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Temperatures and Salinities on the Scotian Shelf in July 1978

by

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Abstract

Temperatures and salinities during a cruise on the Scotian Shelf in July 1978 are described and compared with those of a similar cruise in 1977 (Garcia and Mari, 1977). The mean temperatures of the whole water layer in 1978 (8.49°C) was slightly lower than in 1977 (8.63°C). According to Karasyov (1976), such temperatures are normal for this period of the year. Surface temperatures were higher and bottom temperatures lower than in 1977. Salinities in all water layers were lower than in 1977.

Introduction

The R/V *Isla de la Juventud* has been carrying out investigations on the Scotian Shelf (ICNAF Div. 4VWX) during the summer since 1975, in order to evaluate species of interest to the Cuban fishing fleet and to study the hydrological regime of the area. In 1978, a hydrological survey was carried out during 16-23 July when temperature and salinity observations at different water levels were made. The three water masses covering the Shelf, that were described by Bryantsev (1965, 1974), were identified from data collected during the 1978 cruise.

Materials and Methods

The area investigated extended from Misaine and Banquereau banks in the east to Browns Bank in the west (between 42°20' and 45°30'N latitude, and between 58°50' and 65°20'W longitude), where 40 oceanographic stations were occupied in 10 transects extending seaward from near the shore to the 200-m depth contour on the slope (Fig. 1). At each station, a standard oceanographic cast was made with Nansen bottles and reversible thermometers to near bottom depths. Salinities were determined using an inductive salinometer AUTO-LAB, MARK III. T-S diagrams were used to determine the various water masses.

Results and Discussion

Isolines of surface temperatures were fairly well oriented perpendicular to the coast (Fig. 2), the temperatures being lower on the eastern and western parts of the Shelf and higher on the central part (Emerald and Western banks) where warmer slope water (17°C) impinges on the Shelf. Although surface temperatures were higher in 1978 than in 1977 (Table 1) when the isotherms were more parallel with the coast (Fig. 3), the difference between temperatures near shore and over the slope was greater in 1977 than in 1978.

Bottom temperatures, on the other hand, were generally lower in 1978 than in 1977, particularly on the central part of the Shelf and along the slope (Fig. 4 and 5). In 1978, the highest bottom temperature (10.37°C) was found in shallow water (20 m) just east of Sable Island. While bottom temperatures

to the south and west of Sable Island tended to decrease in approaching the island in 1977, they increased in approaching the island in 1978. In 1977, warm water (10°C) was located on the slope south of Western Bank, whereas in 1978 the area was occupied by colder water (4°C), indicating that the intrusion of warm slope water was less in 1978 than in 1977.

Although the average temperature of the entire water layer over the Scotian Shelf was lower in 1978 than in 1977, it is still within the range considered normal for July (Karasyov, 1976), but with a slight cooling trend.

Surface salinities in 1978 (Fig. 6) increased from east to west, with a central area of minimum values, probably due to the outflow of the Nova Scotia Current with less saline water (Sutcliffe, *et. al.*, 1975). Comparing these 1978 salinities with those of 1977 (Fig. 7), it is noted that they were lower in 1978, which indicates a greater flow of less saline water from the Gulf of St. Lawrence carried by the Nova Scotia Current than in 1977.

Bottom salinities in 1978 (Fig. 8) were also lower than in 1977 (Fig. 9), due to the lesser intrusion of oceanic water over the Shelf in 1978. In 1977 the 35‰ isoline penetrated the central part of the Shelf, whereas in 1978 this isoline appears in a small area on the slope south of Sable Island.

There are three water masses on the Scotian Shelf: surface water with temperatures greater than 5°C and salinities up to 30‰; intermediate water less than 5°C with salinities from 31.5 to 33.5‰; and bottom water with temperatures greater than 5°C and salinities greater than 33.5‰. Fig. 10 shows the water masses over the bottom in July 1978 where the intermediate cold water covers the eastern part of the Shelf westward to Middle and Emerald banks, with mixed water around Sable Island and on Emerald Bank. There is a small area east of Sable Island where the surface water reaches the bottom. The remainder of the Shelf is covered with bottom water, with mixed water over La Have, Browns and Roselyn banks.

#### Conclusions

1. The overall average temperature on the Scotian Shelf was lower in 1978 than in 1977, but still within the range considered normal for the season.
2. Surface temperatures were on the average higher and bottom temperatures lower in 1978 than in 1977.
3. Salinities were lower in 1978 than in 1977, those of the surface due to a greater influx of less saline water from the Gulf of St. Lawrence, and those near bottom to the lesser penetration of oceanic slope water and to its mixing with intermediate water.
4. In 1978, it is shown that intermediate-type water covered the eastern part and bottom-type water the remainder of the Shelf.

#### References

- Bryantsev, V. A. 1965. The influence of water masses of the New England and Nova Scotia Shelf on the formation of commercial concentration of herring. ICNAF Spec. Publ. No. 6: 597-602.
1974. Water temperatures in the Nova Scotia Shelf and Georges Bank areas, 1960-1968. ICNAF Res. Doc. 74/52, Serial No. 3261.
- Garcia, C., and A. Mari. 1977. Results from the research cruise to the Scotian Shelf, summer 1977. Proyecto FAO/PNUD/CIP CUB 73, 007.
- Karasyov, B. E. 1976. One year in advance forecasting method. Centro de Investigaciones Pesqueras, Cuba.
- Sutcliffe, W. H., R. H. Loucks, and K. F. Drinkwater. 1975. Considerations of coastal circulation and fish production on the Scotian Shelf and in the Gulf of Maine. ICNAF Res. Doc. 75/9, Serial No. 3451.

Table 1. Mean, maximum and minimum temperatures and salinities on the Scotian Shelf in 1977 and 1978.

