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QUEENSLAND CYCLONES AND THEIR INFLUENCE ON MONTHLY RAINFALL.

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SUMMARY.

Cyclones bringing rain to Queensland during the years 1925-1936 are classified as coastal, northern, or inland and their influence on monthly rainfall investigated. It is found that with coastal cyclones heavy falls were limited to comparatively small areas so that the cyclones did not cause excess rain at many stations, but they often ensured average rain at the coast when the greater part of the State had poor falls.

Northern cyclones were confined to the first three months of the year; those from the east caused heavy falls on the north coast, rain decreasing sharply in adjacent divisions. Stationary cyclones and those from the Northern Territory which brought good rain to the country south of the Gulf of Carpentaria, in most cases affected the monthly totals at only one or two stations.

Inland cyclones which were not very intense, the isobars being widely spaced, generally caused widespread rain. Excess rain was experienced at several stations during most months that these cyclones occurred, a large part of the good rain being due to the cyclones.

A comparison of the excess rain brought to the various stations by cyclones with that due to other causes shows that cyclones were responsible for approximately one-third of the good rain that fell in Queensland during the first three months of the year, for much less between April and July, and for very little in the remainder of the year.

INTRODUCTION.

The daily rainfall from 1925-1936 at twelve representative stations (Fig. 1) throughout Queensland had previously been classified by K. N. S. Hall, and the contribution of each type of rain to yearly, seasonal and monthly averages determined. Using this classification as a basis, a more detailed study is made of the cyclones bringing rain to Queensland during these years, and their influence on monthly rainfall examined.

DEFINITIONS.

In the classification of Queensland rain adopted by K. Hall, cyclonic rain included all falls within closed areas of low pressure, round which there was the typical cyclonic circulation, the force of the winds varying with the intensity of the cyclone. It is recognised that cyclonic rain is frontal in origin, but because of insufficient meteorological data it was not possible to distinguish between precipitation at the cold and warm fronts within the cyclones, and the term "cyclonic" was adopted for all such rain. For purposes of classification, the term "frontal" was restricted to precipitation at discontinuities where no cyclone was present.

