

## Severe flooding in Canterbury to end the month

<b>Rainfall</b>	<p>An exceptionally heavy rainfall event spanning the final three days of the month caused severe flooding in Canterbury. For the month overall, rainfall was well above normal (&gt;149% of normal) for much of Canterbury, Tasman, and western parts of Taranaki, with considerable portions of Canterbury observing at least 200% of normal rainfall for May. Rainfall was above normal (120-149% of normal) for southern and central Otago, central and northern Southland, Nelson, Marlborough, and the Kapiti Coast. Rainfall was below normal (50-79% of normal) for coastal parts of the South Island from Invercargill to Oamaru, the southern West Coast, and the majority of the North Island. Rainfall was well below normal (&lt;50% of normal) in parts of Auckland, Waikato and Wairarapa.</p>
<b>Soil Moisture</b>	<p>At the end of May, soils were wetter than normal for the eastern South Island north of Otago. In contrast, soils were considerably drier than normal for eastern parts of the North Island from Wairarapa to Hawke's Bay, much of Auckland, and northern Northland. Drier than normal soils were prominent in parts of Waikato, coastal Manawatū-Whanganui, the lower West Coast, much of Otago, and eastern Southland.</p>
<b>Temperature</b>	<p>Temperatures were above average (0.51-1.20°C above average) or well above average (&gt;1.20°C above average) for many parts of the country. The main exceptions were parts of Northland, western Waikato, the Central Plateau, Marlborough, coastal Canterbury south of Banks Peninsula, and southern and central parts of Otago and Southland, where temperatures were near average (<math>\pm 0.50^\circ\text{C}</math> of average).</p>

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### Overview

May 2021 mean sea level air pressure was above normal over and to the east of Aotearoa New Zealand. Overall, this resulted in a relatively settled and dry month throughout the country, with periods of relatively high daily maximum temperatures and low minimum temperatures for inland and eastern parts of the country. However, towards the end of the month, areas of deep low pressure became established over and east of the country. Initially, a persistent deep low pressure system centred east of Northland drove several days of large swells into the eastern North Island, causing erosion of coastal land in some parts. A subsequent low pressure system became established in the Tasman Sea near Taranaki, and travelled southeast to become centred near Wellington. This system caused several days of predominantly southeasterly winds over the South Island. In addition, the

system linked with an atmospheric river to deliver enhanced levels of water vapour from the tropics to New Zealand. These factors culminated in a significant rainfall event over several days in Canterbury, causing widespread and severe flooding for eastern areas of the region including the eastern foothills, the Canterbury Plains and Banks Peninsula. Further details of this rainfall event are listed in the *Highlights and extreme events* section.

Overall, May rainfall was well above normal (>149% of normal) for much of Canterbury, Tasman, and western parts of Taranaki. Considerable portions of Canterbury observed at least 200% of normal rainfall for May, with several locations on the Canterbury Plains receiving more than 300% of normal rainfall. May was also a relatively wet month for southern and central Otago, central and northern Southland, Nelson, Marlborough, and the Kapiti Coast where rainfall was above normal (120-149% of normal). In contrast, it was a relatively dry May for much of the North Island and isolated parts of the South Island. Rainfall was below normal (50-79% of normal) for coastal parts of the South Island from Invercargill to Oamaru, the southern West Coast, and parts of every North Island region. Rainfall was well below normal (<50% of normal) in parts of Auckland, Waikato and Wairarapa.

Temperatures were above average (0.51-1.20°C above average) in parts of every New Zealand region. It was a particularly warm month for areas of Waikato, Bay of Plenty, Gisborne, Hawke's Bay, Manawatū-Whanganui, Tasman, the West Coast, and isolated parts of eastern and inland Canterbury where temperatures were well above average (>1.20°C above average). Temperatures were near average (±0.50°C of average) for parts of Northland, western Waikato, the Central Plateau, Marlborough, coastal Canterbury south of Banks Peninsula, and southern and central parts of Otago and Southland. Overall, the nationwide average temperature in May 2021 was 11.5°C. This is 0.7°C above the 1981-2010 May average from NIWA's seven station temperature series which begins in 1909.

