

International Council for the
Exploration of the Sea

C. M. 1965
Herring Committee
Distant Northern Seas Committee
No. 161
Attn. Comparative Fishing Committee
Hydrographic Committee

Preliminary Report
of the joint Soviet-Norwegian investigations in the
Barents Sea and adjacent waters September 1965

1. Introduction

At the 1964 meeting of ICES the Herring Committee made the following recommendation (B5):

"The Committee recommends strongly that Norwegian and Soviet research vessels should undertake joint surveys of the distribution of the early stages of herring in the eastern Norwegian Sea and the Barents Sea".

The general program for this survey was discussed between Soviet and Norwegian scientists at the third meeting of the Atlanto-Scandian Herring Working Group in Moscow in May 1965, and it was agreed that the aims of this survey were to investigate the distribution and abundance, not only of 0-group herring, but also of other commercial species of fish and to make hydrographic observations.

Final agreement on the detailed program was reached at a meeting in Umanak on September 2nd and 3rd 1965, and the survey was conducted from the 4th to the 17th of September with two Soviet and two Norwegian research vessels. From the 17th to the 19th of September a meeting was held in Tromsø for the purpose of combining the observations made and to prepare a preliminary report.

The participating vessels and the scientific and technical staff were:

R/V Akademik Knipovich: Yu. K. Benko, A. G. Kisliakov, A. A. Gankov,
M. I. Gusnova, V. M. Naumov, K. A. Semina

R/V Jastreb: I. V. Packhorukov, A. S. Seliverstov, A. I.
Muchin, O. E. Schatoba, E. I. Zajtsev

R/V Johan Hjort: P. T. Hognestad, S. Olsen, B. Brynildsen,
O. Cruickshank, W. Løtvedt, T. Monstad,
H. E. Olsen, W. Rasmussen

R/V G. O. Sars: O. Dragesund, L. Midttun, K. Gran, I. Hoff,
O. Martinsen, B. Myrseth, J. Parker, G. Sangolt

2. Program and methods

It was agreed that the four vessels were to operate in two pairs, consisting of one Norwegian and one Soviet vessel, steaming more or less parallel courses 30-40 miles apart.

As will appear from Fig. 1 one pair of ships covered the eastern and north-eastern areas, whereas the other pair investigated the central and western parts.

The technique and methods applied was the same as that of previous Norwegian surveys (Dragesund and Olsen in press), i.e. a combination of echo sounding and fishing experiments with pelagic trawl. In order to make the observations of each ship directly comparable, all four ships were equipped with the same type of echo sounder and the same type of trawl.

3. General outline of results

The time allotted for the meeting in Tromsø was of course not sufficient for a thorough analysis of the large material of data collected. The report prepared is therefore preliminary in its scope, but nevertheless some fairly definite conclusions were reached.

3.1. Hydrography

The aim of doing hydrographic observations in connection with the investigations of the distribution and abundance of 0-group fish, is to get knowledge of the transporting system.

During this survey 143 hydrographic stations have been taken covering the whole area investigated (Fig. 1). Both temperature and salinity have been observed, giving a basic material for an analysis of the current and transport system. At this stage the salinity samples have not been worked up and hence we can only discuss the temperature condition which are presented by a series of horizontal and vertical section charts in the Figs. 2, 3 and 4.

However, some information of the general features in the current system can be drawn even from these charts, particularly those showing the temperature at the deeper layers (viz. 100 and 200 meters) (Fig. 3). Since the inflowing water of the Barents Sea and the West-Spitsbergen water are much warmer than the water originating from these areas, the inflow will cause tongue shaped outbends of the isothermes, as seen from the horizontal charts, for example outside the West-Spitsbergen, or along the banks near Novaya Zemlya.

The two vertical sections which are presented in Fig. 4 (North Cape - Bear Island and Bear Island - W) have been chosen because there already

exists a large material from these sections, giving the opportunity to compare the present conditions with these of previous years. The average temperature at the section North Cape - Bear Island is about 1° below the normal and the anomaly along the Kola meridian is -0.4° which might indicate that the inflow to the Barents Sea also have been less than the normal. However, other factors may also contribute to such low anomalies.

3.2. Distribution and abundance of 0-group fish

Fig. 5 shows the total distribution of pelagic echo-recordings. In the central part of the Barents Sea and along the continental edge from the Norwegian coast to West-Spitsbergen most of these recordings are caused by 0-group fishes, and to some extent also medusae and euphausiids. In the south western part of the area investigated the recordings also include large blue whiting and large herring, and in the north-eastern parts most of the recordings were probably of large capelin and/or polar cod.

The distribution charts for the different species dealt with in the following paragraphs are based on the catch composition of the trawling experiments and on detailed analysis of the echo-recordings.

3.2.1. Herring

0-group herring were observed in two limited areas (Fig. 6) i.e. 1) between Bear Island and the Norwegian coast ($72-73^{\circ}\text{N}$ and $18-25^{\circ}\text{E}$), and 2) along the edge of the continental shelf from NW of Bear Island to Isfjorden on West-Spitsbergen ($75-78^{\circ}\text{N}$). Outside these small areas no 0-group herring was identified. Special attention was also paid to investigating some of the traditional "småsilde" fjords north of the Lofoten Islands (Eidsfjord, Ullsfjord, Lyngenfjord, Revsbotn and Varanger). In contrast to the conditions observed at the same time in previous years, when 0-group herring were present in these fjords or at their entrances, this survey indicated that there were only insignificant numbers of 0-group herring in the coastal areas.

It is thus evident that the abundance of 0-group herring in the area investigated is exceptionally low as compared with previous years.

3.2.2. Cod

0-group cod was caught in a small number at only one of the 86 trawl stations. Neither did the echo-recordings show any traces which could be interpreted as caused by 0-group cod. In the same month in previous years cod fry have frequently been found pelagically distributed in the same areas, and in some years in large abundance. It is hardly likely that this

year nearly all the young cod had already at the beginning of September descended to the bottom strata, and it is therefore justified to conclude that the 1965-year-class of cod is very small.

3.2.3. Haddock

Haddock were observed in two very limited areas (Fig. 7) i.e. 1) midways between Bear Island and the Norwegian coast, and 2) between Bear Island and West-Spitsbergen. It is safely concluded that also the 1965 year-class of haddock is poor.

3.2.4. Redfish

Redfish were found in abundance in the areas between the Norwegian coast and Bear Island (Fig. 8), between Bear Island and West-Spitsbergen, along the continental slope, off West-Spitsbergen, and west of Andenes. The area of distribution extended to Skolpen Bank, but in the eastern part the abundance was low. It should be noticed that the size distribution varies between different regions, and in particular that the redfish in the southwestmost part were very small.

This distribution is very similar to that observed in 1964, and the total abundance in the area this year seems to be of the same order of magnitude. According to the Norwegian investigations conducted in the years before 1964 such a wide distribution of 0-group redfish has never been observed, nor has the abundance been nearly as large. This may indicate that there have been two strong year-classes in succession, but one cannot exclude that the high abundance may mainly be caused by a change in the total distribution pattern for the 0-group redfish.

3.2.5. Capelin

Capelin were found in two main areas (Fig. 9) 1) from North Cape to 41°E south of 74°N , and 2) between Bear Island and West-Spitsbergen. In addition a small patch was found southeast of Bear Island.

