

INTERNATIONAL COMMISSION FOR



THE NORTHWEST ATLANTIC FISHERIES

Serial No. 3077  
(D.c.9)

ICNAF Res.Doc. 73/113

ANNUAL MEETING - JUNE 1973

ICNAF CONVENTION AREA

OCEANOGRAPHIC SUMMARY 1972

W.B. Bailey

Atlantic Oceanographic Laboratory  
Bedford Institute of Oceanography

1. At the ICNAF Symposium on Environmental Conditions in the Northwest Atlantic, 1960-1969, Mr. A.J. Lee (UK), during the discussion period of Rodewald's paper, made a plea for an increase in the availability of sea surface temperature data collected by merchant ships as part of their meteorological reports.
2. In Canada these synoptic data have been regularly analyzed daily and weekly since 1962. In 1972 these analyses were made available to participants in the Integrated Global Ocean Station Systems (IGOSS) Bathy Pilot Project.
3. This summary is based on those data of which some two thousand observations are available each week. Modeled after the descriptions of Hachey, Hermann and Bailey (1954) a wealth of information may be learned about oceanic activities on a scale of 1:5 million. The accuracy of such data and its random nature and paucity will not permit the use of a significantly larger chart scale.

4. In review, 1972 at first appeared to be quite normal. On closer inspection it developed that in comparison with 1970, which Burmakin (1972) shows as being near normal, 1972 was generally about  $2\text{C}^{\circ}$  colder at the end of the cooling season. At the end of the heating season where changes are quite uneven the southern areas were over  $2\text{C}^{\circ}$  warmer while the northern areas were about  $3\text{C}^{\circ}$  colder. In some specific areas these differences were even greater. For instance, the southern portion of the Gulf of St. Lawrence was  $8\text{C}^{\circ}$  cooler than in 1970. The presence of a much lower temperature prompted Ice Central - Ottawa to predict an early freeze-up in the Gulf and heavier ice concentrations in that region. On the Grand Banks temperatures were in some places as much as  $11\text{C}^{\circ}$  colder in 1972 than in 1970. Ocean Station Delta located east of the Grand Banks appeared to be on the boundary between the cooling in the north and warming in the south. Here no significant temperature variations existed between the two years.

5. In all, it appears that the waters in the Convention area were active in 1972. Both the Labrador Current and the Gulf Stream exhibited greater transports as illustrated through the extension of their normal water temperatures over greater distances.

6. It is in the Grand Banks region where these two currents meet that their relative influences are most readily discernable. The record movement of icebergs and the increased Arctic influence indicate a stronger Labrador Current. Figure 1 shows the distribution of iceberg reports south of  $50^{\circ}\text{N}$  for the iceberg season of 1972.

7. As early as mid-January the strong Gulf Stream flow was noted by the extension of the  $24^{\circ}\text{C}$  isotherm as far east as the  $69^{\circ}\text{W}$  meridian. At that

the result that in mid-summer temperatures on the Bank were less than 12°C and large tongues of cold water extended eastward into the Atlantic. It would appear that the blocking effect of the warm ocean waters caused the Labrador Current to seek outlets elsewhere.

13. Probably by mid-October the strength of flow of the Labrador Current had weakened and was confined to the Avalon Channel and the eastern face with the result that while temperatures were decreasing at the rate of 2°C per month throughout the area, they increased by 4°C on the central Grand Banks.

14. By mid-November the warm waters at the Tail of the Bank had receded and a westward flow was re-established. By the middle of December the eastward flow of Labrador water ceased. This eastward flow was sufficiently strong at times to block the northward flow of warm North Atlantic water into the Labrador Sea.

15. The oceanographic conditions in 1972 perhaps showed more clearly than previous years the eastward flow of Labrador water. This water probably lies along the northern edge of the Polar Front and because of its intermittent nature is not readily observable in the standard oceanographic section. Data from previous years has hinted at an extension of modified Labrador water moving well eastward along the Polar Front. Unfortunately, in this area data are too sparse for the formation of conclusions.

16. The ICNAF Red Book Series contains assessments of the oceanographic conditions over many years based on data in sections. As noted from the above description of the dynamic changes it is apparent that the sole use of sections as a measure of conditions may well be very misleading. The same is true also of conclusions drawn solely on the distributions of sea surface

time, the Labrador current appeared to be weak with temperatures on the Banks near  $1^{\circ}\text{C}$ , and the warm water gradient lay close to the eastern face of the Banks. This condition remained until mid-March.

8. In April the fringe of cold water on the edge of the Grand Banks expanded and curved westward around the Tail of the Bank. There were also two tongues of modified Labrador water which extended, respectively, southward to  $40^{\circ}\text{N}$  and 180 nautical miles southeastward from the Tail of the Bank. This latter tongue was observed during a cruise of CSS *Hudson*. Observations indicated that the cooler waters extended to at least a depth of 1000 metres (Reiniger, private communication).

9. A feature not usually observed, but which was prevalent in 1972, was the extension of the Avalon current southward across the Grand Banks to the deep water.

10. In the Flemish Cap area a tongue of cold water extended as far east as the  $40^{\circ}\text{W}$  meridian and a second tongue pushed in a southeastward direction to the same meridian.

11. In June an incursion of warm water onto the western face of the Grand Banks near the Tail caused surface temperatures to reach  $17^{\circ}\text{C}$  and temperatures as high as  $14^{\circ}$ - $15^{\circ}\text{C}$  extended well onto the Banks. This incursion caused a blocking situation at the Tail of the Bank so that the waters of the Labrador Current were directed eastward causing a confusion of cold eddies to move in a southeast direction. The eastward flow in the Flemish Cap area broadened and consolidated into a single stream.

12. The major feature of the Labrador water in 1972 was the effect of the closeness of warm waters to the east face and Tail of the Bank with

temperature. A combination of the two would appear to provide the linkage necessary to make a three-dimensional assessment and to monitor any changes with time. The setting up of standard hydrographic relations and sections throughout the Convention area, their observation at regular intervals coupled with the use of synoptic sea surface temperature data available as part of marine meteorological observations would extend considerably our ability to monitor oceanographic conditions. However, it must be recognized that a net of standard sections which would be sufficient to define the time series of variations presents formidable logistic difficulties and probably cannot be carried out before the development of cheap and reliable buoy systems.

17. References

- BURMAKIN, V.V. 1972. Seasonal and year to year variations in water temperature in the Labrador and Newfoundland areas. ICNAF Special Publication No. 8: 63-70.
- HACHEY, H.B., F. HERMANN and W.B. BAILEY. 1954. The waters of the ICNAF Convention area. Annual Proc. Int. Comm. Northwest Atlantic Fish., 4: 67-102.
- REINIGER, R. 1972. Personal communication. Atlantic Oceanographic Laboratory, Bedford Institute of Oceanography, Dartmouth, N.S.
- RODEWALD, M. 1972. Temperature conditions in the North and Northwest Atlantic during the decade 1961-1970. ICNAF Special Publication No. 8: 9-34.