Further Highlights:

- The highest temperature was 28.3°C, observed at Rangiora on 11 May. This was New Zealand's third-highest temperature for May on record.
- The lowest temperature was -10.8°C, observed at Tara Hills (Omarama) on 27 May. This was New Zealand's lowest May temperature since 2001.
- The highest 1-day rainfall was 209 mm, recorded at Milford Sound on 8 May.
- The highest wind gust was 163 km/h, observed at Cape Turnagain on 17 May.
- Of the six main centres in May 2021, Auckland was the warmest and driest, Christchurch was the coldest, wettest, and sunniest, and Hamilton was the least sunny.
- Of the available, regularly reporting sunshine observation sites, the sunniest four locations in 2021 so far are Taranaki (1207 hours), Bay of Plenty (1172 hours), Marlborough (1154 hours) and Hawke's Bay (1145 hours).

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## Rainfall: Very wet end to May in Canterbury, dry month for much of North Island

The high overall rainfall totals for May in Canterbury were mostly due to an exceptionally heavy rainfall event over the final three days of the month. Prior to this event, it had been a very dry month, with most of the region tracking towards less than half of its normal rainfall for May. It was an exceptionally wet month in Waipara West and Lake Tekapo, which received 515% and 381% of normal May rainfall, respectively. Four locations (all in Canterbury) observed a record or near-record high rainfall total for May.

It was a dry month for much of the North Island, and isolated parts of the South Island. The driest areas (relative to normal) were Castlepoint and Kaitaia, which received 40% and 48% of normal May rainfall, respectively.

### Record<sup>1</sup> or near-record May rainfall totals were recorded at:

Location	Rainfall total (mm)	Percentage of normal	Year records began	Comments
High records or near-records				
Waipara West	186	515	1973	Highest
Lake Tekapo	215	381	1925	Highest
Winchmore	210	318	1947	3rd-highest
Ashburton	184	293	1909	4th-highest
Low records or near-records				
Auckland (Western Springs)	54	50	1948	4th-lowest

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## Temperature: Warm for the south, average for the north

For much of the month, diurnal temperature ranges (i.e. the difference between daily maximum and minimum air temperatures) were exacerbated in eastern and inland parts of New Zealand. This was largely due to the persistence of clear skies associated with high air pressures, and prevalence of drier than normal soils, enabling enhanced radiative warming (cooling) during the day (night). This is illustrated in the following tables, where nine locations observed record or near-record high mean maximum temperatures for May, and three locations observed record or near-record low mean minimum temperatures. Furthermore, twenty-nine locations observed record or near-record high daily maximum temperatures, while nine locations observed record or near-record low daily minimum temperatures (see *Highlights and extreme events* section for further details).

Motueka's mean temperature for the month was 11.7°C, making it the town's 4th-warmest May since records began in 1956. It was also a relatively warm month in Akaroa, where the mean temperature was 12.0°C (1.5°C above the May normal).

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<sup>1</sup> The rankings (1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>.etc) in all Tables in this summary are relative to climate data from a *group* of nearby stations, some of which may no longer be operating. The current climate value is compared against all values from any member of the group, without any regard for homogeneity between one station's record, and another. This approach is used due to the practical limitations of performing homogeneity checks in real-time.

**Record or near-record mean air temperatures for May were recorded at:**

Location	Mean air temp. (°C)	Departure from normal (°C)	Year records began	Comments
<b>High records or near-records</b>				
Motueka	11.7	1.6	1956	4th-highest
<b>Low records or near-records</b>				
None observed				

**Record or near-record mean maximum air temperatures for May were recorded at:**

Location	Mean maximum air temp. (°C)	Departure from normal (°C)	Year records began	Comments
<b>High records or near-records</b>				
Tauranga	19.1	1.8	1913	3rd-highest
Tūrangi	15.8	1.2	1968	3rd-highest
Motueka	17.8	1.8	1956	3rd-highest
Medbury	16.5	2.0	1927	3rd-highest
Waipawa	17.5	1.8	1945	4th-highest
Porirua	16.2	0.9	1968	4th-highest
Ohakune	14.8	2.2	1962	4th-highest
Cheviot	17.3	2.1	1982	4th-highest
Rangiora	16.9	2.3	1965	4th-highest
<b>Low records or near-records</b>				
None observed				

