THE SOUTH PACIFIC COMMISSION FISHERIES NEWSLETTER

No. 11 Noumea, New Caledonia

CONTENTS

EDITORIAL

The last South Pacific Islands Fisheries Development Agency's Newsletter (No. 10) appeared in November 1973. In the editorial of that issue we said that the South Pacific Commission would continue to issue a Newsletter at the request of the Sixth SPC Technical Meeting on Fisheries held in Suva in July 1973. For the sake of continuity we have decided to continue the numbering of the Newsletter in sequence from the SPIFDA Newsletter. Thus this issue of the SPC Newsletter will be No. 11.

While SPIFDA formally ended in December 1973, we are very glad to report that two FAO experts recruited for SPIFDA have continued to work in the field and are now working as country experts in Fiji. These are Mr Dan Popper, fish culturist, who is working on fish rearing at the Ravi Ravi fish ponds near Lautoka in Fiji. These ponds have now been extended and Mr Popper is investigating the possibilities of rearing rabbitfish (Siganus) to marketable size. Dr James McVey and his team at the Micronesian Mariculture Demonstration Center in Koror, Palau, have recently had considerable success in inducing spawning in Siganus canaliculua and in rearing the larvae through to the juvenile stage. This, combined with Dan Popper's work in Fiji, holds out promise of substantial development of farming this species if subsequent economic appraisals give a promising forecast.

Dr Ted Ritchie, SPIFDA consultant on oyster culture, has also now been absorbed into the Fiji UN country programme. Dr Ritchie is having some considerable success in growing of various species of Crassostrea and has found that varying environmental conditions are having a tremendous effect upon growth and survival of the young spat. The absorption of Ted Ritchie into the Fiji country programme will give him the opportunity to reach some definitive conclusions as to the best species of oysters and most desirable conditions for optimum results.

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There are now many ongoing Dory Projects in the Pacific countries and territories of the Pacific islands. The American Samoa Project, the first, has now been in operation for some years and has a well established boat-building shop. Much of the fishing done is handline bottom fishing.

The Gilbert and Ellice Islands Colony has a dory building programme at Betio in Tarawa and has so far built four dories, all petrol (gasoline) engined driving either jets or inboard-outboard drives. The fishing is mainly pearl shell lure or multiple trolling for skipjack, very little bottom fishing having been yet tried.

Western Samoa has so far purchased one dory from American Samoa and may acquire others.

Ponape, in the American Trust Territory of the Pacific Islands started a project in 1972 and eight dories were constructed and launched in 1973. Eighteen more are planned with work commencing in July 1974. The Ponape dories are equipped for trolling, bottom handlining and will be used for transport to the reef for spear fishing.

Palau has proposals for a dory project which could be operational in 1975. Bottom fishing and pelagic fishing for tuna species will be undertaken.

A feasibility study is being done in Tonga to determine the possibility of a fisheries development with Australian bi-lateral aid.

The SPC Dory Project, which will use two types of dory, should be operating in the field in August 1974. An account of the present state of this project appears on page 6-7.

The dory is not necessarily the best craft for all conditions and all types of artisanal fishing developments in the Pacific islands. It has the advantage of being reasonably cheap and simple to build and it is relatively fast. However, the high speed results in high fuel consumption and the high speed engines required are rather sophisticated, requiring a high level of maintenance. It now seems to be the time to consider whether a simple, low powered diesel engined displacement hull might not be the most suitable in many island conditions, particularly where the principle method of fishing is to be bottom fishing.

A corollary of these various projects will be the need to establish fisheries training and the auxiliary skills of boat and engine repair and maintenance, refrigeration engineering and electronic repair capabilities. This can be done by provision of training schools and courses, and to a certain extent by training effective extension officers. We are very glad to be able to report that the Canadian International Development Agency (CIDA) has made a grant of approximately C$ 750,000 to establish a project at the University of the South Pacific. The project has three component parts: a Diploma in Tropical Fisheries, the infusion of specialist marine biology courses into the teaching programme of the University, and a modest research effort.

The Diploma is of three years duration and is pitched at the same academic level (approximately) as the existing Diplomas in Agriculture (Fiji College and Alafua). Twelve or more students will be accepted into the programme each year and graduates should be able to initiate and sustain commercial fishing ventures. A number will be absorbed into the Fisheries Departments of the region and a few may find their way into teaching positions. Students are already in the second year of the course which is funded under the present agreement until 1978.

In addition, the Rockefeller Foundation, through a new specialist organisation known as the International Center for Living Aquatic Resources Management (ICLARM) proposes to make substantial funds available in the South Pacific for fisheries development. This will take many forms, but it is proposed to fund necessary research and development projects through existing organisations and institutes, supply funding for practical ad hoc experimental work and support fisheries and fisherman's training programmes.

It is incumbent upon all the people in the Pacific area concerned with fisheries development to ensure that this welcome flow of fisheries development funds into the area is used to the best possible advantage of the countries and territories concerned. Again it must be said that the flow and interchange of information is vital to ensure that the minimum of overlap occurs.

The SPC Technical Meeting on Fisheries has now become an annual event in order to assist and encourage the exchange of ideas and to act as a forum where the needs can begin to be identified on a regional basis.

R.H. Baird

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PROGRESS OF THE SPECIAL PROJECT ON INSHORE FISHERIES DEVELOPMENT

by
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The South Pacific Commission Special Projects which were made possible by voluntary contributions to SPC funds by Australia, New Zealand and France have already been outlined in the SPIFDA Newsletter No. 10. The following is an extract from a working paper prepared for the SPC Planning Committee Meeting in May 1974 which outlines the present state of the projects.

A. Lobster Sub-Project

It has been decided to divide the lobster project into two phases.

Phase I would be concerned primarily with initial investigation into methods of live lobster storage and would last for one year (1974). For Phase I an Australian undergraduate has been recruited and he has been in the field in the British Solomon Islands Protectorate since early March. He will be working under the supervision of the fisheries staff of the British Solomon Islands Protectorate who already have some experience in lobster work.

Phase II, to last two years, would continue to refine methods of lobster storage but would also undertake in depth studies of lobster populations, growth rates, recruitment etc. so that approximations can be made of the optimum sustained yield that can be expected from a given reef area. This would need the services of a qualified research assistant with some experience to be recruited as Project Officer. The person concerned would be able to use the results of his work to produce a thesis for an advanced degree. The extra cost of recruitment of such a person would be $A3,000 per annum ($A1,000 recruitment and approximately $A2,000 for extra salary above the volunteer level). However, with an experienced Project Officer, some substantial saving could be made in consultant costs. Negotiations are in process for the recruitment of a qualified person for this post.

