

Difference in the time of high water between South-west Point of Anticosti and Quebec, omitting irregularities due to wind. Distance, 360 nautical miles. From simultaneous observations during eleven months in 1894 and 1895. Difference in absolute time ranges from 5 h. 13 m. to 5 h. 39 m. Mean = 5 h. 26 m.

The wide range in the difference of time across the open Gulf, is chiefly due to an unusually great diurnal inequality in Cabot Strait itself; that is, a long interval and a short interval of time between the tides of the same day. It is remarkable, when this inequality is so great in the main entrance to the Gulf by which the tide comes in from the Atlantic, that it should so disappear that scarcely a trace of it is to be found in the tides of the Lower St. Lawrence or at Quebec. On the other hand, this inequality is very marked in Northumberland Strait and the neighbouring regions. It is probable that this is due to tidal interference, occasioned by some contrary tidal undulation which over-runs the main tide entering through Cabot Strait.

The practical results of this inequality are very evident, however. On account of the importance of St. Paul Island in the main entrance to the Gulf, many endeavours have been made to establish a constant difference between it and some port on the Atlantic coast of America or in Europe; but the inequality is there so great that these endeavours have been without result. This diurnal inequality is also very marked at Pictou and Charlottetown in the region referred to.

The diurnal inequality varies with the declination of the moon north or south of the equator; and not with the moon's phases as in the case of the ordinary change from spring tides to neaps. This change still goes on, while the other variation is superadded; and as it takes place in a different period, it is continually overrunning the former. The resulting irregularities are, therefore, very great, unless these two causes are carefully distinguished from each other.

These conditions made it necessary to obtain direct tidal comparisons between the important harbours of this region and the tides as they enter Cabot Strait. For this purpose, the tide-gauge at St. Paul Island was essential, and as it has been twice destroyed by winter storms in three years, on account of its exposed situation, it was necessary to obtain the required observations without delay. A tide-gauge had also been erected at Halifax in the previous season, and the gauge at Anticosti had been put in good order; and as any of these might prove necessary for purposes of comparison, it was advisable to obtain the new observations while they continued in good working order. It was also important to determine how far south of Gaspé in the Bay des Chaleurs and along the New Brunswick coast, the tides could be referred by constant differences to Anticosti and Quebec; and where the irregularities due to diurnal inequality first manifested themselves.

Arrangements were therefore made to take special observations in the region extending from Gaspé along the south-western side of the Gulf, through Northumberland Strait, and around Prince Edward Island. As this comprises some 580 miles of coast-line, it was necessary to select places which were reasonably accessible, to avoid undue delay in travel. The principal harbours in the region had the first claim; and consideration had also to be given to the relative importance of places from a tidal point of view, so as best to obtain tidal differences for intermediate points. The choice of the following places as temporary tidal stations was accordingly made: Carleton, as near the head of the Bay des Chaleurs as possible, while avoiding the local influence of the Restigouche River; Lower Neguac, near the mouth of Miramichi Bay, to obtain the open tide unaffected by the bars and rivers of the bay; Charlottetown, where the tide in Northumberland Strait has the greatest range; Pictou, in line with the open channel between Prince Edward Island and Cape Breton Island, up which the tides pass; and Souris, the nearest port to Cabot Strait which is readily accessible, as there is no railway communication on the west side of Cape Breton Island.

The erection of temporary tide-gauges at these places and the superintendence of the observations was entrusted to Mr. H. M. Mackay, who carried out the work very efficiently. By the use of self-registering instruments, more than twice as much information was obtained as could have been got by direct or personal observation with four to five times the expense.