

This paper not to be cited without prior reference to the Council
International Council for the Exploration of the Sea

C.M. 1980/H:63

ACOUSTIC ABUNDANCE ESTIMATES OF THE ICELANDIC STOCK OF CAPELIN,
OCTOBER 1978 - JANUARY 1980.

by

Hjálmar Vilhjálmsson and Páll Reynisson
Marine Research Institute
Reykjavík, Iceland.

and

Johannes Hamre and Ingolf Røttingen
Institute of Marine Research
Bergen, Norway.

1. Abstract.

During the period October 1978 - January 1980 several estimates of the size and yearclass composition of the Icelandic capelin stock were obtained by the acoustic method. Surveying was carried out in October 1978, February, July-August, late September and October 1979 and in January in 1980. No estimates are presented for 0-group capelin since the surveys did not cover all its distribution and it has been shown that, compared to older yearclasses, it is underrepresented in the samples. Similar problems were encountered with I-group capelin, but to a lesser degree. Seasonal variations in stock size estimates are described and discussed. As yet there is lack of comparative data from the summer-early autumn period. The various estimates obtained in October and January-February, are consistent and have been used for management purposes.

2. Introduction

The bulk of the Icelandic capelin stock spawns, mainly as 3 year old fish, in March and the first half of April. It lasts from 3 to 6 weeks and is usually finished sometime during the first half of April. The main spawning area, extends from SE-Iceland along the S-coast to the Snæfellsnes peninsula or even Látrabjarg in the west.

Some spawning also takes place off the eastern N-coast of Iceland as well as off the western N-coast and the NW-peninsula. This is a later spawning that may last throughout April and May into early June.

After hatching most of the larvae and postlarvae drift with the current to the W and N of Iceland. In some years considerable proportion may also drift across towards E-Greenland. The larvae hatching at SE-Iceland probably drift northwards along the E-coast. The feeding area of the 0-group capelin is, therefore, very wide and sometimes even oceanic.

In early winter, 0-group capelin migrate towards the shore and during their first winter are most frequently encountered in coastal waters off the N-coast of Iceland.

In summer the 2 and 3 ringers are usually mixed on the feeding grounds in deep waters between Iceland, Greenland and Jan Mayen. These yearclasses constitute the fishable stock. The 1 ringers together with the smaller 2 ringers are, on the other hand, more often encountered in the shelf areas off N- and NW-Iceland and E-Greenland.

Towards autumn the capelin aggregate at the cold-warm water boundary off N and NW Iceland whence the maturing part of the stock begins its spawning migration in December and/or January.

A commercial fishery of the Icelandic capelin stock started in the winter of 1965 when 50 thous. tons were landed. The winter fishery is based on maturing capelin from the spawning migration during January-April. The annual yield of the winter fishery from 1973 onwards has been 400-550 thous. tons.

In 1976 an Icelandic summer and autumn fishery was initiated in deep waters off N- and NW-Iceland yielding 111 thous. tons.

The summer and autumn catch increased to 498 thous. tons in 1978 and in 1979 the total was 442 thous. tons when a ban was imposed on the fishery on 10 November.

In 1978 Norway joined the summer fishery of the Icelandic capelin taking 155 thous. tons in the area W and NW of Jan Mayen. In the summer of 1979 the Norwegian catch in that area amounted to 126 thous. tons when a ban was imposed in early September.

In addition the Faroes caught small amounts in the summers of 1978-79 as well as during the winter fisheries in 1977-79.

The above advent of a multinational summer fishery gave rise to a sharp increase in the catch apparently followed by reduced recruitment. Table 1 shows 0-group indices from 1972 onwards as well as the total catch from the parent stock in those years.

The migrations and behaviour of this stock have been studied by acoustic methods since the sixties. Since the autumn of 1978 the Icelandic Marine Research Institute has estimated the size of the stock in late autumn and winter. During the summer and autumn of 1979 additional estimates of stock size have been obtained through joint acoustic surveys carried out by the above institute and the Institute of Marine Research, Bergen. The results of these surveys were subsequently used in order to manage the 1979 and 1980 fisheries.

The purpose of this paper is to describe and discuss the results of the above surveys.

3. Materials and Methods.

All material was collected by research vessels and samples were aged and weighted (volume to nearest ml) on board.

Cruises were timed as follows;

- 1) 16-30 October 1978, R/V B. Sæmundsson
- 2) 1-9 February 1979, R/V B. Sæmundsson
- 3) 14 February - 1 March 1979, R/V B. Sæmundsson
- 4) 26 July - 12 August 1979, R/V B. Sæmundsson,
R/V G.O. Sars

- 5) 25 September - 5 October 1979, R/V B. Sæmundsson
R/V Michael Sars
- 6) 14-26 October 1979, R/V B. Sæmundsson
- 7) 4-30 January 1980, R/V B. Sæmundsson.

In the surveys the 0-group capelin is grossly under-represented compared to older yearclasses. Therefore the contribution by 0-group capelin to the echo abundance has been subtracted and the estimates of stock biomass presented thus exclude the 0-group fish.

The basic integration technique applied was described in detail by Nakken and Dommasnes (1975). The variant adopted for the present purpose may be summarized as follows:

Integrated echo intensities were registered continuously from the depth column along the ships' track producing fish traces and the values obtained were recorded as average/nautical mile for each 5 nautical miles sailed. Trawling was undertaken as necessary in order to ensure adequate biological sampling and to check changes in the echo recordings.

The survey area was divided into suitable subareas depending on variations in the length composition of the capelin as observed from the trawl catches. The integrated echo intensity was converted to fish densities using the equation:

$$N = C \times M \times A$$

Where:

N is the total density in terms of numbers,

C is the number per unit area and dependent on mean length of the fish according to the equation $C = 8.1 \times 1^{-1.91}$ (number of fish/1 n.m.² / 1 mm elevation on echo integrator recorder),

M is the mean integrated echo intensity for the relevant subarea (mm ref. 40 dB gain on echo integrator recorder),

A is the sub-area measured in square nautical miles.

The sum of the number of fish calculated for each subarea then gives the total stock size in number.

Initially, during the R/V B. Sæmundsson surveys in October 1978 and February-March 1979, a slightly different technique of data evaluation as well as C values were used (Vilhjálmsson and Reynisson 1979). After intercalibrations with R/V G.O. Sars in August 1979 it was, however, possible to reevaluate the above survey results. The intercalibration was carried out on a scattering layer of 0-group fish, mostly capelin, off NW-Iceland and the following relationship was established (see also Fig 1):

$$M_{GOS} = 1.07M_{BS} + 10$$

Where:

M_{GOS} are integrator values obtained by R/V G.O Sars and

M_{BS} are integrator values obtained by R/V Bjarni Sæmundsson.

The relation between R/V G.O. Sars and R/V Michael Sars had been previously established by the Institute of Marine Research, Bergen. All results could, therefore, be referred to G.O. Sars values as standard.

4. Survey results.

4.1. October 1978. R/V B. Sæmundsson

In late October 1978, extensive scouting NW and N of Iceland revealed dense capelin concentrations in a fairly large area reaching from approximately 67°45'N, 24°45'W north-eastwards to 68°45'N, 21°00'W. Prior to this, a Norwegian scouting vessel had searched the Jan Mayen area as well as the Iceland Sea south to about 69°00'N. Their results were negative except for a limited area near the 350 m isodepth E of Scoresby Sound. Most of the distribution area of the 1979 spawning stock of the Icelandic Capelin was, therefore, covered during this cruise.

In the period 20-29 October the capelin area off NW-Iceland was successfully surveyed two times and acoustic abundance estimates obtained. The distribution and relative abundance is shown in Figures 2-3.

The two independent estimates are shown in Table 2. They are in good agreement, giving an average total stock biomass of 1585 thous. tons.

4.2. E- and NW-Iceland, February 1979. R/V B. Sæmundsson.

At about mid-January considerable concentrations of capelin were located off the eastern N-coast of Iceland. In the first week of February, when this migration had reached the area off E-Iceland, it was surveyed 3 times by R/V B. Sæmundsson (Figures 4-6). The stock size estimates from the above surveys in numbers and weight by age groups are shown in Table 3.

At the time of the first survey the capelin were scattered but during the two subsequent ones dense shoals were occasionally located as the migration continued southwards. On the whole, however, the fish were more or less evenly distributed, their area of occupation well defined and there is little variance between the three estimates. The surveys, therefore, seem to present a reliable picture of stock abundance, the average being 595 thous. tons.

Surveying off N-Iceland during the later half of January had been negative but during 8-10 February an additional component of the spawning stock together with a considerable number of immatures was located off NW-Iceland as shown in Figure 7. The acoustic abundance estimate of the size of these stock components is shown by age groups and numbers in Table 4. The total biomass was estimated at 660 thous. tons.

4.3. NW- and SE-Iceland, Feb.-Mar. 1979. R/V B. Sæmundsson

In the 3rd week of February the capelin area off the NW-peninsula was resurveyed (Figure 8). Bad weather prevailed for most of the time and heavy shoaling was observed. During 17-18 February, however, the shoals scattered and an acoustic stock assessment could be completed before surveying had to be abandoned due to deteriorating weather conditions. The stock size was estimated at 545 thous. tons. The division by age and number at age is shown in Table 5.

After resurveying the western component of the 1979 spawning stock R/V B. Sæmundsson carried out a survey of the remnants of the eastern component in the shallow coastal waters (30-150 m) at Se-Iceland during the period 27 February - 1 March (Fig 9).

At the time the capelin in this area were recorded as a more or less continuous scattering layer in midwater during the dark hours but in the daytime assembled to form dense shoals, which in places reached from bottom to surface. To comply with this pattern of behaviour surveying was carried out in darkness. The acoustic estimate of stock size thus obtained was 350 thous. tons of mature caplin exclusively. The division by weight and number at age is shown in Table 6.

