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Some observations on the western mackerel stock in March/April 1980

by

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ABSTRACT

R.V. "Anton Dohrn" carried out a survey with special emphasis on adult mackerel and eggs from 13.03. to 14.04.80 in waters west of the British Isles. Substantial quantities of mackerel (up to 972o kg) were caught in half hour tows with a 180-feet-herring-bottom-trawl

especially southwest of Ireland (Great Sole Bank). Mean lengths and length distributions, mean weights and age data are given for the different areas. Bongo catches resulted in up to 800 mackerel eggs/m^2 and up to 2400 blue whiting larvae/m^2.

1. INTRODUCTION

Following a recommendation by the ICES Mackerel Working Group to increase research on exploited mackerel stocks in the western area and because of increased catches by the Federal Republic of Germany fishing fleet (total catch 17473 t Area VI and VII) it was decided to detail R.V. "Anton Dohrn" to the area west of the British Isles.

2. MATERIAL AND METHODS

The Survey was carried out from March 13 to April 14, 1980. The area of investigation is shown in Fig. 1. During the cruise 88 fishing stations were completed using a 180-feet-herring-bottom-trawl rigged with rollers, a kite (0,9 x 1,2 m), a temperature net-sonde and a small-meshed cod-end. Tows were generally of 30 minutes duration at randomly selected stations, with a speed of approximately 3,5 knots. The echosounder was monitored constantly both during tows and when steaming.

The total catch normally was weighed and sorted to species. From larger catches subsamples were taken. For further analysis in the lab ashore 7 samples, each of 100 mackerel, were frozen. Length measurements were made to the nearest centimeter.

For age determination otolith rings were counted (9 and more ringers were grouped together). Otoliths with rings which could not be clearly identified were omitted.

Plankton samples were taken on 137 stations, using a 61 cm Bongo net (Smith and Richardson 1977) with 335 and 500 micron mesh size. Oblique hauls from surface to a maximum depth of 150 m were made, with a ship's speed of 3 knots. The neuston net (Hempel and Weikert 1972) was towed for 20 minutes on each station at the same time as the bongo net.

At all 137 stations temperature and salinity was measured, by means of a Howaldt-Bathysonde.

3. RESULTS

3.1. ADULT MACKEREL

3.1.1. CATCHES

Catches of more than one basket (60 kg) of mackerel per tow are shown in figure 2. It can be seen that the occurence of mackerel in the catches increased from north to south of the area of investigation. Especially on the shelf west and southwest of Fastnet-Rock, on Porcupine-Bank and on Great-Sole-Bamk, considerable amounts of mackerel were caught, whereas on Labadie-Bank and in the inner part of the Celtic Sea catches of mackerel were low.

3.1.2. LENGTH DISTRIBUTION

The length distribution of the catches in the different areas is shown in Fig. 3. From this it can be clearly seen that the smallest mackerel occured in Statistical area VIIf. This confirms results obtained by the Mackerel Working Group (Anon., 1980) regarding the occurence of small fish in this area.

Mean length and mean weights at age for Subareas VI and VII are given in table 1. Limited material, especially for Subarea VI, could account for the substantial differences observed in mean length and mean weight.

Table 1: Mean length (cm) and mean weights (gr) at age of mackerel, March/April 1980

	Age / Yearcl.	1 79	2 78	3 77	4 76	5 75	6 74	7 73	8 72	≥9 ≤71
Sub-area VI	$\bar{x}$ cm	-	-	34.50	33.40	34.57	35.50	38.50	37.00	39.30
	$\bar{x}$ gr	-	-	302	280	314	348	464	383	488
	n	-	-	3	20	15	13	5	6	25
Sub-area VII	$\bar{x}$ cm	19.5o	27.17	31.00	31.75	33.96	35.59	35.58	37.33	40.35
	$\bar{x}$ gr	36	121	216	227	247	290	359	426	560
	n	1	15	2	63	98	63	73	24	185

3.1.3. AGE DISTRIBUTION

The age distribution of 7 mackerel samples (one sample = 100 specimens) with a total of 611 specimens aged from the total western area is shown in fig. 4. Age 9 and 9 + fish predonimated in the samples, although age 4 to age 7 mackerel were also significant.

Fig. 5 shows the age-composition in the different areas. Most striking are the results from area VII b, c from Porcupine-Bank only: 88 % of the fish investigated were 9 years of age and older. Furthermore, the age determinations for Subarea VII f show the predonimance of 4 year old fish, already indicated by the length distribution (see 3.1.2.).

