

REPORT ON NORWEGIAN BLUE WHITING SURVEY, SPRING 1988

by

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ABSTRACT

During the period 25 March - 24 April 1988, the blue whiting stock was surveyed in the spawning area west of The British Isles. It was found distributed along the continental slope, but this year a greater part was also distributed in the deep sea area westwards to the Rockall Bank. These were mostly postspawners migrating back to the Norwegian Sea.

A total of 7.1 mill. t of blue whiting was recorded, 6.8 mill. t of which belonged to the northern spawning stock. The 1983-yearclass was the most numerous one, constituting 32 % of the stock. The 1982-yearclass, previously known to be very rich, was only poorly represented. This confirms the observation from 1987 that it is on its way out of the stock.

RESUME

Pendant la période du 25 mars au 24 avril 1988, le stock du merlan bleu fut prospecté dans la zone de frai à l'ouest des Iles Britanniques. Le stock fut localisé au large de la pente continentale mais de plus, cette année une partie considérable fut enregistrée dans la mer profonde vers l'ouest jusqu'au banc de Rockall. Cette partie ayant dans sa majorité accompli le frai, se trouvait en migration vers la Mer Norvégienne.

En total, 7.1 million de tonnes de merlan bleu furent enregistrées, duquel 6.8 million de tonnes appartenaient au stock adulte septentrional. La classe d'âge de 1983 était la plus nombreuse, constituant le 32 pour cent du stock. La classe d'âge de 1982 antérieurement considérée très abondante, n'était que pauvrement représentée. Ceci confirme les observations de 1987, que cette année est en voie de disparaître du stock.

INTRODUCTION

The blue whiting stock, congregating each spring in the slope area west of The British Isles to spawn, has been surveyed each year since 1972 by research vessels from one or more nations. The estimates from this area, however, show a considerable variability, mostly caused by difference in survey timing and area covered (Anon. 1983, 1986a).

The ICES-coordinated international surveys in the Norwegian Sea, carried out during the feeding season each summer/autumn from 1982 to 1986 (Anon. 1986b), did not give more reliable estimates. The stock is difficult to detect in this period of the year due, among other things, to the dispersion over vast areas and great depths.

To record the total blue whiting stock in a proper way is consequently a very difficult task. Selecting an appropriate time period of the migration cyclus when the stock is in the spawning area and near the peak of spawning, may give the best information of its status.

To achieve this the Norwegian R.V. "G.O.Sars" conducted an acoustic survey in the area to the west of The British Isles from 25 March to 24 April 1988, monitoring the blue whiting spawning stock. The area was surveyed from south to north, starting southwest of Ireland ending up between Faroe Islands and Shetland (Fig. 1).

MATERIAL AND METHODS

The acoustic method used for estimation of the stock size was identical to the one used previously for blue whiting assessments. (Anon. 1982, Monstad 1986, 1987) with the instrument constant:

$$C_I(x 4\pi) = 0.4 \text{ m}^2 / \text{n.m}^2$$

and the length dependent density coefficient referring to a 30 cm fish with target strength of -40.5 dB:

$$C_F = 1.488 \times 10^6 \times l^{-2.18}$$

where l is the fishlength.

For calculations the total area surveyed was divided into 5 subareas which again were divided into rectangles of 30' latitude and 60' longitude size (Fig. 3).

RESULTS

Like previous years blue whiting was recorded near the shelf edge, but this year a greater part of the stock was also located over the deep sea area westwards to the Rockall Bank (Fig.2). Most of the blue whiting caught in this area was spent, while some individuals had running gonads.

The blue whiting was generally found at 400m depth, ranging from 300 to 500m. The highest integrator values were observed at the western slope of the Porcupine Bank, and in this area the zero-line of the distribution was clearly determined. North of the bank the limit of the distribution was not detected westwards, except for the the Rockall Bank, but the recordings were weak, indicating that the zero-line was relatively close. To the north, the distribution of blue whiting continued into the Norwegian Sea on either side of The Faroes.

