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Temperatures and salinities in the eastern Newfoundland area in 1971

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Introduction

In July-August 1971, the 6 standard monitoring sections taken across the Labrador Current east of Newfoundland at approximately the same time each year were occupied by the *Cape Freels*. Station 27, off Cape Spear, was occupied monthly or more often during the year. The 1971 section temperatures are compared with the lowest, average, and highest temperatures at each station and depth in 1951-65 at approximately the same dates (unpublished) and also with temperatures in 1969 and 1970 (Templeman, 1970, 1971).

In the sections, the surface temperatures and salinities are by necessity placed above and occasionally somewhat displaced from the stations which indicate the correct location, otherwise the position of the decimal point indicates the level and position of the temperature or salinity.

Sections across the Labrador Current in July-August

Temperatures

In Section A Labrador from off Seal Islands across Hamilton Inlet Bank (Fig. 1), apart from surface temperatures at the shoreward Stations No. 51-54 which were above average, the temperatures of the western, colder water part of the Labrador Current were below, and the volumes of water below -1°C and below 0°C greater than the 1951-65 average and conditions were closer to those of the years with the lowest observed temperatures

than to the average of this period. Temperatures of the cold water section at or below 0°C were not as low as in 1969, but were not greatly different from those of 1970, except that the small coastward volume of water below -1.5°C present in 1970 was not present in 1971. In the offshore, warmer part of the Labrador Current of West Greenland origin, temperatures of the deeper water at the most seaward stations east of the continental slope were close to the 1951-65 average, having fallen considerably from those of 1970 which were similar to the highest and in some cases higher than any previously encountered, and for the deeper parts of all the deeper stations east of the continental slope were slightly lower than in 1969. Offshore surface temperatures were close to the average for 1951-65.

In Section B off Cape Bonavista (Fig. 2), surface temperatures, except at Station No. 47, were higher than any previously recorded. Temperatures in the western, colder mid-water portion of the Labrador Current were below the 1951-65 average and close to the lowest previously encountered but the volumes of below -1.5 and -1°C water were less than the maximum. Coastward in the deepest water and over the Northeast Newfoundland Shelf, temperatures were slightly higher than any of the 1951-65 and 1969 periods, and on the average were similar to those of 1970. In the offshore deeper water adjacent to the continental slope, temperatures were above the average of the 1951-65 period and higher than in 1969 but lower than in 1970.

In Section C from St. John's to Flemish Cap (Fig. 3), surface temperatures were above the average but below the highest recorded for the 1951-65 period and were in all except Station 27 in 1970 above those of 1969 and 1970. In the western cold water part of the Labrador Current in the Avalon Channel and over the surface of the Grand Bank, temperatures were lower and low temperatures ran deeper than the average of 1951-65 and lower than in 1969 and 1970. Core temperatures in the eastern branch of the colder water of the Labrador Current were lower than the lowest of the 1951-65, 69-70 period. Lower temperatures also extended farther seaward than in any year of the above period. Temperatures in the offshore deeper water of the Flemish Channel and on the seaward slope of

Flemish Cap were generally higher than the highest of the 1951-65, 69-70 period but were most similar to those of 1970 when temperatures near the bottom of the western side of Flemish Channel were a little higher, but for most of the remainder lower than in 1971.

In Section D from St. John's to the southeast slope of the Grand Bank (Fig. 4), surface temperatures at the 3 shoreward stations and Station 33D were close to the highest, at the intermediate stations No. 30 and 31 about halfway between the average and the highest, and at the remaining seaward stations close to the average of the 1951-65 period. Surface temperatures were considerably higher than in 1969, and slightly higher for the shoreward Stations No. 27 to 29, and lower in the remaining seaward stations (except 33D) than in 1970. Temperatures in the deeper water of the Avalon Channel were close to the average of the 1951-65 period but at intermediate levels higher than in 1970. Water below 0°C extended a little farther eastward on the Grand Bank than the average of 1951-65 or in 1969-70. The core temperatures in the eastern branch of the Labrador Current to the east of the Grand Bank were lower than the 1951-65 average and lower than in 1969 and 1970. Deep water temperatures below 200 m in the most easterly Station 33F were above the average of the 1951-65 period and at 600-800 m above or equal to the highest of this period, but as for the whole station, lower than 1969 when very high temperatures were recorded and at 200-300 m lower than in 1970.

