

DEEP-SEA FISH AGGREGATING DEVICES (FADs) IN THE PHILIPPINES

BY

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1. INTRODUCTION

Fish aggregating devices (FADs) have been associated with the Filipino fishermen. These devices are found useful when fishes abound under logs, bushes, branches and other materials either floating or submerged in waters. Recognizing their importance and potential, fishermen adopted the device with modifications to suit the different types of fishes caught, fishing methods and techniques. A FAD is any object on construction for the purpose of facilitating the aggregation and attraction of fish for harvest using various types of fishing gears.

Deep-sea FADs are mostly distributed along the offshore waters of Zambales, Mindoro, Cebu, Leyte, Palawan, Tawi-Tawi, La Union, Pangasinan, Basilan, Cotabato, Davao, Samar, Antique and Misamis Oriental at depths from 500 to 1,500 fathoms (Figure 1). At present, it is estimated that there are 3,000 FADs or "payaw" in the country. The payaw has evolved from a simple fish shelter locally called "tangkal" "bonbon" or "arong" which is set in shallow portions of coastal waters (Figure 2).

Fish species caught are tuna and tuna-like fishes, big-eyed scad, rainbow runner, mackerel, dolphin fish, pilot fish, etc. (Figure 3). The fishing gears to harvest the payaw are handlines, troll lines, bagnet, gillnet, ringnet and purse seine (Figure 4).

2. DESCRIPTION OF THE DEEP-SEA FAD (Payaw)

A deep-sea FAD locally known as "payaw" consists of four(4) functional parts, namely: floating section, anchoring section, mooring section and attractant (habong) section. It is set in certain location of the sea where fish are attracted and harvested by various fishing gears in big quantities. At present, there are four (4) types of payaw according to the float section materials.

The materials for the float section vary from bamboo, rectangular steel buoy, steel plates pontoon bamboo combination to galvanized drum. Their selection depends upon the preference of the user on the availability of the materials within the locality. In the Philippines, the use of bamboo has been proven the most effective in aggregating fishes and simple in construction.

1. Two-layered bamboo raft (Figure 5)

A raft is made of 40–50 pieces seasoned full-length bamboos, (2–3 years old). The base of a bamboo starts with a node. About 5 or 7 centimeters above the node, 2 holes opposite each other are bored through the bamboos and wide enough for a small seasoned bamboo or pieces of lumber to pass

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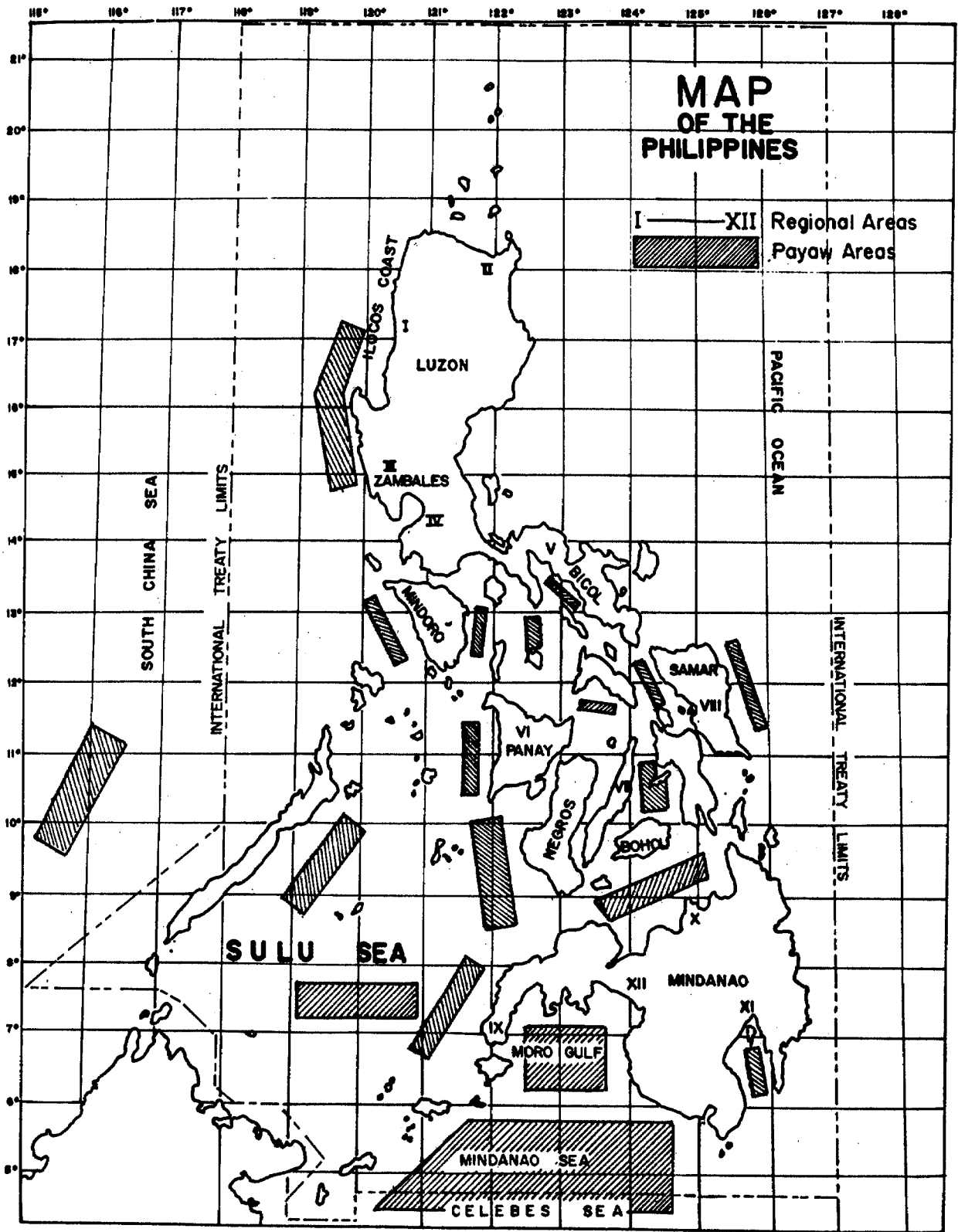


