

# FOCUS ON DSFDP

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## DEEP SEA FISHERIES DEVELOPMENT PROJECT - BACKBONE OF THE SPC'S COASTAL FISHERIES PROGRAMME

The South Pacific Commission (SPC) is involved in a wide range of fisheries development and research activities, from estimating tuna stock sizes throughout the Pacific Islands region, to training seaweed farming technicians. The Commission's longest running project, and one of its most popular, is the Deep Sea Fisheries Development (DSFD) Project.

The DSFD Project began life in 1974 - when it was called the Outer Reef Artisanal Fisheries Development (ORAFD) Project. The ORAFD Project was built on the then unproven conviction of a number of fishermen with experience in the region, that large, unexploited stocks of high-value snappers existed in the deep waters of the outer reef slope in most Pacific Island countries, and could be caught using simple line-fishing techniques. The ORAFD Project was set up to refine and improve these techniques, and to demonstrate that, with the right kind of shore-based support, economically viable fisheries could be set up even in rural and isolated coastal areas in the Pacific.



**Red snapper**

The ORAFD Project had a staff of two or three fishermen, an engineer, a biologist and a project manager, and for equipment, two or three boats in the 20-26 foot range, a small block ice plant, a prefabricated walk-in freezer, and a generator. (The exact make-up varied over the 3 years the project operated). In assignments to five rural areas (Lamap on Malekula, in Vanuatu, Asau on Savai'i in Western Samoa, Aitutaki in the Cook Islands, Funafuti in Tuvalu, and Gizo in the Western Province of Solomon Islands), the Project demonstrated the existence of unfished deep-water snapper stocks, perfected the techniques for catching them, and showed that with proper organisation and equipment rural communities could make money from deep-water fishing.



In 1978 the ORAFD Project was reviewed by the region's fisheries officers, who agreed that the point had been made, and the task ahead of the Commission now was to teach deep-water fishing skills to local fishermen. As a result, the ORAFD Project equipment was sold off, and the team disbanded and replaced by a number (then 3) of Master Fishermen, working independently of each other. The Master Fishermen undertook assignments to Pacific Island countries at government request, to assist with projects aimed at developing deep-bottom fisheries. Initially, these assignments mainly involved training local fishermen to make up deep-bottom fishing lines, use the **wooden fishing reels** that have become the Project's standard equipment, and become accustomed to the difficult technique of feeling for a hooking fish in waters of up to 450 metre deep.

As a result of the Project's operations from 1974 to 1982, deep-bottom fishing has become a widespread technique in the Pacific Islands region. Fisheries based on deep-water snappers are now major money earners for local fishermen and fishing companies in Tonga, Fiji, the Federated States of Micronesia and elsewhere. As well as supplying local demand for

fish, shipments of the highest-grade, most valuable species are regularly air freighted fresh from these countries to the auction markets of Fiji and Tokyo.

Since about 1982, the DSFD Project has started to spread out into other areas. While deep-water snappers are still the target of some of the Master Fishermen's assignments, fisheries for these species are now reasonably well-developed in many countries. In contrast, the increasingly widespread use of fish aggregation devices (FADs) in the Pacific Islands region has opened up a whole range of new fishing opportunities.

