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ON THE MIGRATIONS OF THE NORTH COAST HERRING DURING THE SUMMER SEASON IN RECENT YEARS WITH SPECIAL REFERENCE TO THE INCREASED YIELD IN 1961 AND 1962

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Introduction.

The migrations of the North coast Herring have been studied during a period of over thirty years. During the thirties morphological, as well as scattered fisheries statistics, were the only practical means by which it was possible to study the herring migrations. During the last 10 years detailed acoustic horizontal ranging (asdic), aided by successful tagging, makes it possible to get a relatively accurate picture of the complex feeding migrations that take place during the summer off the North coast of Iceland. The general migration pattern during the poor years 1945 - 1959 (inclusive) was discussed in my comtribution no. 44 at the ICES Herring Symposium 1961. Reviewing these very shortly, the following characteristics can be pointed out: At the beginning of the season in June two main invasions have been observed, one coming from the West (Icelandic spring spawners) and another coming from the North east (Norwegian spring spawners). During the first half of July these have soon dispersed off the North coast due mainly to generally great influx of Atlantic waters that have been poor with regard to food for favourable shoaling behaviour resulting in very little fishing off the North coast during the second half of the season. Off the East coast circumstances for the formation of large shoals have often been better than off the North coast with the result that the main part of the fishery has taken place there. In recent years the herring migrations that enter the East coast fishing grounds have become increasingly strong in recent years and have been responsible for the recovery tendency of the fishery in the late 50ties. These migrations have been of mixed Norwegian and Icelandic origin and usually contained a great number of year classes varying from 2 - 20 years old herring. Thus the migration pattern of recent years has been quite different from that of the good herring years before 1945, when the herring fishing took place off the North coast throughout the summer.

During the two previous seasons very good catches have been obtained. In 1961 the yield reached 212 thousand tons, and in 1962 an over all record of 320 thousand tons was accomplished. A large part of this increase is due to improvements in fishing and searching technique, although biological factors also play their parts. These will now be discussed and compared for these two years.

The 1961 migration pattern.

The 1961 migration pattern is illustrated in Fig. 1. Fisheries statistics show that only 8.2 per cent of the catch were taken in the old and traditional herring grounds off the western North coast. No fishing took place on the traditional grounds off the middle and eastern North coast while 67 per cent came from the East coast grounds. The remaining 24.8 per cent were taken in far offshore waters off the eastern North coast never utilized in the "good" years before 1945. Thus the good 1961 season had in fact many of the characteristics of the 1945 - 1960 poor years period. The differences were, however, (1) greatly increased food in the offshore areas off the eastern North coast during second half of June and first half of July, and (2) much stronger migrations of the Norwegian 1950 year class, as well as that of the oldest part of the Icelandic spring spawning-populations to the East coast fishing grounds, where favourable shoaling conditions remained throughout July and August. (1) resulted in new far offshore fishery which lasted for 3 weeks in June - July, and (2) greatly strengthened the East coast yield and made up the bulk of the record catch.

The 1962 migration pattern.

The early migration pattern of this season is shown in contribution no. 132, and it is quite clear that during the first 3 weeks in June the characteristics are similar to those of previous years (e.g. Jakobsson and Östvedt 1961). Comparison between 1961 and 1962 reveals that in 1962 the very important northeasterly migration entered the far offshore waters off the Eastern and middle North coast during the first week in June while this did not take place until the 3rd and 4th week in June in 1961. The first part of this invasion lasted until the middle of July 1961, but this year the herring moved swiftly eastwards during the 3rd week in June, or 3 weeks earlier than in 1961. The western invasion of the Icelandic spring spawners (mainly 1956 year class) was similar in both years and accounted for less than 10 per cent of the total catch. Similarly the invasions of old Norwegian and Icelandic herring to

the East coast fishing grounds in July were of similar strength in both years and yielded over 100 thousand tons, there being even better feeding conditions in 1962 than in the previous years. Thus in many ways the two years had some similar characteristics, although there were several exceptions that will now be discussed.

