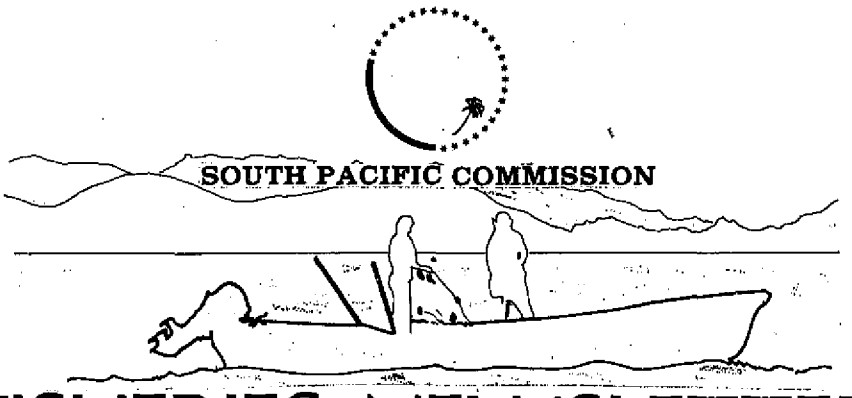

FISHERIES NEWSLETTER

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Contents

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B.P. D5, NOUMEA CEDEX, New Caledonia - Telephone: 26.20.00 - Cable: SOUTHPACOM NOUMEA - Telex: 3139NM SOPACOM - Fax: (687) 26.38.18

SPC ACTIVITIES

NEW FISH HANDLING AND PROCESSING OFFICER RECRUITED

The post of the SPC Handling and Processing officer, vacant since the resignation of David Burford in August 1986, was taken up in June 1987 by Stephen Roberts. Steve, who is from the UK, holds a B.Sc in biochemistry and a M.Sc in food science. Prior to joining the Commission, he worked for the Fish and Meat Section of the UK Tropical Research and Development Institute, and then as a consultant lecturer in fish processing in the Department of Fish Processing Technology of the College of Fisheries, University of the Visayas in the Philippines.

Steve is presently familiarising himself with the background to the SPC Fish Handling and Processing Project, and the present situation and requirements of Pacific Islands countries in the fields of post-harvest fisheries development and marketing of marine produce. He will shortly be undertaking travel to Fiji, to the Cook Islands, and in the Micronesian area, both to undertake specific technical work and to discuss future national-level project activities.

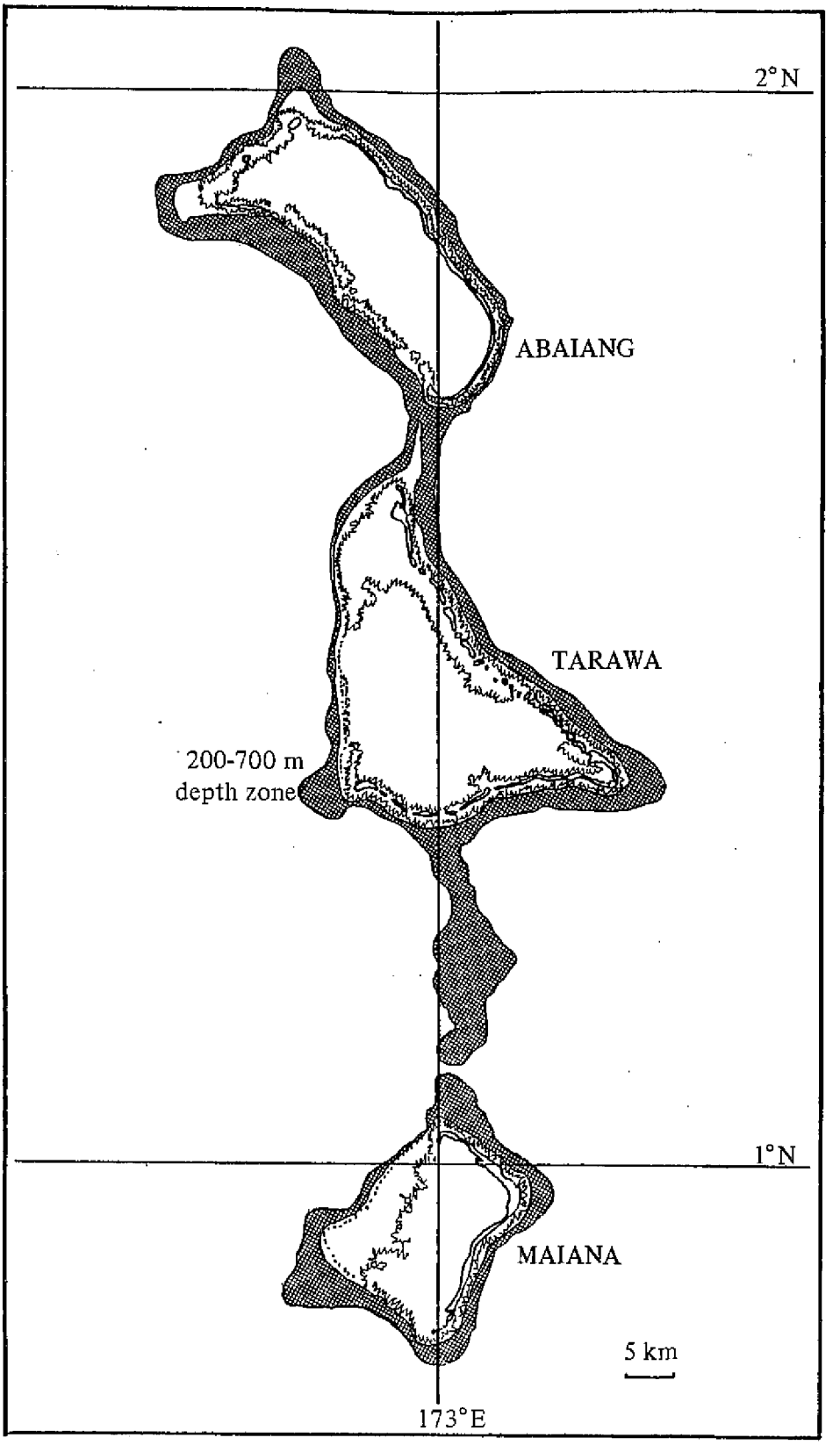
KIRIBATI PRAWN SURVEY COMPLETED

The 6-week survey of deep-water prawn resources in the Northern Gilbert Islands (see SPC Fisheries Newsletter # 40, p.4), which commenced in March 1987, has now been completed and the report forwarded to the Kiribati Fisheries Division for comment. The survey, supervised by consultant deep water fisherman Bernard Crutz, confirmed the presence of deep water shrimp, mainly Heterocarpus laevigatus and H. ensifer, in the 200-700m depth range around Tarawa. The catch rates, which averaged 0.72 kg per standard trap (increasing to 1.04 kg/standard trap in the optimum fishing zone) were in the low end of the range of average catch rates obtained from other parts of the Pacific

The catch results were used to make a very rough-and-ready estimate of the standing stock and annual production of this resource. Based on estimates of the size of the deep water shrimp habitat in the area, and extrapolating from biological research on deep water prawn carried out in other parts of the region, it was estimated that the standing stock would almost certainly be less than 350 tonnes, while the maximum annual yield would be about 125 tonnes. Of this, only about 20% would be concentrated in the optimum fishing zone of 400-500 m, where catch rates were highest, and where the proportion of the larger and more valuable Heterocarpus laevigatus, were also relatively high.

Fishing conditions were very difficult during the survey, with rough bottoms and strong currents contributing to a very high rate of trap loss. Larger traps, set singly, were much easier to recover than the smaller traps, set in strings of up to eight at a time. Although the large traps are more unwieldy to handle on the boat, they probably represent the best option for any future deep water shrimp fishing from the project vessel Nei Tewenei in Kiribati. Catch rates from the larger traps were about 4 times those of the small ones, in proportion to the ratio of the floor areas of the two trap types.

The sizes of the prawn caught tended to be small, with only about 8% of the catch weight (all H. laevigatus) in the most valuable size grade (over 40 g individual weight or less than 25 shrimp/kg). As with catch rates, size composition varied with depth. In general, the highest proportion of larger shrimps occurred in the deepest waters, beyond the depth where catch rates peaked and then began to fall off again.



Estimated extent of deep-water shrimp habitat (area between 200 m and 700 m depth contours) around Tarawa, Maiana and Abaiang. Total area = 630 sq km

Typical small trap catch

The conclusions of the survey were that deep water prawn trapping has only a limited economic potential in the Northern Gilberts group, because of the nature of the resource and the difficulties of marketing the catch. There is nevertheless scope for further investigation by the Fisheries Division into ways of improving catch rates and trap handling methods, and in looking at new areas where access to marketing outlets is easier.

The full report of the survey is currently available in draft form from the Commission and will be published shortly.

DEEP SEA FISHERIES DEVELOPMENT PROJECT NOTES

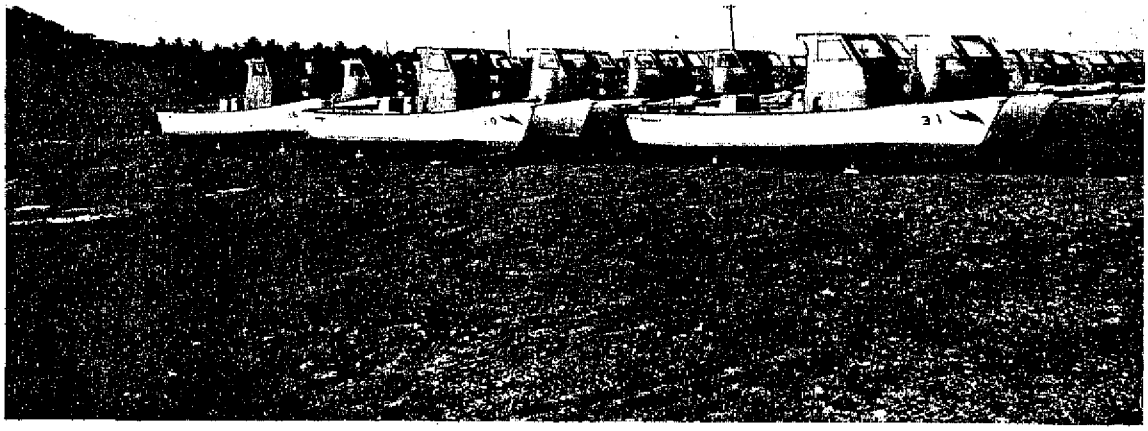
New SPC Master Fisherman joins DSFD Project

Mr Archie Moana, from Niue, joined the Commission as Master Fisherman in May 1987 replacing Pale Taumaia, who resigned in February. Until joining the Commission, Archie was fishing commercially in Niue: previously he was Fisheries Officer with the Niue Fisheries Division, and before that an engineer with the Niue Public Works Department. Archie has a good all-round experience in small-scale fishing and small engine maintenance and repair as well as a specific knowledge of several traditional polynesian fishing methods, including flying-fish scoop-netting and "ulihenga" or Decapterus fishing. He also has a history of association with the DSFD Project, having been involved with the initial vertical longline trials carried out by SPC Master Fisherman Paul Mead during his 1982-1983 assignment to Niue.

Archie spent his first two weeks on a brief "induction course" at SPC headquarters in Noumea. During this period, he became familiar with the Commission's financial accounting and record-keeping system for field projects, and also spent several days with SPC Assistant Fisheries Officer Garry Preston, brushing up on fish identification, the keeping of catch and effort records, and reporting in general. Before leaving for his first assignment, Archie put together a kit of basic gear required for his work, and at the same time assisted with a stock-take of the Commission's fishing gear holdings.

Federated States of Micronesia

Archie's first assignment is to Kosrae, Federated States of Micronesia. The main aim of the visit, which started in June and will run until December, is to provide training for the owners and users of a fleet of 70 new fishing boats provided to Kosrae on Japanese aid. The boats will be sold to local fishermen at subsidised cost, and owners will first be required to undergo the basic training programme that Archie will supervise, using one of the boats that has been rigged out as a training vessel. The training includes elements of basic boat handling and seamanship, safety, and fishing techniques.



Kosrae's new alias

The Kosrae State Marine Resources Department has just taken delivery of the 70 boats, which are all 8.5m (28-foot) fibreglass catamarans, as part of a Japanese grant-in-aid for local fisheries development. The catamarans are based on the very successful outboard powered 'alia' design developed in Western Samoa in the late 70's. Alias have proved popular small fishing boats ever since, with over 300 in use in Samoa alone, and many others in other parts of the Pacific. The original vessels, built from plywood, have now been largely superseded in Samoa by low-maintenance aluminium versions. There have been many design changes, modifications and "customisations" along the way, including attempts to fit sails, mount inboard engines, increase fish carrying capacity, etc. Unfortunately, many of these changes have detracted from the performance of the vessel, which was originally designed specifically as a trolling/pole-fishing boat for Western Samoa's day fishery for skipjack.

Kosrae's case is the first time that these boats have been incorporated into a Japanese grant-in-aid, but it seems likely that more will be seen in the region in the future. The story is that a Japanese volunteer working in Apia took the design with him back to Japan, and that the Japanese International Cooperation Agency (JICA) commissioned Yamaha to build the boat in fibreglass for use in Pacific Island countries. Archie reports that the boats are comfortable and safe, and have the advantage of a wet deck that is completely sealed off from incoming waves (unlike the aluminium or wooden versions, which have to be bailed out). Because of its fibreglass construction, the boat is heavy and relatively slow when powered by the standard 25h.p extra-long shaft outboard. The fibreglass fishing reels provided with the boat proved to be under-strength and Archie has thrown them over the side and built some wooden handreels, which have been an immediate success with local boat owners.

French Polynesia

Master Fisherman Lindsay Chapman arrived in Papeete, French Polynesia late in March to undertake a four-month training and demonstration assignment which involved moving between a number of locations.

Lindsay spent his first two weeks in Papeete, mainly preparing and organising gear and the detailed activities to be undertaken during the assignment. Lindsay also completed several observation trips on local 'bonitiers' (small pole-and-line boats), to familiarise with this type of fishing, which is popular in French Polynesia.