3.1.4. SEX RATIO AND MATURITY

The sex ratio in all samples showed an equal occurrence of male and female mackerel. Spawners and prespawners predominated in all areas with the exception of specimens from the Porcupine-Bank, where only spawners were observed.

3.2. MACKEREL EGGS AND FISH LARVAE

Fish eggs and larvae were sorted from the 335 µ Bongo net catches in 77 samples from the plankton station grid west of Ireland (Fig. 1, stations 35-112) and from 15 stations in the Celtic Sea (Fig. 1, stations 113-127) sampled 22.03.-08.04. Mackerel eggs of maturity stage 1 were identified in order to be used for the calculation of the daily egg production (Lockwood et al., 1977a, 1978). The distribution and abundance of stage 1 mackerel eggs are shwon in fig. 6, by number per squaremeter. Mackerel eggs were recorded at almost every station on the shelf between 120 and 400 meter depth. Largest concentrations - up to 800 eggs/m^2 - were found west and southwest of Fastnet Rock, especially on Great Sole Bank (Fig. 6) whereas concentrations of 10 to 100 eggs/m^2 were detected in catches on the shelf, primarily between 140 and 200 meter depth.

Considerable numbers of fish larvae, identified as blue whiting (Micromesistius poutassou Risso), were found at the deeper stations north and northeast of Porcupine Bank. Up to 2400 larvae/m^2, with length rangig from 3 to 5 mm, were caught at stations between 1000 and 3000 m depth.

3.3. HYDROGRAPHY

Results of hydrographic investigations are shown in figures 7 and 8. Isotherms made from both surface and bottom measurements show the presence of a homotherm in the area of investigation in March/April 1980

4. DISCUSSION

The cruise was the first one conducted by the Federal Republic of Germany with special emphasis on adult mackerel and eggs. Nevertheless, considerable amounts

both of mackerel and eggs were caught throughout the cruise. Largest catches of adult mackerel and eggs were made off the southwest coast of Ireland with increasing extent from the northern part of the shelf to a southward direction (Great-Sole-Bank). During the cruise it was noted that despite large catches of mackerel in half hourtows no traces or indications at all could be detected neither on the ship's two echosounders nor in the netsonde. Taking this fact into consideration it can be concluded that prespawning and spawning mackerel were more or less widespread during Mach/April on the irish shelf and on Great-Sole-Bank. A similar conclusion can be drawn from the occurrence, distribution and number of eggs. However, it should be noted that there might be still an underestimating of the number of mackerel eggs due to the findings of Coombs et al. (1977) who found eggs throughout the upper 400 m and even below that depth.

5. REFERENCES

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HEMPEL,G. & H.Weikert, 1972. The Neuston of the sub-tropical and boreal North-Eastern Atlantic Ocean. A Review. Marine Biology 13 (1) pp.70-88.

