SOUTH PACIFIC COMMISSION

# FISHERIES NEWSLETTER

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(Photo: B. Aubert)

Delegates to the Meeting of Coastal States and Distant-Water Fishing Nations, convened by the South Pacific Commission in June.
(See article on page 2.)

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## SPC ACTIVITIES

### Meeting of Coastal States and Distant-Water Fishing Nations held

The above meeting, whose aim was to "explore ways and means of obtaining input from the distant-water fishing nations in pursuing the objectives of the revised priorities of the SPC Tuna and Billfish Assessment Programme", was held in Noumea from 18-22 June 1984. Delegations attended from 23 SPC member countries (American Samoa, Australia, Cook Islands, Federated States of Micronesia, Fiji, France, French Polynesia, Guam, Kiribati, Marshall Islands, New Caledonia, Northern Mariana Islands, Palau, Papua New Guinea, Solomon Islands, Tokelau, Tonga, Tuvalu, United Kingdom, United States of America, Vanuatu, Wallis and Futuna, and Western Samoa), four distant-water fishing nations (Japan, Mexico, Philippines, and United States of America) and six international organisations (Food and Agriculture Organisation, Forum Fisheries Agency, Inter-American Tropical Tuna Commission, International Commission for the Conservation of Atlantic Tunas, Office de la Recherche Scientifique et Technique d'Outre-Mer, and South Pacific Bureau for Economic Co-operation).

The meeting initially reviewed the achievements of the Tuna and Billfish (TAB) Assessment Programme (and its predecessor the Skipjack Survey and Assessment Programme), and examined the background to the present meeting. The TAB Programme was designed to provide a better understanding of the stocks of tunas and billfish throughout the central and western tropical Pacific and to determine the status of the stocks of the commercially important species. The Programme's three main priorities, redefined by the Twenty-third South Pacific Conference in 1983, are:

1) Development of a regional statistical programme

2) Estimation of the degree of interaction between pole-and-line and purse-seine fisheries and assessment of the impact of each on tuna resources, principally of skipjack and yellowfin tuna

3) Assessment and monitoring of the levels of the stocks of the commercially important billfish species, especially black marlin, blue marlin, sailfish and swordfish.

The meeting then went on to discuss the gaps in the data presently available to the TAB Programme. For fisheries within the EEZ's of SPC member countries, complete catch and effort data is now being supplied by all industrial scale fishing vessels, although there is little information on the smaller scale artisanal or subsistence fishing activities. However, there are a number of high seas areas in the SPC region which do not fall under any national jurisdiction, and data on fishing in these areas is generally incomplete. There are also many fisheries which, though outside the SPC region, are likely to interact with regional fisheries due to the highly migratory nature of the resource. Data on these fisheries too is essential for complete undertstanding of the resources of the SPC areas, but is generally of only limited availability.

Having identified the data shortfalls to the Programme, the meeting went on to consider ways of reducing them. Some distant-water fishing nations pledged their co-operation with the Programme, moves which were warmly welcomed by the meeting. There was much discussion on the need for an organisational structure which would enable distant-water fishing nations to participate more

actively in the Programme's work, and therefore encourage them to collect and provide data more freely. The meeting concluded by directing the SPC Secretariat to prepare a paper outlining specific options for such an organisation for discussion at the forthcoming Regional Technical Meeting on Fisheries in August 1984.

## Sixteenth SPC Regional Technical Meeting on Fisheries announced

Invitations to this annual meeting were circulated to SPC member governments and administrations, and to observers, by SPC Savingram No. 19 of 4 June 1984. The dates of the meeting have been set for 13-17 August inclusive. The draft agenda is a full one and should make for lively and informative discussions on a wide range of important topics. Items to be discussed include regional fisheries training needs and priorities, and future SPC activities in this field, and progress with priority items of the SPC Tuna and Billfish Assessment Programme. A one-day workshop on artisanal fishing vessels is also planned, in which technical specialists from inside and outside the SPC region will exchange views and experience on artisanal fishing boat design, construction and utilisation in Pacific Island countries. Other agenda items include an update on country experiences with fish aggregation devices, a review of the SPC/Nelson Polytechnic Pacific Fisheries Officer training course, and discussion of recent developments in the field of aquaculture and mariculture.

## Deep Sea Fisheries Development Project Notes

### - Fiji

SPC Master Fisherman Paul Mead continued his work on the development of small-scale fishing techniques around fish aggregation devices (FADs), based in Suva, Fiji.

Paul has been carrying out vertical longlining and deep-trolling trials around the FADs, testing alternative gear configurations and operating regimes, and refining the techniques. Deep-trolling has given some good results, although, as with any fishing technique, catches have been variable. The deep-trolling gear is based on that used by Canadian salmon fishermen and consists of a 10 kg weight suspended from the back of the boat on a 600-foot (about 200 m) length of 7-strand stainless steel cable. Lures or baits are attached with snap clips at intervals of about 30 feet (10 m) and the gear is trolled at speeds of up to 2 knots. The weighted mainline hangs more or less vertically in the water with the lures being trolled over a wide range of depths.

Vertical longlines have also been tested both on 'wild' tuna schools and around FADs, and in both situations spectacular catches have been achieved on occasion. The best haul, taken around a FAD, conisted of one 25 kg albacore, five yellowfin totalling 50 kg, and two 5 kg rainbow runner. Hauling in the line by hand is no easy task at time like this.

Paul is now working towards development of a daily fishing strategy for small-boat fishermen wishing to make the most effective use of the FADs. This involves night-time use of the vertical longline, followed by surface trolling commencing at dawn until mid-morning. Deep-trolling or further work with the longline continues during the day, and surface trolling resumes at dusk until nightfall. The objective of the regime is to maximise catches by taking

advantage of natural behavioural cycles in the fish community, and to ensure that full use is made of the time a fisherman spends at sea.

Paul's gear development work was suspended during June when he was attached full-time as an instructor to the students on SPC's Pacific Fisheries Officer Training Course (see article on page 5).

## Kiribati

Master Fisherman Pale Taumaia arrived in Kiribati on April 1 to commence a programme of training local fishermen in techniques suitable for deep bottom fishing on the outer reef-slope. Pale's assignment started in Tarawa where he worked with a five-man government demonstration team rigging up fishing vessels and gear for deep bottom fishing. After finishing this work and completing five fishing trips from Tarawa, Pale moved with members of the trainng team to the island of Abaiang for two weeks, and subsequently to Abemama for another two weeks, to continue his programme with local fishermen. Further trips are planned to Aranuka, Onotoa, Arorae, Tamana and Maiana. At some of these locations, Pale will fish using the canoes currently being produced by the UNDP boatbuilding project in Kiribati (see SPC Fisheries Newsletter No.27, page 8), to assess their suitability for this type of fishing.

## Papua New Guinea

Master Fisherman Lindsay Chapman continued his assignment to Papua New Guinea during which he has been working for relatively short periods of time at each of a number of fisheries stations. Most of April and May Lindsay spent stationed at Wewak, where he assisted with the construction, deployment, and subsequent monitoring of two FADs, and on combined resource assessment, training and fish collection trips by government fishing vessels. Most of these latter activities concentrated on deep-bottom fishing, with the government vessels taking out village fishermen for training trips, and subsequently purchasing their catches from them. Detailed data on catch and effort was also collected, and forwarded to the Papua New Guinea Government Fisheries Research Division to assist in their resource assessment work.

Lindsay's visit to Papua New Guinea was briefly interrupted when he travelled to Fiji for two weeks late in May to assist in a Commonwealth Secretariat course for managers of fish receiving and marketing organisations (see article page 10 this issue). Lindsay returned to Wewak on 11 July.

## SPC fisheries trainees move to Fiji

As noted in the last issue (No. 28) of the SPC Fisheries Newsletter, the twelve students on the SPC/Nelson Polytechnic Pacific Fisheries Officer Training course were scheduled to travel to Fiji in June to commence a one-month period of intensive training in practical small-boat fishing. This training module, which is supplementary to the main body of the course held in Nelson, New Zealand, has been made possible by the Fiji Government, who have kindly provided accommodation, vessels and other necessary facilities, and by generous funding support from the United Nations Development Programme.

Plans for the training module went according to schedule with the trainees and their supervising tutor Capt. Alastair Robertson arriving in Fiji on 8 June. The first week of the training was spent in rigging two 8.5 m plywood monohulls and an 8 m aluminium 'alia' up for fishing, by installing handreels and trolling booms, and preparing the associated fishing gear. Following this, the students commenced a programme of four-day fishing trips, leaving Suva on tuesdays and returning Fridays. Four vessels are being used in all - the three mentioned above plus the research and extension vessel 'Tui-ni-Wasabula', an 18m fibreglass Yamaha with crew quarters for twelve. By using the 'Tui' as mother ship, the students can unload their catches into its ice holds and work in different groups so that each person gains experience of the various vessels and the fishing techniques being undertaken.

Practical fishing using a variety of techniques is being taught under the supervision of SPC Master Fisherman Paul Mead. Methods being covered include deep bottom fishing, surface and midwater trolling, and vertical longlining around FADs. Alastair Robertson is also ensuring that the practical training fits in closely with material already covered in Nelson. The students are keeping detailed catch records and trip logs, including assessing the economics of their fishing operations, and are also involved in the sale or freezing of the catch once it is landed to Fiji's National Marketing Authority. Chartwork exercises in Nelson are being put into practice in Fiji, with one student acting as navigator on each trip. Basic engineering skills are also being put to the test, as the tutors occasionally 'sabotage' the motors by introducing simple faults without the students' knowledge.

The module is due to end on 7 July, with the students returning to their home countries at that time.