Lindsay then travelled by inter-island shipping to the island of Tubuai, in the Australs, where he spent 5 weeks in a programme of demonstration fishing for local fishermen. The main methods used were vertical longlining and deep-bottom fishing, both using the wooden handreels that are the Project's standard equipment. A combination of events made the Tubuai visit difficult and reduced its effectiveness: bad weather cut down the amount of fishing possible to a minimum, and poor catches made it difficult to generate enthusiasm among local fishermen. A long religious holiday also occurred in the middle of the period, and preoccupied the islanders to the exclusion of fishing.

Things were exactly the opposite at the next island to be visited, Rurutu, also in the Australs, where Lindsay stayed for three weeks. The programme at Rurutu was similar to that at Tubuai, but better weather and excellent catches generated immediate interest in the Project. By the time Lindsay left several local fishermen had made their own vertical longlines and were searching around for materials to build wooden fishing reels.

(Photo: Spacii/La Dépêche)

Deep-bottom fishing trials at Rurutu

Lindsay departed Rurutu in mid-May to return to Papeete and from there to travel to the Marquesas Islands to continue his programme.

Gear Development Sub-Project

SPC Master Fisherman Paul Mead has been continuing basic fishing gear development work in Vava'u, Tonga, where he is undertaking a long-term (2 years) assignment for this purpose.

Late last year, Paul deployed four FADs in and around Vava'u (the number has since been reduced to three by cyclone-associated winds and seas). The inshore FADs now appear to be attracting and holding fish, and Paul has been fishing them using a variety of new or modified techniques that target both on baitfish and on large oceanic pelagic species.

One technique that Paul has been working on is a modified version of the Hawaiian 'opelu' or hoop net, similar to that used in recent FAO/UNDP sponsored fishing trials in Niue. Paul is using a 'home-made' version constructed from PVC water-pipe and monofilament gill netting. Unlike the Hawaiian system, which is used in the daytime to catch Decapterus chummed up with ground taro or breadfruit, Paul's system is to use the net at night under a 200W light, which draws bait around the boat. The light, which is run from a small portable generator, is dimmed to 25W to concentrate the bait, then the net is hauled by two people. Catches have so far been small but encouraging, and modifications to the net have resulted in their continual improvement.

Paul has also been turning his attention to deep-swimming tunas and other pelagics. He recently completed the installation on the Vete (the project vessel) of the Commission's new Koden 8812P colour echo-sounder, which allows the detection of fish, plankton clouds and other marine life around the FAD. Paul is using the sounder to monitor changes in the abundance of tuna around the FAD, and to target on promising looking depths and areas for deep-trolling trials.

Present deep-trolling efforts are being carried out using a 'breakaway' system, with two handreels run through trolling booms on either side of the boat. One handreel carries a very heavy trolling weight on a stainless steel wire line. The other carries the bait or lure and this is attached to the weight in such a way that it breaks off when struck by a fish. This rig is in its early stages and Paul has not yet had the opportunity to test and refine it.

EIGHTH NELSON COURSE CONCLUDES

The eighth SPC/Nelson Polytechnic Pacific Island Fisheries Officer Training Course reached its end on Friday 17 July 1987, with students returning to their home countries from Tonga, where the 5-week practical fishing module of the course was based.

As usual in recent years the course ran smoothly, with the 14 weeks Nelson Polytechnic element following the course prescription outlined last issue (SPC Fisheries Newsletter #40 p8). As is also usual with field-based training activities, the practical fishing module had its share of unanticipated setbacks which interrupted its smooth running, although not severely. SPC Fisheries Training Officer Alastair Robertson, who was supervising the overall module as well as skippering one of the three small fishing boats used in the training, had to leave unexpectedly for the UK for 3 weeks for personal reasons shortly after the course started. Fortunately Nelson tutor Mike Wells, who travelled with the students from New Zealand and was acting as second boat skipper, was able to take over course supervision, while SPC Master fisherman Paul Mead, currently stationed in Vava'u, acted as boat skipper in Alastair's absence. Third boat skipper was Tongan Fisheries Officer Naita Manu who was also responsible for local arrangements such as vessel rationing.

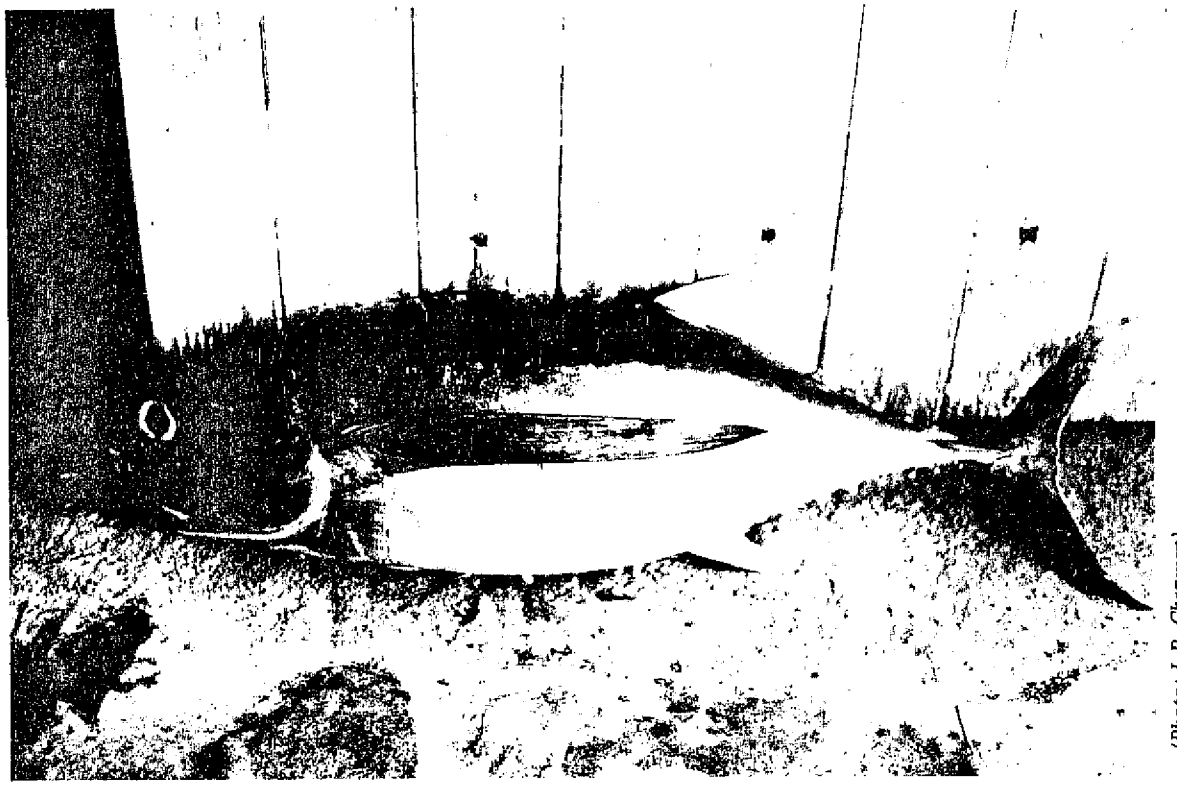
Despite Alastair's absence for a large part of the module, the course ran reasonably well with the students being instructed in a variety of fishing, small-boat handling and related activities, both at sea and on shore in the classroom. The students also took part in a public relations exercise: during the period of the course a Tonga-Samoa canoe race was held in Vava'u and attended by a large number of visitors, from Tonga and overseas. The SPC students participated in an agricultural show put on for the occasion by setting up and and manning a stand explaining the aims and coverage of the course to visitors. The students' stand was praised as the best entry in the show.

The cancellation of all flights into and out of Vava'u during the last week of the course forced a hurried exit en masse to Nuku'alofa, where the last classroom sessions were held before the course closed down. Overall, the module achieved most of its aims, and as always showed up areas for improvement in future courses.

NEWS FROM IN AND AROUND THE REGION

SOUTH PACIFIC ALBACORE FISHERIES
(Source: NMFS-SWFC/SPC/Catch)

Experimental fishing by research vessels (see SPC Fisheries Newsletter #24, p. 9) and more recently by both research and commercial vessels (SPC Fisheries Newsletter #37, p. 23: SPC Fisheries Newsletter #38, p. 27) are rapidly leading to the development of a commercial albacore fishery in the southern Pacific around 40°S. There are presently 7 U.S. albacore trolling boats fishing in the region south of Rapa, French Polynesia and unloading at Papeete, from where most of the catch is being exported frozen to Europe and the U.S. The number of Papeete-based boats is expected to at least double for the 1988 season, and additional boats may be based in Tonga if current discussions between U.S. fishing boat representatives and the Tongan government prove fruitful.



(Photo: L.B. Chapman)

Albacore - a potentially large surface fishery in the Pacific south of 40°S

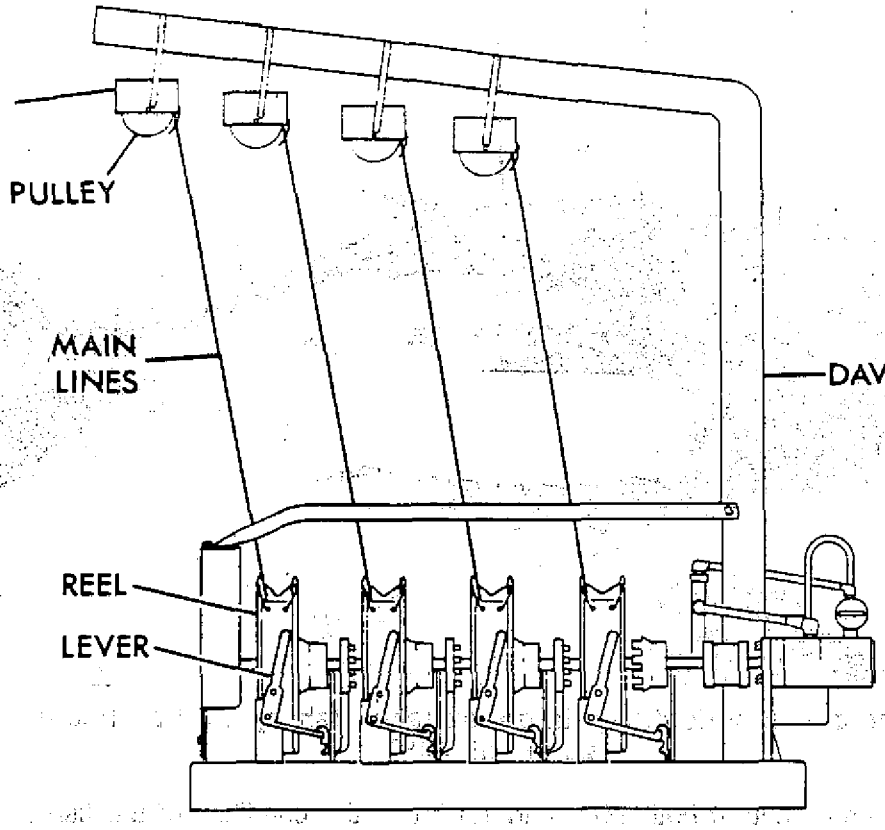
Some US fishermen found in both 1986 and 1987 that the condition of the fish they land is critical, and poor handling can make fish unsaleable. Inadequate freezing when catches were very high, and inadequate insulation in freezers and fish holds while in Tahiti, were the reasons for rejection this year. Fish holds must be well enough insulated to withstand sea water temperatures of 29° to 30°C during the 1300 to 1600 nautical mile trip northwards to unload the catch.

In Tahiti this year, only first grade quality fish were accepted; that is round, not gutted, good aspect, and a storage temperature of at least -15°C. Some US fishermen are investigating the installation of deck chillers to help lower the body temperature before freezing, and additional insulation in their freezer holds to ensure the quality of the fish landed.

Between January and early April this year the seven commercial troll boats (Jeannie, Day Star, Defiance, Bald Eagle, Nathalie Rose, Red Baron, and Madonna) caught a total of 908 tonnes of albacore, with all vessels making at least two loads. Hold capacities of the boats ranged from 44 to 90 tonnes. The highest catches were made between 37°30' and 38°S, and 147° to 153°W. Catches commonly exceeded 500, and occasionally 1000, fish per vessel per day in the area. The average size of the albacore was 7-8kg.

The fishermen commented that they had never before seen such good fishing. Individual boats made several catches as high as 7 to 8 tonnes per day. Next year between 25 and 40 US troll vessels are expected to fish the South Pacific for albacore. Landing points for the catch will depend on where fish are found but Tahiti, Pago Pago, and Levuka have all indicated they will buy fish.

The commercial troll boats maintained high catch rates of albacore by using hydraulic "gurdies" to haul their lines. These are four- or five-reel units mounted at each corner of the stern to haul the three to four outrigger lines and a stern line.