B. Beche-de-mer Sub-Project

Beche-de-mer studies would also form part of the duties of the research assistant. Identification, demonstration of fishing and processing methods would be set up. This work would be undertaken by the Lobster Project Officer.

C. Turtle Farming Sub-Project

Again because of withdrawal by accepted volunteers, recruitment has been delayed. It is now proposed that this post should also be changed from a volunteer basis to that of research assistant. Universities were approached to try to find a qualified research student who would be interested in the post of Project Officer and several applications have been received. The prospects of recruitment of a suitable person are now good.

In the meantime, preliminary investigations have been set up with the University of the South Pacific in Suva, where turtle-holding tanks for feeding experiments are being constructed and collection of eggs and/or turtle hatchlings are being made. Funds have been made available to the University of the South Pacific for this purpose.

Because of the late recruitment, even if a research assistant is appointed soon, the existing budget will be sufficient for 1974.

The extra costs incurred in future years by use of research assistants can be counterbalanced by reduction in the use of consultants, so that budgeting remains the same except for 10% added each year to cover increased costs.

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PROGRESS OF THE SPECIAL PROJECT ON OUTER REEF ARTISANAL FISHING

by
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The South Pacific Commission has undertaken an Artisanal Experimental and Demonstration Fishing Project in those territories which are not able, at present, to test and develop their local fisheries potential. The objectives of the project are to assess territorial resources, determine and demonstrate successful fishing techniques, prepare an economic investment prospectus, train a limited number of fishermen, and compare the cost effectiveness of two different types of fishing craft, both based on the dory design.

The project is now gathering momentum with the team in the final stages of recruitment, the first boats being built, and the equipment ordered.

The Project Manager and Master Fisherman are presently in Noumea finalizing arrangements. Mr Howard Hume, the Project Manager, comes from the New Zealand Navy, where he was Captain of the Oceanographic research vessel HMNZS Tui. He has an M.Sc. in Oceanography and a background of Oceanographic, clearance diving and hydrographic surveying work in North America and the South Pacific. The Master Fisherman, Mr Reg Eginton, has spent many years in Papua New Guinea and for the last nine years has been employed by the Department of Agriculture, Stock and Fisheries as Master of the fisheries research vessel "Tagula". He also has experience with fishing trawlers in coastal waters of Australia and Papua New Guinea.

The Volunteer Boat Skipper, Mr Chris Scott, is in Auckland awaiting the completion of the first aluminium dory. He has a variety of boat experience, was recently mate on the barque "Endeavour II", and has been involved in both lobster and line fishing. The Volunteer Marine Biologist, Mr Ian Clement, arrived in Noumea in May. He has a B.Sc(Hons.) in Zoology and has had two summers in Antarctica working on Weddell seal populations.

Mr Paul Mead, a Volunteer from America, who will be the Logistic Support man, is expected to join the team early June. He holds a B.Sc. in Zoology and has had several years experience with Peace Corps projects in both Western and American Samoa. The youngster of the team, Mr Barry Joblin, another V.S.A. Volunteer, completed a training course on marine diesel engines and refrigeration machinery in New Zealand, and has since been in Pago Pago working with Samoan dory projects gaining practical experience with these vessels.

Two "American Samoan dories" are being built in Pago Pago. They will be powered by a 135 h.p. Ford Falcon petrol engine and a 750 series Hamilton Jet. It is anticipated that the first boat will be completed early July and the second in September.

As a comparison of running and operating costs and the life and reliability of hull materials and engines two 24 foot aluminium V-hull, planing dories are being built in Auckland. The first of these boats will be driven by a Nissan Datsun 105 h.p. high revving, light-weight diesel engine and a 1011 Hamilton Jet unit. The second will have a Volvo Penta 106 h.p. diesel of similar specifications coupled to a 1011 jet unit. The timescale for completion, sea-trials and delivery of these boats is expected to be similar to that of the Samoan dories with the first boat finished mid June and the second three months later.

All boats will be equipped with Furuno model FM 22 C echo-sounders and Single Side Band Transceivers.

Fishing equipment will include bottom handlines, electric winch reels and vertical longlines, trolling handlines and experiments with live bait pole-and-line gear will be done. Live bait stick-held dip nets and beach seine nets will be used for bait fishing.

It is anticipated that the project team and the first two boats will arrive in the field at the end of July. The first base of operations will be Lamap on the Island of Malekula in the New Hebrides. The sequence of further working areas will be decided at the Seventh Technical Meeting on Fisheries at Nuku'alofa, Tonga, in July 1974.

The first two boats will work as a pair in the New Hebrides for both comparative and safety reasons. Approximately five months will be spent in each territory and the availability of live bait and the feasibility of both skipjack fishing and bottom fishing for snappers and grouper outside the reef explored. The third and fourth boats will be shipped to the second territory and be operational by the time the team is ready to move which in the first instance will be toward the end of the current year.

It is hoped that interested Fisheries Officers will get the opportunity to visit the project in the field.

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SUMMARY OF THE MEETING OF THE EXPERT COMMITTEE ON TROPICAL SKIPJACK

by

R.H. Baird

The following is the introduction to the report of the Expert Committee on Tropical Skipjack which met in Tahiti in February 25-29, 1974.

INTRODUCTION

1. At the Sixth Technical Meeting on Fisheries held in Suva, Fiji, from 23 - 27 July 1973, the skipjack working party said: "Although the annual yield of skipjack tuna landed by the several fisheries operating in the Pacific Ocean exceeds 250 thousand tons, assessment studies indicate that the yield can be increased several fold without damage to the resource base" (such increases could have an annual ex-vessel value of from 100 to 500 million $A).

2. The Technical Meeting recommended (recommendation No. 8):

   (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 1974 for the initial meeting of the Standing Committee and for preliminary implementation of the programme.

3. Subsequently the South Pacific Conference and Session in Guam in September 1973 approved the recommendation.

4. At a meeting in Noumea with R.H. Baird, SPC Fisheries Officer, M. G. de Chazeaux, Director of Centre National pour l'Exploitation des Océans dans le Pacifique, proposed Tahiti as the venue for the first meeting on Tropical Skipjack. CNEXO generously offered to host the meeting.