SPC 'Inter-country Study Visits' completed

Two regional fisheries personnel recently benefitted from SPC's Inter-country Study Visit Programme, which enables officers to gain experience through working attachments to establishments in other countries.

Mr Fakasega Apelu, Senior Fisherman on the Tuvalu National Fishing Corporation's (Naficot) pole-and-line boat Te Tautai, visited Truk, in the Federated States of Micronesia, for two weeks in March/April. The purpose of his visit was to observe alternatives to the Te Tautai's usual bouke-ami baitfishing technique. Te Tautai has up to now fished mostly in Fiji waters, where the bouke-ami technique produces good catches of inshore pelagic species. Naficot, however, wants to see more tuna fishing in Tuvalu waters, where tuna are abundant but where conventional bait supplies are inadequate to support even a single boat. Tuna fishermen in Truk use lift-nets to catch coral-associated baitfish such as fusiliers, and Mr Apelu visited Truk to learn the techniques involved and assess their potential for the Tuvalu situation.

The second visit was by Mr Saimoni Tui Cavuilati, of Fiji's Fisheries Division. Mr Cavuilati visited American Samoa for a week to observe the operations of the two tuna canneries and the fleet of U.S. purse seine boats based there. Fiji's own industrial fisheries are developing rapidly with the possibility of new canneries being established (see article page 20 this issue) and expansions to the Fiji-based fishing fleets mooted. Mr Cavuilati's visit will add to the Fiji Government's capacity to ensure that these developments proceed in a rational manner.

Both Mr Cavuilati's and Mr Apelu's study visits were funded from the SPC's grant for Inter-country Study Visits.

## NEWS FROM IN AND AROUND THE REGION

### Shallow-water FADs work well in Fiji

(Source: Fiji Fisheries Division/Fiji Times)

Five fish aggregation devices placed in various parts of Fiji's Western Division in June appear to be working well, particularly the two which are anchored in depths of only 70 metres. The shallow deployments were made to test the idea that coastal pelagic species (eg. mackerels, trevallies and Spanish mackerels) would be attracted to FADs placed inside the lagoon, in the same way that oceanic pelagic fish (eg. tunas and billfish) are attracted to FADs placed in deep offshore waters. Since deployment, the Fisheries Division has been monitoring the performance of the FADs carefully, and is pleased with the success of the devices. Local fishermen are equally pleased, and have been taking advantage of the FADs to improve their catches and cut down their travelling times and costs. They are using a variety of methods to harvest the fish from the FADs, including handlining, and spearfishing for Spanish mackerel or 'walu' (Scomberomerus commersoni) under the floats.

### Vanuatu exports fish to Australia

(Source: Les Nouvelles Calédoniennes/SPC)

Vanuatu's government-operated fish market made its first export shipment of seafood to Australia in April. The consignment consisted of lobsters and crabs as well as fish. The market is supplied by rural fishing groups operating in Vanuatu's outer islands, who airfreight their catch to the distribution centre in Port Vila (see SPC Fisheries Newsletter No. 24, page 6).

### Shark oil as an antifoul agent

A note by Ian Robertson, FAO Senior Fishery Industry Officer, in the March 1984 "South-West Indian Ocean Fisheries Bulletin", notes the use in some African countries of shark liver oil as a cheap and effective antifoul agent. Mr Robertson writes:

> "This oil is most effective when in the crudest state and its effectiveness as a hull protector declines with purification. The raw oil creates a varnish-like skin on the wood surface which lasts for many months. Additional protection can also be achieved with the addition of lime. The oil is usually obtained from simply rotted shark livers with the coarser debris removed before application. The use of shark oil is also extended to all the larger ships. The only objection raised by non-fishermen is the smell of the oil until it dries".

### Australia maps Pacific waters

(Source: Tam-Tam/Fiji Times)

Australian facilities are being put to the service of a number of Pacific countries to assist in marine survey and mapping projects.

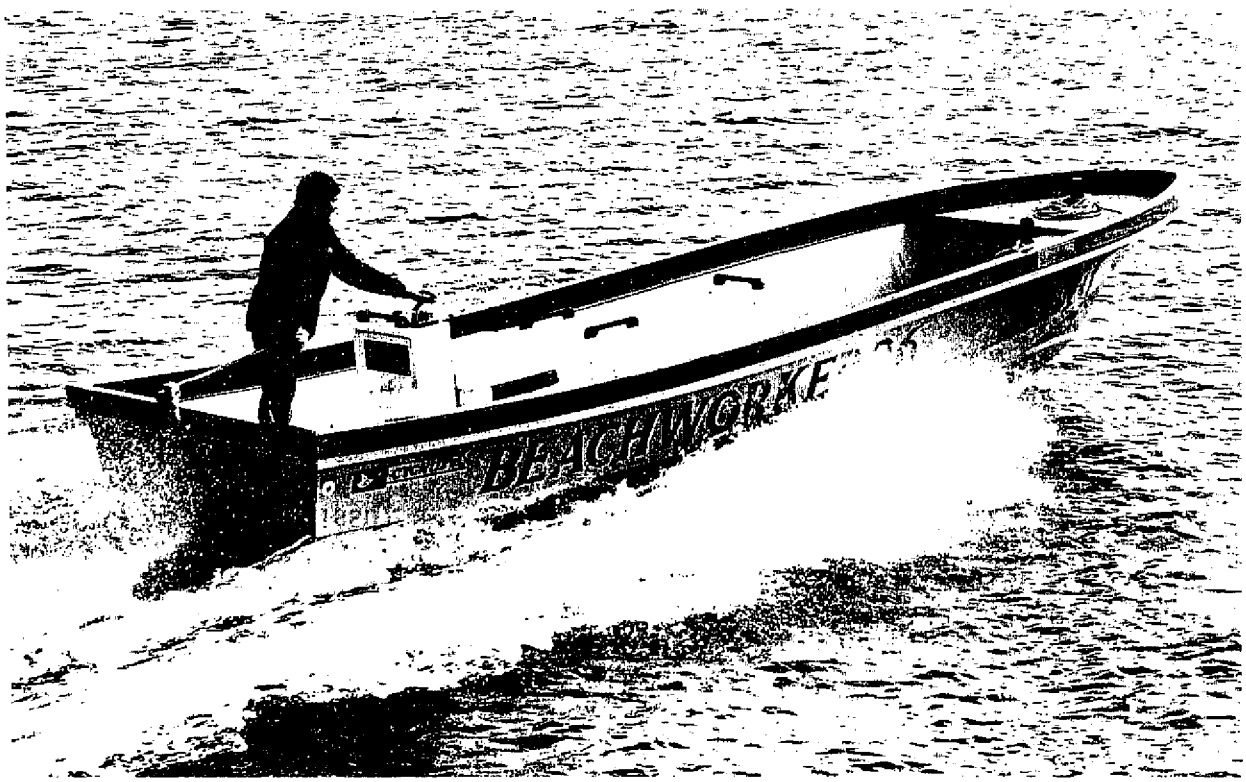
One of Fiji's naval ships, HMS Kula will help an Australian army survey team in mapping out the 200-mile exclusive economic zone (EEZs) of Kiribati, Tuvalu, and Tonga. A team from the Australian Army Survey Corps will make the aerial survey while the surface survey will use HMS Kula. The joint operation is expected to take 4 months, and form part of a programme under which the EEZs of several Pacific countries are being mapped out by Australia.

In another project, Australia's aid programme is meeting the cost of chartering the MV Cape Pillar, which carries specialised hydrographic survey equipment. The vessel will be used by an expert hydrographic team from the Royal Australian Navy, whose services are provided under the Defence Cooperation Programme, to gather information on deep-sea areas in Vanuatu, Solomon Islands, Tuvalu and Kiribati. Work in Vanuatu began in May and is scheduled to continue until August. The survey results will provide information on channels, reefs, tides, bottom types, and seafloor configurations, etc. which will assist in the production of more accurate marine charts, the planning and development of port facilities, and the estimation and management of marine fishery and mineral resources.

'Beachworkers' for inshore fisheries
(Source: Cygnus Marine/Fishing News International)

A UK boatyard, Cygnus Marine Ltd, have recently put their 'Beachworker' range of small fibreglass fishing boats on the market. Developed specifically for the overseas beach-launching market, Beachworkers have proved to be efficient, low cost fishing boats and have been widely adopted by UK inshore fishermen too. The design has a high length to beam ratio and developed reverse chines which give it the qualities of a comfortable and stable craft and a performance which belies its power requirements.

Beachworkers come in a variety of forms. The standard model BW 26, is 8 m (26 feet) in length and can be supplied with an inboard engine and straight shaft with deep keel for protection and grounding, single or twin outboards, inboard engine with stern-drive, or even a water jet. A cut-off version, the BW 20, is also available, but is a shallow draft model suitable for outboard or stern-drive only.




(Photo: Cygnus Marine)

The 'Beachworker 26'.

Performance figures for the BW 26 are impressive. The maximum speed so far achieved is with 2 x 1.6 litre OMC Sea-drive units, which gave over 40 knots. Even with twin 40 hp outboards, the BW 26 will reach 30 knots light and 24 knots with 8 passengers.

