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Preliminary report of ICNAF Larval Herring (*Clupea harengus*) Survey In the Gulf of Maine and on Georges Bank during December, 1972[1]

by

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Introduction

The December 1972 survey of the distribution of herring larvae in the Gulf of Maine, including Georges Bank, was conducted by Albatross IV between December 2 and December 20, 1972. This report presents preliminary results of that survey.

Methods

Larval herring were sampled with the 61 cm bongo array. Tows were single oblique and to a maximum depth of 100 m. Haulback rate was 10 m/min; ship speed was 3.5 knots. Both .505 and .333 mm nets were used. Stations were the preselected series agreed upon for the 1972 fall season (Figure 1). Some additional stations were done by Albatross IV to increase the areal coverage. Herring larvae were sorted at sea and preserved in 5% formalin. They were later counted and measured in the laboratory at Woods Hole, Massachusetts.

Results

Larval herring in December were found principally inside the 100 m isobath off Nova Scotia, the inner coastal regions of the Gulf of Maine, and over most of Georges Bank. A few larvae, numbering one or two individuals per tow, were found in water deeper than 200 m (Figures 2,3).

Larvae over deep water north of Georges Bank were distributed as a band extending from the arm of Cape Cod eastward and then projecting into the Gulf as a lobe over the 200 m contour. These larvae averaged about 20 mm in length, with those found deepest within the Gulf being slightly larger. Larvae in the western portion of the band were similar in length-frequency distribution to those found just north of the tip of Cape Cod. The distribution of these larvae suggests the influence of the counterclockwise gyre of the Gulf sweeping past Cape Cod and following partly the northern edge of Georges Bank.

On the southern edge of Georges Bank, the limits of herring larvae were correlated with the 33°/oo salinity isopleth, the approximate boundary between shelf and slope waters. The front between these water masses probably acts as a dynamic boundary to seaward dispersal of plankton. The southern limit of the herring larvae was generally shoaler than the 100 m isobath in contrast to December, 1971, when larvae tended to be distributed more uniformly out to the 100 m isobath on southern Georges Bank. Strong temperature and salinity gradients on the southeastern edge of Georges Bank and a deeply undulating shelf-slope water boundary appear to have been responsible for containing the larvae farther up on the Bank in December, 1972.

[1] Revision of Sp.Mtg.Res.Doc. 73/11 presented to Special Commission Meeting, FAO, Rome, January 1973.

The wide range of larval sizes found at most stations over Georges Bank and also off western Nova Scotia shows that mixing processes, primarily due to tidal currents, had mixed larvae of all ages rather thoroughly by December. The dispersal of these larvae from spawning centers, e.g on northeastern Georges Bank and in the vicinity of Great South Channel southeast of Cape Cod (Figure 4), is suggested by the distribution of successive size intervals (Figures, 4, 5, 6, 7, 8). These distributions increasingly overlap as the larvae grow up to 20 mm in length, when they are most widespread. Thereafter, the distributions show a contraction, the larvae becoming more confined along the banks and shelves. There is also a net movement tending to the southwest along southern Georges Bank and to the northeast along its northern edge.

Perhaps the most significant aspect of larval dispersal seen is the above apparent contraction of the distributions of larvae with increase in size, along the axis of Georges Bank and also along western Nova Scotia. The higher densities of larvae in the 26-30 mm group tended to be in the same areas where the smallest larvae were most abundant. Larval populations thus appear to be conserved over the same general area that are suitable for their spawning.

The ICNAF Larval Herring Surveys are providing valuable data on larval herring ecology. Further analysis comparing the results from cruise to cruise, within and between years, will be even more revealing. There should be increased effort on future cruises to obtain data on the vertical distribution of larvae and on the developmental pattern of hydrographic features. Participating countries should continue to submit their data to the pooled data file to permit more comprehensive analyses by all interested scientists.