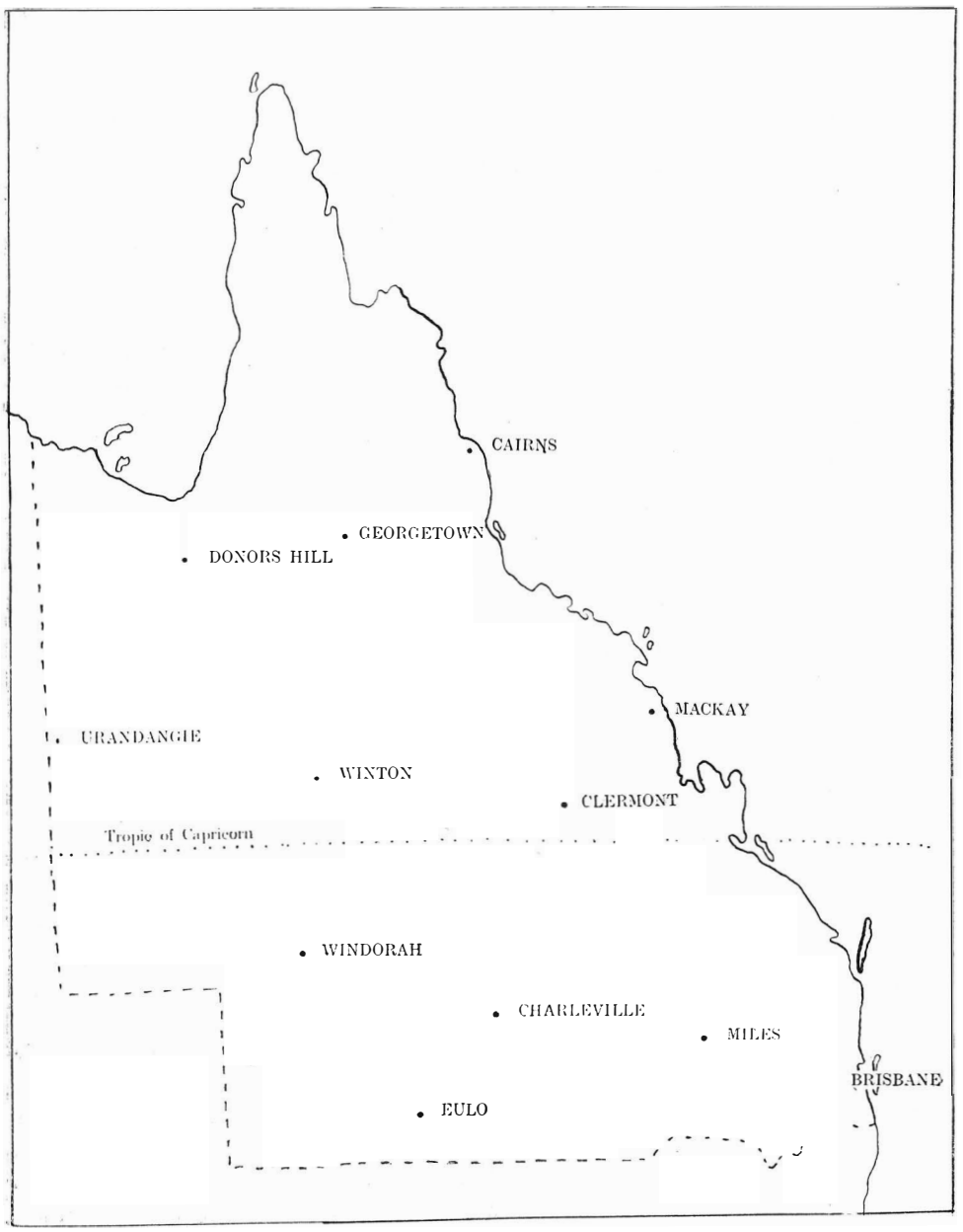

FIG. 1.—Selected Stations.

METHOD.

Cyclones were classified according to their paths, and although some behaved irregularly it was possible to include them all in one or other of the three principal divisions—coastal, northern, or inland.

To investigate the connection if any, between the various types of cyclone and good or poor monthly rains, each month's rain for the different stations was assigned to one of the five following classes—

1. Excess rain—rain exceeding 150 per cent. of the month's average for the twelve years.
2. Rain above average—rain between 150 per cent. and 111 per cent. of the average (inclusive).
3. Average rain—rain within 10 per cent. of the month's average, that is, between 110 per cent. and 90 per cent. of it.
4. Rain below average—rain between 89 per cent. and 50 per cent. of the month's average.
5. Deficient rain—rain less than 50 per cent. of the month's average.

Tables were then prepared showing the class of rain at each station every month throughout the twelve years, and the types of rain determining the classes were indicated. Thus it was possible to estimate the influence of the various types of cyclone on the monthly rainfall, by comparing the number of times excess rain at any station was independent of cyclones with the number it was influenced by them, the word "station" being limited to one of the twelve whose rainfall had been analysed.

1. DIVISION A.—COASTAL CYCLONES.

The largest of the three divisions to which Queensland cyclones were assigned, consisted of those cyclones whose path for a longer or shorter period approximated to the Queensland coast-line. Most of them travelled from north-west to south-east, so that their main influence was on the coastal stations and those adjacent to them. Three sub-groups were adopted as follows:—

GROUP A (*a*) CYCLONES.

Tropical cyclones, which generally approached Queensland from the north-east, formed the largest sub-group; they travelled down the coast for varying distances, before recurving towards the east.

TABLE I.

COASTAL CYCLONES. GROUP (*a*).

Date of Cyclone.	No. of other Cyclones in same Month.	No. of Stations at which Month's Rain was					Rain over State.	Stations at which—					
								Excess Rain.		Rain above Average.		Rain below Average.	
		Ex.	Above. Av.	Av.	Below. Av.	Def.		Mainly due to Cyclone.	Partly due to Cyclone.	Mainly due to Cyclone.	Partly due to Cyclone.	Mainly due to Cyclone.	Partly due to Cyclone.
1925 Feb. 4-6	1	3	1	1	4	3	..	..	..	..	..	..	Mackay
1926 Feb. 8-11	0	..	1	..	..	11	Poor ..	..	..	..	..	..	..
1927 Apr. 1-2	0	1	1	..	2	8	Poor ..	..	..	..	..	Mackay Miles	..
1927 Dec. 16	1	4	3	2	2	1	Good..	..	Mackay	..	..	..	..
1927 Dec. 24	1	4	3	2	2	1	..	..	Mackay (Clermont)	..	..	..	..
1928 Feb. 12-15	2	6	2	..	2	2	Good..	Brisbane	..	..	..	..	..
1928 Feb. 25	2	6	2	..	2	2	..	..	..	..	..	..	..
1929 Jan. 11-14	3	4	1	..	3	4	..	Mackay	..	..	..	..	Brisbane
1929 Jan. 19	3	4	1	..	3	4	..	..	..	..	..	..	Brisbane
1929 Jan. 23	3	4	1	..	3	4	..	..	(Mackay)	..	..	..	..

( ) slight influence only.

TABLE I.—*Continued.*

COASTAL CYCLONES. GROUP (*a*).