Compared with previous observations in the Barents Sea it is evident that the young capelin this year have a westerly distribution, but there is not sufficient data from previous years to make any statement about year class strength.

3.2.6. Long rough dab

Long rough dab was found to have a very wide and continuous distribution (Fig. 10) extending from Novaya Zemlya in the east (72° - 73°N) through the central part of the Barents Sea and further northwest along the Spitsbergen continental edge. The areas of greatest density seemed to be in the central

part between 72°30' to 74°30'N and 28° to 25°E, between Bear Island and the Norwegian coast, and in the area between Bear Island and Spitsbergen. According to previous Norwegian investigations long rough dab has not been found in comparable abundance since 1960.

4. Concluding remarks

Perhaps the most striking result/has come to light from this survey is the very low abundance and restricted distribution area of the 0-group of the commercially important species, herring, cod and haddock. This may be caused by a very low survival rate for the 1965 broods of these species, and/or a low inflow of Atlantic water into the Barents Sea, as indicated by the westerly distribution of capelin fry and the negative temperature anomaly in the North Cape - Bear Island section.

This emphasizes the need for more studies of the interrelationship between the transport of water masses and the distribution of fish larvae and fry.

The experience from this first four-ship survey confirms that a joint multi-ship investigation along similar lines as that of the present one, may provide a reliable picture of the distribution and abundance of 0-group fish. However, it is necessary to improve the methods of identifying the echo recordings and for providing biological samples, i.e. by better pelagic trawls and trawling technique, direct under-water observation facilities, acoustic techniques etc.

It was therefore unanimously agreed by the participating Soviet and Norwegian scientists that these joint investigations shall be continued in the future, and possibly be extended **both with** regard to scope and volume of work.

The program for next year is to be discussed by correspondance and finally agreed at a meeting in Murmansk immediately prior to the start of the 1966 survey.

Reference

Dragesund, O. and Olsen S. 1965. On the possibility of estimating year-class strength by measuring echo-abundance of 0-group fish. Fiskeridir. Skr. Havundersøk., 13 (8) (in press).

