



International Council for the  
Exploration of the Sea

C.M. 1995/G:42

REPORT ON THE 0-GROUP FISH SURVEY IN  
ICELAND AND EAST-GREENLAND WATERS, AUGUST 1995

by

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## 1. Abstract

This paper is a continuation of annual reports on routine investigations of hydrography and the distribution and abundance 0-group fish in Icelandic and East-Greenland waters in August-September.

Although the 1995 abundance index of cod was comparatively low for the whole series, it was similar to that of 1993 which was considerably higher than the indices of the previous 7 years. The abundance index of haddock was slightly higher than the average for the last 10 years but that of capelin was low. The abundance index of redfish was in the medium range.

## 2. Introduction

Annual surveys of the distribution and abundance of 0-group fish in the Iceland-East Greenland area have been carried out since 1970. The main aim has been to obtain a first index of the year class strength of the most important commercial species, *i.e.* cod, haddock, capelin and redfish. Methods and data handling were described by Vilhjálmsson and Friðgeirsson (1976).

In 1995 two vessels covered the survey area as follows:

Vessel	Period	Area
Bjarni Sæmundsson	8.8.-17.8.	SW-Iceland, the Irminger Sea, the East-Greenland shelf area north of 62°N. The Dohrnbank area and the shelf area and adjacent waters off NW-Iceland.
Árni Friðriksson	8.8.-30.8.	The shelf area off E-, NE-, N- and W-Iceland.

Survey routes and stations are shown in Figure 1. In Icelandic waters, the survey area was reduced and did not reach as far offshore as before. Similarly, the survey area in the East Greenland-Irminger Sea was considerably reduced, especially in the southern part. Acoustic records of 0-group fish were obtained and the density assessed by a 38 kHz Simrad EK 500 split-beam sounder/integrator system. Species composition as well as abundance was, however, primarily assessed by frequent trawling in the scattering layer for a set distance. For 0-group capelin and redfish, echo abundance was recorded and an index, based purely on echo integration, was calculated for the 0-group capelin as in previous years.

In Icelandic waters, hydrographic observations were made along standard hydrographic sections and supplemented with XBT observations. In the East-Greenland/Irminger Sea/Dohrnbank area XBT observations were made at intervals of approximately 40 n.m.

Observations of zooplankton and phytoplankton were carried out in Icelandic waters during the cruise, as well as a scouting for and the recording of numbers and species of whales. The results of these studies are not presented in this paper.

During the survey of the Irminger Sea, the distribution and density of the deep scattering layers was observed and recorded.

Greenlandic authorities kindly granted permission for carrying out survey work in East Greenland waters.

Scientific staff were as follows:

R/V Árni Friðriksson: Sveinn Sveinbjörnsson, Sólveig Ólafsdóttir, Þorsteinn Sigurðsson, Björn Sigurðsson Gísli Ólafsson, Agnes Eydal, Hreiðar Valtýsson, Tómas Gíslason, Berglind Ólafsdóttir, Reynir Njálsson, Hörður Andrésson, Kristinn Guðmundsson, Hreggviður Hreggviðsson and Birgir Stefánsson.

R/V Bjarni Sæmundsson: Jutta V. Magnússon, Jakob Magnússon, Jón Jónsson, Þórður Viðarsson, Guðmundur Sv. Jónsson, Ásgeir Gunnarsson, Sigurður Gunnarsson and Hrefna Einarsdóttir.

Svend-Aage Malmberg compiled the hydrographic data and wrote the following prognosis.

### 3. Hydrography

In August 1995 the main features of the hydrographic conditions ( Figs. 2-4) in the Irminger Sea and Icelandic waters were as follows:

Drift ice was not observed but relatively many icebergs were present in East-Greenland waters. The East-Greenland Current was not very pronounced in the study area and the flow of the Irminger Current, west towards Greenland, is well illustrated by the isotherms. In the Central Irminger Sea and to the west and south of Iceland, temperatures were slightly lower than in 1994, *i.e.* around normal, with relatively strong warming up of the surface layers.

In August 1995, the hydrographic conditions of North Icelandic waters had improved since last winter and spring, when Arctic water dominated to an unusual extent. Thus, there was a moderate saline and warm water inflow to the North Icelandic area, below a relatively low saline surface, which had in August reached as far as east of Langanes. These conditions may be compared to those of 1983. Comparing the hydrographic conditions of North Icelandic waters in mid-June to mid-August they correspond to an average flow of the warm water of 4 n.m. per 24 hours, or around 8 cm/sec which corresponds to a normal flow rate.

In August 1995, temperatures were still very low East of Iceland and the influence of this water seemed to be fairly strong in the coastal current off the southeast coast.

It is concluded that in general, temperatures were moderate in the Irminger Sea in the summer of 1995 and that in North Icelandic waters an improvement had taken place since spring, with a moderate inflow of warm water reaching as far as Langanes. East of Iceland the waters were, however, still very cold.

### 4. Distribution and abundance of 0-group fish

In 1994 some exploratory trawl stations were worked off the S- and SE- coasts of Iceland for the first time since 1987. But before that, this area was regularly included in the 0-group surveys. In 1995 some trawling was again done in that area and the catches from these hauls are now included in the calculations of the abundance indices.

In the Icelandic area, the greatest abundance of 0-group cod was recorded off N-Iceland with the highest densities in inshore areas. In other areas the distribution differed from normal years in that a relatively high proportion of the 0-group cod was recorded off E-Iceland while the proportion, recorded off W-Iceland, was relatively low. No drift of 0-group cod was detected west across the Irminger Sea. The distribution of the 0-group haddock was characterized by an unusually low proportion of the abundance being recorded off N-Iceland which is similar to the situation of 1994. The distribution of the 0-group capelin was extensive and similar to that in normal years.

In comparative terms the 0-group index of cod was rather low, and that of haddock was considerably lower than the average of years when the areas off S- and

SE-Iceland were included in the survey but somewhat higher than the average for the last 10 years. The abundance index of capelin was low, but that of 0-group redfish in the medium range.

#### 4.1. Cod

The 1995 distribution and relative abundance of 0-group cod is shown in Figure 5 and the total abundance index as well as the contribution by the various subareas in Table 1.

Table 1. Abundance indices of 0-group cod.

East Greenland Dohrnbank	SE	SW	Iceland W	N	E	Total
0	1	1	8	127	26	163

As usual most of the 0-group cod were recorded off North-Iceland although a considerable proportion was found off E-Iceland. The total abundance index ranks among the lower in the series but is, nevertheless, the highest since 1986. The size of the distribution area of the 0-group cod is normal, but their distribution was more easterly than in most years. No drift of 0-group cod west across the Irminger Sea was observed. The condition of the 1995 cod brood, as judged by the length distribution, was poor and the mean length was the second lowest on record. (Fig. 6).

#### 4.2. Haddock

The distribution and relative abundance of 0-group haddock is shown in Figure 7 and abundance indices by subareas and the total index are given in Table 2.

Table 2. Abundance indices of 0-group haddock.

East Greenland Dohrn Bank	SE	SW	Iceland W	N	E	Total
0	15	3	1	3	0	22

Almost all of the 0-group haddock were recorded off NW- and N-Iceland. The abundance index is slightly higher than the average for the last 10 years. The overall average size of the 0-group haddock (Fig. 6) was somewhat above the long term average.

#### 4.3. Capelin

The distribution of 0-group capelin is shown in Figure 8. The highest numbers were recorded off W-Iceland, but on the whole the 0-group capelin were fairly widely and evenly distributed in the W-, N-, and E-Icelandic region. Very few 0-group capelin were recorded in the East-Greenland/Dohrn Bank area.

The abundance indices of the different areas and the total index are given in Table 3.

Table 3. Abundance indices of 0-group capelin

East Greenland Dohrn Bank	SE	SW	Iceland W	N	E	Total
+	+	1	5	10	8	24

The 1995 0-group capelin abundance index is among the lowest in the series and the mean length ranks among the lowest on record (Fig. 9).