5. The initial meeting of the Expert Committee on Tropical Skipjack was formally opened by the Governor of French Polynesia, M. D. Videau. Also in attendance were the President of the Assembly, M. G. Flosse, and the Counsellor M. E. Le Caill. R.H. Baird replied to the Governor's welcoming remarks with an expression of gratitude to the Government of French Polynesia for hosting the meeting.

R.H. Baird proposed that R. Shomura chair the working sessions and this was unanimously agreed.

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Also following is the agenda of the meeting, the list of participants, summary of recommendations and the list of titles of the appendices to the report.

AGENDA

The Committee, after discussion, adopted the following agenda:

1. Review of recommendations of the Working Party on Skipjack Resources of the Sixth Technical Meeting on Fisheries.
2. Review of Territorial Problems.
3. Discussion of working papers.
4. Review of Pacific Skipjack Information.
5. Collection of Statistics and Data.
6. Skipjack Tagging Programme.
7. Baitfish Problems.
8. Recommendations.

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SUMMARY OF RECOMMENDATIONS

Recommendation No. 1

It was agreed by the Committee that uniform catch statistics and biological data are necessary for the understanding and eventual management of regional skipjack resources. The Committee therefore recommends that all participating countries and territories of the SPC area be urged to implement uniform data collection systems, and further recommends that all joint venture agreements require companies to submit accurate catch-effort statistics.

Recommendation No. 2

In view of the extreme importance of sub-population determinations, the Committee recommends the development of regional morphometric studies.

Recommendation No. 3

It was agreed that approximately 100,000 skipjack should be tagged over a three year period throughout the Pacific to obtain optimal data. Consequently, the Committee recommends a two-part tagging programme in which those territories with adequate facilities would undertake uniform tagging, while a regionally-funded project vessel extends the effort to other territories. A proposed regional tagging programme is presented in Appendix D. Recognizing the high cost of the necessary regional effort, and noting that only two territories are in a position to initiate local programmes, the Committee further recommends that the South Pacific Commission seek funding for the programme from those major countries with an interest in Pacific skipjack resources (presumably Australia, New Zealand, United States, France and Japan).

Recommendation No. 4

The Committee recommends that the South Pacific Commission through its official channels approach the Government of Japan and urge their support of an extensive tagging programme in the Western Pacific and to permit access of Japanese fisheries data on skipjack tuna to the Committee for stock assessment studies.

Recommendation No. 5

Recognizing that meaningful stock assessment will require several years, the Committee recommends continuation of this Committee indefinitely, with meetings to be held no less than once per year, preferably just prior to the annual Technical Meeting on Fisheries.

Recommendation No. 6

The Committee recommends that the South Pacific Commission ensure that staffing is available for the central management of data collated from the various areas. It is essential that such data be analyzed as quickly as possible and the resultant reports promptly distributed.

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APPENDICES

A. Population Assessment of Skipjack Tuna.

B. Recommendations on Collection of Data.

C. Standardized Catch-Effort Data - General Format.

D. Need for Tagging.

E. Considerations of the Economic Benefits and Costs of Joint Ventures versus Indigenous Commercial Fishing Development.

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STANDARDISED SKIPJACK CATCH-EFFORT DATA

Recommendation No. 1 of the Expert Committee on Tropical Skipjack (see p. 11) stressed the need for catch-effort data in a form capable of being computer analyzed. After a great deal of discussion the following form was devised, which provides the necessary information for an understanding of skipjack resources.

It is not of course considered that most countries or territories with developing artisanal fishing will be able to get such forms completed accurately, but it is hoped that where Joint Venture Agreements are proposed, that an accurate reporting and completion of the Daily Catch Record sheet will be obligatory to the Joint Venture Company. By standardization of the catch record throughout the Pacific area, analysis of the returns is much simplified.

The standard format is shown on page 14.

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Form Type	Month	Year	Comp.	Boat	Crew
1	2 3	4 5	6	7 8	9 10

DAILY TUNA CATCH RECORD

COUNTRY _____ LICENCE No. _____ No.of CREW _____

COMPANY _____ AREA FISHED _____

BOAT NAME _____ TYPE OF GEAR _____ MONTH _____ YEAR ____

DAY	GRID REFERENCE	ACTIVITIES	DAY OR NIGHT BAITING	BAIT (BUCKETS)	CATCH BY SPECIES, Wt. in kg							TOTAL CATCH kg	REMARKS	* COUNTRY
					SKIPJACK		YELLOWFIN		O T H E R S					
					Number	Weight	Number	Weight	Species	Number	Weight			
11 12	13 18	19	20	21 24	25 28	29 33	34 37	38 42	////////	43 46	47 50	/////	//////////	80
0 1														
0 2														
0 3														

SKIPJACK TUNA (Katsuwonus pelamis) TAGGING PROJECT

The Expert Committee noted that a theoretical increase in total catch of skipjack in the Pacific could be between two to six times higher than at present, and put a value of between $A100 million to $A500 million per year on such increased catches.

Skipjack tuna is recognised as one of the few underexploited commercial fisheries resources remaining in the world, and in view of the very great potential every effort should be made to obtain an understanding of the population dynamics of the stock to enable correct management decisions to be made.

All the metropolitan countries of the Pacific basin, Australia, France, Japan, New Zealand and the United States, in addition to all the Pacific island countries and territories, have a very real interest in the proper understanding and management of the Pacific skipjack stocks. The report of the SPC Expert Committee on Tagging of Skipjack explains the "Need for Tagging".

NEED FOR TAGGING by Dr R. Kearney, Papua New Guinea.

Very little information exists on the geographic limitations of the skipjack stocks in the Southern Pacific but it appears there is a great deal of migration from one region to another. It is possible that all skipjack in the South Pacific Commission area and in the waters adjacent to Australia and New Zealand are all part of the one stock. Therefore it is also possible that excessive fishing in any one area could adversely influence the catches in one or more other areas. A study of migrational movements of the skipjack in the South Pacific is obviously urgently required. As tagging is the most successful method known for the study of the migration of large pelagic fish the Committee recommends that an extensive tagging programme be commenced as soon as practicable. While it is appreciated that the tagging efforts of individual territories are extremely valuable and any such programmes must be encouraged, the Committee strongly - first priority - recommends that the South Pacific Commission seek funding for a three-year extensive tagging programme to cover the area of the South Pacific.

