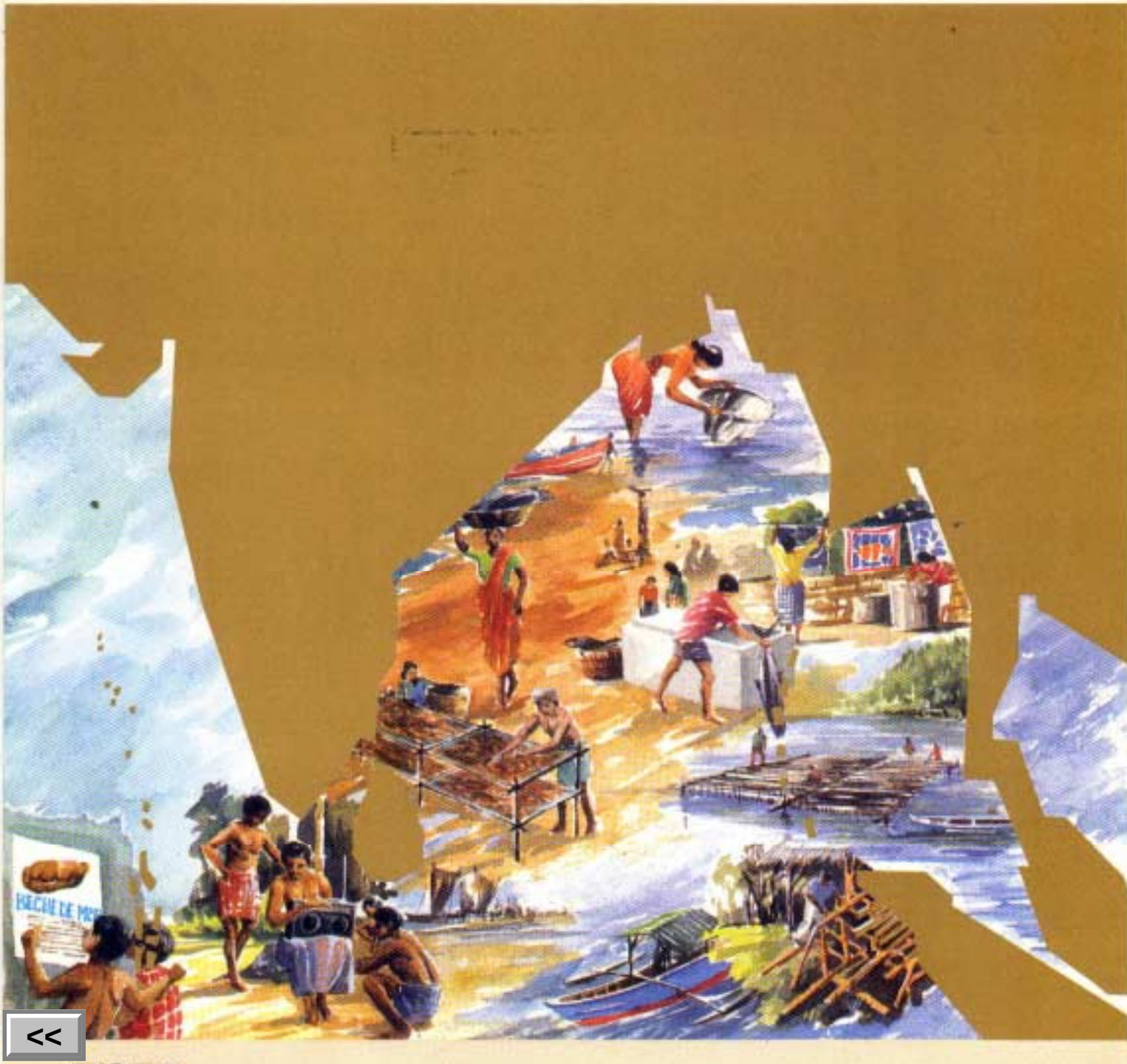
BOBP/WP/95

Biosocioeconomic Assessment of the Effects of Fish Aggregating Devices in the Tuna Fishery in the Maldives



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Small-scale Fisherfolk Communities GCP/RAS/1 18/MUL
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Biosocioeconomic assessment of the effects of fish aggregating devices in the tuna fishery in the Maldives

by

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BAY OF BENGAL PROGRAMME
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Fish Aggregating Devices (FADs) have proved very successful in the Maldives, where there is a countrywide FAD installation programme by the Ministry of Fisheries and Agriculture (MOFA) underway. The main reason for the success of FADs in the Maldives is their applicability to the existing fisheries. With the motorization of the fishing fleet, the efficiency and range of operation of the fleet has increased. FADs help not only to reduce searching time and fuel costs, but they also considerably increase production.

Although the aggregation of fish around FADs has been demonstrated successfully, and the merits of FAD-fishing proven, data on the cost-effectiveness of FADs are still lacking. MOFA, with the assistance of the Bay of Bengal Programme's (BOBP) regional 'Bioeconomics' project (RAS/91/006), therefore, undertook to assess and quantify the impact of FADs in tuna fishing. The project installed two FADs in two separate areas in the Maldives and closely studied the biological, economic and sociological effects of them on the fisheries and on the island communities in the two areas. The effectiveness of the two FADs was measured by comparing data collected one year before and one year after their installation. The results of the study are presented in this paper. The study was funded by the United Nations Development Programme (UNDP).

The Bay of Bengal Programme (BOBP) is a multiagency regional fisheries programme which covers seven countries around the Bay of Bengal — Bangladesh, India, Indonesia, Malaysia, Maldives, Sri Lanka and Thailand. The Programme plays a catalytic and consultative role: it develops, demonstrates and promotes new technologies, methodologies and ideas to help improve the conditions of small-scale fisherfolk communities in member countries. The BOBP is sponsored by the governments of Denmark, Sweden and the United Kingdom, and also by UNDP (United Nations Development Programme). The main executing agency is the FAO (Food and Agriculture Organization of the United Nations).

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1. *INTRODUCTION*

The use of Fish Aggregating Devices (FADs), locally called *Olivaali Kandhufathi*, has truly become a fad among the fishermen of the Maldives. More and more requests for installation of FADs are being received by the Ministry of Fisheries and Agriculture (MOFA), Government of Maldives. A similar situation with regard to FADs now exists as the one experienced when marine engines for fishing boats were first introduced in the Maldives' fisheries back in 1974. The high demand for FADs has resulted in an ongoing, countrywide FAD installation programme by MOFA.

The main reason for the success of FADs in the Maldives is their applicability to the existing fisheries. With the motorization of the fishing fleet, the efficiency and range of operation of the fleet has increased. But, as the fishery in the Maldives is based on live-bait pole-and-line fishing for tuna, the fishermen often spend a long time searching for surface-swimming schools of fish. FADs help not only to reduce searching time and fuel costs, but they also considerably increase production. FADs are, thus, proving to be a boon, especially in countries where there is a shortage of manpower in all employment sectors, including fisheries.

Experiments with FADs began in the Maldives in 1981. The first attempt was an FAO-assisted experimental project (1981-82) to study the effectiveness and demonstrate the possible use of FADs. Thereafter, the United Nations Development Programme (UNDP) sponsored the installation of ten FADs during 1985-88. From the very first trials, FADs have been a great success, the fishing around them showing a marked increase in productivity.

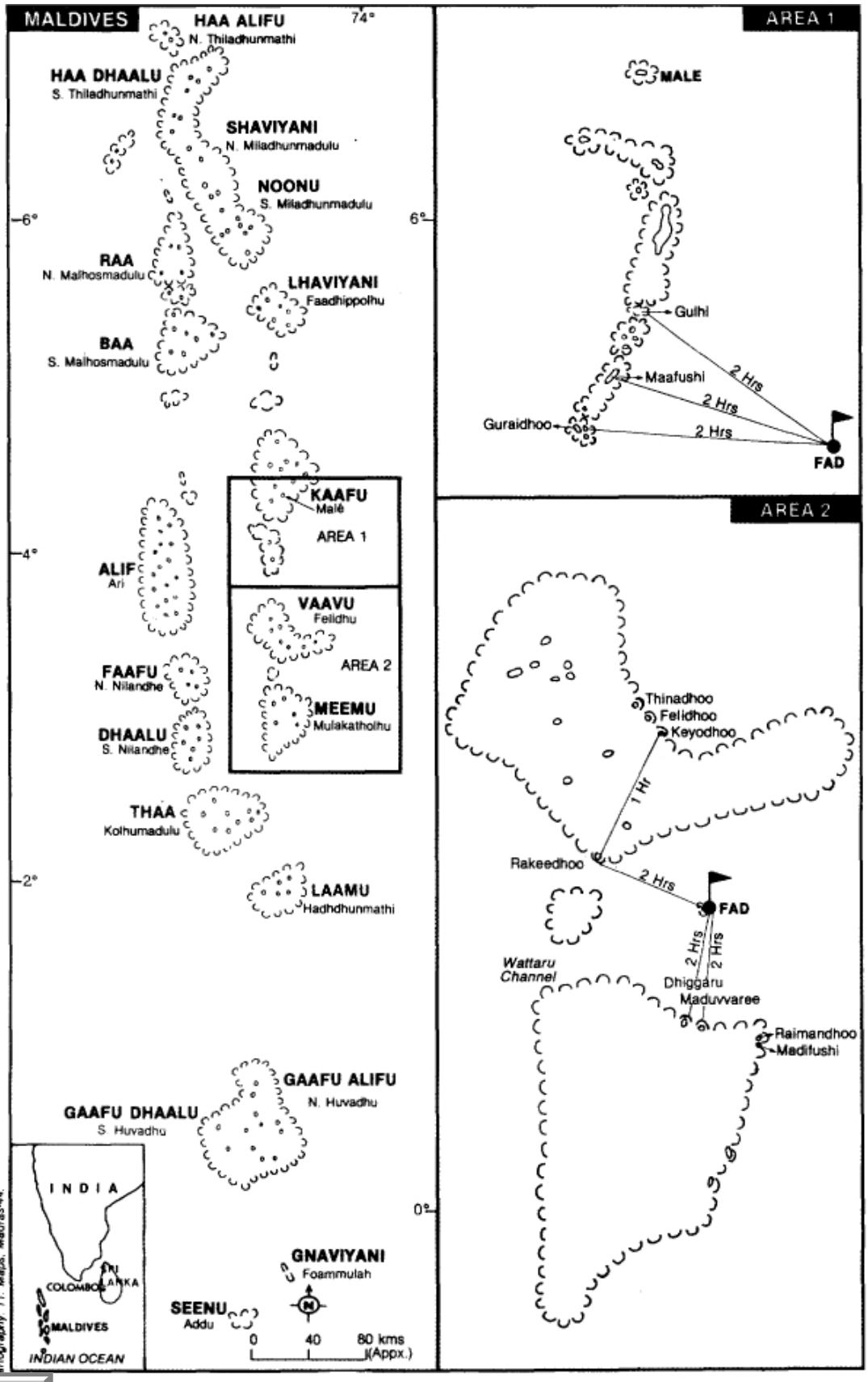
Subsequent trials with various FAD designs have resulted in the development of a reliable FAD with an expected life of at least two years. In 1988, installation of 20 of these new FADs commenced, sponsored by the Government of Maldives. Nine FADs of the improved design were in service by mid-1993 and five more were ready for installation in September 1993. The twenty FADs were expected to be in service by the end of 1993.

Fishing around all the FADs, except two, is reported to be good. Of the two units not performing well, one is installed inside the atoll rim for experimental purposes.

Fishermen have financed the installation of three FADs and many more are in the pipeline (Ali Naeem, 1990 and 1993). Fifty per cent of the cost of each FAD installed by private parties is being paid by the Government. FAD construction and maintenance are still being carried out by the 'FAD Unit' of MOFA.

Although the aggregation of fish around FADs has been demonstrated successfully, and the merits of FAD-fishing proven, data on the cost-effectiveness of FADs are still lacking. MOFA, with the assistance of the Bay of Bengal Programme's (BOBP) regional 'Bioeconomics' project (RAS/91/006), therefore, undertook to assess and quantify the impact of FADs in tuna fishing. The project installed two FADs in two separate areas in the Maldives and closely studied the biological, economic and sociological effects of them on the fisheries and on the island communities in the two areas. The effectiveness of the two FADs was measured by comparing data collected one year before and one year after their installation. The results of the study are presented in this paper.

Fig. 1. Maps showing the locations of the FADS in Areas 1 & 2 and the islands covered by the survey in the Maldives



2. *METHODOLOGY*

An area east of South Male Atoll (Area 1) and the Wattaru Channel between Meemu and Vaavu Atolls (Area 2) were selected as locations for installation of the two FADs (see Figure 1 on facing page). The following eight islands, from where fishing takes place in these two areas, were identified for the study:

Area 1: Kaafu Gulhi, Kaafu Maafushi and Kaafu Guraidhoo.

Area 2: Vaavu Keyodhoo, Vaavu Rakeedhoo, Meemu Dhiggaru, Meemu Maduvvaree and Meemu Madifushi.

The FAD in Area 1 was about two hours by fishing boat from the three islands studied and the one in Area 2 was approximately two to three hours from the five islands it served.

Eight fishermen, one from each island, were selected and trained to compile the catch and effort data. A fishing technologist, fishery biologist and technicians of MOFA were responsible for the technological and biological aspects of the survey. A socioeconomist and assistants from the same Ministry undertook the socioeconomic survey of the selected villages.

