



SOUTH PACIFIC COMMISSION

**UNPUBLISHED REPORT No. 15**

**REPORT ON SECOND VISIT**

**TO**

**WALLIS AND FUTUNA**

**4 November 1983 to 22 March 1984**

by

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## SUMMARY

The South Pacific Commission's Deep Sea Fisheries Development Project (DSFDP) operated in the Territory of Wallis and Futuna for the second time between 4 November 1983 and 22 March 1984, under the supervision of SPC Masterfisherman Pale Taumaia.

The main objectives of the visit were: to survey and assess the current state of deep-bottom fish resources, to evaluate the potential economic viability of a fishery based on those resources, and to encourage local fishermen to enter the fishery through a programme of demonstration and training with local fishing co-operatives.

Twenty fishing trips were completed, three at Futuna and seventeen at Wallis, during which 893 fish with a total weight of 1836.8 kg were landed and deep-bottom fishing techniques were demonstrated to 29 fishermen from seven fishing co-operatives.

Although most effort was devoted to deep-bottom handreeling, shallow-water droplining and trolling were also conducted, with the various methods contributing to the catch as follows: deepbottom fishing, 1402.8 kg in 286 reel hours for a catch rate of 4.9 kg per reel hour (22.5% of this catch comprised unsaleable species and the catch rate recorded after excluding this component [98% of which comprised shark] was 3.5 kg per reel hour); shallow-water droplining, 116.0 kg in 89 line hours for a catch rate of 1.3 kg per line hour; and trolling, 318.0 kg in 53 line hours for a catch rate of 6.0 kg per line hour.

Deep-water snappers comprised 46.2 per cent of the bottom catch by weight, with the most common species taken being large-scaled jobfish (*Pristipomoides flavipinnis*), small-tooth jobfish (*Aphareus rutilans*) and short-tailed red snapper (*Etelis carbunculus*). Emperors and shallow water snappers accounted for 14.5 per cent of this catch by weight. The balance included 9.8 per cent groupers and cods, 5.5 per cent trevallies and jacks and 24.0 per cent miscellaneous fishes and sharks.

All fishing was conducted aboard boats managed by local fishing co-operatives and during the course of these operations, a number of factors were identified which appeared likely to restrain the development of an efficient and economically viable deep-bottom fishery. The most important of these were, the difficulties in obtaining adequate supplies of suitable bait, the restrictions on fishing time imposed by boat purchase agreements, and a fish price structure which offered little incentive to pursue deep-bottom species.

Catch rates and the species composition of the catches taken in the areas surveyed, indicated that substantial stocks of valued species exist but that the extent of their distribution is limited. It is recommended therefore that while encouraging a limited number of fishing groups to enter this fishery through appropriate support services, the Territory's administration should both carefully monitor the resource and seek to diversify local fishing effort.

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## 1. INTRODUCTION

The South Pacific Commission's Deep Sea Fisheries Development (DSFD) Project is a mobile village-level rural development project which operates in Pacific Island nations at specific Government request, and which has the following broad objectives:

To promote the development or expansion of artisanal fisheries throughout the region, based on fishery resources which are at present underutilised, in particular the deep bottom resources of the outer reef slope;

- To develop and evaluate new simple technology, fishing gear and techniques suitable for use by village fishermen, which will enable fishermen to substantially increase catches while reducing dependence on costly imported fuels; and
- To provide practical training in appropriate fishing techniques to local fishermen and government fisheries extension workers.

The Project operated in the Territory of Wallis and Futuna for the second time between 4 November 1983 and 22 March 1984, under the supervision of SPC Masterfisherman Pale Taumaia. This visit was the thirty-sixth made by the Project, and Wallis and Futuna the tenth country or territory in which the Project has operated.

The current visit followed a request by the administration of the Territory for the services of a Masterfisherman to assist in the development of artisanal inshore fisheries as a viable incomeearning pursuit, following a downturn in the economy of New Caledonia and a subsequent decline in remittances to their families at home by expatriate Wallisians and Futunans working there.

The specific objectives of the visit, established in consultation with the Territory's Service de l'Economie Rurale, were:

- To identify and re-assess local bottom-fish resources;
- To evaluate the economic viability of deep-bottom fishing under local conditions;
- To train local fishermen in deep-bottom fishing techniques and gear rigging;
- To conduct training in small-boat handling and safety and outboard motor care and maintenance; and
- To explore the potential of other fishing techniques, such as trolling.

It was decided that in order to best achieve these objectives, the Masterfishermen would work for one week each with established fishing co-operatives in both Wallis and Futuna.

## 2. BACKGROUND

### 2.1 General

Wallis and Futuna, an overseas territory of France, consists of two distinct island groups. The Wallis group (Figure 1) consists of Uvea island, 80 sq km in area, as well as a number of small offshore islands lying inside an encircling barrier reef. The administrative capital of the territory, Mata Utu, is on the east coast of Uvea. Some 200 km to the south, 44 sq km Futuna and 18.5 sq km Alofi (Figure 2) comprise the Futuna group, lying 240 km north-east of Vanua Levu, Fiji.

In the Wallis group the high points and bluffs are composed of basaltic lava. Uvea is composed of broad, low lava domes merging to form an undulating plateau, with sand flats in places along the shore. The surface, which is deeply weathered, is porous and there are no streams. Futuna and Alofi contain ancient, deeply eroded volcanic cores fringed by an uplifted terrace of marine sediments.

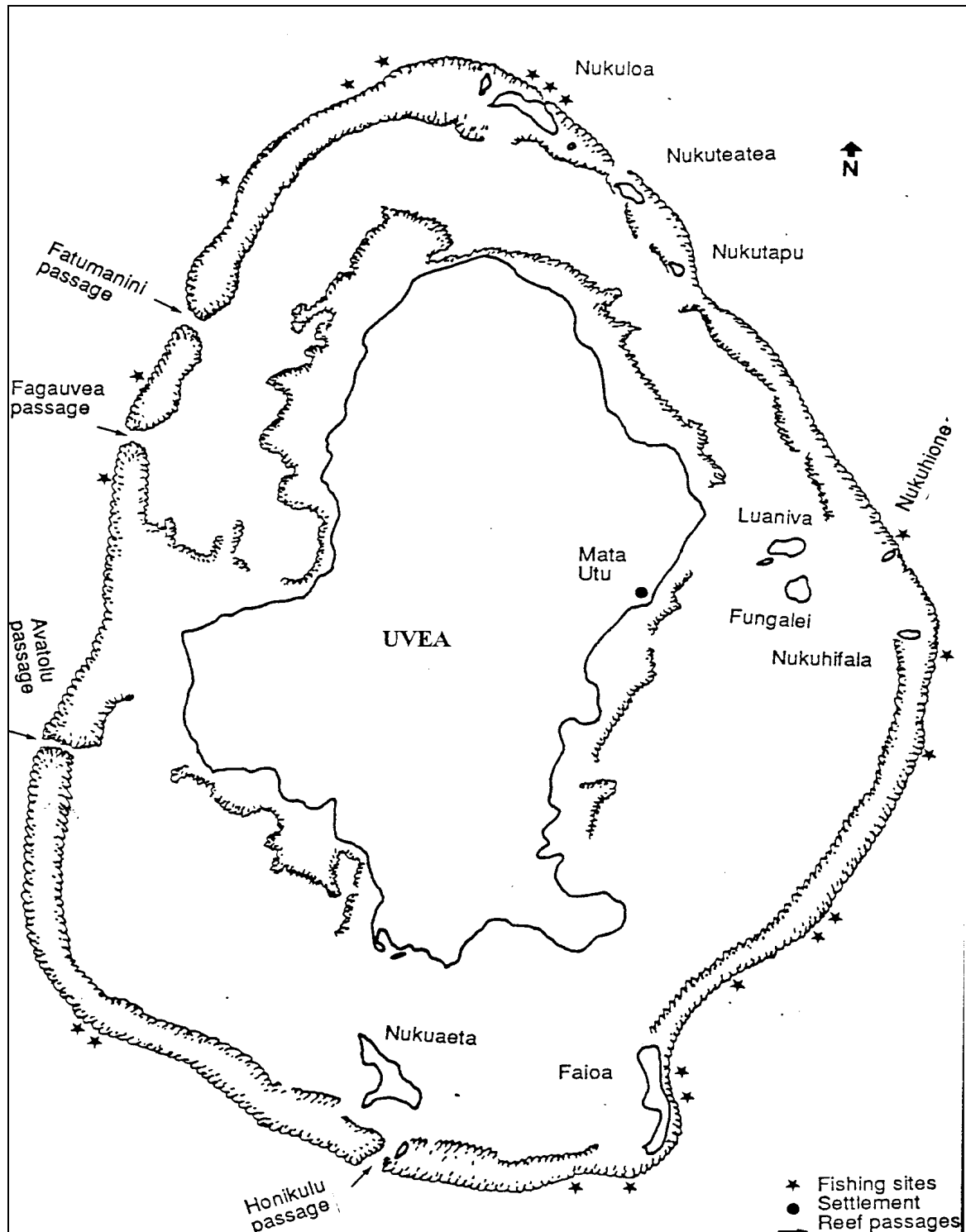
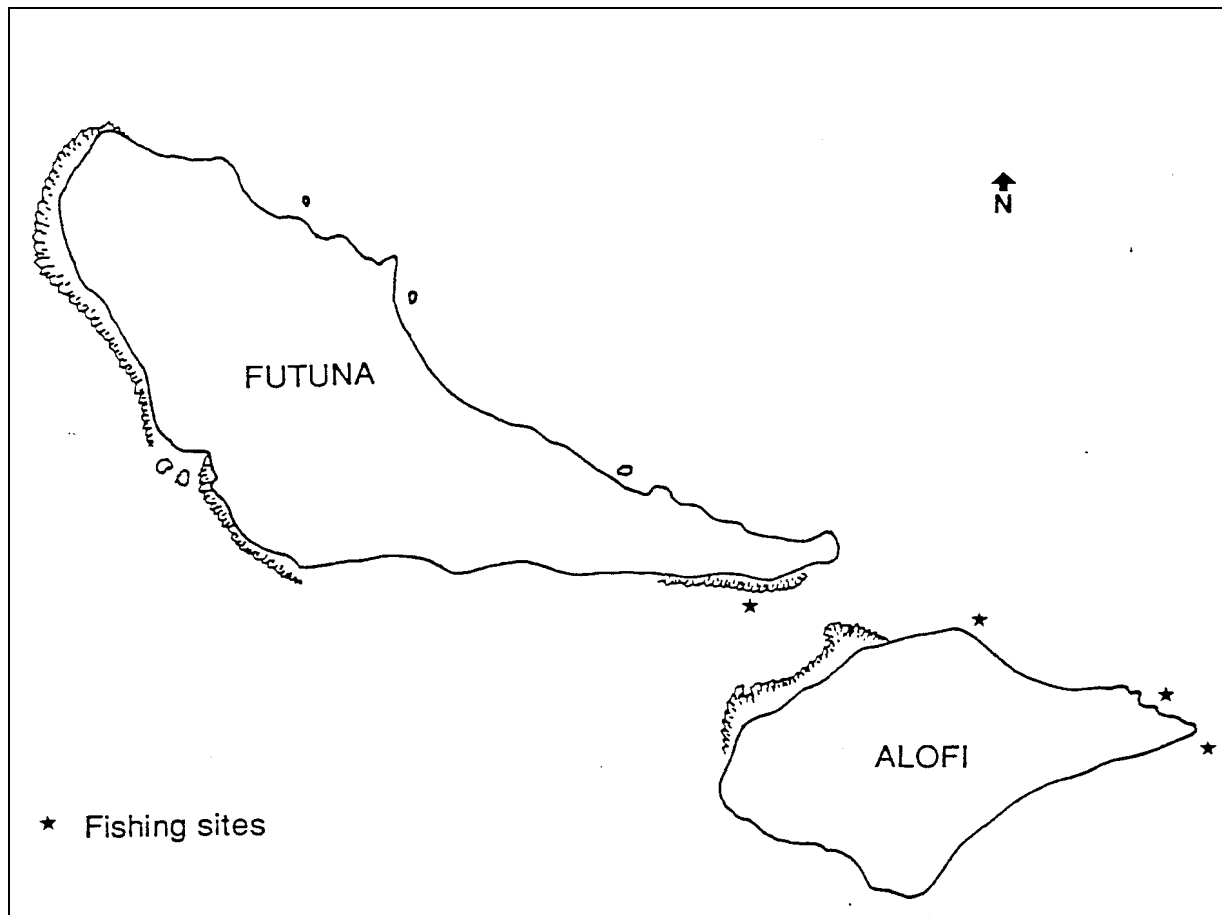


