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SMALL SCALE FAD RESEARCH IN P.N.G. : SITUATION REPORT

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A. INTRODUCTION

The use of fish aggregation device (FAD) in the commercial purse seine and pole and line tuna fisheries has been one of the most significant benefit to this fishery in recent years. One of the main advantages of FAD's is their ability to aggregate fish to a known location, thus decreasing fuel cost by minimizing searching time. This advantage would also suit the small scale artisanal fishermen who is likewise facing an energy crisis (Zann 1982).

The FAD's used in the commercial fisheries are deployed several kilometres out to sea in depth of 1,000-3,000 metres. They are expensive to produce averaging US$2,000-3,000 each. Establishment cost (in terms of the amount of fish caught which is required to cover cost) and the locality where they are deployed hamper the use of there FAD's by artisanal fishermen in P.N.G. The fishing canoes, and recently introduced aluminium dinghies, used by artisanal fishermen restrict operation to within 5 to 10 kilometres of the Shore line.

If FAD's are to be of real benefit to P.N.G.'s artisanal fishermen they must be deployed in shallow water closer to shore, which in turn will lower cost.

Traditional ownership (and fishing rights) of waters and their resources has hindered the development of many fisheries in P.N.G. It is difficult to regularly harvest many of the migratory species (particularly tunas and mackerels) unless they can be attracted inside a traditional fishing area and held for a considerable period in time. FAD's are a way in which migratory species can be harvest while at the same time, maintaining the concept of traditional fishery rights.

FAD research in P.N.G. seeks to evaluate which mooring depths will produce an optimal harvest as well as fullfilling the requirement of artisanal fishermen. Initially two FADs were deployed in depths of 160 and 390m, approximately 3 and 5 miles from shore respectively.

B. CONSTRUCTION

FADs were of the semi-taut mooring type described by Boy and Smith (1984) (Fig. 1). The float at the FAD placed in 160m (FAD.1) consisted of two, 200 litre drums filled with crushed polystyrene foam. The float of the FAD placed in 390m (FAD.2) consisted of a 400 litre marine drum connected to two, 200 litre polyeurythene foam filled drums. These drums were welded to angle iron frames. Twenty-five metres of chain connected the floats to the mooring rope and a further 25 metres of chain connected the mooring rope to the anchor. Swivel were placed between chain and mooring rope connection. Diesel engine blocks were used as anchor. Construction cost of FAD.2 were US$500.00 and $850.00 respectively.

C. LONGEVITY

All 200 litre drums had partially rusted through after ten months. The float for FAD.1 leaked the crushed polystyrene filling and sunk after ten and a half (10½) months. The polyeruythene foam-filled drum with float of FAD.2 broke up after 14½ months. It is only due to the marine buoy that FAD. 2 remains. From these observation it suggested that an untreated 200 litre drum will last for up to 9 months, after which it should be replaced. Foam filling seemed to increase service period of the drums for two (2) to (4) four months.

Heavy duty marine floats will be used on future FADs. It is hoped their performance will prove to be durable as their shape should provide low resistance to wave and current movement rendering less strain on the anchor line. A bamboo or polystyrene drum raft with submarine hanging appendages will be connected to the float. This unit will be easily replaceable if lost or damage.

D. CATCHES

The two FAD's were deployed at the localities shown in Fig. 2. After deployment in early April no catches were recorded until the begining of July. Since July fish have been caught around both FADs. A species list is given in Table 1. All species of fish were caught around both F.A.D.s, although the relative proportion of each species were different. For example FAD1 yellowfin and skipjack tuna and dolphin fish were rarely caught. Catches at FAD 2 were consistent and twice that of FAD 1. FAD 1 catches were sporadic.

The main fishing method used around FADs was trolling using either plastic squids or feathers on number 8 to 12 hooks. Jigging of baited hooks below the FAD was successfull for rainbow runners and dolphin fish although catches were extremely variable. After large catches it was several weeks before jigging again produced good catches. This long recovery period between good catches by jigging, combined with the apparent seasonality of both rainbow runners and dolphin fish at the FAD, suggest that this method is a poor alternative to trolling. Vertical longline trials for sharks and tuna were started but ceased prematurely due to the lack of a suitable vessel. Initial catches of shark (Carcharhinus falciformes) produced 60-100 kgs of shark trunks per night. As with jigging, these catches drop after a couple of trips, but the data presently available is insufficient to determine sustainable catch rates.

The mean catch rate was 10kg/vessel/hour. Vessels, mainly 4.3 to 5.5m aluminium dinghies, trolled between 2 and 5 lines. Although catch rates varied throughout the year, good catch of tuna were obtain in every month. It was estimated that a minimum of 15 tonnes of tuna was caught from July 1984 to June 1985 at FAD 2. This is approximately four times the estimated amount of tuna previously landed per year in Wewak.

