

CONSULTANCY REPORT OF ACCOMPLISHMENT AT CEPENE,  
TAMANDARE, PERNAMBUCO REGARDING THE DESIGN, CON-  
STRUCTION, INSTALLATION AND MANAGEMENT OF TUNA AT-  
TRACTING DEVICE AND OTHER ACTIVITIES ARRANGED BY  
THE STAFF:

BY  
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Upon arrival, CEPENE had already constructed twelve (12) drum FADs of their own designed. The FAD are made of four (4) drums and welded into two rows by flat and angular bars. The four drums were binded together by a flat bar with a clearance in between of about 40 centimeters. On the center top of the two rows of drum is a square iron plate wherein the battery and the plastic post of the blinking light will be placed. In between the two drums below, is the mid-support of two back facing angular bars with three (3) holes, one at the center and two at the near ends. These holes are intended for the three rings that will hold the three chains connecting the anchor line. At the front and back of the mid-portion of the two drums, four (4) angular bars measuring about four (4) feet are welded to the mid-support perpendicular to both rows of the drums. purposely as the tying frame of the bamboo support. The FAD without the bamboos weighs about 120 kilograms.

A meeting with staff was conducted and sighted their experiences about the two FADs they had installed previously. The first FAD capsized because its top heavy due to the installed metal post with a metal box coupled with a four bladed fan at the midpost and a small metal post that holds the bulb. The second FAD was washed ashore because the rings that holds the three chains gave up. At this point, a suggestion was made to the staff to modify the FAD that instead of two drums in one row, it should be three (3) to make the fad longer with a wider clearance in between the two rows to make it more stable and bamboo support is no longer needed. Well, according to the staff its quite impossible for them to modify the FAD because they are fully welded and might damage the drums. So, we have to stick with their constructed FAD and make the bamboo support longer and stable.

Another suggestion was made in the attachment of anchor line and the coco line to the FAD. That instead of using the three chains that holds the FAD, it is much better to weld a cleat with swivel at the mid-front below the two drums angular bars support for the anchor line and another cleat at the mid-aft for the coco line.

In this way, the pull of the anchorline to the FAD is at the center front and not at the middle of the FAD and cleat at the mid-aft with the coco line balance the movement of the FAD. The suggestion was accepted by the staff and a program of activities was made on land and sea. On land is the preparation of materials for the FAD and fishing gears to be operated during the trip and on-board the exploratory vessel "RIOBALDO" were the installation of twelve FADs fronting Pernambuco, Alagoas and Serdipe States with four (4) FADs each. Echo soundings will also be conducted between depth of 50 and 100 meters on a zigzag sounding along the three states.

Two technologist who came from Serdipe and Natao will assist in the preparation of materials and installation of FADs and the other two Biologist who came from Rio de Janiero and Brasilia will take charge in the echo soundings.

"RIOBALDO" was scheduled to leave port in the morning November 25th to install four(4) FADs fronting Tamandare and echo soundings along the water of Pernambuco and will return to port to load the other eight (8) FADs for the other two States of Alagoas and Serdipe.

#### PREPARATION OF MATERIALS FOR TWELVE FADs:

1. Construction of twenty four (24) units anchor cement drums weighing about 600 kgs each with an eye made 1" dia. iron round bar for shackle attachment.
2. Welding of cleats made of 1" dia. round bar at mid-front support with swivel and another at mid-aft for the coco-line of the twelve (12) FADs.
3. Cutting of twelve (12) pieces cable wire 3/4" dia. with ten (10) meters long with attachment of timble and two clamps in one end and the other end with timble, swivel and two clamps.
4. Construction of twelve (12) cement suspension weight with eye on both sides made of 3/4" round bar weighing about 30 kilograms each.
5. Construction of twelve coco weightweighing about 30 kilograms with an eye on top for the coco line.
6. Attachment of bamboo supports with four (4) meters long below the angular frame on both sides of the twelve (12) drum FADs.

#### ~~CON~~STRUCTION OF TUNA DRIFT GILLNETS (Proposed)

Two units of tuna drift gillnets were constructed with a lenght of 140 meters each. The net is made of nylon with twine size No.210/36 and with mesh size of 20 centimeters stretched mesh. The net is cons-

tructed in such a way, by reeving al the above meahes by a 6mm nylon rope that for every ten(10) meters of reeving line, there were 50 free meshes which was given a hanging rate of 50% and for every 10 meters of reeving line is the attachment of two (2) meters floatline by eye splicing with the other end is with float 6" dia. plastic float. The floatline is made of 6mm polyethelene rope. The two side meshes of the floatline were permanently hitched or tied to the reeving line of ten meters. This is done so as not to let the float line from moving sideways. After all the above nettings has been reeved and consumed, the attachment of rings fo~~ll~~lows. The rings are made ironrod 12mm cir. with 24cm dia. which were permanently tied along the mesh of the second bottom mesh and opposite the mesh fronting the floatline. In other words, the number of floatline is the number of rings.