4.4. July - August 1979, R/V B. Sæmundsson, G.O. Sars.

During the period 27 July - 12 August an acoustic survey of the distribution and abundance of the Icelandic stock of capelin was carried out jointly by Iceland and Norway. This survey covered the area Iceland-Greenland-Jan Mayen from approximately 66°00'N to 72°00'N (Figure 10). The size of the stock was estimated at 490 thous. tons. The distribution by age groups and numbers at age is shown in Table 7.

The capelin were mainly recorded in the frontal zone of the East Greenland Current. The most abundant concentrations were located N of cape Horn and W of Jan Mayen. The fish were mainly observed as small shoals close to the thermocline at a depth of 20-30 m. During the daytime, however, the capelin was sometimes found at greater depths and on some occasions it appeared as very small, dense shoals in the uppermost 3-4 metres, i.e. above the detection range of the transducer.

At the time of the survey there was much drift ice in the Denmark Strait south of Scoresby Sound rendering part of the stock inaccessible. The abundance estimate (Table 7) was, therefore, regarded as an underestimate of an unknown magnitude.

4.5. Sept.-Oct. 1979. R/V B. Sæmundsson, R/V Michael Sars.

Iceland and Norway carried out another joint echo survey of the Icelandic capelin stock from 25 September to 5 October. This time practically no drift ice was encountered and surface shoaling was much less pronounced than during the summer survey. The distribution and relative abundance of the capelin is shown in Figure 11. Due to bad weather the area N of 71°N could not

be surveyed but elsewhere little difficulties were encountered. Except for the northernmost regions covering of the distribution area was, at the time, considered adequate.

As shown in Figure 11 the bulk of the mature stock was assembled between $67^{\circ}45'N$ and $70^{\circ}N$, $17^{\circ}-19^{\circ}W$ as well as near the 68th parallel between $21^{\circ}W$ and $26^{\circ}W$. Immatures were recorded over the E-Greenland shelf, to the NW of the NW peninsula of Iceland and about 60 n.m. off the central N-coast of Iceland (Figure 12).

The total stock biomass was estimated at 950 thous. tons. Details of this estimate are shown in Table 8.

4.6. October 1979. R/V B. Sæmundsson.

This survey was carried out during the period 14-28 October in the area off N- and NW-Iceland as shown in Figure 13. In autumn the capelin aggregate in this area prior to the onset of the spawning migration to the S- and SW-coasts of Iceland in winter.

Compared to the joint September-October cruise weather conditions were less favourable. Thus, the northern boundary of the distribution area could not be accurately determined and occasionally surveying had to be halted for short periods of time. From the previous joint survey the majority of the large capelin migrated southwards to assemble for a time in the area $67^{\circ}45'-68^{\circ}0'N$, $18^{\circ}-21^{\circ}W$ (Figures 11 and 13).

In most of the survey area shoaling was pronounced, particularly at night. Most of the shoals were, however, only of moderate density. During darkness the capelin sometimes came within 5-20 m from the surface but mainly kept to deeper waters in daytime (150-300 m).

The acoustic stock size estimate was 1060 thous. tons and distributed by number and weight per age group as shown in Table 9.

4.7. January 1980. R/V B. Sæmundsson.

According to echo surveying the 1980 spawning stock had a most unusual distribution in January. Thus, by mid-January, no capelin had been located neither off E- and NE-Iceland nor

off the N-coast in spite of intense surveying by both research vessels and the fishing fleet. On the other hand all the capelin still seemed to be assembled near the southeastern-boundary of the E-Greenland Current at the shelf edge to the NW of the NW-peninsula of Iceland. During the first 20 days of the month these waters were periodically covered by drift ice which made an acoustic stock size estimate unobtainable.

After 20 January the drift ice receded in a westerly direction and during the period 25-28 January the distribution area of the capelin was ice free altogether. The fish were mostly recorded as a scattering layer of varying density and due to previous survey effort as well as scouting by fishing vessels the boundaries of the distribution area were known. The weather was good and a detailed acoustic survey could, therefore, be completed during the above period under nearly ideal conditions. The distribution and relative density is shown in Figure 14.

The total acoustic stock size estimate was 840 thous. tons. The distribution of weight and numbers by age groups is shown in Table 10.

5. Discussion and Conclusions

When estimating the size of a fish stock by the acoustic method several sources of error are encountered due to variations in the behaviour and migration patterns of the species concerned as well as the nature of the area it occupies. In the case of the Icelandic capelin the most important of these are distribution of fish above transducer range, inaccessibility to parts of the distribution area due to drift ice and dense schools which may saturate the integrator. Since these factors are subject to periodic variations correct timing of the surveys as well as their design are highly important.

In order to compare the results from the various surveys, the two sets of data were backcalculated to 1 August 1978 and 1 August 1979 respectively using an $M = 0.04/\text{month}$ for the summer and autumn season and $0.08/\text{month}$ for the winter season (Table 11) as well as the monthly catch in numbers during the period concerned (Table 12). Since the 1-ringers are under-represented, due to gear selection and sometimes incomplete

coverage, the sum of the three oldest age groups should be used for comparative purposes. These are shown in the last column in Table 11.

The joint Icelandic-Norwegian survey carried out in late July-early August 1979 resulted in an underestimate of all yearclasses. Similar experience was encountered during an Icelandic attempt to obtain values on stock size by the acoustic method in September 1978. The reasons for this are the inaccessibility to parts of the distribution area due to drift ice, and the occurrence of small dense schools above transducer range. Drift ice is a common phenomenon in the Denmark Strait in spring and summer but has usually receded or practically vanished by autumn. As May-September constitute the main feeding period of the capelin in this area, shallow distribution is to be expected at times. The success of an acoustic estimate of stock size is, therefore, very uncertain during the spring and summer months.

The surveys carried out in autumn and winter yield more consistent estimates. During this period the maturing part of the Icelandic capelin stock has a relatively limited distribution in an area which is more or less free of other sound scatterers. Under such circumstances, repeated acoustic estimates of stock size can be carried out in a very short time for comparison. This was done in late October 1978 (Table 2) and in early February 1979 (Table 3). The results from these surveys are consistent, the deviation being less than 10 percent.

The abundance estimate from the joint survey carried out in the period 25/9 - 5/10 1979 did, however, give a larger estimate of 1-ringers than obtained during the Bjarni Sæmundsson October 1979 survey. The reason for this is probably that the distribution area of 1-ringers (Fig. 13) was not covered during the later survey.

The joint survey also gave a considerably smaller estimate of 2 and 3 ringers compared with both later surveys. The reason for this is not exactly known. However, particularly heavy aggregations of capelin were recorded near the eastern and southern boundary of its distribution as shown in Fig. 11.

Since this fact was not known beforehand no extra survey effort was allocated to these areas, and perhaps the joint survey was not detailed enough in this respect.

The preliminary conclusion to be drawn from these investigations is that the most useful results for management purposes are to be expected in October and January - February as far as the maturing component is concerned. In future it could, nevertheless, prove possible to obtain useful index figures of stock size by the acoustic method at other times of the year, particularly as regards the immature part of the stock.

6. References.

- 6.1. Anon. Cruise reports, summer-autumn 1979 and winter 1980.
- 6.2. Nakken, O., Dommasnes, A. 1975. The Application of an Echo Integration System in Investigations on the Stock Strength of the Barents Sea Capelin (Mallotus villosus, Müller) 1971-1974. I.C.E.S. C.M. 1975. (Mimeo).
- 6.3. Vilhjálmsón, H., Reynisson, P. 1979. Abundance Estimates of the 1979 Spawning Stock of the Icelandic Capelin. I.C.E.S. C.M. 1975. (Mimeo).
- 6.4. Vilhjálmsón, H., 1979. Sumar- og haustvertíðin 1978. Loðnuveiðarnar 1978. Reykjavík 1979.
- 6.5. Vilhjálmsón, H., 1980. Sumar- og haustvertíðin 1979. Loðnuveiðarnar 1979. Reykjavík 1980.
- 6.6. Vilhjálmsón, H., 1980. Vetrarvertíðin 1979. Loðnuveiðarnar 1979. Reykjavík 1980.

Table 1.

O-groups indices and catch from the parent stock (tons x 10⁻³) 1972 - 1979.

Year	Catch	O-group index
1972	277	89
1973	441	116
1974	462	134
1975	458	89
1976	342	60
1977	659	43
1978	770	31
1979	1191	49

Table 2.

Echo stock by number and weight at age (N x 10⁻⁹, W x 10⁻³ tons), 16-29 October 1978.

Yearclass	Survey 1		Survey 2		Average	
	N	W	N	W	N	W
1977	0.4	3.5	0.4	3.5	0.4	3.5
1976	50.5	944.4	55.4	1036.1	52.9	989.6
1975	20.5	548.5	22.6	603.4	21.6	576.5
1974	0.4	13.6	0.5	17.0	0.5	15.4
Total	71.9	1510	79.0	1660	75.5	1585.0

Table 3.

Echo stock by number and weight at age ($N \times 10^{-9}$,
 $W \times 10^{-3}$ tons), E-Iceland. 1-7 February 1979.

Yearclass	Survey 1		Survey 2		Survey 3		Average	
	N	W	N	W	N	W	N	W
1977	5.0	31.5	5.2	32.8	5.6	35.2	5.3	33.4
1976	23.2	457.0	24.0	472.8	25.7	506.2	24.3	478.7
1975	3.1	77.8	3.2	80.3	3.4	85.3	3.2	80.3
1974	4	1.7	0.1	3.1	0.1	2.3	0.1	2.6
Total	31.4	568.0	32.5	589.0	34.8	629.0	32.9	595.0

Table 4.

Echo stock by number and weight at age NW-Iceland.
 8-9 February 1979.

