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DUTCH GROUND FISH SURVEY: DATA ON COD AND WHITING (1980-85)

by

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Summary

Data on distribution and abundance of young cod and whiting in the south-eastern North Sea in the period 1980-1985 are presented. Comparisons are made between the catches of the same year classes in consecutive years. For cod correlation diagrams between indices of year class strength from the Dutch Groundfish Survey and the VPA are also given.

Introduction

During 1980-1982, groundfish surveys were conducted in all quarters, following the standard procedures used in the International Young Fish Survey in February. Data from these surveys on the distribution and abundance of young cod and whiting were analysed by Heessen (1983) and a distinct yearly migration pattern of young cod in the German Bight emerged. Particularly during the first quarter of the year, when the IYFS is conducted, young cod usually reach the highest degree of concentration in the shallow coastal zone. Because of this aggregation it is difficult to obtain an accurate estimate of the abundance of young cod of age groups 1 and 2 at this time of the year. Three months earlier, in October/November, young cod are much less concentrated and also they are relatively less abundant in shallow water. Besides, such information might be more efficiently used for management purposes because it would become available earlier in time. Therefore, a shift in timing of the young fish survey from February to November, might result in more accurate estimates of year class strength of cod. However, the IYFS serves other purposes than only recruitment estimates of North Sea cod and for logistic reasons there is no possibility to transfer research vessel effort from February to November (Anon., 1985).

Still, because of the problems encountered in estimating the strength of year classes of young cod from the IYFS (see also Anon., 1983 and 1985) we decided in 1983 to continue the surveys in October/November. Although during this survey only the south-eastern part of the North Sea is fished, the main distribution area of young cod is covered.

Material and methods

The methods used in the Dutch Groundfish Survey are the same as during the IYFS (see IYFS manual, Anon., 1986a). The gear used is a high opening bottom trawl (GOV-trawl) and the haul duration is 30 minutes.

The area covered in the years 1980-1982 corresponded largely with roundfish area 6 and one haul was made per statistical rectangle. From 1983 onwards the area was slightly extended. In the eastern and for young cod the most important part two hauls were made per rectangle and in the western part only one haul per rectangle. Apart from the standard stations fished by the research vessel "Tridens" (in 1980 and 1982 by the chartered commercial trawler KW 34 "Rose Marie"), in 1984 and 1985 additional hauls were made in the coastal zone by research vessel "Isis". In Figure 1 the number of hauls per statistical rectangle is given for the different years; the total number of hauls is given in Table 1.

As described in the IYFS manual the whole catch is sampled for length compositions of all species encountered. Otolith samples are collected for cod, whiting and haddock.

The "standard-area" (Figure 2) used for the calculation of DGFS-indices comprises 31 statistical rectangles, all within roundfish area 6. To correct for rectangles that were not fished in a certain year, the rectangles in the standard-area that were fished during all 6 years (18 out of the 31 rectangles) were used as a reference. The coverage of the standard area in different years is indicated in Table 1.

Results and discussion

In Figure 3-9 the mean number per rectangle for cod (0-, 1- and 2-group) and whiting (0-, 1-, 2-, and 3-group) is shown for the years 1980-1985. In Table 2 the indices for the same age groups are given for the standard area. Comparisons between catches of the same year classes of cod and whiting in consecutive years are shown in Figure 10 and 11.

There is a high correlation between the indices of 0-group cod and the index of the same year class one year later (Figure 10). In the data for cod the absence of year class 1984 is very striking, both as 0- and as 1-group the catches were very low. The 0-group index for year class 1981 is strongly influenced by one very large haul. During the first three years of the survey only one haul was made per statistical rectangle. Over these years in 4 cases over 40% of the total annual catch of a certain age-group was caught in a single haul. The effect of eliminating these hauls is especially noteworthy in the case of 0-group cod in 1981, as indicated in Figure 10. A remarkable feature of the average catch of 0-group cod and the catch of the same year class one year later (Figure 10) is that both are of the same order of magnitude, whereas natural mortality is probably still high during this stage of life. The results of the Multispecies Assessment Working Group indicated a predation mortality of 1-group cod of approximately 40% (Anon., 1986c). An explanation for this feature might be found in the observation that in October/November a high proportion of 0-group cod is present in very shallow waters, where it is hardly possible to fish with a GOV-trawl. Thus, the largest catch of 0-group has been made in 1985 in a shallow gully in rectangle 36F8 (see Figure 3). At this station only a 15 minutes haul can be made. It is likely that in the easternmost part of the German Bight comparable concentrations may occur.

Comparison of 1- and 2-group cod (Figure 10) reveals a sharp decrease in numbers which may partly result from a high fishing mortality but probably also from emigration of 2 year old fish out of the investigated area. Hardly any fish of age group 3 and older are caught, indicating that there are not many older cod left in the area.

Although the time series is rather short the DGFS indices for cod seem to be reasonably well correlated with VPA numbers (Figure 12).

For whiting year class 1983 was remarkably strong in the investigated area. High abundance of this year class was found as 0-, 1- and 2-group. From the comparison of the various age groups of whiting (Figure 11) it is clear that the correlations between 1- and 2-group and between 2- and 3-group are much better than for the 0- and 1-group. Taking into account the size distribution of 0-group it seems likely that in the fourth quarter not all 0-group whiting have recruited to the gear.

Comparisons of VPA numbers for whiting and DGFS indices have not been presented because the correlations are very poor.

References

Anonymus, 1983 - Report of the International Gadoid Survey Working Group, IJmuiden 6-12 July 1983. ICES C.M. 1983/G:62.

Anonymus, 1985 - Report of the Working Group on International Young Fish Surveys in the North Sea, Skagerrak and Kattegat. ICES C.M. 1985/H:2.

Anonymus, 1986a - Manual for the International Young Fish Surveys in the North Sea, Skagerrak and Kattegat. ICES C.M. 1986/H:2.

Anonymus, 1986b - Report of the North Sea Roundfish Working Group. ICES C.M. 1986/Assess:16.

Anonymus, 1986c - Report of the ad hoc Multispecies Assessment Working Group. ICES C.M. 1986/Assess:9.

Heessen, H.J.L., 1983 - Distribution and abundance of young cod and whiting in the south-eastern North Sea in the period 1980-1982. ICES C.M. 1983/G:30.

Table 1. Number of hauls and number of rectangles covered during subsequent surveys.

year	total number of hauls	number of hauls in standard area	number of rectangles covered in standard area
1980	31	28	28
1981	34	24	24
1982	31	31	31
1983	56	50	27
1984	92	83	31
1985	87	79	26

Table 2. Indices of year class strength of young cod and whiting from the Dutch Groundfish Survey. The indices are the arithmetic mean number per hour trawling per rectangle in the standard area.

COD	year class	age 0	age 1	age 2	
	1978	-	-	4.5	
	1979	-	163.8	11.2	
	1980	43.2	46.9	1.6	
	1981	176.8	83.0	2.3	
	1982	26.9	21.8	1.6	
	1983	121.5	121.3	3.1	
	1984	1.3	3.6	-	
	1985	143.6	-	-	
WHITING	year class	age 0	age 1	age 2	age 3
	1977	-	-	-	26.8
	1978	-	-	61.5	9.1
	1979	-	329.8	130.5	52.1
	1980	166.4	205.1	105.2	12.4
	1981	1,393.2	639.8	223.5	90.8
	1982	165.9	430.9	140.7	31.6
	1983	2,649.1	1,330.1	893.3	-
	1984	142.8	783.0	-	-
	1985	859.3	-	-	-

