

SOUTH PACIFIC COMMISSIONNINTH REGIONAL TECHNICAL MEETING ON FISHERIES

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INTERIM REPORT : SPC OUTER REEF FISHERIES PROJECT AT TUVALU,  
12 SEPTEMBER - 30 NOVEMBER, 1976

by

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INTRODUCTION

1. The Project arrived at Funafuti, Tuvalu, on 12 September 1976 after a six weeks' delay, due to the non arrival of the chartered vessel from Aitutaki. The installation of the ice maker, laying of moorings, unpacking and rerigging fishing gear and installation of the echo sounders, radios and electric reels took eight days, and the first exploratory fishing and familiarization voyage took place on 21 September.

2. The aims of the Project are to survey the fish resources of the outer slope of the barrier reef, the pelagic fish resources in close proximity to Funafuti and the marine and fish resources of the lagoon; to ascertain the feasibility of fishing commercially; to determine and demonstrate fishing tackle and techniques suitable to the area; and to train local fishermen in the use of the fishing equipment.

PROJECT PERSONNEL

3. The Project team at Funafuti consists of the Master Fisherman and Project Leader R. Eginton and Boat Skippers/Fishermen P. Mead and C. Scott. Fisheries Assistant Mr Lotu, of the Department of Commerce and Natural Resources, assisted the team during the initial setting-up of the Project.

TRAINING

4. Seven trainees joined the Project in September. All were from Funafuti and several had previously worked for the Fisheries Division of the Department of Commerce and Natural Resources. The selection of the trainees was the responsibility of the Fisheries Division.

#### BOATS AND EQUIPMENT

5. The dories being used in the survey are:
- (a) A 24 foot New Zealand designed and built aluminium boat, powered by a Nissan diesel motor of 56 H.P. driving a Hamilton Model 1011 Jet Unit. This vessel is satisfactory for bottom fishing but her top speed of six and a half knots and the turbulence from the jet unit renders her useless for trolling for skipjack and yellowfin tuna.
  - (b) A 24 foot Pago Pago designed and built plywood dory, powered by a Chrysler Nissan diesel motor of 56 H.P. driving a conventional shaft and propellor with a top speed, loaded, of eight knots. This dory is also too slow to fish the schools of tuna successfully.
  - (c) An FAO designed and Apia built timber dory, powered by a Perkins 35 H.P. diesel motor driving a conventional shaft and propeller, with a top speed of ten knots. This dory has been successful trolling for skipjack and yellowfin.

Each vessel is equipped with a model FM22 Furuno echo-sounder, with a range of 0-410 fathoms, and the two 24 foot vessels with Furuno SSB radiotelephones. The two 24 foot vessels are each fitted with two twelve volt "Electric" snapper reels, which have a capacity of 2,000 feet of 3/64" dia. stainless steel wire.

6. A Resco block icemaker, driven by a 8 H.P. Petter diesel engine, with a capacity of 1,000 lb. of ice every twelve hours is in use to supply the ice required. An electric domestic 22 cubic feet deep-freeze unit is used for the storage of bait, and two ice boxes of twelve cubic feet each are used for the storage of the fish for sale.

#### AREA OF OPERATION

7. Funafuti was selected as the site for the Project at Tuvalu. There is a regular fortnightly air service from Fiji to Funafuti, also an irregular shipping service by chartered vessels and the Nauru Pacific Line. The other islands in the group were not considered suitable for the Project due to logistic reasons and the lack of any protected anchorages at all except at Nukufetau (some 60 miles north of Funafuti).

