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# A further application of the Treshev method on fishing effort measurement.

by

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## INTRODUCTION.

At the ICES meeting on Fishing Effort Measurement (7-8 May, 1973, IJmuiden) a paper was presented on the evaluation of the Treshev method on fishing effort measurement when applied to Belgian beam trawlers fishing for flatfish (Vanden Broucke, Hovart and Cleeren, 1973).

In the present paper the application of the method to otter board trawling is discussed. As in the former paper the relationship between the catch and some vessel (brake horse power and gross tonnage) and gear (length of the headline) characteristics has been computed.

## MATERIAL and METHODS.

Through a questionnaire the following information was obtained : the length of the headrope, the height of the net and the towing speed.

By multiplying these parameters with each other the volume of the water swept by the net was estimated and this volume was introduced as an independent variable.

The dependent variable was the catch per hour fishing.

The catches are those made during the year 1972 by 83 trawlers in the statistical areas IVb, IVc, VIId and e and VIIa, f and g (figure 1). These data were obtained from the auctions and the number of hours fishing were taken from the skippers' logbook.

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Using these variables, linear regressions and corresponding correlation coefficients were calculated.

A second series of calculations was carried out with as independent variables consecutively brake horse power, gross tonnage, as recorded in the ship certificate, and the length of headrope.

The gear used by these vessels was the otter bottom trawl.

Table 1 gives information about the characteristics of vessels and gear and about the catches.

## RESULTS.

Table 2 shows the linear regressions with consecutively as independent variables : the volume of water swept by the net, the brake horse power, the gross tonnage and the length of the headrope.

The individual distribution of the data can be found on figures 2, 3, 4 and 5.

All regression coefficients are highly significant. The correlation coefficient with the swept water volume as independent variable, is in accordance with the results obtained by Guichet for vessels using the 32 m "LR" trawls (R = 0, 65), but is quite smaller than the one obtained by Treshev (R = 0, 97).

Moreover, it was not the highest coefficient obtained, as can be seen in table 2. The correlation coefficient with engine output as independent variable is quite higher and even gross tonnage gave a slightly better result.

However, the results of the present study based on a larger sample are somewhat more favourable to Treshev's method than those of the former one.

## CONCLUSIONS.

1. The present study, using data concerning 83 trawlers fishing with otter bottom trawls, gave results which are slightly more favourable to the Treshev method than the former one, based on data concerning 49 trawlers using the twin beam trawl method. Perhaps the higher correlation coefficients can be traced down to the sample being larger.

2. However, the estimates of the volume of water filtered by the net were much more rudimental as this time al three parameters (speed, width and height) had to be based on the skippers guesses whereas in the former paper this was only the case with one (speed).

3. In both cases data concerning fishing on quite different stocks were used, which tends to influence unfavourably the correlation coefficients.

4. On the other hand Treshev's method is meant to be a basic method of measuring fishing effort of very different fishing gear and ships on a given stock, or to measure stock abundance.

5. For this reasons some refinements in the approach to the problem seem to be necessary :

a. Standardisation of measurement of the swept volume,

b. If different stocks are taken in to the same sample, some way of eliminating the influence of their respective densities should be devised (cfr Gulland),

c. Larger samples including data of different fishing methods (otter board, beam trawl, pelagic trawl) should be studied,

d. Partial correlation coefficients concerning the different independent variables should be computed, to determine clearly which one of them is the most important.

REFERENCES.

G. Vanden Broucke, P. Hovart and G. Cleeren - An application of the Treshev method on fishing effort measurement - ICES - Meeting on Fishing Effort Measurement, IJmuiden, 1973.

R. Guichet - Relations entre le pouvoir de pêche déterminé experimentalement, la puissance utilisée en pêche et le volume d'eau filtré par unité de temps - Exemples calculés sur la pêche du merlu des chalutiers rochelais - ICES - Meeting on Fishing Effort Measurement, IJmuiden, 1973.

A.I. Treshev - Fishery parameters assessment method - ICES - Meeting on Fishing Effort Measurement, IJmuiden, 1973.