The size range of all the tuna species was consistent, being from 20 cm LCF to 40 cm LCF (approximately 0.25 to 1.00kgs). Clearly the FADs are very effective at aggregating juvenile tunas. This was demonstrated by FAD.1 which was anchored in a location where adult mackerel tuna are commonly caught. Although adult macherel tuna were caught in this region, during survey only juveniles were caught in the vicinity of FAD.1. Thus in depths of up to 400m in the North Western Coast of P.N.G. it appears that FADs are only successful in aggregating juvenile tunas.

E. FUTURE RESEARCH

Two more FADs are planned to be deployed in late 1985. FAD.3 will be deployed at the same depth as FAD.2 (400m). The planned location of FAD.3 is on the edge of a slope to oceanic depths whereas FAD.2 was situated between deep water ridges. (See Fig. 2). The catches of FAD.2 and FAD.3 will be compared for species composition and size ranges. FAD.4 will be placed on a slope in deeper water (550-600m) than FAD.3. This FAD will be observed to see wheather species composition and size ranges change with increased depth.

It is intended to placed 3 more FADs in 400m along the South eastern coast of East Sepik Province (FAD.5, 6 and 7). These will be associated with three fishing villages. The proposed location of these from adjacent to the mouth of the Sepik River where river discharge is expected to be high, to Wewak as shown in Fig. 2. These will be monitored for changes in species composition in relation to variation of environmental factors such as salinity, temperature and turbidity.