Figure 1. Wallis Island showing sites fished during the visit



**Figure 2. Futuna and Alofi Islands, showing sites fished during the visit**

Vegetation on Uvea is lush around the coastal fringe, with tall, open forests interspersed with coconut palms and food gardens of taro, yam, kumara and bananas. The interior is mostly covered in open savannah-like growth, known locally as 'toafa', which mainly consists of fern or low shrubs. Vegetation on Futuna and Alofi is similar. Futuna has well-wooded valleys, with fern scrub and some grassland on the ridges, and most of Alofi is well-wooded. Although there is provision for land to be held by individuals, and the Administration and the Church have holdings, most land is held communally according to customary law.

Climate in both groups is warm and humid, with two distinct seasons. From May to October, during the south-east trade winds, the weather is relatively cool and dry. From November to April winds are variable with periods of calm, and hurricanes can occur during this period. Mean annual rainfall is 2,700 mm but its distribution is irregular.

The Territory's population totals 12 400 (1983 census) with 8 080 in Wallis and 4 320 in Futuna. In 1983 there were 12 170 from the Territory living in New Caledonia. Local tradition connects the people of Wallis with the early inhabitants of Tonga and the people of Futuna appear to have originally come from Samoa. The common languages in use are Wallisian and Futunian, both Polynesian dialects, the former related to Tongan and the latter Samoan. French is the administrative language.

The people are engaged mainly in subsistence agriculture and fisheries. Remittances to their families by islanders from the Territory who work in New Caledonia are an important source of income. Subsidies and grants are provided by the French government. Handicrafts and trochus shell (1 500 kg in 1983) are the only exports. Currency in use and quoted in this report is the French Pacific Franc (CFP).



## 2.2 Existing fisheries

Fish has long been a favoured staple in the diet of both Wallisians and Futunans. In the past it has provided almost the only source of animal protein, and in more recent times a still preferred but increasingly scarce and expensive foodstuff. Catches have seldom been sufficient to meet demand and overfishing was reported at Futuna as early as 1932 (Burrows, 1936), while a 1969 SPC survey of fisheries resources noted a decline in lagoon fish stocks at Wallis (Hinds, 1969).

Most harvesting of seafoods has been confined to the sheltered waters inside the islands' barrier reefs or along the reef flats. A variety of modern and traditional fishing techniques are employed, mostly unrestrained by legislation directed at conservation, and include netting, spearing, trapping in stone weirs, bottom handlining and trolling, and the indiscriminately destructive use of poisonous plant extracts and illicit explosives.

Fishing for tuna and other pelagic species offshore has been very limited since the exodus of many fishermen to New Caledonia's nickel industry during the 1950s. The rapid growth of a cash-based economy fueled by remittances from overseas workers has resulted in growing reliance on expensive imported foods, as evidenced by the 11.25 million CFP expended on imported foods during 1981 out of a total import bill of 42.1 million CFP (SPC Statistical Summary, 1982). This has prompted the administration to seek both to diversify local fisheries and to develop artisanal fishing as a cash-generating activity.

A long range development plan was adopted by the Territorial Assembly of Wallis and Futuna in 1979. The plan takes into consideration the state of reef and lagoon fisheries and the demand for fish, and states that the utilisation of resources outside the reef is a major objective (Dijoud, undated). Meanwhile, agreements signed with Japan and Korea allowing vessels from those countries to fish in the Territory's waters generated an income of some 20 million CFP in 1981.

Under the administration's development programme a boatyard established at Mata Utu in 1970, which has produced some 250 canoe-style fishing boats powered by outboard motors, began building plywood hulled 'alia' catamarans of FAO, Western Samoan-design. These boats are made available to local fishing co-operatives under various systems of assisted purchase (see Section 3.2).

In 1981 the Territory acquired a fisheries research and support vessel, the MFV Corsaire, with a 4 tonne freezer capacity, and a boatyard was established at Futuna.

At the time of this visit the Corsaire was no longer operational, but there were about 100 powered fishing boats operating at Wallis, comprising 10 alia catamarans and around 90 timber skiffs, 4.8 m in length, powered by 25–35 hp outboard motors. At Futuna there were around 50 operational boats; 5 alia and 45 skiffs. Although a number of these boats in both island groups were equipped with the FAO, Western Samoan-design wooden handreels, which were introduced to local fishermen during the Project's earlier visit in 1980, only two of these vessels were regularly engaged in deep-bottom fishing. The other boats equipped with handreels typically used them for shallow-bottom fishing inside the lagoons, or not at all.

## 3. PROJECT OPERATIONS

### 3.1 General

Twenty fishing trips were completed during the Project visit, three at Futuna and seventeen at Wallis. On each trip, save two initial survey trips at Wallis, the Masterfisherman worked directly with local fishing co-operatives aboard their own boats.

At Futuna only two co-operatives participated in the Project, the 'Pale Soane', a group which was regularly engaged in deep-bottom fishing to 300 m, and the 'Pelesitene' co-operative, which had lately only bottom-fished to 55 m.

At Wallis the Masterfisherman worked with five co-operatives, the 'Petelo Mafotuna', 'Pelenalo', 'Vitolio', 'Tagalao' and 'Fetu-aho' groups, only one of which had been regularly engaged in deepbottom fishing.

The original Project schedule, which anticipated one week attachments with each of the cooperatives at Wallis and at Futuna, had to be modified, especially in regard to Futuna, because a number of the groups showed little or no interest in exploring deep-bottom fishing techniques. This problem was compounded by the often poor condition of boats and gear, by some fishermen's reluctance to venture offshore or to fish through the night, by the boat purchase agreements which stipulated that a nominal owner (who was often a salaried worker and therefore not available during the week) must participate in all trips aboard boats purchased under subsidy, and by a scarcity of effective bait. All of these factors served as restraints on effective deepbottom fishing and the landing of catches which might stimulate local fishermen into an awareness of the fishery's potential.