The acoustic abundance index of 0-group capelin (Reynisson and Vilhjálmsón, 1983) was 23, which is well below the long term average.

The acoustic abundance indices in the period 1981-1995 are given, together with the corresponding CPUE indices, in Table 4.

Table 4. Abundance indices of 0-group capelin in 1981-1995.

Year	Acoustic index ( $m^2 * 10^{-5}$ )	CPUE index
1981	15.2	29
1982	2.8	13
1983	7.8	22
1984	3.5	28
1985	5.6	33
1986	37.1	37
1987	21.2	14
1988	91.8	52
1989	33.3	40
1990	24.7	21
1991	40.2	54
1992	56.8	35
1993	44.9	51
1994	50.5	94
1995	23.0	24

#### 4.4. Redfish

As mentioned in an earlier section, the survey of the Irminger Sea was still further restricted than that of 1994. Thus, the 1995 survey only covered the northernmost part of the main distribution area of 0-group redfish, *i.e.* from 62°N to 66°N, between approximately 25°W to 40°W (Fig. 10). Consequently, no information on the distribution and abundance of 0-group redfish of the southern area, *i.e.* sub-areas Central Irminger Sea South and East Greenland South is available. In those areas, 0-group deep-sea redfish and oceanic redfish have been predominant.

As usual, 0-group redfish were widely distributed in the Irminger Sea. However, they were more abundant in 1995 than in the preceding years. Three zones with an abundance of more than 100 000 fish per n.m. trawled were observed, one in the Central Irminger Sea and two along the East-Greenland shelf. High density zones of this category have not been observed since 1981. Areas with more than 10 000 fish per n.m. trawled were also more extensive in 1995 than in most of the later years.

In the Icelandic area, 0-group redfish were almost exclusively observed in subareas W- and SW-Iceland.

The 1995 abundance index for the Irminger Sea/East Greenland shelf area was  $13.9 \times 10^6$  fish per n.m<sup>2</sup>. This is more than twice the index of 1994 ( $5.8 \times 10^6$  fish per n.m<sup>2</sup>) and well above the average for the past 20 years. Thus, the 1995 year class of redfish is classified as relatively good.

The overall length of 0-group redfish was 43.6 mm. However, the variations of the average length within sub-areas have been reported throughout the years and were also observed in 1995 (Fig. 11). In the sub-area Central Irminger Sea North, the average length was highest (47.3 mm), but lowest in sub-area W-Iceland (40.8 mm). However, this difference of about 7 mm is not as pronounced as in 1994 (16.5 mm), probably because the information of the southern areas is lacking. Compared to 1994, the 0-group redfish were smaller in the sub-areas Dohrn Bank and W-Iceland but larger in the sub-areas Central Irminger Sea North and SW-Iceland.

In 1995, 73 % of a total of 4556 0-group redfish, identified to species (Magnússon, 1981), were *Sebastes marinus*. The relative abundance of *S. marinus* was highest in the sub-areas East Greenland North and Central Irminger Sea North (64 %). A few 0-group *S. viviparus* were observed during the survey.

In 1995, the overall length of *S. mentella* was 40.2 mm which is about 5 mm higher than in 1994 (35.2 mm). However, the overall length of *S. marinus* was 45.7 mm and is only slightly higher than in 1994 (44.9 mm). One half (50%) of the stations with 0-group redfish catches were taken between 2000 and 0759 hours. About one fourth of the total catch by number of 0-group redfish per n.m. trawled was obtained during that time interval.

#### 4.5. Other species

During the 0-group survey 1995, 23 species were recorded besides the four main species discussed above.

The fry, juveniles and adults of **sandeel** species (*Ammodytidae* spp.) were strikingly numerous in many of the 0-group catches, both in the Irminger Sea/East Greenland area and in the Icelandic region (Fig. 12). They were recorded at a total of 105 stations. The highest catch, *i.e.* 14 412 fish per n.m. trawled, was obtained at one station in the Dohrnbank region. The length range in the Icelandic area was 30-154 mm (av. length 76.8 mm). In the Irminger Sea/East Greenland region the length range was 40 - 131 mm, av. length 64.9 mm.

0-group **Greenland halibut** (*Reinhardtius hippoglossoides*) were not as abundant as in 1994. They were recorded at 4 stations in the East Greenland/Irminger Sea area and at one station west of Iceland. The length range was 62-76 mm, av. length 68.7 mm.

0-group **long rough dab** (*Hippoglossoides platessoides*) were more frequently observed in the Icelandic region than in 1994. They were recorded almost exclusively off the E and N coasts of Iceland, where they occurred at 35 stations in a length range of 12-49 mm (av. length 26.7 mm). Fewer were observed in the East Greenland shelf region, at 5 stations, in a length range of 26 -39 mm (av. length 33.4 mm).

Juvenile **blue whiting** (*Micromesistius poutassou*) were recorded at 5 stations SE, E and N of Iceland. In 1995, very few 0-group **blue ling** (*Molva dypterygia*) were recorded in the Central Irminger Sea and at one station off-SW Iceland. The length range was 66-86 mm (av. length 76.0 mm). 0-group **tusk** (*Brosme brosme*), which have not been recorded since 1990, were observed in the East-Greenland Shelf area, in the Dohrnbank region and off SW-Iceland. The length range was 40-70 mm, av. length 42.2 mm. 0-group **whiting** (*Merlangius merlangus*) were recorded at 8 stations in the Icelandic area, mainly off the W- and SW-coasts. The length range was 55-97 mm, av. length 75.3 mm. 0-group **greater fork beard** (*Phycis blennoides*), 21 mm in length, and **five-bearded rockling** (*Ciliata mustela*) were recorded in the Central Irminger Sea region and off SW-Iceland, but at fewer stations and in much less quantities than in 1994. The length range was 36-52 mm (av. 44.2 mm)

*Myctophidae* spp. were not as frequently recorded in the 0-group catches as in the preceding year. They were mainly observed in the Irminger Sea but also in the Icelandic region. The length range of the lanternfish species *Benthoosema glaciale*

was 21-57 mm (standard length), av. length 34.8. The larger *Myctophum punctatum* were registered in a length range of 56-103 mm (av. length 78.4 mm).

0-group **catfish** (*Anarhichas lupus*) were less abundant in 1995 than in the preceding year. They were mainly observed off the E- and N-coasts of Iceland in a length range of 21-75 mm (av. length 50.3 mm). Some very few but larger 0-group catfish were recorded in the East Greenland Shelf region, av. length 74.5 mm. A few 0-group **jelly cat** (*Anarhichas denticulatus*) with an av. length 67.5 mm and **spotted catfish** (*Anarhichas minor*, av. length 68.00 mm) were observed in the Irminger Sea/East Greenland Shelf region.

Young stages and adults of **lumpsucker** (*Cyclopterus lumpus*) were abundant in the Icelandic region but very few were observed in the Irminger Sea/East Greenland area. Young stages were observed at 36 stations, mainly off the N and W coasts of Iceland, in a length range of 24-105 mm (av. length 64.9 mm). The av. length of lumpsucker in the Irminger Sea/East Greenland region was 97.0 mm. Adult lumpsucker were only recorded in the Icelandic region, mainly off the north coast. Their length range was 17-32 cm (av. length 23.4 cm).

Off the N and E coasts of Iceland, 0-group **Atlantic sea poacher** (*Leptagonus decagonus*) were recorded at 22 stations in a length range of 24 mm, av. length 34.2 mm. Furthermore, juvenile **snake blenny** (*Leptoclinus maculatus*) were entirely recorded in the Icelandic area, mainly off the E- and N-coasts, at 21 stations with a length range of 50-101 mm (av. length 61.4 mm). A few 0-group **greater silver smelt** (*Argentina silus*) were recorded at one station west of Iceland (av. length 94.8 mm). A few **moustache sculpin** (*Triglops murrayi*) were taken off the E-coast of Iceland, av. length 27.0 mm, and one **butterfish** (*Pholis gunnellus*) off the N coast (av. length 31.0 mm).

