

## A chilly month for the South Island, rounds of flooding in the North Island.

<b>Temperature</b>	August temperatures were below average (-1.20°C to -0.51°C) in the north and east of the South Island. It was an especially chilly month across the northwestern Tasman region where mean temperatures were well below average (<-1.20°C). Elsewhere in New Zealand, temperatures were near average (-0.50 to 0.49°C).
<b>Rainfall</b>	Rainfall was below normal (50-79%) or well below normal (<50%) across Westland, Southland, and parts of the Queenstown-Lakes region. Rainfall was below normal across middle and northern Canterbury, the Tasman, Nelson, and Marlborough regions as well as in parts of Taranaki, Wairarapa, and much of the Bay of Plenty and Waikato. Conversely, rainfall was above normal (120-149%) or well above normal (>149%) for coastal southern Canterbury and coastal Otago and much of Hawke's Bay as well as north Auckland.
<b>Sunshine</b>	August sunshine was above normal (110-125% of normal) across much of the South Island and west of the North Island. It was especially sunny in southwestern Waikato and in coastal Otago. Sunshine was near normal (90-109% of normal) in most other areas.
<b>Soil Moisture</b>	At the end of August 2016, soil moisture levels were below normal for the time of year across middle and northern Canterbury as well as coastal Wairarapa. Soil moisture levels for the remainder of the country were near normal for this time of year.

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### Overview

During August 2016, mean sea-level pressures were lower than normal to the northeast of New Zealand and above normal to the southeast of New Zealand. This pressure pattern resulted in a prevalence of winds from an easterly or southeasterly direction.

August temperatures were below average (-1.20°C to -0.51°C below the August average) across much of the South Island except for the southwestern part of the Island and the Christchurch district, where near average temperatures (-0.50 to +0.49°C) occurred. This was the first month in 2016 that an area

this large (on either Island) experienced below average temperatures. It was an especially chilly month in the northwestern Tasman region where well below average temperatures (<-1.20°C below the August average) were recorded. Across the North Island, temperatures were mostly near average. A small area including Wellington and Wairarapa had below average temperatures as well as parts of western Auckland.

The nationwide average temperature in August 2016 was 8.3°C (0.5°C below the 1981-2010 August average from NIWA's seven station temperature series which begins in 1909). This is the coldest August since 2011, which was -0.8°C colder than average. The first eight months of 2016 have all been warmer than normal, and January-August 2016 is the warmest January-August period in the seven station temperature record with departure from average of +1.1°C.

The prevalence of winds from an easterly or southeasterly direction contributed to drier than usual conditions across the west of the South Island with well below normal rainfall (<50% of the August normal) observed in parts of the West Coast, interior Canterbury, interior Otago, and in Southland. In fact, Queenstown had merely 11% of its normal August rainfall and its driest month in over 7 years (since June 2009). A small area of well below normal rainfall was also observed in Taranaki. Below normal rainfall (50-79% of the August normal) was observed across a part of middle and northern Canterbury and much of Tasman, Nelson, and western Marlborough. Much of Waikato, Bay of Plenty, and northern Gisborne, and coastal Wairarapa also had below normal rainfall during August. In contrast, rainfall was well above normal (>149% of the August normal) in some parts of the eastern North and South Islands. Parts of Hawke's Bay, including Napier, had more than double their normal August rainfall (>200% of normal). Coastal East and North Otago, including Oamaru, also recorded double its normal August rainfall. In addition, the north of the Auckland region had above (120-149% of the August normal) or well above normal rainfall. Rainfall was near normal (80-119% of the August normal) for most of Northland, Manawatu-Whanganui, and Wellington regions.

As of 1 September 2016, soil moisture levels were below normal for the time of year across middle and northern Canterbury as well coastal Wairarapa. Soil moisture levels for the remainder of the country were near normal for the time of year.

August sunshine was above normal (110-125% of normal) across much of the South Island and west of the North Island. It was especially sunny in southwestern Waikato and in coastal Otago. Sunshine was near normal (90-109% of normal) in most other areas.

