

## A warm month for all regions, and patches of wet and dry throughout New Zealand.

<b>Temperature</b>	March temperatures were above average (+0.51 °C to +1.20 °C) for most of the country, and numerous sites in all regions except for Otago and Southland experienced well above average (> +1.20 °C) March temperatures. Temperatures were near average (within 0.50 °C of average) for western Waikato, inland and southern Canterbury, coastal Otago, and eastern Southland.
<b>Rainfall</b>	Rainfall was near normal (80-120%) in most parts of the country. However, there were patches of unusually wet and unusually dry areas in both Islands. Rainfall was well above normal (> 149%) in the north-western South Island and Napier. Rainfall was well below normal (< 50%) for localised sites in Northland, coastal northern Canterbury, Milford Sound, and the Queenstown Lakes District. Rainfall was below normal (50-79%) in parts of these regions as well as in Bay of Plenty and Waikato.
<b>Soil Moisture</b>	As of 1 April 2015, soil moisture levels were well below normal for the time of year for most of the North Island, particularly for western Northland, Waikato, eastern Bay of Plenty, southern Hawkes Bay and the Wairarapa, as well as in the South Island for coastal northern Canterbury and parts of Southland.
<b>Sunshine</b>	It was a relatively cloudy month for much of the country, with many areas recording below normal sunshine (75-90%) - including parts of Northland, Waikato, Christchurch, and Otago. In most other areas, sunshine was near normal (within 10% of normal), except Dunedin, Taranaki, and western Waikato where it was sunnier than usual (110-125%).

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### Overview

March 2015 was characterised by lower air pressures than normal over New Zealand, the Tasman Sea, and south of Australia. Higher than normal pressures were located south-east of New Zealand. This pressure pattern caused a north-easterly flow anomaly over the country. As a result of frequent airflow from the tropics over New Zealand, it was a warm month for many regions, with numerous sites in all regions except for Otago and Southland recording well above average temperatures (more than 1.20 °C above March average). In Otago and Southland, above average temperatures were recorded (+0.50°C to +1.20°C above March average). The nation-wide average temperature in March

2015 was 16.7°C (1.0°C above the 1981-2010 March average from NIWA's seven station temperature series which begins in 1909)<sup>1</sup>.

Most of the country received near normal rainfall (within 20% of normal) in March. However, there were pockets with high rainfall, with parts of Buller and Westland and Napier receiving over one-and-a-half times the normal March rainfall (> 150%). There were patches of low rainfall totals in Northland, Waikato, Bay of Plenty, northern Canterbury, Otago, and Southland, which received below normal rainfall (50-79%). Localised sites in Canterbury, Otago, Northland, as well as Milford Sound received well below normal rainfall (< 50%).

Although parts of the country received significant rainfall, soils were still much drier than normal for the time of year in many areas. Specifically, as of 1 April 2015, soil moisture levels were well below normal for the time of year for most of the North Island, particularly for western Northland, Waikato, eastern Bay of Plenty, southern Hawkes Bay and the Wairarapa, as well as in the South Island including coastal northern Canterbury and parts of Southland. Soil moisture levels were near normal for the time of year on the west coast of the South Island and eastern Otago, as well as pockets in Auckland, coastal Taranaki, north-eastern Hawkes Bay, Marlborough, and Canterbury.

It was a relatively cloudy month for most of the country, with many areas recording below normal sunshine (75-90%) - including parts of Northland, Waikato, Christchurch, and Otago. In most other areas, sunshine was near normal (within 10% of normal), except Dunedin, Taranaki, and western Waikato where it was sunnier than usual (110-125%).

**Further Highlights:**

- The highest temperature was 32.1°C, observed at Hanmer Forest on 5 March.
- The lowest temperature was -2.4°C, observed at Pukaki on 19 March.
- The highest 1-day rainfall was 111 mm, recorded at Westport on 5 March.
- The highest wind gust was 145 km/hr, observed at Hicks Bay on 16 March.
- Of the six main centres in March 2015, Auckland was the warmest and wettest, Dunedin was the coolest, Christchurch was the driest, and Tauranga was the sunniest.
- Of the available, regularly reporting sunshine observation sites, the sunniest four centres so far in 2015 (1 January to 31 March) are: New Plymouth (870 hours), Paraparaumu (815 hours), Whakatane (811 hours), and Blenheim (805 hours).