#### AT SEA:

"RIOBALDO" left the port of CEPENE at 9:00 A.M. and proceeded to the location with the undersigned where the four (4) FADs will be installed. At the location echo soundings was made to determine the exact location and depth plotted before hand. On deck, all materials are ready for the installation. The soundings made along the 100 meters depth is too dangerous for the fad because of the abrupt inclination reaching down to 500 meters or more. It has been decided to move the location to shallower area where the FAD is safe.

The first FAD (No.1) was installed at depth of 64 meters. This was installed in such a way, first the two anchor drum cement were lifted at the fort side of the gallows and temporarily held by two individual ropes. Then they were sh~~ak~~led to the two chains with opposite ends shackled to the timble of the anchor rope. The lenght of the anchor rope was measured to its required lenght with 1 : 1.4 ratio based on the depth indicated by the echo sounder. Half of the total lenght of the rope was cut in two with both ends attached with timbles by eye splicing. Then both timbles were shackled to the suspension weight. After all the connection of the ancho line has been attached to each other, the FAD on deck was shackled to the cable line and was unloaded to the water floating. Then the end of the coco line was tied at the back cleat of the FAD. The coco weight with the attached coco leaves<sup>was</sup> immediately release at the astern of the vessel and drifted carried by the current far from the vessel. As the vessel is being drifted by the

surface current, the anchor line is being released little by little until it reaches the chain attached to the two anchor drums and immediately both were released by pulling both ends of the ropes. The movement of the FAD is being observed for about 30 minutes to see if it is in the right location.

The installation of the twelve (12) FADs has the same procedure.

POSITION OF THE TWELVE (12) FADs:

PERNAMBUCO -	FAD No. 1	Lat. 08° 51' S	Long. 34° 48' W	D-64m
	" 2	" 08° 53' S	" 34° 49' W	61m
	" 3	" 08° 54' S	" 34° 49' W	60m
	" 4	" 08° 52' S	" 34° 48' W	62m
ALAGOAS -	" 5	" 09° 33' S	" 35° 10' W	44m
	" 6	" 09° 34' S	" 35° 09' W	45m
	" 7	" 09° 34' S	" 35° 11' W	45m
	" 8	" 09° 34' S	" 35° 10' W	45m
SERDIPE -	" 9	" 11° 21' S	" 37° 04' W	50m
	" 10	" 10° 21' S	" 37° 03' W	70m
	" 11	" 10° 20' S	" 37° 04' W	55m
	" 12	" 11° 21' S	" 37° 03' W	64m

DISTANCE OF ECHO SOUNDINGS AND NAVIGATION:

PERNAMBUCO -	Echo sounding	101 nm	Navigation	154 nm
ALAGOAS -	" "	150 "	" "	126 "
SERDIPE	" "	100 "	" "	72 "
	TOTAL - ----	351 "		352 "

FISHING OPERATION:

Tuna drift gillnet - No operation because of inclement weather.

Troll line - Caught one (1) Albacore

NOTE: "RIOBALDO" returned to home port at exactly 3:00 P.M.

December 2nd, 1989.

ON LAND :

Preparation of materials for one (1) bamboo FAD for construction and installation.

Invited and lectured on fifteen (15) Extension Workers at Universidade Federal Rural de Pernambuco at Recife per request of Director, Do DPTQ. De Pesca Mr. Antonio Liboa to the Staff of Cepene regarding the fishing practices in the Philippines especially fishing with the use of fish aggregating device and light use by the commercial and Municipal fishing boats. Said lecture was conducted for 40 hours, December 11 to 13 lecture at the Universidade, December 14 practicum in the construction of bamboo

FAD at CEPENE, December 15, installation of bamboo FAD at depth of 45 meters at about one (1) nautical mile away from FAD No. 3 on-board "RIOBALDO".

After the installation of the bamboo fad, an ocular inspection of FAD No. 1 by the Extension Workers (Trainees) with snorkels ~~scuba~~ <sup>was used</sup> to determine the presence of fish. They found school of salmon and carangidae species beneath the coco leaves with abundant small fishes sheltering in the coco leaves. The trainees took pictures with their underwater camera the small fishes and the algae that accumulates in the leaves. For fourteen (14) days at sea, the FAD has already a good result. The other three (3) FADS was not inspected because of a radio message instructing "RIOBALDO" to return immediately back to CEPENE.

At CEPENE, several meetings was conducted regarding the management of the 13 FADs installed at the three states. A data sheet was prepared as an example to be used in gathering of data during the monitoring. The content of the sheet is about the sea condition, hydrobiological data, species of fish aggregates by the FADs and the condition of the FAD itself if it needs replacement.