Date of Cyclone.	No. of other Cyclones In same Month.	No. of Stations at which Month's Rain was					Rain over State.	Stations at which—							
								Excess Rain.		Rain above Average.		Average Rain.		Rain below Average.	
		Ex.	Above Av.	Av.	Below Av.	Def.		Mainly due to Cyclone.	Partly due to Cyclone.	Mainly due to Cyclone.	Partly due to Cyclone.	Mainly due to Cyclone.	Partly due to Cyclone.	Mainly due to Cyclone.	Partly due to Cyclone.
1929 Feb. 22-27 ..	0	1	2	3	3	3	..	..	..	..	Cairns	Mackay	..	..	..
1929 Mar. 1-2 ..	0	4	2	3	1	2	Good..	..	Brisbane	..	..	..	..	..	..
1931 Jan. 31 } ..	1	..	1	1	5	5	Poor ..	..	..	..	..	..	..	..	..
1931 Feb. 1-8 } ..	0	1	1	..	3	7	Poor ..	Brisbane	..	Miles	..	..	..	Cairns Mackay	..
1932 Jan. 17-22 ..	0	2	1	..	2	7	Poor ..	Cairns Mackay	..	..	..	..	..	Clermont	..
1933 Dec. 27-30 ..	0	..	3	2	6	1	Poor ..	..	..	..	..	..	Brisbane	..	..
1935 May 26-27 ..	0	2	..	..	2	8	Poor ..	..	(Mackay)	..	..	..	..	Brisbane	..
1936 Mar. 5-9 ..	3	10	1	..	1	..	Good..	..	Mackay George-town	..	..	..	..	..	..
1936 Mar. 21-23 ..	3	10	1	..	1	..	..	..	..	..	Brisbane	..	..	..	..

( ) Slight influence only.

In order to obtain simplicity in classification, four cyclones which did not behave as typical tropical cyclones were included in this group, because, for the greater part of the time their influence was felt in Queensland, they were situated off the coast. The cyclones of February, 1931, and January, 1932, came from the Gulf of Carpentaria across Cape York Peninsula and after travelling slowly down the coast for several days, retreated north again. The first of these caused very strong winds in New South Wales, and 18½ inches of rain at Brisbane where the February average total rain was only 6½ inches.

The other exceptional cyclones were those of 11th-14th January and 22nd-27th February, 1929. The former first appeared on the daily weather chart inland from Mackay and travelled quickly to the coast, while the second came south to latitude 19° then travelled up the coast again to Cooktown, and finally across the Cape York Peninsula to the Gulf.

Table I shows that December-March was the favourable period for these cyclones, of which only eight occurred during months when no other cyclone affected the Queensland rainfall. With the exception of March, 1929, rain was poor at the majority of stations during those eight months, in which only one cyclone occurred; on five occasions it failed to reach average at at least nine stations. Most of the good rain during the months with more than one cyclone was quite independent of these tropical cyclones. On the other hand, in eight instances, indicated in Table I, stations which had rain below average would have been in the deficient class without the cyclonic rain. It must be remembered also that with cyclones which were close to the coast for a short period only, the regions receiving heavy rain were small, and did not necessarily include the stations discussed, as e.g. in February, 1928, when although the largest station fall was 1½ inches at Mackay, Sandy Cape received 5½ inches in twenty-four hours.

Summarising therefore, we see that the coastal stations were the ones to receive most rain from the tropical cyclones, and no cyclonic falls extended further inland than the second group of stations (Miles, Clermont, Georgetown). The tendency was for these cyclones to occur during months when rain at most stations was poor, unless other cyclones occurred during the same month. They did not cause good general rain over widespread areas, but coastal regions frequently benefited from them in that when the rest of the State was experiencing a dry month, rain at the coast, due to their influence, was often little below average, if not good.

GROUP A (*b*) CYCLONES.

This group consisted of seven extra-tropical cyclones, two of which, March, 1925, and November, 1927, appeared to develop in the south, to the

TABLE II.

COASTAL CYCLONES. GROUP (*b*).

Date of Cyclone.	No. of other Cyclones In same Month.	No. of Stations at which Month's Rain was					Rain over State.	Stations at which—							
								Excess Rain.		Rain above Average.		Average Rain.		Rain below Average.	
		Ex.	Above Av.	Av.	Below Av.	Def.		Mainly due to Cyclone.	Partly due to Cyclone.	Mainly due to Cyclone.	Partly due to Cyclone.	Mainly due to Cyclone.	Partly due to Cyclone.	Mainly due to Cyclone.	Partly due to Cyclone.
1925 Mar. 11-12 ..	0	7	2	1	1	1	Good..	..	Brisbane	..	..	..	..	..	..
1926 May 15-18 ..	0	4	..	1	3	4	..	Miles	..	..	..	..	..	Brisbane	..
1927 Nov. 30 ..	0	..	2	2	3	5	Poor ..	..	..	..	..	..	..	..	..
1928 June 26 ..	1	1	..	2	4	5	Poor ..	..	..	..	..	..	..	..	Brisbane
1930 May 10-12 ..	0	9	..	1	1	1	Good..	Brisbane	..	..	..	..	..	..	..
1931 July 5-6 ..	0	..	1	1	3	7	Poor ..	..	..	Brisbane	..	..	..	Miles	..
1934 May 8-10 ..	0	2	2	2	1	5	..	Miles	..	..	..	Brisbane	..	..	..