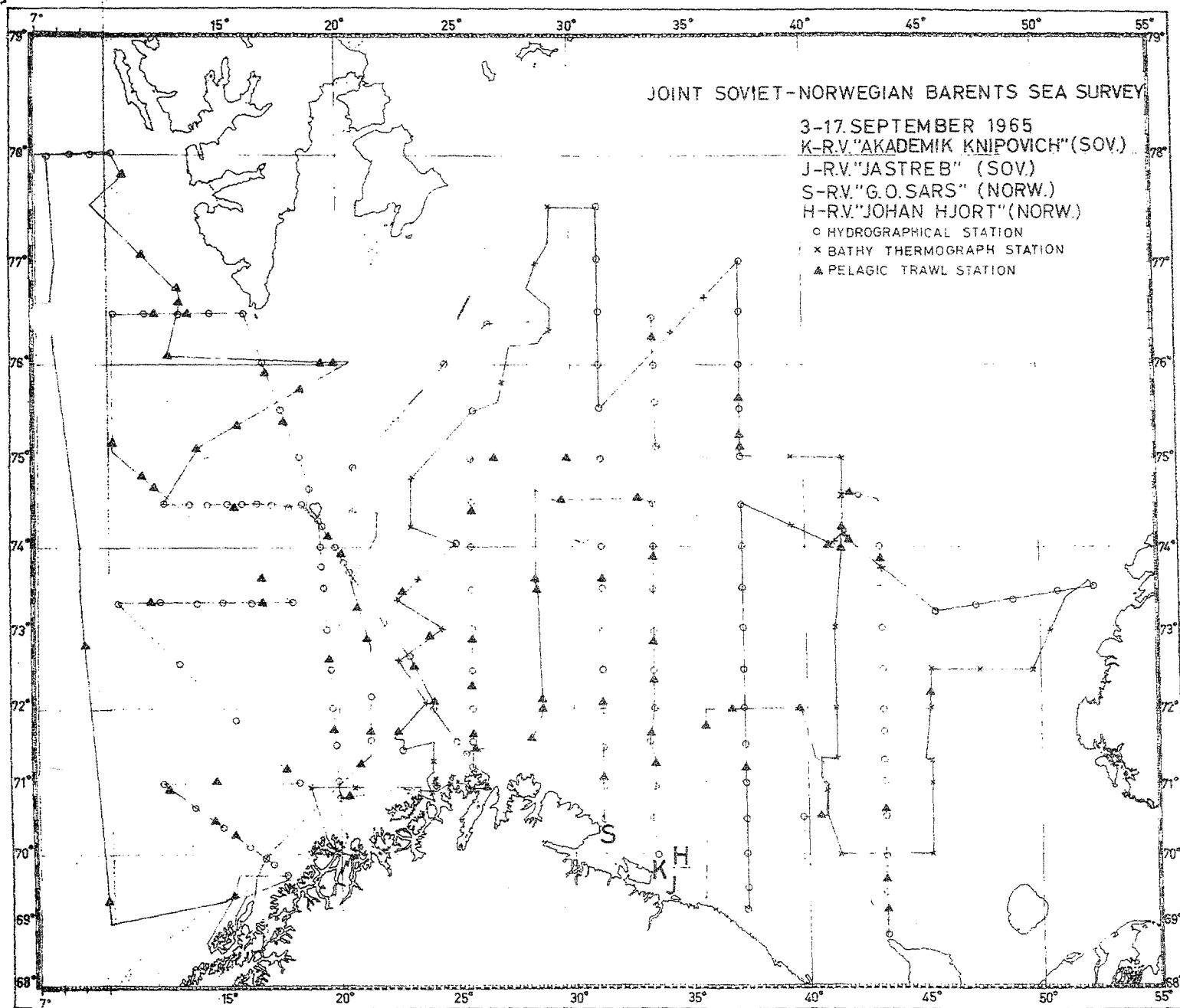


Fig. 1. Routes and stations

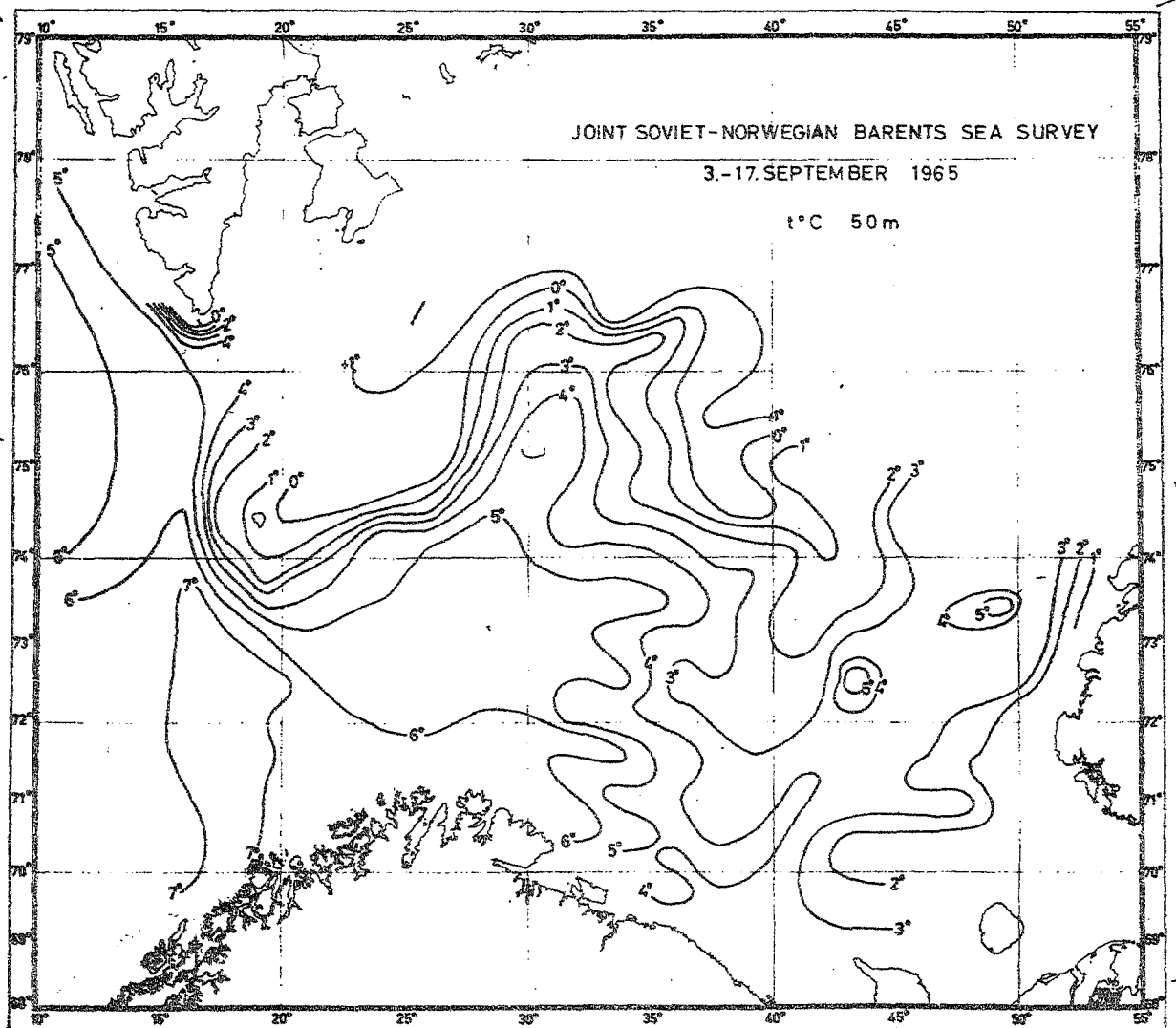
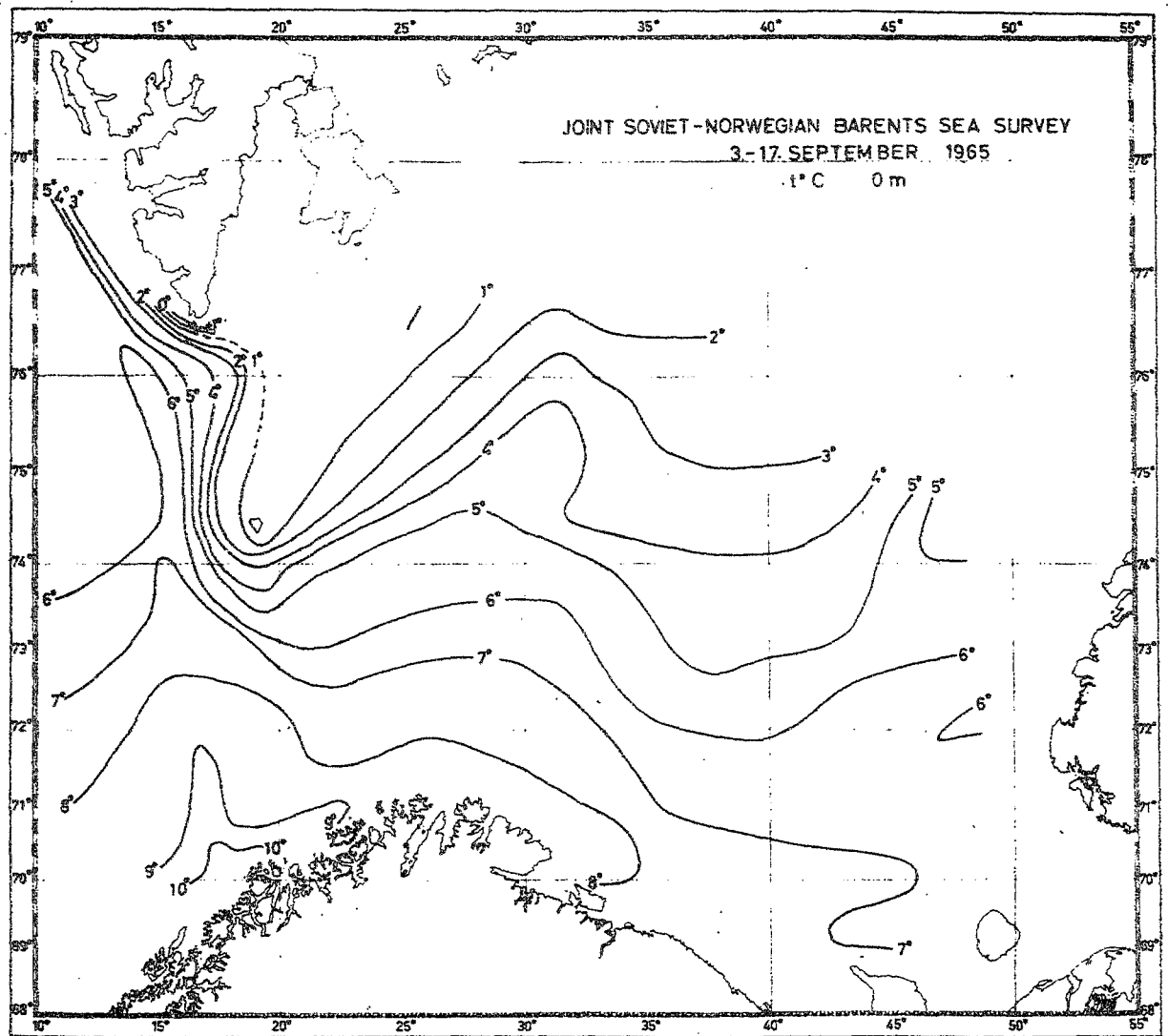


