

THE SOUTH PACIFIC ISLANDS FISHERIES NEWSLETTER

No. 9

Noumea, New Caledonia

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Issued by the South Pacific Islands Fisheries Development Agency, a United Nations Development Programme (Special Fund) project, with the Food and Agriculture Organization of the United Nations acting as Executing Agency and the South Pacific Commission Co-operating Agency on behalf of the participating governments.

SOUTH PACIFIC ISLANDS FISHERIES DEVELOPMENT
AGENCY

Project Manager: Professor F. Doumenge.

Project Co-Manager: Mr R.H. Baird

Address: c/o P.O. Box D5
Noumea
New Caledonia

Cables: SPIFDA, Noumea

EDITORIAL

The South Pacific Islands Fisheries Development Agency now draws to a close. Professor Doumenge, whose energy and enthusiasm have been responsible for the establishment of the experimental fish pond in New Caledonia and contributed to the rapid development of the fish ponds at Ravi Ravi in Fiji, oyster culture programme in Fiji, the New Hebrides and New Caledonia, and who has produced the SPIFDA Newsletter and kept information on all aspects of fisheries development flowing between the Pacific territories, leaves the Project in October. Professor Doumenge returns to the University of Montpellier, where he is Professor of Geography, at the end of October 1973 (see recommendation no. 1 of the Fisheries Technical Meeting, p. 20).

Remaining in the field after the Professor's departure, will be Mr. Dan Popper, fish culturist (see Newsletter no. 8), who will now be based at the Ravi Ravi fish ponds near Lautoka, Fiji, to assist and advise on the fish culture work (rabbitfish and mullets) that is now getting underway there. Mr. Ritchie, of the USA, oyster culture expert, arrived in Noumea on the 7th of July to join SPIFDA. He went on to Suva, after visiting oyster projects in the New Hebrides, on the 20th July, where he will now stay to assist and advise in the oyster culture development work.

The fish pond at Baie St. Vincent (New Caledonia) will, after the end of October, be managed initially by the New Caledonian Administration through the Department of Merchant Marine. Experimental work on culture of shrimp, oysters and fish will be continued. Results of the work carried on there will be available to the region and liaison between the South Pacific Commission and the staff working at the ponds will be maintained.

In view of the termination of SPIFDA, no Consultative Committee meeting was held in 1973. Instead, the South Pacific Commission held its sixth Technical Meeting on Fisheries in Suva (see pp. 3 - 25). Proposed projects to continue and extend the work started by SPIFDA on a regional basis were submitted to the Meeting by SPC and FAO. These projects included mariculture continuation and outer reef fishing developments. FAO and SPC proposals were welcomed and supported by the Meeting and it was considered that the projects were complementary and would substantially assist in fisheries development throughout the region. These projects will be commented upon more fully after they have been discussed by the South Pacific Conference at present meeting in Guam.

The Fisheries Meeting commented upon the usefulness of the Newsletter and recommended that SPC should continue to issue a Fisheries Newsletter after the termination of SPIFDA. It is hoped that fisheries workers in the region will feed in items of interest and reports of progress to the SPC for inclusion in future issues.

It had been proposed, and agreed to by countries and territories in the region, that a post of UNDP Regional Fisheries Adviser should be established. The Fisheries Adviser will be based in Apia. The immediate objectives of the project are:

To assist and advise countries and territories of a region in the:

- Coordination of aquaculture development programmes.
- Formulation of outer reef and mangrove fishery development projects.
- Formulation of fisheries development plans.
- Setting up of training facilities for fishermen.
- Development of local tuna fishery industry including live bait fishing, use of pearl shell lure, etc.
- Development of fishery products for export, e.g. bêche-de-mer and tuna.
- Proper management of reef fishery resources including lobster and turtles.
- Introduction of improved types of gear and craft.
- A fellowships programme to train fishery administrators, development officers and technicians.
- Other related fishery development programmes.

In fulfilling the objectives the Regional Fisheries Adviser will, with the assistance of consultants, perform the following activities:

- Assist countries and territories in the region in the formulation of Country Programmes and development projects for assistance from UNDP and other multi- and bilateral sources.
- Act as FAO/UNDP Project Liaison Officer in the area to prepare project documents and other background data covering all the pre-operational phases of development projects for which assistance may be received from UNDP and other sources.
- Advise governments on ad hoc technical problems as requested.
- Assist FAO headquarters and SPC to prepare handbooks, manuals and other publications on the fisheries of the area.
- Participate in national, group country and regional training centres and seminars in the field of fisheries in the area.
- Inform the fisheries officers in the region and FAO periodically of the progress of fisheries developments in the area in close collaboration with the South Pacific Commission Fishery Officer.

This post has been advertised since July - it is hoped that final selection will be made soon and that the adviser will take up his duties in the very near future.

R.H. Baird

THE SPC SIXTH TECHNICAL MEETING ON FISHERIES

(Suva, Fiji, 23 - 27 July 1973)

At the SPC Planning Committee Meeting held in Nouméa in May 1973, the Meeting was informed by the Deputy Regional UNDP Representative that UNDP support would not be available beyond the end of 1973 for the present SPIFDA Project, except in respect of the uncompleted portion of the contracts of two recently appointed experts.

The Regional UNDP Representative had, on 11 April, 1973, advised the Commission that neither FAO nor UNDP saw the need for a meeting of the SPIFDA Consultative Committee in 1973.

In view of the views expressed by the South Pacific Conference and Session in 1972, the Secretariat felt obliged to seek the advice of Fisheries Officers of the Region on the steps to be taken to carry on the work of SPIFDA after its termination, and arrangements were therefore made for a Fisheries Technical Meeting which was held in Suva from 23 to 27 July 1973.

The Meeting was attended by the following representatives and observers:-

American Samoa

Mr Stanley N. Swerdloff
Director of Marine Resources
Government of American Samoa
Pago Pago.

Fiji

Dr Hubert Squires
Fisheries Division
Department of Agriculture,
Forests and Fisheries
Suva.

Mr P. Holness *Peter*
Principal Fisheries Officer
Fisheries Division
Department of Agriculture,
Forests and Fisheries
Suva.

Mr Robert Stone
Co Project Manager
FAO Skipjack Project
Suva.

Mr John Spottiswood
Fisheries Division
Department of Agriculture,
Forests and Fisheries
Suva.

Mr Tom Licatovich
Fisheries Division
Department of Agriculture,
Forests and Fisheries
Suva.

Gilbert and Ellice Islands Colony

Mr Sam Rawlins
Fisheries Development Officer
Funafuti. Ellice Islands.

New Caledonia
Wallis & Futuna Islands

M. René Grandperrin
Océanographe/Biologiste
Centre ORSTOM de Nouméa
Nouméa.

New Hebrides

M. Michel Autrand
Chargé des Pêches
Résidence de France
Port Vila.

Papua New Guinea

Mr Greg Graham
Assistant Director
Division of Research and Surveys
Department of Agriculture,
Stock and Fisheries
Konedobu.

Tonga

Mr W. Wilkinson
Fisheries Officer
Ministry of Agriculture
Nuku'alofa.

Trust Territory of the
Pacific Islands

Mr Peter Wilson
Chief, Marine Resources
TTPI
Saipan. Mariana Islands. 96950

ObserversAustralia

Professor C. Burdon-Jones
 Professor of Marine Biology
 School of Biological Science
 James Cook University
 Townsville. Queensland.

Mr P. Lorimer
 Technical Adviser on Fisheries
 Department of Primary Industry
 Canberra. A.C.T.

Hawaii

Mr R. Shomura
 Honolulu Laboratory
 US Department of Commerce,
 National Oceanic and Atmospheric
 Administration
 P.O. Box 3830
 Honolulu.

ORSTOM

M. P. Fourmanoir
 Centre ORSTOM de Nouméa
 Nouméa.

M. R. Grandperrin
 Océanographe/Biologiste
 Centre ORSTOM de Nouméa
 Nouméa.

Papua New Guinea

Dr E. Balasubramanian
 Head, Department of Physics
 University of Technology
 Box 793
 Lae.

School of Natural Resources

Professor T.E. McInerney
 School of Natural Resources
 University of the South Pacific
 P.O. Box 1168
 Suva. Fiji.

FAO / UNDP

Mr Raymond Fort
 Senior Agricultural Adviser
 UNDP
 Apia. Western Samoa.

F A O

Dr Subba Rao
FAO of UN Headquarters
Rome. Italy

Mr Robert Lee
Project Manager
FAO Skipjack Project
Fiji.

SPIFDA

Professeur F. Doumenge
Project Manager
UNDP South Pacific Islands
Fisheries Development Agency
P.O. Box D5
Nouméa-Cedex. New Caledonia.