Table 1 - The characteristics of the vessels, the gear and the catches.

| Number of vessels | Volume of the water swept | | H.P. | | G.T. | | L of headline | | Catch per hour fishing | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Range | Average | Range | Average | Range | Average | Range | Average | Range | Average |
| 83 | 45.176-298.018 | 151.624 | 90-510 | 268,45 | 23,17-154,61 | 78,67 | 10,36-24,99 | 18,72 | 23,3-149,1 | 67,09 |

Table 2 - Regression Y = a + b X (Y = catch per hour fishing)

| Independent variable | Regression equation | R | $R^2$ |
|---|---|---|---|
| X = volume of water swept | Y = 15, 572 + 0, 00034 X<br>(0, 00004) (sss)<br>t = 8, 50 | 0, 638 | 0, 407 |
| X = brake horse power | Y = 5, 562 + 0, 22923 X<br>(0, 02159) (sss)<br>t = 10, 62 | 0, 763 | 0, 582 |
| X = gross tonnage | Y = 18, 203 + 0, 62147 X<br>(0, 07802) (sss)<br>t = 7, 97 | 0, 663 | 0, 440 |
| X = length of headrope | Y = -21, 843 + 4, 75162 X<br>(0, 80741) (sss)<br>t = 5, 89 | 0, 547 | 0, 299 |

(sss = significant p < 0, 0001)