Yearclass	$N(x 10^{-9})$	$W(x 10^{-3} \text{ tons})$
1977	3.6	41.0
1976	28.3	512.0
1975	4.6	107.0
Total	36.5	660.0

Table 5.

Echo stock by number and weight at age NW - Iceland
 17-18 February 1979.

Yearclass	$N(x 10^{-9})$	$W(x 10^{-3} \text{ tons})$
1977	2.4	26.9
1976	23.5	283.0
1975	6.0	132.0
1974	0.1	3.1
Total	32.1	545.0

Table 6.

Echo stock by number and weight at age, SE-Iceland
27- February - 1 March 1979.

Yearclass	N(x 10 ⁻⁹)	W(x 10 ⁻³ tons)
1977	0.7	7.7
1976	13.5	249.5
1975	3.7	92.8
Total	17.9	350.0

Table 7.

Echo stock by number and weight at age, Iceland - E-Greenland -
Jan Mayen. 27 July - 12 August 1979.

Yearclass	N(x 10 ⁻⁹)	W(x 10 ⁻³ tons)
1978	3.0	14.3
1977	33.0	390.2
1976	5.0	85.8
1975	+	0.8
Total	41.0	490.9

Table 8.

Echo stock by number and weight at age, Iceland -
E-Greenland - Jan Mayen. 25/9 - 5/10 1979.

Yearclass	N(x 10 ⁻⁹)	W(10 ⁻³ tons)
1978	22.0	140.6
1977	42.0	638.8
1976	8.0	166.5
1975	+	3.6
Total	72.0	949.5

Table 9.

Echo stock by number and weight at age, N- and
NW-Iceland/Greenland 14-26/10 1979.

Yearclass	N(x 10 ⁻⁹)	W(x 10 ⁻³ tons)
1978	10.0	62.0
1977	49.7	780.3
1976	9.1	209.3
1975	0.4	8.3
Total	69.2	1059.9

Table 10.

Echo stock by number and weight at age, N- and
NW-Iceland 25-28 January 1980.

Yearclass	N(x 10 ⁻⁹)	W(x 10 ⁻³ tons)
1978	13.5	84.2
1977	41.7	663.7
1976	3.8	92.1
Total	59.0	840.0

Table 11.

Backcalculations of Echo stock

M = 0.04/month August-December

M = 0.08/month January-March

I Ref. to 1/8 1978

Surveys	Yearclass				Total
	1977	1976	1975	1974	1976-1974
16/10-29/10 '78	0.5	77.7	36.1	0.8	114.6
1/2 - 9/2 '79	12.1	98.0	24.0	0.4	122.4
14/2 - 1/3 '79	5.5	94.6	30.5	0.4	125.5

II Ref. to 1/8 1979

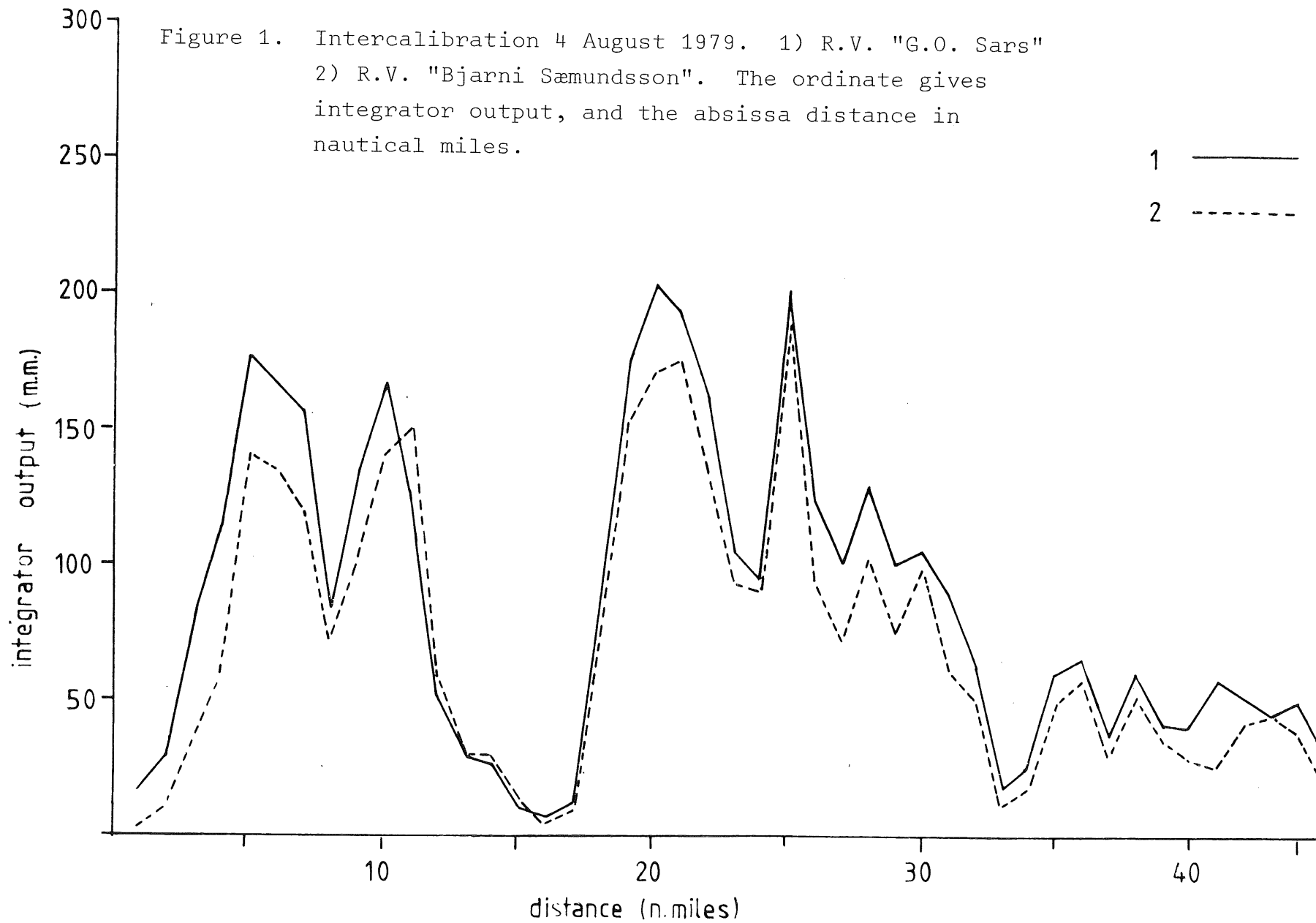
Surveys	Yearclass				Total
	1978	1977	1976	1975	1977-75
26/7 -12/8 '79	3.0	33.0	5.0	+	38.0
25/9 - 5/10 '79	24.1	62.0	12.9	+	74.9
14/10-26/10 '79	11.9	82.9	17.7	0.5	101.1
25/1 -28/1 '80	19.8	94.8	14.6	+	109.4

Table 12.

The total catch in numbers from the Icelandic stock of capelin.

July 1978 - March 1980. (N x 10⁻⁹).

Year	Month	Yearclass					Total
		1978	1977	1976	1975	1974	
1978	July	-	+	0.9	0.8	+	1.7
	August	-	+	6.3	2.2	+	8.5
	September	-	-	5.2	5.6	0.1	10.9
	October	-	+	4.5	2.5	0.1	7.1
	November	-	0.1	3.2	0.4	-	3.7
	December	-	-	1.0	0.7	-	1.7
1979	January	-	0.2	4.9	1.1	+	6.2
	February	-	0.5	10.1	2.0	0.1	12.7
	March	-	0.3	5.8	1.7	+	7.8
	August	0.1	8.5	2.3	-	-	8.1
	September	0.2	7.4	1.7	-	-	9.3
	October	0.3	9.4	2.9	-	-	12.6
	November	-	2.0	0.3	-	-	2.3
1980	January	1.0	7.4	1.2	-	-	9.6
	February	0.1	6.3	1.5	-	-	7.9
	March	0.2	3.9	0.8	-	-	4.9



