



## 2022: New Zealand’s warmest year on record, again.

<b>Temperature</b>	Annual temperatures were above average (+0.51°C to +1.20°C above the annual average) or well above average (>1.20°C above the annual average) for much of Aotearoa New Zealand. Near normal (within -0.50°C to +0.50°C of average) temperatures occurred in pockets around the eastern South Island, and also parts of Marlborough and Nelson. 2022 was Aotearoa New Zealand’s warmest year on record, based on NIWA’s seven station series which began in 1909 ( <a href="#">Figure 2a</a> ).
<b>Rainfall</b>	Rainfall was above normal (120-149% of annual normal) or well above normal (>150% of annual normal) for parts of Northland, Tauranga, Gisborne, the Central Plateau, southern Taranaki, parts of Manawatū-Whanganui, much of Wellington, Nelson, northern Marlborough, parts of Tasman, the West Coast near Westport, and pockets of Canterbury. Rainfall was below normal (50-79% of annual normal) for pockets of Southland and Dunedin. The majority of the country experienced near normal rainfall (80-119% of annual normal). 2022 was the New Zealand’s 8 <sup>th</sup> most unusually wet year on record, based on an analysis of NIWA’s Virtual Climate Station Network dating back to 1960 ( <a href="#">Figure 2b</a> ).
<b>Soil moisture</b>	Below normal soil moisture levels occurred during January, leading to widespread abnormally dry conditions and areas of meteorological drought. Soils became wetter than normal during February across most of the country except Southland. Below normal soil moisture then redeveloped in Waikato and across large parts of the South Island during autumn. Above normal soil moisture levels developed for the vast majority of the country during winter. Soil moisture remained relatively high for the North Island during spring and into summer, but trended below normal in the South Island. At the end of December, soil moisture levels were higher than normal in eastern Northland, Auckland, Bay of Plenty, parts of Hawke’s Bay, southern Taranaki, parts of Manawatū-Whanganui, southern Wellington, and pockets of Canterbury; drier than normal soils occurred in the western and southern South Island, Nelson, much of Marlborough, Banks Peninsula, and were near normal elsewhere.
<b>Sunshine</b>	The wider Taranaki region experienced New Zealand’s highest annual sunshine total during 2022 (2659 hours recorded at New Plymouth).

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## Overview

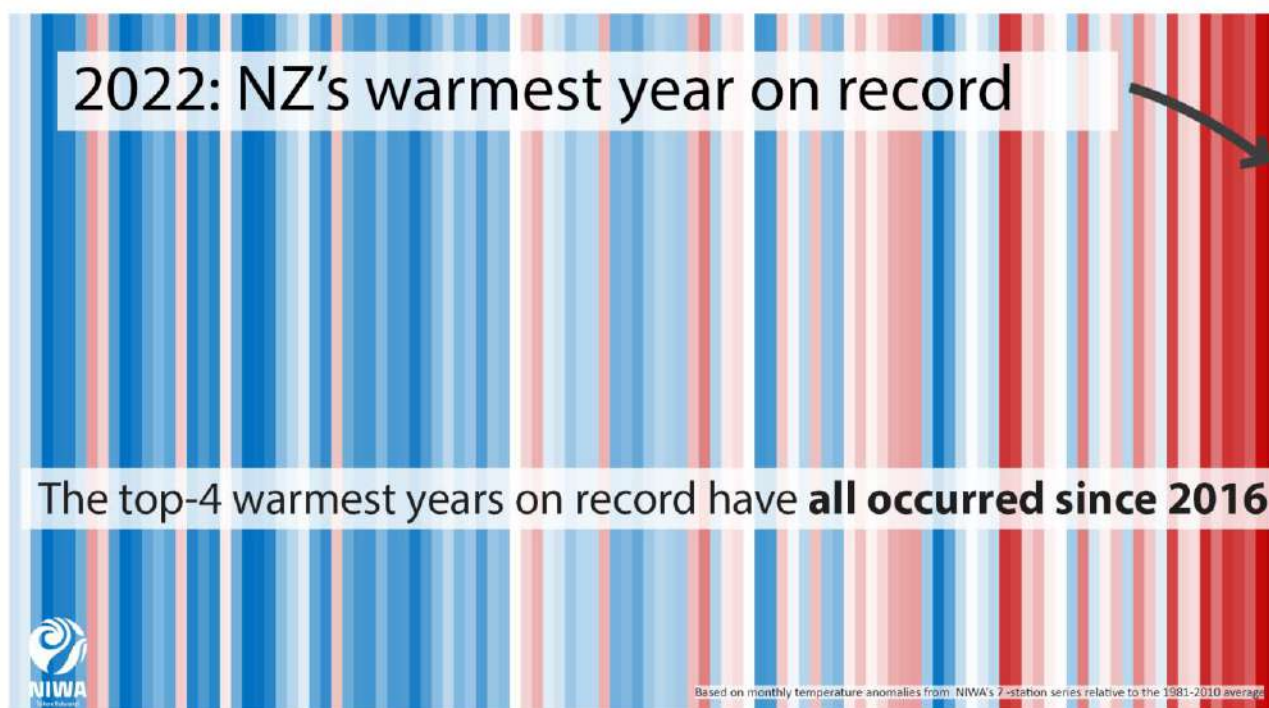


Figure 1: Coloured stripes showing a time series of the national temperature anomaly calculated from NIWA's Seven Station Series, relative to the 1981-2010 baseline. Red colours indicate temperatures above the 1981-2010 baseline while blue colours indicate temperatures below the baseline.

2022 was Aotearoa New Zealand's warmest year on record, surpassing the record set just last year ([Figure 1](#), [Figure 2a](#)). The nationwide average temperature for 2022 calculated using stations in NIWA's seven-station series was 13.76°C, being +1.15°C above the 1981-2010 annual average<sup>1</sup>, surpassing 2021 by +0.20°C. The top-4 warmest years on record have now all occurred since 2016, a trend that is consistent with climate change. It was also the warmest year on record in terms of maximum temperatures (+1.08°C above average) and minimum temperatures (+1.22°C above average). The previous record warmest year in all cases was 2021.

Data from NIWA's seven-station series also shows that no months in 2022 were below average (more than 0.50°C below than the monthly average), and ten out of twelve months were above average (+0.51°C to +1.20°C above the monthly average) or well above average (>1.20°C above the monthly average), visualised in [Figure 3](#). The most unusually warm month was November at +1.6°C above average and the most unusually cool month was October, which despite featuring a significant cold spell with near sea-level snow at the beginning of the month, was still +0.2°C compared to the long-term October average.

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<sup>1</sup> This climate summary refers to differences from average based on the 1981-2010 baseline climate period. The 1991-2020 baseline climate period is planned to be used from 2023.