The total of blue whiting recorded, was estimated to a biomass of 7.1 mill. tonnes, representing 63.7×10^9 specimen. Of this 6.8 mill. tonnes equal to 58.4×10^9 specimen belonged to the spawning stock (Table 1). The biomass calculated for each rectangle is shown in Fig. 3. The highest density, 182 tonnes/n.m² was observed at the northern part of the Porcupine Bank, while the biggest fish was found off the northwestern coast of Ireland (Table 1).

Except for the northernmost area where young fish were most abundant, the 1983-yearclass dominated and constituted 32 % of the total (Figs. 4 and 5). The two peaks in the length distribution from the Faroe/Shetland area, 19 and 25 cm, represent the 1987- and the 1986-yearclasses respectively. The 1986-yearclass was also well represented in the southern part of the Porcupine Bank, and especially at the shelf edge southwest of Ireland.

The samples collected at the southern part of the Porcupine Bank by the end of March, indicated that spawning was already started with a significant number spent (Table 2). Immature fish dominated in the Faroe/Shetland area and was also significant in south. In the intermediate areas, where the majority of the stock was registered, only from 2 to 5 % of immature specimen appeared.

The hydrographical conditions were rather homogenous, with temperature from 8^o to 10.5^o C in the area south of 60^o North. In the deep between The Faroes and Shetland colder water penetrated southwards from the Norwegian Sea (Fig. 6).

DISCUSSION

This is the first year a Norwegian research vessel observes the blue whiting distribution extended east-west to such a degree. Spent blue whiting was observed over the deep sea area all the way from the Porcupine Bank in the south to The Faroes in the north, migrating northwards. Unusually good weather conditions made it possible to get a profitable coverage of this area. In 1987 and 1986, when the observation conditions were significantly reduced by extremely bad weather, the Norwegian research vessel observed the stock more confined to the continental slope (Monstad, 1986, 1987).

The total estimate of 7.1 mill. t and the estimate of the spawning stock of 6.8 mill. t are both 2.3 mill. t higher than the respective Norwegian estimates for the whole area surveyed in 1987. The corresponding 58.4×10^9 specimen of the spawning stock is likewise 15.9×10^9 specimen more than in 1987.

An USSR survey in 1987 resulted in a spawning stock estimate of 5.1 mill. t compared to the Norwegian of 4.1 mill. t for the northern spawning stock. The Blue Whiting Working Group then agreed upon the average between these two estimates, i.e. 4.6 mill. t to be representative for the northern spawning stock of 1987 (Anon. 1988). That is 2.2 mill. t less than the Norwegian estimate for 1988.

The adequate coverage due to the excellent weather conditions and the probably favourable time period with respect to the migration cyclus, may explain some of the increase of the stock size observed. The area containing blue whiting was anyhow found to be 75 968 n.mile², i.e. 14 051 n.mile² larger than observed last year.

The mean density of mature fish was 89 t/n.mile² for the whole area surveyed compared to 72 t/n.mile² in 1987. Only for the southern Porcupine Bank area the density was found lower this year, than in 1987 when it was found to be at the very high level of 325 t/n.mile².

The level of the spawning stock is of the order suggested by Buzeta and Nakken (1975), 6 mill. t for the period 1972 - 1974. This was based on analysis of blue whiting data from several surveys, and deducting a total spawning area of roughly 90 000 n.mile² and a mean density of 70 t/n.mile² for mature fish.

For the Porcupine Bank area, which is considered a mixing area, it was not possible to distinguish the different blue whiting stocks as was done in 1978, when 0.5 mill tonnes was confined to other stocks than the northern one (Monstad, 1987). The total estimate in 1988 was therefore considered belonging to the northern blue whiting stock.

In general the blue whiting was 1-2 cm bigger in the various subareas than observed last year, with a total difference in the mean length of 1.9 cm. The total mean weight was hence found to be 15.0 g higher.

