

A warm mid-winter for most of New Zealand

Temperature	Mean temperatures were well above average ($>1.20^{\circ}\text{C}$ of the July average) for interior Canterbury, interior Otago, and much of Southland. For much of the rest of the South Island, Taranaki, Manawatu-Wanganui, Hawke's Bay, and Wellington-Wairarapa, temperatures were above average ($+0.51^{\circ}\text{C}$ to $+1.20^{\circ}\text{C}$ of the July average). Near average temperatures (-0.50°C to $+0.50^{\circ}\text{C}$ of the July average) were found in parts of Tasman, Nelson, Marlborough, and the remainder of the North Island.
Rainfall	Rainfall was well below normal ($<50\%$ of the July normal) for the Far North, coastal Gisborne, Hawke's Bay, and much of Canterbury. Below normal rainfall ($50\text{-}79\%$ of the July normal) was recorded in the rest of Northland, Gisborne, and Hawke's Bay, northern Auckland, eastern Bay of Plenty, and areas east of the Southern Alps. Near normal rainfall ($80\text{-}119\%$ of the July normal) occurred elsewhere, aside from the Tasman District, the West Coast, and Fiordland where July rainfall was above normal ($120\text{-}149\%$) or well above normal ($>149\%$).
Soil Moisture	As of 1 August 2018, soil moisture levels were above normal for the time of year in northern Otago and southern Canterbury. Soil moisture levels were generally near or slightly above normal for the time of year across the rest of the country.

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Overview

Mean sea level pressure was below normal to the southwest of New Zealand and above normal to the east and north of the country. This led to more northwesterly air flows than normal and allowed warmth from the sub-tropics to occasionally push down toward New Zealand. The pattern led to abundant rainfall across the western South Island, but very dry conditions occurred in the east of both islands which were shadowed by the Southern Alps and Central Plateau, respectively.

During July, there was a notable dichotomy of rainfall anomalies experienced in the South Island. Fiordland, the West Coast, and the Tasman District saw several very heavy rainfall events through the month, with nearly 200% of normal July rainfall recorded in some locations. To the contrary, several locations in northern Canterbury recorded less than 20% of the normal July rainfall, a pattern that carried across the Cook Strait and affected areas of Hawke's Bay and Gisborne. Although the Coromandel Peninsula received one heavy, flooding rainfall event, July monthly rainfall totals were largely below normal.

Temperatures during the month of July were warmer than average for a large part of the country, especially in the South Island. Northwesterly air flows periodically carried warmth across the Tasman Sea from Australia, which warmed further as it descended the eastern slopes of the Southern Alps, with numerous near-record mean monthly temperatures recorded. Seven towns recorded their warmest July on record in terms of mean maximum (daytime) temperature. Compared to June, July also had more sunshine hours for many eastern areas; a welcome reprieve after a dreary start to the winter season and a pattern that supported anomalous warmth.

The nationwide average temperature in July 2018 was 8.9°C (1.1°C warmer than the 1981-2010 July average from NIWA's seven station temperature series which begins in 1909). Based on the seven station series, July 2018 was the fifth-warmest July on record behind 1998, 2000, 2005, and 2013.

Further Highlights:

- The highest temperature was 22.3°C, observed at Kaikoura on 21 July.
- The lowest temperature was -7.6°C, observed at Middlemarch on 13 July.
- The highest 1-day rainfall was 246 mm, recorded at Milford Sound on 6 July.
- The highest wind gust was 209 km/h, observed at White Island on 9 July.
- Of the six main centres in July 2018, Tauranga was the warmest and sunniest, Christchurch was the coolest and driest, and Wellington was the wettest and least sunny.
- Of the available, regularly reporting sunshine observation sites, the sunniest four regions in 2018 so far (1 January – 31 July) were Wider Nelson (1397 hours), Marlborough (1393 hours), Hawke's Bay (1369 hours) and Bay of Plenty (1349 hours).
- Of the available, regularly reporting low elevation rainfall sites, the top two wettest locations in 2018 so far (1 January – 31 July) were Milford Sound (4442 mm) and Manapouri (2650 mm). The top two driest locations in 2018 so far were Alexandra (270 mm) and Eglinton (290 mm).

