

A Demersal Trawling Gear for Inshore Waters Along the West Coast

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Results of comprehensive efficiency tests of three tested designs of 15 m bulged-belly, 15.8 m six seam and 29.26 m longwing type trawls in combination with 114 x 57 cm both rectangular flat and horizontal curved wooden otter boards are reported. Of the possible six combinations, the bulged-belly trawl with flat rectangular otter boards has performed better in landing prawns. Further this study has indicated the selective action of the different designs.

The mechanised boats are forced to shift their activities from the onshore to inshore waters due to the fleet expansion, decrease in the catch per unit effort as well as zone demarcation along the coast for mechanised and non-mechanised or traditional fishing. This has led to the need for maximum exploitation with a more adaptive fishing gear both for shrimps as well as fishes.

Different concepts of designs such as two seam, four-seam multi-seam, longwing and bulged-belly nets are known and attempts to improve/modify each of these designs to suit the local conditions are also reported. Similarly, separate studies are reported on the efficiency of different shaped otter boards. But much less is done to suggest an effective gear and otter board combination for the maximum exploitation of both shrimps and fishes. Hence an attempt is made from February 1977 to May 1977 off Goa coast to arrive at the most suitable trawling gear combination for the west coast.

Materials and Methods

a) Gear and accessories

Tested designs of shrimp trawls namely, 15 m bulged-belly (Fig. 1) (based on Nair *et al.*, 1971), 15.8 m six seam trawl (Deshpande *et al.*, 1970) and 29.2 m long wing

trawl (Satyanarayana *et al.* 1976) were operated with 114 x 57 cm rectangular flat as well as horizontally curved wooden otter boards weighing 50 kg each (Mukundan *et al.*, 1967). While selecting the above designs the general resistance offered by each of the three nets was considered rather than the length of the head ropes.

b) Operational details:

Investigations were conducted off Margao, latitude 15° 25'–15° 35' N and longitude 73° 48' to 73° 58' E in a depth range of 9 to 24 m from *Fishtech IV* (L.O.A. 10.97 m with 65 to 82 HP engine).

Most of the days, all possible three combinations with each type of otter boards were operated in a regular rotation for a duration of 45 min each, except on two days of 30 min each. Altogether 84 comparative hauls were made with each net in 44 daily fishing trips. Of these 42 hauls with rectangular flat type and another 42 with horizontal curved type otter boards were made. The data on warp tension as described by Satyanarayana & Nair (1965) and the catch particulars were collected.

Results and Discussion

The results of the investigations are tabulated in Table 1. It is indicated that, combination of the bulged-belly net with flat rectangular type of otter boards is better suited for demersal trawling having

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Table 1. Efficiency evaluation of operational data

Particulars	Bulged-belly		Six seam		Long wing	
	Flat rectangular (F.R.)	Horizontal C (H.C.)	F.R.	H.C.	F.R.	H.C.
Total trips	44	44	44	44	44	44
Number of hauls	42	42	42	42	42	42
Total trawling time, h	31.5	31.5	31.5	31.5	31.5	31.5
Average warp tension, kgs both warp	540.8	523.57	529.16	491.42	519.16	502
Depth range, m	9-24	9-24	9-24	9-24	9-24	9-24
Prawns, kg	213.0	142.55	123.15	89.2	135.6	102.95
Fish, kg	617.0	472.0	718.0	516.0	580.0	409.0
Total, kg	830.0	614.55	841.15	605.2	715.6	511.95
Catch/h prawn, kg	6.79	4.59	3.9	2.87	4.34	3.32
Catch/h fish, kg	19.58	15.22	22.79	16.64	18.40	13.12
Total catch/h, kg	26.37	19.82	26.79	19.54	22.74	16.42

landed the highest quantity of shrimps. Table 1 indicates that the bulged-belly trawl has landed consistently higher catch of prawns irrespective of the type of otter boards. This firmly establishes the superiority of this design over the other two in landing prawns. In the meantime the total catch landed by the same net is almost the same, especially in combination with the flat rectangular type of otter boards.

It is also noticed that inspite of the length of the head and foot ropes in the long wing trawl, the bulged-belly net with shorter length has been more efficient. This is a possible indication that mere lengthening of the wings may not be of much advantage and so a greater need to study the various designs with particular reference to the shape/contour of the mouth while in action.

The catch data of the 3 nets for 39 valid hauls fitted with both the types of otter boards, were subjected to statistical analysis. For the purpose of analysis the 6 net OB combinations were taken as 6 individual nets and the catch figures were converted to their log values and analysis of variance technique was applied and the ANOVA Tables 2(a), 2(b) and 2(c) prepared for prawn catch, fish catch and total catch respectively. Significant difference ($p < 0.01$) was observed

between nets regarding prawn and fish catch. Bulged-belly trawl fitted with flat rectangular otter boards landed significantly higher quantity of fish and prawns and 6 seam net fitted with flat rectangular otter board landed significantly higher quantity of fish. As regards the resistance offered by the three nets, there was no significant difference.

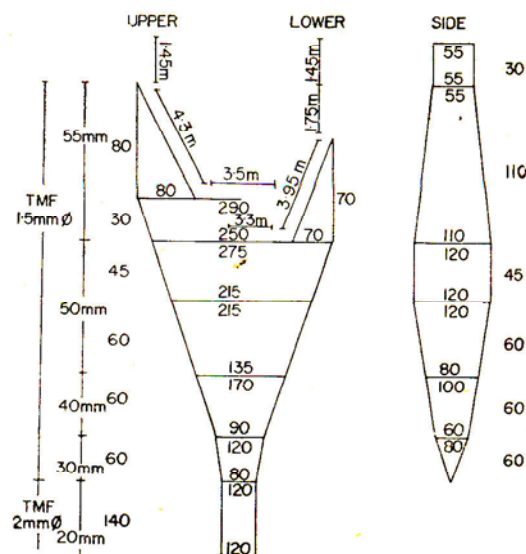
**Fig. 1.** 15m bulged-belly trawl

Table 2(a) ANOVA table for prawn catch

Source	ss	df	ms	F
Total	29.0199	233		
Nets	1.9308	5	0.3862	8.718**
Days	18.6722	38	0.4914	11.093**
Error	8.4159	190	0.0443	

Least significant difference at 5% level for nets=0.0934

Mean log: catch of different nets

A	B	C	D	E	F
0.6710	0.5334	0.4841	0.3849	0.5499	0.4328

Table 2(b) ANOVA table for fish catch

Source	ss	df	ms	F
Total	36.2084	233		
Nets	1.1750	5	0.2350	5.390**
Days	26.7428	38	0.7040	16.147**
Error	8.2806	190	0.0436	

Least significant difference at 5% level for nets=0.0927.

Mean log values for different nets

A	B	C	D	E	F
1.0445	0.9365	1.0813	0.9551	1.0055	0.8679

** - indicates significant at 1% level

A - Bulged-belly trawl fitted with flat rectangular otter board

B - Bulged-belly trawl fitted with horizontal otter board

C - 6 beam trawl fitted with FR otter board

D - 6 beam trawl fitted with HC otter board

E - Long-wing trawl fitted with FR otter board

F - Long-wing trawl fitted with HC otter board

Table 2(c) ANOVA table for total catch

Source	ss	df	ms	F
Total	12.9260	113		
Nets	0.1311	2	0.06555	5.019**
Days	11.8286	37	0.03197	24.479**
Error	0.9663	74	0.01306	

**Significant at 1% level ($P < 0.01$)

The bulged-belly design in combination with flat rectangular type of otter boards is more suitable for demersal trawling in inshore along the west coast.

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