

## The warmth continues everywhere and wetness for some

<b>Temperature</b>	Mean temperatures were above average (0.51 to 1.20°C of average) or well above average (>1.20°C of average) across New Zealand, with isolated parts of Tasman and Southland experiencing near average temperatures (-0.50 to 0.50°C).
<b>Rainfall</b>	Rainfall was well above normal (>149% of normal) in the central North Island, the eastern North Island (south of Napier), Kapiti Coast, Nelson, south Canterbury, north and central Otago, and Fiordland. Rainfall was above normal (120-149% of normal) in Northland, the southern half of the North Island, and Tasman. Below normal rainfall (50-79%) was experienced in isolated patches of Auckland, Waikato, Bay of Plenty, East Cape, Christchurch, Dunedin, and Southland. Near normal rainfall (80-119% of normal) was observed elsewhere.
<b>Soil Moisture</b>	As of 31 March, soils were wetter than normal for the time of year across most of New Zealand. Soils were drier than normal in East Cape, Manawatu-Wanganui, eastern Southland, and Stewart Island.

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### Overview

March 2018 was characterised by significantly higher pressure than normal to the east of New Zealand. This pressure pattern, in concert with the decaying La Niña in the tropical Pacific, caused more northeasterly winds than usual over the country. These warm, humid air masses, combined with the remnants of the marine heatwave in the Tasman Sea, influenced higher than usual temperatures over New Zealand as well as some heavy rainfall events.

March was a warm month across New Zealand, with well above average (>1.20°C of average) or above average (0.51 to 1.20°C of average) mean temperatures experienced almost everywhere across the country. Only isolated parts of Tasman and Southland experienced near average temperatures (-0.50 to 0.50°C). As was observed in February, the number of record and near-record high mean minimum (night time) temperatures in March exceeded the number of record and near-record high mean maximum (day time) temperatures, due to the combination of the marine heat wave along with warm and humid northeasterlies, thereby keeping overnight temperatures elevated.

The nationwide average temperature in March 2018 was 16.9°C (1.3°C above the 1981-2010 March average from NIWA's seven station temperature series which begins in 1909). March 2018 was the sixth-warmest March in the seven-station series. So far, 2018 has had the warmest start to the calendar year on record, with mean temperatures 1.75°C above the 1981-2010 average for January to March combined. The previous record was held by 1998, with January-March mean temperatures that were 1.51°C above average..

March rainfall was spatially patchy across New Zealand, with heavy rain leading to flooding in some areas. Well above normal rainfall totals (>149% of normal) were experienced in the central North Island, the eastern North Island south of Napier, Kapiti Coast, Nelson, south Canterbury, north and central Otago, and Fiordland. Rainfall was above normal (120-149% of normal) in Northland, the southern half of the North Island, and Tasman. Below normal rainfall (50-79%) was experienced in isolated patches of Auckland, Waikato, Bay of Plenty, East Cape, Christchurch, Dunedin, and Southland. Near normal rainfall (80-119% of normal) was observed elsewhere.

By the end of March, soil moisture levels were much above normal for the time of year across most of New Zealand. Soils were drier than normal for East Cape, parts of Manawatu-Whanganui, eastern Southland, and Stewart Island.

Further Highlights:

- The highest temperature was 31.8°C, observed at Kawerau on 5 March.
- The lowest temperature was -1.8°C, observed at Middlemarch on 17 March.
- The highest 1-day rainfall was 205 mm, recorded at Secretary Island on 19 March.
- The highest wind gust was 176 km/h, observed at Cape Foulwind on 13 March.
- Of the six main centres in March 2018, Auckland and Tauranga were the warmest, Wellington was the wettest and least sunny, Christchurch was the driest, Dunedin was the coolest, and Tauranga was the sunniest.
- Of the available automatic sunshine observation sites, the sunniest four locations in 2018 so far (1 January – 31 March) are Blenheim (708 hours), Richmond (708 hours), Napier (697 hours) and Lake Tekapo (688 hours).