The bioeconomic survey included a preliminary analysis of the seasonal variations in catch composition and catch rates in the selected areas, using the previous five years' catch statistics from the islands being studied. The collection of data on catch composition, fishing effort, sailing time, fishing time, operational costs, price of fish, fishing location in relation to the position of the FAD, number of craft operating from each island, number of craft fishing near the FAD, number of fishing days etc. was undertaken on each island 10-15 days in a month. Costs of craft and gear were compiled by conducting interviews with fishermen and in boatyards.

The prices of fish supplied to collector vessels were available with MOFA. Prices of processed fish were collected from households processing the fish. For those craft landing their catches at the Male market, the monthly prices of fish were extracted from the records compiled by the Monetary Authority of the Maldives.

The bioeconomic survey commenced in November 1991 and continued till May 1993. With the installation of the FAD in Area 1 on May 7, 1992, and in Area 2 on October 21, 1992, the data-collection was stratified into those fishing near the FAD and those fishing away from the FAD.

The condition of the FAD, fish at the FAD, aggregation of tuna around the FAD and size composition of tuna caught near the FAD and away from the FAD were some of the on-site observations made.

The socioeconomic surveys were based on a frame survey of the islands conducted in 1991. Two surveys were conducted in both areas, one prior to and one after the installation of the FADs.

Due to limitations in manpower, the data collected did not account for all the fish caught at the two FADs. Catch data from Area l were distorted as a result of the close proximity of the FAD to the MaId fish market and also because many fishing boats from distant fishing villages came to fish around FAD 1. These boats also sold their catch at the MaId market.

A true picture of the increased fish production due to FADs was probably not achieved. For unknown reasons, aggregation of fish at FAD 2 was not good when compared to the previous experience with a FAD installed in the same area and other FADs elsewhere in the country. Only later, at the tail-end of the study, was fishing around FAD 2 sustained.

The proposed field visits to the FAD sites by personnel from MOFA could not also be made on a regular basis, as there was a shortage of personnel and those who were assigned to the study were often required to perform other duties.

As a result, the quantity and quality of data available were not adequate to reflect the actual situation. Nevertheless, using the available information, an attempt has been made here to assess the effectiveness of FADs.

2.1 *FAD specifications*

Modifications and design improvements are being constantly undertaken by the FAD unit of MOFA. The design features of the two FADs installed under the project were, thus, based on experience gained over the years in FAD development and experimentation. The two FADs installed under the project were, therefore, able to perform well during the project period, with no unaccountable causes for any FAD losses.

Apart from the design features, the method of installation and the environmental and ocean bottom conditions of the FAD site are critical for the subsequent performance and longevity of a FAD. A detailed drawing of one of the FADs in position is shown in Figure 2 on facing page.

3. ***RESULTS OF FISHING***

3.1 *Fish near and away from the FAD*

Although no distinct relationship between fish and FAD could be established in the Maldives, certain observations were made.

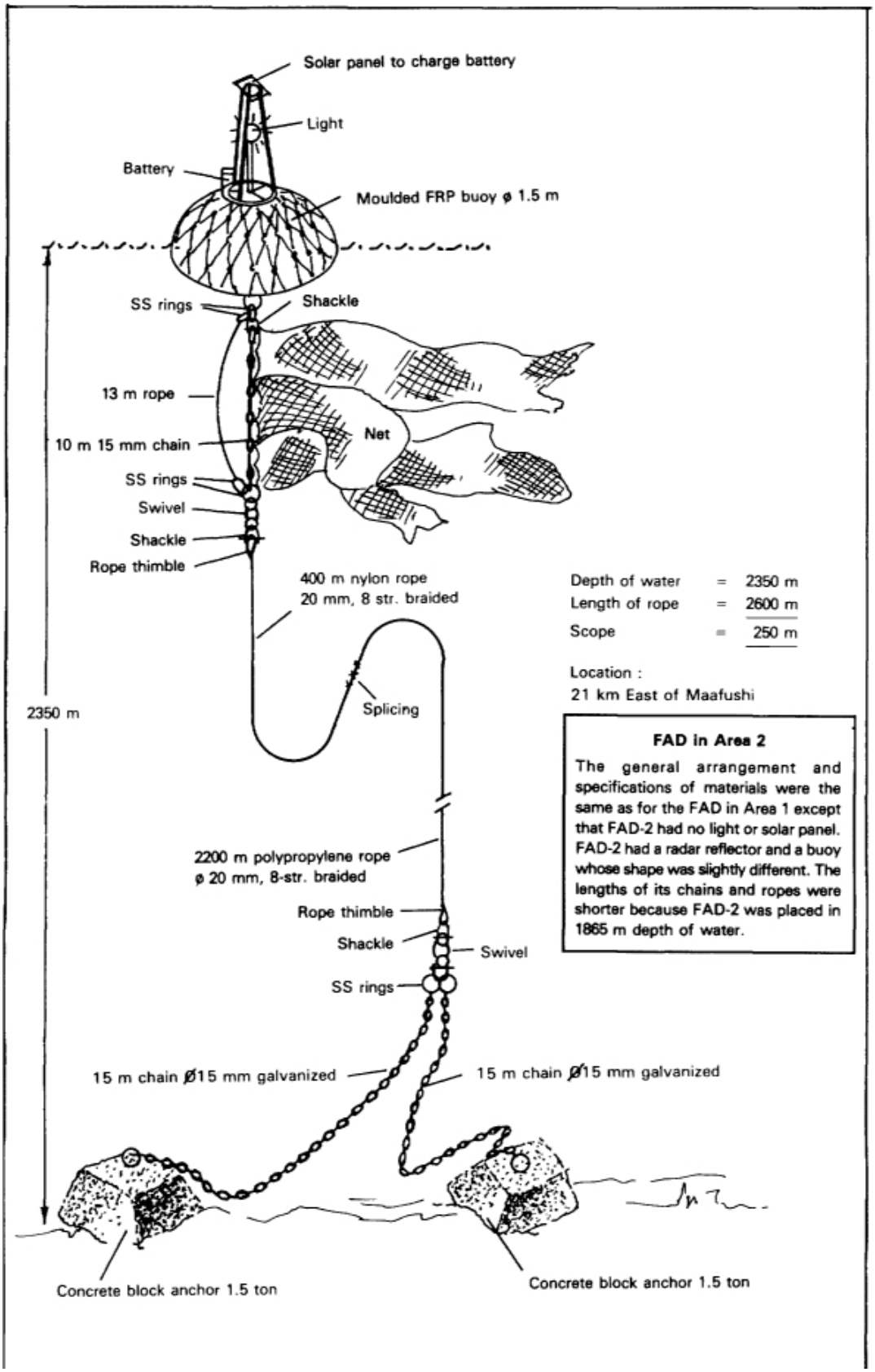
Once the FAD had 'soaked' for three to four weeks, algae and other marine organisms start to grow on the buoy appendages (bait attractor) and on the mooring rope, which, duly, began to aggregate 'baitfish' and adult pelagic fish to the FAD. Baitfish were the first to appear, often overnight, while tuna were generally on site after about three weeks. The small baitfish consisted of a variety of species, including juvenile Blue trevally *(Caranx rnelampvgus),* Rainbow runners *(Elagatis bipinnulatus)* and Triggerfish *(Canthidermis maculatus).* The larger adult fish which aggregated at the FADs included: skipjack *(K. pelamis),* yellowfin *(T. albacares),* Dolphinfish *(Coryphaena hippurus),* Rainbow runners, Frigate tuna *(A. thazard),* Little tuna *(E. affinis)* and sharks (commonly *C. falciformis).*

Baitfish proximity to the FAD appeared to be based on size, with the smaller ones remaining closest to it. The larger baitfish moved away from the FADs at times, but always returned to them. It was noted that when the FADs were affected by strong currents, the baitfish had to swim vigorously to maintain their position. They would generally position themselves along the trailing edge or sides of the bait attractor or underneath the FAD and quickly move from one side to the other. Shoals of skipjack and yellowfin appeared to stay within a radius of 500 m of the FAD. They were observed to reside on the 'shadowy' side of the FAD.

In the morning hours, fishing was done on the west side of the FAD and during the evening on the east side. It was observed that the best fishing times were invariably early in the mornings and at sunset.

Abundance of fish around FADs was observed to vary markedly, with there being no apparent pattern. It was felt that fish aggregating at a FAD sometimes moved away and aggregated to free-floating objects which passed by the FAD. This is the only conceivable explanation for their sudden disappearance at times from FADs. Past experience has shown that fish from adjacent areas are drawn to FADs, affecting non-FAD areas. Although an optimal distance between two adjacent FADs has not been determined yet, experience has indicated the existence of such an 'optimal' distance.

Fig. 2 **The FAD used In Area** 1 in **the Maldives**



3.2 *Fishing methods*

A variety of methods are used worldwide to catch commercial fish species around FADs. They include purse seining, gillnetting, trolling, longlining and pole-and-line fishing.

In the Maldives, the predominant method used for fishing is pole-and-line fishing with live bait. As the Government's policy is to discourage mass exploitation of fish and conserve the country's marine resources, there has been, since 1986, a complete ban on the use of all forms of large-scale fishing gear. The majority of Maldivian fishermen prefer using pole-and-line with live bait for tuna. They use barbless hooks, while live baitfish are chummed in conjunction with a simple spray system. Some fishermen fish around FADs by trolling or with handlines. However, these methods of fishing, close to the FADs, are also prohibited. Despite the prohibition, handlining around FADs was practised by a few fishermen. They hooked live bait and allowed the line to go down about lOm from the FAD. The majority of fish captured by this method were larger yellowfin, indicating the presence of even more valuable fish than the abundant stocks of smaller tuna found around FADs.

Field observations indicated that six to twelve *dhonis* fish around a FAD at a time, with six to eight crew members operating four to six poles on each. During fishing operations, the tuna tend to move away from the fishing craft and toward the FAD. Sometimes, frenzied large yellowfin tuna (100 cm) appeared at the surface, near the FAD, attracted by the chumming.

3.3 *Species composition of the catches*

Skipjack tuna form nearly 60 per cent of the catch in the Maldivian pole-and-line fishery and are followed by yellowfin tuna *(30-35%).* The balance is contributed by smaller tuna, Spanish mackerel etc.

Fishing for other fish is incidental and done only when tuna catches are very poor or when sea conditions are unfavourable for tuna fishing. The catch composition was analyzed for craft operating at, and away from, the FAD. Unfortunately, due to incomplete coverage of the sampling programme, the comparison could be made only for a few months of the year for most islands. It was evident, from the data available for craft from five out of six islands, that the percentages of yellowfin in the catches were higher nearer the FAD than away from it. Though larger skipjack were few in number, the percentage caught tended to be higher near the FAD than away from it, while the percentage of smaller skipjack was higher away from the FAD in four of the six islands for which comparable data were available. The percentage of other fish was higher for craft fishing away from the FAD, in almost all cases, except in Madifushi (see Table 1).

Table 1. Species composition (%) **in the pole-and-line catches near FADs (NF) and away from the FADs (AF)**

Station	*Period*		*Large skipjack*	*Small skipjack*	*Yellow-fin*	*Frigate tuna*	*Little tuna*	*Other fish*
Rakeedhoo	Dec.92 - Apr.93	AF	0.1	54.8	18.4	0.2	0.0	26.5
	Dec.92 - Feb.93	NF	1.3	45.7	46.0	0.0	0.0	7.0
Madifushi	Dec.92 - Feb.93	AF	0.0	59.7	35.6	0.0	0.5	4.2
	Dec.92 - Feb.93	NF	0.0	69.4	17.0	0.4	0.0	13.2
Dhiggaru	Dec.92 - Jan.93	AF	0.0	80.9	17.6	0.0	0.3	1.2
	Dec.92 - Jan.93	NF	0.5	68.9	30.2	0.3	0.0	0.1
Maduvvaree	Nov.92 - Mar.93	AF	0.8	95.1	0.0	2.6	0.4	1.1
	Nov.92 - Mar.93	NF	0.6	89.3	6.2	3.4	0.2	0.3
Guihi	Dec.92 - Apr.93	AF	9.3	28.3	9.6	2.7	16.5	33.6
	Dec.92 - Apr.93	NF	17.4	48.6	13.2	20.5	0.0	0.3

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3.4 *Monthly catch rates and production*

Based on the available data, comparison of the differences in the catch rate near, and away from, the FADs was done only for two to four months, depending on the island. The analysis shows that the catch rate near FADs was 4-47 per cent higher, in terms of numbers of fish, and 5-1 14 per cent higher, in terms of weight, than away from the FADs (see Table 2). This confirms that larger fish are caught near the FADs.

Table 2. Average catch rates before installation of FADs (PRE) and after installation away from FAD (AF) and near FAD (NF)

	Rakeedhoo	*Madifushi*	*Dhiggaru*	*Maduvvaree*	*Guihi*
			Fish per trip (Nos)		
PRE	161	242	327	207	126
AF	168	195	214	190	117
NF	210	121	249	199	173
NF/AF	1.25	0.62	1.16	1.04	1.47
			Fish per trip (Nos)		
PRE	356	531	726	436	258
AF	317	440	466	394	243
NF	484	248	564	417	520
NF/AF	1.53	0.56	1.21	1.05	2.14

One of the surveyed islands (Madifushi) was, however, an exception, having a lower catch rate near the FAD than away from it. This may be explained by a fact pointed out by fishermen from Madifushi: namely, their island being further from the FAD, their craft would arrive much later than the craft from such islands as Rakeedhoo, which are located very close to the FAD, and, consequently, there would be much less fish left at the FAD for them to catch. Comparable data are not available for the other islands. Details of the fleet size, number of trips per *dhoni,* catch rates and production are given in Appendix I.

