

The Escape of Fish from Different Parts of a Trawl

By

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In 1906 Todd¹⁾ reported on some most valuable experiments that he had made covering different parts of trawls with fine meshed netting in order to recapture escaping fish. His experiments were chiefly with beam trawls, those with otter trawls being rather limited. The beam trawl is now virtually obsolete and the design of otter trawls has been advanced in the past half century.²⁾ Reporting on comparative fishing experiments in 1948 Margetts³⁾ suggested that a revision of Todd's work might be timely as some of his results may not apply truly to modern trawling gear.

Recent investigations have been designed to follow up Todd's work by applying his basic technique to modern otter trawling gear.

This report describes one experiment carried out to determine firstly the parts of an otter-trawl net through which escapes of fish occur and secondly the quantitative escape of fish in terms of species and size of fish and the proportion of each sort and size of fish entering the trawl which escape through various parts of the net. It is in no way a finished paper but is merely a brief description of the experiment and a presentation of the salient features of the results; no attempt is made here to reach the ultimate required answers.

Method

The trawl used in the experiment was a Lowestoft trawl operated by the 90 ft. motor trawler PLATESSA. It was a type of Granton trawl with 62 ft. headline and 88 ft. groundrope. The length of the net components, before being rigged, were: upper wings 23½ ft., lower wings 54 ft., square 21 ft., belly and batings 32 ft., and codend 18 ft. The meshes, all made of sisal, were of the following sizes: wings and square 137 mm., fore batings 123mm., mid batings 89mm., after batings 85mm., codend 68mm. The net was attached to the otter boards by 6 ft. legs and a tickler chain between otter boards was used. The headline was lifted by 5 "Siamese Twin" and four spherical floats.

The upper side of the codend was covered by small meshed cotton netting, of mesh size 18mm. between opposite knots when stretched, so arranged that there was considerable slack in it and an overhang of about 3 ft. beyond the after end of the codend.

The cover netting to act as a trap for fish escaping through various parts of the trawl net was itself conical or trawl-shaped with a square mouth 16½ ft. square which was laced along all four sides to the part of the trawl net to be investigated; the bag of the cone was 8 ft. long. This trap netting was of the same material and same mesh size (18mm.) as the codend cover.

The choice of fishing ground was determined largely by what range of species and size range of fish could be obtained. The duration of hauls was from 2½ - 3 hours, made in weather conditions ranging from fine to very bad, and in both daylight and darkness; these variables are not considered separately in the results presented here.

The trap was used in six different positions, viz. over the after batings, the forward batings and the square, first down the mid-line

of the trawl and then along the port side selvage. The proportion of each part of the trawl net covered by the trap in each position was as follows:-

| | |
|----------|---|
| Mid-line | after batings trap, 82% of after batings |
| " | " forward batings trap, 24% of forward batings and after square |
| " | " square trap, 13% of square |
| Lateral | after batings trap, 77% of after batings |
| " | forward batings trap, 33% of forward batings and after square |
| " | square trap, 14% of square |

After each haul the catches in the codend, codend cover and trap netting were examined separately, the numbers of each species being recorded together with the lengths of principal species.

Results

The quantities of the seven more prominent species of fish caught in the codend, codend cover and trap netting, when the trap netting was in each of its six positions, are given in the table. Either two or three hauls were made with each arrangement of gear and their results have been combined.

PLAICE. Plaice were caught on every haul. The great majority of plaice on the particular fishing ground ranged in size from 19cm. upwards, very few specimens of 13-18 cm. length being recorded. They were thus mostly outside the selection range of the codend. None were caught passing through any part of the trawl net.

DAB. Dabs, mostly of small size, were abundant. They ranged in size from 4-33 cm., most being from 7-17 cm. and far fewer from 18-28 cm. The ratios of escapes through the codend to escapes through the two positions on the after batings were 4.5:1 and 4.7:1. Thus it is calculated that through the whole of the after batings two small dabs of 6-17 cm. escaped for every seven of such dabs escaping through the codend. Relatively very few small dabs escaped from the forward batings and square and most of these appeared to do so near the selvage of the net.