#### OBSERVATION AND RECOMMENDATION:

The northeastern part of Brazilian waters as observed, has a good potential for marine fishes especially the migratory or pelagic fishes whose appearance are seasonal in nature. These migratory fishes just passed by feeding along the way until they were caught and if they were not caught here, some other countries will catch them. Such migration can be caught with the use of various devices such as the fish aggregating device (FAD), light and bait. The common device used by the fishermen in this part of the country were the bait for hooks and line and no other fishing method were seen for pelagic fishing. Pelagic fishing should be given more attention because it catches fishes by the tons.

The thirteen (13) fish aggregating device installed by CEPENE in the States of Pernambuco, Alagoas and Serdipe should be given importance by the Federal government because it will increase the fish production and the beneficiaries were the small scale fishermen. They will be trained in various kind of fishing technique by the Federal Rural Extension workers on how to utilize the FAD in fishing. Further, CEPENE should be given full support by the government because of its important role in the development of the fishing industry of the country.

## FISH AGGREGATING DEVICE

Definition of FAD- any type of method, object or construction that facilitate the aggregation and attraction of fish for capture. and that when put in water, algae starts to accumulate itself to attract small fishes and feeds on them and smaller fishes attracts bigger fishes.

### IMPORTANCE OF FAD IN FISHING:

Deepsea aggregating device are extensively used by commercial tuna purse seiner and ringnetters as their main accessories for catching big volume of tuna and tuna-like-species (Skipjacks and bonitos). These are floating buoys made of steel or bamboos with coconut or palm leaves underneath and anchored in fishing grounds of considerable depths. The use of these devices has substantially increases the catch of pelagic fishes.

The beneficiaries on FAD were not only the big time operators, but also thousands of small fishermen engaged tuna handline and other hooks and line fishing. In inland bodies of water, FAD is also used for catching fresh water species like catfishes, mudfishes, carps and shrimps.

### CONSTRUCTION OF BAMBOO FAD:

#### RAFT DOUBLE LAYER

Fifty (50) pieces of full lenght seasoned bamboos will be used with at least 10 meters longwith a diameter of about 10-12 centimeters base diameter and ten (10) pieces of smaller bambooswith 3-4 centimeters diameters diameter throughout its lenght. Prepare an improvise stand and select 18 pieces of bamboo of the same lenght and curvetures which serves as the first layer. Bore holes at the second internod of the 18 bamboos enough for the bamboo fastener to pass through. Reeved the bamboo fastener into the holes of the 18 bamboos and tie each bamboo with a monofilament number 200 by hitches and locks. Cut one piece of the smaller bamboowith the same lenght of the fastener and put it on top of the first bamboo fastener

then tie it to the fastener as the first cross beam. measure 1.5 meters from the first cross beam towards the center and place the second beam then tie the eighteen bamboos. Pass two pieces of exterior tire rims into the inner most two (2) bamboos starting from the tip and push through until it reaches the second cross beam where one exterior tire will be tied. The third cross beam is tied and then the fourth with the other exterior tire.

Another seventeen (17) pieces of bamboo is again reeved to a bamboo fastener. The inner most bamboos will also pass through the tire of the first layer and tied all the seventeen (17) at the four cross beam. All four cross beams of the two layers were tied together. Then encircle a rope around the rear of the four cross beam and pull both ends to bunch the whole bamboo tips together then insert a tire (Exterior) rim to the bamboo tips and removed the rope. Place two (2) full length bamboos each on one side crossing the four beams and tie them to the four beams. Lastly, cut three (3) pieces of bamboos of the same length then their base at the first and second beam then tie all opposite ends in one which serves as a tripod for the marker.

#### ANCHOR LINE

Anchor Cement Drum- Get two or more empty drums with capacity of 200 liters with one side fully opened and insert a 1 inch diameter round bar and fold in two with equal length (2.5 m.) that form an eye at the mid portion enough for the shackle to pass through and bend the opposite end to serve as lock. Filled the drum with cement with a mixture of 1:2:3. Let the cement dry for ten day before using.

SUSPENSION/MID WEIGHT- Prepare wooden box for molding with capacity of 30 kilos of cement with one side fully open and the other side with a hole enough for the eye to pass through. Get a 60 centimeters round bar with 5/8 inch diameter then bend it with both ends meeting at the center forming two bends on both side wherein two shackles will pass through.

Insert the bent iron bar at the whole of the box flooring with the eye equal to the top eye. Fill the box with cement and let it dry for ten days before using.

COCO WEIGHT----- Use the same box of the suspension weight and cover the hole of the flooring with any thin material. Get an iron bar  $5/8$  " dia. with 50 Centimeters long and fold it into halves then bend both ends to serve as lock. Insert the bent iron in the center of the box and fill the box with cement but, see to it that the eye of the iron is out enough for the shackle to pass through. Dry the cement for ten days before using.

