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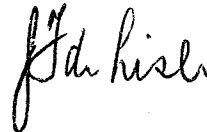
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NEW ZEALAND METEOROLOGICAL SERVICE

TECHNICAL INFORMATION CIRCULAR NO. 148

CYCLONE ALISON

The following report was compiled by Mr A.I. Tomlinson. It describes weather conditions over New Zealand during the passage of Cyclone Alison in March 1975.



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CYCLONE ALISON

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1. SUMMARY

Cyclone Alison passed close to New Zealand from 10 to 14 March 1975. During these four days severe weather conditions were experienced in several parts of the country and there was widespread damage with some major disruption to transport services between Christchurch and Blenheim.

Records of wind and rain have been summarised and tabulations of these items are included in this report. The wind flow was predominantly from between east and northeast during the storm though with some local quite large variations. The areas affected by heavy rain were primarily those exposed to the east and northeast and in some parts the rainfalls were of intensities to be expected on the average of about once in 100 years. Because of the storm's movement the heaviest rainfalls were of durations of less than 24 hours, although from Christchurch to the Kaikoura Coast rainfalls of this duration were very large.

The areas where the strongest winds were recorded were Northland, Auckland, Bay of Plenty and Waikato but in parts of the Manawatu and Nelson Regions, and in Buller and Westland, very severe wind gusts were recorded on the lee side of mountain ranges.

2. WEATHER SITUATION

Because this report is concerned with the effects and not the cause of the weather, what follows is only a very brief account of the weather situation.

Figure 1 shows the track of the centre of Cyclone Alison. The noon (NZST) positions of the cyclone are marked on the track, as are the central pressures at noon each day. Cyclone Alison formed near the New Hebrides on 4 March and after an initial slow movement towards the west it began a steady 10 knot south to southeastward movement on 7 March.

Figure 2 shows the weather situations at midnight on the 9, 10, 11, 12, 13 and 14 March. During 10 March Alison was heading southeast at 10 knots towards central New Zealand. On 11 and 12 March its path changed to a southwesterly heading and it was on these two days that most of the severe weather occurred. At this time it was approaching the anticyclone in the South Tasman Sea and the east to northeast wind flow between the anticyclone and Cyclone Alison was at its maximum strength.

As Alison was approaching the country on 9 and 10 March it was filling slowly but after midday on the 12th it began to fill rapidly. By the 14th it was quite a weak depression which developed two shallow centres as it passed the

southwest tip of the South Island. By late on the 15th it had almost completely filled up.

It should be noted that as in most meteorological situations the weather over New Zealand from 10 to 14 March could not be assigned to one weather system (Cyclone Alison) but to the interplay of several systems, the leading ones being Cyclone Alison and the anticyclone marked H_1 on Figure 2.

3. THE EFFECTS OF THE SEVERE WEATHER

These are summarised in the Appendix. The summary has been made from newspaper reports throughout the country and consequently does not represent a uniform level of reporting. It does show that the effects were widespread and manifest but it does not emphasise that the two most severe effects were damage to bush and forests in the Nelson District and flooding with slips and washouts on the Kaikoura Coast.

4. RAINFALLS FROM 10 TO 14 MARCH

Some extremely heavy rainfalls were recorded during this period. In order to examine the intensity and timing of the rain, records were examined from 140 recording raingauges in the Meteorological Service's weather reporting network. Though this may appear a large number it must be remembered that they are scattered through the 265,000 square kilometres of the North and South Islands.

These records showed that the heavy rain was not of long duration and this would be expected since the Cyclone moved steadily while near New Zealand. The total storm rainfall was of variable duration in different localities but in most areas the bulk of it fell in a little over 24 hours. Because of this and also because return period (or average recurrence interval) statistics are available for 24 hour rainfall, Table 1 gives details of rainfall durations up to 24 hours. In some places the most intense rainfall was of shorter duration than 24 hours and so Table 1 contains maximum rainfalls of duration 6, 12 and 24 hours.

Table 1 shows that very intense rainfalls were not experienced over some quite large areas of the country and in fact heavier 6, 12 and 24 hour rainfalls occurred in March outside the period 10th to 14th at about a third of the stations. Figure 3 has been included to show where the rainfalls were very heavy. Figure 3A shows the rainfall on the Kaikoura Coast on the 12th while Figures 3B, 3C and 3D are based on the data in Table 1. They show that the maximum 6 hour rainfall was more intense and widespread than the maximum 24 hour rainfall. In order to delineate the very heavy rainfalls the 100 year isopleth is drawn on the Kaikoura Coast.

The values recorded at Christchurch Airport were extremely large being 60 per cent greater than those recorded at that site on 16 April 1974 when there was extensive flooding in Christchurch (though on that occasion 124 mm was

recorded in Christchurch City in 24 hours). At Kaikoura a station nearby the Meteorological Station recorded 265 mm in the 24 hours to 9 a.m. on the 13th and this value also had a return period of about 100 years at that site. The highest daily rainfall recorded on the Kaikoura Coast was 419 mm in the 24 hours to 9 a.m. on the 13th at Imphal (11 km north-northwest of Clarence). More than ten manual stations (where the daily rainfall is recorded once a day at 9 a.m.) recorded values of over 150 mm in the coastal regions from Banks Peninsula to Cape Campbell.

Figures 3B, 3C and 3D are based on limited data and show only the broadscale features of the maximum rainfall and may be in error in ungauged areas such as the ranges east of Gisborne.

5. WINDS RECORDED FROM 10 TO 14 MARCH

Recording anemometers are positioned at over 50 sites throughout New Zealand. These showed that the highest wind gusts (or more accurately three second duration wind gusts) occurred on 11, 12 and 13 March. Table 2 lists these maximum gusts on the three days. Because of the relatively small number of stations available the data in Table 2 have not been mapped. Wind gusts are too spatially variable to allow a map to be drawn with reasonable confidence.

