REPORT ON THE SOUTH PACIFIC COMMISSION

DEEP SEA FISHERIES DEVELOPMENT PROJECT IN NIUE

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by

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INTRODUCTION

Nine is a steep-sided island of volcanic origin rising almost straight from the ocean depths. Consequently the area suitable for bottom fishing is very small.

A previous report (Dryden, 1978)[1] showed trolling, and sometimes handlining for bottom fish close inshore to be the most promising fishing methods in the waters around Niue. The main objectives of the Deep Sea Fisheries Development Project were to investigate the.bottom fish resources, to demonstrate deep bottom fishing techniques with the Western Samoa type handreels, and to determine if this type of fishing was suitable for the particular conditions prevailing at Niue. Because of various problems (among them delays in fitting the echo-sounder to the boat, bad weather), only 18 trips were able to be devoted to deep bottom fishing.

BOAT AND EQUIPMENT

The project used the only suitable boat on Me island, *Nukulafalafa*, an 8.5 m (28 ft.) Government vessel powered by a diesel engine. A good knowledge of the bottom is necessary for exploratory bottom fishing trials. As there is no Admiralty chart of the island apart from Alofi anchorage, an echo-sounder was essential. The *Nukulafalafa's* own one being out of order, 'the project's echo-sounder had to be rigged. The fitting of the echo-sounder, and the fact that some repairs were necessary to *Nukulafalafa*, delayed the start of bottom fishing until 25 July; however, trolling was carried out between 11—24 July.

Six lines were used for trolling, and two hand reels rigged with monofilament nylon for bottom fishing. The terminal rig of the bottom line is shown in Figure 1.

FISHING PROCEDURE AND RESULTS

The boat was allowed to drift during deep bottom fishing. Fishing depths ranged from 60 to 330 m, with most of the effort being concentrated around 250 m. Fishing took place between approximately 0600 and 1400, an average of five hours being devoted to deep bottom fishing. No fishing at night was tried. An average per trip of 16 kg of bait (mostly frozen mackerel, occasionally flying fish) was used for both trolling and bottom fishing. The amount of bait used for bottom fishing was not recorded separately. Catches by number and weight are given in Table 1, which shows that trolling was more successful than bottom fishing (53.7 kg against 27.7 kg per trip). However, one should keep in mind that trolling catches mainly skipjack and wahoo which appear during peak seasons (November to January for skipjack, late winter and spring for wahoo). This means that deep bottom fishing should not be neglected during other seasons, when it could provide substantial catches.

1. DRYDEN, N. (1978) Report on Niue Fisheries Development Project, 7pp. Produced for the ministry of Agriculture, Niue.

Table 1: Summary of fishing operations on the *Nukulafalafa* whilst the DSFDP was based in Niue. - not applicable, * no data.

Date	Trolling			Bottom fishing			
	Duration (hours)	N° Fish	Weight (kg)	Duration (hours)	N° Fish	Weight (kg)	Depth (m)
11/7/78	5.5	4	44.4	-	-	-	-
12/7	7.5	5	98.2	-	-	-	-
14/7	7.5	16	168.6	-	-	-	-
17/7	6.5	5	52.3	-	-	-	-
18/7	6.0	0	0	-	-	-	-
19/7	6.5	3	45.2	-	-	-	-
24/7	8.0	6	60.1	-	-	-	-
25/7	2.5	0	0	4.0	10	13.0	250
27/7	2.5	3	35.0	4.5	12	9.0	150-250
28/7	2.5	0	0	2.5	2	6.5	250
1/8	2.5	7	105.6	5.0	3	5.0	100-250
2/8	8.0	2	39.0	-	-	-	-
7/8	2.5	1	15.0	3.0	7	12.0	150-250
8/8	2.5	2	26.0	4.0	0	0	250
9/8	2.5	3	25.0	3.5	9	2.8	60-80
10/8	2.5	3	50.0	3.5	6	2.1	60-150
14/8	5.0	16	177.5	3.0	23	27.0	80-120
15/8	2.5	6	85.0	8.0	10	9.1	80-120
16/8	2.5	0	0	5.5	14	54.1	250
18/8	-	-	-	6.0	26	62.6	260
21/8	4.0	8	101.0	7.5	13	30.0	200
22/8	-	-	-	8.5	36	108.5	220-310
23/8	-	-	-	8.5	27	81.2	260-330
24/8	6.0	1	11.5	2.5	0	0	*
25/8	3.5	1	10.0	4.0	11	23. 0	*
28/8	7.0	5	85.0	-	-	-	-
28/8[1]	-	-	-	6. 0	8	52. 5	*
Totals	**106. 0**	**97**	**1235. 0**	**89. 5**	**217**	**498. 4**	
Means	**4. 5**	**4. 22**	**53.7**	**5. 0**	**11. 2**	**27. 7**[2]	

[1.] Two separate trips, with different crews, were made on this date.
[2]. Mean weight caught per reel per fishing hour 2.8 kg.