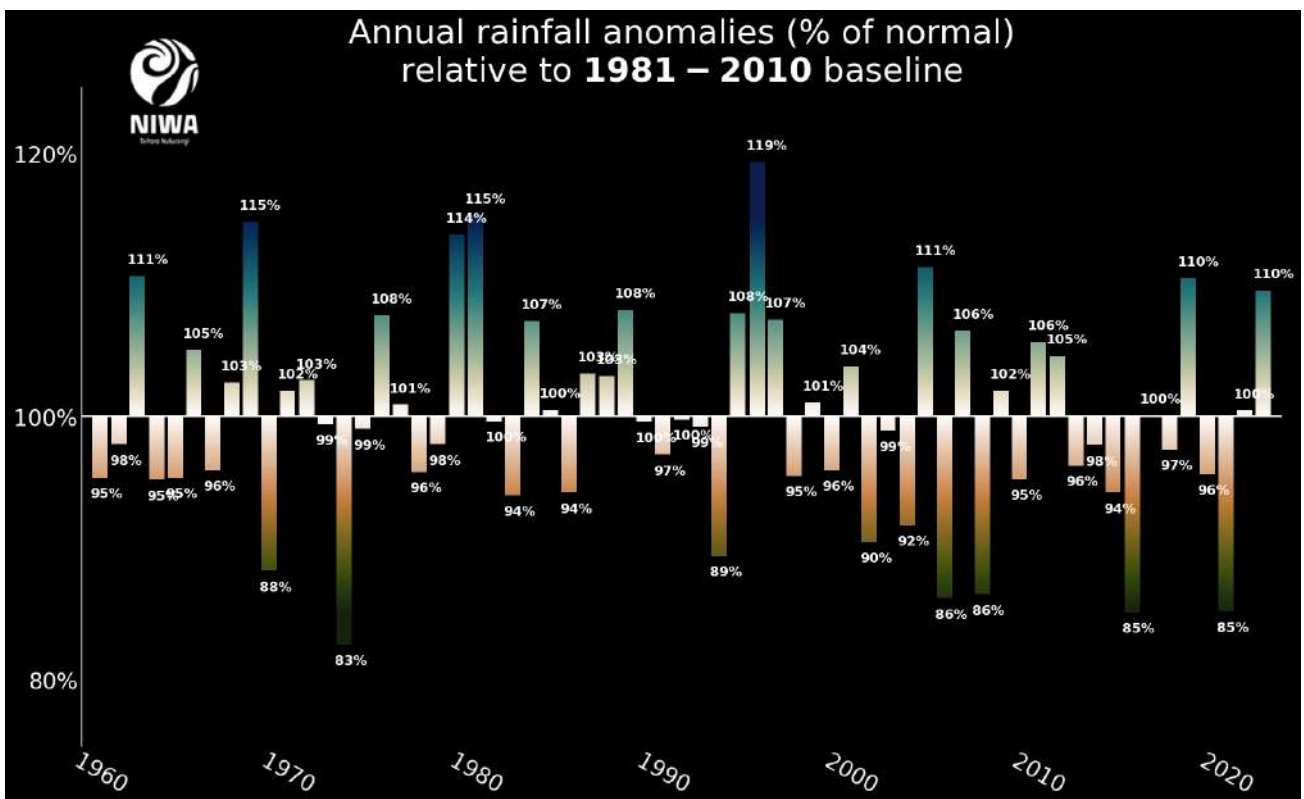
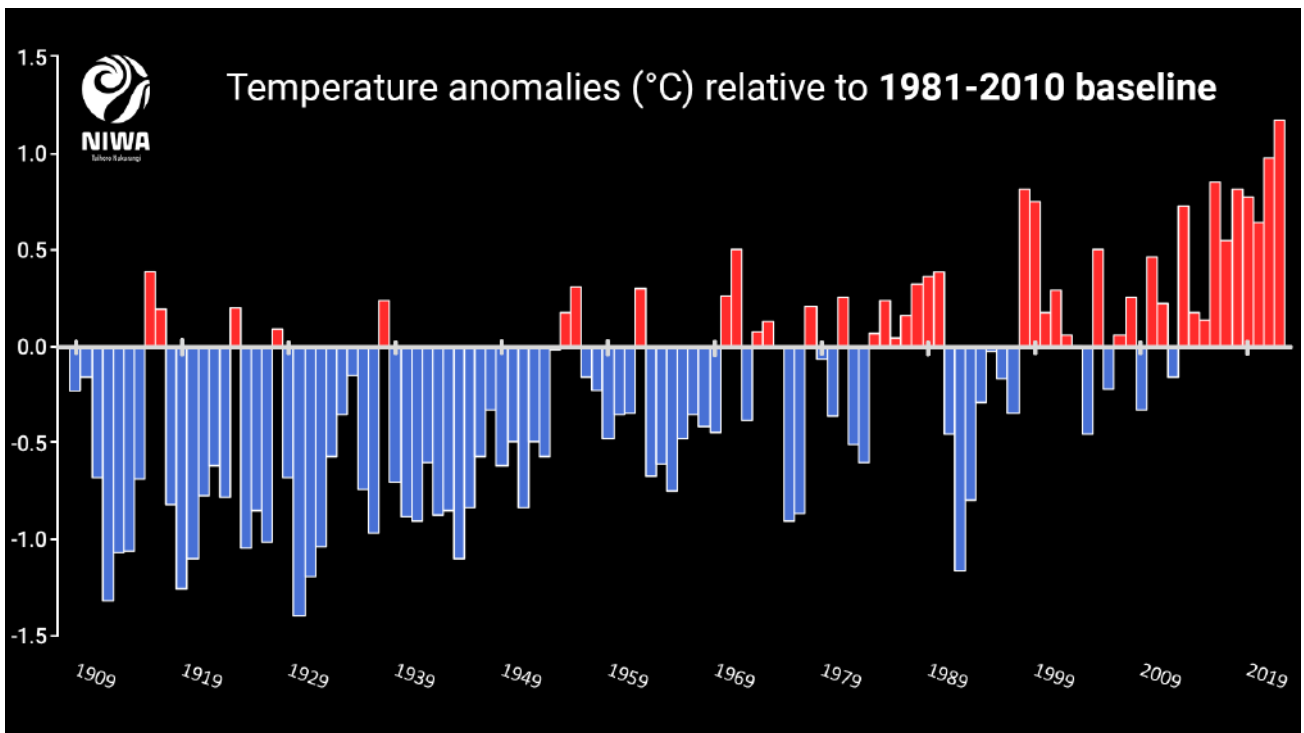


Figure 2: (a) Temperature anomalies from NIWA's seven station series from 1909 to 2022. Blue indicates temperatures colder than the 1981-2010 baseline, red indicates temperatures warmer than the 1981-2010 baseline. (b) Annual rainfall anomalies from 1960-2022 from NIWA's Virtual Climate Station Network relative to the 1981-2020 baseline, averaged over New Zealand.

2022 was also New Zealand's 8th most unusually wet year on record, based on an analysis of NIWA's Virtual Climate Station Network which goes back to 1960 (Figure 2b). It was the most unusually wet year since 2018. The nation wide area-averaged rainfall anomaly during 2022 was 110%.

