

which presents much difficulty, as the gauge has to be placed above high-water mark to prevent it from being carried away by the heavy ice which drifts up and down the river with the tide. This necessitates the excavation of a trench 280 feet in length across a foreshore of shale rock to lead the tide to the gauge. On account of these difficulties the wharf at Rimouski, some six miles distant, was examined before the work was commenced. The dredging of the silt to deepen the water at this wharf has caused it to settle, and there is no certainty that further settlement may not take place, which would interfere seriously with observations made by a gauge placed upon it. Also in winter, there is no one at the wharf in the employ of the Government to carry on the observations; and the employment of a competent observer for the purpose would be less economical than to make the expenditure required to establish the gauge at Father Point. The practical advantage of Father Point as the Pilot Station, is a still more important argument in its favour. The erection of the gauge there should therefore be completed as soon as possible next season.

To complete the number of principal stations for the tidal observations in accordance with the explanations above given, three additional tides gauges should be erected at Yarmouth, Halifax, and Belle Isle respectively; the station at Father Point should be completed, and the tide gauge on the Magdalen Islands should be removed to the vicinity of Miramichi Bay. I would recommend that this be done during the coming season in order that the stations may be in operation at the earliest possible date.

CURRENTS.

There are two ways in which marine currents may be classified. From the point of view of the main routes of navigation which traverse the Gulf and follow our coasts, they may be termed Speed Currents or Cross Currents, according as they assist or retard a vessel, or tend to carry it laterally out of its course. The Gulf Stream off the American coast affords an example on a large scale of a speed current; as vessels between New York and the West Indies can obtain a distinct advantage in time by following or avoiding it. On the other hand with reference to the causes which give rise to the currents, a distinction may be made between tidal currents and those produced largely or wholly by the wind. In this connection also, the relation between surface currents and under currents is important; as the wind may displace a surface current from its normal position, and thus allow the water beneath to replace it to a greater or less extent. There are other causes also, such as difference of temperature, which may bring an under current to the surface, or occasion a surface current to sink. It must not, therefore, be hastily assumed that information regarding under currents is of no practical use for the purpose of navigation. In addition to these causes the height of the barometer may also have an appreciable effect on the movement of currents.

In illustration of the above points, some examples may be given from what is already more or less distinctly known or supposed to take place in the Lower St. Lawrence and Gulf; and these examples may also serve to show the nature of the information that it is so exceedingly important to obtain with at least some degree of certainty.

From Quebec to Father Point the tidal currents occupy the whole width of the River; and although they may class as speed currents, it is only the smaller sailing craft that take any advantage of them. The steamships take their chance of gain or loss and disregard them; although the direction of the current has to be considered in calculating time of arrival in port, and making railway connections. Where the River widens the case is different, as part of the width is occupied by a constant downward current which appears usually to run parallel to the south shore at no great distance from it, all the way to Gaspé. It is possible that this current may prove to be due in some measure to the warmer and fresher waters of the St. Lawrence river, which would naturally float to the surface; and its tendency to keep to the south side may be occasioned by the prevailing direction of the wind.