1980

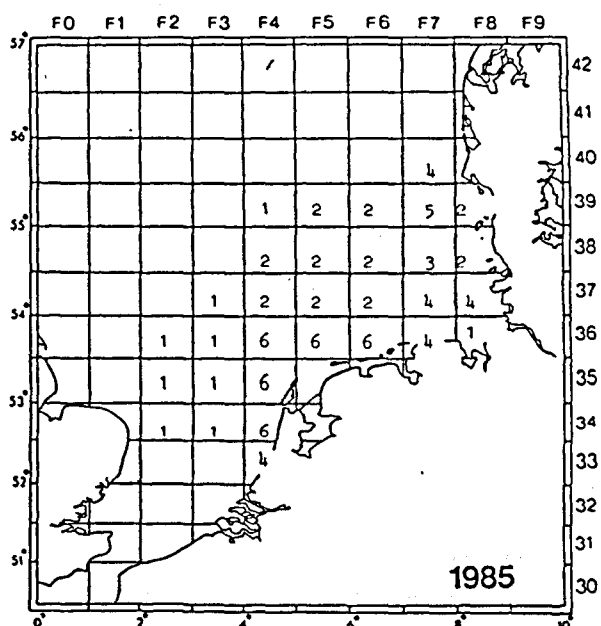
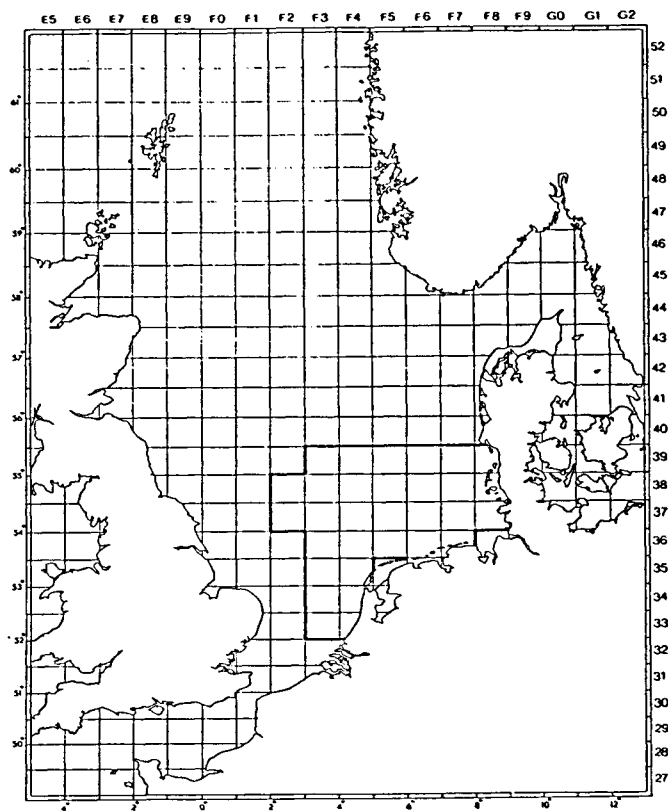


Figure 2 - Standard area used for the calculation of DGFS indices.



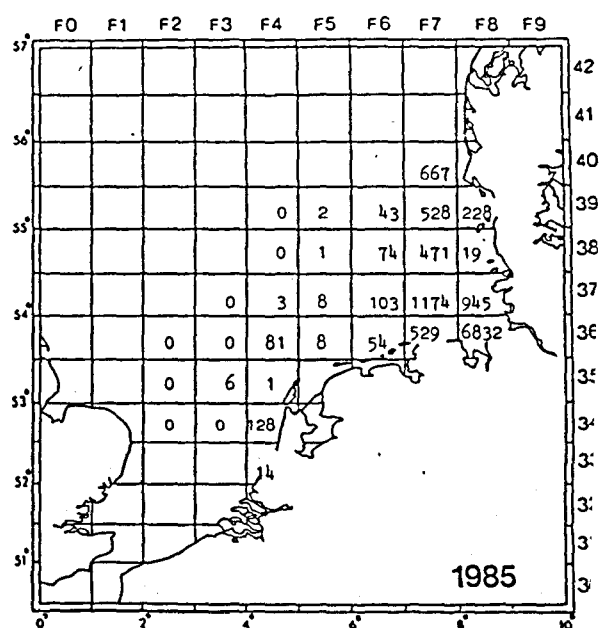
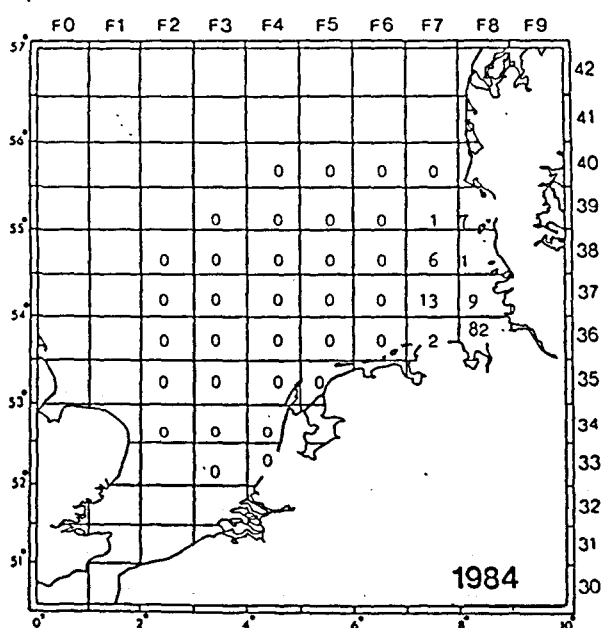
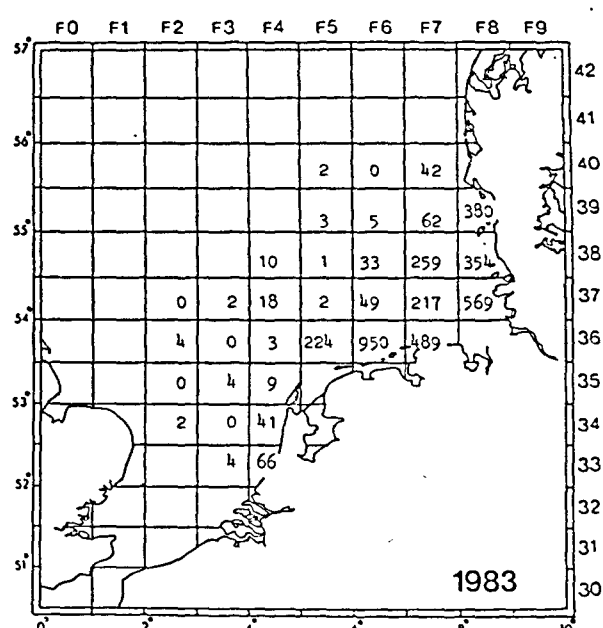
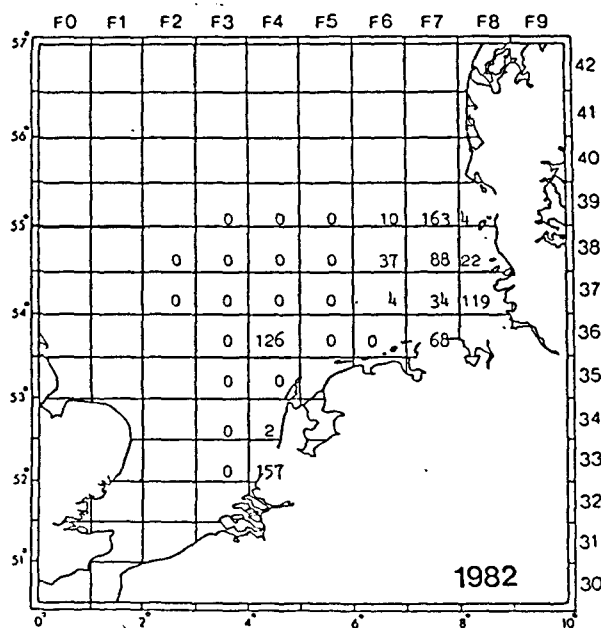
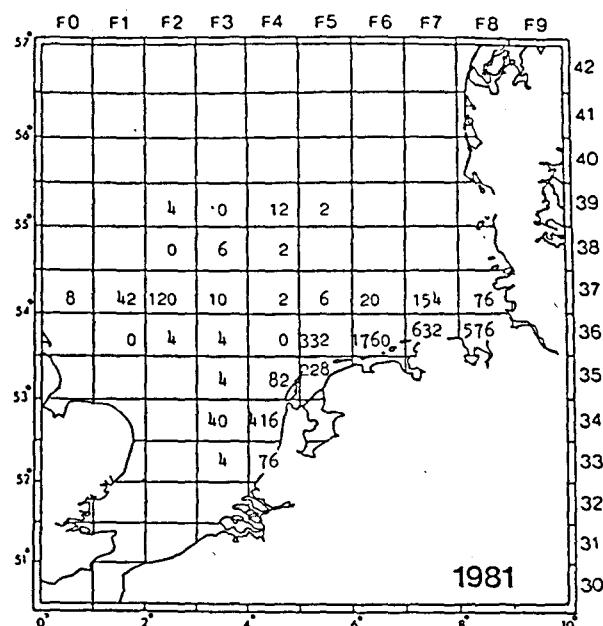
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Figure 4 - Arithmetic mean number of 1-group cod per rectangle