In Section E extending along the southwestern edge of the Grand Bank at about 75 m (Fig. 5), surface temperatures were usually above the 1951-65 average, much higher than in 1969 and higher than in 1970 at the western Stations No. 20A-24 but generally lower at the eastern stations. Temperatures in the Haddock Channel were below the average of the 1951-65 period and below those of 1969 and 1970. Bottom temperatures over the surface of the Grand Bank were below the 1951-65 average on the central part of the bank and slightly above the 1951-65 level on the eastern part of the bank and were not greatly different from those of 1969 and 1970. The eastern branch of the Labrador Current had a greater than average volume of water below 0°C, temperatures below -1°C extended farther

eastward and the lowest temperature of -1.42°C was lower than was previously recorded. Deep water temperatures below 400 m were well above average and close to the highest recorded.

In Section F at about 275 m along the southwestern slope of the Grand Bank to St. Pierre Bank (Fig. 6), surface temperatures were above the average but lower than the highest surface temperatures of the 1951-65 period. Most surface temperatures were considerably higher than those of 1969, and at most of the western stations they were higher, and at most of the eastern stations lower than in 1970. Temperatures in the colder part of the western branch of the Labrador Current at Stations 10 and 13 were lower than the average of the 1951-65 period and lower than in 1969 and 1970. The volume of cold water in the eastern branch of the Labrador Current passing westward around the tail of the Grand Bank was greater than the 1951-65 average and the lowest temperature of this branch, -1.41 , was the lowest yet recorded in our observations. Temperatures in the warmer slope water impinging on the bank at Stations 15 and 16 between the west and east cold water masses were similar to the highest recorded in the August sections since 1951. Bottom temperatures at the level surface were above average but, except that at Station 18 (which was higher), not as high as the highest recorded in 1951-65, and were higher than in 1969 and higher at some and lower at other stations than in 1970. The eastern slope Stations shown (26D-H) were the same as those in Section E (Fig. 5).

Salinities

In the Seal Island Section A (Fig. 1), salinities near the bottom in Hawke Channel and at the crest of Hamilton Inlet Bank were lower than in 1970, resembling those of 1969. The deep water salinities seaward of Hamilton Inlet Bank were lower than in 1969 and still lower than in 1970.

In Section B off Cape Bonavista (Fig. 2), salinities of the deep water east of the continental slope were lower than in 1970 and fairly similar to those of 1969.

In Section C from St. John's to Flemish Cap (Fig. 3), near-bottom salinities in Avalon Channel and over the surface of the Grand Bank were lower than those of 1969 and 1970. Salinities in the deeper parts of Flemish Channel and seaward of Flemish Cap were lower than in 1970 and not greatly different from those of 1969.

In Section D from St. John's to the southeast slope of the Grand Bank (Fig. 4), near-bottom salinities in the Avalon Channel were fairly similar to those of 1970 and lower than in 1969. In the deep water east of the Grand Bank, salinities at the deepest levels ranged from slightly lower to slightly higher than in 1970 and 1969.

In Section E at about 75 m extending along the southwestern slope of the Grand Bank (Fig. 5), salinities in the Haddock Channel were lower than in 1969 and 1970, and near-bottom salinities over the surface of the Grand Bank were low as in 1970 and lower than in 1969. Salinities in the water on the eastern slope of the Grand Bank and continental slope were lower than in 1969 and 1970.

In Section F at 275 m along the southwestern slope of the Grand Bank to St. Pierre Bank (Fig. 6), near-bottom salinities at the level surface were lower than in 1970 but usually little different from those of 1969.

Station 27, 1971

In Station 27 off Cape Spear (Fig. 7), surface temperatures from May to September were above the 1950-62 average (Templeman, 1965); in other months they were lower than this average. Winter-spring surface temperatures were generally lower, June-August temperatures approximately similar and October-November temperatures lower than in 1970. At intermediate levels, in the coldest water of the Labrador Current, temperatures were below the 1950-62 average, below those of 1970 and well below that of 1969. Bottom temperatures were close to the 1950-62 average and generally lower than those of 1969, 1970.

The salinity picture in the deeper water and near bottom was generally similar to that of 1970.