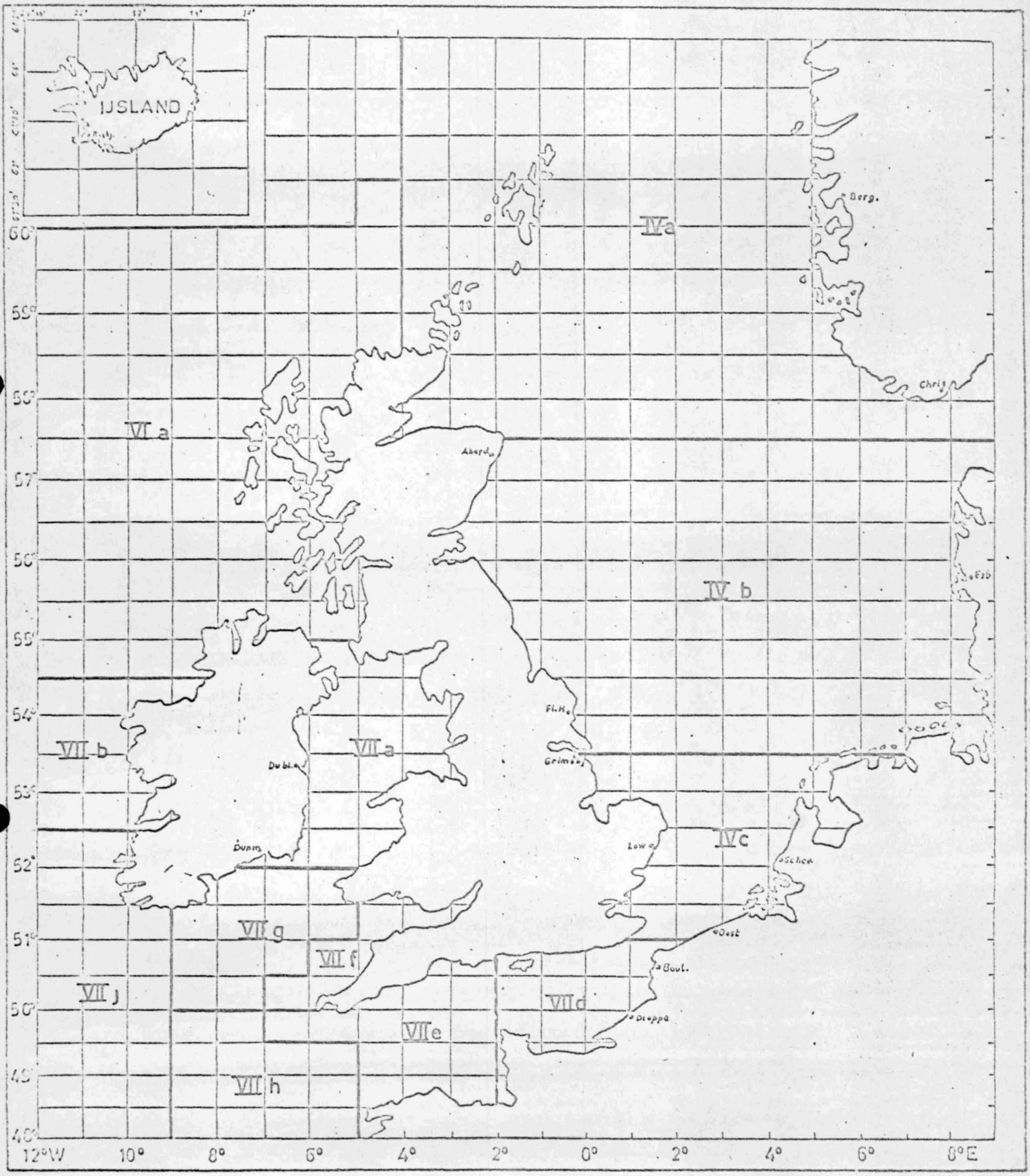
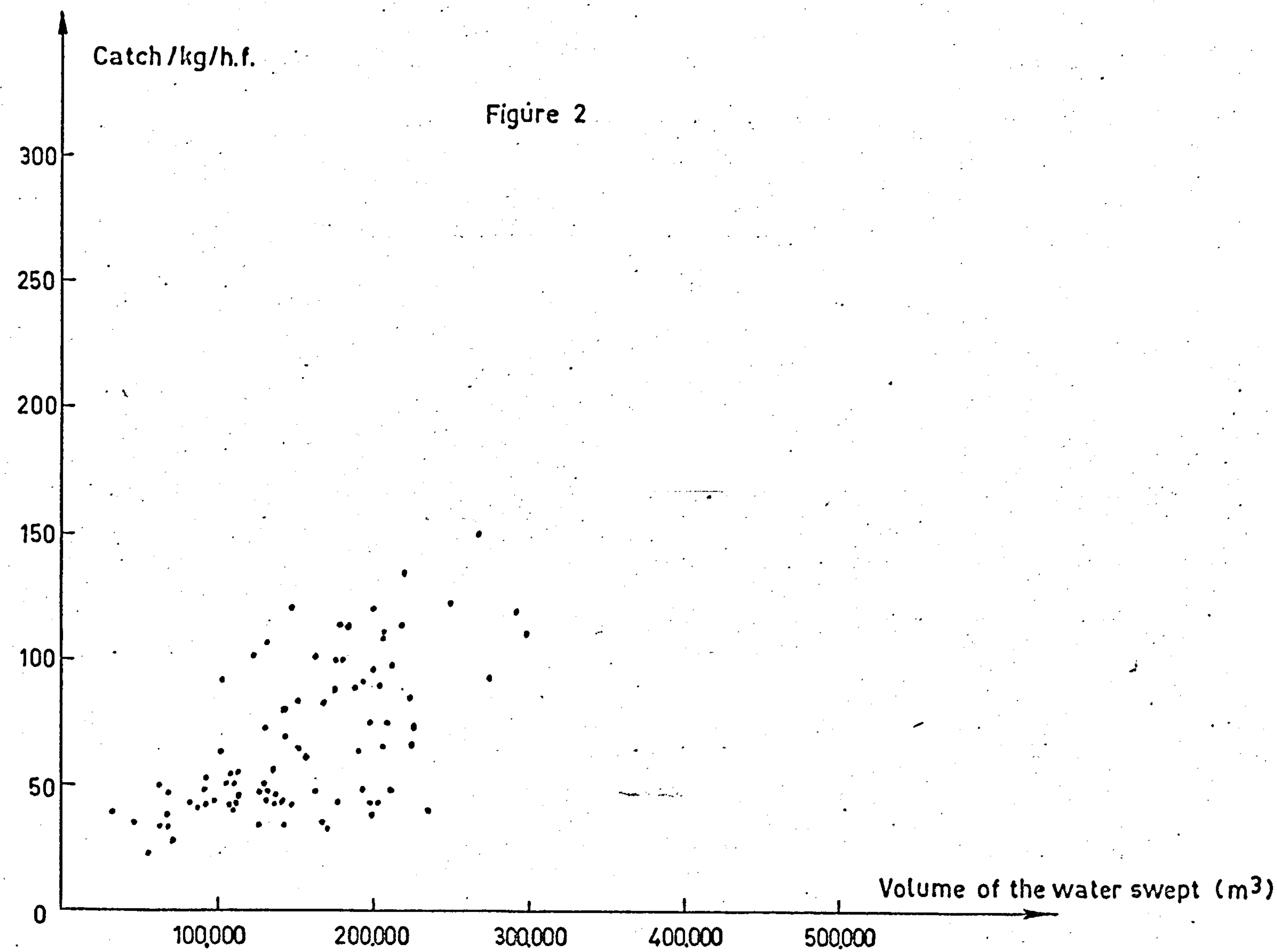
