

best means of draining the lake—I shall now endeavour to do so in as comprehensive a manner as possible.

Lake Ellesmere is situate to the west of and adjoining Banks Peninsula, in the Provincial District of Canterbury. It lies between $44^{\circ} 8'$ and $44^{\circ} 18'$ south latitude, and $172^{\circ} 23'$ and $172^{\circ} 41'$ east longitude. Its greatest length along its southern boundary, by the shingle-bank which divides it from the ocean, is 17 miles—*i.e.*, from Taumutu to Birdlings—and its greatest breadth, measured at right angles from a point half-way along the shingle-spit to the small bight a little to the east of L2 River, is 10 miles. Its circumference at flood-line may be taken roughly at 60 miles, but the length of the traverse chained in ascertaining accurately the flood-line measured 97 miles. The area within the flood-line is computed as follows :—

Submerged during ordinary flood	...	...	...	...	Acres.	73,195
Points of land in lake not submerged	...	...	...	...		592
Sand-hills in lake not submerged	...	...	...	...		135
Total area of lake	...	...	...	...		<u>73,922</u>
Area of land submerged, April, 1878	...	...	...	...	Acres.	49,435
Area of land not submerged and lying between level of lake April, 1878, and flood-line.	...	...	...	...		24,487
Total area of lake	...	...	...	...		<u>73,922</u>

Much speculation has been entered into by theorists relative to the origin of Lake Ellesmere, and the changes that have taken place “in some remote period” as to the course of the larger rivers in the neighbourhood that now flow directly into the sea north and west of the peninsula, such as the Waimakariri and Rakaia, which are alleged to have at one time discharged their waters into the site now occupied by the lake. As nothing could be gained by attempting to unravel intricate questions of this kind even were there reliable data to work upon, I shall simply confine myself to the matter-of-fact evidence as gathered from the survey-plans attached to this report.

The area of the basin which is drained into the lake is about 750 square miles, and the principal channels are the Rivers Selwyn, Hart's Creek, L2, Halswell, Irwell, and Kaituna, besides several other minor creeks and rivulets, situated chiefly along the peninsula border of the lake.

The quantity of water discharged into the lake by each of the above several rivers and creeks (the Selwyn excepted) is continuous, and almost uniform throughout the year. The reason of this is that they are not greatly influenced by heavy rainfall, but almost entirely by springs, contributed most probably by percolations from the larger rivers.

Although the drainage-area of the Selwyn alone may be taken at two-thirds of the whole basin drained into the lake, yet its discharge during the year is not so great as that of Hart's Creek, or even the L2 River.

In order to arrive at an approximate estimate of the quantity of water accumulated in the lake during an average year, I will take the flood-line as 4ft. above high water of sea-level, which gives 13,939,000,000 of cubic feet, or nearly 2,000,000,000 less than calculated by Mr. Bray, M.Inst.C.E., in his report of the 10th April, 1875, addressed to the late Provincial Government.

As, however, there is reason to believe that upon the lake being let out, as has been the custom annually for several years past, and the mouth again becomes closed by the action of the waves breaking on the beach, the water in the lake having attained and preserved for some time a lower level than that of an ordinary high tide of the ocean, it would seem that Mr. Bray's figures as to the quantity of water accumulated in the lake during the year, namely—15,900,000,000 are approximately correct.

The question now arises as to the best means to be adopted, not only for draining the lake of this vast accumulation of water, but to prevent for all time any accumulation whatever above high water of sea-level in the estuary and not within 2ft. of that height in the upper half of the lake, as will presently be shown.

Having given the subject my best consideration I feel confident that, by permanently opening the mouth of Taumutu in the manner I am about to propose, the height of the lake-waters will be reduced throughout its upper compartments to at least that of half-tide of sea-level, as the full influence of the flood-tide will not have time to spread itself over so large an area and at so great a distance from the comparatively narrow entrance at Taumutu before the ebb commences.

This being the case, and taking the height of the ordinary flood-line throughout the lake at 4ft. above high water of sea-level, as already stated, the permanent reduction made in the height of the lake-waters would amount to between 6ft. and 7ft. below ordinary flood-line—*i.e.*, 2ft. at least below high water of sea-level.

The approximate area of land that would thus be reclaimed, judging by the few soundings that have been taken, would amount to between 30,000 and 35,000 acres; but how much of this will be suitable for pasturage and how much for agricultural purposes it is impossible to say until the land is reclaimed.

But, as regards the quality of the submerged lands, it is very evident that the greater portion of that which is laid bare by the periodical opening of the mouth is of such a character as to offer great encouragement for the prosecution of any works at a reasonable cost that would secure its permanent reclamation, as there can be no question of its becoming in a short time a highly remunerative undertaking.