

## A month with long dry spells and late season warmth

<b>Rainfall</b>	Large areas of well below normal rainfall (<50% of normal) or below normal rainfall (50-79% of normal) were observed across much of the northern and eastern North Island and the eastern South Island. The only areas that received above normal rainfall (120-149% of normal) were parts of Waikato, Taranaki, western Manawatū-Whanganui, northern West Coast, northern Tasman and northern Marlborough. Small parts of these regions (mostly mountainous and coastal areas) recorded well above normal rainfall (>149% of normal). Near normal rainfall (80-119% of normal) was observed in the west/east divide straddling these districts, as well as in much of Wellington, Westland and coastal Fiordland.
<b>Temperature</b>	Temperatures were above average (0.50-1.20°C above average) or well above average (>1.20°C above average) in parts of Northland, Auckland, inland Waikato, eastern Hawke's Bay and the Wairarapa and Tararua districts, as well as across most of the South Island excluding the northeast. The rest of New Zealand experienced near average temperatures ( $\pm 0.50^\circ\text{C}$ of average).
<b>Soil Moisture</b>	At the beginning of April, soil moisture levels were lower than normal for this time of year for the northern and eastern North Island, and eastern, central and southern South Island. Above normal soil moisture were observed in parts of Waikato, Taranaki, western Manawatū-Whanganui, parts of Wellington, northern Marlborough, Nelson, parts of Tasman and Fiordland. The remainder of New Zealand had near normal soil moisture levels.

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### Overview

During March, La Niña began its transition to ENSO-neutral. The SOI (Southern Oscillation Index) was neutral and sea surface temperature anomalies increased in the central equatorial Pacific.

March was characterised by a strong mid-month ridge of high pressure across Aotearoa New Zealand and a weaker than normal jet stream in the Tasman Sea and Southwest Pacific, contributing to unusual dryness. This was associated with the suppressed phase of the Madden-Julian Oscillation, a climate driver, over the Pacific Ocean.

New Zealand's coastal water temperature anomalies increased during March with substantially warmer than average sea surface temperatures east of the South Island. Pockets of marine heatwave

conditions were observed in the Far North, coastal Canterbury, and coastal Southland, extending east of the country.

There was a clear west to east divide of rainfall during March in New Zealand. As a result, the majority of New Zealand experienced below normal rainfall (50-79% of normal) or well below normal rainfall (<50% of normal) during March. Infrequent cold fronts brought showers and rain to western areas, particularly the West Coast, while east of the ranges on the South Island and much of the North Island remained drier. Parts of Gisborne, Hawke's Bay, Wellington, Canterbury and Otago recorded at least 25 dry days (0.1 mm or less) during March. However, during 27-31 March, a scattered thunderstorm outbreak brought about by the combination of humid northeasterlies and an upper cold pool resulted in some parts of the western North Island receiving heavy downpours. This brief period of wet weather was responsible for above normal (120-149% of normal) and pockets of well above normal (>150% of normal) rainfall for parts of the Waikato, Taranaki, western Manawatū-Whanganui, northern West Coast, northern Tasman and northern Marlborough.

Temperatures for the month of March were above average for large parts of the South Island, with the exception of the northeast, and parts of the North Island, particularly for inland Waikato and east of the ranges. Some parts of Canterbury and Hawke's Bay even experienced the odd day of temperatures in excess of 30°C. The rest of New Zealand experienced near average temperatures overall ( $\pm 0.50^\circ\text{C}$  of average).

**Further Highlights:**

- The highest temperature was 31.9°C, observed at Waiau on 14 March.
- The lowest temperature was -1.8°C, observed at Middlemarch on 18 March.
- The highest 1-day rainfall was 106 mm, recorded at Franz Josef on 5 March.
- The highest wind gust was 148 km/h, observed at Secretary Island on 5 March.
- Of the six main centres in March 2021, Auckland was the warmest, Christchurch was the sunniest, Dunedin was the coolest and driest, and Hamilton was the wettest and least sunny.
- Of the available, regularly reporting sunshine observation sites, the sunniest four locations so far in 2021 are Taranaki (841 hours), Bay of Plenty (794 hours), Kāpiti Coast (784 hours) and Marlborough (782 hours).
- The mean temperature for March 2021 was 16.3°C which is 0.6°C warmer than normal (1981-2010).

