NIWA NATIONAL CLIMATE CENTRE

Seasonal Climate Summary

NIWA Taihoro Nukurangi

Aotearoa New Zealand Climate Summary: **Winter 2021** Issued: 3 September 2021

New Zealand's second consecutive warmest winter on record

Temperature	Winter 2021 was the warmest winter on record in Aotearoa New Zealand, surpassing winter 2020 that set the record just last year. Temperatures were above average (+0.51°C to +1.20°C of average) across most of NZ. Pockets of well above average temperatures (>1.20°C above average) were recorded in Northland, Waikato, Wairarapa, Nelson, Tasman, West Coast, Canterbury, and Otago. Isolated near average temperatures (±0.50°C of average) were recorded in Bay of Plenty, Waikato, and southern Canterbury. No areas experienced below average temperatures.
Rainfall	Above normal rainfall (120-149% of normal) was observed in parts of Northland, southern Manawatū-Whanganui, Kāpiti Coast, Wellington City, and large swaths of the upper and western South Island. Pockets of well above normal rainfall (>149% of normal) were observed in Nelson and Marlborough. Winter rainfall was below normal (50-79% of normal) in western Northland, southern Auckland, parts of Gisborne District and Hawke's Bay, and southern Canterbury. An isolated area of well below normal rainfall (<50% of normal) was observed near Wairoa. Near normal rainfall (80-119% of normal) was observed elsewhere.
Soil moisture	At the end of winter, soil moisture levels were near normal across most of New Zealand, although a small area of below normal soil moisture levels was were observed from near Napier south to southern Hawke's Bay. Above normal soil moisture levels were located in eastern Marlborough and northern Canterbury.

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Overview

Winter 2021 was the warmest winter on record in Aotearoa New Zealand, surpassing winter 2020 that set the record just last year. The season began on a particularly warm note, with June 2021 being New Zealand's warmest June on record. Winter 2021 was also the first winter on record where the temperature anomaly exceeded +0.9˚C for all three months, relative to the 1981-2010 long-term average.

Several factors contributed to this record-setting season, including frequent high pressure over and east of New Zealand, warm northerly-quarter wind flows, warmer than average coastal waters, and the influence of a decaying La Nina early in the season, followed by a trend back toward La Nina late in the season.

Several atmospheric rivers affected New Zealand during winter, causing extreme rainfall in some regions, which was associated with the Madden-Julian Oscillation spending more time in the Indian Ocean and briefly pulsing eastward over the Pacific. This was likely connected to the emergence of a

negative Indian Ocean Dipole, which refers to warmer than average ocean temperatures in the eastern Indian Ocean. For New Zealand, this may have allowed for more tropical moisture to become available to passing weather systems.

The Southern Annular Mode (SAM) was strongly positive for June, before becoming weaker and more variable in July and August. The phase and magnitude of the SAM is a reflection of the strength and position of the belt of westerly winds that spans zonally across the Southern Ocean. In its negative phase, the SAM usually results in lower than normal air pressure around New Zealand, reflecting the increased risk for unsettled weather conditions.

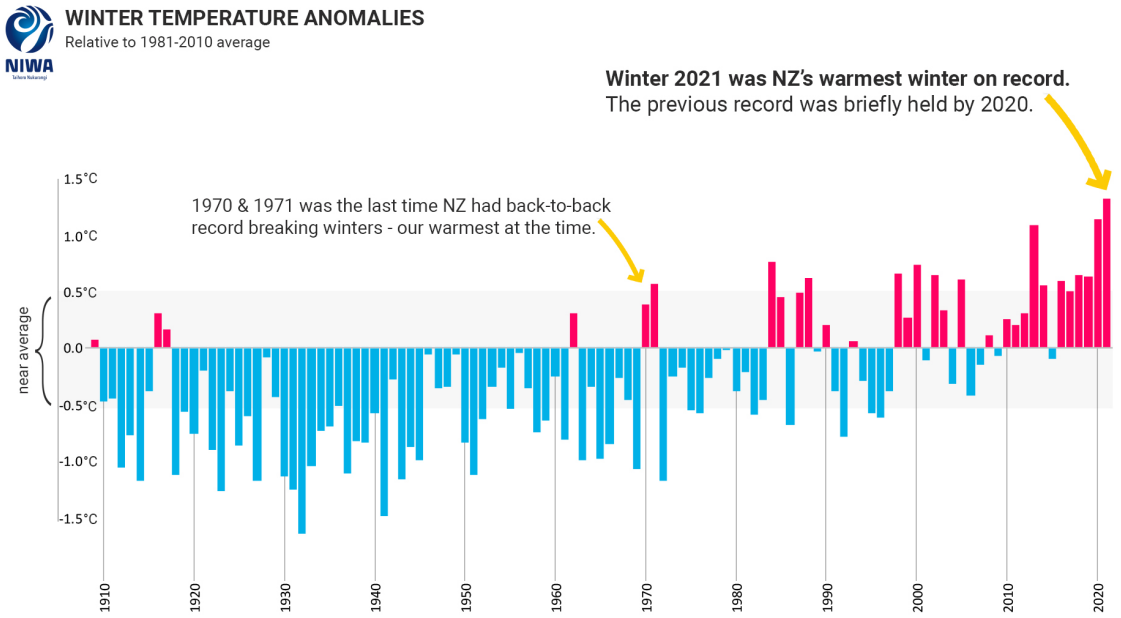

Figure 1: Winter temperature anomalies from NIWA's seven-station series dating back to 1909, relative to the 1981-2010 average. The seven-station series is comprised of long running and high-quality temperature observations from Auckland, Masterton, Wellington, Hokitika, Nelson, Lincoln (Christchurch) and Dunedin. More information about this series can be found here.

