One-Boat Midwater Trawling with Unequal Panelled Trawl

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Results of the comparative efficiency studies with 10.5 m equal panelled and 10.3 m unequal panelled midwater trawls operated from 10.9 m wooden trawler are presented. Out of the two nets, the latter proved to be relatively good for the capture of off bottom and column fishes like pomfrets, seer, lactarius, cat fish, silver bar, ribbon fish and an increase of 84.4% in total catch was observed.

During the last two decade great progress has been achieved in other countries for the development of one-boat "aimed" midwater trawling. Scharfe (1964) is of opinion that midwater trawling is supposed to fill the gap between the working range of conventional near surface bottom fishing gear for exploiting the known fish stocks and opening up the so far untapped resources. Von Brandt (1971) feels that pelagic trawls are not meant to replace bottom trawl but to use as an additional fishing method. Scharfe (1964) has further reported that a midwater trawl of a rectangular cross section caught more than pair trawlers operated during rough weather conditions.

Perumal (1966), Sivan *et al.* (1970), Kartha & Sadanandan (1973), Mhalathkar *et al.* (1975) and Varghese (1975) have described the experimental attempts made in Indian waters. But in the absence of adequate research support, midwater trawling is yet to gain importance as a viable alternate fishing method that can be adopted on a commercial scale when the bottom trawling become uneconomical. This communication deals with the attempt of the authors to select a suitable type of trawl that can be operated from 10.9 m mechanised wooden trawler.

Material and Methods

The investigations were conducted during March 1977 to May 1979 from Fish Tech. No. IV, the constructional details of which have been described by Deshpande & Kartha (1964). During the course of the present study the vessel is fitted with Leyland engine of 65–82 H.P. that can develop trawling speed of 3–3.5 knots per h at 1100–1300 r.p.m.

Table 1. *Particulars of gear and accessories used*

Size of gear	10.3 m	10.5 m
Otter boards: size cm.	120 x 60	120x60
weight kg	50	50
Bridles: H. R. m	50	50
F. R. m	51	51
Front weights kg	15+15	15+15
Number of fishing trips	55	55
Number of hauls	86	86
Depth range in m	14–30	14–30
Warp depth ratio	1:5 Appx.	1:5 Appx.
Towing speed/ RPM range	1100 to 1300	1100 to 1300
Total towing duration h	86	85

A new 10.3 m unequal panelled midwater trawl of 70% width for the side panel was designed so as to develop a rectangular or oval shaped mouth opening when the net is in action. The design and rigging details of the net are given in Fig. 1 and Table 1. The net is compared with a tested design of 10.5 m equal panel (Mhalathkar *et al.* 1975). Both the nets were rigged with vertical curved otter boards of "suberkrub" type described by Sivan *et al.* (1970) weighing 50 kg each. Rigging of gear and accessories are on similar lines as described by Mhalathkar *et al.* (1975)