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## Rainfall: Dry for the east, with bouts of heavy rain for the west

Large areas of well below normal rainfall (<50% of normal) or below normal rainfall (50-79% of normal) were observed across much of the northern and eastern North Island and the eastern South Island. The only areas that received above normal rainfall (120-150% of normal) were parts of the Waikato, Taranaki, western Manawatū-Whanganui, northern West Coast, northern Tasman and northern Marlborough. Small parts of these regions (mostly mountainous and coastal areas) recorded well above normal rainfall (>150% of normal). Near normal rainfall (80-119% of normal) was observed in the west/east divide straddling these districts, as well as in much of Wellington, Westland and coastal Fiordland.

### Record<sup>1,2</sup> or near-record March rainfall totals were recorded at:

Location	Rainfall total (mm)	Percentage of normal	Year records began	Comments
High records or near-records				
Mt Ruapehu (Chateau)	228	131	2000	3rd-highest
Low records or near-records				
Windsor	9	19	2000	3rd-lowest
Dunedin (Musselburgh)	13	20	1918	3rd-lowest
Oamaru	8	19	1941	4th-lowest

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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.

<sup>2</sup> All normal values in this climate summary are compared to the 1981-2010 normals.

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## Temperature: Cool overnight temperatures, late heat in the south

Temperatures were above average (>0.50°C above average) in parts of Northland, parts of Auckland, inland Waikato, eastern Hawke's Bay and the Wairarapa and Tararua Districts, as well as across most of the South Island excluding the northeast. The rest of New Zealand experienced near average temperatures ( $\pm 0.50^\circ\text{C}$  of average).

The nationwide average temperature in March 2021 was 16.3°C. This was 0.6°C above the 1981-2010 average (considered to be above average) from NIWA's seven station temperature series which began in 1909.

### Record or near-record mean air temperatures for March were recorded at:

Location	Mean air temp. (°C)	Departure from normal (°C)	Year records began	Comments
High records or near-records				
Campbell Island	9.7	+1.1	1991	Highest
Cheviot	16.2	+1.7	1982	3rd-highest
Low records or near-records				
None observed				

### Record or near-record mean maximum air temperatures for March were recorded at:

Location	Mean maximum air temp. (°C)	Departure from normal (°C)	Year records began	Comments
High records or near-records				
Cheviot	23.3	+2.6	1982	Highest
Campbell Island	11.8	+0.9	1991	2nd-highest
Hanmer Forest	23.7	+2.7	1906	3rd-highest
Rangiora	22.2	+1.9	1965	4th-highest
Low records or near-records				
None observed				

### Record or near-record mean minimum air temperatures for March were recorded at:

Location	Mean minimum air temp. (°C)	Departure from normal (°C)	Year records began	Comments
High records or near-records				
Campbell Island	7.6	+1.2	1991	2nd-highest
Low records or near-records				
Porirua	11.2	-1.2	1968	3rd-lowest

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## March climate in the six main centres

March rainfall was well below normal in Tauranga, Christchurch and Dunedin, below normal in Auckland, near normal in Wellington and well above normal in Hamilton. Temperatures were well above average in Dunedin, above average in Christchurch, and near average in the other main centres. Of the six main centres in March 2021, Auckland was the warmest, Christchurch was the sunniest, Dunedin was the coolest and driest, and Hamilton was the wettest and least sunny.