Also of interest is the fact that Beachworkers can be bought in kit form for local assembly. Moulded hull panels, gunwales and cabin can be supplied independently, and glassing them together is a relatively simple matter. Local materials can be used in constructing decking and accessory fittings, and freight charges will be considerably lower than for the complete boat. Indicative prices of some Beachworker versions are as follows:

A) Cygnus BW 26 open fishing boat with GRP gunwales, marine plywood deck glassed in with non-slip surface, stainless steel working post forward with bow fairlead, stainless steel sampson posts aft, standing console with steering wheel and cable, all round PVC D-Section fendering, bilge pump.

| | |
|---|---|
| 1) Outboard version, no engine | 4,235 (US$5,885) |
| 2) Stern drive version, with engine box and fuel tank, no engine | 4,632 (US$6,420) |
| 3) As 2) with BMW B 130 130 hp petrol stern-drive | 8,610 (US$11,965) |
| 4) As 2) with Mercruiser 145 DT 145 hp diesel stern-drive | 11,520 (US$16,008) |
| 5) Inboard version with engine box, fuel tank and deep keel, no engine | 4,830 (US$6,712) |
| 6) As 5) with Hawker Siddeley Piranha P4 42 hp diesel inboard | 10,175 (US$14,139) |
| 7) As 5) with Volvo Penta TMD 30 86 hp 4 cylinder turbo-charged diesel inboard | 10,745 (US$14,931) |

B) Kit prices - BW 26. Bare hull, cabin and gunwale mountings, no fittings included.

| | Hull | Cabin | Gunwales |
|---|---|---|---|
| 1) Shallow keel version | 1,925 (US$2,675) | 750 (US$1,042) | 460 (US$639) |
| 2) Deep keel version | 2,200 (US$3,057) | 750 (US$1,042) | 460 (US$639) |

Further information from: Cygnus Marine Ltd, Britannia Yard, Penryn, Cornwall TR10 9ER, England.

Workshop on fish marketing held
(Sources: SPC/Fiji Fisheries Division/Commonwealth Secretariat)

A Training Workshop for Managers of Fish Receiving, Marketing and Distribution Centres in the South Pacific, sponsored by the Commonwealth Secretariat, was held in Suva from 23 May to 1st June. The workshop attracted participants from Cook Islands, Fiji, Kiribati, Niue, Papua New Guinea, Solomon Islands, Tonga, Tuvalu, Vanuatu and Western Samoa. Instructors came from a variety of institutions, including SPC, whose Master Fisherman Lindsay Chapman gave demonstrations of wet fish handling and processing. The workshop covered a wide range of the technical aspects of fish marketing, including fish spoilage, store hygiene and sanitation, chilling and freezing of fish, stock handling, quality control and store management.

Still waters no help to Cook Islands research project
(Source: Cook Islands Ministry of Marine Resources)

A paua and pearl-shell project implemented two years ago in the Rakahanga lagoon is proving unsuccessful due to envronmental degradation, according to a study recently carried out by the Cook Islands Ministry of Marine Resources. The 4,520 pearl-shell (Pinctada margaritifera) and 1,500 paua (Tridacna maxima) introduced from Manihiki are growing only very slowly, and there is no evidence of their having reproduced - features attributed to the inhospitable conditions prevailing in the lagoon.

Fisheries research officer Neil Sims, carried out a survey of the lagoon in May, measuring temperature, salinity, dissolved oxygen content, turbidity, biological oxygen demand and phytoplankton content. His results indicate that dissolved oxygen levels are below expectations, particularly in the deeper waters, where excessive turbidity may be preventing photosynthesis in all but the surface layers. Bottom sediments were high in hydrogen sulphide, indicating anoxic conditions, and the fine silt and mud constantly being deposited appears to be preventing the settlement and growth of desirable benthic organisms.

Residents of Rakahanga assert that the lagoon 'died suddenly' fifteen to twenty years ago, and suggest reasons for the catastrophe as wide and varied as the human imagination permits. Whatever the cause, there is no doubt that the lagoon is depauperate and unproductive, in striking contrast to the great pearl-shell atolls of Penryhn and Manihiki, which it lies between.

American Samoa tuna canneries to expand
(Source: South Seas Digest/Pacific Magazine)

American Samoa's two major private employers are both planning to expand their production capacities as part of a government tax-exemption scheme. Star-Kist, given a 10-year tax-exemption last September, started its $5-million expansion project in December when it closed down for three weeks for renovation, equipment repair and improvements to the plant. Construction of a new reduction plant to produce fish meal for animal food is also planned.

Samoa Packing (previously called Van Camp), whose last tax exemption expired in 1976, has agreed to spend $3.5 million on its local plant as part of a 10-year tax-exemption granted by the government in December. The company will pay full income tax on the first 25,000 tonnes of annual production, but will be exempt on production from 25,000 to 50,000 tonnes/year. The company's Satala factory will close down for about six months in mid-year for improvement and expansion. About 1,000 employees will be laid off, although office and maintenance staff will not be affected. However, both expansion projects will ultimately result in the hiring of more employees.

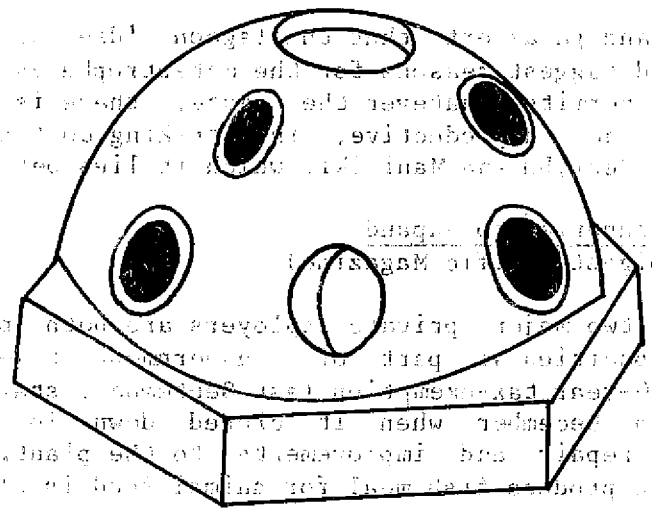
Marine researchers look at cephalopod resources
(Based on FAO Fisheries Technical Paper 231 (Advances in assessment of world cephalopod resources) and articles in New Scientist and Fishing News International)

The failing octopus fishery carried out by the Shiramika fishery cooperative in Hokkaido, Japan, has been revitalised thanks to the deployment of a special type of artificial reef material called 'turtle block'.

The fishery for the edible octopus, Octopus vulgaris, became badly depleted in the mid-1970s due to overfishing. The fishery had been long established in the area and in 1964 the catch was 879 tons. However, from that date catches began to fall, and in 1975 and 1976, no landings were recorded.

To remedy the situation, the cooperative began to experiment with the use of artificial reef materials to create additional habitats for the octopus and rebuild the resource. Various constructions made of concrete blocks, tyres, pipes and wooden boxes were tested under controlled conditions over a three-year period. The researchers found that concrete and unglazed earthen pipes suffered least from fouling by barnacles and other marine life, while the number of octopus eggs spawned was highest in the unglazed pipes. It was also discovered that the larvae of O. vulgaris selected dark places to settle while those of other less commercially valuable species, showed a preference for lighter places.

Based on the result of their findings, the cooperative commissioned a local construction company to mass produce a half round concrete structure perforated by unglazed earthen pipes, to act as a spawning site and nursery for octopus. Called 'turtle blocks' because of their shape, these structures were used during 1981 and 1982 to create an artificial reef zone extending over 258 square kilometres.



(Fishing News International)

A 'turtle block'.

The effect of the reef in rebuilding the octopus rsource was dramatic. In the five months from December 1982 to April 1983 the Shiranuka cooperative landed 926 tons of octopus, the highest catch it has ever recorded.

In other parts of the world too, squid and octopus resources are beginning to attract more attention as the Japanese market for these products continues to expand. 25% of Japanese protein intake comes from the sea, of which at least 5% comes from cephalopods. Of the Japanese squid landings (0.5 million tonnes) 20% now comes from overseas countries as far apart as New Zealand, Argentina and Thailand.

Scientists have for several years estimated that world cephalopod stocks at least equalled those of true fish, but recent findings have indicated that they may be far larger. A study on the cephalopod mouthparts that remain in the stomachs of marine mammals and birds gives an idea of the quantities of squid these animals consume. Using conservative figures, it has been estimated that sperm whales in 1972 consumed over 100 million tonnes of squid - well over the present world fish catch. Nevertheless, the proportion of cephalopods in world landings amounted to only 3.7% in 1980, although this has grown from 2.6% in 1970.

Physiological research is also uncovering new and surprising facts about cephalopod life cycles, which are difficult to reconcile with conventional views of marine ecology. Although some deep-water species grow to large sizes (Architeuthis sp. reach 500 kg), most live only for a short time - generally one year, seldom two - reproduce once, and then quickly die. As a result, the density of populations of squid and octopus varies dramatically from year to year, the stock being almost totally dependent on the number of young produced the previous year. Although having extremely acute eyesight and being sensitive to polarised light, cephalopods appear to be deaf and have no pressure-sensitive system corresponding to the lateral lines of fishes. This feature protects schooling squid species from trawls, which function by herding fish together between waves of pressure created by trawl warps and otter boards.

Cephalopods also have a protein-based metabolic system, protein being used for growth, fuel, and energy storage. Marine animals can break protein all the way to ammonia, and with abundant water there is no need to excrete a less toxic product (such as urea in land animals), and no need to synthesize fat to avoid the weight penalty of a wet protein store. Hence the energy reserve can be the body musculature itself, which allows for very rapid growth during times of heavy feeding, and excellent food conversion rates. Octopuses can convert prey to meat at rates in excess of 50 per cent: broiler chickens, backed by years of breeding programmes and feedstock formulation, achieve about 40 per cent. These factors of very high (sometimes exponential) growth rates and efficient food conversion theoretically make octopuses an ideal culture animals. Perhaps we will be seing octopus farms in the not too-distant future?