Finally, it should be mentioned that a **daggertooth** (*Anotopterus pharao*), 86 cm in size, and **silver hatchetfish** (*Argyropelecus hemigymnus*), 37 mm in size, were caught in 0-group hauls, both of them in the Central Irminger Sea.

## 5. References

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- Vilhjálmsón, H. and E. Friðgeirsson, 1976. A review of O-group surveys in the Iceland-East Greenland area in the years 1970-1975. ICES Coop.Res.Rep.54

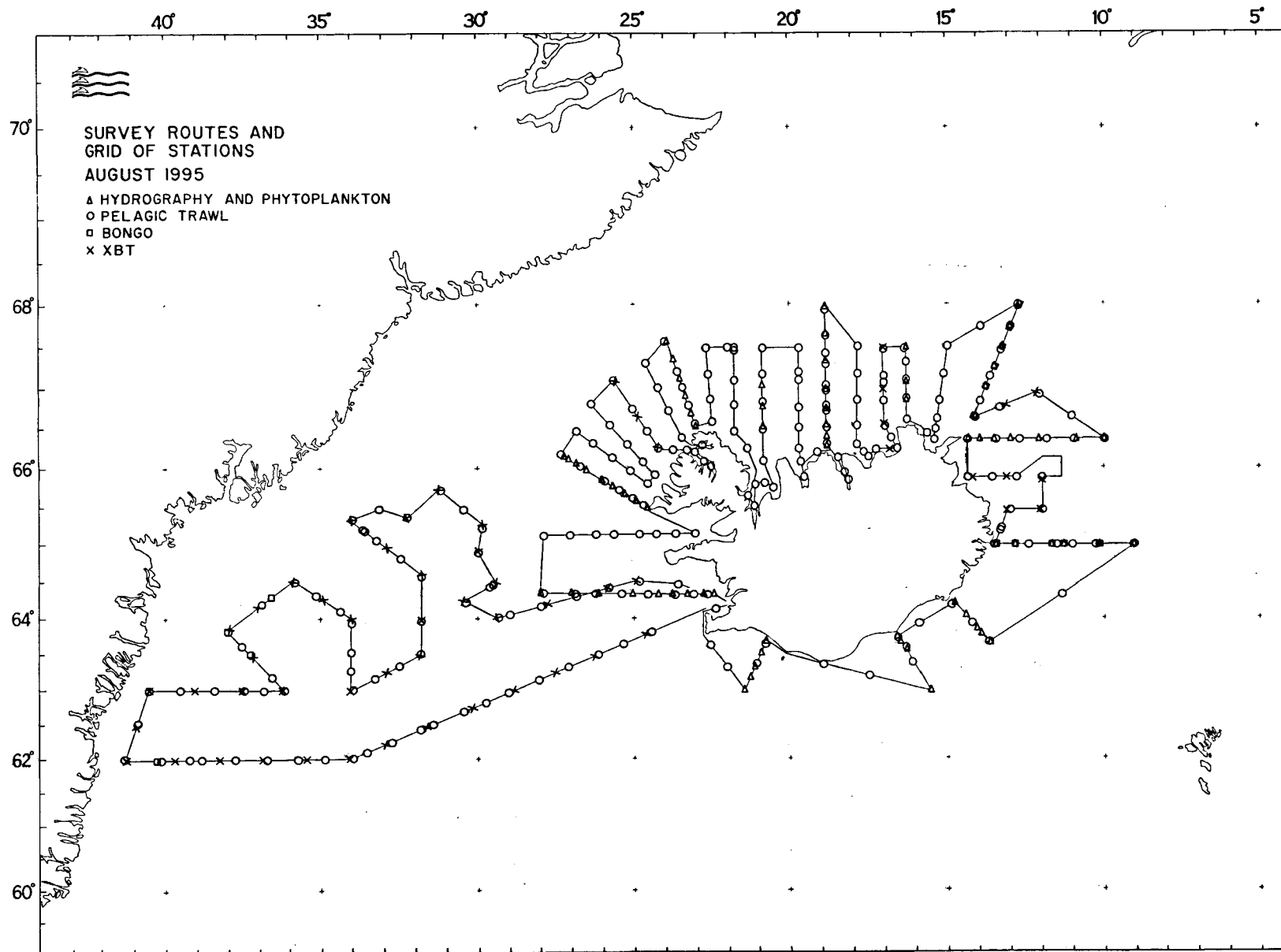


Figure 1. Survey routes and grid of stations, August 1995



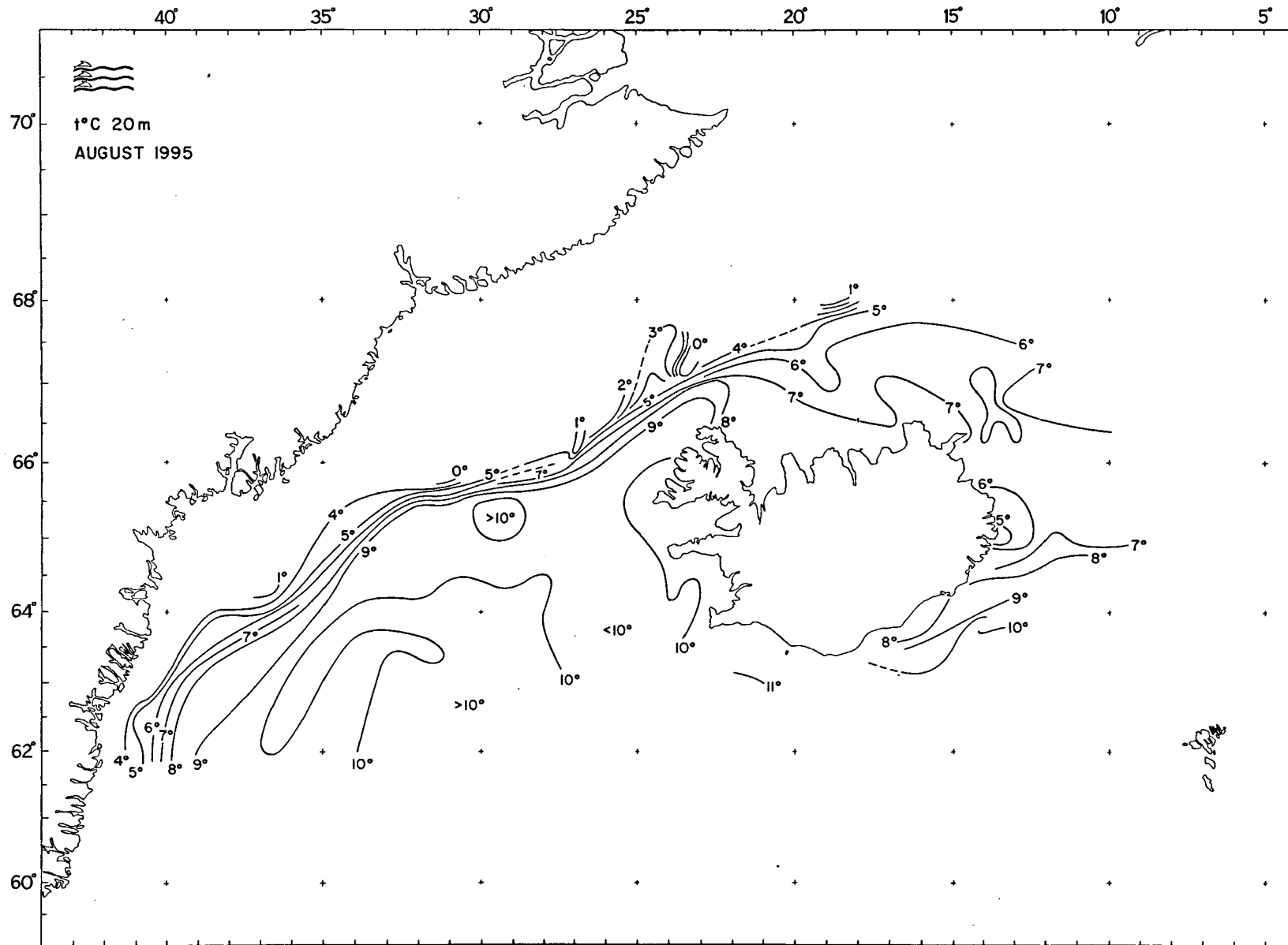


Figure 2. Temperature at 20 m depth, August 1995

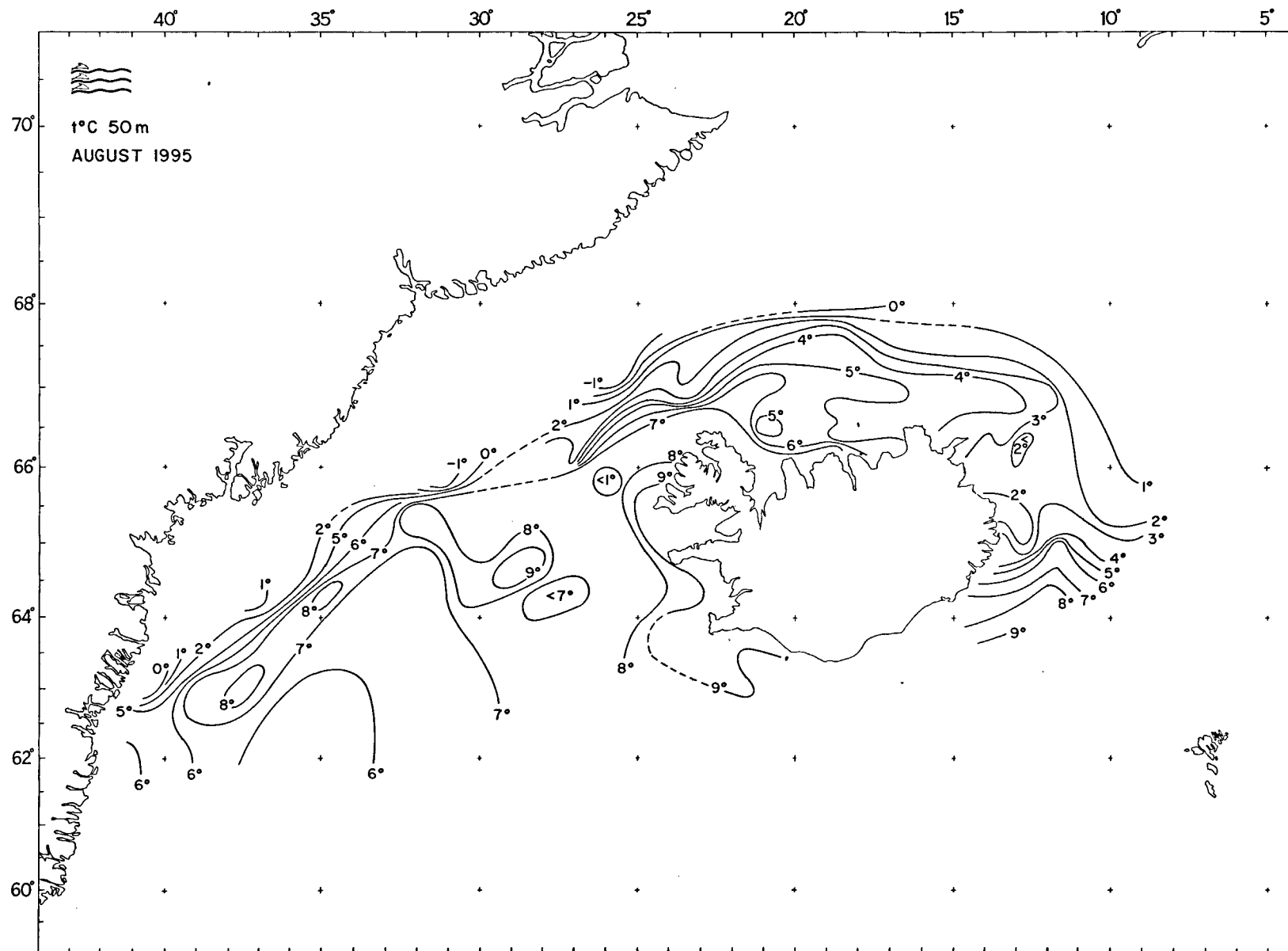


Figure 3. Temperature at 50 m depth, August 1995.

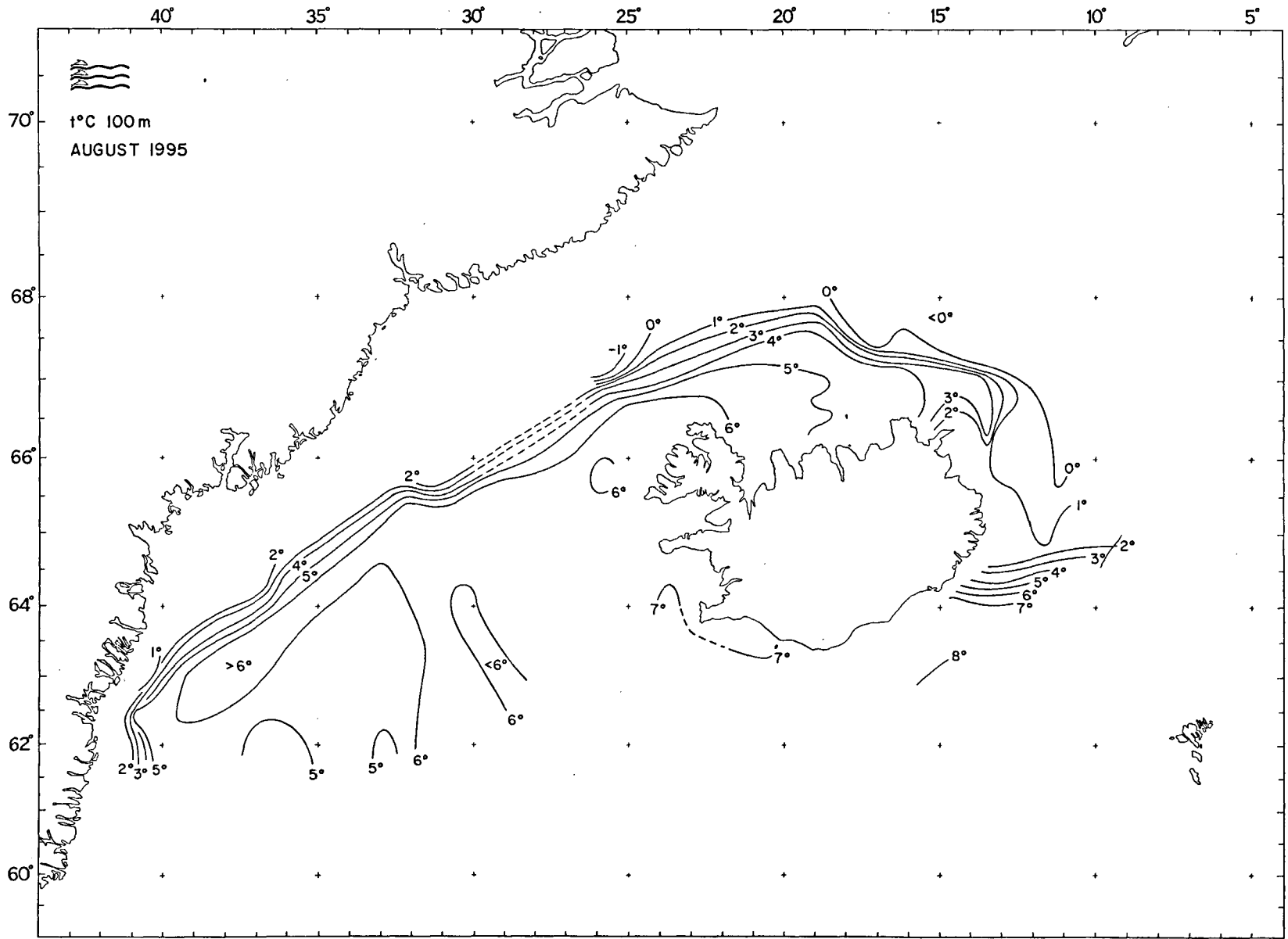


Figure 4. Temperature at 100 m depth, August 1995.