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Rainfall: Soaking wet west, bone-dry east

July 2018 was a contrasting month for rainfall across New Zealand. As low pressure systems moved northward from the Southern Ocean, they helped to siphon sub-tropical moisture southward, which resulted in heavy rainfall totals in the western South Island. Milford Sound had its 3rd-wettest July on record with a bountiful 885 mm of rain recorded during the month. Conversely, just 8 mm of rain fell in Orari Estate (Canterbury), good for the 3rd driest July on record since records began 121 years ago.

On the heels of a very wet June, dryness was the theme of the month in the eastern North Island. Wairoa recorded its lowest July rainfall total on record (13 mm or 10% of normal) and Gisborne had its 4th-driest July on record (24 mm or 20% normal rainfall).

Although flooding rainfall impacted both Auckland and the Coromandel Peninsula on 16 July, during which Albany (North Shore, Auckland) recorded its 3rd wettest hour in nine years, regional rainfall totals were below normal or near normal for the month as a whole.

By the end of July, soil moisture levels were above normal for the time of year in northern Otago and southern Canterbury while much of the rest of the country had near or slightly above normal soil moisture.

Record¹ or near-record July rainfall totals were recorded at:

Location	Rainfall total (mm)	Percentage of normal	Year records began	Comments
High records or near-records				
Arapito	342	178	1978	2nd-highest
Secretary Island	612	243	1985	2nd-highest
Milford Sound	885	209	1929	3rd-highest
Manapouri	165	199	1961	3rd-highest
Queenstown	152	265	1871	3rd-highest
Manapouri (West Arm Jetty)	531	176	1971	4th-highest
Low records or near-records				
Waipara West	16	30	1973	3rd-lowest
Orari Estate	8	14	1897	3rd-lowest
Kaitaia	57	42	1948	4th-lowest
Gisborne	24	20	1905	4th-lowest
Hastings	32	30	1965	4th-lowest
Kaikoura	12	13	1898	4th-lowest
Wairoa	13	10	1964	Lowest

Temperature: A warm July for much of New Zealand

The nationwide average temperature in July 2018 was 8.9°C (1.1°C warmer than the 1981-2010 July average from NIWA’s seven station temperature series which begins in 1909). Based on the seven station series, July 2018 was the fifth-warmest July on record behind 1998, 2000, 2005, and 2013.

During July, northwesterly air flows frequented the South Island, which brought atypical warmth to Southland, Otago, and Canterbury in particular. Numerous locations observed near-record or record mean, mean maximum, and/or mean minimum temperatures. In terms of mean maximum (daytime) temperature, it was the warmest July on record in seven locations, ranging from Kerikeri in the Far North to Cromwell in Central Otago. Furthermore, Cromwell posted a monthly mean maximum temperature anomaly of +3.8°C, the largest difference from average of any location in New Zealand during July and the country’s highest anomaly since January, during the peak of the marine heatwave and New Zealand’s hottest summer on record.

¹ 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.

Limited amounts of cloud cover meant that conditions were prime for radiational (nighttime) cooling, which is why near-record and record mean maximum temperatures outpaced near-record and record minimum temperatures.

No record low mean, mean maximum, or mean minimum temperatures were set during the month of July 2018.