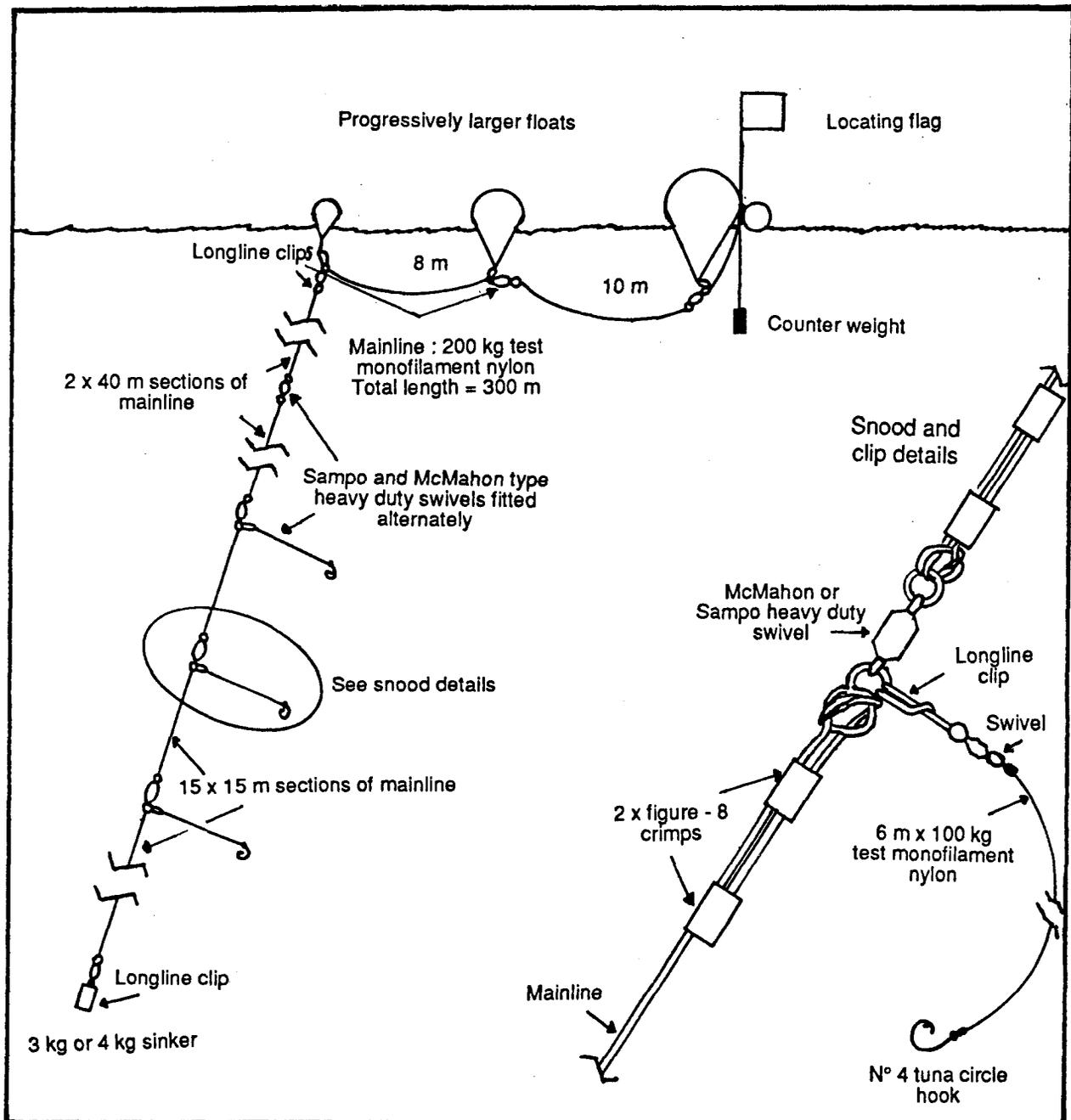
FADs were first used in the Pacific in Hawaii in the 1970s. Simply put, they are buoys anchored to the sea floor, often in water that is several thousand metres deep. The technical difficulties of setting these buoys, and having them stay put, are considerable. The pay-off is that tunas, wahoo, billfish, Spanish mackerels, and other ocean fish species are attracted to the buoys, often in large concentrations, for reasons not yet fully understood. FADs can therefore increase the availability of fish in a small area, reduce the time and fuel wasted in searching, and improve safety at sea, since fishing is carried out in a known area.

Until recently, the main beneficiaries of FADs have been industrial fishing boats (such as pole-and-line and purse-seine vessels) and sports fishermen who can make good catches trolling around the buoys. With one or two exceptions (such as French Polynesia), FADs have not brought significant direct benefits to local small-scale fishermen. This is partly because of the limited number of FAD-fishing techniques currently in use, and partly because fishermen need to be convinced that a new innovation can be of benefit to them before they are prepared to change from the fishing methods they already know and use.

Many DSFD Project assignments since about 1982 have focused on the development of FAD-associated fisheries. Activities have varied, and include: carrying out bathymetric surveys using echo-sounders to locate suitable deployment sites; actual FAD construction and deployment; and the development of fishing methods that can be used by small-scale fishermen to capture FAD-Associated fish, especially the larger, deep-swimming tunas. This last activity has become so important, and the subject of so much country interest, that a major part of the DSFD Project's work is now gear development.