Weather conditions during the early part of the visit, from November to December, were generally calm, with light variable winds and only intermittent rainfall. Between January and March, when the Project was based at Wallis, strong westerly winds predominated with heavy swells and regular rainfall. This weather only slightly hampered fishing operations because good bottom-fishing sites could usually be found in the lee of Uvea island. Table 1 summarises the Project's activities between November 1983 and March 1984.

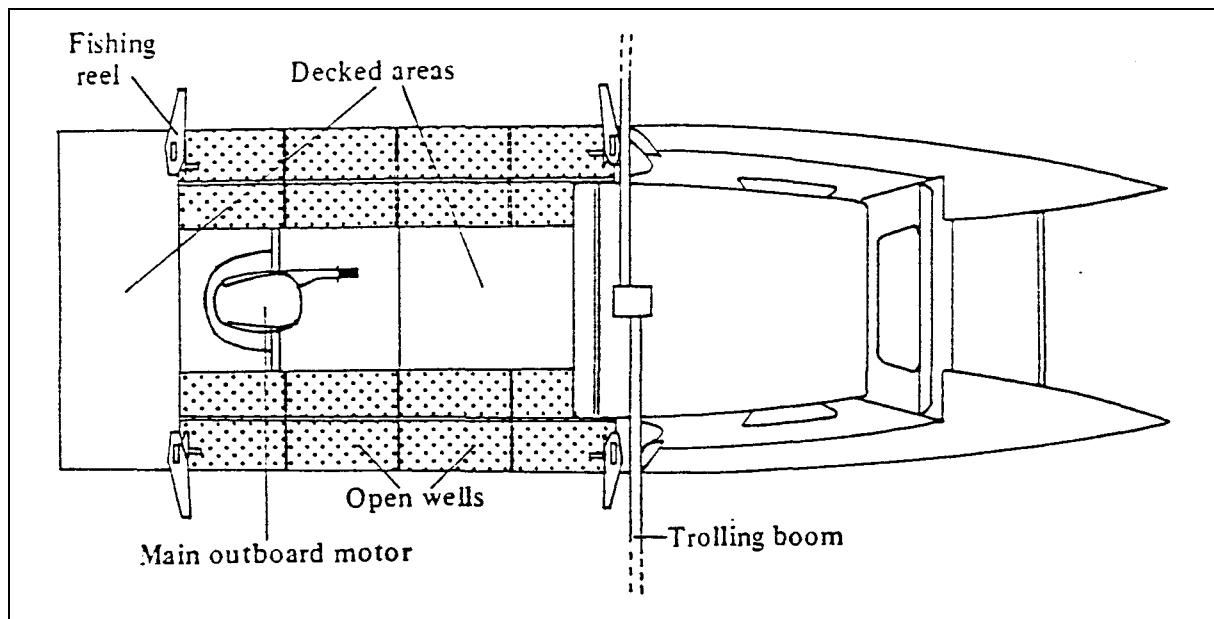
**Table 1. Summary of activities**

4 November – 15 November 1983	Preparation of gear, discussions with Service de l'Economie rurale regarding Project schedule, survey fishing trips. Trips 1 and 2.
16 November – 4 December 1983	Operations at Futuna with 'Pale Soane' and 'Pelesitene' co-operatives. Trips 3–5.
5 December – 17 December 1983	Operations at Wallis with 'Petelo Mafatuna' cooperative. Trips 4–7.
18 December 1983 – 10 January 1984	Masterfisherman on leave
11 January – 8 March 1984	Operations at Wallis with 'Pelenalo', 'Vitolio', 'Tagalao' and 'Fetu-aho' co-operatives. Trips 8–19
10 March – 22 March 1984	Packing of gear, drafting of report.

### 3.2 Boats and equipment

As all fishing was conducted from the co-operatives' own boats there was some variety in vessel type and a great variety in layout, on-board equipment, and the condition of both boats and gear. One of the initial survey trips was made aboard a 7.3 m monohull and two fishing trips aboard a locally-constructed, outboard-powered outrigger canoe.

The majority of trips were made aboard locally-constructed 8.5 m plywood-hulled alia catamarans (though one co-operative at Futuna was using an alia which had drifted from Western Samoa). These boats were built at Mata Utu after the FAO, Western Samoan-design, but with the use of somewhat heavy and oversize materials in the hulls, frames and stringers. Outboard motors were generally mounted on the third last cross-member, rather than the second-last as in the original design specification. On all trips the Master Fisherman insisted that a spare outboard be carried.

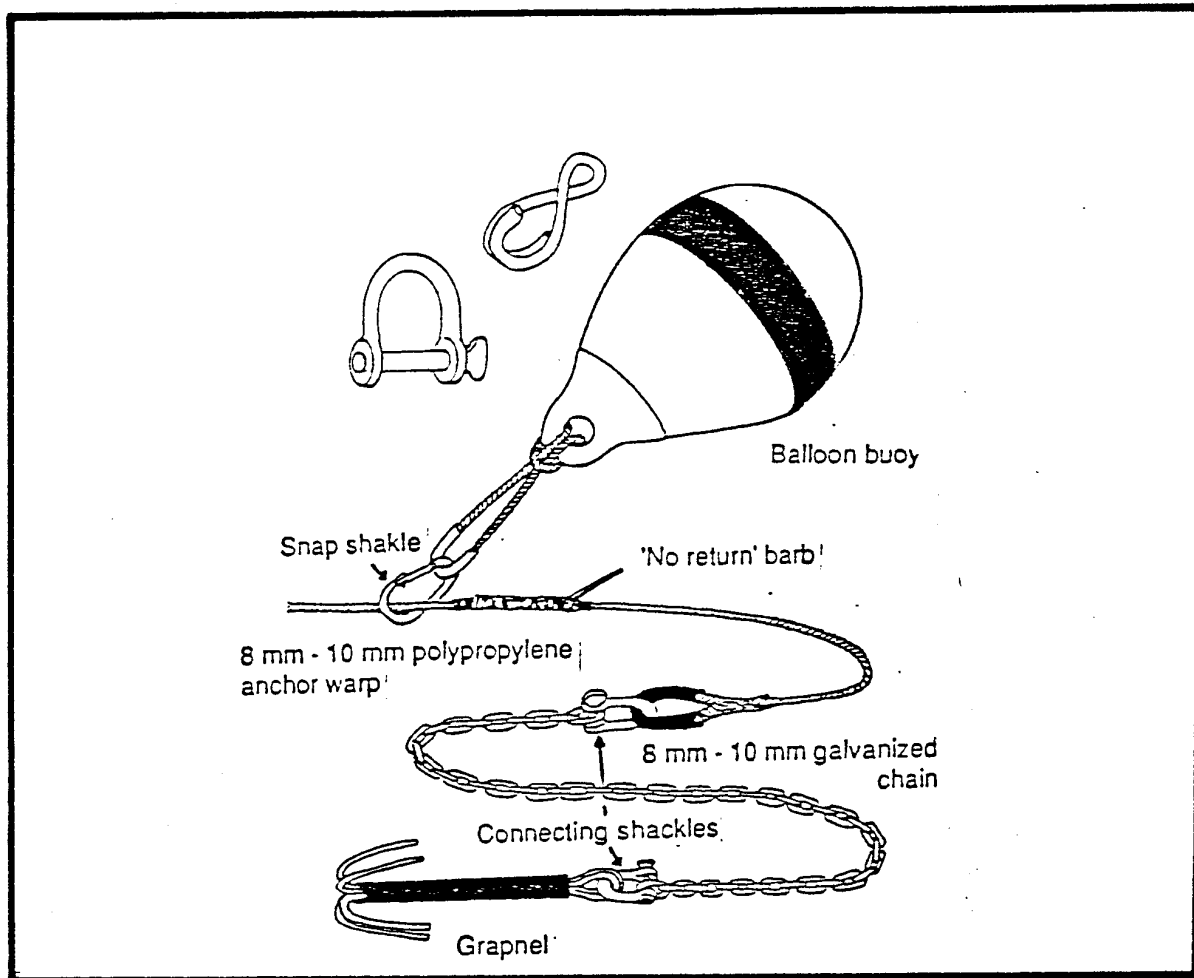


**Figure 3. Locally built fishing craft at Wallis equipped with handreels for deep-bottom fishing**

The Project's standard anchoring gear for deep-bottom fishing operations was also carried on all trips. This comprised a simply constructed grapnel anchor fabricated from four 1.5 m lengths of 9 mm diameter steel rod, welded together and bent into a grapnel shape; a 5 m length of 12 mm diameter chain shackled to the anchor-eye; 440 m of polypropylene anchor rope of a diameter appropriate to the size of the vessel (generally 12 mm), and fitted with a 'no-return' barb of 4 mm diameter steel fencing wire whipped onto the rope about 30 cm from the end; and an inflatable buoy of 75 kg or greater flotation fitted with a snap-shackle which could be clipped onto the anchor rope so as to slide freely along it (Figure 4).

All the co-operatives participating in the Project's activities were equipped with FAO, Western Samoan-type wooden handreels and many also carried bottom handlines. A number of the wooden handreels in use by the co-operatives were found to be poorly constructed or in poor condition and the Project's handreels were often used aboard the groups' boats. The Project's handreels used during this visit were modified from the original design to include a line guide mounted over the drum and a pressure-drag arrangement, which could be adjusted by a thumbscrew to assist in hauling large bottom-fish, and to act as a drag when trolling. These reels were loaded with 300–400 m of 130 kg test nylon monofilament (Figure 5).