Figure I — Distribution of Payaw

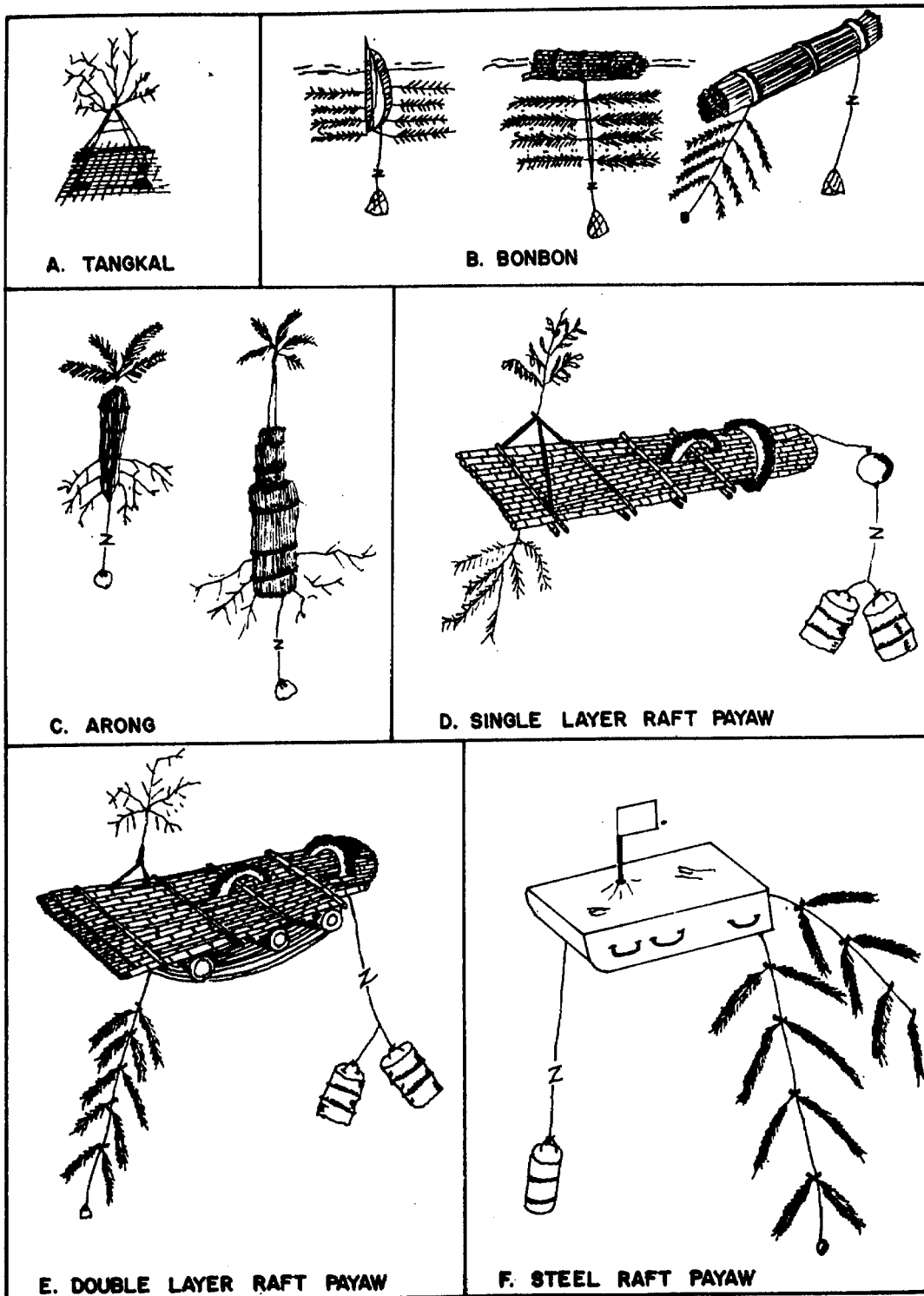
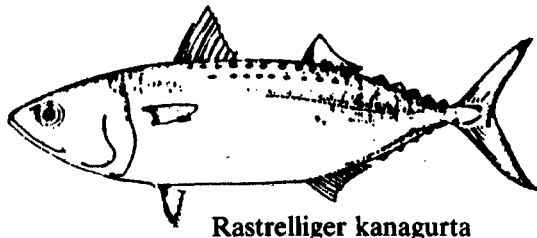
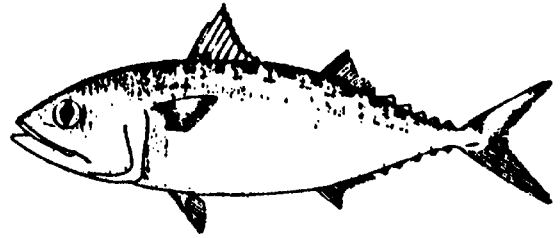


Figure 2. Evolution of payaw (fish shelter).