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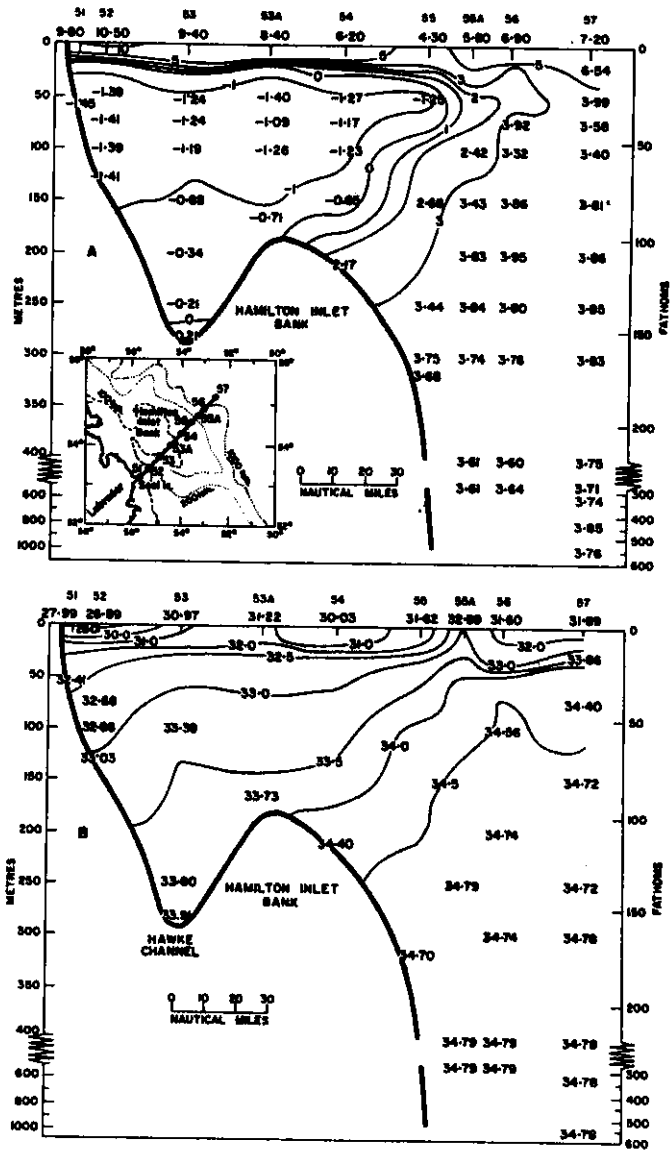


Fig. 1. Temperature ($^{\circ}\text{C}$) above and salinity (‰) below, Section A, Seal Island-Hamilton Inlet Bank, 3-4 August 1971.

