

24th January,	1853,	heavy.	29th May,	1861,
6th June,	1853,		28th January,	1868,
11th June,	1854,		3rd February,	1868, very heavy.
8th October,	1855,	heavy.	1st January,	1870, heavy.

Of these floods, that one on the 3rd February, 1868, rose the Taieri to a higher volume than had ever been recorded before, the highest flood-mark, as shown on the clay cliff at Outram Gorge, being five feet below it. The marks placed by Mr. Adams, of Otakia, show also that the overflow of the Waipori Lake on the Plain exceeded the floods of 1861 and 1870 by 13 and 12 inches respectively.

7. As I had an opportunity of witnessing the heaviest flood at Outram shortly after it had culminated, I gauged the channel, and estimated the rate of current per minute, which, on after-calculation, gives 4,653,068 cubic feet delivered per minute. I also gauged the river in its lowest state, and found a delivery of 45,000 cubic feet per minute. Thus the flood exceeds the low summer delivery by about one hundred times—a rate exceeding the most mountainous torrents in Great Britain. Having also gauged the delivery at the East Taieri Bridge of the highest flood level, I find it to be 1,186,960 cubic feet. Thus the outflow of the flood waters of the Taieri, not reckoning the effects of Silver Stream and Waipori, is about only three-sevenths of the inflow upon the plains; hence the Waipori and Waiholā Lakes, and plains adjacent to them, act as regulators over which the flood waters distribute themselves until the channel of the outlet to the sea is able to draw them off.

8. The area of the Waipori and Waiholā Lakes amounts to about 6 square miles, and the land subject to inundations to 49½ square miles. The flood waters rise 9½ feet above the low-water level of the former; and here a distinction must be made between still flood water of and adjoining the lakes and the flood waters that have a descent from the gorges down thereto—the former extending over 29 and the latter over 20½ square miles. Thus 20½ square miles of land, situated principally on the north-eastern end of the plain, may be reclaimed by drainage, without embankment; but of what may be thought advisable to reclaim of the 29 square miles adjacent to the lakes must be done by the latter system. This question will much depend on the value of land, cost of labour, and the height to which the flood level of the lakes may be safely raised, consequent on the curtailment of their area of dispersion. To give an idea of ultimate measures I have calculated approximately the volumes of flood waters that lie on the plain at their maximum level, as given by Mr. Johnston's survey:—

	Cubic feet.
On Waipori and Waiholā Lakes ... ..	1,589,068,800
On 29 square miles adjacent to lakes ... ..	2,425,420,800
On 20½ square miles to N.E. of plain ... ..	571,507,200
Total ... ..	4,585,996,800

9. As a check on the above result, I have also calculated the difference of the inflow and the outflow of flood waters during 24 hours, as obtained by gauge and measure of valley basins, and which may be stated as a fair mode of reckoning, as great floods are invariably preceded by wet weather, which fully saturates the ground, so that all channels are full.

	Cubic feet.
Inflow ... ..	6,700,417,920
{ By Taieri River ... ..	475,047,936
{ By Waipori River ... ..	66,908,160
{ By Silver Stream ... ..	7,242,374,016
Outflow by channel to sea ... ..	2,717,222,400
Difference, or maximum flood waters that lie on the plain ... ..	4,525,151,616

10. As the channel leading from the Taieri Plain to the sea is deep, and in many parts bounded by steep cliffs on both sides, I anticipate that little improvement by widening and deepening can be made in this direction. The work would be very costly, attended by great danger to the channel, as it now is, by the falling of cliffs into its bed, and the improvement would at best be slight. In considering the subject, therefore, the improvement of the outlet must be left out.

11. The question, therefore, is, how much of the 29 square miles of swampy land near to the lakes, extending so far as Greytown, may be embanked and rendered fit for agriculture? It is clear that the enlargement of the Taieri River bed, or the construction of new channels, will bring the flood waters down sooner on this area than at present. This, with curtailment of the area on which they now distribute themselves, must have the effect of raising the levels on the lakes and adjacent lands, which will affect vested interests in or near the margins. These matters will no doubt engage the attention of the projectors and engineers that may carry out the works. All that I need say at this stage is, that I find that by embanking off 10 square miles of flood waters the flood-mark on the lakes and swamp land adjacent will be raised 2.20 feet; by embanking off 20 square miles, 5.36 feet; and so forth in increasing ratio.

12. A mode of alleviating the floods (and it is a common one in Europe) is to create regulating reservoirs in the course of the river above the lands sought to be reclaimed.

13. The Taieri has two positions well fitted for this purpose at the Strath Taieri and Maniototo Lake, but, as the tailings from the gold fields will have an increasing tendency to fill up the valley at these points, I need do nothing more than mention the fact. Were there no gold fields in the interior, it is evident that by penning up the flood waters their descent on the plains could be made subject to regulation and protracted discharge, which would have a most beneficial effect on the low lands.

14. I come now to the drainage and reclamation works that I would advise in the interests sought to be served by the Taieri settlers.

15. To give a comprehensive view of what is required, it will be necessary to detail the following facts:—