

## SHORTER CONTRIBUTIONS

## AUSTRALIA'S HIGHEST DAILY RAINFALL

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Crohamhurst under the late Mr. Inigo Jones holds the record highest 24 hourly rainfall total in Australia measured on a 9 a.m. to 9 a.m. basis. This amount was recorded at 9 a.m. on 3 February, 1893.

Reports in those days were limited but the Government Service under C.L. Wragge was preparing daily weather charts and that for 9 a.m. on 1 February is shown in Figure 1. The chart shows a cyclone of 29.2 inches apparently centred near Rockhampton having moved south-westward from the Coral Sea. Although not indicated on the original charts, recent detailed analysis shows that the cyclone then degenerated into a rain depression and was located on 2 February south of Gladstone. There was, however, still a strong easterly gradient over the Crohamhurst region due to high pressure to southward.

It happened that Mr. Wragge had been on a voyage to the north and was returning in the ship "Buninyong". After being hove-to off Percy Island (latitude 21 degrees) the ship left there at 2 a.m. on the 31st and by noon was encountering winds estimated by Mr. Wragge to be 100 mph. Subsequently Mr. Wragge stated; "We passed through a terrible hurricane when off the Northumberland group of islands, barometer sea level corrected 28.60 inches - never seen such awful weather before". The effect of this cyclone was to maintain east to south-east winds to gale force over the southern coastal areas of Queensland for several days, and, in addition to yielding the exceptional one day rainfall at Crohamhurst, it was a contributory factor in causing disastrous floods in the Brisbane River whence the Victoria and Indooroopilly bridges were smashed.

In addition the rains from this cyclone and subsequent lesser storms produced Brisbane's wettest month on record, 40.39 inches for February and likewise for Crohamhurst which compiled a month total of 107.60 inches. As though 35.71 inches were not enough Crohamhurst received the following additional daily totals - 1 February 10.78 inches, 2 February 20.06 inches, 4 February 10.76 inches. Other 24 hourly totals in the locality on the 3rd were Landsborough 25.15 inches and Mooloolah 29.11 inches both of which are below the Ranges on the eastern side and Woodford estimated at 20 inches but the gauge overflowed at 14.93 inches.

The only thermal information available for the region is from Brisbane where the dew point rose from 67.0 degrees on the 31st to 70.6 on the 1st and 72.0 degrees on the 2nd. This last value is about four degrees below the maximum sustained 24 hourly dew point experienced for the region.

At Crohamhurst winds reached "force 8 to 11 or 12" during the evening of the 1st and conditions at 9 a.m. on the 2nd were southeast force 7. It is worth noting that a thunderstorm was experienced during the evening of the 2nd but apparently none during the 24 hours ended 9 a.m. on the 2nd.

Incidentally, the young Mr. Jones was very enthusiastic and read the rain gauge every three hours day and night from 31 January to 3 February, but unfortunately the individual three hourly falls are not available from which to ascertain whether there was another 24 hour period with a greater rainfall total.

McIlwraith (1953) suggests that the highest primary rainfall within any 24 hours may be 11.5 per cent above the 9 a.m. to 9 a.m. total.

A controversy has arisen concerning the possibility that the total recorded at Crohamhurst would have been eclipsed by Bald Knob had that station been in operation at the time. This latter station was opened only in 1928. The relative location of these places is shown in Figure 2. It will be noted that Bald Knob has an eastern aspect at an elevation of about 1200 feet on the end spur of the Blackall Range. A valley separates the Blackall Range from the D'Aguiar Range and leads inland to Crohamhurst at 590 feet. Notice that the Conondale Range to the north of Crohamhurst would intercept east to southeast winds.