#### **Further Highlights:**

- The highest temperature was 22.2°C, observed at Christchurch (Riccarton) on 29 August.
- The lowest temperature was -14.1°C, observed at Mt Cook Airport on 8 August.
- The highest 1-day rainfall was 145 mm, recorded at Tutira (Hawke's Bay) on 6 August.
- The highest wind gust was 146 km/hr, observed at Cape Turnagain on 21 August.
- Of the six main centres in August 2016, Christchurch was the coolest, driest and sunniest, Auckland was the warmest, Wellington was the wettest, and Tauranga was the cloudiest.
- Of the available, regularly reporting sunshine observation sites, the sunniest four locations in 2016 so far (1 January – 31 August) were Richmond (1855 hours), Blenheim (1708 hours), New Plymouth (1646 hours) and Takaka (1632 hours).

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## Temperature: A chilly month for the South Island

Though the first eight months of 2016 were the warmest start to any year in New Zealand since NIWA's seven station temperature series began in 1909, August proved to be an exception, offering "proper" winter conditions from time to time, particularly for the South Island. Ten locations observed record or near-record low mean minimum temperatures, four locations observed record or near-record low mean temperatures, and two locations had record or near-record low mean maximum temperatures. During January-July 2016, only one location (Motu, Bay of Plenty) had recorded a record or near-record low mean, mean maximum and mean minimum temperature. Going into August, sea surface temperatures were warmer than average for the time of year to the north and west of New Zealand; however, during August, they cooled closer to average to the west of the country. This contributed to August not being as abnormally warm as months past.

The nationwide average temperature in August 2016 was 8.3°C (0.5°C below the 1981-2010 August average from NIWA's seven station temperature series which begins in 1909). This is the coldest August since 2011, which was -0.8°C colder than average.

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

Location	Mean air temp. (°C)	Departure from normal (°C)	Year records began	Comments
High records or near-records				
Whatawhata	11.3	1.2	1952	3rd-highest
Low records or near-records				
Takaka	6.6	-2.1	1978	Lowest
Turangi	6.3	-1.0	1968	3rd-lowest
Martinborough	8.0	-0.9	1986	4th-lowest
Cheviot	6.5	-0.8	1982	4th-lowest

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

Location	Mean maximum air temp. (°C)	Departure from normal (°C)	Year records began	Comments
High records or near-records				
Whatawhata	15.9	1.6	1952	Highest

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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.

Low records or near-records				
Takaka	12.1	-2.0	1978	Lowest
Le Bons Bay	9.2	-1.2	1984	4th-lowest

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

Location	Mean minimum air temp. (°C)	Departure from normal (°C)	Year records began	Comments
High records or near-records				
None observed				
Low records or near-records				
Turangi	0.3	-2.2	1968	Lowest
Takaka	1.0	-2.3	1978	Lowest
Appleby	0.4	-3.0	1932	Lowest
Waiau	0.3	-0.4	1974	2nd-lowest
Balclutha	0.3	-1.8	1964	2nd-lowest
Cheviot	0.6	-1.0	1982	3rd-lowest
Orari	-0.1	-1.3	1972	3rd-lowest
Martinborough	3.0	-1.2	1986	4th-lowest
Paraparaumu	4.1	-1.6	1953	4th-lowest
Dunedin (Airport)	-0.8	-1.7	1962	4th-lowest

## Rainfall: Large contrast from western dryness to eastern wetness

August was a very dry month for parts of the western and southern South Island. It was particularly dry in Queenstown, where a mere 7.8 mm of rain (11% of the August normal) fell. This made August the driest month in the town in over 7 years, or since June 2009. In stark contrast, rainfall was well above normal in sections of coastal Otago and parts of Hawke's Bay received more than double their normal August rainfall.

In northern Hawke's Bay, Tutira had a two-day rainfall between 6 and 7 August that totalled 259.8 mm. This was more rain than Tutira had received in the previous three months, May-July 2016 (251.4 mm). The extreme rainfall resulted in the closure of State Highway 2 between Tutira and Wairoa. During the first 9 days of August, Napier recorded more rain (112.4 mm) than it had received in June and July combined (108.2 mm). The city also had its 4<sup>th</sup> wettest August day, on the 5<sup>th</sup> of August, since records began in 1870 and finished the month with 134 mm of rain. Farther north, Auckland had an impressively long dry period in mid-to-late August when, between the 14<sup>th</sup> and 24<sup>th</sup>, 11 consecutive dry days occurred. This was the longest stretch of entirely dry weather since January 2015. The period of dryness was followed immediately by rainfall that resulted in localised flooding. Heavy rainfall on 25 and 26 August totalled 62.1 mm or 55% of the normal August rainfall. This was the wettest two-day period since 31 August and 1 September 2015 when two-day rainfall was 67.4 mm.