8. Funafuti is an atoll approximately 6,600 miles north of the Fiji group:

"Funafuti is an almost circular and conical submarine mountain 12,000 feet high, originally volcanic, and of immense geological age, much older than the relatively young and active mountains of the New Hebrides and Solomons. At its base on the ocean bed it is 30 miles wide in one of the directions tested, and 28 miles wide on the other. It rises in a gentle slope which gradually steepens to a point 2,400 feet below water level, after which it rises at an angle of 80 degrees to 840 feet below water level. From this point it rises vertically, like an enormous pillar, till it reaches the surface in the

form of a reef enclosing a lagoon of irregular size, but of which the extremities give a measurement of 13.1/2 miles by 10 miles".<sup>(1)</sup>

It is very different from the lagoon at Aitutaki and there are numerous deep passages leading into the lagoon. The average depth in the lagoon is about 20 fathoms.

9. During the North-West season there is no protected anchorage off the main island, which is the only island inhabited. Permanent moorings were laid in the lagoon off the shed housing the ice-maker. These moorings are sheltered in the South-East season but exposed during the monsoon.

#### WEATHER

10. From April to November the atoll experiences winds mainly from the North-East, with an average speed of 12 knots. Stronger trades from the N.E. to S.E., with wind speeds of up to 25 to 30 knots, occur during this period, but are usually of short duration, seldom blowing for more than four to five days. During the monsoon season, from December to March, periods of calm with light and variable winds are experienced; however sudden squalls from the S.W. to N.W. with very strong winds are frequent at this time. Storms with strong S.W. to N.W. winds can also occur in this season, and wind speeds of up to 55 knots are not unusual. These stormy conditions can last for several weeks and cause very rough seas in the lagoon, especially off the western coast. Funafuti is normally out of the cyclone belt but in October 1972 a cyclone was experienced which caused widespread damage on Funafuti, and the loss of three Japanese tuna boats which were anchored in the lagoon.

#### FISHING EFFORT

11. A considerable amount of fish is landed by the local fishermen of Funafuti and is sold locally. The main fishing effort is concentrated on trolling and to a lesser extent poling with pearl-shell lures for skipjack and yellowfin tuna, from open boats powered by outboard motors. The fishermen usually leave before dawn so as to arrive at the fishing ground, which are mainly to the west of the atoll, at first light. They travel considerable distances offshore when searching for and fishing the tuna schools. No reliable figures are available on the weight of fish landed. It is not uncommon for the top boats to arrive home with over 40 skipjack each, but there are days when very few and even no tuna are caught. While the landings over a twelve-month period must be quite substantial, expenses are very high and it is doubtful if the fisherman secures an adequate return for his labour and investment. Petrol at Funafuti costs \$A2.2 per gallon and on an average trip at least eight gallons would be used. The boats used are too small to carry ice to preserve the catch, and if the boats remain at sea all day, returning late in the afternoon some of the tuna is, by that time, in poor condition.

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(1) Austin Coates; Western Pacific Islands, H.M.S.O. 1970

12. Not as much effort is put into the fishing in the lagoon as in the skipjack fisheries. The fisherman's reputation at Funafuti is based mainly on the success of his tuna fishing. Monofilament nets are used for surgeon fish, mullet and goat fish, atule, etc; very little hand lining is carried out in the lagoon. Weather permitting, fishing for flying fish with lights is carried out. **Again, no** reliable figures are available for the weight of fish landed.

13. The Project's fishing effort was, during the months of September and October, concentrated on the outer slope of the Barrier Reef. The landings were very disappointing (see Appendix I for results). Funafuti is a typical atoll where the outer slope of the Barrier Reef drops away almost vertically to 2,000 fathoms. The problem arises, due to the steep slope, of being able to anchor the dory to fish the drop-off. It is possible if the wind remains constant and blows offshore all night to anchor the dory in shallow water and pay out enough warp to fish the desired depth. If the wind changes and blows onshore or drops away, the skipper has no option but to weigh anchor and attempt to find an alternate position where he can anchor and fish. The deep water species of fish (Euvettus, Etelis, Pristipomoides, etc.) which the Project attempted to exploit both at Aitutaki and Funafuti, each inhabit a definite well-defined depth range. Night fishing was more productive than day fishing; the same result has been obtained in all the areas in which the Project has operated.