Year	Water layer	Temperature (°C)			Salinity(‰)		
		Mean	Max.	Min.	Mean	Max.	Min.
1978	Surface	15.27	17.17	12.00	31.14	31.80	30.03
	Bottom	6.09	10.37	1.40	33.58	35.11	31.11
	Overall	8.49	-	-	32.24	-	-
1977	Surface	13.55	16.30	11.20	32.07	34.76	30.88
	Bottom	7.02	11.10	1.85	34.19	35.73	32.10
	Overall	8.63	-	-	33.02	-	-

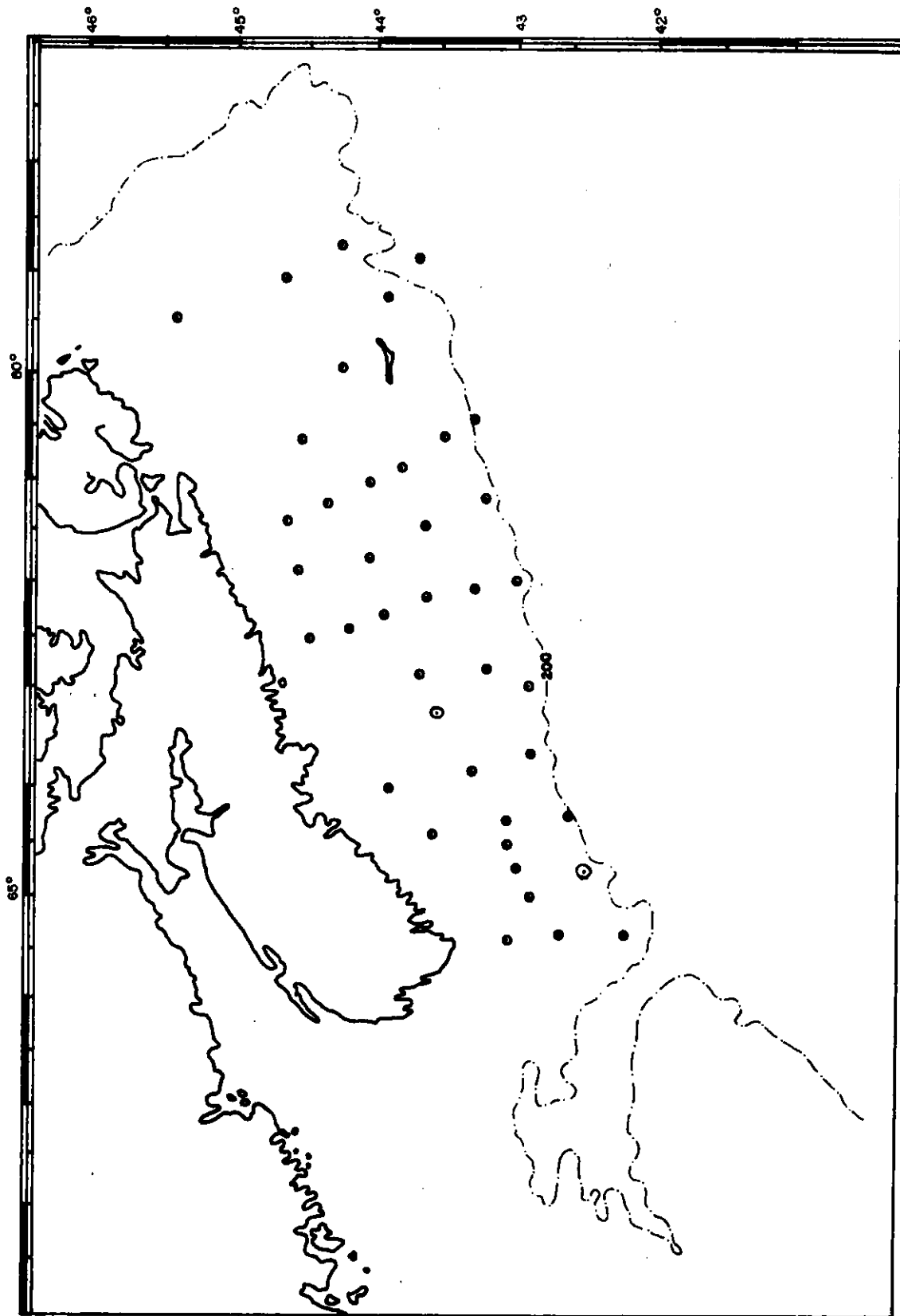


Fig. 1. Station locations on the Scotian Shelf

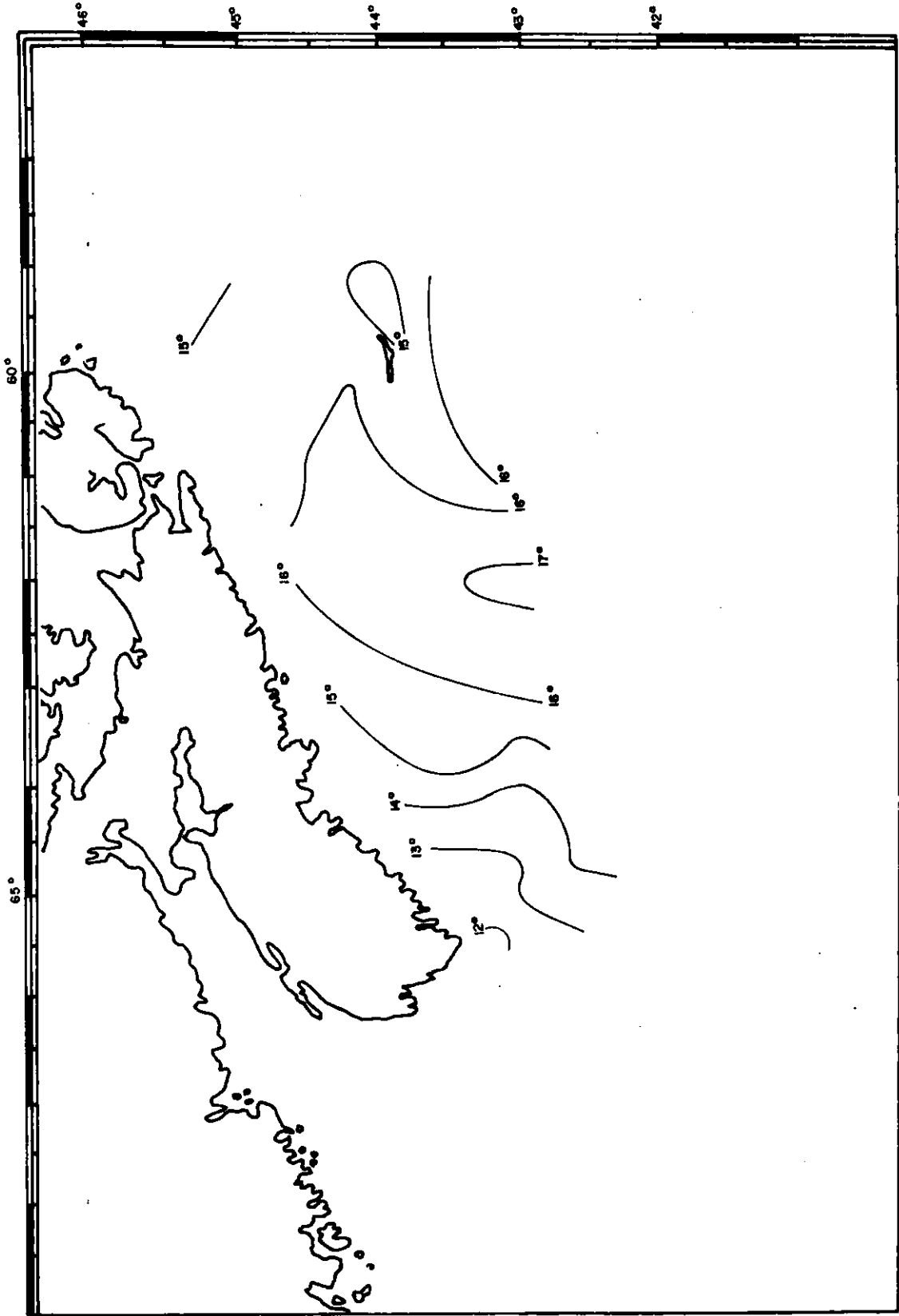


Fig. 2. Surface temperatures on the Scotian Shelf in July 1978.