**For further information, please contact:**

Petra Pearce  
Climate Scientist, NIWA Auckland  
Tel. 09 375 2052

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## Temperature: A warm month across New Zealand

March was characterised by warm temperatures across most of New Zealand. Almost the whole country experienced well above average (>1.20°C of average) or above average (0.51 to 1.20°C of average) temperatures, with only a couple of isolated locations recording near average (-0.50 to 0.50°C) temperatures. A number of locations experienced their warmest March on record – Akaroa

was particularly notable as it observed a mean temperature for March that was 2.4°C above the 1981-2010 average.

As was observed during February 2018, there were more near-records for high mean minimum temperature than high mean maximum temperature, due to the marine heat wave and persistence of northeasterly airflows which brought warm, humid air masses to the country during March. These air masses contain more moisture and therefore cloud cover which leads to warmer temperatures at night.

**Record<sup>1</sup> or near-record mean air temperatures for March were recorded at:**

Location	Mean air temp. (°C)	Departure from average (°C)	Year records began	Comments
<b>High records or near-records</b>				
Motu	15.7	1.8	1990	Highest
Farewell Spit	18.5	1.7	1971	Highest
Westport	17.5	2.2	1937	Highest
Arapito	17.7	2.2	1978	Highest
Cheviot	16.4	1.9	1982	Highest
Akaroa	18.0	2.4	1978	Highest
Mokohinau	20.7	1.2	1994	2nd-highest
Ngawi	18.4	1.2	1972	2nd-highest
Hicks Bay	19.6	1.7	1969	2nd-highest
Puysegur Point	14.5	1.4	1978	2nd-highest
Dunedin (Musselburgh)	15.3	1.6	1947	2nd-highest
South West Cape	13.4	1.3	1991	2nd-highest
Tauranga	19.9	1.7	1913	3rd-highest
Mahia	18.3	1.2	1990	3rd-highest
Haast	15.9	2.1	1949	3rd-highest
Milford Sound	15.4	1.9	1934	3rd-highest
Lumsden	13.9	1.4	1982	3rd-highest
Brothers Island	17.1	1.1	1997	Equal 3rd-highest
Leigh	21.1	2.0	1966	4th-highest
Whangaparaoa	20.1	1.1	1982	4th-highest
Whitianga	19.4	1.7	1962	4th-highest
Wairoa	19.0	1.7	1964	4th-highest
Reefton	16.5	1.6	1960	4th-highest
Secretary Island	15.4	1.5	1985	4th-highest
Oamaru	15.0	1.1	1967	4th-highest
Tiwai Point	14.3	1.2	1970	4th-highest
<b>Low records or near-records</b>				
None observed				

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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 maximum air temperatures for March were recorded at:**

Location	Mean maximum air temp. (°C)	Departure from normal (°C)	Year records began	Comments
<b>High records or near-records</b>				
Westport	21.4	2.3	1937	Highest
Whitianga	24.2	1.6	1962	2nd-highest
Arapito	22.2	1.8	1978	2nd-highest
Puysegur Point	17.2	1.7	1978	2nd-highest
Farewell Spit	21.9	1.2	1971	3rd-highest
Rotorua	22.4	1.8	1964	4th-highest
Mahia	21.1	1.0	1990	4th-highest
Secretary Island	18.4	1.6	1985	4th-highest
Brothers Island	19.1	1.1	1997	4th-highest
Cheviot	22.6	1.9	1982	4th-highest
South West Cape	15.9	1.4	1991	4th-highest
<b>Low records or near-records</b>				
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
<b>High records or near-records</b>				
Cheviot	10.2	1.8	1982	Highest
Akaroa	13.4	3.0	1978	Highest
South West Cape	11.0	1.3	1991	Highest
Mokohinau	18.7	1.3	1994	2nd-highest
Motu	11.0	1.9	1990	2nd-highest
Ngawi	15.2	1.4	1972	2nd-highest
Hicks Bay	16.6	1.8	1969	2nd-highest
Farewell Spit	15.0	2.0	1971	2nd-highest
Te Anau	9.6	2.9	1963	2nd-highest
Cape Reinga	17.3	1.5	1951	3rd-highest
Kerikeri	15.9	2.6	1945	3rd-highest
Whangarei	16.8	2.1	1967	3rd-highest
Tauranga	16.1	2.3	1913	3rd-highest
Mahia	15.5	1.4	1990	3rd-highest
Arapito	13.1	2.4	1978	3rd-highest
Reefton	11.3	2.2	1960	3rd-highest
Haast	12.8	3.1	1949	3rd-highest
Milford Sound	11.5	2.8	1934	3rd-highest
Secretary Island	12.4	1.4	1985	3rd-highest
Puysegur Point	11.9	1.3	1978	3rd-highest
Brothers Island	15.0	1.0	1997	3rd-highest
Lumsden	8.7	1.8	1982	3rd-highest