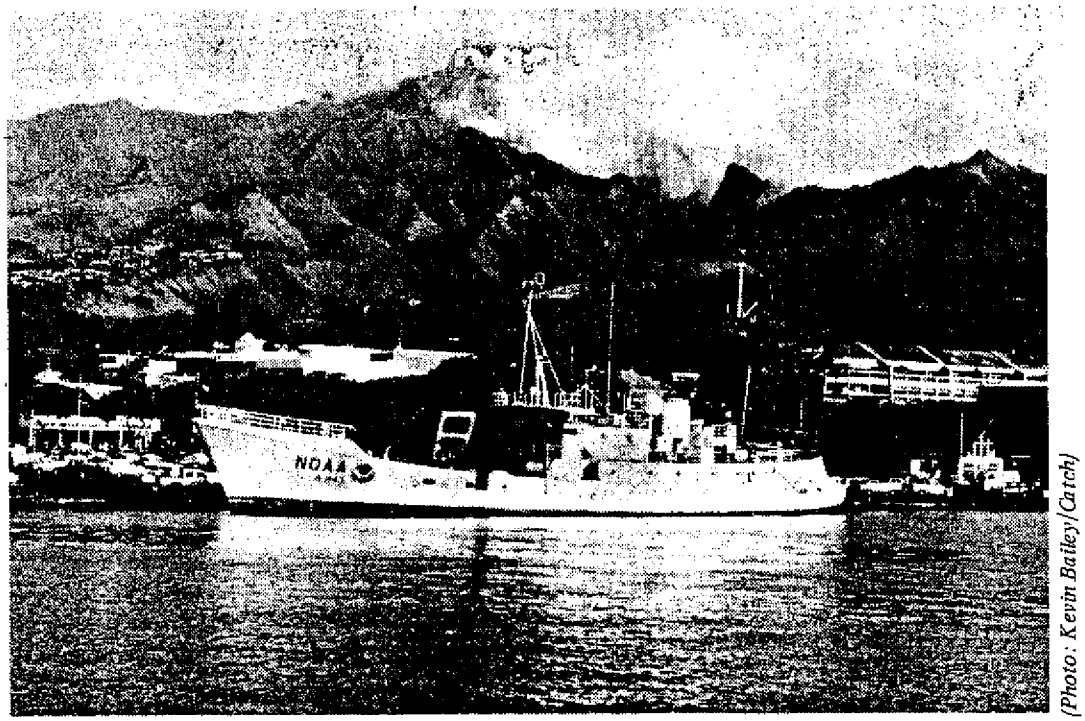


Source: NOAA Technical Memorandum NMFS SWFC 8.

Details of albacore trolling gurdy used on the Townsend Cromwell and US commercial troll boats. Each reel operates independently so that a line can be let out (lever to right and reel running freely); held in place (lever to left, reel locked, and clutch disengaged); or brought in (lever to right, clutch engaged). Line retrieval speed is controlled by a foot pedal.

Research workers from the U.S, France, New Zealand and the Pacific Islands region are meanwhile busy trying to gather baseline information on the size and nature of this previously unknown but evidently large resource. In the past 12 months over 1000 albacore have been tagged by scientists working in a cooperative tagging programme from the vessels Townsend Cromwell (US), Coriolis (France), and Kaharoa (New Zealand). The vessels are also carrying out a coordinated programme to gather biological and environmental data relating to the resource. The South Pacific Commission, the U.S, and New Zealand albacore fishing industries, and several other institutions are also participating in some aspects of the work. The overall aim is to describe the near-surface physical oceanography of the region, develop models of albacore biology required for stock assessment, and support efficient development of surface albacore fisheries in the South Pacific. One key objective is to understand relationships between the distribution and availability of albacore in near-surface waters and such factors as forage density, structure of temperature and salinity fields, and bathymetry. Another is to develop predictive models of South Pacific albacore migration.

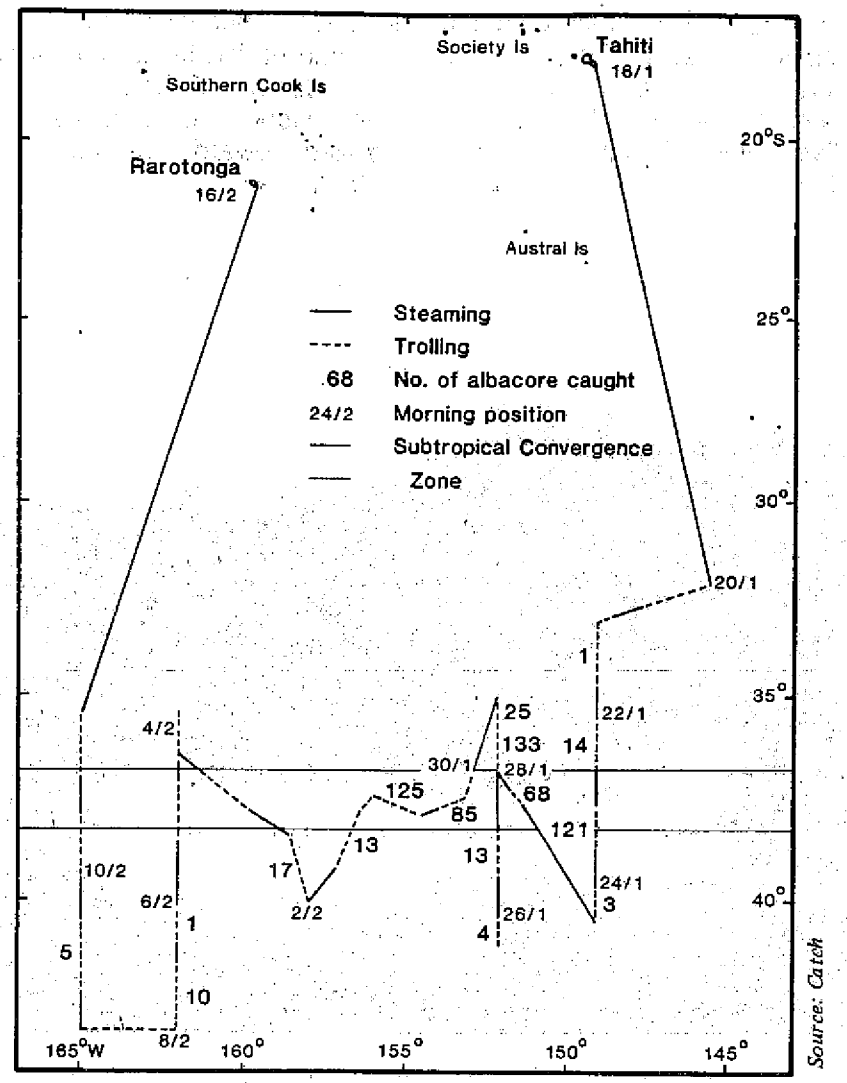
The Townsend Cromwell recently completed its second survey of South Pacific albacore grounds. The survey began in Tahiti on January 16 and ended in Rarotonga on February 16, 1987. It was preceded by an exploratory cruise in January/February 1986. Joining Chief Scientist Dr Jerry Wetherall and other U.S research workers on board were Pacific Island Fishery Scientists Viliame Langi, from Tonga, and Ned Howard, from the Cook Islands. The participation of both scientists was funded by the South Pacific Commission.



(Photo: Kevin Bailey/Catch)

NOAA research vessel Townsend Cromwell in Papeete , Tahiti, prior to departing for the fishing grounds

The Cromwell carried out salinity, temperature and depth measurements to a depth of 1,000m at a total of 73 stations, primarily along north-south transects placed between 149°W and 165°W, and running from 35° to 43°S. During daylight hours between sampling stations, 10 fishing lines were trolled to monitor the density and distribution of albacore and to collect specimens for tagging and biological sampling. A continuous record of the density and distribution of upper ocean scattering organisms, including albacore forage, was collected by photographing chromoscope images. Night-light stations were occupied to collect undamaged specimens of albacore forage, and surface neuston hauls were made to sample ichthyoplankton, including albacore eggs and early larvae, on transits through tropical and subtropical waters where albacore are known to spawn. Expendable bathythermograph probes (XBTs) were dropped routinely throughout the cruise, augmenting upper-ocean temperature data in a region only sparsely sampled. Systematic bottom depth records were compiled for inclusion in the South Pacific data base of the International Hydrographic Office.



Cruise track of Townsend Cromwell, January-February 1987

The two easternmost transects of the Cromwell cut through an area being fished with phenomenal success by five U.S albacore jig vessels, the Nathalie Rose, Day Star, Bald Eagle, Jeannie, and Defiance. During January, these boats caught full loads of roughly 40 to 85 tonnes of albacore between about longitude 147° and 153°W and approximately latitude 36° to 39°S. They offloaded their first-trip catches in Papeete and returned to the grounds, joined in February by two other U.S jig boats, the Red Baron and Madonna. All of the commercial boats are maintaining detailed logbooks of catch data and are tagging and releasing albacore. Some are dropping XBTs as well.

The reward of US$50 and a fishing cap for the return of a whole fish with a tag is the highest so far offered in the Pacific. A recovery rate of about 3% is expected from the tagging, and this will give information on growth rates and migration paths. One recovery has been made so far by a Taiwanese longliner. In two months, the albacore concerned moved over 260 nautical miles eastward and appear to have stayed in the Subtropical Convergence Zone. The STCZ may act as a temperature barrier to the southward summer migration of albacore. It also produces areas of up-welling that provide rich feeding grounds for tuna and other fishes.

The stomachs of the albacore caught during the survey were frequently full, the predominant food item being juveniie Peruvian jack mackerel, Trachurus murphyi. This species was also the main food item of albacore caught during the 1986 cruise. Results from the two cruises show that the juvenile mackerel are abundant and have a widespread distribution from 36° to 42°S and 148° to 165°W. Twice during the cruise, schools of mackerel were attracted to the Cromwell's lights and live specimens taken with dip-net. This suggests that mackerel could be used as live bait in a pole and line fishery for albacore. Some of the US fishermen working the area agreed and were thinking of bait fishing next year

During the Cromwell survey, transect placement and location of "albacore water" in the region was assisted greatly by sea-surface temperature imagery received from NOAA polar-orbiting satellites equipped with infrared sensors. Images were received in near real time and enhanced using the shipboard JVC-16E Oceanographic Colour Display on loan to the Honolulu Laboratory from the Japan Radio Company. Chromascope imagery, catch rate data, stomach data, and jig boat logbook observations will be studied for insights into the association of albacore with forage concentrations and structure of the near-surface waters.

The New Zealand vessel Kaharoa's survey work concentrated on the potential albacore waters within the New Zealand EEZ. Kaharoa's scientists concluded that, in addition to the traditional west coast grounds along the South Island, there appears to be some potential for more commercial fishing around the North Island, especially along the east coast, and in at least some years on the Chatham Rise. However, the excellent catches made by RV Kaharoa in 17° to 18°C water around the Chatham Islands in 1986 were not repeated in 1987, as the water temperatures of 14° to 15°C were too low.

The absence of suitable albacore water around the Chathams may mean that albacore are not regularly found there. The difference in sea surface temperatures around the Chatham Islands in 1986 and 1987 highlights the need for further study of the Chatham Rise area before its albacore fishery potential can be assessed.

SECOND VOLUME OF WPACFIN FISHERY STATISTICS RELEASED
(Source : NMFS)

The second volume of the Western Pacific Fishery Information Network (WPACFIN) report series "Fishery statistics of the western Pacific" was completed and distributed early in 1987. This report series was created as the principal means of normally distributing WPACFIN summary fishery statistics among Pacific islands fisheries offices. Volume II contains about 230 pages of summary tables, graphs, and explanatory text on commercial and creel survey data collected for the Territory of Guam from 1979 through 1984. Volume I, which was completed in March 1986, contained similar information for the Commonwealth of the Northern Mariana Islands (1979-84), the Territory of American Samoa (1982-84), and the State of Hawaii (1979-84). Tables of monthly and calendar year summary statistics of weight, value, and average price per pound for each species or species group landed are provided for the commercial fisheries. Seasonality and landings trend graphs are provided for many of the major pelagic and bottom fish species. Monthly and annual creel survey statistics include estimates of catch, effort, catch per unit effort, and participation for each of the major fishing methods used on Guam, as well as estimates on species composition and weight landed by species for the major methods of trolling and bottom fishing.

The next volume of this series will contain updates from these four island areas for 1985 and 1986 and may be available later this year. For further information, contact :

NMFS Honolulu Laboratory, P.O Box 3830, Honolulu ,Hawaii

SHRIMP FARMING TALKS IN PONAPE
(Source : JK Report on Micronesia)

Hong Kong businessman Felix Ko, president of Far East Systems, Ltd., visited Ponape in July 1987 to explore the possibility of setting up a joint venture company to do commercial shrimp farming on the island. Ko estimates that his company would make an initial investment of around US$3 million if the government provides the land and establishes the dykes necessary for the water compounds. Ko also wants an access road and other basic infrastructure completed, and assurances from the Ponape government that there would be some long-term protection for the foreign investors.

Ko's company, which has shrimp farms in Taiwan, believes Ponape is ideal for shrimp farming because of its warm climate and abundant rainfall. Ko looked at an old rice-growing site at Lukop in Madolenihmw, which could be turned into ponds and used for a 100-acre main farm. Local farmers would be encouraged to farm smaller areas. The joint venture corporation would provide technical assistance to the smaller farmers, help set up their farms, buy the shrimp, and organise shipping and marketing.

Ko said that anyone with about 10 acres of ponds could make $12,000 a year. He envisions an eventual 200 acres of ponds producing one million pounds of shrimp and grossing $4 million a year. Currently, shrimp is selling for $4 /lb.

Ponape's Director of Conservation and Resources, Mr Kikuo Apis, said that his department is not recommending that the state government or any state agency enter into a joint venture with the Hong Kong business group. If the project is deemed feasible, it should have private participation, or be set up as a government project with contracts to the technical advisors needed to get the project underway, Apis said, explaining that once there is a formal proposal his office will start an active campaign to present it to interested businessmen in Ponape.

Ponape officials expect to receive a written proposal from Ko by the beginning of September. After leaving Ponape, Ko visited Palau to look at possible sites there. However, Ko likes Ponape's location because it is closer to the U.S market.

TAIWANESE CLAM BOAT ARRESTED IN SOLOMON ISLANDS

(Source : Clamlines)

On April 14 the Taiwanese fishing vessel Her Cheng Fung No.3 was arrested by the Solomon Islands Patrol Boat Savo at Roncador reef, south of Ontong Java. The vessel had fresh and frozen clam muscle aboard plus some mantle meat and fish. The vessel was escorted to Honiara.

Graham Usher, biologist with the Solomon Islands Branch of the International Giant Clam Mariculture Project (see SPC Fisheries Newsletter # 39, p.13), examined the catch on behalf of the Solomon Islands Fisheries Division. The clam muscles were remarkably small, averaging around 100 g, with the largest at 400g, suggesting that the reef has long since been stripped of its main stocks. Nevertheless, there was 1 metric tonne of adductor muscle aboard, representing about 10,000 harvested clams.