Table 3 gives the daily wind runs at 76 stations. These are not very satisfactory statistics for illustrating maximum winds in a storm of this type, since a period of high wind may be the last few hours of one day and the first few of the next day so that each day does not have a particularly high wind run. Wind run observations are made at 9 a.m. each day so that the wind run for a particular day is for the 24 hours from 9 a.m. on that day. However, these stations do provide records which give some confirmation and extension of the wind information in Table 2.

Tables 2 and 3 show that in Northland, Auckland, Waikato and Bay of Plenty the winds were very strong. Recorded wind gusts in these districts reached return period values of six years and in places exposed to the north and east they probably reached much higher values. The daily wind runs about Hamilton were the highest for 20 years. The other region in the North Island where very strong winds were recorded was the Manawatu. The high gusts recorded at Levin indicate some very strong winds over the Ruahine Ranges. Another indication of strong winds in the mountains comes from an anemometer at 1100 m on Mount Egmont where a gust of 73 knots was recorded. There seems little doubt that many mountainous areas in the North Island and in the north of the South Island did experience gusts of a return period value of greater than 10 years and some possibly a good deal higher.

In the South Island strong winds were recorded only in the most northern areas, as Cyclone Alison lost intensity quickly after its centre had passed Taranaki. The Nelson District caught the end of the strong winds but the end was by no means weak. At Nelson Airport a wind gust from the southeast reached 75 knots on the 12th and this value has a return period of about 100 years. Daily wind runs in the Nelson District were not very high at Riwaka, Golden Downs, Appleby, Rai Valley and Moutere Hills. This was partly because these values suffered from the limitations of daily wind run figures mentioned earlier. However the strong gust at Nelson on the afternoon of 12 March clearly indicates the existence of some extremely strong winds in that District.

Over the remainder of the South Island no unusually strong winds were recorded and this is not surprising since Alison had become a shallow depression by the time it passed Fiordland.

ACKNOWLEDGEMENTS

Thanks are due to Mr S.W. Goulter for his assistance in compiling Tables 2 and 3; to Miss K. Tredrea for writing the Appendix, and to the many observers who maintained the instruments from which the records came.

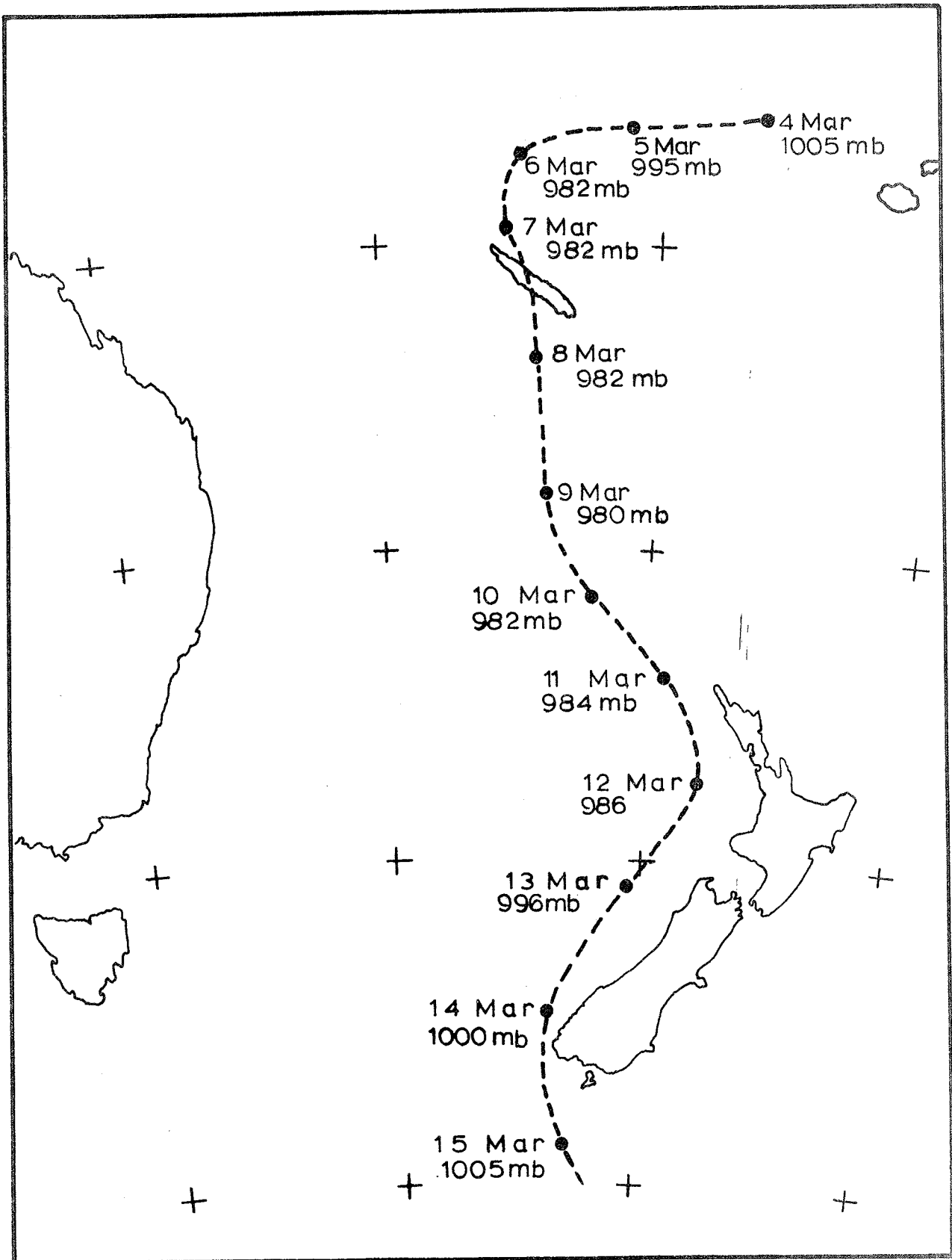


Figure 1. The track of Cyclone Alison. The midday (NZST) positions and central pressures are shown along the track.