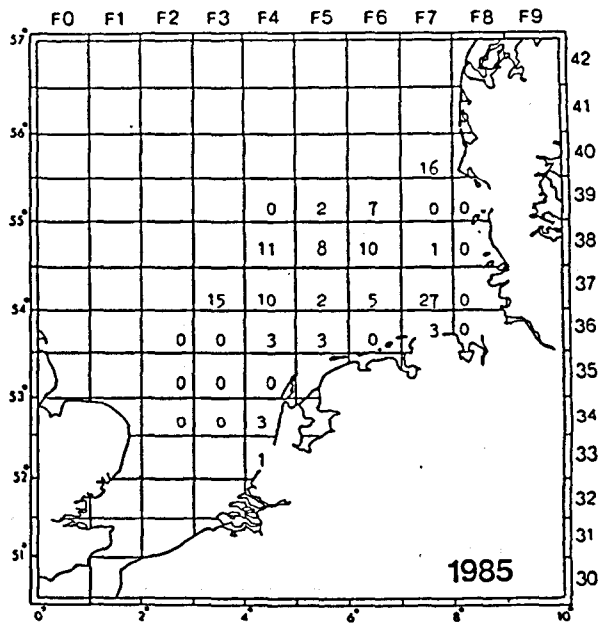
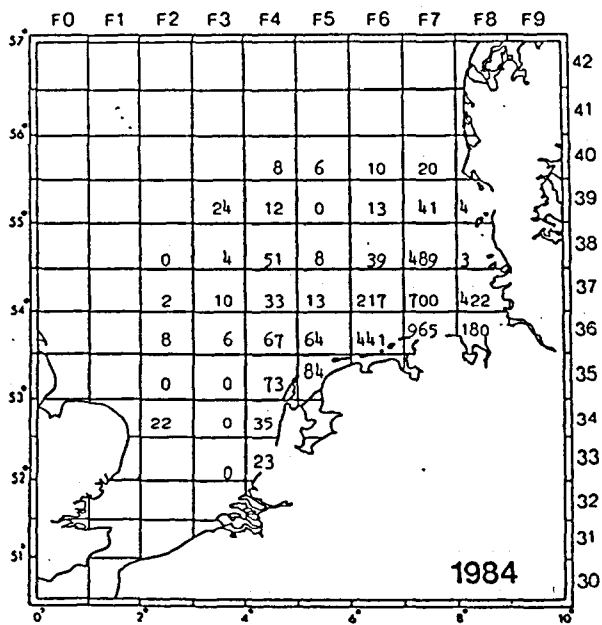
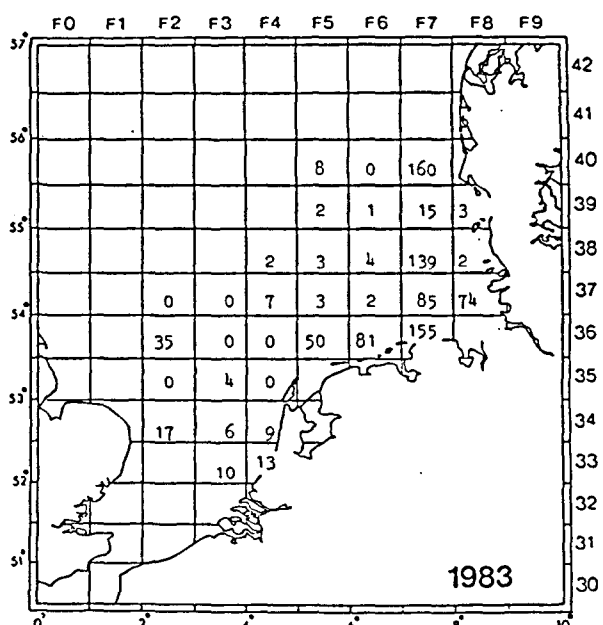
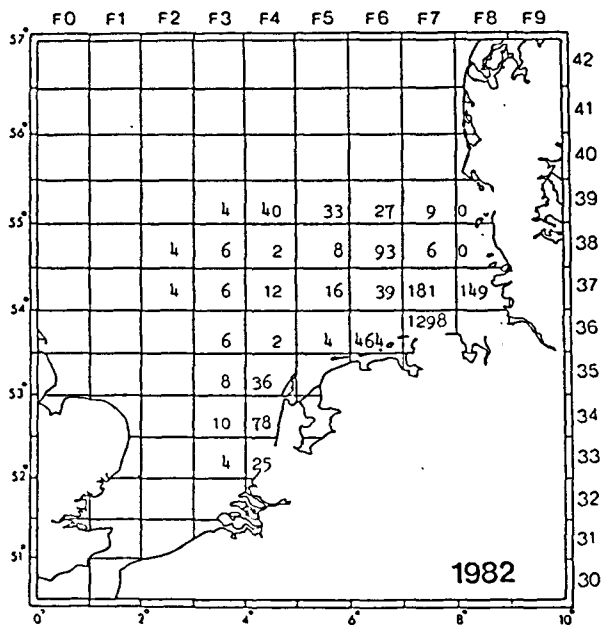
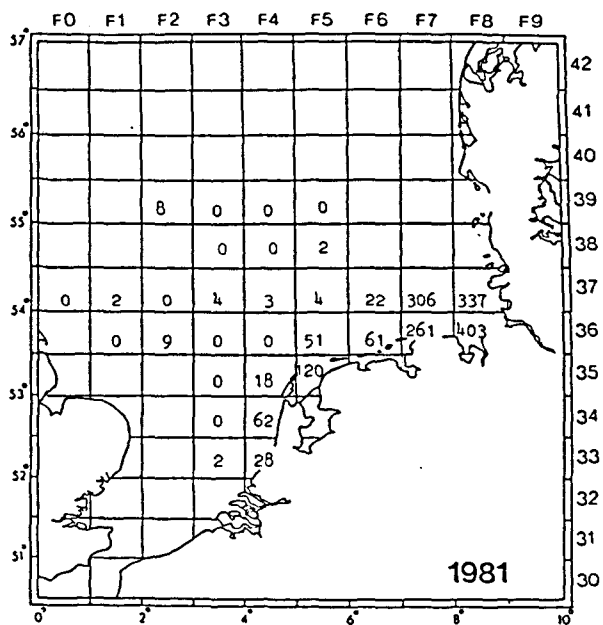
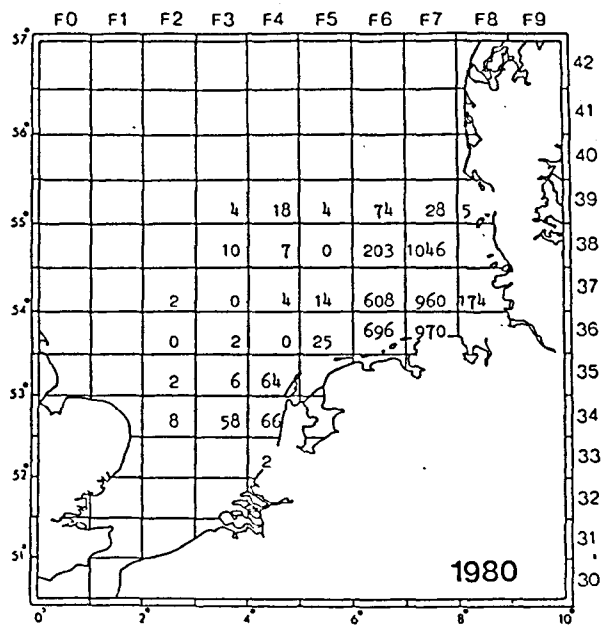