Unlike 1961 there was a second northerly invasion of herring in 1962 to the eastern North coast offshore waters, as shown in Fig. 2. This invasion was distributed along the northern borders of the warm Atlantic waters and reached quite far West. Unusually favourable feeding conditions in the area of the mixed frontal waters were undoubtedly responsible for sporatic formations of large shoals during the first half of July, on which considerable fishing was based. During very many previous years the development during the second half of July had been as is described here above, but Fig. 3 shows that instead of increased inflow of Atlantic waters, as in previous years has been the custom, tongs of cold water below 6^{o} have entered the North coast areas, thus bringing the areas of mixed water nearer the banks off the western North coast. Not only did the herring concentrations of these waters (Fig. 2) follow, but the change in environment also catalized the formations of large shoals resulting in good catches of Norwegian spring spawners in this area during late July for the first time in several years.

The 1962 fishery off the North coast during the second half of July supports the suggested relationship between the herring catches and temperature (inflow of Atlantic water) off the North coast during the good herring years prior to 1945 (e.g. Jakobsson, 1961). Viz. in years with below normal temperatures off the North coast the better catches during the second half of the season in the North coast area proper. Further confirmation of this was obtained during August and September 1962, when it was found that the herring concentrations stayed much longer off the North coast than in previous years. Until the end of July the herring concentrations off both the North and the East coast had mainly consisted of old Norwegian and Icelandic yearclasses (mainly those of 1950, 1951 and 1956), but during August these concentrations were increasingly strengthened by an invasion of immature herring. Preliminary examination of samples reveals that the majority of these were 2- and 3-ringers. Since some of the 3-ringers had distinctly Norwegian scale pattern it was already during the first week of August suggested that at least some of the 3-ringers were a part of the Norwegian 1959 year class. Considerable returns from Norwegian 1961 fat herring tagging experiments in Icelandic reduction plants clearly support the scale type determination.

Conclusions.

Thus as shown in Figs. 2 and 3 and pointed out in the text, the migration pattern of the 1962 North and East coast season differs considerably from that of previous years. These differences are almost certainly in close correlation with changes in the intermixing of the warm and cold watermasses (Atlantic and Polar) that took place during the second half of July, as well as exceptionally good feeding conditions.

The greatly increased yield off the North coast fishing grounds in 1962 as well as comparison of other data suggest that some of the factors of the migration pattern in 1962 closely resemble that of the good herring years prior to 1945.

The presence of the Norwegian 1959 year class on the North and East coast fishing grounds in August this year suggest that this yearclass may have unusual migration pattern, since normally the Norwegian yearclasses do not enter Icelandic waters in great quantity until they have spawned several times (see: Fridriksson, 1944).

References

Fridriksson, A. 1953 - 1961.

The Icelandic North Coast Herring, Ann. Biol. Vols. IX - XVI

Jakobsson, J. & Östvedt, O.J. 1961.