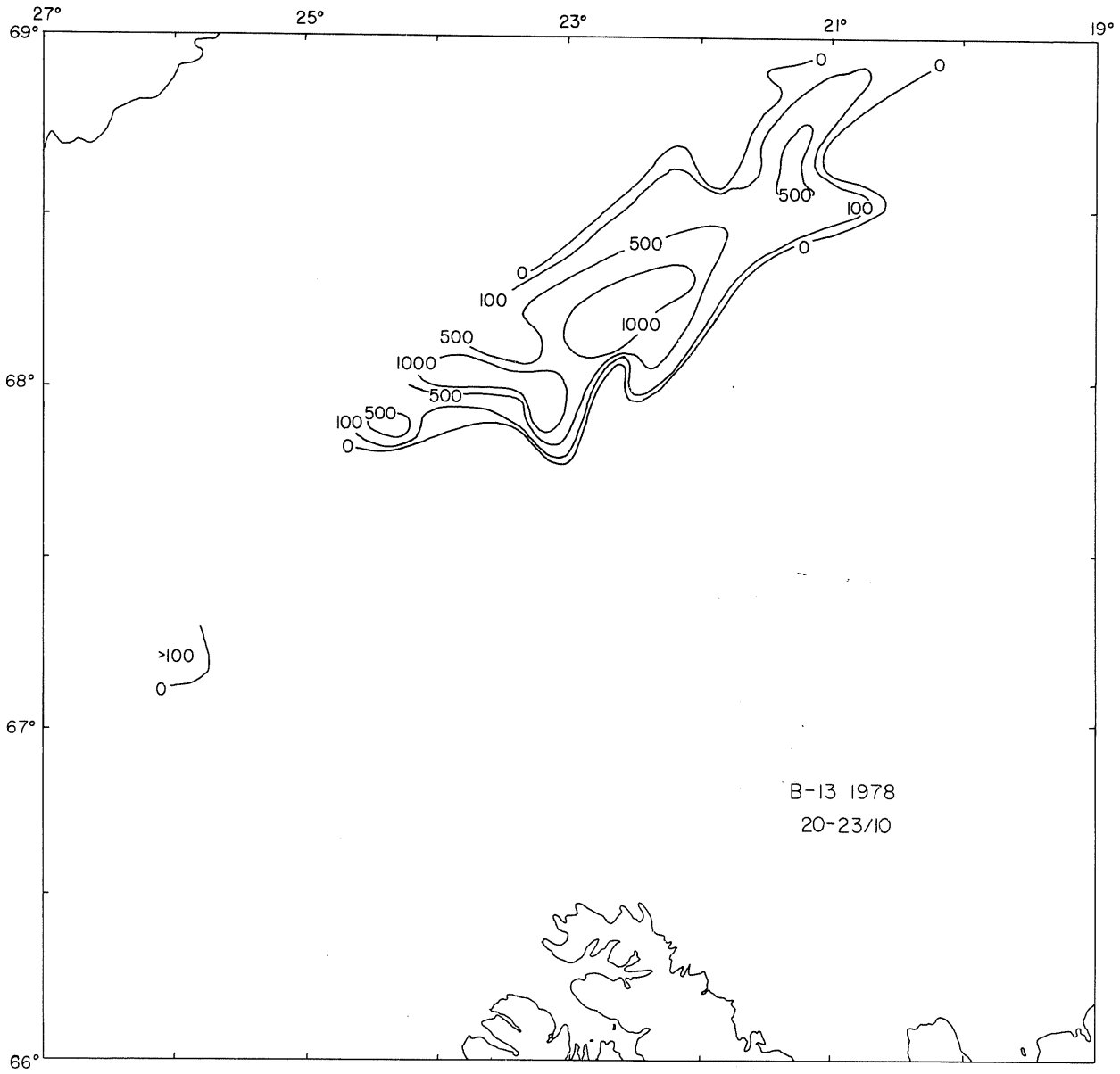


Figure 2. The distribution and relative abundance of capelin, 20-23/10 1978.

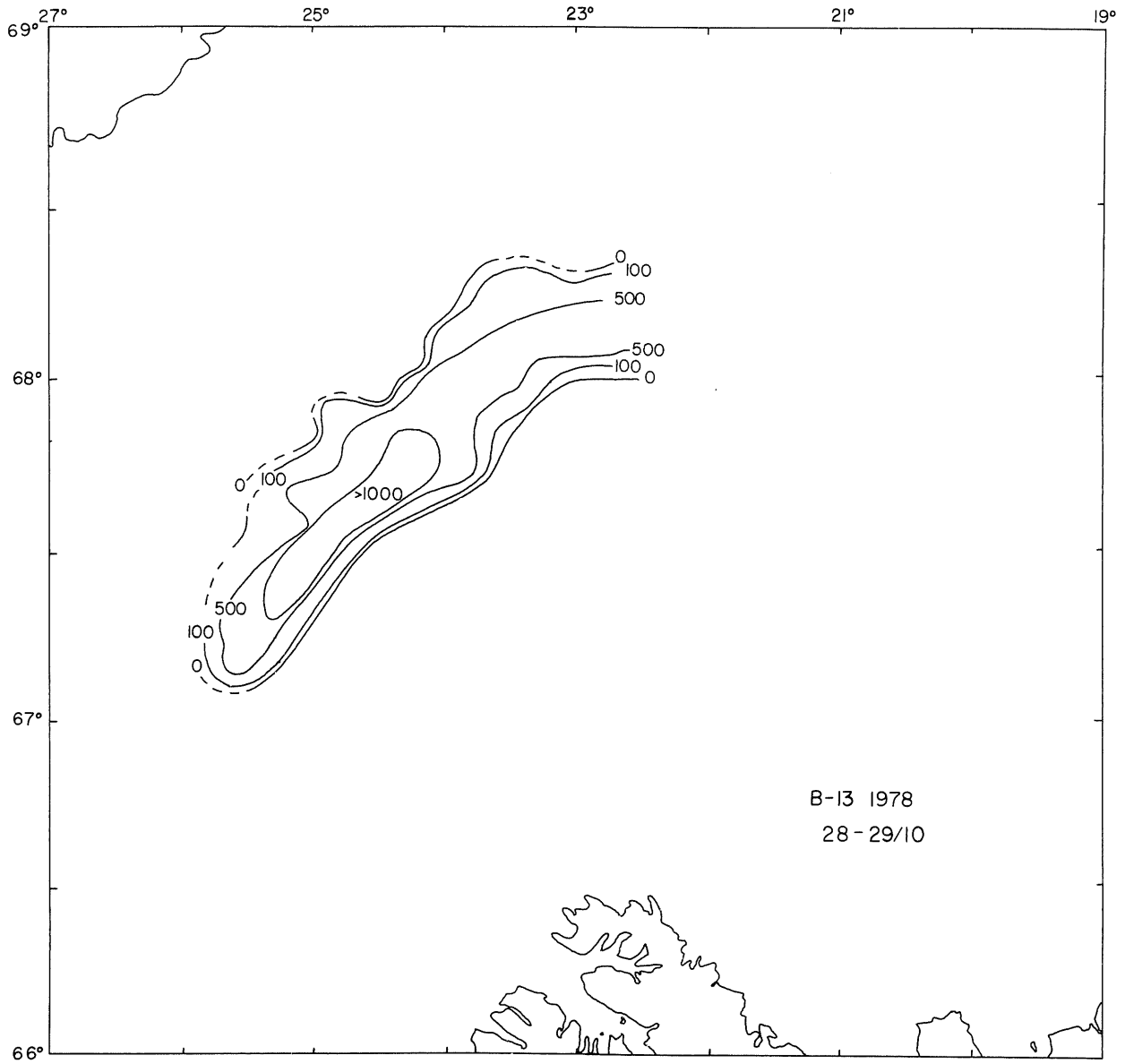


Figure 3. The distribution and relative abundance of capelin, 28-29/10 1978.

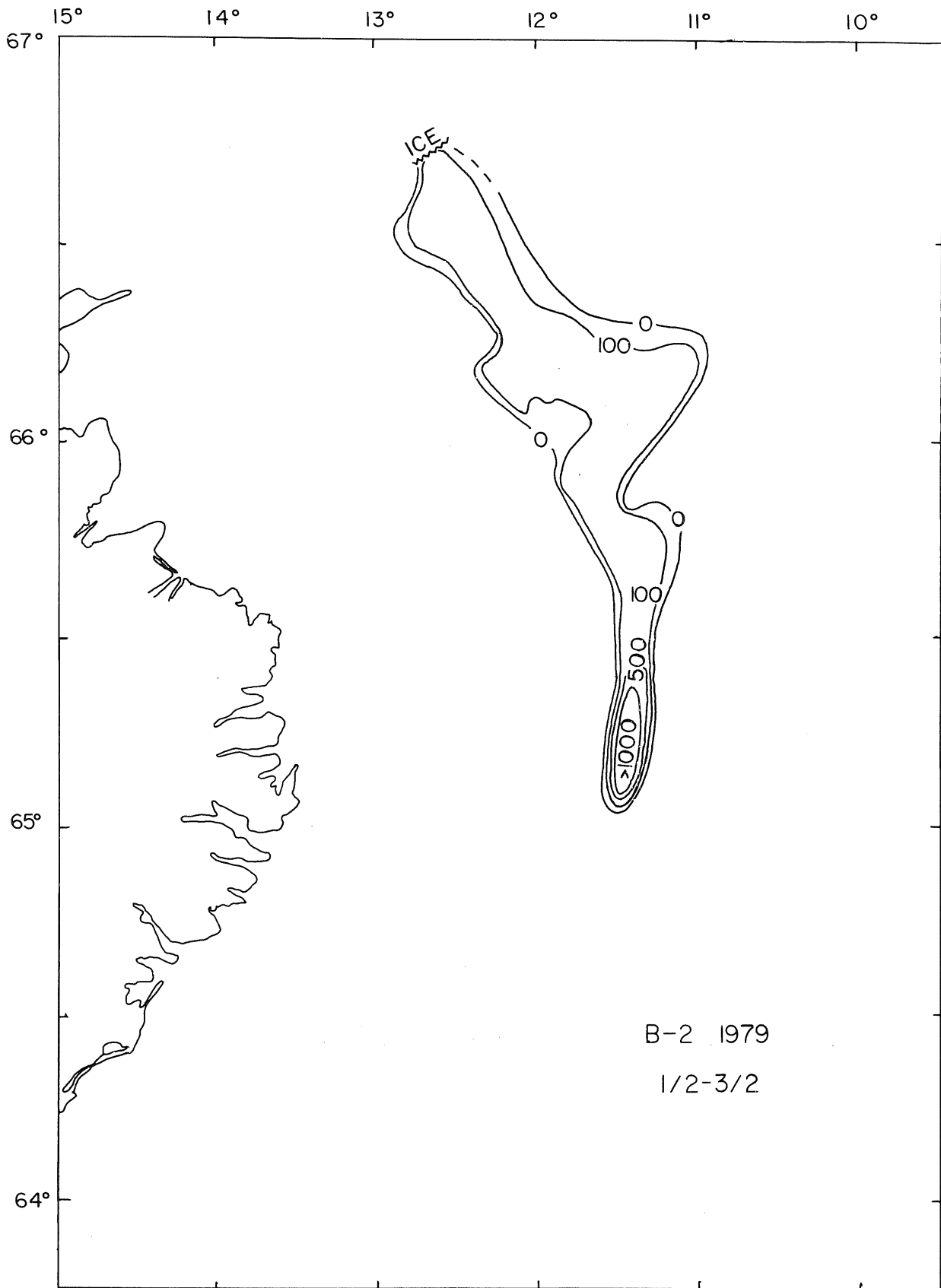


Figure 4. The distribution and relative abundance of capelin, 1-3/2 1979.

