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PRELIMINARY REPORT ON THE TRIAL OF BOTTOM TRAWL RIGGED WITH PLASTIC ROLLER BOBBINS AND OVAL BOARD

ARSENIO S. DE JESUS and ABELARDO R. MANIULIT*

INTRODUCTION

Trawls rigged with wooden, iron and rubber roller bobbins have been in use in other countries a long time ago. In the Philippines, however, their use was started only two or three years ago, operated mostly in rough grounds. There are many places in the Philippines where this kind of trawl can be operated successfully such as Visayan Sea, Asid Gulf waters around Bohol and many other places which will serve as potential ground for this kind of rigged trawl.

In many European countries the use of *plastic roller bobbins* began only a year ago. This paper will therefore describe the experience when it was tested in the Philippines.

The preliminary trial tests of trawl rigged with *plastic roller bobbins* and oval board were performed on board the "F/B Maharlika de Visayas" owned and operated by the Bormont Fishing Corporation of Iloilo City. The trial experiments were carried out through the initiative and joint cooperation of the Philippine Fisheries Commission, (now the Bureau of Fisheries and Aquatic Resources), United Nations Development Program (PFC-UNDP), and the Bormont Fishing Corporation under the supervision of the authors and Mr. Karl Einarsen, FAO Masterfisherman. If proven successful, fishing boat operators in Iloilo City and Negros may adopt the innovation.

The equipment, such as the plastic roller bobbins, oval boards and the 560 x 170 mm star trawl net under the custody of the Bormont Fishing Corporation are the property of the UNDP. The nets will be transferred to Mr. Juan Salvador Jr. by the second week

* Supervising Fishery Technologist and Jr. Fishery Technologist respectively.

of January 1970 for a period of two or three weeks to assess its effectiveness on his boats.

The bobbins under study were tried in Asid Gulf and adjacent waters. Asid Gulf (Figure I) is located South of Masbate where the narrow coastal plain of the province is situated. The rainfall of the province is practically continuous throughout the year. This rainfall brings down a great amount of nutrients to fertilize the waters around the province including the 562-square-mile Asid Gulf. At the time of the experiment, a very large school of hardtail (Carangidae) and Rastrelliger (Scombridae) was encountered inside the Gulf.

The preliminary result of the four day trial (December 13-16, 1969) of the trawl rigged with bobbins and oval boards was good on the point of commercial fishing. The catch was of good quality fish, 80 to 90% of which are first class fishes.

TECHNICAL BACKGROUND OF TRAWLS IN THE PHILIPPINES

Catching of demersal stocks of fish in the Philippines with the use of trawls in commercial quantity became popular only after the Liberation period (1945-1946). During the first three years of operation, fishermen were satisfied with the efficiency of the beam trawl in catching bottom fishes. Subsequently, they used otter doors in place of the wooden beam to open their nets.

Since the adoption of the otter trawl by the fishing industry to the present, it has undergone so many improvements in its design and construction. In the first phase of the modification of the otter trawl, the old beam trawl net was converted into a meztizo net. Other new types of trawl net were introduced and were readily adopted by the industry. These were the Vigneron Dahl, Pacific, and Atlantic types.

With the introduction of the use of twin engines in trawlers in 1958, the trawling speed was also increased so they were able to catch the fast swimming fish which they hardly caught before.

Filipino fishermen continued to modify their trawl nets. Their old box-type net was modified by increasing the number of meshes on the side bellies with the intention of having a higher vertical opening. This is to take advantage of the presence of the semi-

pelagic species like *Decapterus (galunggong)* *Rastrelliger (hasa-basa and alumahan)* etc.

With the desire of the fishermen to catch more of the semi-pelagic fishes, the UNDP, through the initiative of Mr. Einarsen, FAO Masterfisherman, introduced during the latter part of 1966 in Visayan waters, the Norwegian type of trawl followed by the German trawl design. Both designs were adopted by the industry not only in the Visayas but also in some parts of Luzon island.