The captain of the vessel was convicted on three counts relating to illegal fishing and fined SI$10,500. The vessel's equipment, stores and catch were also confiscated. The adductor muscle was sold by the Government of Solomon Islands, with assistance from Forum Fisheries Agency, to a dealer in Papua New Guinea for US$10.00/kg. After paying the cost of air freighting the muscle (US$0.77/kg) there was a tidy sum in hand for the Solomon Islands. Additionally, the Honiara Hospital accepted all of the mantle meat at SI$1.00/kg.

Peter Philipson of the Forum Fisheries Agency reports that it appeared to be easier to sell clam muscle to regional intermediaries than to deal direct with Taiwanese dealers. The high price paid for relatively small muscles was a surprise to all concerned.

WORLD FISH CATCHES RISE

(Source : Catch/FAO Yearbook of Fishery Statistics)

Latest statistics from the UN Food and Agriculture Organization (FAO) show that the world total fish catch for 1985 was nearly 85 million tonnes, an increase of 2.2% over the 1984 figure of about 83 million tonnes.

Inland waters were the source of just over 10 million tonnes (12% of the total) and marine areas provided nearly 75 million tonnes (88%). The Northern Pacific was by far the largest producer of fish; at 26.6 million tonnes nearly double the next largest, the Northern Atlantic (13.7 million tonnes). Principal suppliers in 1985 were Japan (11.4 million tonnes), USSR (10.5 million tonnes) and China (6.8 million tonnes), followed by Chile, the USA and Peru (all with over 4 million tonnes).

REGIONAL COOPERATION IN CIGUATERA RESEARCH

(Source : SPC/ Institut de Recherches Médicales Louis Malarde/ FSM)

The Louis Malardé Medical Research Institute (ILM) in Papeete, French Polynesia, has been helping the Federated States of Micronesia over the past few months in a research project aimed at developing a better understanding of the distribution of ciguatera fish poisoning in FSM. Chief of FSM's Federal Office of Marine Resources, Dr Mike Gawel, is coordinating the collection of samples of fish which are known or suspected to be toxic, along with as much information as possible on the type and size of the fish concerned, and the location and environment in which it was caught. The samples are frozen and then sent in batches to ILM where, under the supervision of researcher Dr Raymond Bagnis, they are analysed to determine the level of ciguatoxin in the flesh. It is hoped that the results will ultimately enable a picture to be formed of the most likely species, areas, and habitat types in which ciguatera might be present in Micronesia.

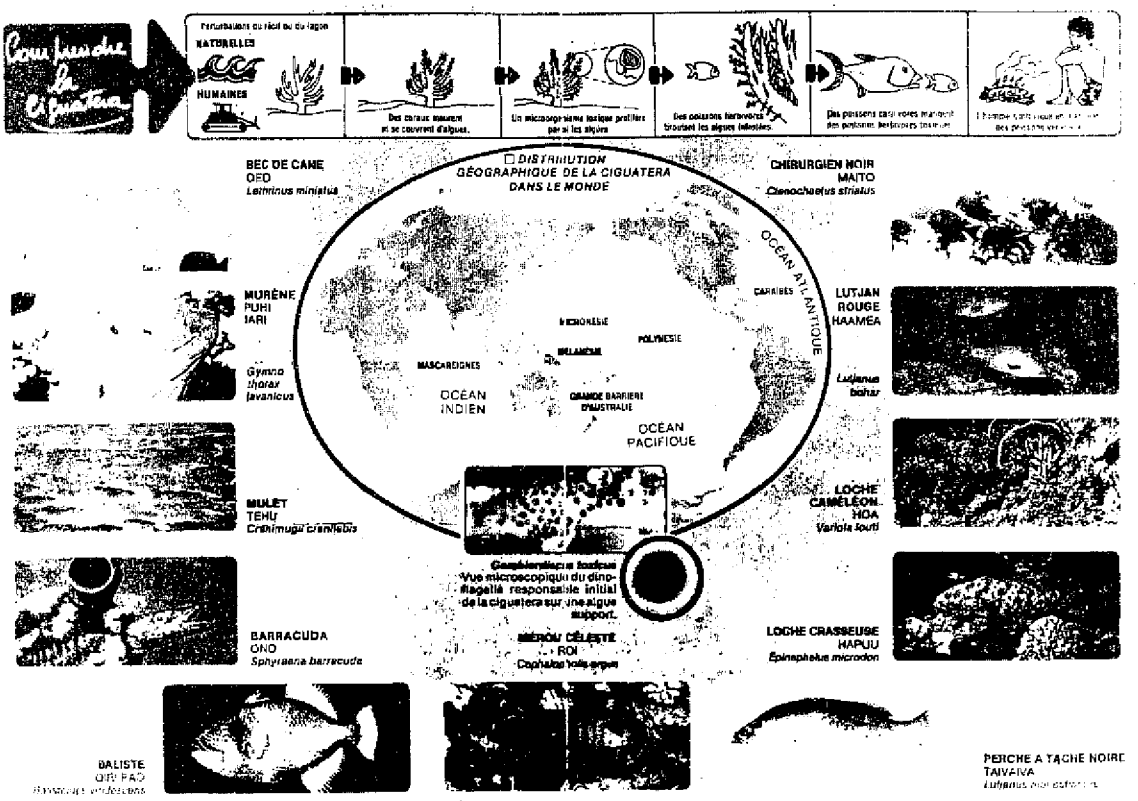
The ILM has been carrying out ciguatera research for several years now, both within French Polynesia and on behalf of other countries of the region. The research programme includes elements of environmental, biochemical, ichthyological and medical research, as well as public education. The Institute's method of testing ciguatoxin levels in fish flesh, by injecting small samples into large numbers of live mosquitoes and assessing resultant mortality rates, remains the only cheap, quick and accurate analytical technique so far developed, despite promising results from the "poke-stick test" under development in Hawaii (see SPC Fisheries Newsletter #34).

Ciguatera continues to be a problem in the Pacific region, both in terms of health, and because of the constraints it presents to fish marketing. Figures from the latest SPC SPEHIS (South Pacific Epidemiological and Heath Information Service) annual report show that the number of notified cases of ciguatera in 1985 were as follows:

Country	Population	Total number of ciguatera cases reported
American Samoa	34,900	13
Cook Islands	17,600	-
Federated States of Micronesia	88,400	8
Fiji	685,000	1,125
French Polynesia	169,600	901
Guam	114,900	28
Kiribati	62,300	412
Marshall Islands	34,800	116
Nauru	8,200	-
New Caledonia	145,800	86
Niue	2,900	3
Northern Mariana Islands	20,000	22
Palau	12,800	3
Papua New Guinea	3,252,400	-
Pitcairn Island	100	-
Solomon Islands	261,200	-
Tokelau	1,600	35
Tonga	96,200	4
Tuvalu	8,500	69
Vanuatu	127,800	491
Wallis and Futuna	12,800	-
Western Samoa	159,000	60

Despite the relatively high numbers for some countries, it is likely that these figures represent for the most part only severe ciguatera cases, since mild cases would by and large go unreported. The true incidence of ciguatera is likely to be much higher in all Pacific Island countries than these figures would indicate.

The Louis Malardé Institute has cooperated with the French Atomic Energy Commission in publishing a poster giving general information on ciguatera fish poisoning.The poster is part of a public education campaign to increase awareness of the biological origins of ciguatera (and to help dispel local rumours that it may result from nuclear weapons testing at Moruroa atoll) and ways to identify and avoid potentially toxic fish. The reverse side contains detailed notes on the manner in which ciguatoxicity develops in fishes and is passed on to man, the symptoms of poisoning, and practical tips to avoid ciguatera, or to minimise its effects. The poster is written in French and in Tahitian Maori, and is intended as a public awareness and education aid for schools, community centres, government offices, etc. Further information on the poster can be obtained from the Institut de Recherches Médicales Louis Malardé, Tahiti, French Polynesia.



French Polynesia's ciguatera poster

Ciguatera continues to present barriers to fisheries development activities in many countries. For this reason, it will be discussed in some detail during the forthcoming 19th SPC Regional Technical Meeting on Fisheries, to be held at SPC headquarters in August 1987.

PACIFIC CONGRESS ON MARINE TECHNOLOGY

(Source : University of Hawaii)

The above congress will be held from May 16-20 1988, in Honolulu, Hawaii. The congress aims to bring together scholars and resource persons who will address key issues concerning the marine technology related to the ocean economic potential of the region from a multi-disciplinary perspective. The congress is held biannually and enables an exchange of ideas between Pacific Islands and Pacific rim countries, strengthening future information exchange and research linkages.

For the 1988 congress, sessions on the following topics are planned:

Technology of Fish Finding and Tracking
Ocean Energy
Maritime Economics and Policy
Marine Transportation and Ports
Undersea Vehicles and Ocean Robotics
Remote Sensing and Oceanographics Satellites
Marine Applications of Global Positioning
Ocean Acoustic Systems
Ocean Engineering Applications in the Pacific
Tsunami
Pacific Ocean Sea Level Variability
EEZ Mapping
Software Technology
Hawaiian Ocean Experiment
Marine Technology Education
Marine Recreation: Boats and Other Moving Platforms
Ocean Data Program for Operational Forecasts.

Further information can be obtained from:

Pacific Congress on Marine Technology, c/o Sea Grant College Programme, University of Hawaii, 1000 Pope Road, Honolulu, Hawaii 96822.

CAREERS IN MARINE SCIENCE

(Source : Reflections)

The Australian Marine Sciences Association (AMSA) has recently published the fourth edition of its booklet Careers in Marine Science, which has been devised to assist secondary and tertiary students interested in pursuing a career in one of the many branches of marine science. The booklet is intended to indicate the current scope of marine science in Australia and provide some background information on each discipline or occupation. Additionally, some information regarding typical qualifications required for these careers, and the contact points for details of further information and training are included.

Copies of the booklet cost A$1 each and are available from:

AMSA Inc., 20/8 Waratah Street, Cronulla, NSW 2230, Australia.

BIVALVE CULTURE PROJECTS IN FIJI
(Source : Qitawa/SPC)

A running sea water quarantine system for giant clam juveniles has been established on the island of Makogai in Fiji as the first step in a giant clam culture project. The facility was put into use for the first time in February 1987 with the introduction of 400 Tridacna gigas juveniles provided by James Cook University in Queensland, Australia. The clams will be kept under observation for six months prior to being planted out into ocean nursery cages. Once the first batch has been released, the tanks will be thoroughly cleaned out in readiness for a second delivery of 1000 juveniles of the same species, due to arrive in two shipments on 17 and 24 August.

The Fiji Fisheries Division is also looking again at the possibility of culturing the Philippine green mussel, Perna viridis, in Fiji waters. Earlier attempts to culture this species in Laucala Bay, Suva were carried out in the late 1970's, but were abandoned due to a range of operational problems. Now, 1950 individual mussels remaining at the old site have been cleaned up and, after 3-4 days quarantine, transferred to a new, more promising site at Naqara where the trials will recommence.

FISHERIES SCIENCE AND TECHNOLOGY

ARTIFICIAL REEF PROJECTS IN HAWAII
(Source : Makai/ Caleb Offley)

A desert covering 400 square miles - that is fishery biologist Jeff Polovina's description of the giant submarine stretch of sand called Penguin Bank, which extends 40 miles out from the eastern edge of the island of Molokai. The bank is one of the most heavily fished recreational and commercial fisheries in Hawaii. In this underwater desert Polovina has set three man-made reefs in an attempt to provide the fish communities with secure habitats around which they can flourish. Polovina is in charge of the artificial reef programme at the National Marine Fisheries Service, Honolulu Laboratory.

The three reefs are situated about half a mile apart, one at a depth of 200 feet (60 m), another at 320 feet (96 m), and one at 385 feet (115 m). This is the first time that artificial reefs have been placed at such depths in the ocean. Most artificial reefs are placed in water much less than 200 feet (60 m) deep. Even the Japanese, world leaders in artificial reef development, have not placed reefs at such depths.

The reef at the deepest site is a fibreglass reinforced plastic one of Japanese make and design, purchased for US$10,000. The 16-foot high, 13-ton reef consists of nine open cylinders stacked in pyramid fashion. Each of the other two reefs consists of six 12- and 18-inch (30 and 46 cm) diameter concrete pipes firmly secured together, also in pyramid fashion. These reefs cost about $600 each. Polovina says there has been no problem keeping the structures in place despite the strong currents that run over Penguin Bank. The bottom pipes on the concrete reefs however, are filling with sand moved by the currents

"These reefs are sitting in small pits because the currents are shifting the sand around them", Polovina said. "The bottom three pipes on each reef are about half-filled with sand." But small difficulties are to be expected in experimental procedures and do not detract from the success these reefs are achieving. The reefs are providing shelter for fish to feed and spawn and, especially, protection for juvenile fish from predators.