The Committee recommends a programme with the broad goal of releasing as many tagged skipjack as possible in areas of specific importance which would be selected at a future meeting of the Committee. A preference would be given to the tagging of small fish and the programme would be aimed at approaching 20,000 tagged fish per annum. The vessel used for tagging would also carry out a great deal of extremely valuable survey work in many territories incidental to the primary goal.

A very preliminary annual budget estimate was given as:-

1.	Charter or purchase of pole-and-line vessel	$A 200,000
2.	Cost of tags and tagging equipment	$A 14,000
3.	Rewards on recaptured tags	$A 6,000
4.	Staff: 2 biologists	$A 40,000
	2 technicians	$A 30,000

For three years: $A 870,000.

Additional cost items such as salaries for crew would depend on whether a vessel was chartered or purchased and in which territory it was operating.

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NOMENCLATURE OF SKIPJACK TUNA

At the recent Expert Committee on Tropical Skipjack meeting in Tahiti there was a nomenclature problem concerning skipjack, some participants using the generic name Euthynnus pelamis and others using Katsuwonus pelamis.

In answer to a query on this matter Dr Bruce B. Collete, Assistant Laboratory Director and Ichthyologist, Systematics Laboratory, U.S. National Museum, replied by letter:

"I recognize the monotypic genus Katsuwonus for two basic reasons. First, the three species of Euthynnus are much more similar to each other than to either Katsuwonus or Auxis so it better expresses relationships to retain Katsuwonus than to lump it in Euthynnus. Second, the four genera of the tribe THUNNINI are related to each other as follows: Thunnus is closest to Katsuwonus; Katsuwonus is closest to Euthynnus; and Auxis is closest to Euthynnus. Thus, Euthynnus is just as closely related Auxis as it is to Katsuwonus. ..... The above is based on an evaluation of about 20 anatomical characters that I consider to be of basic importance in assessing the relationships of the scombrids."

In view of this reply it has been agreed by the "Office de Recherche Scientifique et Technique Outre-Mer" (ORSTOM) and all other bodies in the Pacific area that Katsuwonus pelamis be used in future for skipjack tuna.

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THE C.W.P. SYSTEM FOR INDICATING ONE DEGREE SQUARES OF GEOGRAPHICAL POSITION

by

H.R. Hume

At the recent Expert Committee on Tropical Skipjack meeting in Tahiti use of a standardized method was agreed for reporting the geographical position of catch in one degree squares using the C.W.P. system notation. The system is now used internationally.

In this system the earth or globe is divided into four quadrants based on the point of origin where the equator (0 lat.) intersects the Zero (or Greenwich) meridian of longitude. Hence:-

Quadrant 1 consists of N Lats and E Longs

Quadrant 2 consists of S Lats and E Longs

Quadrant 3 consists of S Lats and W Longs

Quadrant 4 consists of N Lats and W Longs

Each quadrant is then subdivided into 16200 (180 x 80) figures with the dimansions of 1 degree of latitude and 1 degree of longitude. Each area is designated by a 6 figure group where the

- 1st figure gives the quadrant,

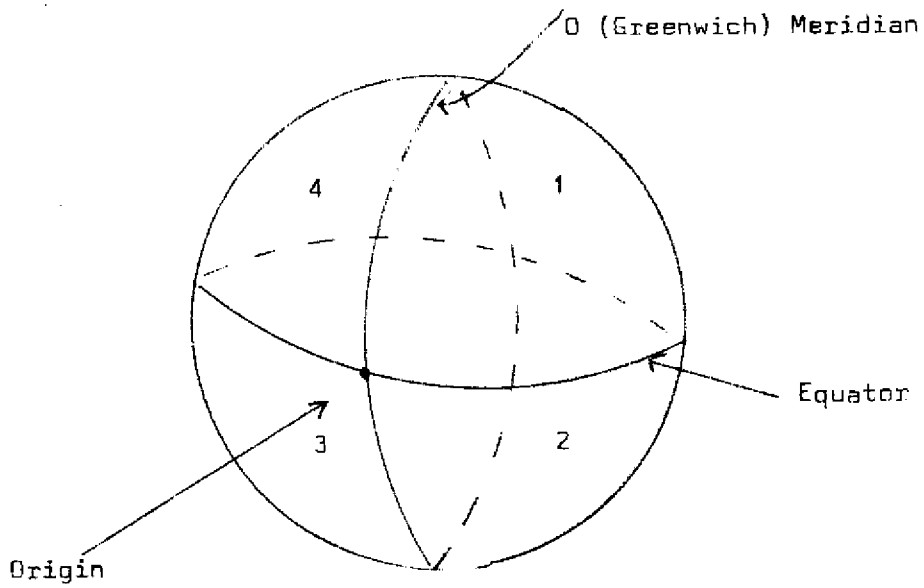
- 2nd and
- 3rd figures give the parallel of latitude nearest the point of origin,