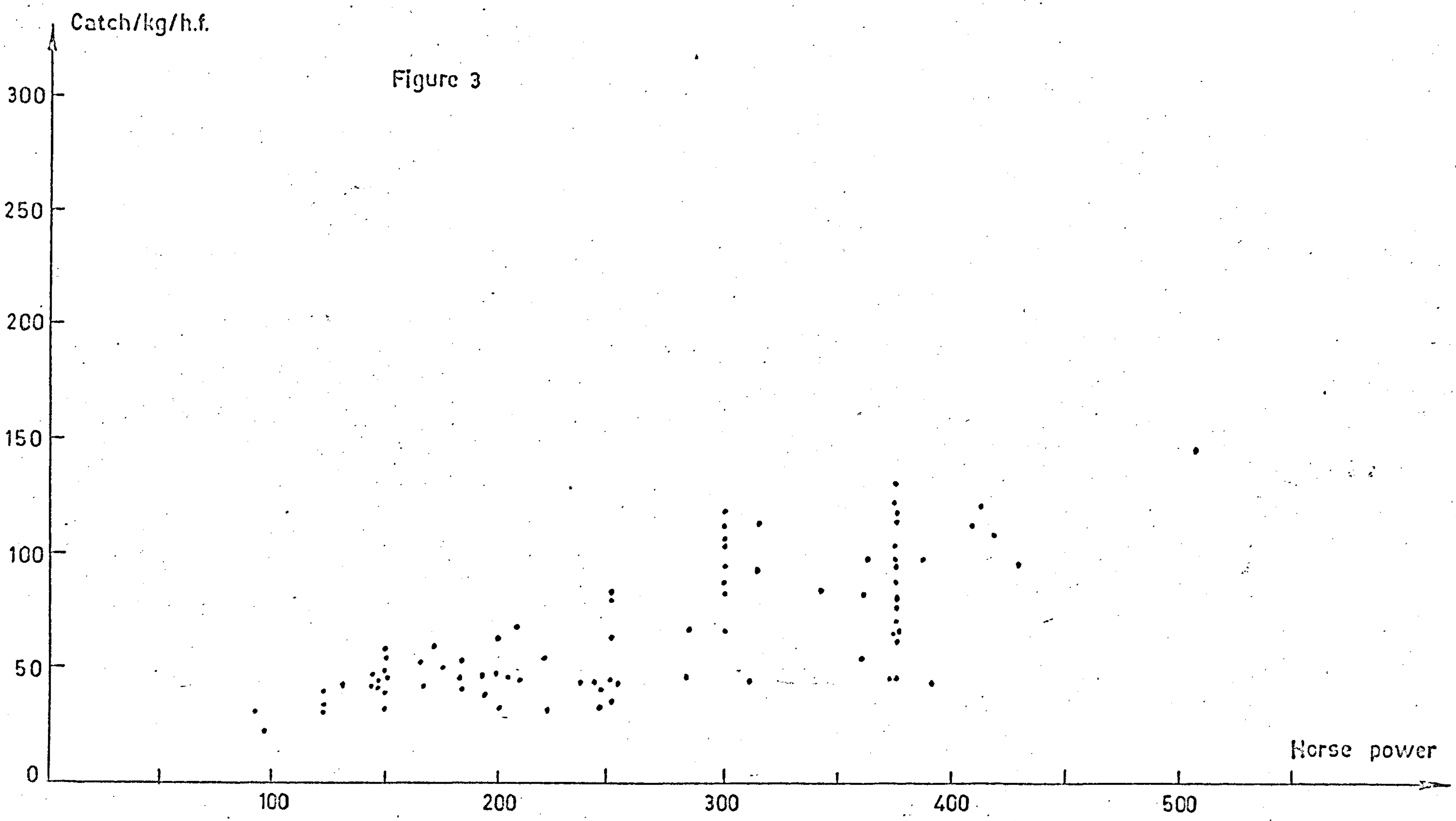