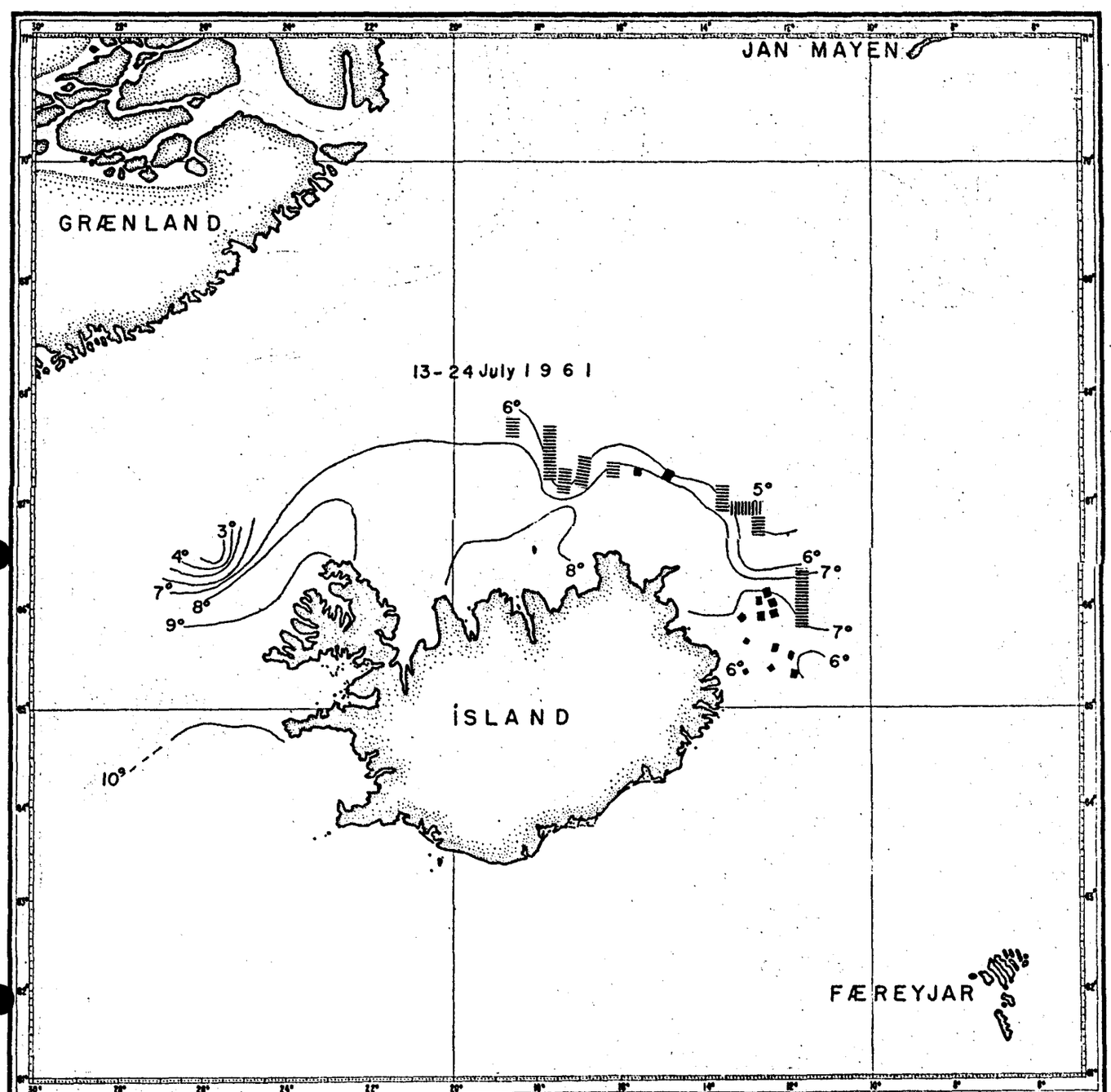
Report of the Joint Meetings of the Norwegian and Icelandic Scientists Working on Board G.O.Sars and Ægir during the First Half of June in 1961. Presented at the meeting of the Herring Committee ICES 1961.

