a Certificate Course.

97. The Representative of the Australian Maritime College informed the meeting that the College would be willing to assist in implementing a Certificate course if USP had difficulty in providing such a facility in the short-term.

98. In response to these discussions the Fisheries Education and Training Adviser acknowledged country concerns but assured representatives that the proposed Pacific Island Fisheries Manpower Study, to be discussed under Agenda Item 5.3(iii), would identify regional training needs over the next three to five years and that any course upgrading could be tailored to meet such needs.

99. At this point the Representative of Solomon Islands expressed the difficulties of making decisions about alteration of the course syllabus when the working papers relevant to the training issues were not provided to representatives well before the meeting. He urged that this situation be rectified in the future.

**(iii) Proposal for Pacific Island Fisheries Manpower Development Study**

100. In order to facilitate deliberation on the course upgrading, the Fisheries Education and Training Adviser then referred representatives to WP.19 and outlined plans for the study, noting that although these might appear ambitious given the 12 weeks available, he was confident that sufficient understanding would come out of the study to direct training efforts.

101. The discussion that followed, particularly that from the Representatives of Solomon Islands, Papua New Guinea and Western Samoa, centred on the suggestion that it would be appropriate to defer any decision on the upgrading of the Nelson Course until the results of the proposed manpower study were available.

102. At this point the Representative of Western Samoa enquired as to the urgency of the upgrading.

103. In response the Fisheries Co-ordinator explained that because of the review of USP's Diploma in Tropical Fisheries Course and the possibility that this course might not be continued, several countries had expressed the concern that a training gap would arise; it was therefore considered appropriate to seek guidance in this regard at this meeting.

104. The meeting agreed that a final decision on the upgrading of the Nelson Course be held over pending the results of the manpower study and directed representatives' attention to consideration of WP.19.

105. The meeting was in agreement that the manpower study would play a vital role but several representatives including the Representative of Papua New Guinea, raised issues related to the study's terms of reference. The Representative of Western Samoa suggested that the terms of reference for the manpower study should include formulating a regional funding proposal to help identify training needs.

106. The Fisheries Education and Training Adviser pointed out that the task assigned to the manpower study team might already be somewhat ambitious and expressed doubt that the team could effectively address the Representative of Western Samoa's concern in the time available.

107. The Fisheries Co-ordinator supported this view and suggested that, as addressing implementation of the study recommendations would be a complex task, funding might be examined by the project report review group once the study was complete, and perhaps could be developed as a second phase of the project. He saw difficulty, however, in organising a funding proposal on a regional basis.

108. The Chairman summed up discussion on WPs 18 and 19 and suggested that the meeting, while expressing strong support for the value of the Nelson Course and the need for upgraded training in certain areas, would prefer to await the identification of needs likely to arise from the manpower study before reaching a final decision.

**Recommendation No. 3**

The meeting, after considering the need for a Pacific Island Fisheries Manpower Development Study, *recommended* it proceed as proposed by the Secretariat, and nominated three representatives, one from each region (Micronesia, Polynesia, Melanesia), to participate in the special review group called for in the project document.

## AGENDA ITEM 6—FISHERIES PROGRAMME —ESTABLISHMENT

### (i) Attachment of Overseas Fisheries Cooperation Foundation (OFCF) Fisheries Specialist to SPC

109. Before dealing with the above, the Fisheries Co-ordinator responded to the comments by the Representative of Solomon Islands regarding lateness of documents sent to countries.

110. The Fisheries Co-ordinator then addressed WP.21. He outlined the function of the OFCF specialist and the benefits of such an attachment based on the experience of FFA. Negotiations between SPC and OFCF had so far been informal. A two-year attachment was proposed, commencing in 1991. He listed the required qualifications of the candidate and stated that he would supply general technical support to the coastal fisheries programme. He then asked for the support of the meeting so that this proposal could then go to the South Pacific Conference for approval.

111. The Chairman then invited discussion and also invited the OFCF Representative to comment if he wished.

112. The Representatives of Palau and French Polynesia expressed their support for the attachment.

#### Recommendation No. 4

**The meeting endorsed the proposal for a Japanese Fisheries Specialist to be attached to the Coastal Fisheries Programme and *recommended* that the Committee of Representatives of Governments and Administrations endorse the Secretariat's plans to proceed in finalising the necessary arrangements with the Overseas Fisheries Cooperation Foundation.**

### (ii) Proposal for the establishment of a Women-in-Fisheries Programme

113. The Fish Handling and Processing Officer addressed WP.17. He cited the growing interest in the role of women in fisheries in the region. The SPC has two programmes mandated to women's development in the region: the Pacific Women's Resource Bureau and the Fish Handling and Processing Project. The manpower commitments required effectively to enhance the role of women in fisheries required that a separate position of Women's Fisheries Officer be created. This officer would work under the Fish Handling and Processing Officer in conjunction with the Women's Programme and the project would be monitored by an SPC internal committee including representatives of both programmes and SPC Management.

#### Recommendation No. 5

**Following discussion which emphasised the growing interest region-wide in activities which support the needs of women from coastal fishing communities, the meeting *recommended* that a Women-in-Fisheries Programme be implemented as proposed and that a position of Women's Fisheries Programme Officer be created.**

### (iii) Restructuring of Coastal Fisheries Programme

114. The Fisheries Co-ordinator addressed WP.23. He cited the reasons for the creation of the position of Fisheries Co-ordinator following the TBAP review in 1987. This resulted in the loss of the Fisheries Adviser position within the Coastal Fisheries Programme whilst the Coastal Fisheries Programme continued to grow to the present level of 16 staff. The Coastal Fisheries programme had suffered from this loss of executive technical direction. Initially funds would be sought from extra-budgetary sources but it was recommended that the position of Coastal Fisheries Manager eventually be a Core Budget item.



115. In general the meeting expressed support for the establishment of a position of Coastal Fisheries Manager, although several representatives expressed concern that SPC members should not have to bear the burden of funding an additional core position.

#### **Recommendation No. 6**

**The meeting recognised the pressing need to establish the position of Coastal Fisheries Programme Manager and *recommended* that the Committee of Representatives of Governments and Administrations endorse the creation of the post. While accepting that extra-budgetary funds may be required to support this post in the short-term, the meeting further *recommended* that means be investigated to allow its incorporation into the Core Budget at the earliest opportunity without imposing additional financial burden on member countries.**

#### **AGENDA ITEM 7—SPC FISHERIES PROJECTS FOR LOME IV FUNDING CONSIDERATION**

116. The Fisheries Co-ordinator referred delegates to WP.31 and outlined the background to the two SPC fisheries projects presented for Lome IV funding consideration. He briefly explained the Lome IV funding procedure and gave details of the two projects: 1) the Regional Small-scale Purse Seine Test Fishing Project which was strongly supported by RTMF delegates at RTMF 21 and fully endorsed by the 1989 South Pacific Conference, and 2) the South Pacific Regional Tuna Research Project (SPRTRP); the background to this project was described by the Chief Fisheries Scientist, who emphasised the likely greater need for field research activities in response to the continued regional growth in tuna fisheries. He pointed out that as the SPC proposal had been solicited, it could be expected that an eventual detailed project document, of which this paper was the precursor, would be sympathetically received.

117. The Representative of Kiribati led the discussion which followed, concerning clarification of the role that the SPRTRP would play in relation to the TBAP, the benefits that might be expected to accrue to countries if the proposal were funded, and the need of reassurance that present problems in the tuna fishery would continue to be addressed now rather than delayed pending the implementation of the proposed new project.

118. In response, the Chief Fisheries Scientist explained that the funding sought would support the growing need for field work, and that the long lead-time involved in Lome IV funding required that future needs be addressed immediately. The Fisheries Co-ordinator emphasised that the present document was presented only to gauge country reaction and that, if this was positive, a fully-detailed project document would be prepared. He also pointed out that more than 80 per cent of present TBAP funds were taken up by salaries and that two posts remained unfilled, so that specific field work activities would require specific extra-budgetary funding.

119. The Representative of New Zealand expressed the view that the general nature of the present document was appropriate in light of the points made by the Fisheries Co-ordinator and the Chief Fisheries Scientist.

120. The Representative of France, addressing the issue of the Purse Seine Project, informed the meeting that due to the long-standing association of his country with this proposal, it was fully supported, as was the proposition to seek funding under Lome IV.

121. After further consideration, the meeting passed the following recommendation:

### Recommendation No. 7

The meeting noted the action taken by the Secretariat with respect to the submission of fisheries projects for Lome IV funding, endorsed the proposed South Pacific Regional Tuna Research Project as outlined; and *recommended* that both projects be strongly supported for EC funding support under Lome IV.

### AGENDA ITEM 8—THE ESTABLISHMENT OF A REGIONAL POST-HARVEST FISHERIES FACILITY FOR THE PACIFIC

122. The Fish Handling and Processing Officer referred to WP.5 and outlined the background leading to the present proposal, which followed the direction of RTMF 21 to assess regional post-harvest needs and prepare a detailed proposal for the establishment of a Regional Post-harvest Fisheries Facility for the Pacific (RPHFF) taking these needs into account.

123. Mr James Crossland then addressed WP.5 and described the report of the consultation and country visits in detail.

124. The Chairman then invited discussion on Mr Crossland's report and the establishment of the RPHFF.

125. The Representative of the United Kingdom stated, with respect to funding, that whilst it was able to fund the consultancy, funds for the establishment of the RPHFF would not be automatically available.

126. The Representative of FFA noted that WP.5 reflected the fisheries post-harvest needs of the countries consulted. Based on FFA's experience in the fish processing and marketing sector he offered some comments for the consideration of the meeting. FFA considered that the private sector should be the major target for the services of the facility and drew attention to the possible shortcomings in the funding and manpower requirements of the proposed facility. He also queried the degree of affiliation between the proposed facility and USP and suggested greater SPC involvement, at least during the establishment phase.

127. Professor South of USP indicated that if the RHPFF was to be affiliated with USP, the University should be consulted in the early stages of planning. He indicated that he hoped to have a five-year plan for IMR ready by the following year and would incorporate the RHPFF in this plan.

128. The Chairman asked the meeting to address the initial proposal – whether there was a need for the establishment of a RPHFF in the Pacific and if so, what form the facility should take. He suggested that the meeting consider a phased implementation of the project by SPC and USP, with SPC's input decreasing as the project advanced. The Chairman also emphasised that the direction of the RPHFF should be monitored by the RTMF or a similar regional fisheries meeting.

129. The Representative of Kiribati stated that Kiribati envisaged a strong association of the RPHFF with USP.

130. The Chairman proposed that in view of the importance of this project and the need for direction from the meeting, a small working sub-committee be established which would report back to the meeting before the adoption of the final meeting report.

131. The meeting then discussed the report of the Sub-committee on the Establishment of a Regional Post-harvest Fisheries Facility for the Pacific convened during this session.