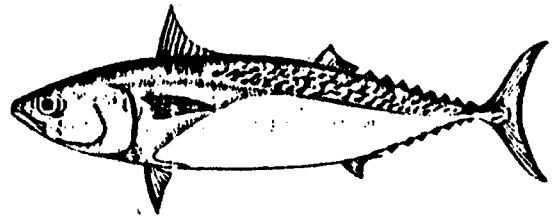
Rastrelliger kanagurta



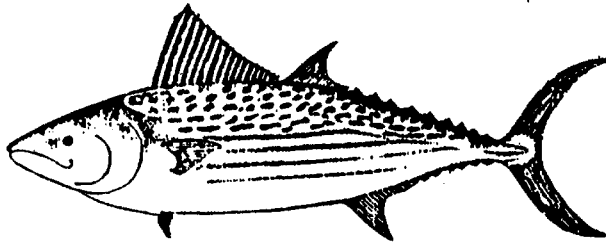
Rastrelliger brachysoma



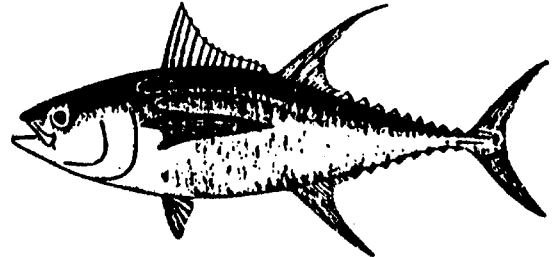
Katsuwonus pelamis



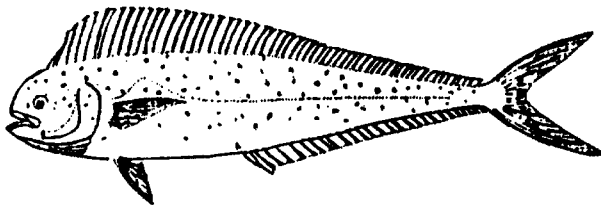
Auxis thazard



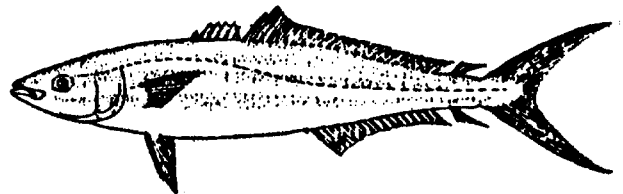
Bonito



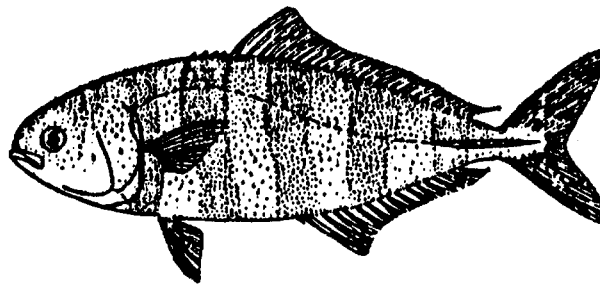
Thunnus albacares



Dolphin fish

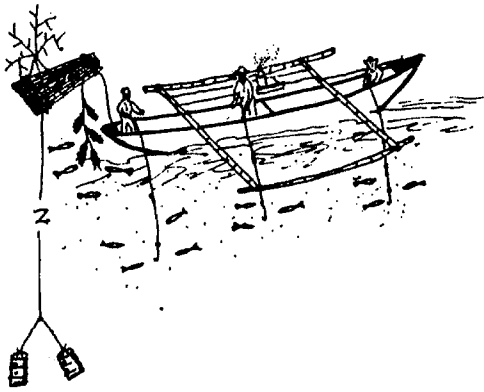


Mackerel (rainbow runner)

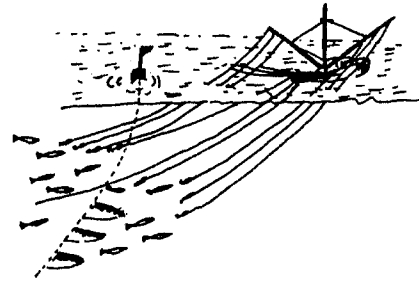


Pilot fish

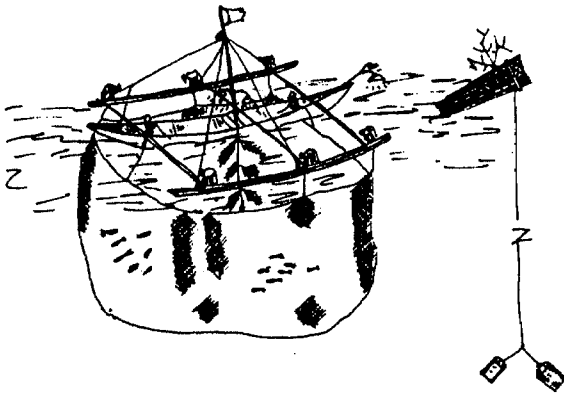
Figure 3. Major fishes caught on payaw.