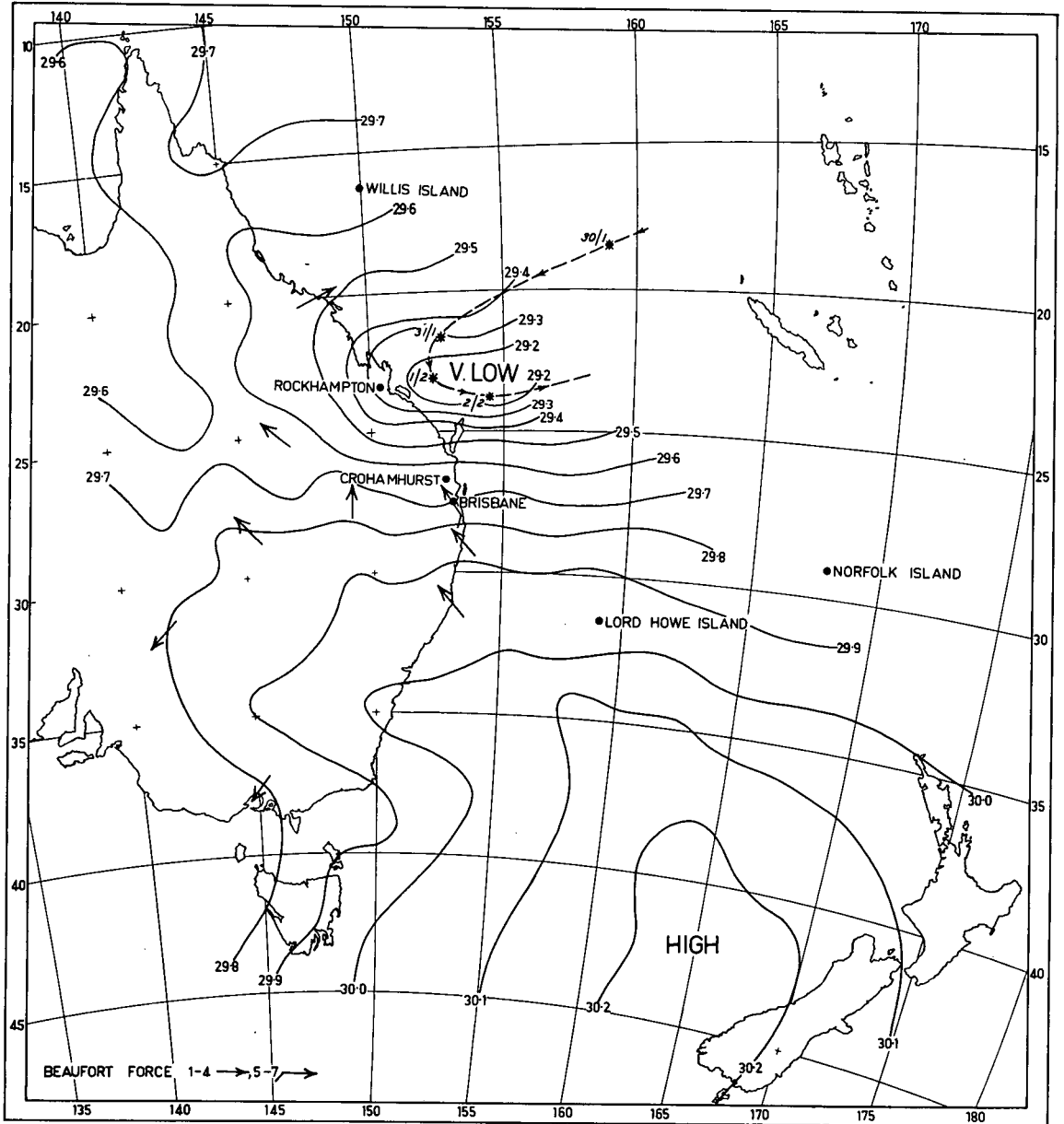


Fig 1. M.S.L. isobars 9 a.m. 1st. February 1893

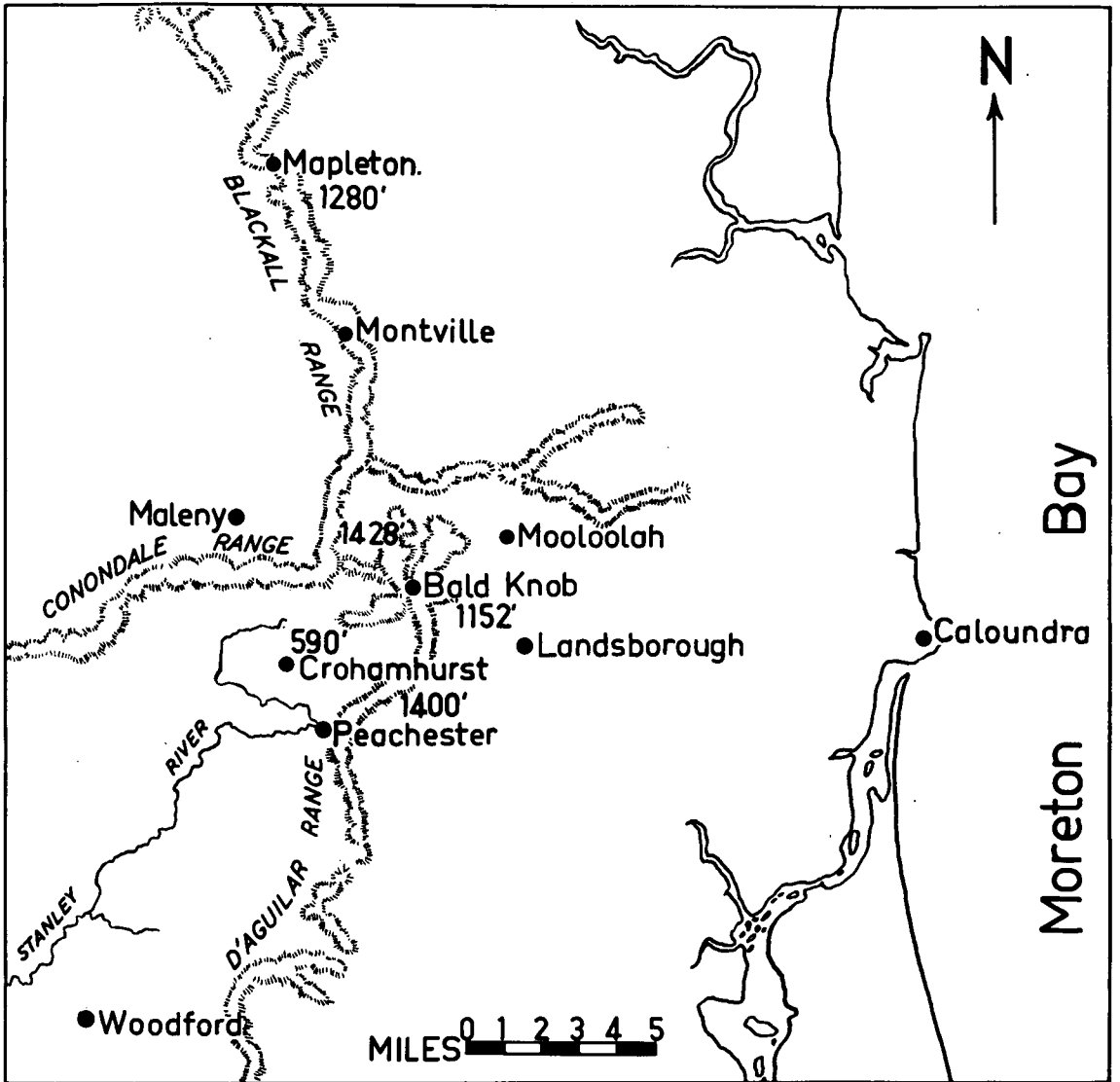


Fig 2. Locality Map

From first principles, aspect and height, one might easily claim that Bald Knob would have had a higher daily total especially as the rain was apparently not of a thunderstorm model. Some colour is lent to this thought by the fact that from comparable data from 1928 to 1955 the mean annual rainfalls are Crohamhurst 72.73 inches and Bald Knob 86.49 inches. Furthermore the means of the 28 one day heaviest rainfall for the year (primary rains) were Crohamhurst 6.96 inches and Bald Knob 8.17 inches. These ratios are respectively 1.189 and 1.174 in favour of Bald Knob and applying these one gets a probable total of about 42 inches for Bald Knob.

Recent investigations by Storm Water Standards Committee, however, suggest that such a simple ratio adjustment may be unsound. It is noted in fact that despite the higher average primary fall for Bald Knob, the highest daily fall in the comparative 28 years was 14.78 inches at Crohamhurst against 14.46 inches at Bald Knob and a more detailed analysis shows that Crohamhurst is more variable. McIlwraith has shown that the frequency distribution of primary heavy rainfalls are proportional to the logarithms of the rainfalls and to the standard deviation of the logarithms of those falls.

It is found that while the mean logarithms of the primary falls gives for Crohamhurst a once in one year fall ( $P_1$ ) of 6.20 inches and for Bald Knob 7.39 inches, the standard deviations are respectively 0.227 and 0.198. From data presented by McIlwraith the function  $F_y$  in the equation for the once in  $y$  years fall  $P_y = F_y \cdot P_1$  is 6.0 for Crohamhurst and 4.8 for Bald Knob giving a once in 1000 years fall for Crohamhurst of 37.20 inches and 35.47 inches for Bald Knob. For standard deviation 0.227 the fall of 35.71 inches is approximately a once in 700 years fall.

It is to be further noted that in the technique of maximum possible rainfalls as distinct from normal rainfall types the extremes are less likely to occur at higher level stations owing to the lesser total moisture content in the superincumbent air.

One possible mechanical result of the location of Crohamhurst under a southeast wind is possible eddy motion in the valley between the D'Aguiar and Conondale Ranges.

#### Reference:

McIlwraith, J.F. 1953 Rainfall intensity - frequency data for New South Wales stations. I. Inst. Engrs; Aust., July-August.