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Demersal Fish (Northern)
CommitteeON THE EVALUATION OF THE ENGLISH EAST COAST 0-GROUP FLATFISH YEARCLASS
MEASUREMENTS 1973-76

J D Riley

MAFF, Fisheries Laboratory, Lowestoft, NR33 0HT, England

ABSTRACT

Yearclass size measurements of 0-group plaice and sole for all of the middle and southern North Sea coastal regions are not available to the ICES working group. This has made early predictions of yearclass size on recruitment to the fisheries unreliable.

Annual trawl surveys along the English east coast since 1973 have produced indices of 0- and 1-group yearclass strengths for plaice and sole which show a significant correlation between 0- and 1-group yearclasses.

A comparison is made of the English survey methods and results with those for the continental side of the North Sea. Some progress has been made in integrating the two sets of historical data. It is concluded that a common 0-group yearclass measurement system for both the English and continental coasts would produce data of greater value than those presently available.

INTRODUCTION

North Sea plaice and sole almost certainly recruit to the commercial fisheries from both the English and continental coastal regions. If it is presumed that there is a correlation between the strength of a yearclass as 0-group and as post-recruits, a single North Sea estimate of yearclass size as 0-group is required for use by the ICES North Sea Flatfish Working Group. At present the 0-group yearclass size estimations are produced by two different methods, the English method and the "Continental" methods used respectively by the Netherlands alone and also jointly by Belgium, the Netherlands and the Federal Republic of Germany. Separately these estimations have been of very limited use for predictions. It was thought advantageous therefore, firstly, to try and bring the two complementary sets of

historical data together and, secondly, to evaluate the respective sampling techniques and statistical procedures with the intention of working towards a common method for the future.

THE ENGLISH METHOD

Following earlier attempts to measure variations in 0-group flatfish year-class sizes in English and Welsh waters by Wimpenny (1960) and Corlett (1966), an annual series of demersal young fish surveys of the English east coast was started in 1973.

The coast was divided into 15 regions (Figure 1) and some sampling was done in every region each year. Within each region sampling effort was randomized except that fishing was conditional upon the type of sea bed being suitable. Once selected, stations were sampled annually but if the nature of the sea bed had changed, making fishing impossible, a sample was taken from a similar depth nearby. On occasions either bad weather or shortage of time resulted in some stations not being sampled. All sampling was done between 1 September and 15 October. Two nets were used; both rigged in a standard way and used at speeds of between 20 and 70 m/min. Both have been described elsewhere, the 2 m beam trawl by Riley and Corlett (1965) and the 1.5 m pushnet by Riley (1971). Distances travelled by the beam trawl on the sea bed were recorded on a meter wheel attached to one trawl head and by the pushnet by direct measurement along the beach.

Survey catch data before 1973 showed that over 60% of 0-group plaice and about 50% of 0-group sole are found in corrected water depths of less than 6 m in September-October and that variations in catch rate were strongly correlated with the water depth. Sampling depths were corrected to the depths at the preceding low tide.

Fishing with the 2 m beam trawl was from either RV TELLINA or chartered inshore vessels in water depths from 12 m or more into quite shallow water, sometimes as shallow as 1 m. In water depths of less than 1 m sampling was with the 1.5 m push net.

0- and 1-group fish were separated by inspection of the size distributions, supplemented where necessary by age determination by the otolith.

The important influence

The important influence of depths on catch rates is summarized by the mean catch/1000 m² for the two species in the three depth bands sampled over the period 1973-6:-

Depth	0-2 m	2-6 m	6-12 m
Plaice	35.6	9.4	4.1
Sole	1.5	11.7	5.8

The total number of samples each year is approximately 300 giving an intensity of sampling in each depth band in each of the 15 regions of about 7/year. There is frequently no significant difference between the catch/1000 m² of the same depth bands in adjoining regions although there is between the depth bands in the same regions. Accordingly, the catch data of the depth bands has been grouped into three major regions; the Scottish border to Flamborough Head, Flamborough Head to Winterton and Winterton to the North Foreland (Figure 1). The confidence limits of the mean catch data/1000 m² were calculated using the method described by Jones (1954) applying the transformation $\log_e (x + 1)$ to the data.