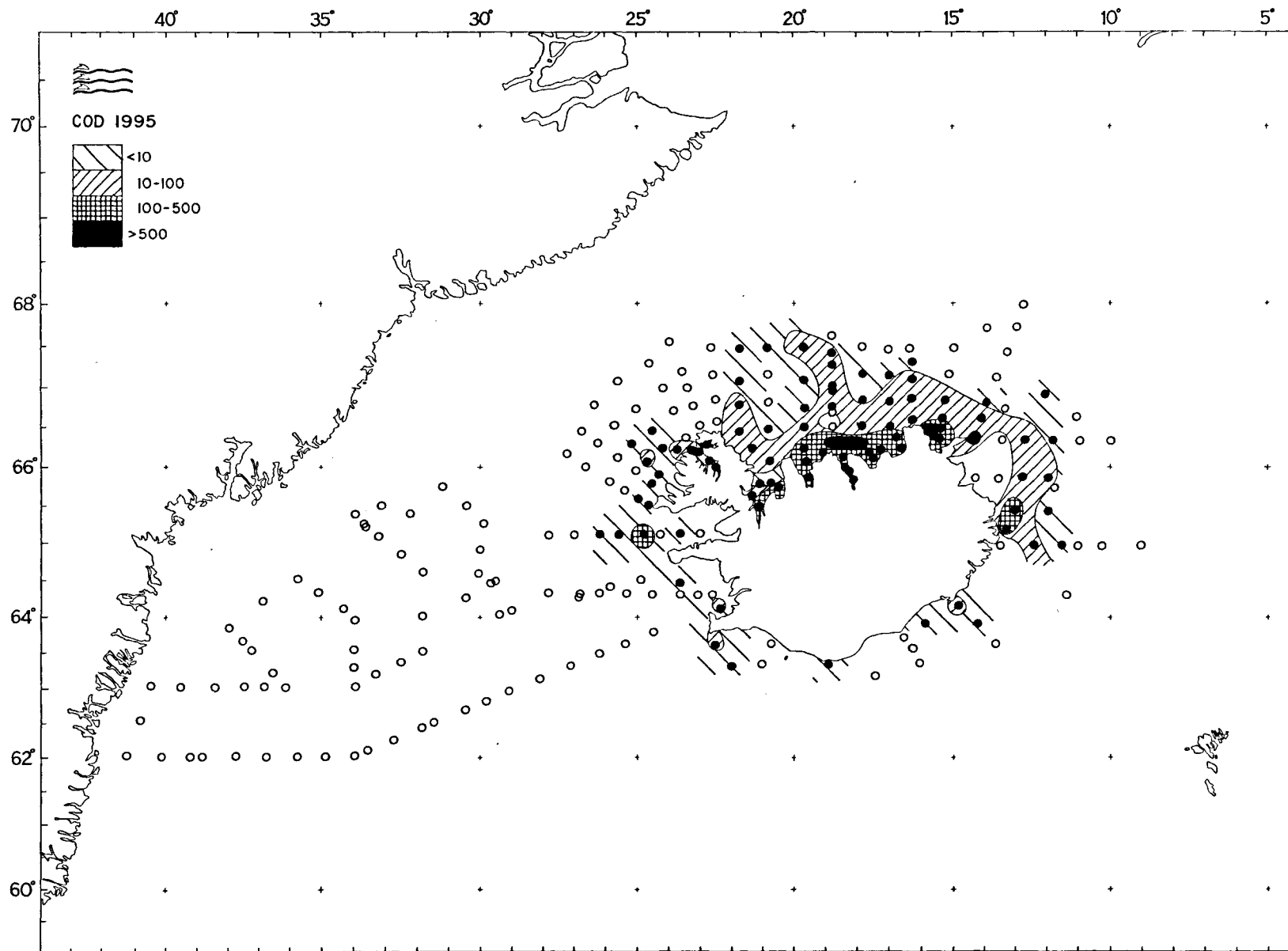


Figure 5. Distribution and density of O-group cod (n / 1 n.m.), August 1995

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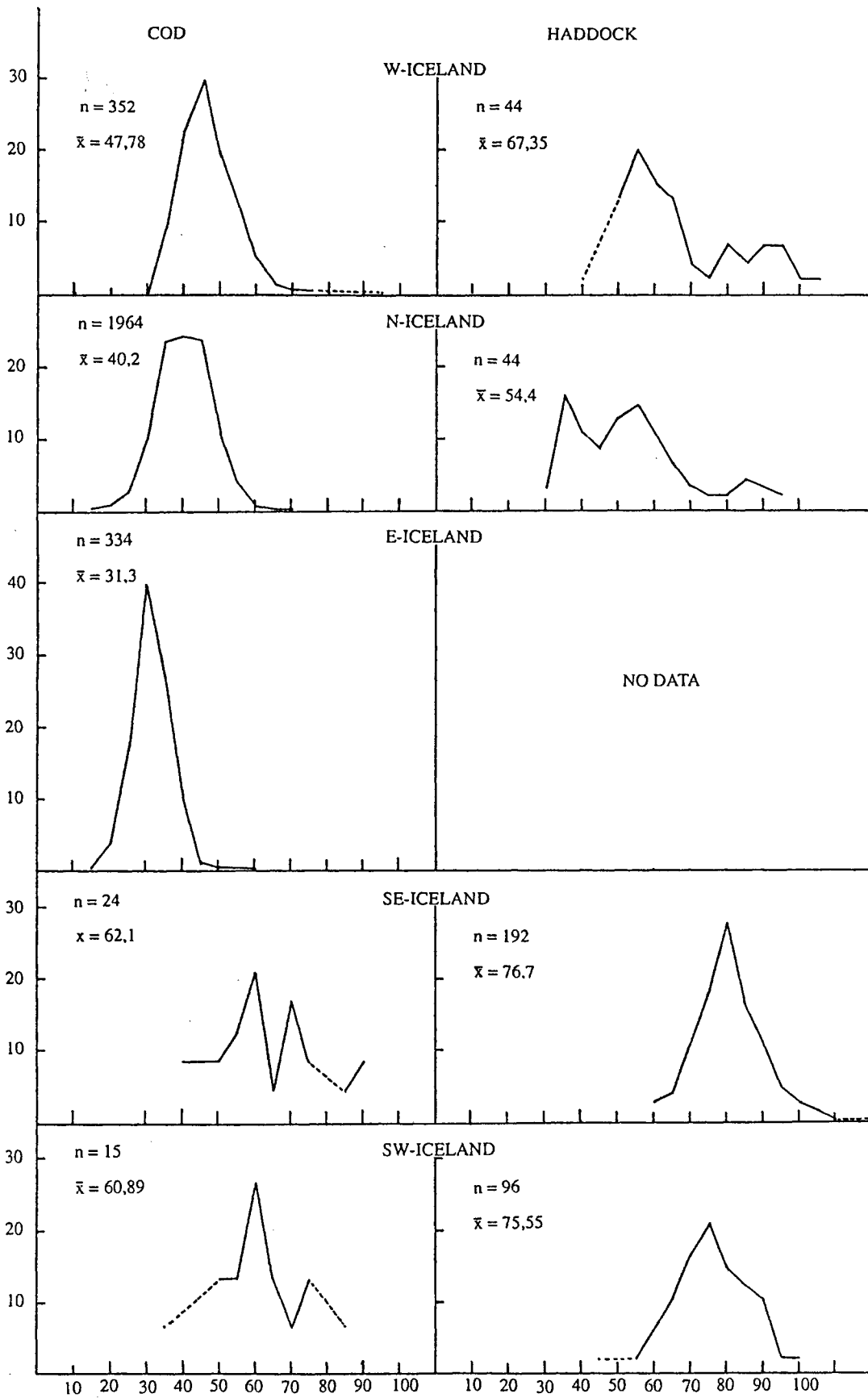


Figure 6. Length distribution of cod and haddock, August 1995 .