Like in 1987, the 1983-yearclass dominated the spawning stock. The 1982-yearclass, previously known to be very numerous, was poorly represented with only 12 %. This is a confirmation of the result from 1987 that this yearclass, which together with the 1983-yearclass have yielded most to fishery in later years, now is on its way out of the stock.

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Table 1. Abundance, density and mean values of blue whiting from west of The British Isles, R.V. "G.O. Sars" 25 March - 24 April 1988.

Subarea	Numbers $N \times 10^{-6}$		Biomass 1000 tonnes		Density tonnes/ n.mile ²	\bar{l} cm	\bar{w} g
	Total	Mature	Total	Mature			
Shetland/ Faroes I	5723	2342	479.1	253.6	33	24.56	83.7
Hebrides II	10898	10260	1235.9	1197.9	70	28.50	113.4
NW of Ireland III	21872	21494	2619.1	2584	123	29.10	119.8
Porcupine north IV	20479	20089	2322.4	2289.7	182	28.63	113.4
Porcupine south V	4765	4210	484.5	449.1	50	27.15	101.7
Sum	63737	58395	7141.0	6778.8	94	28.29	112.0

Table 2. Maturity (%) in blue whiting samples from West of The British Isles, spring 1988.

Subarea	Porcupine south V	Porcupine north IV	NW of Ireland III	Hebrides II	Shetland/ Faroes I
Date	30.3-3.4	3.-10.4	9.-13.4	13.-20.4	21.-23.4
Immature	16.0	1.7	3.2	4.6	69.0
Maturing	10.2	4.2	0.4	4.3	1.0
Running	12.1	7.4	14.0	7.3	0.3
Spent	61.6	86.6	82.3	83.8	29.6
N	900	990	969	702	365