Figure 1 (above) shows winter temperature anomalies of NIWA's seven-station series relative to the 1981-2010 average. The winters of 1970 and 1971 were the last time New Zealand had consecutive record warm winters prior to 2020 and 2021. However, what was record warmth 50 years ago is no longer unusual. The winter of 1971 now stands in 13th place on the winter temperature rankings, while the winter of 1970 is in 18th place. In fact, the once record-breaking warm winter of 1971 was 0.75°C cooler than the winter of 2021.

The nationwide average temperature for winter 2021 was 9.7°C (1.3°C above the 1981-2010 average from NIWA's seven-station temperature series which begins in 1909), making winter 2021 the warmest winter on record. No locations experienced below average temperatures in winter 2021.

Winter rainfall was above normal (120-149% of normal) in parts of Northland, southern Manawatū-Whanganui, Kāpiti Coast, Wellington City, and large swaths of the upper and western South Island. This included Westport and Buller District, which experienced severe flooding in mid-July. Pockets of well above normal rainfall (>149% of normal) were observed in Nelson and Marlborough. Winter rainfall was below normal (50-79% of normal) in western Northland, southern Auckland, parts of Gisborne and Hawke's Bay, and southern Canterbury. A pocket of well below normal rainfall (<50%

of normal) was observed near Wairoa. Near normal rainfall (80-119% of normal) was observed elsewhere.

Further highlights for winter 2021:

- The highest temperature was 23.0°C, observed at Akaroa and Orari Estate on 24 August.
- The lowest temperature was -9.1°C, observed at Lake Tekapo on 9 August.
- The highest 1-day rainfall was 210 mm, recorded at Arthur's Pass on 16 July.
- The highest wind gust was 191 km/h, observed at Cape Turnagain on 28 June.
- Of the six main centres in winter 2021, Auckland was the warmest and sunniest, Christchurch was the coolest, Wellington was the wettest, and Dunedin was the driest and least sunny.

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Temperature: Widespread record and near-record warmth

The nationwide average temperature for winter 2021 was 9.7°C (1.3°C above the 1981-2010 average from NIWA's seven station temperature series which begins in 1909), making winter 2021 the warmest winter on record.

Temperatures were above average (+0.51°C to +1.20°C of average) across most of NZ. Pockets of well above average temperatures (>1.20°C above average) were recorded in Northland, Waikato, Wairarapa, Nelson, Tasman, West Coast, Canterbury, and Otago. Isolated near average temperatures (±0.50°C of average) were recorded in Bay of Plenty, Waikato, and southern Canterbury. No areas experienced below average temperatures.

There was a plethora of locations that experienced record or near-record warm temperatures in winter 2021:

- 76 locations recorded a top-four warmest mean winter temperature.
- 63 locations recorded a top-four warmest mean maximum (i.e. daytime) temperature.
- 56 locations recorded a top-four warmest mean minimum (i.e. nighttime) temperature.
- No location recorded a record or near-record cool temperature for the season.

Please reference the *Highlights and extreme events* section below for additional details.

Record[1] or near-record mean air temperatures for winter were recorded at:

Location	Mean air temp. (°C)	Departure from normal (°C)	Year records began	Comments
High records or near-records				
Alexandra	5.8	1.6	1929	Highest
Brothers Island	11.7	1.1	1997	Highest
Clyde	5.5	1.3	1978	Highest
Cromwell	6.2	1.9	1949	Highest
Dunedin (Musselburgh)	8.5	1.4	1947	Highest
Haast	9.6	1.6	1949	Highest
Hokitika	9.6	1.6	1866	Highest
Lauder	5.2	1.9	1924	Highest
Leigh	14.3	1.5	1966	Highest
Lincoln	8.2	1.4	1881	Highest
Martinborough	9.7	1.3	1986	Highest
Motueka	9.6	2.0	1956	Highest
Ngawi	11.9	1.2	1972	Highest
Ohakune	7.3	1.3	1962	Highest
Paraparaumu	10.5	1.2	1953	Highest
Porirua	10.5	1.2	1968	Highest
Te Anau	6.3	1.5	1963	Highest
Waipawa	9.0	0.8	1945	Highest

[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.