Mr D. Popper
Aquaculture Expert
UNDP South Pacific Islands
Fisheries Development Agency
P.O. Box D5
Nouméa-Cedex. New Caledonia.

Mr E. Ritchie
Mollusc Culture Expert
c/o Fisheries Division
Suva. Fiji.

South Pacific Commission
Secretariat

Mr Alan Harris
Programme Director (Economic)
Mr R. H. Baird, Fisheries Officer

Mr P. Hodgkinson, Statistician

Mr Ch. Stenersen, Interpreter

Mr G. Azariah, Interpreter

Mlle. Simone Exbroyat,
Conference Officer.

It is regretted that the Fishery Officer from Western Samoa, Mr Temo Bati, was unable to attend for reasons of ill health.

The agenda adopted for the Meeting was as follows:-

1. Country Statements. Progress to date and future plans.
2. Brief review of SPIFDA activities.
3. Review of Tuna Programmes.
4. The value of technical meetings and seminars as contrasted to within-region fellowships.
- 4.A Fisheries education.
5. The main factors reducing the rate of fisheries technical progress in the territories and steps that can be taken to overcome these factors.
6. Review of Long-Term Projects.
7. What regional activity, if any, should replace SPIFDA.
8. UNDP/SPC relationships.
9. What should be the future role of the South Pacific Commission in fisheries development ?
10. Other business.
11. Conclusions and recommendations.

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Working parties on Fisheries Education and on Skipjack Research and Development were set up and reported to the Meeting. The working party on Fisheries Education comprised Professor C. Burdon-Jones, Professor T.E. McInerney, Dr E. Balasubramian, Mr P. Wilson and Mr G. Graham.

1. Review of Current and Projected Educational Needs (Report of Working Party)

The present and long-term needs for a wide spectrum of fisheries education and training in the South Pacific were examined. Such training ranged from in-service instruction through diploma training, degree education, and post-graduate research at M.Sc., Ph.D., and other levels.

It was evident that not one institution in the area was able to meet the demand, neither was it thought likely that such an institution was required, but that the expertise of existing institutions be made available to the South Pacific territories, and that by careful integration of expertise available and planning all aspects of training could be met.

The sub-committee stressed that the provision of skilled personnel at all levels compatible with the developmental needs of the fisheries in the South Pacific was an urgent top priority requirement. This need has been recognised by many Universities and Institutions in the area, and some courses have already been initiated.

Training programmes designed to develop a task-force at all levels have been formulated in committees elsewhere, and these are outlined below and detailed in the bibliography (1, 2, 3).

2. Identification of Training Centres

2.1 Whilst recognising that there are many institutions other than those cited below that may be usefully involved in the development and expansion of training programmes in the South Pacific the following were already or would be imminently providing courses and aid:

- (a) University of the South Pacific, Suva, Fiji
- (b) James Cook University of North Queensland, Australia
- (c) University of Technology, Lae, Papua New Guinea
- (d) University of Papua and New Guinea, Boroko.

2.2 The involvement and integration of the contribution of further institutions or programmes would require evaluation and may be the subject of a more extended and detailed report to be submitted to the South Pacific Commission at a later date if required.

2.3 Each centre offers specialist training in discrete fields designed to suit the needs of its catchment area. There is no significant degree of overlap of effort. The training programmes that have been involved can be extended and more closely integrated on an inter-institutional basis if required, and adequately funded.

3. Role of each Training Centre

3.1 The James Cook University provides for the training in Australia at present, of marine scientists with expertise in fisheries biology, who can participate and contribute substantially to the evaluation and development of marine resources. These courses are available to all suitably qualified applicants on an international basis. They are especially well suited for personnel working in Australia, South East Asia, and the South Pacific.

3.2 The James Cook University is Australia's marine centre for training in marine biology and tropical marine biology in particular. It has a well designed research vessel equipped for commercial trawling and gear handling, as well as fisheries oceanography. All advanced courses offer extensive field experience and involve work at sea.

The University is also equipped for research and training in pollution, and environmental quality assessment and management.

3.3 The University can also assist in the training of fisheries experts in those fields in which it has expertise, i.e.

- a. general marine resource evaluation and analysis
- b. pollution problems
- c. pest-identification and control
- d. mariculture and aquaculture
- e. ciguatera
- f. identification of marine organisms
- g. identification and analysis of unusual environmental phenomena.

3.4 The University can advance the development of fisheries expertise in the South Pacific by providing:

- a. consultants
- b. in-field training on a short-term basis in remote Pacific areas if adequately funded
- c. data relevant to fishery development, ecology, larval development, food webs, population analysis, pests, parasites, life histories, long-term effects of pollutants.

3.5 The James Cook University is currently training under-graduates and post-graduates suitable for fisheries work. It can also be a recruiting ground for skilled voluntary labour, as supported by existing government schemes.

3.6 The University is further prepared to consider participation in short-term courses to be held at a suitable venue for field experts, on the following subjects:

- a. environmental quality evaluation and management, pollution
- b. ciguatera
- c. mariculture and aquaculture
- d. vertebrate and invertebrate taxonomy
- e. other subjects where needs defined and if expertise available.

Participation in the above activities will require adequate funding by some extra-university body.

3.8 The University of Technology Lae, sees its role as basically:

- a. fisheries technology
- b. fisheries industry development and management

At present, within Papua New Guinea, the fishing industry is comparatively small and primarily serves internal markets, but is already providing a significant overseas market.

The present professional staff in the institution and in the Department of Agriculture, Stock and Fisheries, is expatriate and to be replaced.

3.9 It is planned that training at Lae should also provide training in environment management (including pollution), sociological relations, and policy formulation.

This training is to be offered at the degree and diploma level and will embrace three elements:

- (a) Fisheries Technology which will include a basic science and fishery science training in fish culture, gear technology, boat technology, marine engineering, seamanship, navigation, fish processing and refrigeration.
- (b) Fisheries Management, e.g. economics, business management, administration, marine laws, political and social science, and rural sociology.
- (c) Environmental Science, i.e. climatology, hydrology, limnology, and pollution control.

3.10 The University of the South Pacific and several co-ordinating Fiji agencies provide fisheries training on a regional basis, and designed to serve the needs of the 10 countries within the University of the South Pacific catchment area. The scheme provides the following spectrum of fisheries training at present:

- a. Post-graduate work in marine biology to M.Sc. and Ph.D. level.
This is only available to a limited number of students.
- b. B.Sc. level training in the marine biological sciences.
- c. Diploma in Tropical Fisheries intended mainly for the training of extension field officers. Over the next 5 years most of the resources will be directed into the Diploma training.
- d. A variety of in-services and short-term courses.

4. Conclusions and recommendations

The Sub-Committee resolved that sufficient existing and projected courses had been initiated and planned to meet the immediate and long-term needs of the South Pacific Commission region, but did not preclude the possibility of modifying the existing programme or projected programmes to meet the specific needs of the Commission if these could be identified and adequately funded.

It is recommended that the SPC should take appropriate action to ascertain the fisheries educational needs of Pacific territories and countries.

- (a) define more clearly its further needs;
- (b) consider the advisability of establishing and supporting a working party on fisheries education.
- (c) register and publicise through governmental agencies and all other interested organisations, its approval and support of training programmes, already being established in Pacific educational institutions.
- (d) seek ways of improving the funding of these courses, and training programmes so that if need be they can be refined and extended to meet regional requirements.

References

1. Balasubramanian and Reynolds, 1973. Requirements for fisheries training in Papua New Guinea.
2. Burdon-Jones, 1973. Opportunities for training in Tropical Marine Science (under revision).
3. Lindsay, 1972. Fisheries training in the region served by the University of the South Pacific.

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The Skipjack working party comprised Mr R. Shomura, Dr S. Swerdloff, M. R. Grandperrin, Mr Robert Lee, Mr Robert Stone and Mr P. Hodgkinson.

In this Newsletter, the full report of the working party on skipjack follows. It is felt that, with the probable rapid growth of this fishery in Pacific countries and territories in the future and the contribution that the fishery can make to the nutritional and economic needs of the area, the content of the report is of vital interest and concern to all fisheries workers and administrators.

DEVELOPMENT OF SKIPJACK TUNA FISHERIES IN THE SOUTH PACIFIC OCEAN

I. Background

The skipjack tuna is probably the most important fish species involved in the future developmental plans of many island communities of the Pacific Ocean. This is especially true in the South Pacific where the skipjack tuna is expected to meet much of the protein needs of the island populace and also form the supply base of a major industry.