132. The Committee presented for discussion a draft recommendation that endorsed the establishment of the facility and recommended that it be located in Fiji, developed by SPC and USP and associated with the University's marine studies programme.

133. The Representative of Solomon Islands pointed out that in the light of the University Council's decision to relocate the IMR research component to Solomon Islands, this might cause some difficulties in immediate implementation of the facility.

134. Professor South of USP explained that under the planning for marine studies programmes, IMR would return to its original mandate as a research institution and that the post-harvest facility would fall within the teaching responsibility of the University and would therefore not be directly involved in the IMR move to Solomon Islands.

135. Concern was expressed over the limited number of Pacific Island representatives on the Committee and the suggestion was put forward that the issue be discussed by the meeting.

136. The Representative of Papua New Guinea agreed with the need for post-harvest training within the region but enquired whether such training could be obtained in presently established facilities outside the region.

137. The Representative of Vanuatu, sharing the concern of the Representative of Papua New Guinea, asked whether the consultant had made contact with existing institutions in the region when developing this proposal. He further requested the Representatives of Australia and New Zealand to inform the meeting of appropriate institutions existing in their respective countries that could cater for the member countries' training needs in the field of fisheries post-harvest technology, as a short-term alternative to the proposal.

138. The Fish Handling and Processing Officer responded that he was aware of the availability of post-harvest training outside the region, but felt that the types of training offered were not designed to meet the needs of Pacific Island countries. However, these resources could be called upon to assist a regional facility.

139. The Representatives of Palau and Tokelau reiterated their strong support for the establishment of such a facility in the region.

140. The meeting further discussed the proposal and eventually agreed on the following recommendation:

#### **Recommendation No. 8**

The meeting expressed its appreciation of the South Pacific Commission's thorough examination of the concept of establishing a Regional Post-harvest Fisheries Facility and unanimously *recommended* its establishment at a suitable location in Fiji. It further *recommended* that the South Pacific Commission, in developing this proposal for implementation, explore as the preferred option the possibility of joint development of this facility by the South Pacific Commission and the University of the South Pacific as a collaborative project associated with the University's marine studies programme. The meeting endorsed the formation of a small planning group consisting of representatives of the South Pacific Commission, the University of the South Pacific and Pacific Island nations to develop the facility in consultation with the private sector and other institutions with expertise in post-harvest fisheries technology and to promote and explore funding possibilities with donor organisations.

#### **AGENDA ITEM 9—CO-ORDINATION OF SPC WORK ON CIGUATERA**

141. The Inshore Fisheries Scientist referred delegates to WP.29 and presented a brief overview of its content with particular regard to SPC action in response to country requests for assistance with ciguatera-related problems. He explained the formation of an inter-disciplinary SPC committee, comprising the Fisheries, Health and Environmental Programmes.

142. The Representatives of the Federated States of Micronesia, Fiji, New Zealand and Guam expressed their satisfaction with the work being undertaken and made the following points: that the need for an inter-disciplinary approach to solving ciguatera-related problems be recognised, and that a regional approach to the problem is likely to prove useful.

143. Several representatives had questions for the Inshore Fisheries Scientist; the Representative of New Caledonia wished to know if the reporting form reproduced in the working paper was intended for the use of health professionals alone; the Representative of Kiribati enquired whether provision could be made on the form for reporting associated reef disturbance; the Representative of Australia asked about the distribution of the report forms, suggesting that this might be achieved through the Ciguatera Special Interest Group, and enquired who would analyse the accumulated database; the Representative of New Zealand wished to know the expected time frame for implementation of the suggested work; and the Representative of Guam enquired if SPC intended to collect compatible historical data which may already be on record.

144. In response the Inshore Fisheries Scientist explained that the reporting form was designed to be simple, as trained medical personnel are not available in some areas where ciguatera problems occur; that provision could be made on the form for reporting instances of associated reef disturbances; that analysis of the database might require the input of an ecologist; that it was expected that wide distribution of the report form would be achieved before the end of the year; and that the Special Interest Group would encourage implementation of more extensive work within the next twelve months. SPC was aware that three historical databases existed, noting that the French Polynesian database compiled by Dr Bagnis, containing 25,000 case histories, was the largest of these.

145. The Chairman summarised the discussion, making the points that the meeting endorsed the suggested actions on implementing this work, that consideration should be given to modifying the reporting form, that the need for an inter-disciplinary approach to ciguatera-related problems be noted; and that historical data be examined.

#### **AGENDA ITEM 10—ENHANCEMENT OF PACIFIC ISLAND INVERTEBRATE FISHERIES BY RESTOCKING**

146. The Senior Inshore Fisheries Scientist addressed WP.25 and Information Paper 5. He briefly summarised previous work on reef fisheries resource enhancement in the region, most notably the establishment of hatcheries for depleted stocks of giant clams and trochus. The IFRP and FAO/SPRADP had reviewed fish stock enhancement efforts detailed in Information Paper 5 and experiences elsewhere, particularly Japan, where large programmes of this kind had been developed. In the South Pacific region, emphasis would probably be given to enhancement of commercial mollusc and crustacean stocks. The conclusions of this review were that restocking was not an alternative to fisheries management; management was still required and decisions to embark on restocking projects might be made because management was lacking in the past. Only certain species would be amenable for restocking, the most cost-effective species being those that have fast growth rates relative to mortality.

147. The Senior Inshore Fisheries Scientist emphasised the need for effective management and planning in re-enhancement programmes, given the vulnerability of wild stocks and the inability of present restocking projects to compensate for over-harvesting.

148. The Representative of FAO/SPRADP stressed the need for more basic work on the biology and ecology of important reef organisms.

149. The Chairman then invited discussion of the presentation.

150. The Representative of Australia recognised the difficulties in obtaining a measure of the effect of reef restocking, but at the same time recognised the importance to the region of pursuing work in this direction.

151. The Senior Inshore Fisheries Scientist replied that experimental studies would need to be undertaken on one or two key species. These would all be invertebrates.

152. Further discussion focused on the need for more biological information on important stocks. The Representative of New Zealand pointed out that the gathering of such information might also be useful for the management of wild stocks.

153. The Representative of Fiji asked that the meeting note that reef re-enhancement was already going ahead in the region with giant clams and would continue regardless of the outcome of the present study.

154. The necessity for a workshop on this subject to be organised by SPC/SPRADP was then discussed by the meeting.

155. The Representative of the Commonwealth Secretariat asked about the timing of such a workshop, pointing out that as there would be a meeting of Commonwealth senior fisheries officers in April 1991, at which this same subject would be addressed, the SPC/SPRADP might consider it appropriate to schedule their workshop after that time.

156. The Representative of France, while supporting the idea of a workshop, asked whether the contents would be restricted solely to aquaculture, or also include marine ranching in controlled areas. He stated that France, as well as many other countries, had been involved in this field for several years and maintained a high level of interest.

157. The Chairman summarised the discussion and indicated that the meeting had reached a consensus that SPC/SPRADP should organise the proposed workshop.

#### **Recommendation No. 9**

**The meeting recommended that the South Pacific Commission and the South Pacific Regional Aquaculture Development Programme collaborate in the organisation of a workshop on Inshore Marine Resource Enhancement as it applies to key species in the region, in order to raise awareness of the potential and limitations of the techniques and technologies involved.**

#### **AGENDA ITEM 11—ISSUES RELATING TO TROCHUS AND PEARL SHELL RESEARCH**

158. The Senior Inshore Fisheries Scientist addressed WP.24. In the light of increasing exploitation of trochus and pearl shell in the region he commented that there were a number of issues that demanded attention. These included introductions of trochus beyond its natural range, aquaculture of trochus and pearl shell for restocking wild populations and the problems encountered by Pacific Island countries in marketing trochus and pearl shell. The Senior Inshore Fisheries Scientist noted that pearl shell had been fished down in many areas where it was once abundant. Culture of wild stocks of pearl shell lent itself to low technology industry and French Polynesia was the acknowledged leader in this field. The Senior Inshore Fisheries Scientist noted concerns expressed by other countries over the difficulties in obtaining information from French Polynesia about pearl shell culture. He invited discussion on the topic for the guidance of future work of the Inshore Fisheries Research Project.

159. The Representative of Kiribati thanked the Senior Inshore Fisheries Scientist and the IFRP for the Christmas Island pearl shell study and commented on the continuation of survey work in Kiribati.

160. The Representative of FAO/UNDP enquired about the possibility of comparative research on the various methods of assessing trochus abundance and the possibility of a regional workshop on this topic.

161. The Senior Inshore Fisheries Scientist responded on the importance of this and the issue of marketing problems and invited the Representative of FFA to enlarge on FFA's work in this area.

162. The Representative of FFA stated that fisheries information and research, management and conservation issues relating to trochus and pearl shell would be addressed in a forthcoming publication by FFA on Pacific Island marine resources. He advised the meeting that FFA had initiated discussions with government officials in Singapore and Hong Kong in an attempt to monitor shipments of marine products from the Pacific and to verify their condition on arrival. He advised the meeting that FFA's marketing adviser was currently compiling a review of all trade information for trochus and that future reviews would include pearl shell.

163. The Representative of Papua New Guinea commented on his country's problem with the lack of manpower to undertake the number of resource surveys requested for trochus. He expressed a need for help with this and other surveys of commercially valuable sedentary invertebrates.

164. The Representative of the Cook Islands explained that the traditional buyers of pearl shell in South-East Asia preferred Indonesian and Philippine trochus to that from the Pacific Islands. The reason for this was the greater yield of button blanks and the tendency of South Pacific trochus to shatter during processing.

165. The Representative of Wallis and Futuna noted marketing problems for trochus and suggested the adoption of a regional standard for trochus quality.

166. The Representative of Fiji expressed interest in the differences between South-East Asian and South Pacific trochus populations and their relevance to aquaculture.

167. The Representative of New Zealand suggested that such differences might be the result of regional variations in growth rate.

168. The Representative of the Cook Islands stated that South-East Asian trochus shell is much lighter than that from the South Pacific. He agreed with the comments from Wallis and Futuna on quality standards and felt this could also apply to pearl shell.

169. The Representative of the Federated States of Micronesia expressed interest in the possibility of introducing South-East Asian trochus to the South Pacific but noted that should this occur, a quarantine protocol should be established.

170. The Chairman noted that this should be a standard procedure where such introductions take place.

171. The Representative of Solomon Islands asked if any information was available on the costs and benefits of juvenile trochus release programmes and the success achieved in this area. He added that Solomon Islands, in the interest of diversifying its export products had done some exploratory surveys to assess the availability of brood stock to support the establishment of a viable gold-lip pearl shell industry.