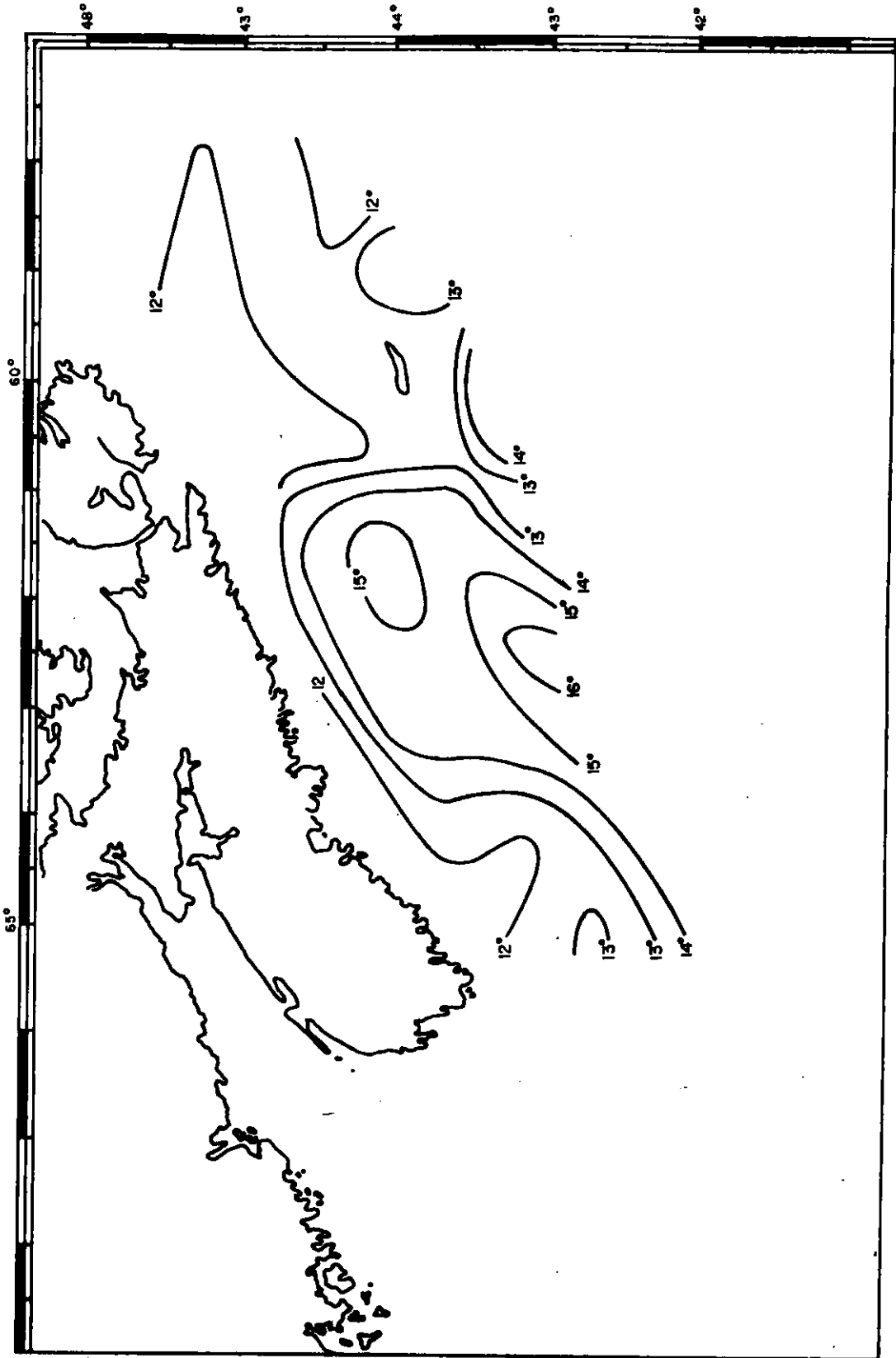


Fig. 3. Surface temperatures on the Scotian Shelf in July 1977.

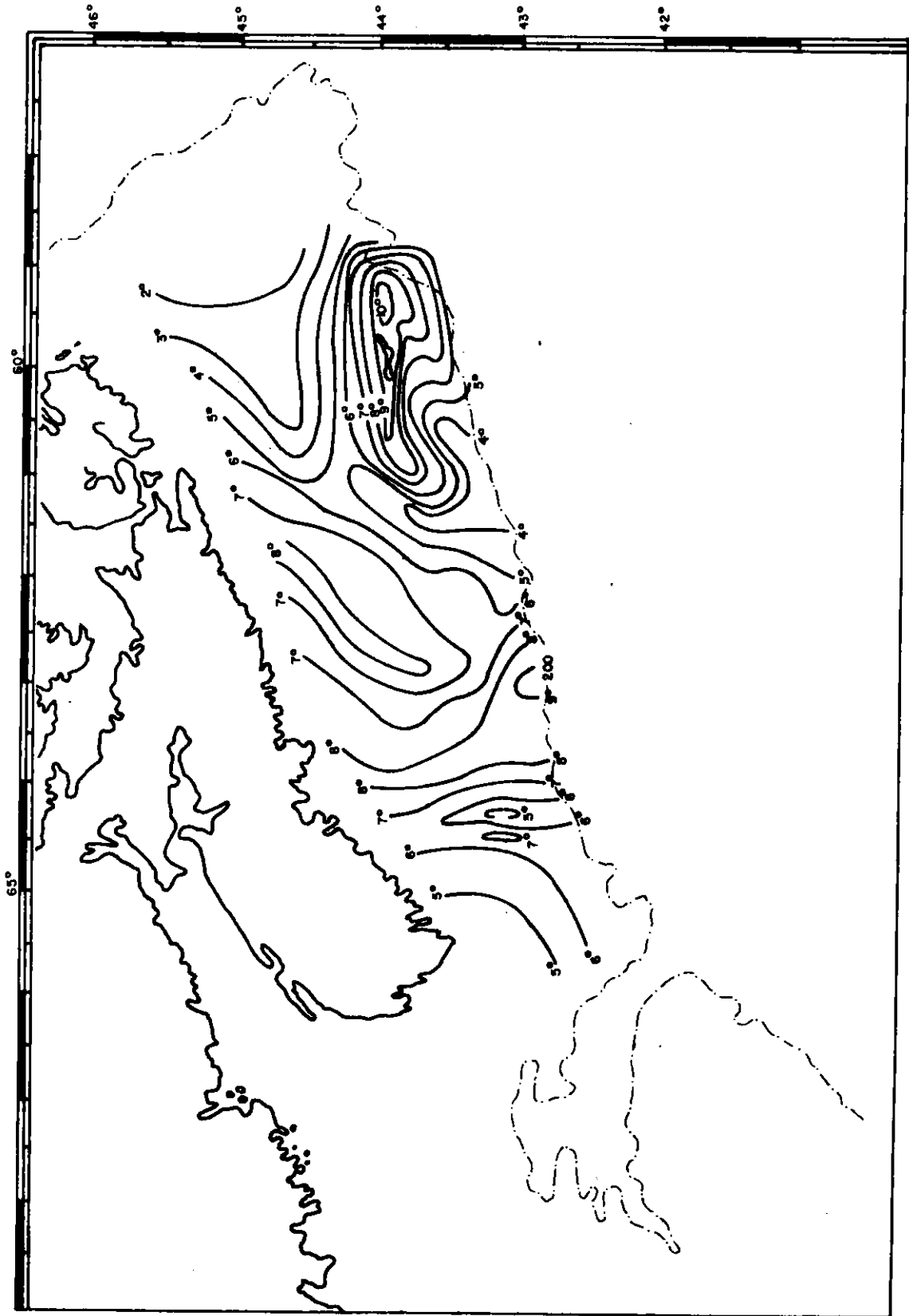


Fig. 4. Bottom temperatures on the Scotian Shelf in July 1978.