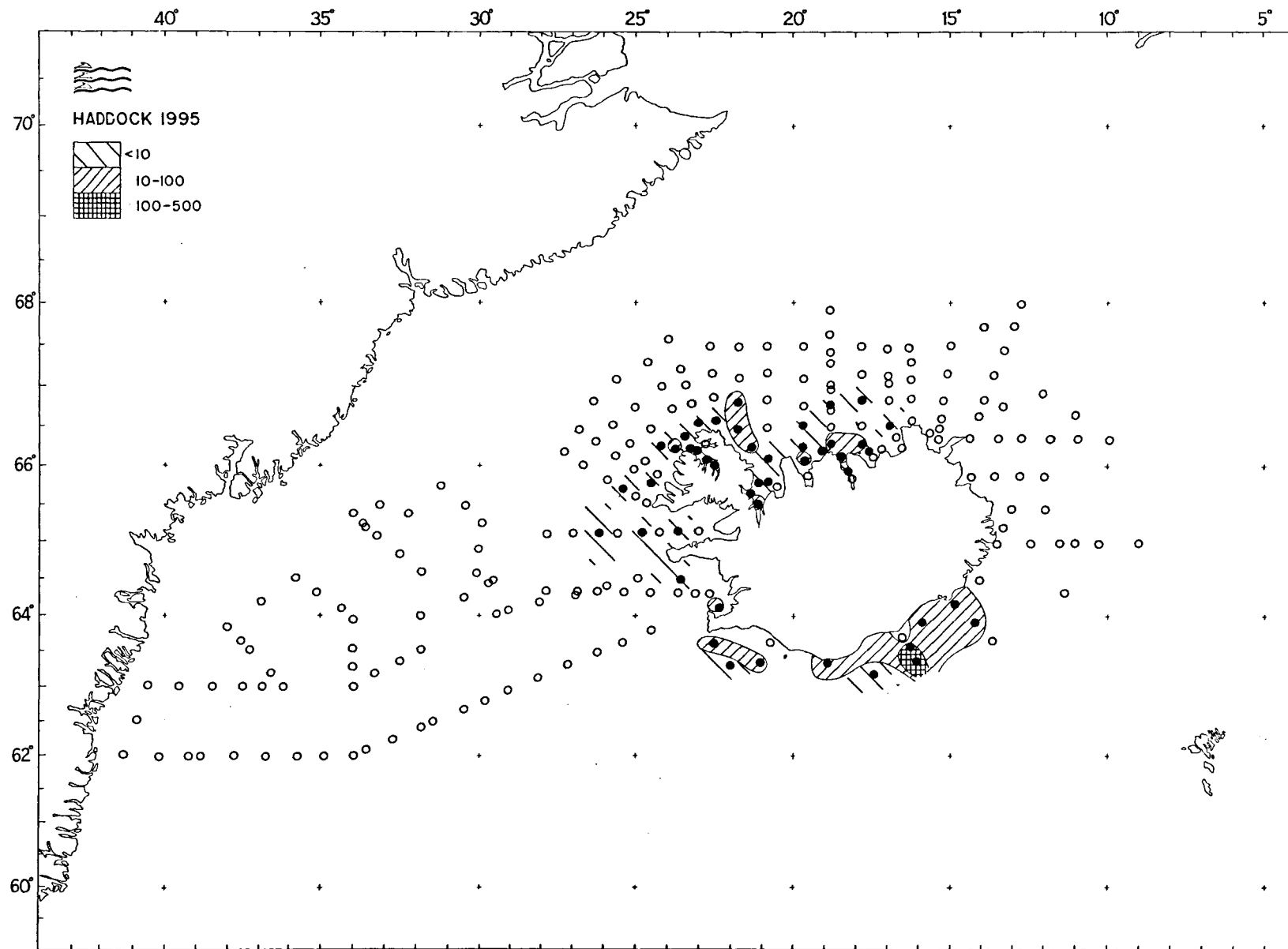


Figure 7. Distribution and density of O-group haddock (n / 1 n.m.), August 1995

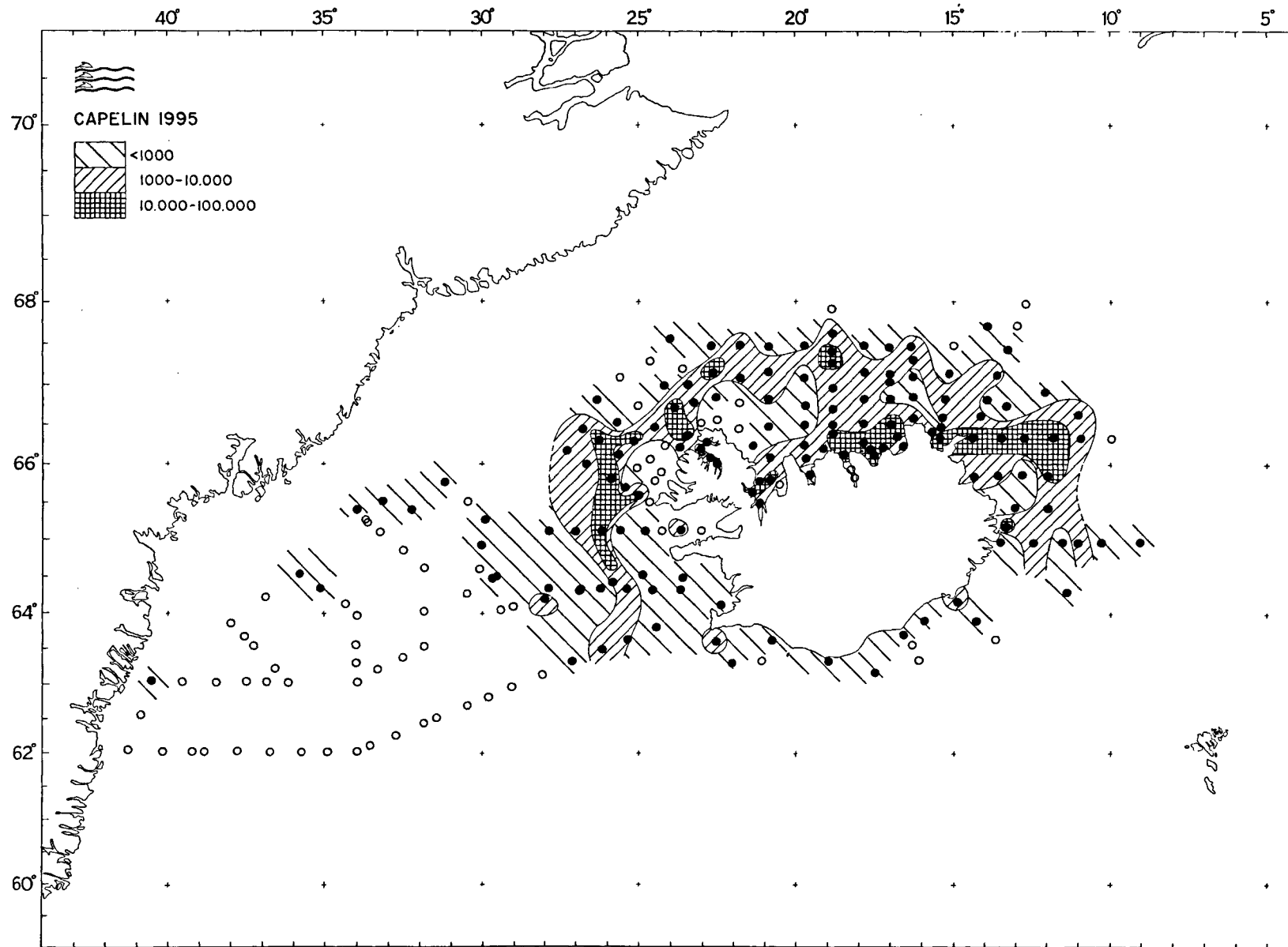


Figure 8. Distribution and density of O-group capelin (n / 1 n.m.), August 1995