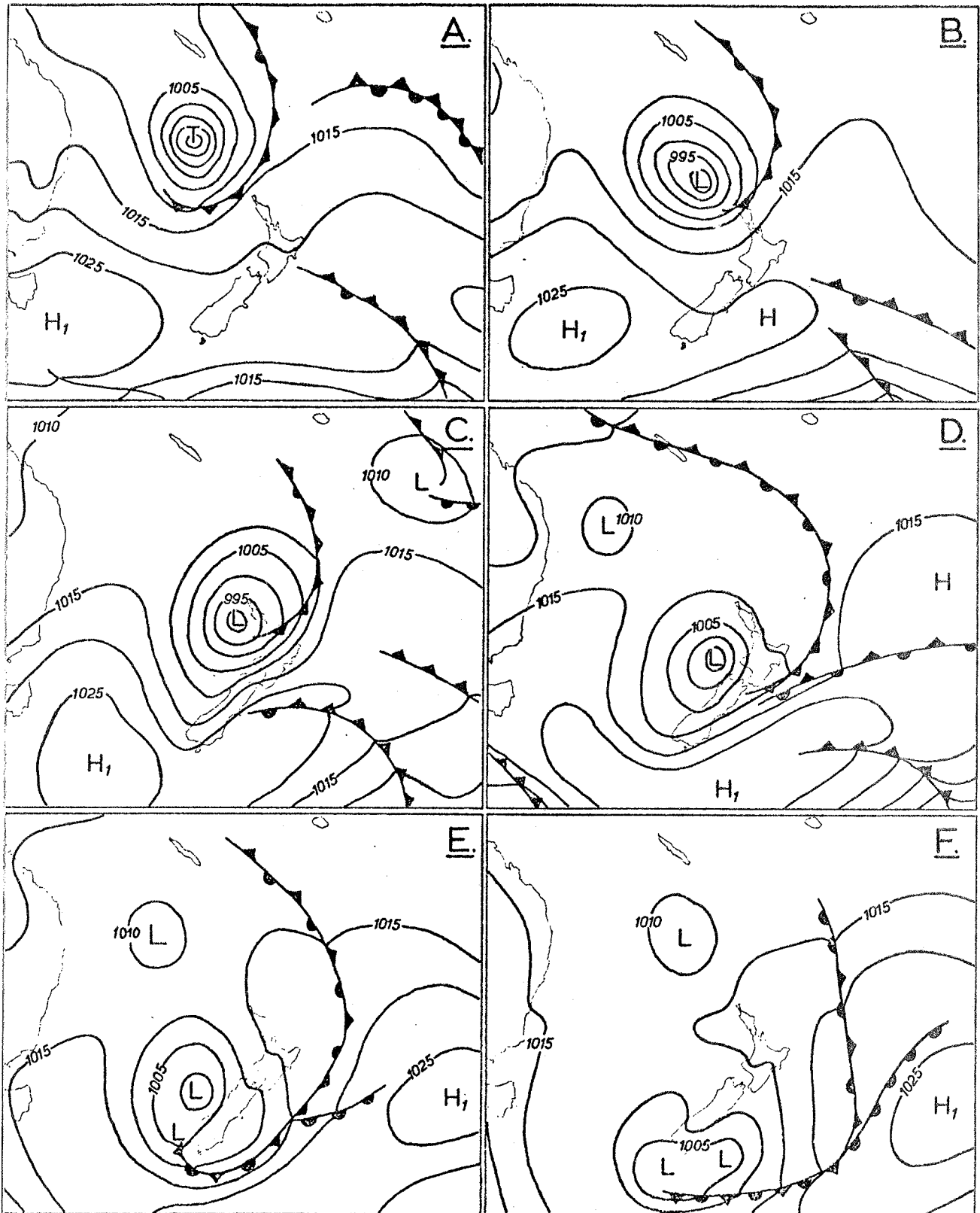


Figure 2. Surface weather maps at midnight (NZST) on:
 A - 9 March; B - 10 March; C - 11 March;
 D - 12 March; E - 13 March and F - 14 March.