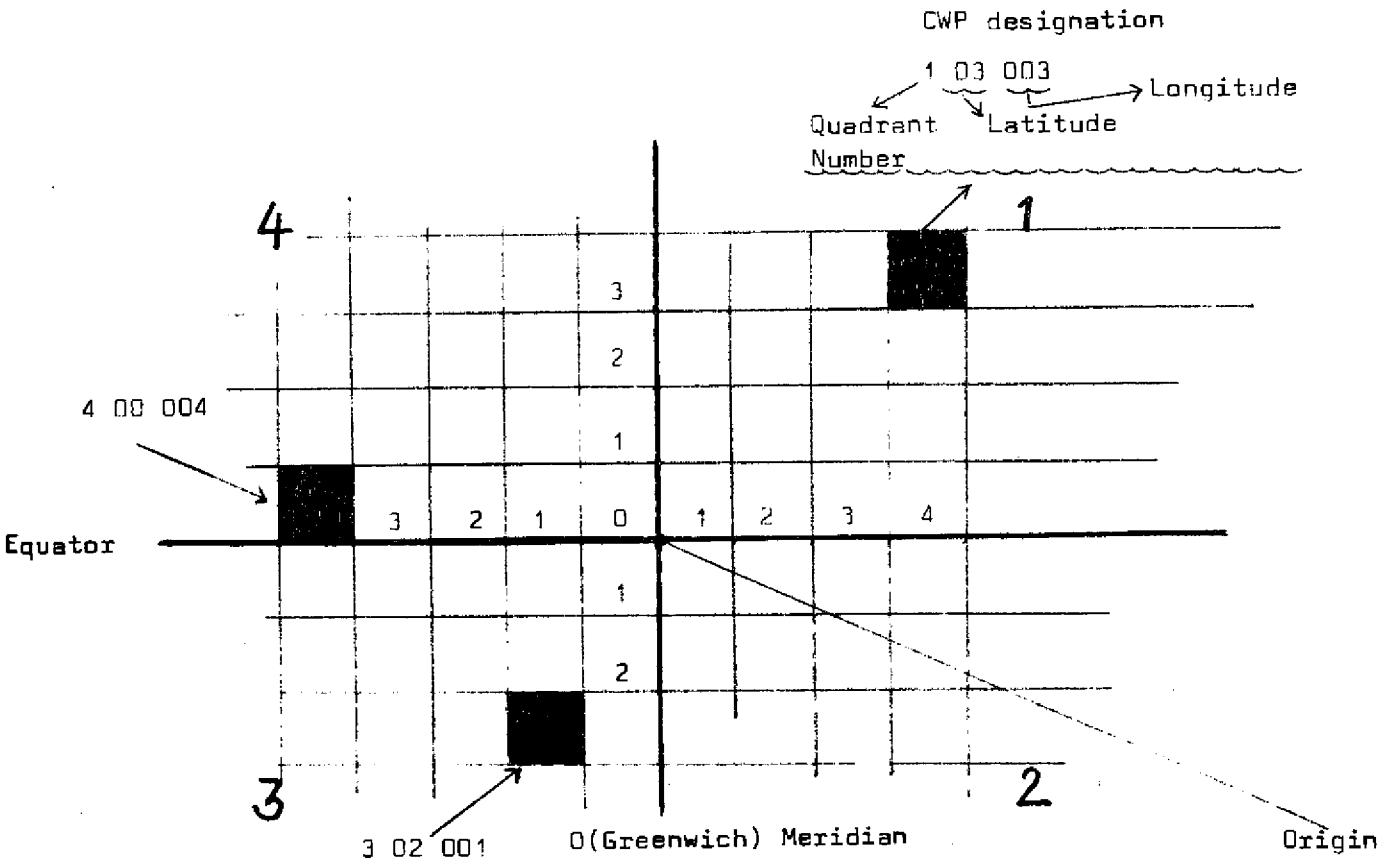
- 4th,
- 5th and
- 6th figures give the meridian of longitude nearest the point of origin.

The position point thus given defines the corner of the one degree square nearest the point of origin.

Some examples of the system are:

Place	LAT	LONG	CWP
Honolulu	21ºN	158ºW	4 21 158
Pago Pago	13ºS	171ºW	3 13 171
Noumea	22ºS	166ºE	2 22 166
Truk	8ºN	152ºE	1 08 152





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

by

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ABSTRACT

The stick held dip net, "Bouke-ami" described in this report was constructed in Japan and modified in Fiji. It was used to capture bait fish attracted to a submerged light. Specifications, method of setting and suggested improvements are given.

INTRODUCTION

The "Bouke-ami" described was used in Fiji during the later half of simulated production fishing cruises of the UNDP/FAO skipjack charter vessel SHINPO MARU NO. 2. Since the net was introduced to the project results have been good and this has indicated the need to record detailed specifications, and method of setting for future use in Fiji's fishing industry.

All materials used to febricate the gear described are similar to types in general use by the Japanese commercial stick held dip net fishing industry.

MODE OF PRESENTATION

The main design (Fig. 1) follows the format set out in the FAO Catalogue of Fishing Gear Designs and is drawn to scale and the scale is then indicated in metre equivalents. The mesh size indicated in the drawings is only for illustrative purposes. The accompanying illustrations are not to scale and only essential dimensions are given.

Dimensions are given in metres (m) and millimetres (mm). The metre is used for larger dimensions such as for lengths of ropes while the millimetre is used for smaller dimensions such as mesh size. The unit of weight is the kilogramme (kg).

Materials are indicated by abbreviations which are preferably based on terms in common international use such as polyamide (PA).

The size of netting yarns is designated according to the denier system.

SPECIFICATIONS

1. Type of net and rope materials

Net material is made of synthetic fibre "Kuralon" (PVA, Polyvinyl alcohol) and "Nylon" (PA, Polyamide) coloured brown. Size of mesh is shown in the attached diagram. Ropes are of staple Polyester (PES).

2. Materials and quantities

(i) Main net (lead line section). Material nylon (PA) with diameter of yarn 210 D/12, of Raschel construction (knotless). Size of mesh 7 mm hung to 21.7 m of Polyester with 5 mm diameter. The foot rope is attached to a 8 mm polyester lead line.

(ii) Main net (head line section) material "Kuralon" (PVA, Polyvinyl alcohol) diameter of yarn 210 D/6, of minnow construction (knotless). Size of mesh 3.5 mm (square). Ratio of hanging is 27.9 mm of 3.5 mm mesh hung to 20.2 m of polyester "bolch" line with 5 mm diameter. This line is attached to an 8 mm polyester head rope.

(iii) A 2.7 kg lead weight is attached to every loop formed in the lead line for attachment of hauling lines. The two hauling lines attached to the edge lines of the net do not have leads.

(iv) To the outboard section of the lead line section of the main net is attached, on alternative strips (see diagram), five .23 kg (8 oz.) lead weights.

3. Hauling lines

These (10) are of 10 mm Polyester rope and are approx. 22 m in length.

4. Bamboos

Eight bamboos with diameters of between 100-150 mm are used. Four are used as float poles and four as spreader poles.

5. Head and lead lines

These lines consist of two individual lines secured together. One line (Bolch line or foot rope) is 5mm diameter and the other (head rope or lead line) is 8 mm diameter. The lines are of polyester (PES). The netting is sewn to the 5 mm diameter line.

6. Sewing of strips

The strips are sewn together by machine with spun nylon thread.

N o t e s :

(i) Ropes

The ropes used on the net should not float as this has adverse affects on the net when set. Hauling ropes should be easy to handle (rot-proof manilla). Nylon tends to slip.

(ii) Netting

The Okinawan fishing master of the Shinpo Maru suggested the the placement of two metres of 3.5 mm (minnow) netting above the lead rope.

(iii) Leads

These can be made by pouring molten lead into a cocacola tin. The two end leads should be larger (3 kg) than the other six leads.

(iv) Hauling ropes

These can be reduced in number in the centre. Most of the strain in hauling is on the end and side ropes.