172. The Representative of Palau commented on her country's experience of juvenile release of trochus and explained the logistical problems of evaluating the benefits. She further drew the attention of the meeting to similar problems elsewhere and recommended caution in altering existing trochus management plans based on projections of increased trochus stock from released trochus seed. Other problems addressed were the difficulties in obtaining exact harvest estimates and the wastage of trochus meat.

173. The Representative of French Polynesia explained that the problems other Pacific Islands have experienced in obtaining information on pearl shell culture from Polynesia were due to its being a private industry in that territory.

174. The Chairman noted the concern expressed by the meeting over commercial and resource management aspects of these resources and closed the session with the recommendation that SPC and FFA co-operate on the different issues, most notably the regional marketing aspects of trochus and pearl shell.

#### **Recommendation No. 10**

**The meeting *recommended* that the South Pacific Commission consult with the Forum Fisheries Agency with a view to developing co-operative action to address the different issues discussed under Agenda Item 11, most notably the regional marketing aspects of trochus and pearl shell.**

### **AGENDA ITEM 12—ONE-DAY WORKSHOP ON FISH AGGREGATION DEVICES**

175. The Workshop reviewed FAD programmes of Pacific Island countries and compared recent information (January 1984 to 15 May 1990) with the previous review (1979–1983). The review evaluated the success of the inverse catenary mooring system design which was introduced in 1984. It further addressed FAD raft and mooring systems design, fabrication, components and mooring system calculations. FAD programme planning and methods for FAD construction and deployment were discussed. Raft designs were technically reviewed and a new raft design was introduced. Four countries profiled their existing FAD programmes.

176. Existing information and current research on pelagic fish around FADs was presented. That information included studies of tuna movements around FADs in French Polynesia, FAD research in the Indian Ocean and FAD fishing practices from industrial, commercial fisheries.

177. A complete report on this workshop is appended as Annex 1 and the workshop agenda as Attachment I.

#### **Recommendation No 11**

**The meeting directed the Secretariat to take due account of concerns expressed by representatives of member countries during the workshop on FADs and *recommended* that the South Pacific Commission's Fisheries Programme carry out appropriate follow-up work, to include: 1) controlled evaluation of deep-water FADs; 2) the feasibility of mid-water and shallow-water FADs; 3) clearly identify and evaluate FAD-related socio-economic concerns faced by member countries.**

### **AGENDA ITEM 13—PIMRIS—A PROGRESS REPORT**

178. Professor South of USP addressed WPs 9 and 34, stating that the views of the meeting were of importance to the forthcoming mid-term review of PIMRIS.

179. The Fisheries Co-ordinator emphasised the importance of this review to the future performance of PIMRIS and suggested it would be useful to have a representative from RTMF involved in the review. The Representative of Fiji expressed his willingness to act as the RTMF representative.

180. The Chairman enquired if PIMRIS was helping countries set up their own library and information services in-country. Professor South replied this was indeed so and that a person would be recruited specifically for this task.

181. The Representative of the Federated States of Micronesia expressed his appreciation and continued support for the services of the PIMRIS programme in the dissemination of relevant current technical papers and other information of general interest which would have otherwise been difficult to access.

182. The FFA Representative advised that the previous PIMRIS Co-ordinator at USP had visited Tonga and that FFA's Information Officer had recently completed visits to fisheries offices in Cook Islands and Western Samoa and that a visit to Palau was planned. In response to a query from the Representative of Kiribati, the Representative of FFA advised that similar in-country visits were possible for all FFA member countries on request.

183. The Fisheries Co-ordinator stated that presently SPC received insufficient support for PIMRIS activities and that a submission had been made for more funding to strengthen SPC's PIMRIS commitments.

184. The Chairman summarised the discussion and noted that Fiji would represent RTMF in the PIMRIS mid-term review and that PIMRIS would provide greater assistance to countries in establishing their own national marine resource libraries.

#### **AGENDA ITEM 14—EDUCATIONAL RESOURCE MATERIALS AND TEACHING ASSISTANCE TO SCHOOLS**

185. The Fisheries Education and Training Adviser presented a brief overview of this subject and referred the meeting to WP.26. He suggested that the Fisheries Programme follow the work already established by SPREP and expand subject matter to encompass all fisheries-related issues.

186. The Representative of FFA gave a brief overview of a similar programme, the FFA Fisheries Awareness Project.

187. The former SPREP Environmental Education Officer then presented a range of audio-visual aids and described other approaches used by SPREP.

#### **Recommendation No. 12**

*The meeting recommended that the South Pacific Commission proceed with the production of educational resource materials and that it maintain contact with the Forum Fisheries Agency and the FAO/UNDP Regional Fishery Support Programme in order to avoid duplication of effort.*

#### **AGENDA ITEM 15—SPC INITIATIVES IN REMOTE SENSING AND GEOGRAPHICAL INFORMATION SYSTEMS**

188. The Senior Inshore Fisheries Scientist reviewed remote sensing techniques and their utility to marine and coastal resource assessment. He briefly outlined a forthcoming feasibility study by three experts who would be contracted to define the remote sensing needs of SPC and member countries with a view to the possible establishment of a remote sensing facility at SPC.

189. The Representative of Papua New Guinea stated that his country wished to map marine coastal resources through remote sensing if funding and technical assistance could be obtained.

190. The Representative of Australia supported the proposed study and suggested that it also investigate ways to avoid duplication of effort in the region on remote sensing studies.

191. Several other representatives, including the Representatives of France, Fiji and Solomon Islands also endorsed the SPC approach to defining regional needs in remote sensing.

192. The Chairman closed the session, noting the approval of the meeting in regard to this initiative.



## **AGENDA ITEM 16—FISHERIES CONSERVATION**

### **(i) Coastal Zone Management and its relevance to fisheries development**

193. The SPREP Project Officer made a short presentation on Coastal Zone Management (CZM), in response to a request from the Fisheries Programme, and indicated some communication problems between coastal zone management planners and fisheries officers. He then outlined the key features of CZM, which seeks to sustain economic development whilst conserving resources and controlling both pollution and the degradation of the environment.

194. The Project Officer outlined some of the ways in which SPREP is seeking to strengthen CZM in the region. These were: 1) development of coastal water quality monitoring capabilities within the member countries of the region, 2) development of environmental impact assessment capabilities to monitor coastal habitat degradation in the region, 3) development of contingency planning for marine pollution emergencies and 4) in-country establishment of priorities for CZM issues. He commented on the need to compile resource inventories within the member countries of the region and stressed the importance to fisheries management of the possible effects of habitat degradation.

195. The Representative of Papua New Guinea stated that dynamite fishing was a serious problem in his country. The SPREP Project Officer responded that little progress had been made in resolving the problem of destructive fishing in the region.

### **(ii) Regional Marine Turtle Management and Conservation Programme**

196. The SPREP Protected Areas Management Officer gave a presentation on the Regional Turtle Management and Conservation Programme (RTMCP). He stated that five out of six species of marine turtle are found in the South Pacific. Both the green turtle and hawksbill turtle are listed as endangered species. Whilst there were no quantifiable data available, it was thought that, in general, populations of turtles were declining. He noted that national conservation projects had not proven successful and that there was a need to establish a regional conservation and management programme.

197. A Regional Turtle Management and Conservation Programme was established following a 1989 meeting of SPREP and representatives of member governments. A three-year workplan for the RTMCP would be formulated at a meeting immediately following the RTMF.

198. The Chairman thanked the two SPREP representatives for informing the meeting of their programmes.

## **AGENDA ITEM 17 — REPORT ON SECOND MEETING OF WESTERN PACIFIC FISHERIES CONSULTATIVE COMMITTEE AND ESTABLISHMENT OF TRANS-PACIFIC FISHERIES CONSULTATIVE COMMITTEE**

199. The Fisheries Co-ordinator gave a brief summary of the outcome of the Western Pacific Fisheries Consultative Committee's (WPFCC) second meeting, held in July 1990 in Port Moresby. The main issues arising from this meeting were: 1) the granting of observer status to non-sovereign SPC member countries and 2) the formation of the Trans-Pacific Fisheries Consultative Committee, primarily to promote closer links between PINs and Latin American countries. The meeting reviewed the progress of the WPFCC, the action programme and other areas of co-operation.

200. The Representative of France thanked SPC for its role in obtaining observer status for non-sovereign SPC member countries in the WPFCC.

## **AGENDA ITEM 18—FAO CONSULTATION ON INTERACTIONS OF PACIFIC OCEAN TUNA FISHERIES**

201. The Representative of FAO presented a brief overview of this consultation to the meeting. This consultation was initially proposed in 1985, but funding problems prevented its implementation. The 1988 RTMF recommended that the consultation should be undertaken. In December 1989 SPC held a preparatory meeting to set in place the calendar and programme of this Expert Consultation, planned for the first quarter of 1991. The Government of Japan indicated its willingness to establish a trust fund to support one year of the consultation. Funds for a further two years might be available.

202. Following discussion the meeting wished to acknowledge the efforts of FAO in responding to the recommendation of RTMF 21, and the Government of Japan in providing funding for the Expert Consultation on Pacific Ocean Tuna Fisheries Interactions. The meeting also wished to express its serious concern that the proposed timing of the consultation for the first quarter of 1991 left little time for conducting interaction studies prior to the consultation.

203. The meeting further wished to urge FAO to delay the consultation to allow adequate time to conduct planned research on interactions which was unanimously regarded as critical in the South Pacific region. The meeting expressed the hope that as much funding as possible be directed to specific research on tuna fisheries interactions in preference to multiple consultations.

204. The meeting requested the Chairman to emphasise this in a letter to FAO.

## **AGENDA ITEM 19—REPORTS BY OTHER ORGANISATIONS**

### **International Centre for Ocean Development/Canadian International Development Agency (ICOD/CIDA)**

205. Mr Phil Saunders, representing ICOD and CIDA, outlined these organisations' recent activities in support of Pacific Island fisheries development. Despite Canadian Government funding cutbacks, both organisations enjoyed steady growth in the availability of funds; each distributed an amount of C\$2 million in the past year. Recent ICOD assistance to the SPC Fisheries Programme included funding for the Extension Development Workshop, and the Fish Handling and Processing Video Project. Arrangements were also underway to provide funds for the establishment of an Albacore Scientist position at SPC and the possibility of funding a Women-in-Fisheries Project, as well as certain SPREP projects, was being considered. A request was also expected for assistance with the Pacific Island Fisheries Manpower Development Study. Mr Saunders said that he expected ICOD's support to SPC to continue and grow.

206. The Fisheries Co-ordinator thanked ICOD for its continued support in all aspects of fisheries programme activities and expressed his appreciation for the assistance provided through the co-ordinating office in Suva.

207. These sentiments were reiterated on behalf of Pacific Island countries by the Representative of Western Samoa and the Chairman on behalf of other delegates.