Fig. 2. Isotherms at 0 and 50 m

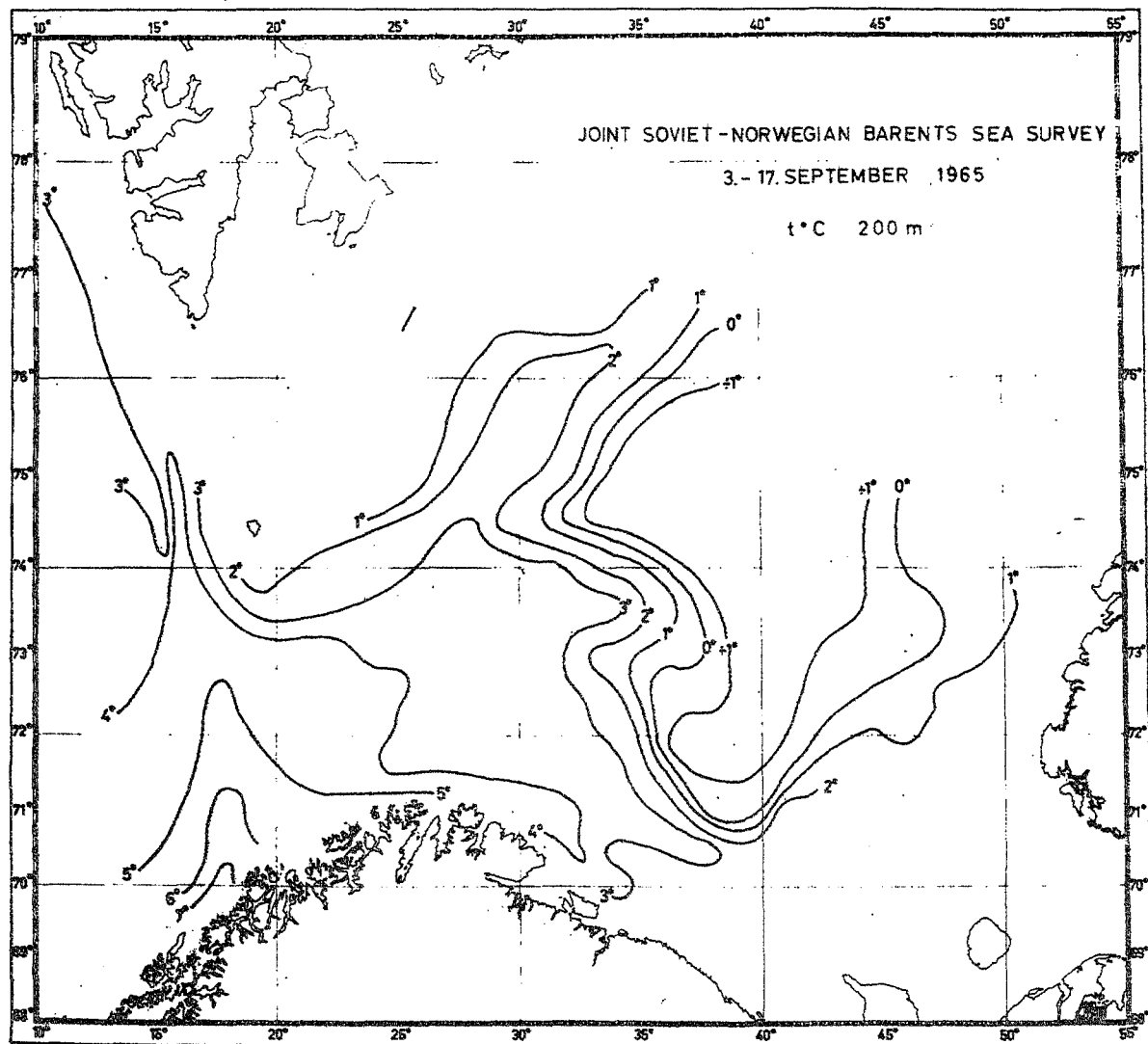
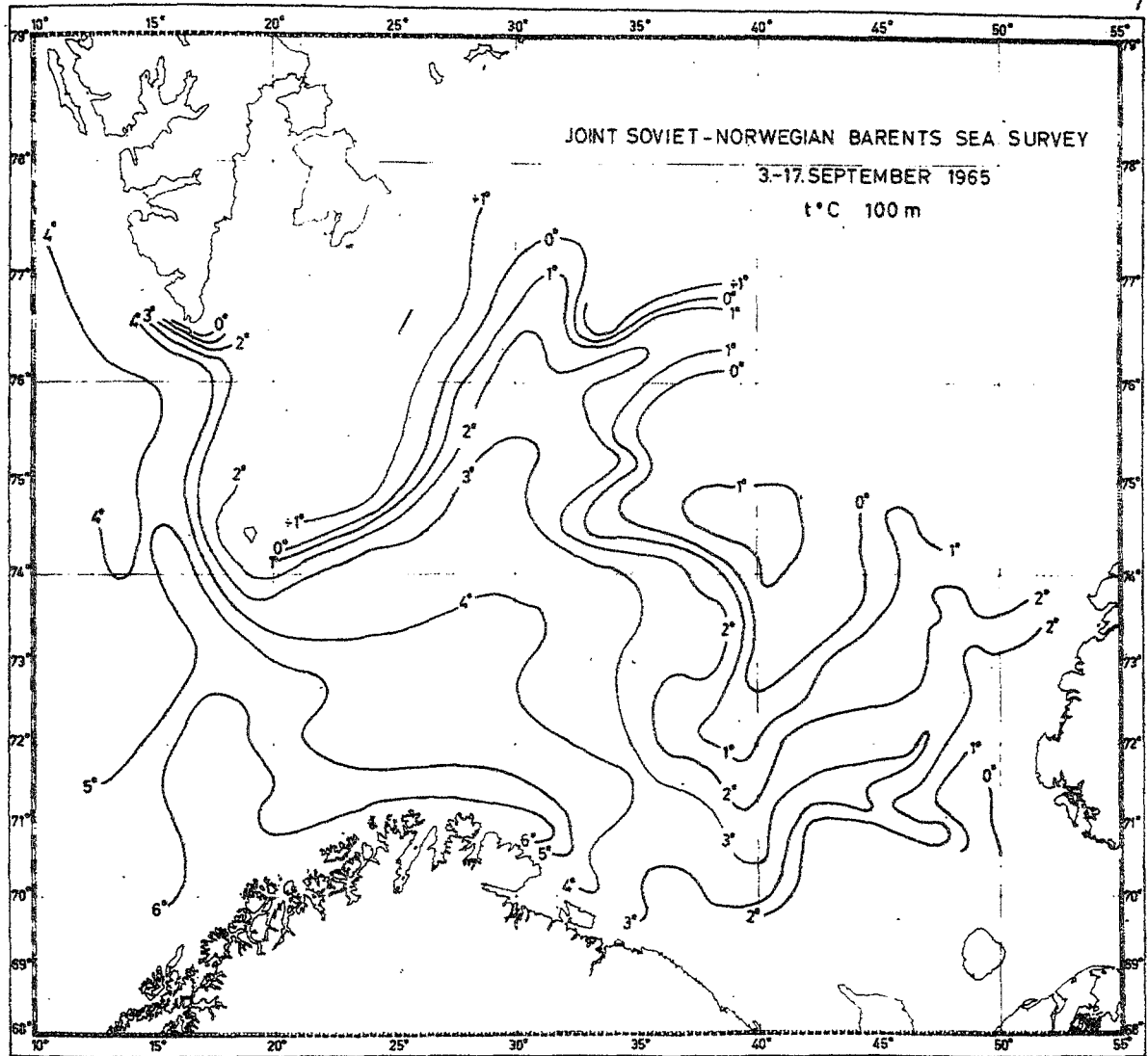