Figure 5 - Arithmetic mean number of 2-group cod per rectangle

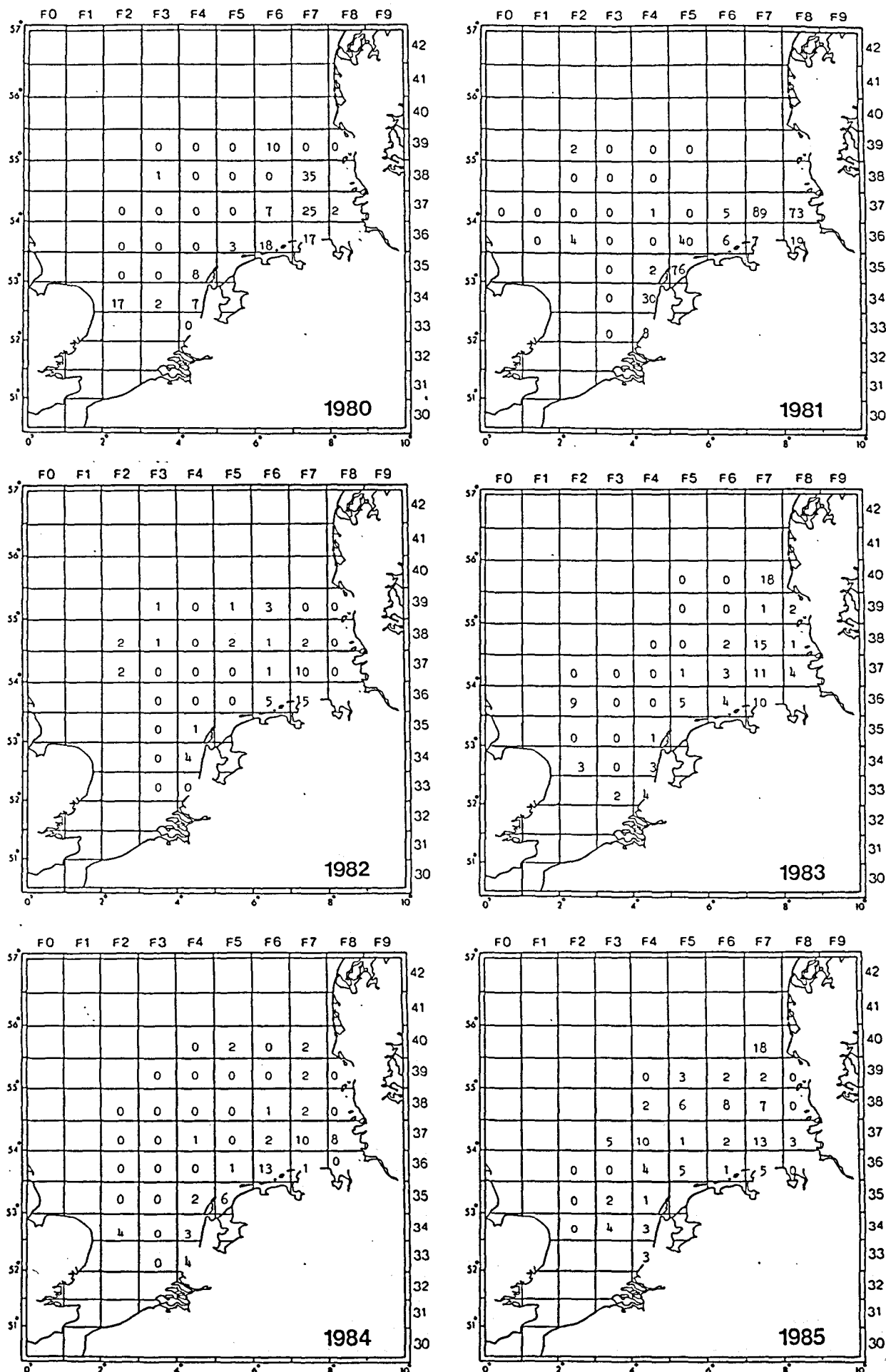


Figure 6 - Arithmetic mean number of 0-group whiting per rectangle

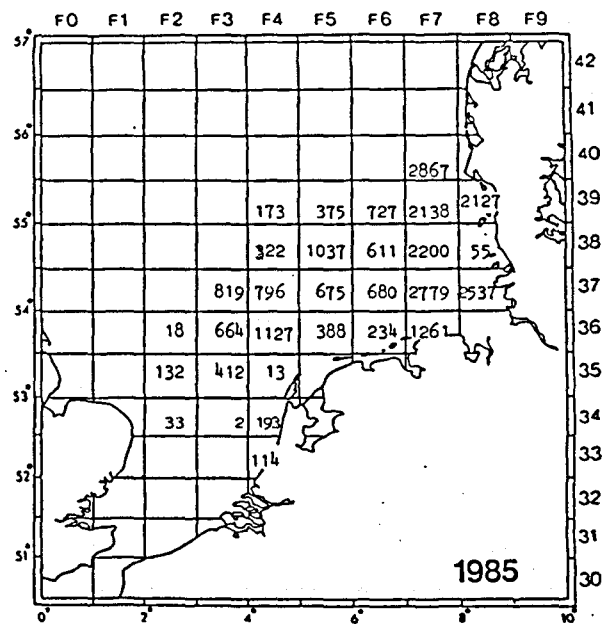
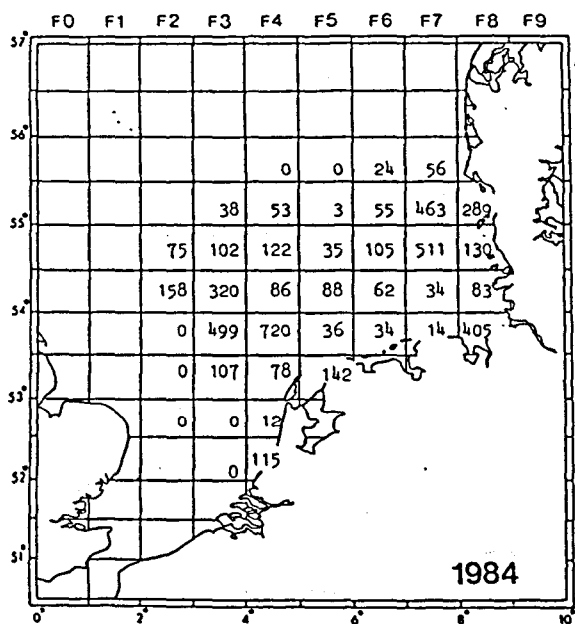
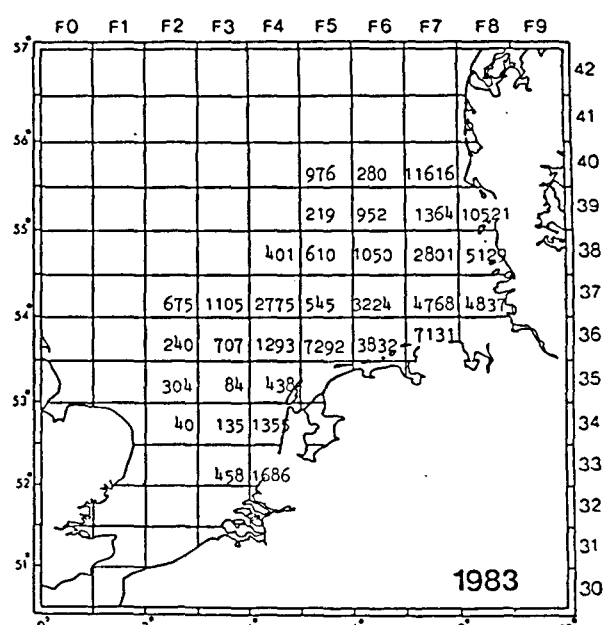
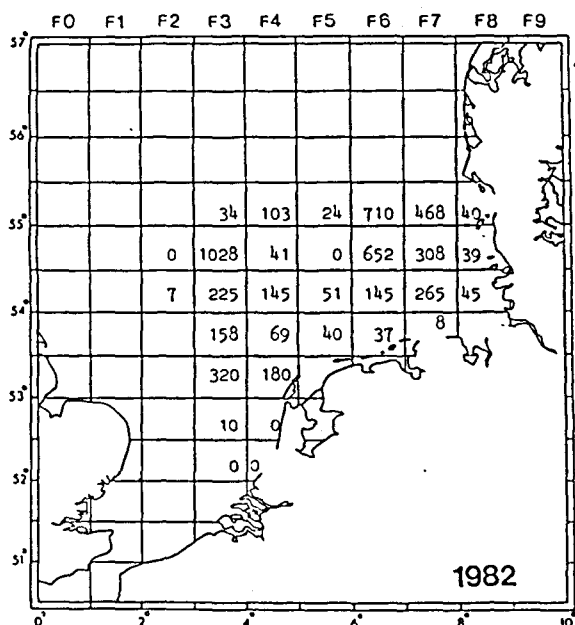
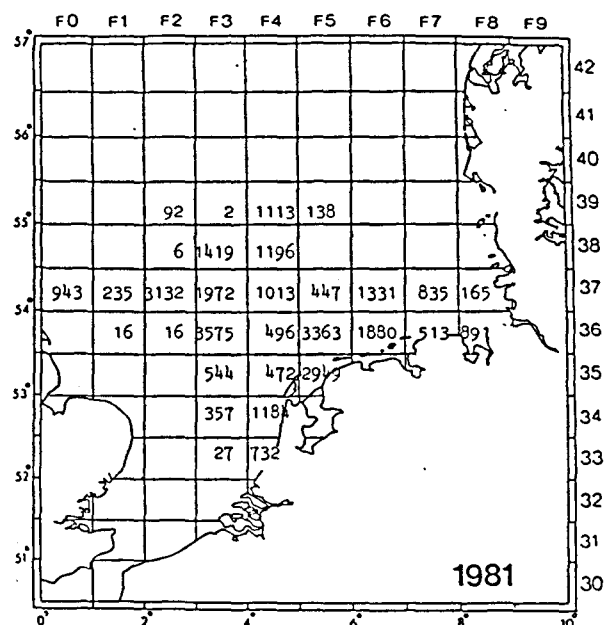
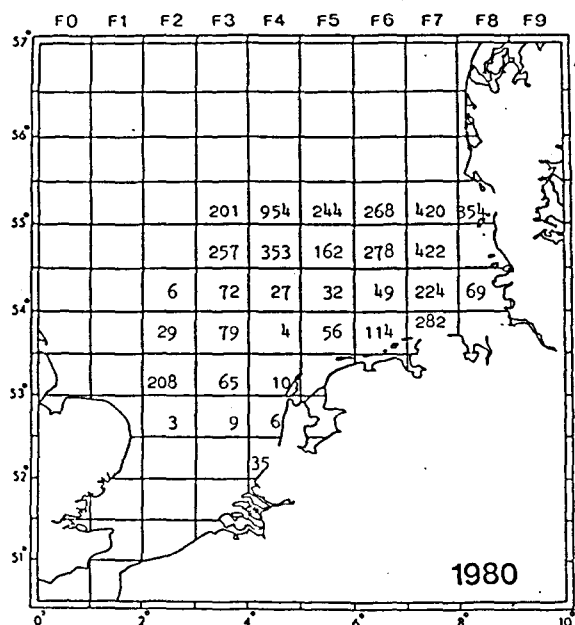