The mean catch per reel per hour fishing (2.8 kg) was low compared with other places where similar projects have operated (Table 2).

Table 2: Average catches in kg per reel per fishing hour in countries where similar SPC projects have operated (* electric reels)

New Hebrides	3.5*
Western Samoa	4.1*
Aitutaki (Cook Islands)	3.5*
Tuvalu	2.5*
Gizo (Solomon Islands)	5.7*
American Samoa	4.4
Niue	2.8

Table 3 gives the catch composition. Fishes of the family Lutjanidae, mainly *Etelis* spp, made up 45.6 per cent of the total by weight, and *Lethrinus* spp a further 25.3 per cent. In other places in the Pacific the vertical distribution of *Etelis* ranges from 200 to 400 m. As most of the bottom fishing was carried out in 250 m or less, this means that only the top part of the habitat was fully investigated. These deep water snappers are never poisonous, and one species, *E. carbunculus*, can reach a weight of 35 kg. Its high commercial value should therefore encourage a careful investigation of this potential resource.

CONCLUSIONS

Although the project was not able to spend as much time m deep bottom fishing trials as hoped, the results suggest the following:

1. Fishing potential is certainly limited, but catches could be improved by a careful and systematic investigation of the fishing spots, and a survey of the topography of the slope. As no suitable Admiralty chart is available, the fisheries team should carefully plot all places fished and make its own chart. The government of New Zealand might be approached to have such a chart made.

2. For deep bottom fishing the boat should be anchored: depths down to 450 m should be explored; night fishing should be tried and catches compared with the day time catch rate; electric reels could be tried. Basic fishing gear required for outer slope deep sea fishing is given Table 4.

3. The fishing effort can be increased if fishing trips last longer. This is related to the organisation of the market.

4. As there are no harbour facilities another type of boat could be more suitable to the difficult conditions existing in Niue. An Alia design 8.3 m aluminium catamaran[1] would be light enough to be beached. The building of a small fishing harbour, if shown to be feasible, would save a lot of effort and time.

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1. Produced by the FAO/DANIDA boat building project, P.O. Box 295. Apia, Western Samoa.

Table 3 : Composition of the catches made by the Nukulafalafa whilst the DSFDP was based in Niue.

Fishing Method	Scientific name	English name	Niuean name	Number Caught	Percent by Numbers	Weight Caught	Percent by Weight
Trolling	*Acanthocybium solandri*	wahoo	paala	79	81.5	1138	92.1
	Coryphaena hippurus	dolphin fish	mahimahi	14	14.1	92	7.5
	Elagatis bipinnulatus	rainbow runner	samani	4	4.1	5	0.4
				97	**100**	**1235**	**100**
	LUTJANIDAE						
	Etelis spp.[1]	deep snapper red snapper	paeko	24	11.1	112	22.5
	Pristipomoides sp.	rosy job fish	paeko	16	7.4	29	5.8
	Lutjanus bohar [2]	red snapper	mu	10	4.6	25	5.0
	Unidentified Lutjanidae	snappers	kupali	13	6.0	61	12.3
Bottom Fishing	LETHRINIDAE						
	Lethrinus spp.	emperors	plau	83	38.3	126	25.3
	SERRANIDAE						
	Variola louti	fairy cod, red cod	malau	55	25.3	70	14.1
	Unidentified Serranidae	groupers, cods plau	pusi	4	1.8	55	11.0
	CARANGIDAE						
	Caranx spp.	Trevallies, jacks	lupu	8	3.7	8	1.6
	SPHYRAENIDAE						
	Sphyraena spp.	Barracudas	sapatu	4	1.8	12	2.4
				217	**100**	**498**	**100**

[1]. *Etelis* spp. are sometimes put into a separate family, the Etelidae.
[2]. This species is sometimes poisonous.

5. The establishment of permanent mooring buoys at selected spots near villages or favoured fishing spots would be advantageous.

6. Fishing data should be kept carefully in appropriate log books. This is essential to work out the economics of any fishing operation. In time spent steaming, trolling, bottom fishing should be recorded as well as the members of lines or reels operated, the amount of bait used for each fishing method, the crew number, the different names, number and weights of fishes caught with the various techniques used.

7. Bait other than frozen mackerel should be tried, for example salted skipjack during the skipjack season.

8. As fishing is extremely hazardous around Nine, safety procedures should be rigorously observed, in particular by checking the running the spare engine every day before sailing, and by setting up a system of radio communications with the government radio. A second fishing vessel would also greatly add to the safety of fishing operations.

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Table 4: Basic fishing gear required for outer slope deep bottom fishing.

1. Mustad tuna circle hooks quality N° 39960 ST, Size N° 3, 4, 5, 6*

2. Sleeves Sevenstrand stock N° A 7 or equivalent.

3. Turimoto N° 29 longline wire or equivalent. (three stranded, three wires per strand, 120 kg test).

4. 136 kg (300 lb.) test swivels*

5. 500 m of 113 kg (250 lb.) test monofilament line.

