

## New Zealand's fifth-warmest summer on record

<b>Temperature</b>	Summer 2021-22 was the fifth warmest summer on record in Aotearoa New Zealand. Temperatures were well above average (>1.20°C above average) for the majority of the North Island with the exception of the Greater Wellington region, and coastal Gisborne and Hawke's Bay where temperatures were above average (0.51-1.20°C above average). Temperatures were also above average in Nelson, Tasman, Southland and parts of Otago and Marlborough. Well above average temperatures were observed for the West Coast. Temperatures were near average ( $\pm 0.50^\circ\text{C}$ of average) in Canterbury, eastern Marlborough and pockets of Otago.
<b>Rainfall</b>	Below normal rainfall (50-79% of normal) was observed in Northland, Auckland, parts of Waikato and Southland. Pockets of well below normal rainfall (<50% of normal) occurred in western Kaipara and Far North districts as well as southern Southland. Conversely, well above normal rainfall (>149% of normal) occurred in Taranaki, Manawatū-Whanganui, parts of Hawke's Bay, Greater Wellington, Tasman, Nelson, Marlborough, the Grey and Buller districts and large parts of Canterbury. Above normal rainfall (120-149% of normal) was observed in the Gisborne region and parts of Otago. Near normal (80-119% of normal) rainfall was observed elsewhere.
<b>Soil moisture</b>	At the end of February, soil moisture levels for the time of year were above average in coastal Gisborne, parts of Hawke's Bay, the lower North Island, most of the upper South Island, and much of Canterbury. Soil moisture levels were below average in most of Northland, Auckland, northern Waikato, Southland, and Stewart Island. Elsewhere, soil moisture levels were near average.

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### Overview

Summer 2021-22 was characterised by lower than normal mean sea level pressure to the north of the country, with above normal pressure over and to the south (Figure 1). This pressure setup was associated with more easterly quarter winds than usual for Aotearoa New Zealand and was influenced by the presence of La Niña throughout the season. Warm and humid winds from the subtropics resulted in widespread above average temperatures for all three summer months. December was the warmest of the three when compared to its monthly average and was New Zealand's 4<sup>th</sup>-warmest December on record. Overall, the nationwide average temperature for summer 2021-22 was 17.8°C. This was 1.1°C above the 1981-2010 summer average, making it the 5<sup>th</sup>-warmest summer on record. Three of the five warmest summers on record have now occurred since the summer of 2017-18.

Fifty-five locations observed a record or near-record warm summer - the majority of these locations were in the North Island. The summer warmth was partly fuelled by warmer than usual coastal waters. Marine heatwave (MHW) conditions developed during November 2021 and were still active at the end of summer in the northern and western North Island and western South Island. In mid-December, daily sea surface temperature (SST) readings reached as high as 4-5°C above average around coastal Waikato and Auckland. For summer as a whole, SST anomalies in the northern (+1.7°C) and eastern (+1.6°C) North Island were the highest on record, surpassing the previous record marine heatwave event of summer 2017-18 (since at least 1982). For the rest of the country, the 2021-22 summer marine heatwave ranks second to 2017-18 (Figure 2). The atmospheric variables associated with this record-breaking MHW included higher than normal air pressure around New Zealand and in the Tasman Sea, weaker wind speeds than normal, more sub-tropical east to north-easterly winds around the North Island, and a relative lack of Southern Ocean fronts. These factors are consistent with La Niña in the equatorial Pacific and a Southern Annular Mode that was in its positive phase over 90% of the time during summer.

Summer rainfall was highly variable and featured extended dry spells alongside extreme rainfall events. Sixteen locations experienced their driest January on record, while Auckland endured a 37-day dry spell from 17 December 2021 to 22 January 2022, which was the city's 2<sup>nd</sup>-longest dry spell since records began in 1943. For the season as a whole, below normal rainfall (50-79% of normal) was observed in Northland, Auckland, parts of Waikato and Southland. Pockets of well below normal rainfall (<50% of normal) occurred in western Kaipara and Far North districts as well as southern Southland. Notably, it was the driest summer on record in Invercargill with records extending back to 1900.

Summer also featured several extreme rainfall events (detailed in [Highlights and extreme events](#) section). A humid northerly flow was intercepted by a colder southerly, generating widespread heavy rain across Wellington from 5-7 December. Another heavy rainfall event occurred in Canterbury and parts of the upper North and South Islands between 13-15 December as moisture from Tropical Cyclone Ruby moved over New Zealand. January was a dry month right across the country, but active weather returned during the first half of February, with two atmospheric rivers (long corridors of atmospheric moisture) bringing heavy rainfall and flooding to parts of the upper South Island and lower North Island. Then on 13 February, the landfall of ex-Tropical Cyclone Dovi delivered a wide range of impacts to the North Island and upper South Island, including strong wind gusts, heavy rain, and flooding. These rainfall events contributed a record and near-record wet summer for several locations. Kaikōura received 488 mm of rain – more than three times the summer normal, making it the wettest summer on record there since records began in 1898. In Christchurch more than two and half times the normal summer rainfall fell making it the 4<sup>th</sup>-wettest summer on record there since records began in 1863.

#### **Further highlights for summer 2021-22:**

- The highest temperature was 34.7°C, observed at Lake Karapiro (Waikato) on 4 January.
- The lowest temperature was 0.0°C, observed at Manapouri on 27 February.