west of Norfolk and Lord Howe Islands respectively and travel north to Queensland. The remaining five cyclones were heralded by a tongue of low pressure off the Queensland coast, which was indicated on the daily weather charts by pronounced dips or loops in the isobars after they crossed the coast. It was at the "tip" of the tongue of low pressure that these cyclones developed, generally two or three days after its first appearance.

The June and July cyclones behaved similarly, travelling south between two anticyclones. The isobars of the following anticyclone were in a north-south direction and rain extended inland, giving small falls as far west as Charleville, instead of being confined to a narrow strip down the coast as was usual with tropical cyclones.

Table II shows that Miles and Brisbane were the only stations which were appreciably affected by these cyclones, although one caused small falls as far inland as Eulo, and two others as far as Charleville. Only two occurred during months when several stations received good rain, which, except at Brisbane, was independent of the cyclones. Their beneficial effect on Miles and Brisbane rain is seen in the three months June, 1928, when coastal stations other than Brisbane had deficient rain, in May, 1926, when Miles and Brisbane were the only stations in the two eastern groups whose rain was not deficient, and in July, 1931. Thus the extra-tropical cyclones were similar to the tropical ones in that they tended to occur during months of poor rather than good rain. The regions receiving good rain from them were limited, but they frequently brought beneficial rain to Brisbane or Miles when the rain at several stations throughout the State was deficient.

GROUP A (*c*) CYCLONES.

These six cyclones which all occurred in June (4) and July (2) were grouped together because frontal rain either preceded or, less frequently, followed their occurrence. A typical example was the cyclone of 14th-17th June, 1929. Loops in the isobars off the Queensland coast, which first appeared on the synoptic chart for the 12th June, 1929, had become more pronounced by the 13th, when frontal rain fell as far inland as Winton. By the 15th, a 29·7-inch cyclone which had developed in the extremity of the loops on the 14th had deepened to 29·5 inches and reached the coast, where it caused some torrential falls as it travelled south (7 inches at Rockhampton on the 16th and 8 inches at Sandy Cape on the 17th).

Two cyclones in this group were responsible for what were for winter exceptionally large twenty-four hour registrations—on the 30th June, 1929, Manly and Pinkenba, suburbs of Brisbane, had 10 and 8 inches respectively, and on the 11th July, 1933, Rockhampton had 11½ inches.

TABLE III.

COASTAL CYCLONES. GROUP (*c*).

Date of Cyclone.	No. of other Cyclones in same Month.	No. of Stations at which Month's Rain was					Rain over State.	Stations at which—							
								Excess Rain.		Rain above Average.		Average Rain.		Rain below Average.	
		Ex.	Above Av.	Av.	Below Av.	Def.		Mainly due to Cyclone.	Partly due to Cyclone.	Mainly due to Cyclone.	Partly due to Cyclone.	Mainly due to Cyclone.	Partly due to Cyclone.	Mainly due to Cyclone.	Partly due to Cyclone.
1925 June 19-22 ..	0	2	2	1	..	7	Poor ..	..	Brisbane	Mackay	Clermont	Miles	..	..	..
1929 June 14-17 ..	1	2	..	..	5	5	Poor ..	Clermont	..	..	..	..	..	Mackay	..
1929 June 30 ..	1	2	..	..	5	5	Poor ..	Brisbane	..	..	..	..	..	..	..
1933 June 24 ..	0	5	2	1	2	2	Good..	..	..	..	..	..	..	..	..
1933 July 9-11 ..	0	7	..	1	..	4	Good..	Mackay Clermont	..	..	..	..	..	..	..
1935 July 7-9 ..	0	5	3	1	..	3	Good..	Clermont Georgetown	Donors Hill	..	..	Mackay	..	..	..

It is seen from Table III that half these cyclones occurred during months which had good rain, part of which was due to the cyclones; much of the remainder was due to the associated frontal rain. Thus the tendency to occur during months of poor rain was not so marked with these, as with other coastal cyclones. In June, 1933, e.g. five stations had excess rain, none of which was due to this cyclone. In June, 1925, on the other hand, with the exception of Cairns, all stations which were not influenced by the cyclone had deficient rain, while in June, 1929, the rain at ten stations failed to reach average.