6. Western Samoan type handreel.

7. 2 kg weights.

8. 600—800 m of polypropylene rope (rope size depends upon the size of the boat).

9. Grapnel anchor and chain, also depending on boat sizes.

10. Electric reels (if the economics of the fishing operation permit)*

11. Echosounder (at least in the initial stages for finding fishing spots).
The echosounder used by the SPC Deep Sea Fisheries Development Project is the J. M.C. Model 707, A/B** which records to a depth of 600 m.

Tools required

1. Pair of standard pliers.

2. Pair of side cutters.

3. Pair of crimping pliers.

4. 15 cm (6 inch) bait knife.

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* These items can be obtained from Atlantic and Gulf, 591 S.W. 8th St Miami, Florida 33130, U.S.A.
** Japan Marima Co., Ltd. 36-2 1001 Udagawa-cho, Shibuya-ku, Tokyo Japan.

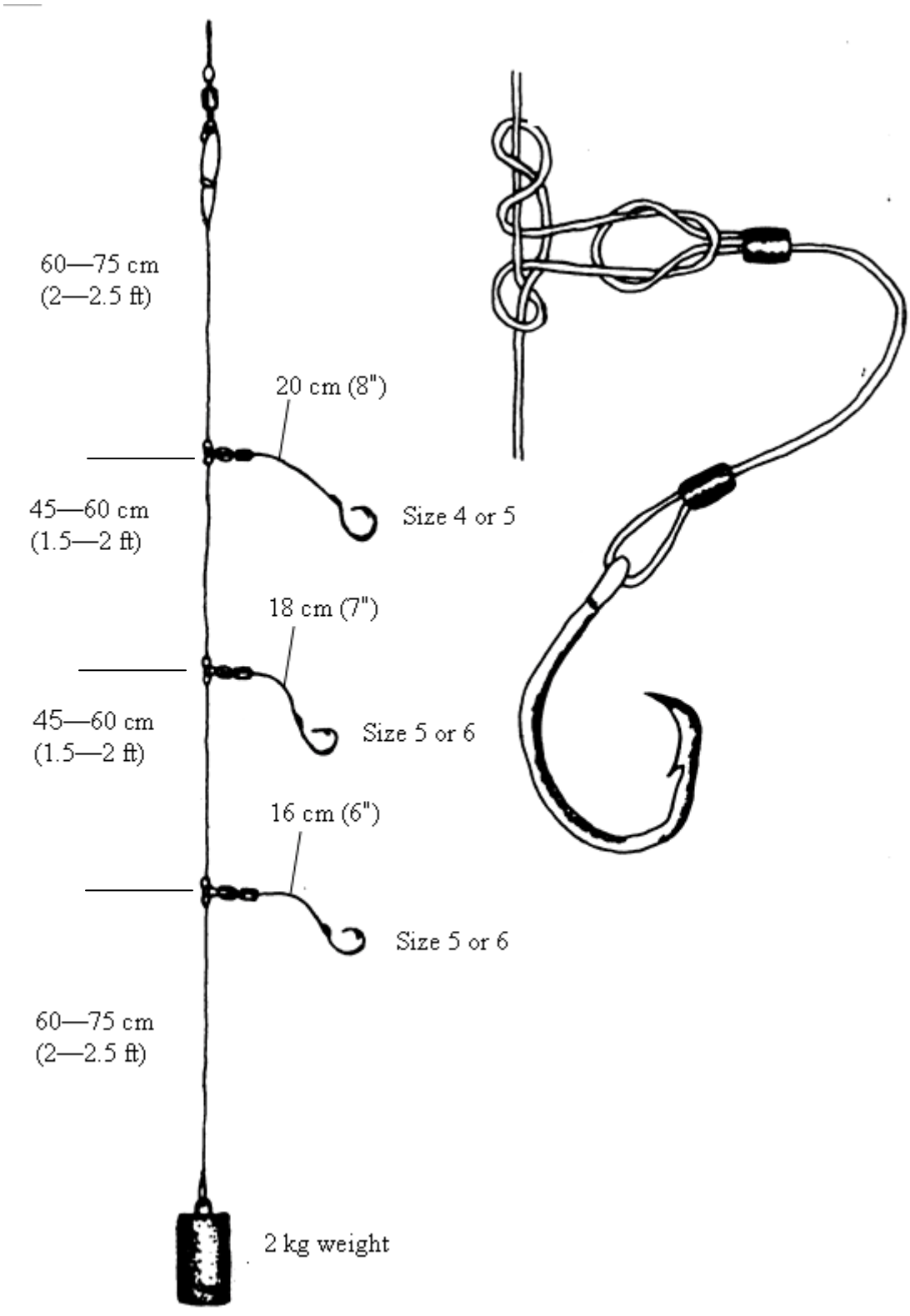

Figure 1: Terminal rig used for deep-bottom fishing; Turimoto No. 29 longline wire, Mustad tuna circle hooks and coastlock snap swivels were used.