**For further information, please contact:**

**Mr Chris Brandolino**

NIWA Forecaster – NIWA National Climate Centre

Tel. 09 375 6335, Mobile (027) 886 0014

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<sup>1</sup> Interim value

## Temperature: Higher than average temperatures almost everywhere in New Zealand.

Due to the predominant north-easterly airflow over the country for March which brought regular warm air masses from the tropics, most parts of the country recorded above average (+0.51 to +1.20°C above March average) or well above average (> +1.20°C above March average) temperatures. In fact, numerous sites in all regions except for Otago and Southland recorded well above average March temperatures. However, sites in Otago and Southland still recorded above average temperatures. It was the warmest March on record for Whatawhata (Waikato) and Cheviot (Canterbury). The few sites with near average temperatures for March (between -0.50°C and +0.50°C of average) were in Canterbury, Otago, and Southland. The nation-wide average temperature in March 2015 was 16.7°C (1.0°C above the 1981-2010 March average from NIWA's seven station temperature series which begins 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
<b>High records or near-records</b>				
Whatawhata	19.6	2.4	1952	Highest
Cheviot	15.7	1.2	1982	Highest
Whangaparaoa	20.1	1.1	1982	2nd-highest
Masterton, Te Ore Ore	17.8	2.3	1992	2nd-highest
Ngawi	18.4	1.2	1972	2nd-highest
Westport	17.0	1.7	1937	2nd-highest
Reefton	16.8	1.9	1960	2nd-highest
Stratford	16.6	1.9	1960	3rd-highest
Farewell Spit	18.2	1.4	1971	3rd-highest
Motueka, Riwaka	17.3	1.6	1956	3rd-highest
Kaitaia	19.5	0.8	1985	4th-highest
Mokohinau	20.2	0.7	1994	4th-highest
North Shore, Auckland	20.1	1.1	1994	4th-highest
Te Puke	18.7	1.6	1973	4th-highest
Campbell Island	9.1	0.5	1991	4th-highest
<b>Low records or near-records</b>				
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
<b>High records or near-records</b>				
Whatawhata	25.3	2.9	1952	Highest
Hicks Bay	23.2	2.2	1969	Highest
Motu	20.7	2.1	1990	2nd-highest
Whangaparaoa	23.5	1.4	1982	3rd-highest

Westport	20.8	1.7	1937	3rd-highest
Puysegur Point	16.9	1.4	1978	3rd-highest
Motueka, Riwaka	23.5	1.9	1956	3rd-highest
Cheviot	22.1	1.4	1982	3rd-highest
Campbell Island	11.2	0.3	1991	3rd-highest
Kaitaia	24.1	0.9	1985	4th-highest
Auckland, Whenuapai	24.2	1.3	1945	4th-highest
Auckland (Airport)	24.3	1.7	1959	4th-highest
Masterton, Te Ore Ore	24.6	2.7	1992	4th-highest
Waione	24.6	2.3	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:**

<b>Location</b>	<b>Mean minimum air temp. (°C)</b>	<b>Departure from normal (°C)</b>	<b>Year records began</b>	<b>Comments</b>
<b>High records or near-records</b>				
Farewell Spit	15.0	2.0	1971	Highest
Ngawi	15.1	1.3	1972	2nd-highest
Cheviot	9.4	1.0	1982	2nd-highest
Masterton, Te Ore Ore	11.1	2.0	1992	3rd-highest
Stratford	12.1	2.0	1960	3rd-highest
Reefton	11.2	2.1	1960	3rd-highest
Mokohinau	18.1	0.7	1994	4th-highest
North Shore, Auckland	16.9	1.5	1994	4th-highest
Haast	12.0	2.3	1949	4th-highest
<b>Low records or near-records</b>				
None observed				

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## Rainfall: Patchiness of wet and dry throughout the country, with near normal rainfall for many.