Lauder	8.5	2.1	1924	3rd-highest
Kaitaia	16.9	2.3	1948	4th-highest
Kerikeri	15.6	2.1	1945	4th-highest
Dargaville	16.0	1.6	1943	4th-highest
Westport	13.5	2.0	1937	4th-highest
Mt Cook Village	8.4	1.7	1929	4th-highest
Waipara West	11.6	2.0	1973	4th-highest
Le Bons Bay	12.2	1.2	1984	4th-highest
Orari Estate	9.9	1.6	1972	4th-highest
Oamaru	10.8	1.2	1967	4th-highest
Dunedin (Musselburgh)	12.0	1.8	1947	4th-highest
Roxburgh	9.8	2.7	1950	4th-highest
Gore	9.5	1.7	1907	4th-highest
Invercargill	9.9	2.0	1905	4th-highest
<b>Low records or near-records</b>				
Kaikoura	9.8	-2.0	1963	3rd-lowest

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## Rainfall: Patches of wet and dry across New Zealand

March rainfall was spatially patchy across New Zealand, with heavy rain leading to flooding in some areas, but stretches of dry weather for other locations. No new rainfall records for March were set during the month. A notable near-record was observed at Ranfurly, which experienced its second-wettest March since records began there in 1897. It was a dry month for Stewart Island, with South West Cape observing its third-driest March on record.

By the end of March, soil moisture levels were much above normal for the time of year across most of New Zealand. Soils were drier than normal for East Cape, parts of Manawatu-Whanganui, eastern Southland, and Stewart Island.

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

Location	Rainfall total (mm)	Percentage of normal	Year records began	Comments
<b>High records or near-records</b>				
Lower Retaruke	207	223	1966	2nd-highest
Ranfurly	108	295	1897	2nd-highest
<b>Low records or near-records</b>				
South West Cape	51	44	1991	3rd-lowest

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<sup>2</sup> Rainfall totals are rounded to the nearest whole number.

## March climate in the six main centres

March was a relatively dry month for the main centres, with below normal rainfall observed in Hamilton, Christchurch and Dunedin, and near normal rainfall observed in Auckland, Tauranga and Wellington. It was once again a warm month for the main centres, with well above average temperatures everywhere except for Christchurch. Of the six main centres in March 2018, Auckland and Tauranga were the warmest, Wellington was the wettest and least sunny, Christchurch was the driest, Dunedin was the coolest, and Tauranga was the sunniest.

### March 2018 main centre climate statistics:

Temperature			
Location	Mean temp. (°C)	Departure from average (°C)	Comments
Auckland <sup>a</sup>	19.9	+1.4	Well above average
Tauranga <sup>b</sup>	19.9	+1.7	Well above average
Hamilton <sup>c</sup>	18.3	+1.4	Well above average
Wellington <sup>d</sup>	17.1	+1.3	Well above average
Christchurch <sup>e</sup>	15.8	+0.9	Above average
Dunedin <sup>f</sup>	15.3	+1.6	Well above average
Rainfall			
Location	Rainfall (mm)	% of normal	Comments
Auckland <sup>a</sup>	75	88	Near normal
Tauranga <sup>b</sup>	85	87	Near normal
Hamilton <sup>c</sup>	60	71	Below normal
Wellington <sup>d</sup>	93	92	Near normal
Christchurch <sup>e</sup>	31	69	Below normal
Dunedin <sup>f</sup>	42	65	Below normal
Sunshine			
Location <sup>3</sup>	Sunshine (hours)		
Auckland <sup>a</sup>	190		
Tauranga <sup>b</sup>	216		
Hamilton <sup>g</sup>	189		
Wellington <sup>d</sup>	174		
Christchurch <sup>e</sup>	178 <sup>4</sup>		
Dunedin <sup>f</sup>	184		

<sup>a</sup> Mangere <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

<sup>3</sup> Tauranga, Wellington and Christchurch record sunshine use Campbell-Stokes manual sunshine recorders, whereas Auckland, Hamilton and Dunedin record sunshine with high-precision electronic sensors.