'Ocean Pearl' sued by fishermen
(Source: Pacific Magazine/Tuvalu Fisheries Division)

A Western Samoan sailor, injured in an explosion aboard the purse seiner Ocean Pearl in November near Funafuti, Tuvalu (see SPC Fisheries Newsletter No. 27, page 13), has sued the vessel and the estate of its deceased captain for $2.5 million. Captain John Medina was killed in the accident. The suit claims that the Samoan sailor suffered burns to 50 percent of his body and remained on the vessel for 48 hours before being evacuated to Honolulu for medical treatment. The vessel was alleged to be unseaworthy when it left Pago Pago and subsequent repairs to the engine were undertaken in a negligent and unsafe manner.

Because of the assistance given to the crew of the Ocean Pearl at the time of the accident by the people of Funafuti, the American Tunaboat Association offered to add a small intensive care wing to the Funafuti hospital as a gesture of thanks. However, the Tuvalu Government feels that the operating costs of such a unit once established, would prove difficult to meet from its very restricted budget, and the ATA is now looking at alternative ways to repay the people of Tuvalu. One suggestion under consideration is to provide some jobs for Tuvaluan fishermen on ATA boats.

Fuel-efficient 31-foot mini-seiner/longliner marketed
(Source: Nils Lucander/Australian Professional Fisherman)

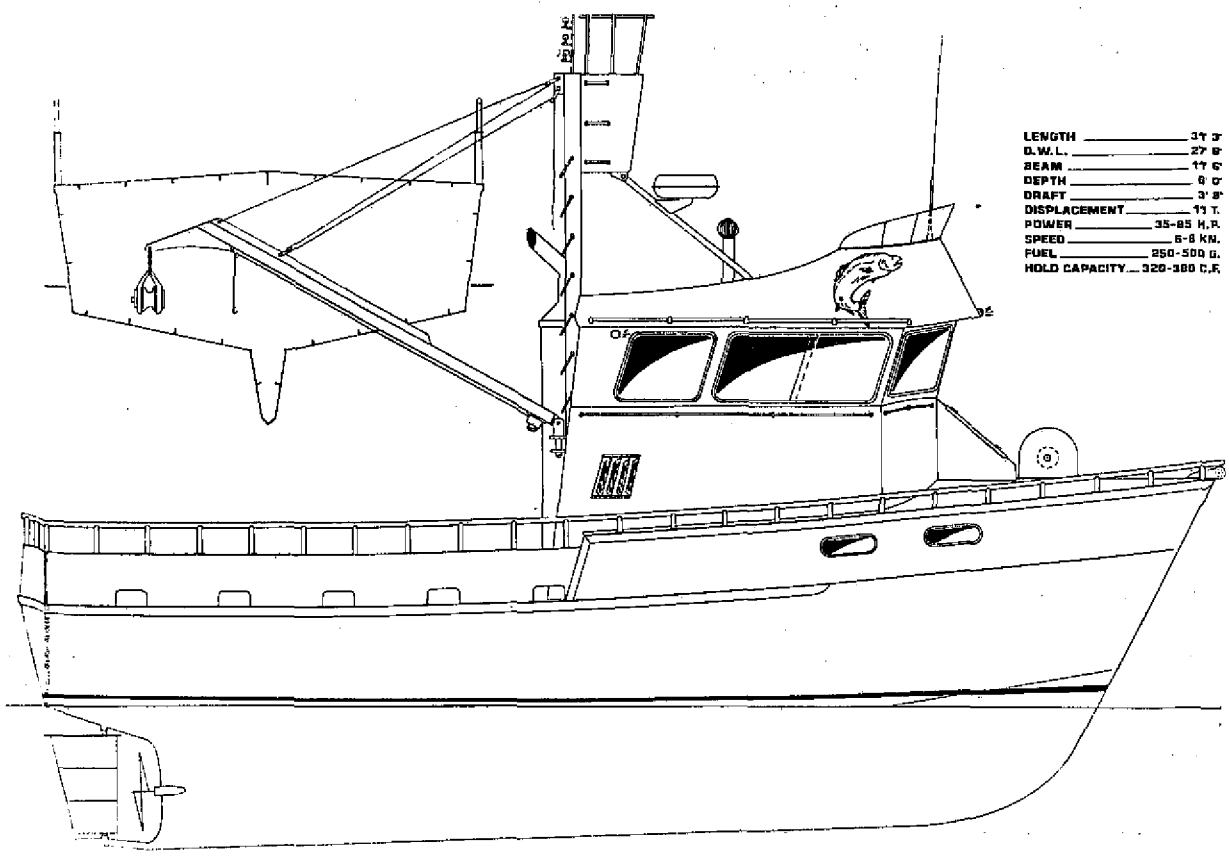
Boat designer Nils Lucander of the USA has recently announced completion of a super-economical small fishing vessel design, the first of which has been built by Custom Metal Fabrication of Ward Cove, Alaska for Jack Meyers of the same city.

The basic requirements included simplicity in design to allow on-site construction without need for sophisticated equipment found in larger boat of shipyards. The first boat will be of steel construction. Aluminium can be used and this has been included on the plans.

Since a speed of only 7 knots was required, a small 3-cylinder, 36 HP Volvo diesel has been installed. Using less than 2 gallons per hour, the 400-gallon fuel tank capacity gives a total range nearing 1500 nautical miles. If the vessel is to be used for heavy duty dragging, the design can accommodate larger engines and up to 28" dia. propeller.

As the first boat will be mainly used for day trips the accommodation, which includes three berths, is relatively spartan. The pilot house contains the helmsman's position with controls, a comfortable dinette, a small compact galley with sink, refrigeration and an oil stove for cooking and heating. Aft to port is a vented and heated wet locker for clothes drying.

Since all fishermen have their own ideas about fishing gear, none has been shown on the plan. The afterdeck, however, is 15' long and offers 160 square feet for working, which should be more than enough for all types of fishing. If necessary, the vessel can be fitted with a flying bridge over the pilot house and the mast sports a crows nest for spotting.




(Drawing: N. Lucander)

**The Lucander 31-foot (9.3 m) mini-seiner/longliner.**

The deep forefoot, easy buttocks and long keel makes it an easily handled boat, with an easy motion, very economical and the flared topsides provide excellent stability. More information from: Nils Lucander, 5307 N. Pearl Street, Tacoma, WA 98407, U.S.A.

Pumice forces fish ashore in Fiji
(Sources:Fiji Sun/Fiji Times/SPC)

Villagers of Ono-i-Lau, Fiji's most southerly inhabited island, crowded their beaches early in June to gather fish apparently trapped and forced to the surface by huge quantities of floating pumice stones.

Masses of pumice were reported in April by SPC Master Fisherman Paul Mead, whose trolling lines were repeatedly clogged by the material. That reported from Ono-i-Lau was much thicker, and villagers were able to walk on the pumice to collect fish floating between the islands of Ono and Doi. The pumice is thought to have originated from one or more underwater volcanic eruptions in Tonga during March.

Ono-i-Lau villagers were disappointed that Fiji's fish collection vessels were far away from their island at the time, and could not assist them in getting their windfall to Suva market for sale. Ono-i-Lau is two days journey from Suva and, as no chill facilities are available on the island, the fish would have been decaying before they could be collected. However, the islanders contented themselves with a huge feast on the more than 2000 large fish they collected.

Later in June the pumice spread to many other parts of the Fiji group, and south easterly winds at the end of the month brought it around the area of the capital, Suva. Thick grey blankets of the tiny pumice rocks clogged Suva harbour and gave vessels the appearance of being beached on a flat expanse of grey sand.

Reports from Tonga say that the eruption which produced the pumice lasted six weeks and was located at Home Reef, where volcanic activity has been recorded frequently in the past. The site of the eruption has been marked by the formation of a new island 1.6 km long and 0.8 km wide, but which is likely to wash away in a strong storm.

## Trouble with Tuna Transhipment in Northern Marianas

(Source: Pacific Magazine)

The value of the tuna transhipment industry on Tinian is being debated in government circles, and hearings have been scheduled to decide its fate. Tinian leaders welcome the industry, which has brought jobs and income to the island - but several incidents of violence have others worried. There was a "mini riot" between sailors and residents, and a sailor was seriously wounded when he was stabbed with a fishing spear. A sleeping Palauan stevedore died when he was axed in the neck by another. Health officials say the Tinian harbor has been polluted, too.

## Do tropical fish spoil less rapidly in ice than temperate fish?

It has long been contended that cold water fish spoil more rapidly in ice than tropical fish because the normal bacterial flora of their bodies is better able to survive and cause spoilage at ice temperatures. A number of studies have been carried out which add weight to this contention, such as that described in the following article by John Sumner and Elizabeth Gorczyca in FAO's Fisheries Technology News No. 6 (December 1983):

"The considerable circumstantial evidence that tropical fish keep longer when stored in ice than fish from temperate and cold waters led Dr Jim Shewan to propound the theory that keeping times in ice were related to the numbers of psychrotrophic (cold-loving) bacteria present, cold water fish being more likely to have higher numbers of psychrotrophs and therefore to spoil more rapidly. A series of experiments carried out at the Royal Melbourne Institute of Technology (RMIT) lends weight to Shewan's theory. Mullet (Mugil cephalus) caught off Brisbane from waters of 23 degrees C kept 26 days in ice compared with 20 days and 21 days for the same species taken from Gippsland (Victoria) waters of 9 degrees C. Rainbow trout (Salmo gairdneri) harvested from the same farm in Buxton, Victoria, kept 18 days in ice when taken in summer (water temp. 18 degrees C) compared with 14 days and 15 days in winter (water temp. 5 degrees C). In both sets of experiments at the time the fish was rejected by a trained taste panel total bacterial counts (22 degrees C) were 10 -10 /g; with H S-producers (mainly Alteromonas putrefasciens) being 10 -10 /g and comprising 1-10% of the total count. Rejection by the taste panel approximated depletion of the nucleotide, inosine monophosphate (IMP), depletion being accomplished more rapidly in cooler-water fish."