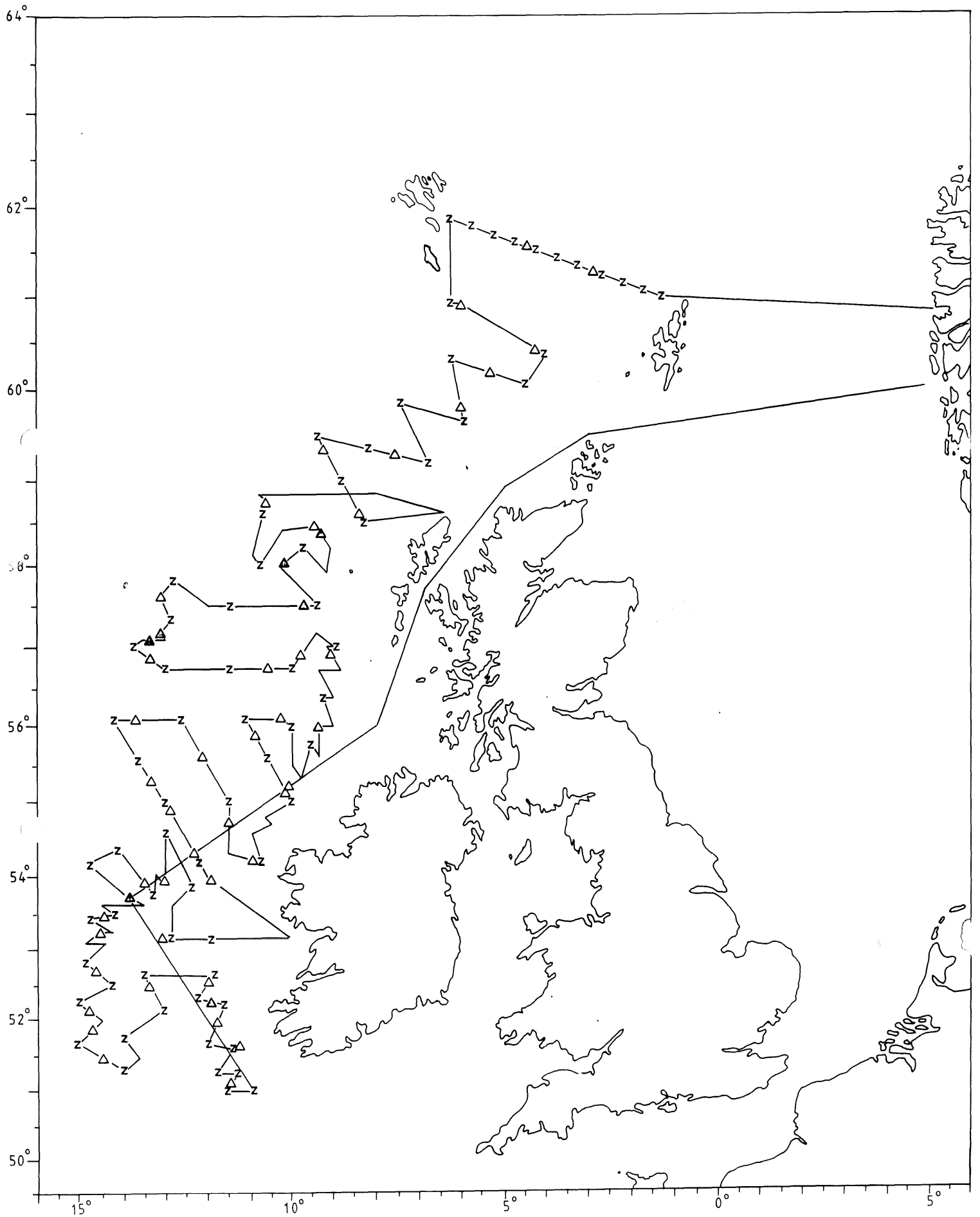


Fig.1. Cruise track and stations of R.V. "G.O.Sars" 25 March - 24 April 1988. Legend: z) CTD-stations, (triangle) pelagic trawl station.

