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Trends in Catch and Effort in the Greenland Trawl Fishery for Cod

by

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In the 1990 assessment of West Greenland cod, the spatial distribution of Greenland trawlers' catch and effort was described, and an annual catch rate index was derived on the basis of logbook information from the commercial Home Rule fleet (Riget et al NAFO SCR Doc. 90/28).

This paper updates previous information. Data processing was similar to that of Riget et al (op. cit).

General trends in catch and effort

Fig. 1 shows total catch and effort during 1975-90 for all Greenland trawlers fishing in Subarea 1. The catch of 1990 is underestimated by about 4000 tons as logbooks for the last months of the year has not been processed yet. The catch declined to about 20,000 t, while the effort increased slightly compared to 1989.

Catch rate and distribution

Fig. 2 shows effort, catch and catch rates for all Greenland trawlers, while Appendix 1 and 2 show the distribution of effort. The West Greenland fishing area is divided into NAFO divisions whereas the East Greenland area is divided into FRG trawl survey areas. In 1990 the fishery took place far south and a significant part of the effort was spent at East Greenland.

Seasonal pattern

Fishing effort by quarter, catch and catch rate is shown in fig. 3. Data cover six sister trawlers (721 GRT) fishing in Subarea 1. During 1990 the effort decreased during the first 3 quarters and increased again in the last quarter. The quarterly catch decreased during 1990 as did the catch rate - excepting a slight increase in the second quarter of the year.

Catch rate index

Data covering the period 1975-90 were analyzed by the multiplicative model.

$$\ln(\text{CPUE}) = I + a * \text{Year} + b * \text{DIVISION} + c * \text{MONTH} + \text{error}$$

Table 1 shows the results of the multiplicative analysis and fig. 4 gives the annual indices from 1975 to 1990. In 1990 the cpue index drops to about the mean for the period. Fig. 5 shows the annual index derived from the multiplicative analysis and an index calculated as the logarithm of the overall annual catch rate. The two indices show the same pattern.

References

Riget, F., H. Hovgård and H. Lassen 1990. A Catch Rate Index for West Greenland Cod for 1975-89 Based on Logbook Information from the Commercial Fleet. NAFO SCR Doc. 90/28.

Table 1 : Statistics and parameter estimates from the multiplicative analysis of CPUE from 6 Home Rule trawlers off West Greenland, 1975-1990.

Source of variation	Df	Sum of Squares	Mean	F value	P
Model	30	391.480	13.049	16.74	<0.0001
Year	15	248.847	16.590	21.28	<0.0001
Division	4	54.251	13.563	17.40	<0.0001
Month	11	88.382	8.035	10.31	<0.0001

Year	Estimate	Std error	Month	Estimate	Std. error
1975	-1.128	0.231	Jan	0.416	0.206
1976	-0.969	0.242	Feb	0.526	0.213
1977	-0.384	0.263	Mar	0.197	0.204
1978	0.700	0.278	Apr	0.550	0.207
1979	0.009	0.282	May	0.575	0.212
1980	-0.117	0.258	Jun	0.714	0.223
1981	0.671	0.273	Jul	0.155	0.226
1982	0.595	0.246	Aug	-0.157	0.232
1983	-0.241	0.245	Sep	-0.715	0.207
1984	-0.758	0.287	Oct	-0.928	0.216
1985	-1.086	0.303	Nov	-0.267	0.207
1986	-0.512	0.367	Dec	0	-
1987	0.324	0.556			
1988	0.570	0.270	Div.	Estimate	Std. error
1989	1.079	0.244	1B	-1.245	0.250
1990	0	-	1C	-0.152	0.192
			1D	0.031	0.173
			1E	0.233	0.165
			1F	0	-
Inter cept.	6.756	0.247			