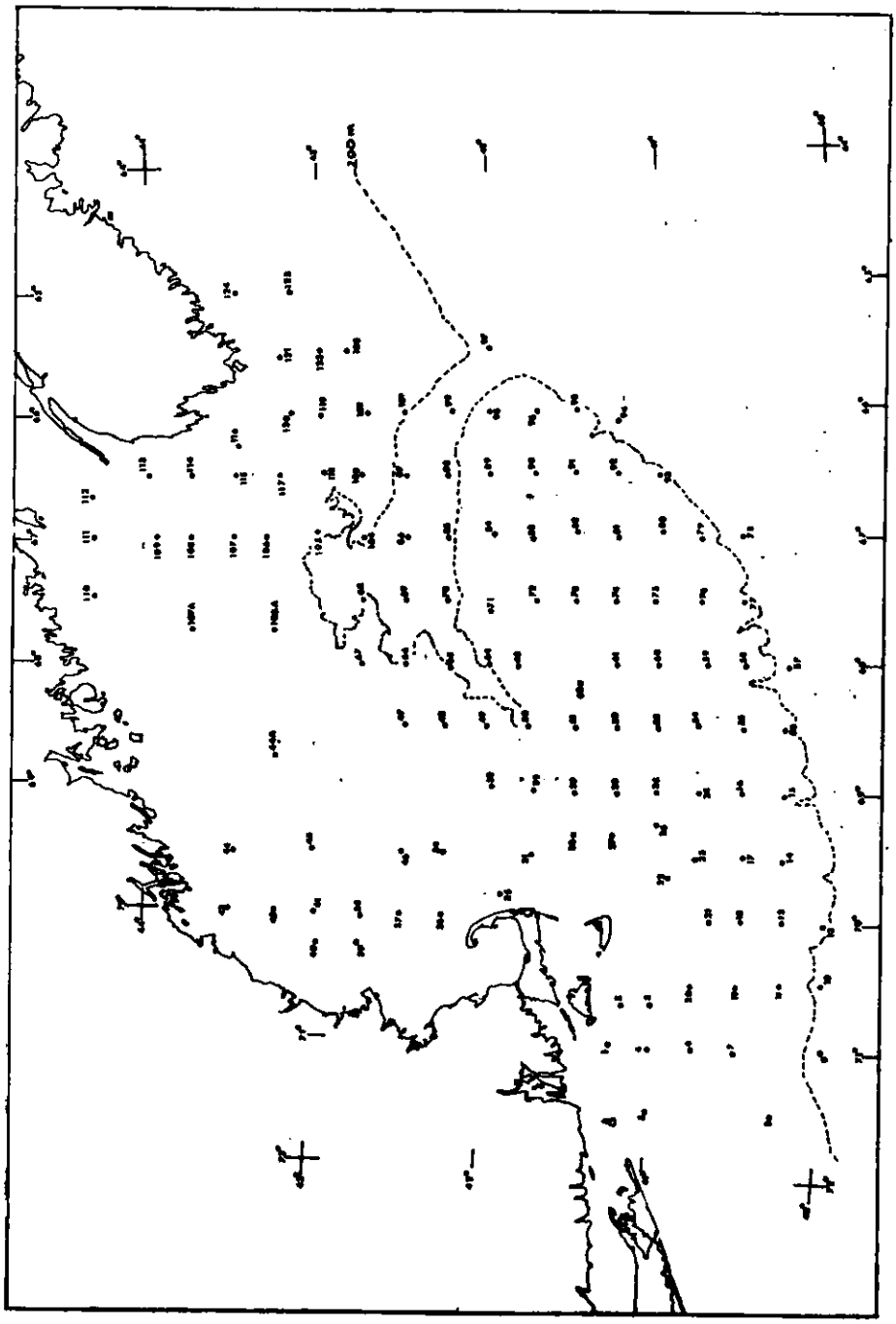

Figure 1. Stations completed by R/V Albatross IV, 2-20 December 1972.