In 1967, bull trawling (two boats trawl) was reintroduced in the Philippines with good results particularly as to its commercial possibilities. Rubber bobbins, as well as wooden ones, were also used by some private fishing boats in their trawling activities.

MATERIALS AND METHODS

Fishing Craft

Fishing operations were made on board fishing boat *F/B Maharlika de Visayas*, owned and operated by the Bormont Fishing Corporation in Iloilo City. The said craft was powered by 380 hp Caterpillar engine with a maximum revolution of 1,250 rpm and provided with a power take-off belt that drives the mechanical winch used to haul the net and its accessories.

The fishing craft used was a stern set trawler with a wooden boom for lifting the net and other heavy objects on board. The wooden trawl gallows (davit) is situated at the astern part of the boat. The Furuno fish-finder is located at the pilot house.

The general particulars of the wooden craft are listed as follows;

Overall length	26.30 m
Breadth	6.01 m
Draft	2.75 m
Gross Tonnage	83.38 m
Net Tonnage	35.70 tons

The fishing craft has a tugging power of 3,900 kilograms at 1,158 rpm.

Fishing Gear and Accessories

The net used for this trial was the 560 meshes around x 170 mm mesh stretch star trawl with a combination wire ground rope of

39 meters. The original net was made of pure nylon, (Figure 2). The same net was used by the corporation for six months and later became 75% Kuralon twine due to mendings and repair.

The Norsenet No. 3 is 600 meshes around x 4 knots with 49 m groundrope 3/8" diameter cable wire covered with electric plastic tape and wound with polyethylene twine.

The pendants used was common for both nets and measured half inch in diameter with a 27½ meter long cable wire with electric plastic tape and wound with polyethylene twine.

The sweep line was made of Manila (abaca) rope, 30 fathoms long each.

The oval board with three-slit opening used in this trial weighed 326 kg. each. It was rigged with the fore and aft rigid brackets. The chain back stop is provided with the block-roller where the kelly's eye was also attached.

The set of plastic bobbins was 38 m long and made of the following materials:

17 pieces	plastic bobbins 10½" diameter.
26 pieces	plastic bobbins 8" diameter.
16 pieces	4 link chain (each 8" long)
24 pieces	3 link chain (each 6" long)
3 pieces	½" diameter cable wire with a length of 11 m at bossom and 13.5 m x 2 at the wings.
86 pieces	2½" diameter iron discs. (washer).
1440 pieces	45 mm diameter rubber discs.

The set of bobbins was directly attached to the ground rope by way of the pieces of chain links in between the bobbins. At this juncture the bobbins is clear of the ground rope by about 1½" for the star trawl, while for the Norsenet, the chain links are provided with an extension line of two inches more.

Fishing Ground

Asid Gulf lies south of the narrow coastal plain of Masbate province. The Gulf has an approximate area of 562 sq. mile with an average depth of 15 fathoms. The bottom is generally coralline although there are areas with sandy and muddy bottoms where an

ordinary trawl is commercially operated. The Gulf is being fertilized by nature through the run-offs coming from the mainland of Masbate.

Methods

The main objective of these trials was to test the feasibility of the bobbin-rigged trawl in hard, soft, or rough ground. The net used were the 39 m on the ground rope star trawl and Norsenet No. 3. There was no intention of comparing the catch of these two nets but the star trawl became unserviceable on the third day of operation so the Norsenet No. 3 was used.

The operational procedure followed was the same as in ordinary bottom trawl, paying out cod end first, followed by the belly, wings, pendants, sweepline doors and towing cable. The net was dragged at an average of 3 hours on rough, hard and soft bottoms at depths ranging from 6 to 27 fathoms. The engine revolution was kept constant for both nets, and data was collected for each haul.

RESULTS AND DISCUSSION

The data on haul results during the trial tests are found in Tables I and II. Table III indicates the total fishing efforts and average catch per hour by the star and Norsenet trawls.

