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Results of the joint FRG-US bottom trawl survey, R/V *Anton Dohrn*, 1-28 October 1978, in ICNAF Subareas 4 and 5

by

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Introduction

A Fishery Conservation and Management Act creating a 200-mile controlled fishing zone in United States coastal waters became effective in March 1977. U.S. Regional Councils were established and assigned the responsibility of setting quotas and limits based on recommendations and data from the National Marine Fisheries Service.

Based on the minimal herring catches made by the international fleet in ICNAF Subareas 4 and 5 during 1977, the U.S. Regional Fishery Councils did not establish any herring quotas during 1978. Therefore, no biological information would be available from commercial catches on the status of the herring stocks in the Georges Bank/Gulf of Maine area. Because of this, the German Scientific Commission for Marine Research of the Federal Republic of Germany decided to send the R/V ANTON DOHRN into these areas to obtain these necessary data.

Materials and Methods

The R/V ANTON DOHRN departed Woods Hole, Massachusetts, on 1 October and returned 24 October. The survey area is shown in Figure 1. The cruise was split into two parts: First, a bottom-trawl survey from 1 to 19 October, and second, a hydroacoustic surve- from 19 to 24 October. During the first part, a total of 86 trawl stations, randomly selected according to depth and area were completed, using a German 180 herring bottom trawl rigged with rollers, a kite (0.9 x 1.2 m) and a

temperature netsonde. Codend meshes measured 30 mm stretched. Tows were normally of 30-minute duration, mostly during daylight hours at approximately four knots. The echosounder was monitored constantly, both during tows and when steaming.

The total catch was normally sorted to species, then weighed and measured. Subsamples were taken of bigger catches. Length measurements were made to the centimeter below, sea herring to half centimeter below. Otoliths were extracted from cod and haddock for age determination in the Hamburg Laboratory. On each station either an XBT cast was made or temperature and salinity was measured with a STD probe. Additional hydrographic data were obtained on extra stations when time permitted.

During the second part echosounders were monitored constantly while the ship transected areas of historic herring abundance (Figure 1).

Results

Trawl Catches

Atlantic herring (Clupea harengus harengus, L.)

In subarea 4X a total of 418 herring was caught. Sizes ranged from 32 to 69 cm/2; (Figure 2) predominant was the 1976 year-class (34 to 38 cm/2) with the 1975 year-class (40 to 46 cm/2) also represented. Fishes of the 1974 and older year-classes were present but represented by only a few individuals.

In Subarea 5Y a total of 598 herring was caught ranging in size from 45 to 75 cm/2. The length distribution (Figure 2) does not show any significant predominance of year-classes. It is of interest, however, that the youngest year-classes (1976 and 1977) did not occur in the catches.

In Subarea 5Z the total catch amounted to 870 specimens. Length distribution (Figure 2) shows the predominance of 1975 and older (50 cm/2 and larger) year-classes while the 1976 and 1977 (50 cm/2 and smaller) were represented in the catches. However, more detailed information will be available after age determinations are made of collected samples.

It should be noted that in all three areas, observations of maturity stages showed a mixture of prespawners, ripe and spent herring.

Mackerel (Scomber scombrus L.)

During the cruise a total of 777.8 kg of mackerel (2,037 specimens) was caught. The biggest catch (693.3 kg) was taken in the eastern part of Georges Bank (SA 5Z) near the continental slope. Sizes ranged from 17 to 44 cm with a mean length of 31 cm. Only a few individuals were caught in Div. 4X and 5Y.

Atlantic cod (Gadus morhua L.)

A total of 2365.7 kg (1,038 specimens) cod was caught during the cruise . Largest catches (maximum 402 kg/30 min) were taken in SA 5Z. Sizes ranged from 16 to 121 cm (mean 53 cm) in SA 5Z, from 11 to 62 cm (mean 38 cm) in SA 4X, and from 19 to 110 cm (mean 50 cm) in SA 5Y. More detailed information about the status of the stocks will be available after age determinations of extracted otoliths.