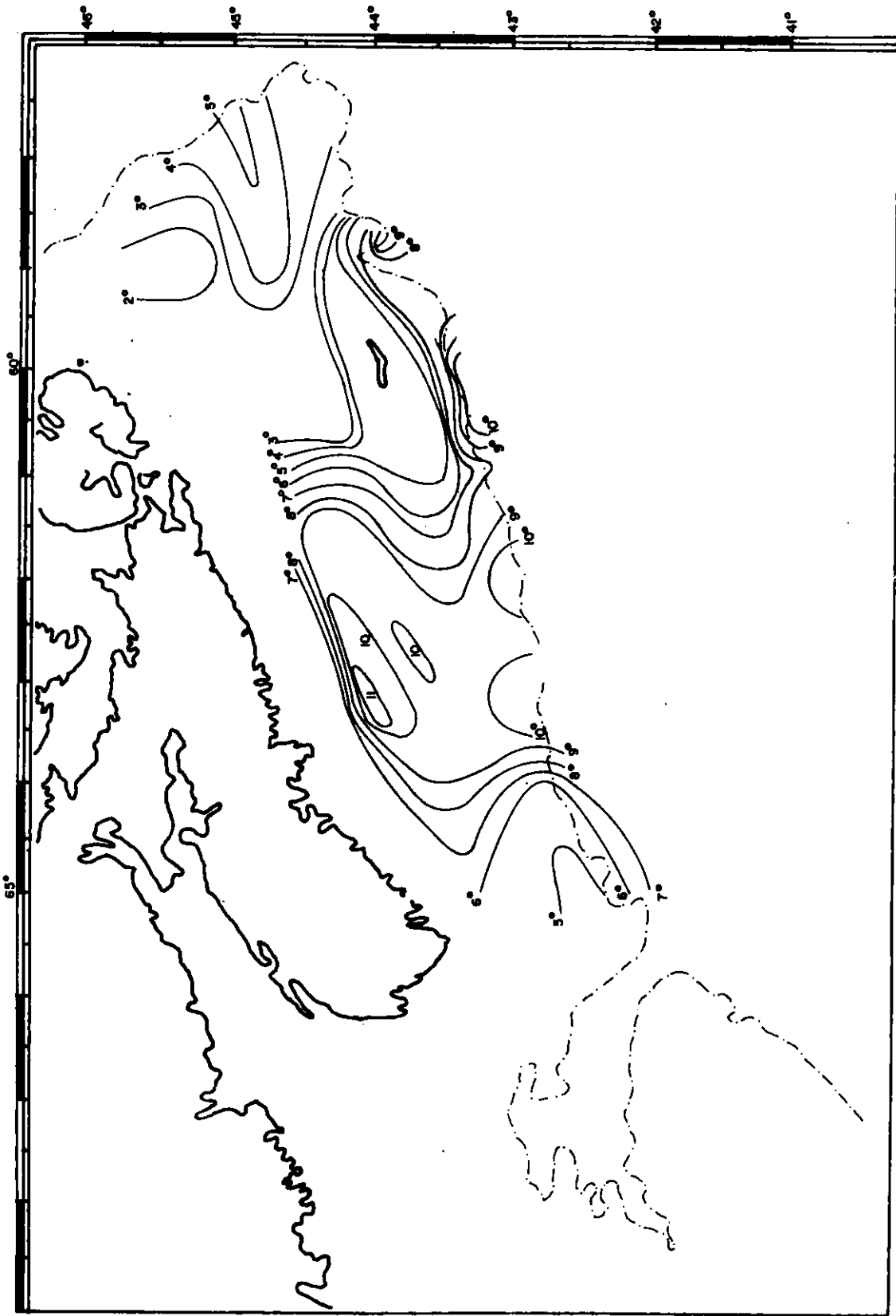


Fig. 5. Bottom temperatures on the Scotian Shelf in July 1977.