However, a review article by FAO's Carlos Lima dos Santos in Volume 23 of Tropical Science suggests that existing data collected from fish storage trials fall far short of validating this theory. Lima dos Santos' article brings together for the first time detailed results of over 200 different trials on the storage life of fish and the associated bibliography. While none of the trials reviewed were based in the SPC region, some related to fish species

found in SPC member countries, and these are summarised in the table below.

**Storage life of selected marine fish species**

(from C.A.M. Lima dos Santos: The storage of tropical fish in ice - a review. Tropical Science, Vol. 23 No. 2, 1981, pp.97-127.)

| ORDER/ family | Species (Latin/Common name) | Catching Area | Shelf life (days) |
|---|---|---|---|
| ELASMOBRANCHS: | | | |
| Triakidae | Galeorhinus australis (school shark) | South Australia | 12 |
| | Galeorhinus australis (school shark) | South Australia | 10-12 |
| | Galeorhinus antarcticus (gummy shark) | South Australia | 10-12 |
| TELEOSTS: | | | |
| Serranidae | Epinephelus sp. (grouper) | Sri Lanka | 6-14 |
| | Epinephelus chlorostigma (vieille maconde) | Seychelles | 13 |
| | Plectropomus leopardus (blue-spotted bass) | Brunei | 28 |
| Carangidae | Caranx spp. (horse mackerel) | Sri Lanka | 0.5 |
| | Caranx fulvoguttatus (carangue) | Seychelles | 13 |
| | Caranx ignobilis (yellowfin jack) | Brunei | 12 |
| | Decapterus spp. (horse mackerel) | Indonesia | 9 |
| Lutjanidae | Aprion virescens (green jobfish) | Seychelles | 16 |
| | Lutjanus argentimaculatus (red snapper) | Sri Lanka | 18 |
| | Lutjanus bohar (vara vara) | Seychelles | 14-20 |
| | Lutjanus bohar (vara vara) | Seychelles | 16 |
| | Lutjanus purpureus (red snapper) | North East Brazil | 10-14 |
| | Lutjanus purpureus (red snapper) | North East Brazil | 12 |
| | Lutjanus rivulatus (blue-spotted snapper) | Sri Lanka | 14 |
| | Lutjanus sanguineus (red snapper) | Bahrain | 20 |
| | Lutjanus sebae (borgeois) | Seychelles | 16 |
| Leiognathidae | Leiognathus equulius (ponyfish) | Brunei | 10 |
| Lethrinidae | Lethrinus lentjan (purple emperor) | Bahrain | 15 |
| Mugilidae | Mugil sp (grey mullet) | Sri Lanka | 12 |
| | Mugil cephalus (striped mullet) | Mexico | 19 |
| Sphyraenidae | Sphyraena sp (barracuda) | Sri Lanka | 7 |
| Scombridae | Acanthocybium solandri (wahoo) | Seychelles | 11 |
| | Auxis thazard (frigate mackerel) | Philippines | 10-15 |
| | Euthynnus affinis (bonito) | Seychelles | 9 |
| | Katsuwonus pelamis (skipjack) | Sri Lanka | 12 |
| | Katsuwonus pelamis (skipjack) | Indonesia | 18 |
| | Scomberomorus commerson (spanish mackerel) | Bahrain | 11 |
| Xiphiidae | Xiphias gladius (swordfish) | Canada | 19 |
| Chanidae | Chanos chanos (milkfish) | Indonesia | 11-16 |

Lima dos Santos' article argues that: "It is not in dispute that trials have been conducted in which certain fish caught in tropical areas (e.g. tilapia) have been found to remain acceptable in ice for longer than fish from temperate or coldwater areas (e.g. cod). The question is whether it is possible to generalise and state that this is a property of all tropical fish.

"It is the contention of this review that to date the case for this statement has not been proved. There are a number of reasons for this. Perhaps the most important is that it is questionable whether a meaningful scientific comparison can be made of the shelf life of an exhausted, aphyxiated, trawled North Sea haddock with that of a gill netted carp caught in an Indian freshwater pond and killed by a blow to the head. Factors such as taxonomic position of the species concerned, fishing grounds, food supply, method of capture and death have a great effect on organoleptic quality of fish as food and, hence, should not be ignored.

"If an attempt is made to reduce the variables which could affect the comparison by, for example, looking only at fish of one family then, according to the data in this review, the fish of the Lutjanidae family would have a storage life between 4 and 20 days in ice and members of the Gadidae family would have a shelf life ranging between 1 and 15 days in ice. However, the former only inhabit the warm waters of the world and the latter cold waters: no direct comparison is therefore possible. Carangidae, Clupeidae, Sparidae and Scombridae do inhabit both warm and cold water but insufficient data are available for a satisfactory comparison to be made.

"It would appear, therefore, that with the data currently available no proper comparison of tropical and temperate/coldwater fish is possible. If one also considers that certain flat fish from cold waters (e.g. halibut) keep on ice for up to 3 weeks and some of the white fleshed, deep sea, coldwater fish (e.g. grenadiers) keep for a similar period then, in the author's opinion, it is unwise to state that tropical fish species have a longer shelf life in ice than colder water species.

"In conclusion, therefore, it may be stated that individual differences between fish species in their storage life in ice do occur. In some cases fish from tropical waters have an extended shelf life but it is also true that certain fish from colder waters have the same property. The reasons for these differences are still open to conjecture and it is recommended that, in future research programmes, priority should be given to a study of species having unusually extended shelf lives."

Fisheries Information Training Course to be held
(Source: University of Rhode Island)

The University of Rhode Islands International Centre for Marine Resource Development (URI-ICMRD) has recently announced its intention to hold a Training Programme for Marine And Fisheries Information Personnel From Developing Countries, scheduled for 1 August to 8 October 1984. The course will take place in the Main Library of the University, and at the Pall Marine Science Library, with special sessions at other marine libraries in New England also planned. The courses' general objective is to broaden and deepen professional understanding of marine information resources and their application to the problems of development. Specific parts of the course are:

I. Information sources in Marine/Fisheries Science
II. Cataloguing of Marine/Fisheries Science Information
III. Managing Marine Information Centres
IV. Online Systems and Microcomputer Workshop
V. Current Issues in the Development of Marine Resources
VI. Site Visits.

Applicants should be fluent in English, work in the marine sciences field and have basic library training. Further information can be obtained from ICMRD, Main Library, URI, Kingston, Rhode Island 02881, United States of America.

FFA Tuna Fishing Workshop held in Kiribati
(Source: South Pacific Commission)

A Workshop on National Tuna Fishing Operations was sponsored by the Forum Fisheries Agency in Tarawa, Kiribati, from 29 May to 2 June 1984. Participants included delegates from 11 Forum Fisheries Agency member countries, eight fishing industry consultants, members of the FFA and representatives of three regional organisations including the South Pacific Commission.

The theme of the workshop was discussed under several topic headings including the role of national tuna fisheries ventures, tuna markets and sales arrangements, fishing operations, financing, localisation and training, infrastructure requirements and regional co-operation. Twenty-one papers presented by speakers are summarised in the proceedings of the workshop. Recommendations endorsed by the workshop concerned tighter regional management of fishing effort, preferential access for FFA member state vessels, standardisation of seamanship and engineering qualifications, monitoring the use and effectiveness of FADs and the standardisation of fishing operations financial accounting practices.

The General Manager of Te Mautari Fishing Company, Brendan Dalley, conducted participants on a bus and boat tour of Te Mautari installations on Betio. Visitors also had the opportunity of examining the *Eucheuma* seaweed culture programme conducted by Steve Why and test sailing two FAO-designed fishing canoes built under the supervision of Mike Savins.

Another view of "traditional fishing"

The following article, by Murray Mitchell, appeared in the January 1984 issue of Australia's 'Professional Fisherman' magazine:

"Traditional fishing - the finest racket?

"Governments cry 'conservation'. So does the press and just about everybody else.

'Let us protect turtles and dugongs', they say. And so the popular front for liberation of something or other swings into action and in no time at all there arrives impressive legislation for the purpose of protecting the aforesaid beastie. No one thinks as to who will do the protecting. Laws are fine but some are downright silly in implementation. Some are almost impossible to enforce. But that's not all, friends. Here and there are situated groups who have exploited turtles, dugongs, or what have you for the purpose of filling their bellies. This is most commendable. Conservationists mostly have full bellies. So when the new noble Act first sees light of day there is often a big outcry, which mostly sounds like:- 'But, what about the tribal native groups?' There is a ghastly silence. Someone has blundered. Quickly, the Act is amended

and the local tribal groups go on their merry way killing the endangered species 'for subsistence'. Unfortunately the legislators all seem to have forgotten one important thing. Catching must be done by traditional means and the animals must not be sold.