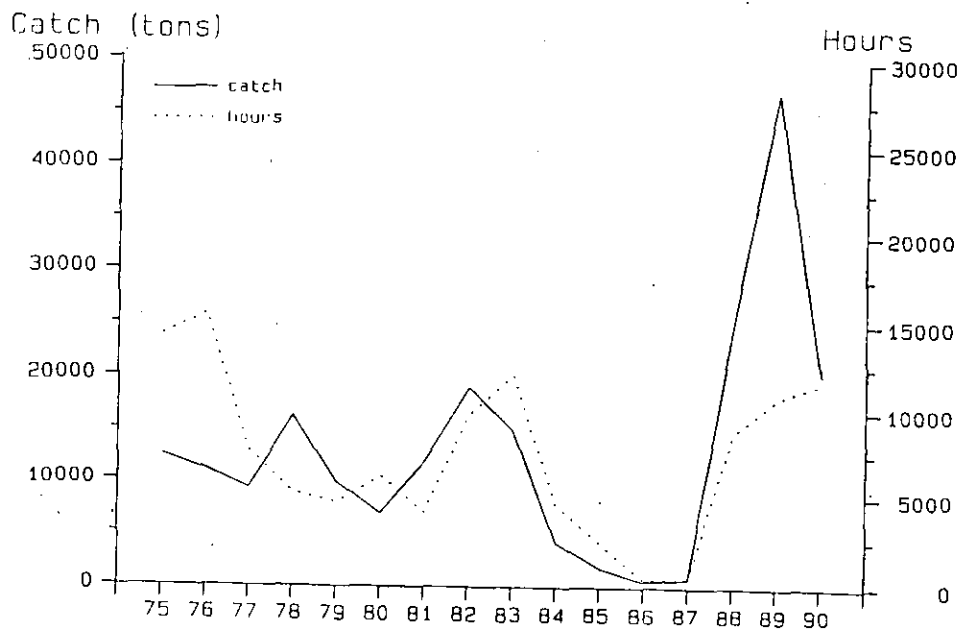


Fig. 1. Catch and effort in Subarea 1, 1975-90, all greenlandic trawlers.