CABLE WIRE----- Cut the cable wire with  $3/8$ " dia. to 10 to 12 meters long and fold the end at 15 meters long then insert a  $5/8$ " timble inside the fold cable and put a clamp near the timble and tightened it. Put again another clamp before the end of the fold cable and tightened it. At the other end of the cable, insert a swivel with  $5/8$  " dia. inside the timble then pass the cable above the timble of the same length as the other then clamps the two cables together. See to it that all clamps were tightened.

CHAIN ( $1/2$  " dia.)- For two (2) drum anchor weights, cut two (2) chains to three (3) meters long and attached two (2) shackles on both ends. for attachment to the two drum anchor weight. The other two ends are shackled into one for attachment to the anchor rope's timble.

ROPE ENDS WITH TIMBLES- All rope ends for attachment to the cable, suspension weight, coco weight and chains must be with timbles to protect the rope from abrasion. Timbles were attached to end rope by eye splicing.

BAMBOO FAD WITH COMPLETE ACCESSORIES- Please see Figure I



#### INSTALLATION OF FAD:

In the installation of FAD, all materials and accessories should be prepared on-board the vessel. The location and depth wherein the FAD will be installed should be known together with the prevailing wind and water current direction in order to avoid foul setting.

FAD is installed in such a way by using the boom winch and its two nigger heads for lifting and unloading the materials. First, the two drum cement weight were lifted at the fort side of the gallows and temporarily held by two individual ropes. Then they were shackled to the two chains with the two opposite ends was shackled to the timble of the anchor rope. The length of the anchor rope was measured to its required length with 1 : 1.4 ratio based on the depth as indicated by the echo sounder. Half of the total length of the rope was cut in two with both ends attached with timbles by eye splicing. Then both timbles were shackled to the suspension weight. The FAD on deck was shackled to the cable line and was unloaded to the water floating, then the end of the coco line without timble was tied at the back cleat of the FAD. The coco weight of the coco line <sup>with attached coco leaves</sup> was released at the astern of the vessel:

The FAD is then released from the vessel and drifted carried the current far from the vessel. As the vessel is being drifted by the surface current, the anchor line is being released little by little until it reach the chain attached to the two anchor drums and immediately both were released by pulling both ends of the rope. The FAD then is being observed for about 30 minutes to see if it is in the right location.

#### OPERATION OF FAD:

FAD is operated when there is fish concentration like tuna and tuna-like species. It was lighted at night time to keep the fish concentrate under the FAD. At dawn, the light boat will detached the co-

co line and let them adrift away from the FAD. The catcher boat or the purse seine boat then starts to ring the light boat with the coco line. Then pursing of the bottom netting commence until all the rings (Purse) were brought up. The light boat return the coco-line to the FAD and tied it again for another concentration. At daytime, small scale fishermen uses handlines for catching big tunas, multihooks handlines for skipjacks, bonitos and frigate mackerels. If the concentration were small fishes, they use multihooks and line with smaller hooks. Some small fishermen uses troll-lines by running back and forth at the back of the FAD. In one day fishing, these fishermen can catch as much as 100 to 200 kgs of fishes aggregated by the FAD.

#### MANAGEMENT OF FAD:

FAD at sea should be monitored from time to time by conducting hydrobiological study to determine the condition of the FAD. It should be done every week for one year to determine the kinds of fish aggregated and their seasonality. Water temperature is one important factor to be taken into consideration because abundant fish migration can only be determine on what temperature the FAD is effective to aggregate the fish.

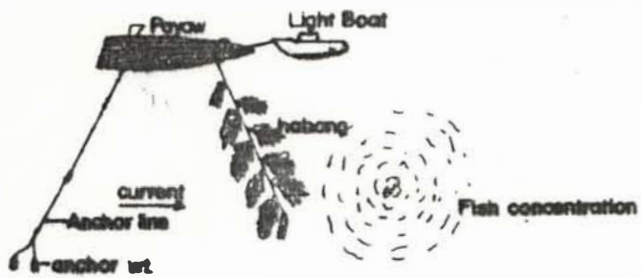
#### FISHING GEARS USING FAD:

Tuna Purse seine  
Ringnet  
Tuna handline  
Multi-hooks and line  
Troll line

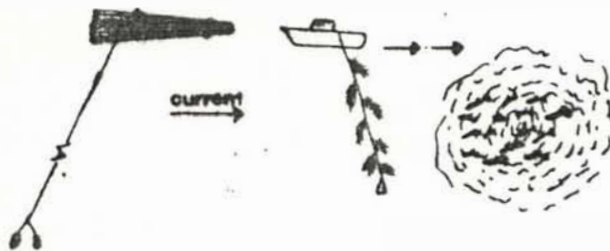
#### FISHING GEARS USING LIGHT:

Sardine Purse seine  
Bagnet  
Stationary lift net  
Largarete  
Scoopnet for squid  
Jigger       "       "