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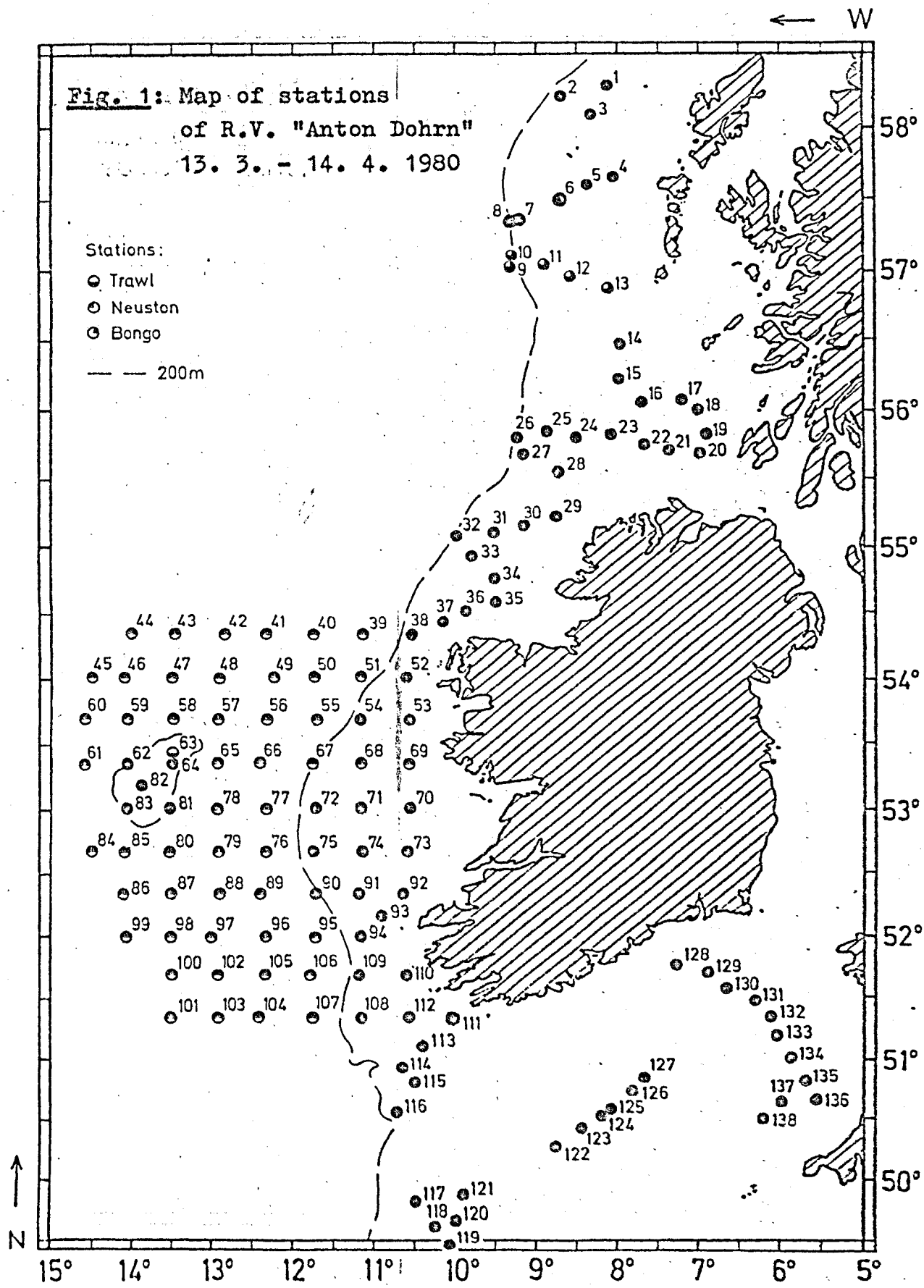


Fig. 1: Map of stations
of R.V. "Anton Dohrn"
13. 3. - 14. 4. 1980
Stations:
Trawl
Neuston
Bongo
200m
W
N
58°
57°
56°
55°
54°
53°
52°
51°
50°
15°
14°
13°
12°
11°
10°
9°
8°
7°
6°
5°