Haddock (Melanogrammus aeglefinus L.)

A total of 6897.5 kg (24,664 specimens) of haddock was taken during the cruise. Length measurements and/or otoliths were extracted from approximately one-half the catch. Largest catches (maximum 1058 kg in a 5 minute tow because of hang-up) occurred at the northeastern part of Georges Bank (SA 5Z). Sizes ranged from 10-89 cm (mean 26 cm) in SA 5Z, from 26-70 cm (mean 47 cm) in SA 5Y, and from 9 to 69 cm (mean 47 cm) in SA 4X. It must be noted that especially in 4X and 5Z that substantial amounts of 1978 year-class haddock occurred in the catches with a range from 10 to 20 cm (peak at about 16 cm). In addition, especially in SA 5Y and 5Z, the 1975 year-class now ranging 45 to 55 cm in length were significant in the catches.

Pollock (Pollachius virens L.)

A total of 1202.7 kg (228 specimens) of pollock was caught during the cruise. Only 5 and 2 specimens were taken in areas 5Y and 4X, respectively. The largest catches were in 5Z where the 1141.7 kg numbering 221 specimens were caught with a mean length of 74 cm.

Silver hake (Merluccius bilinearis M.)

A total of 3,290.4 kg (11,810 specimens) of silver hake was caught during the cruise. As with pollock only a few specimens, 158 and 49 were caught in Div. 5Y and 4X, respectively. 3,207.7 kg numbering 11,603 specimens and averaging 27 cm were caught in Div. 5Z.

Hydrography

The hydrographic situation in the area of investigation was mainly characterized by several Gulf of Maine water masses. First, the surface water with temperatures between 10 and 15^{0}C and salinities from 32 to 35 o/oo. Second, the Gulf of Maine intermediate water (MIW) with temperatures between 4.8 and 10^{0}C and salinities above 34 o/oo. Surface water (practically homogeneous)occurred to depths of 79 meters on Georges Bank, south of Nantucket, in the Great South Channel and on Browns Bank. Stations were made in the MIW (up to 160 meters deep) at the northwest peak on Georges, on Franklin and Howell Swell. This MIW was completely absent from the slope of the northeast peak of Georges but was present in depths of 80 to 180

meters as a strong cold nucleus above the Georges Basin. On Stout Swell and in the Wilkinson Basin fishing only took place in deeper water masses. The surface water was limited by warm and high salinity water masses (21.4°C, 35.4 o/oo) above the slope of the northeast peak to the east. However, it cannot be determined from the data available whether there is a direct connection of these warm water masses with the medium maxima (12.5°C, 35.2 o/oo) at 120 meters in the northeast channel. The bottom temperature configuration of the area of investigation is shown in Figure 3.

Hydroacoustic survey

During the hydroacoustic portion of the cruise, no significant echo traces were observed. However, trawl sets made on the basis of source echo signals in mid-water resulted in catches of small quantities of medusae and no fish.

Discussion

Herring catches during the 1978 survey, although greater, would still be considered similar to those from the same area during the 1977 survey of the Anton Dohrn. During 1977 only 94 specimens of herring were caught in 78 tows (Res. Doc. 78/VI/89). During this year's cruise, a total of 1,886 herring were caught in 86 tows. Although the relative catch has increased considerably, it is still far below what would be considered encouraging in discussing historic Georges Bank herring survey catches. During the 1978 spring survey by Anton Dohrn on Georges Bank, relatively large catches of the 1975 year-class were made (Res. Doc. 79/VI/39). Based on those catches, we had hoped to see more of that year-class involved in spawning. There is no evidence that this occurred.

Mackerel catches totalled 2,037 individuals from the 86 tows. Although this is an increase from the 108 taken in 78 tows last autumn, the number is still low. However, the low mackerel catches cannot be considered conclusive because only sections of Div. 5Y were surveyed and fixed gear (lobster pots) prevented complete sampling in the canyon areas south of Georges Bank (Div. 5Z).

As in 1977, haddock were abundant relative to surveys in the early 1970's.

