

Effect of Horizontal Opening of Bottom Trawl on Fish Catch

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Influence of horizontal opening on the catch of different species groups, in respect of three designs of bottom trawls have been evaluated through field trials. 25 m high opening trawl was found to be most effective for catching ribbon fish and small miscellaneous fish at a horizontal opening of 15-16 m. For *Lactarius* sp. and Sciaenids, 25 m large mesh trawl was found to be most efficient and the horizontal opening of 18-20 m and 16-18 m respectively were found to be optimum for the two species groups. For squid and cuttle fish, 25.6 m BOBP high opening trawl gave better performance at a horizontal opening of 16-17 m and beyond this range, its performance was similar to that of 25 m large mesh trawl.

The horizontal opening of a fish trawl while in operation has an important bearing on the catch it obtains. The horizontal opening can vary over a range for each trawl and when it varies, the vertical opening will be correspondingly affected, being less when horizontal opening is more and vice versa. This in turn might affect the catch obtained by the trawl, as more of horizontal opening might be favourable for obtaining higher catch of some varieties of fish, while more of vertical opening for some other varieties. The aim of this paper is to verify this aspect of the trawl net based on experimental observations.

Materials and Methods

The data for the study were obtained from comparative fishing operations off Veraval, Gujarat, during October 1984 to March 1985. Brief description of the three experimental trawls is given below:

i. Trawl I (25 m large mesh demersal trawl)

25 m large mesh demersal trawl described by Kunjipalu *et al.* (1989) is the scaled down version of 32 m large mesh demersal trawl reported by Kunjipalu *et al.* (1979). It is a two panelled design with a horizontal profile and has proved to be effective for capture of *Lactarius* sp., Sciaenids and Cephalopods.

ii. Trawl II (25 m high opening trawl)

25 m high opening trawl reported by Kunjipalu *et al.* (1990) is a modified design of eight - panelled high opening trawl described by Kunjipalu *et al.* (1984). It has six panels in its construction and incorporates large meshes in the front trawl sections, thus integrating salient features of high opening trawl and large mesh demersal trawl. The net assumes a relatively high vertical opening and has proved to be effective for catching semi-pelagic and off-bottom fishes like ribbon fish. Its efficiency has been further enhanced by attaching a head line lifting device called sailkite (Boopendranath *et al.*, 1986).

iii. Trawl III (25.6 m BOBP high opening trawl)

25.6 m BOBP high opening trawl described by Pajot & Crocket (1980) is a two-panelled high opening trawl with a horizontal profile.

Field trials were conducted from the research vessel Fishtech No.8 of 15.2 m OAL (165 hp) in a depth range of 30-40 m. Duration of tow was maintained at 1 1/2 h uniformly. Flat rectangular boards of wood and steel construction of 1524 x 762 mm size weighing 100 kg each described by Kuriyan *et al.* (1964) was used in combination with 5 m double bridles. The horizontal

opening of the gear was estimated using the method suggested by Ben-Yami (1959) correct to one tenth of a metre. The number of observations taken, the range and average of horizontal opening for each of the trawls, are given in Table 1. For each net, the horizontal opening was tabulated for a class interval of 1 m and the corresponding data on catch in kg for different categories of fish were noted. Cumulative mean logarithmic values (base e) of catch for each category of fish were obtained and plotted against horizontal opening, for all the three trawls (Fig.1 to 5). Variations in the catch of small miscellaneous fish (Clupieds, carangids, silver bellies, soles etc.) 2. ribbon fish, 3. *Lactarius* sp. 4. Sciaenids and 5. squids and cuttle fish were considered in this study.

Table 1. Range and average of the horizontal opening of the experimental trawls

	No. of operations	Range m	Average m
Trawl I (25 m large mesh demersal trawl)	36	15.0-24.0	19.00
Trawl II (25 m high opening trawl)	37	14.0-20.9	16.76
Trawl III (25.6 m BOBP trawl)	38	12.5-24.0	17.33

Results and Discussion

The figures clearly depict the relative efficiency of the three trawls with respect to the variety of fish. Thus in four of the five varieties of fish, one of the trawls markedly stands above the rest, while in one case one trawl is below others. This is with respect to each class interval of the horizontal opening. For a given horizontal opening, trawl

II obtained more average catch with respect to the small miscellaneous and ribbon fishes than the other two trawls. Thus its performance with respect to the above two varieties was superior to the other two trawls. However the increase in the horizontal opening has adversely affected the catch. Its increase from 15 to 16 m resulted in sharp decline in the average catch. Further increase also resulted in reduction in average catch, though the decline was not as steep as in the beginning. The average catch has not shown significant variation with increase in horizontal opening beyond 18 m. However, the remaining two trawls namely, trawls I and III have shown less variation with increase in the horizontal opening, through their performance was far below trawl II.