3.5 Size composition of tuna species

The length-frequency sampling was poor due to catches not being landed on the islands. They were mostly taken directly to the Maid market or sold to collector vessels. The data collected on the islands were supplemented with data from a sampling programme carried out by MOFA at the Male market. As already discussed, under the species composition (Section 3.3) there were more smaller skipjack seen away from the FAD and more larger ones near the FAD, at least during certain months. Yellowfin length-frequency data were insufficient for comparison. The length-frequency distribution, based on the available data from the catches of skipjack and yellowfin near and away from the FAD, are shown in Appendix **II.**

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3.6 *Costs and earnings*

The cost of fabricating and installing the FADs in Areas I and 2 was around MRf 50,000* each (see Table 3). The cost per unit could have been somewhat reduced if large numbers had been fabricated at the same time. Cost of individual FADs could vary considerably depending on the depth of water, as the mooring rope is the most expensive component of the FAD.

During the cost and earnings analysis, it was observed that, as a result of fishing at the FAD, the cost of fuel was two-thirds the normal cost. This saving is due to the significant reduction in searching time.

As a result of this reduction in fuel cost and the increase in catch rate, the total net earnings of a craft fishing near the FAD increased by 21-127 per cent, depending on the island (see Table 4), except in the case of Madifushi. This island is an exception for reasons explained already.

The owner and crew shares also show proportionate increases. Additional net income from fishing at the FAD, per boat and per month, based only on the months for which data were available, ranged between MRf 2000 and MRf 9000 for islands around FAD 2, with higher gains for islands closer to the FAD (Appendix **III).**

In the case of craft from Gulhi fishing at FAD I, the gain in catch rate (in kg) was nearly 100 per cent compared to both the predeployment period and the time fishing away from FAD. However, gain in net income by fishing at the FAD is as high as eight times that for the same season during the predeployment period, but only 20 per cent more than that for craft fishing away from the FAD during the same period. Though Gulhi fishermen have been selling part of their catch at the Male market even before the deployment of the FAD, the relative proportion of fish sold there, compared to that processed in the island, appears to have increased very much more for craft fishing away from the FAD than for those fishing at the FAD (Appendix III).

Table 3. Cost of material, fabrication and installation of FADs 1 and 2

Quantity	*Details*	*FAD 1 (MRf)*	*FAD 2 (MRf)*
1 No	Moulded fibreglass buoy 5'dia.	8,500	8,500
150 ft	Hot dipped galvanized chain 5/8' dia.	1,500	1,500
5 Nos	Shackles (custom made)	500	500
2 Nos	Thimbles (custom made)	80	80
12 ft	Stainless steel rod 5/8" dia.	320	320
2 Nos	Swivels (stainless steel, (custom design)	200	200
1 No	Blinking light	400	400
1 No	Radar reflector	200	200
1 No	Day marker	100	100
1 Bot.	Netting (Bait attractor)	500	500
2 Nos.	Concrete block anchors (3t)	3200	3200
11 Coils	Polypropylene rope (200 m x 20 mm dia., 8 str.braided)	16,500	12,000*
2 Coils	Nylon rope (200 m x20 mm dia. 8 str. braided)	4,200	6,300**
	Miscellaneous (Paint, plastic pipe)	300	300
	Fabrication	4,000	4,000
	Installation	11,000	11,000
	TOTAL	51,500	49,100

* 8 coils ** 3 coils

The price of tuna at Male market is many times the price paid for fresh fish by collector vessels and for processed fish. This may explain the reason for the smaller difference in the net income for craft fishing at and away from the FAD. Further, comparing the net income for craft operating

* US $ 1 = MRf 11 (appx.)

Table 4. Incomes before installation of FADs (PRE) and after installation, away from FAD (AF) and near FAD (NF)

	Rakeedhoo	*Madifushi*	*Dhiggaru*	*Maduvvaree*	*Guihi*
			Boar net income (MRf)		
PRE	7464	9623	13607	10920	17006
AF	7148	9173	11111	9529	113251
NF	16229	4109	17416	11483	138608
NF/AF	2.27	0.44	1.56	1.21	1.22
			Owner income		
PRE	1659	2319	4118	2896	4430
AF	1501	2102	2982	2140	52553
NF	6041	— 609	5851	3152	65231
NF/AF	4.03	— 0.29	1.96	1.47	1.24
			Crew income		
PRE	498	554	689	676	1098
AF	495	584	613	561	7157
NF	1110	269	961	702	8724
NF/AF	2.24	0.46	1.57	1.25	1.22

from various islands (see Table 4), it is evident that the earnings of the craft from Gulhi are far greater than those of other islands actively fishing around FADs but not selling significant quantities at the Male market. In view of the limitations in the data collected, these results should be accepted with caution.

With the average gain in monthly net income (Rf 5,000) per boat from FAD 2, and assuming that about ten craft can fish efficiently around the FAD and that it is functional for two years, the cost of the FAD can be met by providing only about 5 per cent of the gain in net income.

4. SOCIOECONOMIC CONDITIONS IN THE ISL4NDS

The eight islands, in the two areas surveyed, have a total population of 5,012 in 660 households (see Table 5).

Table 5. Distribution of households and population of mechanized craft in operation

Atoll & island	*Households*	*Population*
Area 1		
K. Gulhi	75	505
K. Guraidhoo	161	1007
K. Maafushi	105	779
Total	341	2291
Area 2		
V. Keyodhoo	58	566
V. Rakeedhoo	37	337
M. Dhiggaru	122	1050
M. Maduvvaree	77	590
M. Madifushi	25	178
Total	319	2721

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About 90 per cent of the households would appear to be engaged in fishing, according to the sampling, twentyfive (25) per cent of the households own craft, while 65 per cent of them have members working as crew on board fishing craft. Details are given in Table 6. The information was gathered during the frame survey.

Table 6. Distribution of sample households into different income-earning categories (a pre-installation scenario)

Households (HHs) sampled in selected islands	*No.*	*% of total no of households*	*Owner HHs earning income from fishing and other sources*	*Owner HHs earning income from fishing only*	*Crew HHs earning income from fishing and other sources*	*Crew HHs earning income from fishing only*	*Non-fishing HHs*	*No. of mechanized P & L craft operating*
Area 1								
K. Gulhi	29	(39)	6	2	9	9	3	8
K. Guraidhoo	38	(24)	6	2	15	6	9	8
K. Maafushi	27	(26)	3	3	14	6	1	6
Total	94	(28)	15	7	38	21	13	22
Area 2								
V. Keyodhoo	33	(50)	2	6	14	9	2	8
V. Rakeedhoo	22	(57)	4	3	9	4	2	7
M. Dhiggaru	27	(22)	7	1	12	7	-	8
M. Maduvvaree	29	(38)	5	4	9	11	-	9
M. Madifushi	12	(56)	1	2	7	2	-	3
Total	123	(39)	19	16	51	33	4	35

4. 1 *Income*

In relative terms, income from fishing is more important to owners than to crew. For the former, 50-100 per cent of the total income is derived from fishing, as against 40-70 per cent for the crew (see Table 7). Further survey data on income of different categories and occupations are given in Appendix IV. It should, however, be noted that there are certain discrepancies in this data due to the conditions on the ground.

Information on the various kinds of income-generating activities undertaken by members of different household categories is presented

Table 7. Percentage of total earnings derived from fishing

	Craftowners (% earnings)	*Crew (% earnings)*
Area 1		
K. Gulhi	69	41
K. Guraidhoo	98	48
Area 2		
V. Keyodhoo	132	69
V. Rakeedhoo	75	41
M. Dhiggaru	68	45
M. Maduvvaree	70	72
M. Madifushi	49	70

in Table 8. In both areas the average number of income-earners per household is two. The highest number of income-earners per household is observed in households which derive their income from fishing as well as other activities.

Table 8. Number of persons by occupation

Households sampled (category)	*No.*	*Fishing*	*Govt. service*	*Needle-work*	*Mid-wifery*	*Shop-keeping*	*Car-pentry*	*Mas-onry*	*Agri-culture*	*Tourist industry*	*Merchant seaman*	*Working in Mali*	*Others*
Area 1*													
Craft-owner — income from fishing and other sources	15	12	5	1	1	8	2	-	1	4	-	-	
Craft-owner — income from fishing only	7	12		-	-	-	-	-	-	-			
Crew—income from fishing and other sources	38	47	16	4	4	9	3	3	1	4	2	2	8
Crew — income from fishing only	21	24	-				-	-	-	-	-	-	-
Nonfishing	13	-	7	-	-	7	3	-	-	5	1	1	4
Total	**94**	95	28	5	5	24	8	3	2	**13**	**3**	**3**	**13**
Area 2**													
Craft-owner — income from fishing and other sources	19	20	19	-	1	2	-	-	-	-	-	6	2
Craft-owner — income from fishing only	16	17	-	-	-	-	-	-	-	-	-	-	-
Crew — income from fishing only	51	85	12	2	-	2	-	-	6	22	2	3	-
Crew — income from fishing only	33	58	-	-	2	-	-	-	-	-	-	-	4
Nonfishing	4	-	2	1	1	-	1	-	-	-	-	3	4
Total	123	180	33	3	4	4	1	0	6	22	2	12	10

* Avg. no. of members/household: 7; ** Avg. no, of members/household: 9

Fish-processing is being carried out in Area 2, but the actual number of individuals engaged in this activity could not be reliably estimated because of the part-time nature of the enterprise. Fish-processing is mainly undertaken by women, whilst subsequent marketing is carried out by men.

The development of tourism has created new employment opportunities in both areas.

Estimates of the average monthly income (MRf/month) from some of the nonfishery activities are listed in the box alongside.

	MRf
Government service	400 - 1000
Needlework	100 - 250
Shopkeeper	1000 - 3000
Carpentry	1000 - 2000
Masonry	500 - 1000
Agriculture	250 - 300
Work in tourist resorts	800 - 2000
Working in Male	1000 - 2000

<<

4.2 *Assets*

All the households in the sample own their dwellings. Coral stone is generally used as building material and there is no significant difference in housing standards.

Twentythree (23) per cent of the households surveyed in Area 1 and 28 per cent in Area 2 are owners of motorized fishing craft, valued at approximately MRf 150,000 each.

Almost all households have at least one radio. To a lesser extent, the households are also owners of sewing machines, televisions, video recorders and bicycles, particularly in Area I (see Table 9 on facing page).

The data reveal that it is more common to save in households in Area 1. The total amount of savings there is higher than in Area 2. The number of households in debt is not high in both areas (see Table 10 on facing page).

In Area 1, savings are used mainly for purchase of consumer goods. This is due to its proximity to Male. Savings in Area 2 are perceived as security for unexpected future expenditure unfavourable fishing conditions, lean fishing seasons etc.

4.3 *Changes due to installation of FADs*

The post-installation survey was conducted in April 1993, ten months after installation in Area 1 and six months after installation in Area 2. These time periods are probably not long enough to assess the impact, if. any, on the socioeconomic conditions of the fisherfolk concerned. However, as already shown in Section 3.6, the FADs had varying degrees of influence on the cost and earnings of the fisheries and there were consequent changes in income accruing to owners and crew.

4.4 Attitudes and responses of fisherfolk to the introduction of FADs

Almost 60 per cent of the craft-owners stated that they fished regularly at the FADs. The others declared that they fished at the FADs irregularly. The fishermen fishing at the FADs stated that they saved searching time and fuel cost. They also confirmed that their incomes had increased.

Some fishermen at Gulhi complained that the FAD was located too far away; that the engine power their craft had was insufficient for them to travel, first, southwards to the FAD and, then, northwards to Male which they had to reach in time if they were to obtain a good price for their catch.

A number of fishermen in Area 2 said that sufficient fish did not aggregate round the FAD. Some felt that the FAD was too small to properly aggregate fish. A few other fishermen expressed reluctance to fish at the FAD, alleging that some of their fellow-fishermen used a baitfish which turned away tuna. The 'Silverline' baitfish that these fishermen used are unusually bony and appear not to attract tuna.

No reports of any conflicts in fishing at the FAD were received and no attempts made to damage the FADs.

There was no change in the number of crew members for fishing at the FADs.

All craft-owners expressed willingness to contribute to installation, repair and maintenance of FADs.

The majority of fisherfolk perceived the FADs as belonging to MOFA, but a few felt that the FADs were common property.

The survey showed that fisherfolk in both areas had been aware of the plans to instal FADs. The majority had heard it on the radio, while the others had been informed by MOFA staff. Extension material on the design, fabrication and deployment of FADs had been prepared in the local language and distributed among fisherfolk, with the aim of improving their capability to fully participate in the entire process.

5. *MAJOR FINDINGS*

- The income of both craft-owners and crew members in six out of the eight islands surveyed has increased since the two FADs were deployed, but the level of increase varies a lot from one island to another.

- FAD 1 has performed better than FAD 2. The poor performance of the latter, it has been suggested, has been due to the use of 'Silverline' as bait fish near the FAD. According to the fishermen, this baitfish is unusually bony and tuna possibly find them indigestible.

- Fishermen found that fishing at a FAD saved time and reduced fuel cost by as much as a third.

- Tuna fishermen are willing to contribute towards fabrication and deployment of FADs. The number of individuals who have contributed financially to FAD installations is growing.

- Only a small percentage of the gain in household income, per annum, is required to fabricate and instal a FAD.

- The only limitation to the execution of the FAD programme in the Maldives is manpower.