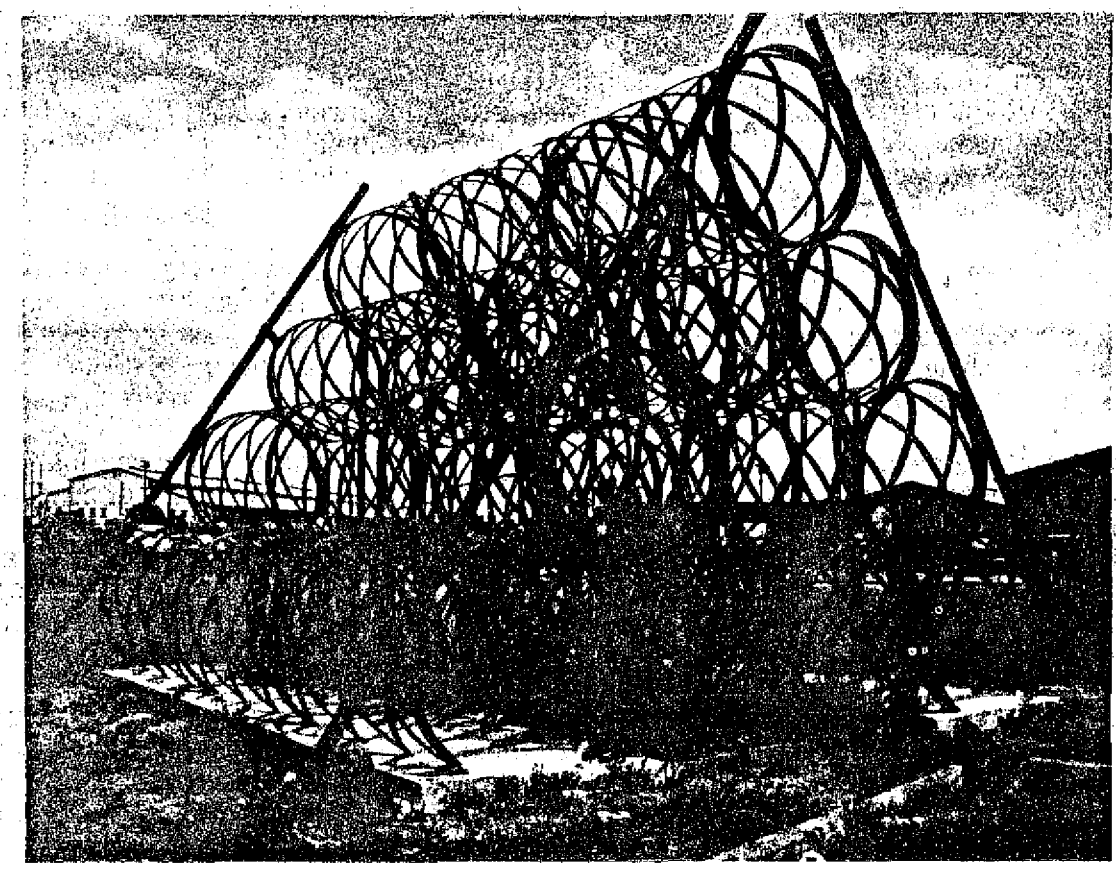
"One of the primary functions of the reefs is as a nursery habitat increasing the survivability of bottomfish larvae and other juvenile species", Polovina said. "But we still haven't seen many of the juveniles inhabiting the reefs".

Polovina said there is a great need for some type of sanctuary in Penguin Bank for young fish. Because of the barrenness of the area, juveniles are especially vulnerable to predators. Polovina has observed 17 different species of fish at the 200-foot (60 m) level reef, including ulua (trevally), aweoweo (red big-eye), snappers, and other reef fish, and at least seven species at the deeper reefs. On the Japanese reef he has observed opakapaka (pink snapper), kahala (amberjack), uku (gray snapper), and other commercially important bottomfish.

Polovina's extensive work with artificial reefs includes a study commissioned by the departments of the Navy and Air Force on artificial reef technology in Japan. The Japanese government has subsidised the development of more than 100 different reef designs, and Japanese researchers have classified more than 100 species of fish according to what kind of reef they prefer.

"[The Japanese] have an enormous number of types of reef designs and materials and a lot of experience building and deploying them and fishing around them", said Polovina. "Yet even with the enormous money and deployment, they haven't really answered the question: What is the value of these reefs from a fisheries production standpoint?"

Polovina hopes his work will answer that question. His studies of the Japanese artificial reef technology have enhanced many of his own ideas for developing reefs in Hawaii and provided him with the blueprint for his largest artificial reef at Penguin bank.



(Photo: Makaii)

This fibreglass artificial reef was bought in Japan and placed on Penguin Bank

One of the most pressing questions facing scientists concerns whether artificial reefs actually increase the overall production of fish in a specific area, or whether they simply beef up the local population by attracting fish from nearby areas. Polovina said that it has been difficult in the past to resolve this question because most field experiments have been performed in continental coastal regions, which are easily accessible to fish from other areas along the coast. He hopes that by studying the reefs at Penguin Bank, an environment much more isolated than the continental coastal regions, he will be able to shed some light on this question.

The answers from this and other artificial reef studies being conducted in Hawaii and elsewhere may have important implications for the future of the state's recreational and commercial fisheries.

Other researchers are meanwhile experimenting with artificial reef designs that make use of cheap waste materials. Dr Fred Casciano, an engineer with Ocean Innovators, is masterminding the comeback of the rubber-tyre artificial reef. Artificial reefs built from scrap automobile tyres were popular in the late 1960's and into the 1970's. States on both coasts of the mainland U.S set up tire reefs in their waters. But when tyres began washing up on the beaches, environmentalists became concerned.

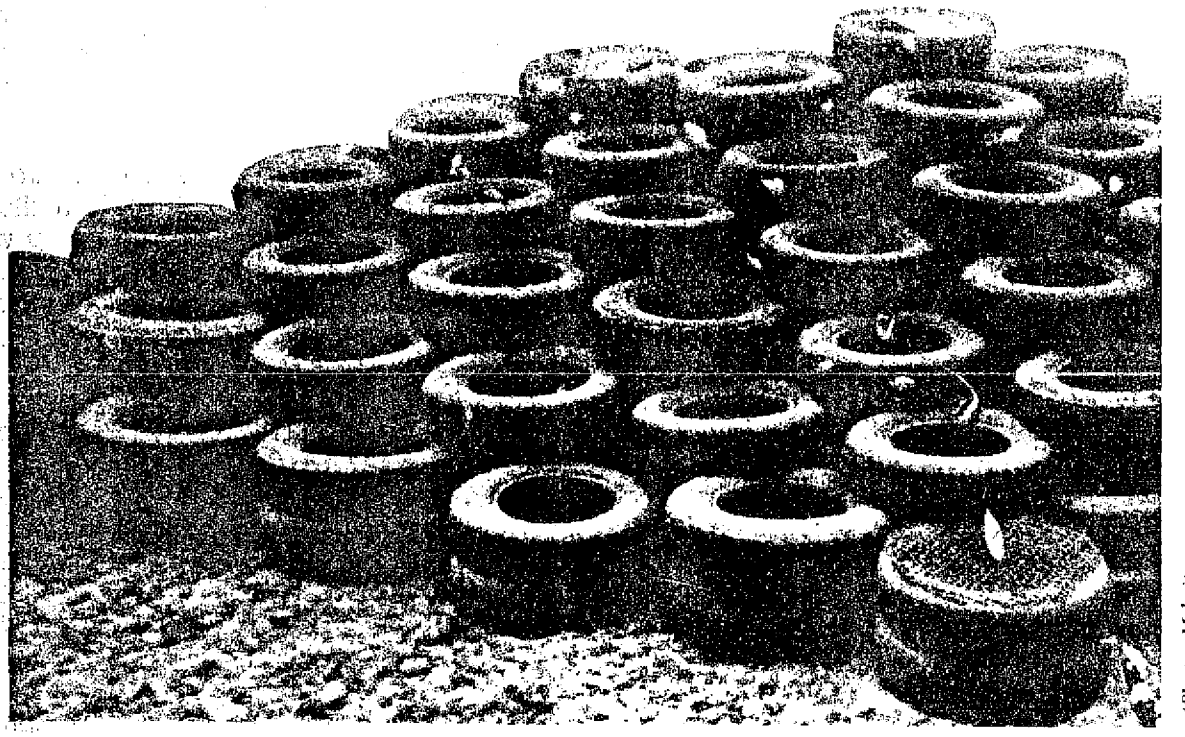
Casciano explained that early designs did not include any strong fastening device to secure the scrap-tyre reefs to the ocean floor. When the reefs began to break apart, reef architects dropped such projects under pressure from environmentalists, rather than coming up with a workable anchoring device for fastening the tyres to the ocean floor. California and Washington took drastic steps to prevent further use of tyres as material for artificial reefs, banning the construction of such reefs. In Florida, a state with more than 173 major artificial reefs in place, their use has been virtually discontinued.

Casciano hopes to change the dismal reputation of scrap-tyre reefs. The Hawaii Division of Aquatic Resources has used junk car bodies, concrete pipes, derelict barges and vessels, and, recently, scrap tyres to create reefs on the sea-floor, with varying results. "I have personally observed old tyres on the bottom off Waikiki with small (coral) heads of Pocillopora firmly attached" Casciano wrote in an early proposal for his own artificial reef. "I have recently placed a small number of tyres in the ocean and watched the fish population grow from one small puffer fish the day after installation to about 60 fish after 2 months".

Japanese researchers have already experimented with numerous module designs for tyre reefs. The most common method of construction uses cement poured into the tyres to improve their stability on the ocean floor. However, evidence shows that this has been insufficient to prevent movement of the reefs during strong wave conditions. Casciano used this information as well as the extensive literature on artificial reefs in designing his modules. After considerable thought and shop tests on components, Casciano has designed a module consisting of 38 tyres set in pyramid shape fastened together with nylon bolts and fixed to the ocean floor with threaded fibreglass rods embedded in the coral.

A test module was installed in June 1986 in 40 feet (12 m) of water near Kewalo Basin. Since then the structure has endured without any damage or movement. Casciano explained that the reef was designed to withstand the force of at least a few breaking waves 32 feet (10 m) high and should last indefinitely in 16 foot waves. "This new reef hasn't been exposed to all the kinds of waves that can occur on this coastline", Casciano said. But swells that hit Oahu in late August 1986 did test the strength of the reef, and Casciano is optimistic that the structure will be able to withstand the conditions it was designed for.

The reef is already a biological success. Observations by Casciano and other divers have led him to conclude that the reef holds a particular attraction for several species of fish. A variety of marine animals that are difficult to find in surrounding waters are living and flourishing there. "The most recent count put the fish at the artificial reef at two-and-a-quarter pounds per square metre as compared with one-tenth pound per square metre at the nearby control station", said Casciano. While this does not quite match the successes reported on other artificial reefs, the number of fish it has already attracted is remarkable, considering the location of the reef and the short time it has been installed.

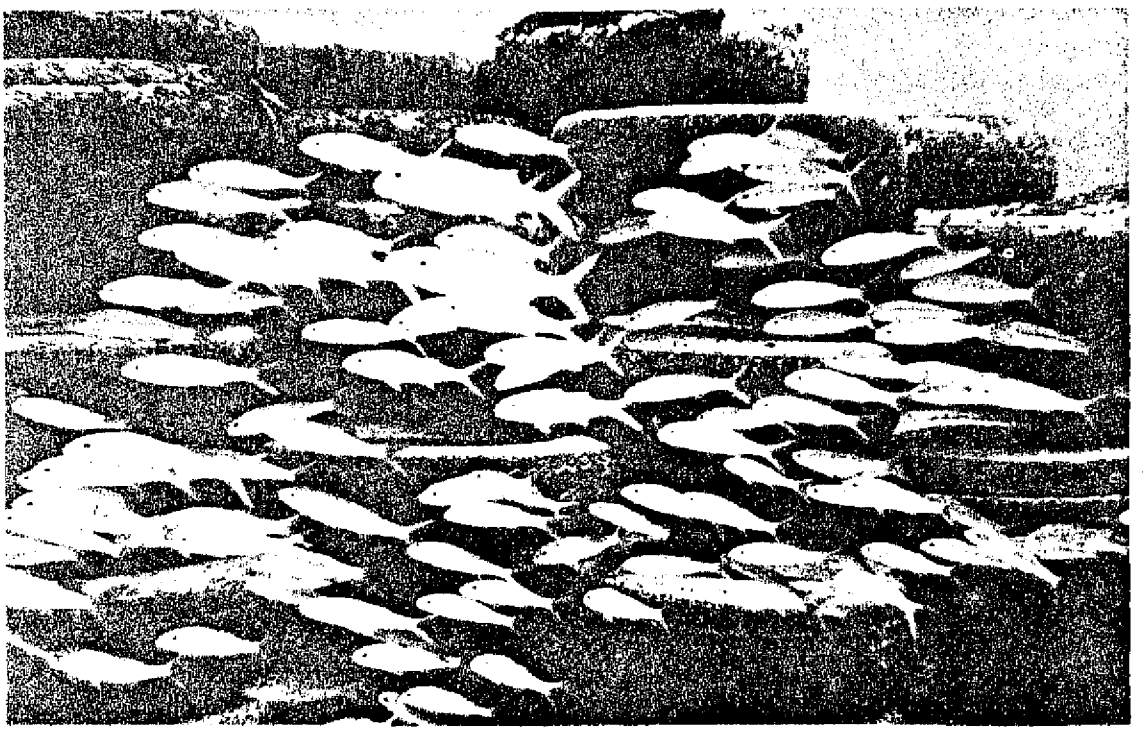


(Photo - Makai)

This pyramid-shaped experimental tyre reef lies in 40 feet (12m) of water outside Kewalo Basin in Honolulu.

The reef, says Casciano, is designed to be installed by a two-man dive team. Two different techniques can be used for installing the modules. The first method assembles the module entirely on the ocean bottom. The unattached tyres are carried out to the site in a small boat, thrown overboard, and then bolted in place underwater. In the second method the module is assembled on land, taken to a pier and placed in the water attached to a lift bag capable of supporting 200 pounds. The entire unit is then towed to the site, sunk, and secured to the bottom. On Casciano's test reef some of the base tyres were capped, and other tyres were screened off to create habitat areas for fish. The entire cost of material per module came to only $110. "It took me about 2 months to install the reef with some assistance from students" said Casciano, "but I'd say that 95 percent of it was a one-man job with a buddy diver required only for safety."

Casciano said that there has been a proposal submitted to the National Marine Fisheries Service to scale up the present design and construct a 400-tyre module attached to a concrete base for deployment at a deepwater site on Penguin Bank. The larger module could also be used at the State's planned deepwater artificial reef off Ewa Beach. Casciano said that there has also been discussion of establishing an artificial reef site in Mamala bay as a research zone and marine sanctuary. If this becomes a reality, Casciano would like to see a 50-module prototype tyre reef constructed there to test the fish aggregating effectiveness of this design compared with other designs that would be built in this zone. Such a reef would cost about $5,000 for materials and could possibly be built by community volunteers. The reef and research zone would provide an underwater playground for local sport divers and tour groups who wish to observe and photograph an abundant variety of marine animals.