The trawl wire payed out in relation to depth of water for star trawl ranged from 1:4.6 to 1:14.28 while that of the Norsenet is 1:7.5 to 1:10. According to the masterfisherman of *F/B Maharlika de Visayas* they have a trawling speed of 3 knots with the Star trawl with the rectangular board. In this trial where the same net was used with the plastic bobbins and oval board, the trawling speed was 3.5 to 3.7 knots while that of the Norsenet had a speed of three knots only. This can be explained by the fact that the oval board offers lesser resistance than the rectangular board. Besides, the bobbins roll instead of ploughing the bottom.

The Furuno fish-finder installed on board helped us determine the nature of bottom as the nets were being dragged. It was observed that in some portions the bottom was very irregular. The soft-muddy portion of Central Asid Gulf (near Circe Bank) which extends to Jintotolo Island was tried and proved to be successful. According to the masterfisherman, ordinary bottom trawlers avoid this area because of the experience they have when their nets sank or almost anchored into the mud after a few minutes of towing. The

TABLE I
Details of Fishing Operation with Star Trawl Rigged with Plastic Bobbins & Oval/Boards

1969	Depth in Fathoms	Length of warp Fathoms	Place	Time set	Time haul	Duration of drag		Catch in tubs	REMARKS
						Hrs.	Min.		
12-13	11-7 1/2	100	SW of Guithagan Island	0300	0600	3		5	Majority of catch are crevalles and nemipterids and a kilo of shrimps with few but large lizard fishes. Bobbins spouting sand, shell and water. Mud adhered to bottom belly. Echo-sounder revealed a very irregular bottom.
12-13	7 1/2-11	100	—ditto—	0705	0835	1	30	3	Back chain strop on one of the doors snapped, combination wire rope near bossom was cut. Mud also adhered at belly. Plenty of white bait fish at the belly.
12-13	11-13	100	—ditto—	0950	1300	3	10	12	Five floats added on the head rope, 14 at the rib line and two at the bag. Weather was calm. Bottom topography irregular. Of 12 tubs landed, 8 had assorted big fishes including big lizard fishes.

Continuation of Table I

1969	Depth in Fathoms	Length of warp Fathoms	Place	Time set	Time haul	Duration of drag		Catch in tubs	REMARKS
						Hrs.	Min.		
12-13	12-14	120	--ditto--	1355	1635	2	40	14	Very wide school of hard tail and Rastrellinger in the area, the 3/4" swivel between pendant and sweep rope of the left wing snapped, net was also damaged.
12-13	10-6	100	Guinla- tagan to Chico Is.	2035	2335	3		11	Few big fishes caught under day time catches. Net was dragged between two shoals.
12-14	6-8	100	--ditto--	2420	0325	3	5	8	Two out of 8 tubs was thrown over board composed of shrimps, fish, and hard-shelled shrimps. The rest were good quality fish.
12-14	8	100	Guinla- tagan to Central Asid Gulf	0655	0655	2		5	Net hauled because of abrupt change in depth. Four tubs were good quality fish, one tub was second class fish. Belly was still muddy.
12-14	26-27	120	Central Asid Gulf to Jintotolo	0825	1225	4		6	Soft muddy bottom avoided by other trawls for fear of sinking in mud. The bobbins performed satisfactorily. Added four more floats to the body. Good quality fish were caught.

Continuation of Table I

1969	Depth in Fathoms	Length of warp Fathoms	Place	Time set	Time haul	Duration of drag		Catch in tubs	REMARKS
						Hrs.	Min.		
12-14	12	100	Pulan- duta Pt. to	1300	1600	3		9	Damaged bottom belly as boat took very sharp curve to avoid very steep reef not found in the chart. Good quality fish were caught. Net was repaired.
12-14	12-11	80	Mandaun to Balud	2100	2100	3	6	7	Damaged bottom belly but catch were good quality fish. Bottom belly was clean. Six more floats placed inside the belly. There were also lizard fishes with shrimps. Net repaired after 3 hours.
12-15	21	120	Balud	0100					Net heavily damaged after a few minutes of dragging. Net was beyond repair on board.