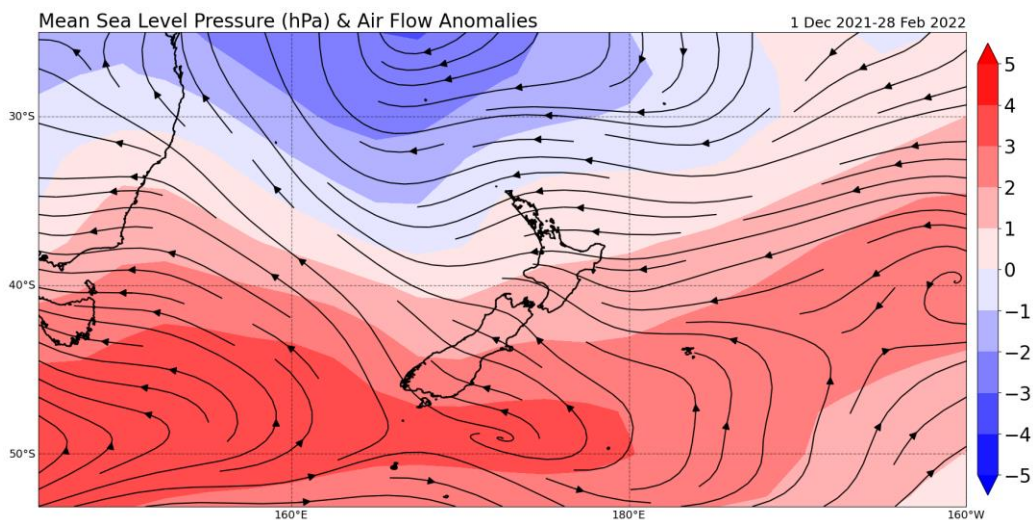
- The highest 1-day rainfall was 277 mm, recorded at Franz Josef on 2 February.
- The highest wind gust was 185 km/h, observed at both South West Cape and Puysegur Point on 20 December.
- Of the six main centres in summer 2021-22, Auckland was the warmest, Dunedin was the coolest and driest, Tauranga was the sunniest, Wellington was the wettest and Christchurch was the least sunny.

**For further information, please contact:**

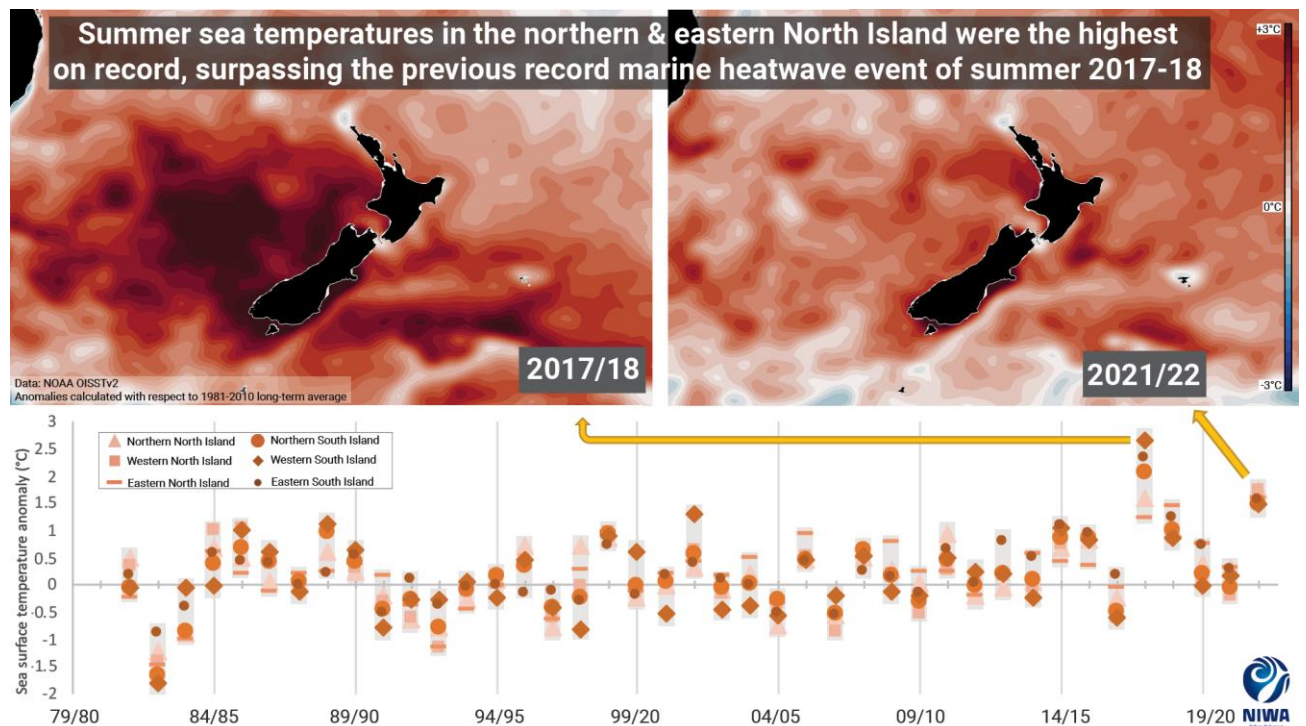
**Nava Fedaeff**

Forecaster / Science Communicator

Tel. 09 375 6337



**Figure 1:** Summer mean sea level pressure and air flow anomalies.



**Figure 2:** Summer sea surface temperature anomalies.

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## Temperature: Widespread record and near-record warmth

The nationwide average temperature for summer 2021-22 was 17.8°C (1.1°C above the 1981-2010 average from NIWA's seven station temperature series which begins in 1909), making summer 2021-22 the fifth-warmest summer on record.

Temperatures were well above average (>1.20°C above average) for the majority of the North Island with the exception of the Greater Wellington region, the Wairarapa, and coastal Gisborne and Hawke's Bay where temperatures were above average (0.51-1.20°C above average). Temperatures were also above average in Nelson, Tasman, Southland and parts of Otago and Marlborough. Well above average temperatures were observed for the West Coast.

A plethora of locations experienced record or near-record warm temperatures for summer as a whole (detailed in the table below), particularly in the North Island. Notably, Auckland (Airport), Tauranga and Hamilton experienced their warmest summers on record with records extending back to 1949, 1913 and 1906, respectively. Consistent warmth was another defining feature of the summer, particularly in the North Island. At Auckland (Airport), 58 hot days were observed (days with a temperature exceeding 25°C) compared to 19 days for an average summer.

