

December: Soil moisture quite low for most of the country

Rainfall	Rainfall was below normal (50-79%) or well below normal (< 50%) for many areas of the South Island along and east of the Divide while the far northern part of the island received near normal (80-119%) or above normal rainfall (120-149%). Rainfall for the North Island was greatest for the eastern and northern sections where above normal to well above normal (>149%) rainfall occurred. Meanwhile, the general theme for central and western portions of the island was near normal or below normal rainfall.
Soil Moisture	As of 1 January 2015, soil moisture levels were below normal for the time of year for extensive areas of New Zealand, but especially for the Waikato, lower Hawke's Bay, Wairarapa and along and east of the Divide in the South Island. Wetter than normal soils for this time of year were evident over parts of upper West Coast for the South Island as well as for northern Gisborne, coastal Bay of Plenty, much of the Coromandel Peninsula as well as central and eastern Northland.
Temperature	December temperatures were above (+0.51°C to 1.20°C) or well above average (>1.20°C above average) for much of the South Island, particularly for areas along and west of the Divide, with mostly near average temperatures (-0.50°C to +0.50°C) east of the Divide. For the North Island, December temperatures were largely near average for most of the island. However, parts of the central and eastern regions recorded below average temperatures (-1.20°C to -0.51°C) with pockets of well below average temperatures (< 1.20°C below average) experienced. A few locations in the Northland, Auckland and Waikato regions observed above average temperatures.
Sunshine	December sunshine was abundant for much of the South Island, especially along and west of the Divide as well as much of Southland and Otago where monthly sunshine hours were above normal (110-125%) to well above normal (>125%). For the North Island, near normal sunshine (91%-109%) was recorded for December.

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Overview

December 2014 was characterised by higher than normal pressure centred near the Chatham Islands and extending over New Zealand with lower than normal pressures over the Tasman Sea and eastern Australia. This pressure pattern resulted in an anomalous northeasterly airflow over the country. In terms of temperature, the month of December was a month with two halves, with below average or

well-below average temperatures dominating most of New Zealand through the first half of the month. Thereafter, however, the remainder of the month featured much warmer temperatures which compensated for the unusually cool start. In fact, in some cases, the warmth was enough to not only make up for the temperature deficit, but allow for a surplus as monthly mean temperatures went from below average through mid-December to above by month's end. Examples of this remarkable turnaround are listed below. The nation-wide average temperature in December 2014 was 16.1°C (0.5°C above the 1971-2000 December average from NIWA's seven station temperature series which begins in 1909)¹.

The month of December was separated by two distinct temperature regimes:

Location	Mean air temp. to 16 Dec, inclusive (°C)	Departure from normal as of 16 Dec (°C)	Mean monthly air to 31 Dec temp. (°C)	Departure from normal to 31 Dec (°C)
Dargaville	17.1	-0.6	18.4	+0.7
Auckland (Albany)	17.3	-1.1	18.4	0.0
Martinborough	13.5	-3.0	16.1	-0.3
Napier	16.0	-1.7	17.8	+0.1
Wanganui	16.0	-0.9	17.8	+0.9
Wellington (Kelburn)	13.7	-1.8	15.5	+0.1
Hokitika	13.7	-0.7	15.6	+1.2
Blenheim	14.8	-2.0	17.3	+0.6
Hanmer Forest	11.3	-3.2	14.2	-0.2
Christchurch (Riccarton)	14.1	-2.0	16.2	+0.1
Timaru	12.5	-2.0	14.9	+0.5
Ranfurly	13.0	-0.5	15.3	+1.9
Dunedin (Musselburgh)	11.9	-2.0	14.0	+0.2
Queenstown	13.6	-0.6	15.3	+1.2
Gore	12.3	-0.9	14.7	+1.6

The northeasterly wind flow anomaly for the month as a whole contributed to rainfall totals that were above normal (120-149%) or well above normal (> 149%) for central and eastern Northland, Coromandel Peninsula, Coastal Bay of Plenty, Gisborne and Hawke's Bay regions. The drying orographic effect of air moving westward over elevated land meant that rainfall was below normal (50-79%) for much of the Waikato and parts of the Manawatu-Wanganui regions for the month. However, coastal regions from Taranaki to Wellington received above normal to well above normal December rainfall. Generally speaking for the South Island, with the exception of the northern third of the island, December rainfall was below normal or well below normal rainfall (<50%).

