1878.

NEW ZEALAND.

THE

# SURVEYS OF NEW ZEALAND

(REPORT BY THE ASSISTANT-SURVEYOR-GENERAL, ON)

*Presented to both Houses of the General Assembly by Command of His Excellency.*

The ASSISTANT-SURVEYOR-GENERAL to the Hon. the MINISTER of LANDS.

SIR,— General Survey Office, Wellington, 3rd September, 1878.

In the absence of the Surveyor-General, I have the honor to forward the Annual Report and out-turn of work of the Survey Department for the twelve months ended 30th June, 1878.

The main divisions of the work are Standard, Trigonometrical and Topographical, Sectional Surveys, Native Land Court, and Native Land Purchase Surveys.

## *The Standard Survey.*

The selection and observation for true meridian of all the initial stations of Meredional Circuits had been made during the previous year, with the exception of the circuits of Collingwood and Amuri in Nelson Provincial District. These two meridians have been astronomically determined by Mr. Marchant. From Collingwood he extended bearings to the country around and on to Nelson. From Amuri he established and observed a line of Main and Reference Stations across the island to Ahaura, and another line north to St. Arnaud Station at the head of Buller Valley, also lines to junction and check with the Canterbury and Marlborough extension of standard bearings. The check on the Canterbury line showed a discrepancy of only 10″ between the observed and computed convergence. These operations, and a few stations established in the early part of the season by Messrs. Thompson and Sinclair, complete the standard work for Nelson. Mr. Marchant also laid down chain standards at Collingwood and Amuri.

In Canterbury Mr. Adams extended standard bearings from Woolshed Hill up the Rakaia Valley to Lake Coleridge, then on through the Acheron Pass and along the West Coast Road to Bealey, and from Magog across the Waimakariri and back country to a close with one of Mr. Kitson's stations at Mairaki Downs. This circuit enclosed 853 square miles and closed to 4″.

Similarly, another circuit of standard bearing, originating at the Meredional Station, Gawler Downs, was extended over the Upper Ashburton and across the back country to the Rakaia and down it to Double Hill and back to origin, enclosing 547 square miles, with an error in closing of 4″. A line of coastal bearings was also run from Timaru to Mount Herbert, Banks' Peninsula. In reporting on this work Mr. Adams says:—"During the time I was at Timaru I obtained some excellent observations of Mount Cook, which, with others observed before and since, will enable me not only to calculate the position and height of Mount Cook, but to connect the East and West Coast surveys, and the observation will also afford a very reliable value of the longitudes of my West Coast Astronomical Stations."

Regarding the three West Coast Astronomical Stations established by Mr. Adams, it ought to be mentioned that, in computing the latitudes from his observations of stars N. and S. of zenith, there was an accordance within the limits of a few seconds of all the observations excepting those into which the star Alpha$^2$ Centauri entered. The discrepancy was so constant for all the deductions from that star, that the only solution of the difficulty was to assume that the declination, as given in the Nautical Almanac, was about 14″ in error. It was rather bold for a surveyor with an eight inch Transit Theodolite to challenge the accuracy of the Nautical Almanac. But Mr. Adams did so by addressing the Greenwich and Melbourne Observatories on the subject, and he had the gratification of receiving letters both from Sir George Airey and Mr. Ellery confirmatory of his finding, that the declination of Alpha$^2$ Centauri was in error, as given in Nautical Almanac for 1877 and previous years.

The other extensions of standard bearings in Canterbury were conducted during the early part of the season by Mr. Kelleher, from Mount Horrible to Burke's Pass, and from Timaru to Waimate, and up the Waitaki, and to the head of the Hakateremea Valley.