There were more mean minimum temperature records and near records (53 locations) set this summer than mean maximum temperature records and near records (41 locations). This indicates that the summer warmth was pushed along by warm nights more than warm days in some locations.

No locations experienced record or near-record low summer temperatures, however not all parts of the country experienced an unusually warm summer. Temperatures were near average ( $\pm 0.50^\circ\text{C}$  of average) in Canterbury, eastern Marlborough and pockets of Otago. In Christchurch (Airport), the mean maximum temperature for summer was 0.9°C below normal, however, the mean minimum temperature was 0.9°C above normal. This shows that while daytime temperatures were cooler than usual, warmer than usual nights led to near average temperatures for the season as a whole. Christchurch experienced 17 hot days this summer compared to a summer average of 22.

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

Location	Mean air temp. (°C)	Departure from normal (°C)	Year records began	Comments
High records or near-records				
Cape Reinga	20.4	1.7	1951	Highest
Kaitaia	21.2	2.2	1948	Highest
Kerikeri	20.6	1.7	1945	Highest
Dargaville	21.0	2.2	1943	Highest
Whangārei	21.5	2.0	1967	Highest
Leigh	22.0	2.8	1966	Highest
Auckland (Whangaparāoa)	21.3	2.1	1982	Highest
Auckland (Whenuapai)	20.8	2.2	1945	Highest
Paeroa	21.0	1.8	1947	Highest

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<sup>1</sup> 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.

Tauranga	21.1	2.0	1913	Highest
Te Puke	20.3	2.3	1973	Highest
Rotorua	19.3	2.2	1964	Highest
Taupō	19.4	2.9	1949	Highest
Auckland (Airport)	21.6	2.1	1959	Highest
Auckland (Pukekohe)	20.8	2.5	1969	Highest
Hamilton (Ruakura)	20.4	2.3	1906	Highest
Port Taharoa	20.7	1.8	1973	Highest
Tūrangi	18.4	1.8	1968	Highest
Hicks Bay	20.3	2.0	1969	Highest
Franz Josef	16.7	1.9	1953	Highest
Kaikohe	20.0	1.7	1973	2nd-highest
Auckland (Western Springs)	21.3	2.3	1948	2nd-highest
Whitianga	20.6	2.0	1962	2nd-highest
Matamata	20.1	2.4	1999	2nd-highest
Whakatāne	20.5	1.7	1974	2nd-highest
Motu	17.4	2.2	1990	2nd-highest
Whatawhata	20.3	2.3	1952	2nd-highest
Hamilton (Airport)	19.9	1.9	1946	2nd-highest
Te Kuiti	19.7	1.7	1959	2nd-highest
Taumarunui	19.5	1.9	1947	2nd-highest
New Plymouth	19.2	1.9	1944	2nd-highest
Lower Retaruke	19.0	1.9	1966	2nd-highest
Mt Ruapehu (Chateau)	14.1	2.3	2000	2nd-highest
Waipawa	18.8	1.2	1945	2nd-highest
Levin	18.7	1.5	1895	2nd-highest
Stratford	17.4	1.8	1960	2nd-highest
Hāwera	17.8	1.6	1977	2nd-highest
Waiouru	15.9	2.3	1962	2nd-highest
Whanganui (Spriggens Park)	19.5	1.7	1937	2nd-highest
Westport	17.9	1.9	1937	2nd-highest
Gisborne	20.6	1.9	1905	3rd-highest
Māhia	19.1	1.2	1990	3rd-highest
Paraparaumu	18.3	1.4	1953	3rd-highest
Tākaka	18.0	1.1	1978	3rd-highest
Greymouth	17.4	1.7	1947	3rd-highest
Okarito	16.8	1.3	1982	3rd-highest
Milford Sound	16.2	1.4	1934	3rd-highest
Stewart Island	14.4	1.3	1975	3rd-highest
South West Cape	13.8	1.1	1991	3rd-highest
Dannevirke	18.2	1.3	1951	4th-highest
Wairoa (North Clyde)	20.4	1.6	1964	4th-highest
Porirua	18.0	0.7	1968	4th-highest
Ohakune	16.3	1.4	1962	4th-highest
Windsor	15.4	0.6	2000	4th-highest
Low records or near-records				
None observed				

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

Location	Mean maximum air temp. (°C)	Departure from normal (°C)	Year records began	Comments
<b>High records or near-records</b>				
Cape Reinga	23.2	1.5	1951	Highest
Whangaparāoa	25.0	2.2	1982	Highest
Auckland (Whenuapai)	25.4	2.2	1945	Highest
Paeroa	26.8	2.4	1947	Highest
Matamata	26.3	2.7	1999	Highest
Te Puke	25.0	1.9	1973	Highest
Taupō	25.9	3.8	1949	Highest
Auckland (Airport)	25.6	2.4	1959	Highest
Whatawhata	26.2	3.4	1952	Highest
Hamilton (Airport)	26.1	2.4	1946	Highest
Port Taharoa	24.1	1.5	1973	Highest
Te Kuiti	26.4	2.8	1959	Highest
Taumarunui	26.6	3.1	1947	Highest
Tūrangi	24.9	2.5	1968	Highest
Lower Retaruke	25.4	2.3	1966	Highest
Mt Ruapehu (Chateau)	20.1	3.0	2000	Highest
Hicks Bay	23.4	2.0	1969	Highest
Waiouru	21.8	2.8	1962	Highest
Franz Josef	21.6	2.2	1953	Highest
Dargaville	25.5	2.8	1943	2nd-highest
Whangārei	25.9	1.9	1967	2nd-highest
Leigh	26.0	3.8	1966	2nd-highest
Whakatāne	25.2	1.4	1974	2nd-highest
Rotorua	24.5	2.8	1964	2nd-highest
Motu	22.5	2.5	1990	2nd-highest
Waipawa	25.7	2.2	1945	2nd-highest
Stratford	22.4	2.1	1960	2nd-highest
Whanganui (Spriggens Park)	24.0	2.0	1937	2nd-highest
Greymouth	21.4	2.0	1947	2nd-highest
Whitianga	25.5	2.1	1962	3rd-highest
Auckland (Pukekohe)	25.6	2.8	1969	3rd-highest
Hamilton (Ruakura)	26.2	2.8	1906	3rd-highest
New Plymouth	23.5	2.3	1944	3rd-highest
Ohakune	22.5	2.1	1962	3rd-highest
Okarito	21.0	1.4	1982	3rd-highest
Stewart Island	18.6	1.8	1975	3rd-highest
Tauranga	25.0	1.6	1913	4th-highest
Gisborne	25.8	1.8	1905	4th-highest
Levin	23.2	1.7	1895	4th-highest
Manapouri	20.4	1.8	1971	4th-highest
<b>Low records or near-records</b>				
None observed				