In the world markets, the demand for tuna has undergone a tremendous growth in the last several decades. In the 1950's and 1960's the demand was met by the rapid development and expansion of the longline fisheries in the world's oceans and by the modernization of the purse seine fishery in the eastern Pacific. Assessment studies of the commercially important species, e.g. yellowfin tuna, bigeye tuna, albacore and bluefin tuna indicate that in most areas substantial increases in landings cannot be expected with increased effort. This, however, is not true for the skipjack tuna. Although the current annual yield of skipjack tuna landed by the several fisheries operating in the Pacific Ocean exceeds 250.0 thousand tons, assessment studies indicate that the yield can be increased several folds without damage to the resource base.

In response to the demand for tuna, several new fisheries for skipjack tuna have been initiated and existing ones expanded. This development has been especially notable in the western Pacific. The Japanese pole-and-line fishery has shown a phenomenal growth with an expansion of its operation into southern waters; present catches from the waters south of the main Japanese islands have been reported to exceed 30.0 thousand tons annually.

For the island communities, participation in the development of skipjack tuna fisheries has a high probability of success. Of the two principal methods of fishing commercially for surface tunas, the pole-and-line method is more readily adaptable for application by the islands than the purse seine method. The purse seine requires considerable capital for the purchase and maintenance of vessel and gear. Further, purse seine fishing for skipjack tuna in the central and western tropical Pacific has not been totally successful to date. Full participation in a purse seine fishery for skipjack tuna in the central and western Pacific by island territories is not likely, at least in the immediate future. The pole-and-line method, on the other hand, can be implemented immediately by island territories with adequate supplies of naturally-occurring baitfish. Relative to purse seine fishing, the pole-and-line method includes less initial capital outlay, lower overhead and operating costs; trips of shorter duration, and lesser demands of harbour and port facilities. Further, pole-and-line fishing is a proven method of catching skipjack tuna in the tropical waters of the Pacific.

In the current climate of increased demand for tuna and the increased activity of fishing nations to harvest the skipjack tuna resources of the Pacific, it is urgent and timely that the island territories of the South Pacific implement immediately their plans to initiate skipjack fisheries or expand existing ones.

It should be emphasized that the development of a full understanding of the status of the skipjack stocks in the Pacific will require a common data base; thus, standardization of the data collected and method of collection is essential. Further, there is a definite and urgent need for interchange of information and cooperative management of skipjack resources between:

1. The various territories in proximity to the stocks.
2. The SPC territories and the external countries already exploiting the resources; the island communities have not previously had access to skipjack resource data collected by the larger countries.

II. Data collection of catch and effort statistics

The purpose of collecting data from a fishery vary from meeting the need to measure economic growth and success of the fishery for the purposes of business to providing the basis for management of the resources. Although the demands of business may only require the collection of total production by a time unit, e.g. week, month or year, it would be prudent to collect statistics which would meet the needs of stock assessment. Too often, fisheries management are applied after the resources have been overexploited. Also, for many fisheries, data are not collected from the initial stages of development; a period considered important in the eventual evaluation of the stock.

It is recommended that all countries and territories in the region implement a programme to collect adequate fishery statistics. These data should be from each fishery in the area and should include information which will provide for proper inter and intra regional comparisons.

The collection of catch and effort data on a routine basis will be most applicable for areas where the fishery has one or several centralized points, e.g. fishing harbour or a central marketing place. Under these conditions data collection will be relatively easy. The collection of fishing data from casual fishing effort e.g. non-commercial effort, however, will be too difficult in most areas for routine assessment. For these, the fisheries officers should consider implementing a suitable sub-sampling system to obtain estimates of total catch.

The basic data needed on a regional basis, the means to collect these data and the approach for processing and disseminating these statistics are discussed in the following sections.

A. Catch

Weight and, if possible, number of tuna caught each trip should be recorded by species. A report form similar to that already in use in Papua New Guinea would meet the basic statistics needs for the South Pacific area. The data base should be the catch by boat and not be a summary of market statistics where individual boat catches may be combined. These data could be collected directly from each boat, companies or markets. For the latter two elements the condition of obtaining individual catch by boat still exists.

A number of features will influence the selection of the collecting method. Each island territory should develop its collection system based on the characteristics of its fishery and marketing elements.

B. Effort

The basic effort data should include the number of days fished by trip. It should be noted here that an important statistic often omitted from many fisheries data is the reporting of zero catches, this statistic is essential for assessment studies. Other data to be collected include the method of fishing, number of crew, size of vessel and the horse-power of engines. The latter data could be obtained from boat registrations. For island territories where boat registration is lacking, the establishment of a suitable system is urged as a priority activity.

The collection of regional catch and effort data would be considerably assisted by the use of a standardized regional reporting form, and it is recommended that the Honolulu Laboratory of the U.S. National Marine Fisheries Service be asked to design a suitable form, based on the Papua New Guinea model. It is also proposed that the South Pacific Commission be asked to arrange for the processing of data for those countries lacking the facilities to process their data, and for the dissemination of regional statistics as prepared.

III. Regional Research Efforts

Certain population parameters can only be studied over the entire range of stock. This would include seasonal migratory patterns, sub-population distribution, maturation, spawning and, as an endpoint, magnitude of the resource and optimal sustainable yield. Region-wide data collection with centralized analysis is necessary to provide the basic information for skipjack management decisions.

Skipjack research units possessing required capabilities already exist in at least six widespread territories. It is appropriate and urgent at this time to commence with cooperative research efforts which will aid in the development of the skipjack fisheries in the island territories and also aid in understanding the skipjack resources for management purposes. Examples of several important regional programmes include:

1. Gear and other technological programmes to solve problems faced mutually by the island territories, e.g. supply and survival of baitfish and culture of suitable baitfish.

2. It is proposed that immediate efforts be directed toward a regional tagging programme which would provide information of several important parameters, e.g. migration, age and growth, and mortality rates. In the interest of standardization, one type of tag and one uniform technique must be adopted by all territories. Technical instruction must be given to all units by the central agency. The central agency would serve as the bank for all tagging and return information.
3. A study of the sub-population structure of skipjack tuna in the central and western Pacific Ocean. The territories could collect the necessary samples and transmit them to an interested institution for processing and analysis. Sample collection techniques are not particularly complex, but instruction is necessary to assure uniformity.
4. A programme to study the relationship between oceanographic conditions and the spatial-temporal distribution of skipjack tuna. Physical and chemical data (e.g. water temperature, salinity, and current regimes) are available in various international data banks, but analysis of these data with skipjack availability are limited.
5. A programme to study the relationship between the biological environment and the skipjack diet. The regional programme could include a cooperative collection of stomach contents and the analysis of these data. Also, the spatial-temporal variations of skipjack tuna could be compared with the standing stocks. Similar studies could include all aspects of the ecology of skipjack tuna larvae.

According to the above considerations, it is therefore proposed that the South Pacific Commission sponsor a "Standing Committee on Tropical Pacific Skipjack Resources". The role of the committee would be the assessment of skipjack resources in the tropical Pacific, with concomitant exchange of information between the island communities and larger fishing nations. It is proposed that the South Pacific Commission organize this committee. The committee should consist of a small group, e.g. 6 individuals, of tuna specialists from member countries and from other countries as needed. Membership of the Standing Committee could include:

1. representatives from those island territories with developing skipjack fisheries,

2. representatives of larger nations with tropical skipjack fleets, including Japan, United States, Australia and New Zealand,
3. SPC Fisheries Officer and
4. a representative of FAO.

The Committee should meet at least annually.

V. Dissemination of Information

The current literature on tropical skipjack fisheries is voluminous, but because of their isolation, the island territories do not have ready access to this information. It is therefore proposed that the SPC Fisheries Officer, in conjunction with important Fisheries Services (e.g. U.S. National Marine Fisheries Service and ORSTOM) collect and disseminate pertinent skipjack literature to the concerned territories.

VI. Recommendations

The following provides a summary of the recommendations to the South Pacific Commission made in this report.

The working party recommended that:

1. The countries and island territories of the South Pacific Commission area should implement plans to initiate skipjack fisheries in their area or to expand existing fisheries.
2. A data collection system should be implemented to gather appropriate statistics from the tuna fisheries of the various areas.
3. The data collected should be standardized on a region-wide basis, and the processing of data and dissemination of regional statistics should be coordinated by the South Pacific Commission.
4. The needed region-wide research effort be co-ordinated by a centralized agency. Research efforts identified as urgent include a regional tagging programme, identification of skipjack sub-populations, defining the relationship of spatial-temporal distributions of skipjack with the environment, and defining the relationship of the biological environment and the skipjack tuna diet.

5. The SPC sponsor a Standing Committee on Tropical Pacific Skipjack Resources. The Committee to assess the skipjack resources on a timely basis and provide for the exchange of information between the island communities and the larger fishing nations. The committee to be made up of tuna specialists from member countries of the South Pacific Commission and other outside specialists as needed. The Secretary of the Standing Committee will be a representative of the South Pacific Commission. The Secretary in consultation with other officials of the South Pacific Commission will determine the make-up of the Standing Committee.
6. SPC arrange for collection and dissemination of pertinent skipjack literature to the island territories.