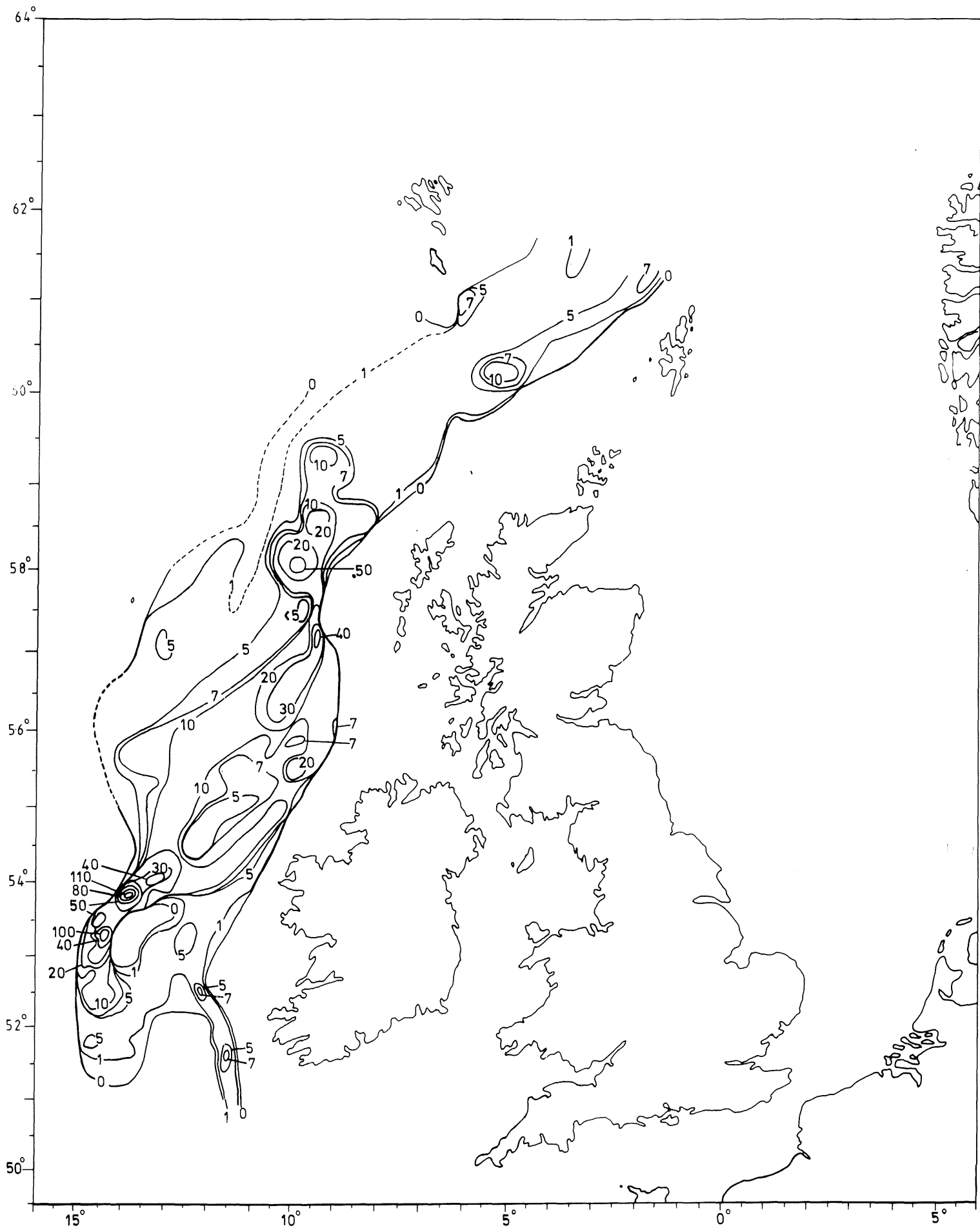


Fig.2. Distribution and densities of blue whiting observed during spring 1988. Echo intensity in $m^2/n.mile^2 \times 10^{-2}$.