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

Location	Rainfall total (mm)	Percentage of normal	Year records began	Comments
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High records or near-records				
Warkworth	243	160	1966	3rd-highest
Leigh	238	198	1966	4th-highest
Low records or near-records				
Secretary Island	114	41	1985	2nd-lowest
Te Puke	82	51	1973	4th-lowest
Mt Cook (Village)	74	25	1928	4th-lowest
Lumsden	35	56	1982	4th-lowest

## Sunshine: Plenty of sunshine for many parts of the country

Winter's trend of sunnier than usual conditions continued during August with many locations observing near-record amounts of sunshine hours for the month. Cheviot, Timaru, Ashburton, Lake Tekapo, and Balclutha all had a near-record amount of sunshine hours during August. Sunshine hours were closer to normal (90 to 109% of normal August sunshine hours) across the eastern and northern North Island.

Of the available, regularly reporting sunshine observation sites, the sunniest four locations in 2016 so far (1 January – 31 August) were Richmond (1855 hours), Blenheim (1708 hours), New Plymouth (1646 hours) and Takaka (1632 hours).

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

Location	Sunshine hours	Percentage of normal	Year records began	Comments
High records or near-records				
Te Kuiti	165	141	1962	2nd-highest
Cheviot	189	145	1983	2nd-highest
Queenstown	185	154	1930	2nd-highest
Cromwell	182	121	1979	2nd-highest
Taumarunui	157	137	1947	3rd-highest
Timaru	184	120	1930	3rd-highest
Turangi	172	124	1976	4th-highest
New Plymouth	195	120	1972	4th-highest
Ashburton	190	132	1930	4th-highest
Lake Tekapo	204	117	1928	4th-highest
Balclutha	157	134	1964	4th-highest
Low records or near-records				
None observed				

## August climate in the six main centres

Mean temperatures were near the August average in five of six main centres and below average in one, Christchurch. This is the first time since September 2015 that no main centre had a warmer than average month in terms of mean temperature. Rainfall varied considerably across the centres, with Christchurch recording its third consecutive month with below normal or well below normal rainfall. In Auckland, an 11-day dry spell during August (the longest in over 1.5 years) was immediately followed

by the largest 2-day rainfall in nearly a year, though monthly rainfall finished near normal. Despite 116% of normal rainfall, Dunedin recorded above normal sunshine hours (129% of the normal August sunshine hours). Of the six main centres in August 2016, Christchurch was the coolest, driest and sunniest, Auckland was the warmest, Wellington was the wettest, and Tauranga was the cloudiest.

#### August 2016 main centre climate statistics:

Temperature			
Location	Mean temp. (°C)	Departure from normal (°C)	Comments
Auckland <sup>a</sup>	11.7	+0.1	Near average
Tauranga <sup>b</sup>	11.0	+0.2	Near average
Hamilton <sup>c</sup>	9.3	-0.3	Near average
Wellington <sup>d</sup>	9.2	-0.2	Near average
Christchurch <sup>e</sup>	6.4	-0.8	Below average
Dunedin <sup>f</sup>	7.2	-0.5	Near average
Rainfall			
Location	Rainfall (mm)	% of normal	Comments
Auckland <sup>a</sup>	94	83%	Near normal
Tauranga <sup>b</sup>	75	68%	Below normal
Hamilton <sup>c</sup>	98	82%	Near normal
Wellington <sup>d</sup>	149	129%	Above normal
Christchurch <sup>e</sup>	39	63%	Below normal
Dunedin <sup>f</sup>	65	116%	Above normal
Sunshine			
Location	Sunshine (hours)	% of normal	Comments
Auckland <sup>a</sup>	161	109%	Near normal
Tauranga <sup>b</sup>	141	82%	Below normal
Hamilton <sup>g</sup>	155	108%	Near normal
Wellington <sup>d</sup>	142	96%	Near normal
Christchurch <sup>e</sup>	165	107%	Near normal
Dunedin <sup>f</sup>	158 <sup>1</sup>	129%	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>1</sup> Missing two days of data.