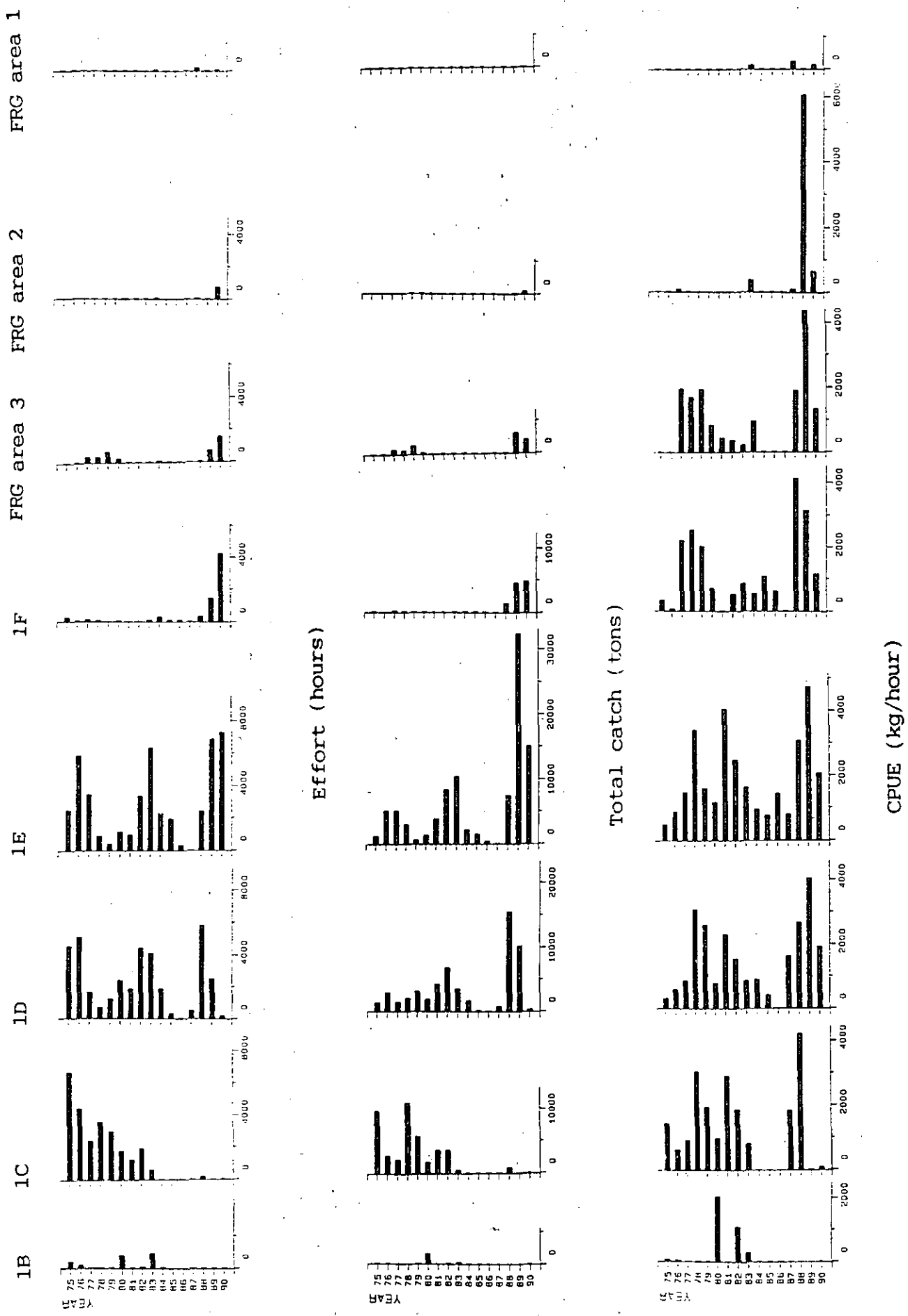


Fig. 2. Effort, catch and CPUE by area, 1975-90, all greenlandic trawlers.