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The titles of working papers and country statements submitted to the Meeting are listed below:

FISHERIES DEVELOPMENT IN TONGA

by W. Wilkinson, Fisheries Officer, Ministry of Agriculture, Nuku'alofa. Tonga.

PROSPECTS FOR CULTURE OF RABBITFISH IN THE SOUTH PACIFIC

by D.H. Popper, Department of Zoology, University of Tel Aviv, FAO Consultant to SPIFDA, Nouméa.

THE CONSERVATION OF THE HAWKSBILL TURTLE ERETMOCHELYS IMBRICATA IN WESTERN SAMOA

by Wayne N. Witzell, U.S. Peace Corps, Fisheries Division, Department of Agriculture, Forests and Fisheries, Apia, Western Samoa.

OYSTER FARMING IN THE NEW HEBRIDES

by Michel Autrand, Fisheries Officer, French Residency, Vila, New Hebrides.

CURRENT FISHERIES PROJECTS IN AMERICAN SAMOA

by Stanley N. Swardloff, Director of Marine Resources, Government of American Samoa, Pago Pago, American Samoa.

THE ACTIVITIES OF THE MICRONESIAN MARICULTURE DEMONSTRATION
CENTRE

by Peter Wilson, Chief, Marine Resources,
Trust Territory of the Pacific Islands,
Saipan, Mariana Islands.

A BRIEF OUTLINE OF THE FIRST YEARS OF THE PAPUA NEW GUINEA
SKIPJACK FISHERY

by R.E. Kearney, Department of Agriculture, Stock and Fisheries,
Konedobu, Papua New Guinea.

EXPLORATORY SHRIMP TRAPPING IN THE HAWAIIAN ISLANDS

by P. Struhsaker and D.C. Aasted, Southwest Fisheries Center,
National Marine Fisheries Service, NOAA
Honolulu, HI 96812.

SKIPJACK TUNA FISHING PROJECT IN FIJI

by Robert Lee, Project Manager, UNDP/FAO,
Skipjack Project, Fiji.

SPECIFICATIONS AND METHOD OF SETTING OF THE STICK HELD DIP NET
USED BY THE UNDP/FAO CHARTER VESSEL SHINPO MARU NO. 2.

by Robert M. Stone, Fisheries Officer

NOTES ON PROBLEMS ENCOUNTERED IN AN ATTEMPT TO DEVELOP A
CANOE FISHERY AT FUNAFUTI ATOLL

by Mr Sam Rawlins, Fisheries Development Officer,
Funafuti.

DORY CONSTRUCTION IN BETIO SHIPYARD, TARAWA
GILBERT & ELLICE ISLANDS DEVELOPMENT AUTHORITY

by Ian Wallace, Ch.Eng. M.R.I.N.A.,
Betio.

COUNTRY STATEMENT

by Gilbert & Ellice Islands Colony.

COUNTRY STATEMENT

by British Solomon Islands Protectorate.

The SPC Secretariat presented working papers on the following, which are to be presented to the SPC Conference in Guam in September:

1. Special Project on Inshore Fisheries Development (Reef, Lagoon and Mariculture).
2. Special Project on Outer Reef Artisanal Fishing.
3. Special Project on Fish Poisoning.
4. Special Project on Conservation of Nature and Natural Resources.
5. Special Project for the creation of a Regional Statistical Center.

These working papers are all at present restricted until they have been examined and discussed at the forthcoming South Pacific Commission Conference to be held in Guam in September.

Two regional projects proposed by FAO for aquaculture and outer reef fishing were discussed by the Meeting, and it was agreed that they were complementary to the SPC projects 1 and 2 above. The FAO regional projects papers are also at present restricted.

The following recommendations were made by the Meeting:

South Pacific Islands Fisheries Development Agency
Recommendation No 1

The Meeting reviewed the programme and accomplishments of the South Pacific Islands Fisheries Development Agency during the life of the project, and recognised and highly commended the work of its Project Manager, Professor F. Doumenge, whose dedication and untiring efforts contributed greatly to the success of the S.P.I.F.D.A. The Meeting recommended that a letter of commendation be forwarded by the South Pacific Commission to FAO and UNDP.

Fisheries Education
Recommendation No 2

The meeting recommended that the South Pacific Commission should:

- (a) take appropriate action to ascertain the fisheries educational needs of Pacific territories and countries;

- (b) consider the advisability of establishing and supporting a working party on fisheries education;
- (c) register and publicise through governmental agencies and all other interested organisations its approval and support of training programmes already being established in Pacific educational institutions;
- (d) seek ways of improving the funding of these courses and training programmes so that if need be, they can be refined and extended to meet regional requirements.

The Role of the South Pacific Commission in Fisheries Development
Recommendation No 3

The Meeting

- (a) recognised the assistance rendered by the South Pacific Commission in encouraging Pacific territories to establish their own territorial programmes, and in organising and sponsoring the South Pacific Islands Fisheries Development Agency during the past three years, during which time this Agency has played such an important part in the development of various territorial fisheries programmes;
- (b) also recognised that, with the closing of the S.P.I.F.D.A. programme, a decrease in regional fisheries activities may develop which could seriously retard many territorial fisheries programmes;
- (c) considered that with the development of fisheries programmes in most territories during recent years, the role of the South Pacific Commission in assisting with the development of fisheries programmes should now be revised in the light of existing conditions;
- (d) further considered that primary assistance to the territories by the South Pacific Commission in future will require more technical support of a long-term basis than has been possible in the past with the limited fisheries staff and budget. Therefore, the Meeting recommended that the South Pacific Commission note the growing importance of fisheries in the region and greatly increase the scope of its technical assistance programme by providing a larger percentage of South Pacific Commission operational funds and personnel towards this effort;

- (e) in view of the extended role proposed for the South Pacific Commission in fisheries development, recommended that the second post of Fisheries Officer, approved by the Twelfth South Pacific Conference and Thirty-fifth Session of the Commission, should be continued and filled, if adequate funds were available.

Review of Proposed Long-Term Projects

A. Outer Reef Artisanal Fishing Project Recommendation No. 4

The Meeting recommended that support be given to this Project, and further recommended that

- (a) additional expenditure of \$A20,000 (of which \$A5,000 could be contributed by American Samoa) be added to the project to permit the purchase of two further aluminium diesel powered boats, which would be used in tests against existing dory fleets in order to assess the value of alternative hull design, power units and materials.
- (b) having regard to the present and proposed high level of investment in dories, the utmost importance should be attached to the investigation of alternative boat designs,

B. Inshore Fisheries Development Project Recommendation No. 5

The Meeting recommended that support be given to this project, and further recommended that

- (a) in view of the great importance placed upon turtle conservation and the prospective value of turtle farming, the turtle sub-project should be expanded to provide that more consultant services should be made available throughout the duration of the project; to permit visits to interested territories;
- (b) because lobster potential is considered as an under-developed resource in most of the territories of the region, the lobster sub-project should be considerably expanded, and consultant services should be available to supervise the sub-project, and to advise interested territories;
- (c) additional support should be given to the bêche-de-mer sub-project by providing for inter-territorial study visits to facilitate development of this industry.

C. FAO Proposed Aquaculture Project
Recommendation N° 6

The Meeting noted with interest and approval that the draft FAO Aquaculture Project provided for continuation for two years of the Aquaculture Demonstration Centre at Baie St. Vincent, New Caledonia, and of the aquaculture project in Fiji, which had been initiated by S.P.I.F.D.A. and recommended that support be given to the proposal. The Meeting further recommended that, in the light of the FAO proposal, the proposed work on molluscs in the South Pacific Commission project for Inshore Fisheries Development could be eliminated.

D. FAO Proposed Outer Reef Fisheries Project
Recommendation N° 7

The proposed FAO project on Outer Reef Fisheries was studied with care. It was concluded that the FAO project as drafted would be of considerable value to the region as complementary to the proposed South Pacific Commission project. The Meeting therefore recommended that the FAO project be supported. It was further noted that the FAO project did not overlap with the proposed South Pacific Commission project.

E. Tropical Pacific Skipjack Resources
Recommendation N° 8

The Meeting accepted and endorsed the report of the working party on Skipjack Resources and, recognising the economic importance of tropical skipjack resources, recommended

- (a) the establishment of a region-wide skipjack resource assessment programme;
- (b) the establishment of an SPC sponsored standing committee on Tropical Pacific Skipjack Resources; such committee to include tuna specialists from SPC territories and countries and other outside specialists as needed. The Commission should determine the composition of the Committee, with an SPC officer serving as Executive Secretary. The role of the Standing Committee shall include formulation, implementation and evaluation of the skipjack resource assessment programme;
- (c) that funds be made available in January 1974 for the initial meeting of the Standing Committee and for preliminary implementation of the programme.