Figure 1 _ Fishing areas


Catch /kg/h.f.
Figure 2
300
250
200
150
100
50
0
100,000
200,000
300,000
400,000
500,000
Volume of the water swept ($m^3$)



Catch/kg/h.f.
Figure 3
300
250
200
150
100
50
0
100
200
300
400
500
Horse power

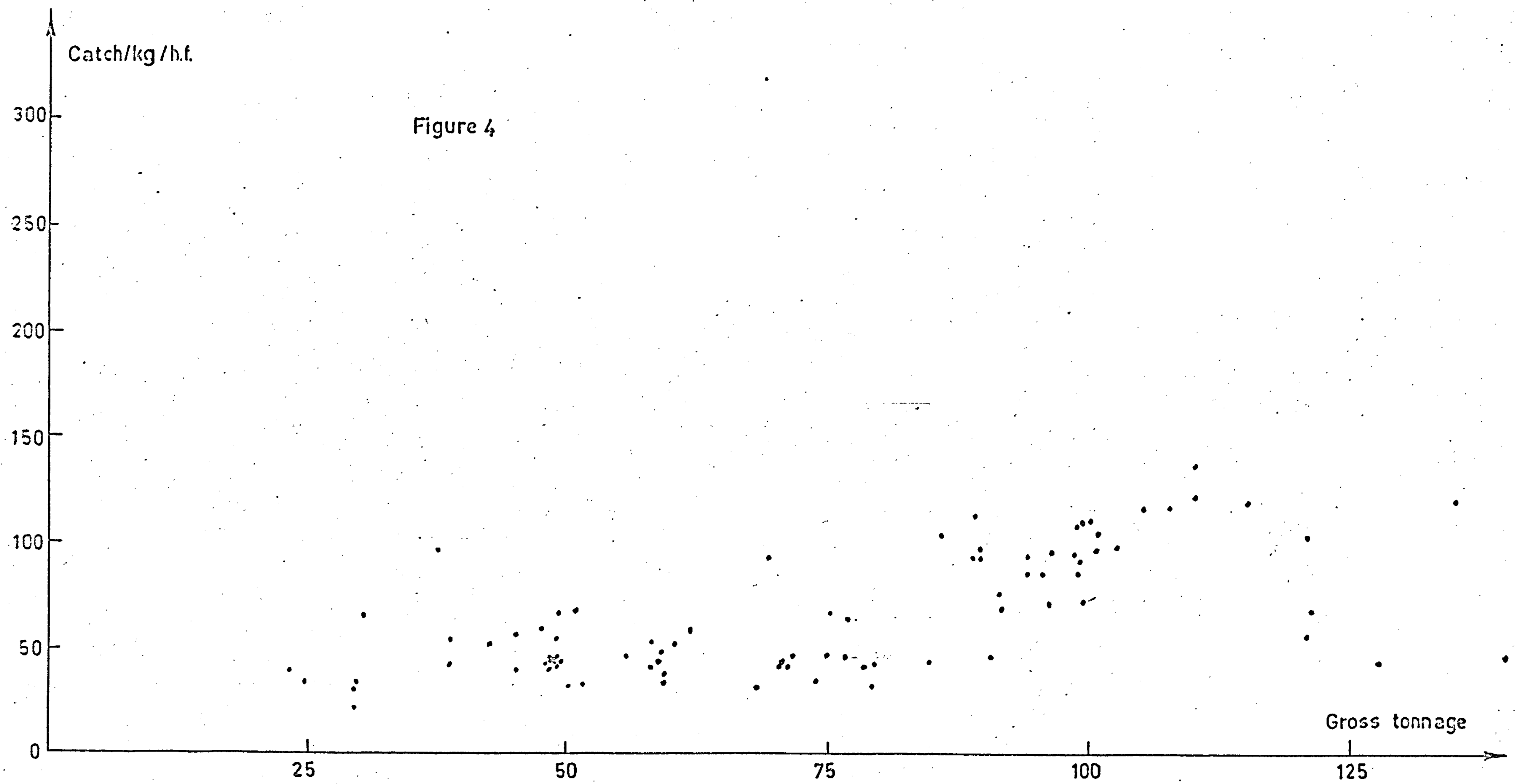
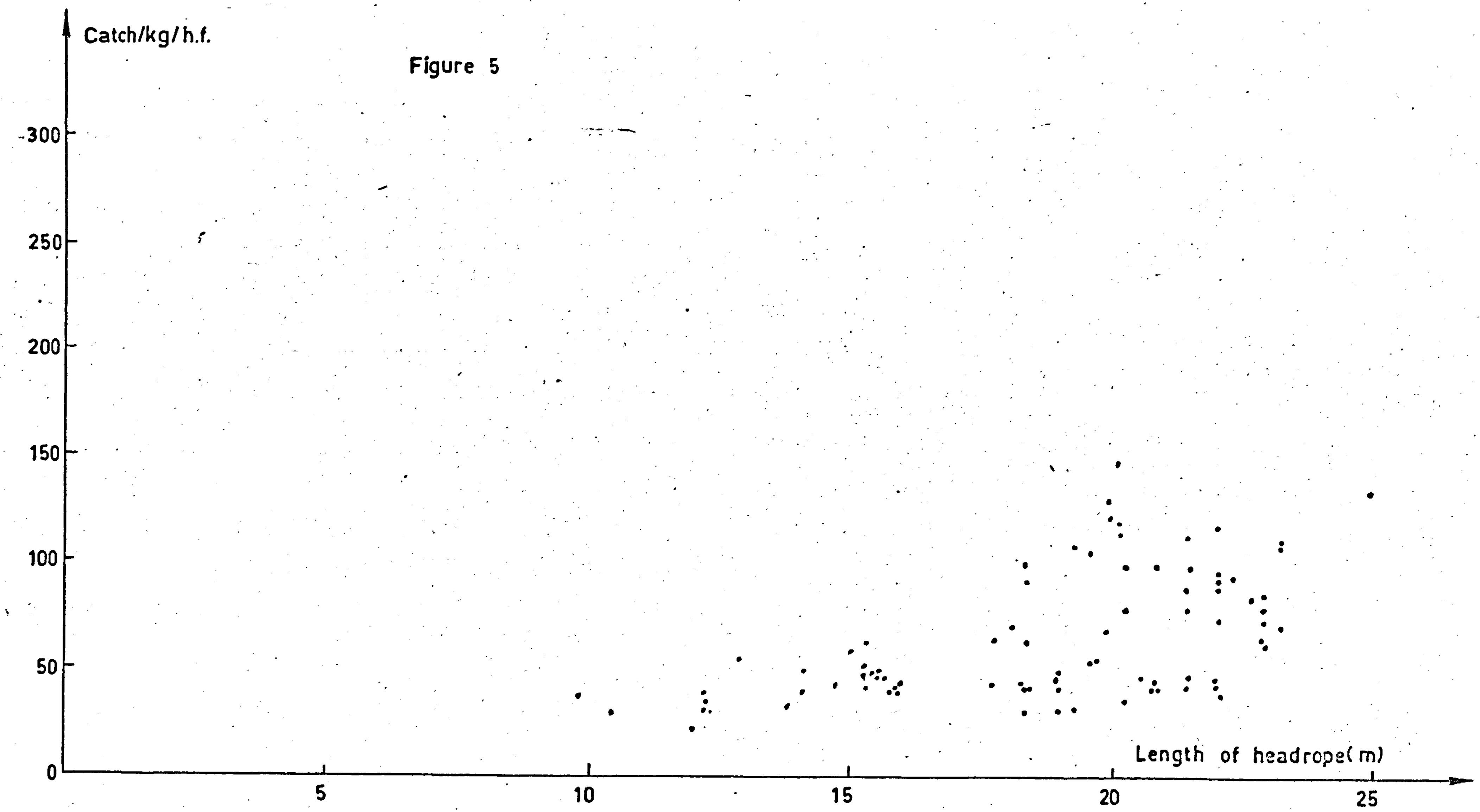

Catch/kg/h.f.
300
250
200
150
100
50
0
25
50
75
100
125
Gross tonnage

Figure 4


Catch/kg/h.f.
Figure 5
300
250
200
150
100
50
0
5
10
15
20
25
Length of headrope(m)