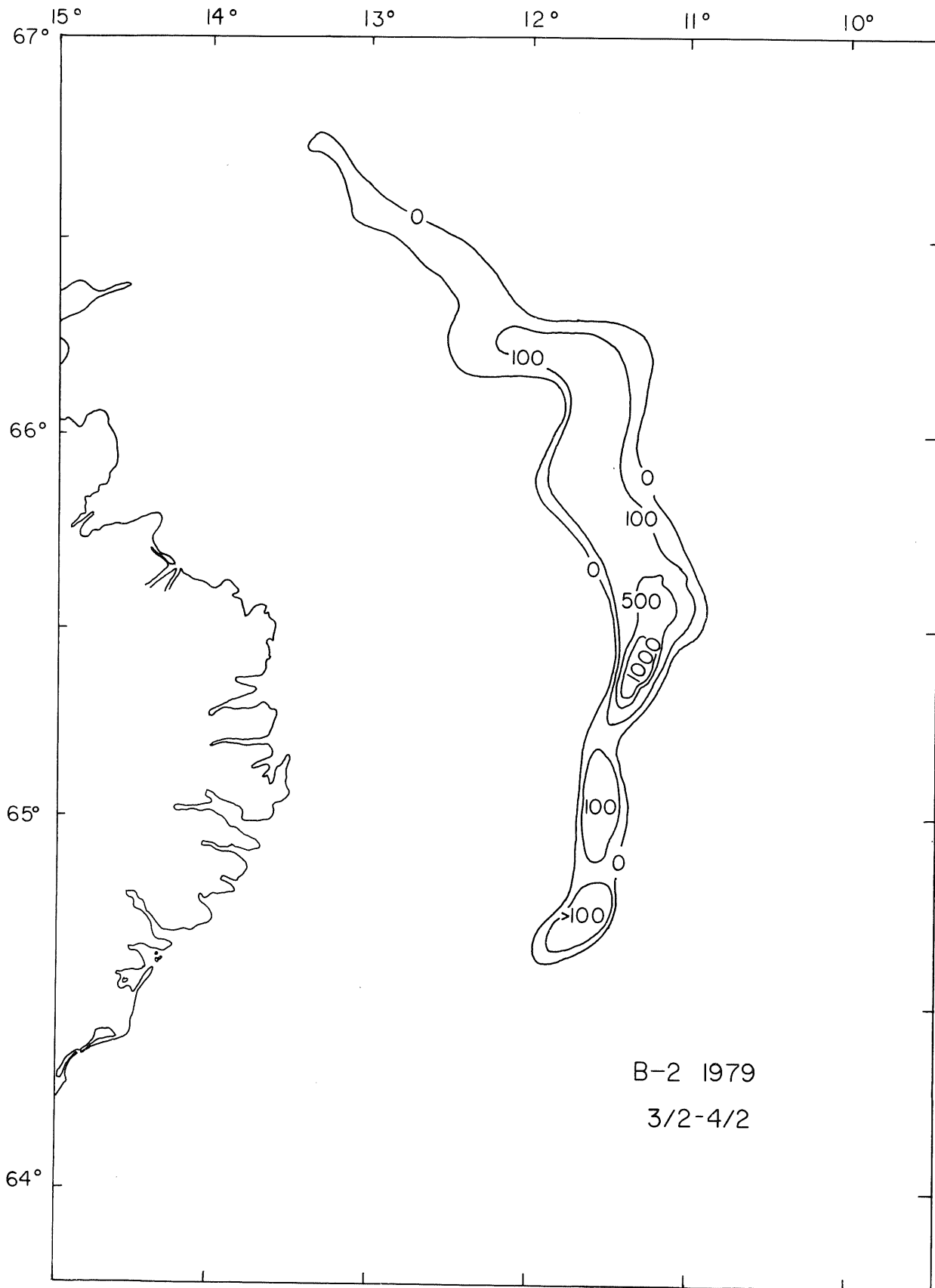


Figure 5. The distribution and relative abundance of capelin, 3-4/2 1979.

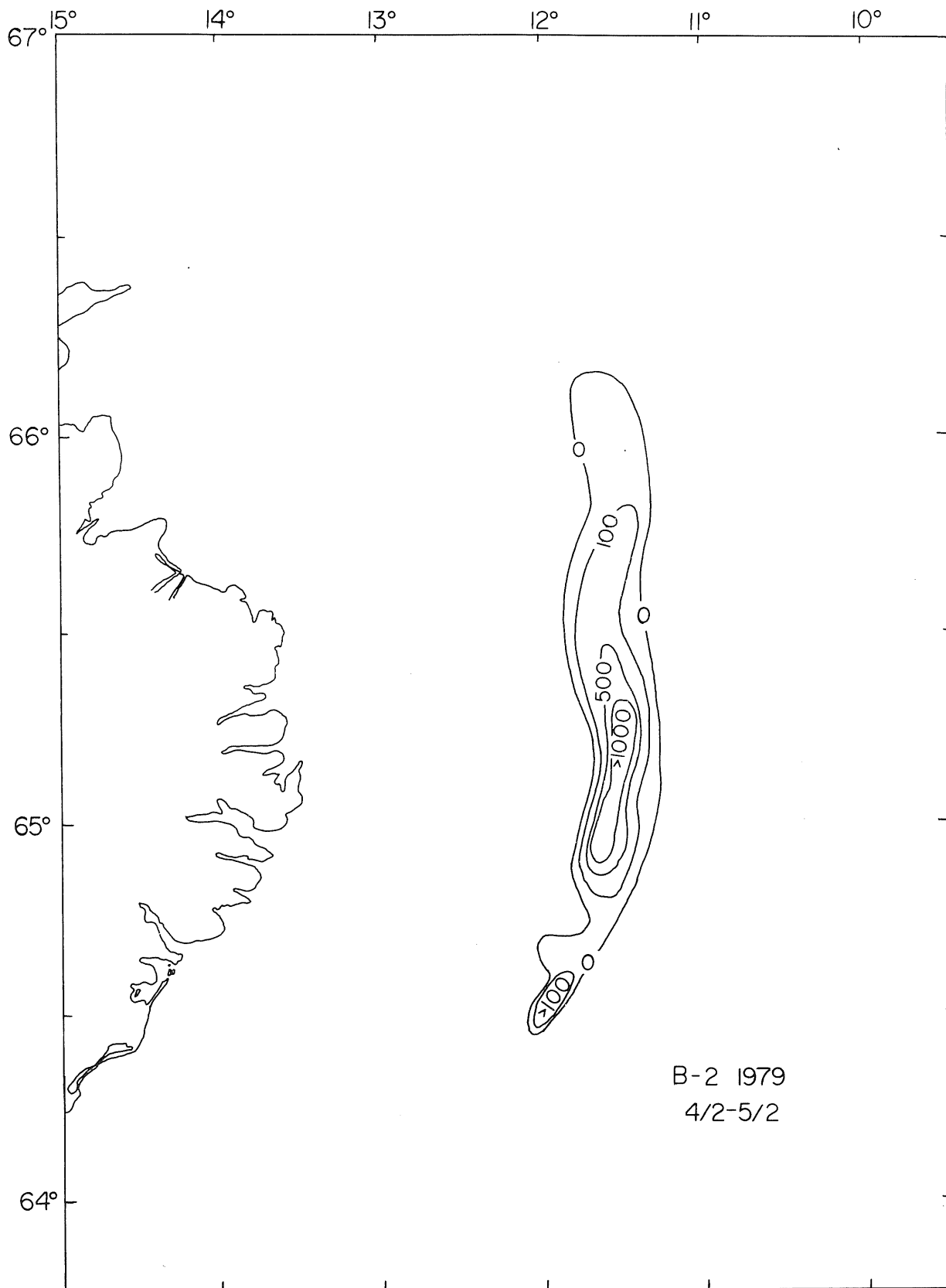


Figure 6. The distribution and relative abundance of capelin, 4-5/2 1979.