TABLE II
Details of Fishing Operation with Norsenet No. 3 Rigged with Plastic Roller Bobbins and Oval Board.

1969	Length of warp Fathoms	Fathoms	Place	Time set	Time haul	Duration of drag		Catch in tubs	REMARKS
						Hrs.	Min.		
12-15	21-12	120	Guinlutan	0550	0850	3		23	21 floats were added to original floats. Catch was good, 80% of which were slipmouths of bigger sizes. In this haul not a single lizard fish was caught.
12-15	12-18	120	—ditto—	0950	1235	3	10	13	Adjusted 3 more floats on the bag portion. Catch was good quality fish without a single lizard fish. Still there were more slip-mouths.
12-15	18-13	120	Guinlutan	1300	1625	3	25	1	Bag portion was damaged. Sea became choppy with intermittent rains. Net was cleaned.
12-15	13	120	—Ditto—	1900	1915		25	1	Net was hauled at once due to some abnormal behavior seen in the echo sounder graph.
12-15	13-10	120	—Ditto—	1950	2150	3		16	Catch was of good quality fish. Very windy and sea was still choppy.
12-16	10	100	—Ditto—	2305	0310	4	5	9	Still very windy. Catch was good quality fish.
12-16	10	100	—Ditto—	0400	0700	3		10	Safety line got fouled thus partially closing the intermediate bag. Still majority of the catch were slipmouths

bobbins behaved satisfactorily in this area. Here we caught big lapu-lapu and snappers weighing about 5-10 kilos each.

As seen in Table III, the total fishing hours of the Star trawl was 25 hours and 25 minutes while the Norsenet was 19 hours and 55 minutes with the total catch of 80 and 73 tubs respectively. The average catch of the Star trawl is 3.14 tubs/hour or 137.25 kg. and

TABLE III

Results of Fishing Operation in Asid Gulf

	Star Trawl Net 560 x 170 mm.	Norsenet 600 x 4 knots (4" mesh)
Trawling speed at 975 r.p.m.	3.7 knots	3 knots
Distance between boards	46 meters (182 m. warp length)	49 meters (145 m. warp length)
Total number of hauls	10	6
Total dragging hours	25 hours 25 minutes	19 hours 55 minutes
Total catch (tubs)	80 tubs	73 tubs
Average catch/trawling hours tubs/hr.	3.14 tubs	3.66 tubs

* Fish tub measured —23" top dia. x 18" Bot. dia. x 10" high = 35 kg. to 40 kg./tub.

3.66 tubs/hour for the Norsenet. These are very high compared to the 16.16 kg/hr landed by Manila Bay trawlers in 1957 (Ronquillo et al, Paper presented to the IPFC session, Australia, 1969).

The horizontal distance between the two boards has been calculated by taking the difference of the spread of the warps from the towing block and one meter from it multiplied by the length of the warp released plus the width of the astern where the trawl gallows were located. In this preliminary trial no systematic attempts were made to measure the towing tensions of the gear and the vertical height of the nets while in operation due to lack of measuring equipment.

CONCLUSION

The big gap in the average catch of fish in Asid Gulf and Manila Bay area may be attributed to the following reasons:

1. The fishing intensity in Manila Bay is very heavy compared to Asid Gulf.
2. The efficiency of the performance of the fishing gear. This is in relation to the kind of material and construction of the fishing net.
3. The right adjustment of the gear in accordance with the type of fish to be caught.
4. The use of modern fishing aids in which the presence and behaviour of fish can be detected.
5. The fishing ground wherein the rough grounds of the Asid Gulf are located is barely unexploited.
6. The human factor which is very difficult to measure.

Between the Star and Norsenet trawls, the latter got more poundage but the quality was much inferior. The Star trawl had a bigger mesh (170 mm stretched) than the Norsenet (101 mm stretched).

The resident species of fish such as snappers, groupers and other coral fishes still abounds in this area. These species are found in this kind of habitat throughout the year, feeding on bottom fauna and do not go in schools. If these species are desired, a high horizontal opening trawl is necessary.