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

Location	Mean air temp. (°C)	Departure from normal (°C)	Year records began	Comments
High records or near-records				
Cheviot	7.8	1.8	1982	2nd-highest
Akaroa	9.5	2.1	1978	2nd-highest
Lake Tekapo	4.1	2.5	1927	2nd-highest
Orari Estate	6.5	1.5	1972	2nd-highest
Wanaka	5.5	2.2	1955	2nd-highest
Oamaru	7.7	1.1	1967	2nd-highest
Dunedin (Musselburgh)	7.8	1.3	1947	2nd-highest
Five Rivers	5.6	1.7	1982	2nd-highest
Cromwell	5.4	2.2	1949	2nd-highest
Lauder	5.0	3.0	1924	2nd-highest
Roxburgh	7.5	3.1	1950	2nd-highest
Gore	6.8	2.3	1907	2nd-highest
Invercargill	7.2	1.9	1905	2nd-highest
Nugget Point	7.5	1.4	1970	2nd-highest
South West Cape	8.9	1.4	1991	2nd-highest
Ngawi	11.6	1.4	1972	3rd-highest
Levin	9.9	1.4	1895	3rd-highest
Wellington (Kelburn)	10.2	1.3	1927	3rd-highest
Wellington (Airport)	10.8	1.2	1962	3rd-highest
Hokitika	8.8	1.4	1866	3rd-highest
Puysegur Point	9.5	1.3	1978	3rd-highest
Kaikoura	9.9	1.8	1963	3rd-highest
Culverden	7.1	2.1	1928	3rd-highest
Mt Cook	4.2	2.0	1929	3rd-highest
Tara Hills	4.0	2.1	1949	3rd-highest
Ranfurlly	4.4	2.2	1897	3rd-highest
Te Anau	6.0	1.8	1963	3rd-highest
Lumsden	5.6	1.7	1982	3rd-highest
Gore	6.7	2.2	1907	3rd-highest
Tiwai Point	7.6	1.4	1970	3rd-highest
Low records or near-records				
None recorded				

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

Location	Mean maximum air temp. (°C)	Departure from normal (°C)	Year records began	Comments
High records or near-records				
Kerikeri	17.9	2.0	1945	Highest
Whangarei	17.1	1.6	1967	Highest
Whitianga	16.6	1.8	1962	Highest
Waipawa	14.0	1.6	1945	Highest
Cheviot	14.4	2.7	1982	Highest
Le Bons Bay	11.6	1.8	1984	Highest
Cromwell	11.8	3.8	1949	Highest
Taupo	12.5	1.5	1949	2nd-highest
Puysegur Point	11.8	1.2	1978	2nd-highest
Blenheim	14.5	1.5	1932	2nd-highest
Hanmer Forest	12.9	2.8	1906	2nd-highest
Kaikoura, Middle Creek	14.0	3.1	1963	2nd-highest
Medbury	12.9	2.2	1927	2nd-highest
Ashburton	13.1	2.3	1928	2nd-highest
Waipara West	13.9	1.9	1973	2nd-highest
Rangiora	13.8	2.7	1965	2nd-highest
Christchurch (Airport)	13.5	2.6	1863	2nd-highest
Lincoln	13.2	2.4	1881	2nd-highest
Lake Tekapo	8.8	2.6	1927	2nd-highest
Orari Estate	13.0	2.7	1972	2nd-highest
Tara Hills	10.0	3.1	1949	2nd-highest
Ranfurly	10.0	2.8	1897	2nd-highest
Oamaru	12.7	1.8	1967	2nd-highest
Dunedin (Airport)	12.5	2.1	1962	2nd-highest
Dunedin (Musselburgh)	12.0	2.0	1947	2nd-highest
Lauder	10.6	3.8	1924	2nd-highest
Alexandra	11.2	3.0	1929	2nd-highest
Clyde	11.5	3.7	1978	2nd-highest
Gore	11.4	3.2	1907	2nd-highest
Invercargill	11.4	2.0	1905	2nd-highest
Balclutha	11.5	2.1	1964	2nd-highest
Mokohinau	15.5	0.9	1994	3rd-highest
Motu	11.5	1.5	1990	3rd-highest
Masterton	14.4	1.8	1906	3rd-highest
Martinborough	14.1	1.7	1986	3rd-highest
Ngawi	14.1	1.5	1972	3rd-highest
Hawera	13.2	1.2	1977	3rd-highest
Akaroa	13.9	2.1	1978	3rd-highest
Timaru	12.9	2.3	1885	3rd-highest
Wanaka	10.0	2.4	1955	3rd-highest
Five Rivers	10.7	2.1	1982	3rd-highest
Invercargill	11.4	2.1	1905	3rd-highest
Tiwai Point	11.2	1.7	1970	3rd-highest