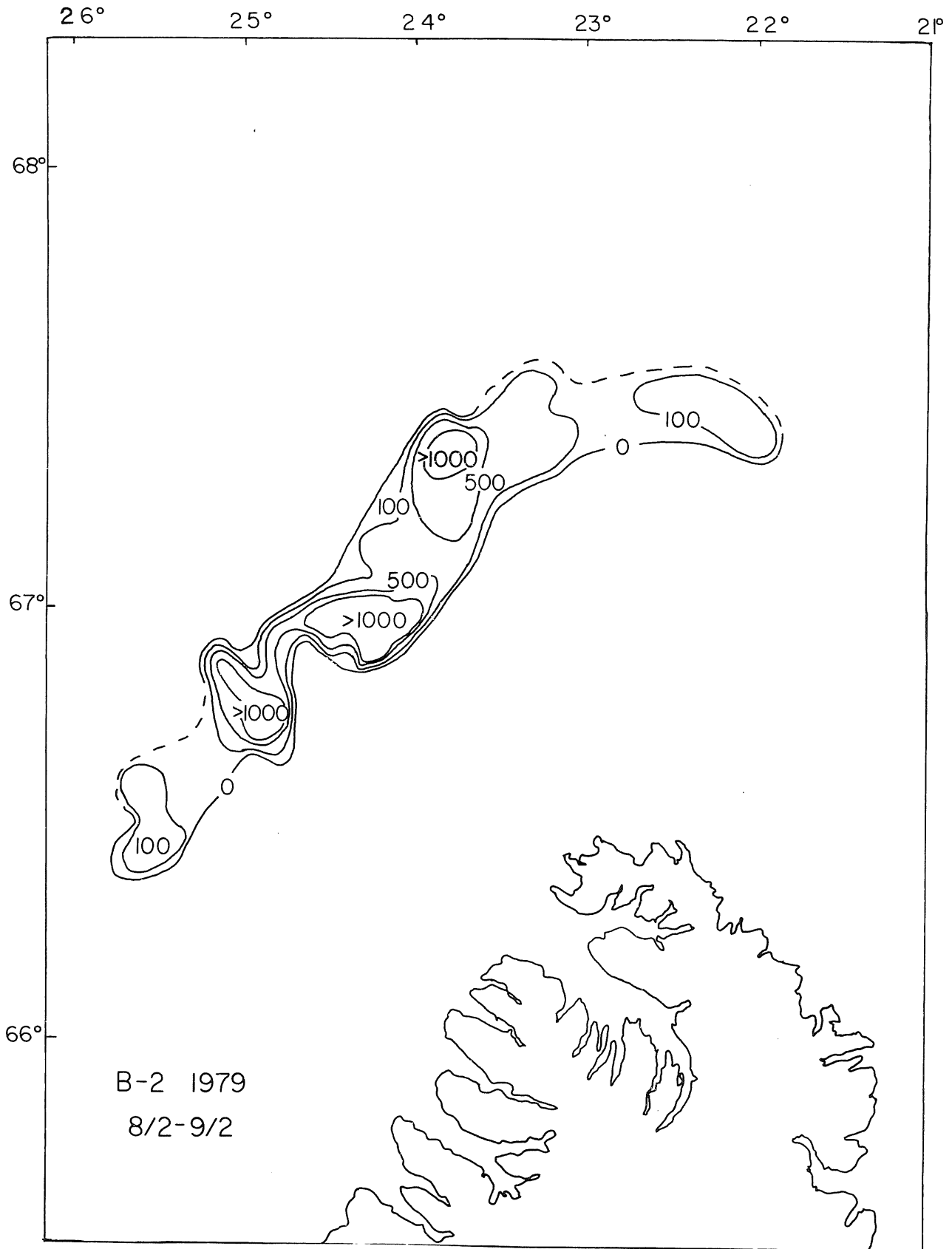


Figure 7. The distribution and relative abundance of capelin, 8-9/2 1979.

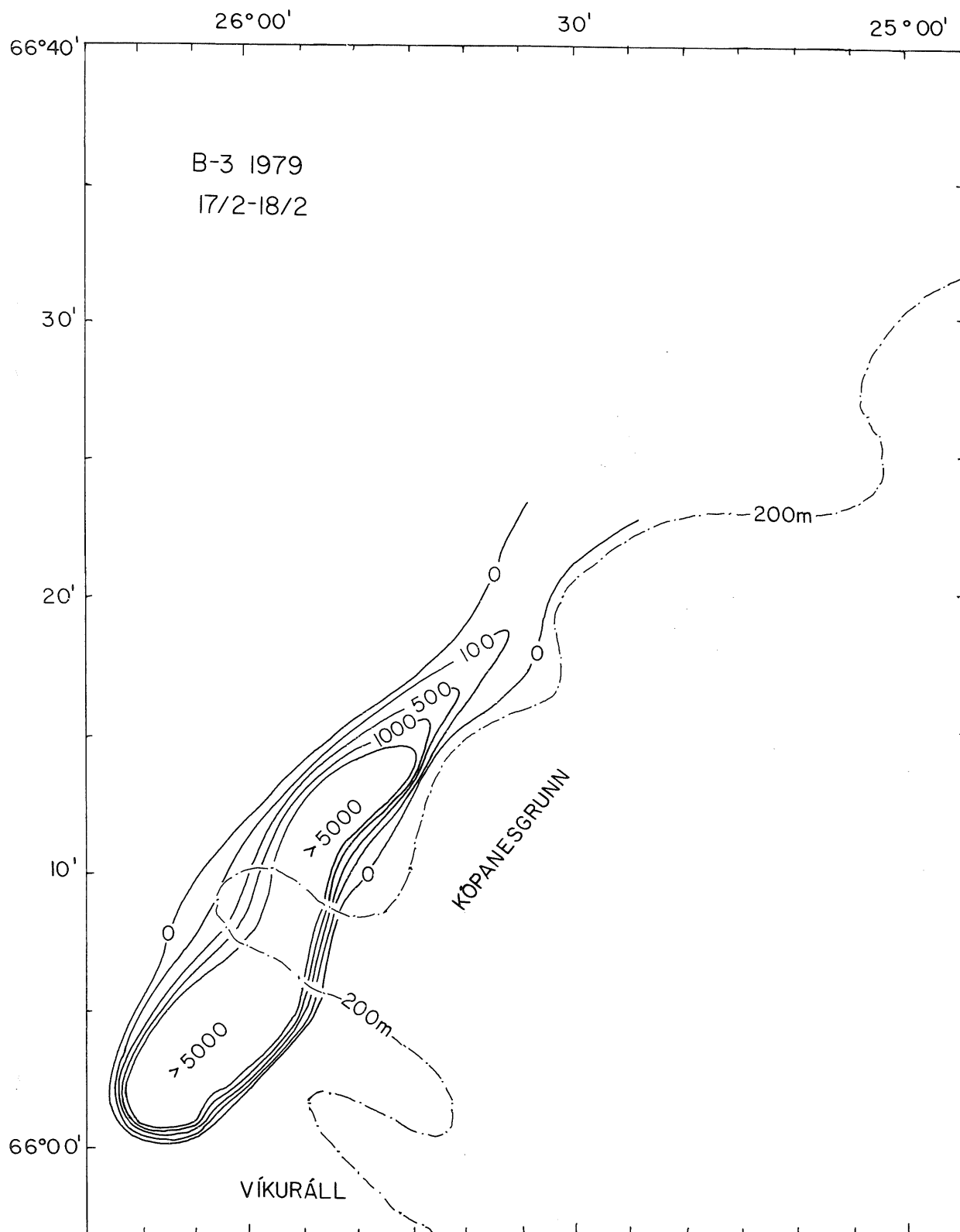


Figure 8. The distribution and relative abundance of capelin, 17-18/2 1979.

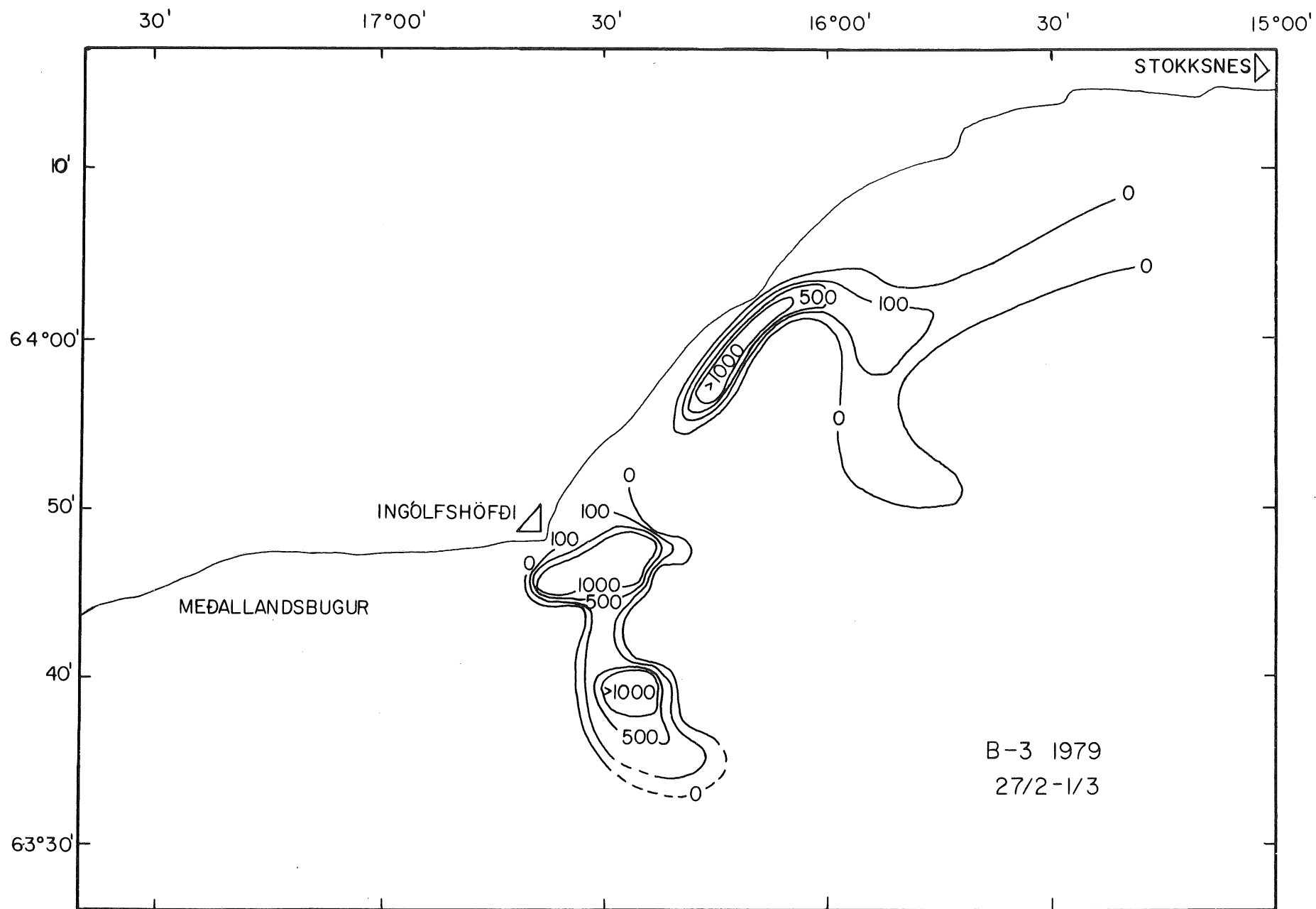


Figure 9. The distribution and relative abundance of capelin,
27/2 - 1/3 1979.