(Photo - Makai)

The tyre reef has attracted schools of fish, perhaps because the reef offers almost the only vertical bottom profile in the area

Though overcoming the ghosts of the past tyre reefs is a large obstacle in Casciano's path, this present project may be just the key to renew interest in that area. Casciano has done an exhaustive survey of literature on the subject, and the evidence indicates that tyres are non-polluting and non-toxic to the environment, last almost indefinitely in the ocean, and provide a good habitat for marine life. Furthermore, the reefs will provide an excellent way to dispose of some of the estimated 500,000 tyres discarded annually in Hawaii. Casciano's design can be built for about $100 a module, and the modules can be easily installed. The tyres he has installed are successfully attracting fish and are remaining stable on the ocean floor. Though it has yet to be shown that this structure can live up to its "infinite" lifespan design, at present it shows no signs of deterioration and has already withstood conditions that caused earlier models to break apart.

DEEP-WATER SHARKS - POTENTIAL ECONOMIC VALUE?

(Source : Catch)

Deep-water sharks have so far attracted little commercial attention. The livers of small numbers of them may occasionally be sold for oil processing in some countries, but in most parts of the Pacific, these sharks, often caught when deep-bottom fishing, are just thrown away.

However, in some countries they are a valuable resource. The flesh and fin cartilage are eaten, and a cartilage extract (chondroitine) is also used in eye drops. The skin can be substituted for leather, and the liver is a source of vitamin A, and of oil which is used in the textile, tanning, chemical, pharmaceutical, and cosmetic industries. Squalene is a refined product of liver oil and is used in making skin moisturisers, dyes, artificial silks, perfumes, rubber and lubricants.

Spiny dogfishes (family Squalidae) are the most abundant sharks of the continental shelf. Eight species are large enough (and sufficiently abundant) to have commercial potential: shovelnose dogfish (Deania calcea); Baxter's dogfish (Etmopterus baxteri); seal shark (Dalatias licha); leaf-scale gulper shark (Centrophorus squamosus); Plunket's shark (Centroscymmus plunketi); and the related black sharks- Owston's dogfish (C. owstoni), Portuguese dogfish (C. coelolepis), and longnose velvet dogfish (C. crepidater). They range in size from Baxter's dogfish (up to 0.8 m, 2.1 kg) to the seal shark (up to 1.4 m, 17.7 kg). These spiny dogfish species have wide global distribution, except for Plunket's shark, which is restricted to New Zealand and South West Australia, and Baxter's dogfish, which is found only in New Zealand. They generally live on or near the bottom, but can occur well above it; shovelnose dogfish and leafscale gulper shark have been caught in midwater trawls.

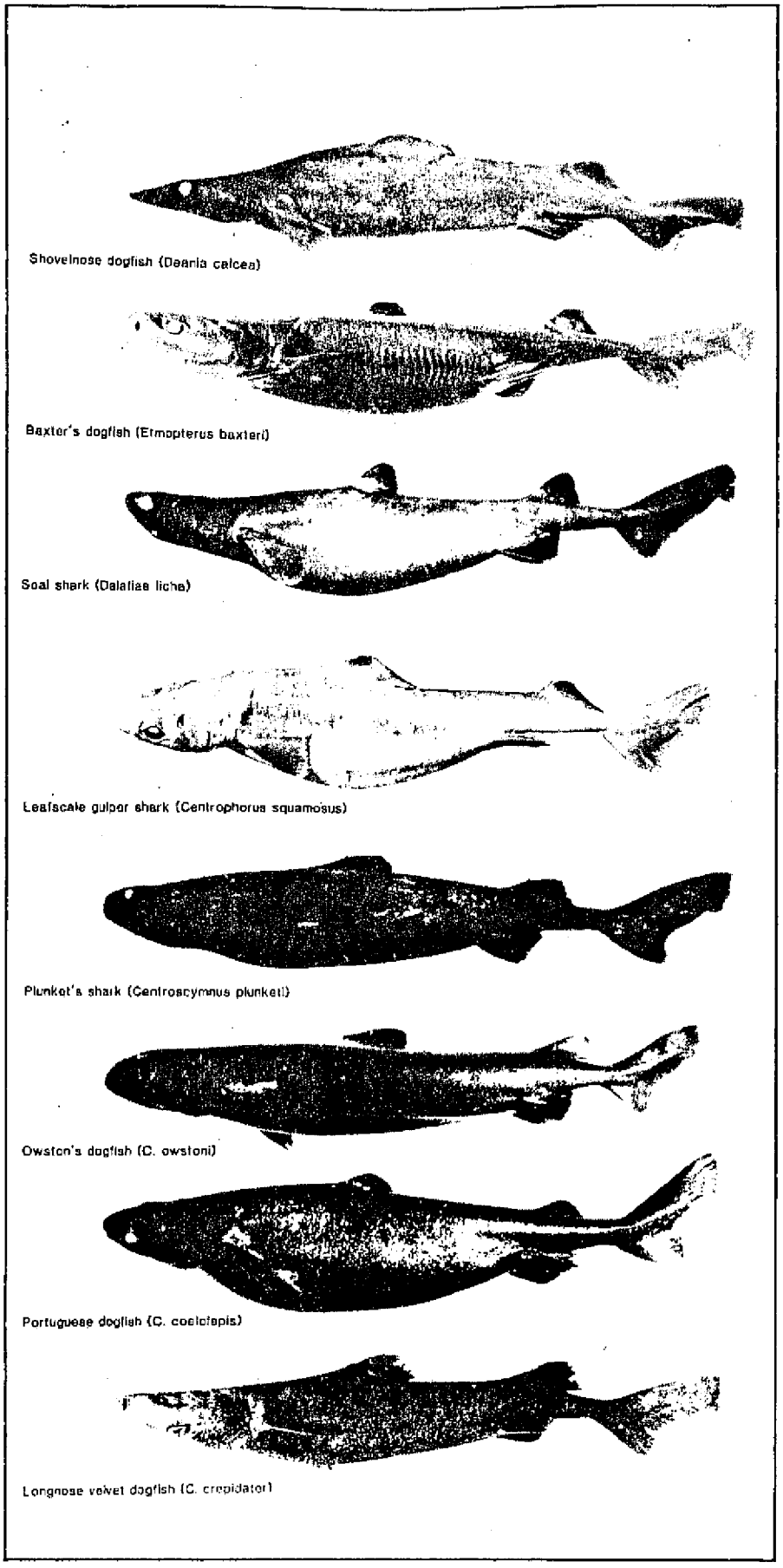
It is important to know how spiny dogfishes interact with other species and what capacity they have to replace the parent stock. They are terminal predators feeding generally on fish and squid, as shown in the table below. They also prey on their own kind: shovelnose dogfish is frequently eaten by black sharks.

Main prey types of spiny dogfishes

	No of samples	Occurence (% of stomachs) Squid	Fish	Other
Shovelnose dogfish	63	20	78	2
Owston's dogfish	50	64	34	2
Portuguese dogfish	38	40	47	13
Longnose velvet dogfish	20	20	65	15
Leafscale gulper shark	17	24	76	0
Seal shark	16	6	94	0
Baxter's dogfish	14	21	79	0

All these sharks produce similar numbers of eggs and give birth to a few, fully developed, and rather large young. Owing to their size, heavy predation on the juveniles by other fish species is unlikely.

It is possible that there is up to 4 years between pregnancies. They appear to have very low fecundity compared to teleosts. If growth rates are at least as fast as shallower species of shark, the time from birth to maturity may be long, as there is a large difference between size at birth and size at maturity. The size range of mature fish is also large. This all means that the population of spiny dogfishes could be very slow to recover and replace fish removed by fishing.



(Photo: Catch)

Spiny dogfish from the upper continental slope

The impact of exploitation of the sharks on the ecosystem is difficult to judge, but there could be an increase in the abundance of species they prey on, including commercial finfish. The position of spiny dogfish at the end of food chains and their apparent longevity means they receive concentrated heavy metals that remain in their bodies. Some analyses have been made on the mercury content of flesh of several of these dogfishes. The mercury levels of 8 shovelnose dogfish were found to be 1.36 - 2.65 ppm, which are 3 to 5 times the permissible level for human consumption in New Zealand. However, these data are from few fish and more complete sampling is necessary to examine differences between species, sizes, and geographical locations.

About 20% of the weight of deep-water shark is liver. When sold this is usually processed to a semi-refined or 'crude oil' form. Oil refined into squalene could receive much higher prices. However, squalene is expensive to manufacture and is difficult to market. It is an unstable product that breaks down to less desired products, making handling difficult if top prices are to be realised.

In summary, although widely distributed, total quantities of the eight species of spiny dogfishes do not appear to be large, and sustainable yields would probably be low. High mercury levels, low biomass, and an uncertain capacity to replace the adult stock, as well as the practical difficulties of liver oil and squalene production, are major constraints to their effective utilisation. Overall, it therefore seems that the development of fisheries for deep-water sharks is likely to remain limited until the market for shark products improves.

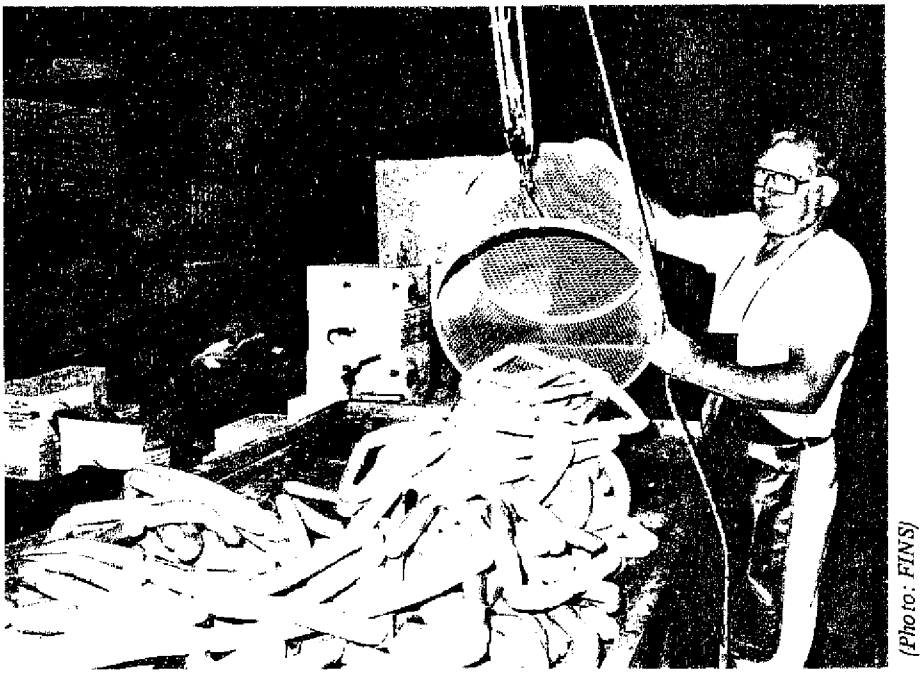
NEW BAIT IDEA DEVELOPED IN WESTERN AUSTRALIA

(Source : FINS)

Rising bait prices and increasing pressure on the suppliers have resulted in two local entrepreneurs developing a manufactured bait for the Western Australian rock lobster industry. The developers of the new bait, called "Craylure", Rolf Micha and Neville Lavars, are hoping to capture about 2 percent of the bait market by the end of the current season. Craylure, is a large sausage containing a paste made from fish and several 'secret' ingredients which include preservatives and flavour enhancers.

Mr Micha is a former engineer who has been involved in the fishing industry for the last 10 years, and Mr Lavars is the owner of a rock lobster potting boat. Mr Micha said that some years ago it became obvious that fish bait for the traps was becoming more scarce and more expensive due to increasing pressure on local bait fisheries. As a result, the industry was importing more and more bait fish. In 1986, 60% of the industry's annual consumption of 11,000 tonnes of bait was imported. Micha and Lavars felt they had something of a captive market, which justified the substantial investment they made in the plant to manufacture Craylure.

Craylure can be made from a variety of fish but the makers favour a local type, mulies, which are popular bait fish with a very soft texture. Fresh mulies are brought into the factory where they are placed in a cutter and turned into a paste. The 'secret' ingredients are added and the paste is fed into a Linker sausage machine via a compressor. The sausages are made using a special skin, imported from the USA, which dissolves in water and causes no pollution problems. The sausages are boiled to kill bacteria and placed in a special anti-bacterial solution before being packaged.



(Photo: FINS)

Craylure bait sausages being removed from the anti-bacterial soak by Mr Micha

Craylure has several advantages, as it requires no refrigeration, is pleasant to handle and convenient to bait up. One of the product's big attractions is the fact that it does not go stale in the water, and new bait can be added without having to remove the old bait. As a result, every piece of craylure eventually gets used, and it is ideal for two-day sets, there being no problem with the bait going off. Mr Lavars rock lobster boat Nifty II is carrying out an on-going testing and evaluation of the product, and results have so far been excellent.

Craylure is packaged in 18kg cartons (90 baits) and the makers say that, as well as being half the price of the average bait fish, it is available all season, so fishermen's bait storage costs are reduced.

ABSTRACTS

SUMMARY TRANSLATIONS OF TROCHUS RESEARCH FROM SOUTH SEAS FISHERIES NEWS, 1937-1939, by Masanami Izumi, 1987. 30 pp.

Half a century ago, the collection of trochus (Trochus niloticus) shells for button making was one of the most important fisheries in the Japanese-occupied islands of Micronesia. Many transplantations of trochus from one island to another were undertaken, and a great deal of biological data collected in the process. Much of this was documented in the Japanese language publication South Seas Fisheries News

This document contains translations of 11 articles on trochus which appeared in South Seas Fisheries News between 1937 and 1939. The articles include site surveys at a variety of locations, observations on spawning, reports of actual transplants, and guidelines for future transplants. The information continued is invaluable in planning trochus transplants on national or international scales and for understanding the nature of the trochus resource.

Contact address:
FAO/UNDP Regional Fishery Support Programme, C/O UNDP, Private mail bag, Suva ,Fiji.

MARKETING TUNA IN JAPAN
by S.C Williams. October 1986. 60 pp.