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

<b>Location</b>	<b>Mean minimum air temp. (°C)</b>	<b>Departure from normal (°C)</b>	<b>Year records began</b>	<b>Comments</b>
<b>High records or near-records</b>				
Cape Reinga	17.6	1.9	1951	Highest
Kaitaia	17.2	2.5	1948	Highest
Kerikeri	16.2	2.3	1945	Highest
Whangārei	17.5	2.2	1967	Highest
Leigh	18.1	1.8	1966	Highest
Auckland (Western Springs)	17.2	2.2	1948	Highest
Auckland (Pukekohe)	16.0	2.2	1969	Highest
Hicks Bay	17.1	2.0	1969	Highest
Kaikohe	15.9	1.8	1973	2nd-highest
Dargaville	16.4	1.7	1943	2nd-highest
Auckland (Whenuapai)	16.2	2.2	1945	2nd-highest
Whitianga	16.0	2.2	1962	2nd-highest
Tauranga	17.1	2.3	1913	2nd-highest
Te Puke	15.6	2.7	1973	2nd-highest
Whakatāne	15.9	2.4	1974	2nd-highest
Rotorua	14.0	1.6	1964	2nd-highest
Motu	12.3	2.1	1990	2nd-highest
Hamilton (Ruakura)	14.5	1.8	1906	2nd-highest
Port Taharoa	17.3	2.1	1973	2nd-highest
New Plymouth	15.0	1.6	1944	2nd-highest
Lower Retaruke	12.5	1.4	1966	2nd-highest
Mt Ruapehu (Chateau)	8.1	1.5	2000	2nd-highest
Gisborne	15.3	2.0	1905	2nd-highest
Māhia	16.1	1.6	1990	2nd-highest
Stratford	12.3	1.4	1960	2nd-highest
Hāwera	13.9	1.7	1977	2nd-highest
Waibouru	10.0	1.8	1962	2nd-highest
Okarito	12.6	1.3	1982	2nd-highest
Rangiora	12.2	1.5	1965	2nd-highest
Middlemarch	9.2	1.1	2000	2nd-highest
Whangaparāoa	17.7	2.0	1982	3rd-highest
Taupō	13.0	1.9	1949	3rd-highest
Auckland (Airport)	17.6	1.8	1959	3rd-highest
Masterton	12.5	2.1	1906	3rd-highest
Dannevirke	13.1	1.2	1951	3rd-highest
Martinborough	13.2	1.3	1986	3rd-highest
Paraparaumu	14.4	1.3	1953	3rd-highest
Levin	14.2	1.3	1895	3rd-highest
Whanganui (Airport)	15.1	1.6	1937	3rd-highest

Westport	14.6	2.2	1937	3rd-highest
Reefton	12.4	1.8	1960	3rd-highest
Franz Josef	11.9	1.7	1953	3rd-highest
Nelson	15.2	1.8	1862	3rd-highest
Lincoln	12.4	1.3	1881	3rd-highest
Windsor	10.5	1.0	2000	3rd-highest
Paeroa	15.1	1.3	1947	4th-highest
Whatawhata	14.4	1.3	1952	4th-highest
Castlepoint	15.4	1.4	1972	4th-highest
Wairoa ( North Clyde)	14.8	1.3	1964	4th-highest
Porirua	14.4	0.8	1968	4th-highest
Puysegur Point	12.0	1.2	1978	4th-highest
Blenheim	13.5	1.4	1932	4th-highest
<b>Low records or near-records</b>				
None observed				

## Rainfall: Periods of extended dryness interspersed with extreme rainfall events

Summer rainfall was highly variable and featured extended dry spells alongside extreme rainfall events. For the season as a whole, below normal rainfall (50-79% of normal) was observed in Northland, Auckland, parts of Waikato and Southland. Pockets of well below normal rainfall (<50% of normal) occurred in the western Kaipara and Far North districts as well as southern Southland. Most notably it was the driest summer on record in Invercargill with records extending back to 1900. Tiwai Point and Stewart Island also experienced their driest summer on record.

Several extreme rainfall events occurred during summer (detailed in [Highlights and extreme events](#) section). These rainfall events contributed to a record or near-record wet summer for several locations. Well above normal rainfall (>149% of normal) occurred in Taranaki, Manawatū-Whanganui, parts of Hawke’s Bay, Greater Wellington, Tasman, Nelson, Marlborough, the Grey and Buller districts and large parts of Canterbury. Above normal rainfall (120-149% of normal) was observed in the Gisborne region and parts of Otago. Kaikōura received 488 mm of rain – more than three times its summer normal, making it the wettest summer on record there since records began in 1898. In Christchurch, more than two and half times the normal summer rainfall fell, making it the 4<sup>th</sup>-wettest summer on record there since records began in 1863.