As of 1 January 2015, soil moisture levels were drier or much drier than normal for this time of year for the majority of the country. The driest soils for this time of year are in areas of the Waikato, Wairarapa, and for much of eastern Canterbury and northern Otago regions. Compared to about one month earlier, South Island soil moisture has increased significantly for the Tasman, Nelson and Marlborough regions, but drier than normal soils for this time of year have expanded and even intensified east of the Divide. Soil moisture levels for this time of year have increased or improved,

¹ Interim value

when compared to 1 December 2014, for Gisborne, coastal Bay of Plenty, Coromandel Peninsula as well as central and eastern sections of Northland. Conversely, soil moisture levels for this time of year have remained low and even deteriorated since early December over the Wairarapa and northern Taranaki, along with much the Waikato region.

December sunshine was abundant for much of the South Island, in particular, along either side of the Divide as well as much of Southland and Otago where monthly sunshine hours were above normal (110-125%) to well above normal (>125%). For the North Island, near normal sunshine (91%-109%) was recorded, although below normal December sunshine was evident from the Kapiti Coast to Wellington as well as parts of the Waikato.

Further Highlights:

- The highest temperature was 32.8°C, observed at Middlemarch on 24 December
- The lowest temperature was -2.4°C, observed at Pukaki on 1 December
- The highest 1-day rainfall was 145 mm, recorded at Hicks Bay on 17 December
- The highest wind gust was 178 km/hr, observed at Cape Turnagain on 7 December
- Of the six main centres in December 2014, Auckland was the warmest, Dunedin was the coolest and sunniest, Tauranga was the wettest, Christchurch was the driest and Hamilton was the cloudiest
- Of the available, regularly reporting sunshine observation sites, the sunniest four centres² in 2014 (1 January to 31 December) are: Whakatane (2710 hours), Blenheim (2509 hours), Lake Tekapo (2505 hours) and Nelson (2486 hours).

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Rainfall: Distribution largely determined by wind direction

December rainfall distribution was, for the most part, a function of prevailing wind direction. As noted in the overview section above, the pressure pattern during the month of December promoted an anomalous northeasterly airflow over the country. Consequently, the greatest monthly rainfall total and near record monthly rainfall totals were, generally speaking, from Northland to Gisborne. Additionally, four out of the six near-record one day rainfall events also occurred in these regions. The rain has increased soil moisture levels in these locations.

Conversely, not too far southwest over the central portion of the North Island, very dry conditions were experienced in Taupo and Ohakune as the once moist northeast wind dried by the time it crossed and descended down the elevated terrain separating the coastal and interior sections of the island. Soil moisture levels have responded as much of the Waikato, less the far eastern sections, and

² New Plymouth sunshine is omitted from this ranking as its sensor was deemed faulty

Wairarapa regions are severely dry for this time of year with areas of extremely dry soils for this time of year.

For the South Island, dry conditions continued for much of the island east of the Divide. Note that parts of eastern Canterbury received less than 15 mm of rainfall during December, with Waipara receiving only 2 mm for the month, or 4% of December normal rainfall – making it the driest December on record. The continued lack of rainfall has led to severely to extremely dry soils for this time of year for much of eastern Canterbury and parts of Otago.