WHITING. The whiting on the fishing ground mostly fell into the two length groups 7-18 cm. and 28-31 cm., the former group containing the majority. Escapes occurred through all parts of the net, but again, as with the dab, mostly through the after batings. There, the ratios of escapes through the codend to escapes through the two positions of the trap netting were 1:1.5 and 1:2.8. Thus, on the average, for the whole of the after batings five whiting escaped for every two of the same size escaping through the codend.

Escapes of whiting through the more forward netting of the trawl were few, most of them being in the forward batings near the selvage where escapes were at the rate of 19% of that through the codend. In the middle of the forward batings escapes were very few. Thus, it might be reasonably estimated that for every five small whiting escaping through the whole of the forward batings, some 23 escaped through the codend. Similarly, for every one small whiting escaping through the square netting about 11 escaped through the codend.

HERRING and SPRAT. Shoals of mixed herrings and sprats, together of a size range of 9-18cm., were caught spasmodically. The collected information relating to forward parts of the trawl is not very conclusive, but that for the after batings shows escapes of such fish to take place there on a large scale. For every sprat or small herring that escaped through the codend (and escape there was almost total) about 14 escaped through the after batings.

Table 1 Numbers of fish caught in codend, codend cover, and trap
netting on square and batings of Lowestoft 62 ft. trawl

| Trap Position | | Mid-line After Batings | Mid-Line Forward Batings | Mid-Line Square | Lateral After Batings | Lateral Forward Batings | Lateral Square |
|----------------------|--------------|------------------------------|--------------------------------|--------------------|-----------------------------|-------------------------------|-------------------|
| PLAICE PLAICE | Codend | 257 | 264 | 550* | 236 | 244 | 120 |
| | Codend Cover | - | - | - | - | 26 | - |
| | Trap | - | - | - | - | - | - |
| DAB | Codend | 691 | 934 | 375 | 353 | 551 | 230 |
| | Codend Cover | 1,349 | 1,428 | 880 | 1,530 | 2,191 | 867 |
| | Trap | 296 | - | 1 | 322 | 46 | 5 |
| WHITING | Codend | 183 | 98 | 195 | 232 | 154 | 127 |
| | Codend Cover | 2,403 | 2,451 | 1,284 | 1,491 | 2,432 | 2,523 |
| | Trap | 3,698 | 6 | 10 | 4,147 | 469 | 67 |
| HERRING AND SPRAT | Codend | 5 | 3 | - | 18 | 1 | 2 |
| | Codend Cover | 191 | 20 | 4 | 217 | 36 | 138 |
| | Trap | 3,416 | 42 | 5 | 1,238 | 4 | 1 |
| GURNARD | Codend | 26 | 7 | 22 | 93 | 16 | 18 |
| | Codend Cover | 179 | 74 | 116 | 299 | 12 | - |
| | Trap | 143 | - | 18 | 152 | 4 | - |
| SOLE | Codend | 29 | 48 | 176 | 33 | 55 | 34 |
| | Codend Cover | 11 | - | - | 2 | 20 | - |
| | Trap | - | - | - | - | 3 | - |
| SOLENETTE | Codend | 1 | - | - | - | - | 20 |
| | Codend Cover | 375 | 262 | 152 | 176 | 2,025 | 1,200 |
| | Trap | 172 | - | - | 56 | 11 | 54 |

* Approximate

GURNARDS. The escape of small gurnards 9-27cm. long was practically negligible through the forward netting of the trawl while three small gurnards passed through the after batings for every four that escaped through the codend.

SOLE and SOLENETTE. Of the 408 soles entering the codend, only 33 escaped to the cover netting. Only three were caught in the trap netting and those when it was on the forward batings near the selvage. Solenettes escaped from the after batings at half the rate that they escaped through the codend; through the forward netting they escaped only near the selvages and there at a low rate.

Conclusion

Such results, in comparison with those of Todd, show that his investigations of escapes of fish through the netting immediately in front of the codend were not complete and that considerable numbers of small round-fish and very small flat-fish do escape there.

The significance of these results lies especially in the field of the design and development of pelagic and research trawls.

References

- 1) Todd, R.A. "Covered Net Experiments".
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- 2) Margetts, A.R. "Experimental Comparison of Fishing Capacities
of Different Trawlers and Trawls".
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