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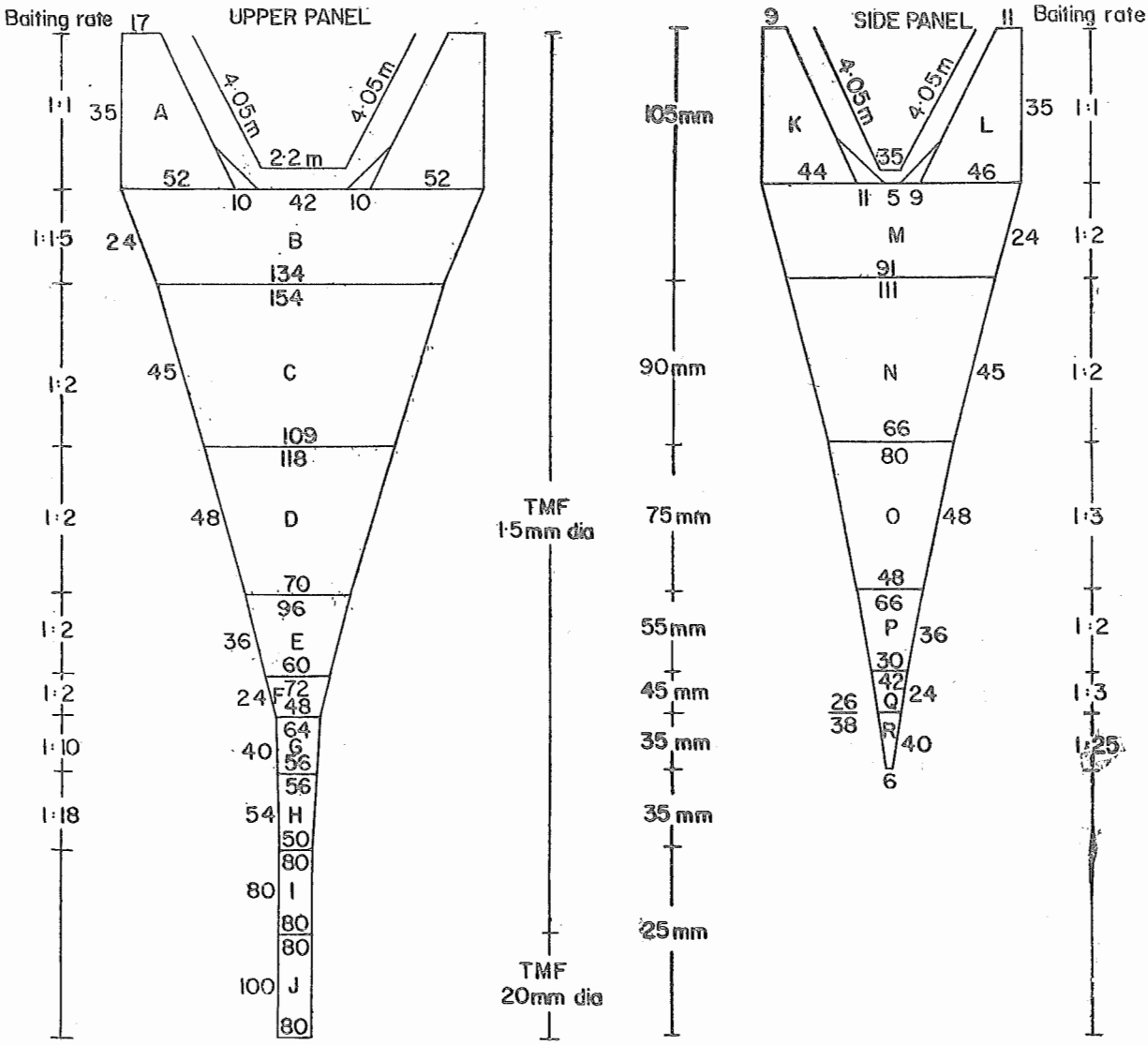

Fig. 1. Design and rigging of net

except that the length of bridle used for HR and FR respectively were 50 m x 51 m. Apart from the floats and sinkers used on HR and FR additional front weights made of bunched chains were provided in the middle of lower bridles so as to keep the net afloat and at the same to open the trawl vertically due to the force exerted by these bridle weights. As difficulty was experienced to get the desired towing speed with the available towing power the weight bunched chains were limited to 15 kg each.

During the course of present investigation the two nets were operated in rotation keeping the various fishing parameters such as fishing ground, depth, scope ratio, towing speed, towing duration more or less same for the two nets. A total of 86 comparative hauls were made with each net in 55 days fishing by taking paired haul on 31 days and single hauls on 24 days with each net. Data on warp tension of the nets were recorded only for 52 hauls on 34 days following the method described by Satyanarayana & Nair (1965).

Results and Discussion

The results of the fishing operation conducted are presented in Tables 2 and 3. From the Tables it can be observed that there was no significant difference in average tension offered by the two nets, the average

Table 2. *Particulars of tension and total catch (kg)*

	10.3 m net	10.5 m net
Average tension (on both warps)	536.00 (51 hauls)	540.00 (52 hauls)
Quality fish	5136.50	2376.00
Trash fish	2909.00	1987.00
Total catch	8045.50	4363.00

Catch/h in kg (average)			% increase of 10.3 m net
Quality fish	60.43	27.95	115.00%
Trash fish	34.22	23.37	47.3 %
Total fish	94.65	51.32	84.4 %