CAPELIN AUGUST 1995

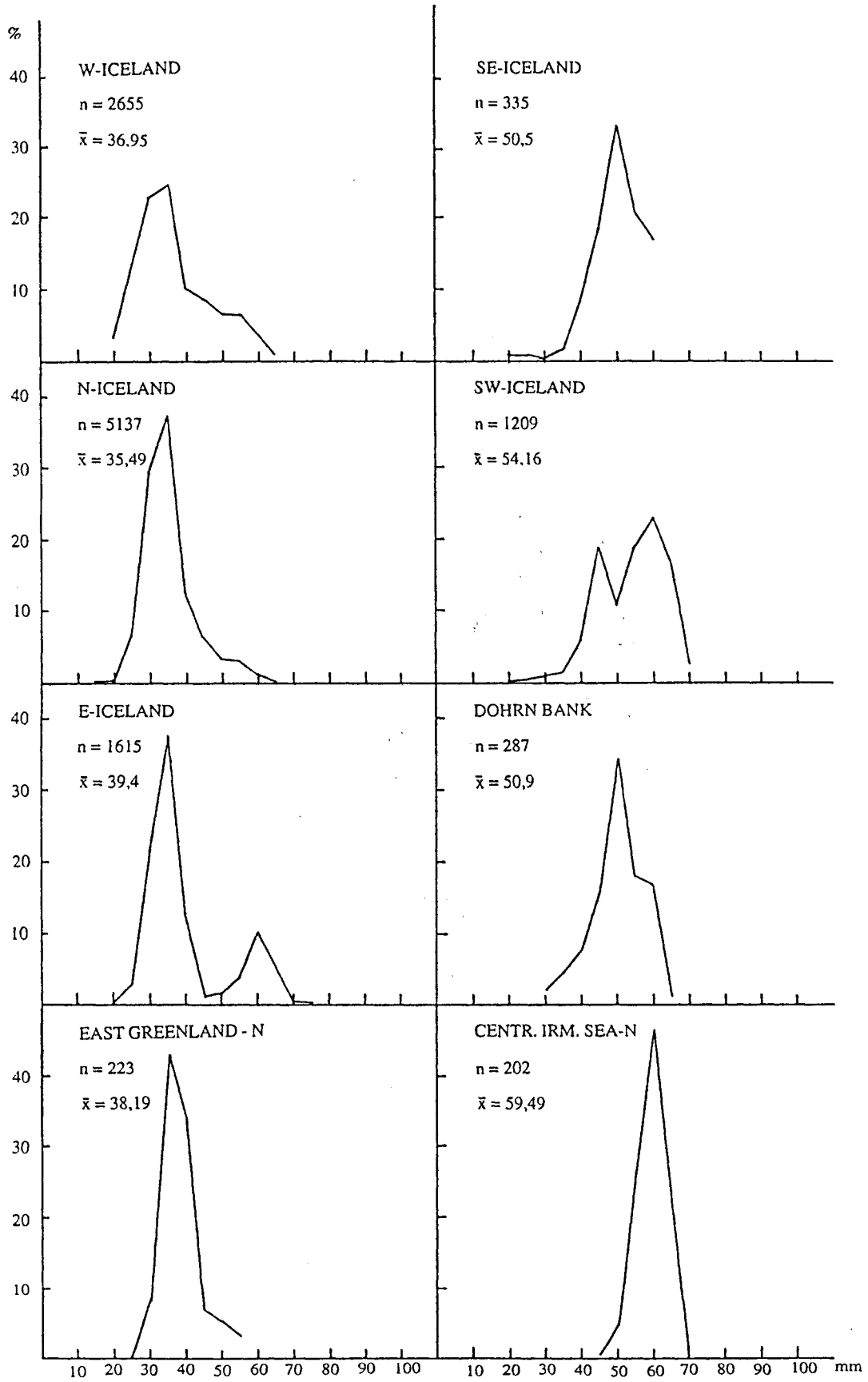


Figure 9. Length distribution of O-group capelin, August 1995.



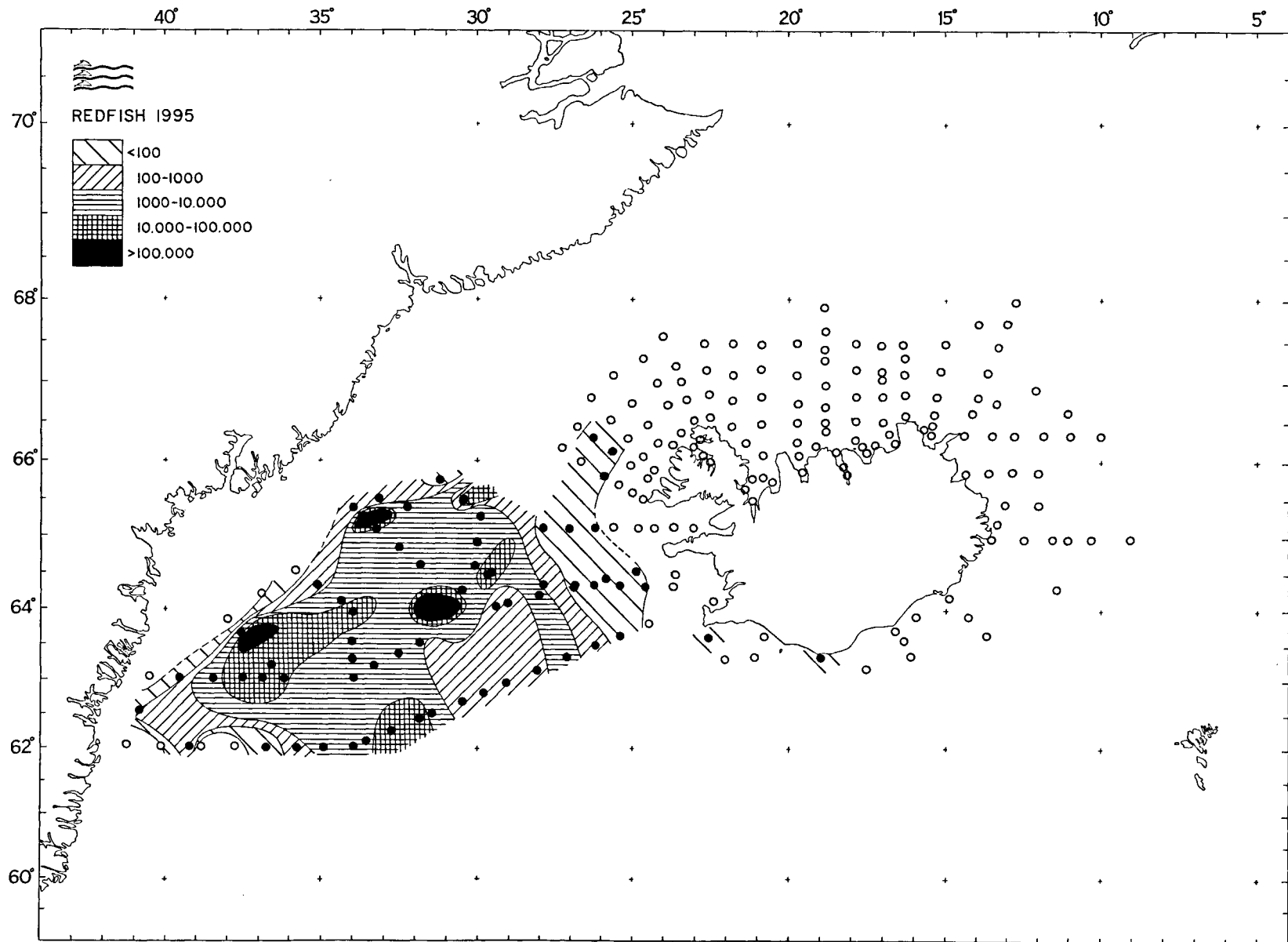


Figure 10. Distribution and density of O-group redfish (n / 1 n.m.), August 1995.