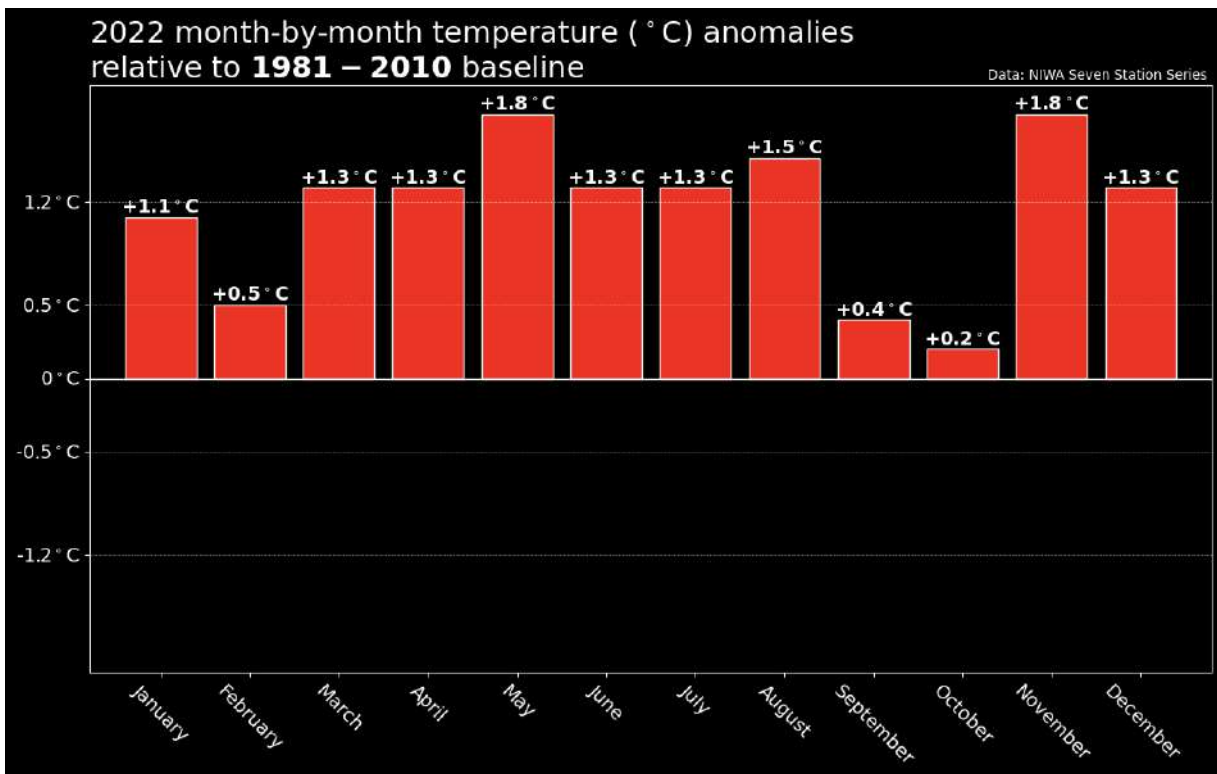


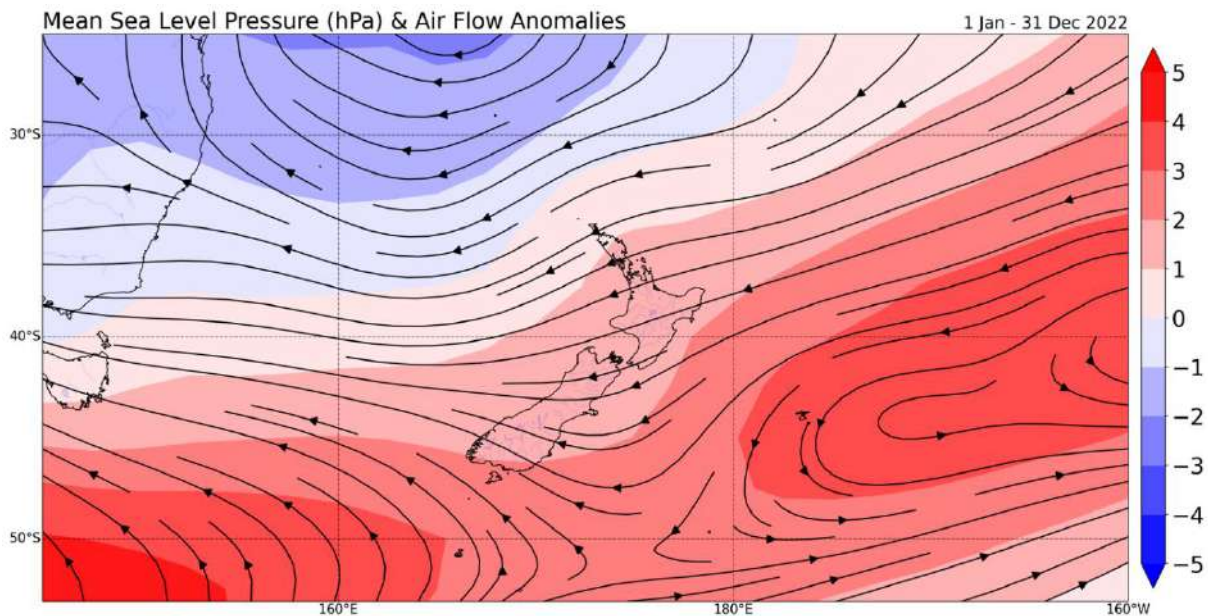
Figure 1: Monthly temperature anomalies calculated from NIWA's seven station series. All bars are red, indicating that no month had an anomaly below 0°C. Values above 0.5°C are considered "above average", while values above 1.2°C are considered to be "well above average".

There were a myriad of climate drivers that contributed to the unusual warmth and wetness (Figure 4) in 2022. The primary driver was La Niña, marked by cooler than average ocean temperatures in the central and eastern equatorial Pacific. La Niña influences atmospheric circulation patterns in the Pacific Ocean and has flow-on effects to climate across the globe. Both 2022 and 2021 were La Niña years and are ranked 1<sup>st</sup> and 2<sup>nd</sup> warmest years on record for New Zealand. 2022 was the third consecutive year of La Niña, known as a "triple dip", an uncommon occurrence that last happened in 1998-2000. For New Zealand, La Niña tends to be associated with higher-than-normal air pressure near and to the east of the country with lower pressures



Figure 2: Climate drivers that contributed to the unusual warmth and wetness of 2022.

to the north. This pressure setup causes more sub-tropical, northeasterly winds than normal, driving up air and sea temperatures. [Figure 5](#) shows how the average mean sea level pressure was higher than normal (red shading) across the New Zealand region for the year as a whole, with the arrows (vectors) showing the air flow anomaly.



*Figure 5: Air pressure as a difference from normal during 2022. Red colours indicate higher than normal pressure, which tends to be associated with tranquil weather, and blue colours indicate lower than normal pressure, typically associated with unsettled weather. The vectors indicate the air flow anomaly. Climatology is based on the 1981 – 2010 period.*

Another mode of variability, called the Southern Annular Mode (SAM), is a proxy for measuring the strength and position of the belt of westerly winds that encircle the Southern Ocean and bring storms to New Zealand. The SAM was positive 76.2% of the time in 2022, the highest annual percentage since at least 1979. A positive SAM is associated with higher-than-normal pressures over the New Zealand region, as shown by the schematic in [Figure 6](#). The SAM has exhibited a trend toward the positive phase over the last 40 years which is consistent with climate change.

In the Indian Ocean, a sea surface temperature seesaw known as the negative phase of the Indian Ocean Dipole (IOD) developed during winter and continued through spring. This feature, marked by warmer (cooler) than average seas in the eastern (western) tropical Indian Ocean, was associated with above normal atmospheric moisture across the wider Australasia region. This extra moisture which was picked up and transported into New Zealand by mid-latitude low pressure systems and fronts.

Since New Zealand is an island nation, coastal sea surface temperatures (SSTs) have an important influence on weather conditions. Warmer than average SSTs can drive up humidity, lead to persistently above average air temperatures, especially near the coast, and contribute more moisture to approaching low pressure systems. During 2022, coastal SSTs were above or well above average every month, with December, November, and January ranking as the top three most unusually warm months. This culminated in a marine heatwave (MHW) event, or unusually warm ocean temperatures over thousands of kilometres, that lasted much of the year. MHW conditions were most persistent in Northland, Auckland, Waikato, Bay of Plenty, Taranaki, Tasman, West Coast, and Southland.

The presence of warmer-than-average regional SSTs, along with La Niña conditions and the negative IOD, were the primary natural reasons why New Zealand experienced warm and wet conditions through much of the year. Climate change continues to influence New Zealand’s long-term temperature trend, which is increasing at a rate of approximately 1.17°C (± 0.2°C) per century according to NIWA’s seven-station series.