### Record or near-record summer rainfall totals were recorded at:

Location	Rainfall total (mm)	Percentage of normal	Year records began	Comments
<b>High records or near-records</b>				
Masterton	556	307	1926	Highest
Martinborough	420	275	1924	Highest
Paraparaumu	557	269	1945	Highest
Levin	544	213	1895	Highest



Wellington (Airport)	509	276	1958	Highest
Hāwera	600	248	1977	Highest
Kaikōura	488	354	1898	Highest
Waipara West	350	232	1973	Highest
Westport	905	190	1893	2nd-highest
Māhia	362	171	1990	3rd-highest
Palmerston North	429	193	1928	3rd-highest
Wellington (Kelburn)	595	259	1928	3rd-highest
Upper Hutt	488	187	1924	3rd-highest
Winchmore	328	187	1947	3rd-highest
Whanganui (Spriggens Park)	405	182	1890	4th-highest
Tākaka	740	177	1976	4th-highest
Farewell Spit	507	203	1874	4th-highest
Ashburton	337	207	1909	4th-highest
Christchurch (Airport)	314	250	1863	4th-highest
<b>Low records or near-records</b>				
Invercargill	129	42	1900	Lowest
Tiwai Point	117	40	1970	Lowest
Stewart Island	140	36	1975	Lowest

## Summer in the six main centres

Record high mean summer temperatures were observed in Auckland and Tauranga while the mean temperature at Hamilton Airport was the 2<sup>nd</sup>-highest on record (highest on record at Hamilton – Ruakura). Temperatures were above average in Wellington and Dunedin while Christchurch experienced near average temperatures. In terms on rainfall, Wellington had its 3<sup>rd</sup>-wettest summer on record based on readings in Kelburn (wettest on record at the Airport) while Christchurch experienced its 4<sup>th</sup>-wettest summer on record. Conversely, Hamilton and Dunedin experienced below normal summer rainfall while rainfall in Auckland and Tauranga was near normal (below normal at some other Auckland climate stations). Of the six main centres in summer 2021-22, Auckland was the warmest, Dunedin was the coolest and driest, Tauranga was the sunniest, Wellington was the wettest and Christchurch was the least sunny.

### Summer 2021-22 main centre climate statistics:

Temperature			
Location	Mean temp. (°C)	Departure from normal (°C)	Comments
Auckland <sup>h</sup>	21.6	+2.1	Well above average (highest on record)
Tauranga <sup>b</sup>	21.1	+2.0	Well above average (highest on record)
Hamilton <sup>c</sup>	19.9	+1.9	Well above average (2 <sup>nd</sup> -highest on record)
Wellington <sup>d</sup>	17.3	+0.8	Above average
Christchurch <sup>e</sup>	16.6	0.0	Average
Dunedin <sup>f</sup>	15.5	+0.8	Above average
Rainfall			
Location	Rainfall (mm)	% of normal	Comments
Auckland <sup>h</sup>	178 <sup>2</sup>	80	Near normal
Tauranga <sup>b</sup>	225	87	Near normal
Hamilton <sup>c</sup>	175	67	Below normal
Wellington <sup>d</sup>	595	259	Well above normal (3 <sup>rd</sup> -highest on record)
Christchurch <sup>e</sup>	314	250	Well above normal (4 <sup>th</sup> -highest on record)
Dunedin <sup>f</sup>	150	68	Below normal
Sunshine			
Location	Sunshine (hours)		
Auckland <sup>a</sup>	718		
Tauranga <sup>b</sup>	806		
Hamilton <sup>g</sup>	707		
Wellington <sup>d</sup>	657		
Christchurch <sup>e</sup>	604		
Dunedin <sup>f</sup>	641		

<sup>a</sup> Māngere <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>h</sup> Airport

<sup>2</sup> 1 missing day of data

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## Highlights and extreme events

This section contains information pertaining to some of the more significant highlights and extreme events that occurred during summer 2021-22. Note that a more detailed list of significant weather events for summer 2021-22 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 was 34.7°C, observed at Lake Karapiro (Waikato) on 4 January.

The lowest temperature was 0.0°C, observed at Manapouri on 27 February.

The first few days of 2022 featured hot temperatures across much of New Zealand, with many locations exceeding 30°C, and some observing near-record daily maximum temperatures between 2-5 January. This was caused by a combination of a warm air mass overhead, plentiful sunshine due to high pressure, a north-easterly wind flow and warmer than usual coastal waters.

The first half of February was particularly humid across the North Island. On 11 February, the dew point (a way to measure near-surface atmospheric moisture) in Auckland reached 24.1°C, the city's highest for any day in February on record, and the highest overall since 31 January 1999. The cloudy and humid conditions contributed to several record and near-record high daily minimum temperatures (warm nights) in mid-February.

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

Location	Extreme maximum (°C)	Date of extreme temperature	Year records began	Comments
High records or near-records				
Whatawhata	33.0	Feb-10th	1952	Highest
Whanganui (Airport)	32.7	Feb-10th	1937	Highest
Westport	29.2	Feb-8th	1937	Highest
Greymouth	29.8	Feb-8th	1947	Highest
Okarito	28.2	Feb-8th	1982	Highest
Taupō	33.2	Jan-4th	1949	Equal highest
Cape Reinga	28.4	Feb-23rd	1951	2nd-highest
Tiri Tiri Lighthouse	27.6	Jan-10th	1982	2nd-highest
Motu	29.6	Feb-9th	1990	2nd-highest
Te Kuiti	32.6	Jan-4th	1959	2nd-highest
Arapito	29.2	Feb-8th	1978	2nd-highest
Balclutha	33.2	Feb-2nd	1964	2nd-highest
Leigh	30.2	Feb-10th	1966	3rd-highest
Auckland (Henderson)	31.8	Jan-4th	1948	3rd-highest
Mt Ruapehu (Chateau)	27.3	Jan-4th	2000	3rd-highest
Franz Josef	29.0	Feb-8th	1953	3rd-highest
Secretary Island	26.0	Dec-14th	1985	3rd-highest
Nugget Point	31.5	Feb-2nd	1970	3rd-highest
Auckland (Whenuapai)	30.1	Jan-4th	1945	4th-highest
Te Puke	32.2	Dec-24th	1973	4th-highest