Record or near-record December rainfall totals were recorded at:

Location	Rainfall total (mm)	Percentage of normal	Year records began	Comments
High records or near-records				
Kaikohe	256	234	1956	2nd-highest
Hicks Bay	255	258	1916	4th-highest
Low records or near-records				
Waipara	2	4	1973	Lowest
Toenepi	32	33	1951	3rd-lowest
Orari	14	22	1897	3rd-lowest
Balclutha	20	29	1964	3rd-lowest
Ohakune	50	41	1961	4th-lowest
Lumsden	53	56	1982	4th-lowest
Taupo	37	40	1949	Equal 4th-lowest

Temperature: Unseasonably cool start, a much warmer finish

The first half of December started off on an unseasonably chilly note with much of the country experiencing below (-1.20°C to -0.51°C) or well below average temperatures (< 1.20°C below average). However, significantly warmer temperatures followed for the second half of the month, which offset the chilly start. For some locations in the South Island, the warmth was more profound and was great enough to allow for near all-time high mean maximum temperatures. Of note is the cluster of near-record warm mean maximum temperatures over the far southern part of the South Island from Otago to Fiordland. Also noteworthy is Ranfurly which secured its third warmest mean December temperature by way of not only warm days, but abnormally warm nights. The nation-wide average temperature in December 2014 was 16.1°C (0.5°C above the 1971-2000 December average from NIWA’s seven station temperature series which begins in 1909).

Record³ or near-record mean air temperatures for December were recorded at:

Location	Mean air temp. (°C)	Departure from normal (°C)	Year records began	Comments
High records or near-records				
Stratford	16.1	1.7	1960	2nd-highest
Campbell Island	9.6	0.9	1991	2nd-highest
Ranfurly	15.3	1.9	1975	3rd-highest
Reefton	17.5	2.1	1960	4th-highest
Secretary Island	14.4	1.1	1985	4th-highest
Puysegur Point	13.8	1.3	1978	4th-highest

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

Location	Mean maximum air temp. (°C)	Departure from normal (°C)	Year records began	Comments
High records or near-records				
Puysegur Point	16.8	1.6	1978	2nd-highest
Ranfurly	22.4	2.4	1975	3rd-highest
Reefton	23.3	2.5	1960	4th-highest
Low records or near-records				
Cape Campbell	16.8	-1.2	1953	4th-lowest

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

Location	Mean minimum air temp. (°C)	Departure from normal (°C)	Year records began	Comments
High records or near-records				
Campbell Island	7.3	1.2	1991	2nd-highest
Ranfurly	8.2	1.4	1975	4th-highest
Low records or near-records				
Wallaceville	9.4	-1.9	1939	4th-lowest

Sunshine: Grey start to summer for the lower North Island

The far south and southwest part of the North Island had a relatively dull start to summer with Wellington and Paraparaumu each enduring their fourth-lowest total December sunshine hours on record. Much of the remainder of the North Island experienced near normal (within 10% of normal) December sunshine. On the other end of the spectrum, Dunedin experienced a particularly sunny start to summer having received 219 hours of sunshine, or 131% of normal for December.

³ The rankings (1st, 2nd, 3rd.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.

Of the available, regularly reporting sunshine observation sites, the sunniest four centres in 2014 (1 January to 31 December) are: Whakatane (2710 hours), Blenheim (2509 hours), Lake Tekapo (2505 hours) and Nelson (2486 hours).

Record or near-record December sunshine hours were recorded at:

Location	Sunshine hours	Percentage of normal	Year records began	Comments
Low records or near-records				
Wellington (Kelburn)	173	78	1928	4th-lowest
Paraparaumu	161	78	1953	4th-lowest

December climate in the six main centres

December temperatures were near average (within 0.5°C) monthly temperatures for all of the main centres. However, as noted previously, a closer inspection reveals December temperatures were actually more eventful than what the final monthly numbers indicate as chilly temperatures dominated the first half of the month followed by a much warmer second half of December. After a dry November in Tauranga, December proved to be very wet with more than 150% of December normal rainfall occurring – again the aforementioned northeast wind flow contributing to well above normal early summer rainfall. Farther west, the winds were not so moist for the Waikato with Hamilton receiving only 74% of normal December rainfall, this in spite of receiving well below normal sunshine for the month. The lack of December sun in Wellington reflected the above normal rainfall with more than 140% of normal rain occurring, while abnormally dry December conditions were experienced in Christchurch and Dunedin. Of the six main centres in December 2014, Auckland was the warmest, Dunedin was the coolest and sunniest, Tauranga was the wettest, Christchurch was the driest and Hamilton was the cloudiest.