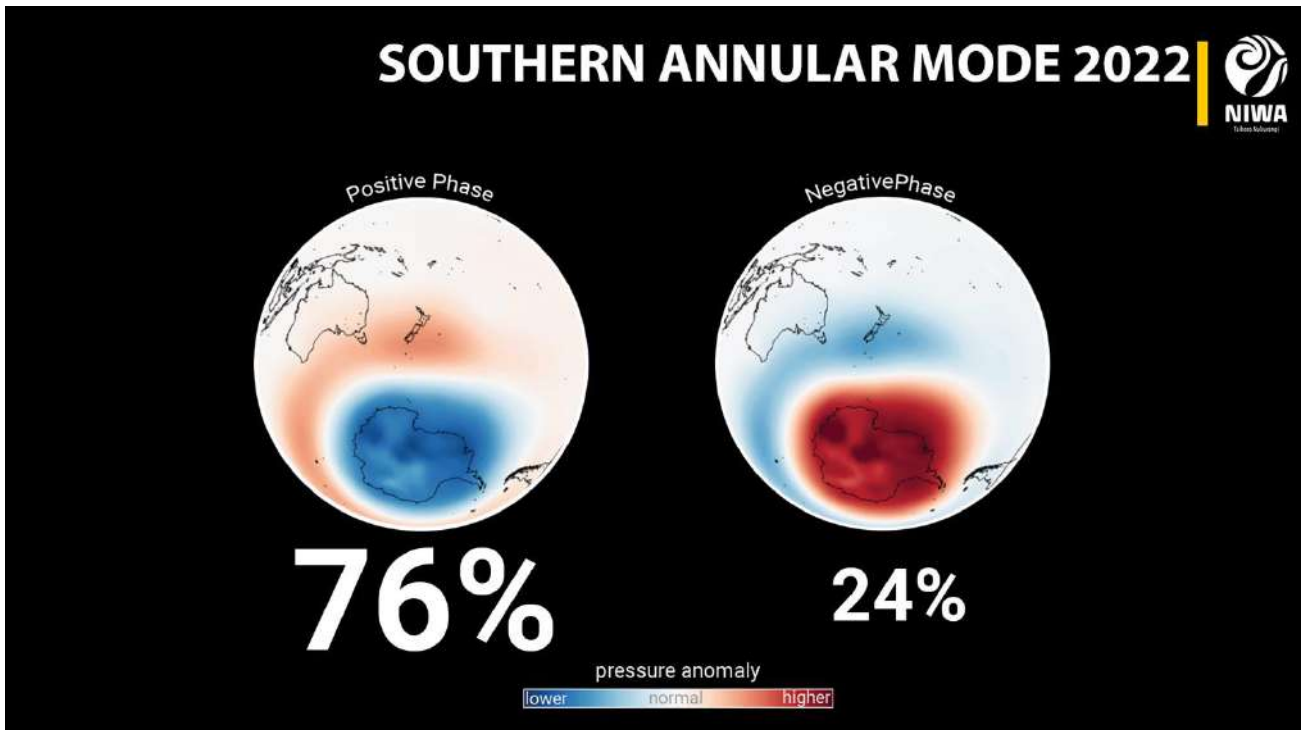


Figure 3: Pressure anomalies associated with the different phases of the Southern Annular Mode (SAM).

Starting with January, abnormal dryness developed right across the country, along with pockets of meteorological drought - 16 locations experienced their driest January on record. This was coupled with unusual warmth as the January national temperature was +1.1 °C above average. Drought-breaking rain then arrived during February with a series of extreme rainfall events, including several landfalling atmospheric rivers (ARs)<sup>2</sup> for the North Island and South Island, and ex-tropical cyclone (ex-TC) Dovi making landfall in the North Island. However, this rain missed much of Southland, where dryness and drought persisted.

Into autumn, dryness took over again for much of the country as warmth persisted, driven by warmer-than-average sea surface temperatures (SSTs) and a waning La Niña. However, a significant heavy rain event brought record-breaking rain to Auckland and flooding to parts of the upper North Island and the Gisborne area late in March. Additionally, rain was above normal in the lower South Island during April, alleviating the long-standing dryness. Autumn as a whole was the equal 2<sup>nd</sup> warmest autumn on record (since at least 1909).

Winter was the wettest and warmest winter on record. The most notable event of the season took place in August, when the 2<sup>nd</sup> strongest landfalling AR during winter since at least 1950 occurred in the middle part of the month. This AR event caused widespread flooding across the top of the South Island, Nelson in particular, triggering a state of emergency. It was responsible for generating the highest daily rainfall total of the year when 692 mm was recorded at North Egmont on 18 August. June also saw several significant thunderstorm outbreaks, some of which generated tornadoes and hail. The warm, wet conditions caused variable snow conditions for the South Island ski fields; measurements at Mueller Hut (Aoraki/Mt Cook National Park) saw the deepest snowpack on record (since 2010) in mid-July, just prior to a large rain-on-snow event that caused avalanching and flooding throughout the region. In the North Island, the warmer and frequently humid conditions resulted in extremely poor snow coverage for ski fields.

<sup>2</sup> Atmospheric rivers (ARs) are large strands of moisture transported from the tropics. Four to five ARs are present in the Southern Hemisphere at any given time.

Notable winter-like cold snaps carried on into spring, particularly during the early parts of both September and October. During 5-6 October, snow fell to around 100 metres in the South Island and around 200-300 metres in the North Island. Above average warmth, owing to warmer seas and La Niña, occurred outside of these cold snaps resulting in near average nationwide spring temperatures. The warmth and wetness ramped up again in November, with frequent thunderstorm outbreaks for parts of the South Island and the North Island. It was the warmest November on record for the country.

The wet weather persisted into December, but eased in time for the holiday period, bringing a settled end to the year. Unusually warm conditions lingered, ranking as the 10<sup>th</sup> warmest December on record.

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## Section 1: The year in review

The monthly sequence of New Zealand climate was as follows:

### **January 2022: A warm and very dry month for most locations**

Below normal rainfall (50-79% of normal) or well below normal rainfall (<50% of normal) was observed across a vast majority of New Zealand, including nearly all of the North Island, along with the upper, western, and lower South Island. A small area of above normal rainfall (120-149% of normal) was observed near Kaikōura. Temperatures were above average (0.51-1.20°C above average) or well above average (>1.20°C above average) across a majority of New Zealand. At the end of January, soil moisture levels were lower than normal for the time of year across nearly all of the North Island, and in Nelson, Tasman, the West Coast, Otago, and Southland.

### **February 2022: A warm and very wet month for many locations**

Above normal rainfall (120-149% of normal) or well above normal rainfall (>149% of normal) was observed across most of the central and lower North Island, along with a majority of the South Island. Below normal rainfall (50-79% of normal) or well below normal rainfall (<50% of normal) was observed in parts of the Far North, coastal Southland, and Stewart Island. Temperatures were above average (0.51-1.20°C above average) or well above average (>1.20°C above average) across nearly all of the North Island, Tasman, the West Coast, and Fiordland. However, small pockets of below average temperatures (0.51-1.20°C below average) were observed in Canterbury and interior Otago. At the end of February, soil moisture levels 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.

### **March 2022: A warm and dry month for most of Aotearoa New Zealand**

Below normal rainfall (50-79% of normal) or well below normal rainfall (<50% of normal) was observed in parts of the Aupouri Peninsula, Waikato, Taranaki and Wellington, as well the vast majority of the South Island. Above normal rainfall (120-149% of normal) or well above normal rainfall (>149% of normal) was observed across the eastern North Island and pockets of Northland and Auckland. Temperatures were above average (0.51-1.20°C above average) or well above average (>1.20°C above average) for most of the country. At the end of March, soil moisture levels were above average normal in the eastern North Island, southern Taranaki, Manawatū-Whanganui, Auckland, eastern Northland, coastal northern Canterbury and the Marlborough Sounds. Soil moisture level were below normal in western Northland, most of Waikato, northern Taranaki, and the western and southern South Island.

### **April 2022: Yet another warm, dry month**

Below normal rainfall (50-79% of normal) or well below normal rainfall (<50% of normal) was widespread in the North Island and northern and eastern South Island. A pocket of above normal rainfall (120-149% of normal) or well above normal rainfall (>149% of normal) occurred near Whangārei in Northland. Temperatures were above average (0.51-1.20°C above average) or well above average (>1.20°C above average) across most of Aotearoa New Zealand. At the end of April, soil moisture levels were below normal across western Northland, Auckland, Waikato, Manawatū-Whanganui, west-coastal Taranaki, Wellington, much of the northern South Island, mid and southern Canterbury, the lower West Coast, and much of Otago and Southland. Meanwhile, normal or above normal soil moisture levels were present in eastern Northland, Bay of Plenty, Gisborne, Hawke's Bay, Wairarapa, North Canterbury, and the mid and northern West Coast.