The major breakthrough in the area of FAD fishing has been the perfection of the 'vertical longline'. This consists of a mainline, buoyed at one end and weighted at the other, with 20 or more hooks on short branch lines spaced at regular intervals between top and bottom. The system bears some resemblance to the traditional Polynesian down-line, but the use of modern materials and on-board handling methods allows more lines, each with more hooks, to be set.

Although apparently simple in construction, the handling of these lines, especially when a number of fish have been hooked, is not easy and has been the subject of constant refinement. First put to test in Niue in 1982, the vertical longline has since been refined and improved in successive assignments to Fiji, Tuvalu, Tokelau, American Samoa, Tonga, New Caledonia, French Polynesia and elsewhere. In most countries, the success of the method has prompted a small core of local fishermen to adopt it, in some cases even where there are no FADs in place. Ultimately, the 'multiplier effect' is expected to increase the popularity and use of this fishing method in much the same way that deep-bottom fishing became widely adopted in the late 70's and early 80's.

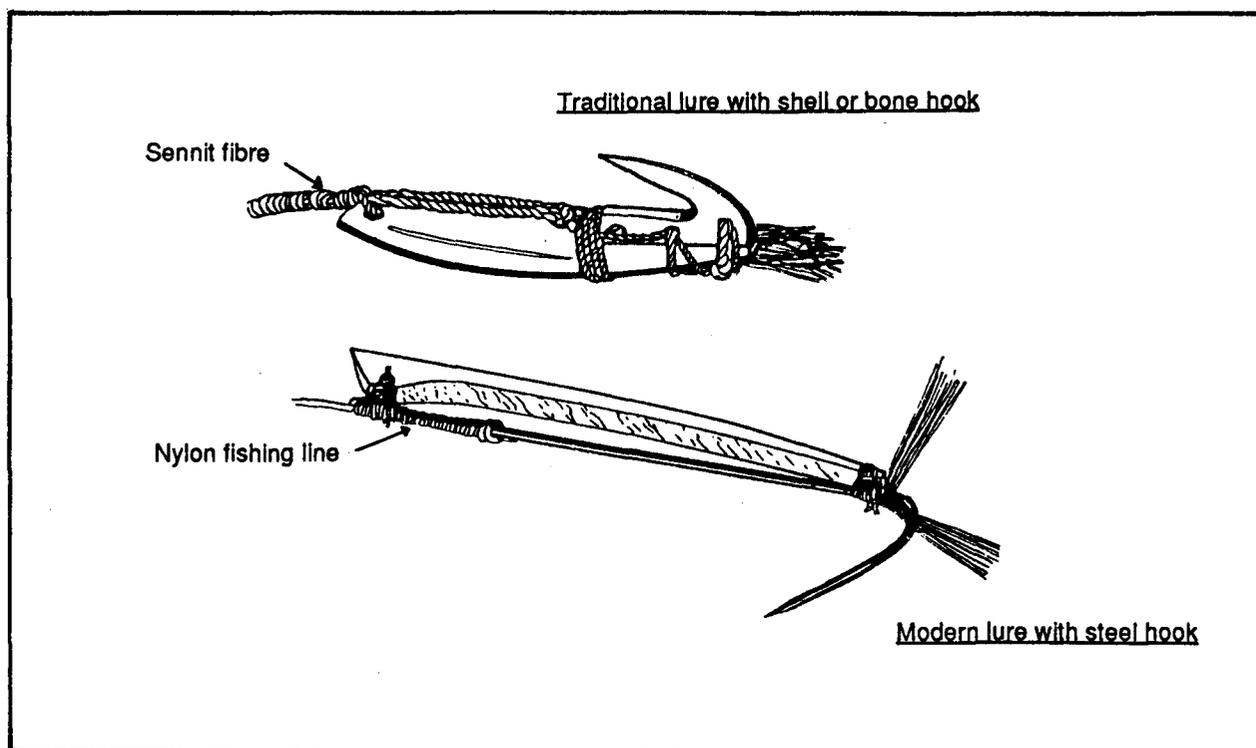


Vertical longline gear arrangement

As vertical longlining takes off in the region, the DSFD Project is again turning its attention to new ideas and under-exploited resources. Large potential fisheries exist in inshore waters throughout the Pacific Islands region. In many instances, there are established techniques for catching the same or similar species, which could be adapted to local use. The adaptation of these fishing methods, and encouraging island fishermen to make use of them, will present continued challenges to the Deep Sea Fisheries Development Project.