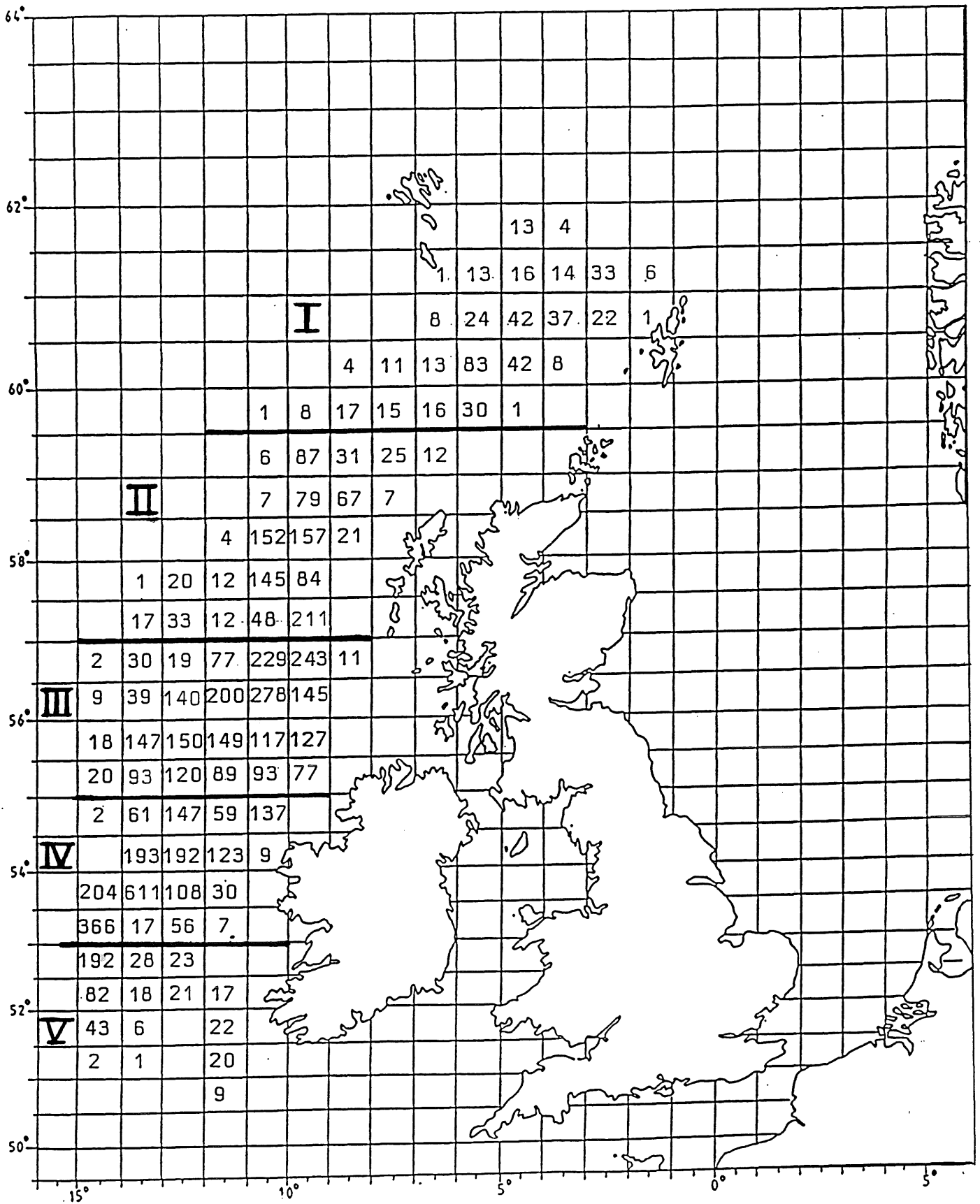


Fig.3. Biomass of blue whiting (thousand tonnes), spring 1988. I - V show the various subareas used in the calculation.