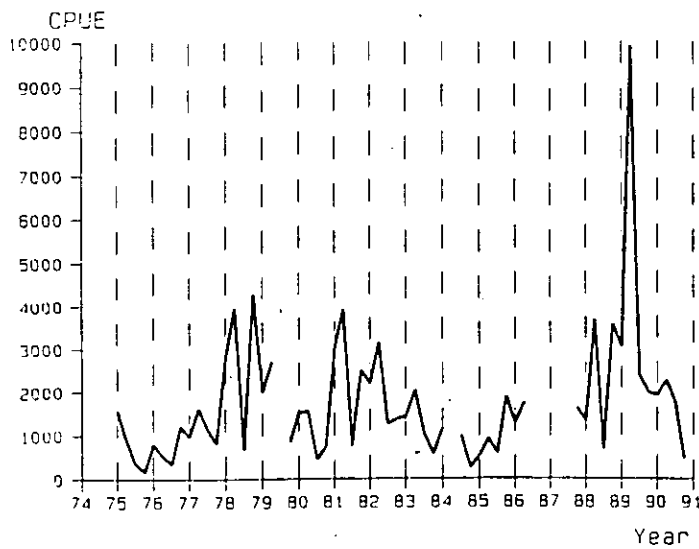
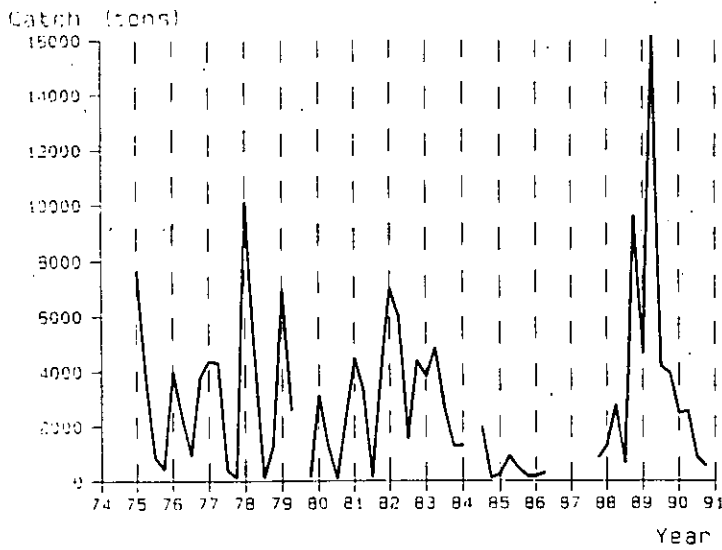
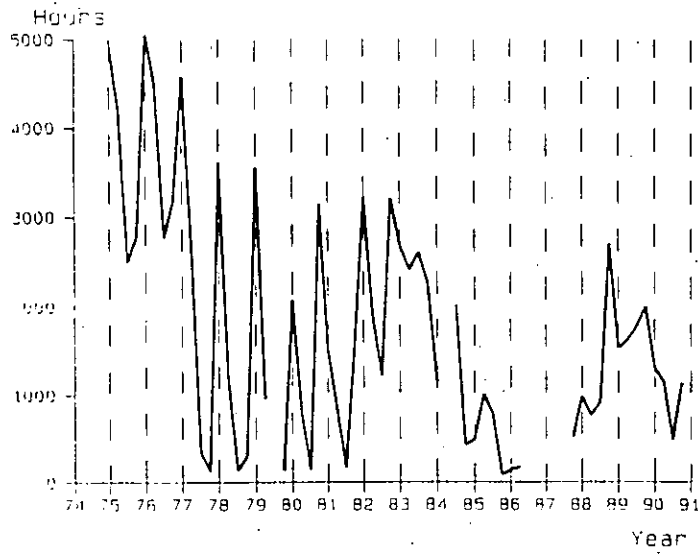


