

Brunswick coast and around Prince Edward Island, to Cape Breton Island; as detailed in the last Report of Progress. A large amount of work was involved in the reduction of these observations; as comparisons had to be made between the tides at these points and several of the principal tidal stations; notably the stations at Halifax, St. Paul Island and Anticosti, in order to ascertain to which of these stations the tides in the south-western half of the Gulf of St. Lawrence could best be referred. The observations also covered a sufficient extent to enable the general progress of the tide to be traced throughout this region. It was found that the general course of the tidal undulation which passes across the Gulf from Cabot Strait to the entrance of the St. Lawrence, is complicated by a return undulation; and that this makes the time of the tide nearly simultaneous along the north coast of Prince Edward Island; and this appears also to explain an irregularity known as diurnal inequality which occurs in Northumberland Strait.

The outcome of the investigation was to show that the time of the tide in this region cannot be correctly obtained by a constant difference from a port on the Atlantic coast such as Halifax; but that these tides can best be referred to the station at St. Paul Island, where the tidal undulation enters the Gulf from the Atlantic. The comparison of the observations with that station have furnished a valuable set of tidal differences for the harbours of this region, which will become available when the tidal data for St. Paul Island itself are worked out.

The ports which can be referred to that station include Miramichi Bay, Cape Tormentine, Charlottetown, Pictou, and Souris; and also St. Peters, Rustico, and Alberton, on the north coast of Prince Edward Island. All of these ports have railway communication, and several of them have the importance of a railway terminus. It was also found that Pictou was the best port of reference for Northumberland Strait; as the tides at Charlottetown are more irregular, either because of wind disturbance, or because of interference from the tide entering the western end of the strait. This is important with reference to the tidal currents in the strait. In the Shediac region, from Richibucto towards Cape Tormentine, the tides are confused, and have at times so small a range as to be scarcely appreciable. In Chaleurs Bay, the tides can be referred to the station at South-west Point, Anticosti, and thus to Quebec. The range of the tide at Carleton, Que., at the head of the bay, is nearly 10 feet; and at Charlottetown, where the highest tide in Northumberland Strait occurs, the extreme range is nearly 9 feet.

The importance of St. Paul Island in commanding this region thus became evident. As the interruptions there have been serious, owing to the difficulty of maintaining a tide gauge in so exposed a situation, the best continuous record yet available was found to extend from October, 1895, to November, 1896, or one complete year. Any breaks in the tide curves were filled by interpolation, the record was carefully reduced to a uniform datum, and forwarded to the Nautical Almanac office for analysis, and the determination of the constants necessary for the calculation of tide tables for that station; and from these, tide tables for the ports above referred to, can be deduced by direct differences.

In order to make the tidal observations of 1896 immediately available for the present season of navigation (1897), a provisional series of tidal differences was worked out, between Pictou and Halifax. From the simultaneous record obtained from the self-registering tide gauges at the two ports, it appeared that the actual difference in the time of high water between these two places was far from constant; as the time of high water at Pictou was found to range from 0h. 53m. to 3h. 23m. later than at Halifax. This range in the difference is largely due to the diurnal inequality which occurs at Pictou; and it serves to show that such tide tables as have been prepared in the past for ports within the Gulf must necessarily be far from correct, when they are based upon a constant difference from a port on the open Atlantic. This difference varies regularly, however, between the above limits, in accordance with the declination of the moon; and, without entering into technicalities, it will be sufficient to mention that it was thus found possible to use a *variable* difference as a sliding scale by which to calculate the Pictou tides from the tide tables already prepared for Halifax. The Charlottetown tides were in turn calcul-