**Record or near-record mean minimum air temperatures for May were recorded at:**

Location	Mean minimum air temp. (°C)	Departure from normal (°C)	Year records began	Comments
<b>High records or near-records</b>				
None observed				
<b>Low records or near-records</b>				
Middlemarch	-1.7	-2.6	2000	Lowest
Dunedin (Airport)	0.3	-1.8	1962	4th-lowest
Clyde	-0.8	-2.3	1978	4th-lowest

## May climate in the six main centres

From 1-28 May it had been a relatively dry month in Christchurch, with 28 mm of rainfall recorded. However, the final three days of May were exceptionally wet, with 137 mm of rainfall, meaning the city ended the month with 286% of its normal May rainfall. Of the six main centres in May 2021, Auckland was the warmest and driest, and Hamilton was the least sunny. Christchurch had the distinction of being the coldest, wettest, and sunniest of the six main centres.

### May 2021 main centre climate statistics:

Temperature			
Location	Mean temp. (°C)	Departure from normal (°C)	Comments
Auckland <sup>a</sup>	14.5	+0.5	Near average
Tauranga <sup>b</sup>	14.1	+0.8	Above average
Hamilton <sup>c</sup>	11.8	+0.2	Near average
Wellington <sup>d</sup>	12.3	+0.6	Above average
Christchurch <sup>e</sup>	9.5	+0.5	Near average
Dunedin <sup>f</sup>	10.4	+1.1	Above average
Rainfall			
Location	Rainfall (mm)	% of normal	Comments
Auckland <sup>a</sup>	55	51	Below normal
Tauranga <sup>b</sup>	113	102	Near normal
Hamilton <sup>c</sup>	69	65	Below normal
Wellington <sup>d</sup>	154	138	Above normal
Christchurch <sup>e</sup>	165	286	Well above normal
Dunedin <sup>f</sup>	59	91	Near normal
Sunshine			
Location	Sunshine (hours)		
Auckland <sup>a</sup>	158		
Tauranga <sup>b</sup>	171		
Hamilton <sup>g</sup>	141		
Wellington <sup>d</sup>	145		
Christchurch <sup>e</sup>	173		
Dunedin <sup>f</sup>	149		

<sup>a</sup> Māngere <sup>b</sup> Tauranga Airport <sup>c</sup> Hamilton Airport <sup>d</sup> Kelburn <sup>e</sup> Christchurch Airport <sup>f</sup> Musselburgh <sup>g</sup> Ruakura

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## Highlights and extreme events

### Rain and slips

The highest 1-day rainfall was 209 mm, recorded at Milford Sound on 8 May.

From 29-31 May, a prolonged and heavy rainfall event struck Canterbury. A state of emergency was declared across the region, with severe flooding occurring in many areas east of the eastern foothills. The government declared a medium-scale adverse event, unlocking funding for recovery measures. Damage caused by flooding was widespread, with numerous roads closed, bridges damaged and impassable, and farms suffering considerable impacts to infrastructure and stock. Hundreds of residents from several settlements were forced to evacuate, including the entire town of Springfield. There were several reports of people getting caught by the floodwaters and requiring rescue, including people becoming trapped after driving into floodwaters, and two individuals who were rescued from trees after being swept away in the floods.

Six Canterbury locations observed record or near-record high 1-day rainfall totals for May, but it was the prolonged nature of this heavy rainfall event that was especially notable. For example, Winchmore recorded 77 mm of rain on 29 May, establishing a new record for its highest 1-day rainfall total in May. However, the very next day this record was superseded: Winchmore recorded 78 mm of rain on 30 May. A similar situation occurred in Akaroa, which recorded 89 mm of rain on 29 May. At that point, it was Akaroa's 3rd-highest 1-day rainfall total for May on record. However, on 30 May Akaroa recorded 98 mm of rain, replacing the near-record high total from the previous day.