### **May 2022: 3rd-warmest May on record**

Temperatures were above average (0.51-1.20°C above average) or well above average (>1.20°C above average) for most of the country. It was a particularly warm May in parts of Southland, Otago, inland Canterbury and the West Coast, where mean temperatures were more than 2°C higher than average. Rainfall was below normal (50-79% of normal) or well below normal (<50% of normal) in parts of Northland, Auckland, Gisborne, Hawke's Bay, the Wairarapa, Canterbury (south of Christchurch), Otago and southwestern Southland. Rainfall was above normal (120-149% of normal) or well above normal (>149% of normal) for northern parts of inland Canterbury and the West Coast, Manawatū-Whanganui, much of Taranaki, and inland portions of Bay of Plenty and Waikato. At the end of May, drier than normal soils were prominent for Otago, eastern and inland Canterbury about and south of Christchurch, southern Wairarapa, northern Waikato, Auckland, and eastern and northern parts of Northland. Soils were wetter than normal for parts of Manawatū-Whanganui, Hawke's Bay and coastal Gisborne.

### **June 2022: A warm month, wet in the west but dry in the east**

Temperatures were above average (0.51-1.20°C above average) or well above average (>1.20°C above average) for most of the country. Tara Hills (near Ōmarama) was the only location where temperatures were below average (0.51-1.20°C below average). Rainfall was above normal (120-149% of normal) or well above normal (>149% of normal) for many western and inland parts of New Zealand. Rainfall was below normal (50-79% of normal) or well below normal (<50% of normal) for eastern parts of the country, and western parts of Northland. At the end of the month, soil moisture levels were significantly lower than normal for eastern-most parts of Otago and Canterbury. Soil moisture levels were higher than normal for inland parts of the South Island, especially inland Canterbury.

### **July 2022: Aotearoa New Zealand's wettest and 4th-warmest July on record**

Well above average (>1.20°C above average) temperatures were observed in the majority of the North Island and many locations experienced a record or near-record warm July. In the South Island, temperatures were generally above average (0.51-1.20°C above average). Some areas along the West Coast experienced well above average temperatures. It was an extraordinarily wet month and nationally it was the wettest July on record. Most of the country observed well above normal (>149% of normal) rainfall. The exceptions were coastal parts of Gisborne, Hawke's Bay and northern Wairarapa which experienced below normal rainfall (50-79% of normal). At the end of the month, above normal soil moisture was observed in coastal parts of Otago, Canterbury and Marlborough.

### **August 2022: Heavy rain, flooding, and New Zealand's 2nd-warmest August**

Well above average (>1.20°C above average) temperatures were observed in a majority of the North Island and the central South Island, and many locations experienced a record or near-record warm August. Above average temperatures (0.51-1.20°C above average) were observed in parts of Bay of Plenty, western Waikato, coastal South Canterbury, eastern Otago, and much of Southland. Well above normal (>149% of normal) or above normal (120-149% of normal) rainfall was observed in northern Northland, parts of Auckland, western Waikato and Taranaki, southern Hawke's Bay, southern Manawatū-Whanganui to western Wellington, Tasman, Nelson, Marlborough, the West Coast, interior Canterbury, and northern Otago. Conversely, below normal rainfall (50-79% of normal) was observed in southern Northland, northern Waikato and the Coromandel, parts of Bay of Plenty and Gisborne, interior Manawatū-Whanganui, much of coastal Canterbury, southern Otago and eastern Southland. Pockets of well below normal rainfall (<50% of normal) occurred in eastern Bay of Plenty, Banks Peninsula, and near Dunedin. At the end of August, soil moisture levels were near normal for a majority of the country. Above normal soil moisture was observed in eastern Marlborough, coastal South Canterbury, and interior Otago.

### **September 2022: Wet for the eastern North Island, dry for the South Island**

Rainfall was above normal (120-149% of normal) or well above normal rainfall (>149% of normal) in parts of northern Northland and Auckland, Waikato, Bay of Plenty, Gisborne, Hawke's Bay, Wairarapa and southeastern Marlborough. Rainfall was below normal (50-79% of normal) or well below normal (<50% of normal) for most of the South Island, parts of Kāpiti Coast, and central parts of Northland. Temperatures were near average (within  $\pm 0.50^{\circ}\text{C}$  of average) for most of the country. Areas of above average temperatures ( $0.51^{\circ}\text{C}$  to  $1.20^{\circ}\text{C}$  above average) were observed in coastal Southland, West Coast, isolated eastern parts of Canterbury, Nelson, Tasman, Manawatū, Hawke's Bay, inland Gisborne, eastern Bay of Plenty, central Waikato, and northern Northland. At the end of September, soil moisture levels were higher than normal in coastal parts of Gisborne and Hawke's Bay, much of Marlborough, Kaikōura, and a small portion of Central Otago about Alexandra, Clyde, and Cromwell.

### **October 2022: A mild and dry month for much of the country**

Temperatures were near average ( $\pm 0.50^{\circ}\text{C}$  of average) for much of the country, with below average temperatures ( $0.51^{\circ}\text{C}$  to  $1.20^{\circ}\text{C}$  below average) for parts of the lower North Island, eastern Canterbury, and the southern South Island. Temperatures were above average ( $0.51^{\circ}\text{C}$  to  $1.20^{\circ}\text{C}$  above average) in parts of Northland, Auckland, Waikato, Bay of Plenty, and the West Coast. Rainfall was below normal (50-79% of normal) or well below normal (<50% of normal) for much of the South Island, southern and western parts of the North Island, and Gisborne. In contrast, rainfall was above normal (120-149% of normal) or well above normal (>149% of normal) in eastern parts of Northland, Waikato, Bay of Plenty, and inland parts of Otago and Southland. At the end of October, soil moisture levels were lower than normal in Nelson, northern and central parts of Canterbury, and northwestern Otago. Soil moisture was higher than normal in parts of eastern Northland, Auckland, Waikato, and northern Hawke's Bay.

### **November 2022: New Zealand's warmest November on record**

Temperatures were above average ( $0.51^{\circ}\text{C}$  to  $1.20^{\circ}\text{C}$  above average) or well above average ( $>1.20^{\circ}$  above average) for the majority of Aotearoa New Zealand. Rainfall was above normal (120-149% of normal) or well above normal (>149% of normal) for the majority of the North Island and South Island. Near normal rainfall (80-119% of normal) was observed in patches about Cape Egmont, the Māhia Peninsula, south of Cape Kidnappers, eastern Wellington, the northern Canterbury Bight, parts of coastal Southland and parts of Otago. Rainfall was below normal (50-79% of normal) or well below normal (<50% of normal) in Fiordland and eastern Otago. At the end of November, soil moisture levels were well above normal for much of the North Island, as well as parts of Marlborough, Tasman, Canterbury and Southland. Small patches of below normal soil moisture levels were observed in eastern Wellington, near Dunedin and parts of Rakiura/Stewart Island. Elsewhere, near normal soil moisture levels were observed.

### **December 2022: A generally warm month with variable rainfall patterns**

Temperatures were above average ( $0.51^{\circ}\text{C}$  to  $1.20^{\circ}\text{C}$  above average) to well above average ( $>1.20^{\circ}\text{C}$  above average) across a majority of the North Island, Nelson, Tasman, the West Coast, much of southern Canterbury, Otago, and Southland. December rainfall was above normal (120-149% of normal) or well above normal (>149% of normal) in eastern Northland, the Coromandel Peninsula, Bay of Plenty, much of the Central Plateau, southern Gisborne, Hawke's Bay, Wairarapa, eastern Marlborough, and parts of northern and southern Canterbury. Below normal (50-79% of normal) or well below normal (<50% of normal) rainfall was observed in the Far North, southern Auckland, Tasman, the West Coast, Banks Peninsula, along with most of Otago and Southland.