Cold Front



Warm Front



Stationary Front



Occluded Front



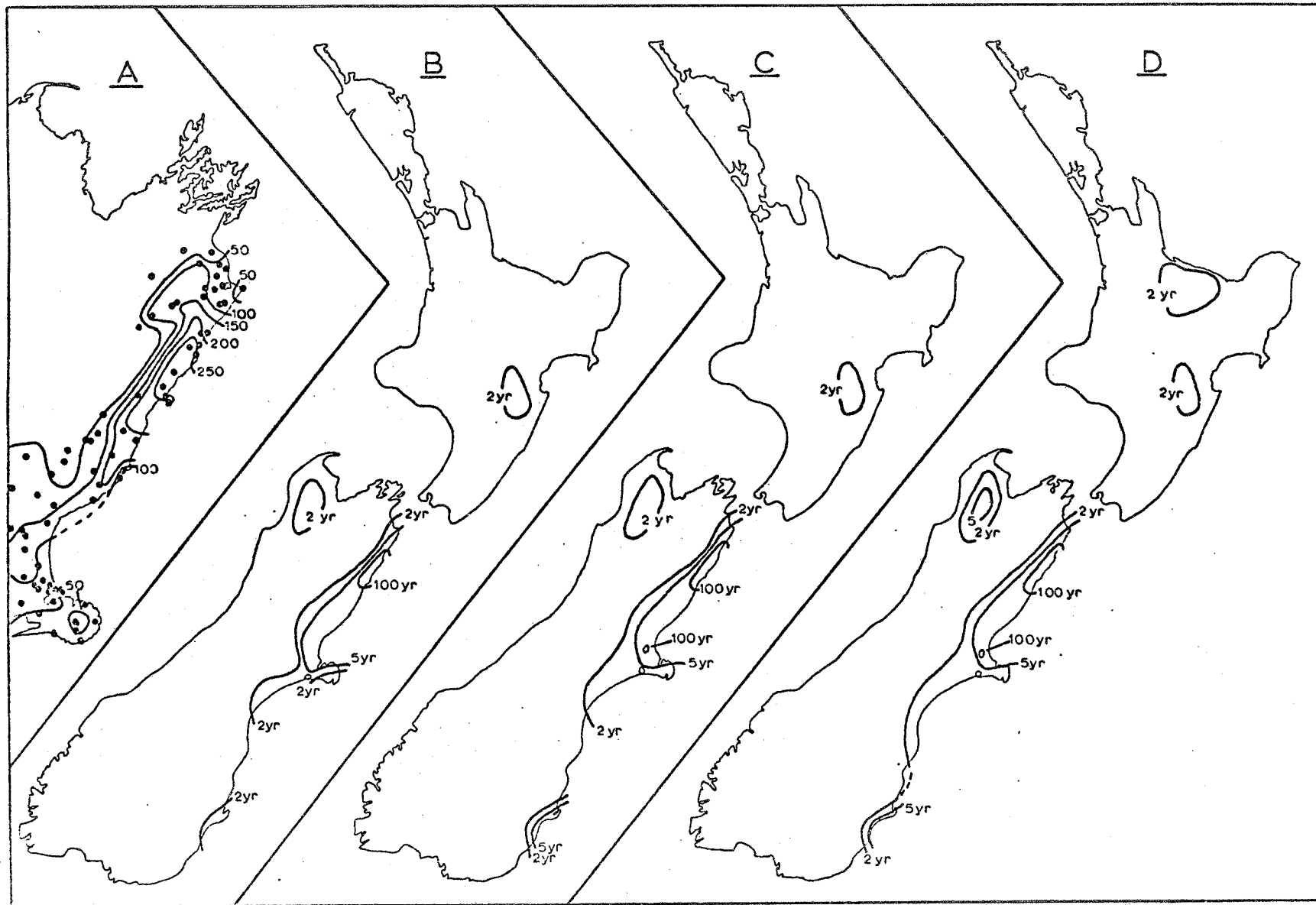


Figure 3. Rainfall patterns resulting from Cyclone Alison.
 A - The total rainfall (mm) over the 24 hours to 9 a.m. on 13 March on the Kaikoura Coast.
 B - The return period (years) of the maximum 24 hour rainfall during Cyclone Alison.
 C - As in B but for 12 hour rainfall.
 D - As in B but for 6 hour rainfall.

TABLE 1

MAXIMUM RAINFALLS (mm) OF DURATIONS 6, 12 and 24 HOURS
DURING THE PERIOD 10-14 MARCH 1975. THE BRACKETED
FIGURES ARE THE RETURN PERIOD VALUES (YEARS) OF
THESE RAINFALLS

		6-Hour	12-Hour	24-Hour
Kaitaia Airport	A53021 *	19	23	28
Kaikohe	A53482	25	54	74
Waipoua	A53651	37	44	53
Glenbervie	A54631 *	30	36	69
Leigh	A64282	6	11	11
Warkworth	A64462 *	40	53	66
Dairy Flat	A64662 *	24	34	43
Whenuapai	A64761 *	34	35	46
Albert Park	A64871 *	38	56	63
Thames	B75152	42	63	70
Paeroa	B75361 *	35	48	53
Waihi	B75381 *	72	91	118
Te Aroha	B75571	Missing	Missing	Missing
Morrinsville B/C	B75653	18	22	27
Tauranga Airport	B76621 *	44	50	52
Te Ranga	B76921 *	84(2)	100	136
Thornton	B76981 *	Missing	Missing	52
Whakatane Board Mills	B76993 *	38	47	58
Whakatane Airport	B76994	40	52	58
Whakarewarewa	B86124 *	55(2)	58	72
Rotorua Airport	B86131	56	62	75
Grant Rd, Kopuriki	B86382	31	35	48
Atiamuri Power Stn.	B86403	35	39	40
Taupo	B86602 *	26	28	37
Wairakei	B86611 *	37	39	41
Wairaki Soil Cons.	B86612	33	43	45
Tarapounamu	B86681	29	32	56
Waimihia Forest	B86821	Missing	Missing	Missing
Opotiki	B87023 *	5	5	5
Waimana	B87103 *	42	52	54
Matahi	B87212	Missing	Missing	Missing
Otara	C64981 *	17	23	28
Auckland Airport	C74082 *	22	22	27
Pukekohe Res. Stn.	C74282 *	30	36	42
Pokeno	C75201 *	40	50	55
Ruakura	C75731 *	29	36	47
Hamilton A/port(Rukuhia)	C75832	30	37	40
Arapuni	C85061 *	27	31	38
Te Kuiti	C85314 *	24	27	30
Pureora	C85551	35	40	43
Taumarunui	C85821	Missing	Missing	5
New Plymouth Airport	C94011 *	30	40	46
Turangi	C95085	8	13	19
National Park	C95142	4	5	6

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Table 1 contd.