### **Forum Fisheries Agency (FFA)**

208. Mr Andrew Wright, FFA Research Co-ordinator, briefly outlined recent developments in the organisation, including a significant staff turnover. FFA's major activities in 1990 had included work related to developments in the Western Pacific tuna fishery, particularly consideration of limiting effort in response to expansion of the purse seine fleet; the review of the Minimum Terms and Conditions; and support to parties of the Nauruan Group in the development of a second implementing arrangement. The next meeting of the Parties, at Ministerial level, would be held in Palau in September 1990. Mr Wright outlined a legal consultation to be organised by FFA concerning reciprocal surveillance and enforcement. He also gave details of other developments, including an overview of the multilateral Treaty on Fisheries with the United States, the fact that little progress had been made in attempts to involve Japan in a similar arrangement, the appointment of a Manager of Projects funded under the EC Lome programme, and developments with respect to South Pacific albacore fisheries management.

209. Other regional activities included a workshop on length-based methods in fisheries stock assessment and a systems development workshop concentrating on fisheries databases. Mr Wright thanked donors and countries which support FFA activities.

210. In response to an enquiry from the Representative of Vanuatu, Mr Wright explained that FFA had a long history of problems in obtaining EC project support and that the post of EC Projects Manager was decided on at FFA management level after discussion at a number of FFCs concerning FFA's ability to access Lome funding. In response to an enquiry from the Representative of Kiribati as to the participation in the surveillance and enforcement consultation he explained that it would consist of a five-person expert advisory group to meet in Honiara.

211. The Fisheries Co-ordinator expressed his satisfaction with the good working relationship between FFA and SPC and thanked Mr Wright for FFA's co-operation.

### **FAO/UNDP Regional Fishery Support Programme**

212. Mr Robert Gillett, RFSP Manager, gave an overview of recent developments, in particular the reduction in core funding from US\$800,000 per year to a present level of US\$350,000. However, some extra-budgetary funds had been identified for boat building and naval architecture projects and for fisheries development planning.

213. Recent regional activities included an update of the *Addresses useful to Pacific Island fisheries personnel* directory, the preparation of a similar directory listing gear suppliers, a simple guide to shark fin processing and marketing, a catalogue of fishing vessel plans and domestic fish species posters for four countries. Mr Gillett also mentioned that the RFSP staff was now reduced to one professional officer and that a mid-level Pacific Island national appointment was possible. The RFSP now had 20 more months to run and Mr Gillett suggested that strong country support at the upcoming UNDP Mini Mac meeting would assist its continuation.

### **United States Agency for International Development (USAID)**

214. Mr Elisala Pita, USAID Fisheries Adviser, referred the meeting to WP.37, which outlined recent USAID activities in the fisheries sector. He gave a brief review of the Pacific Island Marine Resources Project (PIMR) now authorised, with a budget of US\$12.5 million and explained that this project incorporated a Regional Impact Component designed to extend the development experience gained to countries not included in the core project, particularly in respect of workshops, attachments and training. Mr Pita also described past USAID support to the SPC Fisheries Programmes, including the TBAP and the DSFDG Gear Development Sub-project. He also indicated that under the U.S. Fisheries Treaty, countries will have access to equal shares of the economic development fund of US\$1 million annually and that some countries had experienced difficulties in utilising their shares. Recently FFA and USAID had made a joint visit to countries to assist in resolving this problem.

215. Mr Pita also explained that the PIMR component in Kiribati involving resource assessment and management of the Tarawa lagoon was a potential fisheries conservation model, which assessed and monitored the impact of causeway construction and sewage system on the resources of the lagoon and adjacent reefs. He added that there were other donors, including AIDAB, which were interested in similar activities involving the Tarawa lagoon and that consultation will be held to avoid duplication of effort.

216. In response to an enquiry by the Representative of Western Samoa regarding the possibility of funding additional proposals under the Regional Impact Component of PIMR, Mr Pita pointed out that consideration would only be given to requests which were related to the approved components in PIMR.

#### **Institut français de recherche scientifique pour le développement en coopération (ORSTOM)**

217. The Representative of ORSTOM, Mr René Grandperrin, outlined recent ORSTOM work in the Pacific: in New Caledonia, research on maximum sustainable yield for bi-valves, lagoon fish sampling to determine maximum sustainable yield, a study on the significance of mangroves in relation to fish resources, a study of bottom longline fishing yields on seamounts, and compilation of a bibliography for New Caledonian fisheries.

218. In Vanuatu, ORSTOM had been involved in FAD research, a survey of community subsistence fisheries and exploitation of external reef slope fishes. In French Polynesia, ORSTOM work recently centred on the study of a lagoon fishery by trapping, pearl oyster culture and tuna fisheries productivity.

#### **Overseas Fisheries Cooperation Foundation (OFCF)**

219. The Representative of OFCF, Mr Yoshihiro Takagi, outlined the structure of the Foundation and briefly reviewed its recent activities, in particular the Fisheries Development Assistance for Pacific Island Nations. The project will make funds of US\$3 million available this year, and after review, may continue over at least five years. A liaison office will be opened in Suva soon for the better management of OFCF activities in the Pacific.

220. Mr Takagi explained that OFCF funds may be made available for the reconditioning of fisheries-related facilities and equipment (which need not necessarily be of Japanese origin) for the supply of spare parts and also for test operation costs in some instances. OFCF's aim is to effect technological transfer through counterpart training where appropriate. He mentioned that priority would be given to assisting countries having either government or private fishing agreements with Japan. He invited countries to seek more information on OFCF assistance through either the Suva or Tokyo offices.

#### **University of the South Pacific (USP)**

221. Professor Robin South referred the meeting to WP.34, aspects of which had been previously discussed, and outlined two major USP funding proposals for marine studies programmes: the Pacific Marine and Environmental Science Technology and Education, Training and Monitoring Network at the secondary and tertiary levels, and the Atlantic Centre for Communications and Ocean Resources and Development proposal. He also informed the meeting that Mr Hugh Williamson had been appointed Co-ordinator of the Ocean Resources Management Programme, this post being funded by FFA but under the direction of the Professor of Marine Studies.

### **Commonwealth Secretariat**

222. The Representative of the Commonwealth Secretariat, Mr Semisi Fakahau, thanked SPC for the invitation to attend the meeting. He gave a brief overview of the organisation's activities in the four main regions of Africa, Asia, the Caribbean and the South Pacific. He explained that the Commonwealth Secretariat had contributed significantly towards the development of fisheries in the South Pacific region in terms of technical assistance and training directed towards Commonwealth member governments and to regional fisheries organisations, including FFA and SPC. He informed the meeting that he was the Commonwealth Secretariat's Fisheries Officer attached to the Food Production and Rural Development Division and responsible for the implementation of the Division's fisheries work programme. He advised the meeting that the Commonwealth Secretariat was at present assisting its member governments in the South Pacific region in the development and management of fisheries, with special emphasis on the role of women in small-scale fisheries. He drew the attention of delegates to the report on the consultation on the role of women in small-scale fisheries sponsored by the Commonwealth Secretariat.

223. Mr Fakahau informed the meeting of the forthcoming meeting of Commonwealth fisheries officials scheduled to be held at FAO Headquarters in Rome on 7 April 1991, and invited RTMF delegates from Commonwealth member countries who might wish to attend to make this known to him so that he could start investigating funding possibilities. Mr Fakahau pointed out that since the recommendations of this meeting influenced the mandate of the Secretariat's fisheries work programme, he was keen to see increased input from the South Pacific and Caribbean regions.

224. In response to an enquiry by the Representative of Western Samoa on the funding level available for fisheries development, Mr Fakahau explained that no capital assistance was provided but rather technical assistance and training.

### **Nelson Polytechnic School of Fishing**

225. The Representative of the Nelson Polytechnic School of Fishing, Captain Angus Scotland, briefly outlined the background to the Fisheries Officers Training Course, emphasising that its practical bias was adapted to meeting Pacific Island needs. Captain Scotland then described development toward the School's offering an upgraded Course to meet advanced needs and referred the meeting to the curriculum detailed in WP.18.

### **Australian Maritime College**

226. Dr John Wallace of the Australian Maritime College outlined the fisheries courses offered by the institution. The Bachelor's Course had been most popular amongst Pacific Island countries; six students were presently enrolled. He also explained the expanded graduate programme on fisheries to be offered in 1991, pointing out that, although entry requirements were normally at degree or diploma level, provision would be made for accepting students with lesser qualifications but with suitable experience on a case-by-case basis. He also informed the meeting of the new Equity and Merit scholarship scheme made available by AIDAB and mentioned that 50 per cent of these scholarships would be reserved for women. He offered to provide interested delegates with more information upon request.

### **International Center for Living Aquatic Resources Management (ICLARM)**

227. Mr Sylvester Diake spoke on behalf of this organisation, referring the meeting to WP.45. He described manpower recruitment and infrastructure developments and studies conducted in association with other institutions, as well as details of funding by organisations, as outlined in WP.45.

228. Mr Diake detailed recent activities of the Solomon Islands-based Aquaculture Center, in regard to giant clam culture, including processing, product development and marketing. He also commented on improvements in larval survival rate, as evinced by a recent successful shipment of larval clams to the Philippines. He described the establishment of a new research centre in the Western Province which will be the venue for work on selective breeding and on nursery and growout systems. This centre will be a focus for giant clam seed distribution in the Western Province. He commented on the studies on the socio-economic aspects of clam culture, and on larval feeding. He also previewed plans for work in pearl shell culture.

#### **National Marine Fisheries Service (NMFS)**

229. Mr Raymond Clarke gave an overview of the activities of the NMFS Saltonstall-Kennedy Grant Programme and explained the funding process. He stated that available funds had declined steadily in recent years to a level of US\$3 million in 1990.

230. Mr Clarke described recent NMFS activities in Guam, Palau and Hawaii and informed the meeting that 20 other projects were current in the Pacific. He emphasised that the Service was aware of the need to establish better communications and liaison with other regional organisations, particularly in light of the decline in available funding.

231. The Chairman thanked the representatives of all organisations for their presentations and, on behalf of all delegates expressed appreciation for the assistance provided to Pacific Island countries and territories over the past year.

232. The Fisheries Co-ordinator reiterated the Chairman's sentiments, in particular SPC's appreciation for the continued support of donor agencies.

#### **AGENDA ITEM 20—OTHER BUSINESS**

233. The Representative of Solomon Islands asked if RTMF working papers could be distributed at least six weeks before the meeting, in line with the procedure for sending papers for the CRGA and South Pacific Conference.

234. The Representative of Australia reiterated this sentiment, noting that the SCTB secretariat had also agreed to circulate papers for that Committee in advance of SCTB to allow proper consideration and review of technical issues.

235. The Fisheries Co-ordinator stated that whilst the quality of some documentation would necessarily diminish if sent out early, all Secretariat papers discussing policy and proposal items could be distributed well in advance of the meeting. This was endorsed by the meeting.