<sup>4</sup> 1 day missing

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## Highlights and extreme events

### Temperatures

On 22 March, a southerly front brought cold temperatures to the South Island. On 21 March, afternoon temperatures were in the mid-twenties for many locations but the next day a number of those same locations struggled to reach temperatures that were half as high. Some locations experienced record or near-record low maximum temperatures for March on the 22nd (see table below).

#### 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>				
Whitianga	28.3	6th	1962	Highest
Rotorua	28.7	5th	1964	Highest
Westport	28.0	3rd	1937	2nd-highest
Whangaparaoa	26.8	5th	1982	3rd-highest
Motu	25.8	6th	1990	3rd-highest
Auckland (Mangere)	27.9	6th	1959	3rd-highest
Hamilton	29.6	5th	1906	3rd-highest
Hawera	26.1	2nd	1977	3rd-highest
Auckland (Whenuapai)	27.7	5th	1945	4th-highest
Te Kuiti	29.0	5th	1959	4th-highest
Haast	25.5	7th	1949	4th-highest
Paeroa	28.5	5th	1947	Equal 4th-highest
Arapito	27.0	1st	1978	Equal 4th-highest
<b>Low records or near-records</b>				
Wanaka	6.6	22nd	1972	Lowest
Oamaru	9.0	22nd	1972	Lowest
Cromwell	8.0	22nd	1949	2nd-lowest
Lauder	7.0	22nd	1924	2nd-lowest
Akaroa	11.5	22nd	1978	Equal 2nd-lowest
Tara Hills	7.4	22nd	1949	Equal 2nd-lowest
Waipara West	10.9	22nd	1973	3rd-lowest
Queenstown	7.3	22nd	1871	3rd-lowest
Clyde	9.4	22nd	1978	3rd-lowest
Alexandra	8.5	22nd	1930	3rd-lowest
Cape Reinga	17.9	16th	1971	4th-lowest

**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>				
Mahia	18.8	7th	1990	Highest
Brothers Island	18.8	3rd	1997	Highest
Five Rivers	17.0	20th	1982	Highest
Cape Reinga	20.1	2nd	1971	2nd-highest
Haast	18.2	3rd	1949	2nd-highest
Secretary Island	17.7	3rd	1988	Equal 2nd-highest
Wanaka	17.3	20th	1972	3rd-highest
Motu	16.1	6th	1990	Equal 3rd-highest
Wellington (Airport)	19.2	6th	1972	Equal 3rd-highest
Arapito	18.3	5th	1978	Equal 3rd-highest
Te Anau	16.5	3rd	1973	Equal 3rd-highest
Manapouri (West Arm)	15.6	3rd	1972	Equal 3rd-highest
Alexandra	17.4	3rd	1930	Equal 3rd-highest
Clyde	17.5	3rd	1978	Equal 3rd-highest
Whangaparaoa	19.6	3rd	1982	4th-highest
Cheviot	16.6	16th	1982	4th-highest
Oamaru	15.5	5th	1972	4th-highest
Manapouri (Airport)	16.2	3rd	1973	4th-highest
Lumsden	15.4	3rd	1982	4th-highest
<b>Low records or near-records</b>				
None observed				

**Rain and slips**

On 8 March, heavy rain fell in the Esk Valley area of Hawke’s Bay, causing flooding. About 200 people were evacuated from a school, a campground, and homes in the area after more than 300 mm of rain fell in a 24-hour period. More than 80 properties were affected by flooding. SH 43 between Whangamomona and Taumurunui was closed for a time due to slips. More than 100 tourists were trapped at Blue Duck Station near Owango on the Whanganui River due to heavy rainfall and slips. They were evacuated by helicopter the next day.

On 12 March, ex-tropical cyclone Hola affected the North Island. Heavy rain fell in eastern Northland, and around 100 mm of rain was recorded in parts of Coromandel and East Cape as the storm passed through. Three flights between Northland and Auckland were cancelled due to the bad weather.