## Section 2: Monthly temperature

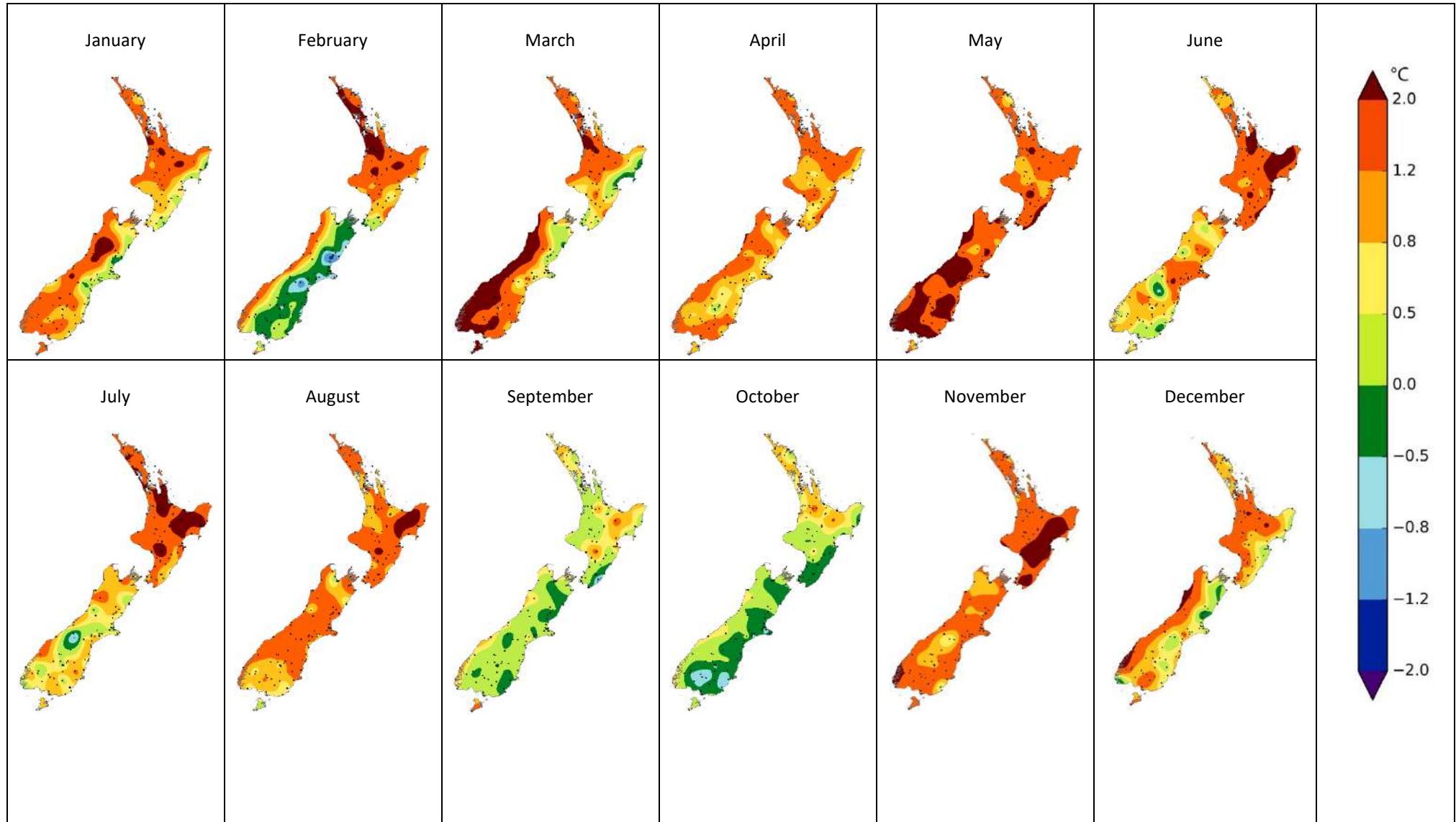


Figure 4: Monthly temperature anomalies (compared to the 1981-2010 monthly averages) for each month of 2022.

### Section 3: Monthly rainfall

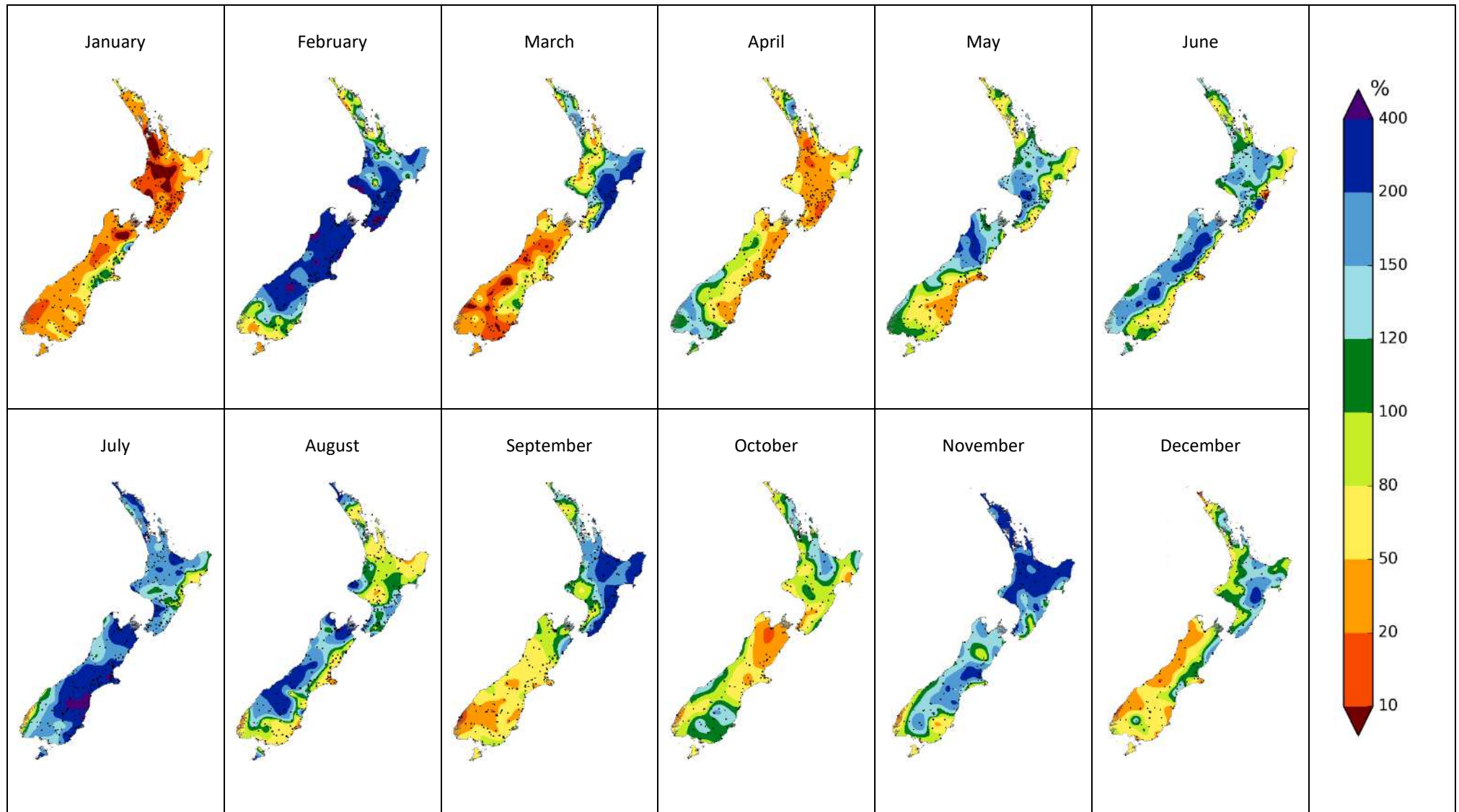


Figure 5: Monthly rainfall as a percentage of each 1981-2010 monthly normal for each month of 2022.