		6-Hour	12-Hour	24-Hour
Desert Rd Tearooms	C95171 *	20	36	61
Mt Bruce	D05751	Missing	Missing	Missing
Waingawa (Masterton)	D05964 *	12	14	17
Waipukurau	D06051 *	27	31	54
Dannevirke	D06212 *	18	24	34
Naumu Forest	D15081	19	30	42
Ruatoria	D78931	55	89	97
Waipaoa	D87281 *	Missing	Missing	Missing
Tarndale Station	D87283	16	28	32
Waerenga-o-Kuri	D87681 *	30	49	63
Gisborne Airport	D87692 *	18	22	29
Onepoto	D87811 *	23	29	40
Esk Forest	D96272 *	39	58	79
Tangoio	D96382 *	56	67	84
Kaweka Forest	D96444	Missing	Missing	87
Napier Airport	D96481 *	Missing	Missing	21
Hastings Civic Square	D96688	32	42	44
Havelock North	D96689	37	42	50
Gwavas State Forest	D96743 *	42(2)	66(3)	97(3)
Wairoa	D97043 *	Missing	Missing	Missing
Paraparaumu Airport	E04991 *	7	7	9
Te Awa	E05171	Missing	Missing	Missing
Ohakea	E05231 *	Missing	Missing	Missing
Wharite	E05282	53	78	92
D.S.I.R. Palmerston Nth	E05363 *	2	2	2
Himatangi	E05431 *	1	1	1
Levin	E05622	4	5	5
Avalon (Lower Hutt)	E14195 *	6	6	6
Kelburn	E14272 *	21	23	27
Makara	E14273 *	7	8	12
Maungaraki No. 2	E14280	Missing	Missing	Missing
Wainuiomata (Reservoir)	E14294 *	14	15	29
Wainuiomata	E14296	5	6	6
Wellington Airport	E14387 *	6	17	20
Kaitoke Farm	E15011	19	30	38
Wallaceville	E15102 *	2	3	3
Cape Egmont	E93271	25	38	46
Stratford	E94332 *	32	55	61
Ohakune	E95445 *	12	14	14
Taihape	E95683	6	9	12
Wanganui	E95902 *	5	6	8
Takaka	F02882	33	50	86
Westport Airport	F11752	Missing	Missing	33
Cobb Dam	F12162 *	108(8)	125(4)	177(3)
Murchison M.O.W.	F12831 *	3	4	8
Hokitika Airport	F20793 *	40	61	73
Reefton Forest Service	F21182 *	30	50	70
Greymouth	F21422 *	31	50	68
Otira Substation	F21851 *	26	44	66
Harihari	F30153	53	98	126
Haast	F39801 *	23	43	71
MacPhersons Camp	F39932	41	61	68
Milford Sound	F47691 *	7	9	13

Table 1 contd.

		6-Hour	12-Hour	24-Hour
Riwaka, Motueka	G12191	39	63	70
Collins Valley	G13153 *	21	34	48
Nelson Airport	G13222 *	36	49	61
Moutere Hills	G13301 *	32	41	62
Roding River	G13321 *	40	63	91
Woodbourne (Blenheim A/port)	G13581	20	31	35
Blenheim	G13592 *	22	31	34
Wither Hills	G13595 *	25	38	47
Waihopai	G13651 *	14	26	39
Lake Grassmere	G14711	41	55	75
Hanmer Forest	G22581 *	25	38	48
Kaikoura Met.	G23471 *	155(over 200)	193(over 200)	205(100)
Lake Coleridge	H31352 *	4	8	10
Highbank Power Stn.	H31572 *	24	34	40
Winchmore	H31883 *	33(3)	45(3)	52(2)
Christchurch Airport	H32451 *	80(over 100)	98(about 100)	102(15)
Lincoln	H32641 *	35(3)	42(3)	51(3)
Lake Pukaki	H40112	3	4	4
Twizel	H40211	2	3	3
Waimate Saddle	H40791 *	Missing	Missing	Missing
Timaru Airport	H41323	18	31	38
Adair	H41411 *	23(2)	29	30
Gleniti Reservoir	H41414 *	24(2)	41(3)	48(2)
Waimate	H41701 *	28(2)	37(2)	51(2)
Lake Waitaki	I40641 *	4	5	9
Makarora Stn.	I49222 *	14	15	17
Tara Hills	I49591 *	0	0	0
Lake Hawea	I49621 *	1	1	1
Cherry Farm, Waikouiti	I50662	60	74	83
Dunedin Airport	I50921 *	7	8	10
Musselburgh (Dunedin)	I50951 *	36(5)	49(5)	50(2)
West Arm (L. Manapouri)	I57522 *	1	1	1
Queenstown	I58061	2	4	4
Mid Dome	I58552 *	3	3	3
Alexandra	I59234 *	2	2	2
Roxburgh Hydro	I59431 *	0	0	0
Gore (D.S.I.R.)	I68192	6	6	6
Invercargill	I68433 *	1	1	1
Tiwai Point	I68533	1	1	1
Balclutha	I69272 *	1	1	1

* Indicates a station for which return period values are available. Only return periods of two years or more are indicated.

'Missing' indicates that the recorder malfunctioned during 10 to 14 March.

All Meteorological Service records available at 9 May 1975 are used in the above list.

TABLE 2

MAXIMUM WIND GUSTS (KNOTS) AND DIRECTION
ON 11, 12 & 13 MARCH 1975

	11 March	12 March	13 March	Return Period (years) of Maximum Gust
Cape Reinga	040/88	300/67	290/34	-
Kaitaia Airport	050/56	330/50	340/27	About 2
Whangarei Airport	010/63	350/43	310/22	4
Marsden Point	040/40	050/69	350/47	-
Leigh	050/56	020/50	310/36	-
Warkworth	070/55	030/48	320/23	-
Whenuapai Airport	060/50	030/40	320/25	About 1
Auckland City	070/51	020/51	360/26	About 1
Tauranga Airport	080/53	070/52	360/27	6
Tauranga Harbour	Missing Record			
Whakatane Airport	080/44	080/47	010/32	Less than 1
Rotorua Airport	070/52	090/52	050/25	3
Auckland Airport	070/46	010/53	320/25	1
New Plymouth Airport	070/46	010/53	320/25	Less than 1
Turangi	080/27	090/36	020/20	-
Castlepoint	120/22	120/43	040/49	-
East Cape	060/36	040/57	350/35	-
Gisborne Airport	070/22	060/39	330/26	Less than 1
Napier Airport	090/37	090/52	360/26	1
Paraparaumu Airport	130/52	110/44	350/30	Less than 1
Ohakea	120/50	110/56	340/32	Less than 1
Palmerston Airport	110/44	090/47	310/25	Less than 1
Levin	120/44	110/67	120/30	8
Kelburn (Wgtn) (1)	150/35	150/41	340/43	Less than 1
Gracefield (Lower Hutt)	Missing Record			
Wellington Airport	160/36	170/36	010/40	Less than 1
Cape Egmont (2)	160/42	150/56	360/50	Less than 1
Waiouru	090/42	090/59	360/32	2
Wanganui Airport	Missing Record			
Farewell Spit	130/58	110/64	030/40	-
Westport Airport	120/28	130/53	030/50	1
Hokitika Airport	140/19	120/34	050/36	Less than 1
Milford Sound	140/28	140/21	140/22	-
Nelson Airport	120/56	120/75	350/38	About 100
Blenheim Airport	120/31	130/46	040/18	Less than 1
Vernon Lagoons	150/35	160/48	330/26	-
Lake Grassmere	140/30	090/44	330/36*	Less than 1
Kaikoura	110/16	060/34	050/44	Less than 1
Mount John	060/39	100/37	150/23	Less than 1
Winchmore	140/22	110/19	250/22	-
Eyrewell Forest	090/15	130/21	230/29	-
Christchurch Airport	080/18	090/23	100/38	Less than 1
Wigram	080/16	080/22	080/40	Less than 1
Bromley (Christchurch)	120/19	110/31	110/42	Less than 1
Mount Cook	090/40	100/36	150/24	-
Lake Pukaki	060/24	070/30	060/26	-
Aviemore	150/24	140/32	130/28	-