## GEAR DEVELOPMENT - EXCHANGING OLD FISHING METHODS FOR NEW

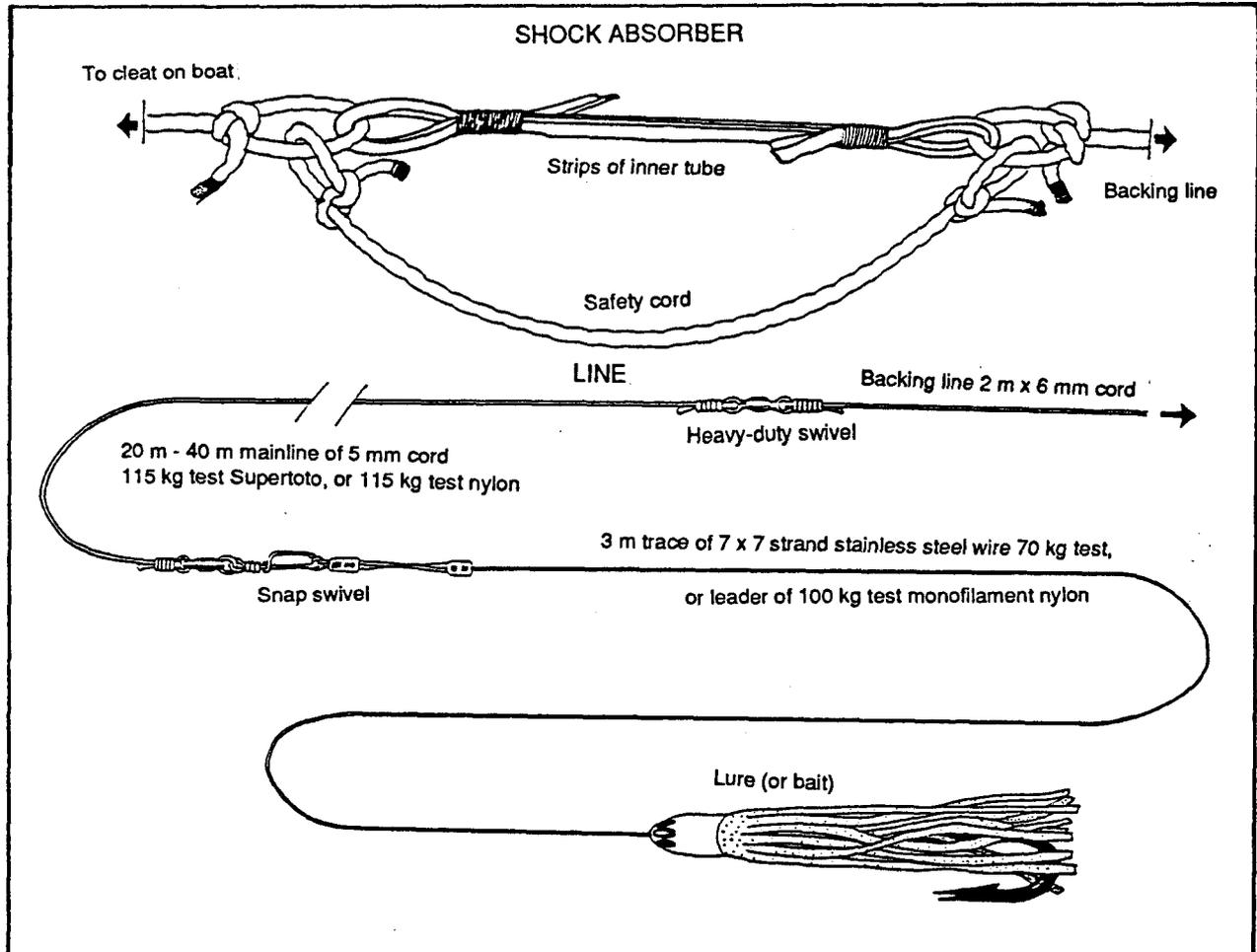
From small beginnings, fishing gear development has come to be a major part of the work of SPC's Deep Sea Fisheries Development (DSFD) Project. Gear development means the adaptation of new fishing methods, or those used elsewhere, to capture locally available species and to fit in with local conditions. Usually, this means adapting fishing methods for use on small boats, or to catch different species than they were originally intended for.