### March 2021 main centre climate statistics:

Temperature			
Location	Mean temp. (°C)	Departure from normal (°C)	Comments
Auckland <sup>a</sup>	19.0	+0.5	Near average
Tauranga <sup>b</sup>	18.6	+0.4	Near average
Hamilton <sup>c</sup>	17.4	+0.5	Near average
Wellington <sup>d</sup>	16.1	+0.3	Near average
Christchurch <sup>e</sup>	15.8	+0.9	Above average
Dunedin <sup>f</sup>	15.1	+1.4	Well above average
Rainfall			
Location	Rainfall (mm)	% of normal	Comments
Auckland <sup>a</sup>	48	57	Below normal
Tauranga <sup>b</sup>	35	36	Well below normal
Hamilton <sup>c</sup>	172	204	Well above normal
Wellington <sup>d</sup>	85	100	Near normal
Christchurch <sup>e</sup>	19	41	Well below normal
Dunedin <sup>f</sup>	13	20	Well below normal
Sunshine			
Location	Sunshine (hours)		
Auckland <sup>a</sup>	192		
Tauranga <sup>b</sup>	200		
Hamilton <sup>g</sup>	178		
Wellington <sup>d</sup>	211		
Christchurch <sup>e</sup>	213		
Dunedin <sup>f</sup>	189		

<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 106 mm, recorded at Franz Josef on 5 March.

Parts of the Waikato (Matamata-Piako District) moved into level 3 water restrictions in the beginning of March due to dry conditions. This follows the recent elevation of water level restrictions in this area from level 1 in December 2020, to level 2 in February 2021.

Parts of the Tasman (Motupiko and Dovedale areas) relaxed water restrictions at the beginning of March due to recent rain. On 2 March, a downpour of rain in Richmond caused localised surface flooding.

Severe thunderstorms brought flash flooding to parts of the Waikato and Bay of Plenty on 4 March. Ruakura recorded 15.7 mm of rain in the hour to 4 p.m., while Hamilton Airport recorded 8.6 mm of rain in the hour to 5 p.m. Further east, thunderstorms also hit Rotorua, where 14.6 mm of rain was recorded in the hour to 3 p.m. Localised flooding was reported in the town of Pūtāruru.

Thunderstorms, showers and areas of heavy rain hit the western and northern North Island on 11 March. Stratford recorded 28.2 mm of rain in an hour and Paeroa recorded 20.2 mm of rain in an hour.

Heavy rain caused flooding on the West Coast Highway on 28 March between Turiwhate and Otira.

Much of the east had extended dry periods. In the South Island, Blenheim, Kaikōura, Culverden, Cheviot, Bromley, parts of Christchurch, Akaroa, Oamaru, Windsor, Cromwell, Clyde, Lauder, Alexandra, Wanaka and Middlemarch all among those locations that recorded over 25 dry days during March (less than 1 mm of rainfall recorded). During 18-24 March, no rainfall was recorded anywhere in Christchurch. In the North Island, Napier, Whakatu, Masterton and parts of Wellington city all recorded over 25 dry days during March. During 17-24 March, no rainfall was recorded anywhere in Wellington city.

At the end of March, an outbreak of isolated thunderstorms caused parts areas in western North Island and northern South Island to receive an entire month's worth of rain in just a few days. 96-hour totals recorded at Hamilton were 111 mm, which is equivalent to 132% of the March normal there. Nelson received 102 mm in 96 hours, 144% of its March normal. New Plymouth received 96 mm in 96 hours, 98% of its March normal. On 31 March, an evening downpour of rain caused flooding in parts of Rotorua and nearby settlements.

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

Location	Extreme 1-day rainfall (mm)	Date of extreme rainfall	Year records began	Comments
Mt Ruapehu (Chateau)	53	29th	2000	2nd-highest
South West Cape	47	28th	1991	4th-highest

### Temperatures

The highest temperature was 31.9°C, observed at Waiau on 14 March.

The lowest temperature was -1.8°C, observed at Middlemarch on 18 March.

On 2 March, Hastings and Napier both recorded temperatures over 30°C and their hottest March day in 5 years.

Persistent humid north-easterly winds brought a string of warm nights during the end of the month for the northern North Island. Parts of Auckland remained above 19°C for over 48 hours between 30-31 March.

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

Location	Extreme maximum (°C)	Date of extreme temperature	Year records began	Comments
<b>High records or near-records</b>				
Campbell Island	18.8	1st	1991	Highest
Waiau	31.9	14th	1974	4th-highest
<b>Low records or near-records</b>				
None observed				

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

Location	Extreme minimum (°C)	Date of extreme temperature	Year records began	Comments
<b>High records or near-records</b>				
Campbell Island	12.8	2nd	1991	Highest
Windsor	15.2	2nd	2000	4th-highest
<b>Low records or near-records</b>				
Martinborough	1.1	19th	1986	Equal 2nd-lowest
Mokohinau	14.4	20th	1994	3rd-lowest
Ohakune	-1.0	13th	1962	Equal 4th-lowest

**Wind**

The highest wind gust was 148 km/h, observed at Secretary Island on 5 March.