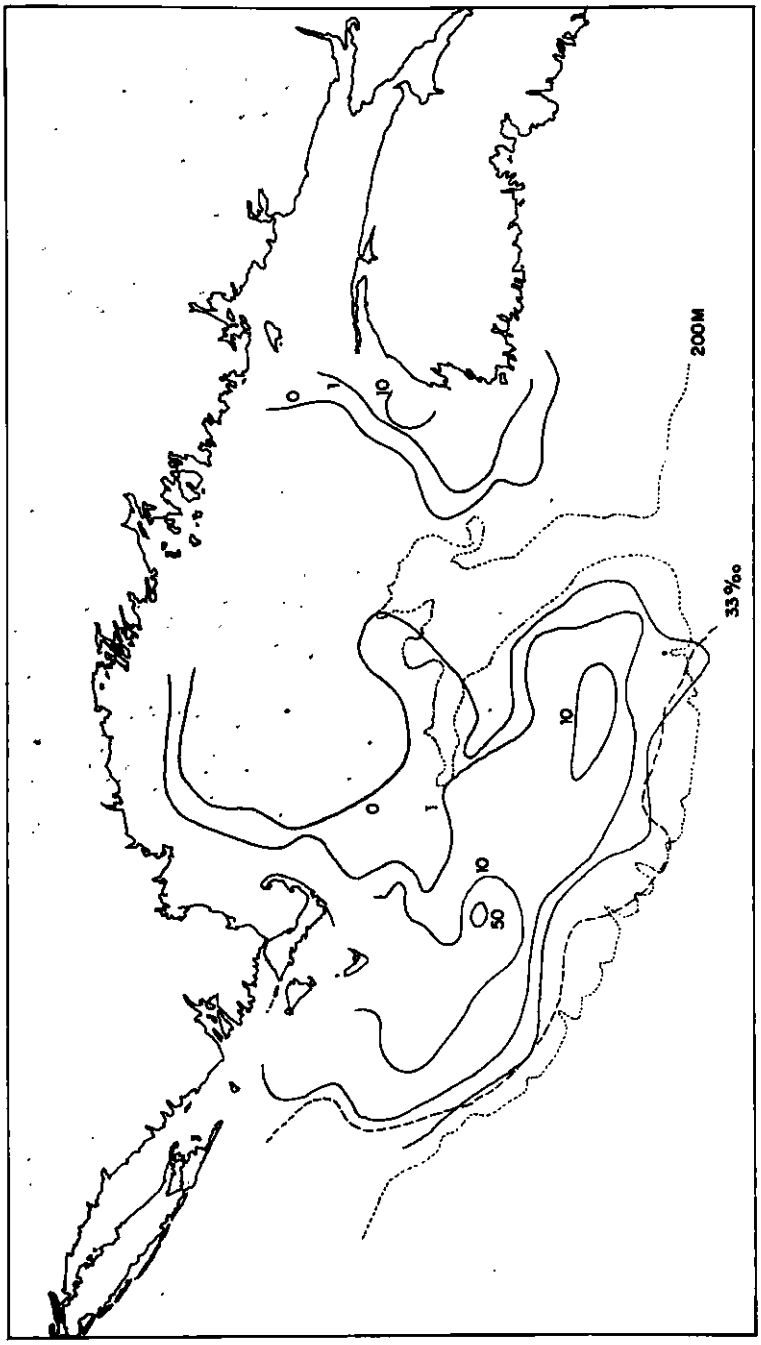

Figure 2. Herring larvae, all sizes combined. No./100m³ caught by .505 mm mesh net, 2-20 December 1972. R/V Albatross IV.