The population indices for each depth band of the 3 major regions are derived by multiplying the mean catch/unit area by the areas of each depth zone, measured by planimetry, and the index of each of the major regions obtained by adding the values of the three depth zones together. No 0-group soles are found north of Flamborough Head and so the east coast index for this species is obtained by adding the totals of the two major regions to the south together. 0-group plaice occur along all parts of the coast. The results of the surveys are published annually in "Annales Biologiques".

As a measure of the reliability of the yearclass indices, they were compared with the results obtained for the same yearclass as 1-group. The 0-group indices of 1973, 1974 and 1975 were compared with the 1-group values obtained from the surveys of 1974, 1975 and 1976, prepared in an identical way. The results for plaice and sole combined with the 95% confidence limits are shown in Figure 2. The correlation coefficient of the population indices of the two species shows a positive correlation significant at less than 2% level of probability.

COMPARISON OF RESULTS OBTAINED BY THE ENGLISH AND "CONTINENTAL METHODS"

The 'continental' results that have been published differ in both degree and kind from the English results. Firstly, the catch rates, which are expressed in numbers/1000 m², as are the English data, are in general much lower than those

for the English coast and, secondly, the results are not interpreted in a way which produces either regional population indices, which can be compared with one another in any year, or total values that can be used for comparison between years.

It seems probable that the lower average catch rates are caused by at least two factors:

- a sampling effort is not concentrated in the depth zones where 0-group plaice and sole are most abundant but is spread over a wide range of depth zones. (The older fish that are present in the deeper stations are required to be sampled as part of the aims of the continental demersal young fish surveys.)
- b the English gear may be more efficient than the continental gear.

In an attempt to measure the relative efficiencies of the two gears a series of comparative fishing trials was started. The standard 2 m Lowestoft beam trawl was fished at or near the standard speed of 35 m/min and the catch rates (as numbers/1000 m²) compared with the standard 3 m beam trawl (as supplied by the IJmuiden laboratory except for the addition of a distance measuring wheel) used at or about the standard fishing speed of 100 m/min.

Twelve pairs of tows have been made to date and for sole the mean catch rate of the 2 m trawl was 22.4/1000 m² (313 fish) whilst that of the 3 m trawl was 6.5/1000 m² (234 fish). A similar proportion was found in the plaice catches but the total catch with each gear did not exceed 100 plaice and the numbers are insufficient to make a reliable comparison. The trials will continue and their completion will remove one problem presently preventing the comparison and integration of the English and continental data.

When the gear correction values are available the continental catch data could be processed in a similar way to the English data. In anticipation that the basic catch data can be made available, the areas of the 0-2 m, 2-6 m and 6-12 m depth bands along the continental coast from the Franco-Belgian border to 55°40' on the Danish west coast have been measured by planimetry. It may then be possible to produce both regional and total 0-group yearclass estimates in terms of absolute numbers for plaice and sole in the North Sea and to test their reliability against yearclass estimates derived from virtual population analyses.

CONCLUSION

For the future, it seems reasonable to work towards the introduction of a standard survey procedure for all the coastal regions around the North Sea which produce recruits to a common fishery, the aim being to produce both regional and total population indices with confidence limits, comparable region-to-region and year-to-year. The availability of this type of 0-group population index might solve some of the present difficulties in the early predictions of flatfish year-class sizes experienced by the ICES Flatfish Working Group and provide a useful aid to the management of the North Sea flatfish stocks.