Rotorua	30.8	Jan-3rd	1964	4th-highest
Hāwera	28.1	Feb-4th	1977	4th-highest
Invercargill	32.2	Jan-2nd	1905	4th-highest
Taumarunui	33.1	Jan-4th	1947	Equal 4th-highest
Lower Retaruke	31.5	Jan-4th	1966	Equal 4th-highest
Dannevirke	31.9	Feb-4th	1951	Equal 4th-highest
Boyle River Lodge	33.5	Jan-2nd	1983	Equal 4th-highest
<b>Low records or near-records</b>				
Oamaru	10.1	Dec-11th	1972	Lowest
Te Anau	10.3	Feb-4th	1973	3rd-lowest
Five Rivers	10.0	Feb-4th	1982	4th-lowest
Arthurs Pass	7.5	Feb-13th	1973	Equal 4th-lowest

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

Location	Extreme minimum (°C)	Date of extreme temperature	Year records began	Comments
<b>Low records or near-records</b>				
None observed				
<b>High records or near-records</b>				
Cape Reinga	21.8	Feb-12th	1971	Highest
Kaitaia	24.2	Feb-12th	1948	Highest
Kerikeri	23.0	Feb-12th	1952	Highest
Kaikohe	22.6	Feb-12th	1973	Highest
Dargaville	23.1	Feb-12th	1951	Highest
Whangārei	24.0	Feb-12th	1967	Highest
Leigh	22.7	Feb-12th	1966	Highest
Auckland (Whangaparāoa)	21.9	Feb-12th	1982	Highest
Auckland (Whenuapai)	22.6	Feb-12th	1951	Highest
Auckland (Western Springs)	22.9	Feb-12th	1971	Highest
Paeroa	23.1	Feb-12th	1971	Highest
Taupō	20.5	Feb-13th	1950	Highest
Motu	18.8	Feb-12th	1990	Highest
Auckland (Māngere)	23.0	Feb-9th	1961	Highest
Hamilton (Ruakura )	22.0	Feb-13th	1940	Highest
Port Taharoa	22.4	Feb-10th	1974	Highest
Mt Ruapehu (Chateau)	16.1	Feb-12th	2000	Highest
Paraparaumu	21.1	Jan-2nd	1972	Highest
Palmerston North	20.7	Feb-11th	1940	Highest
Hāwera	21.1	Feb-11th	1977	Highest
Whanganui (Spriggens Park)	22.2	Feb-5th	1972	Highest
Westport	21.2	Feb-10th	1966	Highest
Arapito	20.4	Feb-10th	1978	Highest
Okarito	18.8	Feb-10th	1983	Highest
Waipara West	24.4	Feb-3rd	1973	Highest
Rangiora	23.2	Feb-3rd	1972	Highest
Tautuku	19.9	Dec-20th	1976	Highest

Whakatāne	22.4	Feb-13th	1975	Equal highest
Whitianga	22.0	Feb-13th	1971	2nd-highest
Tauranga	22.4	Feb-13th	1941	2nd-highest
Te Puke	21.2	Feb-13th	1973	2nd-highest
Rotorua	20.6	Feb-12th	1972	2nd-highest
Auckland (Pukekohe)	22.3	Feb-12th	1969	2nd-highest
Hamilton (Airport)	22.0	Feb-6th	1946	2nd-highest
Tūrangi	19.6	Feb-13th	1968	2nd-highest
New Plymouth	21.4	Feb-5th	1944	2nd-highest
Lower Retaruke	19.9	Feb-5th	1972	2nd-highest
Hicks Bay	21.5	Feb-13th	1972	2nd-highest
Levin	21.4	Feb-10th	1950	2nd-highest
Kaikōura	20.7	Feb-3rd	1972	2nd-highest
Cheviot	22.2	Feb-3rd	1982	2nd-highest
Akaroa	22.7	Feb-3rd	1978	2nd-highest
Martinborough	21.7	Feb-11th	1986	Equal 2nd-highest
Waioru	18.0	Feb-13th	1972	Equal 2nd-highest
Franz Josef	18.0	Feb-9th	1953	Equal 2nd-highest
Stewart Island	16.4	Dec-20th	1975	Equal 2nd-highest
Warkworth	22.0	Feb-12th	1966	3rd-highest
Wellington (Airport)	20.9	Feb-4th	1972	3rd-highest
Greymouth	18.9	Feb-9th	1972	3rd-highest
Motueka	19.9	Feb-4th	1972	3rd-highest
Arthurs Pass	15.8	Jan-3rd	1978	3rd-highest
Matamata	21.6	Feb-12th	1999	Equal 3rd-highest
Stratford	18.8	Feb-10th	1972	Equal 3rd-highest
Masterton	21.0	Feb-11th	1943	4th-highest
Upper Hutt	20.6	Feb-4th	1972	4th-highest
Reefton	18.8	Feb-10th	1972	4th-highest
Culverden	22.4	Feb-3rd	1930	4th-highest
Waiau School	21.6	Feb-3rd	1974	4th-highest
Ashburton	21.6	Feb-3rd	1928	4th-highest
Windsor	17.7	Dec-20th	2000	4th-highest
Alexandra	18.2	Dec-20th	1992	Equal 4th-highest

## Dryness and drought

Auckland City experienced a 37-day dry spell from 17 December to 22 January, which was its 2<sup>nd</sup>-longest dry spell since records began in 1943. Dryness in January also occurred across most of the country as a plethora of locations around New Zealand introduced water restrictions during January due to the very dry month.

The lack of rainfall during January led to rapidly drying soils across New Zealand. By the end of the month, the New Zealand Drought Index (NZDI) indicated that meteorological drought had emerged in western Northland and small pockets of Waikato. A wetter February helped to alleviate some of the dryness. However, by the end of summer dry to extremely dry conditions (based on the NZDI) remained in Southland and dry to very dry conditions were present in parts of Northland, Auckland and Waikato.