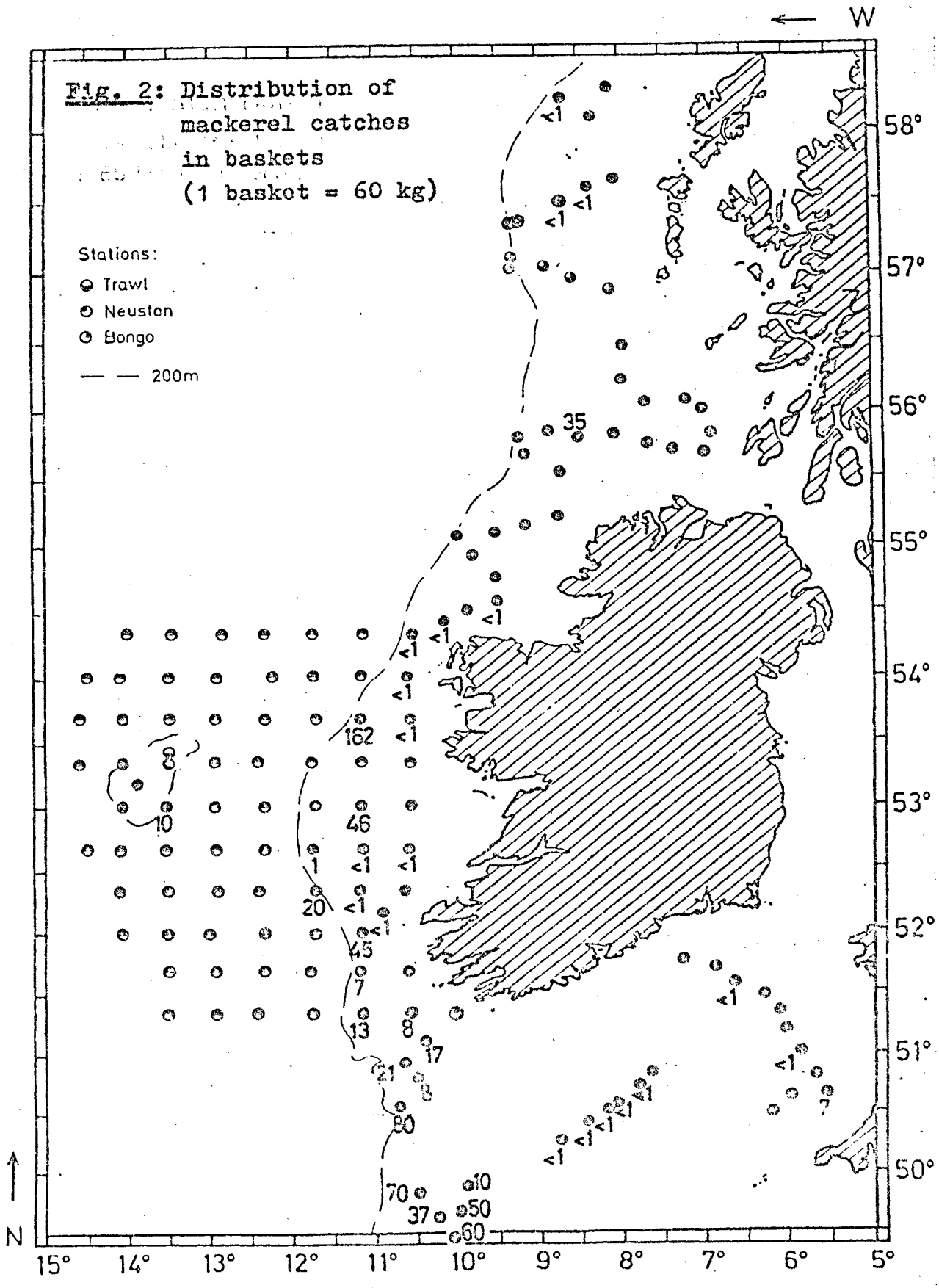


Fig. 2: Distribution of mackerel catches in baskets (1 basket = 60 kg)

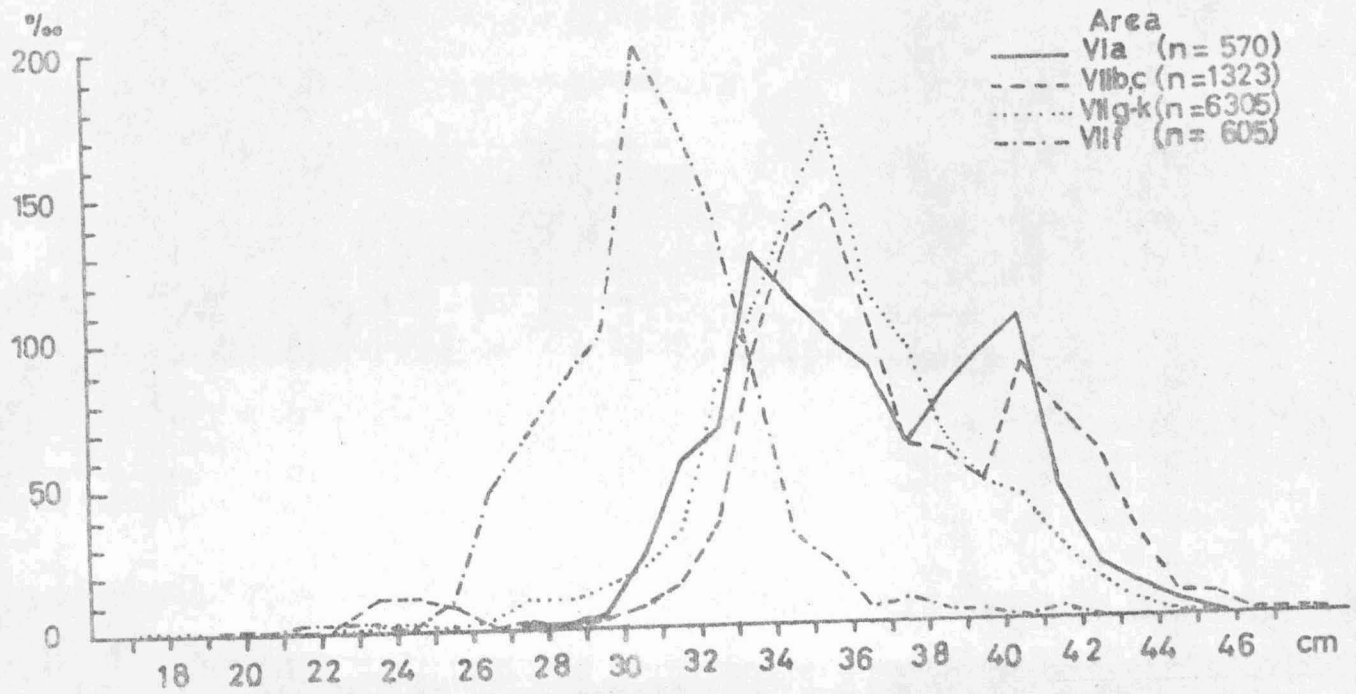


Fig. 3: Length composition (°/oo) of mackerel catches in the different areas.