14. During November the Project concentrated on fishing the shallower waters of the lagoon and passages (See Appendix I for results). The lagoon appears to be under-exploited at the moment.

15. Only sufficient tuna were trolled to supply bait for the Project's other fisheries. Fishing for tuna and skipjack is a traditional fisheries of the Funafuti people and except for supplying the fishermen with better-quality lures than were available locally, there was nothing the Project team could teach these fishermen about catching skipjack and tuna. The Project sold very little tuna so as not to upset the local market.

#### MARKETING

16. The price paid to the local fishermen varies from about 20 to 30 cents per pound according to the supply available. The supply does not appear to satisfy the market requirements. Skipjack and the smaller Lutjanus and Lethrinus are the most popular fish and command a ready market. The deep water fish (Ruvettus, Etelis and cod) caught by the Project were not at all popular and could not be sold even during a fish shortage. The Funafuti people are not familiar with these fish and suspect them of being poisonous. These fish were usually given to the trainees for pig food or dumped at sea after being held in the ice boxes for several days. Shark is not eaten at Funafuti and is unsaleable.

#### FISH SPECIES

17. The percentage, by weight, of the different species landed is given in Appendix II. The weight of the sharks caught is an estimate only. The sharks, if landed on board the boats, are usually dumped at sea before the boats return to Funafuti.

### POISONOUS FISH

18. Ciguatera poisoning is not a major problem at Funafuti but, even so, a large proportion of fish caught, i.e. 17% of the Project's catch, is reputed to be poisonous. The species considered poisonous include:

Lutjanus bohar

Variola louti

Plectropoma maculatus

Large Grouper and Cod and several unidentified

Lutjanus sp.

### RESOURCES

19. The Project has too little data to try and evaluate the fish resources of Funafuti at this time. From the few observations made by the Project staff and from reports by the local fishermen, the skipjack stocks off the atoll appear to be substantial. However, it would be unwise to make any estimate of the number and size of the schools occurring in close proximity to the atoll in any month without more observations carried out over a long period. The deep water resources appear to be limited by the availability of the optimum depths required by deep water living species. The reef drops away almost vertically to 2,000 fathoms and there are no off-lying banks of a suitable depth to carry these species. The only area available to these fish is the narrow band of suitable depth occurring around the outside of the barrier reef. The resources of the lagoon appear to be under-exploited by the local people at the moment. With an area of only 100 square miles approximately it is very doubtful if the lagoon could support any fisheries except one at village-level for local consumption.



APPENDIX IMONTHLY FISHING EFFORT

## A. SEPTEMBER 1976

## 1 DORY "TANGAROA"

Percentage of days fished

Days available	10%	100%
Days fished	5%	50%
Days not fished	5%	50%
Reasons for not fishing:	Days	Percentage
(a) Maintenance on boats and fishing gear	3	30%
(b) Engine repairs and breakdowns	1	10%
(c) Holidays and other commitments	1	10%

Catch Effort

Number of man/days fished	14
Number of man/hours fished	107.25
Catch man/days	20.71 kilos
Catch man/hours	2.704 "

Methods and Catch Total

Trolling		66.0	kilos
Bottom lining		224.0	"
Catch <u>total</u>		<u>290.0</u>	<u>"</u>
Shark	Six - Estimated weight	145.0	"

MONTHLY FISHING EFFORT

A. SEPTEMBER 1976

2 DORY "NORMAN KIRK"

Percentage of days fished

Days available	10	100%
Days fished	3	30%
Days not fished	7	70%

Reasons for not fishing:

	Days	Percentage
(a) Maintenance on boats and fishing gear	4	40%
(b) Engine repairs and breakdowns	1	10%
(c) Holidays and other commitments	2	20%
(d) Weather		

Catch Effort

Number of man days fished	10
Number of man hours fished	93.5
Catch man/days	7.85
Catch man/hours	1.19