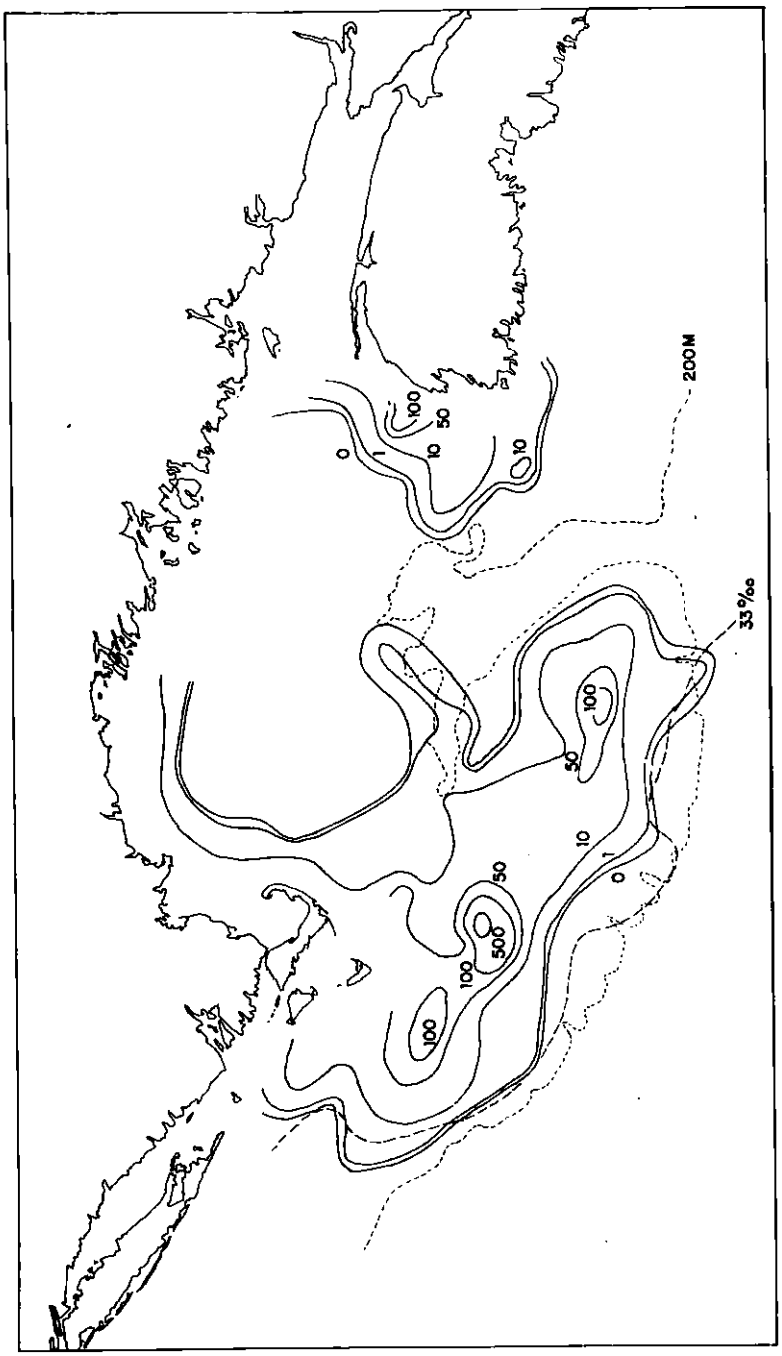

Figure 3. Herring larvae, all sizes combined. No./10m² caught by .505 mm mesh net, 2-20 December 1972. R/V Albatross IV.