236. The Representative of France suggested that the number of working papers could be limited strictly to policy items and that other issues be presented as information papers. He then suggested that all papers sent to countries beforehand should also be sent to the French-speaking Territories, regardless of whether in English or French. He also wished to thank the Translation Section, on behalf of the French Territories, for their efforts during this meeting.

237. The Fisheries Co-ordinator agreed that more attention should be paid to the definition of working papers, pointing out that the RTMF is just one of a number of meetings serviced by the Translation Section which can begin to service a meeting two weeks prior to commencement.

238. The meeting requested that the Secretariat send all working papers to all countries six weeks in advance of the meeting, regardless of whether in English or French.

239. The Representative of Western Samoa expressed concern over the difference in status of the two fisheries projects submitted for funding by the EC under Lome IV.

240. Discussion by the meeting then focused on the necessity for presentation of a project outline to the RTMF and South Pacific Conference for approval, whilst at the same time the outline needs to be presented with a funding proposal to prospective donor agencies.

241. The Chairman raised the issue of future Regional Technical Meetings on Fisheries and the need for more time to be allocated for discussion of important subject items.

242. The Fisheries Co-ordinator then stated that it was normal procedure for the meeting to identify the topic for the workshop of the next RTMF, and suggested the theme of 'Women in Fisheries'.

243. The Representative of Tokelau suggested the alternative topic of 'Conservation and fisheries management'.

244. The Representatives of Western Samoa and Tonga both supported the theme of 'Women in Fisheries'.

245. The Representative of Wallis and Futuna suggested that a possible workshop topic for next year's RTMF would be review of tuna fisheries, particularly the status of the various species, fleets and marketing.

246. The Chairman took note of the issue but asked the Secretariat to continue its efforts to identify a workshop theme for next year's RTMF.

#### **AGENDA ITEM 21—ADOPTION OF REPORT**

247. The draft report was read and corrected by the meeting. The Representative of Australia moved that the report be adopted. The Representative of France seconded the motion.

248. The Fisheries Co-ordinator, on behalf of the meeting, thanked all SPC support staff who serviced the meeting, the meeting secretaries, the printery and travel staff, and made special mention of Mrs Helen Wolfgramm-Page for the organisation of the Fisheries Barbecue and the Marine marchande of New Caledonia, particularly Aymeric Desurmont, for providing the fish.

249. The Representative of Western Samoa expressed the meeting's thanks for the work of the Chairman, Vice-Chairman, rapporteurs and report committee.

250. The Chairman offered his thanks to the representatives to the meeting for their participation and noted his special appreciation of the interpretation and translation staff for their efforts, the Vice-Chairman and the report committee.

## V. RECOMMENDATIONS

### Recommendation No. 1

The meeting, noting that the present Tuna and Billfish Assessment Programme technically expires in September 1991, endorsed the strong recommendation by the Standing Committee on Tuna and Billfish that the Tuna and Billfish Assessment Programme be continued on a longer term basis, adopted the proposal by the Standing Committee on Tuna and Billfish that a strategic plan for the next five-year period (1992–96) be prepared to guide the future direction of this programme and authorised the Standing Committee on Tuna and Billfish to develop a draft document for consideration by the 1991 Regional Technical Meeting on Fisheries. It was agreed that the draft plan should reflect the current programme directions and initiatives, and use as a starting point the existing Tuna and Billfish Assessment Programme mission statement.

### Recommendation No. 2

Recognising the increasing need for a comprehensive assessment of yellowfin stocks in the Western Pacific region, the meeting adopted the recommendation by the Standing Committee on Tuna and Billfish that a scientific workshop on yellowfin be convened, tentatively scheduled for 1992, and endorsed the establishment of a special working group, operating on a similar basis to the South Pacific Albacore Research Group and fostering collaborative research action among group members, to develop a work plan and arrangements for a workshop.

### Recommendation No. 3

The meeting after considering the need for a Pacific Island Fisheries Manpower Development Study, **recommended** it proceed as proposed by the Secretariat, and nominated three representatives, one from each region (Micronesia, Polynesia, Melanesia), to participate in the special review group called for in the project document.

### Recommendation No. 4

The meeting endorsed the proposal for a Japanese Fisheries Specialist to be attached to the Coastal Fisheries Programme and **recommended** that the Committee of Representatives of Governments and Administrations authorise the Secretariat to proceed in finalising the necessary arrangements with the Overseas Fisheries Cooperation Foundation.

### Recommendation No. 5

Following discussion which emphasised the growing interest region-wide in activities which support the needs of women from coastal fishing communities, the meeting **recommended** that a Women-in-Fisheries Programme be implemented as proposed and that a position of Women's Fisheries Programme Officer be created.

### Recommendation No. 6

The meeting recognised the pressing need to establish the position of Coastal Fisheries Programme Manager and **recommended** that the Committee of Representatives of Governments and Administrations endorse the creation of the post. While accepting that extra-budgetary funds may be required to support this post in the short-term the meeting further recommended that means be investigated to allow its incorporation into the Core Budget at the earliest opportunity without imposing additional financial burden on member countries.



#### **Recommendation No. 7**

The meeting noted the action taken by the Secretariat with respect to the submission of fisheries projects for Lome IV funding, endorsed the proposed South Pacific Regional Tuna Research Project as outlined; and **recommended** that both projects be strongly supported for EC funding support under Lome IV.

#### **Recommendation No. 8**

The meeting expressed its appreciation of the South Pacific Commission's thorough examination of the concept of establishing a Regional Post-harvest Fisheries Facility and unanimously **recommended** its establishment at a suitable location in Fiji. It further **recommended** that the South Pacific Commission in developing this proposal for implementation explore as the preferred option the possibility of joint development of this facility jointly by the South Pacific Commission and the University of the South Pacific as a collaborative project associated with the University's marine studies programme. The meeting endorsed the formation of a small planning group consisting of representatives of the South Pacific Commission, the University of the South Pacific and Pacific Island nations to develop the facility in consultation with the private sector and other institutions with expertise in post-harvest fisheries technology and to promote and explore funding possibilities with donor organisations.

#### **Recommendation No. 9**

The meeting **recommended** that the South Pacific Commission and the South Pacific Regional Aquaculture Development Programme collaborate in the organisation of a workshop on Inshore Marine Resource Enhancement as it applies to key species in the region, in order to raise awareness of the potential and limitations of the techniques and technologies involved.

#### **Recommendation No. 10**

The meeting **recommended** that the South Pacific Commission consult with the Forum Fisheries Agency with a view to developing co-operative action to address the different issues discussed under Agenda Item 11, most notably the regional marketing aspects of trochus and pearl shell.

#### **Recommendation No. 11**

The meeting directed the Secretariat to take due account of concerns expressed by representatives of member countries during the workshop on FADs and **recommended** that the South Pacific Commission Fisheries Programme carry out appropriate follow-up work, to include: 1) controlled evaluation of deep-water FADs; 2) the feasibility of mid-water and shallow-water FADs; 3) clearly identify and evaluate FAD-related socio-economic concerns faced by member countries.

#### **Recommendation No. 12**

The meeting **recommended** that the South Pacific Commission proceed with the production of educational resource materials and that it maintain contact with the Forum Fisheries Agency and the FAO/UNDP Regional Fishery Support Programme in order to avoid duplication of effort.

## VL LIST OF WORKING PAPERS PRESENTED TO THE MEETING

- WP.1      Summary report of the South Pacific Commission 1989/90 activities under the Fisheries Work Programme
- WP.2      Stock status of skipjack tuna in the Western Tropical Pacific
- WP.3      Stock status of yellowfin tuna in the Western Tropical Pacific
- WP.4      Third Standing Committee on Tuna and Billfish (Draft Report)
- WP.5      The establishment of a regional post-harvest fisheries facility for the Pacific
- WP.6      Méthodes pour une gestion rationnelle du stock de trocas au Vanuatu
- WP.7      Country statement — Federated States of Micronesia
- WP.8      Report on a visit made from 26–30 March 1990 to inspect juvenile trochus transplanted on Lifou reefs
- WP.9      Review of the Pacific Islands Marine Resource Information System (PIMRIS)
- WP.10     Report on Secretariat action on RTMF 21 recommendations
- WP.11     General description of the fish aggregation device (FAD) programme in French Polynesia
- WP.12     Country statement — Guam
- WP.13     Initial analysis: economic viability of ships fishing around FADs off the south-west coast of Efate
- WP.14     Techniques de pêche utilisées autour des dispositifs de concentration de poissons en Polynésie française
- WP.15     Conception des dispositifs de concentration de poissons en Polynésie française
- WP.16     SPC initiatives in remote sensing digital image analysis and geographical information systems
- WP.17     Proposal for the establishment of a Women-in-Fisheries Programme
- WP.18     Syllabus review of the SPC Pacific Island Fisheries Officers Course and the possible development of this course to become a Certificate in Fisheries Technology
- WP.19     Proposal for a Pacific Island fisheries manpower development study
- WP.20     SPC Post-harvest Training Project — update and progress report
- WP.21     Attachment of a Japanese fishery specialist to SPC's Coastal Fisheries Programme
- WP.22     Analyse des résultats du programme de mouillage des DCP en Polynésie française
- WP.23     Restructuring of the SPC Coastal Fisheries Programme

- WP.24 Issues relating to trochus and pearl shell research
- WP.25 Enhancement of Pacific Island invertebrate fisheries by restocking
- WP.26 Educational resource materials and teaching assistance to schools
- WP.27 PIMRIS progress report (August 1989 — August 1990), USP
- WP.28 FADs — are they really of any help to fishing? Example: South-West Efate (Vanuatu)
- WP.29 Co-ordination of SPC work on ciguatera
- WP.30 Country statement — New Caledonia
- WP.31 SPC fisheries projects for Lome IV funding consideration
- WP.32 Recherches halieutiques menées par l'ORSTOM dans l'Océan Pacifique
- WP.33 Country statement — American Samoa
- WP.34 USP-IMR Report to RTMF 22
- WP.35 Country statement — Fiji
- WP.36 Country statement — Australia
- WP.37 USAID/RDO/SP assistance for fisheries development in the South Pacific
- WP.38 Review of Pacific Island FAD deployment programs — Part 1
- WP.39 Country statement — Papua New Guinea
- WP.40 Country statement — Tuvalu
- WP.41 Country statement — Niue
- WP.42 Impact socio-économique des DCP sur la pêche des poti-marara de l'île de Tahiti
- WP.43 Comparaison des contenus stomacaux de thonidés pêchés sous et hors DCP (Résultats préliminaires)
- WP.44 Country statement — Vanuatu
- WP.45 ICLARM Coastal Aquaculture Center status report
- WP.46 Expériences de DCP dans l'océan Indien: technique, rendements, comportement du poisson, aspects sociaux-économiques et légaux
- WP.47 Country statement — Solomon Islands

