

channel, the Cansau, cuts through between Sable Island bank and Banquereau. Farther to the south is the Fundian channel passing out from the Bay of Fundy and through the gulf of Maine. These three channels delimit two portions of the continental shelf off Nova Scotia. That to the north between the Laurentian and Cansau channels includes the Banquereau, Misaine, and Cansau banks, and may be called the Breton portion of the shelf, or the Breton bank, since it lies off Cape Breton island. The southern part lies between the Cansau and Fundian channels and includes La Have and Sable Island banks. It may be called the Scotian bank since it lies against the main portion of the province of Nova Scotia.

In the St. Lawrence gulf we have to the north of Anticosti island, the Anticostian channel, and running north towards the straits of Belle Isle the Esquiman channel. To the south of the Laurentian channel in the gulf is an extensive submarine plateau with, for the most part, less than 30 fathoms of water covering it. Cropping up from it are the Magdalen islands and Prince Edward island. This area is peculiar in its biological and hydrographical characters. We have referred to it as the Lower Gulf region. It might be called the Magdalen bay.

The currents of the region have been thoroughly investigated by Dr. W. Bell Dawson, and his results published in the reports of the Tidal and Current Survey of Canada from 1894 to 1913, including special reports on the currents. In the gulf of St. Lawrence he finds that the general circulation is in a left-handed direction and chiefly confined to the deep central portions. A current enters the gulf through Cabot strait off Cape Ray and spreads out to the north and northeast. Part runs up the Esquiman channel on the east side and returns on the west. Similarly a current runs up the Anticostian channel on the north side and returns on the south, and up the Laurentian channel between Anticosti island and the Gaspé coast on the north side and returns on the south. The last of these, the Gaspé current, is very strong and spreads to the southeast over the Magdalen bay, passing to either side of the Magdalen islands, and finally as a single stream of constant strong character, the Cape Breton current, it emerges from the gulf on the south side of Cabot strait.

Dr. Dawson has shown by density determinations that the inflowing water is more saline than the outflowing mud, as a result, the northern part of the gulf is constantly more saline than the southern, a line of division passing from East cape, Anticosti island, to the middle of Cabot strait.

The shallower channels of the gulf show the same circulation but to only a slight degree. Through the straits of Belle Isle and the Mingan channel on the north there is a general inward or westward tendency, and through the Northumberland strait (and perhaps also the Gut of Canso<sup>1</sup>) on the south a general outward or eastward tendency.

Outside the gulf there is a slight westward tendency on the southern coast of Newfoundland and a southwestward drift along the outer coast of Nova Scotia. In the gulf of Maine, Bigelow has found a general left-handed circulation, entering the gulf on the north and leaving it on the south. In the Bay of Fundy there is doubtless a similar circulation, although so masked by the heavy tides that Dawson has been unable to determine it by current measurements.

Farther out we have two well-known strong currents, the Polar or Labrador current coming down from the north along the outer coast of Newfoundland, flooding the Grand Banks and then turning to the east at their southern border; and the Gulf Stream coming from the southwest along the coast of the United States and being deflected to the east and south just south of the Grand Banks.

As a basis for our knowledge of the different kinds of water occurring in the region we may take the three sharply marked zones found by Hjort off our coasts in 1910 (Murray and Hjort, 1912, p. 109) in his section from the Azores to Newfoundland. There are the following: (1) a Northern Coastal zone Arctic (?) on the Newfoundland

<sup>1</sup> I have just received from Dr. Dawson a proof sheet of a forthcoming report in which he describes a preponderance of outflow to the south through the Gut of Canso.