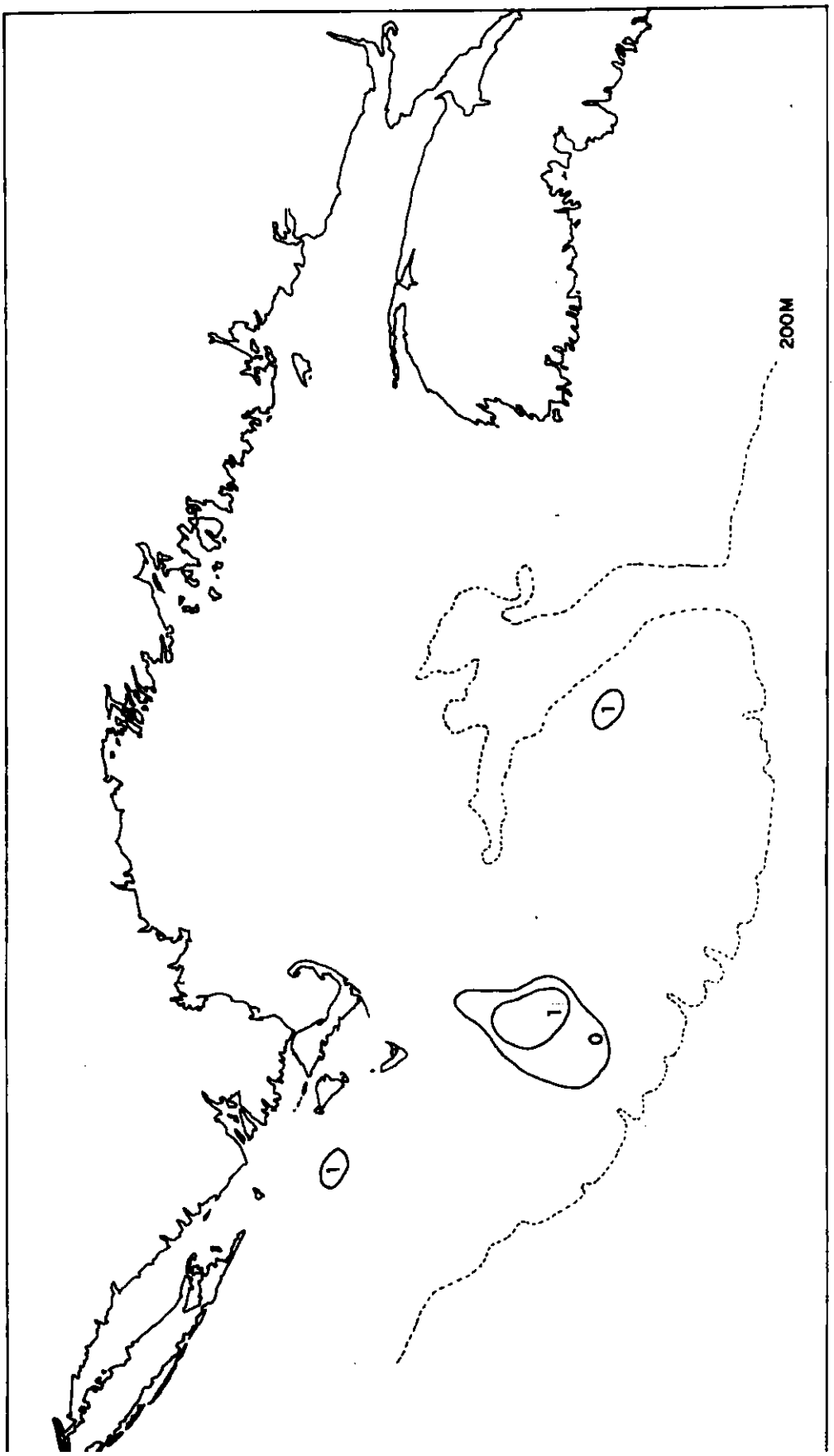

Figure 4. Herring larvae, 5-10 mm in length. No./100m³ caught by .505 mm mesh net, 2-20 December 1972. R/V Albatross IV.

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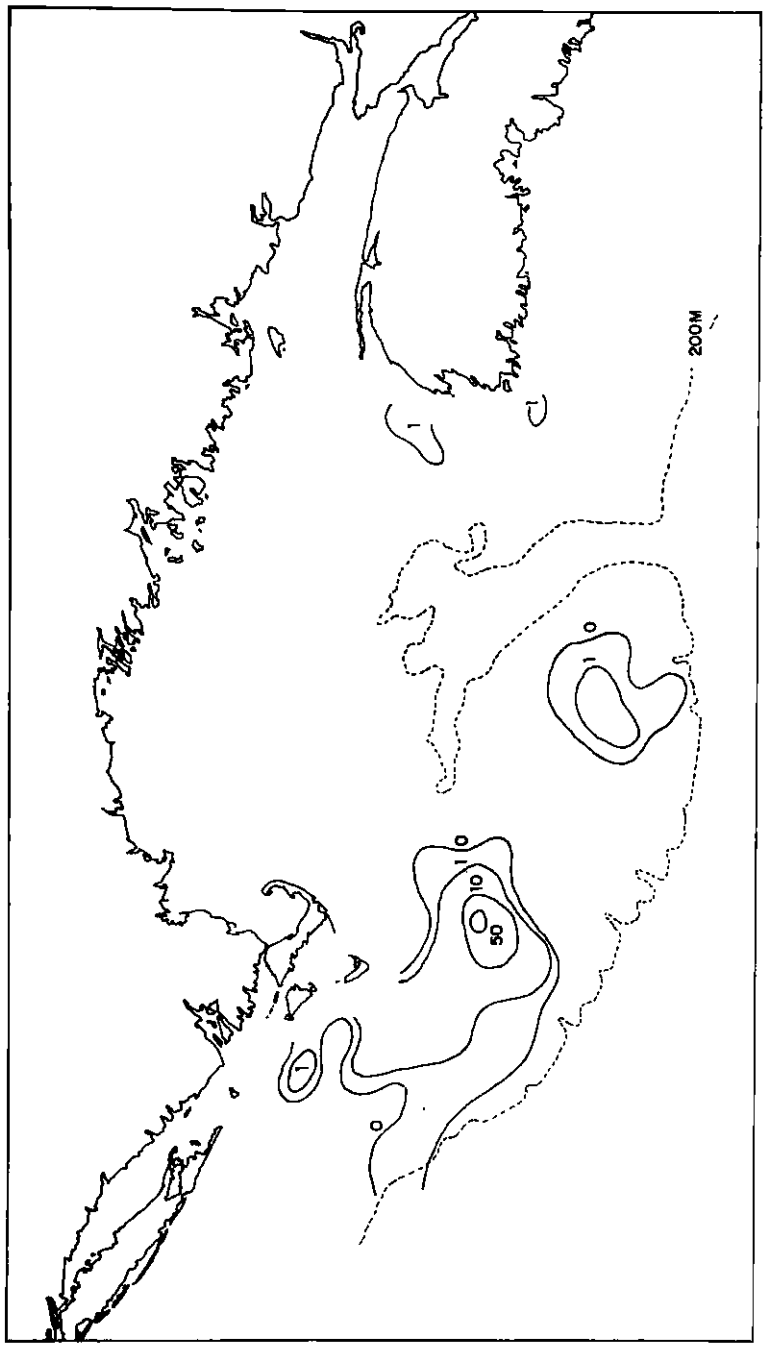