#### Record or near-record May extreme 1-day rainfall totals were recorded at:

Location	Extreme 1-day rainfall (mm)	Date of extreme rainfall	Year records began	Comments
Winchmore	78	30th	1947	Highest
Waipara West	75	29th	1973	Highest
Lake Tekapo	107	29th	1925	Highest
Akaroa	98	30th	1977	3rd-highest
Secretary Island	99	8th	1985	4th-highest
Hanmer Forest	90	30th	1905	4th-highest
Ashburton	62	29th	1927	4th-highest

### Temperatures

The highest temperature recorded during the month was 28.3°C, observed at Rangiora on 11 May. The lowest temperature was -10.8°C, observed at Tara Hills (Omarama) on 27 May.

From 9-11 May, exceptionally high daily maximum and minimum temperatures were observed in many parts of the country, but especially about eastern areas. The most notable temperature observations are listed below:

- 28.3°C in Rangiora on 11 May: New Zealand's 3rd-highest May temperature on record.
- 28.2°C in Cheviot on 9 May: New Zealand's 4th-highest May temperature on record.
- 28.1°C in Hastings on 10 May: New Zealand's 5th-highest May temperature on record.

- 27.8°C in Napier on 10 May: New Zealand’s 6th-highest May temperature on record.

On 26 and 27 May, severe frosts were observed in many South Island areas. Most notable was Tara Hills (Omarama), which recorded -10.8°C on 27 May. This was New Zealand’s coldest May temperature since 2001, when -10.9°C was recorded in Ophir. The temperature at Timaru Airport dipped as low as -7.8°C on 26 May, making it the city’s lowest May temperature since records began in 1885. The cold temperatures persisted throughout the day in some parts due to an inversion associated with a high pressure system. Dunedin Airport’s maximum temperature on 27 May was just 3.2°C, which was that location’s lowest daily maximum air temperature for May on record.

**Record or near-record daily maximum air temperatures for May were recorded at:**

Location	Extreme maximum (°C)	Date of extreme temperature	Year records began	Comments
<b>High records or near-records</b>				
Tauranga	24.9	19th	1913	Highest
Napier	27.8	10th	1868	Highest
Hastings	28.1	10th	1965	Highest
Whakatu	26.7	10th	1965	Highest
Waipawa	26.9	10th	1945	Highest
Porirua	21.7	6th	1968	Highest
Takaka	26.2	5th	1978	Highest
Nelson	22.9	6th	1862	Highest
Hanmer Forest	26.0	11th	1906	Highest
Medbury	25.7	9th	1927	Highest
Waiau	27.1	9th	1974	Highest
Cheviot	28.2	9th	1982	Highest
Rangiora	28.3	11th	1965	Highest
Akaroa	27.0	11th	1978	Highest
Masterton	26.1	10th	1906	2nd-highest
Martinborough	23.0	5th	1986	2nd-highest
Wairoa	26.2	10th	1964	2nd-highest
Motueka	24.8	5th	1956	2nd-highest
Richmond	22.9	6th	1862	2nd-highest
Le Bons Bay	23.7	11th	1984	2nd-highest
Whitianga	23.2	6th	1962	Equal 2nd-highest
Rotorua	21.2	10th	1964	3rd-highest
Mahia	24.0	10th	1990	3rd-highest
Manapouri (West Arm Jetty)	15.6	9th	1971	3rd-highest
Cromwell	22.8	5th	1949	3rd-highest
Appleby	22.9	6th	1932	4th-highest
Ranfurly	20.6	5th	1897	4th-highest
Motu	20.5	6th	1990	Equal 4th-highest
<b>Low records or near-records</b>				
Dunedin (Airport)	3.2	27th	1972	Lowest