December 2014 main centre climate statistics:

Temperature			
Location	Mean temp. (°C)	Departure from normal (°C)	Comments
Auckland ^a	18.7	+0.5	Near average
Tauranga ^b	18.1	+0.1	Near average
Hamilton ^c	17.1	+0.2	Near average
Wellington ^d	15.5	+0.1	Near average
Christchurch ^e	15.7	-0.1	Near average
Dunedin ^f	14.0	+0.2	Near average
Rainfall			
Location	Rainfall (mm)	% of normal	Comments
Auckland ^a	76	86%	Near normal

Tauranga ^b	145	153%	Well above normal
Hamilton ^c	78	74%	Below normal
Wellington ^d	118	141%	Above normal
Christchurch ^e	29	62%	Below normal
Dunedin ^f	34	42%	Well below normal

Sunshine

Location	Sunshine (hours)	% of normal	Comments
Auckland ^a	182	92%	Near normal
Tauranga ^b	202	87%	Below normal
Hamilton ^g	163	74%	Well below normal
Wellington ^d	173	78%	Below normal
Christchurch ^e	204	93%	Near normal
Dunedin ^f	219	131%	Well above normal

^a Mangere ^b Tauranga Airport ^c Hamilton Airport ^d Kelburn ^e Christchurch Airport ^f Musselburgh ^g Ruakura

Highlights and extreme events

Temperatures

While mean December temperatures for many locations in New Zealand were near average, there was a distinct difference between the first and second half of the month, as noted in mean maximum and minimum temperatures earlier in the document. This was also illustrated with extreme maximum and minimum temperatures, as noted in the tables below. Note that all extreme daily maximum air temperatures occurred *on or after* 16 December while all daily minimum extreme temperatures occurred during the *first 15 days* of the month.

Another interesting fact is the extreme temperatures that occurred during December in Middlemarch. As indicated below, Middlemarch observed the highest New Zealand temperature for the month on Christmas Eve, however, Middlemarch also observed the second coldest December temperature having reached a frosty -2.1°C on 1 December. This is yet another example of the stark contrast between the first and second half of December.

The highest daily maximum temperature was 32.8°C, observed at Middlemarch on 24 December

The lowest daily minimum temperature was -2.4°C, observed at Pukaki on 1 December.

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

Location	Extreme maximum (°C)	Date of extreme temperature	Year records began	Comments
High records or near-records				
Puysegur Point	24.7	30th	1978	Equal highest
Reefton	31.2	16th	1960	2nd-highest
Tiwai Point	28.1	26th	1970	2nd-highest
Masterton	29.9	20th	1992	3rd-highest
Lumsden	28.8	26th	1982	Equal 3rd-highest
Ranfuryly	30.0	24th	1975	4th-highest
Low records or near-records				
Cheviot	10.9	10th	1982	Lowest
Whitianga	15.3	14th	1971	2nd-lowest
Le Bons Bay	9.1	10th	1984	2nd-lowest
Balclutha	10.2	1st	1972	2nd-lowest
Turangi	13	1st	1968	Equal 2nd-lowest
Whangaparaoa	16.1	14th	1982	3rd-lowest
Warkworth	15.9	14th	1966	3rd-lowest
Waione	15.1	1st	1993	3rd-lowest
Te Kuiti	15.6	1st	1959	3rd-lowest
Masterton	11.4	1st	1943	3rd-lowest
Martinborough	12.3	1st	1986	3rd-lowest
Waipawa	12.9	14th	1945	Equal 3rd-lowest
South West Cape	9.9	11th	1991	Equal 3rd-lowest
Motu	11.6	14th	1990	4th-lowest
Lumsden	10.4	1st	1982	4th-lowest
Hicks Bay	15.1	14th	1972	4th-lowest
Dunedin (Musselburgh)	10	1st	1947	4th-lowest
Whangarei	17.1	15th	1967	4th-lowest
Lumsden	10.4	1st	1982	4th-lowest
Balclutha	10.2	1st	1972	2nd-lowest
South West Cape	9.9	11th	1991	Equal 3rd-lowest