Figure 5. Herring larvae, 11-15 mm in length. No./100m³ caught by .505 mm mesh net, 2-20 December 1972. R/V Albatross IV.

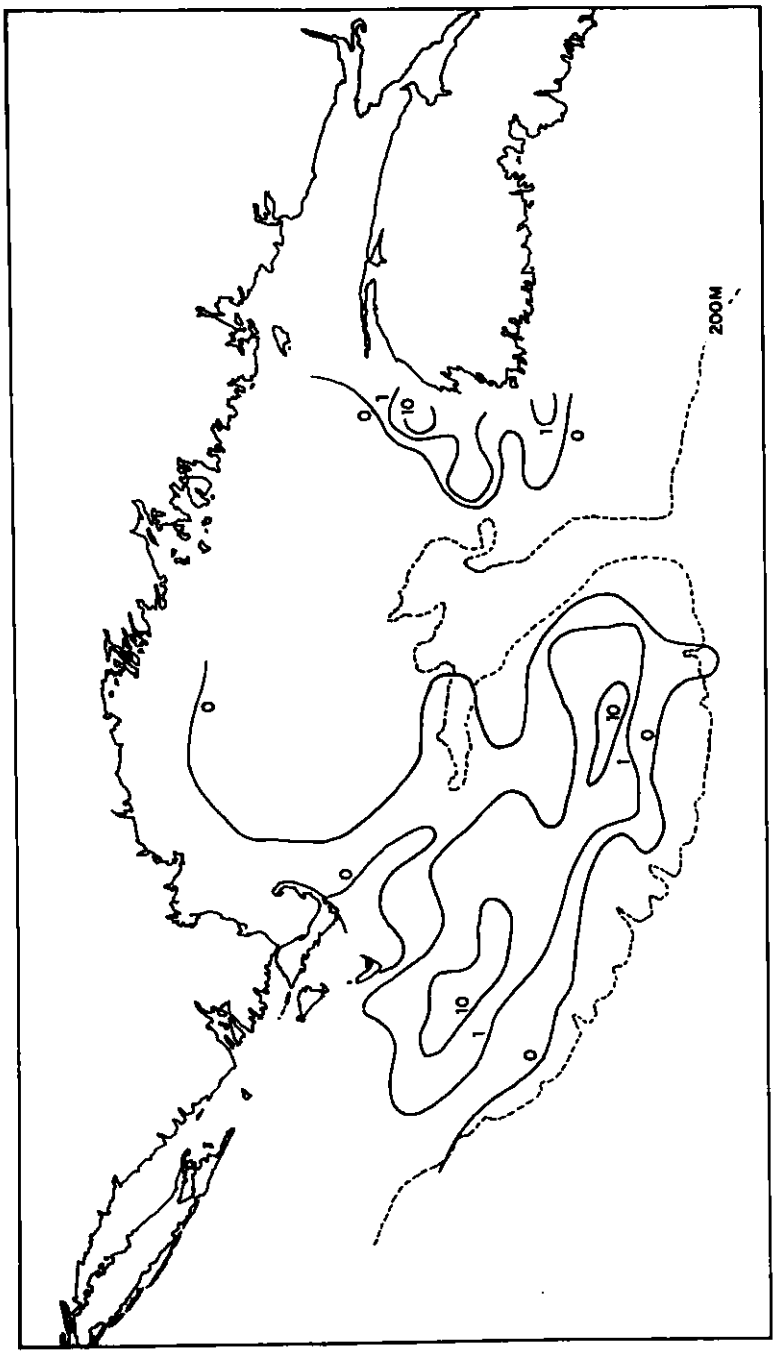

Figure 6. Herring larvae, 16-20 mm in length. No./100m³ caught by .505 mm mesh net, 2-20 December 1972. R/V Albatross IV.