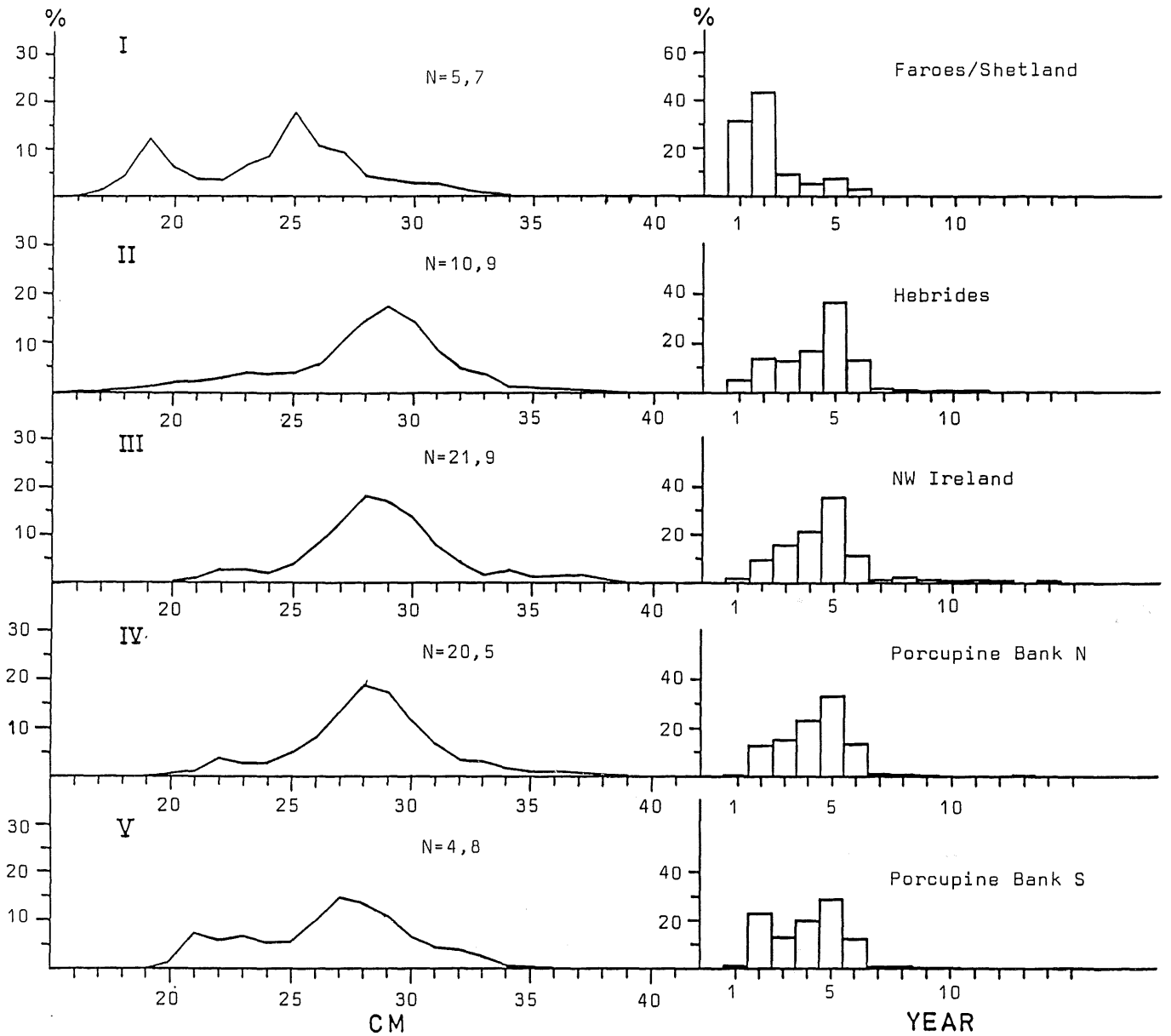


Fig. 4. Length- and age compositions of blue whiting weighted by abundance in the various subareas (Fig. 3), spring 1988. $N \times 10^{-9}$.

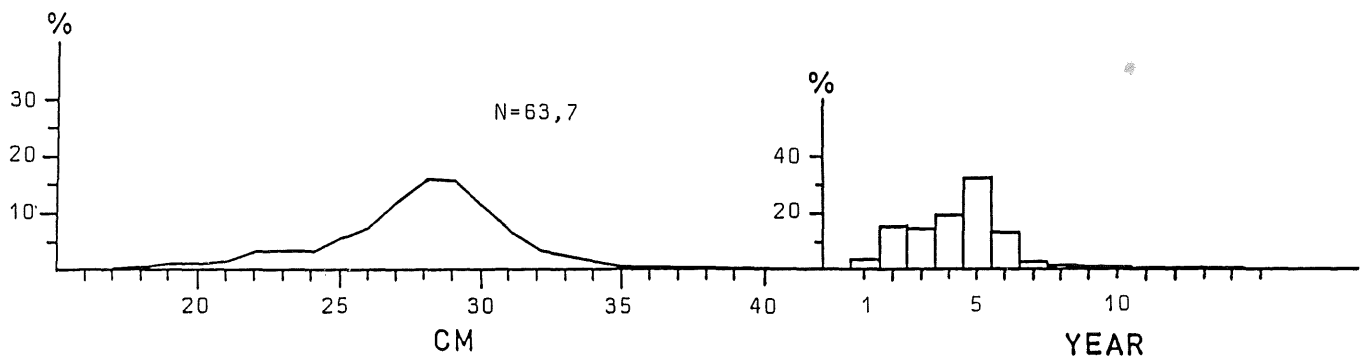


Fig. 5. Total length- and age composition of blue whiting from the shelf edge area west of The British Isles, spring 1988. $N \times 10^{-9}$.