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

Location	Extreme minimum (°C)	Date of extreme temperature	Year records began	Comments
High records or near-records				
Manapouri	17.1	27th	1973	Highest
Puysegur Point	18.9	27th	1978	Highest
Motu	16.6	21st	1990	Equal highest
Gore	16.4	31st	1972	2nd-highest

Invercargill	18	27th	1905	2nd-highest
Tiwai Point	16.3	27th	1972	2nd-highest
Campbell Island	11.7	27th	1991	2nd-highest
Secretary Island	16.5	27th	1988	2nd-highest
Motueka	18.6	26th	1972	Equal 2nd-highest
Wanaka	17.7	27th	1972	Equal 2nd-highest
Haast	16.9	27th	1949	3rd-highest
Milford Sound	16.8	27th	1935	3rd-highest
Ranfurly	16.6	27th	1975	3rd-highest
Lauder	19	27th	1924	3rd-highest
Cromwell	18.7	27th	1949	4th-highest
Westport	17.5	28th	1966	4th-highest
Reefton	17.4	20th	1972	Equal 4th-highest
Low records or near-records				
Kerikeri	4.5	5th	1981	Lowest
Te Kuiti	1.9	2nd	1959	Lowest
Turangi	-0.5	3rd	1968	Lowest
Martinborough	-1.6	1st	1986	Lowest
Motueka	1.9	2nd	1956	Lowest
Appleby	0.9	2nd	1932	Lowest
Blenheim	-0.3	2nd	1932	Lowest
Taumarunui	1.4	3rd	1947	2nd-lowest
Alexandra	0.4	2nd	1983	2nd-lowest
Waione	0.6	3rd	1991	2nd-lowest
Le Bons Bay	3.6	1st	1984	2nd-lowest
Tara Hills	-1.7	2nd	1949	Equal 2nd-lowest
Motu	0.1	3rd	1990	3rd-lowest
Port Taharoa	6.6	3rd	1973	3rd-lowest
Queenstown	-0.2	2nd	1871	3rd-lowest
Tiwai Point	2.6	14th	1970	3rd-lowest
Balclutha	0.7	14th	1964	3rd-lowest
Dunedin (Musselburgh)	4.4	1st	1947	Equal 3rd-lowest
Ranfurly	-1.2	2nd	1975	Equal 3rd-lowest
Secretary Island	4.8	1st	1985	4th-lowest
Waiau	1.8	14th	1974	4th-lowest
Timaru	0.2	2nd	1885	4th-lowest
Kaitaia	6.8	4th	1948	4th-lowest

Wind

On 14 December, 1600 Hauraki Plains and Coromandel Peninsula properties were without power after damaging winds brought down trees and power lines.

On 17 December, damaging winds struck in the Morrinsville and Matamata areas, with reports of tree branches on roads, lifting roofs and downed power lines. Caution was also advised by the NZTA for motorists travelling over the Auckland Harbour Bridge and Mangere Bridge due to strong wind gusts.

The highest wind gust was 178 km/hr, observed at Cape Turnagain on 7 December

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

Location	Extreme wind gust (km/hr)	Date of extreme gust	Year records began	Comments
Cape Reinga	128	16th	1974	Highest
Paeroa	91	14th	1991	2nd-highest
Pukekohe	63	14th	1986	Equal 2nd-highest
Oamaru Airport	80	7th	1984	4th-highest
Oamaru	72	7th	1984	4th-highest

Rain and slips

On 10 December heavy rain caused surface flooding in parts of the Kapiti Coast, Horowhenua and Manawatu. Caution was advised to motorists travelling on SH 1 between Levin and Manakau and SH 57 near Tavistock Road north of Levin due to flooding.