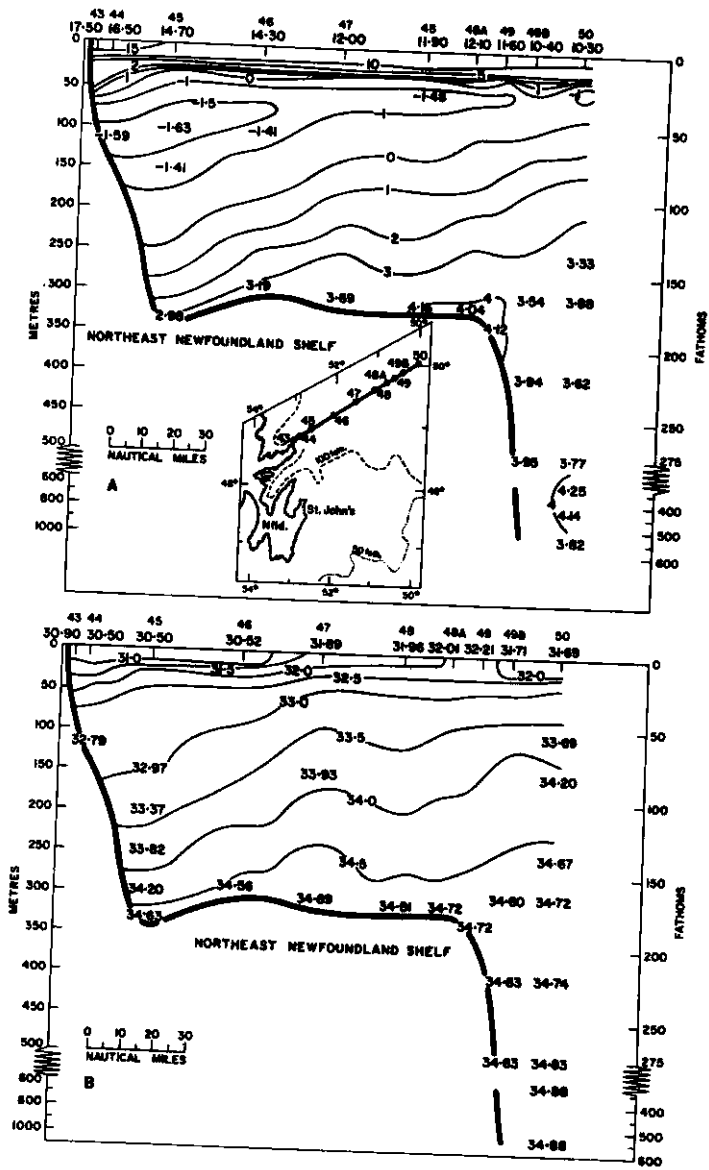


Fig. 2. Temperature ($^{\circ}\text{C}$) above and salinity (‰) below, Section B, off Cape Bonavista, 1-2 August 1971.

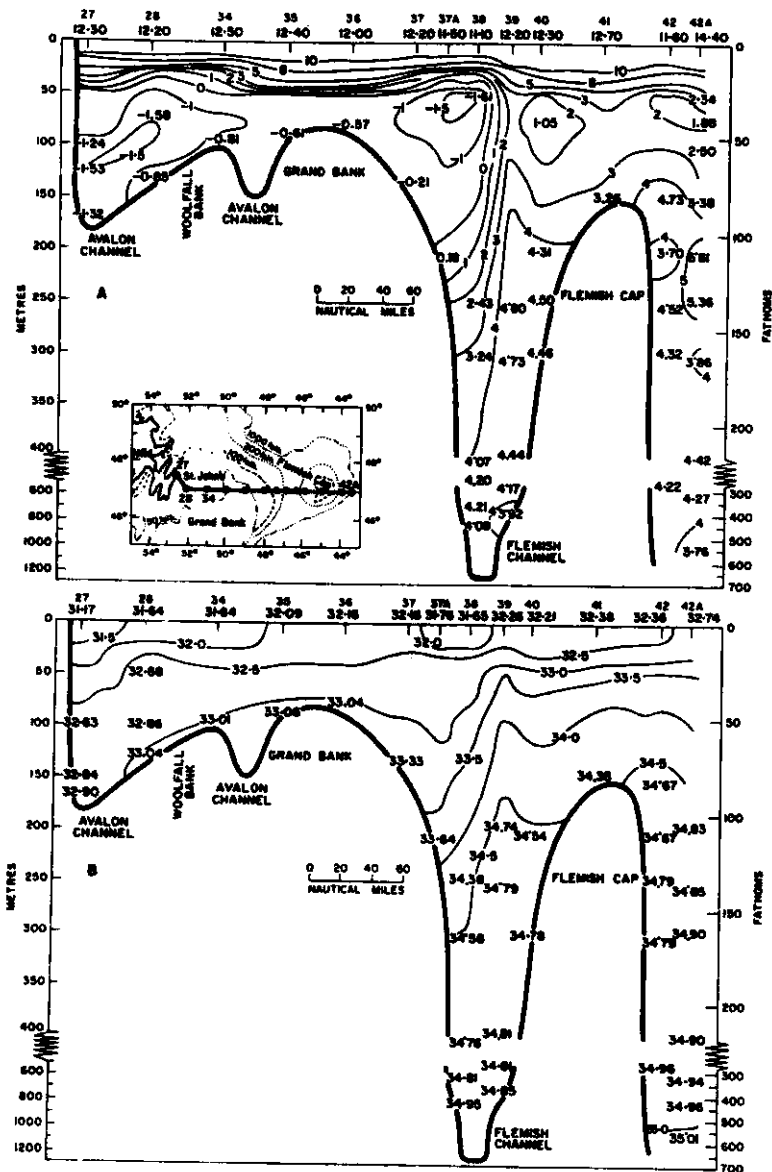


Fig. 3. Temperature ($^{\circ}\text{C}$) above and salinity (‰) below, Section C, St. John's-Flemish Cap, 29-31 July 1971.