Other equipment carried by the Masterfisherman on all trips included a portable echo-sounder, compass, two gaffs, spare anchor, a small cooler box, bait knife, shark noose, spearfishing gear, cast net, tool kit, assorted lures and hooks for trolling and bait fishing, and nylon monofilament terminal rigs for shallow-water bottom fishing. A list of basic equipment calculated to outfit 8-10 boats for deep-bottom fishing is detailed in Appendix 1.



**Figure 4. Self-hauling anchor gear**

### 3.3 Fishing methods

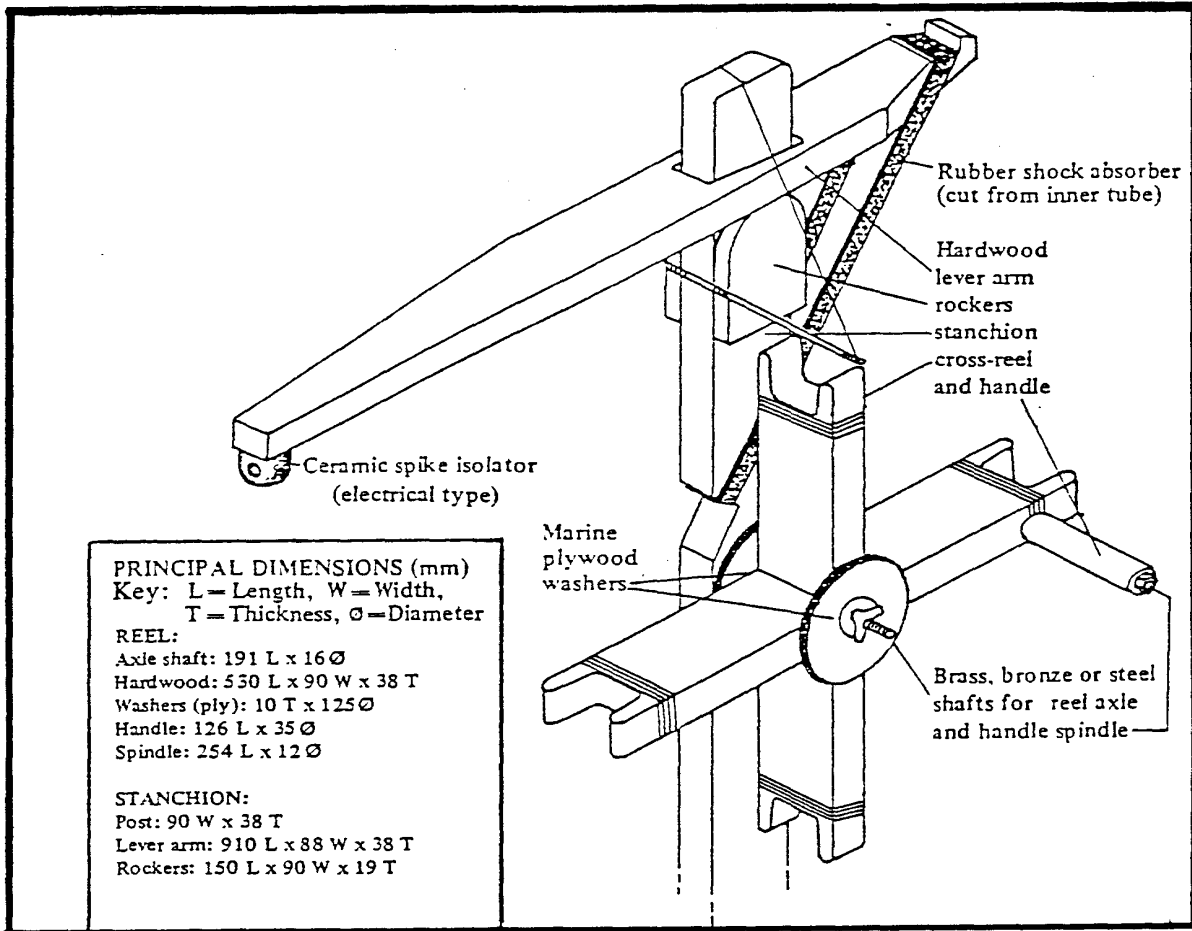
Although the Project's principal activity was deep-bottom handreeling the requirements of obtaining bait and the longtime preoccupation of most of the fishing groups with shallow-water droplining resulted in a variety of fishing methods being employed, most often in combination during anyone trip.

Apart from the two bottom-fishing techniques, other methods employed included cast netting for bait, spearfishing for bait, and trolling, both for bait and opportunistically when travelling to bottom-fishing grounds. A description of the techniques employed in each method along with their results can be found in Section 4.

### 3.4 Training activities

All training was conducted at sea during actual fishing operations. A total of 29 fishermen, 7 at Futuna and 22 at Wallis, participated in at least one training trip.

Apart from the Project's standard training topics such as deep-bottom gear rigging and fishing technique, anchoring, safety procedures, and maintenance (which are detailed in Appendix 2), the Masterfisherman devoted a good deal of effort to demonstrating that good deep-bottom catches are a product of well-maintained boats and gear, the selection of suitable fishing grounds, willing fishermen, good bait, and good weather. An attempt was also made to have fishermen consider the potential of the fishery as an economically viable occupation.



**Figure 5. Wooden handreel used by the Project at Wallis and Futuna showing design modifications**

### 3.5 Post harvest handling and disposal of the catch

Ice was generally unavailable at sites where the Project operated, nor were ice-boxes generally carried by the co-operatives' boats. When ice could be obtained, fish were gutted but not gilled on landing and placed in the Project's small cooler, or in the ice box if one was carried. When neither ice nor ice-boxes were available fish were gutted as before and placed in baskets in the shade. The strong demand for fish at each site, which largely goes unsatisfied, and the subsequent readiness of consumers to accept fish in even poor condition, has given little incentive to develop improved catch handling procedures.

Ciguatoxicity is apparently rare in the Territory and nearly all species of fish were readily sold at 300 CFP/kg. Some co-operatives had regular commercial buyers whom they supplied, and some sold on the open market or shared the catch. Sharks, although not generally acceptable for sale, were readily eaten and were most often shared among the crew.

### 3.6 Data Collection

SPC Masterfishermen use a standard logsheet, shown at Appendix 3, to record catch, effort and other data, and make detailed notes of their daily activities and of any supplementary information required. During this Project visit, data collected for each trip comprised: time spent travelling, anchoring and fishing; fishing area, fishing depth or depth range; number of crew; quantity and type of fishing gear, fuel and bait used; the specific identity of each fish caught, where this could be determined; and the total number and weight of each species taken by each fishing method.

## **4. FISHING ACTIVITIES AND RESULTS**

### **4.1 General**

Fishing activities and the gear and techniques used varied from trip to trip and depended on the boats' equipment, the number of crew, whether bait was on hand, and whether the trainees were accustomed to deep-bottom or shallow-water fishing. Bottom fishing in deep or shallow water using a multiple-hook terminal rig hauled by hand or reel was carried out on all 20 fishing trips. Trolling opportunistically, or specifically for bait, was commonly conducted while travelling to bottom fishing sites. On a number of occasions, when bait was not available from other sources, the fishing trip was preceded by bait fishing using cast net or spear inside the lagoon.

Trip duration was limited by the availability of ice to preserve catches and by most fishermen's reluctance to fish at night. Trip frequency was limited by arbitrary rearrangement of fishing schedules, the unavailability of nominal boat owners on a number of occasions, and at some locations, the need to wait for high tides in order to cross shallow lagoon areas giving access to bottom-fishing sites. Details of the operational aspects of each trip can be found in Appendix 4.

### **4.2 Deep-bottom handreeling**

The fishing method which was of main concern during the visit, and which is standard for the Project, involves deep-bottom fishing on the outer reef-slope using the wooden handreels. Suitable fishing sites were selected using the echo-sounder, target depths being around 200 m, with factors such as the proximity of likely sites to the particular co-operative's home base, the amount of fuel carried, and prevailing weather conditions, being taken into account. While at Futuna the sites fished around the western point of Alofi island were selected because bait was more plentiful there. When fishing in the lee of the islands or during calm conditions, particularly around Uvea island, the boat was sometimes allowed to drift while bottom-fishing. The sites fished are shown in Figures 1 and 2.

When anchoring was necessary, the anchor, when possible, was dropped in water shallower than that of the chosen fishing site, in a position selected so that prevailing wind and current would carry the boat back over the deeper water as the anchor-warp was paid out. If the bottom was level it was sometimes necessary to drop the anchor in the same depth as the fishing site.

Once the boat was resting at anchor fishing was conducted using the handreels, a multiple hook terminal rig as illustrated in Figure 6, and a 1–2 kg sinker. The sinker was lowered to the bottom and thereafter the line kept taut by hand to allow the fishermen to respond to bites by striking, and to lessen the possibility of fouling other lines. Because of the elasticity of the long lengths of line deployed, great reliance is placed on the 'self-hooking' qualities of the tuna circle hooks used.

Obtaining adequate supplies of suitable bait was a persistent difficulty. Skipjack is the best bait for deep-bottom fishing, and trolling for these and other offshore fish was conducted whenever possible. However, local fishermen were reluctant to venture far offshore in pursuit of skipjack schools and only 17 were taken at Wallis and 1 at Futuna. Other troll-caught fish which were used as bait included barracuda, wahoo, trevallies, and bigeye tuna.