Fig.3. Effort, catch and CPUE by quarter, 1975-1990, six Home Rule trawlers.

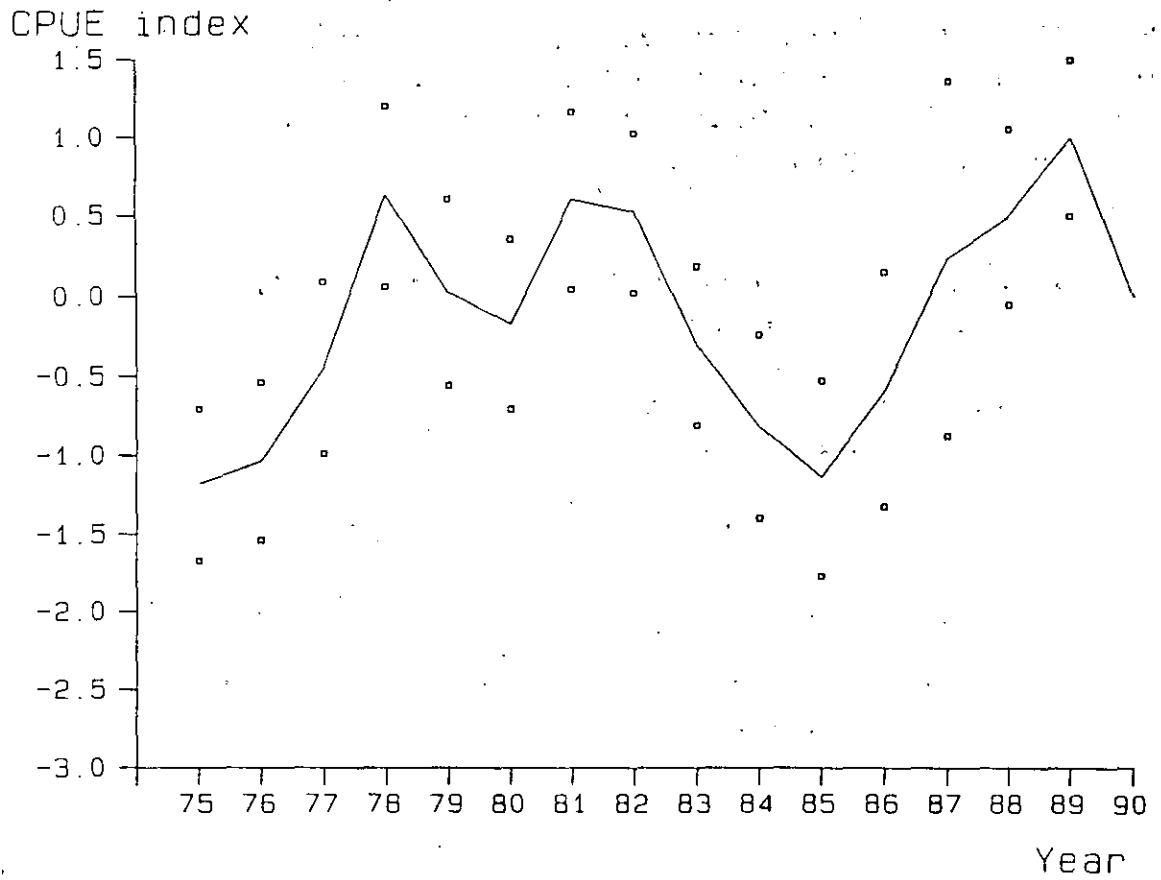


Fig. 4. CPUE from multiplicative model, with error bars ( $\pm 2 \times$  S.E.), for cod in Subarea 1.