Fig-1

DETAILS OF CONSTRUCTION OF FAD'S USED IN WEWAK, PAPUA NEW GUINEA

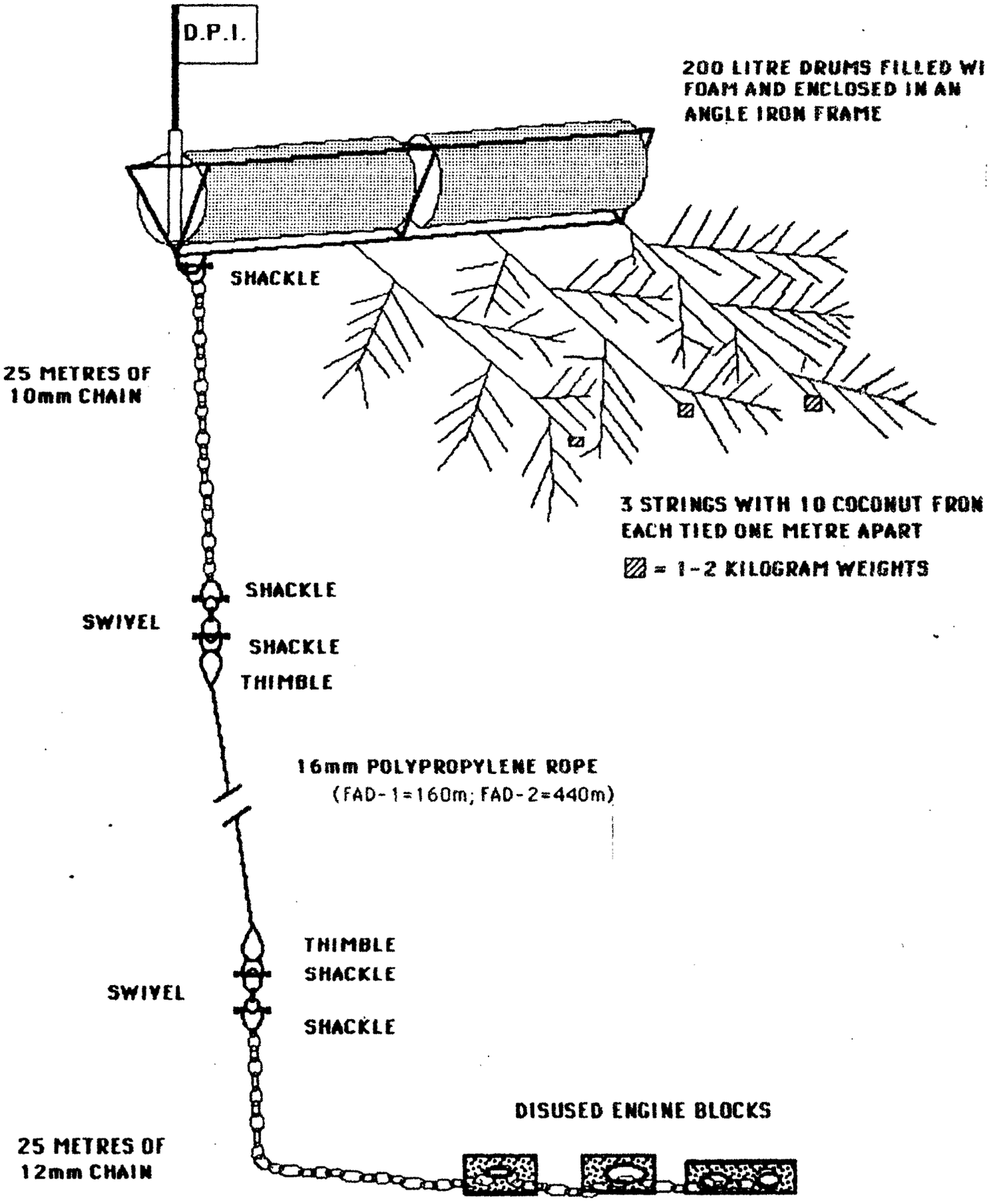

TABLE - 1 FISH CAUGHT AROUND FAD's IN WEWAK

FISHING METHOD	SCIENTIFIC NAME	COMMON NAME
TROLLING	Euthynnus affinis	Mackerel tuna
	Auxis thazard	Frigate tuna
	Thunnus albacares	Yellowfin tuna
	Thunnus obesus	Bigeye tuna
	Elegatis bipinnulatus	Rainbow runner
	Caranx tili	Trevally
	Coryphaena hippurus	Dolphin fish
	Sphyraena barracuda	Giant barracuda
	Acanthocybium solandri	Wahoo
JIGGING	Elegatis bipinnulatus	Rainbow runner
	Caranx tili	Trevally
	Coryphaena hippurus	Dolphin fish
	Sphyraena barracuda	Giant barracuda
LONGLINING	Carcharhinus falciformes	Oceanic whaler

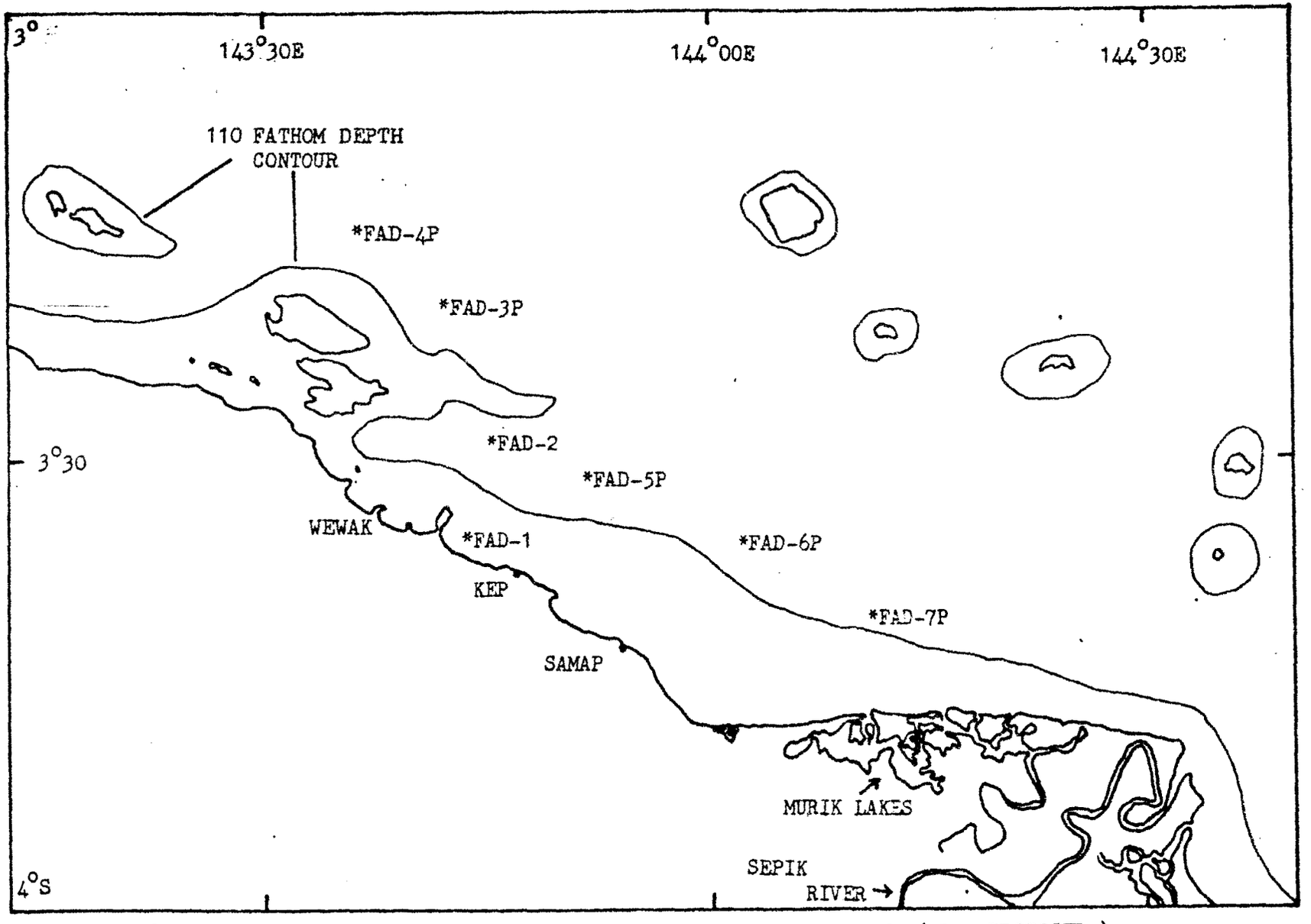

FIG. 2. MAP OF VICINITY OF WEWAK SHOWING POSITIONS OF FADS (P = PROPOSED)