Figure 7 - Arithmetic mean number of l-group whiting per rectangle

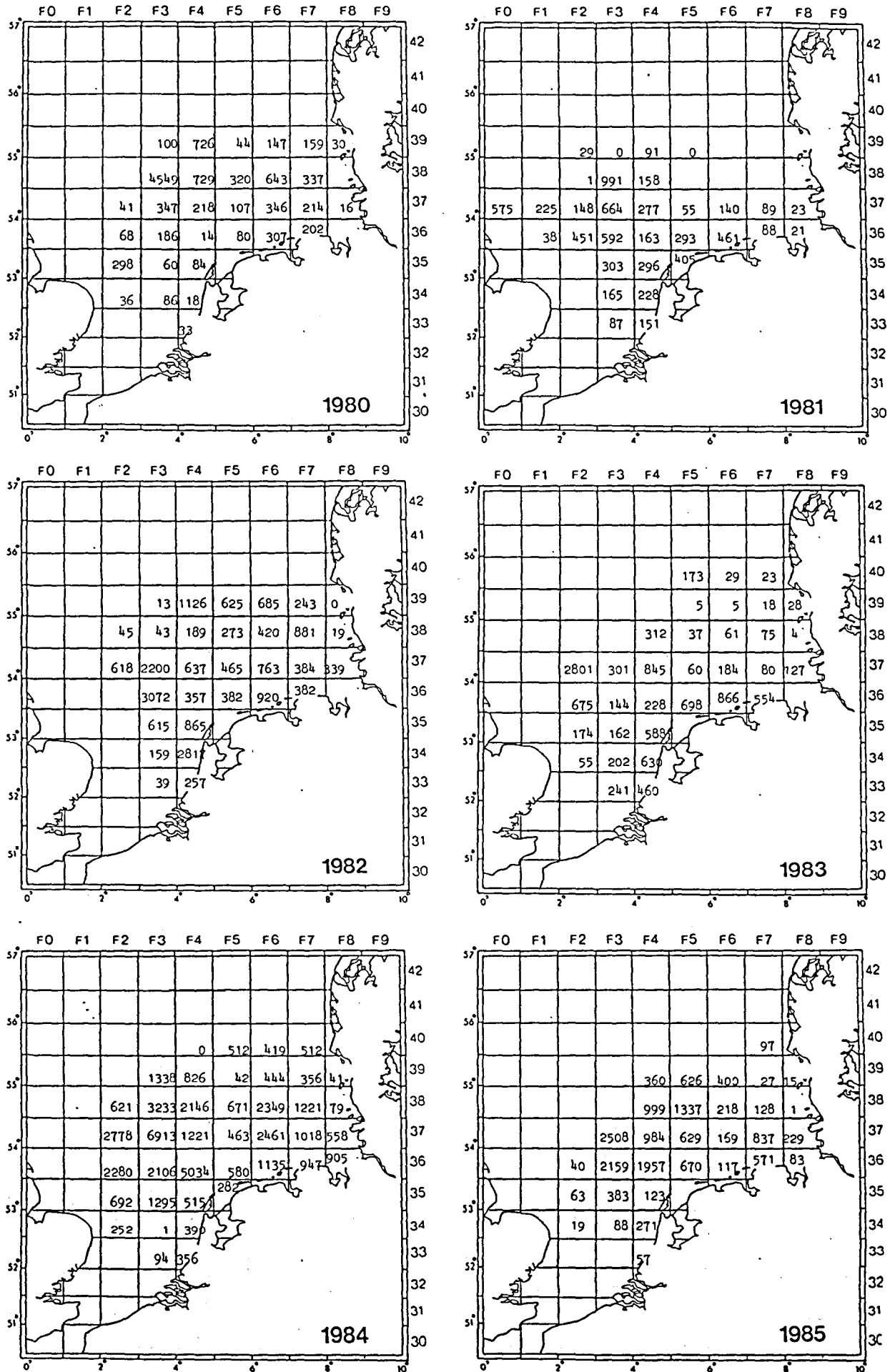


Figure 8 - Arithmetic mean number of 2-group whitening per rectangle

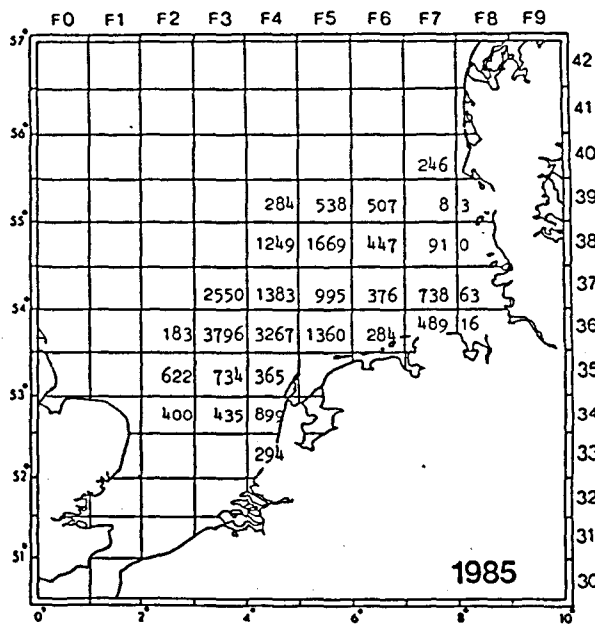