Wānaka	6.1	1.8	1955	Highest
Wellington (Airport)	11.3	1.2	1962	Highest
Wellington (Kelburn)	10.5	1.1	1927	Highest
Akaroa	9.7	1.7	1978	2nd-highest
Arapito	10.3	1.3	1978	2nd-highest
Auckland (Māngere)	12.5	1.2	1959	2nd-highest
Blenheim	9.5	1.2	1932	2nd-highest
Cape Campbell	10.6	0.9	1953	2nd-highest
Cape Reinga	13.6	0.7	1951	2nd-highest
Dannevirke	9.4	1.1	1951	2nd-highest
Franz Josef Village	8.9	1.6	1953	2nd-highest
Gisborne	11.2	1.3	1905	2nd-highest
Greymouth	10.0	1.4	1947	2nd-highest
Hanmer Forest	6.5	1.5	1906	2nd-highest
Hāwera	10.2	1.2	1977	2nd-highest
Hicks Bay	12.7	1.2	1969	2nd-highest
Kaitaia	13.6	1.3	1948	2nd-highest
Kerikeri	12.9	1.1	1945	2nd-highest
Lake Tekapo	4.3	1.6	1927	2nd-highest
Levin	10.3	1.2	1895	2nd-highest
Lumsden	5.9	1.2	1982	2nd-highest
Mahia	11.4	1.1	1990	2nd-highest
Medbury	7.7	2.0	1927	2nd-highest
Middlemarch	5.7	1.2	2000	2nd-highest
Milford Sound	7.6	1.7	1934	2nd-highest
Nugget Point	7.5	0.8	1970	2nd-highest
Queenstown	6.4	1.9	1871	2nd-highest
Ranfurly	4.6	1.5	1897	2nd-highest
Reefton	7.7	1.6	1960	2nd-highest
Roxburgh	7.5	2.2	1950	2nd-highest
Tākaka	9.7	1.4	1978	2nd-highest
Taumarunui	9.3	1.3	1947	2nd-highest
Taupō	9.0	2.0	1949	2nd-highest
Upper Hutt (Trentham)	9.5	1.1	1939	2nd-highest
Waipara West	8.9	1.0	1973	2nd-highest
Whanganui	11.2	1.2	1937	2nd-highest
Westport	10.5	1.4	1937	2nd-highest
Whangaparāoa	13.1	1.0	1982	2nd-highest
Whangārei	13.1	1.1	1967	2nd-highest
Auckland (Whenuapai)	11.7	0.9	1945	3rd-highest
Five Rivers	5.9	1.1	1982	3rd-highest
Gore	6.8	1.4	1907	3rd-highest
Invercargill	7.1	1.1	1905	3rd-highest
Kaikōura	9.7	1.1	1963	3rd-highest
Manapouri (West Arm Jetty)	5.4	1.6	1971	3rd-highest
Palmerston North	10.3	1.1	1928	3rd-highest
Pukekohe	11.8	1.1	1969	3rd-highest
Rangiora	7.7	1.1	1965	3rd-highest

South West Cape	8.9	1.2	1991	3rd-highest
Tara Hills	4.3	1.2	1949	3rd-highest
Tauranga	11.7	1.0	1913	3rd-highest
Waiau	7.6	1.8	1974	3rd-highest
Waimate	7.4	1.1	1908	3rd-highest
Whitianga	11.9	1.2	1962	3rd-highest
Lower Retaruke	8.7	0.8	1966	4th-highest
Nelson	9.5	1.5	1862	4th-highest
Whakatāne	11.0	1.1	1974	4th-highest
Windsor	6.8	1.3	2000	4th-highest
Low records or near-records				
None observed				

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

Location	Mean maximum air temp. (°C)	Departure from normal (°C)	Year records began	Comments
High records or near-records				
Auckland (Māngere)	16.1	1.3	1959	Highest
Brothers Island	13.4	1.0	1997	Highest
Cromwell	11.3	1.9	1949	Highest
Dannevirke	14.0	1.9	1951	Highest
Dunedin (Musselburgh)	12.1	1.5	1947	Highest
Gisborne	16.1	1.3	1905	Highest
Haast	13.1	1.4	1949	Highest
Hāwera	13.8	1.3	1977	Highest
Levin	14.7	1.5	1895	Highest
Mahia	14.0	1.1	1990	Highest
Ohakune	12.4	2.5	1962	Highest
Palmerston North	14.8	1.7	1928	Highest
Paraparaumu	14.4	1.4	1953	Highest
Porirua	14.3	1.4	1968	Highest
South West Cape	10.9	1.2	1991	Highest
Tūrangi	13.2	1.3	1968	Highest
Waipawa	14.9	2.0	1945	Highest
Wānaka	10.4	1.7	1955	Highest
Wellington (Airport)	13.8	1.0	1962	Highest
Whakatāne	16.1	1.0	1974	Highest
Whakatu	16.2	2.2	1965	Highest
Whangaparāoa	15.6	1.0	1982	Highest
Whangārei	17.4	1.5	1967	Highest
Whitianga	16.8	1.5	1962	Highest
Akaroa	14.0	1.4	1978	2nd-highest
Arapito	14.5	1.1	1978	2nd-highest
Clyde	11.1	1.7	1978	2nd-highest
Manapouri (West Arm Jetty)	8.0	1.5	1971	2nd-highest
Martinborough	14.5	1.3	1986	2nd-highest

Matamata	15.5	1.6	1999	2nd-highest
Medbury	13.2	1.7	1927	2nd-highest
New Plymouth	14.7	1.0	1944	2nd-highest
Ngawi	14.5	1.3	1972	2nd-highest
Rotorua	13.6	1.3	1964	2nd-highest
Stratford	13.3	1.4	1960	2nd-highest
Tākaka	15.3	1.4	1978	2nd-highest
Taumarunui	14.4	1.4	1947	2nd-highest
Taupō	13.7	2.2	1949	2nd-highest
Upper Hutt (Trentham)	13.9	1.1	1939	2nd-highest
Whanganui	15.0	1.2	1937	2nd-highest
Appleby	14.1	0.8	1932	3rd-highest
Auckland (Whenuapai)	15.9	0.8	1945	3rd-highest
Greymouth	13.6	1.1	1947	3rd-highest
Hanmer Forest	13.2	2.1	1906	3rd-highest
Hastings	15.7	1.7	1965	3rd-highest
Lake Tekapo	9.2	1.9	1927	3rd-highest
Leigh	17.4	1.9	1966	3rd-highest
Middlemarch	11.4	1.5	2000	3rd-highest
Milford Sound	11.2	1.3	1934	3rd-highest
Motu	12.3	1.6	1990	3rd-highest
Motueka	15.0	1.7	1956	3rd-highest
Napier	15.7	1.2	1870	3rd-highest
Rangiora	13.3	1.3	1965	3rd-highest
Tauranga	15.8	1.0	1913	3rd-highest
Gore	11.1	2.0	1907	4th-highest
Hicks Bay	15.7	1.1	1969	4th-highest
Hokitika	13.7	1.4	1866	4th-highest
Kaikōura	12.8	1.2	1963	4th-highest
Kerikeri	17.1	0.9	1945	4th-highest
Masterton	14.4	1.2	1906	4th-highest
Reefton	12.0	1.3	1960	4th-highest
Wairoa	16.0	1.4	1964	4th-highest
Windsor	12.6	1.4	2000	4th-highest
Low records or near-records				
None observed				