South West Cape	10.7	1.3	1991	3rd-highest
New Plymouth	14.2	0.9	1944	4th-highest
Whakatu	15.5	2.1	1870	4th-highest
Palmerston North	13.8	1.1	1928	4th-highest
Levin	13.9	1.2	1895	4th-highest
Wellington (Kelburn)	12.6	1.2	1927	4th-highest
Culverden	13.1	2.1	1928	4th-highest
Mt Cook	8.9	2.3	1929	4th-highest
Wanaka	9.8	2.0	1955	4th-highest
Manapouri (West Arm Jetty)	7.3	1.9	1971	4th-highest
Manapouri	9.7	1.8	1963	4th-highest
Lumsden	10.6	2.0	1982	4th-highest
Roxburgh	11.4	2.4	1950	4th-highest
Gore	10.8	2.6	1907	4th-highest
Nugget Point	10.2	1.3	1970	4th-highest
Low records or near-records				
None recorded				

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

Location	Mean minimum air temp. (°C)	Departure from normal (°C)	Year records began	Comments
High records or near-records				
Hokitika	5.1	2.2	1866	Highest
Reefton	3.2	2.7	1960	Highest
Medbury	1.1	2.0	1927	Highest
Wellington (Kelburn)	7.8	1.5	1927	2nd-highest
Cape Campbell	8.4	1.4	1953	2nd-highest
Te Anau	2.9	2.7	1963	2nd-highest
Lauder	-0.5	2.3	1924	2nd-highest
Roxburgh	3.6	3.8	1950	2nd-highest
Gore	2.7	1.9	1907	2nd-highest
Nugget Point	4.8	1.4	1970	2nd-highest
South West Cape	7.0	1.4	1991	2nd-highest
Ngawi	9.1	1.3	1972	3rd-highest
Arapito	5.7	1.9	1978	3rd-highest
Hokitika	5.0	2.1	1866	3rd-highest
Haast	5.3	1.5	1949	3rd-highest
Puysegur Point	7.2	1.4	1978	3rd-highest
Mt Cook	-0.1	2.1	1929	3rd-highest
Le Bons Bay	6.4	1.5	1984	3rd-highest
Lumsden	0.6	1.3	1982	3rd-highest
Tiwai Point	4.1	1.3	1970	3rd-highest
Milford Sound	3.1	1.8	1934	4th-highest
Secretary Island	7.3	1.0	1985	4th-highest
Culverden	1.2	2.1	1928	4th-highest
Akaroa	5.2	2.3	1978	4th-highest
Five Rivers	0.5	1.2	1982	4th-highest

Invercargill	3.0	2.0	1905	4th-highest
Low records or near-records				
Warkworth	4.8	-1.5	1966	2nd-lowest
Kaikoura, Middle Creek	1.9	-3.4	1963	3rd-lowest

July climate in the six main centres

Of the six main centres in July 2018, Tauranga was the warmest and sunniest, Christchurch was the coolest and driest, and Wellington was the wettest and least sunny. Auckland recorded over half its July monthly rainfall during two days (14-15 July) and recorded three less wet days (13) than the July normal (16). It was a particularly dry and warm month for Christchurch, where just 24 mm of rain fell and the mean monthly temperature was 1.5°C above average.