Table 9. Assets according to type of households

Households sampled (category)	*(No)*	*House (%)*	*Gene-rator (%)*	*Sewing machine* (%)	*Radio* (%)	*Tele-vision* (%)	*Video* (%)	*Bi-cycle* (%)
Area 1								
Craft-owners — income from fishing and other sources	15	100	40	100	133	73	40	33
Craft-owners — income from fishing only	7	100	14	100	171	43	43	57
Crew — income from fishing and other sources	38	100	5	60	92	34	15	15
Crew — income from fishing only	21	100	0	38	76	24	14	14
Nonfishing	13	100	8	100	192	54	38	38
Total	94	100	11	70	115	41	24	24
Area 2								
Craft-owners — income from fishing and other sources	19	100	10	95	95	16	16	5
Craft-owners — income from fishing on1y	16	100	6	62	94	6	6	—
Crew — income from fishing and other sources	51	100	4	35	100	*4*	2	2
Crew — income from fishing only	33	100	24	24	103	—	—	—
Nonfishing	4	100	–	50	50	–	–	—
Total	123	100	11	46	98	5	3	2

Table 10. Percentage of households with savings and in debt

Households (HHs) sampled (category)	*No.*	*% of HHs with savings*	*Average amount of savings (MRf)*	*% of HHs in debt*	*Average amount of debt (MRf)*
Area 1*					
Craft-owners — income from fishing and other sources	15	87	8045	13	5400
Craft-owners — income from fishing only	7	86	12,876	14	16,000
Crew — income from fishing and other sources	38	53	7516	5	600
Crew — income from fishing only	21	48	2840	5	600
Nonfishing	13	62	12,777	0	0
Total	94	61		6	—
Area 2**					
Craft-owners — income from fishing and other sources	19	53	11,985	5	40,000
Craft-owners — income from fishing only	16	31	9400	0	0
Crew — income from fishing and other sources	51	39	1828	4	300
Crew — income from fishing only	33	33	1463	3	600
Nonfishing	4	2	25,000	0	0
Total	123	38		3	—

* Avg. no. of members/household 7; Avg. no. of members/household 9

<<

APPENDIX I

Catch rates and production before and after deployment of FADs

Fishing gTound		Sample trips	Sample catch (number)	Sample catch rate (number)	Sample calch (kg)	Sample catch rate (kg)	Produc- lion (number)	Produc- lion (kg)	Number of dhonis	Total trips	Trips dhoni
Keyodhoo											
	Nov-91	50	8632	172.64	16256	325.11	18127	34137	7	105	15
	Dec-91	25	4418	176,72	7892	*315.66*	12017	21465	7	68	10
	Jan-92	39	15489	397.15	34128	875.07	32169	70880	7	81	12
	Feb-92	50	10005	200.10	21626	432.52	27814	60120	8	139	17
Pre-	Mar-92	49	8343	170.27	18188	371.18	27072	59018	7	159	23
deployment	Apr-92	25	4404	176,16	9419	376.78	24310	51995	8	138	17
	May-92	36	7129	198.03	16645	462.36	22773	53172	6	115	19
	Jun-92	64	10944	171.00	30730	480.16	17271	48496	7	101	14
	Jul-92	14	3974	283.86	7524	537.46	17315	32785	7	61	9
	Aug-92	26	11564	444.77	21419	823.82	32913	60963	6	74	12
	Sep-92	24	9523	396.79	19143	797.64	37695	75776	7	95	14
	Oct-92	47	10379	220.83	22995	489.26	18108	40120	7	82	12
	Nov-92	17	7644	449.65	15483	910.76	44515	90165	6	99	17
	Dec-92	7	3193	456.14	7201	1028.69	38316	86410	6	84	14
Post-	Jan-93	31	10492	338.45	24218	781.23	24030	55467	7	71	10
deployment	Feb-93	5	1116	223.20	2261	452.12	17410	35265	8	78	10
	Mar-93	71	12461	175.51	27074	381.33	27730	60249	7	158	23
	Apr-93	34	8528	250.82	10740	315.88	28594	36010	6	114	19
	May-93	-	-	-	-	-	-	-	-	-	-
Rakeedhoo											
	Nov-91	-	-	-	-	-	-	-	-	-	-
	Dec-91	5	650	130.00	1453	290.65	4290	9591	6	33	6
	Jan-92	46	6747	146.67	14812	321.99	9680	21251	6	66	11
	Feb-92	52	10771	207.13	23783	457.37	11185	24698	5	54	11
	Mar-92	40	9739	243.48	20974	524.36	12661	27267	6	52	9
Pre-	Apr-92	23	2208	96.00	4945	214.99	4032	9030	5	42	8
deployment	May-92	76	13951	183.57	31312	412.00	14502	32548	5	79	16
	Jun-92	58	8901	153.47	25661	442.43	9054	26103	6	59	10
	Jul-92	51	4502	88.27	11415	223.82	8739	22159	6	99	17
	Aug-92	65	15045	231.46	25426	391.17	20600	34814	6	89	15
	Sep-92	45	8951	198.91	17634	391.87	10144	19986	5	51	10
	Oct-92	47	6459	137.43	12621	268.54	7009	13696	5	51	10
	Nov-92	-	-	-	-	-	-	-	-	-	-
	Dec-92	22	6254	284.27	14631	665.06	19899	46554	5	70	14
	Jan-93	31	5832	188.13	14253	459.76	7713	18850	4	41	10
At FAD	Feb-93	32	5034	157.31	10482	327.55	9596	19981	5	61	12
	Mar-93	-	-	-	-	-	-	-	-	-	-
	Apr-93	-	-	-	-	-	-	-	-	--	
	May-93	-	-	-	-	-	-	-	-	-	-
	Nov-92	46	6954	151.17	13879	301.72	8163	16293	5	54	11
	Dec-92	41	8011	195.39	15399	375.59	13677	26291	5	70	14
Away from	Jan-93	1	69	69.00	131	130.90	2829	5367	4	41	10
FAD	Feb-93	5	1206	241.20	2225	445.02	14713	27146	5	61	12
	Mar-93	-	-	-	-	-	-	-	-	-	-
	Apr-93	-	-	-	-	-	-	-	-	-	-
	May-93	-	-	-	-	-	-	-	-	-	-

Appendix I *(contd.)*

Fishing ground		*Sample trips*	*Sample catch (number)*	*Sample catch rate (number)*	*Sample catch (kg)*	*Sample catch rate (kg)*	*Production (number)*	*Production (kg)*	*Number of* dhonis	*Total trips*	*Trips* dhoni
Madifushi											
	Nov-91	15	757	50.47	1497	99.81	1161	2296	2	23	12
	Dec-91	21	3943	187.76	8558	407.50	2816	6113	2	15	8
	Jan-92	12	4469	372.42	9878	823.16	4841	10701	2	13	7
Pre-	Feb-92	6	1003	167.17	2180	363.28	3343	7266	2	20	10
deployment	Mar-92	4	373	93.25	757	189.20	373	757	2	4	2
	Apr-92	16	1386	86.63	2965	185.31	1559	3336	2	18	9
	May-92	38	4668	122.84	12084	318.01	4791	12402	2	39	20
	Jun-92	16	5559	347.44	11526	720.37	6254	12967	2	18	9
	Jul-92	24	4962	206.75	11744	489.33	5996	14190	2	29	15
	Aug-92	20	2275	113.75	5047	252.35	2616	5804	2	23	12
	Sep-92	13	3146	242.00	3058	235.20	3388	3293	2	14	7
	Oct-92	17	1140	67.06	2161	127.09	1207	2288	2	18	9
	Nov-92	-	-	-	-	-	-	-	-	-	-
	Dec-92	8	1172	146.50	2506	313.21	2930	6264	2	20	10
	Jan-93	2	233	116.50	447	223.65	932	1789	2	8	4
At FAD	Feb-93	7	701	100.14	1447	206.66	1803	3720	2	18	9
	Mar-93	-	-	-	-	-	-	-	-	-	-
	Apr-93	-	-	-	-	-	-	-	-	-	
	May-93	-	-	-	-	-	-	-	-	-	-
	Nov-92	28	5854	209.07	11771	420.40	6481	13032	2	31	16
	Dec-92	7	2290	327.14	5348	764.06	6543	15281	2	20	16
Away from	Jan-93	4	136	34.00	292	73.03	272	584	2	8	4
FAD	Feb-93	9	2006	222.89	4334	481.51	4012	8667	2	18	9
	Mar-93	18	1194	66.33	2381	132.30	1526	3043	2	23	12
	Apr-93	5	492	98.40	1008	201.64	1378	2823	2	14	7
	May-93	-	-	-	-	-	-	-	-	-	-
Dhiggaru											
	Nov-91	46	10659	231.72	23213	504.63	36843	80236	11	159	14
	Dec-91	32	11987	374.59	26616	831.76	33713	74859	12	90	8
	Jan-92	36	10026	278.50	22272	618.67	27850	61867	12	100	8
Pre-	Feb-92	-	-	-	-	-	-	-	-	-	-
deployment	Mar-92	-	-	-	-	-	-	-	-	-	-
	Apri-92	-	-	-	-	-	-	-	-	-	-
	May-92	91	18168	199.65	41633	457.51	41527	95162	12	208	17
	Jun-92	75	11464	152.85	29192	389.23	12687	32306	12	83	7
	Jul-92	64	11054	172.72	23415	365.86	13127	27805	12	76	6
	Aug-92	148	43667	295.05	58744	396.92	54289	73034	12	184	15
	Sep-92	160	55356	345.98	66953	418.46	55702	67372	12	161	13
	Oct-92	80	15017	187.71	28814	360.18	27218	52226	12	145	12
	Nov-92	-	-	-	-	-	-	-	-	-	-
At FAD	Dec-92	4	1278	319.50	2844	710.95	44730	99533	11	140	13
	Jan-93	31	5523	178.16	12923	416.88	15678	36685	11	88	8
	Feb-93	-	-	-	-	-	-	-	-	-	-
	Mar-93	-	-	-	-	-	-	-	-	-	-
	Apr-93	-	-	-	-	-	-			-	-
	May-93	-	-	-	-	-	-	-	-	-	-
Away from	Nov-92	130	22092	169.94	45456	349.66	27360	56296	12	161	13
FAD	Dec-92	94	26672	283.74	56485	600.90	39724	84126	11	140	13
	Jan-93	47	6771	144.06	15492	329.62	12678	29006	11	88	8
	Feb-93	-	-	-	-	-	-	-	-	-	-
	Mar-93	-	-	-	-	-	-	-	-	-	-
	Apr-93	-	-	-	-	-	-	-	-	-	-
	May-93	-	-	-	-	-	-	-	-	-	-