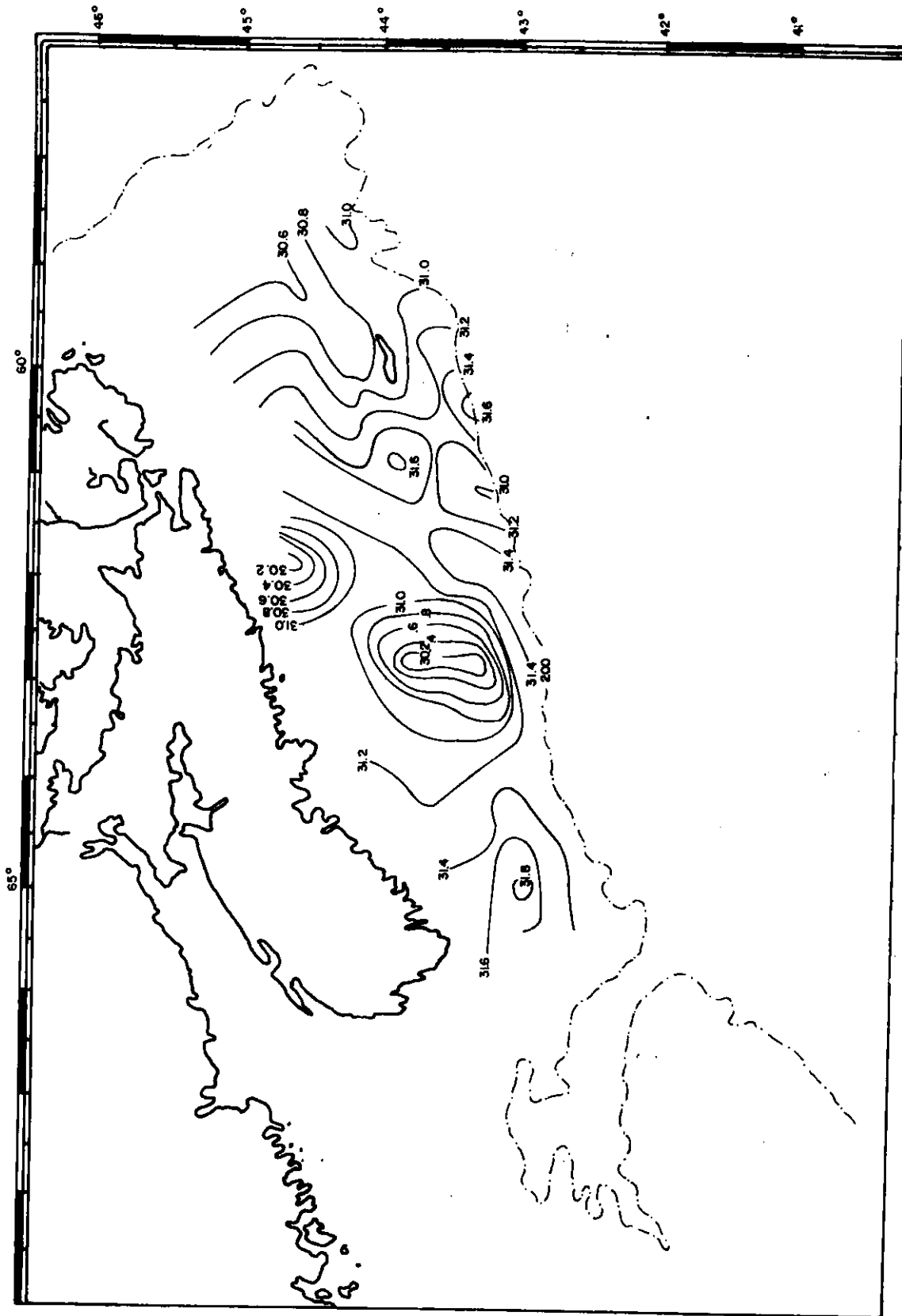


Fig. 6. Surface salinities on the Scotian Shelf in July 1978.

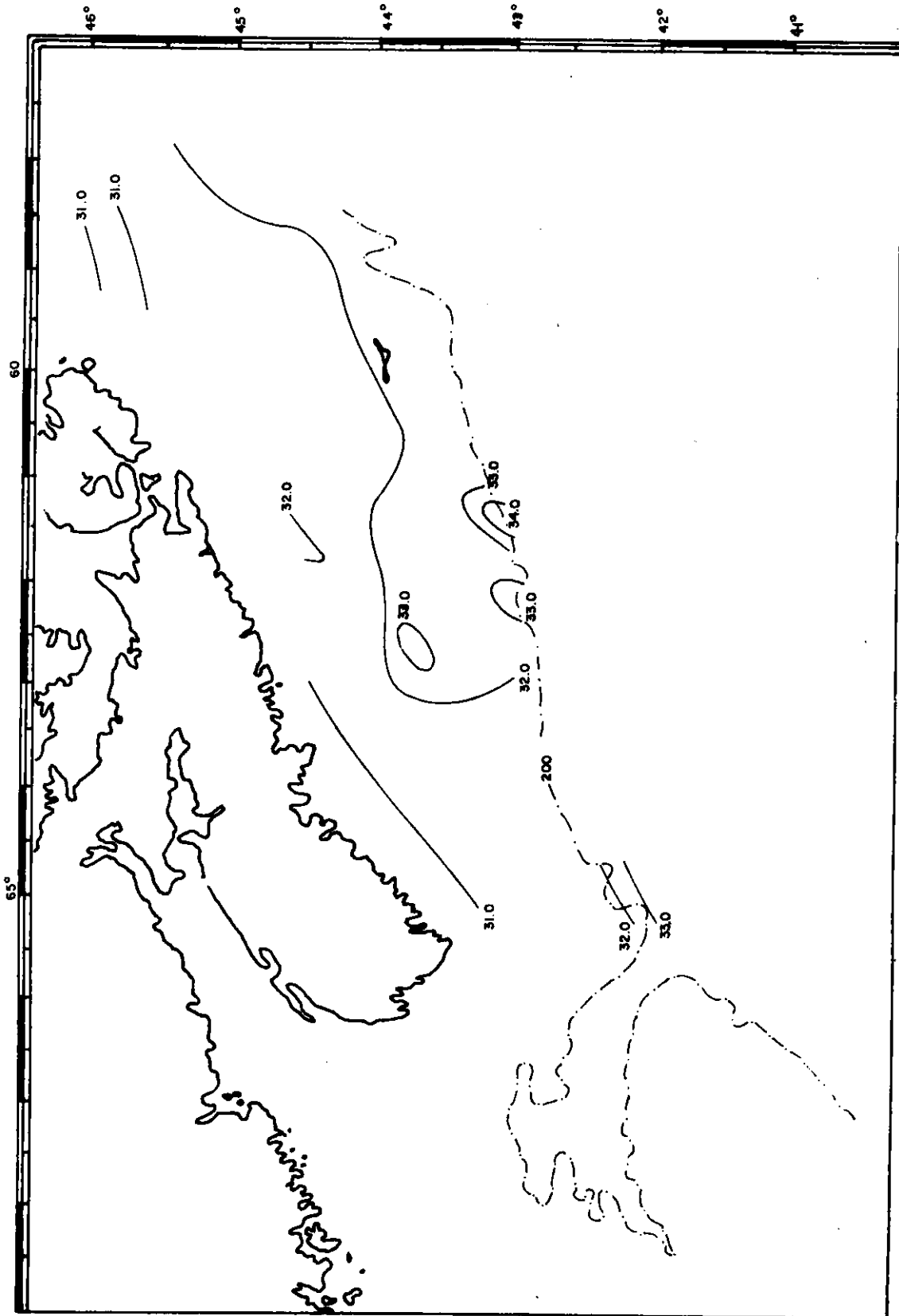


Fig. 7. Surface salinities on the Scotian Shelf in July 1977.