**Information Papers**

- IP.1            Horizontal and vertical movements of yellowfin and bigeye tuna associated with FADs
- IP.2            Summary of Guam fisheries developments
- IP.3            Fish aggregation device moorings for moderate to shallow depths
- IP.4            FADs in the Pacific Island region
- IP.5            A review of the potential of aquaculture as a tool for inshore marine invertebrate resource enhancement and management in the Pacific Islands
- IP.6            Fisheries studies in Australia
- IP.7            Project activities of FAO South Pacific Aquaculture Development Project, from July 1989 to July 1990
- IP.8            Japanese fishery co-operation

## WORKSHOP ON FISH AGGREGATING DEVICES (FADs)

1. The SPC Fisheries Co-ordinator opened the workshop session by describing the fisheries enhancement aspect of FADs in regard to their ability to improve productivity, increase boat safety, and diversify fishing effort away from stressed resources. He outlined the long involvement of the SPC in FAD development and utilisation; specifically the publication of the FAD handbook in 1984, the 1987 FAD training workshop held in Kiribati, the development of appropriate FAD-associated fishing techniques by the Deep Sea Fisheries Development Project, and studies by the Tuna and Billfish Assessment Programme on the relationship between FADs and industrial fisheries, and aspects of FAD-associated tuna behaviour.
2. He pointed out that discussion at the 1988 and 1989 RTMFs had made clear that many problems remained in FAD development. In many cases the life span of FADs is unacceptably short relative to costs. Further, many questions first posed in the early 1980s about FAD design, rigging, site selection and deployment still remain unanswered. For these reasons SPC undertook a major regional and international study review of FAD development and country experience. The study included a questionnaire survey of all Pacific Island countries, visits to a number of countries with current FAD programmes and, most recently, attendance by the Senior Inshore Fisheries Scientist at an IPFC-sponsored FAD seminar in Colombo, Sri Lanka. The Fisheries Co-ordinator thanked all those who had contributed to the present study and passed the floor to the Workshop Chairman, the SPC Senior Inshore Fisheries Scientist.
3. Mr Preston introduced Mr Paul Gates, the consultant retained by SPC to undertake the FAD review.
4. Mr Gates outlined the background and organisation of the study and expressed his thanks to those countries which supplied data. He pointed out that prior to 1983, when the original FAD study was undertaken, records concerning the deployment and life span of FADs were not rigorously kept. He presented a slide show illustrating the types of FADs employed in the Pacific and the components from which they are constructed. He pointed out that during the original FAD study it was found that no FAD lasted longer than 22 months after deployment. The conclusion of that study was that there was a need for a mooring system that would extend the life-span of FADs beyond 2 years. The principal outcome of the study was the design of the inverse catenary system of FAD mooring.
5. By 1984, 600 FADs had been deployed in the Pacific. However, because of their short life-span, problems were experienced with obtaining donor funding for future deployments. Both French Polynesia and Hawaii have continued with vigorous FAD deployment programmes since 1984, but neither programme has relied on donor funding, as they are supported by national budgets.
6. Neither of the SPC studies considered FADs deployed by commercial tuna fishing interests, only those deployed by Government fisheries departments. Of 420 FADs deployed between 1984 and 1990, 307 have been lost. Prior to 1984 no FAD lasted more than 2 years, now, out of 15 countries contacted in this survey, 8 have FADs that have been on station for over 2 years, and some have lasted for almost 5 years.
7. While the maximum longevity of FADs has certainly increased since the original study, the average life span of FADs is still low. Half of the FADs noted in the present study were lost before 10 months on station. No country has achieved an average life-span of 2 years. A note of caution was expressed concerning the original estimated average life-span of 9 months because the basis for this was anecdotal, rather than strictly quantified.

8. Thus, the major problem with FADs is short life-span and concomitant premature loss. The causes of FAD loss are hard to determine unless the missing FAD is recovered. Out of the 307 FADs reported lost in the present study, only 76 were recovered. Many FADs are lost as a result of human intervention. Successful fishermen will vandalise a FAD to disadvantage mediocre and poor fishermen. In French Polynesia user-rights conflicts between fishing groups have also been the cause of vandalism.

9. FADs are also lost due to fish bite and 'man bite'. Fish bite is defined as damage caused to the mooring line by large predatory fishes, such as sharks, while 'man bite' refers to inadvertent damage to FAD moorings through human action. An example of this is the damage caused by handline fishermen who snag fishing lines on the mooring and, in trying to free these using the motive power of their boat, either weaken or part the mooring.

10. Another prime objective of the original study was to try to maintain the cost of constructing and deploying FADs at around US\$3000. In many countries, however, FAD costs have greatly exceeded this amount due to the increasing sophistication of the design. The inverse catenary system has been responsible for increasing the longevity of FADs, but has not produced a marked increase in their average life-span.

11. At this point a number of representatives had questions regarding the FAD review: in response to an enquiry from the Representative of Solomon Islands it was explained that the inverse catenary system had improved FAD life-spans as outlined, but that increased training and experimentation by countries had also been important. The improved design of buoys had also played an important part in the extension of FAD life spans; the Representative of New Zealand asked about the differences in loss rates for FADs deployed in deep and shallow water and was told that the data presently available were not adequate to make significant comparison between shallow and deep water deployments; Mr Angus Scotland of the Nelson Polytechnic School of Fishing asked if there were any recommendations about the standardisation of materials with respect to costs, pointing out that although most countries claim to use SPC recommendations, some variations occur because the prices of materials differ from place to place. It was agreed that there could be cost savings through rational standardisation of materials; the Representative of French Polynesia noted that each country has developed its own specific raft design, partly because of the availability of local material. He stated that he would like to see a study aimed at reducing raft costs. He was told that rafts were indeed part of the present study and that Lt. Richard Boy would make a presentation later in the meeting on this subject.

12. The Representative of French Polynesia then referred the meeting to WP.11 and gave a slide presentation about the construction and deployment of FADs in French Polynesia. He said that FADs were deployed in French Polynesia for the benefit of both commercial and artisanal fishermen. Deployments commenced in 1981 and over the years several modifications had been made. Six types of FADs had been tried, but only 2 designs were currently being used. He then gave details of these designs (outlined in WP. 15). He also thanked Lt. Richard Boy for the work carried out in there in 1984. He stated that the mooring system used in French Polynesia was adopted on Lt. Boy's recommendations, but with modifications made for deployment in deep water. He commented that entanglements of fishing lines on the upper mooring rope by handline fishermen were a real problem and quoted the example of a FAD deployed for only three months that was fouled by over 100 handlines. Handline fishermen used the motive power of their boats to try to free entangled handlines and this sometimes resulted in the parting of the mooring rope. He stated that probably 90 per cent of FAD losses in French Polynesia were due to human intervention. To offset this problem in French Polynesia the upper mooring rope was now sheathed in plastic.

13. He then discussed details of FAD costs. These, he said, were dependent on the depth of FAD deployment, but ranged from US\$6000 to US\$8000 per FAD. Work was currently underway in the Territory to find ways to reduce costs. He suggested that it might be possible to reduce raft costs by as much as 45 per cent by employing plastic materials. FADs were moored for the use of the *bonitiers* (skipjack pole-and-line boats) but increasing usage of the FADs by handline fishermen had caused both increased losses and user conflicts. The solution was to place some FADs further out to sea (between 10 and 15 nmi), beyond the reach of the handline boats. The present objective for FAD deployment in French Polynesia was the deployment of 30 FADs over a period of 2 years.

14. The Representative of Guam next presented an overview of Guam's FAD programme. Guam had deployed 5 FADs in 1990, the first since 1983 when activity was suspended despite the urging by fishermen for deployment to continue. Considerable effort was required to explain the technical difficulties causing the delays. He made mention of some of the other difficulties experienced in the FAD programme, including a military restriction on deployments at the 1000 fathom line, and staff turnover. He then gave a slide presentation illustrating the raft, moorings, deployment and maintenance procedures used in Guam. He also made mention of a video film of deployment techniques and offered to make it available to any interested party. Other points made were that as some FAD supplies were procured from rigging companies it was essential that the buyer know, and make clear, exactly what materials were required. He also mentioned Guam's recent trials with a lighting system, in which a McDermott 8-cell battery light was run continuously for 5 months, and plans to install a self-contained underwater light on upper mooring chains to test its effectiveness in gathering scads.

15. The Representative of New Caledonia's Service des affaires maritimes et de la marine marchande next presented a review of the Territory's FAD programme. He pointed out that FADs were not considered indispensable in New Caledonia because of productive local deep reef-slope and offshore tuna longline fisheries. Ten FADs had been deployed over the past 5 years, following the SPC-recommended design, but average life-span had been an unsatisfactory 9 months. He described the use of a ball-bearing swivel above the upper chain as giving good results, particularly in avoiding line twist during deployment, and the use of a Global Positioning System plotter and an echo-sounder to survey the bottom contour of potential FADs sites. Two problems areas noted were raft design and instances of documented shark bite. Although few FAD-associated fishing data were available from the domestic fleet, his own record gave the following: for trolling – over 73 days, an average catch of 8kg/line hour (40% dolphin fish, 40% yellowfin); for vertical longlining – over 57 sets, 32 sets gave no catch and 10 sets produced sharks only, for an overall average of 2.5 kg/set.

16. The Representative of ORSTOM, Vanuatu, referred the meeting to WPs. 13 and 28 which discussed the economics of a small-boat FAD fishery around Efate. Thirty FADs have been deployed in Vanuatu since 1982, mostly around the urban centres of Santo and Efate, however, the economic benefit of the FADs is open to question. Her study of this question for the small-boat fishery around Efate recorded the average trolling time and CPUE for inshore, offshore and FAD-associated operations. Since FADs have been deployed, both catch and effort from coastal areas are down, while the catch around FADs is much higher than previous offshore yields. FAD-associated catches now account for 95 per cent of trolling yields. The question was therefore posed – has abundance decreased in the offshore zones away from FADs, or is the effect the result of fishermen targeting FADs much more?

17. As to the question of whether FADs are profitable, the following points were made: open-water trolling is inefficient and the only real productivity comes from trolling near FADs; however, results from 52 trips show that two hours of trolling are required before covering the cost of the trip and, as the average trip was two hours, it could be said that no profits were made. Trolling effort must therefore be increased in order to increase fishing income. The Representative concluded by stating that it will be important to reduce the travelling time to FADs, but as productive fishing areas are away from fishing communities, more efficient boats and motors are needed.

18. The Representative of New Zealand noted that the Vanuatu study raised serious questions about the cost-effectiveness of FADs. He pointed out, however, that although FADs might not increase real production, it was apparent that they decrease the amount of fishing required to achieve a satisfactory minimum income for some fishermen and that this is a hidden benefit worthy of consideration. The Chairman, in response, referred to another hidden benefit of FADs: that they increase the safety of small-boat operations by providing fishing grounds in a well-known area, usually not too far offshore.