METHOD OF USE

Bait fishing starts with the attraction of the bait fish to an underwater lamp. The lamp (500-1500 watts) is hung 10 metres below the surface from a skiff which is tethered approximately 50 metres astern of the vessel. Usually just before day break the "baitman" pulls the skiff into the vessel and checks for bait around the light. If sufficient bait is "balled" about the light he indicates to the man on watch to alert the crew. The baitman remains in the skiff and weits 50 metres aft of the vessel until the net is set.

The net is laid along the starboard side of the vessel with bamboo float poles uppermost. The bamboo spreader poles are attached to the ends of the bamboo float poles which are then lowered into the water. The spreader poles then push the float poles out while the crew play out the rest of the net. The leads are finally lowered into the water and the end of each hauling line held by one crew man. When the net is hanging vertically in the water the baitman slowly pulls up the underwater light until it is about one metre below the skiff and then moves the skiff very slowly in to the vessel and all lights on the vessel are then extinguished. When he reaches the stern of the vessel he grabs hold of the spreader poles, ducks under them and moves to place the skiff and light between vessel and net. He keeps the skiff in position by holding onto cross ropes which keep the net from drifting (see Fig. 2).

When the baitman is certain that all bait fish are again "balling" around the light he signals to the crew to begin hauling.

Most strain is usually felt on the end and the two side hauling ropes. Once the net is hauled (Fig. 3), the underwater lamp is switched off and a small 60 watt above water light is switched on. This is held out from the side of the vessel and prevents the bait from becoming too wild. The skiff now moves out of the set net.

The spreader poles and net are then pulled slowly in so that a bag is formed between vessel and float poles. These are then about 2 metres from the side of the vessel. The skiff with two crew members aboard moves along the outside of the net crowding the bait fish into the centre of the net by working along from each end, drying up the net as they go. When the bait fish are concentrated in a sectioned off area opposite the bait wells a plank is placed between skiff and vessel upon which crewmen can stand. Rocks, attached by 3 mm diameter ropes to the side of the vessel are placed inside the net to keep the net bagged so that the bait will not suffocate.

Brailing then begins, and bait is transferred to the bait wells in buckets.

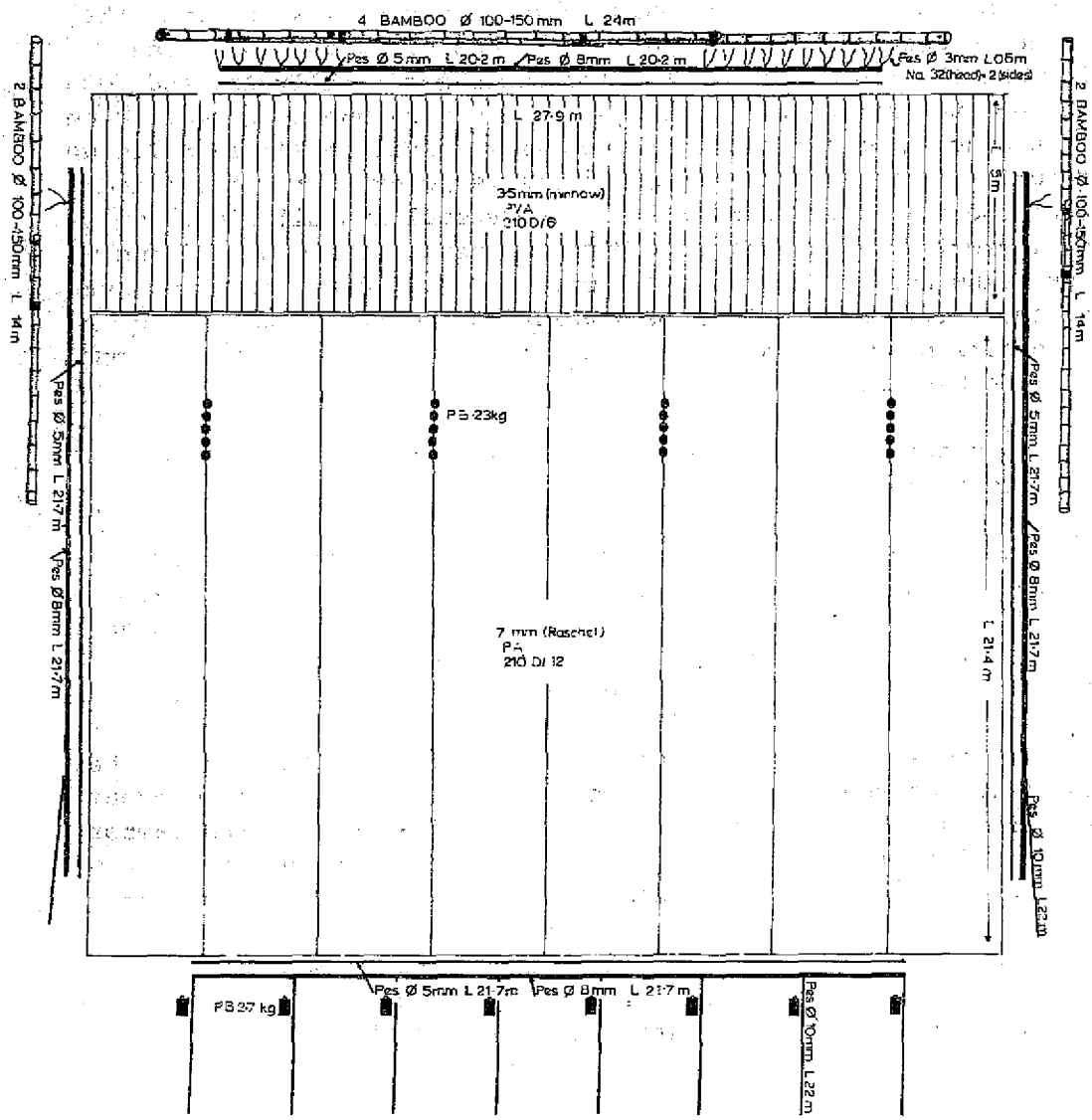

FIGURE 1 BOUKE-AMI (Stick held dipnet)

Legend		Reference		Vessel	
Pes	Polyester	Robert M. Stone		Loa	19·5m
PA	Polyamide	Fisheries Division		GT	39·95
PVA	Polyvinylalcohol	Lami		hp	250
D	Denier	Suva, Fiji			
Ø	Diameter				
PB	Lead				