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

Location	Mean minimum air temp. (°C)	Departure from normal (°C)	Year records began	Comments
High records or near-records				
Alexandra	0.5	1.9	1929	Highest
Ashburton	2.5	1.2	1928	Highest
Brothers Island	10.0	1.1	1997	Highest
Cape Campbell	8.7	1.2	1953	Highest

Cromwell	1.2	1.9	1949	Highest
Culverden	2.2	2.3	1928	Highest
Haast	6.2	2.0	1949	Highest
Hokitika	5.8	2.1	1866	Highest
Kaitaia	10.6	1.9	1948	Highest
Lauder	0.3	2.0	1924	Highest
Lincoln	4.0	2.0	1881	Highest
Medbury	2.2	2.2	1927	Highest
Motueka	4.1	2.2	1956	Highest
Te Anau	3.2	2.5	1963	Highest
Wellington (Airport)	8.7	1.3	1962	Highest
Wellington (Kelburn)	8.1	1.4	1927	Highest
Westport	7.0	1.7	1937	Highest
Queenstown	2.4	2.4	1871	Equal highest
Arapito	6.1	1.6	1978	2nd-highest
Blenheim	4.6	1.5	1932	2nd-highest
Cape Reinga	11.5	1.0	1951	2nd-highest
Five Rivers	1.5	1.4	1982	2nd-highest
Gore	2.9	1.3	1907	2nd-highest
Greymouth	6.3	1.6	1947	2nd-highest
Hāwera	6.6	1.2	1977	2nd-highest
Kerikeri	8.6	1.3	1945	2nd-highest
Leigh	11.3	1.0	1966	2nd-highest
Martinborough	5.0	1.2	1986	2nd-highest
Milford Sound	3.9	2.2	1934	2nd-highest
Mt Cook (Airport)	0.3	1.6	1929	2nd-highest
Ngawi	9.3	1.0	1972	2nd-highest
Paraparaumu	6.6	1.1	1953	2nd-highest
Porirua	6.8	1.0	1968	2nd-highest
Ranfurly	-0.7	1.4	1897	2nd-highest
Roxburgh	3.8	3.4	1950	2nd-highest
Secretary Island	7.8	1.3	1985	2nd-highest
Tara Hills	-0.8	1.2	1949	2nd-highest
Taupō	4.4	1.8	1949	2nd-highest
Upper Hutt (Trentham)	5.1	1.2	1939	2nd-highest
Waipara West	4.1	1.2	1973	2nd-highest
Windsor	1.0	1.0	2000	2nd-highest
Dunedin (Musselburgh)	4.9	1.2	1947	3rd-highest
Hicks Bay	9.6	1.2	1969	3rd-highest
Kaikōura	6.7	0.9	1963	3rd-highest
Le Bons Bay	6.2	1.0	1984	3rd-highest
Lumsden	1.5	1.4	1982	3rd-highest
Mahia	8.8	1.0	1990	3rd-highest
Middlemarch	0.0	0.9	2000	3rd-highest
Nugget Point	4.8	0.9	1970	3rd-highest
Reefton	3.3	1.9	1960	3rd-highest
South West Cape	6.9	1.1	1991	3rd-highest
Waiau	1.7	1.9	1974	3rd-highest

Franz Josef Village	4.6	2.2	1953	4th-highest
Motu	3.0	0.9	1990	4th-highest
Wānaka	1.8	1.9	1955	4th-highest
Winchmore	2.1	0.7	1949	4th-highest
Low records or near-records				
None observed				

Rainfall: Periods of extended dryness interspersed with extreme rainfall events

There were periods of extended dry spells across New Zealand during winter due to the prevalence of high pressure over and east of New Zealand, but also significant rainfall events. This 'see-saw' of winter rainfall distribution led to most of New Zealand experiencing unremarkable rainfall totals, with only four locations observing near-record highest rainfall and two locations record-low rainfall.

However, there were several extreme rainfall events over the winter that affected both the North and South Island. See the *Highlights and extreme events* section below for more details.

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

Location	Rainfall total (mm)	Percentage of normal	Year records began	Comments
High records or near-records				
Reefton	734	136	1960	3rd-highest
Milford Sound	1954	142	1929	3rd-highest
Tākaka	864	148	1976	4th-highest
Blenheim	335	161	1927	4th-highest
Low records or near-records				
Auckland (Western Springs)	315	80	1948	Lowest
Wairoa	172	48	1964	Lowest

Winter in the six main centres

Mean winter temperatures were above average in all main centres except Dunedin, where the mean temperature was well above average. In fact, both Wellington and Dunedin experienced their warmest winter on record, while Auckland and Tauranga experienced near-record warmth. Tauranga, Hamilton, Christchurch, and Dunedin all experienced near normal rainfall, while below normal rainfall was observed in Auckland and above normal rainfall occurred in Wellington.