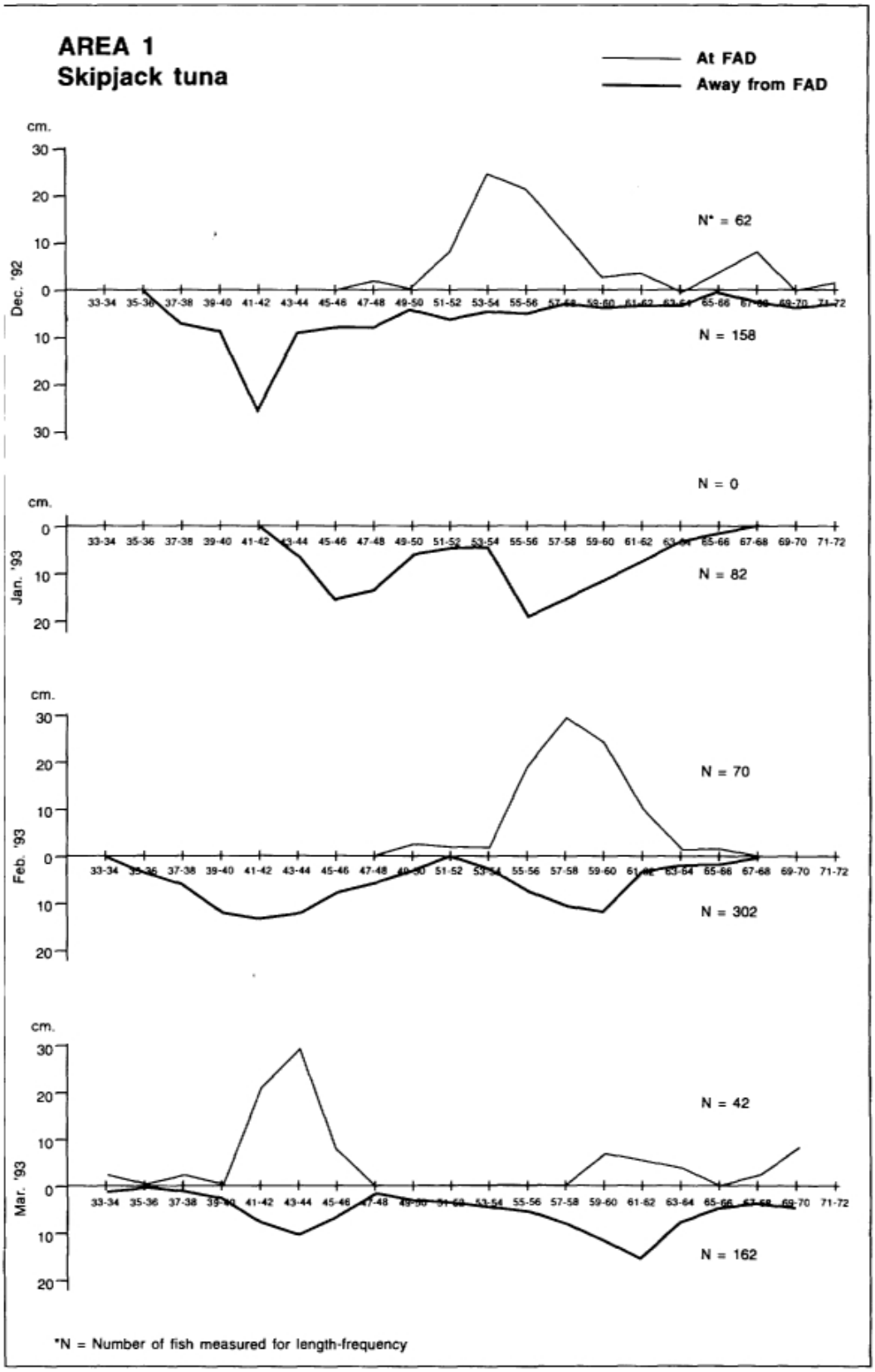
Appendix I *(contd.)*

Fishing ground		*Sample trips*	*Sample catch (number)*	*Sample catch rate (number)*	*Sample catch (kg)*	*Sample catch rate (kg)*	*Production (number)*	*Production (kg)*	*Number of dhonis*	*Total trips*	*Trips dhoni*
Maduvvaree											
	Nov-91	5	1282	256.40	2692	538.44	31794	66767	10	124	12
	Dec-91	26	5597	215.27	11992	461.24	23680	50736	10	110	11
	Jan-92	61	10315	169.10	21587	353.89	17079	35742	10	101	10
Pre-	Feb-92	144	24036	166.92	51688	358.94	25538	54918	10	153	15
deployment	Mar-92	160	30055	187.84	62224	388.90	32121	66501	10	171	17
	Apr-92	111	15806	142.40	34597	311.68	165.18	36155	10	116	12
	May-92	163	25378	155.69	61891	379.70	26156	63789	10	168	17
	Jun-92	59	8049	136.42	20219	342.70	12415	31186	10	91	9
	Jul-92	111	17786	160.23	39907	359.52	17466	39188	10	109	11
	Aug-92	128	31588	246.78	37677	294.35	30601	36499	10	124	12
	Sep-92	135	38124	282.40	45951	340.38	39818	47993	10	141	14
	Oct-92	110	15475	140.68	29176	265.24	17445	32889	10	124	12
	Nov-92	121	21891	180.92	45164	373.26	25690	53002	10	142	14
	Dec-92	85	22940	269.88	48300	568.24	27258	57392	10	101	10
	Jan-93	29	5147	177.48	11774	405.99	12246	28013	8	69	9
	Feb-93	39	8042	206.21	17073	437.76	19383	41150	9	94	10
At FAD	Mar-93	37	6155	166.35	11842	320.04	24121	46406	10	145	15
	Apr-93	12	2099	174.92	4408	367.33	20465	42977	10	117	12
	May-93	-	-	-	-	-	-	-	-	-	-
	Nov-92	3	322	107.33	654	218.07	15241	30965	10	142	14
	Dec-92	8	1339	167.38	2784	347.99	16905	35147	10	101	10
	Jan-93	1	337	337.00	708	707.70	23253	48831	8	69	9
Away from	Feb-93	-	-	-	-	-	-	-	-	-	-
FAD	Mar-93	17	2506	147.41	5141	302.42	21375	43851	10	145	15
	Apr-93	-	-	-	-	-	-	-	-	-	-
	May-93	-	-	-	-	-	-	-	-	-	-
Gulhi											
	Nov-91	93	13834	148.75	24245	260.70	21123	37020	9	142	16
	Dec-91	139	18937	136.24	37063	266,64	21526	42129	10	158	16
	Jan-92	88	11228	127.59	20183	229.35	18118	32568	10	142	14
Pre-	Feb-92	60	7168	119.47	14587	243.12	16009	32578	9	134	15
deployment	Mar-92	88	10635	120.85	25745	292.55	20061	48564	8	166	21
	Apr-92	-	-	-	-	-	-	-	-	-	-
	May-92	-	-	-	-	-	-	-	-	-	-
	Jun-92	-	-	-	-	-	-	-	-	-	-
	Jul-92	-	-	-	-	-	-	-	-	-	-
No data	Aug-92	-	-	-	-	-	-	-	-	-	-
	Sep-92	-	-	-	-	-	-	-	-	-	-
	Oct-92	-	-	-	-	-	-	-	-	-	-
	Nov-92	-	-	-	-	-	-	-	-	-	-
	Dec-92	32	6277	196.16	14870	464.69	26677	63198	8	136	17
	Jan-93	83	18191	219.17	56843	684.85	40985	128068	10	187	19
At FAD	Feb-93	79	11326	143.37	47079	595.94	23942	99521	10	167	17
	Mar-93	134	17744	132.42	44781	334.19	26748	67506	10	202	20
	Apr-93	2	475	237.50	450	225.00	47975	45450	10	202	20
	May-93	-	-	-	-	-	-	-	-	-	-
	Dec-92	19	1296	68.21	1902	100.10	9277	13614	8	136	17
	Jan-93	40	4357	108.93	6405	160.13	20369	29943	10	187	19
Away from	Feb-93	25	3934	157.36	9966	398.64	26279	66573	10	167	17
FAD	Mar-93	31	4176	134.71	9628	310.59	27211	62740	10	202	20
	Apr-93	126	16806	133.38	25240	200.32	26943	40464	10	202	20
	May-93	100	10455	104.55	157.80	157.80	17355	26194	11	166	15