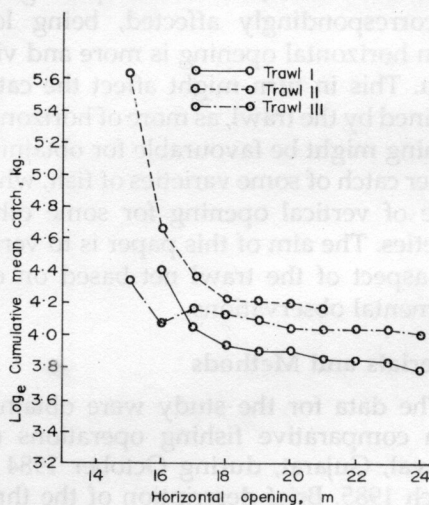


Fig. 1. Small miscellaneous fish

In the case of sciaenids and *Lactarius* sp. it was trawl I which has given the superior performance. For any given interval of horizontal opening its performance was above trawls II and III. Here too, the net has shown some variation in the catch with increase in the horizontal opening, before it became constant for higher horizontal opening. Trawls II and III have not shown

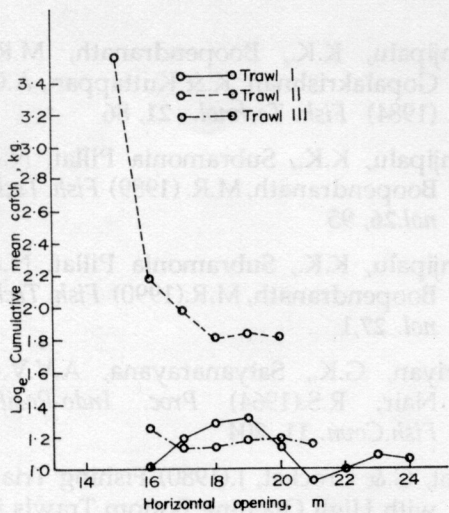


Fig. 2. Ribbon fish

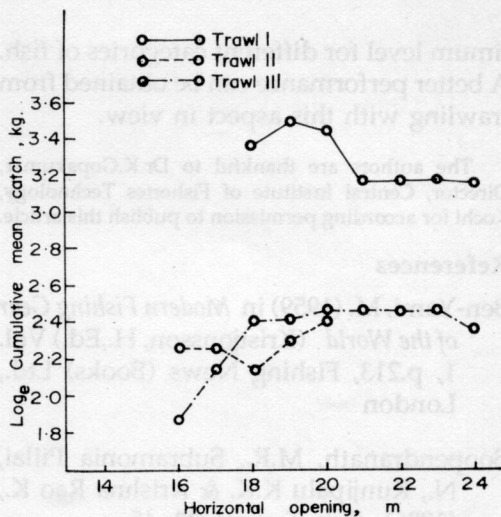
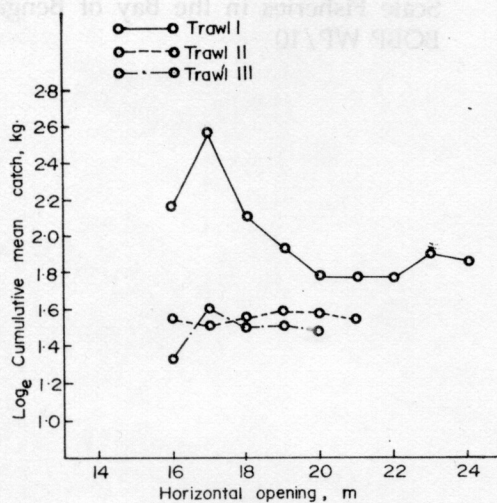
Fig. 3. *Lactarius* sp

Fig. 4. Sciaenids

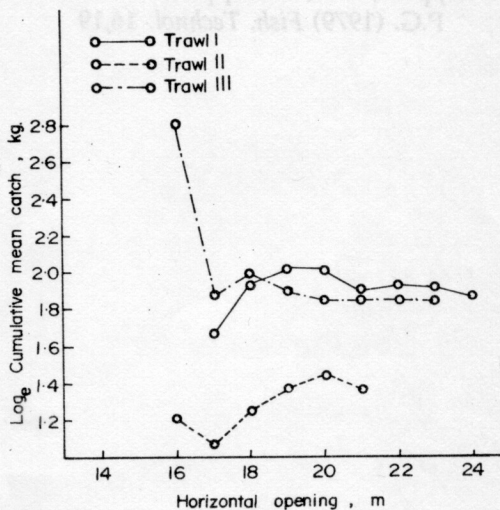


Fig. 5. Squids and cuttle fish

much difference in catch corresponding to variations in horizontal opening.