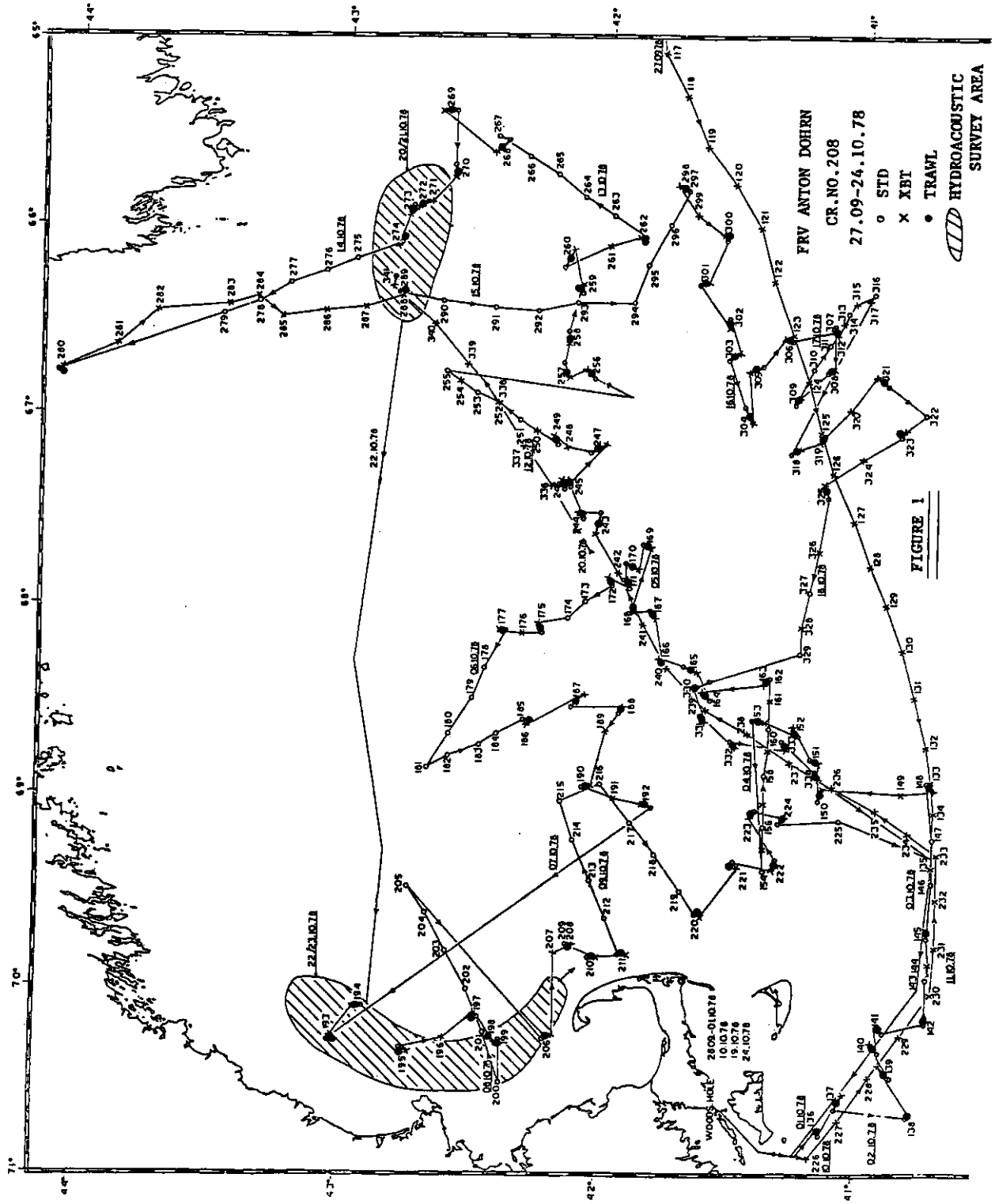

Figure 1. Cruise track of Anton Dohrn in Gulf of Maine-Georges Bank area, autumn 1978.