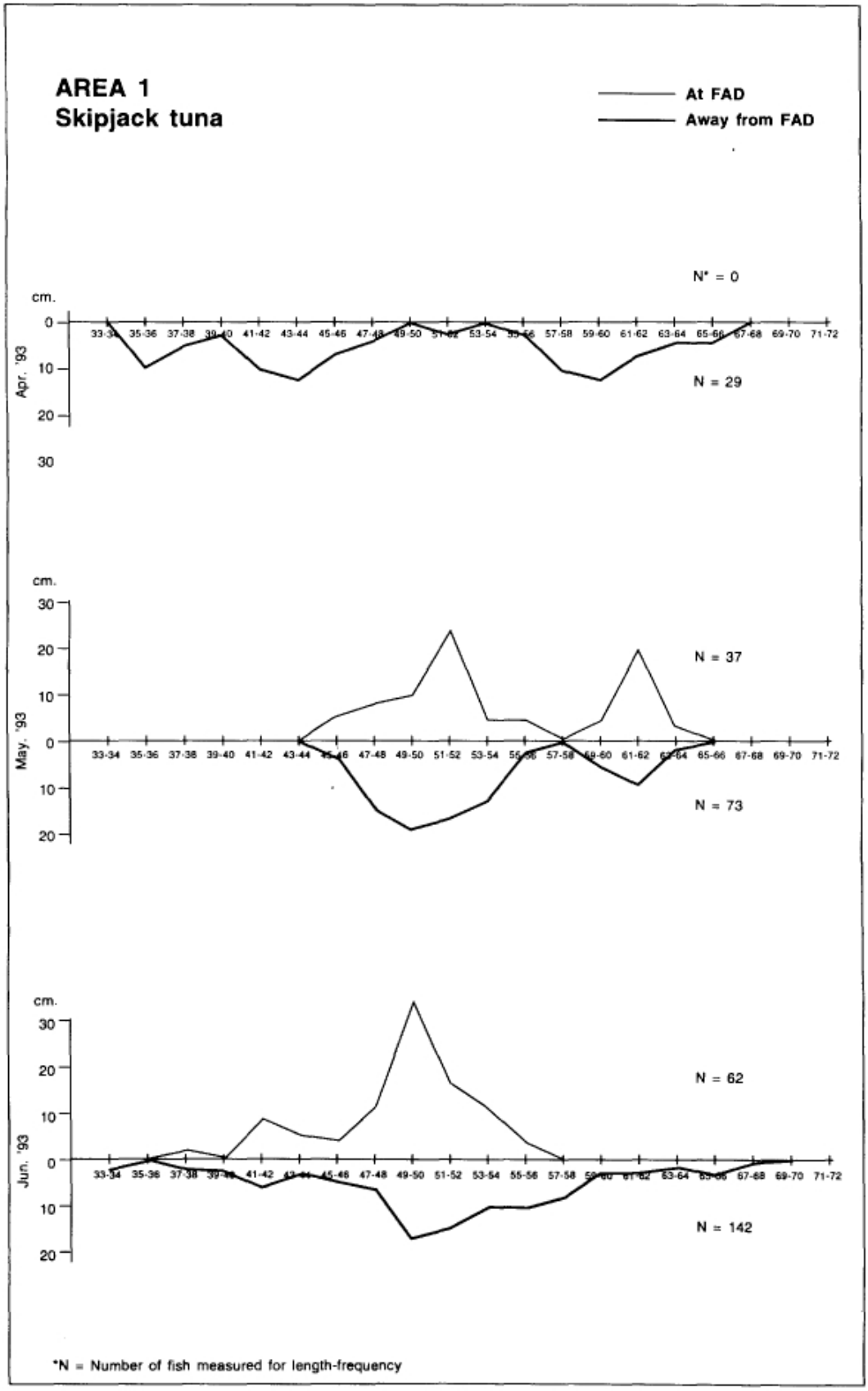
<<

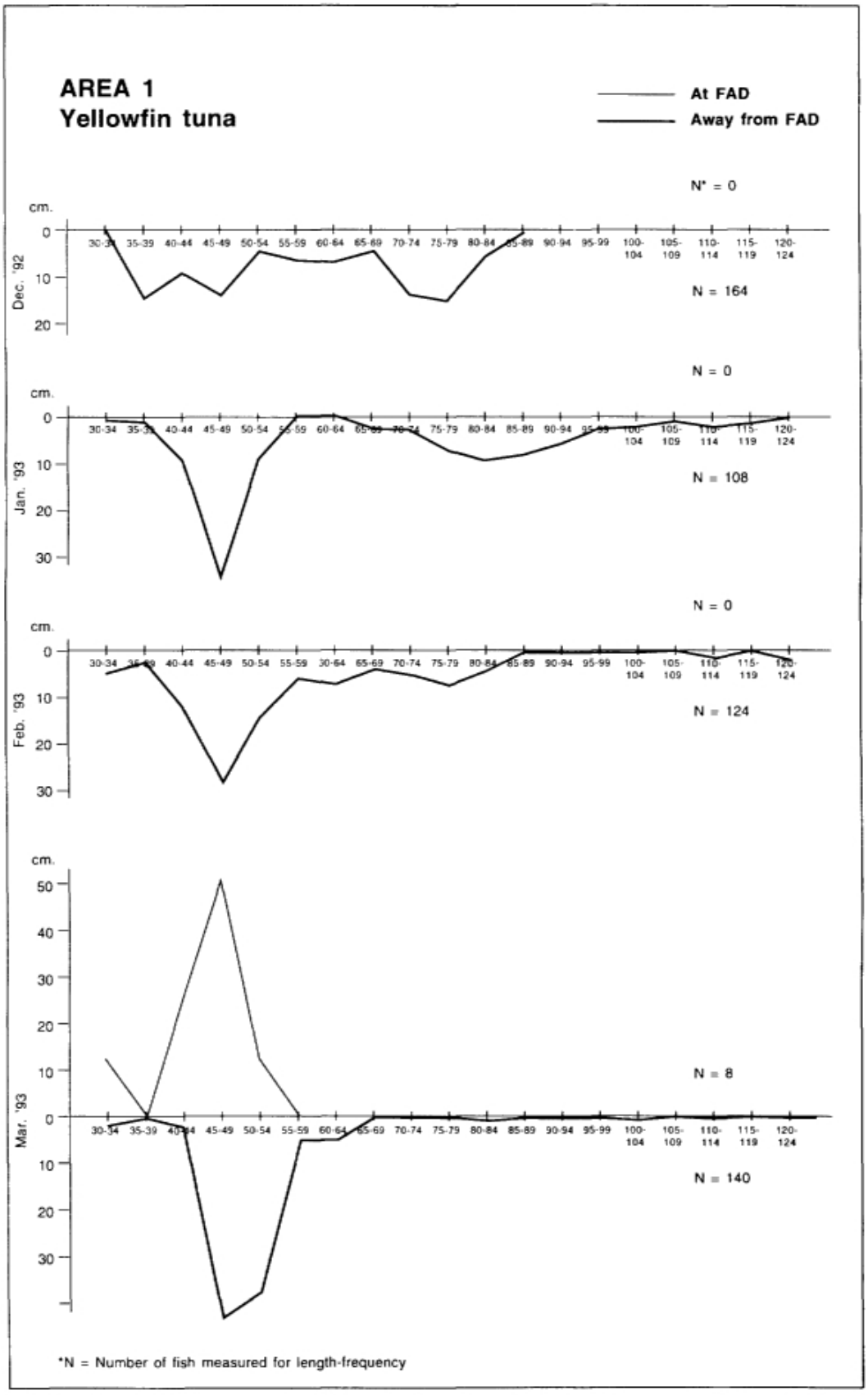
APPENDIX II

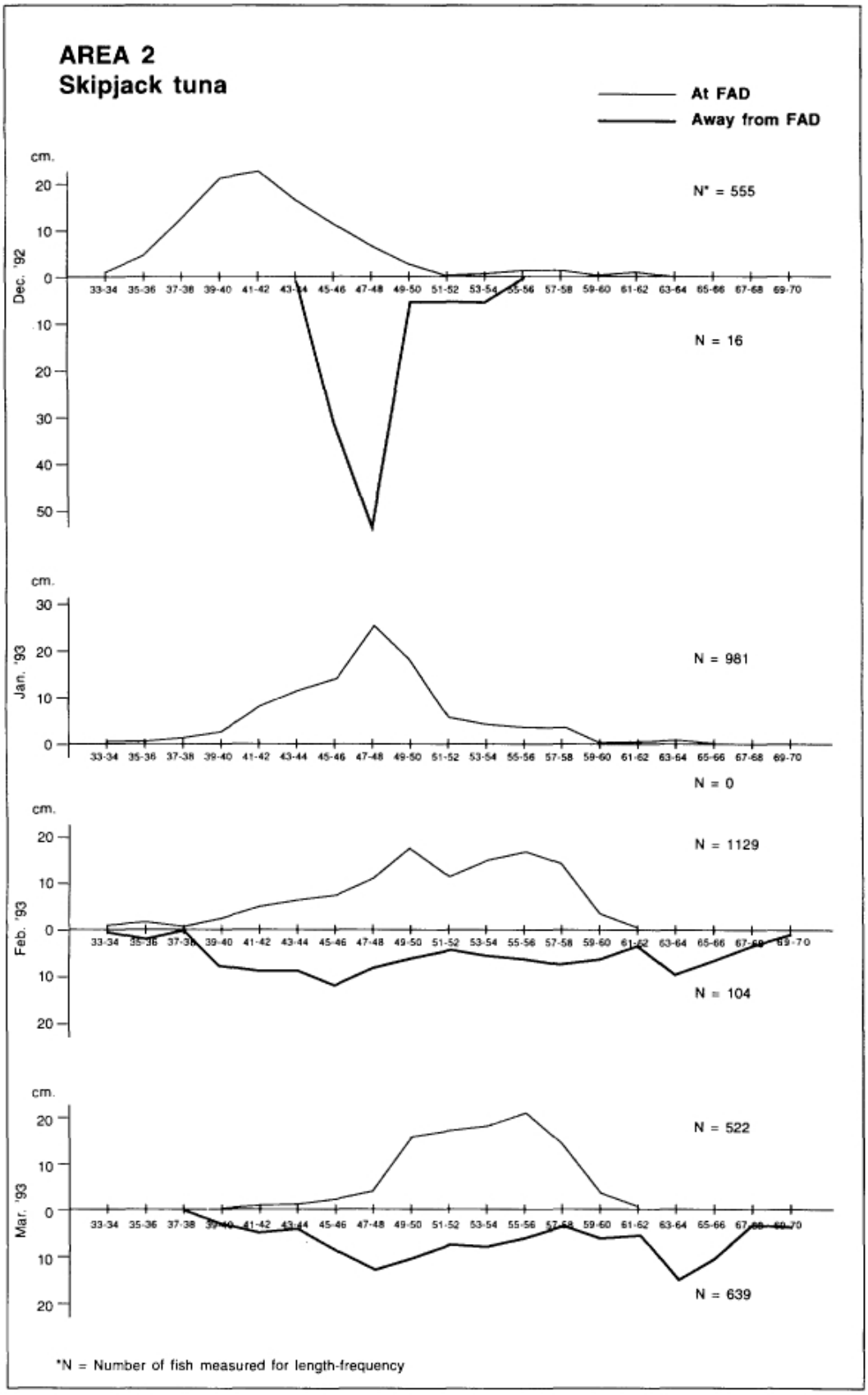
Length-frequency distribution of Skipjack tuna and Yellowfin tuna near FAD and away from FAD, in Areas 1 and 2

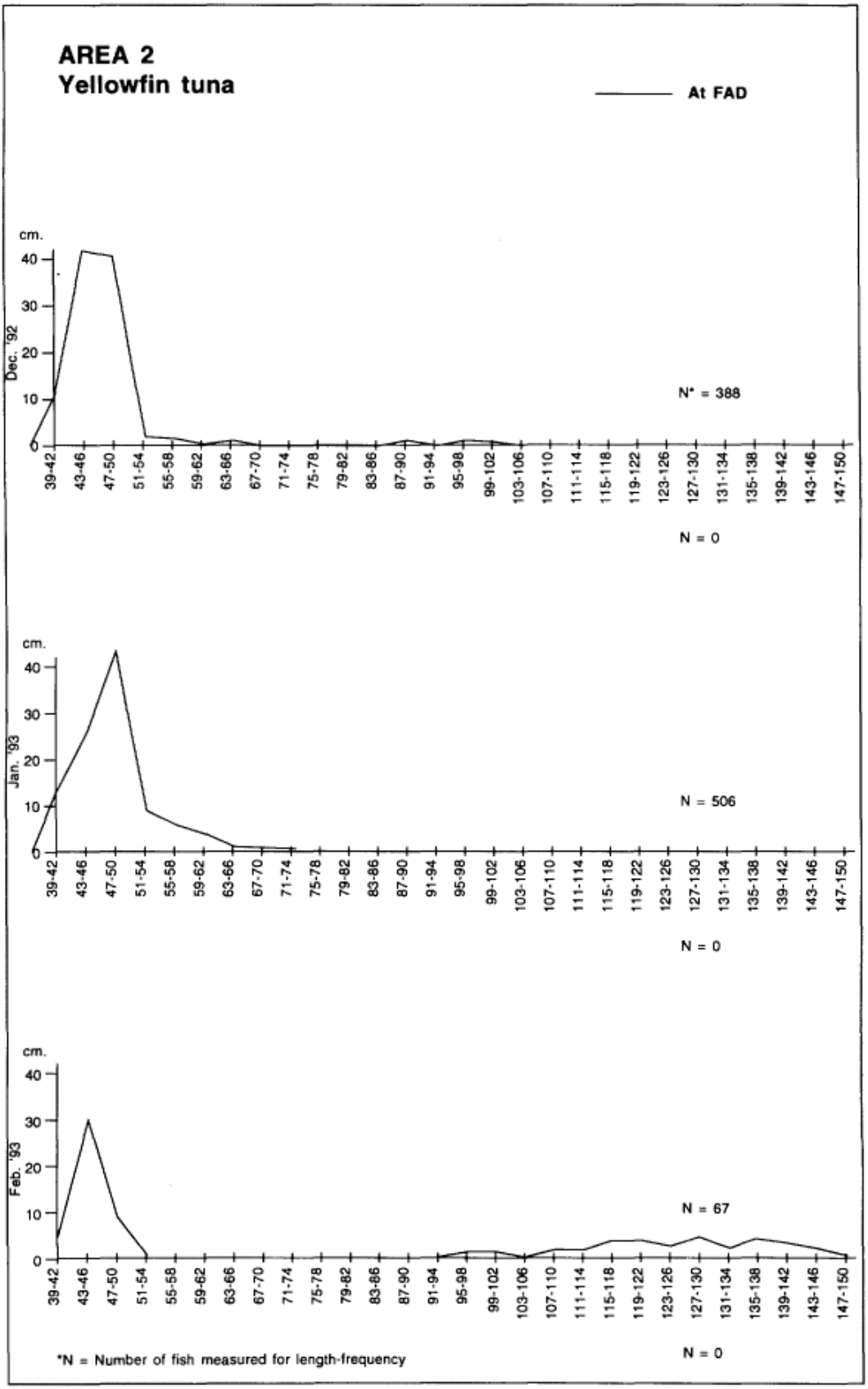


APPENDIX II *(continued)*




AREA 1
Yellowfin tuna
At FAD
Away from FAD
N* = 0
cm.
Dec. '92
N = 164
N = 0
Jan. '93
N = 108
N = 0
Feb. '93
N = 124
Mar. '93
N = 8
N = 140
30-34 35-39 40-44 45-49 50-54 55-59 60-64 65-69 70-74 75-79 80-84 85-89 90-94 95-99 100-104 105-109 110-114 115-119 120-124
*N = Number of fish measured for length-frequency


AREA 2
Skipjack tuna
At FAD
Away from FAD
cm.
Dec. '92
N* = 555
N = 16
Jan. '93
N = 981
N = 0
Feb. '93
N = 1129
N = 104
Mar. '93
N = 522
N = 639
33-34 35-36 37-38 39-40 41-42 43-44 45-46 47-48 49-50 51-52 53-54 55-56 57-58 59-60 61-62 63-64 65-66 67-68 69-70
*N = Number of fish measured for length-frequency


AREA 2
Yellowfin tuna
At FAD
cm.
Dec. '92
N* = 388
N = 0
Jan. '93
N = 506
N = 0
Feb. '93
N = 67
N = 0
39-42
43-46
47-50
51-54
55-58
59-62
63-66
67-70
71-74
75-78
79-82
83-86
87-90
91-94
95-98
99-102
103-106
107-110
111-114
115-118
119-122
123-126
127-130
131-134
135-138
139-142
143-146
147-150
*N = Number of fish measured for length-frequency

APPENDIX III

Cost and earnings analysis of fishing before and after deployment of FADs

Fishing ground		Avg. trips/ boat	Avg. no. crew	Total boats	Earnings from				*Gross: total Rf/ boat	Total net earnings/boat Rf	Net earnings (Rf.)				
					Processed	Male mkt	CV	Total Rf			Owner	Skipper	Asst. Skip.	Chum	Crew
		A	B	C	D	E	F	G	H	I	J	K	L	M	N
Keyodhoo															
	Nov-91	15	8	7	38012	6906	0	44918	13476	7301	1577	464	464	464	464
	Dec-91	lO	7	7	19847	0	0	19847	7712	4710	282	318	318	318	318
Pre-	Jan-92	12	7	7	104424	0	0	104424	30983	27407	11631	1912	1912	1912	1912
deployment	Feb-92	17	7	8	54604	36155	0	90760	31539	24410	10132	1641	1641	1641	1641
	Mar-92	23	9	7	1849	275020	0	276870	128345	116926	56390	6601	6601	6601	6601
	Apr-92	17	9	8	- 180	208870	0	209050	144245	137374	66614	8038	8038	8038	8038
	May-92	19	8	6	38796	50704	0	89500	47650	39968	17911	2480	2480	2480	2480
	June-92	14	8	7	93991	0	0	93991	21190	16731	6293	1099	1099	1099	1099
	Jul-92	9	9	7	23025	0	0	23025	14332	11639	3746	675	675	675	675
	Aug-92	l2	9	6	65543	0	0	65543	31091	27280	11567	1581	1581	1581	1581
	Sep-92	14	9	7	58578	0	0	58578	33125	28931	12393	1677	1677	1677	1677
	Oct-92	12	8	7	70366	0	0	70366	17538	13918	4886	838	838	838	838
Post-	Nov-92	7	9	2.4	47340	0	0	47340	45947	40849	18351	2269	2269	2269	2269
deployment	Dec-92	2	9	3.5	22034	0	0	22034	44069	39743	17798	2208	2208	2208	2208
	Jan-93	10	9	3.1	74108	0	0	74108	24247	21113	8484	1228	1228	1228	1228
	Feb-93	2	8	.2.5	6917	0	0	6917	13489	10476	3165	629	629	629	629
	Mar-93	18	9	3.9	8430	504847	0	513277	163175	156200	76027	8720	8720	8720	8720
	Apr-93	13	9	2.6	14439	160011	0	174450	97487	91616	43735	5344	5344	5344	5344
	May-93	-	-	-	-	-		-	-	-	-	-	-	-	-

G=D+E

Fixed cost per boat: (P) 100% @ 2073 Rf/mth deducted from owner's share. I = H — variable Cost (V.C. = 309xA + 220xdays to Maté)

Variable cost (fuel) per boat: (Q) 309 Rf/day/boat. For travelling to Male; extra 220 Rf/day. J = (I/R) — P

Share system: (R) Gross earnings divided into two shases, (S) one share to owner, other share divided equally among crew, K,L,M,N = (I/R)/B *(Note:* Discrepancies caused by procedures in computerisat.ion)

*This column was obtained by taking the catch rate (kg/trip) for each species, each month and multiplying these by the average numbers of trips by each boat during that month, to obtain the average total catch of species per boat during that entire month (see Appendix I for these values). The catches of each species thus obtained were then multiplied by the price of each species for that month and according to the mode of disposal (Maid market, collector vessels, purchase and selling of processed fish — smoked or smoked and dried — on the respective islands).

Rakeedhoo															
	Nov-91	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Dec-91	6	7	6	3655	0	0	3655	4021	2521	-812	194	194	194	194
	Jan-92	11	7	6	45162	0	0	45162	10800	7801	1828	529	529	529	529
	Feb-92	11	8	5	72287	0	0	72287	15013	12069	3962	771	77!	771	771
	Mar-92	9	8	6	63883	0	0	63883	1384!	11479	3666	717	717	717	717
Pre-	Apr-92	8	8	5	15061	0	0	15061	5501	3211	-468	202	202	202	202
deployment	May-92	16	8	5	95722	0	0	95722	19900	15593	5723	957	957	957	957
	Jun-92	10	8	6	78416	0	0	78416	13295	10614	3234	642	642	642	642
	Jul-92	17	8	6	34824	0	0	34824	11267	6769	1311	415	415	415	415
	Aug-92	15	8	6	77473	0	0	77473	17680	13636	4745	879	879	879	879
	Sep-92	10	7	5	53804	0	0	53804	12196	9415	2635	662	662	662	662
	Oct-92	10	7	5	38223	0	0	38223	8295	5515	684	387	387	387	387
	Nov-92	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Dec-92	14	8	5	44694	0	0	44694	28442	26l53	11003	1699	1699	1699	1699
	Jan-93	10	7	4	43436	0	0	43436	14362	12686	4270	923	923	923	923
At FAD	Feb-93	12	7	5	31064	0	0	31064	11843	9849	2851	709	709	709	709
	Mar-93					-									
	Apr-93	-	-	-	-	-	-	-	-	-					
	May-93	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Nov-92	11	8	5	33284	0	0	33284	7814	4870	362	316	316	316	316
	Dec-92	14	8	5	35398	0	0	35398	12087	8271	2062	537	537	537	537
Away from	Jan-93	10	7	4	376	0	0	376	3849	1055	-1546	77	77	77	77
FAD	Feb-93	12	7	5	6330	0	0	6330	15444	12119	3986	878	878	878	878
	Mar-93		-	-	-	-		-	-	-	-	-	-	-	-
	Apr-93	-	-	-											
	May-93	-	-	-	-	-	-								

Fixed cost per boat: 100% @ 2073 Rf/mth deducted from owner's share.