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## Section 4: Observations and statistics

Based on data available at the time of writing, NIWA analyses of month-by-month records show:

- The nationwide average temperature for 2022 was 13.76°C (1.15°C above the 1981–2010 annual average). Using NIWA’s seven-station temperature series, 2022 was the warmest year on record since records began in 1909, surpassing the record set just last year.
- The nationwide average annual rainfall anomaly for 2022 was 110%, the 8<sup>th</sup> highest on record based on an analysis of NIWA’s Virtual Climate Station Network which goes back to 1960.
- Leigh recorded the highest annual average temperature across the mainland for 2022 with 18.0°C, followed Kaitaia at 17.2°C, and Whangaparāoa at 17.1°C.
- The highest air temperature of the year was 34.7°C recorded at Lake Karapiro on 3 January, followed by 34.2°C at Alexandra and 34.0°C at Clyde, also recorded on 3 January.
- The lowest air temperature of the year was -11.6°C recorded at Mt Cook Airport on 17 July. This was followed by -11.2°C at Middlemarch on 23 June, and -11.0°C at Tara Hills (near Ōmarama) on 22 June.
- The top three daily rainfall totals from regularly reporting gauges in 2022 were 692 mm at North Egmont on 18 August, 498 mm at Castle Mount on 18 February, and 387 mm at Mueller Hut on 2 February.
- The top three daily rainfall totals from regularly reporting gauges in 2022 *excluding* high elevation stations were: 282 mm at Arthurs Pass on 2 November, 245 mm at Upper Tākaka on 17 August, and 229 mm at New Plymouth (Hurford Rd) on 5 February.
- Of all the regularly reporting gauges, the wettest locations in 2022 were: Cropp River (West Coast, 975 metres above sea level) with 11034 mm, Tuke River (West Coast, 990 metres above sea level) with 10510 mm, and Hokitika (West Coast, 427 metres above sea level) with 8475 mm.
- The lowest rainfall recording locations for 2022 were Roxburgh and Middlemarch with 368 mm, followed by Alexandra with 377 mm.
- Taranaki experienced New Zealand’s highest annual sunshine total during 2022 (2659 hours recorded at New Plymouth), followed by the wider Nelson region (2581 hours - Richmond), and Bay of Plenty (2526 hours - Whakatāne). Further to this, a total of 358.6 hours of sunshine in New Plymouth during January set an all-time monthly sunshine record for New Zealand.
- The highest confirmed wind gust for 2022 was 233 km/h recorded at Cape Turnagain on 14 June.
- Of the six main centres in 2022, Tauranga was the wettest, Dunedin was the driest and coolest, Auckland was the warmest, Hamilton was the sunniest, and Wellington was the least sunny.

Ranked annual total rainfall, mean temperatures and sunshine hours for the stations available at time of writing are displayed on the following six pages. Some sites have missing days of data. The number of missing days is indicated by a superscript number next to the annual value in the tables below.

Location	Rainfall (mm)
CROPP AT WATERFALL	11034
TUKE AT TUKE HUT	10510
CROPP AT CROPP HUT	10169
NORTH EGMONT RAINE	9430
HOKITIKA AT PRICES FLAT	8475
HOKITIKA AT RAPID CK	8064
HOKITIKA AT COLLIER'S CK	7514
HAAST AT CRON CK	7355
WAIHO AT DOUGLAS HUT	7113
IVORY AT RIPPLEROCK	6660
GODLEY AT PANORAMA RIDGE	6335
DOON AT MIDDLE ARM	6295
HAAST AT ROARING BILLY	5651
GODLEY AT EADE HUT	5617
RAKAIA AT LAKE RAMSAY	5537
WHATAROA AT SHB	5433
MILFORD SOUND EWS	5416 <sup>3</sup>
MILFORD SOUND AWS	5413 <sup>1</sup>
ARTHURS PASS AWS	4975 <sup>5</sup>
MURCHISON AT ROSE RIDGE	4810
ARTHURS PASS EWS	4809
MATHIAS AT NZDSA HUT	4807
FRANZ JOSEF EWS	4664
TAIPO AT SHBR	4554
ARTHURS PASS RAINE EWS	4505 <sup>1</sup>
PIGEON CREEK CWS	4341
MT COOK EWS	4168
MUELLER HUT EWS	4146 <sup>7</sup>
BUTCHERS CK AT BUTCHERS GULLY	3990

HAAST AT MOA CK	3830
HAAST AWS	3577 <sup>1</sup>
HOPKINS AT ELCHO FLATS	3415
WAIPAEOA AT MANGATU DIVIDE	3319
ŌKĀRITO EWS	3228
WHAKAPAPA AT MT RUAPEHU EWS	3106
NGAHERE AT NGAHERE HUT	3030
HOPKINS AT BOANERGES RIDGE	3026
HOKITIKA AWS	2983 <sup>1</sup>
HOKITIKA AERO	2926
AHURIRI AT CASSINIA MORAINES	2925
MAKOTUKU AT F TRIG	2895
MOTU EWS	2808 <sup>1</sup>
MT RUAPEHU, CHATEAU EWS	2801 <sup>4</sup>
MAHANGA EWS	2794
TĀKAKA EWS	2770
MANAPOURI, WEST ARM JETTY EWS	2753
GREYMOUTH AERO EWS	2746
HOKITIKA EWS	2706
WESTPORT AERO AWS	2667
KERIKERI AERODROME AWS	2617 <sup>1</sup>
MOTU AT WAITANGIRUA	2605
STRATFORD EWS	2565 <sup>6</sup>
TE PUKE EWS	2538
ALBERT BURN	2509 <sup>1</sup>
WESTPORT EWS	2490 <sup>5</sup>
COBB AT TRILOBITE	2485
MT COOK AERO AWS	2484 <sup>2</sup>
KERIKERI EWS	2428
ARAPITO EWS	2404 <sup>11</sup>

MURCHISON MTNS EWS	2352
TAURANGA-TAUPŌ AT KIKO RD	2344
UPPER RAKAIA EWS	2303
WHAKATĀNE AT TARAPOUNAMU	2250
AWAKINO EWS	2243 <sup>5</sup>
WHITIANGA AERO AWS	2239 <sup>3</sup>
WHANGANUI AT TE PORERE	2227
PUYSEGUR POINT AWS	2219 <sup>1</sup>
WHITIANGA EWS	2150 <sup>1</sup>
ROTORUA AERO AWS	2147 <sup>1</sup>
RANGITAHI AT ANIWHENUA	2109
WHANGĀREI AERO AWS	2100 <sup>1</sup>
WAIPAPA AT WAITETI STATION	2070
REEFTON EWS	2058
PUREORA FOREST CWS	2005
PURUKOHUKOHU AT NO 4	1982
EGLINTON, KNOBS FLAT CWS	1941
ROTORUA EWS	1940
NEW PLYMOUTH AWS	1935
TAUMARUNUI EWS	1924
TE KŪITI EWS	1893
HICKS BAY AWS	1864 <sup>11</sup>
PURERUA AWS	1858
TONGARIRO AT TURANGI	1857
WAIMARINO AT KEPA RD	1830
TURANGI 2 EWS	1826 <sup>10</sup>
TAURANGA AERO AWS	1812 <sup>2</sup>
LOWER RETARUKE CWS	1799
WARKWORTH EWS	1793 <sup>1</sup>
WELLINGTON, KELBURN AWS	1763
FAREWELL SPIT AWS	1761 <sup>12</sup>