19. The Representative of New Caledonia pointed out that in French Polynesia fishermen would troll only as a last resort, but typically used mid-water techniques at the FADs. He said that static mid-water fishing would be difficult to do in New Caledonia because strong winds usually prevailed – winds over 15 knots blew for more than 80 per cent of the time.

20. The Representative of French Polynesia, in response, pointed out that 80 per cent of their FADs were deployed in windward areas, but weather did not affect mid-water fishing because fishermen use a free drifting line supported by a small buoy.

21. The Representative of France referred to studies conducted in the Comores, where canoe handline fisheries have increased productivity by 90 per cent since the introduction of FADs, but where troll fisheries have shown no improvement.

22. The Representative of Tuvalu then presented an overview of his country's FAD programme. He said that FADs were first deployed during the early 1980s with the assistance of SPC's DSFDP, firstly in Funafuti and later in the outer islands. Twenty-five FADs had been deployed to date, as well as 6 deployed by JICA during 1985/86. There were still a number of problems inhibiting a successful FAD programme; notably, lack of funds, isolation (in regard to procuring components) and lack of suitable deployment vessels. This last problem had now been largely alleviated by the delivery of a 19 m research vessel equipped with echo-sounding and lifting gear. Local raft design has remained simple to contain costs; 44-gallon drums filled with foam and welded together are still used. Recently, 8-strand plaited rope has been used, but it is comparatively very expensive. Future priorities, which will depend on the availability of funds, include collaboration with regional organisations, identification of the best locally-suited raft and mooring design, and the education of fishermen to safeguard FADs.

23. The Representative of Western Samoa made a brief presentation on his country's FAD programme. FADs have been deployed in Western Samoa since the mid 1970s. The recent cyclone destroyed all but one of the FADs on station. Eleven had been deployed recently, however, and more were planned. FADs are politically important, being very popular with fishermen, so funds are readily available. Sites are selected on the criteria of being not less than 8 miles from shore and not less than 145 m in depth, these criteria having been established by experience.

24. He also noted the following problems with the domestic FAD programme: 1) fishermen target the dawn bite, so some fishermen remove the FAD's light to prevent others finding the raft – the solution to this was to remove all lights, extend the mast, and add flags; 2) if all FADs are productive and the market is glutted with fresh fish, some fishermen have tended to cut rafts loose from other areas in an attempt to control the market – the solution to this was to triple the upper mooring chain so that fishermen could not lift and cut it; 3) when fishing is productive, dolphins tend to aggregate at the FADs also and disrupt fishing – a suggested solution to this problem would be welcome.



25. In response to an enquiry about submerged raft FADs, Mr Gates described the Hawaiian experience with submerged buoys, where mid-water FADs are deployed singly and in series to provide trolling alleys. He said that fishermen had difficulty locating the solitary mid-water FADs from given bearings so they are now marked with a small surface float, which usually lasts long enough for fishermen to locate the FADs and take their own land bearings. The value of the trolling alley has been questioned in relation to its proximity to the reef, and the fish interaction which is thought likely to occur between the reefs and the FADs. He said too, that FADs set in waters as shallow as 20 to 25 m had proved effective in gathering baitfishes, even in areas where such species had not been previously observed in abundance.

26. Lt Boy also offered his thoughts on this topic, saying that submerged buoys gave some technical advantages, in particular the avoidance of movement by wave action. He noted however, that the ability to locate FADs easily was an important consideration in most island situations.

27. Mr Gates then outlined the technical difficulties which still beset island FAD programmes. He pointed out that some modifications to the SPC recommended design, made on basically sound principles, had created potential problems. He described difficulties with each mooring component in turn.

### *Anchors*

28. Mooring connections made from the narrow side of the block, and deploying blocks before they are properly cured (28 days), are not uncommon. He mentioned that blocks must have a low centre of gravity to prevent tumbling, and that forms should be prepared so that several anchors can be poured at the same time for later use. Dispensing with an attachment eye on the block, that is embedding the chain directly in the block, can wear a gouge in the block and eventually result in anchor breakage. He showed a U.S. coast-guard anchor design with a low centre of gravity which will be featured in the revised handbook.

### *Chain*

29. Chains are subject to severe wear and corrosion, particularly if the FAD lasts two years or more – this problem can be alleviated by the use of sacrificial zinc anodes attached to the chain near the shackle/swivel connection points. If using anodes, ensure that protective coatings are not applied between the anode and the hardware. Chains should have smooth curves and welds should be dressed.

### *Lights*

30. Lights help fishermen locate FADs, as well as signalling their presence to shipping. Solar powered lights are used in some places, but these are expensive and panels can be fouled by birds. The McDermott light (displayed during the Workshop) is cheap at US\$174 and simple. With the recommended batteries these lights will operate continuously for one year.

### *Ropes*

31. Three-strand polypropylene ropes have proven satisfactory in Hawaii, primarily because great care is taken in rigging and deployment and procedures have become routine. If three-strand rope is allowed to twist during deployment it can hockle and weaken significantly. The use of eight- and twelve-strand ropes, which are torque balanced, eliminates this problem. Other points made were that Samson or Donaghy's plastic thimbles should always be used in preference to galvanised types, and that if three-strand rope is used it should always be faked into a crate or other container rather than paid out from coils.

### *Splices*

32. Breaking strength tests show that three-strand rope will typically break at the splice, while eight- and twelve-strand ropes break elsewhere and the splice is not the weakest point of the line. All splices give slightly under strain, therefore it is important that the ends of splices be left extending somewhat from the rope to allow for this.

### *Swivels*

33. Forged swivels should be used. This type of swivel should spin freely when spun by hand and should not seize under loading. Swivels play a useful role in avoiding line twists during deployment.

### *Sheathing*

34. Plastic sheathing has been used experimentally in French Polynesia to protect against hook and line abrasion of the mooring rope, but care must be taken to avoid leaving a sharp edge where the sheathing terminates.

### *Appendages*

35. The value of appendages is debated by many fishermen, but it is critical, if using appendages, to ensure that they cannot foul swivels.

36. It was pointed out that technical information regarding all components would be expanded in detail in the revised SPC handbook.

37. Mr Gates then addressed Agenda Item 9 of the Workshop. He said that site selection is generally based on three criteria: the presence of fish, the distance of sites from users, and bottom topography. In assessing bottom topography it is unwise in most cases to rely on established charts which in many cases have proven to be quite inaccurate. The use of an echo-sounder with capability well in excess of estimated depth is vital, as are accurate position-indicating instruments, or distinctive land bearings. He also stressed the importance of monitoring FADs once they are in position. If catch and effort records are kept accurately, as well as accurate details of mooring specifications, much may be learned about FADs which will be of great use for future deployments. The ability to identify problems during the present study was largely possible because of the increasing trend among many Pacific Island countries to keep such records.

38. The Representative of Papua New Guinea asked if any other administrative problems had been noted in the course of the study. He gave the example of his own country where, after sites were selected, it was necessary to obtain the permission of various authorities before effecting deployments.

39. Mr Gates said that such problems had indeed been noticed, quoting the examples of Hawaii and Guam where military and shipping considerations restricted utilisation of selected FAD sites.

40. Mr Angus Scotland of Nelson Polytechnic informed the meeting that a hand-held Global Positioning System (GPS) receiver was now available for around US\$3–4000; this would be invaluable in accurately charting FAD sites. He also mentioned that echo-sounders used in site selection should be equipped with a 28 khz transducer.

41. The Representative of French Polynesia, while acknowledging the value of GPS site selection, made the point that in his experience, an anchor, once deployed, could fall far wide of the intended mark, and that this question needed to be addressed. He gave the example of two deployments made between 1500 and 2000 m, which were accurately sounded, but where the anchor settled some 600 m deeper than estimated.

42. Lt Boy stated that this problem had been studied by the U.S. coast-guard and indeed anchors did not fall straight down. It was necessary, therefore, to survey a wide area of the bottom to ensure that deployment was made on a flat site even if the anchor deviated during its fall.

43. Lt Boy addressed Information Paper 3. He stated that the existing SPC FAD handbook dealt mainly with deployments of FADs in waters of about 800 fathoms (1500 m). This design can be customised for shallower deployments, as outlined in IP. 3. Lt Boy explained the properties of the inverse catenary mooring system, but stressed that local knowledge is also important in terms of determining the dimensions of the ropes and chains required for a mooring. The bottom chain on a mooring was there to act as a shock absorber during rough sea conditions. He also discussed the type of rope used and recommended eight- or twelve-strand rope rather than three-strand, since the three-strand has a tendency to unravel if twisted too much.

44. As FAD deployment depths vary widely, different mooring types need to be considered. In shallower water a semi-taut mooring can be used, where a nylon rope acts as a shock absorber. In very shallow water an all-chain mooring might be sufficient if the FAD buoy or raft can support the weight. However, the inverse catenary system does put the least strain on the mooring. The semi-taut system puts more strain on the mooring and thus there is a need, in general, for a larger buoy. Graphical comparisons of the semi-taut and inverse catenary systems were shown and the customising of these designs for shallow waters explained.

45. Although it is possible to use wire rope to avoid shark bite and 'man bite' losses, the use of wire is not recommended for technical reasons. Some manufacturers have produced ropes designed to withstand shark bites, but these are very expensive and have not been shown to be significantly effective.

46. The Representative of Guam then briefly outlined the methods for computing mooring line calculations. The bottom rope in the inverse catenary system is buoyant so that it can lift the chain clear from the sea bed. It is important, therefore, to ascertain the length of rope necessary to perform this lifting function. Once the bottom rope length is known, it is possible to compute the length of the sinking top rope. The intent of the inverse catenary system is to produce a loop in the neutral portion of the mooring. He explained the step-by-step computation of mooring requirements and suggested that an interactive computer software could be written to handle the various calculations, giving input on depth of deployment, etc.

47. The Fisheries Co-ordinator noted that ropes are not only selected for flotation but for strength and asked Lt Boy to comment on this. In response Lt Boy said that breaking strength was indeed critical and that buyers needed to be firm with suppliers and specify their exact requirements when buying rope, because suppliers are generally not experts in FAD deployment. He also remarked that blended ropes should be avoided if possible, as they do not have the strength of pure nylon or polypropylene rope. Further, many of these blended ropes are almost neutrally buoyant, which also makes them unsuitable for use in the inverse catenary system.

48. The meeting next considered raft and buoy design for FADs. Mr Gates introduced the topic by outlining the problems of raft and buoy design encountered during country visits. Lt Boy then discussed the parameters and technical considerations of raft and buoy design for FADs. After presenting a slide show demonstrating different buoy types, he stated that marker buoys are not suitable for FADs. The colour of a FAD buoy is important since international standards require that FAD buoys should now be yellow. Lighting might be required on a buoy and servicing arrangements should be considered in the design of the size and shape of the buoy. Further considerations for design of the buoy are the drag of any aggregators deployed on the FAD.