## Rain and slips

On 6 December, an airmass laden with tropical moisture combined with a brisk southerly change to generate flooding rainfall for the Wellington region. Over 25 mm of rainfall was recorded at Kelburn in an hour, the heaviest hourly rainfall rate recorded in over 14 years. Palmerston North recorded 26 mm in an hour, the heaviest hourly rainfall rate recorded in 3 years. As a result, roadways were flooded as the Waikanae River and Hutt River burst its banks. Twenty-five homes near Paraparaumu were cut off after a serious slip.

Between 13-15 December, an influx of tropical moisture from Tropical Cyclone Ruby was drawn across New Zealand by an upper level trough. This also induced the formation of a surface low pressure system. The resulting weather system led to heavy rainfall, spreading from the north to the south over several days. Parts of Auckland received 25 mm in an hour. This resulted in several road collisions due to slippery motorways. In Akaroa, 79 mm of rain fell in 24 hours, the heaviest December rainfall on record, while in Christchurch, 61 mm fell in 24 hours, the 3<sup>rd</sup>-heaviest December rainfall on record. Flooding and slips were observed around Le Bons Bay, closing roads.

From 3-5 February, an atmospheric river of moisture impacted the upper South Island with very heavy rainfall, leading to flooding, slips, and evacuations, and a local state of emergency was declared for the Buller District. Westport residents were urged to self-evacuate, with some areas of the city facing mandatory evacuation orders. Meanwhile, a large slip blocked the only access road to the Seddonville settlement, while SH6 was closed between Makarora and Fox Glacier due to several slips. Other towns cut off included Mokihinui and Karamea. Nearly 200 people in Franz Josef lost power after a slip or washout damaged power poles. In Marlborough, the settlements of Duncan Bay and Penzance Bay were cut off following slips, while SH6 was closed between Hira and Rai Valley. DOC announced a partial closure of the Heaphy Track that would last several months as three bridges were extensively damaged or destroyed.

On 6 February, the same atmospheric river that had affected the upper South Island in previous days moved north into Taranaki, with some locations recording nearly a half-metre of rain. SH45 between Okato and Opunake was closed due to flooding.

Another atmospheric river impacted the upper West Coast on 9-10 February, resulting in a new state of emergency being declared in Buller District, and another round of mandatory evacuations. Surface flooding, slips, and road closures affected all access routes into Westport and surrounding areas, including SH6, SH7, SH67, and SH69. FENZ was called in to pump water out of the Westport hospital basement, along with multiple homes in Westport, Reefton, Waimangaroa, and Granity.

On 13 February, ex-Tropical Cyclone Dovi brought a variety of weather impacts to the North Island and upper South Island, including heavy rainfall and strong wind gusts. This was the first cyclone to make landfall in New Zealand in nearly four years, since Fehi and Gita in February 2018. Numerous roads were temporarily closed due to surface flooding or slips, including SH2 in Lower Hutt, SH58 between Paremata and Haywards, several roads in Wairarapa including SH53, and SH45 in Taranaki. In the South Island, SH1 between Kaikōura and Waipara was closed due to flooding and slips. In Wellington, Featherston residents were urged to boil water before use as surface water had entered the Boar Bush reservoir, contaminating the water supply. Several homes in Wellington were also evacuated due to slips, and heavy rainfall resulted in widespread surface flooding. FENZ responded to more than 300 calls across the country, mostly from Auckland, Waikato, Bay of Plenty, Taranaki, and Wellington.

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

Location	Extreme 1-day rainfall (mm)	Date of extreme rainfall	Year records began	Comments
Masterton	124	Feb-12th	1926	Highest
Kāpiti Island	91	Dec-6th	1961	Highest
Wellington (Airport)	116	Feb-12th	1958	Highest
Hāwera	153	Feb-5th	1977	Highest
Westport	169	Feb-9th	1928	Highest
Reefton	167	Feb-9th	1960	Highest
Woodend	92	Dec-15th	1981	Highest
Te Kuiti	139	Feb-11th	1957	2nd-highest
Martinborough	108	Feb-12th	1924	2nd-highest
Paraparaumu	80	Dec-6th	1951	2nd-highest
Wellington (Kelburn)	127	Feb-12th	1928	2nd-highest
Stratford	180	Feb-5th	1960	2nd-highest
Prebbleton Valway	90	Dec-15th	1969	2nd-highest
Greenpark	83	Dec-15th	1956	2nd-highest
Leeston	87	Dec-15th	1986	2nd-highest
Motunau	95	Dec-16th	1992	2nd-highest
Little Akaloa, Brockwort	118	Dec-15th	1911	2nd-highest
Taupō	119	Feb-11th	1949	3rd-highest
New Plymouth	125	Feb-5th	1944	3rd-highest
Hicks Bay	150	Feb-7th	1916	3rd-highest
Bulls	53	Dec-28th	1999	3rd-highest
Palmerston North	81	Feb-5th	1928	3rd-highest
Tākaka	190	Feb-2nd	1976	3rd-highest
Arapito	112	Dec-9th	1978	3rd-highest
Greymouth	145	Feb-9th	1947	3rd-highest
Cheviot	74	Dec-15th	2000	3rd-highest
Pirinoa	65	Dec-6th	1967	4th-highest
Levin	77	Feb-5th	1949	4th-highest
Amberley	70	Dec-16th	1987	4th-highest
Akaroa	79	Dec-15th	1977	4th-highest

**Wind**

The highest wind gust was 185 km/h, observed at both South West Cape and Puysegur Point on 20 December.

On 20 December, powerful west-northwesterly winds ahead of a front developed across the South Island and lower North Island. Wellington Airport experienced a gust of 100 km/h, while Upper Hutt had a gust of 82 km/h, the equal 3<sup>rd</sup>-highest December gust on record.