## Highlights and extreme events

### Rain and slips

On 1 August, SH 6 between Makarora and Hawea was closed due to a slip blocking the road at The Neck.

On 6-7 August, SH 2 was closed between Tutira and Wairoa in Hawke’s Bay due to flooding and a slip. During these two days, Tutira received a remarkable 259.8 mm of rain which is more rain than May, June, and July 2016 had combined (251.4 mm).

On 8 August, part of McVicar Rd in the Te Haroto district of Hawke’s Bay washed out, cutting off a remote community of about a dozen residents.

On 9 August, a large slip closed the Waimana Gorge between Awakeri and Opotiki in the Bay of Plenty.

On 10 August, SH 16 closed between Kaukapakapa and Wellsford in Auckland due to heavy flooding. Wayby Valley and Whangaripo Valley Roads in the Warkworth and Wellsford areas also closed. A motorist was trapped by rising floodwaters on Waiteitei Rd, north of Wellsford.

On 11 August, State Highway 25 south of Coromandel Township was closed to heavy vehicles because of a slip.

On 25 and 26 August, heavy rainfall across the north of the North Island led to flooding in West Auckland’s suburb of Swanson, South Auckland’s Clarks Beach, as well as in Belmont on the North Shore. Three tonnes of debris including rocks, dirt and trees completely blocked Scenic Drive in Titirangi. The road was reopened on the afternoon of 26 August. Between these two days, Auckland had its highest 2-day rainfall (62.1 mm) since 31 August and 1 September 2015. A slip also left debris covering part of SH 25 between Whiritoa and Waihi on the Coromandel Peninsula.

The highest 1-day rainfall total in August was 145 mm, recorded at Tutira (Hawke’s Bay) on 6 August.

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

Location	Extreme 1-day rainfall (mm)	Date of extreme rainfall	Year records began	Comments
Leigh	18	13th	1983	3rd-highest
Napier	64	5th	1870	4th-highest

**Temperatures**

On 5 August, 13 locations across New Zealand had record or near-record low daily maximum air temperatures as a wintry blast surged northward.

On 8 August, a crisp morning minimum of -9.8°C at Mt Ruapehu’s Chateau was the coldest morning at the location in over 25 years (since 14<sup>th</sup> June 1991).

On 8 August, extremely cold temperatures froze part of the Otago Harbour and burst water pipes in Dunedin homes and businesses. The wintry blast kept Dunedin’s plumbers and electricians busy with calls. Consultant hydrologist David Stewart said that the rugby field-sized frozen portion of the harbour was “highly unusual.”

The highest August temperature was 22.2°C, observed at Christchurch (Riccarton) on 29 August. The lowest July temperature was -14.1°C, observed at Mt Cook Airport on 8 August.

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

Location	Extreme maximum (°C)	Date of extreme temperature	Year records began	Comments
<b>High records or near-records</b>				
Mahia	20.7	26th	1990	2nd-highest
Wairoa	22.0	26th	1964	Equal 2nd-highest
Leigh	20.4	28th	1966	4th-highest
Whatawhata	19.4	31st	1952	4th-highest
Napier	21.9	26th	1868	Equal 4th-highest
<b>Low records or near-records</b>				
Takaka	6.4	5th	1978	Lowest
Farewell Spit	8.4	5th	1972	Lowest
Turangi	5.8	6th	1968	Equal lowest
Whanganui (Spriggens Park)	7.5	5th	1972	Equal lowest
Auckland (North Shore)	10.6	6th	1995	2nd-lowest
Taupo	4.6	6th	1950	2nd-lowest
Waione	7.3	8th	1993	2nd-lowest
Martinborough	6.9	5th	1986	2nd-lowest
Palmerston North	7.0	5th	1940	2nd-lowest
Kaikoura	4.5	5th	1972	2nd-lowest
Le Bons Bay	3.4	5th	1984	2nd-lowest
Orari Estate	3.4	5th	1972	2nd-lowest
Hawera	7.7	5th	1977	Equal 2nd-lowest
Cape Reinga	11.3	6th	1971	3rd-lowest
Paeroa	8.8	6th	1971	3rd-lowest
Mahia	7.6	8th	1990	3rd-lowest
Paraparaumu	7.0	6th	1972	3rd-lowest
Palmerston North	7.1	5th	1940	3rd-lowest
Stratford	5.9	5th	1972	3rd-lowest
Levin	7.7	6th	1950	Equal 3rd-lowest
Whitianga	11.2	9th	1971	4th-lowest
Whakatane	10.2	29th	1975	4th-lowest
Motu	5.2	7th	1990	4th-lowest
Hanmer Forest	1.7	5th	1972	4th-lowest
Waiau	3.6	5th	1974	4th-lowest
Cheviot	4.3	6th	1982	4th-lowest
South West Cape	4.9	4th	1991	4th-lowest
Whangaparaoa	10.5	10th	1982	Equal 4th-lowest
New Plymouth	8.7	6th	1944	Equal 4th-lowest