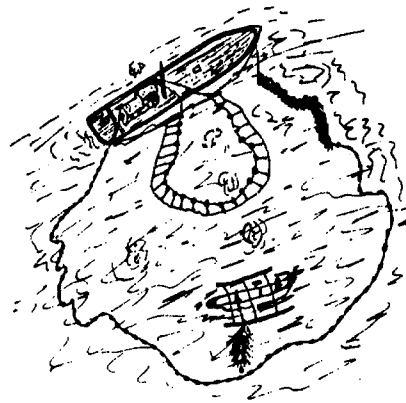
Handlines



Troll Lines



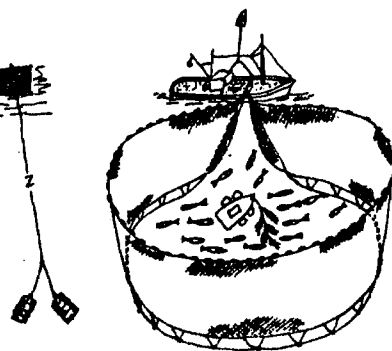
Bagnet



Ringnet



Tuna Drift Gill Net



Purse Seine

Figure 4. Major fishing gears used on payaw.

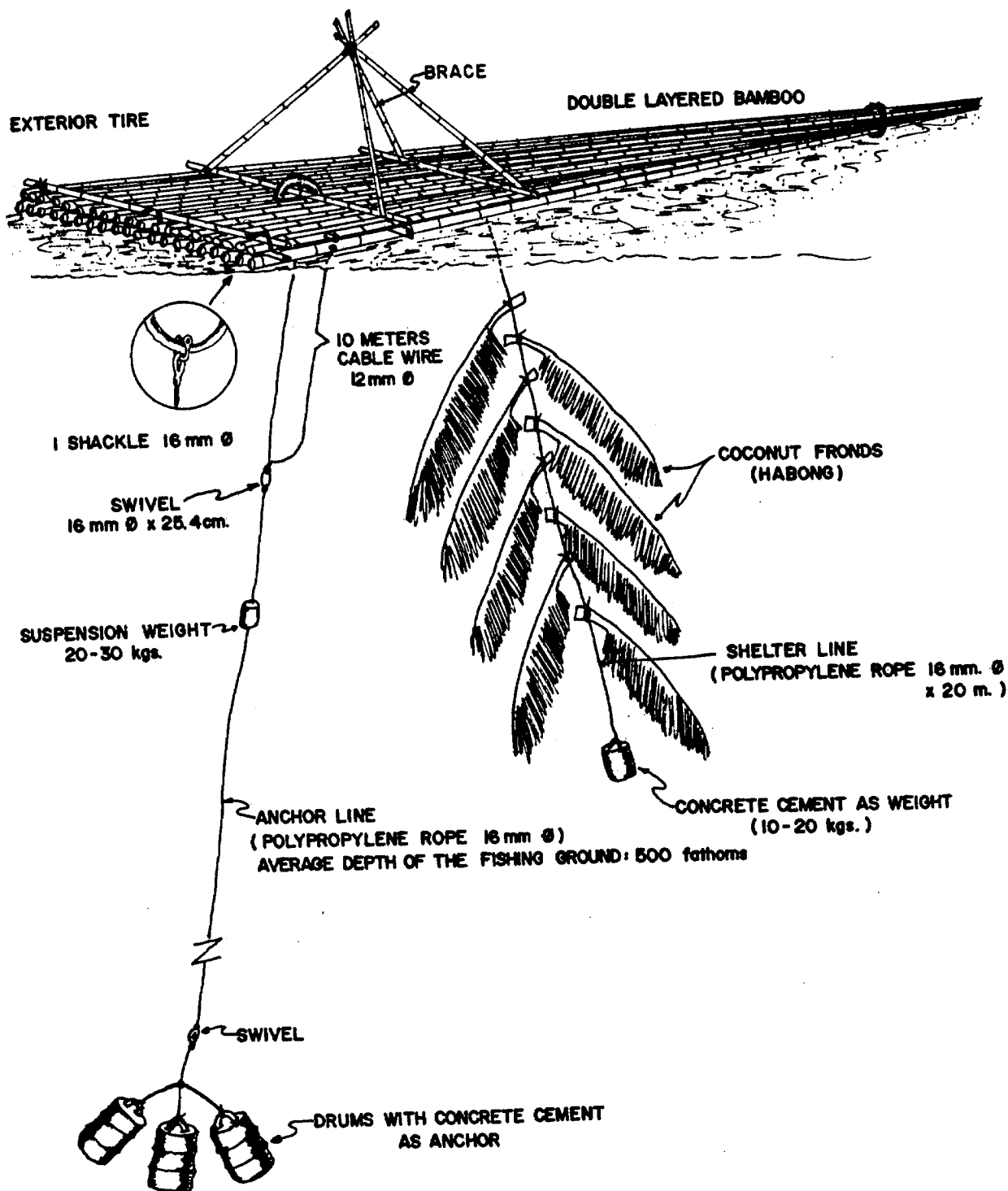


Figure 5. BAMBOO PAYAW

through. The smaller ends of both rafts are bunched by an exterior tire. Galvanized iron wires or monofilament nylon twine are used to tie and to prevent the bamboos from slipping. Often times, sliced interior tires are used as additional tying materials to make the rafts more resistant to strong winds and waves.

2. Rectangular Steel Buoy-Type (Figure 6)

The materials are flat bottom portable floats made of steel plates, about 5 mm thick. The steel payaw is 2–4 m long by 1–2 m wide by 0.3 m high. One end tapers off above the water to make the steel pontoon manoeuvrable at sea and to lessen the surging effect of the current and waves. All joints are fully molded. Inside are four (4) compartments with styrofoam. Four (4) cleats, two on each opposite side, are welded for easy handling. Underneath are cleats for the attachments of the anchor line and the “habong”.

3. Steel Pontoon-bamboo raft combination (Figure 7).

A bamboo raft is tied around a steel pontoon with cleats around the sides. A ring underneath is welded to which the anchor line is attached. During harvest, the coconut frond at the rear of the pontoon is untied and drifts with the current away from the steel pontoon-bamboo assembly.