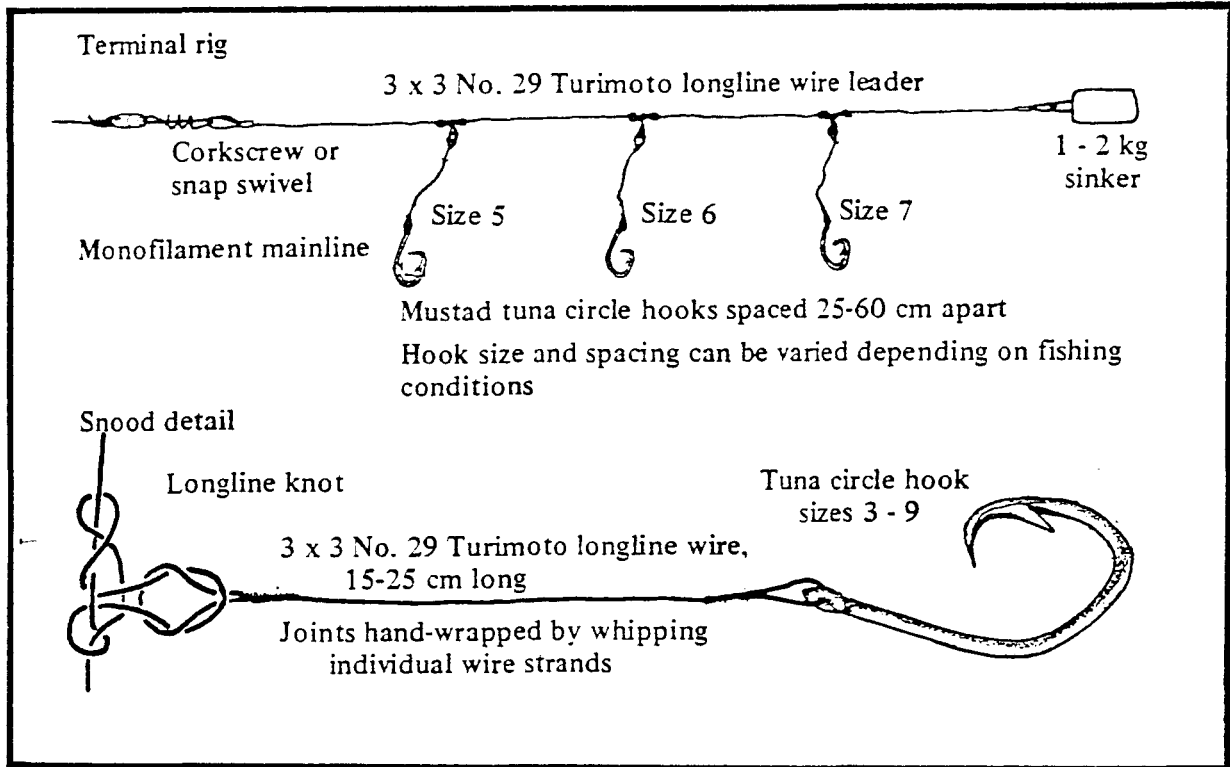


Figure 6. Typical terminal rig for deep-bottom fishing

In further attempts to secure bait, supplementary bait catching activities were conducted inside the lagoon at the beginning of some trips. The techniques employed were cast netting along the beaches, which produced catches of hardyheads (*Hypoatherina* sp.) and small goatfish (*Mulloidichthys* spp.), and spearfishing around the inner edge of the barrier reef, which produced catches of surgeon-fish (*Acanthurus* spp.). However, none of these attempts to capture bait supplies were entirely satisfactory and, in an attempt to convince local fishermen of the importance of proper bait and of the high-value catches that such bait could produce, a consignment of frozen skipjack (100 kg) was airfreighted from New Caledonia. This bait was used thereafter and proved to be effective so long as the thawed flesh was placed in salt for five minutes prior to use in order to toughen it sufficiently to hold well on the hooks.

A simple technique was used to retrieve the anchor which greatly reduced the effort involved in hauling by hand. The anchor warp was tied off at the stern and then by motoring rapidly forward the anchor was broken out and towed until it streamed behind the boat. While still under way the anchor buoy was attached to the anchor warp with a snap-shackle and released. The boat's forward motion forced the buoy back along the line until it became trapped by the 'no-return' barb (these components are described in Section 3.2 and illustrated in Figure 5). The boat was then run back along the anchor warp with the floating line being fed inboard by hand and the anchor, suspended at the surface by the buoys, easily recovered (see Figure 7).

A total deep-bottom fishing effort of 286.0 reel-hours (calculated as one reel in use for one hour) produced a catch of 650 fish with a total weight of 1402.8 kg, giving an overall catch rate of 4.9 kg/reel hour. However, this catch included 309.0 kg of shark and 6.0 kg of moray eel which were unsaleable (22% of the deep-bottom catch by weight) and the catch rate for saleable species only was 3.5 kg per reel hour. With consideration given to the various restraints on effective fishing earlier described, the catch rate recorded compares well with results obtained by the Project in its earlier visit to the Territory, and with results obtained elsewhere in the region, and indicates the presence of substantial deep-bottom stocks in the areas surveyed. Table 2 summarises catch and effort by deep-bottom handreeling at Wallis and Futuna and Table 3 catch rates recorded by the Project at geographically similar locations.

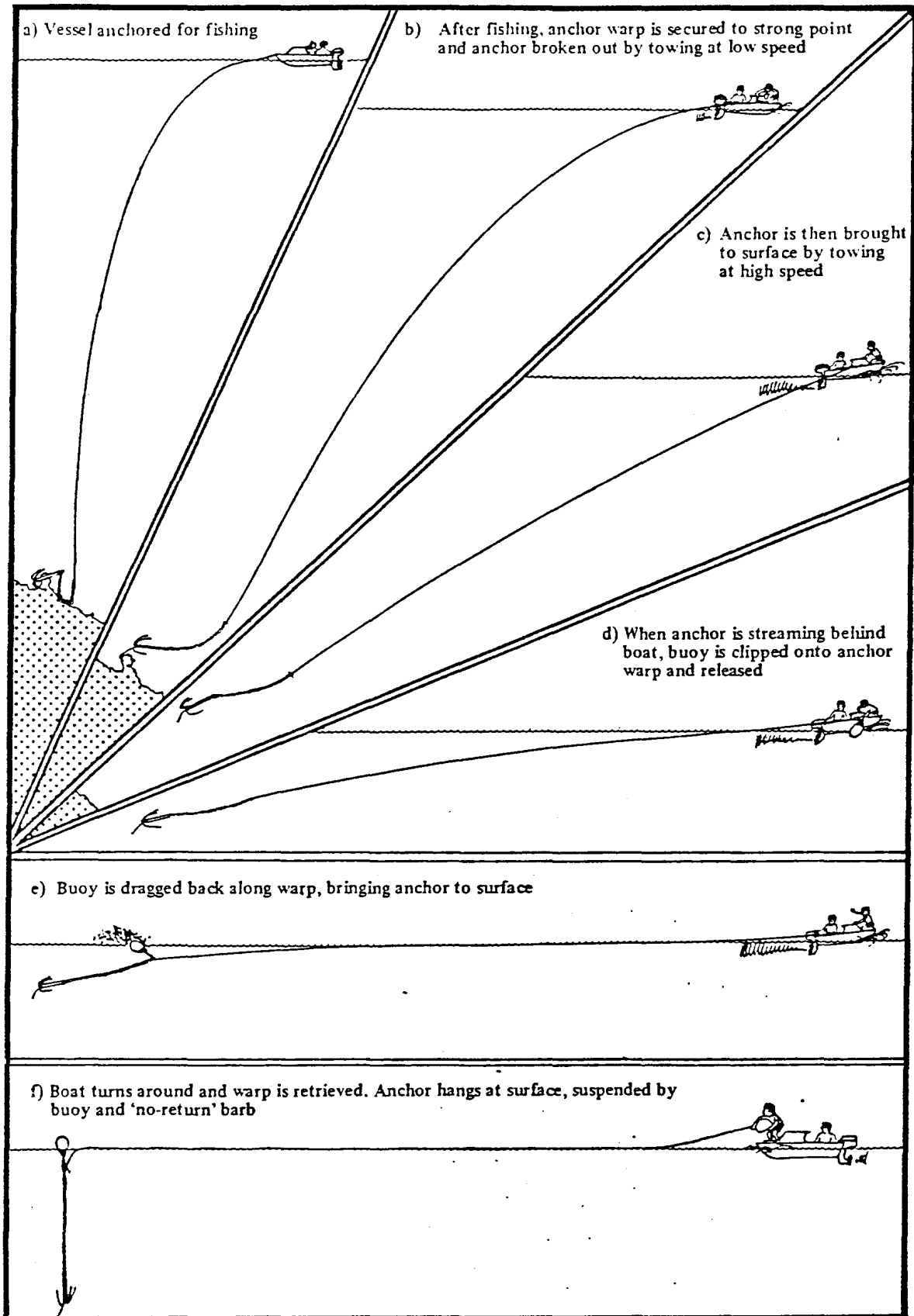


Figure 7. Anchor recovery method



**Table 2. Summary of catch and effort by deep-bottom handreeling**

Location	No. of trips	Fishing hours	Effort (reel hours)	Saleable catch		Unsaleable catch		Total catch (kg)	CPUE (kg)
				No.	Wght (kg)	No.	Wght (kg)		
Wallis	17	85	261.0	579	924.8	7	315.0	1 239.8	4.8
Futuna	3	10	25.0	64	163.0	0	0.0	163.0	6.5
Total	20	95	286.0	643	1087.8	7	315.0	1 402.8	4.9
Note:	Wallis	If sharks are excluded from the catch, CPUE = 3.6 If sharks and other locally unsaleable species are excluded, CPUE = 3.5							
	Futuna	No unsaleable species taken							
	Both areas	If sharks are excluded from the catch, CPUE = 3.8 If sharks and other unsaleable species are excluded from the catch, CPUE = 3.8							