F. Other Projects
Recommendation N° 9

The Meeting recommended

- (a) the compilation by the South Pacific Commission of a catalogue of fishing gear and equipment;
- (b) the provision of funds to obtain the services of a marketing expert to assess possible markets for fisheries products from the South Pacific Commission area;
- (c) the compilation by the South Pacific Commission of a list of personnel involved in fisheries work in the South Pacific Commission area.

Other Business

A. Environmental Pollution
Recommendation N° 10

The Meeting strongly supported the proposed programme for the conservation of natural resources being submitted to the South Pacific Conference, and in particular, emphasises the need for suitable films and other audio-visual aids in this field.

B. Ciguatera Investigation
Recommendation N° 11

- (a) The Meeting recommended that, in view of the serious marketing and public health aspects of ciguatera amongst Pacific food fish, integration and further extension of research into the causes of ciguatera should be undertaken. Support funding for a concentrated effort is urgently needed.
- (b) The Meeting noted that a limited project for further work in this field was included in the South Pacific Commission Health Programme, and strongly supported this project.
- (c) The Meeting further recommended that all data concerning cases of fish poisoning (ciguatera) be transmitted to the South Pacific Commission.

C. Organisation of Fisheries Departments
Recommendation N° 12

The Meeting recommended the desirability of separating Government fisheries departments from agricultural departments throughout the countries and territories of the South Pacific.

D. Territorial Waters
Recommendation N° 13

The Meeting continued to endorse the previous resolutions of the Fourth and Fifth Technical Meetings on Fisheries in relation to the definition of territorial waters.

E. Future Meetings
Recommendation N° 14

The Meeting recommended that Fisheries Technical Meetings should in future be held annually in order to assess progress on the proposed long-term projects and to facilitate exchange of information. The Meeting further recommended that future meetings be held whenever possible in territories with fisheries programmes of interest.

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The full report of the Meeting will be available in October. It would be helpful if recipients of this Newsletter who would be interested in receiving copies of the Report of the Technical Meeting would write to the SPC Fisheries Officer, B.P. D5, Nouméa, New Caledonia, indicating their requirements as soon as possible. This would assist the SPC to determine the number of extra copies of the Report to be run off.

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LIVE BAIT RESEARCH

Skipjack tuna Fishery Project in Fiji

by

Robert Lee

FAO/UNDP Project Manager

Baiting

The method used in searching for baitfish during the day is by visual observation, i.e. scouting accessible beach areas either with a skiff and outboard motor or by walking along the shoreline. The presence of flocks of sea gulls hovering and diving along the shoreline is a good sign that small fish are present in the area.

Two species of baitfish, the sardine (Herklotsichtys punctatus) and silverside (Pranesus pinquis) are usually found schooled together over these areas with the sardine being the predominant species. These species have also been found independent of each other. Another baitfish is the anchovy (Thrissina baelama) which is usually found in estuarine areas, either near mouths of creeks that empty into the sea or in the creeks affected by tides. The foregoing 3 species are the most abundant and important baitfishes captured during the day with a beach seine.

The capture of baitfish during the day is done with a 73m long by 4 m deep (240' x 13') Hawaiian type beach seine. Except for a narrow strip of selvedge between the net and lead line, the entire net is made up of 3.5mm minnow netting. Day baiting is usually conducted in shallow water (depths of 0.3m to 1.83m or 1' to 6') along the beaches which have varying bottom conditions, i.e. over sandy bottom, over sand and coral-rocks or over coral heads.

When a school of small fish have been found, the school is encircled with a beach seine set from a small skiff. The net is gathered until the fish is concentrated in a small area at which time the fish is then transferred from the net into a bait receiver. The receiver is then towed from the baiting area to the vessel at anchor for subsequent transfer to the baitwells.

The method used for catching baitfish with the beach seine is very effective in areas with relatively good and even bottom conditions but not so over coral or rocky bottoms.

Of the baitfish taken during the day, the H. punctatus and P. pinquus are hardy and vigorous and keep well in the vessel's baitwells. They are able to withstand crowding while in the receiver under tow to the vessel or in the vessel's baitwells. Properly cared for, they survive for extended periods in captivity. In 1972 they made up 81% of the day bait catch. The I. baelama is not as hardy as the other two species and must be handled with care. They scale very easily and survival in the wells is for a limited period. In 1972 it made up 19% of the day bait catch.

The method used at night is by light attraction employing either a 1,000 watt above water lamp or a 500, 1000 or 1500 watt underwater lamp while the vessel is riding anchor. Night light attraction is usually carried out in sheltered areas (inlets, bays, harbours and between shoreline and barrier reefs).

At night, bait is captured either with a 12.8m x 16.8m (42' x 55') "lift net" using two 9.8m (32') outrigger poles suspended outboard over the rail or a 20.2m x 21.7m (66.3' x 71.2') "boke ami" also spelt "bouke ami" (stick-held blanket net). A surface light was mainly used when utilizing the "lift net" although a submerged light was sometimes used. An underwater lamp was exclusively used with the "boke ami".

The "lift net" was operated as follows. The vessel anchored in depths of 12.8m (42') or deeper. The outrigger poles were lowered to a position almost parallel to the sea. The net was spread along one side of the vessel and connected to the lines from the outrigger poles. A boom supported either a surface or an underwater light, which hung about 5.2m (17') outboard from the side of the vessel. The light was usually switched on after sundown. When enough baitfish gathered around the light, the net was lowered over the side until the net hung vertically in the water. At a signal from the captain, the crew hauled in the lines that were threaded through the blocks at the end of the outrigger and connected to the bottom edge of the hanging net. Two men in the skiff also assisted in hauling up the section of the net between the outriggers. The net is then gathered until the fish is confined to a smaller area and bailed into the baitwells of the vessel.

In the case of the "boke ami", the vessel is anchored in depths of 22m (72') or deeper. After dark, the submerged light is hung about 7.5 to 9.0m (25 to 30') below the surface suspended from a skiff that trails about 46 to 61m (150 to 200') aft of the vessel. When there is sufficient bait around the light, the boke ami is set in a position well outboard of the vessel. The skiff with the light is slowly moved towards the center of the netting area between the vertically hanging net and the vessel. Upon a given signal the bottom edge of the net is lifted and the net gathered until the bait is concentrated in a small area and ready for bailing and transfer into the baitwells.

Baitfish of various species are attracted to the night lights. The most abundant of the important species attracted and taken at night are the small round herring (Spratelloides delicatulus), sardine (Sardinella sirm), silverside (Atherina ovalaua) and small anchovy (Stolephorus buccaneeri). Important species taken in lesser quantities are the small anchovy (Stolephorus heterolobus), small round herring (Spratelloides gracilis), sardine (Herklotsichthys punctatus), silverside (Pranesus pinquus) and anchovy (Thrissina baelama). Other species of baitfish taken in lesser quantities and importance are the mackerel (Rastrelliger kanagurta), big-eyed scad (Selar crumenophthalmus), cardinal fish (Rhabdamia gracilis), Jacks (Caranx sp.), leatherskin (Chorinemus tol), herring (Dussumieria acuta) and small anchovies (Stolephorus indicus and Stolephorus commersonii (?)).

By species, the H. punctatus ranged from 4.8 to 12.3cm., the P. pinquus from 7.4 to 9.8cm., the I. baelama from 4.0 to 10.2cm., S. delicatulus from 3.1 to 6.9 cm., S. sirm from 10.1 to 20.1 cm., A. ovalaua from 4.7 to 8.0cm., S. buccaneeri from 4.7 to 8.5 cm., S. heterolobus from 4.5 to 8.0cm., R. kanagurta from 9.9 to 20.5cm., S. crumenophthalmus from 6.3 to 14.1cm., R. gracilis from 4.1 to 5.9cm., S. gracilis from 4.0 to 6.7 cm., Caranx sp. from 6.3 to 8.5cm., C. tol from 5.6 to 10.5cm., D. acuta from 7.3 to 15.3cm., S. indicus from 3.3 to 15.0cm., S. commersonii (?) from 5.0 to 9.0cm.

The method of capturing baitfish at night with the lift net-outriggers and boke ami are very effective with the larger boke ami having the edge over the former. The nets were effective in catching most baitfish species, the exception being the H. punctatus and I. baelama which tended to be more "skittish". Bays with some but not too much fresh water run-off appear to be the best places for night baiting in Fiji.

In both day and night baiting operations, the baitfish is transferred from either the net or bait receiver to the vessel's baitwells by means of a bucket (3 imp. gal.). A mixture of seawater and fish in the bucket is transferred to minimize injury to the fish.