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(1) Maximum gust Oteranga Bay 040/61 on 13 March (Wgtn area max. value)

(2) At 1100 m on Mt Egmont 010/73 on 12 & 13 March

* Estimated value.

Table 2 contd.

	11 March	12 March	13 March	Return Period (years) of Maximum Gust
Timaru Airport	120/13	090/20	200/22	Less than 1
Invermay (Taieri)	150/15*	060/27	060/23	Less than 1
Dunedin Airport	150/20	060/27	060/22	Less than 1
Queenstown Airport	050/34	060/30	050/31	-
Invercargill Airport	150/23	070/42	080/43	Less than 1
Tiwai Point, Bluff	110/22	080/37	110/40	-

* Estimated value

TABLE 3

DAILY WIND RUNS DURING 10 to 14 MARCH 1975

	Maximum Daily Wind Run		Most Recent Occasion with a Higher Value*	
	Run (km)	Date (March)	Run (km)	Date
Punakitere	799	10	801	Nov. 1974
Kaikohe	1245	11		Dec. 1972
Puketurua	1020	11		Nov. 1965
Leigh	1233	11	1338	Jun. 1974
Woodhill Forest	565	11	586	Jun. 1974
Auckland City	475	10	554	Sep. 1969
Oratia, Auckland	370	11	412	Feb. 1975
Thames	488	11	501	Feb. 1975
Waihi	549	11	593	Feb. 1975
Rotoehu Forest	490	12	647	Sep. 1970
Whakarewarewa	409	11	410	Feb. 1975
Tarawera Forest	238	12	253	Feb. 1975
Purukohukohu	541	11	959	Feb. 1975
Murupara	98	12	113	Mar. 1975
Taupo	452	11	493	Feb. 1975
Wairakei	219	11	236	Feb. 1975
Waimana	368	12	388	Jan. 1974
Waimihia	195	11	197	Feb. 1975
Otara, Auckland	731	11	807	Mar. 1959
Pukekohe	814	11	966	Feb. 1971
Ruakura, Hamilton	740	11	824	Mar. 1954
Whatawhata	401	11	493	Dec. 1972
Rukuhia	949	11	1080	Mar. 1954
Otutira	870	11	1061	Jul. 1974
Woodville	597	12	703	Feb. 1975
Pahiatua	259	12	520	Feb. 1975
Masterton	357	12	517	Feb. 1975
East Taratahi	518	12	667	Jan. 1975
Tauherenikau	262	14	418	Dec. 1974
Gladstone	589	12	618	Apr. 1974
Waiorongomai	378	14	740	Mar. 1975
Waerenga-o-Kuri	319	11	367	Mar. 1975
Manutuke, Gisborne	252	11	413	Feb. 1975
Makahu Saddle	361	12	472	Feb. 1975
Tangoio	579	11	604	Feb. 1975
Kaweka Forest	410	11	627	Dec. 1974
Napier	501	11	534	Feb. 1975
Makaretu	587	12	934	Feb. 1975
Flockhouse, Bulls	764	11	840	Dec. 1972
Kairanga	948	11	1101	Apr. 1973
Palmerston North	636	11	732	Feb. 1975
Massey University	737	11	929	Mar. 1974
Levin	676	12	698	May 1972
Pauatahanui	864	12	877	Dec. 1974
Kelburn, Wellington	436	11	583	Mar. 1975
Makara	920	13	1109	Feb. 1975
Wainuiomata	268	14	509	Feb. 1975
Kaitoke	612	11	684	Sept 1972
Wallaceville	412	11	482	Dec. 1974

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Table 3 contd.

	Maximum Daily Wind Run		Most Recent Occasion with a Higher Value*	
	Run (km)	Date (March)	Run (km)	Date
Stratford	517	12	551	Nov. 1974
Manaia	716	12	729	Feb. 1975
Wanganui	477	11	812	Feb. 1975
Riwaka (Motueka)	405	12	455	Feb. 1975
Golden Downs Forest	395	12	423	Jan. 1973
Appleby	553	13	653	Oct. 1972
Rai Valley	420	11	451	Nov. 1974
Moutere Hills	811	12	932	May 1973
Wither Hills, Blenheim	751	12		Dec. 1969
Lake Grassmere	803	12	818	Mar. 1975
Hamner Forest	236	14	289	Feb. 1975
Balmoral Forest	228	12	378	Feb. 1975
The Hermitage	212	14	524	Mar. 1975
Ski Basin, Craigieburn	578	14	641	Feb. 1975
Craigieburn Forest	258	14	270	Feb. 1975
Highbank Power Stn.	440	14	542	Mar. 1975
Winchmore	388	14	414	Mar. 1975
Lincoln	208	14	292	Mar. 1975
Adair Soil Con. Res.	449	12	627	Feb. 1975
Waimate	200	12	217	Mar. 1975
Tara Hills, Omarama	480	12	481	Feb. 1975
Alexandra	273	11	664	Feb. 1975
Mahinerangi Dam	447	12	469	Feb. 1975
Winton	722	12	753	Apr. 1974
Gore	885	12	936	Sep. 1973
Balclutha	458	12	840	Feb. 1975

* Where a daily wind run is not given under the heading 'Most Recent Occasion with a Higher Value' but a date is given, this date is the start date of the record at the station and the Cyclone Alison maximum is the maximum daily wind run at that station.