**Table 3. Deep bottom catch rates recorded by the Deep Sea Fisheries Development project in selected Pacific island locations**

Location	Year	Catch rate (kg/reel hour)	
		All species	Excluding sharks
Wallis and Futuna (this visit)	1983–84	4.9	3.6
Wallis and Futuna	1980	7.6	7.0
Vanuatu (Tanna)	1979	2.7	2.5
Vanuatu	1980–81	8.2	6.5
New Caledonia (Lifou)	1979	7.5	7.2
New Caledonia (Ile des Pins)	1979	7.8	7.1
Western Samoa	1982–83	5.1	4.1
Fiji	1981–82	12.9	7.6

### 4.3 Shallow-water droplining

Bottom fishing in shallow waters along the reef edge or inside the lagoon was the principal fishing activity of the local co-operatives at the commencement of this visit. The technique employed was essentially the same as for deep-bottom fishing in that a multiple hook terminal rig was lowered to the bottom with the boat at anchor or drifting. Both handlines and handreels were used, but with generally lighter mainlines and with terminal rigs made up from 10–20 kg test nylon monofilament rather than wire. Hooks used were smaller than those employed in deep-bottom fishing, reflecting the generally smaller average size of the species taken by this method.

A total fishing effort of 89 line or reel hours was spent fishing in depths from 5–60 m, during 5 trips. The catch comprised 173 fish with a total weight of 116.0 kg, all of which was saleable, giving a catch rate of 1.3 kg per reel or line hour. Table 4 summarises catch and effort by this method.

**Table 4. Summary of catch and effort by shallow-water droplining**

Location	No. of trips	Fishing hours	Effort (line hours)	Number	Catch Weight	CPUE (kg)
Wallis	5	21	89.0	173	116.0	1.3

\* No unsaleable species taken

The catch data recorded during the visit do not allow a comparison to be made of the species composition of the catch taken by each bottom fishing method, but a comparison of average individual fish weights can be made; discounting the unsaleable portion of the catch the average fish weight taken by deep-bottom fishing was 2.2 kg and for shallow-water fishing 0.7 kg.

The species composition of the bottom catch by both methods (1518.8 kg) was dominated by deep-water snappers (46.2% by weight) of which the most common was the large-scaled jobfish (*Pristipomoides flavipinnis*) with 204 individuals landed with a total weight of 224.0 kg. Next most numerous were the small-toothed jobfish (*Aphareus rutilans*) and the short-tailed red snapper (*Etelis carbunculus*) with 39 individuals of each species landed and with total weights of 97.0 kg and 104.0 kg respectively.

Shallow-water snappers comprised 8.4 per cent of this catch by weight of which paddletail (*Lutjanus gibbus*) (63.0 kg) were most common. Emperors accounted for 6.1 per cent of the catch, groupers and cods 9.8 per cent, trevallies and jacks 5.5 per cent and miscellaneous saleable fishes, including tunas and barracudas, 3.3 per cent. A detailed record of species composition of the bottom catches can be found in Appendix 5.

#### 4.4 Trolling

Trolling specifically for bait or trolling opportunistically while travelling to or between bottomfishing sites was conducted for a total of 26 hours (53.0 line hours) during 15 fishing trips. Table 5 summarises the catch and effort by both methods by this technique.

**Table 5. Summary of catch and effort by trolling**

Location	No. of trips	Fishing hours	Effort (line hours)	Number	Catch Weight	CPUE (kg)
Wallis	12	19	37.0	50	214.0	5.8
Futuna	3	7	16.0	20	104.0	6.5
Total	15	26	53.0	70	318.0	6.0

\* No unsaleable species taken

The total catch of 70 fish with a combined weight of 318.0 kg realised a catch rate of 6.0 kg per line hour. The most numerous species and that most sought after for bottom-fishing bait, was skipjack tuna (*Katsuwonus pelamis*) with 18 individuals landed with a total weight of 57.0 kg. Next most common species was yellowfin tuna (*Thunnus albacares*) with 13 fish taken with a total weight of 81.0 kg. Other species taken included rainbow runner, barracuda, seapike and wahoo. The species composition of the troll catch is detailed in Appendix 6.

## **5. DISCUSSION AND RECOMMENDATIONS**

### **5.1 General**

The catches recorded during the 20 fishing trips completed at Wallis and Futuna indicated that although of limited extent the deep-bottom grounds surveyed hold substantial stocks of valued fish species. Despite the presence of this resource, the availability of essentially adequate fishing craft, a general familiarity among local fishermen with deep-bottom fishing technique and gear, a strong and constant demand for fresh fish for which good prices were offered, and the indication that deep-bottom fishing is locally more productive than shallow-water fishing (respective catch rates for saleable species of 3.8 kg/reel hour and 1.3 kg/reel hour being recorded during this visit), only two of the seven co-operatives which participated in Project operations were regularly engaged in the deep-bottom fishery.

This apparent under-exploitation of deep-bottom resources indicated that local fishermen were either not aware of the potential of the fishery or that significant restraints existed which discouraged their participation in it. During the course of Project operations a number of organisational, operational and economic factors were identified which appeared to hinder the development of an economically viable deep-bottom fishery and which were likely to make the fishery unattractive to local fishermen.

Among the more obvious of these factors was the requirement that all boats purchased under instalment plans or financed by loans have a nominal owner on board during all fishing trips. As these nominees were most often salaried employees, the times when they, and therefore their boats, were available for fishing were extremely limited.

The most significant operational restraint was the persistent difficulty in obtaining adequate supplies of bait, even though skipjack tuna are common offshore and other baitfish are common in some areas, particularly in Uvea's lagoon. The correlation between good bait and good bottom catches was not widely appreciated. Fishermen were almost universally reluctant to venture far offshore in pursuit of skipjack, nor had they developed effective techniques for taking baitfish occurring in the lagoons.

A more subtle but important restraint was created by the strong and largely unsatisfied demand for fresh fish, which resulted in an indiscriminating market in which fish of all edible species commanded the same price, regardless of relative table quality. Presented with such a price structure and largely unaware of the higher potential productivity of deep-bottom fishing, fishermen were understandably reluctant to invest time and effort in the pursuit of deep-bottom species which brought no more on the market than fish which could be taken more easily and closer to home by shallow-water droplining. In addition, the customary system of barter and exchange, of which fish catches are a focal point, discouraged fishermen from establishing commercially viable small-scale operations. This was compounded by a lack of an easy catch disposal infrastructure.

Other factors impeding the development of the fishery were the heavy construction of the alias and the position in which outboard motors were mounted, both of which made these craft rather slow, the inadequacy of stocks of deep-bottom fishing gear at the SMDR store, the often poor construction and condition of wooden handreels, and the difficulty in obtaining ice to chill catches.

### **5.2 Fishing Economics**

Alias constructed at the government boatyard at a cost of around 1 050 000 CFP, including 305 000 CFP for materials and 700 000 CFP for labour, were made available to approved fishing co-operatives with an 80 per cent government subsidy, so that bona fide groups paid only 210 000 CFP for a completed hull (20% of the direct cost). With wooden handreels selling at cost of materials only, for 9 000 CFP, and 25 hp outboard motors available at 102 500 CFP, an alia could be purchased and outfitted with basic fishing and running gear for around 600 000 CFP.

Several loan or instalment purchase plans were in operation to assist fishermen obtain these boats; for a bare boat a deposit of 105 000 CFP followed by five interest-free monthly instalments of 21 000 CFP, for a fully-equipped boat (costing 600 000 CFP) a loan could be obtained from the Caisse Centrale de Cooperation Economique (CCCE) with a 20 per cent cash contribution and with the balance repayable over five to six years at 5 per cent interest.

A third system, available to groups judged to be in need of particular financial assistance, involved the Fonds d'aide au développement économique et social (FADES). Under this plan a fishing group wanting to purchase a fully-equipped boat was required to deposit 20 per cent of the total purchase price, and FADES contributed 30 per cent. The balance (50%) was available as a loan from CCCE.

Table 6 attempts to estimate the projected income and expenditure over one year for a fishing group operating a locally built alia purchased for 600 000 CFP with the balance repayable over 5.5 years at 5 per cent interest. Calculations of income from catches and operational expenses are derived from Project records of the 20 fishing trips completed during this visit.