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

Location	Extreme minimum (°C)	Date of extreme temperature	Year records began	Comments
<b>High records or near-records</b>				

Kerikeri	15.8	26th	1981	Highest
Kaikohe	15.3	26th	1973	Highest
Cape Reinga	14.9	26th	1971	2nd-highest
Kaitaia	15.4	26th	1948	2nd-highest
Mokohinau	15.0	26th	1994	2nd-highest
Kaitaia	15.2	26th	1971	3rd-highest
Whangarei	15.1	26th	1967	4th-highest
<b>Low records or near-records</b>				
Whanganui (Spriggens Park)	-1.8	10th	1937	Lowest
Takaka	-4.3	7th	1978	Lowest
Mt Cook Village	-9.3	7th	1929	Lowest
Dunedin (Musselburgh)	-3.7	7th	1947	Lowest
Lumsden	-7.2	7th	1982	Lowest
Puysegur Point	0.1	7th	1978	Equal lowest
Reefton	-6.9	11th	1960	2nd-lowest
Motueka	-4.3	11th	1956	2nd-lowest
Dunedin (Airport)	-7.5	11th	1962	2nd-lowest
Queenstown	-6.5	7th	1871	Equal 2nd-lowest
Appleby	-5.7	11th	1932	3rd-lowest
Waiau	-6.1	11th	1974	3rd-lowest
Le Bons Bay	-0.3	5th	1984	3rd-lowest
Manapouri	-6.8	7th	1963	3rd-lowest
Balclutha	-5.9	11th	1964	3rd-lowest
Nugget Point	-1.4	7th	1970	3rd-lowest
Turangi	-5.7	10th	1968	Equal 3rd-lowest
Paraparaumu	-3.0	10th	1953	Equal 3rd-lowest
Invercargill	-5.7	7th	1905	Equal 3rd-lowest
Cheviot	-5.2	11th	1982	4th-lowest
Orari	-6.3	11th	1972	4th-lowest
Te Puke	-1.4	8th	1973	Equal 4th-lowest
Hawera	-2.1	11th	1977	Equal 4th-lowest

## Wind

On 1 August, wind warnings were in place for SH 2 at Rimutaka Hill.

On 4 August, caution was advised on SH 6 from Ross to Harihari due to strong winds.

On 26 August, strong winds around the Auckland region left Asquith Rd in Mt Albert, Miller St in Pt Chevalier, and Royal Rd in Massey closed due to downed power lines. In total, around 2000 Auckland homes lost power. By late in the day on 27 August, Vector had restored power to the backbone of the network, though areas without power still existed and some of these locales did not have hot water.

In Auckland's CBD, construction signs tipped and blew over on Quay St. On the North Shore, the winds lifted a roof from a house in Takapuna and a large gum tree crashed on a house in Narrow Neck. In Henderson, an "unruly trampoline" landed atop a garage several homes away. Meanwhile, a tree blocked part of State Highway 1 between Puhoi and Mahurangi.

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

Location	Extreme wind gust (km/hr)	Date of extreme gust	Year records began	Comments
Auckland (North Shore)	80	26th	1994	Highest
Napier	104	27th	1973	Highest
Kaikohe	87	26th	1986	3rd-highest
Palmerston North	80	27th	1991	Equal 3rd-highest
Hamilton (Airport)	83	26th	1978	4th-highest
Turangi	89	27th	1973	4th-highest

## Snow and ice

On 1 August, SH 1 at the Desert Road was closed due to white-out conditions. The road reopened late in the morning. SH 93 from Mataura to Clinton was also closed due to snow. SH 73 at Arthur's Pass, SH 7 at Lewis Pass, SH 7 from Reefton to Springs Junction SH 94 from Te Anau to Milford Sound was closed to towing vehicles and chains were essential for all other vehicles. Warnings for ice were in place for many other South Island roads. Two families with four young children were rescued after they were trapped by snow after spending an unplanned night in the remote Kahurangi National Park. The storm that caused this impactful snow and ice was forecast by NIWA's high resolution model and its impressive cloud structure can be [viewed here](#). The cloud formation then was [captured on satellite](#) the next day.