**Record or near-record March extreme wind gusts were recorded at:**

Location	Extreme wind gust (km/h)	Date of extreme gust	Year records began	Comments
Secretary Island	148	5th	1994	2nd-highest

**Lightning and hail**

Large hail was reported in the town of Pūtāruru on 4 March, accompanying severe thunderstorms. Over 2000 lightning strikes were recorded across the North Island with these thunderstorms.

Marble-sized hail was reported around Waitomo caves on 11 March with a severe thunderstorm. Over 1900 lightning strikes were recorded across the North Island with these thunderstorms.

During 27 – 31 March, isolated daily thunderstorms erupted in parts of the North Island, with over 2500 lightning strikes recorded over or near land during this period. On 31 March, lightning strikes knocked out power in some parts of Rotorua.

### Cloud and fog

Heavy fog was attributed to a six-vehicle pile-up on the Hawke’s Bay Expressway during the morning of 15 March.

Sections of the Waikato Expressway were closed due to multiple crashes during a morning of heavy fog on 26 March.

On 29 March, dense fog caused delays and cancellations of flights at Dunedin Airport.

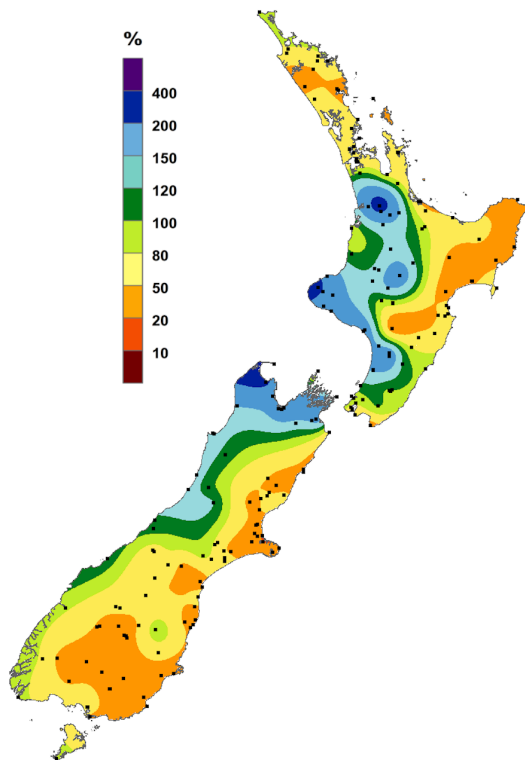
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**For further information, please contact:**

### Tristan Meyers

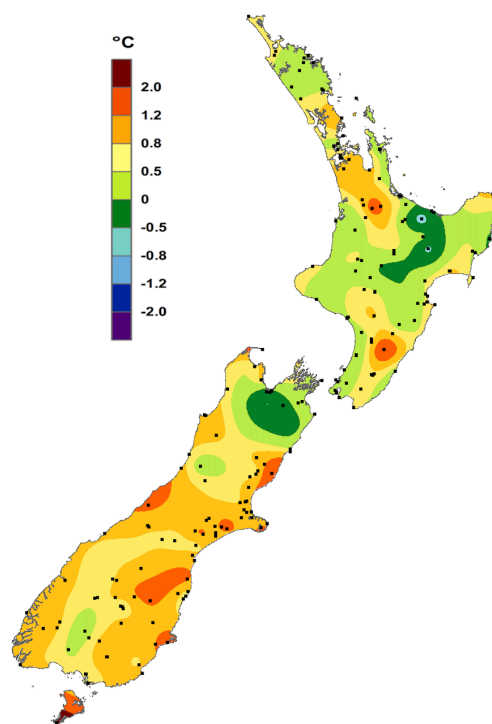
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### March rainfall

Expressed as a percentage of the 1981-2010 normal.



### March 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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