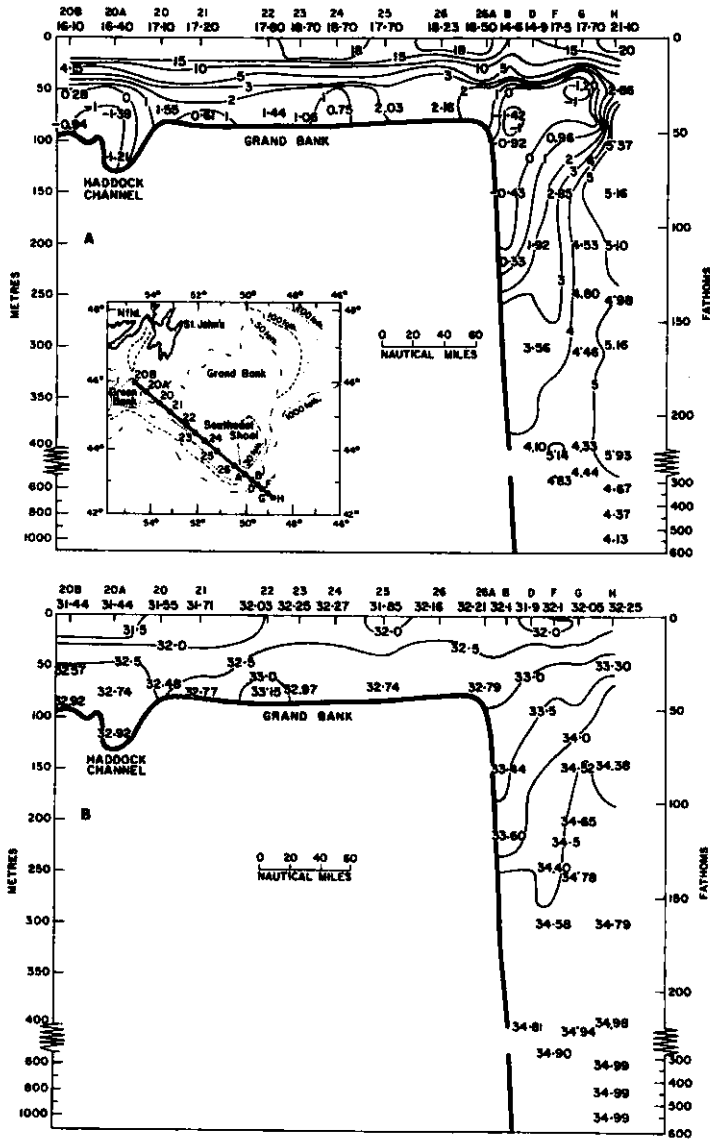


Fig. 5. Temperature (°C) above and salinity (‰) below, Section E, Green Bank-SE Grand Bank, 20-23 August 1971.