Of the baitfish catches taken at night, the S. sirm, A. ovalaua, R. kanagurta, S. crumenophtalmus, C. tol, Caranx sp., including the H. punctatus and P. pinguis which are also taken during the day, are the hardiest. They made up 45.35% of the catch in 1972 and 49.18% in 1973. The I. baelama and R. gracilis which are moderately hardy made up 2.34% in 1972 and 4.74% in 1973. The S. delicatulus, S. gracilis, S. buccaneeri and S. heterolobus are delicate and fragile and must be handled with extreme care. They do not fare well in captivity and therefore must be used as quickly as possible after capture. With good care they survived up to 2 days in the baitwells. They constituted 42.65% of the catches in 1972 and 42.90% in 1973. The D. acuta, S. indicus and S. commersonii (?) are extremely fragile and do not survive in captivity for more than 6 hours. On the few occasions when we were able to utilize these species as baitfish, they produced good results. The only drawback appears to be their poor survival qualities after capture. These species made up 9.91% in 1972 and 2.89% in 1973.

The catch rate during 1972 was rather low: 2,500 buckets of live bait (10,000 pounds or 4,500 kilos) were supplied for 29 cruises (8 cruises less than 50 buckets, 10 cruises between 50 and 100, 9 cruises between 100 and 200, 2 cruises more than 200). Fortunately with a better knowledge of the local environment and with an improvement of the efficiency of fishing effort the catch rate increased by more than 100% for the period January - June 1973. During the first six months of 1973, 16 cruises were supplied by 4,000 buckets of live bait (16,000 pounds or 7,200 kilos). Only one cruise was under 100 buckets, 4 between 100 and 200 and 11 with more than 200 buckets (maximum 553 buckets for the 5th cruise).

Search for live bait during 1972 was spread all over the Fijian archipelago. The best catches were provided from Momi bay (Viti Levu) with 18% of the total catch, Kia island (15%), Savu Savu bay (Vanua Levu - 12.5%) and Ono island (12.5%).

In 1973, the most successful grounds were Soso bay (Kadavu island) providing 46% of the total catch and Ovalau island coastal area (25%).

Fiji Tuna Project

Catch record for 1972 and 1973

In the year 1972, 29 cruises of between 5 to 10 days duration per cruise, involving 214 days were completed. Of the total of 214 days spent on cruises, 103 days (46.6%) of the vessel's time was devoted to scouting and fishing during which time a total of 643 fish school sightings or an average of 6.24 sightings per day were made. Identified schools were 247 skipjack tuna (Katsuwonus pelamis), 53 yellowfin tuna (Neothunnus macropterus), 44 mixed skipjack-yellowfin, 40 little tuna (Euthynnus vaito), 8 mixed skipjack-little tuna, 28 tunas mixed with other pelagic species, 18 dolphin fish (Coryphaena hippurus), 18 miscellaneous pelagic species and 197 were unidentified. Total catch of the year was 44714 kilos.

The year 1972 may not be a representative year to determine the seasonal variation of tuna in the area but it indicated that there are stocks of tuna (skipjack, yellowfin and little tuna) during all months of the year. The better fish catches in 1972 were made between mid-February through May.

In 1973, 16 cruises from January through June gave a total catch of 96151 kilos.

The skipjack is by far the most abundant of the tunas caught in the area which is reflected by the fact that this species made up 80.70% of the Project's total catch by weight. The remainder was comprised of 14.32% yellowfin, 2.79% little tuna and 2.20% of other pelagic species.

Of the tunas, the average weight composition of the skipjack taken from different schools ranged from 0.44 to 9.9kg. (1.0 to 22 lb.), yellowfin from 1.5 to 15.6kg. (3.3 to 34.3 lb.) and the little tuna from 3.0 to 4.5kg. (6.6 to 10 lb.). A very high percentage of the skipjack, however, were under 5kg. (11 lb.) in weight with most in the 2 to 4kg. (4.4 to 8.8 lb.) group.

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FIJIFish processed at Levuka (Ovalau Island) freezing plant

SPIFDA Newsletter no. 3-4 (March 1972) has published data about Levuka's freezing plant for processing catches from Japanese, Formosan and South Korean tuna longliners (see pp. 30/31). Landings of fish for 1972, 11,951 metric tons, are up by more than 40% from the previous year (1971, 8,228 metric tons).

Monthly records of fish landings at Levuka's freezing plant for 1972 (metric tons) are as follows:

Month	Albacore	Yellowfin	Miscellaneous	T o t a l
January	325.852	494.451	207.441	1027.744
February	160.650	356.362	95.882	612.894
March	176.597	572.417	233.191	982.205
April	136.063	419.586	173.601	729.250
May	253.036	548.089	228.990	1030.115
June	686.324	100.787	233.391	1020.502
July	687.393	77.901	169.860	935.154
August	537.791	79.246	133.358	750.395
September	1284.523	137.006	372.330	1793.859
October	850.722	124.962	274.727	1250.411
November	410.448	58.275	196.622	665.345
December	457.669	384.470	311.196	1153.335

TOTAL	5967.068	3353.552	2630.589	11951.206
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A BRIEF OUTLINE OF THE FIRST YEARS OF
THE PAPUA NEW GUINEA SKIPJACK FISHERY

by

R.E. Kearney

Department of Agriculture,
Stock and Fisheries

Konedobu, Papua New Guinea

In the late 1960's the realization that most of the world's large tuna species were being maximally exploited prompted greatly increased interest in the underexploited skipjack (Katsuwonus pelamis) resources, particularly in the western Pacific Ocean.

Evidence accumulated by Japanese longliners and several cruises by Japanese research vessels suggested that the waters adjacent to Papua New Guinea were likely to harbour stocks of skipjack and yellowfin tuna (Thunnus albacares) sufficient to support a sizeable industry. A survey of these stocks was commenced in 1970 by a joint Japanese - Australian company based in the north eastern Bismarck Sea.

During this first year of operation the company took a total of 2,431 tons* of skipjack and tuna (see table 1) and showed for the first time that commercial quantities of these species could be taken from these waters. Because of the problem associated with the establishment of operations in a new area and the difficulty in initially locating skipjack and bait stocks fishing was often interrupted. Consequently the figures given in table 1 do not give a real indication of seasonal fluctuation in the availability of fish in 1970. They do however, indicate that reasonable catches were possible for most of the year.

In 1971 two additional companies commenced survey operations in the Bismarck Sea and the total number of catcher boats in operation at any one time reached a high of 19.

* All figures used were taken from catch returns from each catcher boat.

All catcher boats successfully used were of Japanese or Okinawan origin and were crewed in the main, by Okinawan fishermen. In September, 1971, two Australian tuna clippers fished the north eastern Bismarck Sea for approximately three weeks each. During this period both boats failed to pole even a single skipjack. This lack of success was due mainly to the inability of the crews to catch good quantities of suitable bait but it also appears that the standard Australian tuna clipper is not an efficient skipjack poling unit in the waters of Papua New Guinea.

(1) Fishing Areas.

All commercial skipjack and tuna poling in Papua New Guinea waters during 1970-71 was conducted in, or on the boundaries of the Bismarck Sea. In 1970 the entire catch was taken from the north eastern sector but with the expansion in the number of fleets in 1971 fishing was concentrated in three main areas:

- (a) the north eastern Bismarck Sea,
- (b) the eastern Bismarck Sea,
- (c) the south western Bismarck Sea.

Catches for 1971 have been divided according to the area from which they were taken and are given in table 3.

The distribution of the catch represented most areas of the Bismarck Sea but it was found that most fish were taken within 20 miles of the sizeable land masses. It must be noted however, that almost all of the vessels in use were not suitable for long distance survey voyages and thus many areas of the Bismarck Sea remained unexplored. Of the areas which were fished, the eastern sector proved most productive but the catches from all three areas were more than adequate for economic operations.

(2) The Catch by Species.

During 1970 only one joint venture company was in operation and the catches recorded by it were accurately divided into species. The monthly composition of the catch is given in table 1. In excess of 95% of the fish grouped under other species were mackerel tuna (Euthynnus affinis) or frigate mackerel (Auxis thazard).

In 1971 two of the three joint venture companies submitted accurate records of the species composition of the catch but the failure of the third company to do so means that the figures given for the amount of yellowfin taken in 1971 (table 2) are only estimates.

(3) The Bait Fishery.

All skipjack and tuna vessels registered in Papua New Guinea in 1970-71 were bait and pole boats and hence the importance of the associated bait fishery is obvious.

Until May 1971 fishermen operating in the western and northern sectors of the Bismarck Sea were catching bait by the "drive in" fishery technique during daylight hours. The species of greatest importance taken in this was Gymnoceesio gymnopterus. From May of that year night baiting operations with bright underwater bait lights were exclusively used. Stolephorus devisi was the dominant species taken by this later technique and proved to be excellent bait for skipjack but was, unfortunately, very delicate and difficult to transport. The problems associated with the transport of this the most common bait species, necessitated daily bait catching operations in most areas and negated many of the advantages of the larger boats capable of carrying greater quantities of bait.