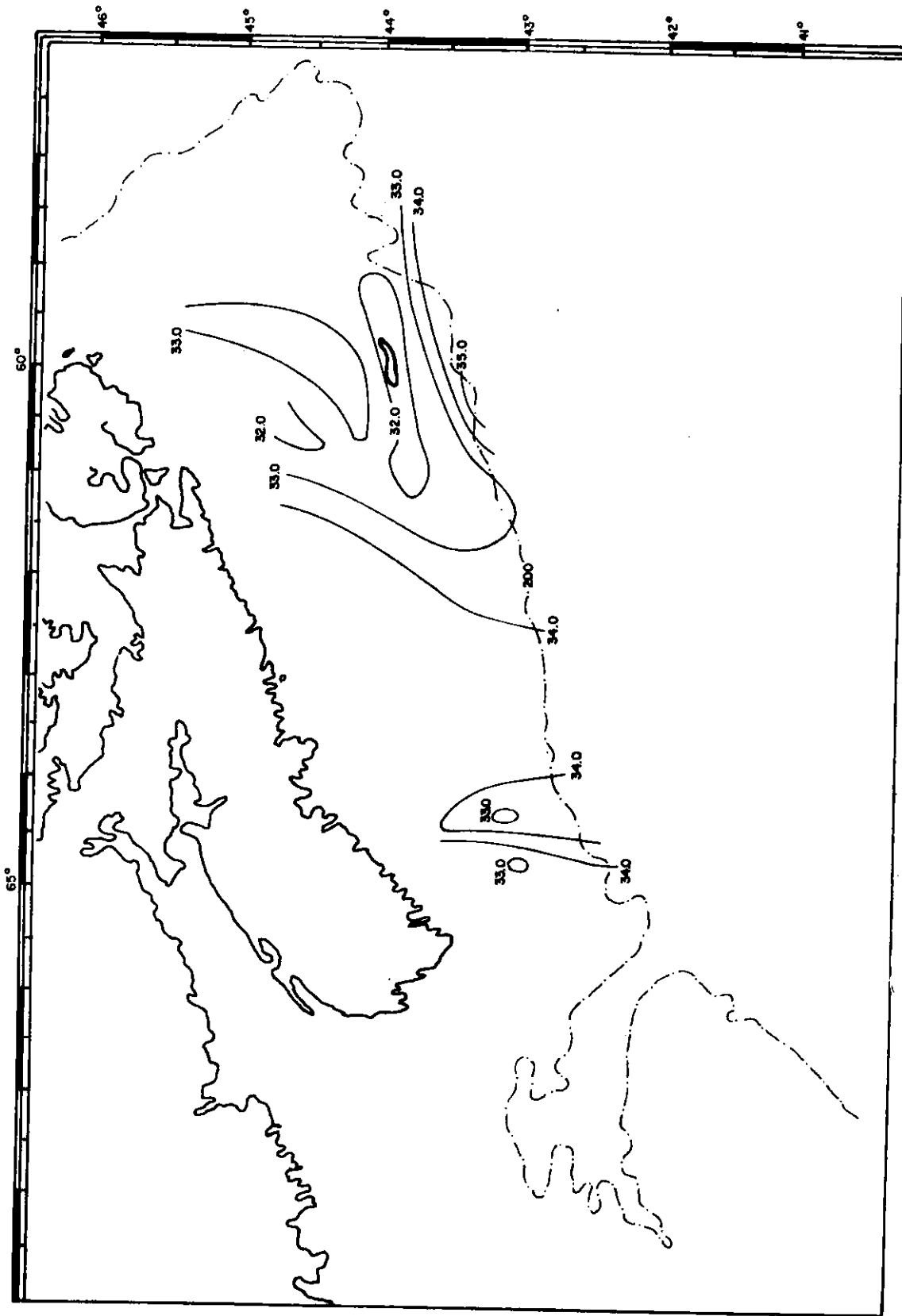


Fig. 8. Bottom salinities on the Scottish Shelf in July 1978.