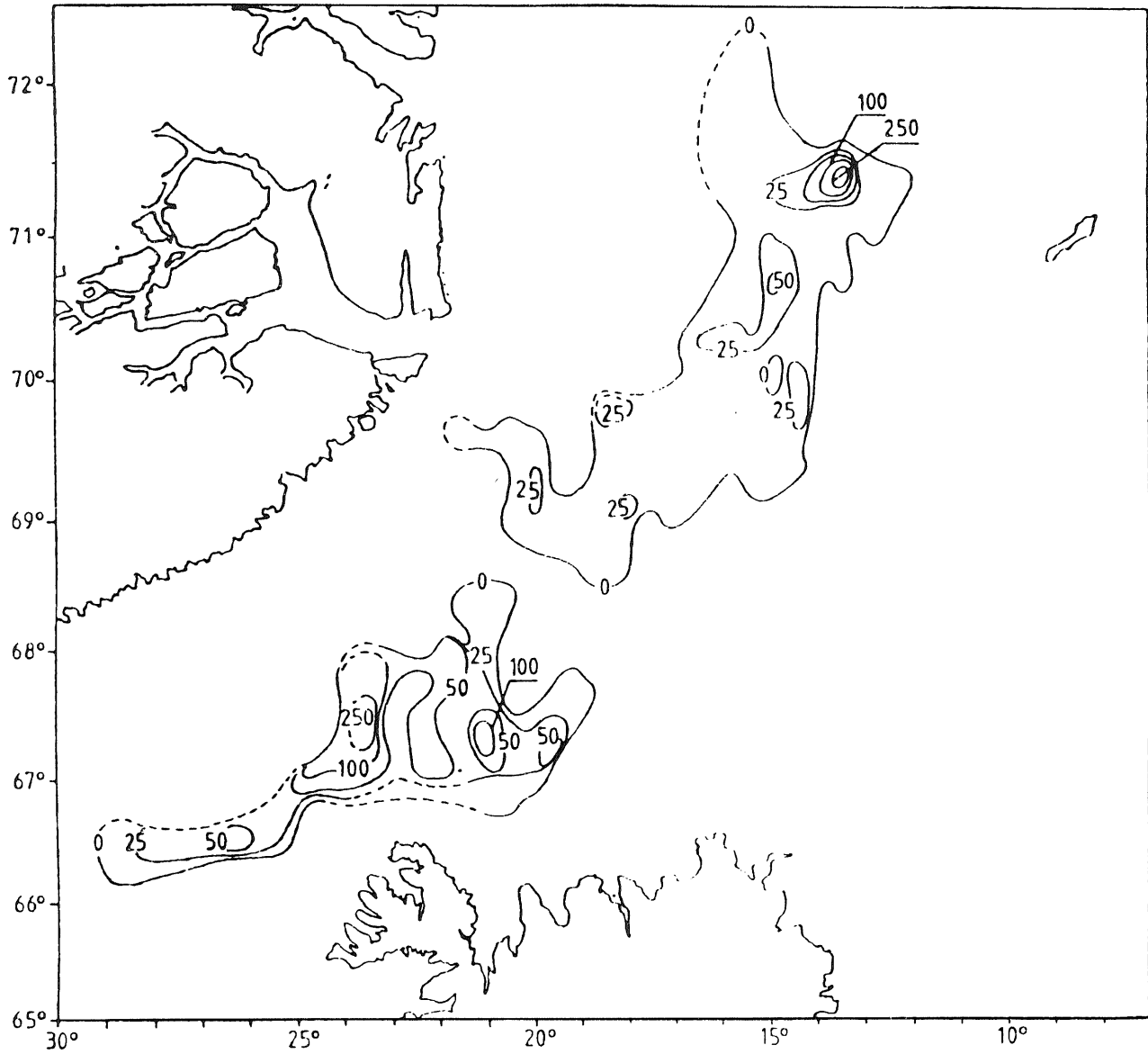


Figure 10. The distribution and relative abundance of capelin, 27/7 - 12/8 1979.

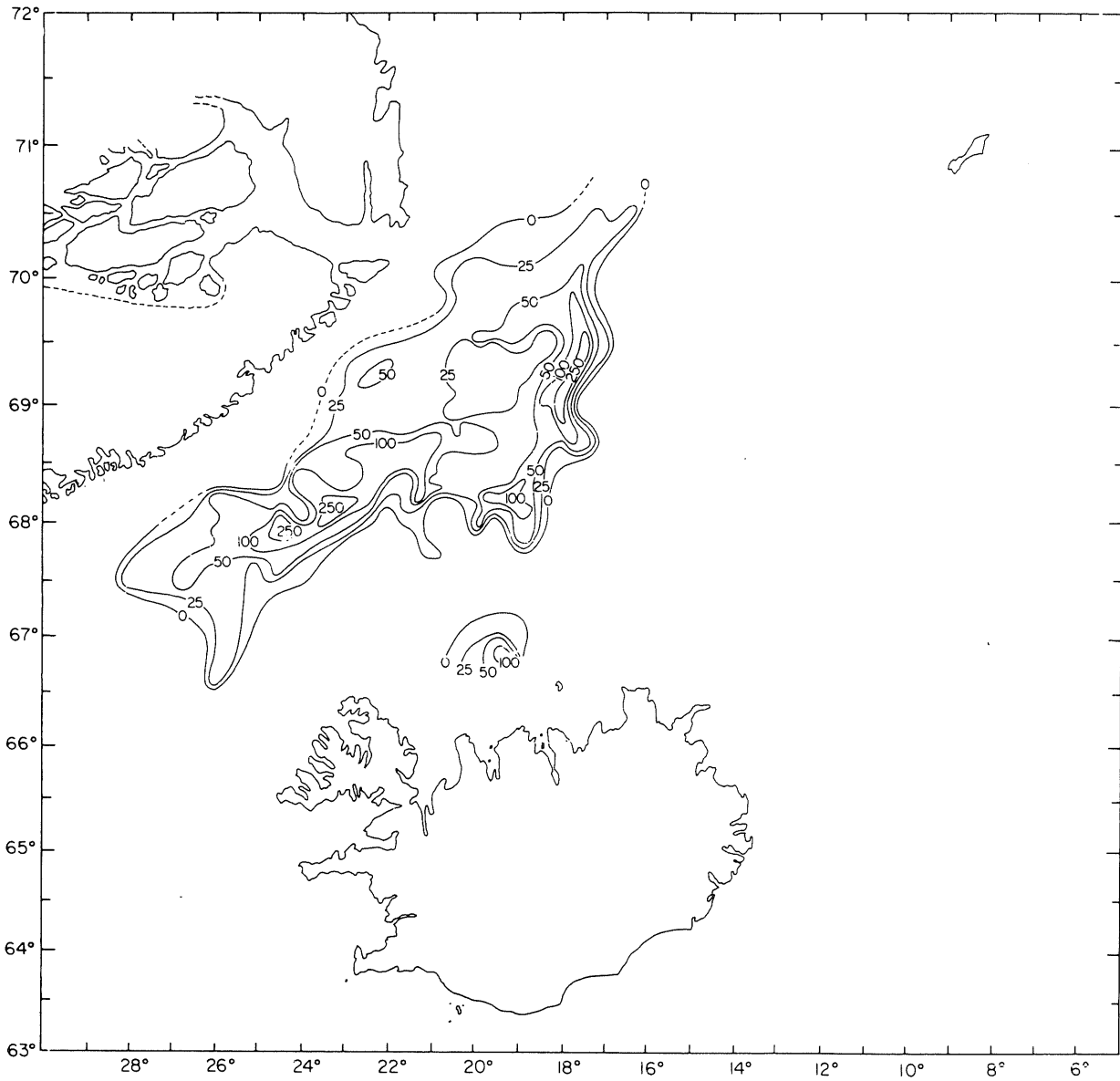


Figure 11. The distribution and relative abundance of capelin, 25/9 - 5/10 1979.