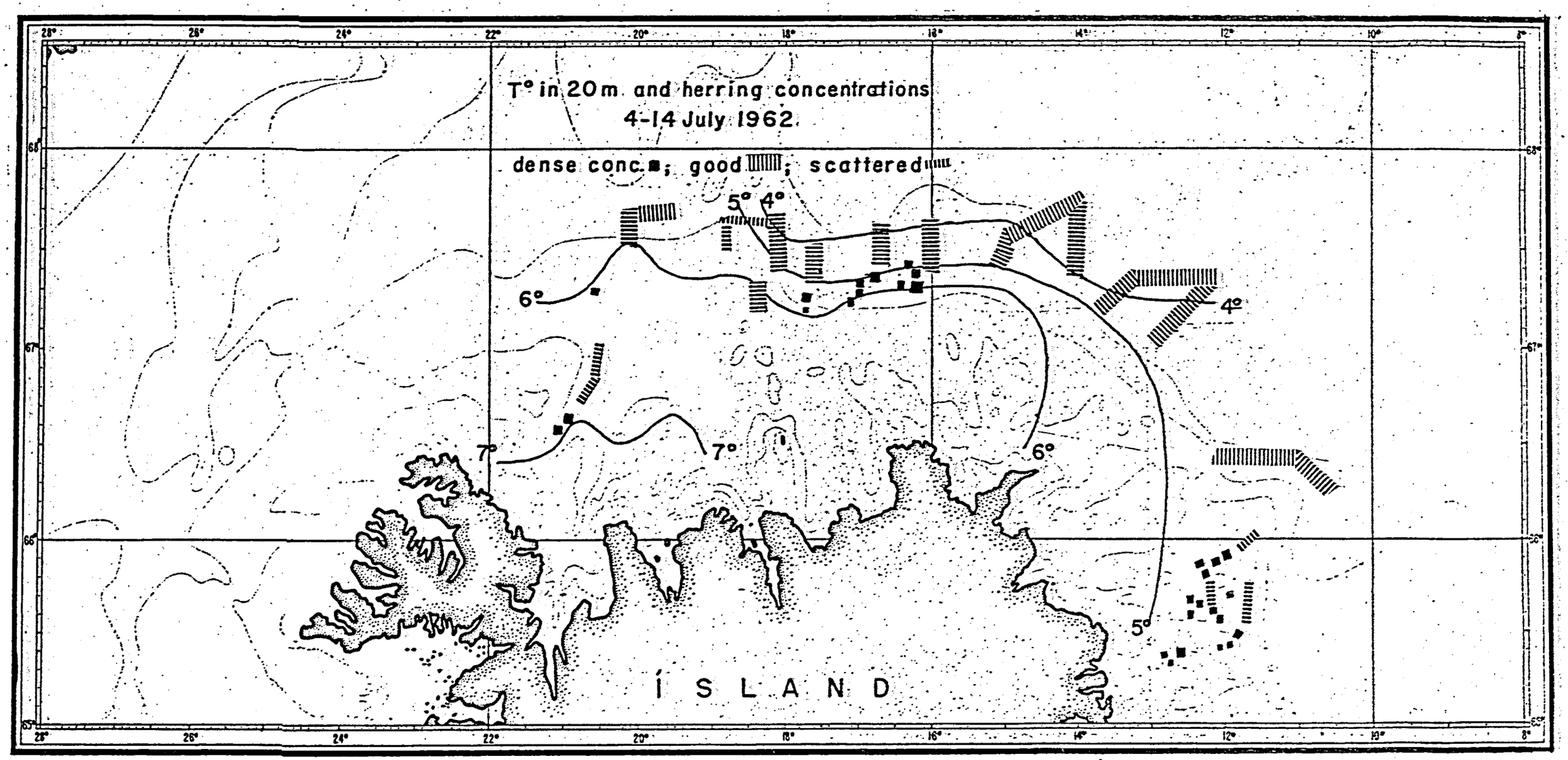
EXPLANATIONS OF FIGURES

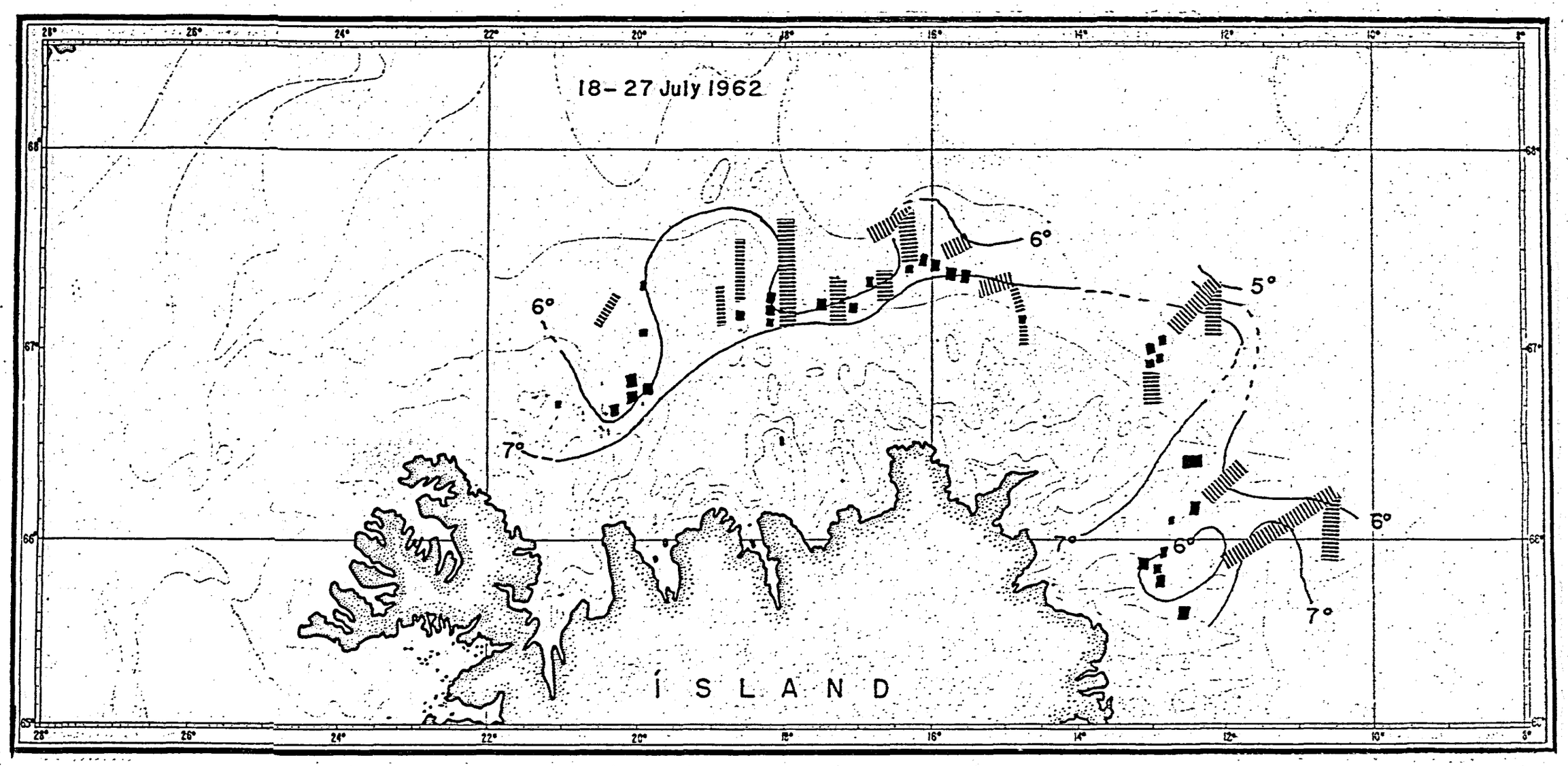
Fig. 1. Temperature in 20 m and herring concentrations in July 1961. For denotations see Fig. 2.

Fig. 2. Temperature in 20 m and herring concentrations 4-14th July 1962.

Fig. 3. Temperature in 20 m and herring concentrations 18-27th July 1962. For denotations see Fig. 2.


JAN MAYEN
GRÆNLAND
13-24 July 1961
6°
5°
3°
4°
7°
8°
9°
8°
6°
7°
7°
6°
6°
ÍSLAND
10°
FÆREYJAR


T° in 20m and herring concentrations
4-14 July 1962
dense conc. ■; good ▥; scattered ▥
5°
4°
6°
4°
7°
7°
6°
5°
ÍSLAND


18- 27 July 1962
28°
26°
24°
22°
20°
18°
16°
14°
12°
10°
8°
68°
67°
66°
65°
6°
5°
7°
ÍSLAND