2. DIVISION B.—NORTHERN CYCLONES.

In Division B were included those cyclones which on reaching the North Queensland coast from the ocean either remained stationary there before retreating east again, or continued on their westward course across North Queensland. Also included were those cyclones which reached North Queensland from the west, having either come from the Northern Territory or developed in the neighbourhood of the Gulf of Carpentaria. According to these various paths, Group B cyclones were divided into three sub-groups.

GROUP B (*a*) CYCLONES.

Group B (*a*) consisted of those cyclones which, approaching North Queensland from the east or north-east, remained more or less stationary in the neighbourhood of Cooktown or Cairns, then moved off eastwards again without crossing or travelling any distance down the coast. Most of them were not intense cyclones, often being indicated on the daily chart by a single isobar, yet having a definite cyclonic circulation. They usually caused torrential rain in the North Coast Division, Cairns being the only station to receive large falls.

It is notable that while four out of these six cyclones were off the coast, a second cyclone was operating in the Northern Territory or the Gulf of Carpentaria, and the isobars of an anticyclone centred in the south occupied the greater part of Queensland, conditions resulting in widespread rain in North Australia.

Table IV shows that Cairns was the only station which received from these cyclones sufficient rain to affect the monthly totals. They generally brought good rain to Cairns, often when rain at several other stations failed to reach average.

TABLE IV.

NORTHERN CYCLONES. GROUP (*a*)

Date of Cyclone.	No. of other Cyclones In same Month.	No. of Stations at which Month's Rain was					Rain over State.	Stations at which—							
								Excess Rain.		Rain above Average.		Average Rain.		Rain below Average.	
		Ex.	Above Av.	Av.	Below Av.	Def.		Mainly due to Cyclone.	Partly due to Cyclone.	Mainly due to Cyclone.	Partly due to Cyclone.	Mainly due to Cyclone.	Partly due to Cyclone.	Mainly due to Cyclone.	Partly due to Cyclone.
1926 Jan. 19 ..	0	1	2	..	3	6	Poor ..	..	..	..	Cairns	..	..	..	..
1928 Mar. 4-5 ..	1	2	2	1	..	7	..	..	..	Cairns	..	..	..	..	..
1930 Feb. 8 ..	2	3	3	..	4	2	..	..	..	..	..	..	..	..	..
1930 Mar. 2-4 ..	1	1	..	..	3	8	Poor ..	..	..	..	..	..	..	..	..
1933 Feb. 4-7 ..	1	8	1	1	1	1	Good..	..	Cairns	..	..	..	..	..	..
1935 Feb. 28 ..	0	..	1	..	2	9	Poor ..	..	..	..	..	..	..	Cairns	..
1935 Mar. 1 ..	1	1	1	..	..	10	Poor ..	Cairns	..	..	..	..	..	..	..

TABLE V.

NORTHERN CYCLONES. GROUP (*b*).

Date of Cyclone.	No. of other Cyclones in same Month.	No. of Stations at which Month's Rain was					Rain over State.	Stations at which—					
								Excess Rain.		Rain above Average.	Average Rain.		Rain below Average.
		Ex.	Above Av.	Av.	Below Av.	Def.		Mainly due to Cyclone.	Partly due to Cyclone.	Partly due to Cyclone.	Mainly due to Cyclone.	Partly due to Cyclone.	Mainly due to Cyclone.
1925 Feb. 27	1	3	1	1	4	3	..	..	..	..	..	..	..
1927 Feb. 9-14	0	3	2	1	3	3	..	Cairns..	..	..	George-town	..	..
1930 Jan. 5-10	1	7	1	2	2	..	Good..	..	Cairns..	..	..	Donors Hill (George-town)	..
1936 Feb. 16-22	0	5	2	2	2	1	Good..	Cairns.. Mackay	(Uran-dangie)	Donors Hill Winton	..	..	George-town

( ) Slight influence only.

GROUP B (*b*) CYCLONES.

Cyclones from the east which continued across Cape York Peninsula to the Gulf of Carpentaria, or to the Northern Territory, formed Group B (*b*).

Cairns was the only station to receive rain from the 1925 cyclone, but the other three caused widespread rain north of the Tropic. The 1927 cyclone which approached the coast as a low level cyclone (29·2 inches), gradually expanded and began to fill up as it moved towards the Gulf, general rain falling in North Queensland. The main influence of these cyclones was on the north coast, where they caused torrential falls. Rain decreased sharply in the divisions adjacent to the coast, and although widespread, the falls were light away from the coast.

Table V shows that the cyclone of February, 1936, was the one to affect most stations, but was only partly responsible for the good rain which fell throughout the State that month, while most of the good rain in January, 1930, was due to a type C cyclone. Cairns, and to a less extent Georgetown and Donors Hill, were the stations whose monthly rainfall was most affected by B (*b*) cyclones.