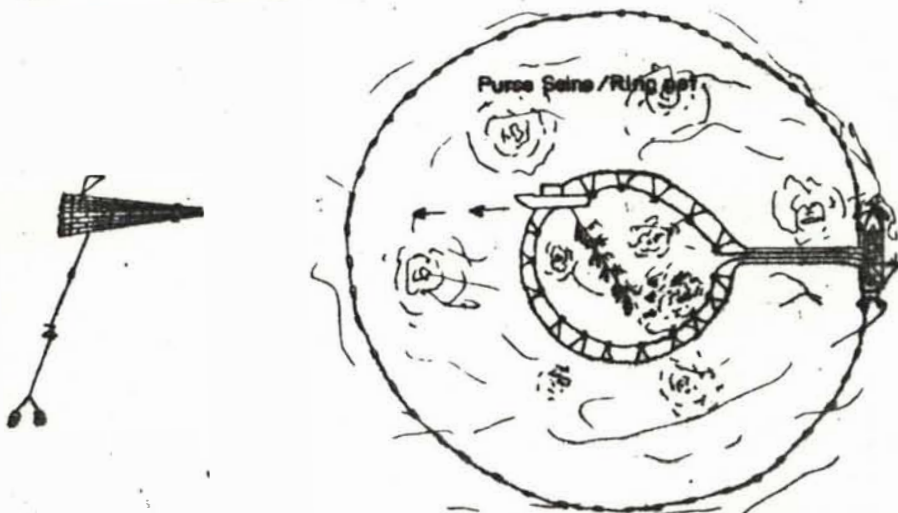
# PAYAW IN OPERATION



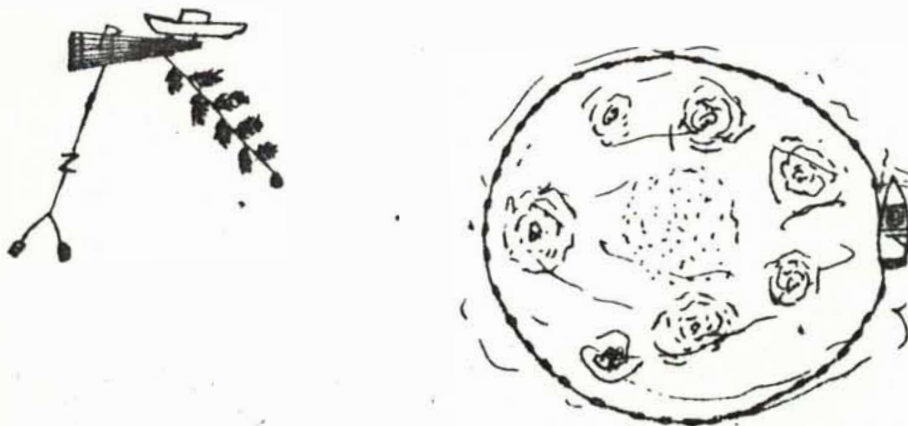
Position of payaw before operation with light boat



