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THE USE OF CATCH RATE FOR THE ESTIMATION OF YEAR-CLASS STRENGTH OF FLATFISHES

R. DE CLERCK

Fisheries Research Station, Ostend, Belgium



ABSTRACT

The relationship has been calculated between VPA estimates of year-class strength and the catches of II-group soles (North Sea and Bristol Channel) and plaice (North Sea) by Belgian beam trawlers during the last quarter of the year.

RESUME

La relation entre les estimations de l'abondance des classes d'âge provenant de l'analyse de la population virtuelle et des poissons plats par unité d'effort de pêche a été calculée.

L'étude se rapporte aux groupes II de poissons plats (soles : Mer du Nord et Canal du Bristol ; plies : (Mer du Nord) capturés par des chalutiers belges pratiquant la pêche à gaules au cours du dernier trimestre de l'année.

INTRODUCTION

The recruitment estimated by means of young flatfish surveys or by VPA calculations at ICES assessment working group meetings can certainly be improved. Catch predictions and management objectives are highly dependent on the reliability of these estimates. The aim of this paper is to investigate the use of the catch rate of an entering year-class as a secondary method for the determination of the year-class strength of flatfishes.

MATERIAL AND METHODS

Three flatfish stocks were examined, viz. the sole stock in the North Sea, the sole stock in the Bristol Channel and the plaice stock in the North Sea.

The beam trawl catch in numbers of two year old flatfishes per hour fishing during the last quarter of each year was determined for the period 1970 to 1977.

The corresponding year-class strengths from VPA calculations were obtained from the 1978 working group reports (ICES, C.M. 1978/G:6 and G:9).

For the three stocks the regression of catch per effort on VPA estimates per year-class was calculated (Figure 1 and table 1).

RESULTS AND DISCUSSION

One of the most difficult tasks of the ICES assessment working groups consists of the determination of the incoming year-class strengths. Relatively large variations in recruitment occur in most of the flatfish stocks. This is very pronounced in the North Sea sole stock having an average recruitment of about 90 millions over the last two decades, but with variations of strong year-classes (552 millions in 1963) and poor year-classes (38 millions in 1970) (ICES, C.M. 1976/F:4).

In the three populations under review being fully or overexploited the incoming year-classes contribute a large proportion to the adult stock and are an essential part of the catch prognoses. For long term stock management practices it is therefore most important that reliable estimates of recruitment are available. In the past the current 0- and

I-group surveys for flatfish species have proved to have a certain level of reliability. But due to some unknown abiotic factors wrong estimates can still be made which can lead to serious management difficulties.

During the 1978 flatfish working groups' meetings a nearly overall phenomenon came forward indicating a 1975 year-class with strengths oscillating from good to abundant. The uncertainty about the input F-values for young flatfishes made the estimation of this year-class rather unreliable for plaice as well as for sole. For this reason an alternative method for confirmation and even for enhancing the estimation of year-class strengths was needed. One of those possible methods is the catch per unit effort method. For the three stocks a new year-class starts to recruit as a II-group during the last quarter.

The following results are obtained from the regression calculated between VPA estimates and catch per unit effort data for the last quarter (figure 1 and table 1).

- North Sea sole.

A high correlation coefficient of 0.91 was obtained. As the series of data varied from poor (68, 70, 74), good (72, 73, 75) to strong (69) year-classes the obtained regression line can provide good estimates for year-class strengths.

- Bristol Channel sole.

The correlation coefficient of 0.75 was mostly disturbed by the year-class 1970 which was - for some unknown reasons - underestimated on the basis of the catch per unit effort. Nevertheless the other observations indicate a good relationship.

- North Sea plaice.

The plotted values were in good agreement with the calculated regression line - except for the 1972 year-class. The absence of substantial variations in recent year-class strengths may also be a limiting

factor for improving the relationship which has only a correlation coefficient of 0.7.

From the results it appears that with a large series of data and with some corrections (viz. horse power, fishing rectangle) the method may be useful for assessment purposes.