4. Galvanized-drum Payaw (Figure 8)

It is made of two (2) and a half pieces galvanized drum. The last end is closed while the middle is open where the styrofoam is embedded inside. The third drum is tapered and welded.

The anchor line is made of 2 parts. The upper part consists of 30–40 meters, 16mm diameter cable wire while the lower part is a 16 mm diameter polyethelene or polypropelene rope. The length of the rope is determined by the sea depth-rope ratio of 1:1.2 or 1"1.5.

Along the upper part of the anchor rope are attached suspension weights to hold the anchor rope from floating.

The main anchor weight is a first class mixture of cement-gravel-sand which is molded in an empty oil drum. Protruding halfway on top of the cement is the split exterior tire rim where the anchor line is shackled with a swivel. Several anchor weights are attached to the anchor line depending on the depth.

The attractant or “habong” is made of a 16 mm diameter polyethelene, 15–20 meter rope. At one end is a 10-kg. weight made of concrete cement. Coconut fronds are tied at 1 to 2 m intervals. The other end is tied to the exterior tire located near the narrow end of the buoy.

3. TYPES OF PAYAW USERS

a. Municipal Tuna Handliners

Small-scale fishermen living along the coastal waters and owning a 10–16 HP gasoline engine pumpboat and several units of handlines sail offshore for 1 to 2 hours in search of payaw. Using handlining they catch yellowfin and big-eyed tuna, skipjack and dolphin fish. Although they are not owners of the payaws, fishing is usually allowed by the company.

The fishermen guard the payaw and report to the owner which payaw has the most aggregated fish. In General Santos City, southern Philippines, a medium-sized pumpboat powered by 80–190 HP

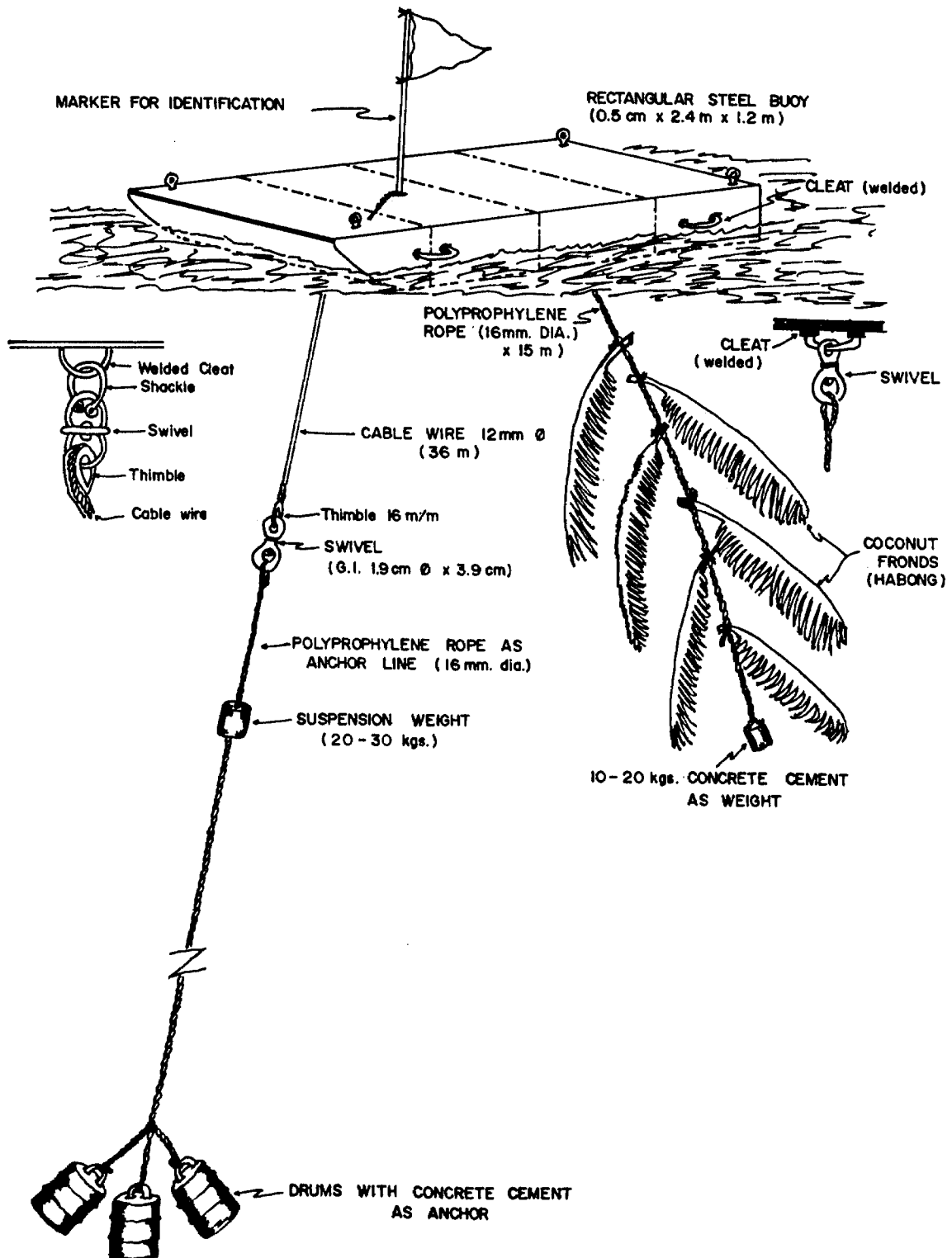


Figure 6. Steel Buoy Payaw.