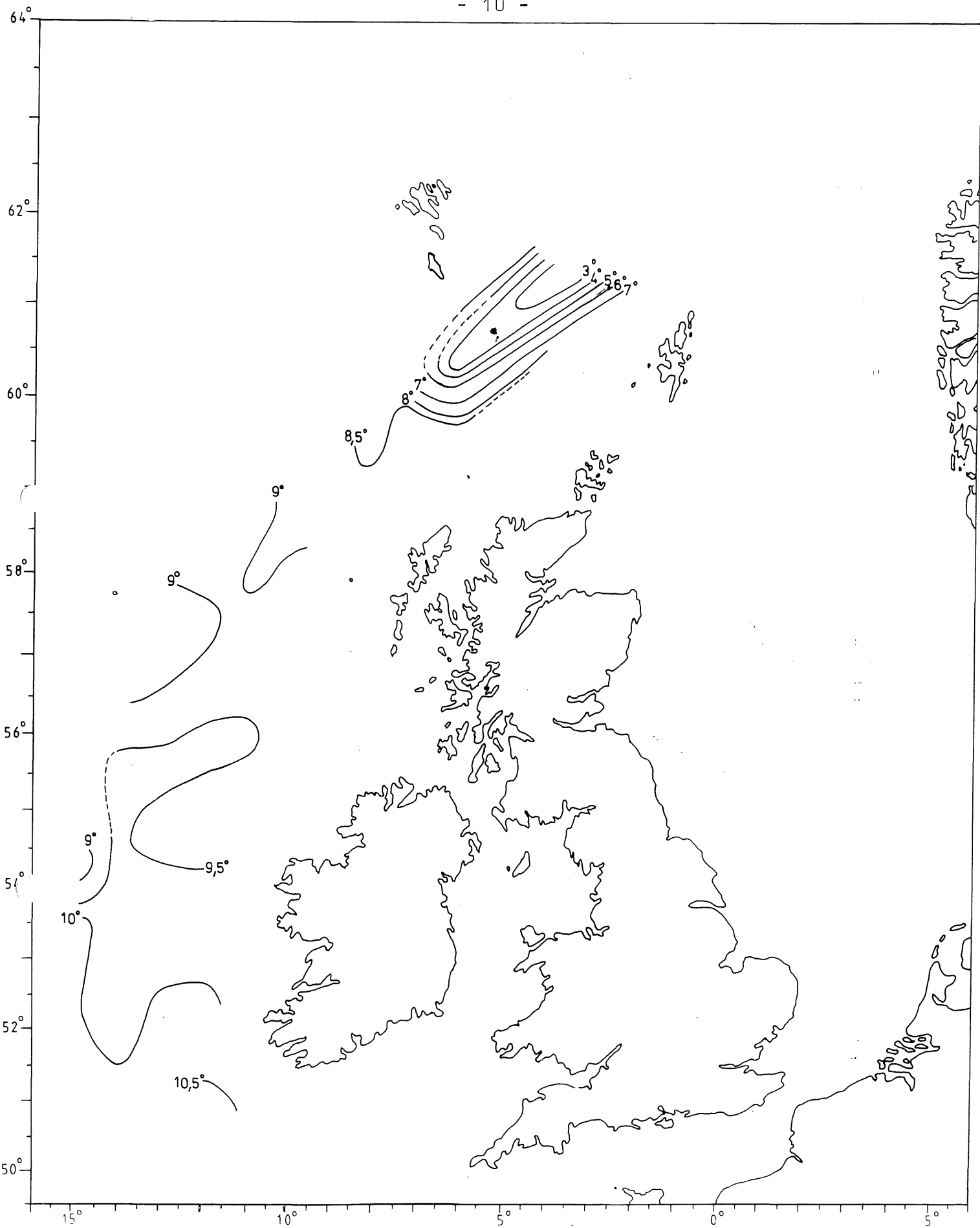


Fig. 6. Temperature, $t^{\circ} C$, at 400m depth, March/April 1988.