March was a patchy month in terms of rainfall for New Zealand. There were no clear-cut rainfall trends across the different regions, with recording stations within each region often measuring significantly different rainfall totals. Many sites throughout New Zealand recorded near-normal rainfall (within 20% of normal), however there were localised patches of anomalously high and low rainfall totals for the month. Buller and Westland recorded well above normal rainfall totals for March due to a significant event on 5 March – sites in those regions recorded over 150% of normal March rainfall for the month. Napier also recorded well above normal rainfall for March. In contrast, parts of Northland, Waikato, Bay of Plenty, northern Canterbury, Otago, and Southland recorded below normal rainfall (59-79%), and some sites within these regions received well below normal rainfall (< 50%).

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

Location	Rainfall total (mm)	Percentage of normal	Year records began	Comments
Low records or near-records				
Greymouth	358	202	1947	4th-highest
High records or near-records				
None observed				

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<sup>2</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.

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## Sunshine: Below normal sunshine for much of the country.

March was a relatively cloudy month for much of the country, with parts of many regions of both Islands recording below normal sunshine (75-90%). In contrast, it was sunnier than usual in Dunedin, Taranaki, and western Waikato, which recorded above normal sunshine (110-125%).

Of the available, regularly reporting sunshine observation sites, the sunniest four centres so far in 2015 (1 January to 31 March) are: New Plymouth (870 hours), Paraparaumu (815 hours), Whakatane (811 hours) and Blenheim (805 hours).

### Record or near-record March sunshine hours were recorded at:

Location	Sunshine hours	Percentage of normal	Year records began	Comments
High records or near-records				
Cheviot	215	120	1983	2nd-highest
Low records or near-records				
None observed				

## March climate in the six main centres

Half of the main centres had a dry month and half had near normal rainfall, which reflected the patchy nature of rainfall across the country in March. However, all of the main centres had higher temperatures than usual in keeping with the trend across the rest of New Zealand, with Auckland and Hamilton recording well above average temperatures. Sunshine was near normal for the North Island main centres. In Christchurch it was cloudier than usual and in Dunedin it was sunnier than usual. Of the six main centres in March 2015, Auckland was the warmest and wettest, Dunedin was the coolest, Christchurch was the driest, and Tauranga was the sunniest.

### March 2015 main centre climate statistics:

Temperature			
Location	Mean temp. (°C)	Departure from normal (°C)	Comments
Auckland <sup>a</sup>	20.1	+1.6	Well above average
Tauranga <sup>b</sup>	18.7	+0.5	Above average
Hamilton <sup>c</sup>	18.7	+1.6	Well above average
Wellington <sup>d</sup>	16.8	+1.0	Above average
Christchurch <sup>e</sup>	15.5	+0.6	Above average
Dunedin <sup>f</sup>	14.4	+0.7	Above average
Rainfall			
Location	Rainfall (mm)	% of normal	Comments
Auckland <sup>a</sup>	86	100%	Near normal
Tauranga <sup>b</sup>	77	80%	Near normal
Hamilton <sup>c</sup>	60	76%	Below normal
Wellington <sup>d</sup>	54 <sup>3</sup>	64%	Below normal
Christchurch <sup>e</sup>	40 <sup>3</sup>	90%	Near normal
Dunedin <sup>f</sup>	47	74%	Below normal
Sunshine			
Location	Sunshine (hours)	% of normal	Comments
Auckland <sup>a</sup>	193	101%	Near normal
Tauranga <sup>b</sup>	206	96%	Near normal
Hamilton <sup>g</sup>	179	97%	Near normal
Wellington <sup>d</sup>	194	94%	Near normal
Christchurch <sup>e</sup>	160 <sup>3</sup>	84%	Below normal
Dunedin <sup>f</sup>	175	121%	Well above normal

<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> Missing one day of data.

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## Highlights and extreme events

### Ex-Tropical Cyclone Pam

Tropical Cyclone Pam originated north of Vanuatu where she was defined as a Category 5 tropical cyclone. As she travelled south, she devastated parts of Vanuatu. Pam was forecast to cause significant rainfall and high winds for eastern New Zealand, but the storm passed further offshore than initially expected so the impacts were less severe. However, there were still some impacts directly related to Pam and so they have been summarised in this separate section.

On 16 March, about 2000 Auckland properties lost power overnight as ex-Tropical Cyclone Pam passed the country with strong winds. In Northland, 200 properties lost power. Strong winds in eastern Northland brought down trees but no major roads were closed.