Light boat w/ habong being adrift

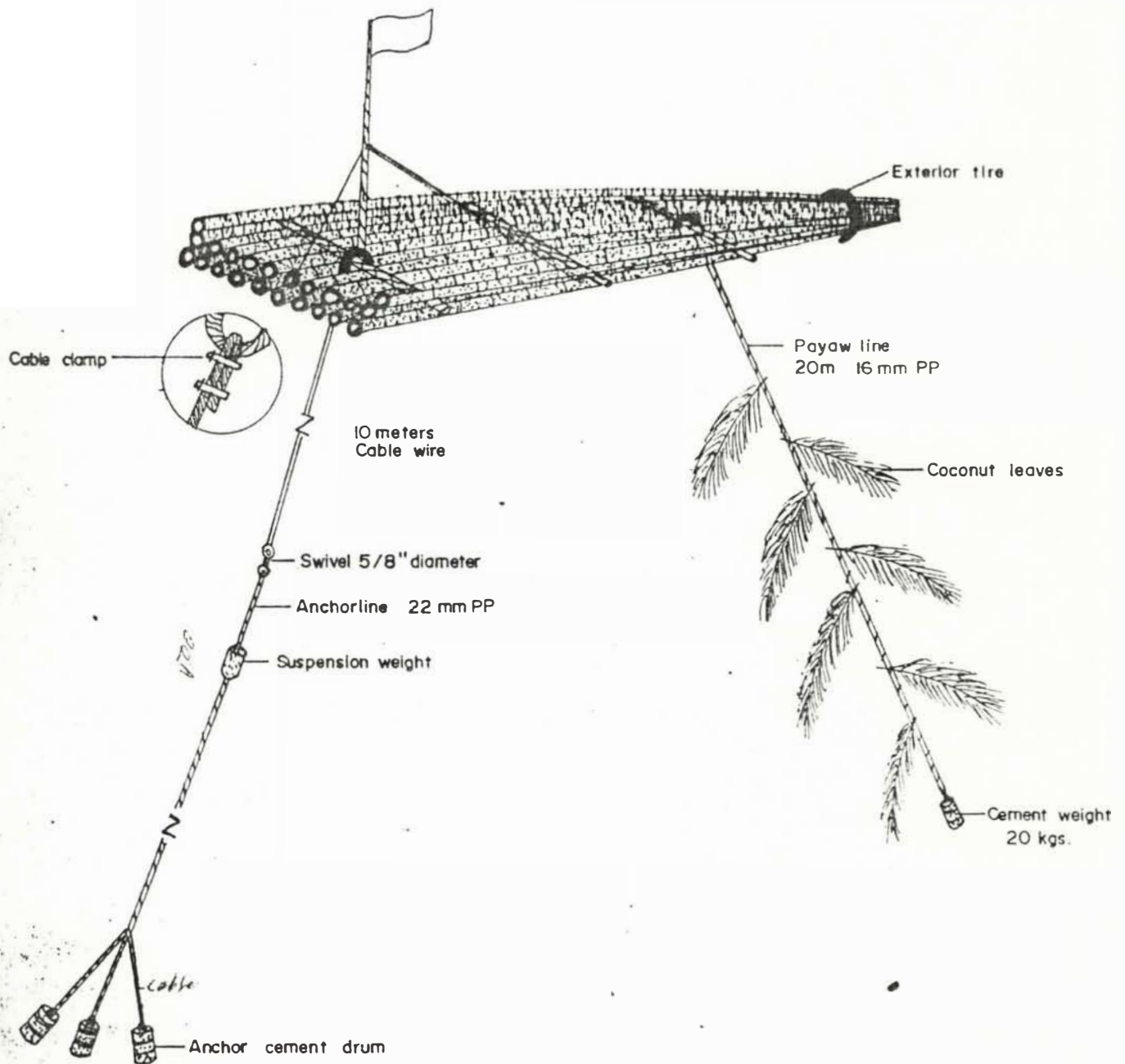


Saining operation w/ light boat at the middle



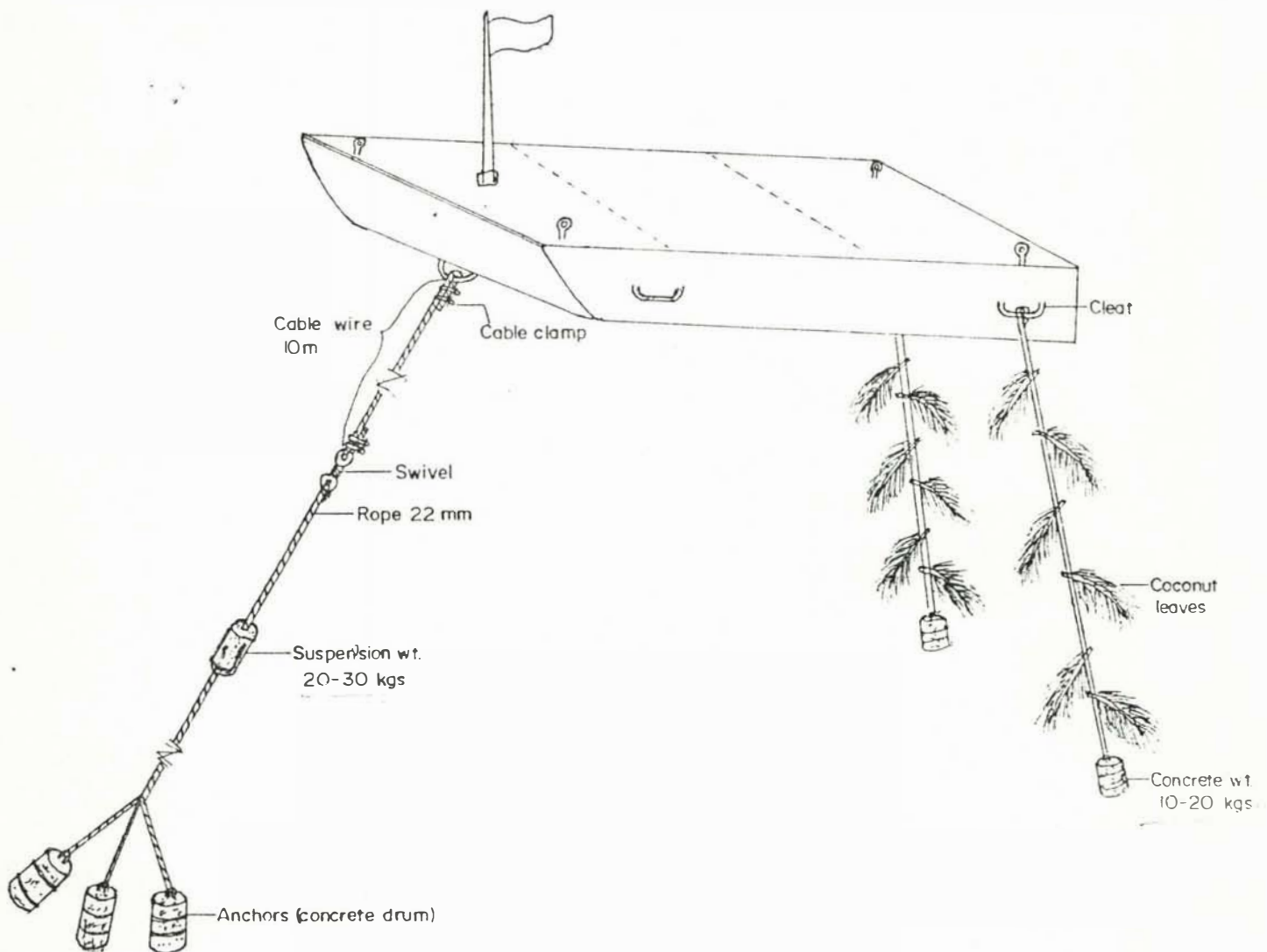
Finished pursing operation with light boat returned the habong back to payaw