Of the six main centres in winter 2021, Auckland was the warmest and sunniest, Christchurch was the coolest, Wellington was the wettest, and Dunedin was the driest and least sunny.

Winter 2021 main centre climate statistics:

Temperature			
Location	**Mean temp. (°C)**	**Departure from normal (°C)**	**Comments**
Auckland[a]	12.5	+1.0	Above average (2nd-warmest on record)
Tauranga[b]	11.7	+1.0	Above average (3rd-warmest on record)
Hamilton[c]	9.9	+0.6	Above average
Wellington[d]	10.5	+1.1	Above average (warmest on record)
Christchurch[e]	7.6	+1.2	Above average
Dunedin[f]	8.5	+1.4	Well above average (warmest on record)

Rainfall			
Location	**Rainfall (mm)**	**% of normal**	**Comments**
Auckland[a]	285	77	Below normal
Tauranga[b]	300	85	Near normal
Hamilton[c]	374	100	Near normal
Wellington[d]	499	128	Above normal
Christchurch[e]	159	86	Near normal
Dunedin[f]	142	83	Near normal

Sunshine	
Location[2]	**Sunshine (hours)**
Auckland[a]	463
Tauranga[b]	460
Hamilton[g]	366
Wellington[d]	362
Christchurch[e]	411
Dunedin[f]	332

[a] Māngere [b] Tauranga Airport [c] Hamilton Airport [d] Kelburn [e] Christchurch Airport [f] Musselburgh [g] Ruakura

[2] Tauranga, Wellington and Christchurch record sunshine use Campbell-Stokes manual sunshine recorders, whereas Auckland, Hamilton and Dunedin record sunshine with high-precision electronic sensors.

Highlights and extreme events

This section contains information pertaining to some of the more significant highlights and extreme events that occurred during winter 2021. Note that a more detailed list of significant weather events for winter 2021 can be found in the *Highlights and extreme events* section of NIWA's monthly Climate Summaries. These monthly summaries are available online, and may be viewed here.

Temperatures

The highest temperature during winter 2021 was 23.0°C, observed at Akaroa and Orari Estate on 24 August.

The lowest temperature during winter 2021 was -9.1°C, observed at Lake Tekapo on 9 August.

Relatively warm and humid northerly airflows prevailed over much of New Zealand during the first half of June, delivering periods of high temperatures for the time of year. Twenty-two locations observed record or near-record high daily maximum temperatures between 5-14 June.

On 5 July, low cloud and fog persisted throughout the day over inland parts of Waikato, Bay of Plenty and Manawatū-Whanganui. The lack of sunshine contributed to low daytime temperatures, with Hamilton, Whatawhata, Rotorua and Taumarunui recording near-record low daily maximum temperatures for July, respectively.

From 16-18 July, humid and windy conditions led to a string of mild nights for many areas in the South Island and parts of the lower North Island. During this period, Hokitika, Motueka, Reefton and Porirua recording their warmest July daily minimum temperature on record, with 18 other locations across the North Island and South Island recording near-record warm July minimums.

On 24 August, a warm northwesterly airflow delivered the country's highest temperatures for August 2021. Both Akaroa and Orari Estate observed a maximum temperature of 23.0°C, with record or near-record high August temperatures observed in several locations across Southland, Otago and Canterbury.

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

Location	Extreme maximum (°C)	Date of extreme temperature	Year records began	Comments
High records or near-records				
Five Rivers	19.5	Jun-5th	1982	Highest
Middlemarch	21.5	Aug-24th	2000	Highest
Ohakune	19.1	Jun-14th	1962	Highest
Porirua	19.5	Jun-9th	1968	Highest
Puysegur Point	18.1	Jun-5th	1978	Highest
Taumarunui	21.7	Aug-13th	1947	Highest
Westport	18.6	Jun-8th	1937	Highest
Akaroa	23.0	Aug-24th	1978	Equal highest
Stratford	18.3	Jun-9th	1960	Equal highest
Arapito	19.6	Jun-8th	1978	2nd-highest
Matamata	20.0	Jun-10th	1999	2nd-highest
Ranfurly	19.2	Aug-24th	1897	2nd-highest
Tūrangi	19.2	Jun-9th	1968	2nd-highest

Manapouri (Airport)	18.1	Jun-5th	1963	Equal 2nd-highest
Leigh	22.0	Jun-19th	1966	3rd-highest
Windsor	21.3	Aug-24th	2000	3rd-highest
Oamaru	22.1	Aug-24th	1967	Equal 3rd-highest
Orari Estate	23.0	Aug-24th	1972	Equal 3rd-highest
South West Cape	16.4	Jun-5th	1991	Equal 3rd-highest
Lumsden	18.6	Jun-5th	1982	4th-highest
New Plymouth	19.1	Jun-9th	1944	4th-highest
Pelorus Sound	18.7	Jun-13th	1982	4th-highest
Rotorua	18.4	Aug-28th	1964	4th-highest
Tiri Tiri Lighthouse	18.2	Jun-11th	1982	4th-highest
Whakatāne	20.1	Jun-9th	1975	4th-highest
Low records or near-records				
Dargaville	8.9	Jun-23rd	1951	2nd-lowest
Mokohinau	9.8	Jul-8th	1994	2nd-lowest
Whatawhata	6.3	Jul-5th	1952	4th-lowest
Hamilton Airport	6.3	Jul-5th	1946	4th-lowest