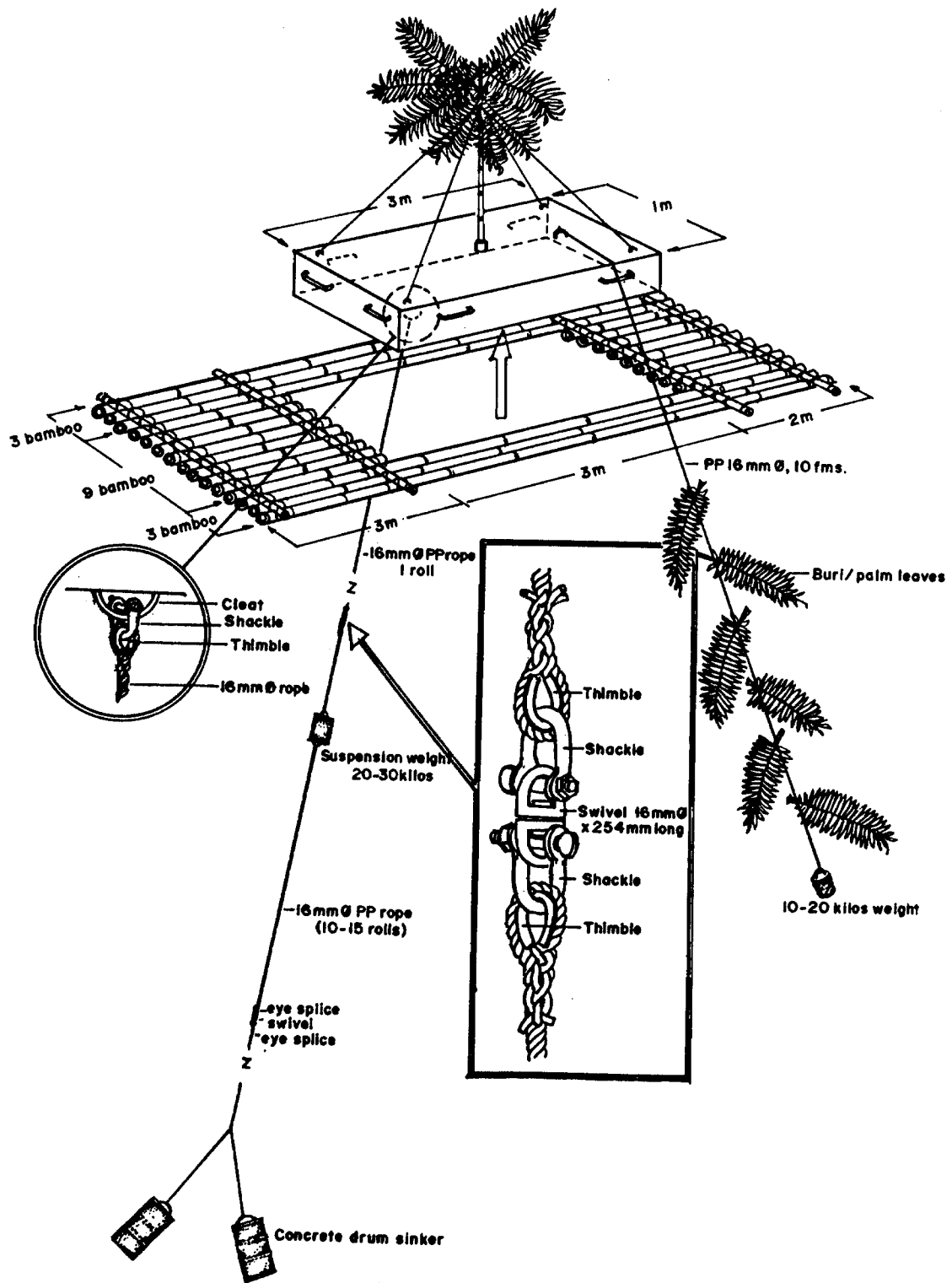


Figure 7. Bamboo-Steel Buoy Combination Fish Shelter.