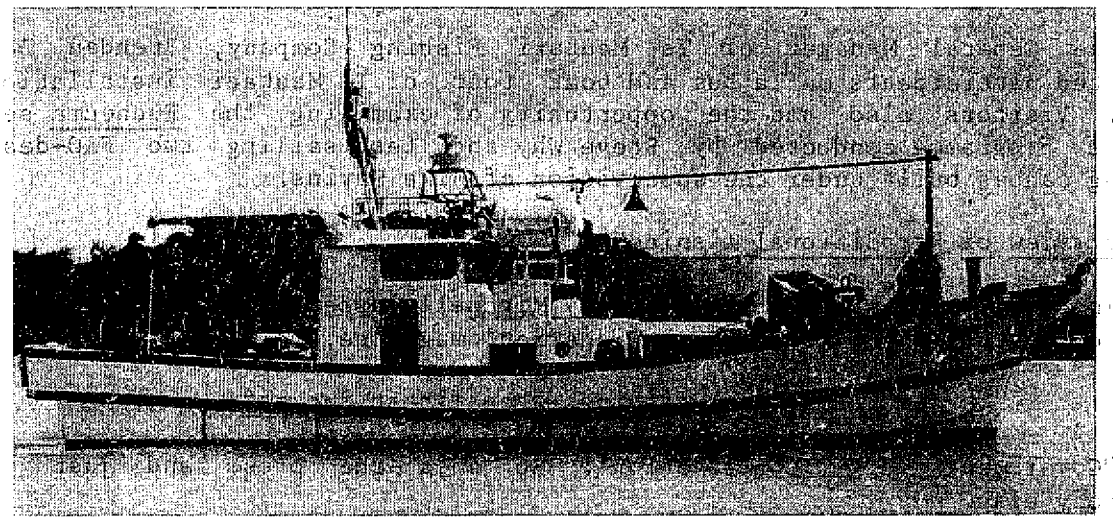
"The writer knows and so does everyone else that legal loopholes are just a farce. Fast boats and outboard engines are used. Big mesh nylon nets are set for dugong. It's a good thing most of the tribes don't have flying facilities! So the turtles and dugong are sold and the proceeds taken to the pub. Conservation - who are you kidding?"

French Polynesia signs new fishing agreement
(Source: Pacific Magazine)

French Polynesia and South Korea have recently signed a fishing agreement for 1984 which will allow Korean longline vessels a quota of 7,680 tonnes of tuna from French Polynesia's waters. Returns to the territory, as a proportion of the catch, are expected to be around 2,034,000 French francs. The 1983 agreement, by comparison, was for 6,480 tonnes of tuna, which returned 1,990,000 French francs. Thirty longliners will be based in Papeete.

PNG University of Technology offers degree course
(Source: PNG University of Technology)

The Papua New Guinea University of Technology has announced its intention to replace the 3-year diploma in Fisheries Technology Course with a 4-year Bachelor of Science Degree Course in Fisheries. The degree course will be run for the first time in academic year 1984, and the diploma course phased out in 1986.



(Photo: W. Y. Tseng)

*Scomber*, training vessel of the Fisheries Department, Papua New Guinea University of Technology.

The first year of the degree course is devoted to basic studies in subjects such as biology, chemistry, physics, mathematics, social science, English and introduction to the different disciplines of fisheries science. Year two deals with foundation subjects in fisheries science and technology - the nature of aquatic environments, structure and function of resource organisms, elements of navigation and seamanship, capture and culture, fisheries and fish utilisation and processing technology. During year three, units in aquatic resources and management, fishing gear technology, aquaculture and mariculture, and fish processing technology are offered at an intermediate level in the first semester and at an advanced level in the second semester. During the fourth and final year, fisheries subjects in all major areas are offered at a specialised level together with a supervised indpendent project of the student's choice.

The Fisheries Science Degree Course is intended to produce graduates to meet the immediate demand for highly skilled fisheries manpower in Papua New Guinea. Minimum entry requirements are Grade 12 school certificate, with credit passes in mathematics and science. The intake quota is 25 students per academic year.

Fijian pole-and-line boat spends 5 weeks on reef
(Source: Fiji Times/SPC)

A battered Ika # 5 was towed into Suva harbour on May 29 by the salvage vessel Pacific Salvor after spending 5 weeks hard aground on Cakaulevu reef in the Lau island group in the eastern part of Fiji. The ship, the largest in the fleet of Ika Corporation (Fiji's national fishing company), was accompanied by a strong smell of rotting fish from the two tonnes of skipjack left in the fish holds.

At the time of the accident, the Ika # 5 was sheltering on the lee side of Cakaulevu reef during a period of extremely rough weather. A sudden shift of the wind at 3.30 am on April 23 pushed the vessel onto the reef breaking the rudder post. The hull was not holed immediately, but soon sprang leaks into the engine room, forcing the crew to shut down the engine after sending a Mayday message. The fish holds too became waterlogged and the ship was soon stuck fast onto the reef.

In the weeks that followed, most of the crew were taken off the Ika # 5 by other Ika Corporation vessels, only the captain, fishing master and a small skeleton crew remaining. Two unsuccessful salvage attempts were made before the vessel was refloated by a 20-man team from Pacific Salvaging Partnership. The team used a relatively novel salvage technique, which involves 'sacrificing' another vessel. In this case, a derelict longliner was attached to the pole-and-line boat by cables, and sunk in deep water. The weight of the sinking boat acted to pull the stranded one to the edge of the reef. The longliner was then cut loose and the Ika # 5 towed home.

Another Fijian pole-and-line boat, the Independence was also grounded on a reef patch on May 6, a few days after the Ika # 5. The Independence, which is privately owned (see SPC Fisheries Newsletter # 27, p. 15) was pulled off shortly afterwards, but sustained major damage to the hull and sterngear which resulted in repairs estimated to cost between F$80,000 and F$100,000. About 60% of the underwater hull area had to be cut out and renewed.

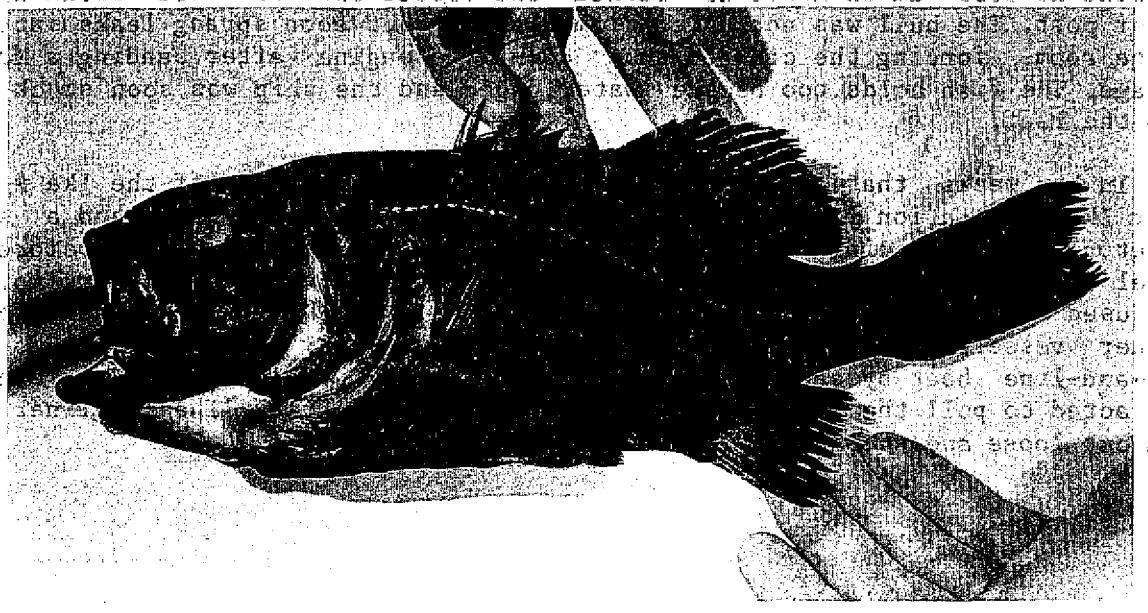
NMFS Field Station to be reopened in American Samoa
(Source: NMFS)

Because of the growing importance of tuna purse seine landings in American Samoa, the U.S. National Marine Fisheries Service plans to reopen its field sampling station in Pago Pago. The field station will increase the Honolulu Laboratory's monitoring activities of the tuna purse seine fishery and will collect, among other information, the size composition of the landings. Monitoring activities on the foreign longline fishery based in Pago Pago will also continue.

New 'roughy' found in Cook Islands
(Source: Cook Islands Ministry of Marine Resources)

A deep-bottom fishing expedition from Rarotonga in May turned up a surprise catch in the form of a previously unrecorded trachichtyid fish, pictured below. The fish, caught on the bottom at night in 240 m of water, generally resembles a grouper but the fin ray counts are inconsistent with those of other members of the family Serranidae, and the presence of hard anal scutes (plate like scales) and lack of teeth point to a closer similarity to the 'roughies', particularly those of the genus Meloptygyra.

Readers familiar with the collector of the specimen will doubtless agree that, while no resemblance is implied, it would be particularly fitting to christen this unusual and unique creature with the specific name "dashwoodii".



(Photo: N. Sims)

New 'roughy'

Koreans in Fiji fish canning venture
(Source: South Seas Digest)

Three South Korean companies, Dae Young Industries Ltd, Dae Hwa Foods and Dong Yang Tinplate Industries Co.Ltd., will combine with the Vonu Company, of Fiji in a joint venture, the establishment of a $F500,000 fish cannery on the Wailada estate at Lami, about 4 km from Suva port area. The Korean companies will have a 60% share in the venture, with Vono holding the balance. The canning equipment will be imported from Korea and, initially, fresh mackerel will be imported from New Zealand for canning. Fiji already has a tuna fisheries complex at the old capital of Levuka on Ovalau Island operated as a joint venture by Fiji government and the Japanese C. Itoh Company.

Black magic blamed for shark attack in Vanuatu
(Sources: Tam-Tam; Sydney Daily Telegraph; Islands Business; Fiji Sun)

Black magic has been blamed by the parents of ni-Vanuatu shark attack victim Rael Etna for their daughter's misfortune. But others might think that Rael, age 17, is in reality quite lucky.

One day in March Rael, of Paama Island, and some friends headed to their usual lagoon swimming spot. "All my friends were already in, laughing and splashing, and I was not only last in but also closest to shore", she related. "I had no reason to even think about sharks because I was only waist-deep".