Methods and Catch Total

Catch trolling	4 kilos
Catch bottom lining	74.5 "
Catch <u>total</u>	<u>78.5 "</u>
Sharks	Nil



MONTHLY FISHING EFFORT

B. OCTOBER 1976

1 DORY "TANGAROA"

Percentage of days fished

Days available	31	100%
Days fished	12	38.7%
Days not fished	19	61.3

Reasons for not fishing:

(a) Maintenance on boats and fishing gear	3	9.7
(b) Engine repairs and breakdowns	5	16.1
(c) Holidays and other commitments	7	22.6
(d) Weather	4	12.9

Catch Effort

Number of man days fished	36	
Number of man hours fished	365.15	
Catch man/days		17.22 kilos
Catch man/hours		1.698 "

Methods and Catch Total

Catch trolling	104.0	kilos
Catch bottom lining	516.0	"
Catch <u>total</u>	<u>620.0</u>	<u>"</u>
Sharks	Thirty-eight (38) - Estimated weight	832.0 "

MONTHLY FISHING EFFORT

C. NOVEMBER 1976

1 DORY "TANGAROA"

Percentage of days fished

Days available	30	100%
Days fished	18	60%
Days not fished	12	40%
Reasons for not fishing:		
(a) Maintenance on boats and fishing gear	2	6.7%
(b) Engine repairs and breakdowns	2	6.7%
(c) Holidays and other commitments	7	23.3%
(d) Weather	1	3.3%

Catch Effort

Number of man days fished	36	
Number of man hours fished	365.15	
Catch man/days		25.8 kilos
Catch man/hours		1.94 "

Methods and Catch Total

Catch trolling		00.0 kilos
Catch bottom lining		<u>774.0 "</u>
Catch <u>Total</u>		<u>774.0 "</u>
Sharks	Forty-five - Estimated Weight	1384.0 kilos

MONTHLY FISHING EFFORT

B. OCTOBER 1976

2 DORY "NORMAN KIRK"

Percentage of days fished

Days available	31	100%
Days fished	9	29%
Reasons for not fishing:		
(a) Maintenance of boats and fishing gear	1	3.2%
(b) Engine repairs and breakdowns	5	16.2
(c) Holidays and other commitments	16	51.6
(d) Weather		

Catch Effort

Number of man days fished	21	
Number of man hours fished	263.5	
Catch man/days		20.69 kilos
Catch man/hours		1.65 "

Methods and Catch Total

Catch trolling		6.5 kilos
Catch bottom lining		<u>428.0 "</u>
Catch <u>Total</u>		<u>434.5 kilos</u>
Sharks	Ten - Estimated weight	931.0 kilos

MONTHLY FISHING EFFORT

C. NOVEMBER 1976

2 DORY "NORMAN KIRK"

Percentage of days fished

Days available	30	100%
Days fished	15	50%
Days not fished	15	50%

Reasons for not fishing:

(a) Maintenance of boats and fishing gear	1	3.3%
(b) Engine repairs and breakdowns	2	6.7%
(c) Holidays and other commitments	11	36.7%
(d) Weather	1	3.3%

Catch Effort

Number of man days fished	29	
Number of man hours fished	401	
Catch man/days		13.83 kilos
Catch man/hours		1.0 "

Methods and Catch Total

Catch trolling	0.0 kilos
Catch bottom lining	<u>401.0 "</u>
Catch <u>Total</u>	<u>401.0 kilos</u>
Sharks	Nil