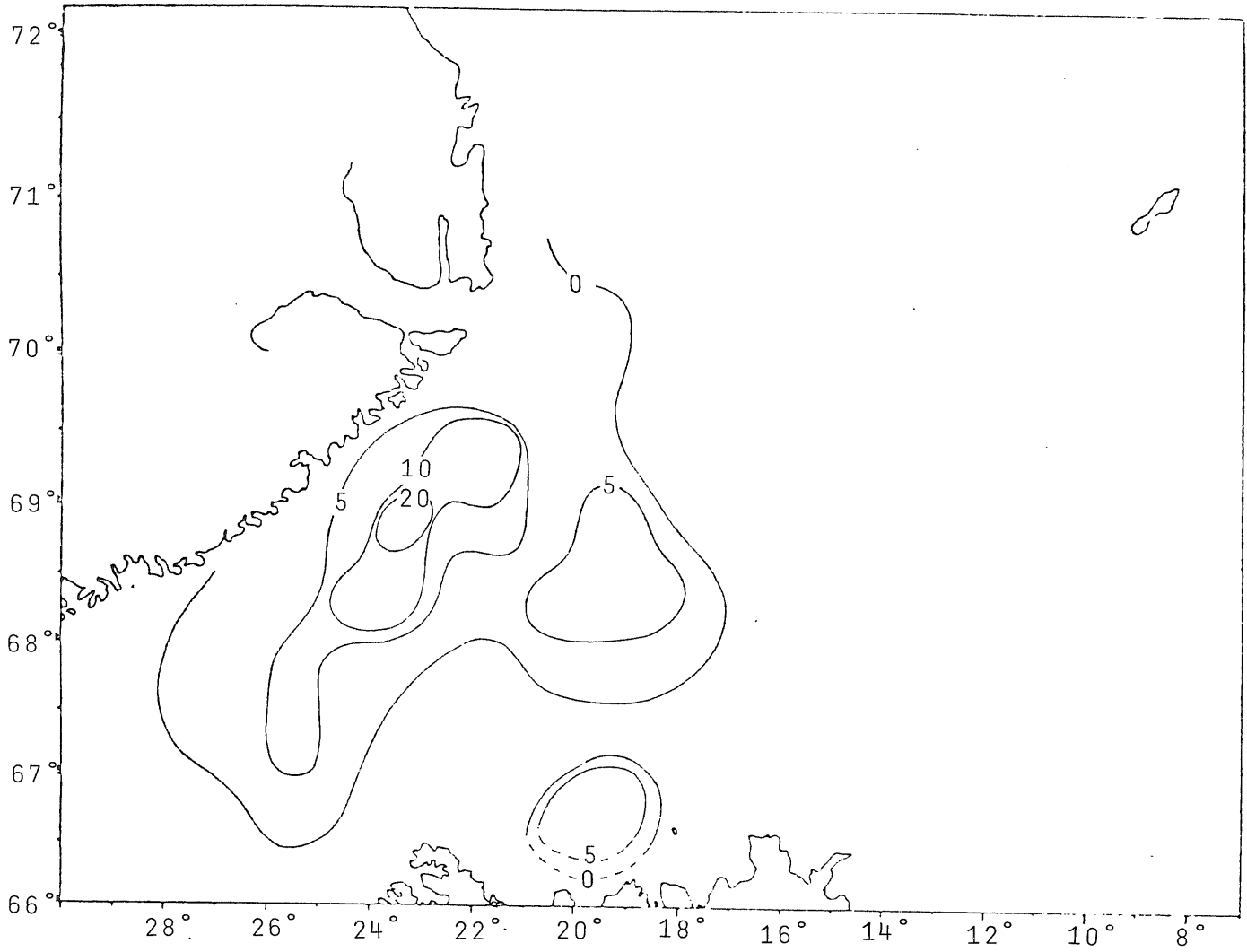


Figure 12. The distribution and abundance of 1-ringers
25/9 - 5/10 1979.

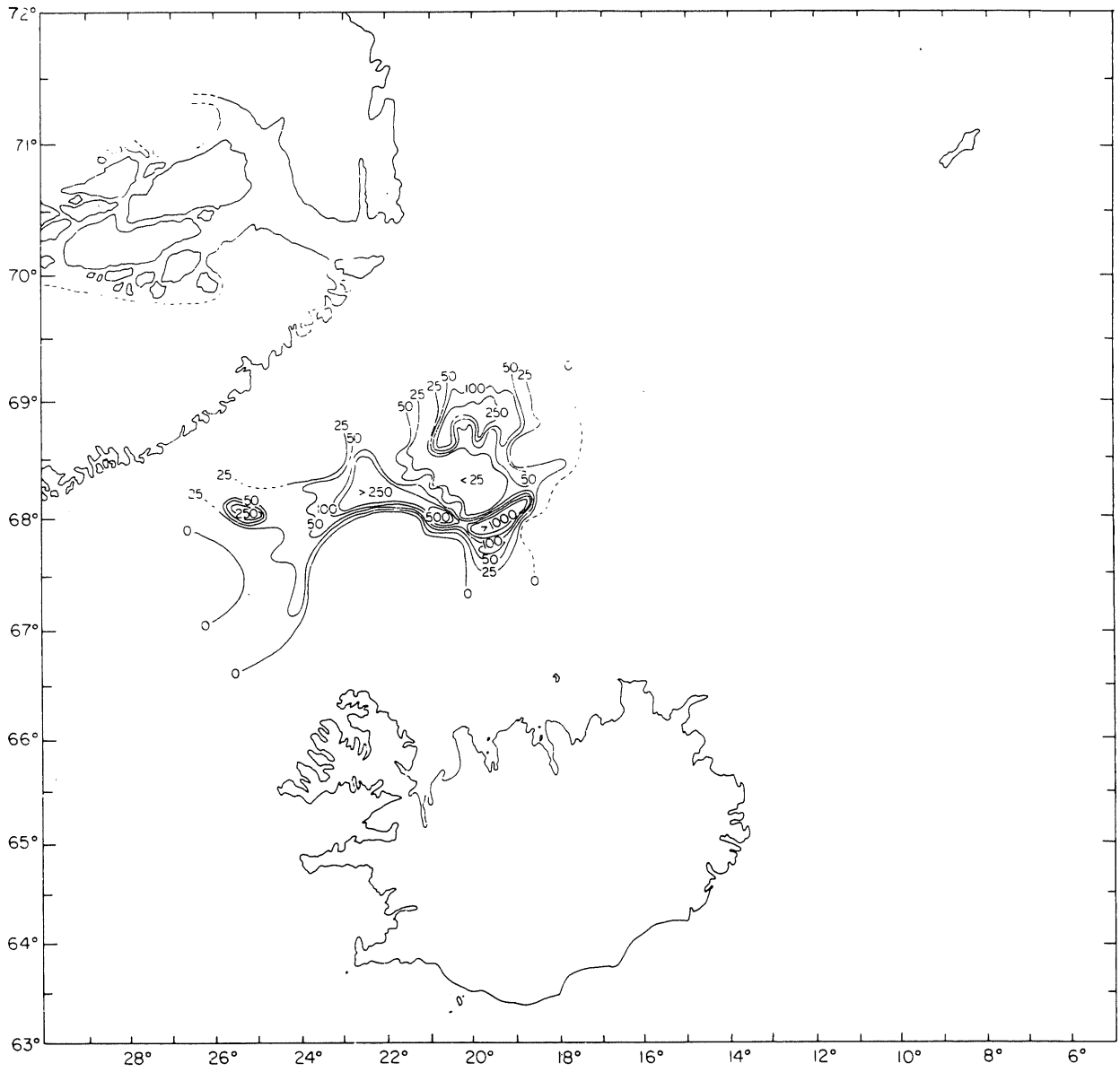


Figure 13. The distribution and relative abundance of capelin, 14-26/10 1979.

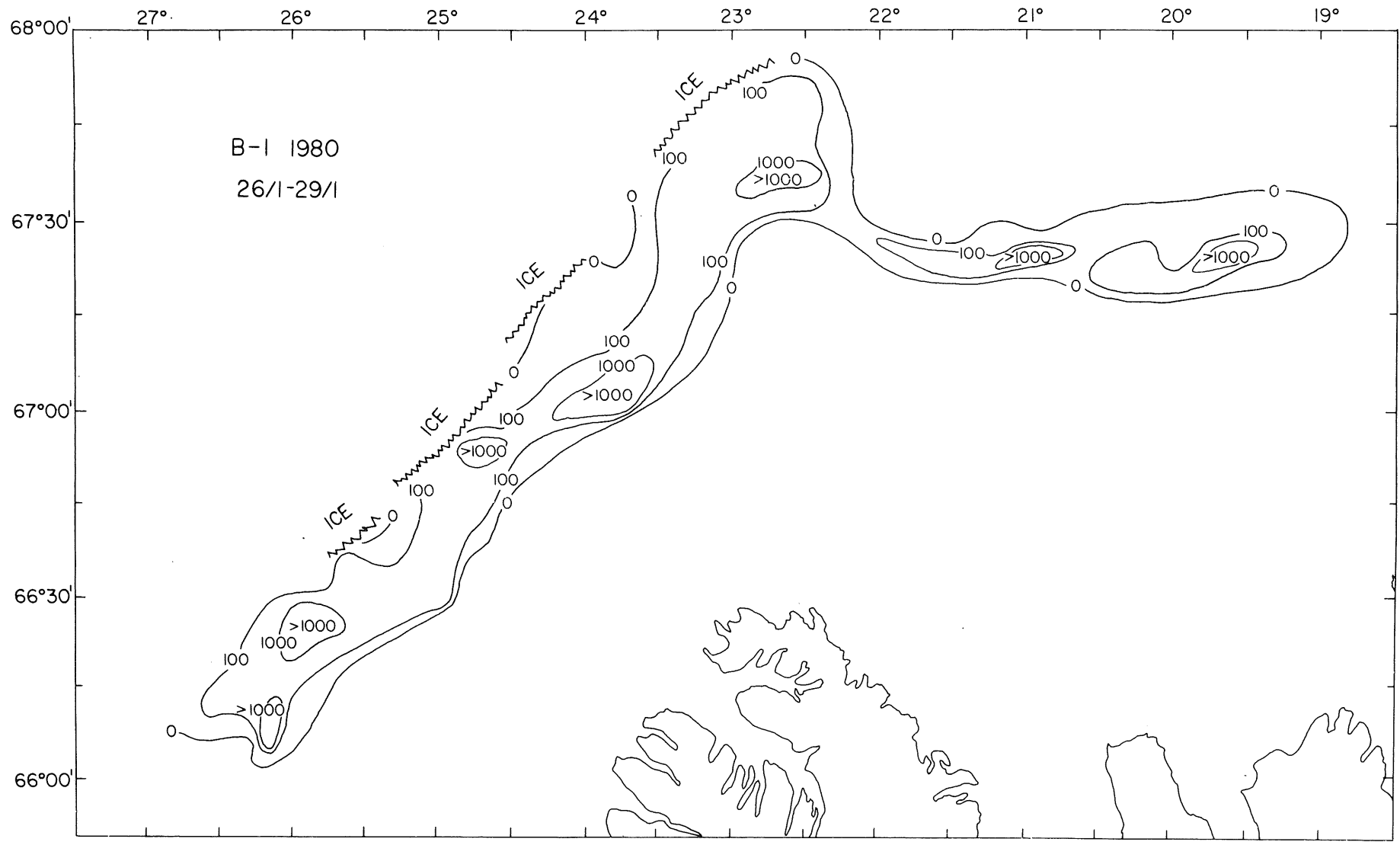


Figure 14. The distribution and relative abundance of capelin, 25-28/1 1980.