**Traditional and modern pearlshell lures**

Early gear development trials were carried out in Tonga, Fiji and elsewhere in the late 1970's. These involved bottom longlining, fish trapping, and other methods aimed at capturing deep water snappers. Because they were carried out during short country assignments, these earlier trials suffered due to the frequent re-location of the Project's Master Fishermen, and because of local fishery seasonality. Although neither bottom longlining nor fish trapping were ultimately felt to have much promise for the small-scale fishermen of the region, it is true to say that neither method was exhaustively evaluated by the Project.

These problems were raised during a review of the DSFD Project in 1985, and it was ultimately decided that one Master Fisherman should be permanently assigned to gear development work, in a fixed location for periods of up to 2 years. Subsequently, the Gear Development Unit was established in Vava'u, Tonga, where it is still operating under the supervision of long-serving SPC Master Fisherman Paul Mead.



**Fixed length trolling line rigging arrangement**

Mead's broad aims in Vava'u are both to look at improved ways of capturing tuna around FADs, and to develop small-scale bait catching methods. Obtaining supplies of good-quality bait is one of the major problems faced by fishermen operating in rural areas.

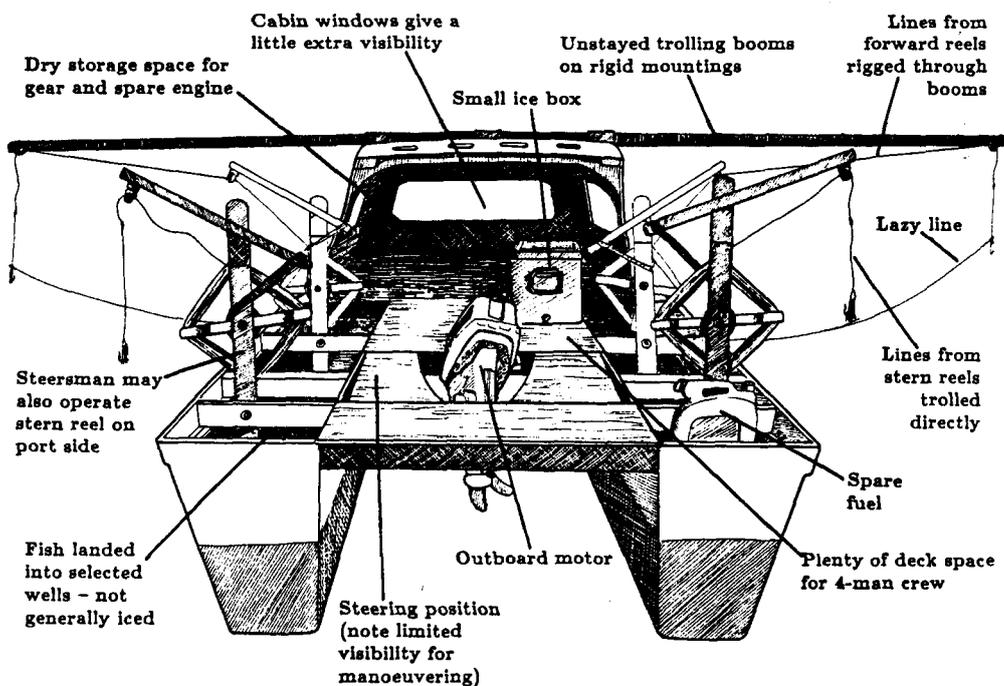
As a result, Mead has been involved in a range of fishing trials. One of the most promising is deep-trolling, an adaptation of the Canadian method of 'cannonball-trolling' for salmon, to capture tunas around FADs. It is a known fact that large tunas (over 50 kg) are attracted to FADs, but swim round them at depths of up to 100 m, rather than joining their small cousins at the surface. They can be seen on powerful echo-sounders, and sometimes captured using vertical longlines. Deep-trolling, using very heavy weights to get the lures down deep, is another promising method of hooking these giants. Mead is presently working on a deep-trolling system that can be used from the wooden handreel that is the Project's standard fishing tool.

Other trials have included the use of the Hawaiian hoop-net (as well as a home-made 'imitation') to capture round scad for bait, and the installation of a number of innovative FAD designs. Some of these have been deployed in shallow waters, especially to aggregate small bait species and make them available for capture.

An interesting spin-off of the trolling trials in Vava'u has been the capture of an unusually high number of marlins and sailfish. Since this has happened two years running, it is unlikely to be a seasonal fluke, and there is a strong possibility that Vava'u is a favoured billfish spot. There may therefore be a bright future for Vava'u as a holiday destination for game fishermen - a possibility that has been taken on board by the Tongan Government in its plans to develop tourism in the Vava'u group.