On 17 March, all schools in the Gisborne region were closed due to the forecasted impact of ex-Tropical Cyclone Pam. Over 100 people in the East Cape area were evacuated from their homes as a precaution, particularly in low lying coastal townships as high seas were expected to cause flooding and damage. Ferry services in Gulf Harbour and Whangaparaoa, Auckland, were cancelled for the morning due to expected high winds and swells. Some flights into and out of Auckland Airport were delayed due to high winds. Parts of SH 35 around East Cape, as well as local roads, were closed due to slips and tree falls. Power was out to several communities around the East Cape and Mahia Peninsula. Power lines came down and a house roof lifted in Hicks Bay, and trees came down in Ruatoria. A local state of emergency was declared on the Chatham Islands. Ex-Tropical Cyclone Pam caused high seas around the eastern coast of the North Island, with waves in excess of 9 m recorded in the western Bay of Plenty and the East Cape/Gisborne area. Some coastal properties obtained minor damage in Hawke's Bay from the high seas, and the ports at Napier and Gisborne were closed as a precaution.

On 18 March, the yachts competing in the Volvo Ocean Race departed two days after originally scheduled, due to delays caused by ex-Tropical Cyclone Pam.

On 26 March, NASA's super pressure balloon was finally launched from Wanaka after initial delays caused by ex-Tropical Cyclone Pam's unfavourable wind conditions.

### Temperatures

The highest daily maximum temperature for the country was 32.1°C, observed at Hanmer Forest on 5 March. This was followed by 31.3°C at Waipara West, also on 5 March, and Christchurch (Kyle Street, Riccarton) on 2 March.

The lowest daily minimum temperature for the country was -2.4°C, observed at Pukaki on 19 March. This was followed by -2.0°C at both Turangi and Ranfurly, on 20 and 19 March respectively.

### 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
High records or near-records				
Takaka	30.4	1st	1978	Highest



Auckland (Mangere)	28.1	1st	1959	2nd-highest
Pukekohe	28.6	5th	1969	2nd-highest
Masterton, Te Ore Ore	30.9	2nd	1992	2nd-highest
Waione	31.0	5th	1991	2nd-highest
Castlepoint	29.1	2nd	1972	2nd-highest
Auckland (Airport)	28.0	14th	1959	3rd-highest
Whatawhata	30.4	5th	1952	3rd-highest
Stratford	25.7	5th	1960	3rd-highest
Motu	25.6	1st	1990	Equal 3rd-highest
Hanmer Forest	32.1	5th	1906	4th-highest
Le Bons Bay	26.7	2nd	1984	4th-highest
Ngawi	27.6	5th	1972	Equal 4th-highest
Motueka, Riwaka	28.3	2nd	1956	Equal 4th-highest
<b>Low records or near-records</b>				
Farewell Spit	15.3	17th	1972	Lowest
Cape Reinga	18.0	21st	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>				
South West Cape	15.9	2nd	1991	Highest
Secretary Island	17.7	2nd	1988	Equal highest
Farewell Spit	19.0	6th	1972	Equal 2nd-highest
Whangaparaoa	19.5	6th	1982	3rd-highest
North Shore, Auckland	20.1	3rd	1994	4th-highest
Campbell Island	11.1	6th	1991	4th-highest
Masterton, Te Ore Ore	17.5	6th	1992	Equal 4th-highest
Puysegur Point	17.3	2nd	1978	Equal 4th-highest
<b>Low records or near-records</b>				
Campbell Island	-1.6	8th	1991	2nd-lowest
Turangi	-2.0	20th	1968	2nd-lowest
Martinborough	1.4	21st	1986	Equal 3rd-lowest
Wanganui	4.1	20th	1937	Equal 4th-lowest

### **Rain and slips**

The highest 1-day rainfall was 111 mm, recorded at Westport on 5 March.

On 5 March, heavy rain fell in the Buller and Grey Districts, causing slips that blocked roads, flooding of 17 homes, and the closure of SH 6 through the Buller Gorge. Several vehicles were trapped by slips in the Buller Gorge. Schools were closed and several streets were flooded in Westport, Reefton, and Greymouth. South of Greymouth, the Coast Guard had to rescue a campervan from the rising Taramakau River. In Nelson, roads were closed due to heavy rain and strong winds.

On 7 March, thunderstorms brought torrential rain to Wellington for a short period, flooding properties and roads, including SH 1 and SH 2.