49. Lt Boy then outlined the design process for a simple FAD buoy and associated structures, based on some reasonable assumptions about the type of structure required and the conditions in which it would be deployed. If the buoy is to be deployed in reasonable to moderate currents then a buoy that does not follow surface movements of the water too much is preferable. The buoy should be big enough and rugged enough to support a man's weight in case servicing is essential. The most efficient buoy in these circumstances is a sphere, and the next most efficient a cylinder. A cylinder with a 1.5 m diameter will provide enough buoyancy to support a man, plus a light and radar reflector. The buoy requires about 1000 kg of displacement after the mooring weight has been discounted. A simple steel shell for the buoy can be made from 5 mm plate. This will give a basic buoy mass of about 250 kg. The mooring can be a simple chain bridle but this is not suitable in stormy weather as the buoy might capsize. A rigid padeye fixed to the bottom of the counterweight is probably more suitable. A mast will probably be required for the light and radar reflector. A recommended lamp for the buoy is the McDermott light, which has proven to be reliable on buoys in the United States. The height of the lamp should be a minimum of 2 m from the water surface. Reflective material should be painted or stuck on to the raft so that it can easily be seen in the dark if the lamp fails.

50. A counterweight is required for the buoy to keep the mast upright. The buoy should be compartmentalised so that leaks will not cause the whole structure to sink. Problems are encountered using old fuel drums, because of leaks. If buoys or floats are filled with foam, care should be taken when cutting these, as the foam will generate hydrogen cyanide when heated. The new buoy should first be moored in a lagoon or shallow water to test it out. The buoy should be painted and primed for protection and the name, address and phone number of the owner(s) painted visibly on the structure.

51. In response to questions from representatives Lt Boy said that altogether the structure described would weigh about 400 kg; that used new fuel drums would probably have a satisfactory life when used as buoys; and that mussel floats available in New Zealand would probably not provide sufficient reserve buoyancy to serve as FAD buoys.

52. The Representative of France gave a description of FAD designs in the Indian Ocean, principally those employed in the islands of the Comores, Mauritius and Reunion. The FADs used there are based on an FAO design initially tried in Mauritius. The FAD is built from a number of small plastic floats, normally used on deep trawling nets. Each float is separated from its neighbour by a rubber bushing to prevent chafing. The mooring is of the semi-taut type. This design of FAD is very flexible and sinks progressively in rough seas, descending to 150 m in very bad weather. The cost of this type of FAD is about US\$ 2500. The FAD requires regular maintenance costing about US\$300 to US\$600 per year. In Reunion, an attempt was made to build a cheap disposable FAD based on this design. The mooring rope diameter was 16 to 19 mm, which reduced both the cost and the drag of the mooring. Initially, aggregators were attached to the FAD but this practice has been discontinued. In Mauritius, 22 FADs were deployed in the last 2 years. Of these, 8 have been lost, giving an average life span of 10 months. The remaining FADs now have life spans of between 20 and 22 months. These FADs are used mainly by handline fishermen.

53. The SPC Chief Fisheries Scientist then addressed Agenda Item 11 of the Workshop. He discussed the role of FADs in the industrial fishery sector, pointing out that the lessons learned may have application in the artisanal fisheries. He gave the example of Papua New Guinea where 11 purse seiners fish around more than 500 FADs and average 30 tonnes per set; the Philippines, where tens of thousands of FADs are deployed and 300 to 400 thousand tons of fish are taken from FADs annually; Indonesia, where the pole-and-line fishery is based on FADs; and Solomon Islands where 2 purse seiners fish around 50 FADs averaging 30 tons per set, with a gross catch of 8 thousand tons per year.

54. The common feature of FAD-associated industrial fisheries is that the cost/benefit view is quite different; one catch of 30 t from a FAD more than pays for the unit, so that a 3- to 6-month life span for a FAD is quite acceptable. Industrial fisheries experience indicates that the attraction period before a commercial density of fish is gathered is around 18 to 30 days and industrial boats often schedule their fishing effort to this period. It is almost universally accepted among industrial fishermen that both appendages and lights are critical for effective fishing, and that one 500 to 800 t vessel requires 30 to 50 FADs to support its operations. The industrial view of raft design is that rafts should be as cheap as possible, while strong enough for net or light boats to tie off to.

55. The Chief Fisheries Scientist also addressed some of the biological features of FAD-associated tunas: FAD-associated fish are almost always smaller than those found in free schools (fish of 15 cm are commonly taken in the Philippines, for instance). It is known, too, that purse seiners take large by-catches from FADs, which are usually dumped. The present RTTP was expected to produce more information on tuna behaviour in association with FADs.

56. In response to questions from representatives, the Chief Fisheries Scientist said that the use of lights in industrial fisheries usually involved high-powered devices suspended over the water, which were gradually dimmed towards dawn to gather the fish and draw them away from the raft, so that a seine net could be set around them. He also explained that although 18 days were considered the average natural restocking period for FADs, it was noted that mahi mahi could aggregate after one day and that there was a sequence of species appearance. The Chairman then made the point that although FADs apparently made fish stocks more vulnerable to capture, it could not be said that they actually augmented stocks, and that FADs therefore could be considered an extension of fishing gear rather than a resource enhancer. He wondered, too, about the management implications of the tendency for FADs to aggregate juvenile fishes and thus render them more vulnerable to exploitation. The Chief Fisheries Scientist stated that the increased vulnerability of juvenile fishes was of concern and that the RTTP tagging efforts in South-East Asia were in part aimed at addressing this.

57. The Representative of French Polynesia presented Agenda Item 12 of the Workshop, referring the meeting to WPs 11, 15 and 22, and gave an overview of recent research into the movements of FAD-associated tunas. He described the use of side-scan sonar to monitor fish presence around FADs and thus the FAD's efficiency in aggregating fish. The major findings of a 1986 study were that bio-mass peaks at midnight and is at its lowest between 4 am and 10 am. It was also found that fish left the FAD at night and returned at sunrise. A study conducted in 1990 also gives preliminary indications that fish leave the FAD at night. In response to a question from the Representative of Papua New Guinea, he stated that fish tend to be closer to the surface at night (in the upper 20 to 40 m), can vary down to 180 m, but that most fish remain between 60 and 80 m. He also referred the meeting to WPs 14 and 43, which described studies conducted by acoustic tagging and FAD fishing techniques used in French Polynesia, and WP. 42, which examined the socio-economic aspects of the French Polynesian FAD programme. The major points outlined in WP.42 were that the *poti marara* fleet, which previously targeted flying-fish, now tends toward FAD-associated fisheries. Catches by these boats vary from 9.24 kg/line hour at FADs, to 2.7 kg/line hour at traditional tuna holes and 5.0 kg/line hour in open-water fishing. The *poti marara* also engage in mahi mahi fishing, where an average catch increase of 90 per cent has been noted. The boats average 40 kg per trip. The average income of these fishermen is calculated as 130,000 CFP francs/month, which is rather low for French Polynesia, but is achieved in an average 11 fishing days per month. The net result is that the *poti marara* fleet has increased both in number and in productivity, the range of fishing activities has increased, and the number of professional fishermen in the Territory has increased.

58. The Representative of French Polynesia also addressed Agenda Item 14 of the Workshop, which described recent FAD research in the Indian Ocean. In a Comores study, tuna were tagged with acoustic transmitters and followed for a maximum of 24 hours; records of their lateral movement indicated that fish showed no homing behavior toward FADs (this was supported by conventional tagging studies at FADs where no tag recoveries were made in the same area). Observations of vertical movement indicated that there were marked differences in movement between albacore, yellowfin and skipjack tunas. Yellowfin spent an average 5 per cent of their time at the surface, whereas skipjack spent 34 per cent of their time there. During the day yellowfin typically swam at between 70 and 90 m. Both yellowfin and skipjack tended to swim in the thermocline. The Mauritius study indicated that FADs had a negative effect, leading to a decline in local market prices and conflict between users. It was important that legal and administrative matters be considered as part of any FAD programme.

59. He said too that although site depth was a factor in determining a FAD's ability to aggregate fish, proximity to coastlines or reef systems was regarded as more important. He gave the examples of the Comores, where FADs are typically anchored 15 miles offshore in depths of 3000 m, and Mauritius where FADs are anchored in 2000 to 3000 m, making the point that the aggregating effect of high-seas FADs was usually different from those moored in coastal waters.

60. The discussion which followed centred on the effectiveness of shallow-water FADs; the point was made that although little work had been done on such FADs in the Pacific, experience elsewhere indicated that shallow water FADs could be very effective in gathering bait species which could be used as a food source or as bait to support offshore fishing operations.

61. The Chairman then moved the meeting to Agenda Item 15 of the Workshop and summarised the presentations made during the workshop. It was clear, he said, that all aspects of FAD technology and utilisation remained of deep interest to Pacific Islands fisheries managers, administrators and fishermen, and that any one of the topics addressed could have been expanded at some length to good effect.

62. The Chairman reiterated the important point made during the workshop that knowledge of how FADs perform as fisheries enhancement tools, and their relative value, had increased dramatically since systematic recording of FAD catch data and life spans had become widespread. He pointed out that for any country to gauge the worth of its FAD programme, and thus determine what resources should be devoted to supporting such, accurate long-term data collection would continue to be of great importance.

63. The Chairman noted that through their comments and questions, representatives had expressed particular concern with: the continuation of technical research and experimentation aimed at increasing FAD longevity; exploration of the technology and application of FADs deployed in shallow, inshore waters for the purpose of gathering small pelagic species; and pursuing the study of the socio-economic value of FADs in relation to their cost.

64. The Chairman concluded by thanking all speakers and representatives for their contributions to the workshop and the FAD review study, and expressed the particular thanks of the Commission on behalf of all member-countries, to the United States Coast Guard for making available the services of Lt Richard Boy. He offered his personal thanks to Lt Boy, and to Mr Paul Gates who undertook the FAD review study on behalf of the Commission.

**ATTACHMENT I****WORKSHOP AGENDA****FAD PROGRAMMES IN PACIFIC ISLAND COUNTRIES**

1. Introduction and overview
2. SPC regional FAD study
3. FAD case studies
  - French Polynesia
  - Guam
  - New Caledonia
  - Vanuatu
  - Hawaii

**PROBLEM AREAS**

4. Introductory overview of major problem areas
5. Design and fabrication problems
6. Mooring designs and line selection
7. Mooring component calculations
8. Problems associated with raft design
9. Improvements in raft design
10. FAD programme planning and deployment-related problems
11. FAD monitoring

**FADS AND FISH**

12. Application of FAD experience from the industrial sector
13. Studies of tuna movements around FADs: French Polynesia
14. Studies of tuna movements around FADs: Hawaii
15. FAD research in the Indian Ocean
16. Summing up