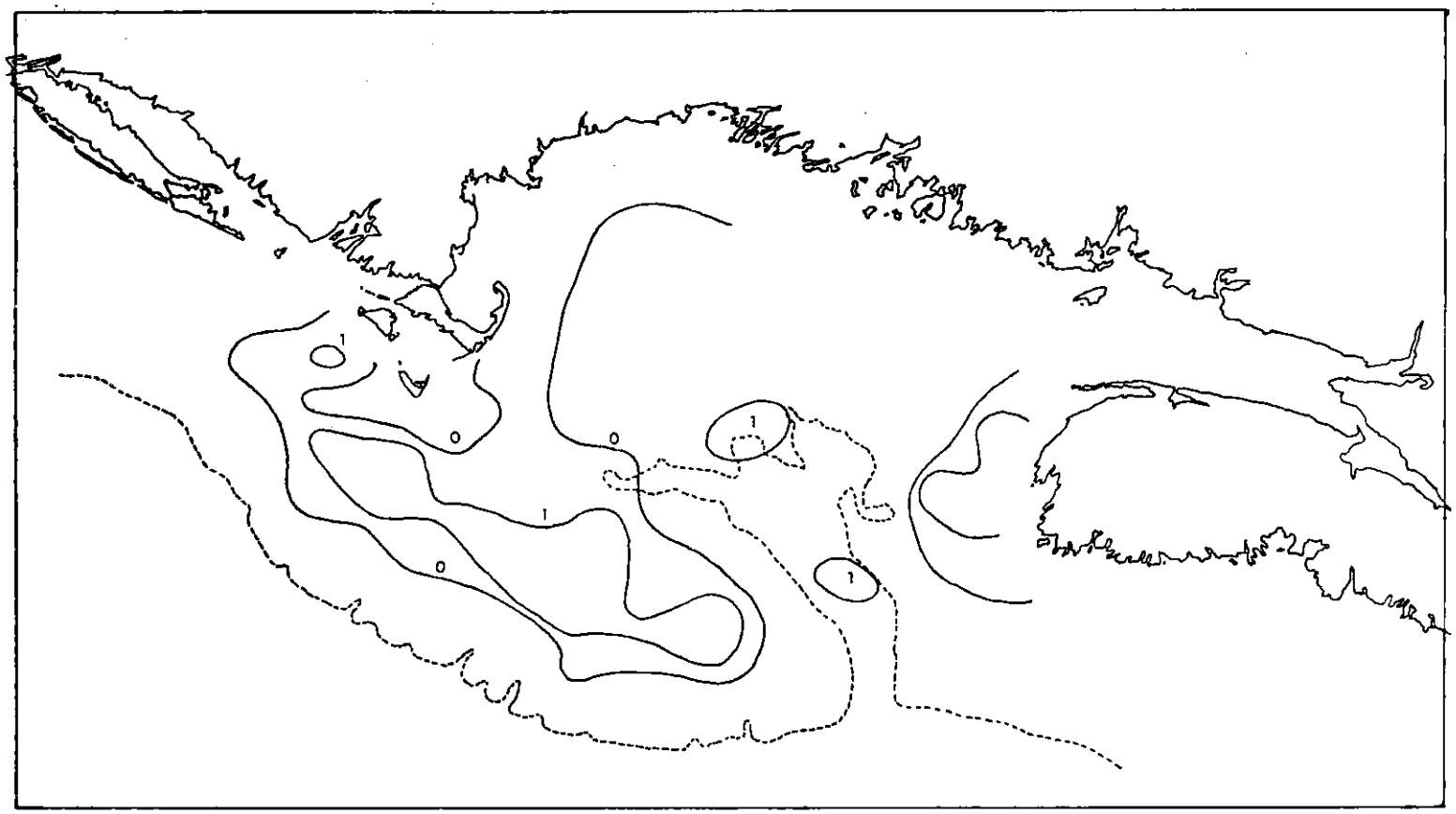

Figure 7. Herring larvae, 21-25 mm in length. No./100m^3 caught by .505 mm mesh net, 2-20 December 1972. R/V Albatross IV.