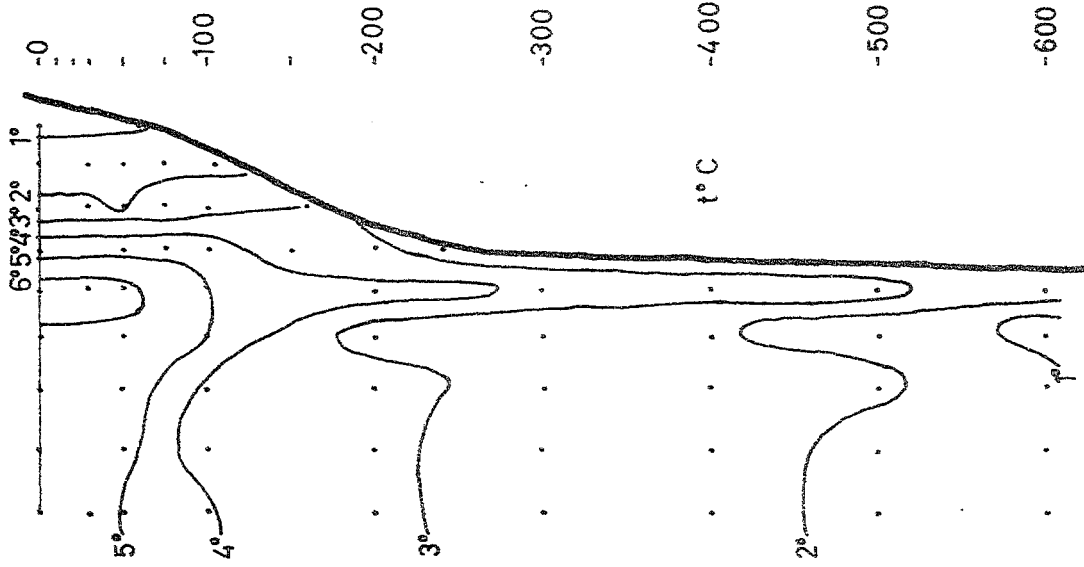
Fig. 3. Isotherms at 100 and 200 m

BEAR ISLAND -- W

SEPT. 1965

"AKADEMIK KNIPOWICH"

ST.No. 28 27 26 25 24 23 22 21 20



NORTH CAPE -- FAR ISLAND

SEPT. 1965

"AKADEMIK KNIPOWICH"