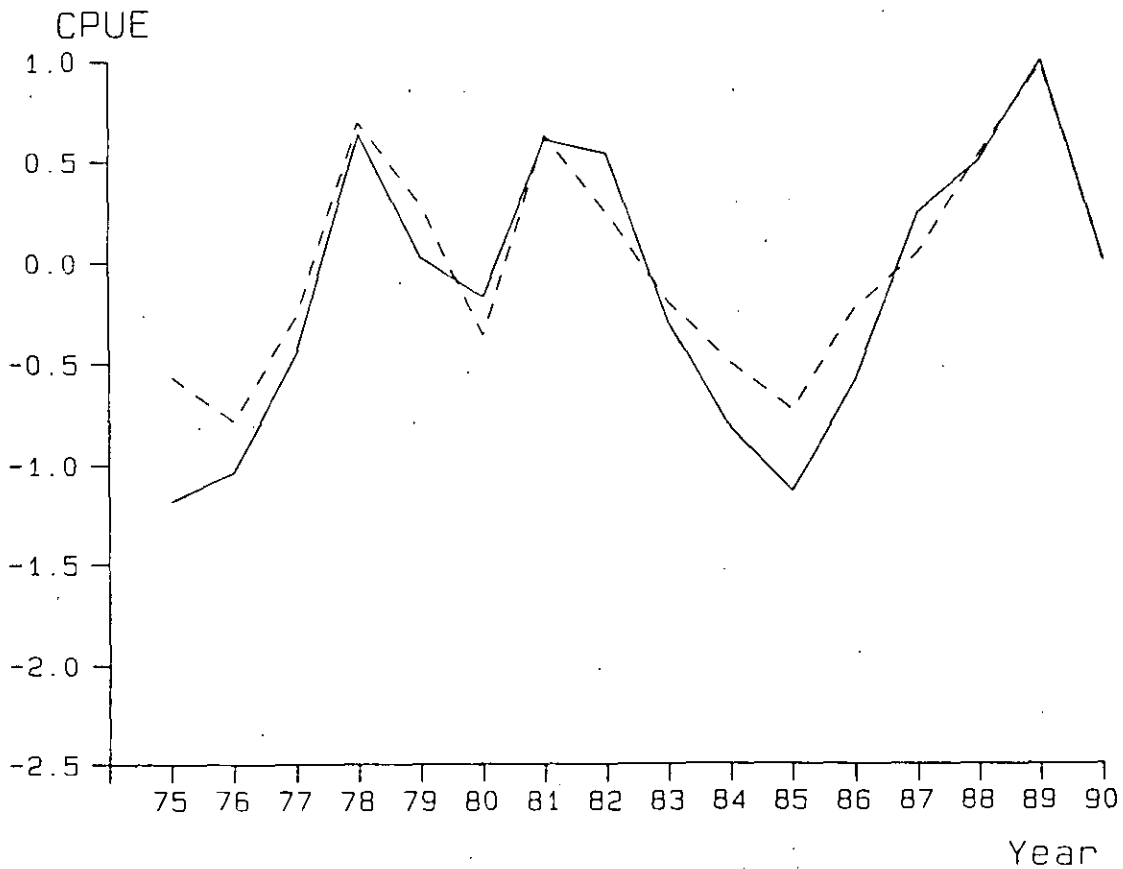


Fig. 5. Comparisons between CPUE from multiplicative model and mean annual CPUE.

Appendix 1. Geographical distribution of effort (hours trawled) in the fishery for cod by Greenland trawlers. Symbols are given for every 15 n. m. shift in latitude. For each year the 15.n m. zones where fishing took place are grouped in four categories, viz.

i) that quart of the zones which each has higher effort than any of the rest (biggest symbol).

ii) that quart of the zones which each has less effort than any of the rest (smallest symbol).

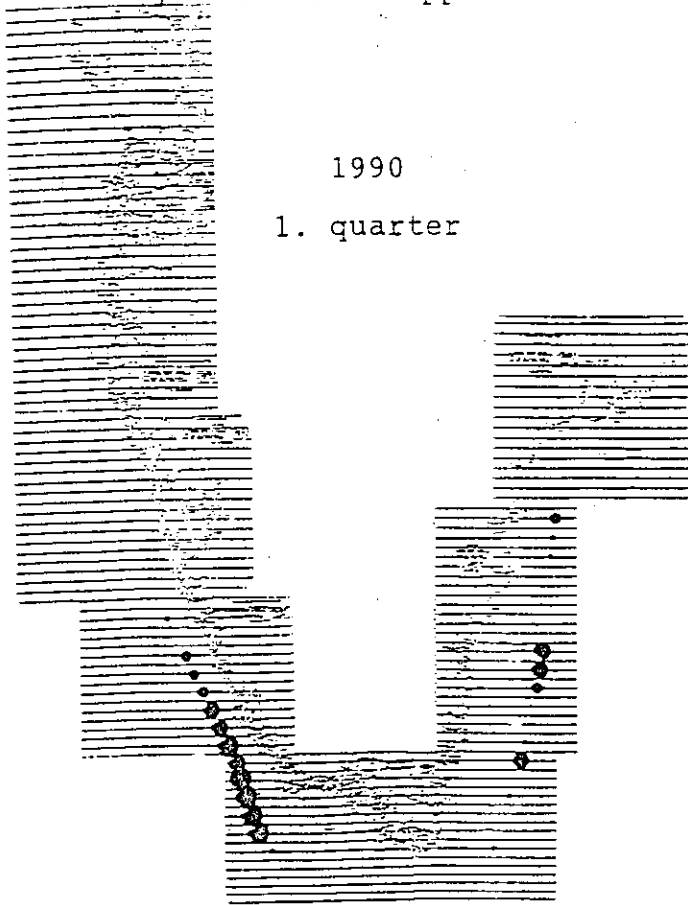
iii and iv) the remaining zones split in two halves according to their effort. symbols accordingly.

Thus for each year there is an equal number of zones in the four categories, but categories are not comparable between years in terms of actual amount of effort.