**Record or near-record daily minimum air temperatures for May were recorded at:**

Location	Extreme minimum (°C)	Date of extreme temperature	Year records began	Comments
<b>High records or near-records</b>				
Martinborough	18.1	11th	1986	Highest
Ngawi	18.6	11th	1972	Highest
Palmerston North	16.9	10th	1940	Highest
Porirua	16.0	10th	1972	Highest
Hāwera	16.2	11th	1977	Highest
Milford Sound	14.4	31st	1935	Highest
Motueka	15.3	11th	1972	2nd-highest
Medbury	14.6	5th	1927	2nd-highest
Port Taharoa	17.2	11th	1974	Equal 2nd-highest
New Plymouth	17.3	11th	1944	3rd-highest
Dannevirke	16.5	11th	1951	3rd-highest
Castlepoint	17.8	11th	1972	3rd-highest
Stratford	14.9	11th	1972	3rd-highest
Haast	14.4	9th	1949	3rd-highest
Nelson	16.1	11th	1862	3rd-highest
Windsor	10.7	11th	2000	3rd-highest
Hicks Bay	17.8	12th	1972	Equal 3rd-highest
Whanganui	16.8	10th	1972	Equal 3rd-highest
Westport	15.2	9th	1966	Equal 3rd-highest
Auckland (Western Springs)	17.2	9th	1971	4th-highest
Upper Hutt (Trentham)	16.9	11th	1972	4th-highest
Arapito	14.9	11th	1978	4th-highest
Reefton	14.1	11th	1972	4th-highest
Franz Josef	13.3	11th	1953	4th-highest
Arthurs Pass	10.8	10th	1973	4th-highest
Te Anau	12.1	11th	1973	4th-highest
Manapouri (West Arm Jetty)	11.1	10th	1972	4th-highest
South West Cape	12.7	9th	1991	4th-highest
Ohakune	13.0	10th	1972	Equal 4th-highest
<b>Low records or near-records</b>				
Timaru	-7.8	26th	1885	Lowest
Tara Hills	-10.8	27th	1949	Lowest
Middlemarch	-10.1	27th	2000	Lowest
Dunedin (Airport)	-8.8	27th	1962	Equal lowest
Rangiora	-5.2	27th	1965	2nd-lowest
Balclutha	-5.7	27th	1964	2nd-lowest
Clyde	-7.8	27th	1978	3rd-lowest
Ranfurly	-9.3	26th	1897	Equal 3rd-lowest
Appleby	-3.9	26th	1932	4th-lowest



## Wind

The highest wind gust was 163 km/h, observed at Cape Turnagain on 17 May.

From 23-24 May, a low pressure system east of the North Island generated strong winds and large swells. The swells battered eastern parts of the North Island, especially from Northland through to Bay of Plenty. Brophy's Beach in the Coromandel Peninsula was particularly hard hit, with Civil Defence staff working to secure two private properties and other infrastructure by pushing up protective barriers of sand and rocks. The beach was reportedly wiped out, with other coastal areas of the Coromandel suffering extensive damage. Storm surges flooded roads in Whitianga and Tairua, and Buffalo Beach Road was closed.

### Record or near-record May extreme wind gusts were recorded at:

Location	Extreme wind gust (km/h)	Date of extreme gust	Year records began	Comments
Diamond Harbour	102	30th	1980	Equal highest
Mt Ruapehu Chateau	107	24th	2000	2nd-highest
Castlepoint	150	18th	1972	3rd-highest
Secretary Island	130	14th	1994	3rd-highest
Dannevirke	89	18th	1961	4th-highest
Queenstown	85	11th	1972	Equal 4th-highest

## Snow and ice

On 12 May, a cold southerly change saw snow falls about Porters Pass in the South Island, however the road remained open.

On 18 May, snow fell to low elevations over much of the South Island, particularly in Southland. The Milford Road (SH94) was closed, while there were reports of logging trucks getting stuck in snow on SH93 between Clinton and Matura. Snow settled on the Crown Range Road between Queenstown and Wānaka, with motorists required to fit chains.

Canterbury's heavy rainfall event from 29-31 May also resulted in significant snowfalls at high elevations. Measuring the depth of new snowfall proved difficult for many ski areas due to access issues (e.g. damage to access roads due to flooding and slips) and wind effects. *Mount Hutt* ski area reported snow depths of 4 metres at the summit of their ski area along the wind fence (~2,080 metres above sea level), tapering to 30-40 cm at the base area (~1,610 m above sea level), and to just 5 cm at the bottom of their triple chair (~1,440 metres above sea level).