Table 3. *Analysis of species-wise catch*

	10.3 m net	10.5 m net
Pampus sp.	168.0	130.0
Scomberomorus sp.	93.0	68.0
Trichiurus sp.	973.0	455.0
Lactarius sp.	858.0	548.0
Carangids	30.0	20.0
Elasmobranchs	94.0	109.0
Rastrelliger sp.	10.0	5.0
Chirocentrus sp.	15.0	8.0
Arius sp.	2332.0	564.0
Loligo sp.	103.0	46.0
Scianids	460.0	423.0
Trash fish	2909.0	1987.0
Total	8045.0	4363.0

Table 4. *Analysis of variance of catch data based on* 34 *and* 44 *days observations*

	Sources	SS	DF	ms	F
a) Catch of quality fishes	Total	19.7208	67		
	Nets	0.8329	1	0.9329	6.872*
	Days	14.8876	33	0.4511	3.722**
	Error	4.0004	33	0.1212	
b) Catch of trash fish	Total	20.8745	67		
	Net	0.3084	1	0.3084	5.439*
	Days	18.6941	33	0.5665	9.991**
	Error	1.8718	33	0.0567	
c) Total catch	Total	9.4143	67		
	Nets	0.5805	1	0.5805	6.719*
	Days	5.9825	33	0.1813	2.098**
	Error	2.8513	33	0.0864	
a) Catch of quality fishes	Total	28.8134	107		
	Nets	1.5521	1	1.5521	15.968**
	Days	22.1111	53	0.4172	4.292**
	Error	5.1502	53	0.0972	
b) Catch of trash fish	Total	32.7084	107		
	Nets	0.1973	1	0.1973	2.103
	Days	27.5393	53	0.5233	5.579**
	Error	4.9718	53	0.0938	
c) Total catch	Total	13.7315	107		
	Nets	1.2576	1	1.2576	20.787**
	Days	9.2694	53	0.1749	2.891**
	Error	3.2045	53	0.0605	

* Indicates significance at 5% level
** Indicates significance at 1% level

tension being 540 kg for 10.5 m net and 436 kg for 10.3m net. Analysis of the catch data indicated that 10.3 m net is superior to 10.5 m and percentage increase in the new 10.3 m net is worked out to be 115, 47.3, 84.4 respectively for quality fish, trash fish and total fish in the landings. Thus the catch results amply justify the superiority of 10.3m unequal panelled net in landing all varieties of off bottom and column fishes such as pomfrets, seer, lactarius, cat fish, silver bar, and ribbon fish.

The same data was subjected to statistical analysis using the analysis of variance technique. The average catch per hour of the hauls made on each day with each of the two nets were taken. The catch figures were converted to their log values after adding 1 to each observation wherever necessary.

The analysis of the 34 days catch data (Table 4) clearly indicated the significant difference in the catch of quality fishes, trash fishes and the total of the two nets at 5% level. The mean catch per hour of the equal panelled and unequal panelled net was 30.65, 20.60, 52.35 and 61.11, 29.97, 91.79 kg. for quality, trash and total catch respectively. Thus the unequal panelled net landed more than the equal panelled net. Because of the very fluctuating conditions in the sea as well as the wide gap in the period of operations between March, 1977 and May, 1979 between days variations were also significant at 1% level indicating the non-uniformity of the fishery during the course of the study.

Table 4 also indicates the significant difference in the catch of quality fish and total catch of the two nets at 1% level. The mean catch per hour of equal panelled and unequal panelled nets for quality and total catch were 28.17 kg, 51.46 kg and 65.33 kg, 99.25 kg respectively. However, the trash fish catch of the two nets showed no such significant difference at 5% level.

From the above results it is quite reasonable to assume that the new design of 10.3 unequal panelled net has been functioning effectively in yielding higher fish catch. Hence it is quite obvious that the proper projection of the mouth region of the net is the only factor responsible for harvesting large quantity of off bottom and column fishes. Thus it has been possible to conclude that a 70% width in the side panel is very much favourable to get the desired rectangular or oval shape for enhancing the functional efficiency of the one-boat midwater trawl in contrast to 50% width in the side panel effected in the earlier work (Mhalathkar *et al.* 1975).

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