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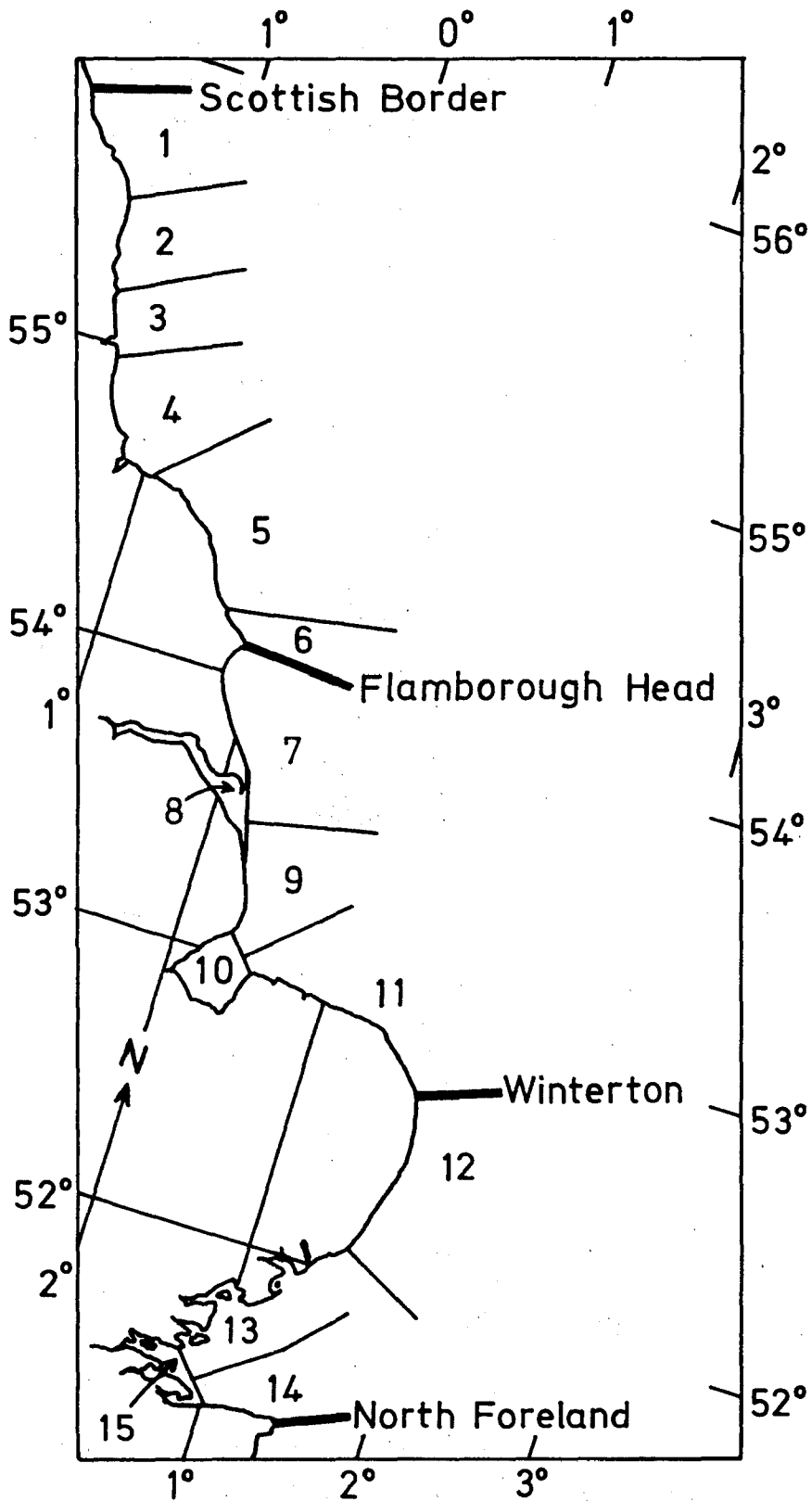


Fig. 1 English east coast, showing minor and major coastal regions.