On 19 March, a slow-moving southerly front caused significant rainfall in Fiordland. Secretary Island recorded its wettest March day on record, with 205 mm of rain.

On 21 March, New Plymouth was affected by surface flooding after a sudden downpour. The rainfall overwhelmed the stormwater system and the water ran into shops in the centre of the city. The water receded after about 30 minutes.



On 22 March, heavy rain fell in Nelson, causing surface flooding. On the Kapiti Coast, an overnight deluge flooded homes and closed Paraparaumu Beach School and Raumati Beach School. The New Zealand strokeplay golf championship was abandoned for a day because of heavy rain causing surface flooding at Paraparaumu Golf Course.

On 23 March, the top of the North Island was cut off from the rest of the country when a washout occurred on State Highway 1, after a heavy deluge. The road was washed out between Whalers Road and Lamb Road near Pukenui, making a gap in the road about 20 m wide and four to five metres deep. The only way to get north or south of the washout was to use forestry roads or drive along Ninety Mile Beach.

On 25 March, thunderstorms caused heavy rain, surface flooding, and slips in the eastern Bay of Plenty around Wainui, Waimana, and Kutarere.

**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
Lower Retaruke	160	7th	1967	Highest
Secretary Island	205	19th	1985	Highest
Taumarunui	85	7th	1913	2nd-highest
Dannevirke	92	8th	1951	2nd-highest
Castlepoint	110	7th	1907	2nd-highest
Stratford	130	22nd	1960	2nd-highest
Hawera	67	7th	1977	2nd-highest
Ranfurly	47	21st	1897	2nd-highest
Mahia	57	8th	1990	3rd-highest
Turangi	63	7th	1968	4th-highest
Nelson	105	22nd	1862	4th-highest

**Wind**

On 10 March, a strong gust of wind lifted the roof from a west Auckland factory and threw it onto powerlines, cutting electricity in the area.

On 27 March, strong winds blew a campervan over in Aoraki/Mt Cook National Park, and scenic flights were also cancelled due to the wind conditions.

**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
Lauder	109	19th	1981	Equal 4th-highest

**Cloud and fog**

On 4 March, Otago Harbour was affected by fog. Six vessels were stationed off Taiaroa Head, unable to enter the harbour, and three vessels were unable to leave Port Chalmers until the fog lifted later in the evening.

On 6 March, heavy fog affected about 60 flights in and out of Auckland Airport in the morning. The fog had lifted by about 10.30 am.

### **Snow and Ice**

On 22 March, Cardrona Alpine Resort, near Wanaka, was closed to summer activities due to 30 cm of snow falling. Snow covered the mountain tops around the Queenstown-Lakes District.

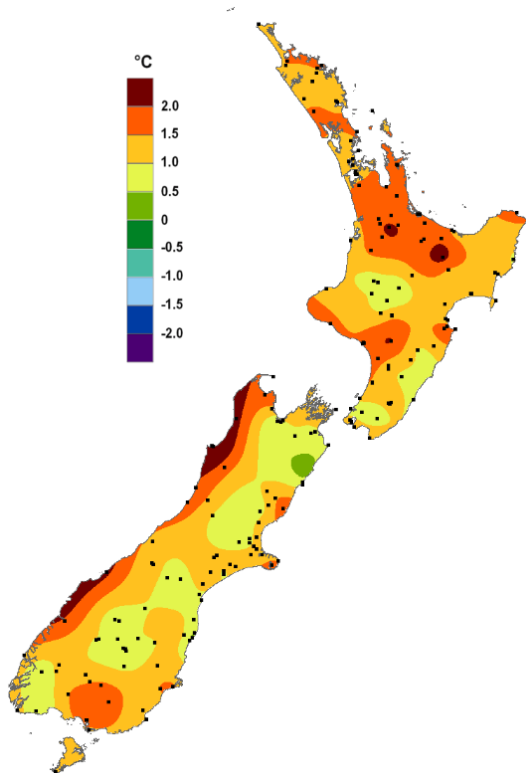
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**For further information, please contact:**

### **Petra Pearce**

Climate Scientist, NIWA Auckland

Tel. 09 375 2052



March 2018 mean temperature compared to the 30-year average (1981-2010 average).

March 2018 was New Zealand's sixth-warmest March on record according to the New Zealand seven station temperature series.

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