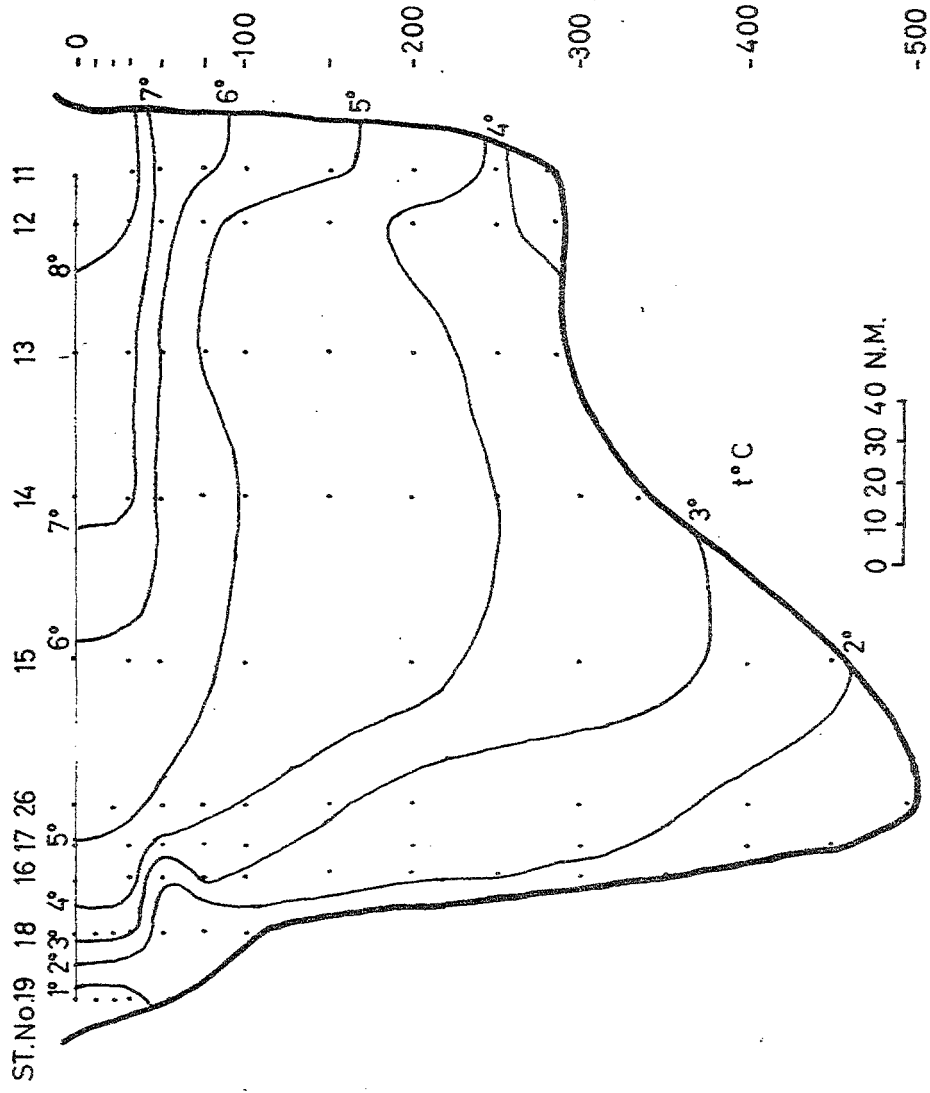


Fig. 4. Vertical temperature section North Cape - Bear Island - West

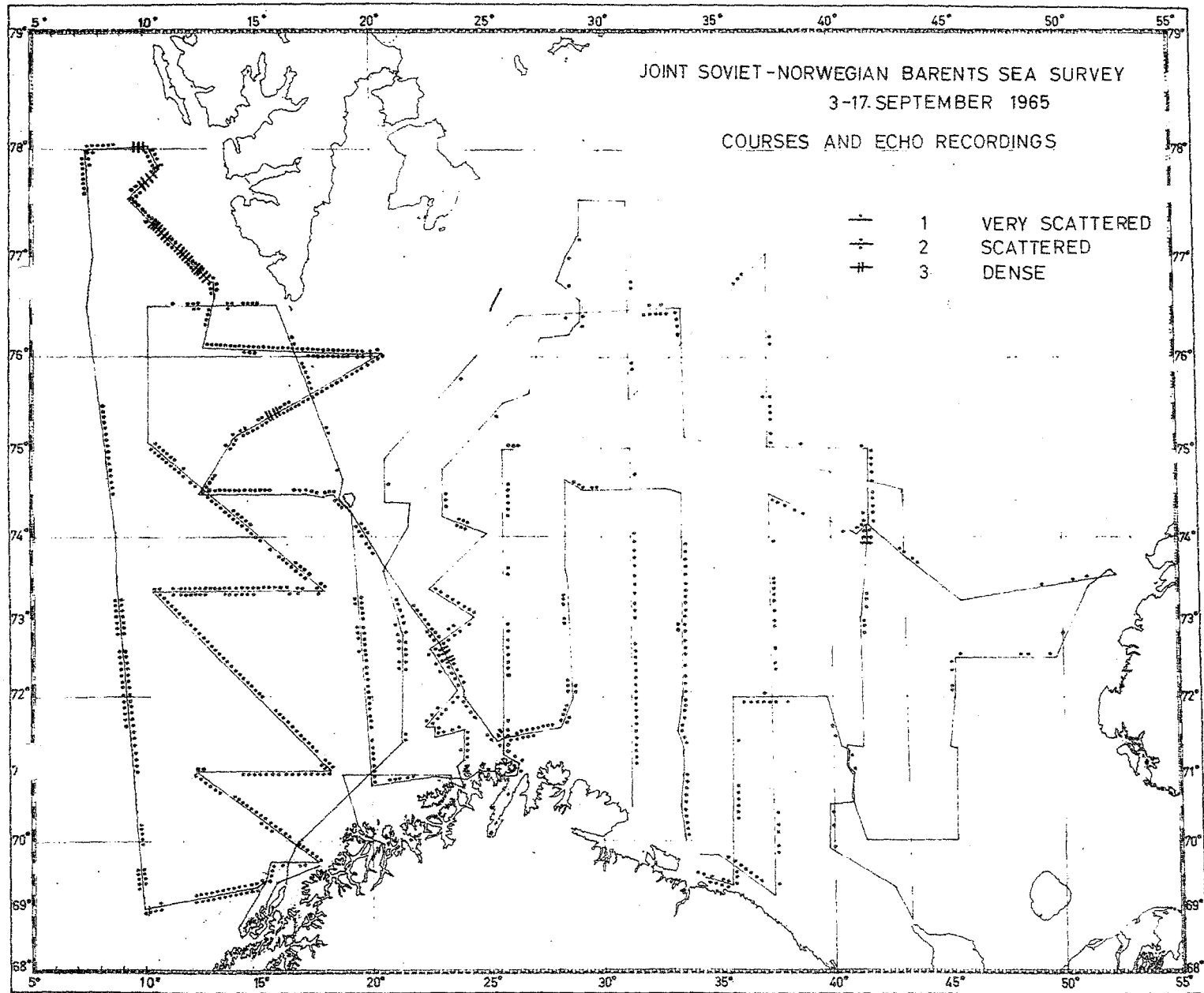


Fig. 5. Courses and echo recordings