The fishing masters of all three fleets operating in Papua New Guinea waters in 1971 stated that the scarcity of suitable bait was the greatest limiting factor in their operations. While the lack of a really abundant, suitable bait species did undoubtedly restrict catches to some extent, the catches which were taken (table 2) show that sufficient bait was available to maintain a sizeable skipjack and tuna industry.

(4) Recent Developments.

During 1972 a fourth joint venture company commenced operations in the Bismarck Sea. Despite the increase in the number of boats in operation the 1972 catch fell to 13,123 tons, consequently the catch per unit effort was well down on previous years. Despite this drop in the 1972 catch the future of the pole fishing industry in Papua New Guinea is regarded with optimism.

TABLE 1 1970 SKIPJACK AND TUNA CATCH BY SPECIES
 (All figures are in metric tons)

	SKIPJACK	YELLOWFIN	OTHERS	TOTAL	AV CATCH/DAY**
MARCH	279.2	27.8	0	307.0	3.743
APRIL	336.6	11.3	0.1	348.0	4.704
MAY	361.8	8.2	0.1	370.1	4.512
JUNE	438.5	2.5	0	441.0	5.444
JULY	472.8	7.5	0	480.3	6.403
AUGUST	101.4	11.3	0	112.7	4.026
NOVEMBER	143.9	0.3	1.0	145.2	4.539
DECEMBER	220.3	5.4	0.5	226.2	3.968
TOTAL	2354.5	74.3	1.7	2430.5	

** A fishing day was defined as a day on which a catcher boat proceeded to the fishing rounds with sufficient live bait to warrant fishing.

TABLE 2 1971 SKIPJACK AND TUNA CATCH BY SPECIES
(All figures are in metric tons)

	SKIPJACK	YELLOWFIN	OTHERS	TOTAL	AV CATCH/DAY**
JANUARY	899.7	16.7	1.3	917.7	3.543
FEBRUARY	969.8	21.3	0.8	991.9	3.493
MARCH	1445.0	13.8	0.8	1461.6	4.402
APRIL	1499.1	6.4	6.1	1511.6	4.270
MAY	1862.2	15.1	7.1	1884.4	5.510
JUNE	2037.9	1.3	0.4	2039.6	6.433
JULY	1950.6	0.8	1.1	1952.5	5.515
AUGUST	2021.9	3.0	1.9	2026.8	4.231
SEPTEMBER	1486.0	3.0	0.6	1489.6	3.547
OCTOBER	1058.3	2.7	2.6	1064.6	3.775
NOVEMBER	945.6	15.6	1.3	962.5	2.856
DECEMBER	687.6	8.3	3.7	699.6	2.332
TOTAL	16863.7	108.0	27.7	17002.4	

** A fishing day was defined as a day on which a catcher boat proceeded to the fishing rounds with sufficient live bait to warrant fishing.

TABLE 3
DISTRIBUTION BY AREA OF THE TOTAL CATCH AND
AVERAGE WEIGHT OF SKIPJACK IN 1971

	NORTH EASTERN BISMARCK SEA		EASTERN BISMARCK SEA		SOUTH WESTERN BISMARCK SEA	
	TOTAL CATCH (tons)	AV. WEIGHT OF SKIPJACK (kg)	TOTAL CATCH (tons)	AV. WEIGHT OF SKIPJACK (kg)	TOTAL CATCH (tons)	AV. WEIGHT OF SKIPJACK (kg)
JANUARY	447.6	3.9	470.1	-	0	-
FEBRUARY	625.3	3.8	366.6	-	0	-
MARCH	477.3	3.9	569.4	-	414.9	5.0
APRIL	367.8	3.8	645.8	-	498.1	4.8
MAY	649.4	3.7	788.4	4.0	446.7	4.7
JUNE	224.3	3.3	1078.9	-	736.3	5.1
JULY	87.7	3.5	1348.3	4.2	516.5	4.9
AUGUST	353.3	3.3	1257.0	3.9	416.5	4.9
SEPTEMBER	534.9	3.4	818.9	3.8	135.8	4.7
OCTOBER	538.1	3.8	520.2	4.6	16.3	5.0
NOVEMBER	412.8	3.4	462.7	4.2	86.9	3.6
DECEMBER	129.5	3.2	381.6	4.0	188.5	4.5
TOTAL	4837.1		8707.9		3456.5	

GRAND TOTAL

17002.4

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FISHERIES DEVELOPMENT IN TONGA

by

W. Wilkinson
Fisheries Officer
Ministry of Agriculture
Nuku'alofa, Tonga

INTRODUCTION

The Kingdom of Tonga consists of some 150 islands in three main groups, with a total land mass of 257 square miles, supporting a population in the region of 87,000. There is an annual growth rate of around 4%.

The seat of Government and Administration is in Nuku'alofa in Tongatapu, which is the most densely populated island holding 61% of the Kingdom's population. Tonga's primary industry is subsistence agriculture, and there is an export trade in copra, bananas, and other fruits.

At present, the Kingdom is faced with the serious problems of finding sufficient animal protein food for an increasing population in a restricted land mass.

BACKGROUND TO FISHERIES

Several attempts have already been made to develop the Fisheries of Tonga with varying degrees of success.

In 1958, the Government purchased the 47 foot fishing vessel "Alaimoana" from New Zealand, and the pelagic deep-sea long-line technique was introduced, under the instruction of a Japanese Master Fisherman. This proved successful enough to justify the purchase of a new and larger vessel from Japan. This vessel named the "Teiko" was unfortunately lost with all hands, including the Government Fishery Officer on her maiden fishing trip in November, 1961.

In 1964 a north sea 'Pocket' trawler type vessel was purchased from the United Kingdom, and named the "Pakeina". This vessel was unfortunately, not designed or suitable for deep-sea long-lining, and was unsuccessful. It was withdrawn from service and is now used as a cargo vessel in the inter-Island service. The present Government owned fishing vessel was purchased second-hand from Japan in 1971, and named "Ekiaki". This vessel is a typical Japanese long-liner 90 feet in length with a refrigerated capacity of 50 tons. The "Ekiaki" is manned by a Tongan Master and crew, with Tongan Trainee Fishermen, and a Japanese Master Fisherman.

"EKIAKI" CATCH STATISTICS

		%	1971	%	1972	%	1973
Number of times fished			45		37		39
Number of baskets			9548		6587		7740
Number of hooks			58398		51529		61920
Albacore	no.		334		787		376
weight	kg	10.8	6830	31.1	16513	21.3	7752
Yellow Fin	no.		674		323		312
weight	kg	20.9	13183	16.1	8534	30.5	11093
Big Eye	no.		134		17		55
weight	kg	8.6	5417	7.3	3859	5.5	2004
Bill Fish	no.		391		183		136
weight	kg	25.4	15994	18.1	9628	15.5	5621
Shark	no.		86		236		133
weight	kg	26.1	16472	21.3	11277	15.9	5766
Other Species	no.		397		271		347
weight	kg	8.2	5189	6.1	3244	11.3	4094
Total	no.		2016		1907		1359
weight	kg	100.0	63042	100.0	53056	100.0	36330

The above catches are sold partly to the American Tuna base at Pago Pago in American Samoa, and partly at the Government market at Nuku'alofa for local consumption. There is very considerable demand for "Ekiaki's" catch, and long queues of potential buyers quickly form to buy.

LOCAL FISHERY

Tonga's fisheries are fundamentally under-developed. With the exception of the Government's own fishing vessel "Ekiaki", and a locally based Australian Company which specialises in the processing of spiny-lobster, there is no organised local fishery in Tonga. Fishing is carried out on a subsistence basis centered on the rapidly declining lagoon and near reef resources.

The fishing 'Fleet' consists of local outrigger canoes, sailing skiffs, and outboard powered dinghies.

The basic gear used are fixed traps and fish fences, hand lines, gill and surround nets. Some trolling is carried out by sailing vessels for pelagic species, and good seasonal catches are made of the little Tuna (Euthynnus affinis) and the skipjack (Katsuwonus pelamis).

The inshore lagoon and near reef catch consists of a miscellaneous collection of coral and tropical species. Also collected in large quantities for local consumption are Holothurians, Clams, mainly Tridacna, various bivalves and echinoderms. Unfortunately, no systematic collection of fishery statistics has been maintained, albeit a good knowledge of the existing situation is an essential requisite to the formulation of realistic proposals for change.

An approximation of the fish production would indicate that this is in the region of 500 tons annually.