On 3 August, Haast Pass was briefly closed due to snow. Snow chains were essential on SH 80, the highway to Aoraki/Mt Cook, and SH 8 from Fairlie to Twizel. On 4 August, caution was advised on SH 94 from Te Anau to Milford Sound and SH 6 from Kawarau Falls to Lumsden due to snow and ice.

On 5 August, snow and ice settled in Dunedin, interrupting taxi and bus services and leading to the closure and delay of several schools. Dunedin's Northern Motorway was also closed for a time.

From 5 to 8 August, a significant snow event impacted the central and eastern North Island. Major highways were closed, including SH 1 at the Desert Road, SH 5 from Napier to Taupo, as well as minor roads in the region. Trucks were stranded for several days and motorists faced detours of up to five hours. More than 100,000 people were without power in the Hawke's Bay, particularly in Napier and Hastings, as well as in rural areas around Taupo, after snow overloaded transmission lines. The wild weather brought down 200 power poles across the region. In the South Island, snow closed SH 87 from Mosgiel to Kyeburn and SH 85 from Palmerston to Kyeburn.

On 8 August, black ice contributed to a number of accidents on the Silverstream Bridge in Upper Hutt, as well as in the Mackenzie District of Canterbury, and forced the closure of SH 8 between Tekapo and Twizel for a time during the morning.

On 9 August, the Napier-Taupo Road (SH 5) reopened after being closed by snow for almost four days. Despite opening the route, the NZTA asked drivers to avoid using it after 5.30pm unless "absolutely necessary," because of the cold weather.

On 19 and 20 August, SH 94 from Te Anau to Milford Sound closed at 5 pm due to avalanche warnings.

## Cloud and fog

On 17 and 18 August, morning fog delayed flights departing from Timaru Airport.

On 18 August, a flight from Christchurch to Hamilton was cancelled due to dense morning fog.

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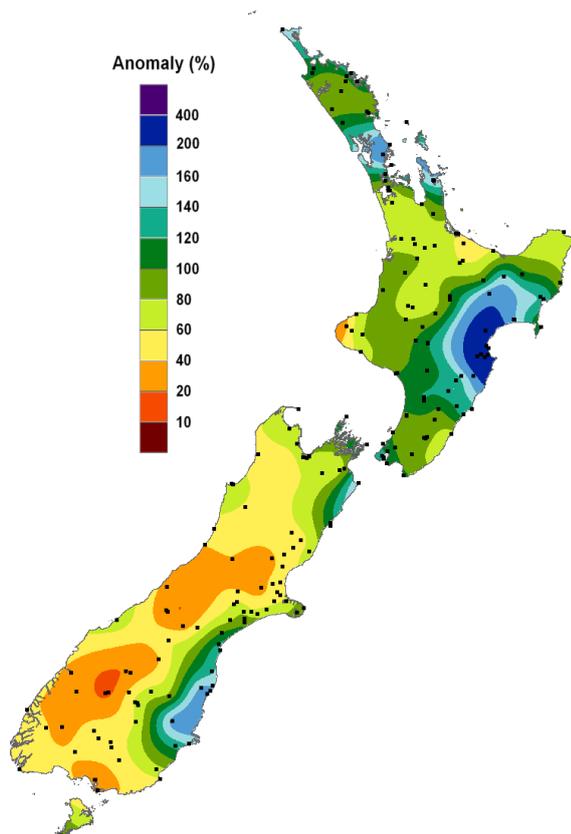
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*August 2016 rainfall, expressed as a percentage of the 1981-2010 normal.*

*It was a dry month for western parts of New Zealand's South Island, but one location in Hawke's Bay (Tutira) received more rain on 6 and 7 August (259.8 mm) than it had received in May, June, and July combined (251.4 mm).*

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