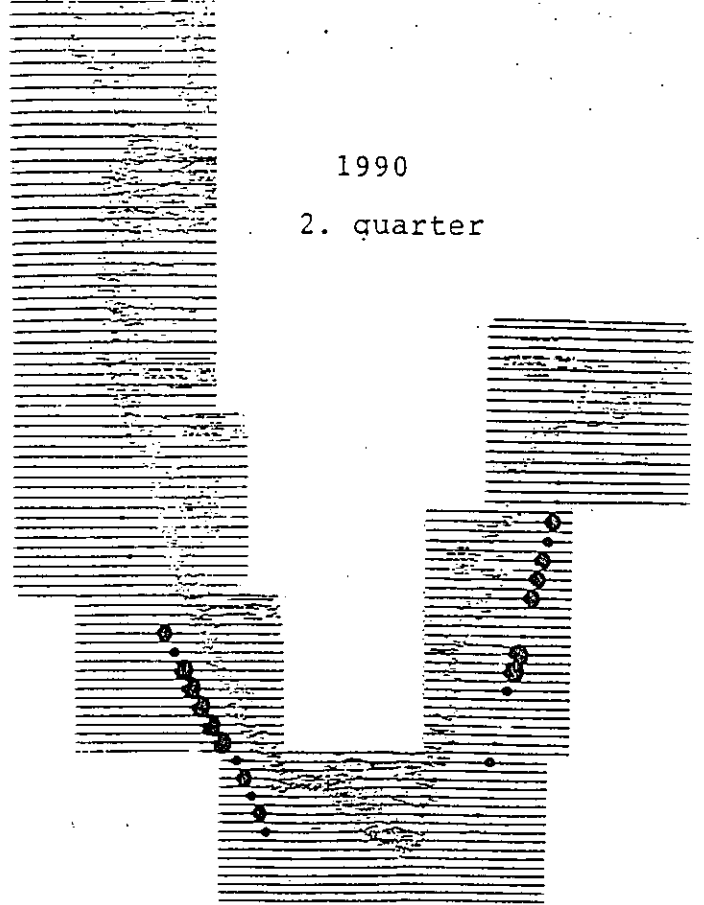


Appendix 2. Geographical distribution of effort (hours trawled) in the fishery for cod by Greenland trawlers by quarter in 1990. Symbols as in Appendix 1.

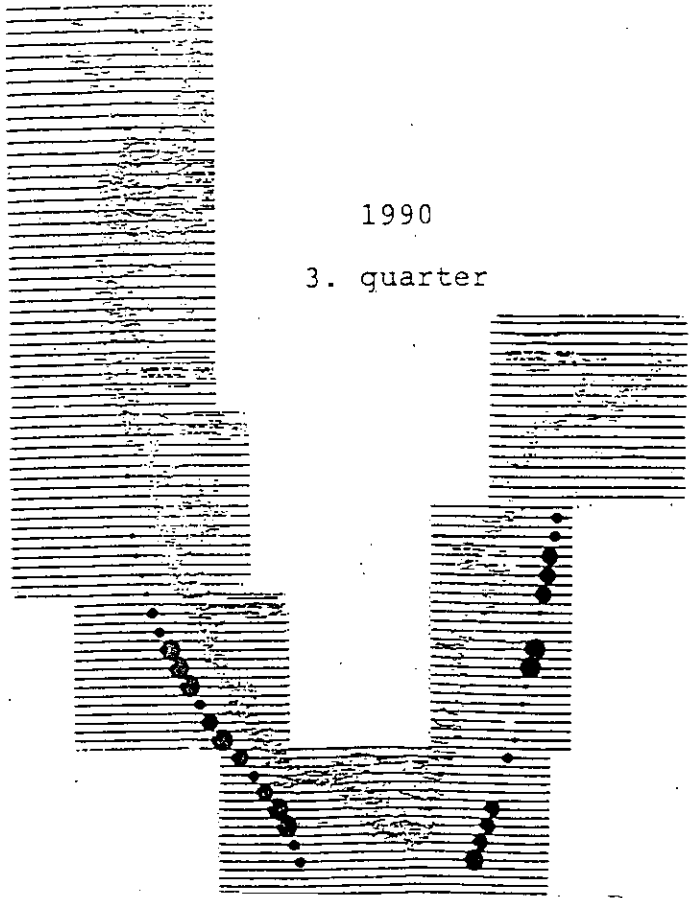
1990  
1. quarter



1990  
2. quarter



1990  
3. quarter



1990  
4. quarter