With respect to squid and cuttle fish the least effective net turned out to be trawl II. For any horizontal opening its performance remained at a lower level than trawls I & III. For horizontal openings of 18 m and above, trawls I and III had more or less same catch rate of this variety. However trawl III gave high rate of catch from 16 to 17 m horizontal opening, which declined

with increase in the horizontal opening. In this respect, trawl III is superior to trawl I for the catch of squids.

From the above it is clear that for a particular variety of fish, one trawl is superior to others and that its performance varies with the extent of the horizontal opening. After initial variation, the catch rate remains uniform with further increase in the horizontal opening. The horizontal opening can thus be judiciously adjusted to the op-

timum level for different categories of fish. A better performance can be obtained from trawling with this aspect in view.

The authors are thankful to Dr.K.Gopakumar, Director, Central Institute of Fisheries Technology, Kochi for according permission to publish this article.

References

Ben-Yami, M. (1959) in *Modern Fishing Gear of the World* (Kristjonsson, H.,Ed.) Vol. 1, p.213, Fishing News (Books) Ltd., London

Boopendranath, M.R., Subramonia Pillai, N., Kunjipalu K.K. & Krishna Rao K., (1986) *Fish. Technol.* 23, 45

Kunjipalu, K.K., Kuttappan, A.C.& Mathai, P.G. (1979) *Fish. Technol.* 16,19

Kunjipalu, K.K., Boopendranath, M.R., Gopalakrishnan, K.& Kuttappan, A.C. (1984) *Fish. Technol.* 21, 86

Kunjipalu, K.K., Subramonia Pillai, N.& Boopendranath, M.R. (1989) *Fish. Technol.* 26, 95

Kunjipalu, K.K., Subramonia Pillai, N.& Boopendranath, M.R. (1990) *Fish. Technol.* 27,1

Kuriyan, G.K., Satyanarayana, A.V.V.& Nair, R.S. (1964) *Proc. Indo-Pacific Fish. Convn.* 11, 204

Pajot, G.& Crocket, J. (1980) Fishing Trials with High Opening Bottom Trawls in Palk Bay, Tamil Nadu, Bay of Bengal Programme. Development of small Scale Fisheries in the Bay of Bengal BOBP WP/10

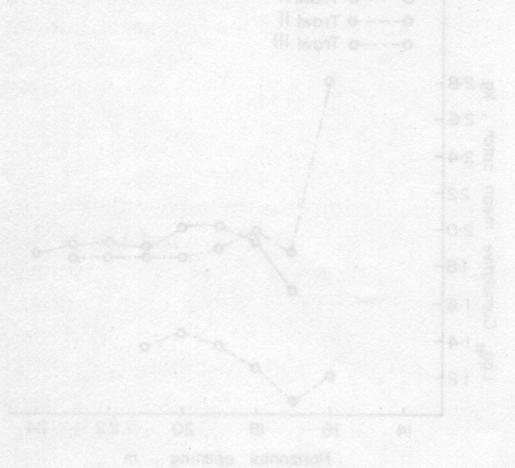


Fig. 2. Squids and cuttle fish

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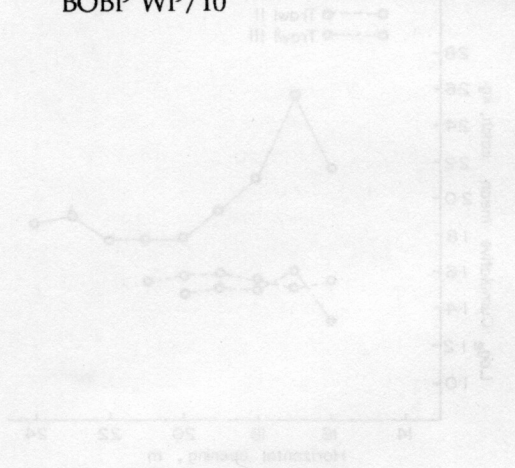


Fig. 4. Sciaenids

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