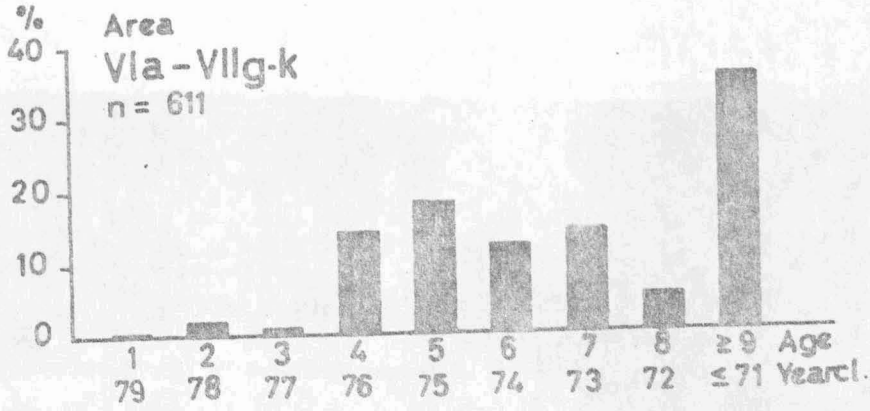


Fig. 4: Age composition (%) of mackerel catches in the total area of investigation.