## SMALL-SCALE LONGLINING - OPENING THE DOOR TO NEW OPPORTUNITIES

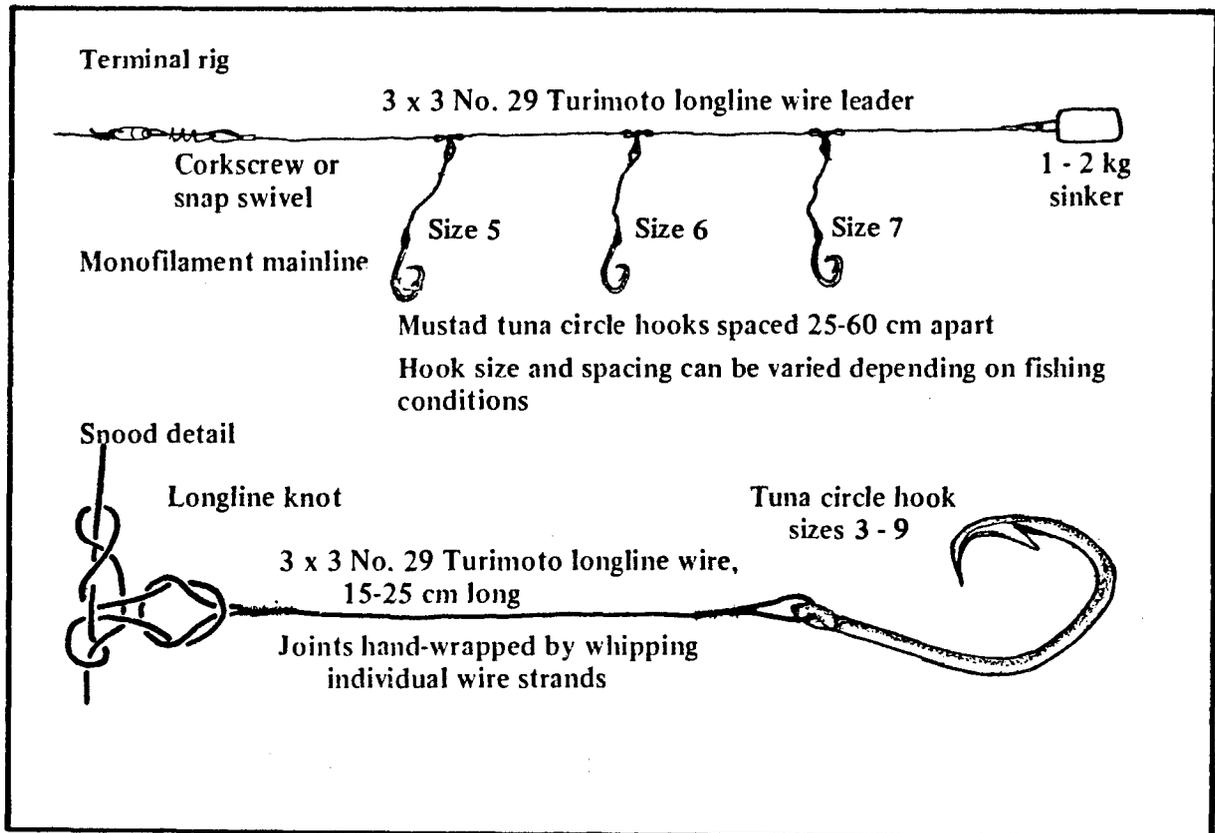
SPC Master Fisherman Paxton Wellington is on a 12-month assignment with the Fisheries Division in Tarawa, Kiribati. His brief is challenging: develop a system whereby tuna longlines can be effectively operated from skiffs, catamarans, and other small boats, including, ultimately, canoes.



**Outboard-powered 'Alia' catamaran**

Canadian-born Paxton has had plenty of experience with bottom longlines in the colder waters of the US and Canada, as well as several years deep-bottom fishing with village fishing groups in Vanuatu and Papua New Guinea. This new challenge, however, is outside his experience - or anyone else's - because, up to now, no-one has even attempted to carry out tuna longlining on such a small scale.