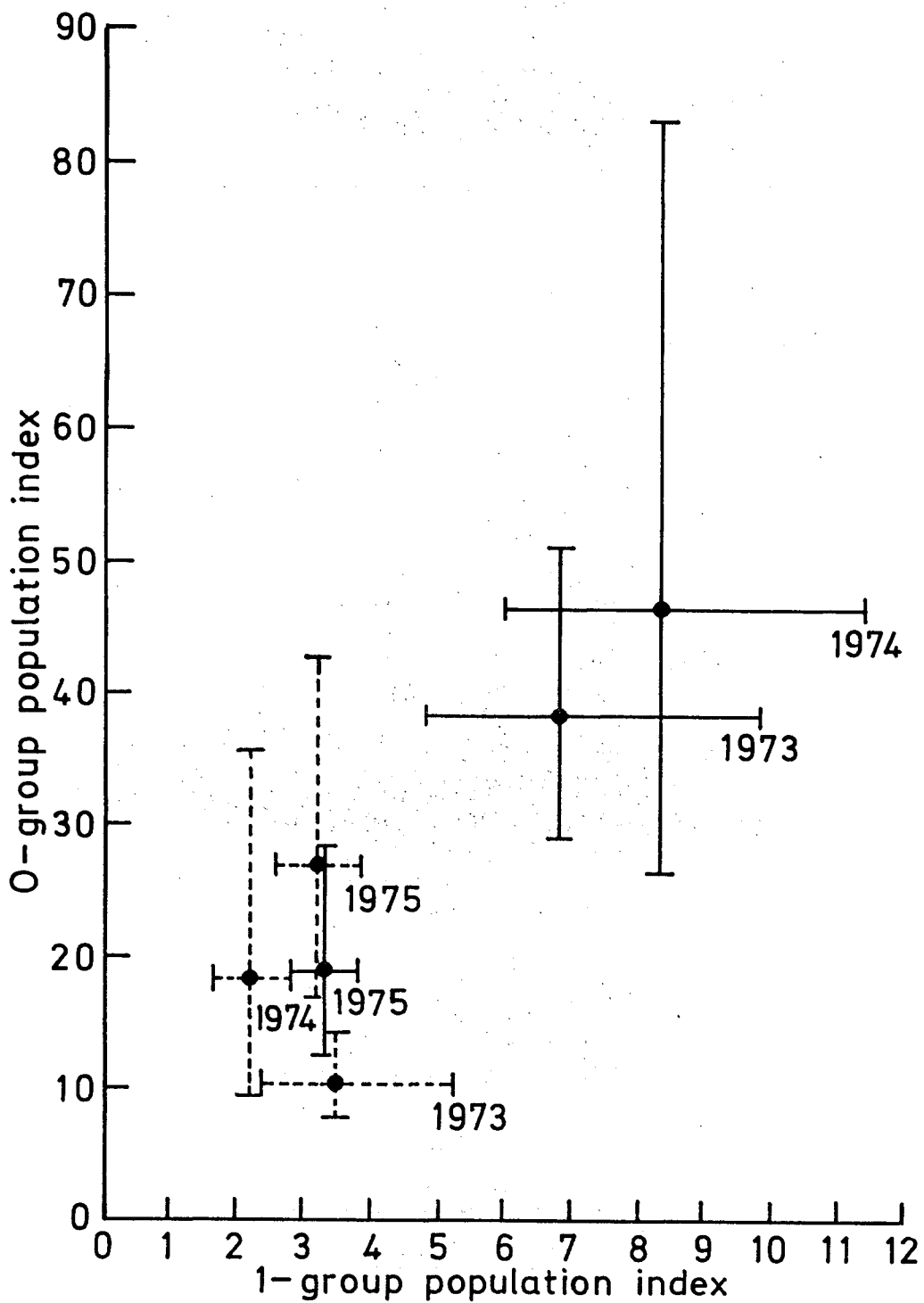


Fig. 2 English east coast, 0 and 1-group population indices with 95% confidence limits, solid lines, plaice; broken lines, sole. Years refer to year-class.