# DOUBLE LAYER BAMBOO RAFT (PAYAW)

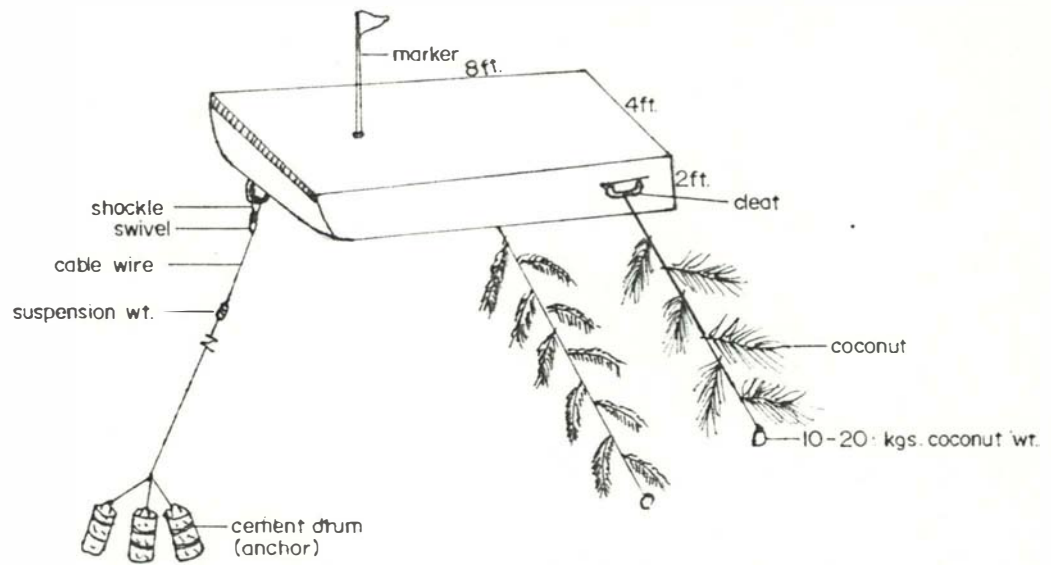


*1 m = 1.3 m*

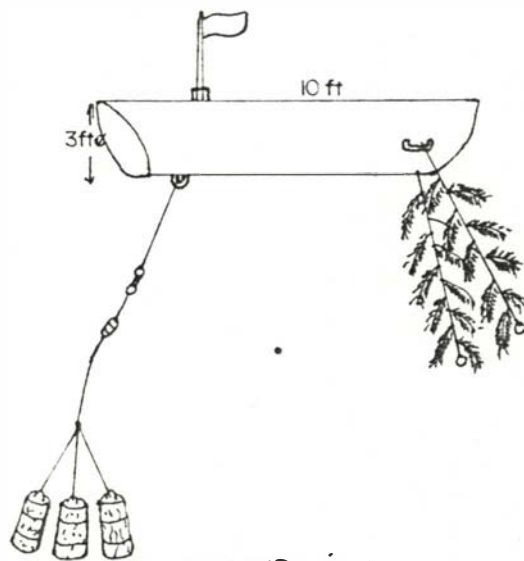
RECTANGULAR STEEL PAYAW  
(3/16" X 4' X 8')