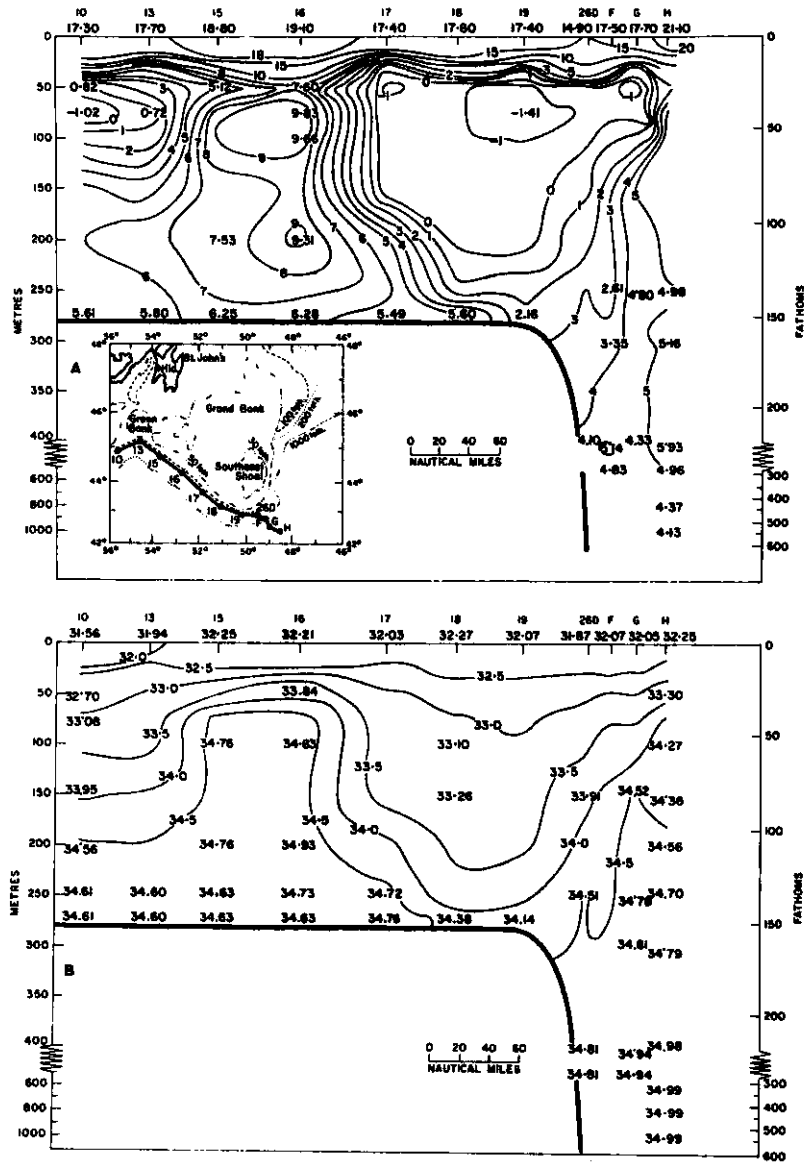


Fig. 6. Temperature ($^{\circ}\text{C}$) above and salinity (‰) below, Section F, SW slope Grand Bank-St. Pierre Bank, 20-23 August 1971.

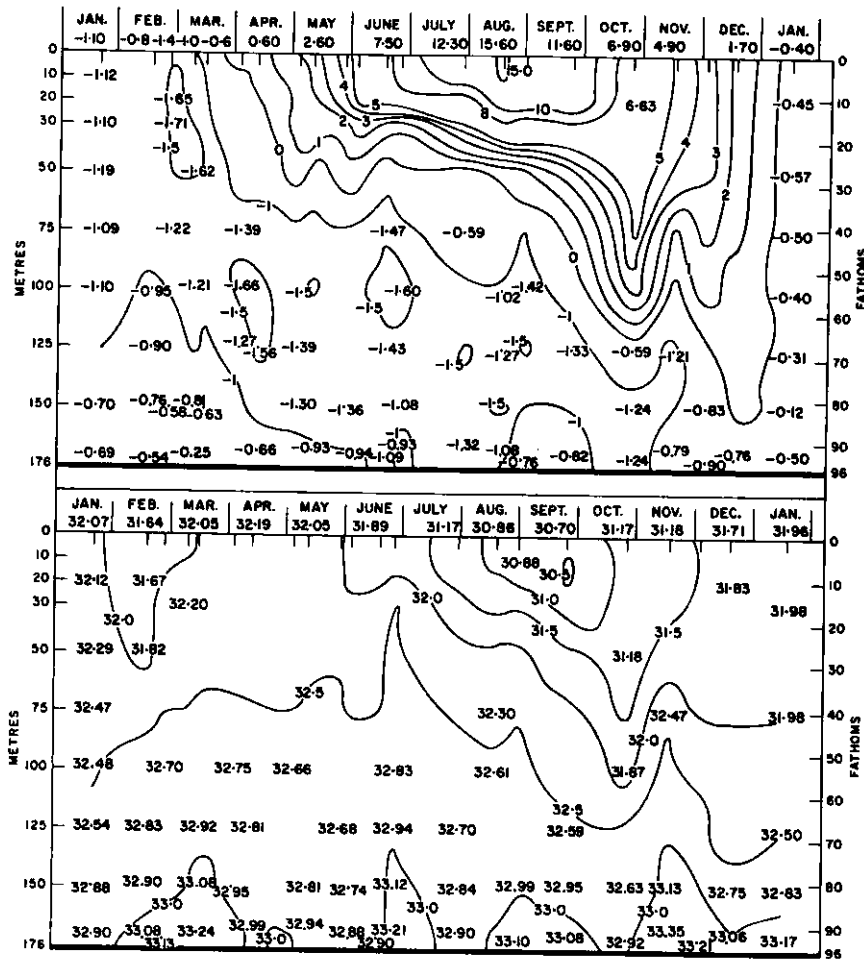


Fig. 7. Temperature ($^{\circ}\text{C}$) above and salinity (‰) below, January 1971 to January 1972, from surface to bottom at Station 27 (see Fig. 3, 4 inset), 2 nautical miles off Cape Spear near St. John's.