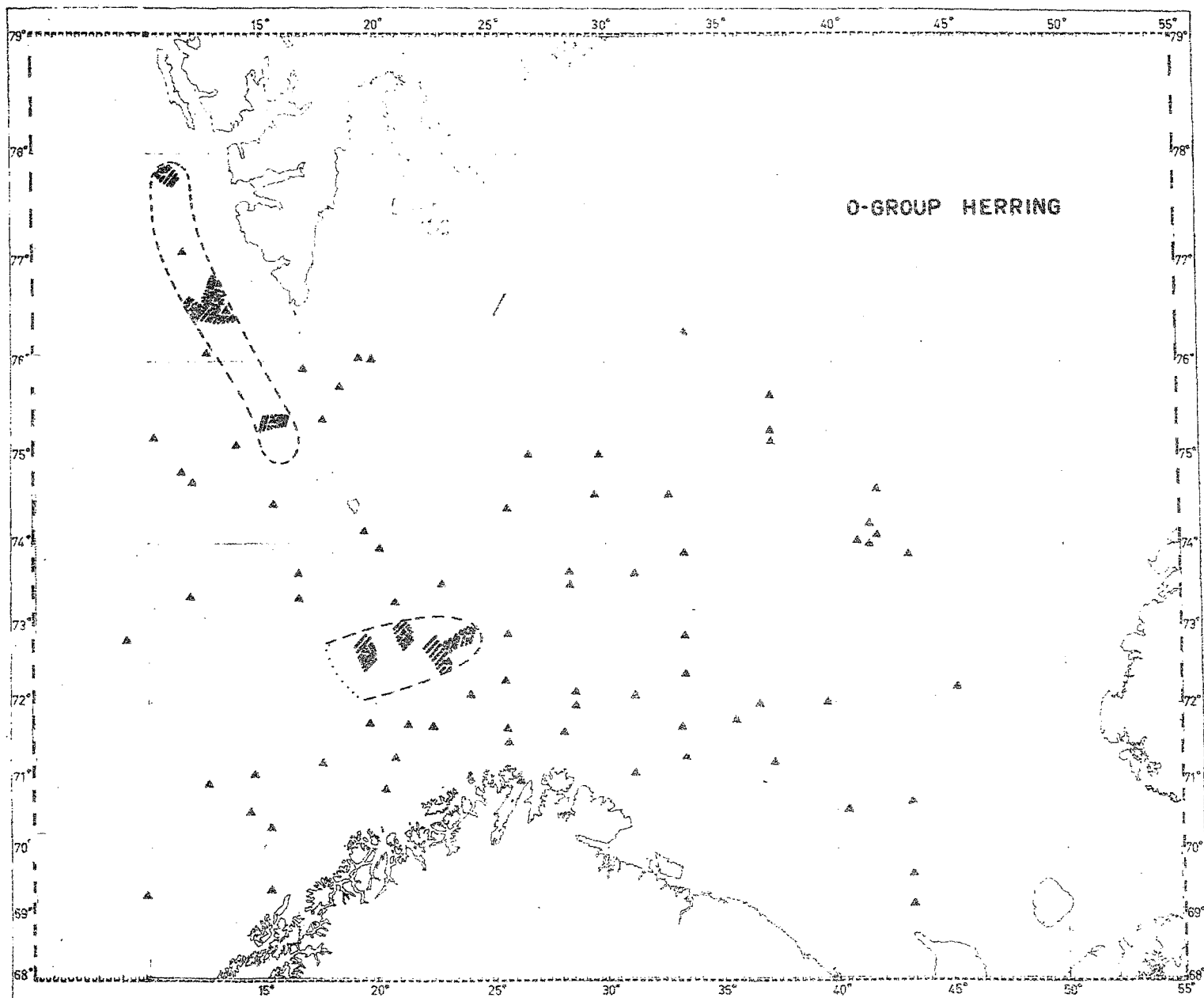


Fig. 6. Distribution of O-group herring

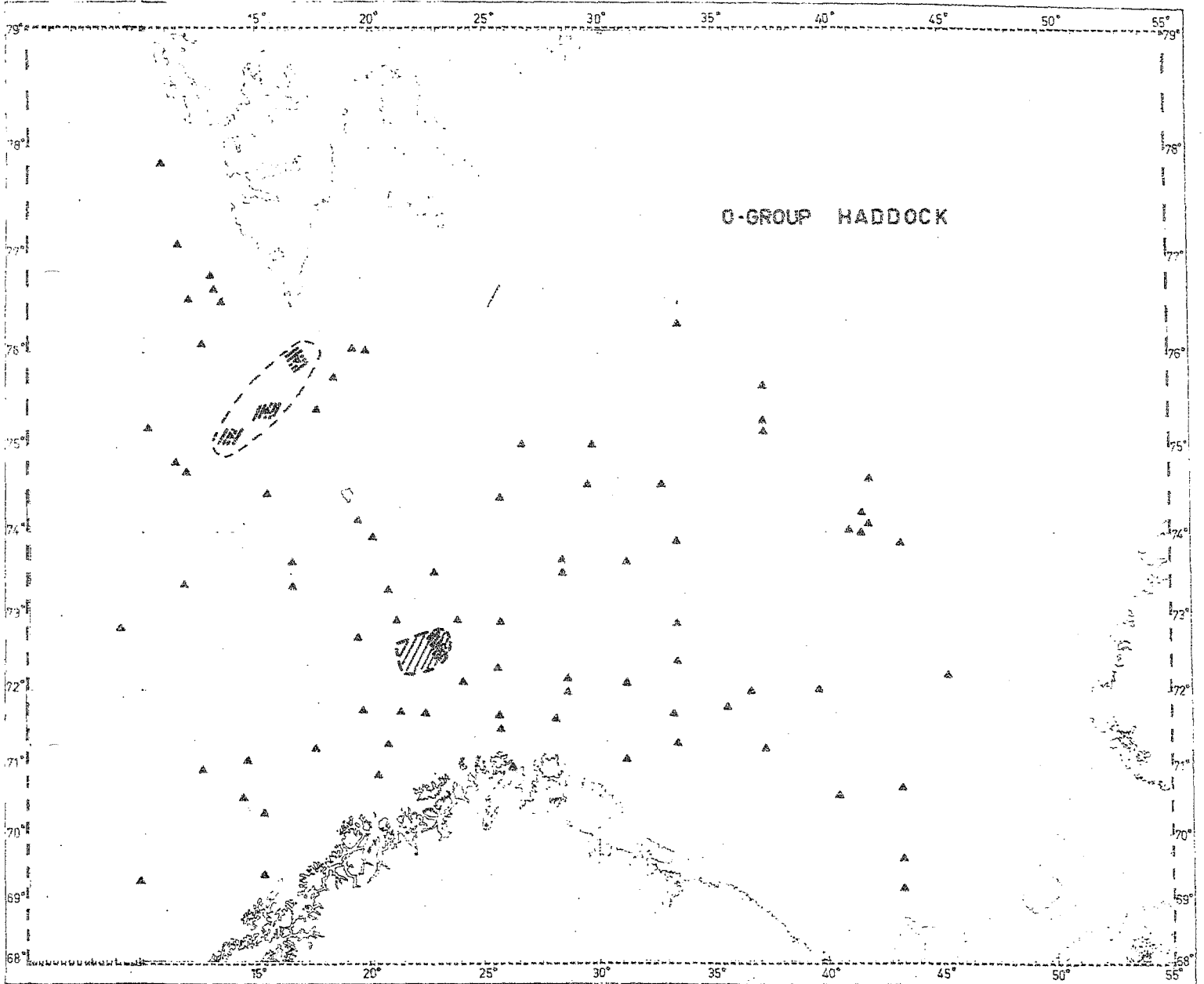


Fig. 7. Distribution of O-group haddock

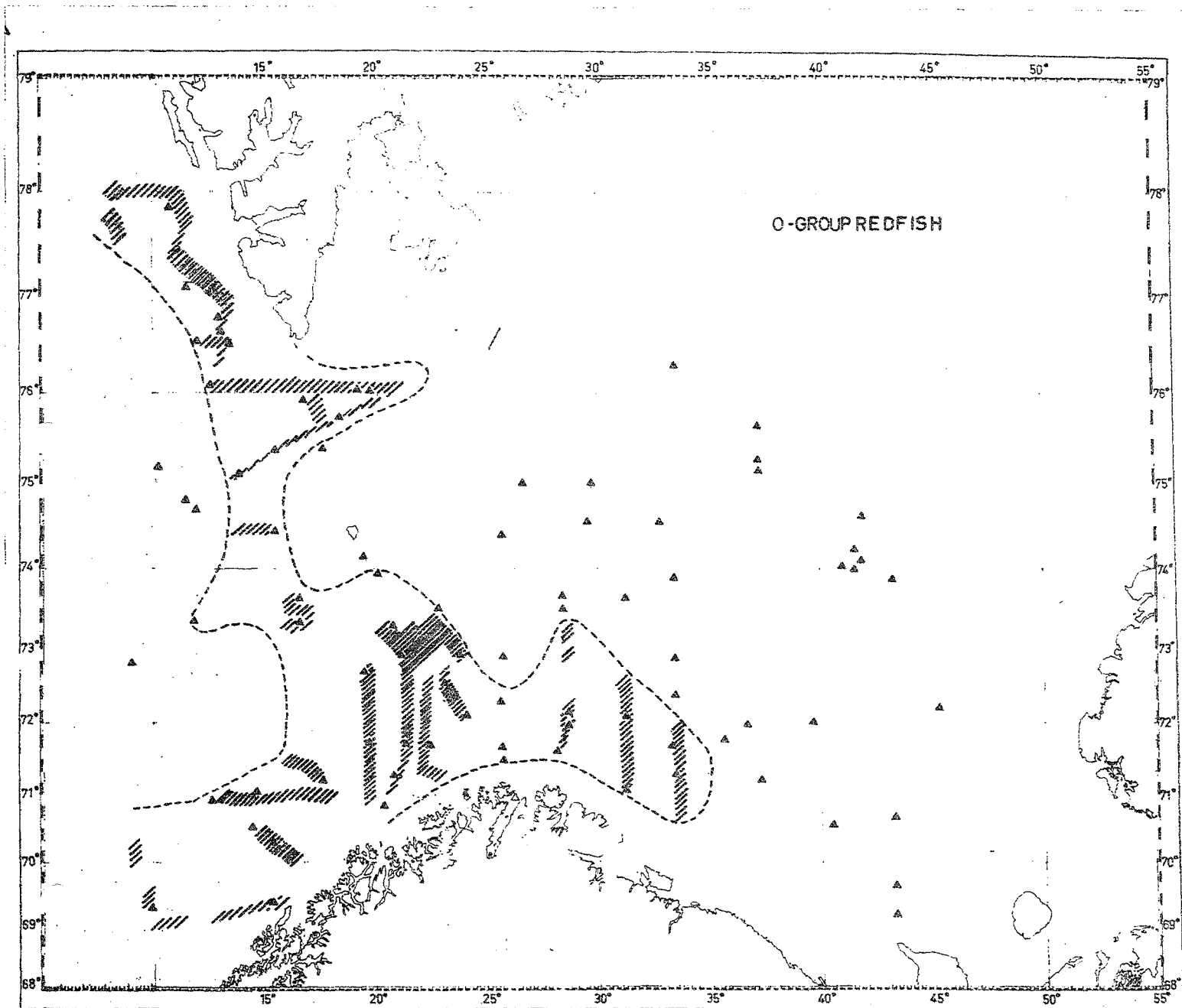