APPENDIX IICOMPOSITION OF CATCH

## A. SEPTEMBER 1976

Species	Number	Weight Kilos	Av. Weight	Percentage
<i>Sphyraenoidei</i> (spp.)	7	19.5	2.79	5.29%
<i>Etelis carbunculus</i>	8	22.5	2.81	6.11
<i>Etelis oculatus</i>	4	22.0	5.5	5.97
<i>Aprion virescens</i>	7	6.3	0.9	1.71
<i>Aprion microlepis</i>	11	31.0	5.81	8.41
<i>Aphareus tutilans</i>	1	4.0	4.0	1.1
<i>Epinephelidae</i> (spp.)	10	121.0	12.1	32.8
<i>Lutjanus bohar</i>	8	54.0	6.75	14.7
<i>Tropidinius zonatus</i>	10	10.7	1.07	2.9
<i>Carangoides</i>	1	6.0	6.0	1.66
<i>Gymnosarda nuda</i>	2	48.0	24.0	13.05
<i>Thunnus albacares</i>	1	8.0	8.0	2.27
<i>Katsuwonis pelamis</i>	1	3.0	3.0	.8
<i>Acanthocybium solandri</i>	1	9.0	9.0	2.44
<i>Lethrinade</i> (spp.)	2	3.0	1.5	.8
TOTAL	74	368.0		100%

## B. OCTOBER 1976

<i>Aprion virescens</i>	1	1.0	1.0	0.08
<i>Aprion microlepis</i>	39	68.0	1.74	5.45
<i>Epinephelidae</i> (spp.)	17	52.5	3.08	4.2
<i>Lethrinade</i> (spp.)	7	6.5	0.92	.52
<i>Lutjanus bohar</i>	60	206.0	3.43	16.5
<i>Ruvettus pretiosus</i>	24	422.0	17.58	33.8
<i>Sphyraenoidei</i> (spp.)	5	13.5	2.7	1.08
<i>Etelis carbunculus</i>	11	72.5	4.77	5.8
<i>Gymnosarda nuda</i>	2	16.5	8.25	1.32
<i>Gempylidae</i> (spp.)	20	39.0	1.95	3.12
<i>Carangidae</i> (spp.)	19	43.5	2.29	3.5
<i>Tropidinius zonatus</i>	22	32.5	1.47	2.6
<i>Katsuwonus pelamis</i>	64	175.5	2.74	14.05
<i>Thunnus albacares</i>	3	28.0	9.3	2.24
<i>Acanthocybium solandri</i>	2	50.0	25.0	4
<i>Grammatorcymus. bicarinatus</i>	1	3.0	3.0	.24
<i>Euthynnus alletteratus.affinis</i>	3	3.5	1.16	.28
Mixed reef species	19	15.0	.79	1.2
TOTAL	319	1248.5		100%

COMPOSITION OF CATCH

C. NOVEMBER 1976

Species	Number	Weight Kilos	Av. Weight	Percentage
<i>Aprion virescens</i>	1	2.0	2.0	.14
<i>Aprion microlepis</i>	16	20.0	1.25	1.4
<i>Epinephelidae</i> (spp.)	42	40.0	.95	2.8
<i>Lethrinade</i> (spp.)	524	397.5	.76	27.96
<i>Lutjanus gibbus</i>	494	201.5	.40	14.17
<i>Lutjanus bohar</i>	31	90.5	2.92	6.37
<i>Sphyraenoides</i> (spp.)	28	45.0	1.6	3.16
<i>Tropidinius zonatus</i>	8	7.0	.86	.49
<i>Elegatis bipinnulatus</i>	6	20.0	3.3	1.4
<i>Carangoides</i> (spp.)	42	46.0	1.1	3.24
<i>Gymnosarda nuda</i>	1	7.0	7.0	.49
<i>Thunnus albacares</i>	7	79.0	11.28	5.57
<i>Katsuwonis pelamis</i>	52	155.0	2.98	10.9
<i>Etelis oculatus</i>	1	4.0	4.0	.28
<i>Holocentridae</i> (spp.)	5	3.0	0.6	.21
Mixed reef species	653	300.0	0.46	21.1
<i>Euthynnus alletteratus affinis</i>	3	3.5	1.16	.25
TOTAL	1914	1421.5		100%