On 22 March, heavy rain was welcomed near Motueka after a tanker carrying cream tipped over and the cream flowed into the Riwaka River. The heavy rain and consequent higher river flow quickly diluted the cream and helped to avoid any major impact on the river ecosystem.

On 28 March a localised thunderstorm caused heavy rainfall over Alexandra. Widespread surface flooding was caused by 24 mm of rainfall in one hour, and the fire brigade received 34 calls as a result of the flooding. Some homes and businesses suffered flooding but no major damage was caused.

**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
Westport	111	5th	1944	Highest
Reefton	74	5th	1960	2nd-highest
Greymouth	111	3rd	1947	2nd-highest
Campbell Island	42	1st	1991	3rd-highest
Mokohinau	58	15th	1994	4th-highest
Mahia	54	16th	1990	4th-highest
Alexandra	31	28th	1983	4th-highest

**Wind**

The highest wind gust was 145 km/hr, observed at Hicks Bay on 16 March, during ex-Tropical Cyclone Pam's time near New Zealand. See other notes about high winds during ex-Tropical Cyclone Pam in the separate section above.

On 6 March, three shipping containers were tossed into Wellington Harbour by strong winds. Cook Strait ferries were delayed due to the wind. In Christchurch, a plane slid off the runway as it was landing due to strong winds and heavy rain.

On 7 March, Wellington's *Homegrown* music festival was postponed for a day as high winds were set to batter the city.

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

Location	Extreme wind gust (km/hr)	Date of extreme gust	Year records began	Comments
Mokohinau	124	15th	1994	Highest
Hicks Bay	145	16th	1975	Highest
Farewell Spit	126	6th	1973	Highest
Westport	102	7th	1973	2nd-highest
Nelson	98	6th	1972	2nd-highest
Motu	89	16th	1991	Equal 2nd-highest
Pukekohe	63	7th	1986	3rd-highest

## Cloud and fog

On 17 March, fog caused flight delays at Wellington Airport.

On 27 March, fog caused flight delays at Auckland Airport.

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### For further information, please contact:

#### Mr Chris Brandolino

NIWA Forecaster – NIWA National Climate Centre

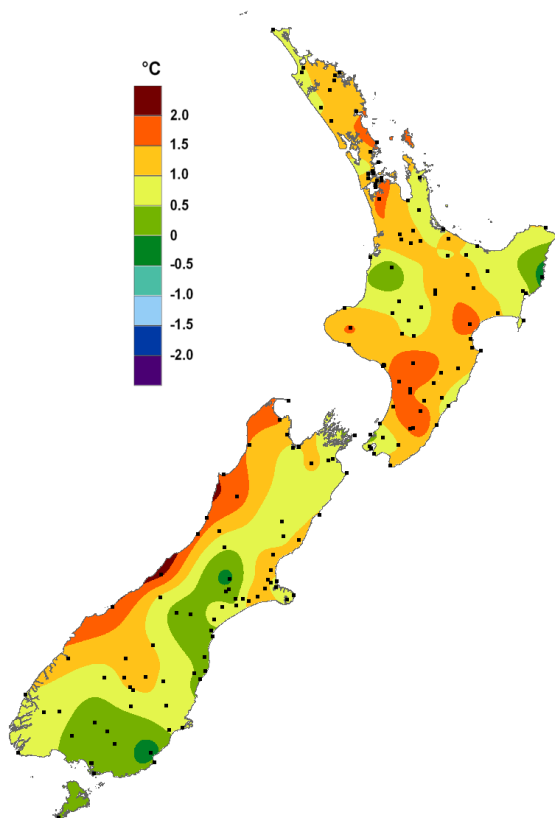
Tel. 09 375 6335, Mobile (027) 886 0014

For climate data enquiries, please contact:

#### Ms Petra Chappell

Climate Scientist, NIWA Auckland

Tel. 09 375 2052



*March 2015 average temperature, expressed as a departure from average (°C).*

*Mean temperatures were well above average (> 1.2°C above average) for much of the country including most of the North Island and western parts of the South Island, as indicated by the orange and red shades.*

*Mean temperatures were near average (within 0.5°C of average) for central and southern parts of the South Island as well as Gisborne, as indicated by the green shades.*

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