On 13 February, ex-Tropical Cyclone Dovi brought strong winds to much of the North Island. Widespread power outages occurred in Auckland due to gusts near or above 100 km/h, while the Auckland Harbour Bridge was closed from 9:30 a.m. to 2:00 p.m. due to winds above the 90 km/h

threshold for safe use. In addition, ferry sailings in Auckland were disrupted, and Interislander ferries were cancelled for the day. Air New Zealand cancelled more than 100 flights, mostly due to the strong winds. A man in Raglan was taken to hospital with serious injuries after a tree fell on his vehicle, with another vehicle hit by a tree in Hamilton. In Kauri, Whangārei, a tree fell and damaged a home, while several boats broke free of their moorings at Russell and Opuā. Power outages were reported in several parts of Taranaki due to high winds, with power also out in parts of Northland and Waikato.

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

Location	Extreme wind gust (km/h)	Date of extreme gust	Year records began	Comments
Tauranga	104	Feb-13th	1973	Highest
New Plymouth	128	Feb-13th	1972	Highest
Puysegur Point	185	Dec-20th	1986	Highest
South West Cape	185	Dec-20th	1991	Highest
Kaikohe	91	Feb-13th	1986	2nd-highest
Auckland (Airport)	107	Feb-13th	1971	2nd-highest
Hamilton (Ruakura)	83	Feb-13th	1996	2nd-highest
Baring Head	159	Feb-13th	1991	2nd-highest
Martinborough	122	Dec-20th	2001	2nd-highest
Hāwera	120	Feb-13th	1986	2nd-highest
Kaitiā	96	Feb-13th	1972	Equal 2nd-highest
Dargaville	93	Feb-13th	1997	Equal 2nd-highest
Auckland (Whenuapai)	96	Feb-13th	1972	Equal 2nd-highest
Castlepoint	159	Dec-21st	1972	Equal 2nd-highest
Palmerston North	100	Feb-13th	1991	Equal 2nd-highest
Alexandra	95	Dec-20th	2001	Equal 2nd-highest
Cape Reinga	128	Feb-13th	1974	3rd-highest
Hamilton (Airport)	87	Feb-13th	1978	3rd-highest
Whanganui (Airport)	106	Feb-13th	1977	3rd-highest
Motu	98	Feb-13th	1991	Equal 3rd-highest
Mt Kaukau	148	Feb-13th	1969	Equal 3rd-highest
Auckland (Western Springs)	78	Feb-13th	1994	4th-highest
Auckland (Airport)	107	Feb-13th	1971	2nd-highest

#### Volcanic activity

On 15 January, the Hunga Tonga–Hunga Ha’apai volcano in Tonga experienced a powerful eruption, ejecting an estimated 400,000 tonnes of sulphur dioxide into the atmosphere. However, due to the prevailing upper-level wind patterns, little of the sulphur dioxide reached New Zealand.

The eruption also caused a pressure wave which was measured by weather stations in New Zealand at a maximum amplitude of approximately 7 hectopascals. The pressure wave moved across the country at approximately 1230 km/h.



A tsunami caused by the eruption reached northern New Zealand early on 16 January. Most notably, it caused extensive damage at the Tutukaka marina in Northland, as several boats sank completely, as well as damaging structures at the marina.

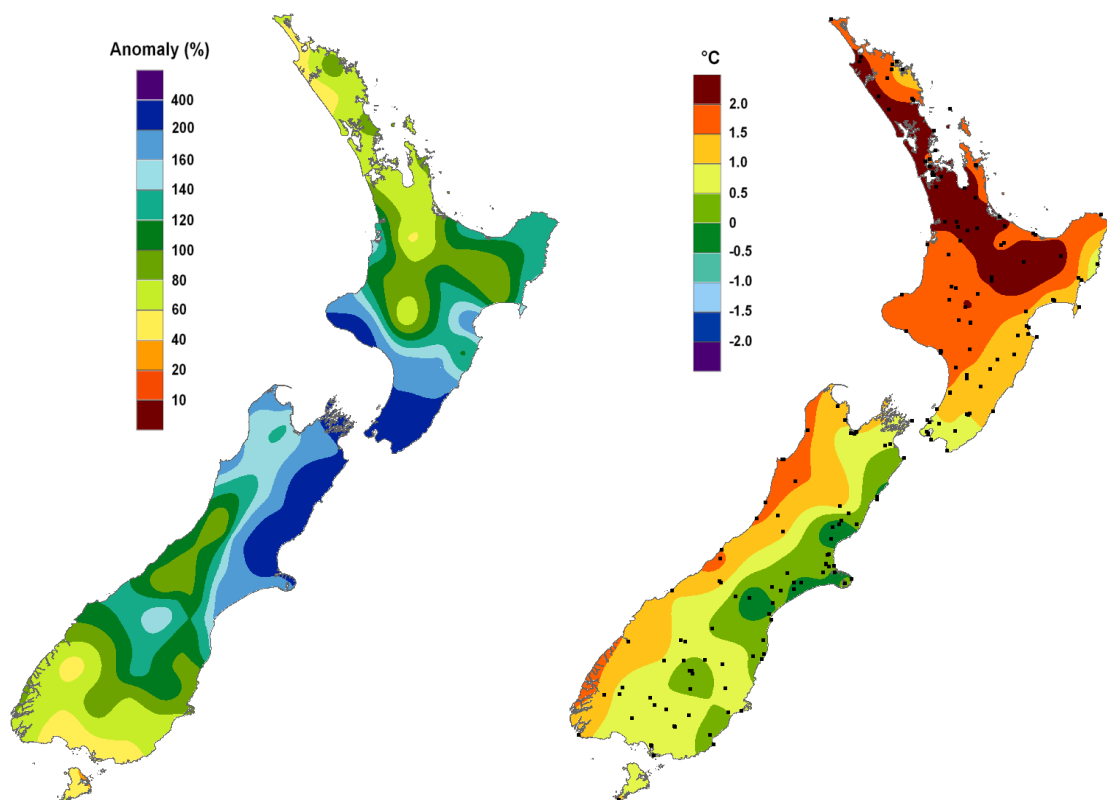
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**For further information please contact:**

**Nava Fedaeff**

Forecaster/Science Communicator

Tel. 09 375 6337



**Summer rainfall**

Expressed as a percentage of the 1981-2010 normal.

**Summer temperature**

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

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