0 1 2 3 4 5 6 10m

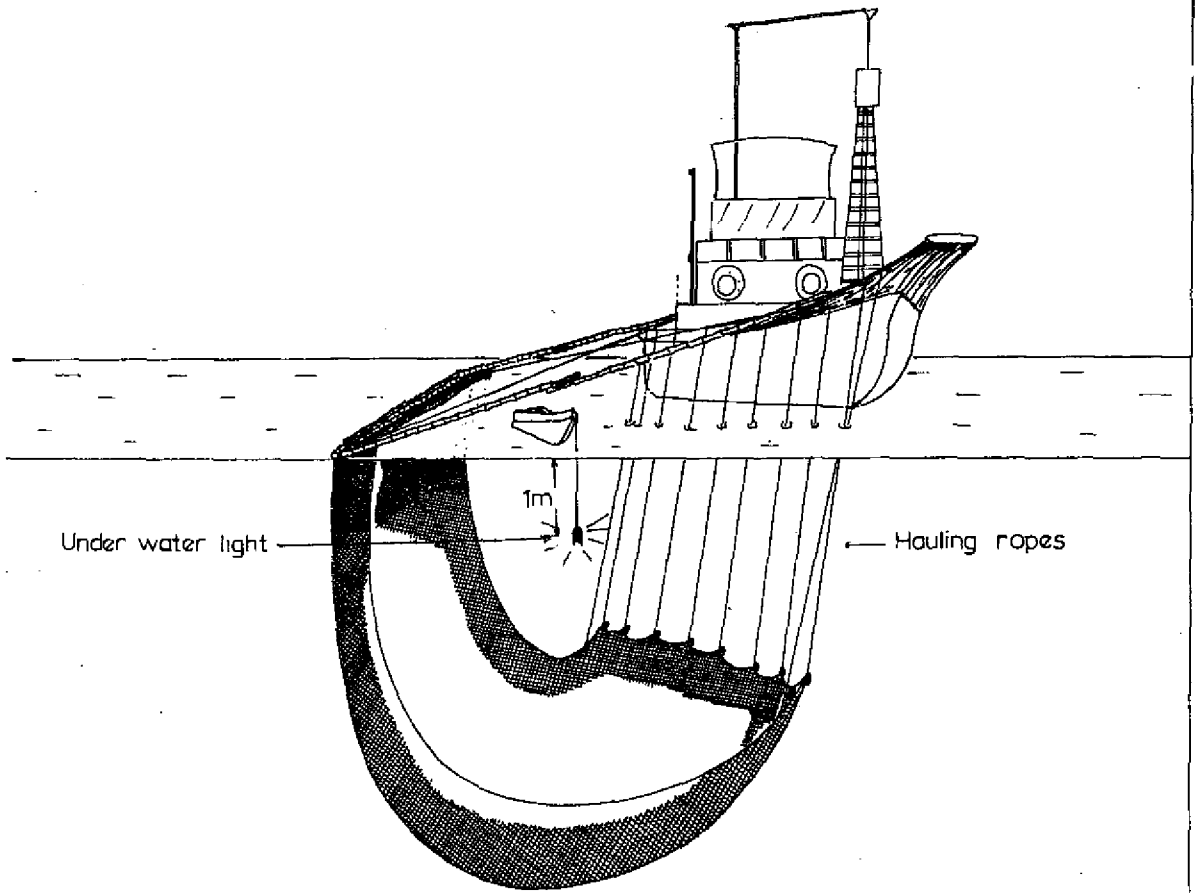

FIGURE 2 Schematic view of operation of bouke-ami

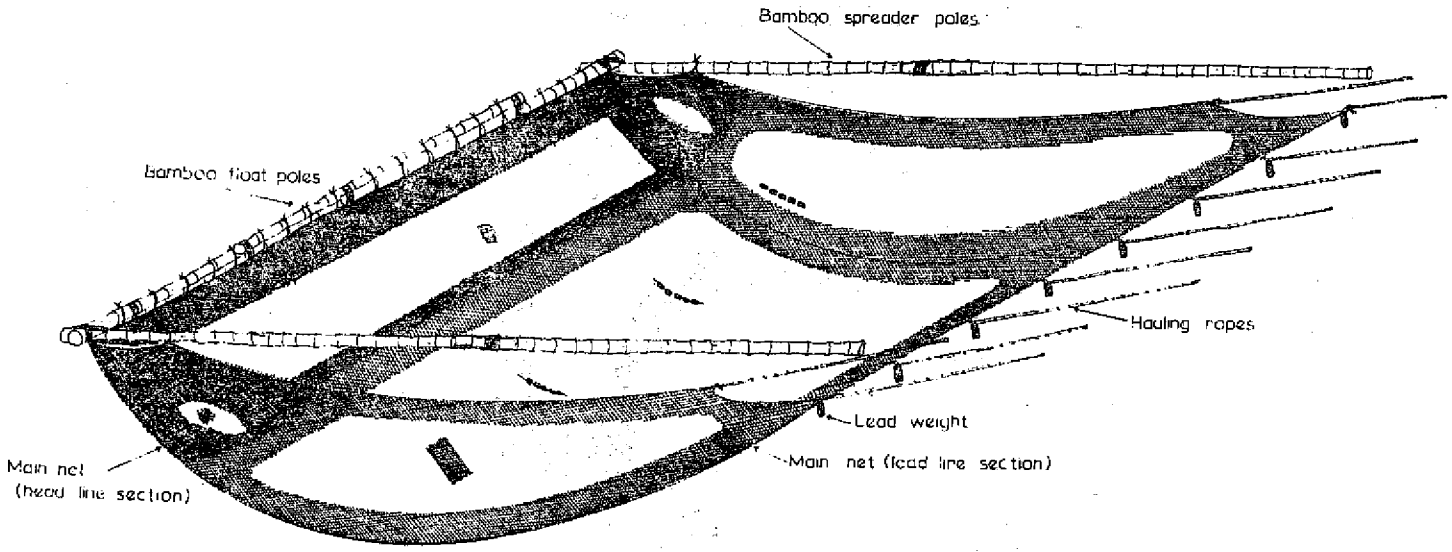

FIGURE 3 Schematic view of hauled bouke-ami

THE NEW ZEALAND ACOUSTIC TUNA LURE

The New Zealand acoustic tuna lure has been developed in the form of a compact "transducer" device for transmitting and receiving underwater sound. It can be used to turn a fibreglass fishing dory into a "drum" or sounding board which sends acoustic signals out through the ocean to schools of pelagic fish miles away.