O-GROUP REDFISH AUGUST 1995

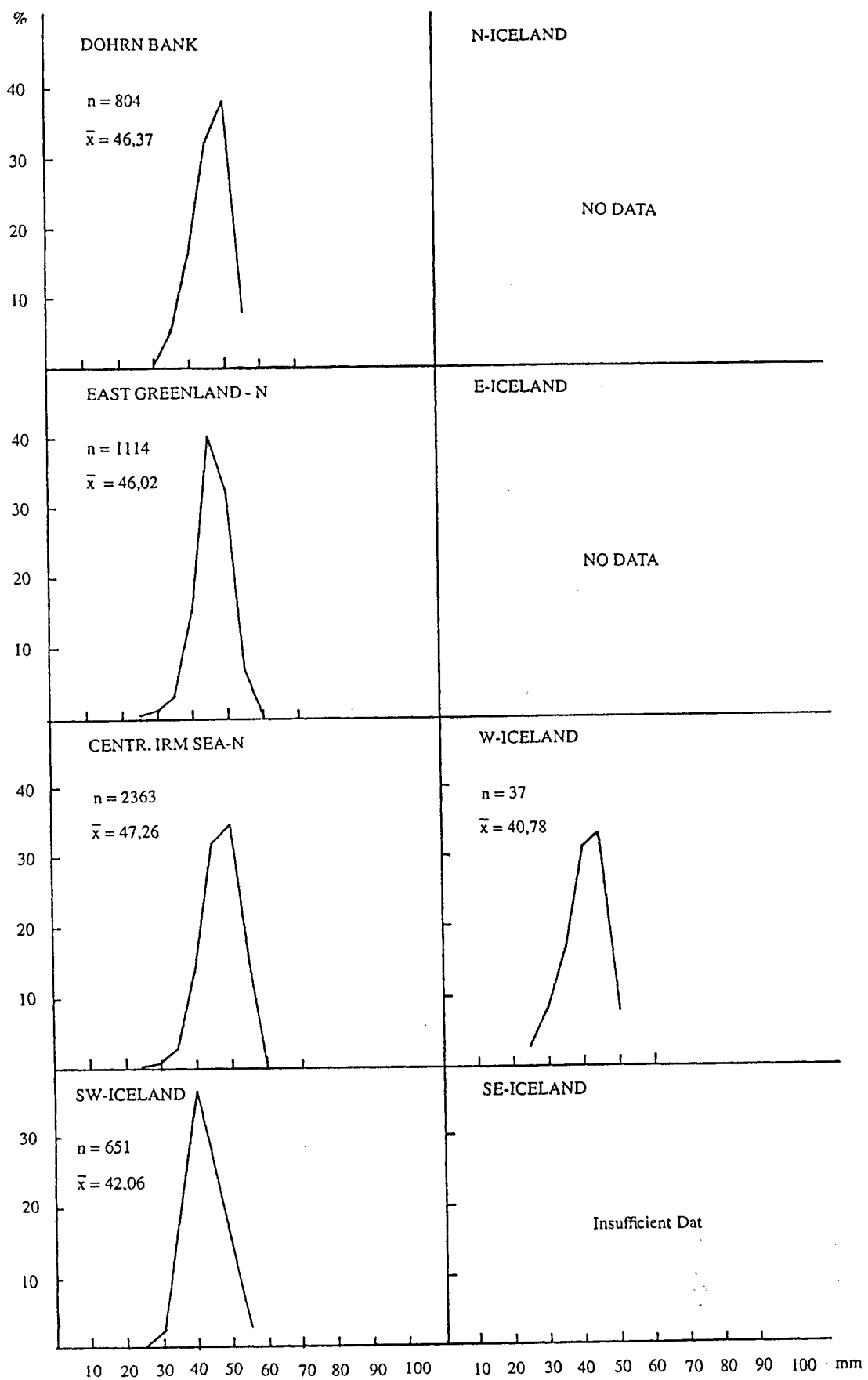


Figure 11. Length distribution of O-group redfish, August 1995.

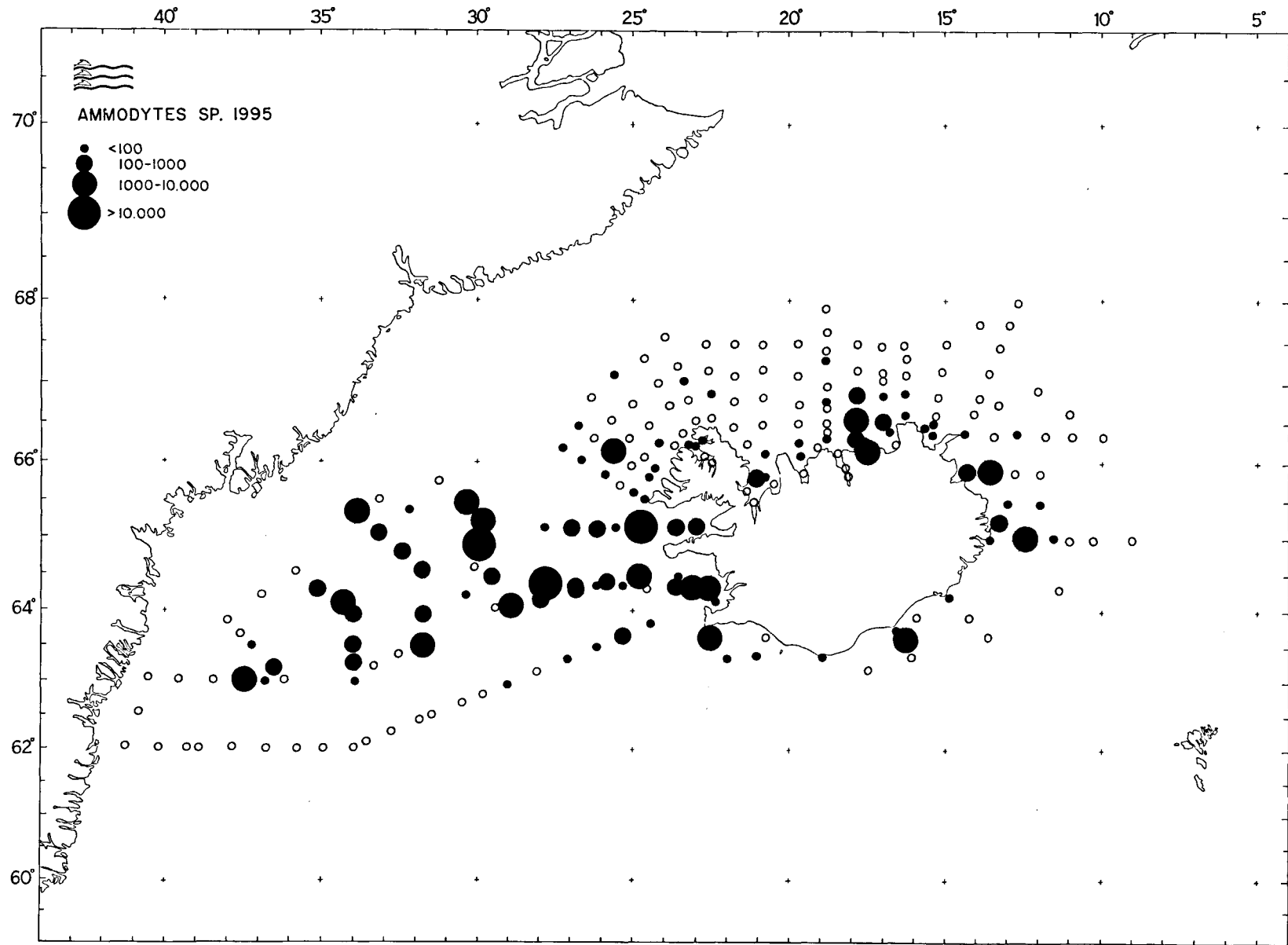


Figure 12. Distribution of *Ammodytes* spp., August 1995.