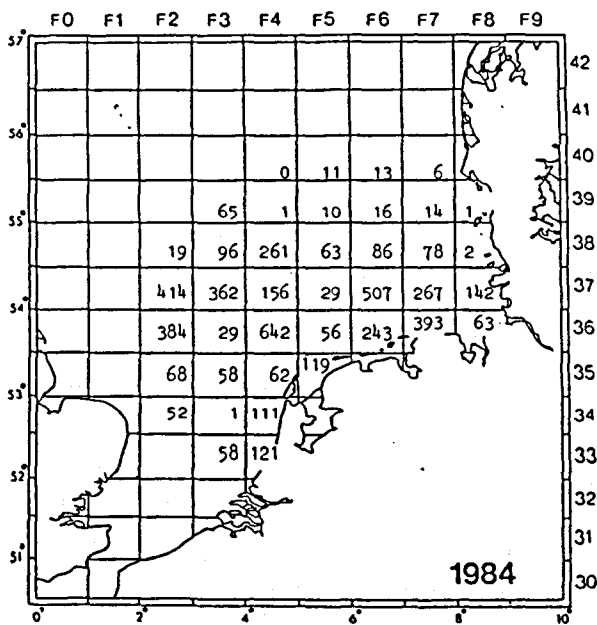
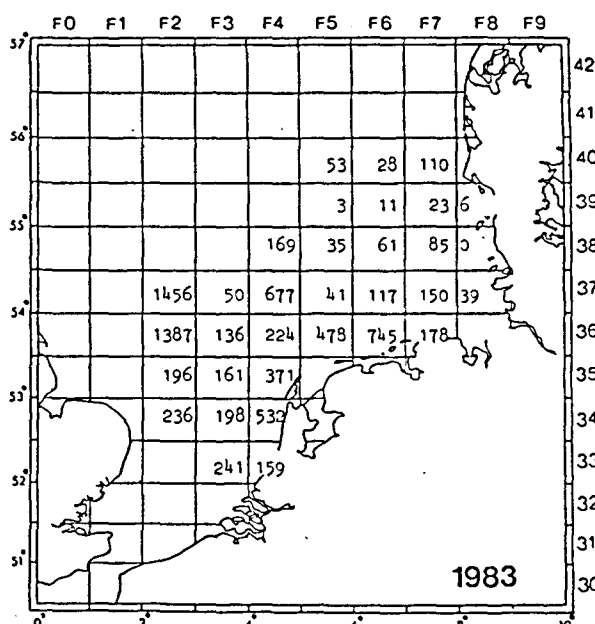
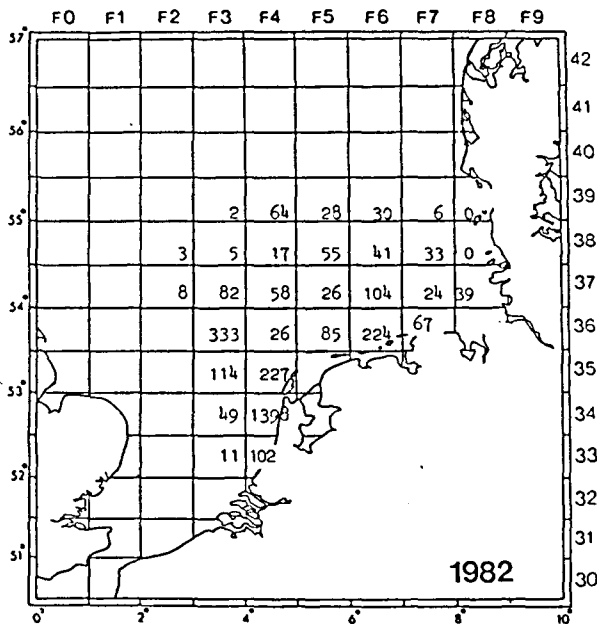
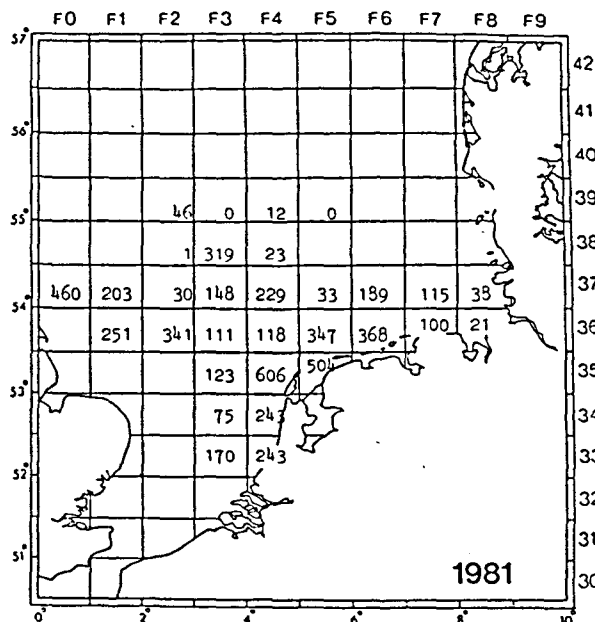
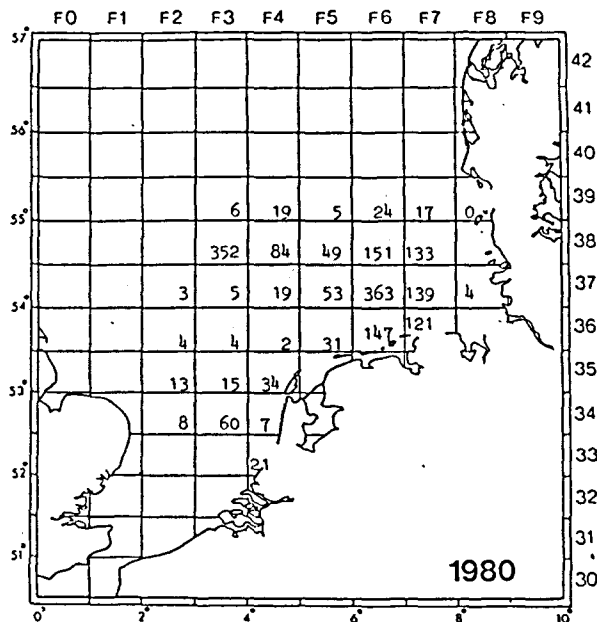