Tuna longlining is traditionally a south-east Asian fishing method. Longline boats from Japan, Korea and Taiwan have been roaming the Pacific for years, often staying away from home for months at a time, seeking favourable areas to set their lines. The lines themselves, made of a rope mainline with hook-bearing branches of cord and braided steel wire, may be over 20 km long. The storage space required for the line, the numerous buoys required to keep it afloat, and of course the fish, have meant that longlining has up to now been a big-boat activity.



Typical terminal rig for deep bottom fishing

However, things are changing. With the development of less bulky synthetic lines, and improved systems of hauling and storing the gear (sometimes using spools or drums on which the line is wrapped), smaller boats can now fit themselves out for longlining. All around the coast of Australia, as well as in the Gulf of Mexico, local fishermen are now able to get in on the longline act and access some of the catch that was previously taken by foreign boats.

In the Pacific situation, this development needs to be taken a step further. Few Pacific Island fishermen have boats over 30 feet long, and often they are much smaller. There is often little or no room for bulky deck equipment, and no possibility of mechanised setting and hauling. The system therefore needs to be taken back to absolute basics : light, compact gear that can be set and hauled using a minimum of deck hardware.

According to Paxton, this is not so unconventional as it sounds, even in these hi-tech days when most heavy work on a modern fishing boat is done by machine. There are still many boats using hand-hauled longlines in Canada, the US and Europe. Additionally, in the budding New South Wales longline fishery in Australia, a number of boats are tuna longlining using hand-hauled lines made of braided dacron, or 'venetian blind cord' stored in buckets or boxes. This strong, light material is very compact, easy to handle, and may turn out to be suitable for use in Kiribati and elsewhere in the Pacific. Paxton used vertical longlines for the first few weeks of this assignment, so as to get a feel for the local tuna fishing scene, and to see if there is any particular depth stratification to the fish population. This is important because once a tuna longline is set up to fish in a certain depth zone, it can be a lot of work to alter.

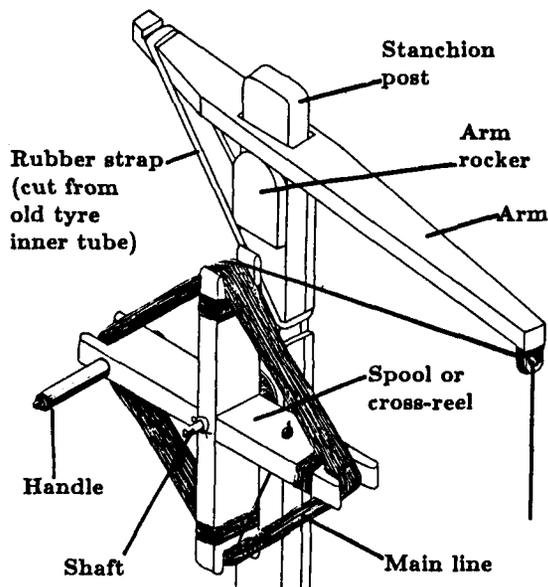
Paxton spent two weeks in Australia working on boats operating out of Woollongong and Ulladulla. While there he saw first hand how Australian fishermen have adapted the gear to their particular needs, and talked over his own ideas with people who had already been through the learning curve. This helped him to short-circuit many of the normal obstacles and frustrations of starting from scratch. Paxton also spent some time in Fiji learning about small-scale longlining trials that had been carried out there.

## SPC PUBLICATIONS ON FISHING AND FISHERIES DEVELOPMENT

Most of the work referred to in these articles is described more fully in a series of over 50 Deep Sea Fisheries Development Project Reports.

Additionally, the Commission has published a number of practical guides aimed at fishermen. Among them the most popular are:

*Handbook No. 24 (1984): Design improvements to fish aggregation device mooring systems in general use in Pacific Island countries.* This outlines the main causes of FAD loss in the region, and preventive practices during construction, deployment and maintenance to prevent future losses.



*Handbook No. 25 (1985): Notes on the construction of the FAO wooden fishing reel.* Bad construction of these fishing reels causes all kinds of line handling problems, loss of fish, and back strain. This handbook is a guide to proper construction, and contains a full-size template for marking out parts accurately.

*Handbook No. 28 (1987): Trolling techniques for the Pacific Islands.* This highly illustrated book contains over 160 pages of information on trolling, from basic boat rigging, through the gear, fishing procedures, catch handling, and on-board safety. It is compiled from the many years of Pacific experience of SPC's team of fisheries development staff.