**Table 6. Projected income and expenditure for deep-bottom fishing operations over one year**

Income		CFP
Reels in use each trip	4	
Hours spent deep-bottom fishing each trip	4	
Effort/trip (reel hours)	16	
Saleable catch /trip (based on catch rate of 5.0 kg/reel hour) (kg)	80.0	
Number of trips p/year	120	
Total annual catch (kg)	9 600	
Market weight of catch (less 20% for gutting) (kg)	7 680.0	
Sale price/kg		300
Annual income		2 304 000
Expenditure		CFP
Annual fuel cost (32 l p/trip at 78 CFP/l)		299 520
Outboard motor oil and grease		80 000
Annual loan repayment		100 000
Maintenance and repairs		50 000
Fishing gear replacement		150 000
Value of bait used (8 kg trip at 300 CFP/kg)		288 000
Wages (50% of gross income)		1 152 000
<b>Total expenditure</b>		<b>2 119 520</b>
<b>Profit</b>	<b>184 480</b>	

Although the figures in Table 6 are based on a small sample of fishing trips, and a number of development restraints affecting the fishery have been noted, it is considered that a small-scale commercial deep-bottom fishery is economically viable in the Territory. A number of the development restraints now existing could be eliminated through appropriate action by responsible authorities and the effects of others diminished by improvements in gear and techniques, accumulation of knowledge of local bottom grounds, and the desire to maximise market returns from catches which generally characterises commercial fisheries pursuits. At the very least, the development of deep-bottom fishing activity in place of shallow-water drop lining would result in greater return for fishing effort.

### 5.3 Recommendations

In consideration of the above and with a view to increasing fishermen's awareness of the potential of the deep-bottom fishery the following recommendations are made:

Fishing co-operatives and individuals planning to purchase boats under subsidy should be required to participate in a training programme covering not only deep-bottom fishing techniques but catch handling, care and maintenance of boats, engines and gear, and safety at sea.

More groups should be encouraged to enter the deep-bottom fishery through the maintenance of existing support services and the introduction of others, such as the carrying of adequate stocks of deep-bottom fishing gear at the SMDR store, the provision of ice and ice-boxes at reasonable cost, a trial programme of bait sales to create an awareness of the importance of good bait for effective fishing, and a variation in the existing requirements regarding nominal 'owners'. Some assistance in marketing catches and establishing catch handling facilities would be valuable adjuncts to the commercial development of the fishery. The construction of the alia catamarans should follow the original specifications in order to reduce weight, and motors should be mounted on the second-last cross-member.

A fish aggregation device (FAD) deployment programme should be initiated to facilitate the capture of skipjack for bait, and to diversify local fisheries.

Because the catch rates recorded during this visit were from virtually unexploited stocks, because little is known about the ability of deep-bottom resources to withstand sustained fishing pressure, and because the extent of deep-bottom fishing grounds appears to be limited, the resource should be closely monitored and the deep-bottom fishery limited at present to six boats at Wallis and four at Futuna.

## 6. REFERENCES

- Anon, 1981. *Pacific Islands Yearbook* (14th Edition), Sydney, Australia. Pacific Publications Ltd.
- Anon, 1984. *An assessment of the skipjack and baitfish resources of Wallis and Futuna*. Skipjack Survey and Assessment Programme Final Country Report No. 19. Noumea, New Caledonia. South Pacific Commission.
- Anon, 1982. *South Pacific Economies Statistical Summary*, Edition No. 18, Noumea, New Caledonia. South Pacific Commission.
- Burrows, E.E., 1936. *Ethnology of Futuna*. Bulletin No. 138, Honolulu, Hawaii, U.S.A. Bernice P. Bishop Museum.
- Dijoud, P., undated. *Un plan de développement économique et social à long terme pour les îles Wallis et Futuna*. Créé à Nouméa, Imprimeries Réunion.
- Fusimalohi, T. and Grandperrin, R., 1980. *Rapport sur le projet de développement de la pêche profonde à Wallis et Futuna*. Noumea, New Caledonia. South Pacific Commission.
- Gulbrandsen and Savins, M. 1947. *Artisanal fishing craft of the Pacific Islands*. Suva, Fiji. FAO/UNDP Regional Fisheries Support Programme.
- Hinds, V.T., 1969. *A Fisheries Reconnaissance to Wallis Island, July 25–August 7, 1969*. Noumea, New Caledonia. South Pacific Commission.
- Stanley, D., 1985. *Micronesian handbook*. Chicago, U.S.A. Moon Publications.

## APPENDIX 1

**BASIC EQUIPMENT LIST TO OUTFIT 8–10 BOATS FOR DEEP BOTTOM DROPLINE  
FISHING AND LIMITED TROLLING AT WALLIS AND FUTUNA**

<b>FISHING GEAR</b>	<b>AMOUNT</b>
Mono filament nylon 130 kg test	30 x 1000 m
"      "      36 kg "	20 x 1000 m
"      "      20 kg "	20 x 100 m
'Lockfast' swivels size 4/0 or equivalent	1 gross
'Berkeley-McMahon' swivels size 1/0	2 gross
'Berkeley-McMahon' swivels size 4/0	1 gross
'Mustad' tuna circle hooks	
Size 4	100
Size 5	100
Size 6	300
Size 7	600
Size 8	700
Size 9	800
Size 12	
(or equivalent)	1 000
'Turimoto' galvanized longline wire, 3x3, No 29, 200 m coil	15 coils
Lures, plastic octopus skirts, various colours sizes 8–25	1 000
Double-hooks to suit above (2 for each lure)	
Anchoring gear	
Anchor rope 10 mm polypropylene 220 m coils	20 coils
Thimbles to suit above	20
Shackles 9.5 mm galvanized	20
Shackles 8.0 mm galvanized	20
60–75 cm diameter inflatable anchor buoys	10
8–12 mm galvanized chain	100 m
Reinforcing rod for grapnel construction	120 m
Small boat compasses	10

**TOPICS COVERED IN THE TRAINING PROGRAMME**

1. Boat handling and seamanship
  - a. Knots and splices for mooring and anchor lines
  - b. Construction of a grapnel anchor
  - c. Anchor retrieval technique
  - d. Care and maintenance of boat
  - e. Use of equipment checklist before departure
  
2. Handling of equipment and fishing gear
  - a. Safety during fishing operations
  - b. Use of Western Samoan-type wooden handreel
  - c. Suitable knots and splices for monofilament line, wire leaders and traces
  - d. Techniques for handling large fish
  - f. Operation of an echo-sounder
  - g. Care of gear to prevent corrosion
  - h. Rigging gear in 'tackle-balance' (appropriate matching of hooks, swivels and line)
  
3. Handling of the catch
  - a. Landing and unhooking
  - b. Appropriate handling techniques when ice not available, gutting, washing, storing in shade
  - c. Appropriate techniques when ice available, gutting, ice/water slurry, use of salt and suitable ice-boxes





## APPENDIX 4

Trip number	Location	Fishing method	Trip hours	Catch				Bait (kg)	Fuel (litre)
				Saleable		Unsealable			
				Number	Weight(kg)	Number	Weight(kg)		
1	Wallis	Bottom droplining	12	65	123.5	0	0	8	41
2	Wallis	Bottom droplining	13	74	89	0	0	2	36
3	Futuna	Trolling	11	12	66	0	0	6	32
		Bottom droplining		32	72	0	0		
4	Futuna	Trolling	10	1	7	0	0	9	32
		Bottom droplining		10	35	0	0		
5	Futuna	Trolling	11	7	31	0	0	9	23
		Bottom droplining		22	56	0	0		
6	Wallis	Trolling	11	7	52	0	0	21	32
		Bottom droplining		30	59	1	90		
7	Wallis	Trolling	13	1	5	0	0	4	27
		Bottom droplining		19	29	0	0		
		Shallow handlining		4	12	0	0		
8	Wallis	Trolling	13	5	22	0	0	9	32
		Bottom droplining		18	41	4	56		
9	Wallis	Trolling	11	5	28	0	0	6	32
		Bottom droplining		9	25	1	80		
10	Wallis	Bottom droplining	12	44	53.3	1	89	4	34
11	Wallis	Trolling	11	7	16	0	0	4	54
		Bottom droplining		12	11	0	0		
12	Wallis	Trolling	27	1	1	0	0	5	36
		Bottom droplining		14	33	0	0		
		Shallow handlining		21	13	0	0		
13	Wallis	Trolling	24	2	5	0	0	5	41
		Bottom droplining		22	26	0	0		
		Shallow handlining		10	11	0	0		
14	Wallis	Trolling	16	17	51	0	0	9	21
		Bottom droplining		58	90	0	0		
15	Wallis	Bottom droplining	10	62	148	0	0	10	32
16	Wallis	Bottom droplining	10	44	75	0	0	7	18
17	Wallis	Trolling	10	2	8	0	0	4	23
		Bottom droplining		24	41	0	0		

**APPENDIX 4 (Cont'd.)**

18	Wallis	Trolling		1	14	0	0		
		Bottom droplining		8	8	0	0		
		Shallow handlining	14	40	18	0	0	10	36
19	Wallis	Trolling		1	11	0	0		
		Bottom droplining		14	10	0	0		
		Shallow handlining	25	98	62	0	0	16	41
20	Wallis	Trolling		1	1	0	0	11	23
		Bottom droplining	11	62	63	0	0	11	23

<b>TOTALS</b>			<b>275</b>	<b>886</b>	<b>1521.8</b>	<b>7</b>	<b>315</b>	<b>170</b>	<b>669</b>
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## SPECIES COMPOSITION OF THE BOTTOM CATCH