July 2018 main centre climate statistics:

Temperature			
Location	Mean temp. (°C)	Departure from normal (°C)	Comments
Auckland ^a	10.6	-0.3	Near average
Tauranga ^b	10.7	+0.4	Near average
Hamilton ^c	9.0	+0.3	Near average
Wellington ^d	10.2	+1.3	Well above average (3 rd highest on record)
Christchurch ^e	7.3	+1.5	Well above average
Dunedin ^f	7.8	+1.3	Well above average (2 nd highest on record)
Rainfall			
Location	Rainfall (mm)	% of normal	Comments
Auckland ^a	99	72	Below normal
Tauranga ^b	93	73	Below normal
Hamilton ^c	133	103	Near normal
Wellington ^d	139	101	Near normal
Christchurch ^e	24	37	Well below normal
Dunedin ^f	30	52	Below normal
Sunshine			
Location	Sunshine (hours)		
Auckland ^a	144		
Tauranga ^b	159		
Hamilton ^g	133		
Wellington ^d	110		
Christchurch ^e	156		
Dunedin ^f	117		

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

Highlights and extreme events

Temperatures

The highest temperature for the month was 22.3°C, observed at Kaikoura, on 21 July.

The lowest temperature for the month was -7.6°C, observed at Middlemarch, on 13 July.

July was dominated by downsloping “foehn” air flows, in which air blows across the Southern Alps and warms as it descends the leeward side of the ranges. Kaikoura reached 22.3°C in one such instance on 21 July, which was the warmest July temperature in New Zealand since July 2014.

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

Location	Extreme maximum (°C)	Date of extreme temperature	Year records began	Comments
High records or near-records				
Kaikoura, Middle Creek	22.3	21st	1963	Equal highest
Oamaru	20.0	7th	1967	Equal 2nd-highest
Tiwai Point	16.0	21st	1970	Equal 3rd-highest
Orari Estate	20.5	7th	1972	4th-highest
Low records or near-records				
Rotorua	7.0	1st	1972	4th-lowest

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

Location	Extreme minimum (°C)	Date of extreme temperature	Year records began	Comments
High records or near-records				
Dunedin	9.5	7th	1972	3rd-highest
Roxburgh	9.4	7th	1950	3rd-highest
Cheviot	9.5	22nd	1982	4th-highest
Oamaru	8.5	7th	1972	4th-highest
Low records or near-records				
Kaikoura, Middle Creek	-1.6	13th	1963	3rd-lowest

Rain and slips

The highest 1-day rainfall was for the month was 246.0 mm, recorded at Milford Sound on 6 July.

On 7 July, three large slips led to the closure of Glenorchy Road between Queenstown and Glenorchy. Tourists and locals were trapped at the head of Lake Wakatipu due to 1000 cubic metres of soil blocking the road. Queenstown Water Taxis ran trips between Queenstown and Glenorchy to transport those who were stuck.

On 7 July, heavy rain along the West Coast region of the South Island led to a large slip along State Highway 6 in Upper Buller Gorge leading to its closure. State Highway 6 from Murchison to Inangahua

Junction was also closed due to flooding. Additional slip hazards were reported along State Highway 6 from Westport to Greymouth and from Fox River to Lower Buller Gorge.

On 8 July, persistent heavy rains associated with a frontal system contributed to flooding at the Petone Working Men’s Club in Wellington, slips across the region, and downed trees. This led to the closure of Paekakariki Hill Road.

On 16 July, a plume of sub-tropical moisture, in conjunction with a compact low pressure system, led to flooding across Auckland and the Coromandel Peninsula.

- The Oteha Valley Road State Highway 1 on-ramp in Auckland’s North Shore was closed for a time Sunday morning due to flooding. Albany recorded its 3rd wettest hour since records began in late 2009 when it recorded over 31 mm of rain between 7:00-8:00 AM.

- Delays were reported due to flooding at the Lincoln Road on-ramp along State Highway 16 near Auckland.

- Flooding in south-east Auckland forced the closure of East Coast Road between Whakatiwai and Orere Point.

- Wairoa River in south Auckland rose significantly, leading to flooding near Clevedon and forcing farmers to move their stock to higher ground.

- Fire and Emergency NZ answered around 30 calls about flooding incidents between 7:00-10:00 AM in the vicinity of Auckland.

- The Coromandel was hit particularly hard, with the Peninsula becoming cut-off on both the east and west side due to extensive flooding and slips. State Highway 25 was closed north of Tapu along the Thames-Coromandel Coast and then again north of Manaia. Surface water was widespread in Whitianga on Sunday after heavy rainfall; this persisted into Monday. In addition, a large slip closed State Highway 25A through Kopu-Hikuai, shutting down the main route between the two peninsula coastlines.