This is a manual prepared for fishermen in Queensland, Australia which provides information on all aspects of the Japanese fresh/frozen tuna business. The manual is well illustrated with many colour photographs showing tuna and tuna products, and the means by which their quality and value are determined. The chapter/section titles, which illustrate the scope of the manual, are as follows:

1. INTRODUCTION

2. SASHIMI AND SUSHI - THE PRODUCTS

-Sashimi
-Sushi
-Tuna types, grades and uses
-Changes in the markets for Sushi and Sashimi

3. THE TUNA FISHING INDUSTRY IN JAPAN

-Historical development
-Imports
-Exports
-Current situation

4. UNDERSTANDING THE JAPANESE TUNA MARKETS

-Market differences
-Selling and distribution
-Market trends
-Marketing and government policy
-Tsukiji market

5. WHICH AUCTION MARKET? SOME OBSERVATIONS ON SELECTED AUCTION MARKETS IN JAPAN

-Tokyo (Tsukiji)
-Osaka (Honjo)
-The role of the auctioneers
-Auctions at Tsukiji
-Auctions at Honjo
-Tuna grading in Japan

6. HOW TO MAXIMISE TUNA QUALITY

-Composition of tuna flesh
-Preservation of freshness
-Fishing methods
-Bleeding and handling
-Chilling and storage
-Freezing to -30°C on board and/ or ashore
-Chilling procedures on board

7. A GRADING SYSTEM FOR QUEENSLAND

-Quality variations in tuna
-Incentives to grade tuna
-A point-score system for tuna grading

8. MARKETING TUNA IN JAPAN

-Doing business in Japan
-Which marketing strategy?
-Selling directly by auction

APPENDICES

-A point-score for tuna grading
-Colour scores for bigeye
-Colour scores for yellowfin
-'Condition' scores for yellowfin and bigeye
-References

This is one of the best publications on fish processing/marketing, that we have seen at SPC. It is highly recommended for anyone involved or interested in marketing tuna and other fishery produce in Japan.

Contact address:

Queensland Fishery Industry Training Committee, PO Box 414, Fortitude Valley, Queensland, Australia.

SPC Fisheries Newsletter #41
April - June 1987

Filipe Viala of the Fisheries Division, Ministry of Primary Industries, Fiji undertook an eight-day SPC Inter-Country Study Visit to Noumea, New Caledonia from 12 to 20 June 1986 to study management methods for corals. The following article is based on his trip report.

REPORT ON CORAL STUDY VISIT TO NOUMEA

by

Filipe Viala,
Ministry of Primary Industry,
Suva, Fiji

The aim of the visit was to gather information on studies being carried out by ORSTOM and the Noumea Aquarium on coral regeneration potentials, growth rates at different stages of the life cycle, and reproduction patterns, and to visit harvest and experimental sites, coral processing factories and souvenir shops. Organised by SPC, and carried out under the guidance of Miss Pascale Joannot, Director of Noumea Aquarium, the visit included the Fisheries Service; ORSTOM; Tetembia Reef; the Noumea Aquarium (which is world famous for its live corals); two souvenir shops specialising in corals, shells and other coral reef related items; two factories working corals for both the local and overseas markets; and the Noumea fish market.

Harvesting

Although coral harvesting has occurred for the past ten years in New Caledonia, the first law regulating the harvest of corals was promulgated in 1982, and recent amendments date from May 1984 and June 1985. The local government has sought a balance between the preservation of a natural resource and the development of the coral trade, and authorises harvest of certain corals in given conditions while at the same time encouraging scientific observations of the natural habitat of the corals. This is currently being undertaken by the Territorial Government and ORSTOM, with funding provided by the French Investment Economic and Social Development Fund, and aims to provide information required for future coral harvest regulations to ensure rational management of the resource.

Permits to harvest coral are issued on a yearly basis and up to June 1986 there are only two licensed harvesters and producers of coral curio items. Branching corals such as Acropora, Seriatopora, Pocillopora, Stylophora, etc, are permitted to be exported unworked because of their quick growth rate, while slow growing massive corals (including the families Faviidae and Poritidae) must be worked for export purposes to ensure higher financial returns. A solid coral of the Faviidae family measuring 30 cm in diameter is thought to be between 15 and 60 years old.

Between June 1980 and June 1985 160 tonnes of coral have been harvested in New Caledonia. Of this 68 tonnes were exported unworked (branching corals) and 92 were transformed into curio items including jewelry boxes, lamp shades and stands, coral balls, vases, wall clocks, etc. Wastage from worked curio items can be as high as 45 to 50% of the original block of coral (see Fig 1) and presently there is no industry to cater for the wasted corals.

(Photo: P. Viala)

(Photo: P. Viala)

Figure 1: Cylinders (above) and blocks (below) cut from massive corals, prior to working into decorative curio objects. The hollowed-out blocks in the upper photo are waste. Further wastage will occur as the blocks are ground or turned into their final shapes.

Tetembia Reef

While observing one diving team harvest corals on Tetembia reef it was noted that damage was frequent, occurring when divers pulled out the corals and transported them to the boat. 3 - 4 clusters may be damaged for every one collected. This type of damage is thought to contribute to ciguatera fish poisoning although this has not been proven scientifically.

Transects are surveyed on a monthly basis to assess the availability or non-availability of resources to be harvested. Experimental studies on regeneration and transplantation are currently being undertaken on the reef. An area of 9 sq m has been cleared of live coral and after one year it has been established that there is a regeneration coefficient ranging from 1-5 per cent. Transplantation experiments are also being carried out on strips 40 m x 4 m. While some Acropora species survived the transplantation, most genera died and the researchers have concluded that to obtain more refined results a thorough study must be undertaken for a longer period of time.

Public awareness of coral reef ecosystems

Throughout the visit the importance of public awareness of manual damage to coral reef ecosystems was emphasised. Such damage occurs as a result of pollution, construction sedimentation, net fishing, and boats anchoring, as well as indiscriminate coral collection. The researchers involved felt that awareness should be encouraged at an early age via the education system, and subsequently reinforced among the general public by means of publications and brochures.

(Photo: P. Vitale)

Figure 2: Significant damage occurs to the corals that are left behind (above) as a result of trampling by divers during the collection operation (facing page).

(Photo: P. Viala)

(Photo: P. Viala)

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PRELIMINARY RESULTS OF FISHING TRIALS WITH ARROWHEAD FISH TRAPS IN PAPUA NEW GUINEA

by

P. Dalzell
International Center for Living Aquatic Resource Management
Manila, Republic of the Philippines

and

John W. Aini
Department of Primary Industry
Port Moresby, Papua New Guinea.

Introduction

Fish traps constructed from wire-mesh and mangrove sticks or steel rods are widely used throughout the Caribbean to catch a variety of reef-associated fishes and crustaceans (Munro, 1983). In Papua New Guinea (PNG) fish traps constructed from bamboo, vines and other bush materials are amongst the traditional fishing methods employed for subsistence fish catches (Quinn et al, 1984). However, traps constructed from modern material such as wire-mesh have not been employed as a capture method by PNG fishermen. Around coral reefs fish are caught principally by handlines, spear and netting (Wright & Richards 1985).

As fish traps are an effective method of catching fish in the coralline regions of the Caribbean it was decided to investigate the potential for Caribbean style fish trapping on coral reefs in PNG. Initial results of fish trapping with modified Cuban 'S' traps were presented by the PNG Department of Primary Industry (DPI) (1985). This report summarizes data from 16 months of sustained fish trapping around the coral reefs of Kavieng Harbour with an arrowhead or chevron-style of trap.

Fishing area and methods

All trap fishing took place in Kavieng Harbour on the western and eastern slopes of the Nusalik Reef and along the eastern shore of the harbour in proximity to the Hospital Reef (Fig. 1). The traps were set in depths varying between 10-25 m and were placed 50-100 m apart. Plastic gill net floats were used to mark the traps. On the eastern shore the floats were submerged a metre below the surface to reduce the risk of theft of both marker floats and traps in this area. All traps were baited regularly with slaughter house offal, particularly femur bones split in half to expose the bone marrow.

The fish traps were hauled at irregular intervals to obtain data on catches with various soak times. The catches from the traps were weighed to the nearest 10 g then sorted to species level. For most soak times a minimum of three sets were made although this was not possible for all soak times exceeding 15 days.

Trap design

The fish trap used for this work was a modification of a Puerto Rican arrowhead trap described by Thiesen (1983). The traps were 1.3 m long, 0.9 m wide and 0.65 m deep (Fig. 2) and were constructed from 5.0 cm mesh, 1.6 mm gauge wire which had a maximum

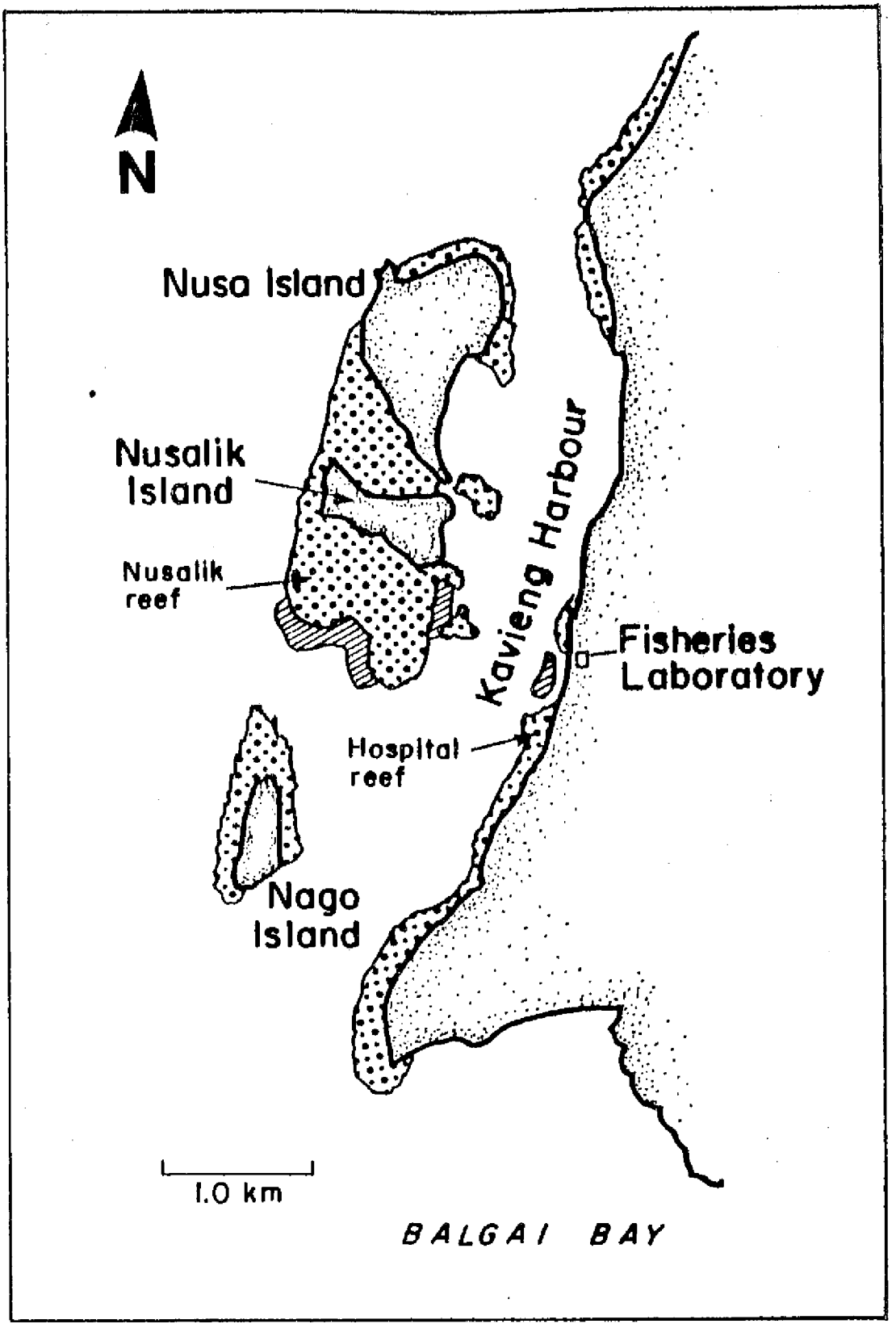

Figure 1: Sketch map of Kavieng Harvour. Fish trap sites are indicated by diagonal shading.

aperture between knots of 7.5 cm. Entrance to the trap was gained by a horse-neck funnel mounted at the rear of the trap with an initial width of 40 cm that narrowed to an ellipse with maximum and minimum diameters of 25 cm and 16 cm respectively.

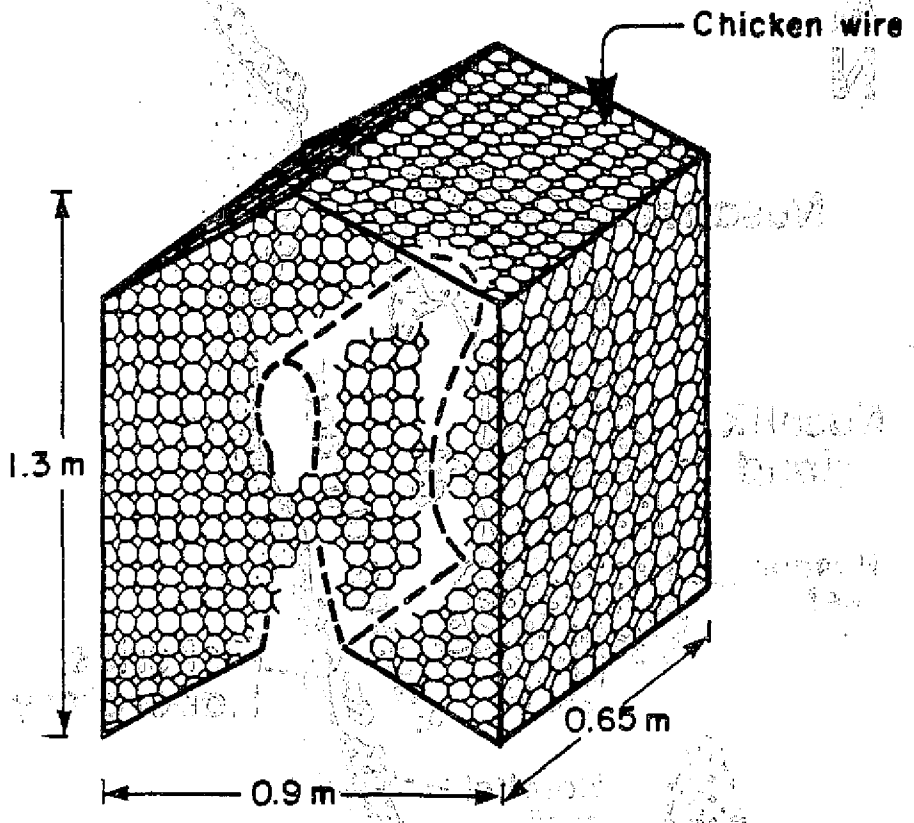

Figure 2: Sketch plan of the arrowhead trap design used in Kavieng Harbour.