Variable cost (fuel) per boat: 272.6 Rf/day/boat: one-third deducted for 'At FAD' fishing.

Share system: Gross earnings divided into two shares, one share to owner, other share divided equally among crew.

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Appendix III *(contd.)*

Fishing ground		*Avg. trips! boat*	*Avg. no. crew*	*Total boats*	*Earnings from*				**Gross: total Rf/ boat*	*Total net earnings/boat Rf*	*Net earnings (Rf)*				
					Processed	*Male mkt.*	*CV*	*Total Rf*			*Owner*	*Skipper*	*Ass!. Skip.*	*Chum*	*Crew*
Madifushi															
	Nov-91	12	6	2	3771	0	0	3771	2891	70	-2041	7	7	6	6
	Dec-91	8	10	2	21436	0	0	21436	7656	5816	573	412	383	354	296
	Jan-92	7	8	2	29852	0	0	29852	16170	14575	4559	1202	1130	1057	911
Pre-	Feb-92	10	9	2	6558	0	0	6558	10931	8478	1784	625	583	541	456
deployment	Mar-92	2	7	2	2260	0	0	2260	1130	640	-1782	62	59	56	49
	Apr-92	9	9	2	9073	0	0	9073	5104	2896	-755	224	210	196	167
	May-92	20	9	2	36978	0	0	36978	18976	14192	4385	1033	962	89!	749
	Jun-92	9	8	2	35254	0	0	35254	19830	17623	5945	1399	1311	1223	1047
	Jul-92	15	9	2	35912	0	0	35912	21697	18140	6181	1430	1339	1248	1067
	Aug-92	12	8	2	15444	0	0	15444	8880	6059	684	500	470	439	379
	Sep-92	7	7	2	9344	0	0	9344	5032	3314	-565	310	293	277	244
	Oct-92	9	8	2	6604	0	0	6604	3496	1288	-1487	110	103	97	84
	Nov-92	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Dec-92	10	8	2	6314	0	0	6314	7893	6421	849	537	505	473	409
	Jan-93	4	7	2	1084	0	0	1084	2168	1579	-1354	152	144	136	120
At FAD	Feb-93	9	8	2	4396	0	0	4396	5652	4327	-104	363	342	320	277
	Mar-93	-	-	-	-	-		-	-	-	-	-	-	-	-
	Apr-93	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	May-93	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Nov-92	16	9	2	29651	0	0	29651	16414	12612	3665	941	878	815	689
	Dec-92	10	8	2	13448	0	0	13448	19212	16759	5552	1402	1318	1234	1066
Away from	Jan-93	4	7	2	882	0	0	812	882	-99	-2118	-10	-9	-9	-8
FAD	Feb-93	9	8	2	13074	0	0	13074	13074	10866	2871	912	858	804	695
	Mar-93	12	7	2	7149	0	0	7149	4567	1746	-1278	162	153	144	127
	Apr-93	7	7	2	3085	0	0	3085	4319	2602	-819	238	225	212	186
	May-93	-				-			-	-		-	-	-	-

Fixed cost per boat: 100% @ 2073 Rf/mnth deducted from owner's share.

Variable cost (fuel) per boat: 245.3 Rf/day/boat; one-third deducted for 'At FAD' fishing.

Share system: Gross earnings divided into two shares, one share to owner, other share divided equally among crew from owner's share; 4% to Skipper; 3% to Ass! Skipper; 2% to Chummer.

Dhiggaru															
	Nov-91	14	9	11	**58497**	**0**	**0**	**58497**	**18381**	**14836**	4677	1103	1029	955	806
	Dec-91	8	10	12	67042	0	0	67042	15713	13873	4239	958	888	819	680
	Jan-92	8	10	12	59984	0	6475	66459	15384	13340	3997	964	897	830	697
Pre-	Feb-92	-	-	-	-	-	-	-	-	-	-	-	-	-	
deployment	Mar-92	-		-	-		-	-							
	Apr-92	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	May-92	17	10	12	127398	0	0	127398	24266	20014	7034	1443	1343	1243	1042
	Jun-92	7	10	12	89273	0	0	89273	8233	6536	901	463	430	398	332
	Jul-92	6	9	12	71650	0	0	71650	7090	5537	446	405	377	350	294
	Aug-92	15	9	12	179714	0	0	179714	18619	14858	4687	1097	1022	948	800
	Sep-92	13	9	12	204787	0	0	204787	17172	1388!	4243	1033	963	894	755
	Oct-92	12	9	12	88171	0	0	88171	13318	10354	2638	759	707	655	552
	Nov-92	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Dec-92	13	9	11	8702	0	0	8702	27688	25815	9673	1950	1821	1692	1434
	Jan-93	8	9	11	39501	0	0	39501	10194	9016	2029	667	622	577	487
at FAD	Feb-93	-	-	-		-	-		-	-	-	-	-	-	-
	Mar-93	-	-	-	-		-								
	Apr-93	-	-	-											
	May-93	-	-	-	-		-	-							-
away from	Nov-92	13	9	12	114409	0	0	114409	11808	8516	1802	656	614	571	486
FAD	Dec-92	13	9	11	142285	0	0	142285	19265	16143	5272	1220	1139	1058	897
	Jan-93	8	9	11	47237	0	0	47237	8040	6078	692	450	419	389	328
	Feb-93	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Mar-93	-	-	-	-	-	-	-	-		-				-
	Apr-93	-	-	-	-	-	-	-	-		-				-
	May-93	-	-	-	-	-	-	-							-

Fixed cost **per boat:** 100% @ 2073 Rf/mth deducted from owner's share.

Variable cost (fuel) per boat: **245.3 Rf/day/boat:** one-third deducted for 'At FAD' fishing.

Share system: Gross earnings divided into two shares, one share to owner, other share divided equally among crew from owner's share, 4% to Skipper; 3% to Asot Skipper; 2% to Chummer.

Appendix HI *(contcL)*

Fishing ground		*Avg. trips! boat*	*Avg- no. crew*	*Total bouts*	*Earningsfrom*				*'Gross: total Rf/ boat*	*Total net earn-ings/boat Rf*	*Net earnings (Rf)*				
					Processed	*Male mkt.*	*CV*	*Total Rf*			*Owner*	*Skipper*	*Asst. Skip.*	*Chum*	*Crew*
Maduvvaree															
	Nov-91	12	8	10	6784	0	0	6784	16825	13783	4198	1137	1068	999	861
	Dec-91	11	8	10	30158	0	0	30158	12759	10061	2505	841	791	741	640
	Jan-92	10	8	10	65267	0	0	65267	10807	8329	1717	665	624	582	499
Pre-	Feb-92	15	8	10	136184	0	0	136184	13984	10231	2582	825	774	723	621
deployment	Mar-92	17	8	10	167117	0	0	167117	15702	11507	3163	933	876	818	703
	Apr-92	12	8	10	94758	0	0	94758	8794	5948	633	485	455	426	366
	May-92	17	8	10	170238	2168	0	172406	18103	13762	4189	1100	103!	962	824
	Jun-92	9	8	10	61305	0	0	61305	9456	7223	1214	573	537	501	429
	Jul-92	11	7	10	117525	0	0	117525	11972	9298	2158	808	76!	715	622
	Aug-92	12	8	10	111490	0	0	111490	10972	7930	1535	659	620	580	501
	Sep-92	14	7	10	129743	0	0	129743	14292	10833	2856	957	902	848	740
	Oct-92	12	7	10	89652	0	0	89652	10106	7064	1141	616	581	546	475
	Nov-92	14	8	10	113782	0	0	113782	13353	11319	3077	938	881	824	711
	Dec-92	10	7	10	121664	0	0	121664	14456	13010	3847	1133	1068	1003	873
	Jan-93	9	8	8	36028	0	0	36028	10715	9480	2240	782	735	687	592
	Feb-93	10	9	9	52199	0	0	52199	13979	12484	3607	955	893	830	705
At FAD	Mar-93	15	10	10	36235	0	0	36235	14200	12124	3443	874	813	753	631
	Apr-93	12	9	10	13488	0	0	13488	13151	11476	3148	905	847	790	675
	May-93	-	-	-	-	-		-	-	-	-	-	-	-	-
	Nov-92	14	8	10	1638	0	0	1638	7752	4268	-131	354	332	311	268
	Dec-92	10	7	10	7014	0	0	7014	8856	6378	829	556	524	492	428
	Jan-93	9	8	8	2166	0	0	2166	11678	16562	5463	1366	1284	1201	1035
Away from	Feb-93	-	-	-	-	-	-	-	-	-	-	-	-	-	
FAD	Mar-93	15	10	10	15694	0	0	15694	13386	9829	2399	709	659	610	512
	Apr-93	-	-	-	-	-		-	-	-	-	-	-	-	-1
	May-93	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Fixed cost per boat: 100% @ 2073 Rf/mth deducted from owner's share.
Variable cost (fuel) per boat: 245.3 Rf/day/boat; for sale to Male market add extra 220 Rf; one-third deducled for 'At FAD' fishing.
Share system: Gross earnings divided into Iwo shares, one share to owner, other share divided equally among crew from owner's share, 4% to Skipper, 3% to Asst Skipper, 2% to Chummer.

Guihi															
	Nov-91	16	7	9	4049	177645	0	181694	23307	20972	6413	2415	1915	1915	1415
	Dec-91	16	7	10	31445	174572	0	206017	16608	14269	3062	1956	1456	1456	956
	Jan-92	14	8	10	10326	101616	0	111942	12516	10415	1134	1640	1140	1140	640
Pre-	Feb-92	15	8	9	5646	32684	0	38329	8780	6576	-785	1411	911	911	411
deployment	Mar-92	21	8	8	7697	222660	0	230357	3983	36762	14308	3385	2885	2885	2385
	Apr-92	-	-	-	-	-	-	-	-	-	-	-	-	-	
	May-92	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Jun-92	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Jul-92	-	-	-	-	-	-	-	-	-	-	-	-	-	-
No data	Aug-92	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Sep-92	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Oct-92	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Nov-92	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Dec-92	17	8	8	3379	164782	0	168161	89336	87826	39840	6250	5750	5750	5250
	Jan-93	19	8	10	20982	564470	0	585452	131903	130242	61048	9524	9024	9024	8524
At FAD	Feb-93	17	8	10	12964	824153	0	837117	176960	175477	83666	12211	11711	11711	11211
	Mar-93	20	8	10	964!	1069531		01079173	162681	160887	76371	10912	10412	10412	9912
	Apr-93	20	9	10	129	6330	0	6459	65238	63445	27649	4660	4160	4160	3660
	May-93	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Dec-92	17	8	8	388	33456	0	33845	30282	27766	9810	2660	2160	2160	1660
	Jan-93	19	8	10	1995	121440	0	123435	57706	54938	23396	4595	4095	4095	3595
Away from	Feb-93	17	8	10	2605	368082	0	370687	247619	245147	118501	16662	16162	16162	15662
FAD	Mar-93	20	8	10	2000	194654	0	196654	128142	125153	58503	8711	8211	8211	7711
	Apr-93	20	9	10	7048	435451	0	442499	70940	6795!	29902	4920	4420	4420	3920
	May-93	IS	9	11	8544	240755	0	249300	37622	35388	1362!	3042	2542	2542	2042

Fixed cost per boat: 100% @ 2073 Rf/mth deducted from owner's share.
Variable cost (fuel) per boat: 148 Rf/day/boat: one-third deducted for 'At FAD' fishing.
Share system: Gross earnings divided into two shares, one share to owner, other share divided equally among crew from owner's share. 1000 Rf to Skipper, 500 Rf to Asst Skipper, 500 Rf to Chummer