GROUP B (*c*) CYCLONES.

Group B (*c*) consisted of cyclones which came from the west, or north-west, across the Northern Territory to Queensland, together with those which appeared to develop cyclonic characteristics in the Gulf of Carpentaria, where they remained more or less stationary for varying periods.

As would be expected from cyclones which did not advance very far into the State, only three brought rain to more than two stations. The most widespread rain, which reach five stations (U., D.H., Wt., G., Ca.), occurred with the 1929 cyclone which developed from an area of low pressure extending over the Gulf of Carpentaria and the Northern Territory. As the cyclone travelled into Queensland along the southern coast of the Gulf, general rain, heavy in parts, fell in North Queensland.

Table VI shows that although only one of these cyclones occurred during a month when no other cyclone affected the Queensland rainfall, rain at half or more of the stations failed to reach average every month but February, 1933. These cyclones caused most excess rain at Donors Hill, which is favourably situated to receive rain from cyclones stationary in the Gulf.

Briefly then all northern cyclones occurred between January and March. There was a tendency for cyclones of Group (*a*) to occur at the same time as those of Group (*c*) and with all but two of the fourteen in these two groups

TABLE VI.

NORTHERN CYCLONES. GROUP (*c*).

Date of Cyclone.	No. of other Cyclones in same Month.	No. of Stations at which Month's Rain was					Rain over State.	Stations at which—					
								Excess Rain.		Rain above Average.	Average Rain.	Rain below Average.	
		Ex.	Above Av.	Av.	Below Av.	Def.		Mainly due to Cyclone.	Partly due to Cyclone	Mainly due to Cyclone.	Partly due to Cyclone.	Mainly due to Cyclone.	Partly due to Cyclone.
1928 Mar. 8-12	1	2	2	1	..	7	..	..	Donors Hill	..	..	..	..
1929 Jan. 8-14	3	4	1	..	3	4	..	George-town Donors Hill	..	Cairns..	..	..	..
1930 Feb 8 ..	2	3	3	..	4	2	..	Donors Hill	..	..	..	..	..
1930 Feb. 27-28	2	3	3	..	4	2	..	..	(Donors) Hill) (Uran-dangie)	..	..	..	..
1930 Mar. 1-3	1	1	..	..	3	8	Poor ..	Uran-dangie	..	..	..	..	..
1931 Jan. 27-28	1	..	1	1	5	5	Poor ..	..	..	..	..	..	(Donors Hill) (George-town)
1932 Mar. 3-5	0	..	3	..	3	6	Poor ..	..	..	..	..	George-town	..
1933 Feb. 2-7	1	8	1	1	1	1	Good..	..	Donors Hill (Uran-dangie)	..	George-town	..	..
1935 Mar. 4-6	1	1	1	..	..	10	Poor ..	..	..	..	..	..	..

( ) Slight influence only.

other cyclones were operating in Queensland during the same month, yet more occurred during months of poor than of good rain. The influence of the northern cyclones on the monthly rainfall was felt most at Cairns and Donors Hill, to a less extent at Georgetown and Urandangie.

3. DIVISION C.—INLAND CYCLONES.

Group C consisted of cyclones which travelled through Queensland, generally in a south-east direction, bringing rain to a large part of the State. Some came from the Gulf regions, others developed, or at least were first recorded, in the interior of the continent. Generally these cyclones were not very intense in Queensland, the isobars being widely spaced and the level about 29·6 to 29·8 inches. By the time they reached the New South Wales coast, however, they were usually very intense, and pressures as low as 29·1 inches were experienced.

The cyclone of September, 1926, which was a drought breaker, was an excellent example of this type of cyclone. Forming in Central Australia on the 23rd, it travelled due east till its centre was between Boulia and Thargomindah, then south-east through Queensland to New South Wales bringing rain to all stations but Donors Hill, Georgetown, and Cairns, falls ranging from 63 points at Urandangie to 280 points at Windorah.

The cyclone of 9th-14th March, 1936, after remaining stationary in the Gulf of Carpentaria for two days entered Queensland and travelled in a south-east direction to Richmond, which it reached on the 13th. On the 14th, Longreach and Barcaldine (in the interior) experienced record falls of 795 and 695 points respectively, Longreach having more rain that month than during the whole of the preceding year.

The January, 1930, cyclone was exceptional in that it approached Queensland from the north-east, remained near Cooktown on the 19th and 20th, then travelled inland across Cape York Peninsula to the Carpentaria District, where it expanded considerably and was stationary from the 23rd to the 27th, causing rain in all divisions. It then travelled slowly to the coast, where it contracted and deepened, and continued to bring general rain to the coastal districts.