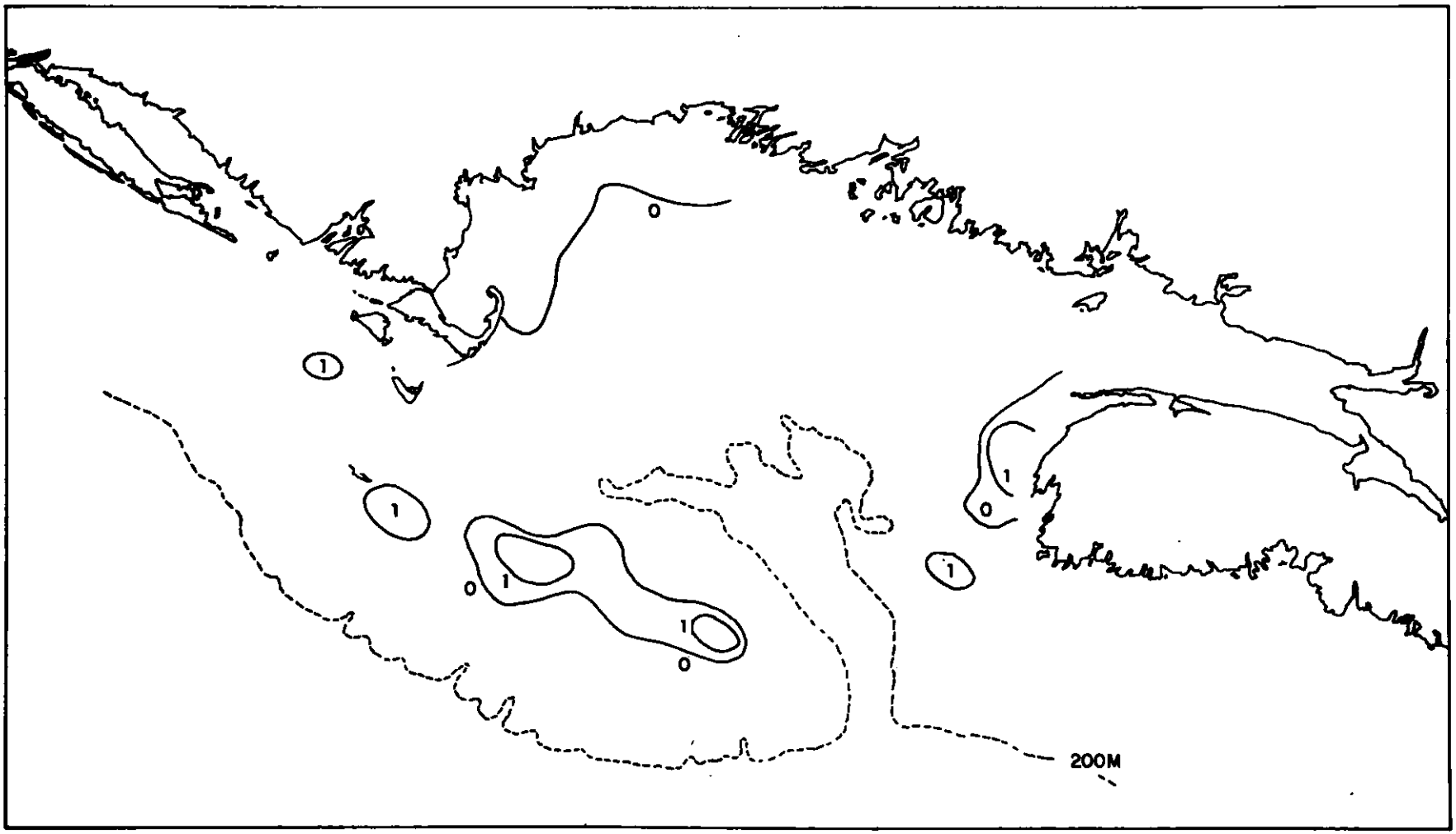

Figure 8. Herring larvae, 26-30 mm in length. No./100m^3 caught by .505 mm mesh net, 2-20 December 1972. R/V Albatross IV.