"Even as I felt its first attack as it tore my leg, I felt no pain. I thought it was my older sister up to her usual trick again - swimming underwater and pulling at me. It happened too fast to describe, but the next thing I knew that something was terribly wrong. I quickly tried to feel in the water with my hand, only to plunge it in the shark's mouth - and it took hold of it.

"I shouted to my friends: 'I've been bitten by a shark!' They were terrified and ran out of the water and scurried home while I struggled to release my hand. I got hold of something in its mouth and tore it off. It weakened its grip and I hurt my hand badly by pulling it out through its teeth. I threw the thing in the water and dragged myself ashore where intense pain overtook my entire body, and I rolled on the sand."

Rael had lost a finger and had flesh stripped from her arm between her elbow and hand. Her left leg was badly savaged. It was to be hours before she was to receive medical treatment. After being carried home by relatives - her parents were away visiting another island - she lay all night in agony with wounds covered by black sand and blood. The local clinic couldn't cope with her injuries. Next day, a boat ferried her to Epi Island and Lamen Bay airfield, from where she was flown to the central hospital in Vila and then subsequently to Concord Hospital in Sydney, Australia.

Doctors at the hospital described her survival as an 'absolute miracle'. They have used plastic and micro-surgery techniques developed only this year to graft a huge piece of flesh and muscle from her abdomen to the area of the shark bite. The six-hour operation saved Rael's leg and prevented amputation. "How Rael survived her ordeal is just unbelievable" a member of the surgical team said.

But was the shark that attached Rael controlled by black magic? Among the islands of Vanuatu belief in all kinds of magic still has a strong hold on the country's people, although government policy is to discourage this practice. Rael's parents are certain that the attacker was not a shark, but a man in the form of a shark. "Rael herself told me: 'I could see the shadowy figure of a man watching me from under a punao tree as I was lying on the beach'," said her father. "We are not rich but we are a big family. We have land on Paama and Epi, plantations, pigs, cattle and poultry. People do not like us for our property. Why did a shark earlier attack my own brother's son and why did it avoid the other girls who were further out and come for my daughter, who was closest inshore?" A suspected sorcerer has been summoned from Port Vila to be questioned by the Paama Island Council.

There have been a number of other fatal shark attacks in Vanuatu this year. A nineteen-year old boy died in Motaleva in mid-June after a shark bit away a large portion of his left thigh. Earlier, two holiday-makers, one from Sydney and another from Switzerland, both died in the country following separate shark attacks. And Lelepa villagers were so angry with a shark which viciously attacked the outrigger of a gardener's canoe, and nearly had him as well, as he was paddling home from the mainland, that they baited it with dogmeat and hooked it ashore. The shark attacked the outrigger so violently that it broke the binding vines and some of its teeth in the attempt. Fortunately, the gardener used his spear to hold on to the outrigger and prevent a capsize until friends rescued him and his canoe. On dragging the 3.7 m shark ashore and finding some of its teeth missing, they examined the mangled outrigger and found them implanted there.

ABSTRACTS

The following documents are listed as being of potential technical interest to readers, who should contact the addresses given for information on how to obtain copies.

(1) A Guide for the Small-scale Fishery Administrator: Information from the Harvest Sector, 1982 by David Stevenson, Richard Pollnac and Philip Logan. 124 pp. A manual designed to assist individuals in developing countries who either require or are responsible for providing information used in making policy decisions which affect small-scale fisheries. The final three chapters describe a minimum set of biological, economic and socio-cultural information from the small-scale fishery resource and harvest sector which should be available to enable intelligent policy decisions to be made. The first three chapters give guidelines to the collection, organisation and interpretation of such data, recognising the funding and staff constraints which may apply in developing countries. The guide also contains sample questionnaire, interview and other types of data collection forms.

Contact address: Librarian, International Centre for Marine Resource Development, University of Rhode Island, Kingston, Rhode Island.

(2) A Review of Aquaculture Activities in the Pacific Islands Region, 1984, by K. Roger Uwate with Peniasi Kunatuba, Baraniko Raobati and Charles Tenakanai, 490 pp. Detailed description of the history of aquaculture in 20 Pacific Island countries and territories, with a summary of the successes and failures of each major project and extensive references where these are available.

Contact address: Pacific Islands Development Program, East-West Center, Honolulu, Hawaii.

(3) Growth Rate, Abundance and Distribution of the Topshell Trochus Niloticus on Guam, 1979, by Barry D. Smith (M.Sc. Thesis). 24 pp. Results and discussion of mark-and-recapture experiments on T. niloticus including growth rate estimates and an interpretation of spatial distribution as related to reef topography.

Contact address: Author, University of Guam.

(4) Biology of Western Samoan Snapper Populations, 1984, M.Sc. thesis by David Mikenzo. Presents information on feeding, reproductive habits and life histories derived from biological studies of Lutjanus kasmira, Lutjanus rufolineatus and Pristipomoides multidens carried out in Western Samoa during 1982/83. Studies of the stomach contents of captured fish inducate the two Lutjanus species to be bottom feeders, while P. multidens feeds on pelagic and near-bottom swimming prey. The nocturnal feeding activity of these fish is reflected in the nocturnal habit of their main prey species. From observations of sex ratios and spawning cycles the eggs and larvae of all three species are deduced to be pelagic, and it is inferred that juvenile P. multidens lead an extended planktonic life which allows for their wide dispersal, e.g. to the relatively isolated Hawaiian chain, where there are no naturally-spread Lutjanus populations.

Contact address: Author, 757 Mary Street, Perth Amboy, New Jersey 08861, USA.

SPC Fisheries Newsletter No. 29 April-June 1984

# FIRST HARVEST RESULTS FROM THE GREEN MUSSEL CULTURE PROJECT IN WESTERN SAMOA

by
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Apia Western Samoa

## Introduction

Western Samoa's green mussel culture project was initiated by the Fisheries Division in 1981. The main aim was to assess the feasibility of mussel culture as a cash-crop activity suitable for village-level involvement. The early part of the project concentrated on the development of appropriate culture techniques and the investigation of growth rates, and this work is reported in detail in earlier issues of the SPC Fisheries Newsletter (Bell, L. and J. Albert, 1983; Bell, L.A.J., E.J. Albert and J. Schuster, 1983). The present paper documents marketing trials carried out in September 1983.

## Background

One of the most important aspects of any farming venture, apart from good growth rates, is the establishment of a market. One needs to be certain that there are buyers of the product, either locally or elsewhere, before committing time and money into production. For this reason our mussels were partially harvested for marketing trials once it had been established that good growth rates were possible using culture techniques appropriate for Western Samoa.

As reported earlier, culture trials of mussels attached to ropes and suspended from bamboo rafts have been carried out at four different sites. Two of these were subsequently closed down when it became clear that localised problems would severely hamper project activities. Culture continued at the other two sites, Safata and Asau, where good growth rates had been obtained and the mussels had reached sexual maturity. Spat collector rafts were placed in Asau bay in July 1983 in anticipation of the mussels spawning naturally. However, no spatfall had been observed by September 1983, and it was decided to go ahead with marketing trials on a portion of the crop.

As the two rafts at Asau were more densely populated, this site was selected for the first harvest. One raft was harvested completely, the other being left intact to allow further growth observations, and for the possibility of spawning. Prior to the harvest a faecal coliform test on the Asau mussels was done by the Health Department to ensure fitness for consumption. The test results were completely satisfactory and showed figures in the recommended hygiene spectrum for molluscan shellfish (FAO/WHO 1979).

## Harvesting and transportation

Mussel harvesting from the raft simply involved undoing the ropes from the raft bamboos and lifting the whole growing rope out of the water onto the boat on which they were to be transported to Apia. The harvest of twenty growing ropes lasted less than an hour with four workers employed. This took place in the late afternoon.

(Photo: Lui Bell)

**Mussels on a two-metre growing rope.**

Transportation was by a 20 m Japanese pole-and-line fishing vessel which had been anchoring a fish aggregation device out of Asau. The trip to Apia took about eight hours but the mussels were kept in the boat until the next morning, i.e. some 15 hours.

Three methods of keeping the mussels were employed simultaneously during the trip: (1) Ropes of mussels were hung in bait wells of the ship with continuous water exchange (most of the harvest was transported this way). (2) Chilling - some mussels (still attached to growing ropes) were packed in a rectangular wooden, well draining box on a layer of clean sacking. A good layer of ice was placed (on top only) on a layer of sacking which covered the mussels. Thus the mussels did not come in direct contact with the ice. The temperature in the box measured between 5 and 7 degrees C throughout the trip. (3) In ice - a few mussels were transported packed in ice in a fish cooler. The ice was in direct contact with the mussels and the cooler was not drained.

On arrival, all the mussels packed in ice in the fish cooler were dead (but still fresh) while those in the bait wells and the box chilled with ice were still alive.

Cleaning and packing

On the morning after arrival in Apia, the growing ropes, with the mussels still attached, were removed from the boat. The mussels were detached from the ropes by grasping at the byssal attachment, cleaned of algae and barnacles, and weighed. Two kg of mussels (shell on) were packed in plastic bags, and they were sold in this form.

## Production

At harvest, the mussels measured between 5.4 and 13.3 cm in length, with a length mean of 8.6 cm. The mean corresponds to an average increment of 7.4 cm since their importation from Tahiti in mid-February 1983, or an overall average growth rate of slightly over one centimetre per month.

The meat content is comparable to that obtained in other countries. The wet flesh weight ranges from 4.1 to 19.0 g per mussel and 31-49% of the whole unopened mussel weight. A high ratio of 10.6:1 females to males was found.