On 14 December heavy morning rain caused a section of highway between Warkworth and Wellsford to become flooded.

On 17 December, Port Jackson road in the Coromandel was closed due to flooding caused by heavy rain.

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

Location	Extreme 1-day rainfall (mm)	Date of extreme rainfall	Year records began	Comments
Hicks Bay	145	17th	1916	2nd-highest
Kaitaia	46	13th	1985	4th-highest
Whangaparaoa	56	13th	1946	4th-highest
Whakatane	114	17th	1952	4th-highest
Hawera	73	10th	1977	4th-highest
Campbell Island	33	31st	1991	4th-highest

Lightning and Hail

Snow and ice

On 1 December an unseasonable snowfall occurred on some mountainous regions of the South Island. Staff at *Mount Hutt* ski area reported 20 cm of fresh snow.

Cloud and fog

On 19 December thick fog grounded planes at Auckland Airport, cancelling three domestic flights and delaying 30. The fog lingered till mid-morning.

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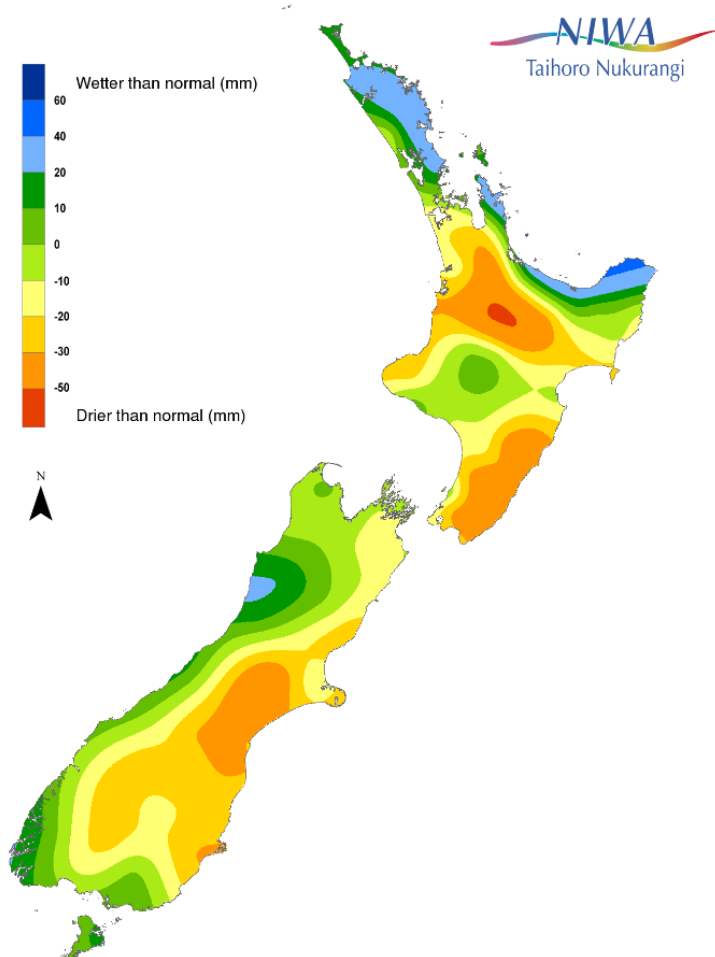
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Soil moisture anomaly (mm) at 9am on 01/01/2015



Soil moisture anomaly as of 1 January 2015. Expressed in units of millimetres (mm).

Regions in the orange and red indicate where soil moisture levels are severely to extremely dry for this time of year. Sustained rainfall over an extended period of time is needed to return to normal conditions.

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