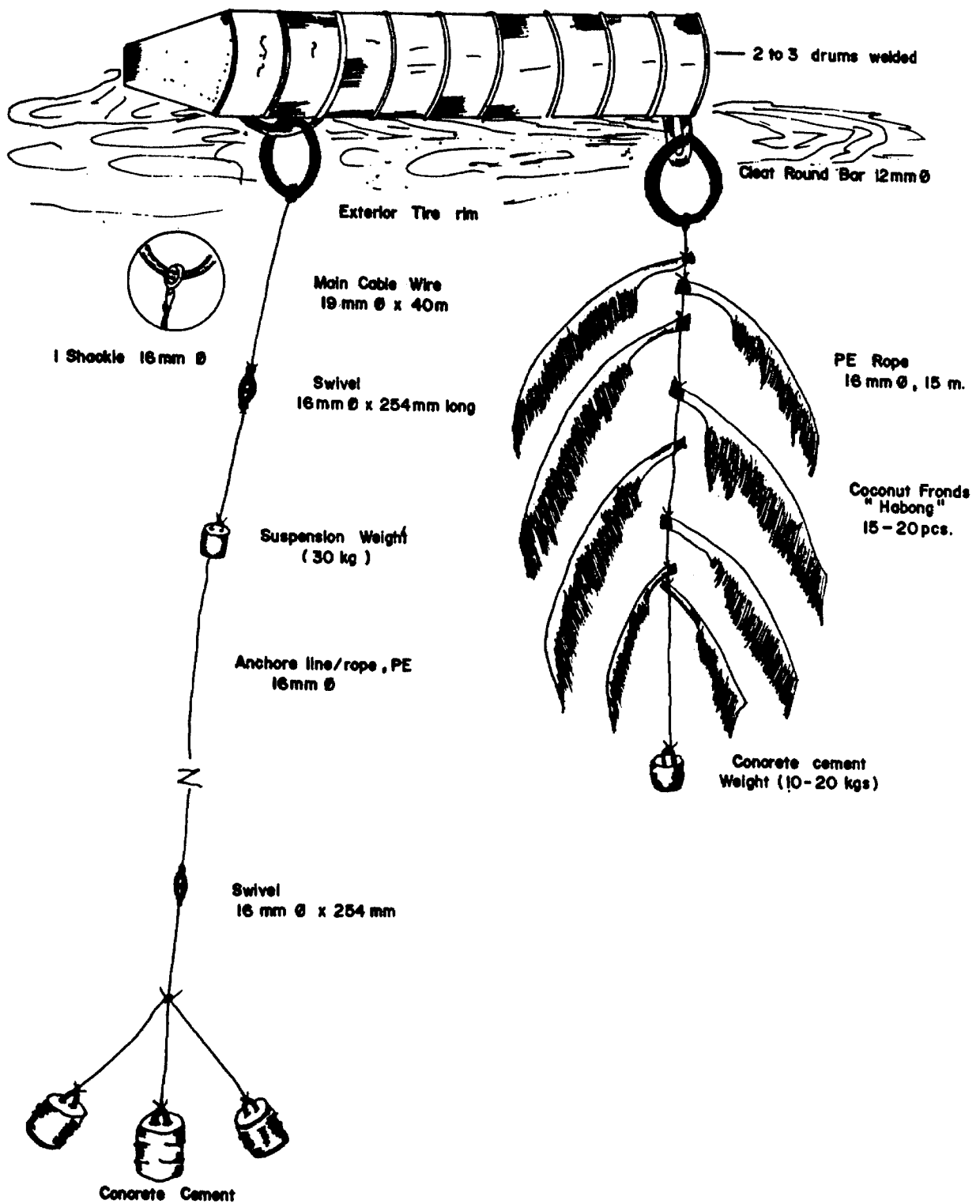


Figure 8. Galvanized Drum Payaw.

diesel engine and crew complement of 6 fishermen sail for two days to the Celebes Sea in search for payaw. Upon locating a payaw, they use handlines to catch from 30 to 50 kilos yellowfin and big-eyed tuna which are kept in the fish hold with ice from 5 to 7 days. Fishes caught are then inspected for "sashimi" quality before exporting to Japan.

b. Municipal ringnetters

These are small-scale from 8 to 12 meter bancas or pumpboats powered by 10–16 HP gasoline engine and net particular of 150–250 m long by 40 to 50 m deep. The payaw is lighted during night time, and the "habong" is detached. The net is set early morning to encircle the payaw.

c. Commercial Ringnetters

Ringnetters are distributed mostly in regions II, IV, VI, VII, VIII, IX, X and XI (Table 1). They are from 30 GT to 50 GT wooden boat using payaw as an accessory to the gear. The operation is similar to the tuna purse seine using payaw.

d. Commercial Tuna Purse Seiners

Commercial fishing companies of tuna purse seiners are based mostly in Navotas, Metro Manila. Their fishing grounds are the South China Sea, Western Zambales/Bataan Coasts, Sulu Sea, Celebes Sea, while others operate in Papua New Guinea, Indonesia and Solomon Islands under joint venture.

The ratio of the number of payaw units to a purse seiner is 30:1 or 50:1 in order to insure a harvestable tuna everyday. It takes from one to two weeks to aggregate enough fish.

4. IMPACT OF FADs ON MARINE RESOURCES

Since the country-wide use of payaw, the commercial tuna fishery has emerged as the most valuable fishery in the country. This is due to the introduction of the ringnet-purse seine fishing in combination with FADs. In 1970, tuna production by commercial fishing vessels was 9,054 tons, about 1% of the total marine catch of 892,000 tons. Export of fresh and frozen tuna in 1970 were 820 tons worth ₱ 2.5 million (approx. US\$ 44 million). By 1980, commercial tuna production was 87,250 tons which was 7.7% of the total marine catch. The increased production has led to increased exports of fresh and frozen tuna valued at ₱ 430 million in 1980 (approx. US\$ 57 million).

Fishing surveys, conducted by the Food and Agriculture Organization of the United Nations South China Sea Fisheries Development and Coordinating Programme (SCSP) in late 1974 confirmed that there were substantial tuna resources and that bamboo rafts could be modified to be used for commercial operations in the Philippine waters. The SCSP survey team estimated that the potential catch of seiners (420 GT, 425 HP and 283 GT, 859 HP) fishing commercially in Philippine water for 25 days per month, 10 months a year, would be at least 1,500 tons. Two Philippine private companies spearheaded the purse seining with FADs shortly afterwards. By 1977, tuna exports were valued at ₱ 85 million doubling the 1975 figure.

However, the tuna export production declined from 41,000 tons in 1980 to 36,000 tons in 1981 (Table 2). This trend had continued up to 1982, forcing some companies to close down. Some experts had attributed this decline to natural fluctuations and to the revised system of catch sampling.