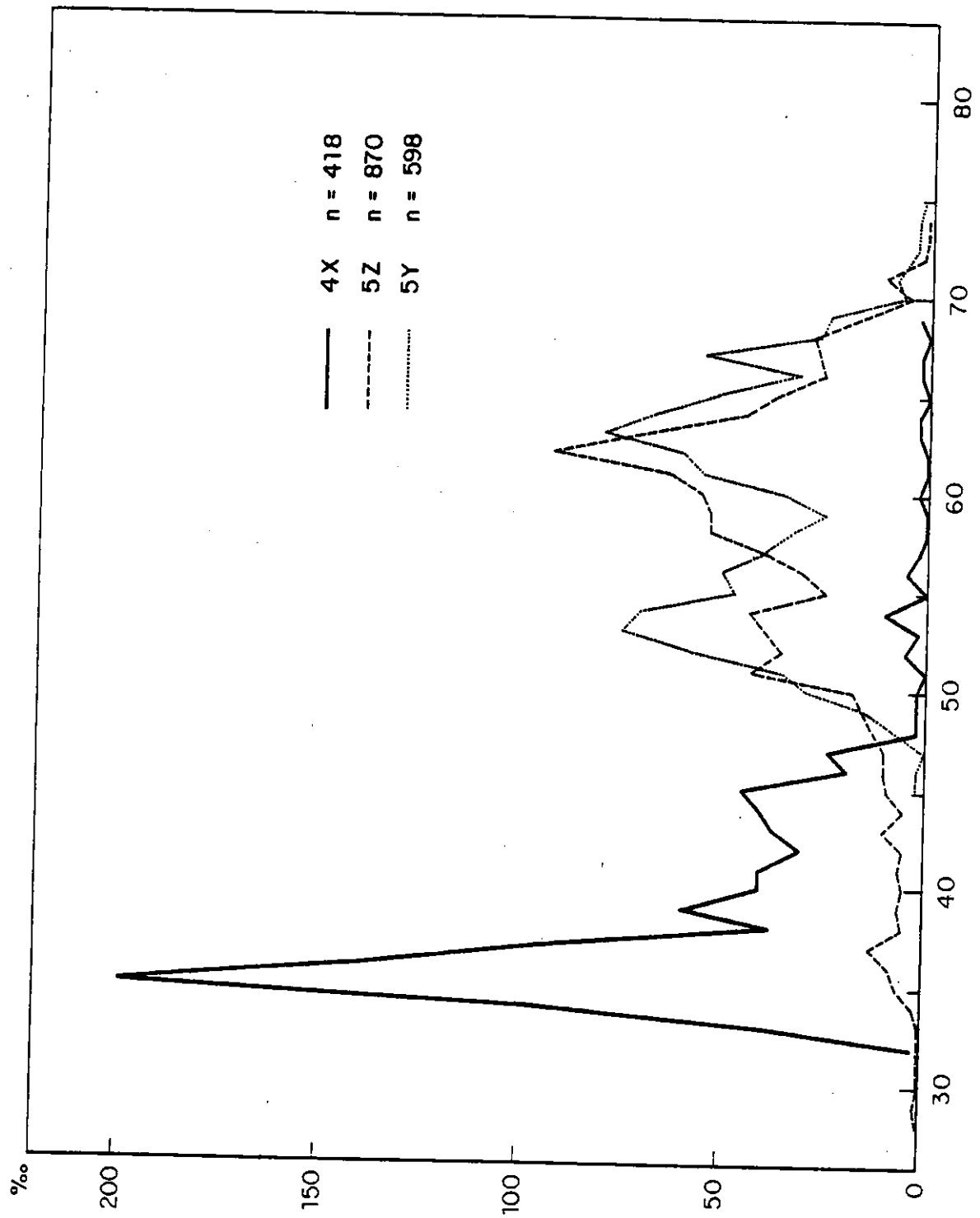

Figure 2. Length distribution of Atlantic herring from R/V ANTON DOHRN Cr. No. 208, 1-24 October 1978.