APPENDIX

SUMMARY OF THE NEWSPAPER REPORTS OF THE DAMAGE CAUSED BY CYCLONE ALISON

The following summary has been made directly from newspaper reports. The reports have only been edited to a minor extent so that they can be used to locate the original newspaper report. Because of this there is a mixture of units for rainfall and wind speed measurements. The wind speeds are the wind gust speeds of three to five seconds' duration.

Since the reports come from many different sources they do not represent a uniform standard of reporting.

Northland:

Hit area afternoon 10th, trees uprooted, power and telephone lines down, shipping movements disrupted, heavy seas. Paihia ferry service suspended. 70 mph Cape Reinga. 7 m seas at base of lighthouse; 63 kt Onerahi Air; 60 kt Cape Brett; 53 kt Kaitaia 25.8 mm to 9 a.m. 11th; 63 kt 1.40 p.m. Whangarei 12th, airport closed.

Bay of Islands:

Strong NW winds made fishing conditions difficult for billfish tournament 10th/11th.

Whitianga:

Minor damage over widespread area due to gale force winds and heavy rain - minor flooding and slips.

Auckland:

65 mph Auckland Harbour; Tamaki Drive closed - waves crashed over sea wall (12th); more than 24 small boats wrecked or damaged Northcote Pt, Hobson Bay and Panmure; power and telephones out; flights cancelled; trees blown down; ships delayed, cargo work disrupted; roads blocked by flooding and fallen trees; Henderson Orchards affected; more than 1 inch of rain reported, 55 kt winds; 70 kt and high seas Hauraki Gulf.

South Auckland:

Power and telephone lines down; trees uprooted Piako County; surface water on roads; farm buildings demolished; Manawaru School lost roof evening of 12th; 145.2 mm Hauraki Catchment and 149 mm Mangaiti 24 hrs to 9 a.m. 12th.

Thames/Coromandel:

Gale force winds and heavy rain left trail of damage, power faults. 80 mm 24 hrs to 9 a.m. 12th Thames, 166.3 mm Puru, 150 mm Te Aroha district. Minor flooding, many small slips. 52.5 mm Paeroa, 138 mm Waitawheta. Hit area late afternoon 11th and overnight.

Waikato:

Power lines down; child killed Rotowaro; uprooted trees, fruit damaged in orchards; phones out; roads affected by slips and flooding; Hamilton Airport closed 4.30 p.m. 11th to morning 12th; 48.0 mm Rukuhia 24 hrs to 9 a.m. 12th.

Matamata:

High winds and heavy rain left trail of damage throughout area, power faults, waterworks affected, trees uprooted, telephone services disrupted.

Te Awamutu:

One part of Oparau district received 5 inches of rain on night of 12th - flooding and sheep losses. Awaroa and Kauri Rivers flooded to highest levels in memory, trees blown down, power lines down.

Piako County:

Gale force winds 70 kt, heavy rain, power lines down - Morrinsville and Te Aroha worst affected. Trees blown down, roads blocked, little flood damage reported.

Putaruru:

Gale hit area early hours 12th, trees uprooted, power supply cut, roof blown off shed Waotu area, gardens damaged.

Otorohanga:

Many trees uprooted, some sheds demolished, power and telephone lines down.

Waihi Beach:

2 houses Shaw Road lost roofs, 1 bach blown over, power supplies cut.

Bay of Plenty:

23 ft sloop sank at moorings Sulphur Pt. 2 a.m. to 5 a.m. 12th. Seas high, house moved 6 ft off foundations Papamoa Beach; many houses lost roofs, debris strewn about.

Whakatane:

Strong winds, no serious damage reported.

Rotorua:

Surface flooding by 7 a.m. 12th, power lines down, airport closed, minor damage, gale force winds blew down 80 ft by 40 ft marquee. 99.9 mm Rotoehu 24 hrs to 9 a.m. 12th.

Taupo:

Trees blown over; minor flooding; 34.7 mm Wairakei 4.30 to 9.30 a.m. 12th; power and phone supplies not affected; slight damage only.

Northern King Country:

Disrupted power and telephone communications, blew down trees, flattened gardens.

Central Hawkes Bay:

Western high country area worst hit; bridges smashed; slips, washouts; roads blocked; rivers in flood, farmland and roads affected; communications disrupted; power cuts; sewerage systems affected Waipukurau; 164.6 mm Guavas Forest; 69.4 mm Waipukurau - 72 hrs to 9 a.m. 13th; orchards damaged, some crops destroyed in Clive; Napier Airport closed 9 a.m. - 5 p.m. 12th; schools closed.

Hastings:

Waimarama surf life saving championships affected by strong on-shore winds and violent jumbled surf breaking up to three-quarters of a mile out.

Southern Hawkes Bay:

114.6 mm 24 hrs to 9 a.m. 12th Dannevirke Domain; flash flooding affected town water supply - discoloration. Rivers in flood; bridge approaches washed away; farms flooded and littered with debris; Kumeti Riverbed lifted 4 ft overnight 12/13th by stones and rubble brought down by floods.