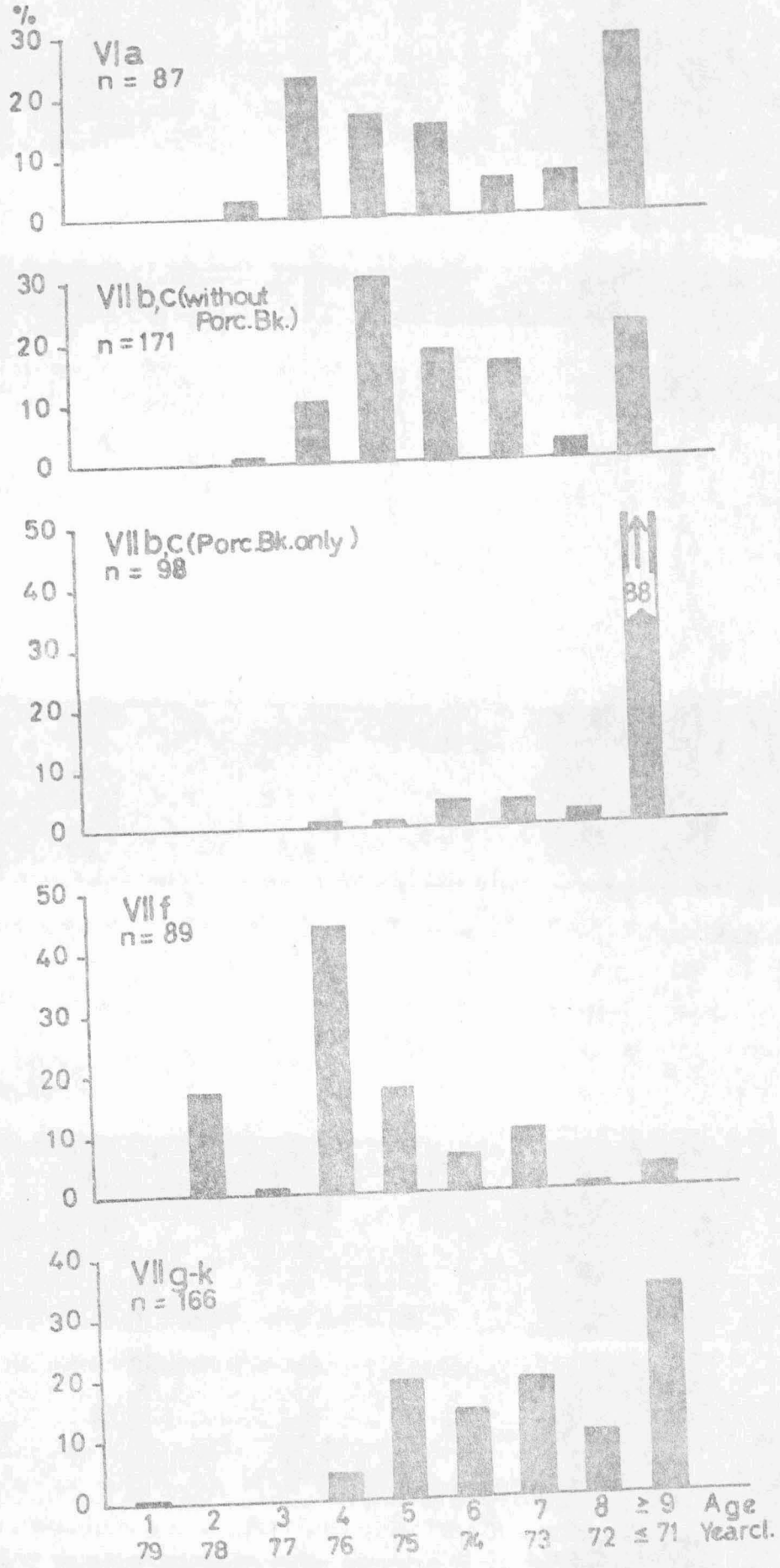


Fig. 5: Age composition (%) of mackerel catches in the different areas.