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

Location	Extreme minimum (°C)	Date of extreme temperature	Year records began	Comments
Low records or near-records				
Balclutha	-9.0	Jun-19th	1964	Lowest
Dargaville	-4.1	Jun-24th	1943	2nd-lowest
Mokohinau	6.5	Jul-7th	1994	3rd-lowest
Cheviot	-6.3	Jul-5th	1982	4th-lowest
High records or near-records				
Farewell Spit	14.6	Jun-14th	1972	Highest
Middlemarch	13.6	Aug-25th	2000	Highest
Motueka	13.2	Jun-7th	1972	Highest
Secretary Island	13.9	Jun-13th	1988	Highest
South West Cape	12.8	Jul-30th	1991	Highest
Wellington (Kelburn)	14.1	Jun-27th	1931	Highest
Windsor	12.6	Aug-25th	2000	Highest
Dannevirke	14.2	Jun-27th	1951	Equal highest
Mahia	14.2	Jun-27th	1990	Equal highest
Arthur's Pass	8.6	Jun-14th	1978	2nd-highest
Dunedin (Airport)	13.8	Aug-25th	1972	2nd-highest
Hāwera	14.5	Jun-27th	1977	2nd-highest
Martinborough	14.7	Jun-27th	1986	2nd-highest
Oamaru	12.6	Aug-25th	1972	2nd-highest
Reefton	11.5	Jul-17th	1972	2nd-highest
Stratford	12.8	Jun-27th	1972	2nd-highest
Upper Hutt (Trentham)	14.7	Jun-27th	1972	2nd-highest
Wellington (Airport)	14.9	Jun-27th	1972	2nd-highest
Brothers Island	14.2	Jun-27th	1997	Equal 2nd-highest

Cheviot	11.8	Aug-25th	1982	Equal 2nd-highest
Palmerston North	13.9	Jun-27th	1940	Equal 2nd-highest
Whanganui	14.2	Jun-27th	1972	Equal 2nd-highest
Cromwell	12.2	Aug-25th	1949	3rd-highest
Culverden	13.7	Jun-26th	1930	3rd-highest
Five Rivers	12.5	Aug-25th	1982	3rd-highest
Napier	16.0	Jun-27th	1940	3rd-highest
New Plymouth	15.6	Jun-27th	1944	3rd-highest
Ngawi	15.9	Jun-14th	1972	3rd-highest
Tākaka	13.0	Jun-27th	1978	3rd-highest
Westport	13.4	Jun-14th	1966	3rd-highest
Arapito	13.1	Jun-27th	1978	Equal 3rd-highest
Grassmere	14.6	Jun-14th	1972	4th-highest
Haast	12.8	Jun-14th	1949	4th-highest
Lumsden	12.0	Aug-25th	1982	4th-highest
Roxburgh	12.1	Aug-25th	1950	4th-highest
Blenheim	13.8	Jun-26th	1947	Equal 4th-highest
Castlepoint	14.5	Jun-27th	1972	Equal 4th-highest
Port Taharoa	14.9	Jun-27th	1974	Equal 4th-highest
Tiwai Point	10.3	Aug-25th	1972	Equal 4th-highest

Rain and slips

The highest 1-day rainfall during winter 2021 was 210 mm, recorded at Arthur's Pass on 16 July.

On 20 June, heavy rainfall caused flooding in Tokomaru Bay, with four homes and the local school seriously damaged by the floodwaters. Extensive damage was reported on many district roads in Gisborne, while SH35 around the East Cape was closed due to a slip. Farther south, several roads in the Wairarapa were closed due to flooding, including the main route into Martinborough over the Waihenga Bridge. Heavy rain also caused flooding and road closures in parts of Marlborough near Blenheim.

From 15-18 July, a pulse of tropical air originating from the Indian Ocean combined with an upper level trough and front to direct a humid and gusty northerly flow to the central and northern South Island. Within a 72-hour period, Ivory Glacier recorded 697 mm, Arthur's Pass recorded 413 mm and Motueka recorded 105 mm. In response to this persistent heavy rain, the Buller River swelled. Flood levels measured at the Buller River reached the highest they had been since 1926. Floodwaters also cut off areas of Marlborough and nearly 1000 people had to evacuate. Residents in parts of Westport were also forced to evacuate as the Buller River burst its banks, leaving waist-high water in many areas. A State of Emergency was declared by the local council. In the aftermath of the flood, at least 200 homes in Westport were deemed uninhabitable and the army was brought in to help clean the damage. At least 1000 stock were lost due to the floods. The Ministry for Primary Industries (MPI) declared a medium-scale adverse event, unlocking funds to help flood affected farmers and growers.

From 30-31 August, near-record rainfall occurred in parts of Auckland. The rainfall was associated with a stalled low pressure system that, in conjunction with a strong ridge of high pressure near the South Island, contributed to an enhanced temperature gradient, or change in temperature over distance, over the Auckland region. Along this gradient, a concentrated area of unusually strong winds formed about 1500 metres above the surface called a low-level jet, which rapidly transported moisture toward Auckland from the Pacific Ocean. This slow-moving weather feature enabled

sustained heavy rainfall and thunderstorm activity to reoccur over northwestern Auckland for over 12 hours. Considerable flooding was reported in some areas including Kumeū, Helensville, Henderson Valley and Rānui, with an evacuation centre set up for the approximately 60 households forced to leave their home. Approximately 400 homes were without power as slips and downed trees causing issues for the electricity infrastructure. At least 11 roads were closed due to flooding and slips. Kumeū (West Auckland) received 201 mm of rain during a 14-hour period from 30-31 August. The daily total of 208 mm represents 149% of the normal August monthly rainfall total at Kumeū. This total was additionally New Zealand's highest daily rainfall total for August 2021.