<b>GROUP</b>			
<b>FAMILY</b>			
<i>Species</i>			
English name		<b>Number</b>	<b>Weight(kg)</b>
Wallisian name (where known)			
<b>DEEP-WATER SNAPPERS</b>			
<b>LUTJANIDES (sub-families Apsilinae, Etelinae)</b>			
<i>Aphareus rutilans</i>			
Small-tooth jobfish/silvermouth		39	97
Ulugassi			
<i>Aprion viriscens</i>			
Green jobfish		9	20
Utu			
<i>Etelis carbunculus</i>			
Short-tailed red snapper		39	104
Malau			
<i>Etelis coruscans</i>			
Longtail snapper		30	78
Tavake			
<i>Etelis radiosus</i>			
Silver-gilled red snapper		10	47
Malau			
<i>Paracaesio kusakarii</i>			
Saddled fusilier		16	56
Kurapolegalega			
<i>Paracaesio stonei</i>			
Stones fusilier		10	34
Kuvapolula			
<i>Pristipomoides auricilla</i>			
Gold-tailed jobfish		10	5
Sitapa			
<i>Pristomoides amoenus</i>			
Large-eye flower snapper		4	8
Sitapa			
<i>Pristipomoides filamentosus</i>			
Rosy jobfish		5	13
Sitapa			
<i>Pristipomoides multidentis</i>			
Large-scale jobfish		9	8
Sitapa			

## APPENDIX 5 (Cont'd.)

<b>GROUP</b>			
<b>FAMILY</b>			
<i>Species</i>			
English name			
Wallisian name where known			
	<b>Number</b>	<b>Weight(kg)</b>	
<i>Pristipoides flavippinis</i>			
Yellow jobfish			
Sitapa	204	224	
<i>Pristipomoides zonatus</i>			
Banded flower snapper			
Sitapa	30	16	
<b>Sub-total</b>	<b>415</b>	<b>702,8</b>	
<b>SHALLOW-WATER SNAPPERS</b>			
<b>LUTJANIDES (sub-family Lutjanidae)</b>			
<i>Lutjanus argentimaculatus</i>			
Mangrove jack			
Hoputuvai	3	12	
<i>Lutjanus bohar</i>			
Red bass			
Kivi	18	40	
<i>Lutjanus caeruleovittatus</i>			
Snapper			
Havane	12	2	
<i>Lutjanus gibbus</i>			
Paddletail			
Taelulu	99	63	
<i>Lutjanus kasmira</i>			
Blue-lined snapper			
Havane	8	2	
<i>Lutjanus rufolineatus</i>			
Red-lined snapper			
Havane	19	6	
<i>Lutjanus spilurus</i>			
Fire-lined snapper			
Havane	5	1	
<i>Macolor niger</i>			
Black snapper			
Taeluluvai	1	1	
<b>Sub-total</b>	<b>165</b>	<b>127</b>	

## APPENDIX 5 (Cont'd.)

<b>GROUP</b>			
<b>FAMILY</b>			
<i>Species</i>			
English name			
Wallisian name (where known)			
	<b>Number</b>	<b>Weight(kg)</b>	
<b>EMPERORS</b>			
<b>LETHRINIDAE</b>			
<i>Gnathodentex mossambicus</i>			
Large-eye sea bream			
Mutumutu	13	19,5	
<i>Gymnocranius rivulatus</i>			
Sea bream	2	1	
<i>Lethrinus amboenenis</i>			
Ambon emperor			
Gutula	13	27	
<i>Lethrinus kallopterus</i>			
Orange spotted emperor			
Hoputu tokelau	4	12	
<i>Lethrinus mahsena</i>			
Yellow-tailed emperor			
Hoputuhina	1	2	
<i>Lethrinus miniatus</i>			
Long-nose emperor	11	26	
<i>Lethrinus spp.</i>			
Emperor	4	5	
<b>Sub-total</b>	<b>48</b>	<b>92,5</b>	
<b>GROUPERS AND CODS</b>			
<b>SERRANIDAE</b>			
<i>Cephalopholis igarasiensis</i>			
Yellow-banded cod	1	1	
<i>Cephalopholis miniatus</i>			
Blue-spot rock cod	3	1	
<i>Cephalopholis pachycentron</i>			
Rock cod	2	1	
<i>Cephalopholis spp.</i>			
Rock cod	2	18	
<i>Epinephelus chlorostigma</i>			
Brown-spotted grouper			
Gatalapulepule	3	5	

## APPENDIX 5 (Cont'd.)

<b>GROUP</b>			
<b>FAMILY</b>			
<i>Species</i>			
English name			
Wallisian name (where known)			
	<b>Number</b>	<b>Weight(kg)</b>	
<i>Epinephelus maculatus</i>			
Spotted grouper	5	10	
<i>Epinephelus microdon</i>			
Marbled cod			
Fapuku	36	38	
<i>Epinephelus miliaris</i>			
Spotted-finned grouper			
Gatala	52	37	
<i>Epinephelus morrhua</i>			
Curve-banded grouper			
Kavakava	4	17	
<i>Epinephelus spp.</i>			
Grouper	16	15,5	
<i>Variola louti</i>			
Luna-tail	3	5	
<b>Sub-total</b>	<b>127</b>	<b>1485</b>	
<b>JACKS AND TREVALLIES</b>			
<b>CARANGIDAE</b>			
<i>Caranx lugubris</i>			
Black trevally			
Lupo	5	13	
<i>Caranx melampygus</i>			
Blue trevally			
Lupo	1	1	
<i>Caranx ignobilis</i>			
Great trevally	1	9	
<i>Caranx sexfasciatus</i>			
Bigeye trevally			
Lupo	2	5	
<i>Seriola rivoliana</i>			
Deep-water amberjack			
Lupo	17	55	
<b>Sub-total</b>	<b>26</b>	<b>83</b>	

## APPENDIX 5 (Cont'd.)

<b>GROUP</b>			
<b>FAMILY</b>			
<i>Species</i>			
English name			
Wallisian name (where known)			
	<b>Number</b>	<b>Weight(kg)</b>	
<b>MISCELLANEOUS FISHES</b>			
<b>TUNAS</b>			
<b>SCOMBRIDAE</b>			
<i>Gymnosarda unicolor</i>			
Dogtooth tuna	1	12	
<i>Thunnus obesus</i>			
Bigeye tuna	1	5	
<b>BARRACUDAS</b>			
<b>SPHYRAENIDAE</b>			
<i>Sphyraena jello</i>			
Yellow-tail barracuda			
Motomoto	11	5	
<i>Sphyraena qenie</i>			
Seapike			
Sapatu	16	21	
<b>SQUIRRELFISH</b>			
<b>HOLOCENTRIDAE</b>			
<i>Ostichthys japonicus</i>			
Deep-water squirrelfish	4	2	
<b>EELS</b>			
<b>MURAENIDES</b>			
<i>Evenchelys sp.</i>			
Eel	2	6	
Toke			
<b>UNIDENTIFIED SPP</b>	2	5	
<b>Sub-total</b>	<b>37</b>	<b>56</b>	

## APPENDIX 5 (Cont'd.)

<b>GROUP</b>			
<b>FAMILY</b>			
<i>Species</i>			
English name		<b>Number</b>	<b>Weight(kg)</b>
Wallisian name (where known)			
<b>SHARKS</b>			
<b>CARCHARHINIDAE</b>			
<i>Carcharhinus albimarginatus</i>			
Silver-tip reef shark			
Aga		2	169
<i>Carcharhinus amblyrhynchos</i> *			
Black-tip reef shark			
Aga		1	90
Carcharhinus sp. *			
Shark		2	50
<b>Sub-total</b>		<b>5</b>	<b>309</b>
<b>TOTAL</b>		<b>823</b>	<b>1 518,8</b>

\* Denote locally unsaleable species



## SPECIES COMPOSITION OF THE TROLL CATCH

GROUP	FAMILY	Species	English name	Wallisian name (where known)	Number	Weight (kg)
<b>MACKERELS AND TUNAS</b>						
<b>SCOMBRIDAE</b>						
		<i>Acanthocybium solandri</i>	Wahoo	Valulapa	3	27
		<i>Grammatorcynus bicarinatus</i>	Double-lined scad		3	4
		<i>Katsuwonus pelamis</i>	Skipjack tuna	Atu	18	57
		<i>Thunnus albacares</i>	Yellowfin tuna		13	81
<b>Sub-total</b>					<b>37</b>	<b>169</b>
<b>TREVALLIES AND JACKS</b>						
<b>CARANGIDAE</b>						
		<i>Caranx ignobilis</i>	Great trevally		3	28
		<i>Caranx melampygus</i>	Blue trevally	Lupo	9	29
		<i>Elegatis bipinnulata</i>	Rainbow runner	Atualo	7	11
<b>Sub-total</b>					<b>19</b>	<b>68</b>
<b>MISCELLANEOUS FISHES</b>						
<b>SPHYRAENIDAE</b>						
		<i>Sphyraena barracuda</i>	Great barracuda	Ali	2	10
		<i>Sphyraena qenie</i>	Seapike		11	68
<b>LUTJANIDAE</b>						
		<i>Aprion viriscens</i>	Green jobfish		1	3
<b>Sub-total</b>					<b>14</b>	<b>81</b>
<b>TOTAL</b>					<b>70</b>	<b>318</b>