Aside from the resident ones, migratory species such as Carangids and those that belongs to family Scombridae are also found in Asid Gulf in certain parts of the year. These fishes are fast swimmers and are sometimes, found above the shoals. For this purpose a high vertical opening trawl is required to take advantage of its presence in the fishing ground. Both of these groups (residents and migratory fishes) are the major bulk of the catch of the Star trawl.

RECOMMENDATION

Having boarded the *F/B Maharlika de Visayas* of the Bormont Fishing Corporation, we hereby recommend the following:

1. Drum brake of the winch should be of larger diameter so that the braking power can be increased and the adjustments

- of the towing cable can be made possible without stopping the forward movement of the boat.
2. Dandy line hook-up of the board should be used so that the sweepline together with the pendants can be taken up directly in the drum.
3. Shooting of the net especially in the star trawl should be done slowly to avoid fouling of its parts.
4. The masterfisherman or other crew members should keep a close watch on the fish finder, towing cable and behavior of the net.
5. Sharp turning of the boat must be avoided so the boards will not be stacked close to each other and they won't get entangled.
6. On new and unexplored ground, the duration of dragging time must not exceed two hours.
7. There should be control levers in the engine room within the easy reach of the masterfisherman while in operation because sometimes nobody is in the engine room.
8. Lowering of the nets from the boom should not be very fast to avoid breakage of the floats.
9. Protection of the bag should be longer by two fathoms to prevent the bag from breaking due to the weight of the fish when there is a very big catch.
10. Bottom belly in this method of trawling should be of thicker twine and possibly made of polypropylene material that has specific gravity lower than water.
11. Net drum roller is likewise recommended to be located at the astern of the boat so that the shaking of the nets to remove dirt or mud while being lifted thru the boom will not be cumbersome to the fishermen.
12. The wooden trawl gallows if possible should be changed with steel I-beams or high quality steel pipes.

It is strongly recommended that the future exploration of the rough grounds with the use of bobbins be done by the Bureau of

Fisheries and Aquatic Resources so that a more detailed, comprehensive and systematic experimental trial can be performed.