The total weight of mussels on each growing rope varied. The lowest production was from a 2 m growing rope with 13.7 kg of mussels shell on (thus 6.85 kg/m of rope). The highest production was also from a 2 m rope with a yield of 29.10 kg, a production of 14.55 kg/m. The total production from the raft (20 ropes with a total length of 47 m) amounted to 445.59 kg of mussels, giving an average yield of 9.48 kg/m. In the Philippines, raft culture of the green mussel has a production range of 5-15 kg of mussels per metre of rope (Yap et al. 1979).

## The local market and public feedback

More than half of the harvest was sold via the new Apia Fish Market in less than an hour. Two kilogram bags of mussels, shell on, were sold at the price of $WS1.50 per bag. The harvest was too small for the number of buyers and orders that came, and the Division has since had many enquiries about the next harvest.

Those who were present (locals and expatriate staff and visitors) at the Fisheries Division building where the mussels were detached, cleaned and packed, were given free samples for tasting tests. We also asked a few people who bought some to come back the following day and tell us how they liked the mussels. All the feedback was positive. The common comments made were: "very nice", "they taste better than the mussels grown in the country I've been", "we enjoyed eating them", "wish there were more".

The harvest results indicate that there is a good local market (the level of production to satisfy it is not determined yet) and the product is well accepted.

## References

Bell, Lui, and Jane Albert, 1983. Progress report on the green mussel culture project in Western Samoa, April 1983. SPC Fisheries Newsletter No. 25, pp. 12-16.

Bell, Lui A.J., E. Jane Albert and J. Schuster, 1983. Update report on the green mussel culture project in Western Samoa. SPC Fisheries Newsletter No. 26, pp. 24-28.

FAO/WHO, 1979. Recommended International Code of Hygienic Practice for Molluscan Shellfish. Joint FAO/WHO Food Standards Programme CODEX ALIMENTARIUS COMMISSON CAC/RCP 18-1978.

Yap, W.G., Adam L. Young, Celio E.F. Orano and Ma Teresa de Castro, 1979. Manual of Mussel Farming. Aquaculture Department, Southeast Asian Fisheries Development Centre, Tigbauan Iloilo, Philippines.

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# BRITAIN'S TROPICAL DEVELOPMENT AND RESEARCH INSTITUTE

by
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## Introduction

TDRI is a relatively new organisation, having been formed in April 1983 by the amalgamation of the Tropical Products Institute (TPI) and the Centre for Overseas Pest Research (COPR). These two organisations had a long history of working for the benefit of developing countries. Like its predecessors TDRI is a scientific unit of Britain's overseas aid programme. It has over 400 staff and its main laboratories and offices are in London although it operates from a number of sites.

The general TDRI remit is to collaborate with developing countries to solve agricultural and health problems caused by crop pests and disease vectors, and to help them derive greater benefit from their agricultural, fisheries and forest products by improved post harvest handling, processing, preservation, storage, transportation and marketing. This collaboration takes the form of research and development, both in Britian and overseas, and the provision of scientific, technical and economic information, advice and training. TDRI is a multidisciplinary organisation whose staff of scientists, technologists, engineers and economists are deployed in teams covering appropriate disciplines to tackle projects for developing countries. The main emphasis of the Institute's work is centered on the improvement of food supplies, in accordance with one of the major objectives of the British overseas aid programme.

## The TDRI Fish Group

Prime responsibility for work on fish at TDRI is vested in a group of nine scientists and technologists within the Fish and Meat Section of the Animal Products and Feeds Department. Other technical and scientific inputs are provided by members of other sections of the Department, especially in the fields of microbiology, entomology and animal nutrition.

Economic inputs are provided by the Marketing and Industrial Economics Department, while engineering expertise is provided as required by the Industrial Development Department.

Work on fish is typical of the whole range of TDRI activities, with special emphasis on overseas advisory missions, research and development at home and overseas, marketing studies and training at home and overseas.

## Overseas advisory missions

The fish group at TDRI undertakes frequent short-term advisory work in developing countries, both on behalf of the Overseas Development Administration (ODA) and also on a consultancy basis for multilateral aid agencies and other organisations. TDRI staff have carried out assignments of this nature in a wide range of countries in recent years, ranging from Latin America through Africa, Asia and the Far East to the Pacific. These assignments have been mainly concerned with the identification and techno-economic evaluation of projects.

## Long-term technical assignments overseas

Long-term field assignments in developing countries are a major element of the Institute's work in the fisheries field. In these TDRI officers are assigned to work on specific projects, either in support of the British bilateral aid programme or within the programmes of various international aid organisations. Such assignments normally last for between one and three years. Recent examples include:

Sri Lanka. An officer was attached to the Sri Lankan Institute of Fish Technology for two years where his work involved improving the traditional processing of fish, increasing the distribution of fresh fish and reducing wastage.

Mexico. A project entailing 9-man years of effort has been undertaken in Mexico to develop means of utilising large quantities of shrimp trawler by-catch.

Malaysia. A TDRI officer recently spent three years in northern Malaysia setting up a training school for fisheries extension workers.

Malawi. TDRI has been awarded a major EDF contract by the Government of Malawi to provide technical assistance to the Central Lake Fisheries Development project. Inputs from TDRI include the management of the project, extension work, marketing and exploratory fishing.

## Research and development

Research and development has always been a major part of the TDRI programme on fish. Much of the research work has been carried out in the Institute's laboratories in London, but increasingly the activities are being transferred to field locations in the developing world. In general the research and development programme is in support of the needs of the developing world particularly as identified by the fish group staff during their overseas missions. The programme is split into two main parts:

Improved utilisation and reduction of losses. Perhaps the main effort of the TDRI programme both in Britain and overseas has been associated with the prevention of wastage in fisheries. The aim of this part of the programme is to reduce losses either by introducing improved processing methods such as more efficient smoking kilns for cured fish, or by using modern technology to develop new products for human consumption from by-catch and pelagic fish. In cases where the raw material is unsuitable for human consumption the aim is to produce an animal feed ingredient, and in this regard work has been carried out on the development of an animal feed known as fish silage.

Improved quality and yield. The second part of the programme relates to studies to determine how the handling and processing characteristics of tropical fish differ from those from cold or temperate waters. Work at TDRI and elsewhere has indicated that in some cases tropical fish differ markedly from similar types of fish found in cold waters. For example, some species of tropical fish may remain acceptable in ice for 3-4 weeks, much longer than similar fish from cold waters. There is also some evidence to suggest that similar differences may exist in other characteristics. This part of the programme seeks to identify these, and to develop optimum handling and processing practices for tropical fish to give maximum quality and yield.

## Training

The lack of suitably qualified manpower is possibly the greatest constraint to fisheries development in the tropics. Training is therefore an important part of TDRI's activities and takes place both in Britain and overseas. Most technical overseas assignments include an element of training and some are almost exclusively devoted to this end, for example the assignment in Malaysia mentioned earlier. In recent years an increasing effort has been directed towards short-term courses in developing countries. Whereas many of the more senior personnel in developing countries have the opportunity for overseas training, the middle and lower levels often have few training opportunities. In an attempt to ease this problem and be cost-effective, two courses on fish handling and processing have been designed. The first lasts approximately ten days and is designed to help fishermen, administrators and managers to understand the basic technology involved in fish preservation. The second, which lasts for two months, is designed for graduate fishery officers and goes into much more detail on all aspects of handling, processing and distribution of fish. Both courses have a very high practical content to ensure that the participants have personal experience of the subjects covered in the lecture courses.

These courses have now been carried out in a range of countries including the Dominican Republic, Honduras, Ecuador, Indonesia, Burma, Somalia and Tanzania.

## Publications

TDRI publications are intended to disseminate information on both technical and marketing aspects of fish. A list of recent publications in their 'G' report series is given below. Single copies of these reports are available free of charge to governmental, educational and research institutions, and non-profit making organisations working in countries eligible for British aid.

Halliday, D. and Disney, J.G. (1971) Fish protein concentrates: A review. Report of the Tropical Products Institute, G58, 18 pp. London: Tropical Products Institute*.

Harman, G.W. and MacMillan, M.J.J. (1973) The market for tuna. Ibid., G80, 92 pp.

Rogers, J.F., Cole, R.C. and Smith, J.D. (1975) An illustrated guide to fish preparation. Ibid., G83, 73 pp.

Street, P.R., Clucas, I.J. Jones, A. and Cole, R.C. (1980) Economic aspects of small-scale fish freezing. Ibid., G146, 47 pp.

Edwards, D., Street, P. and Clucas, I.J. (1981) Economic aspects of small-scale fish canning. Ibid., G151, 36 pp.

Clucas, I.J. and Sutcliffe, P.J. (1981) An introduction to fish handling and processing. Ibid., G143, 86 pp.

Clucas, I.J. (Compiler) (1981) Fish handling, preservation and processing in the tropics: Part 1. Ibid., G144, 141 pp.

Clucas, I.J. (Compiler) (1982) Fish handling, preservation and processing in the tropics: Part 2. Ibid., G145, 144 pp.

Cole, R.C. and Rogers, J.F. (1982) Handbook for Junior Fisheries Officers: Part 1. Ibid., G137, 98 pp.

(* Published when TDRI was TPI, therefore published title must be used.)

Enquiries

Around 200 enquiries are answered each year on various aspects of fishery products. They originate from many different countries and are largely requests for information. It is usually possible to supply the information required from the TDRI library facilities, and this is a very useful service that TDRI can provide to people and organisations working in post-harvest aspects of fishery development in the developing world.

Requests for any further information, and enquiries on post-harvest aspects of fish and fisheries or any of the services offered by TDRI, should be addressed to: The Director, Tropical Development and Research Institute, 127 Clerkenwell Road, LONDON EC1R 5DB, ENGLAND, or: Fisheries Adviser, British Development Division in the Pacific, Vanua House, Victoria Parade, Private Mail Bag, SUVA, FIJI.