Finally, the cyclone of February, 1928, behaved differently from others in the group in that it travelled from Richmond to the coast at Mackay, south to Sandy Cape, then north again to Mackay and inland once more, but since most rain fell during its passage from the interior to the coast, and at Mackay when it crossed the coast the second time, it was grouped with the inland cyclones.

TABLE VII.

Inland Cyclones.

Date of Cyclone.	No. of other Cyclones in same Month.	No. of Stations at which Month's Rain was					Rain over State.	Stations at which—					
								Excess Rain.		Rain above Average.	Average Rain.		Rain below Average.
		Ex.	Above Av.	Av.	Below Av.	Def.		Mainly due to Cyclone.	Partly due to Cyclone.	Mainly due to Cyclone.	Mainly due to Cyclone.	Partly due to Cyclone.	Mainly due to Cyclone.
1925 Jan. 31 ..	0	2	6	1	3	..	Good..	..	..	..	..	..	Mackay
1926 Mar. 23-25	0	2	1	..	3	6	Poor ..	Uran-dangie	Eulo ..	Windorah	..	..	..
1926 Sep. 24-27	0	10	1	1	..	..	Good..	Uran-dangie Windorah Winton Miles	Charle-ville Clermont Eulo (Mackay)	Brisbane	..	..	..
1928 Feb. 18-24	2	6	2	..	2	2	Good..	Mackay	Miles .. Eulo (Brisbane)	..	..	..	..
1928 June 13-15	1	1	..	2	4	5	Poor ..	Charle-ville	..	..	Miles .. Clermont	..	..
1929 Apr. 3-4..	0	7	1	1	1	2	Good..	Brisbane Mackay Miles Clermont George-town	Charle-ville Winton	Windorah	..	..	Eulo
1930 Jan. 19-30	1	7	1	2	2	..	Good..	Charle-ville Eulo Winton Windorah Mackay Clermont	Cairns..	Brisbane	Donors Hill George-town	..	Miles

( ) Slight influence only.

TABLE VII.—*Continued.*

INLAND CYCLONES.

Date of Cyclone.	No. of other Cyclones in same Month.	No. of Stations at which Month's Rain was					Rain over State.	Stations at which—			
								Excess Rain.		Rain above Average.	
		Ex.	Above Av.	Av.	Below Av.	Def.		Mainly due to Cyclone.	Partly due to Cyclone.	Mainly due to Cyclone.	Partly due to Cyclone.
1930 June 1	0	3	1	3	2	3	..	..	Brisbane ..	..	..
1934 Feb. 1-2 ..	1	8	1	1	2	..	Good ..	Miles .. Clermont .. Charleville	Brisbane .. Georgetown	..	..
1934 Feb. 18-20 ..	1	8	1	1	2	..	Good ..	..	..	..	Cairns
1936 Mar. 5-7 ..	3	10	1	..	1	..	Good ..	..	Donors Hill	..	..
1936 Mar. 9-14 ..	3	10	1	..	1	..	Good ..	..	Mackay Georgetown Winton	..	..

TABLE VIII.

NUMBER OF MONTHS WHEN EXCESS RAIN AND RAIN ABOVE AVERAGE WAS MAINLY CYCLONIC, PARTLY CYCLONIC, OR INDEPENDENT OF CYCLONES.