Figure 9 - Arithmetic mean number of 3-group whiting per rectangle

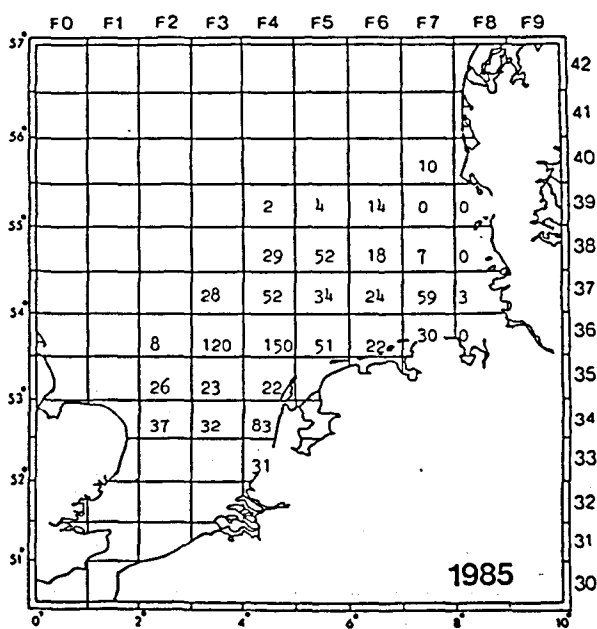
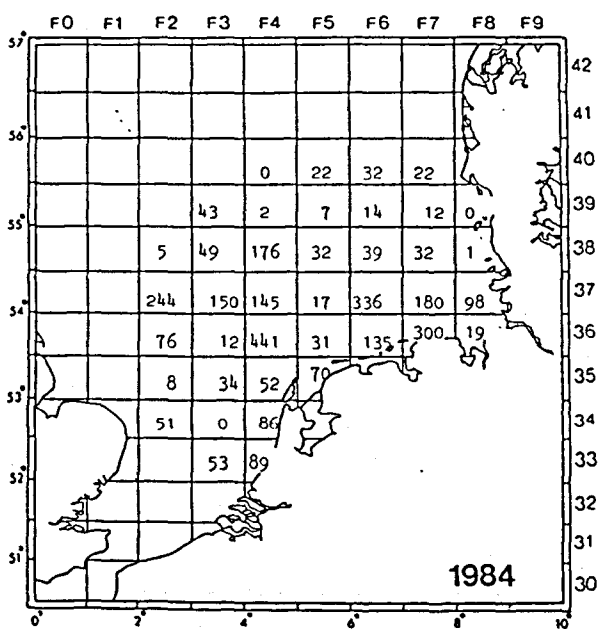
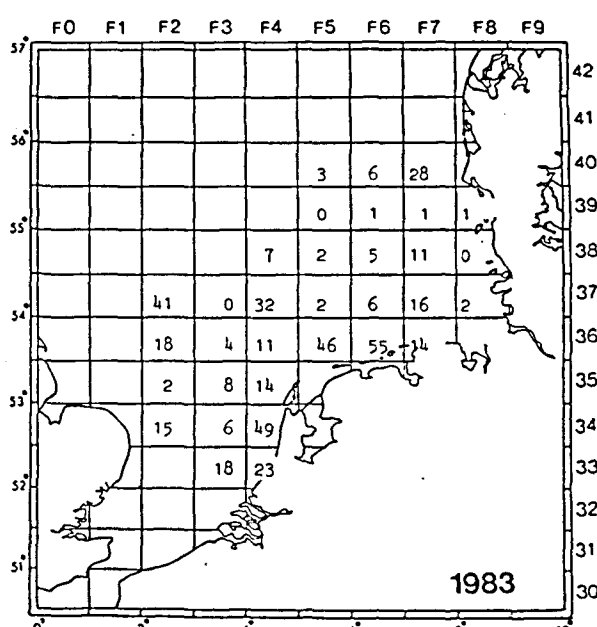
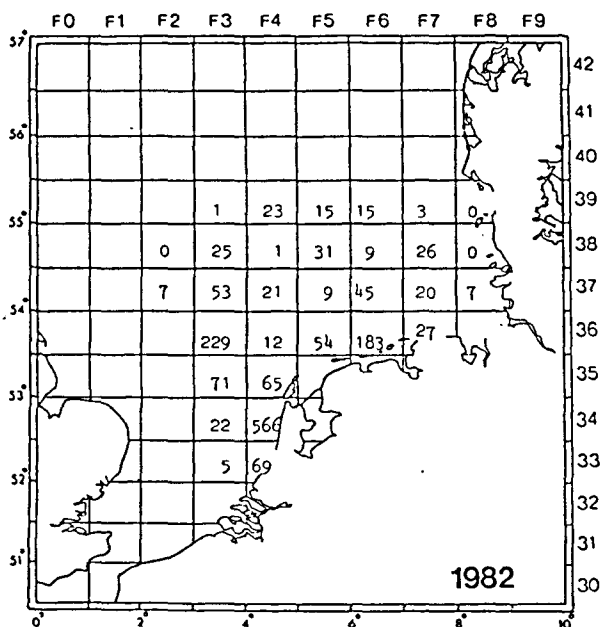
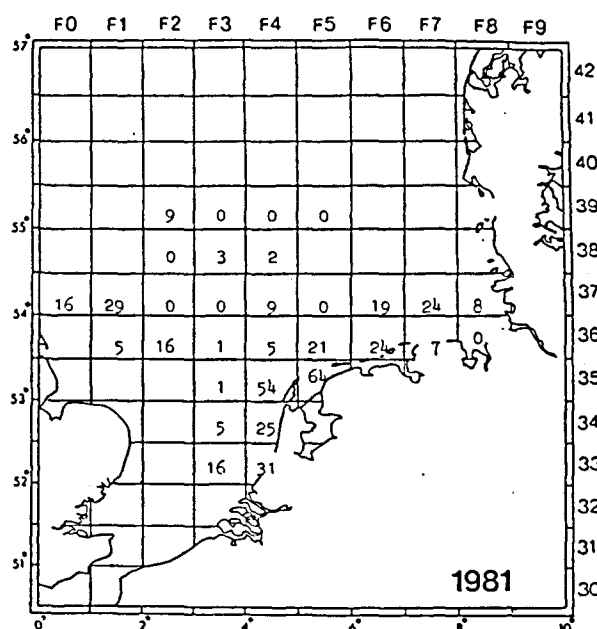
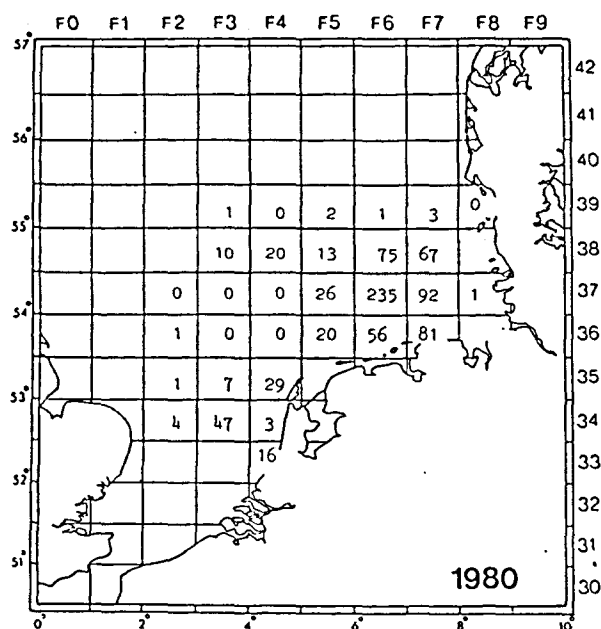


Figure 10 - Correlation between DGFS indices of the same year classes of cod in consecutive years.