One major negative development was the increased catch of juvenile fish landed by the commercial ringnet and purse seine fishery. In General Santos City, for example, about 100 tons of

TABLE 1
NUMBER OF COMMERCIAL FISHING VESSELS, BY REGION

FISHING GEARS	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	NCR
Beach Seine	27	-	-	5	3	-	-	2	-	-	-	-	-
Drift Filter Net	-	22	-	-	-	-	-	-	-	-	-	-	-
Purse Seine	2	-	1	11	8	84	2	-	25	-	26	-	137
Round haul seine	-	28	-	-	-	-	-	-	-	-	-	-	-
Ringnet	-	38	6	43	8	22	108	106	49	39	97	5	3
Trawl	34	17	38	10	50	134	6	53	2	-	-	-	425
Bagnet	-	-	9	300	68	14	22	4	166	4	23	3	8
Gillnet	-	-	1	-	-	-	-	-	-	-	-	-	2
Hook and Line	-	-	-	39	-	1	-	-	-	-	5	-	32
Drive-in-Net	-	-	-	1	-	-	-	-	-	-	-	-	28
Longline	-	-	-	-	-	-	-	-	-	-	-	-	61
Push Net	-	-	-	-	-	-	-	-	-	-	-	-	31
Pole and Line	-	-	-	-	-	-	-	-	-	-	-	-	1

Source: BFAR 1987 Fisheries Statistics.

small skipjack, weighing 70–100 grams each were unloaded daily in the 1981 season. Due to their small size, a substantial portion of these fish were misidentified as roundscads or frigate mackerel.

The large decrease in tuna production maybe the result of reduced mature stock, as well as the result of increased catches by the local handline fishery.

Available catch reports from commercial export operators also indicate that the purse seine tuna fishery in the Philippines is catching a significant quantity of small tunas. Skipjack between 10–12 cm are sometimes found in the catches of ringnets and smaller purse seine vessels.

The decline in tuna production may be due to the catching of undersized fish from payaw. It is possible to say that payaws have apparently contributed to the growth of overfishing in the Philippines because they made small tunas accessible to fishermen.

A ban on catching or landing tuna below a certain size or regulating the use and placement of “payaws” could help prevent the incidence of overfishing in areas where very small tunas are available.

5. MONITORING OF “PAYAW”

Commercial fishing around “payaw” is monitored by small-scale fishermen who are permitted to use handline around the payaw. These fishermen watch for poachers and dive at the “payaw” to monitor the amount of schooling.

For ringnet operators, light boats or ranger boats leave the home port early in the morning to check “payaws” with the most aggregated fish school. Upon knowing the presence, they radio the home base informing them of the location or the number of the “payaw”. The boats light the payaw from dusk until the arrival of the mother boat.

For tuna purse seiners, the catcher himself checks the payaw early in the morning after the night fishing operation. Upon knowing of the presence of fish school, the catcher lowers the dim boat before sundown to light the payaw. Before dawn, the catcher encircles the payaw.

6. CONFLICTS AND SOLUTIONS AMONG PAYAW USERS

A. Conflict

1. There is a rampant poaching of unguarded payaw by operators of purse seines and handline. Unscrupulous handliners go to the extent of cutting anchor ropes of payaw to retrieve their line which get entangled with the anchor rope. The tuna, once hooked, swerved vehemently to extricate itself from the hook.

2. Often times, the anchor line of a payaw is cut, unintentionally due to mechanical defect or to wear and tear. Naturally, the payaw then drifts with the current and may get stuck and later found among those which are owned by another operator. The question then arises: who has the right to catch the fish of drifting payaw?

3. There is much competition for the acquisition and possession of good sites along the known migratory path of tuna.

4. Since there are no regulations governing the set up of payaw, the operators are free to set them. What should be the reasonable and legal distance between payaw units and where should its demarcation lines be set to segregate the site claimed by one operator from that of the other.

TABLE 2
Annual Tuna Production and Export

Year	Tuna Production ¹ (MT)			Tuna Exports		Value (million pesos)
	Total ²	Municipal	Commercial	Quantity(MT)	Value	
1970	:	:	9,054	820	2,519	
1971	:	:	8,246	2,770	8,719	
1972	:	:	9,239	5,161	17,737	
1973	:	:	22,600	8,545	30,120	
1974	:	:	25,339	11,376	51,860	
1975	:	:	21,559	8,120	36,616	
1976	:	92,124	32,860	5,735	26,812	
1977	:	155,514	60,386	15,619	85,367	
1978	:	183,999	50,700	19,771	114,827	
1979	:	197,311	78,204	33,775	222,723	
1980	:	200,805	87,250	41,463	430,319	
1981	:	203,754	105,763	35,850	345,515	
1982	:	216,604	105,274	37,141	537,966	
1983	:	242,286	106,676	42,069	798,822	

¹ Includes yellowfin, skipjack, eastern little tuna and frigate tuna.

² Prior to 1976, tuna production was only reported for commercial vessels.

Source: BFAR Fisheries Statistics of the Philippines.

5. Drift tuna longlines which are set along the migratory path of tuna get entangled with the payaw. The process of retrieval causes much turmoil, resulting in rush and harsh actions by parties involved.

B. Solutions recommended

1. Formulate a Fisheries Administrative Order (FAO) dealing with the protection of sustenance fisherman from commercial and individual payaw operators and from tuna purse seine operators.

2. Regulate tuna fishing in critically, depleted areas and assign fishery technologists/biologists on board fishing vessels to gather data to be used in long term conservation measure.

3. Determine the season for juvenile tuna and impose regulatory measures such as closed season.

4. Regulate the operation of payaw units at specific distances, set-up a demarcation line between and among payaw, operation sites and enforcing the payment of a fee for a license to operate the payaw.

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