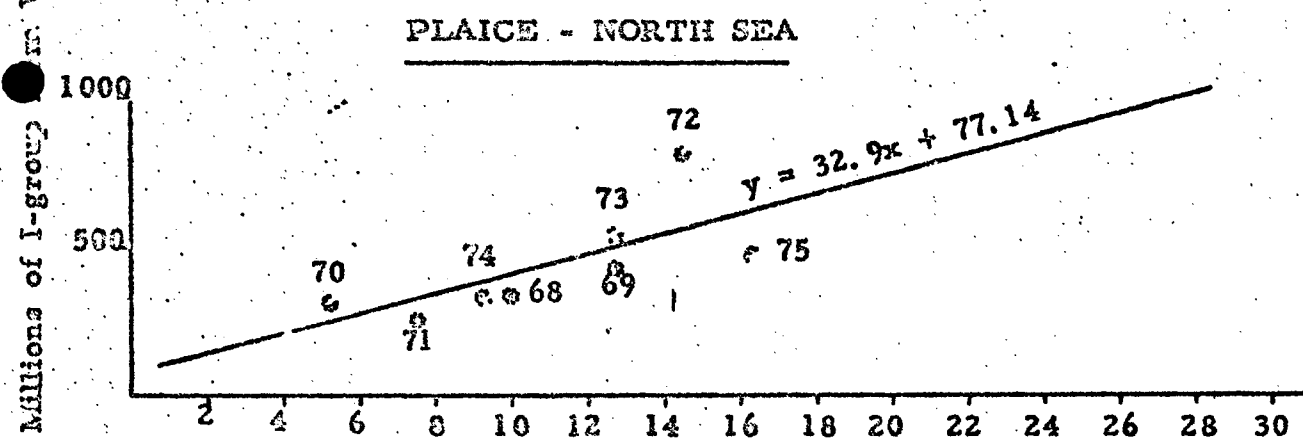
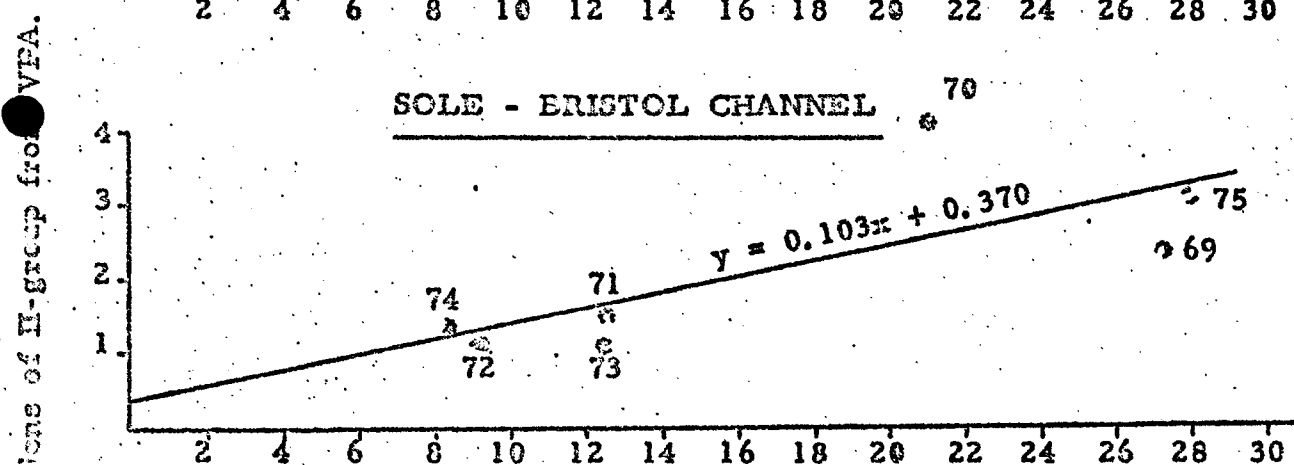
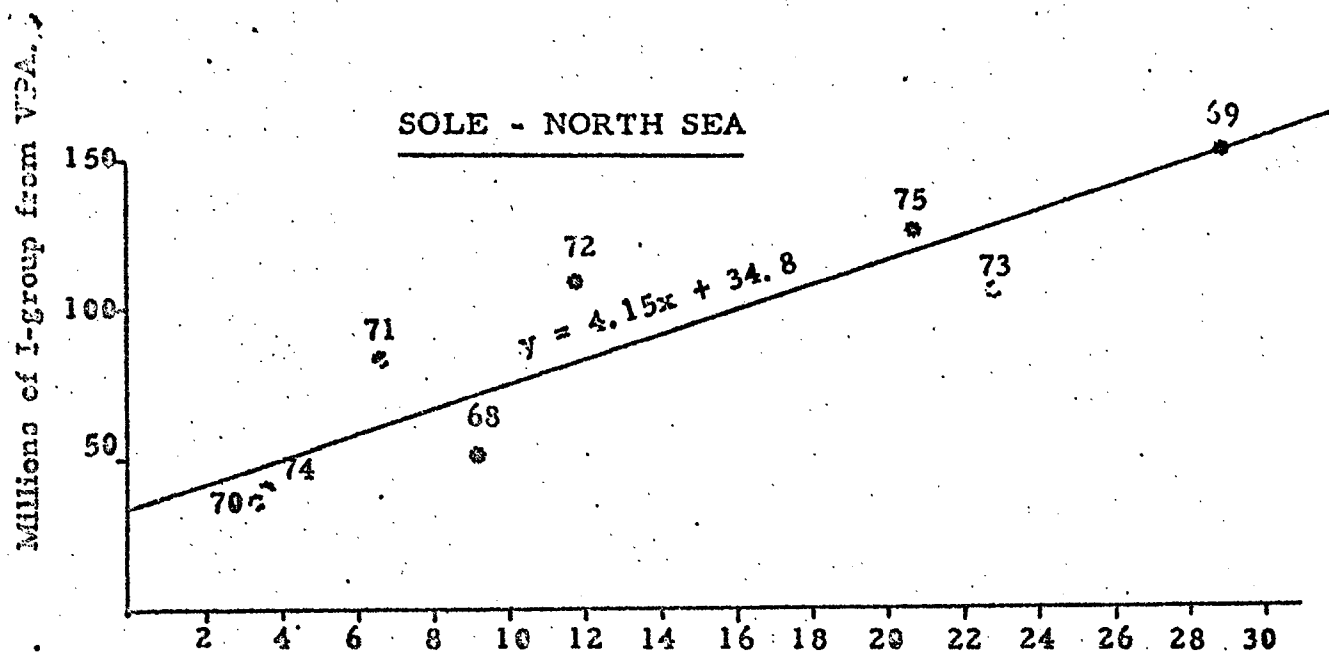
BIBLIOGRAPHY

ICES, C.M. 1978. G:6 : Report of the Irish Sea and Bristol Channel Working Group.

C.M. 1978. G:9 : Report of the North Sea Flatfish Working Group.

Table 1 - Regression parameters.

	North Sea sole	Bristol Channel sole	North Sea plaice
Regression	$y = 4.15 x + 34.8$	$y = 0.103 x + 0.370$	$y = 32.90 x + 77.144$
Correlation coefficient	0.905	0.748	0.702
Standard deviation on regression	20.022	0.837	133.122



Numbers of II-group per hour fishing during the 4th quarter of Belgian beamtrawl catches.

Figure 1 - Regression of catch per effort on VPA estimates per year-class.