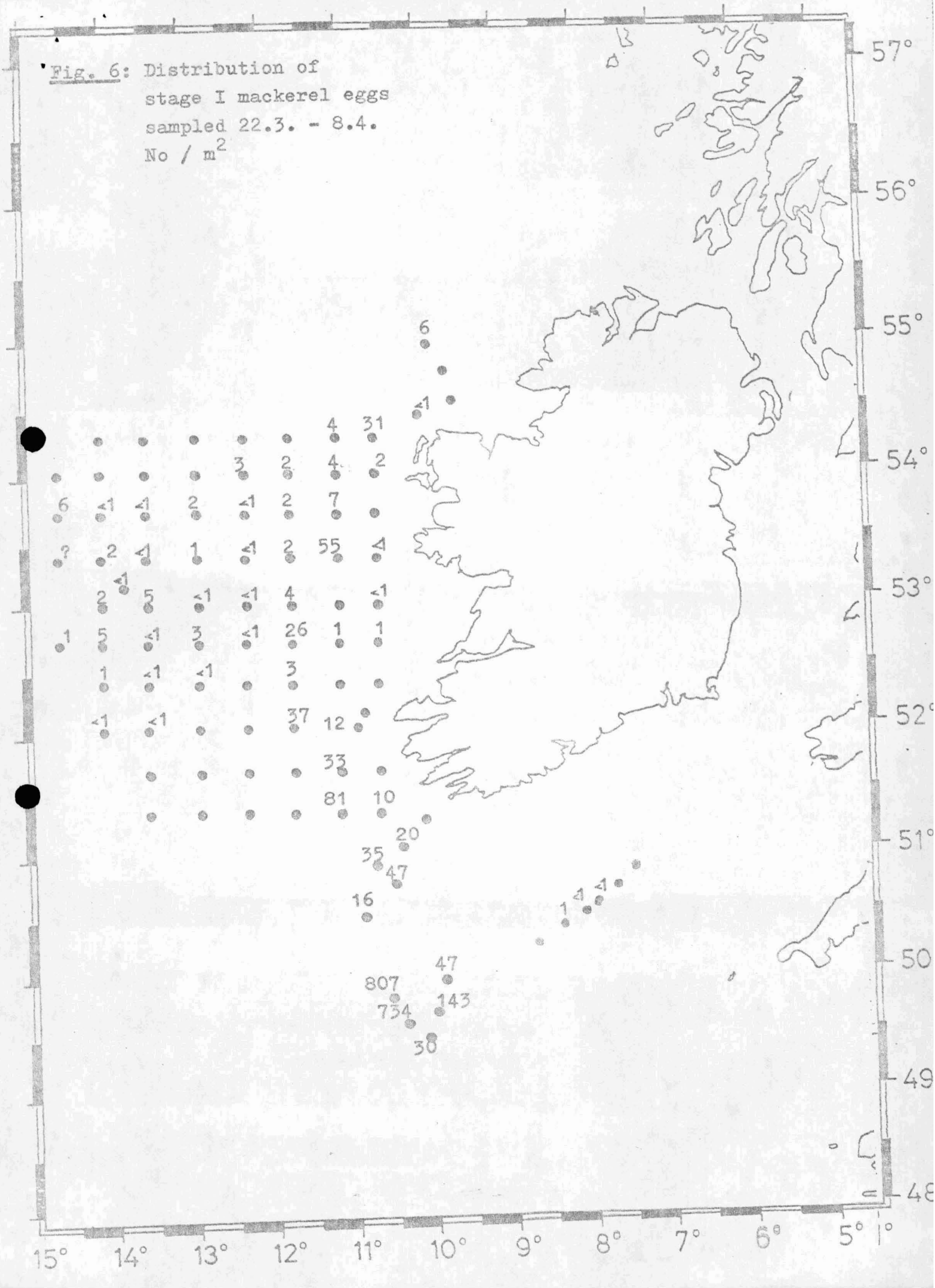
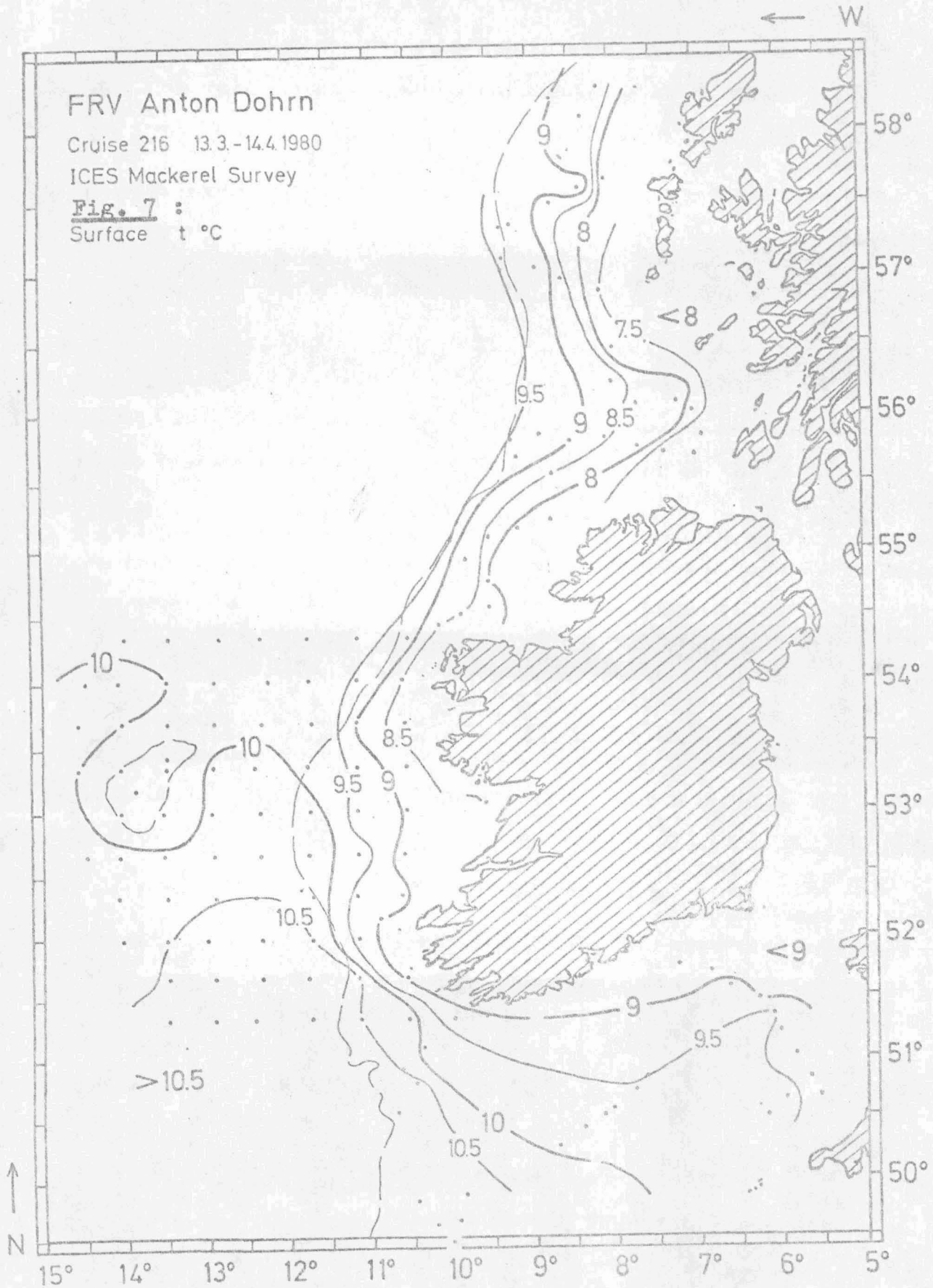
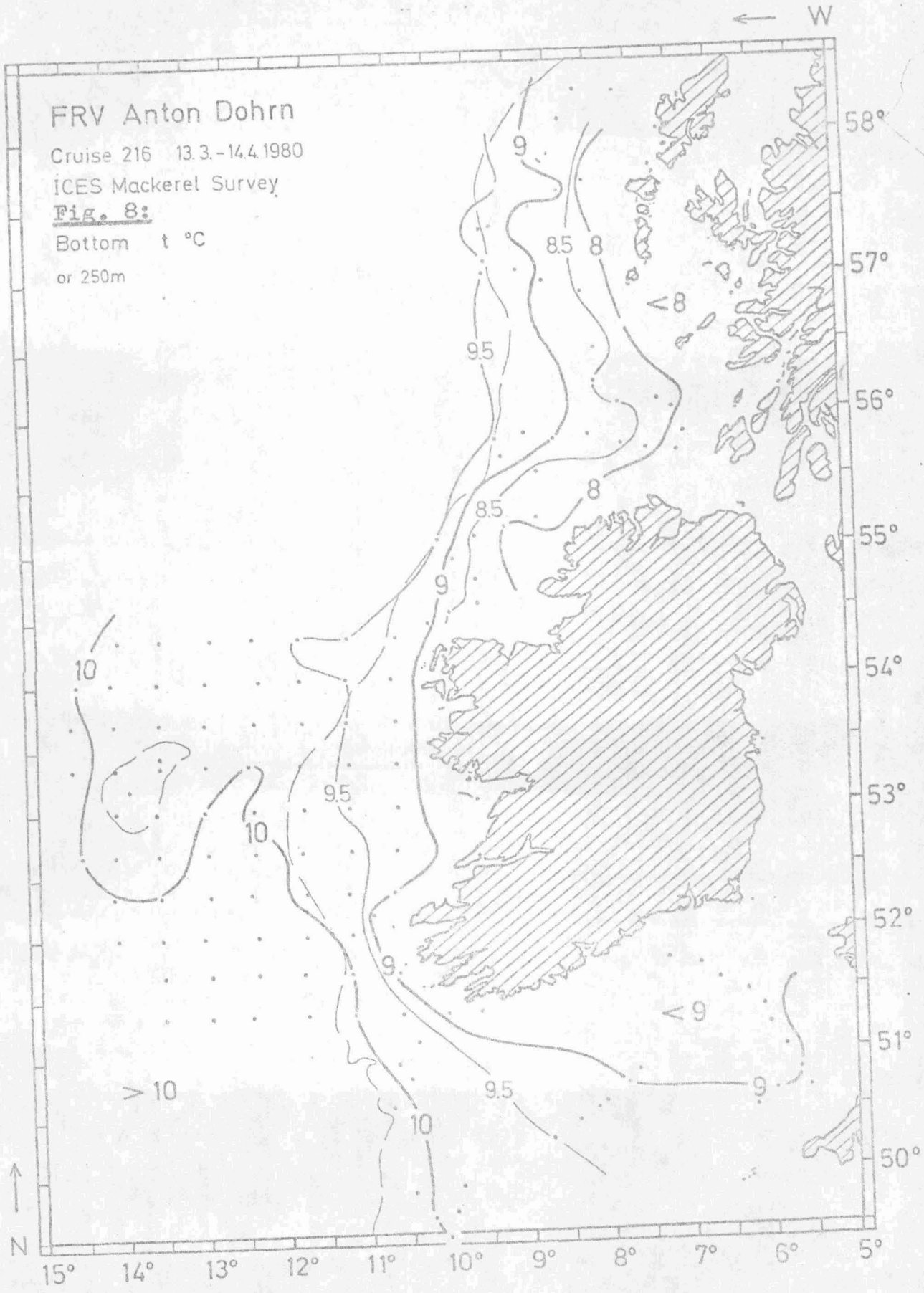


Fig. 6: Distribution of stage I mackerel eggs sampled 22.3. - 8.4. No / m^2


FRV Anton Dohrn
Cruise 216 13.3.-14.4.1980
ICES Mackerel Survey
Fig. 7 :
Surface t °C
← W
58°
57°
56°
55°
54°
53°
52°
51°
50°
15°
14°
13°
12°
11°
10°
9°
8°
7°
6°
5°
N
9
8
7.5
<8
9.5
9
8.5
8
10
10
8.5
9.5
9
10.5
<9
9
9.5
>10.5
10
10.5


FRV Anton Dohrn
Cruise 216 13.3.-14.4.1980
ICES Mackerel Survey
Fig. 8:
Bottom t °C
or 250m
W
N
58°
57°
56°
55°
54°
53°
52°
51°
50°
15°
14°
13°
12°
11°
10°
9°
8°
7°
6°
5°
9
8.5
8
<8
9.5
8
8.5
9
10
9.5
10
9
<9
9
9.5
10
>10