Catch rates

Between September 1984 and December 1985 a total of 5,803 trap days were expended, yielding a catch of 2,258 fish weighing 1.52 tonnes. A total of 654 hauls were made during this period with a mean catch per trap of 2.32 kg for an average soak time of 7.1 days. Catch rates were extremely variable and adjacent traps hauled on the same day had up to 5.0 kg difference in accumulated catch. The greatest single catch was 10.0 kg during January 1985 after a soak of 6 days.

To examine the variation of catch with the length of soak the mean catches between 1-5, 6-10 and 11-15 days were estimated and plotted against the corresponding median soak time (Fig. 3a). The relationship between catch and soak is curvilinear and suggests that it may conform to an asymptotic curve as discussed by Munro (1974) for fish traps in the Caribbean. The average catch for a 10-15 day soak was 2.01 kg. Catches of up to 4.51 kg/trap were obtained with soaks of between 16-20 days but there were too few observations for traps set for this time period to calculate an accurate mean catch rate. A single soak of all traps for 23 days produced a mean catch/trap of 3.15 kg.

The mean catch per trap in terms of numbers showed a similar trends towards curvilinearity with a mean catch between 10-15 days at 4.3 fish/trap (Fig. 3b). The catch rates between 16-20 days varied from 3.3 to 8.0 fish/trap and the single set at 23 days produced a mean catch rate of 5.2 fish/trap.

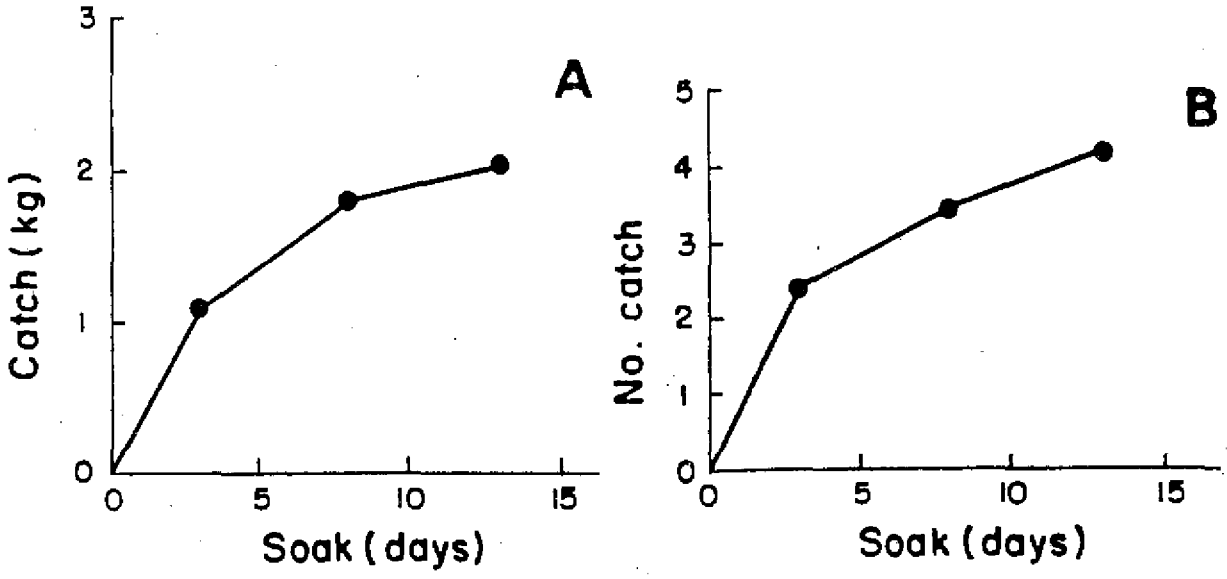

Figure 3: The relationship between soak-time against: A) catch in weight ; B) catch in numbers for arrowhead fish traps set in Kavieng Harbour.

The greatest number of hauls were made for soaks lasting between 6 and 7 days. These catch observations were used to examine the effects of lunar periodicity on catch rates of the arrowhead traps. Each catch was assigned to the 'new moon', 'first quarter', 'full moon' and 'last quarter' of the lunar cycle on the basis of when the traps were set and hauled. The average catch for each of the moon phases is shown in Figure 4. The best catches were obtained between the time of the full moon and last quarter. Fishing success declined markedly between the new moon and first quarter.

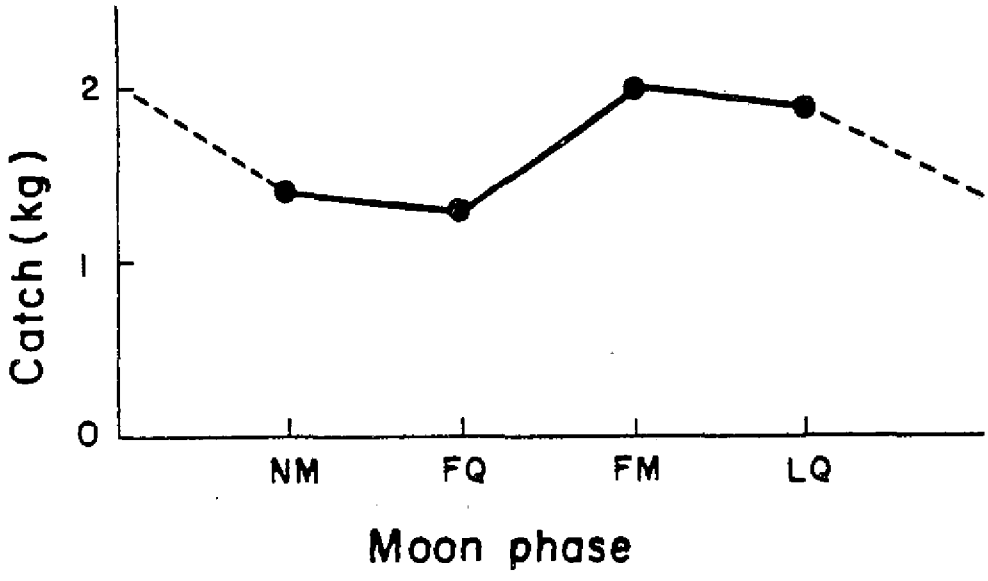

Figure 4: Relationship between catch and moon phase for arrowhead traps set in Kavieng Harbour. NM = New Moon; FQ = First Quarter; FM = Full Moon; LQ = Last Quarter.

Species composition

A total of 116 species representing 26 families of fish were caught by the arrowhead traps. All fishes, except one species of sting-ray, Dasyatis kuhlii, were teleosts. The breakdown of catch by weight and numbers in families is given in Table 1. The greatest single number of species within a family that contribute to the catch were the Lutjanidae followed by the Serranidae, Lethrinidae and Chaetodontidae. The largest contribution to the catch total in terms of weight and numbers were made by the Acanthuridae which comprised about 30% of the fish taken by the arrowhead traps. Approximately 95% of the surgeon fish catch was a single species, Acanthurus xanthopterus.

Munro (1983) gave details of the composition of fish trap catches from the inshore waters of Jamaica. Catches of fish were dominated by the Scaridae, Pomadasydae and Acanthuridae. Approximately 22% of the total catch by weight was comprised of spiny lobster (Palinuridae) and spider crabs (Majiidae) which are the most important components of the trap catches and add considerably to the value of the catch as a whole. The only crustaceans taken in the traps set in Kavieng harbour were hermit crabs and the three-spotted reef crab Carpilus maculatus. Whilst this crab is edible it is rather small (adult carapace width of about 12cm) and of little economic value.

Table 1: Catch composition of arrowhead traps set in Kavieng Harbour.

(Composition by weight is ranked serially, composition by numbers is not.)

Family	Common Name	% Wt	% No	No. of Species
Acanthuridae	Surgeon fish	29.3	27.6	7
Serranidae	Rock cods	16.6	7.3	12
Lethrinidae	Emperors	11.7	14.3	11
Scaridae	Parrot fish	9.2	7.2	9
Lutjanidae	Snappers	5.7	3.5	14
Carangidae	Trevallies	4.5	7.3	5
Nemipteridae	Bream	4.0	5.3	3
Mullidae	Goat fish	3.5	4.5	6
Balistidae	Trigger fish	2.3	2.5	3
Siganidae	Rabbit fish	2.1	4.7	8
Tetraodontidae	Puffer fish	2.0	1.6	4
Haemulidae	Sweet lips	2.0	1.8	3
Pomacanthidae	Angel fish	1.6	1.6	1
Chaetodontidae	Butterfly fish	1.5	5.4	10
Dasyatidae	Sting ray	1.0	0.7	1
Labridae	Wrasses	0.9	0.9	2
Scorpaenidae	Butterfly cod	0.5	0.9	1
Sparisomidae	Parrot fish	0.3	6.1	1
Ostraciidae	Box fish	0.3	0.4	2
Syanaceidae	Stone fish	0.2	0.2	1
Holocentridae	Squirrel fish	0.1	0.2	4
Aluteridae	File fish	0.1	0.1	1
Diodontidae	Porcupine fish	0.1	1.1	3
Zanclidae	Moorish idol	0.1	0.4	1
Ephipidae	Bat fish	0.1	0.3	2
Platycephalidae	Flat head	0.013	0.03	1

Discussion

These preliminary results suggest that fish trapping in PNG may be a viable alternative fishing method for artisanal and subsistence fishermen operating in the coralline areas of the country. The catch rates reported here are probably lower than could be achieved if the traps were moved around to take advantage of seasonal variation in abundance of fishes at different locations. In this study the traps were maintained at the same locations throughout the period of observations. Catches are also likely to be maximised by hauling the traps after soaks of 6-8 days, given the curvilinear nature of the catch curve (Fig. 3). A soak of longer duration will only achieve a small increase in the accumulated catch.

Munro (1983) reported an average catch rates of 1.9 kg/trap after a 7 day soak for 'Z' and 'S' shaped traps on Jamaican near-shore reefs. The average catch after the same soak time with the arrowhead traps which were half about the size of Z and S traps on the Kavieng harbour reefs was 1.6 kg/trap. Lock (1979) reported catch rates for 'S' and heart-shaped traps set in the coastal waters the Dominican Republic varied after a 3-day soak between 0.19 and 8.60 kg/trap with a mean catch of 1.58 kg/trap. Fishermen who rely on trap catches for their living in the Dominican Republic generally own 30-90 traps.

The trap dimensions used here were dictated by the availability of rolls of wire-mesh 0.9m wide in PNG. In Jamaica the dimensions of fish traps were based on the availability of 1.22m wide wire-mesh (Munro, 1983). The estimated cost of an arrowhead trap was 12.00 Kina (1 Kina = 1 US $) assuming mangrove wood can be acquired free. The mangrove wood frame normally lasted for about three months before succumbing to the action of wood boring Teredo worms. The trap frame may also be constructed from steel rod but this would increase the cost of the trap considerably. The 1.6m gauge wire is robust enough to withstand shark attack although occasionally enough damage was done to a trap to permit fish to escape and on two separate occasions a trap was damaged beyond repair.

Dalzell (1985) reported on the catch composition of Cuban 'S' traps which in common with the arrowhead traps was dominated by Acanthuridae. The surgeon fishes comprised about 40% of the total catch and 60% of the surgeon fish catch was dominated by one species, Acanthurus gahhm. The 'S' traps were set in the same general location as the arrowheads but in depths ranging from 3-13m. In contrast to the trap catches, surgeon fish comprise only 4.7% of the artisanal reef fish catch from the Kavieng area (Wright & Richards, 1985), where they are caught with nets and spears. This suggests that whilst surgeon fish are abundant they remain lightly exploited due to the inefficiency of local fishing methods for Acanthuridae. Further, surgeon fishes are highly regarded as a food fish by residents of the Kavieng area but catches of these species remain low due to inappropriate fishing gear.

The lack of any commercially valuable crustaceans in the trap catches is a major difference between the catch composition form PNG waters and the Caribbean. Artisanal fishermen using fish traps will have to rely on the sale of fish as a source of income from the traps. Most of the fish taken in arrowhead traps are acceptable in local markets. Some species such as the Ostraciidae are eaten only by certain coastal villagers but they are eaten nonetheless. Fishes which were of no interest were the Chaetodontidae, Zanclidae, Aluteridae and venomous species such as the Scorpaenidae and Syanaceiidae.

Further work is required to determine which trap designs are most efficient in PNG. Also, little work has been done in PNG to investigate the possibilities of using traps to catch snappers and emperors in the deeper water beyond the reef slope. Deep water trap fishing in New Caledonia achieved catch rates over 24 hours of 8.9 kg/trap in depths ranging from 90-140 m (Anon., 1985b). Further, sales of the shell of Nautilus macromphalus supplemented the income from the New Caledonian trap catches. Specimens of Nautilus pompilius have been taken regularly from deep water traps set in PNG waters (W.B. Saunders, Dept. of Geology, Bryn Mawr College, Pennsylvania, USA, pers. com.).

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