

AUCKLAND TIDE-TABLES FOR 1914—continued.

Date.	Day.	H.	m.	Ft.	H.	m.	Ft.	H.	m.	Ft.	H.	m.	Ft.
December—continued.													
20	Sunday	..	..	2 47	—0.1	9 19	9.0	15 18	—0.2	21 48	9.5		
21	Monday	..	..	3 38	0.1	10 6	8.9	16 0	0.1	22 35	9.4		
22	Tuesday	..	..	4 32	0.3	10 54	8.6	16 55	0.5	23 22	9.0		
23	Wednesday	..	..	5 28	0.5	11 43	8.3	17 50	0.8	..	..
24	Thursday	..	..	0 10	8.6	6 21	0.7	12 32	7.9	18 45	1.1		
25	Friday	..	..	0 58	8.0	7 17	0.9	13 20	7.5	19 43	1.3		
26	Saturday	..	..	1 46	7.7	8 10	0.9	14 13	7.2	20 36	1.4		
27	Sunday	..	..	2 38	7.4	8 59	0.9	15 18	7.1	21 23	1.5		
28	Monday	..	..	3 30	7.2	9 48	1.0	16 13	7.1	22 10	0.9		
29	Tuesday	..	..	4 23	7.2	10 35	1.5	16 56	7.3	22 56	1.4		
30	Wednesday	..	..	5 19	7.3	11 16	0.8	17 47	7.6	23 41	1.4		
31	Thursday	..	..	6 10	7.5	11 58	0.8	18 35	7.9	..	..

The work of the year has comprised the predictions of the tides for 1914 both for Wellington and Auckland, also the examination of the tidal records of Melbourne, Dunedin, Port Chalmers, Bluff, and Lyttelton. The harmonic analysis of the tides of Dunedin is in hand, as well as the predictions for 1915 for Wellington.

Inspections were made of the tide-gauges at Wellington, Bluff, Dunedin, and Port Chalmers, and suggestions given to the officers in charge of the gauges as to the necessary checks to be applied periodically to the gauges to keep them as accurate as possible. After careful examination of these records advice was given as to the necessary precautions to be taken to make the records sufficiently reliable for use in making harmonic analyses from.

A new tide-predicting machine has been designed, and all the necessary calculations made for it; difficulties in construction, however, have to be overcome and have delayed the machine. These are not serious, so the machine may be expected to be in working-order soon. If the machine works as well as it is anticipated, a very considerable saving in time will be effected in the tidal predictions. This is urgently wanted, as under present arrangements and with a limited staff there is very little time available for the analysis of the tides of the other ports.

For the very large amount of arithmetical work the various calculating-machines in use have been of the greatest assistance. For the additions the Mercedes adding-machine has been used regularly; this machine has one set of keys numbered from 0 to 9, and can add columns of figures nine digits wide; it is compact and easily portable, and is well made and reliable in its action. The Rapid Computer, a small adding-machine, has also been used. For the multiplications, &c., the Brunsviga calculating-machine, with printing attachment, and the Millionaire calculating-machine have been used. For plotting the numerous curves required the very fine Coradi co-ordinatograph is employed; by this machine rectangular co-ordinates can be readily plotted to 1/1000 of an inch. For checking harmonic analysis the harmonic analyser, designed by Dr. O. Mader has been used on curves plotted by the co-ordinatograph. The analyser is well made, and works on a base of 24 in. For a description of it see *Elektrotechnische Zeitschrift*, 1909, Nos. 34, 35.

CHECKS OF PREDICTIONS.

As in former years, checks are constantly applied to the predicted times and heights of high and low water. The figure shows a portion of the record made by the tide-gauge described and illustrated in the Tidal Survey Report for 1911–12. This gauge is at present working in the N shed of the Wellington Harbour Board, on Jervois Quay.

On the figure the predicted high and low waters, as determined by the Tidal Survey, are plotted, and it will be seen how closely the predictions agree with actuality. A check of this kind proves the accuracy of the predictions and gives confidence in the results of the Tidal Survey. As will be seen from the figure, the predicted heights vary slightly from the actual heights; this is due to the winds and barometric pressure, which have a marked influence on the height of the tide. The wind-velocity for the preceding twenty-four hours, measured at 9 a.m. each day, is shown plotted at twelve hours earlier—i.e., at 9 p.m.—and gives a general indication of its effect on the heights; while the height of the barometer is also shown for each day on the diagram.

The predictions are for average conditions, and the heights accordingly require slight corrections for the wind and barometric pressure for any given day. The times of high and low water are not altered by the barometric conditions or by the winds, and, as will be seen from the figure, the predicted times agree very closely with actuality.

General.—Messrs. T. G. Gillespie and J. J. Hay have assisted in the calculations of the tidal survey in a satisfactory manner, and they are now conversant with the details of the calculations both for the harmonic analysis of the tidal records and for the prediction of the tides. Their work has been of a technical nature, involving great care to guard against errors, and has been carried out accurately.