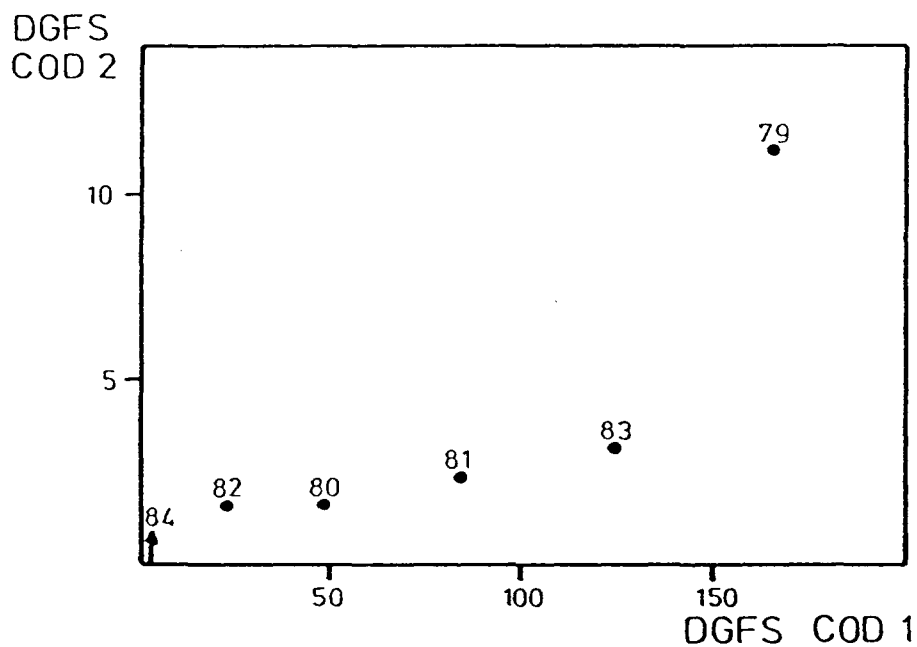
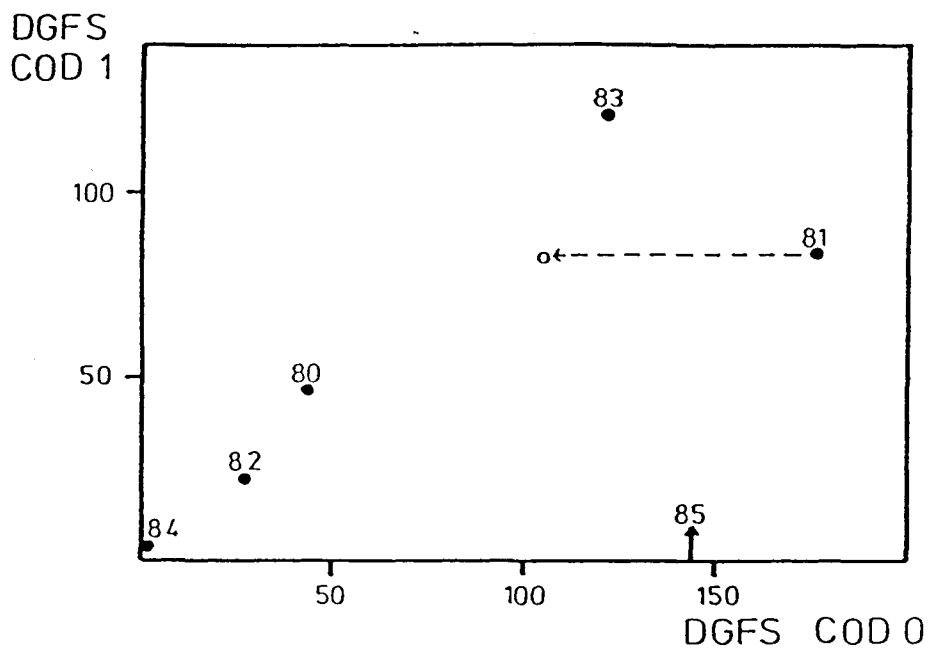


Figure 11 - Correlation between DGFS indices of the same year classes of whiting in consecutive years.

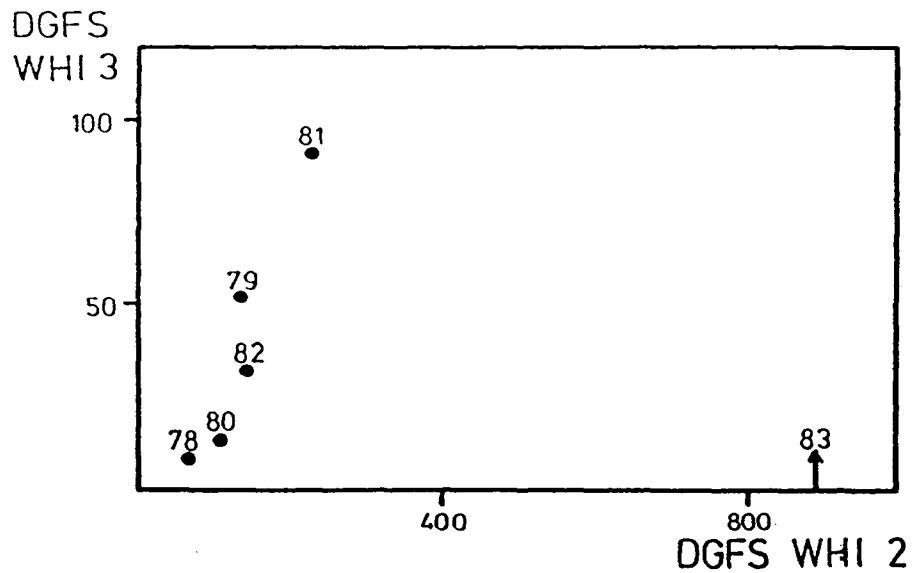
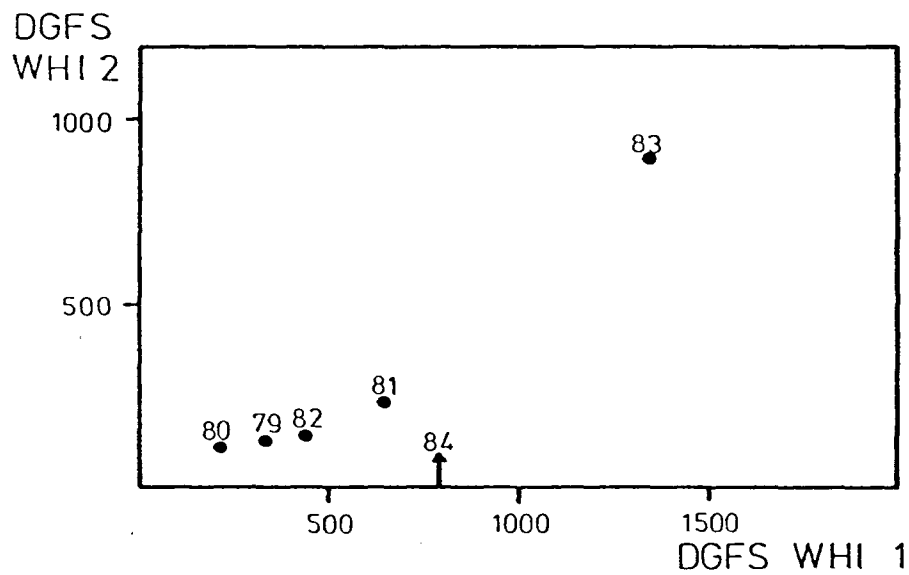
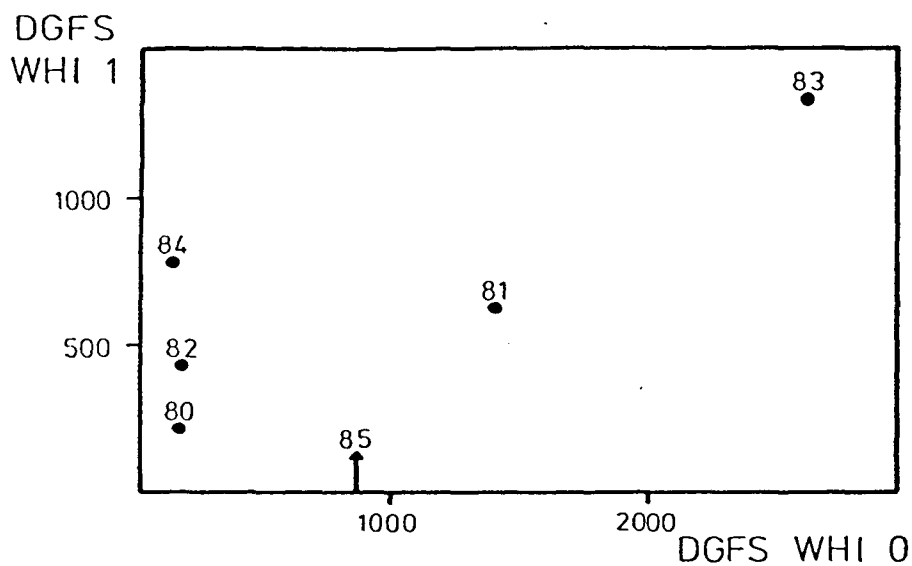


Figure 12 - Correlation between DGFS indices for cod and numbers in the VPA (Anon., 1986b)