APPENDIX IV

Income of fishing households before and after deployment of FADs

GULHI

Occupation	*HHs*		*Income pre-FAD*	*Income post-FAD* Fishing at FAD	*Income post-FAD* Fishing away from FAD
Boat-owner households (HHs): Income from fishing and other sources					
1 Boat-owner + 1 Govt. service	2		11,202	1,21,428.00	90,576
1 Boat-owner + 1 crew + I Govt. service	1		6,887.00	68,425.00	*51,053.00*
1 Boat-owner + 1 shop + 1 midwife	1		7,826.00	60,714.00	10,711.00
I Boat-owner + 1 crew + 1 guest shop + I resort + I sewing	1		9,787.00	69,225.00	*51,853.00*
1 Boat-owner + 3 crew + 2 Govt. sservice + 1 resort	1		11,348.00	85,047.00	63,783.00
	6	Avg.	7,841.00	67,473.00	44,662.00
Boat-owner HHs: Income from fishing					
1 Boat-owner	1		4,826.00	57,714.00	42,288.00
1 Boat-owner + 4 crew	1		5,987.40	88,558.00	65,348.00
	2	**Avg.**	**5,407**	**73,136.00**	**53,818.00**
Crew: Income from fishing and other sources					
1 crew + I other	2		3,402	15,922	12,030
I crew + 1 Govt. service	1		2,051.00	8,311.00	6,365.00
1 crew + 1 Male	1		2,451.00	8,711.00	6,765.00
2 crew + 1 other	1		2,903.00	15,672.00	11,780.00
4 crew + I Govt. service	1		6,407.00	31,444.00	23,666.00
4 crew + 1 carpenter + 2 other	1		7,108.00	32,144.00	24,360.00
3 crew + 1 shopkeeper + I other	1		7,355.00	26,133.00	20,295.00
5 crew + 1 sailor	1		10,758.00	42,055.00	32,325.00
	9	Avg.	4,715.00	20,043.00	15,286.00
Crew HHs: Income from fishing					
I Crew	6		8,711	46,266	34,590
2 Crew	3		8,711	46,266	34,590
	9	Avg.	1,935,00	10,281.00	7,687

Appendix IV *(contd.)*

GURAIDHOO

Occupation	*HHs*		*Income pre-FAD*	*Income post-FAD*
Boat-owner HHs: Earning income from fishing and other sources				
I Boat-owner + 1 guest shop	3		42,441.00	16,000.00
I Boat-owner + I crew + 1 guest shop	1		17,40700	21,000.00
I Boat-owner + 1 crew + I guest shop + 1 Govt. service	1		18,007.00	21,600.00
I Boat-owner + 2 crew + I guest shop	1		20,667.00	26,000.00
	6	Avg.	16,420.00	**14,100**
Boat-owner HHs: Income from fishing				
I Boat-owner + I crew	1		14,407.00	17,000.00
1 Boat-owner + 2 crew	I		17,667.00	21,000.00
	2	Avg.	16,037.00	19,000.00
Crew fills: Income from fishing and other sources				
1 crew + I agri.	1		3,410.00	5,150.00
I crew + I Govt. service	2		7,720.00	11,200.00
I crew + I Govt. service + sewing	1		4,260.00	6,000.00
I crew + 1 carpenter	1		4,260.00	6,000.00
I crew + I resort	2		8,520.00	12,000.00
I crew + 1 guest shop	1		6,260.00	8,000.00
I crew + 1 resort + I guest shop	1		7,260.00	9,000.00
I crew + I resort + I guest shop + I mason	1		8,260.00	10,000.00
2 crew + I hotel+ I resort	1		8,520.00	12,000.00
2 crew + 1 guest shop	1		9,520.00	13,000.00
3 crew + I agri.	1		10,482.00	15,700.00
2 crew + I carpenter + 1 guest shop	1		10,520.00	14,000.00
2 crew + I mason + I guest shop + 2 Male	1		12,520.00	16,000.00
	15	Avg.	6767.00	9,203.00
Crew HHs: Income from fishing				
I crew	6		19,560	30,000
	6	Avg.	3,260.00	5,000.00

Appendix IV *(contd)*

KEYODHOO

Occupation	*HHs*		*Income pre-FAD*	*Income post-FAD: Fishing away from FAD*
Boat-owner HHs: Income from fishing and other sources				
1 Boat-owner + carpenter	1		17,451.00	28,426.00
1 Boat-owner + I mason	1		17,451.00	28,426.00
	2	Avg.	17,451.00	28,426.00
Boat-owner HHs: Income from fishing				
1 Boat-owner + I crew	4		104,236	125,307
1 Boat-owner	2		33,902	55,852
	6	Avg.	23,023	30,192
Crew HHs: Income from fishing and other sources				
I crew + 1 other	2		4,377.00	6,998.00
1 crew + 1 Govt. service	2		5,654.00	7,898.00
1 crew + I tourism + I midwife	1		3,577.00	4,699.00
I crew + I tourism + I sewing and embroidery + I other	1		4,277.00	5,399.00
I crew + 1 tourism + I Govt. service	2		8,554.00	10,798.00
I crew + I sailor	1		4,277.00	5,399.00
2 crew + I other	3		14,412.00	21,144.00
2 crew + 1 Govt. service	2		10,308.00	14,796.00
I crew + I tourism + 1 business	1		5,277.00	6,399.00
1 crew + 2 tourism + I Govt. service	1		5,277.00	6,399.00
2 crew + I tourism	2		13,108.00	17,596.00
	18	Avg.	**4,394**	**5,971.00**
Crew HHs: Income from fishing				
1 crew	8		18,216.00	27,192.00
4 crew	1		9,108.00	13,596.00
	9	Avg.	3,036.00	4,532.00

Appendix IV *(contd.)*

RAKEEDHOO

Occupation	HHs		*Income pre-FAD*	*Income post-FAD*	
				Fishing at FAD	*Fishing away from FAD*
Boat-owner HHs: Income from fishing and other sources					
1 Boat-owner + 1 Govt. service + 1 other	3		9,927.00	20,823.00	6,348.00
1 Boat-owner + 4 crews + 2 govt. service	1		5,937.00	11,781.00	4,316.00
	4	Avg.	3,966.00	8,151.00	2,666.00
Boat-owner HHs: Income from fishing					
1 Boat-owner	1		2,409.00	6,041.00	1,216.00
1 Boat-owner + 1 crew	1		2,966.00	7,151.00	1,660.00
1 Boat-owner + 2 crew	1		3,563.00	8,261.00	2,116.00
	3	Avg.	2,979.00	7,151.00	1,664.00
Crew: Income from fishing and other sources					
1 crew + 1 Govt. service	1		1,277.00	1,810.00	1,150.00
1 crew + 1 tourism	1		1,577.00	2,110.00	1,450.00
2 crew + 1 Govt. service	1		1,655.00	2,720.00	1,400.00
1 crew + 1 Govt. service + 1 midwife	1		1,827.00	2,360.00	1,700.00
2 crew + 2 Govt. service	1		2,155.00	3,220.00	1,900.00
2 crew + 1 tourism	1		2,155.00	3,220.00	1,900.00
2 crew + 1 tourism	1		2,555.00	3,320.00	2,000.00
1 crew + 2 Govt. service	1		2,577.00	3,110.00	2,450.00
1 crew + 1 tourism + 1 Govt. service	1		3,027.00	3,560.00	2,900.00
	9	Avg.	2,089.00	2,825.00	1,872.00
Crew: Income from fishing					
1 crew	2		1,154.00	2,220.00	900.00
2 crew	2		2,308.00	4440.00	1800.00
	4	Avg.	865.00	1,665.00	675.00

Appendix IV *(contd.)*

DHIGGARU

Occupation	*HHs*	*Income pre-FAD*	*Income post-FAD*	
			Fishing at FAD	*Fishing away from FAD*
Boat-owner HHs: Income from fishing and other sources				
1 Boat-owner + 1 crew + 1 Govt. service	2	9,626.00	14,622.00	7,316.00
1 Boat-owner + 1 crew + 1 Male	1	5,313.00	7,811.00	4,158.00
1 Boat-owner + 1 crew + 1 Govt. service + 1 Male	1	5,313.00	7,811.00	4,158.00
1 Boat-owner + 1 crew + 3 Govt. service	1	6,113.00	8,611.00	4,958.00
1 Boat-owner + 2 crew + 1 Govt. service + 3 Male	1	8,625.00	9,421.00	5,378.00
1 Boat-owner + 1 crew + 4 Govt. service	1	9,313.00	11,811.00	8,158.00
	7	Avg. 6,329.00	8,584.00	4,875.00
Boat-owner HHs: Income from fishing				
1 Boat-owner	1	4,313.0	6,811.00	3,150.000
	1	Avg. 4,313.0	6,811.00	3,150.000
Crew HHs: Income from fishing and other sources				
1 crew + 1 sewing and embroidery	1	762.00	1,060.00	670.00
1 crew + 1 mason	1	1,262.00	1,560.00	1,232.00
2 crew + 1 mason	1	1,524.00	2,120.00	1,340.00
1 crew + 1 hotel	1	1,562.00	1,860.00	1,470.00
1 crew + 1 tourism	1	1,662.00	1,960.00	1,570.00
1 crew + 2 Govt. service	1	2,162.00	2,460.00	2,070.00
1 crew + 2 tourism	1	2,662.00	2,960.00	2,570.00
3 crew + 1 tourism	1	2,686.00	3,580.00	2,410.00
3 crew + 1 hotel	1	2,786.00	3,680.00	2,510.00
1 crew + 1 hotel + 1 midwife + 1 carpenter	1	3,062.00	3,360.00	2,970.00
2 crew + 1 tourism + 1 hotel	1	3,124.00	3,720.00	2,940.00
3 crew + 1 mason + 1 Male	1	4,386.00	5,280.00	4,110.00
	12	Avg. 2,303.00	2,800.00	2,155.00
Crew: Income from fishing				
1 crew	5	3310.00	4,800.00	2,850.00
3 crew	2	3970.00	5,760.00	3,420.00
	7	Avg. 1,040.00	1,508.00	895.00

Appendix IV *(contd.)*

MADUVVAREE

Occupation	HHs	*Income pre-FAD*	*Income post-FAD*	
			Fishing at FAD	*Fishing away* from *FAD*
Boat-owner HHs: Income from fishing and other sources				
I Boat-owner + 1 other	I	3,324.00	4,227.00	3,140.00
I Boat-owner + I crew + I Male	1	3,930.00	4,834.00	3,700.00
1 Boat-owner + 1 crew + I other	1	3,930.00	4,924.00	3,700.00
I Boat-owner + 1 crew + 1 other	1	4,536.00	5,441.00	4,260.00
1 Boat-owner + 2 crew + 1 business + 2 Govt. service	1	7,386.00	8,471.00	7,110.00
	5 Avg.	4,621.00	5,579.00	4,382.00
Boat-owner HHs: Income from fishing				
I Boat-owner	1	2,324.00	3,227.00	2,140.00
I Boat-owner + 1 crew	1	2,930.00	3,924.00	2,700.00
I Boat-owner + 2 crew	1	3,536.00	4,621.00	3,260.00
1 Boat-owner + 3 crew	1	4,142.00	5,316.00	3,880.00
	4 Avg.	3,233.00	4,272.00	2,995
Crew HHs: Income from fishing and other sources				
1 crew 1 mason	1	656.00	747.00	616.00
1 crew + I other	1	786.00	877.00	740.00
1 crew + 1 other	1	1,156.00	1,247.00	1,110.00
2 crew + 1 Govt. service	2	3,826.00	4,188.00	3,640.00
I crew + I Govt. service + 1 other	2	4,162.00	4,344.00	4,070.00
3 crew + I Govt. service	1	3,420.00	3,691.00	3,280.00
	8 Avg.	1,751.00	1,887.00	1,682.00
Crew HHs: Income from fishing				
1 crew	3	1,818.00	2,091.00	1,680.00
2 crew	6	7,278.00	8,364.00	6,720.00
3 crew	I	1,820.00	2,091.00	1,680.00
5 crew	1	3,033.00	3,455.00	2,800.00
	11 Avg.	1,268.00	1,454.00	1,170.00

Appendix IV *(contd.)*

MADIFUSHI

Occupation	*HHs*		*Income pre-FAD*	*Income post-FAD*	
				Fishing at FAD	*Fishing away from FAD*
Boat owner HHs: Income from fishing and other sources					
1 Boat-owner + 1 Govt. service	1		2,950.00	1,703.00	2,800.00
	1	Avg.	2,950.00	1,703.00	2,800.00
Boat-owner HHs: Income from fishing					
1 Boat-owner	2		2,912	-406	2600
	2	Avg.	2,912	-406	2600
Crew HHs: Income from fishing and other sources					
1 crew + 1 other	1		954.00	768.00	959.00
1 crew + 1 Govt. service	2		2,508.00	2,136.00	2,518.00
1 crew + 2 Govt. service	1		1,454.00	1,268.00	1,459.00
2 crew + 1 Male	1		1,909.00	1,536.00	1,918.00
3 crew + 1 Govt. service	1		2,062.00	1,504.00	2,077.00
2 crew + 2 Male + 1 other	1		2,400.00	2,036.00	2,418.00
	7	Avg.	1,612.00	1,321.00	1,621.00
Crew HHs: Income from fishing					
2 crew	1		909.00	536.00	918.00
3 crew	1		1,363.00	804.00	1,337.00
	2	Avg.	1,136.00	670.00	1,127.00

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11. ***Marine Small-Scale Fisheries of West Bengal : An introduction.*** (Madras, 1990.)
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13. ***Bibliography on the Mud Crab Culture and Trade in the Bay of Bengal Region.*** (Madras, 1992.)

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1. ***Helping Fisherfolk to Help Themselves : A Study in People's Participation,*** (Madras, 1990.).
2. ***The Shark Fisheries of the Maldives.*** R C Andersen, H Ahmed. Ministry of Fisheries and Agriculture, Maldives. (Madras, 1993).

NOTE: **Apart** from these publications, the BOBP has brought out several folders, leaflets, posters etc., as part of its extension activities. These include Post-harvest Fisheries folders in English and in some South Indian **languages on anchovy** drying, insulated fish boxes, fish containers, ice boxes, the use of ice etc. Several unpublished reports connected with BOBP's activities over the years are also available in its Library.

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