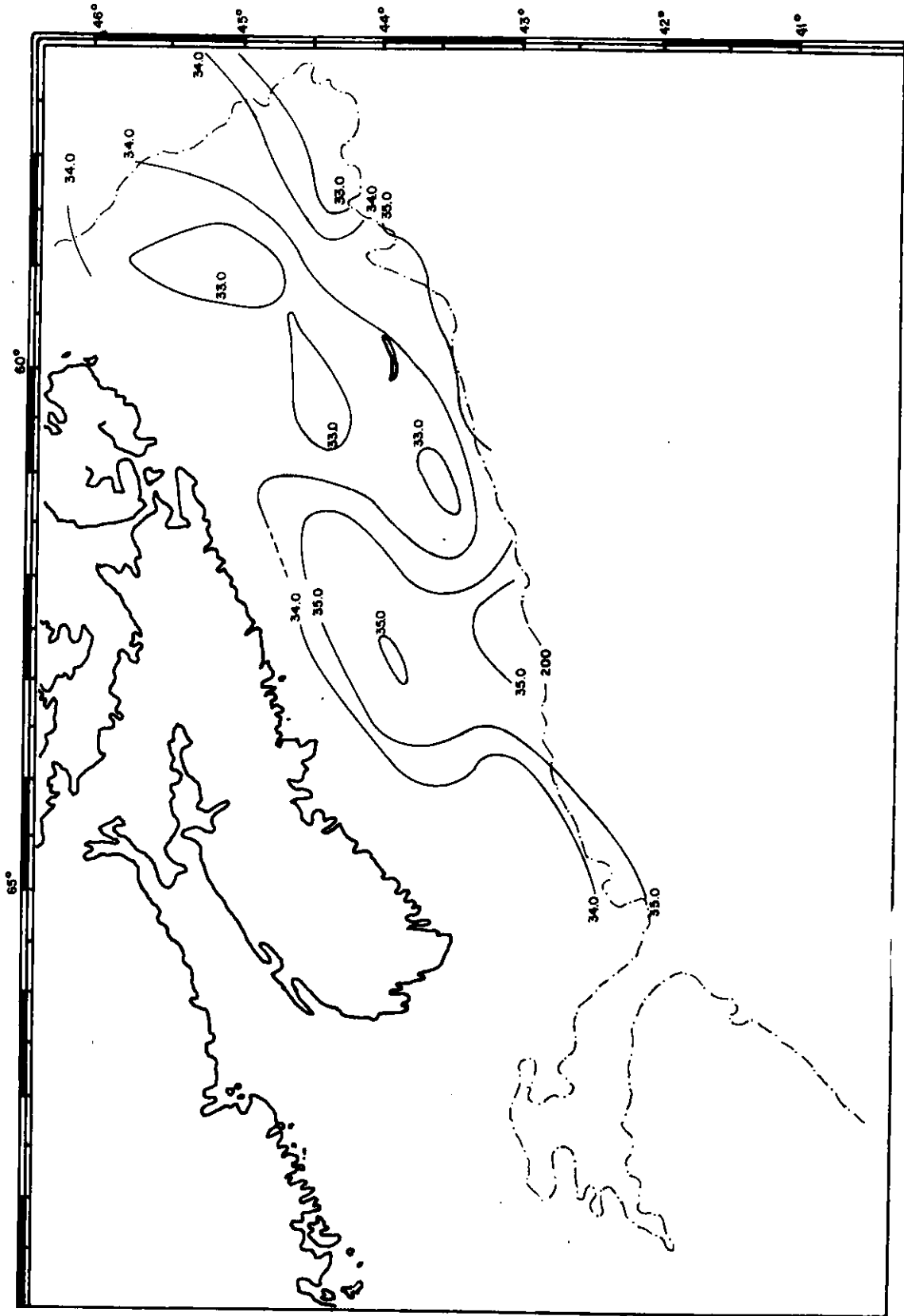


Fig. 9. Bottom salinities on the Scotian Shelf in July 1977.

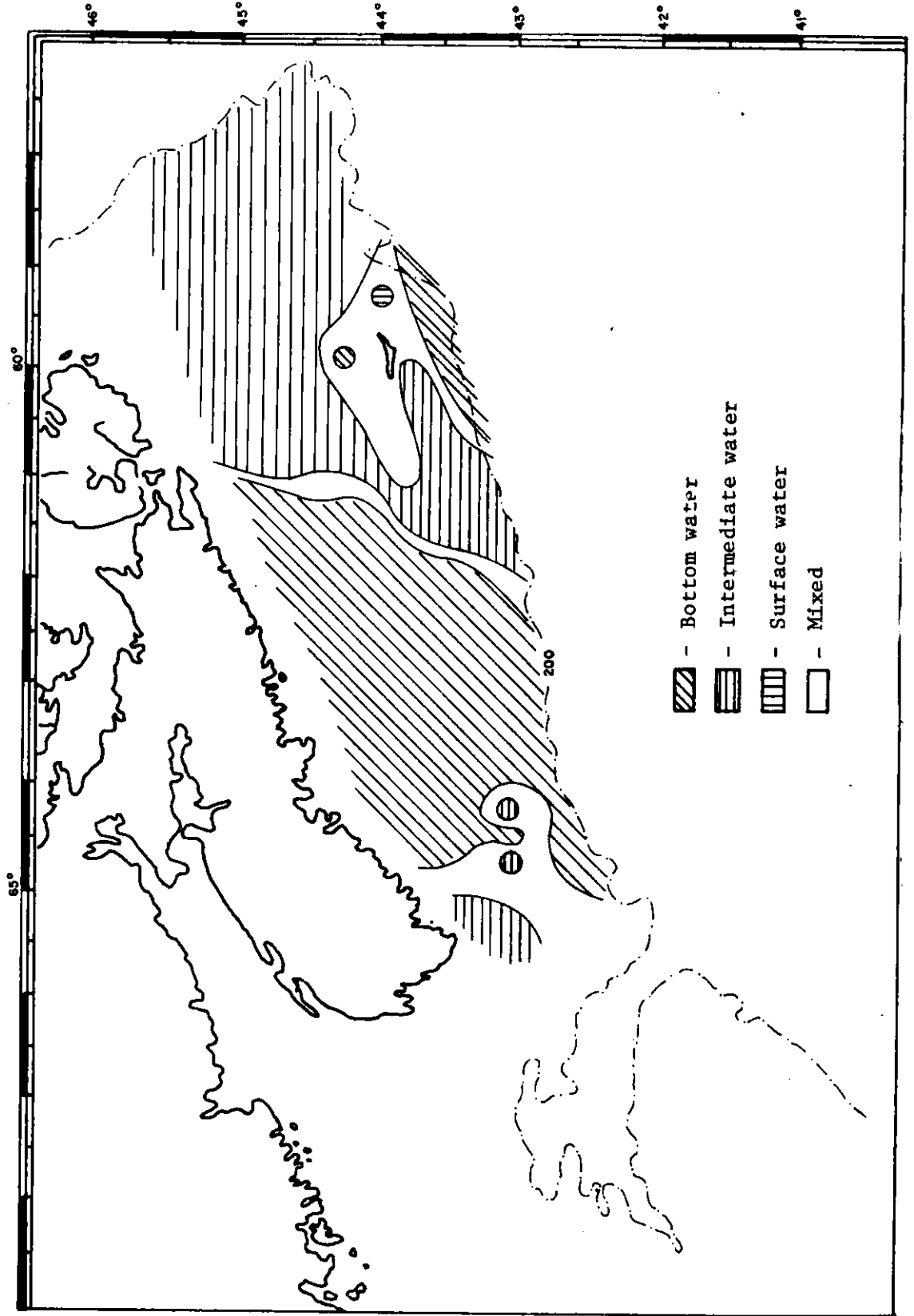


Fig. 10. Bottom water masses on the Scotian Shelf in July 1978.