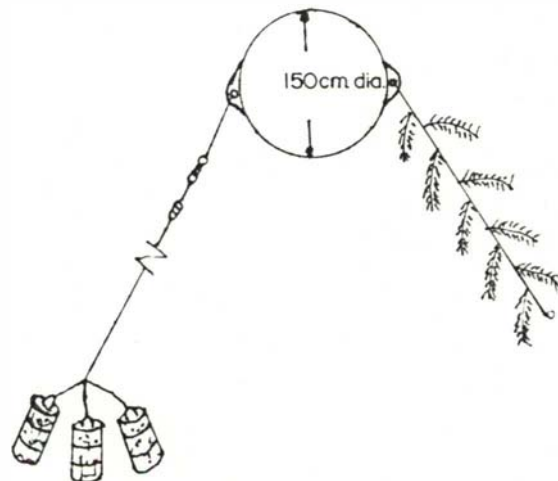
# STEEL PAYAW



RECTANGULAR

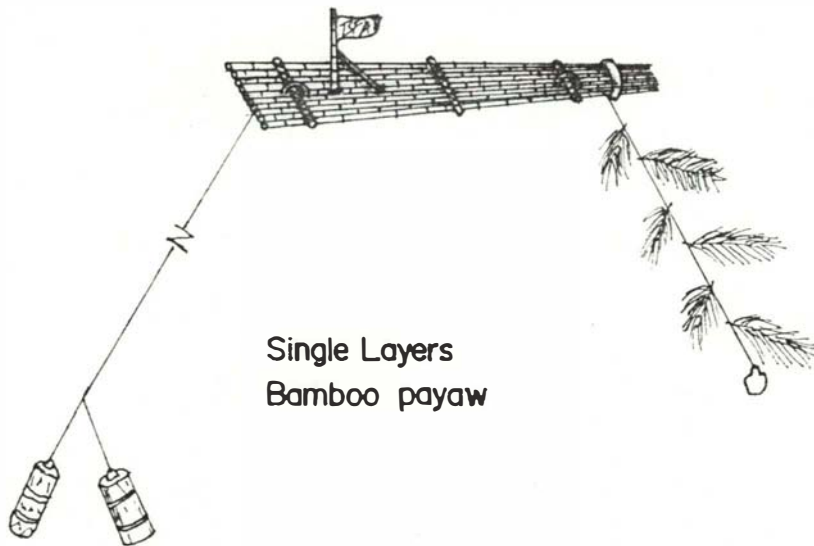
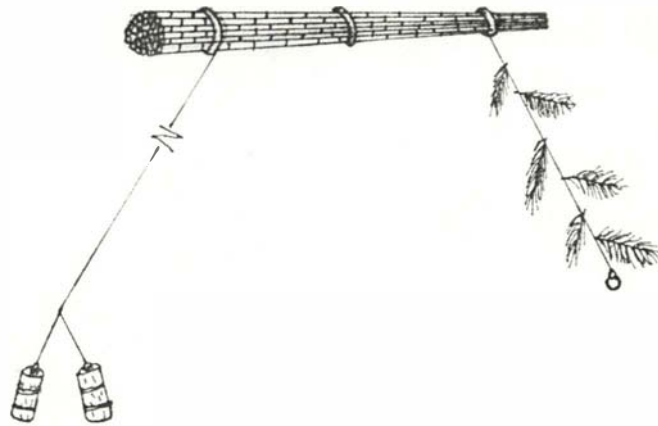


CYLINDRICAL

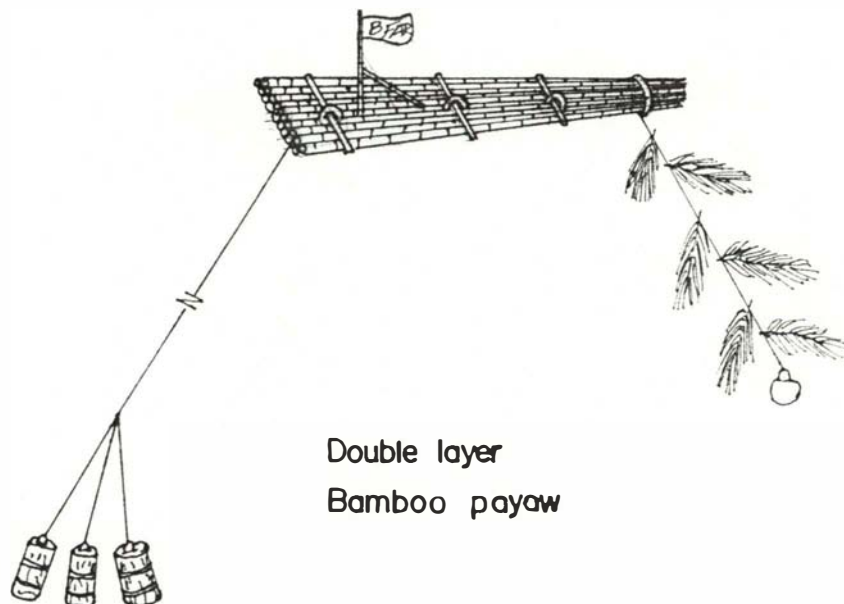


Round US marker bouy

# BAMBOO PAYAWS



Single Layers  
Bamboo payaw



Double layer  
Bamboo payaw