SPINY LOBSTER FISHERY

Australian interests, Fathom Fisheries (Tonga) Limited, have established a small export trade based on the tropical crawfish or spiny lobster. This company operates a ferro-cement freezer barge, which is towed to the fishing areas. Local fishermen are employed to dive and collect the catch. These are de-tailed and deep frozen on the barge, for final enshipment to Fiji, and the American Pacific Territories. Catching methods are by diving, using face masks, spearing, and catching by hand at night using kerosene pressure lanterns.

Traps have been tried but with lack of success. This is not unusual as tropical crawfish are known to show a marked disinclination to enter traps. Notwithstanding, this merits further investigation; as does the need to experiment with other catching methods such as bottom set entangling nets, trammel nets, different types of traps, and the investigation of new fishing grounds.

At present there is no regulatory restrictions on the catching of spiny lobster in Tonga, and in fact until some catch and effort figures are available, any such restrictions could be of little benefit.

Three main species of spiny lobster occur in Tongan waters. These are, in order of abundance, Panulirus penicillatus, P. longipes, P. versicolor. In addition to processing crawfish, Fathom Fisheries also purchases whole fresh fish from some of the Islands in the northern group, which is carried to Nuku'alofa in ice boxes for marketing. This is a very useful service in an area where no other outlets exists. In 1972 the exportation of frozen tails reached a total of 42 tons.

FISHERY PRIORITIES

The Government of the Kingdom of Tonga is faced with three basic priorities in relation to its fisheries.

- (a) The immediate need to find an assured source of protein for a rapidly growing population, and to reduce the necessity to import expensive tinned foodstuffs from overseas.
- (b) The need to diversify the countries economy away from its present dependance on Agriculture, based on a new industry in which local people can participate without loss of their native traditions and culture.

- (c) To improve employment prospects for a proportion of the Kingdom's school leavers, and for the currently unemployed.

So far as fish for human consumption is concerned, there are two basic aspects which have to be considered.

Firstly, to what extent can the existing fisheries be intensified and diversified, to provide for the nutritional needs of the people.

The present fishery can be improved by providing cheap ice to eliminate wastage by providing insulated holding depots, and by improving the transport system of fish from the northern groups. By introducing mechanized fishing boats, where these can be most usefully and economically utilised; by improving the fishing equipment at present in use.

Secondly, to establish the capability of Tongan fishermen to exploit the coastal demersal and pelagic fish resources. That this resource exists, is indicated by reports from Japanese fishery survey vessels which showed that bottom feeding species, mainly Lutjanidae, can be caught in commercial quantities. This resource is not exploited at present, as the fishermen do not have suitable mechanized vessels, nor are they familiar with the deep water vertical long-line techniques. This requires mechanical reels for fast retrieving of line, knowledge and understanding of echo-sounding machines, and interpretation of bottom recordings. A further possible development exists in exploiting the shoals of skipjack and the little tuna, which occur in seasonal abundance in close proximity to the many Tongan islands. Again, techniques new to Tongan fishermen will require to be introduced.

This transition from traditional norms should not be difficult - Tongans are good natural seamen and fishermen, willing and quick to learn.

AQUACULTURE

The Kingdom of Tonga has good areas of brackish and fresh water, which could be more usefully utilised than at present.

Nomuka Island in the Ha'apai group, holds a salt water lake of some 400 acres, where the milk fish (Chanos chanos forskal) are known to grow and breed. This is an unusual feature, as milk fish do not normally breed in an enclosed environment. It is also of some academic interest that the salinity of this lake fluctuates considerably, and at times is reported higher in the lake, than in the sea itself, though there is no visible outlet.

On Vava'u Island, there is a fresh water lake of some 840 acres. This lake has a resident population of tilapia sp. and milk fish. Both species are exploited for local consumption. The main island of Tongatapu holds a large salt water lagoon named Fanga'uta. This lagoon supports a good seasonal fishery for mullet, and is an excellent spawning ground for this, and other local fish species. This area, with its mangrove periphery is in need of conservation. Recent reclamation of land, and the destruction of mangroves, has made serious in-roads into the lagoon's productivity. Strict effective and enforceable legislation is urgently required to ensure its future protection.

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CURRENT FISHERIES PROJECTS IN AMERICAN SAMOA

by Stanley N. Swerdloff
 Director of Marine Resources
 Government of American Samoa
 PAGO PAGO

The fisheries program of American Samoa is administered by Office of Marine Resources, Government of American Samoa. Present staff includes the director, three fisheries biologists, two fisheries biologist trainees, three biological technicians, one master fisherman, eight skilled fishermen, one boatbuilding facility manager, three boatbuilders, three marine mechanics, two fisheries extension agents, one boat operator, one secretary, and eleven VISTA volunteer instructors - a total staff of 40.

Marine Resources projects are primarily designed for two major objectives: 1) development of an indigenous fishing fleet, and 2) increase in production of local tuna canneries. The first objective will satisfy fresh protein requirements and provide employment, the second will ensure continued employment and tax revenues (private sector economy is dependent on canneries).

Six specific projects have been undertaken, all of which interact to some degree. These are listed below.

1. Local commercial fleet development: this is a programmatic approach to development, involving boatbuilding, gear research and development, fisheries training, marketing services, and support services (engine and boat repair, gear stocks). The project is designed to convert untrained subsistence fishermen into skilled commercial fishermen. A relatively low-cost 24' "Samoa dory" is the starting point, but it is anticipated that fishing enterprises will move into larger vessels within several years. Eighteen boats have been produced in 18 months, with annual landings increasing from 40,000 lbs. in 1971 to an estimated 175,000 lbs. during June 1972 - May 1973. Anticipated landings for calendar year 1973 are 300,000 lbs. Although crews are taught a variety of fishing methods, all boats have concentrated on bottom-handline fishing primarily due to small tuna stocks during the past 12 months. The five year cost (1972-6) is estimated at US\$350,000.
2. Tuna surveys: A preliminary three-year survey indicated that skipjack and yellowfin tuna stocks represent Samoa's most promising fishery potential. Standard track surveys are being continued, but project emphasis has been shifted to fishing methodology and catch evaluation. Primary tool for the program is a 50' live bait pole-and-line survey vessel. Results of the project will benefit both the local fleet and outside fleets supplying local canneries. Six year budget is approximately US\$700,000.

3. Culture of live bait: The most effective method for capturing surface tunas in the tropical Pacific is live bait pole-and-line. Unfortunately, natural live bait stocks in Samoa are not adequate for even a small fishery. A possible solution to this problem is the mass culture of a fresh- or brackish-water fish with proper baitfish characteristics. Current experiments deal with the Mexican mollie (Poecilia mexicana), a euryhalinic live-bearer which reaches maturity (80 mm) in four months. P. mexicana bears 30-180 fry every 28 days without regard to salinity (0-35‰). Mortality of young and adults is less than 10%. Production schedules call for 600,000 baitfish to be used in field trials January - April 1974. If successful, this species could be used as baitfish by small local boats without circulating bait tanks, as well as larger live bait vessels. Three-year project costs are estimated at US\$95,000.
4. Statistical analyses of fisheries: Data are collected and analyzed from three sources: canneries, local fishery, and village subsistence activities. The U.S. National Marine Fisheries Service analyzed data from the 300 vessel longline fleet based in Samoa to determine trends in the South Pacific subsurface tuna stocks. Indigenous fleet data are used as a basis for resource management and local fishery development programs. Five year budget is US\$57,000.
5. Sport fishery surveys and facilities development: This program includes surveys of pelagic and inshore gamefish species and development of shoreside facilities such as boat launching ramps, docks, and fishing piers. Preliminary pelagic surveys indicate a good sportfishing potential for blue marlin, sailfish, dolphinfish, and tunas. Diving surveys of inshore reefs will commence in July 1973. Three launching ramps, three small docks, and one marina-fishing pier complex will be completed by the end of 1973. Five year costs will be US\$200,000.
6. Commercial fisheries training: A one-year course in commercial fishing technology will be offered by the Community College of American Samoa, beginning September 1973. Curricula will include: English, mathematics, seamanship, small boat piloting, navigation, gear technology, fish behavior, engine and boat maintenance, boatbuilding, fish processing, marketing, and business principles. Approximately 50% of training time will be spent aboard survey and fishing vessels. As a corollary to the project, two fisheries biologist trainees and two extension agent trainees will receive overseas education. Five year budget is US\$300,000.

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DIARY OF FORTHCOMING MEETINGS

1973Language

- September 10 - 28 SPC: Thirteenth South Pacific
Conference and Thirty-Sixth
Session.
Guam.
- December 4 - 16 FAO: Technical Conference on Fishery
Products.
Tokyo, Japan.
- December 7 - 16 Pacific Science Association:
Marine Science Special Symposium
Hong Kong.

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