## Lightning, hail, and tornadoes

On 17 May, a tornado was reported in Waitara (Taranaki), with the roof torn off one local business.

On 18 May, approximately 1,200 lightning strikes were recorded over and near New Zealand. Hail settled on the streets of Invercargill during the morning hours, with hail falls also reported in Waipara. The unsettled weather was associated with the northward passage of cold fronts over the country.

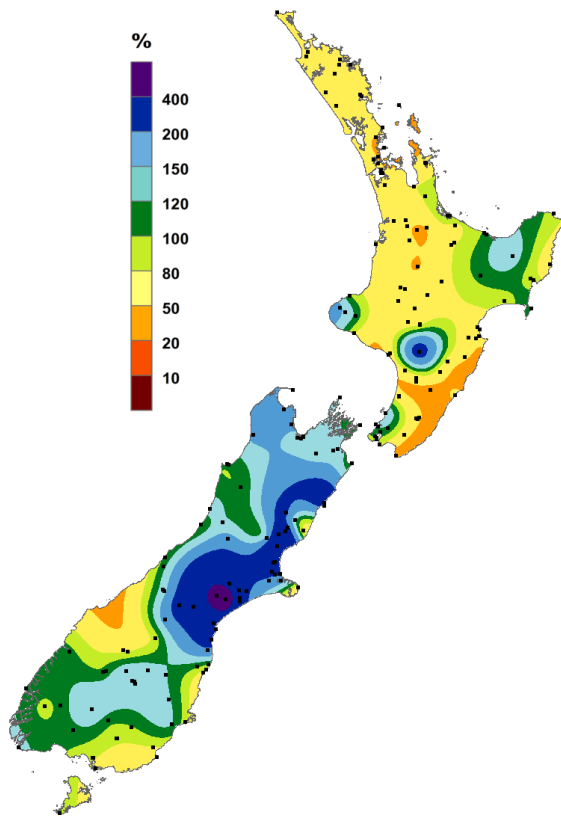
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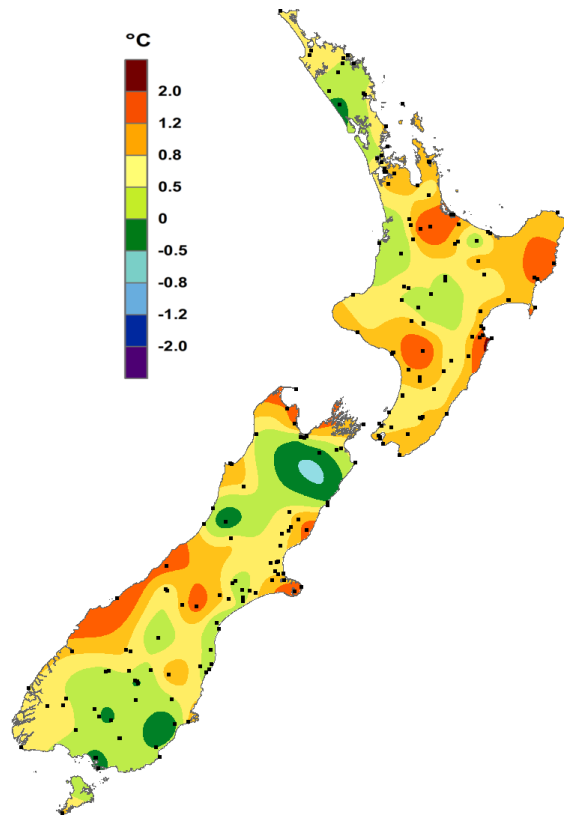
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### May rainfall

Expressed as a percentage of the 1981-2010 normal.  
Note, at the time of writing we have identified missing data from a climate station at Cheviot, and dubious data at a Flat Hills station. This has resulted in an inaccurate illustration of May rainfall for an area of coastal north Canterbury, and inland from Whanganui, respectively. An updated map was not ready in time for publication of this summary.



### May temperature

Expressed as a departure from the 1981-2010 average in degrees Celsius.

<https://www.niwa.co.nz/our-science/climate>

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