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

Location	Extreme 1-day rainfall (mm)	Date of extreme rainfall	Year records began	Comments
Upper Tākaka	200	Jul-16th	1995	Highest
Inchbonnie	271	Jun-25th	1949	2nd-highest
Kaka	114	Jul-16th	1997	2nd-highest
Linkwater	180	Jul-16th	1938	2nd-highest
Murchison	116	Jul-16th	1997	2nd-highest
Putara	143	Jun-25th	1917	2nd-highest
Secretary Island	121	Jun-24th	1985	2nd-highest
South West Cape	67	Aug-25th	1991	2nd-highest
Auckland (Whenuapai)	103	Aug-30th	1943	3rd-highest
Homeburn Station	138	Jun-20th	1969	3rd-highest
Mt Ruapehu (Chateau)	93	Jul-17th	2000	3rd-highest
Pelorus Sound	96	Jun-20th	1982	3rd-highest
Tapawera	58	Jul-25th	1992	3rd-highest
Waiawa	99	Jun-20th	1968	3rd-highest
Arapito	82	Jul-15th	1978	4th-highest
Arthur's Pass	210	Jul-16th	1906	4th-highest
Ferniehurst	107	Jun-20th	1949	4th-highest
Hanmer Forest	111	Jun-20th	1905	4th-highest
Reefton	95	Jul-16th	1960	4th-highest

Wind

The highest wind gust was 191 km/h, observed at Cape Turnagain on 28 June.

On 29 June, the *East by West* ferry across Wellington Harbour was cancelled because of wind and large swells entering the harbour. *Interislander* and *Bluebridge* ferry sailings between the North and South Islands were also cancelled.

The same front that caused the flooding in the Buller district in mid-July also brought powerful winds. Wellington recorded a 122 km/h wind gust on 18 July, while Castlepoint recorded a 111 km/h wind gust and Whanganui a 104 km/h gust on 17 July.

On 27 July, motorists heading over the Auckland Harbour Bridge were warned to take extra care due to strong wind gusts. Whenuapai recorded a maximum gust of 72 km/h.

On 3 August, strong winds battered parts of Auckland, toppling over trees, powerlines, as well as shipping containers at *Ports of Auckland*. Approximately 4,500 customers were temporarily without

power, while *Fire and Emergency New Zealand* were called to 128 weather-related incidents. Farther south, approximately 2,000 homes in Waikato and the Coromandel Peninsula were without power due to downed power lines.

Record or near record winter extreme wind gusts were recorded at:

Location	Extreme wind gust (km/h)	Date of extreme gust	Year records began	Comments
Secretary Island	161	Jun-5th	1994	Highest
Palmerston North	95	Jul-17th	1991	Equal highest
Reefton	70	Jul-7th	1999	Equal highest
Baring Head	163	Aug-9th	1991	2nd-highest
Brothers Island	148	Aug-9th	1997	2nd-highest
Dannevirke	96	Aug-17th	1961	2nd-highest
Upper Hutt (Trentham)	96	Jul-18th	1999	2nd-highest
Pukekohe	83	Aug-3rd	1986	3rd-highest
Westport	119	Jun-28th	1973	3rd-highest
Lincoln	96	Jun-29th	1999	Equal 3rd-highest
Puysegur Point	148	Jul-5th	1986	Equal 3rd-highest
Mahia	115	Aug-9th	1991	4th-highest
New Plymouth	115	Aug-9th	1972	4th-highest
Rangiora	93	Jun-29th	1999	4th-highest
Dargaville	102	Jun-29th	1997	Equal 4th-highest
Motu	102	Jul-17th	1991	Equal 4th-highest

Snow and ice

From 28-29 June, a heavy snowfall occurred in parts of Southland and Otago. On 28 June, Northern Southland College was closed because of snow on the roads near Lumsden, making it too dangerous for the school bus to operate. On 29 June, all schools in Queenstown were closed, with flights at the airport cancelled. Approximately 10-15 cm of snow was reported in many parts of the Wakatipu Basin. Snow also settled in parts of Central Otago, Banks Peninsula, and in Stratford and Midhirst in Taranaki. Many State Highways throughout the country were closed temporarily as a result of the snowfall.

On 16 July, snow fell and settled to the valley floor around Lake Ōhau. The snowfall was somewhat unexpected, given the prevailing warm northerly airmass over the South Island. This was a warm advection snowfall, where cold air near the ground surface enables snow to fall to much lower elevations than the free air freezing levels of the prevailing northerly airmass. In this case, cold air trapped in the Lake Ōhau basin (a localised inversion) enabled the snowfall. It was a particularly isolated event, which was notable as New Zealand's warm advection snowfalls are typically more widespread, and due to a southerly front undercutting a warm and moist airmass. The local ski area *Ōhau Snow Fields* reported 50 cm fresh snow.

On 8-9 August, cold air moving in behind a front brought low-elevation snowfall to much of the South Island and a few areas in the North Island. Hundreds of motorists were stranded along SH1 at Hundalee on their way south from Kaikōura, while snow closed Lewis and Porters Passes. SH8 was also closed between Fairlie and Lake Pukaki, while in the North Island, Desert Road was closed for a time, as were Napier-Taupō Road and SH1 between Waiouru and Taihape.