The device, the York Acousto lure, is a combined effort by the New Zealand Ministry of Agriculture and Fisheries, which holds patent rights, the New Zealand Inventions Development Authority, and the Christchurch firm of Elsham and Associates Ltd. The acousto lure was invented by Mr Dan York, of the Fisheries Management Division of the New Zealand Ministry of Agriculture and Fisheries.

The lure sends a tape-recorded signal through water to attract fish, and, alternatively, can be used as a listening device to enable fishermen to detect schools of fish. A likely future development is the repelling or attracting of sharks to help increase safety off bathing beaches.

So far, the best results with the lure have been on juvenile Southern bluefin tuna, but Atlantic bluefin tuna, horse mackerel, warehon, kahawai and bronze whaler sharks have also been attracted.

The Company believes there is a big potential for the new transducer with fibreglass dories for purse seining, and for tuna trolling with a drogue-mounted transducer.

The above is an extract from an article in the New Zealand "Commercial Fishing" magazine.

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EUCHEUMA FARMING FOR CARRAGEENAN

Some countries have expressed an interest in seaweed farming, and certainly for remote islands and atolls with sheltered lagoons this could provide cash income from a sea product that would not suffer from long storage and shipping delays.

A paper published in 1973 by Maxwell S. Doty under the University of Hawaii Sea Grant Program describes Eucheuma farming in the Philippines. The Introduction to the paper and the section on "Supply and Demand" appear verbatim:-

INTRODUCTION

The different species of the seaweed genus Eucheuma produce quite purely one or another form of carrageenan. Carrageenans are colloids or gels; they are key ingredients in a great many products of the modern American food and dairy industry. Southeast Asia is the major source of this seaweed.

Few phycologists are familiar with the genus, Eucheuma, as are perhaps fewer people in industry. Thus it is of interest to note that records of Eucheuma are as old as Linnaean botanical literature itself. It has long been used in Southeast Asia as a green salad vegetable and for its gel content. Hesse's introduction of agar agar to microbiology (Hitchens & Leiking, 1939) was apparently the first scientific use of the gel, kappa carrageenan, from the Eucheuma "cottonii" group of species. The terms agar and agar agar are now applied in the Western World to a different gel substance from different algae.

The meanings of the following technical or colloquial terms are provided here for clarity. A thallus is one of the individual algal bodies that grow and it is the thalli (plural) that are harvested for their carrageenan content. Carrageenans are complex carbohydrate molecules that form unusual gels or colloid combinations in water and milk. They often contain as much as 30 per cent sulfate by weight. The different forms are designated by Greek letters.

The culture of a very different seaweed in Japan, Porphyra, has provided certain of the Eucheuma farming techniques. The term 'monospecific product' is used to indicate Eucheuma produces either one or the other of the different carrageenans. Finally basic production ecology is the study of the environments in which Eucheuma grows well and the use of this information in the empirical farming method now in use.

SUPPLY AND DEMAND

The modern food industry requires 10 to 20 times more carrageenan than the wild seaweed crop provides. Part of this need is being met by the research and development reported here on the basic production ecology and agronomy of Eucheuma, a carrageenan-producing tropical seaweed. Other marine algae, such as Chondrus crispus, the "Irish moss" of temperate regions, produce variable mixtures of the different carageenans.

The genus, Eucheuma, can be divided (Table 1) into two groups of species; one produces iota carrageenan and the other, kappa carrageenan. Morphologically these two are named in commerce "spinosum" and "cottonii".

Currently, an amount perhaps between 3000 and 4000 dry tons of Eucheuma reaches the world market. Most of it goes to the United States, with much less going to the United Kingdom, France, and Denmark. Largely it comes from Southeast Asia, e.g., the Philippines and Indonesia. Wildman (1971) provides both an interesting series of photographs and a variety of information on the Eucheuma industry. The world price might now be $350 (U.S.) per ton if the product were clean, rewashed, dry and monospecific regardless of the species of kind of carrageenan contained. Deviations from these specifications may reduce the F.O.B. price one-half or two-thirds, but the value has nearly doubled in the past five years.

TABLE 1. The better-known carrageenan-containing Eucheuma species used commercially

Sources of Kappa carrageenan ("cottonii" types)	Sources of iota carrageenan ("spinosum" types)
E. cottonii (E. okamurae)[a]	E. spinosum (E. muricatum) (E. denticulatum)
E. striatum (E. nudum) (E. edule)	E. isiforme (E. acanthocladum)
E. procrusteanum	E. unicinatum (E. johnstonii)
E. speciosum	

[a] The scientific names in parentheses are probably synonyms of those under which they are indented insofar as they are used in the Pacific.

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The paper describes the various species of Eucheuma, methods of culture, suitable habitats and an economic appraisal of culture under Philippine conditions.

Mr Doty concludes his paper thus:-

"In conclusion, let us consider the probable useful dry matter and monetary returns from a Eucheuma farm in comparison with other productivities. The 30-odd tons of dry Eucheuma that can probably be produced per hectare per year is (Westlake, 1963) in line with other estimates of dry-matter productivity in tropical shallow marine waters. Such Eucheuma will be worth significantly more than $250 per ton. In Mauritius, sugar is profitable at 3.5 tons per hectare per year. In Hawaii, the mean productivity[1] during 1970 was 11.23 tons of sugar per hectare per year. After all the care and processing required, it is only worth[2] $187 per ton. Yet, to tropical agriculturists, sugar is considered an attractive crop. It requires good soil and must compete with many other possible uses for the land. Eucheuma is a crop of tropical reef flats which are of little use in today's economics, and it provides an income to a group of people not otherwise aided by the current development programs. On a given area, Eucheuma farming can provide more than three times the dollar return that sugar brings."

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[1] Value from Hawaii Sugar Planter's Association Experiment Station.

[2] U.S. average price for sugar in 1971 was $187.44 and the world price was $99.44 per ton.

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DIARY OF FORTHCOMING MEETINGS

June 4 - 6	Skipjack Baitfish Workshop. NMFS Laboratory, Honolulu, Hawaii.
June 20 - August 29	Third United Nations Conference on the Law of the Sea. Caracas, Venezuela.
June 25 - July 5	International Symposium on Indo-Pacific Tropical Reef Ecology. Guam (Palau).
July 15 - 19	SPC Seventh Technical Meeting on Fisheries. Nuku'alofa, Tonga.
October	Indo-Pacific Fisheries Council. Probably Djakarta, Indonesia.

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