Fig. 8. Distribution of 0-group redfish

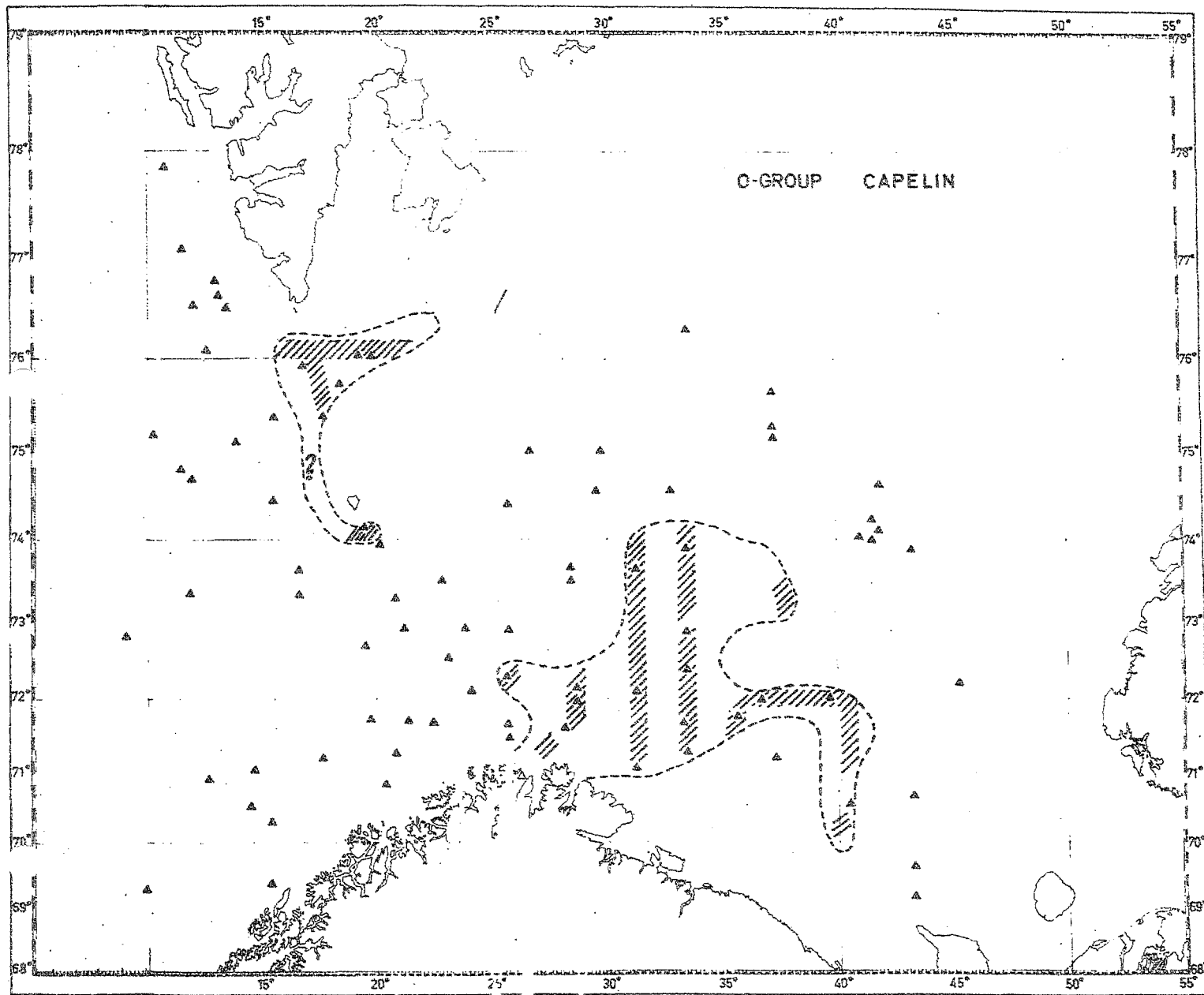


Fig. 9. Distribution of O-group capelin

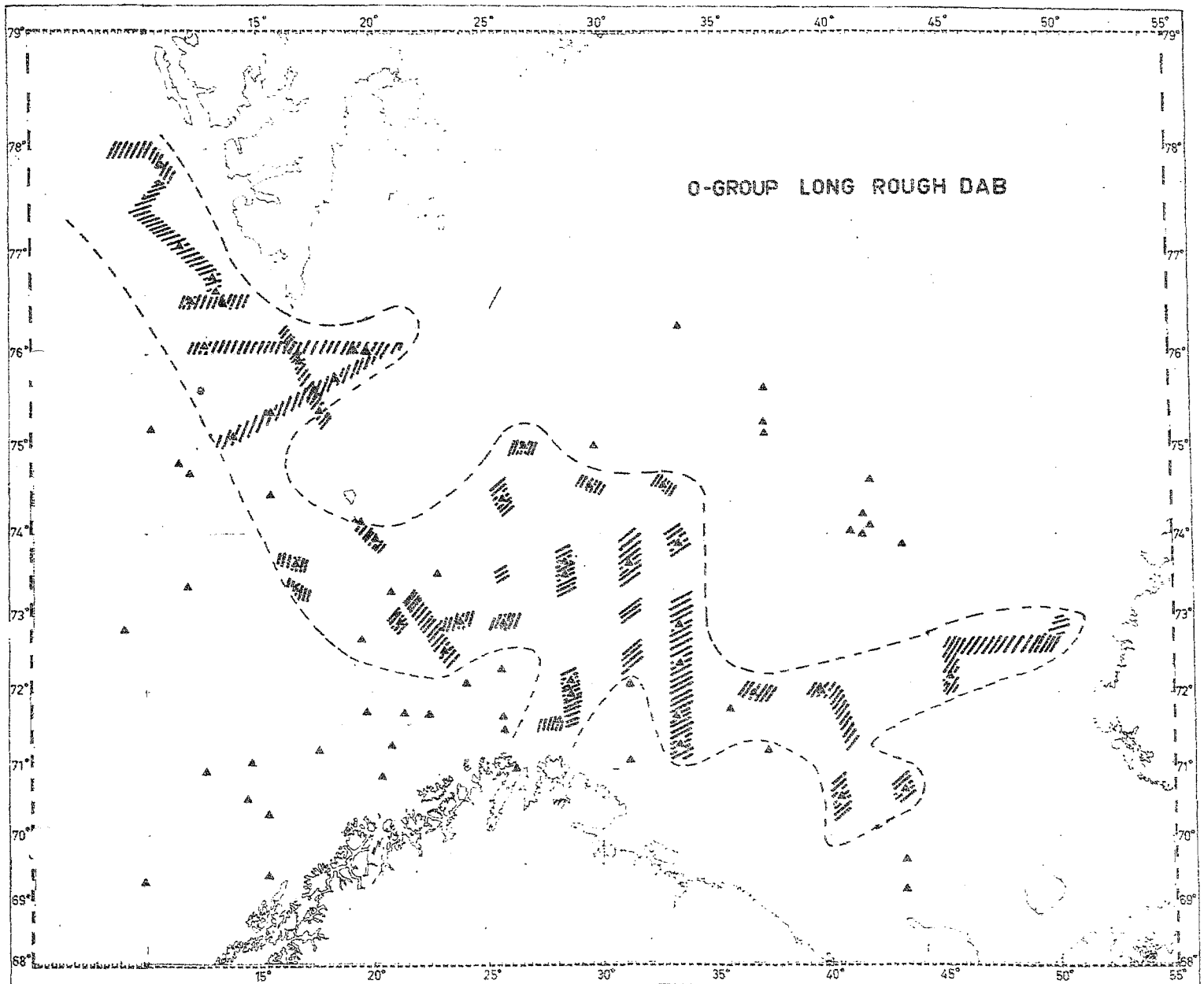


Fig. 10. Distribution of 0-group long rough dab