From 16-17 August, a front passing over the South Island delivered heavy snowfalls to most alpine areas of New Zealand. This resulted in the closure of the Crown Range Road between Queenstown and Wānaka, SH94 between Hollyford Road Junction and Chasm, while chains were required on SH73 between Springfield and Arthur's Pass. Up to 1 metre of fresh snowfall was reported at Ōhau ski area, 40-50 cm was reported at ski areas in the northern Craigieburn Range, and 25-40 cm was reported for Queenstown and Wānaka ski areas. The fresh snow remained untouched at many ski areas, due to a community outbreak of Covid-19 forcing a nationwide Level 4 lockdown from 11:59 p.m. on 17 August.

Lightning, hail, and tornadoes
On 19 June, a likely tornado caused extensive damage in Papatoetoe, Auckland. Approximately 240 homes were impacted, with roofs torn off, windows smashed, and power lines downed. Containers were toppled over at Ports of Auckland's South Auckland Freight Hub, killing one worker and injuring at least two others.

A front brought thunderstorms to western areas of the North Island on 18 July. Over 1200 lightning strikes were detected in under three hours.

On the night of 5-6 August, lightning strikes affected the Nelson and Tasman regions as thunderstorms moved through the area. A house was struck by lightning in Britannia Heights, Nelson, as was one in Tākaka. A number of suburbs in Tasman lost power for about an hour after lightning struck the Stoke substation, affecting about 6,500 homes.

During the evening hours of 30 August, approximately 600 lightning strikes were recorded over Auckland. Large hailstones were observed in some western suburbs.

Cloud and fog
On 15 June, fog caused flight delays and cancellations at Christchurch and Dunedin Airports. The fog and low cloud remained about Dunedin for most of the day, meaning there were only two flight arrivals and departures there for the day.

On 24 July, heavy fog caused significant delays at Auckland Airport. Twenty-six domestic flights were cancelled.

For further information please contact:

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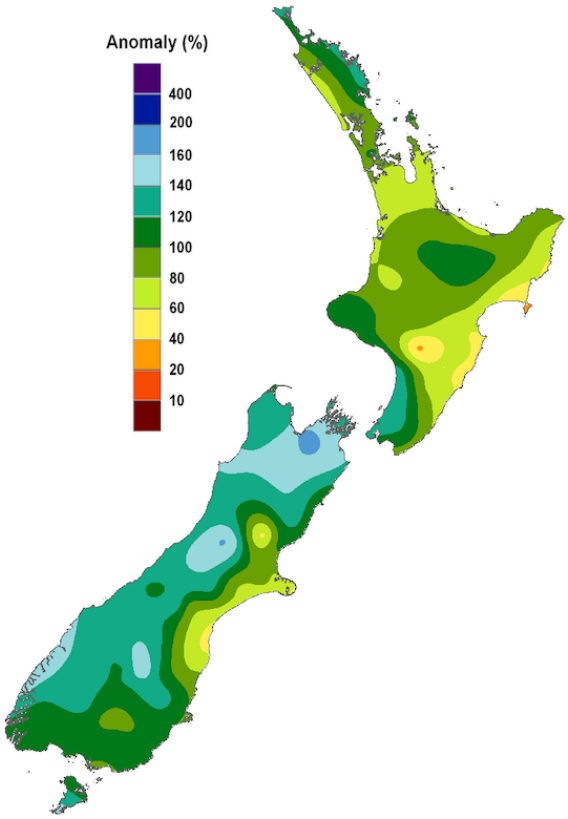
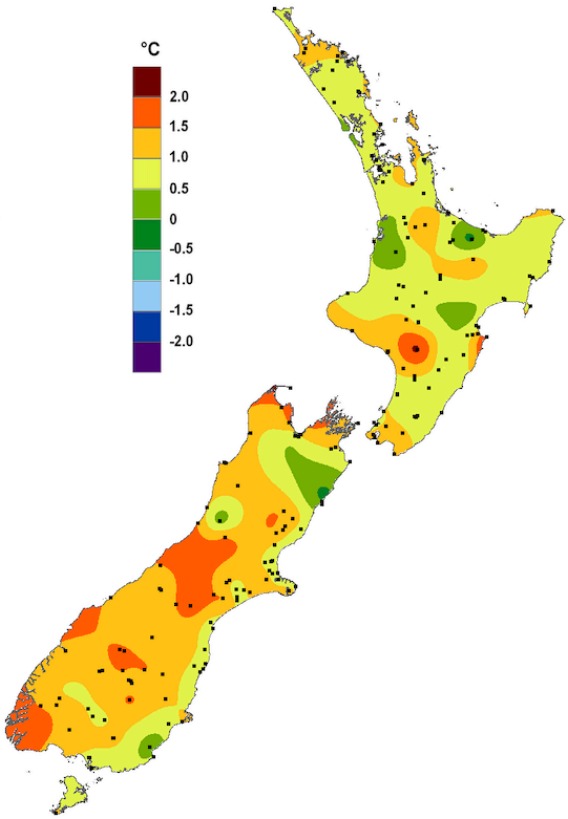


Winter rainfall

Expressed as a percentage of the 1981-2010 normal.



Winter temperature

Expressed as a departure from the 1981-2010 average in degrees Celsius.

https://www.niwa.co.nz/our-science/climate