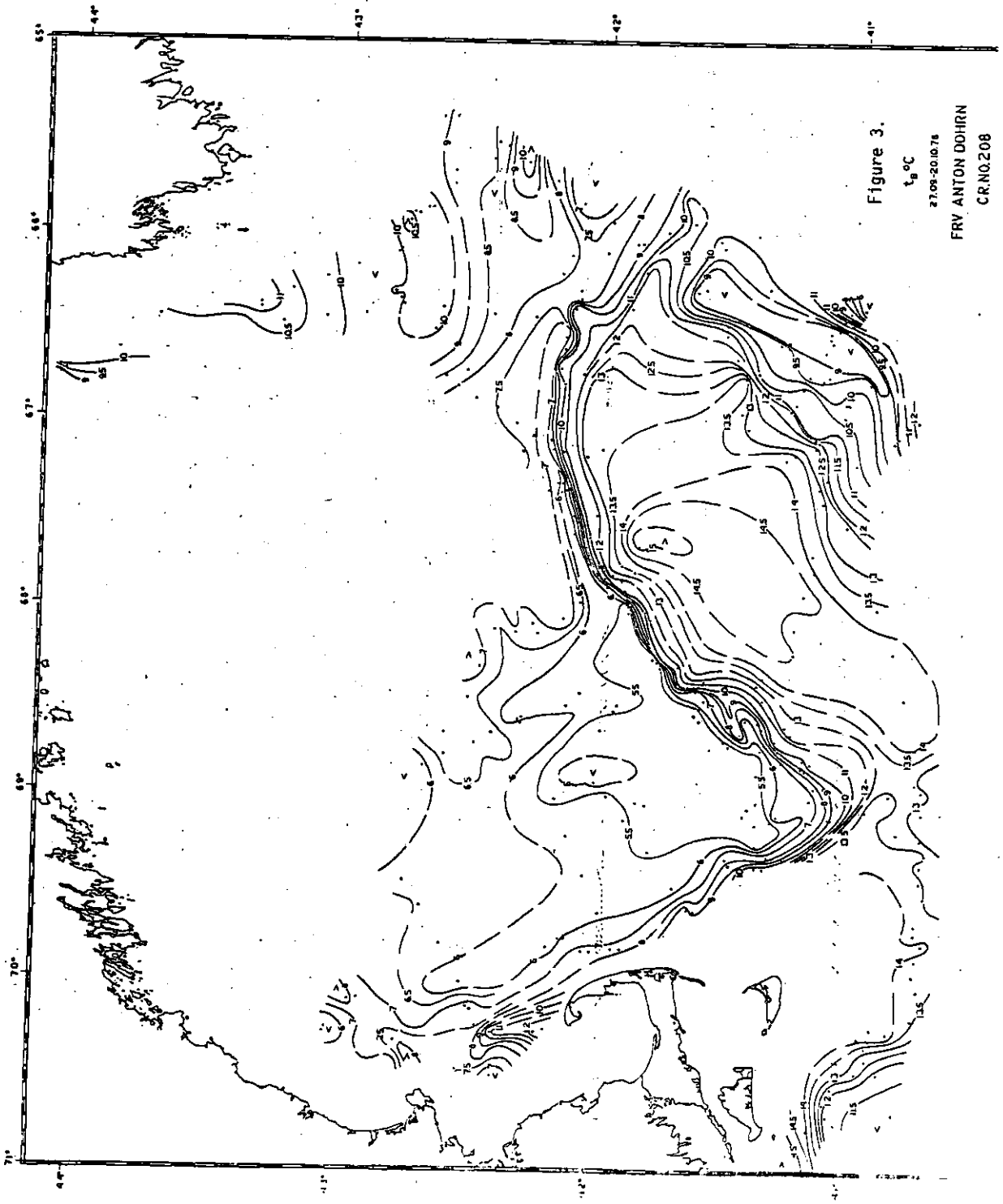

Figure 3. Bottom temperature distribution during Anton Dohrn cruise in the Gulf of Maine-Georges Bank area, autumn 1978.