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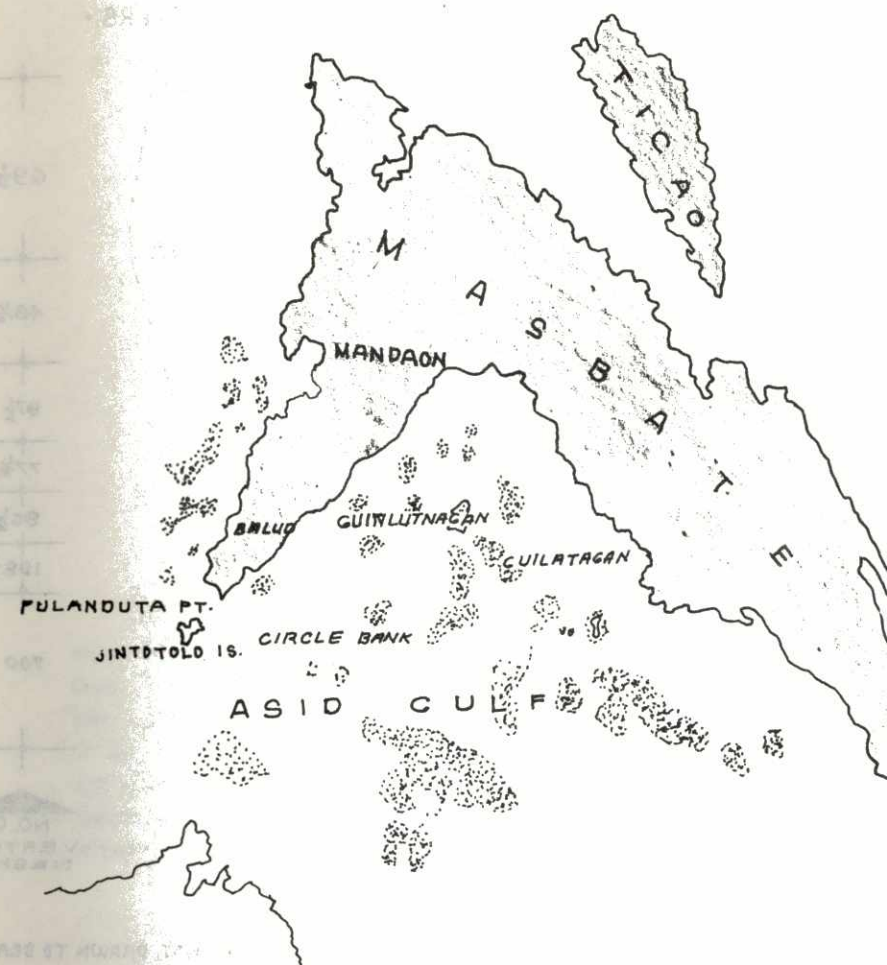
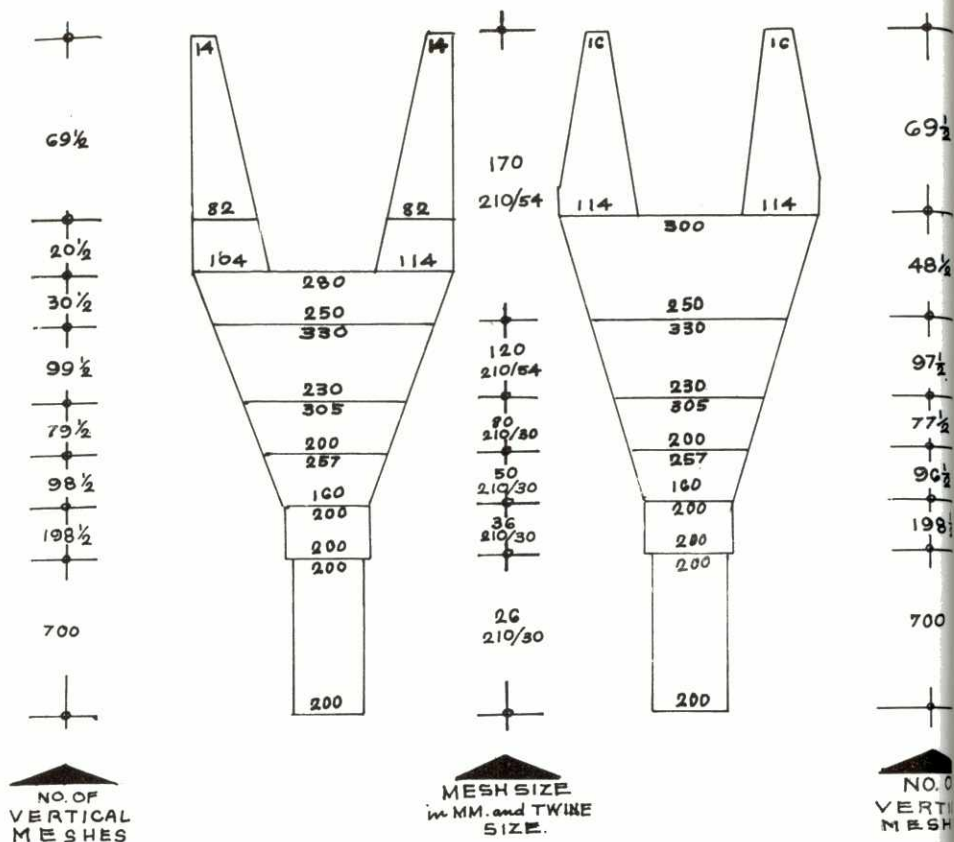


FIG. 1. ASID GULF FISHING GROUND

• GROUND ROPE — 40.00 METERS • HEAD ROPE — 31.2 METERS •



(NOT DRAWN TO SCALE)

FIG. 2. 560 MESHES X 170 MM. NYLON STAR TRAWL NET