Taranaki:

Worst storm in years, wreaked havoc Port Taranaki, left trail damage across harbour, flying sand forced campers Pt Fitzroy to abandon tents, beaches littered with debris, sand level dropped by about 1 ft; power and phones affected, schools closed; drilling halted Penrod rig; trees and gardens battered; 32 kt overnight 12/13th Bell Block, 55.3 mm to 9 a.m. 13th; many boats sunk by heavy seas, 8 ft waves.

Wanganui:

Little or no damage caused; 50 kt 8 a.m. 12th (Civil Aviation Dept.), no commercial flights cancelled; no electrical faults.

Manawatu:

Winds up to 56 kt; trees uprooted; iron torn off houses and farm buildings; telephone and power services out; driving hazardous.

Levin:

Winds gusted to 75 mph, trains affected - 25 mph restriction; power poles fell, fences smashed, out-buildings smashed, roofing iron lifted from buildings and houses, fruit trees stripped, trees uprooted and blocking highways, TV aerials blown down, widespread damage to gardens, power and telephone cuts. Shannon and Foxton worst hit. Ohau Track devastated (Tararua Forest Park).

Ruahine Ranges Area:

Rivers and streams flooded, Pohangina R. worst affected; Makaroro area badly hit - erosion, bridges washed out, trees and branches laced riverbed.

Wairarapa:

Sth Wairarapa worst hit; residents evacuated, roads flooded, rivers high, minor bridge-approach scouring; crops flattened; greater than 40 kt Castlepoint and Cape Palliser; Carterton water supply discoloured; several slips Rimutaka Rds; 5½ inches of rain Kaipaitangata Valley; 15 mm Waingawa 24 hrs to 9 a.m. 12th.

Wellington:

Winds up to 56 kt Kelburn, no damage reported in city; considerable damage reported from Gold Coast and Upper Hutt; \$2000 damage to Paekakariki school; roofs blown off, trees uprooted.

Nelson:

Trees uprooted; fences and sheds wrecked, orchards stripped; small craft battered; power cuts, phones out; Stoke School closed; roofs and tiles lifted; caravan smashed; glasshouses demolished; cars damaged by flying debris; gardens flattened; flights cancelled; squid boats sheltering Boulder Bank. Heaphy Track closed due to damage, 1500 acres native bush flattened.

Marlborough:

Seddon without water supply, rivers flooded, bridges and approaches washed out. Flatlands and pastures ruined by rock, rubble, silt and debris, miles of fencing damage; east coast area worst hit; most orchards not badly hit, picking halted.

Blenheim:

Creeks and streams running high; minor telephone faults; roads flooded; power cuts; many slips; branches torn off trees; minor line damage. 50 mm rain Picton 24 hrs to 9 a.m. 12th, further 1 inch 9 a.m. to noon 12th. Port Underwood Road closed. 1 inch of rain Cape Campbell, 60 km/h winds; 30 kt Blenheim Air.

Kaikoura:

Township isolated after 212 mm in 24 hrs to 8 a.m. 13th, water swept through houses some people evacuated; business area flooded. S.H. 1 and main trunk closed by 85 slips and washouts Kaikoura to Clarence, severe rail and bridge damage, motorists trapped, 2 goods trains marooned, streams and rivers in flood. Declared disaster area 17th.

Akaroa:

Up to 125 mm 36 hrs to morning of 13th, minor slips in and around Akaroa, some peninsula roads awash, land flooded, rain accompanied by high NE winds.

Christchurch:

People injured; car fell into road subsidence; schools closed, families marooned and evacuated; city flooded; 101.5 mm of rain in 24 hrs to 9 a.m. 13th Airport, 2 inches recorded 2 a.m. to 4 a.m. - highest 2 hr fall since 1928; market garden crops damaged, acres surface water covered paddocks, washed out crops; Avon and Heathcote Rivers swollen; St Albans, Riccarton, Darlington, Linwood and Addington among worst hit areas; houses and business premises flooded in Addington.

Ashburton:

Lawns awash, gardens wiped out, Mill Creek flooded, all approaches to low level bridges Hinds River washed out; all roads open but many had surface water.

South Canterbury:

50 mm of rain in most coastal areas, scattered showers in back country; surface flooding isolated areas, rivers not far above normal flows; $\frac{1}{2}$ inch overnight 12/13th, $1\frac{1}{2}$ inch to 9 a.m. 14th at Timaru, telephone faults, air services cancelled, visibility 1000 yd at ground level 4 p.m. 13th. 2 inches 24 hrs to 4 p.m. 13th Geraldine, damage to water intake supply; Waihi River in flood, bridge approach (Coach Rd) damaged, road closed. Minor surface flooding Waimate County roads, some fords closed, 2 inches recorded by evening 13th.

Oamaru:

Severe flooding of streets in township.

Otago:

Fishermen in port due to heavy seas; flights normal; no communication difficulties; street flooding coastal Otago areas; no highways closed by slips or flooding.

Dunedin:

50.2 mm 24 hrs to 9 a.m. 14th, spate of minor accidents; rivers high; blocked stormwater drains; few minor slips. 45 mm 24 hrs to 8 p.m. 13th Musselburgh.

Westport:

No reports of major damage, minor power faults. Granity, Waimangaroa and Birchfield areas hard hit; roofs and chimneys damaged, toll lines to north cut in all three centres. 55-60 kt 12th (Harbour Master's Office), 53 kt Airport.

Cobden:

3 houses de-roofed; old church demolished; power cut; schools closed, trees down.

Greymouth:

Greatest wind damage in living memory; estimated 60 kt; roofs torn off buildings, electricity cut; telephone lines down; air services cancelled; aerodrome hangar partially destroyed; flying debris a major hazard; railcar services to Christchurch cancelled; Victoria Park demolished, Fair abandoned; creeks and streams dammed up due to fallen trees - causing threat of flooding.

Hokitika:

Lake Kaniere area hard hit, roof off hayshed, iron off baches and boatsheds, trees blown down, water lifted off lake by force of wind, some other minor damage also reported, power failures, gardens smashed.