Station.	Class of Rain.	January.			February.			March.			April.			May.			June.			July.			Aug.	September.			Oct.	Nov.	December.		
		M.	P.	I.	M.	P.	I.	M.	P.	I.	M.	P.	I.	M.	P.	I.	M.	P.	I.	M.	P.	I.	I.	M.	P.	I.	I.	I.	M.	P.	I.
Urandangie ..	Excess ..	..	..	1		3	2	2		2	..	..	2		..	3		..	3	..	..	2	1	1	..	2	2	2	..	..	3
	Above Av.	..	..	3	..		..	..	..	2	..	..	..	..	..	..		..	..	..	..	..	..	..	..	1	..		..	..	
Windorah ..	Excess ..	1	..	1			3		..	3	..	..	4	..	..	4	..	..	1	..	..	3	4	1	..	1	1	3	..	..	2
	Above Av.	..	..	1	..	..	1	1			1	..	..	..	..	..	..	..	4	..	..	..	..	..	..	1	1	1	..	..	2
Eulo	Excess ..	1		2		1	5	..	1	1	..	..	4		..	2	..	..	3	..	..	2	3	..	1	2	3	2	..	..	3
	Above Av.	..	..	..			..		..	2		..	1	..			..	..	1	..	..	3	1	..	..		..	..	..	..	..
Donors Hill ..	Excess ..	1	..	..	1	1		..	2	1	..	..	3	..		4	..	..	2	..		3	1	..	..	2	2	3		..	2
	Above Av.	..	..	4	..	1	3	..	..	1		..	1	..	..	..	..	..		..	..	..			..		..	3	..	..	3
Winton ..	Excess	1	..	1		..	4	..	1	2	..	1	1	..	..	3	..		1	..	..	2	3	1	..	1	1	3		..	3
	Above Av.	..		3	..	1			..	1	..				..	..	..	..	1	..	..	1	..		..	1	..	1	..	..	1
Charleville ..	Excess ..	1	..	1	1	..	2		..	4	..	1	2	..	..	3	1		2		..	3	3	..	1	2	3	3	..	..	3
	Above Av.	..	..	1	..	..	2						2	..		2	..	..	3	..	..	2	..	..	..		1	..		..	2
Georgetown	Excess	1		1		1	1	1		2	1			..	..	4			3	1		2	2		..	2	3	2	..	..	1
	Above Av.	..		3		..	2			2		..	1	..			..	..			..			..	..	2	..		..	..	3
Clermont ..	Excess	1		1	1		3			3	1		2			2	1		2	2		2	..	1	3	3	2	..	..	2
	Above Av.			2			1			1		..	1					1								3	4	..	..	2
Miles	Excess			3	1	1				4	1	..	2	2		1		..	2			4	3	1	..	2	2	3	..	..	3
	Above Av.			3	1	..	2						1			1			3			1	..		..	1	3	1	..	..	2
Cairns ..	Excess	2			2	1		1		2			2			2			3			2	3			3	3	2		..	2
	Above Av.	1	1	1	..	2		1		1			4			3			1	..		3	2			1		2		..	2
Mackay ..	Excess	3			2	..	1	1		2	1		1		1	2			1	1	..	1	2	..	1	1	4	3	1	..	..
	Above Av.	..		..			1	..	..	1			1			2	1	..	2				1	..	..	1	1			..	3
Brisbane	Excess		..	1	2	1			2	2	1		2	1		1	1	2	1			2	3	..	..	3	3	3	..	..	3
	Above Av.	1		1	..	..	..	..	1	..	..		1	..						1		1	1	1	..	..	2	2	..	..	2

Table VII shows a striking difference between these cyclones and those of other groups, only two occurring during months with poor rain, and those of January, 1925, and February, 18th-20th, 1934, being the only ones which failed to cause excess rain. During the two months with poor rain (March, 1926, and June, 1928) the cyclones were responsible for whatever average to excess rain there was, whilst in most other months a large part of the excess rain which occurred was, at a majority of stations, due to them. The inland cyclones, therefore, were the most beneficial to Queensland, since they frequently caused good rain throughout a large part of the State.

4. UNCLASSIFIED CYCLONES.

Two southern cyclones brought a little cyclonic rain to Queensland. They occurred in July, 1933, when Eulo received 10 points, and in July, 1936, when the four southern stations, also Windorah and Clermont, received small falls, the maximum being 60 points at Charleville, then 45 at Miles. Both stations would still have had excess rain without these falls, so the influence on Queensland rainfall of cyclonic rain from southern cyclones was negligible.

CONCLUSION.

To make a final estimate of the influence of cyclones on Queensland monthly rainfall, Table VIII was prepared, showing the relation between the number of times good rain at each station was independent of cyclones and the number it was due mainly or in part to them. The results concerning excess rain for the various months may be enumerated as follows:—

1. At the three coastal stations during January and February, also at Donors Hill in the north-west from January to March, most of the excess rain was influenced by cyclones.
2. During January half or more of the excesses at eight of the twelve stations were due to cyclones. (Exceptions—Urandangie, Eulo, Miles, Brisbane.)
3. In February every station except Windorah and Winton had some excess rain due to cyclones.
4. Between January and March, apart from the stations mentioned in 1, also Miles in February, excesses due to other causes were more numerous than those due to cyclones.
5. Generally, April excesses were independent of cyclones, only one cyclone causing excess rain occurring in April.

6. Miles, Mackay, and Brisbane were the only stations at which excess rain during May was cyclonic.
7. Much of the June excess rain at Brisbane, and about one-third at Charleville and Clermont, was cyclonic, excesses at the remaining stations being due to other causes.
8. Only Georgetown, Clermont, and Mackay had July excesses influenced by cyclones.
9. No cyclones occurred in August or October and the one in November caused no excess rain.
10. The one cyclone which occurred in September influenced excesses at all stations but Donors Hill, Georgetown, Cairns, and Brisbane.
11. Mackay was the only station at which excess rain was due to a December cyclone.

Except at Cairns in January, February, and March, Brisbane in January, March, July, and September, Winton in February, Windorah in March and April, and Clermont in June, most of the rain above average was independent of cyclones.

Generalising, therefore, it might be said that in Queensland cyclones were responsible for about one-third of the good rain which fell during the first three months of the year, for much less between April and July, and for very little between August and December.