On 21 July, heavy rainfall along the West Coast led to flooding and slips that closed State Highway 6 between O’Sullivans Bridge and Upper Buller Gorge. Flooding and slips also affected Inangahua along State Highway 6 as well as Fox River, Ross, and Haast.

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

Location	Extreme 1-day rainfall (mm)	Date of extreme rainfall	Year records began	Comments
Milford Sound	246	6th	1929	Highest
Secretary Island	178	6th	1985	Highest
Manapouri (West Arm Jetty)	126	6th	1971	3rd-highest

Wind

The highest wind gust for the month was 209 km/h, recorded at White Island on 9 July.

On 8 July, a narrow frontal rain band caused strong winds that brought power outages to Powerco customers in Whanganui, Martinborough, Inglewood, and Stratford across the Manawatu-Whanganui and Taranaki regions. Power outages were also reported in the Akatarawa Valley north of Wellington.

On 20-21 July, high winds along State Highway 1 north of Kaikoura led to its closure.

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

Location	Extreme wind gust (km/h)	Date of extreme gust	Year records began	Comments
Secretary Island	130	7th	1994	Highest
Waiouru	124	21st	1970	2nd-highest
Motu	102	8th	1991	3rd-highest
Hokitika	100	21st	1972	3rd-highest
Hanmer Forest	95	21st	1995	3rd-highest
Paeroa	96	15th	1991	4th-highest
Mt Kaukau	146	8th	1969	4th-highest
Mokohinau	113	8th	1994	Equal 4th-highest

Snow and Ice

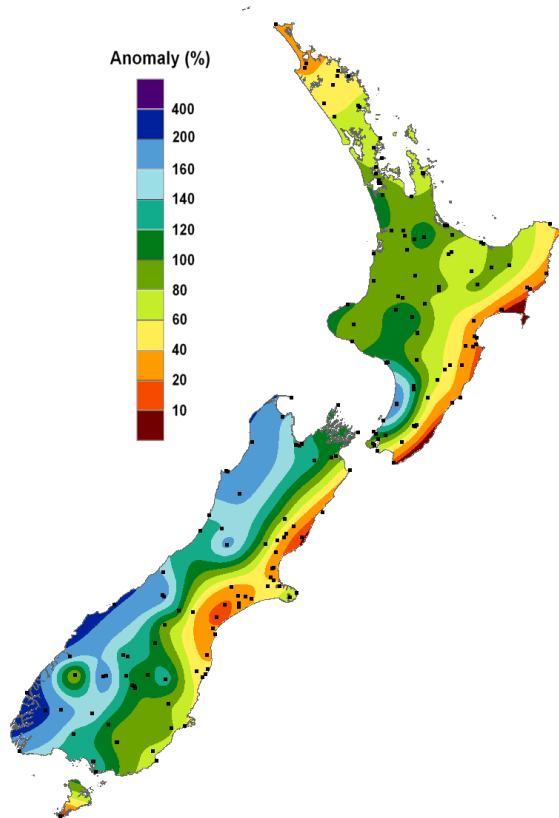
On 7-8 July, a storm affecting New Zealand brought high elevation snow and heightened the risk of backcountry avalanches in the South Island. On 10 July, Mt Taranaki received a fresh snowfall, closing to road to Manganui Skifield and bringing a “considerable” avalanche risk.

On 12 July, a police van slid off State Highway 2 in Wharerata Hills near Gisborne due to very icy conditions.

On 21 July, State Highway 94 in Southland was closed due to the forecast of heavy snow and an avalanche risk.

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July 2018 total rainfall, expressed as a percentage of normal (1981-2010 normal).

July rainfall was above or well above normal for the western South Island and along the Kapiti Coast (blue and teal shades). In contrast, rainfall was well below normal for the Far North, Gisborne, Hawke's Bay, Canterbury, and Otago.

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