WHANGĀREI EWS	1755
WHAKATĀNE AERO AWS	1744 <sup>3</sup>
POKAIWHENUA AT PUKETURUA	1712
WHIRINAKI AT GALATEA	1706
MANGAKINO AT DILLON RD	1705
PORT TAHAROA AWS	1690 <sup>6</sup>
WAIPAPA AT TTT RD CULVERT	1677
TAUMARUNUI AWS	1675 <sup>10</sup>
TOLAGA BAY WXT AWS	1647 <sup>13</sup>
WELLINGTON, KELBURN 2	1647
KAITAIA AERO AWS	1645 <sup>10</sup>
GALATEA AWS	1644 <sup>2</sup>
MANAIA, MOTUMATE STM	1634
PORIRUA, ELSDON PARK AWS	1631 <sup>1</sup>
MOTUEKA, RIWAKA EWS	1615
MAKOTUKU AT SH49A BR	1606
KAITAIA EWS	1566
MT LARKINS EWS	1565 <sup>14</sup>
TUTIRA CWS	1560
WHAKAURU AT MOSSOP RD	1555
HAMILTON AWS	1554 <sup>1</sup>
MAUNGARAKI 3	1543
WHANGANUI AT BELOW PIRIACA	1539
LEIGH 2 EWS	1532
TAHUNAATARA AT OHAKURI RD	1526
TAUPŌ AWS	1523 <sup>1</sup>
HĀWERA AWS	1521 <sup>7</sup>
WAIROA, NORTH CLYDE EWS	1519
CASS EWS	1511
TAKAPAU PLAINS AWS	1504 <sup>1</sup>
UPPER HUTT, TRENTAM EWS	1494

WAIROA AERO AWS	1483 <sup>7</sup>
AUCKLAND, WHENUAPAI AWS	1481
AUCKLAND, ALBANY EWS	1462
PARAPARAUMU AERO AWS	1462
KAITAIA AERO EWS	1460
LEVIN AWS	1438
NELSON AERO	1428 <sup>2</sup>
HAMILTON, RUAKURA 2 EWS	1422
CASTLEPOINT AWS	1419 <sup>4</sup>
PARAPARAUMU AERO	1408 <sup>1</sup>
WELLINGTON AERO	1405
MASTERTON AERO AWS	1390 <sup>4</sup>
WAIOTAPU AT REPOROA	1375
MANA ISLAND AWS	1365 <sup>1</sup>
WAIKATO AT CAMBRIDGE GOLF COURSE	1362
WELLINGTON, GRETA POINT CWS	1360
GISBORNE AWS	1357
NELSON AWS	1356 <sup>2</sup>
AUCKLAND AERO	1355 <sup>2</sup>
AUCKLAND, MOTAT EWS	1354
WAIKATO AT REIDS FARM	1349
PUKEKOHE EWS	1340 <sup>8</sup>
PAHIATUA EWS	1326
KAIKŌURA, MIDDLE CREEK	1322
NAPIER AERO AWS	1313
DANNEVIRKE EWS	1299
TROUNSON CWS	1297
AUCKLAND, MĀNGERE 2 EWS	1280
PARAPARAUMU EWS	1275
WAIKERIA EWS	1272 <sup>7</sup>
NGAWI AWS	1261 <sup>1</sup>

WAIOURU AIRSTRIP AWS	1256
RICHMOND EWS	1241
MASTERTON, TE ORE ORE CWS	1227
LEVIN EWS	1223
FLAT HILLS WXT AWS	1222 <sup>1</sup>
MASTERTON EWS	1206 <sup>11</sup>
KAIKŌURA AWS	1194 <sup>3</sup>
PALMERSTON NORTH AWS	1184 <sup>1</sup>
LAKE KARAPIRO CWS	1180
GISBORNE EWS	1166 <sup>4</sup>
WHANGANUI, SPRIGGENS PARK EWS	1150
APPLEBY 2 EWS	1150
OHAKEA AWS	1147 <sup>9</sup>
TAUTUKU EWS	1145
PALMERSTON NORTH EWS	1136
BLENHEIM AERO AWS	1125 <sup>7</sup>
WHANGANUI AWS	1119 <sup>1</sup>
METHVEN CWS	1112
DARGAVILLE 2 EWS	1109
HANMER FOREST EWS	1100 <sup>4</sup>
WHANGAPARĀOA AWS	1087 <sup>4</sup>
MAYFIELD AT RUAPUNA FORECAST	1083
FIRTH OF THAMES EWS	1078
MARAEKAKAHO CWS	1040
MATUKITUKI AT WEST WĀNAKA	1033
MANAPOURI AERO AWS	1016
AKAROA EWS	1004
AHURIRI AT STH DIADEM	1000
LUMSDEN AWS	994
MARTINBOROUGH EWS	986
STEWART ISLAND EWS	983 <sup>13</sup>

GORE AWS	978
NAPIER EWS	973 <sup>8</sup>
BIRCHWOOD WXT AWS	965
WAIOURU EWS	954
INVERCARGILL AERO	951 <sup>8</sup>
CHRISTCHURCH AERO	942 <sup>1</sup>
INVERCARGILL AERO AWS	923 <sup>5</sup>
FIVE RIVERS CWS	922
LISMORE, RACEMANS HOUSE CWS	921
WHAKATŪ EWS	918
WAIPAWA EWS	899 <sup>13</sup>
WINCHMORE 2, RAINE EWS	898
QUEENSTOWN EWS	898
FAIRLIE AWS	888 <sup>1</sup>
WAIPARA WEST EWS	879
RANGIORA EWS	873
WAIUA SCHOOL CWS	859
CHRISTCHURCH AERO BACKUP AWS	850
GORE EWS	847
INVERCARGILL AERO 2 EWS	842 <sup>3</sup>
BLENHEIM RESEARCH EWS	832
MEDBURY CWS	820
OHOKA CWS	811
STANTON AT CHEDDAR VALLEY	795
CHRISTCHURCH BOTANIC GARDENS EWS	791 <sup>1</sup>
TIMARU AERO AWS	790
BALMORAL EAST CWS	785
WINCHMORE 2 EWS	784
ORARI ESTATE EWS	779
LINCOLN, BROADFIELD RAIN EWS	773 <sup>1</sup>
ASHBURTON AERO AWS	772

TIWAI POINT EWS	769 <sup>6</sup>
NUGGET POINT AWS	764
CULVERDEN AWS	762
TARA HILLS AWS	762 <sup>1</sup>
PUKAKI AERODROME AWS	753 <sup>9</sup>
BARING HEAD	738
WĀNAKA CWS	737
WĀNAKA AERO AWS	732
CHRISTCHURCH, KYLE ST EWS	727 <sup>13</sup>
LE BONS BAY AWS	724 <sup>1</sup>
WAIPOUNAMU CWS	723 <sup>10</sup>
BROMLEY EWS RAINE	722
QUEENSTOWN AERO AWS	717 <sup>1</sup>
LAKE TEKAPO EWS	715
TIMARU EWS	696
WAKANUI 2 CWS	694
CHERTSEY CWS	691
LINCOLN, BROADFIELD EWS	684
ŌTAIO @ SPRINGBANK ROAD	683
TAPANUI EWS	674 <sup>6</sup>
CAPE CAMPBELL AWS	663 <sup>5</sup>
WAIMATE CWS	661 <sup>13</sup>
DIAMOND HARBOUR EWS	640
BROMLEY EWS	612
DUNEDIN, MUSSELBURGH EWS	589
BALCLUTHA, TELFORD EWS	568
OAMARU AIRPORT AWS	558
WINDSOR EWS	548
DUNEDIN AERO AWS	523
ALEXANDRA AWS	506
LAUDER RAINE EWS	500

OAMARU EWS	494
LAUDER EWS	454
CROMWELL EWS	448
CLYDE 2 EWS	439
RANFURLY EWS	391
ALEXANDRA EWS	377
MIDDLEMARCH EWS	368
ROXBURGH WXT AWS	368 <sup>10</sup>
<b>Location</b>	<b>Mean temp (°C)</b>
LEIGH 2 EWS	18.0
MOKOHINAU AWS	17.5
KAITAIA EWS	17.2
WHANGAPARĀOA AWS	17.1
KAITAIA AERO EWS	17.0
WHANGĀREI AERO AWS	17.0
KAITAIA AERO AWS	17.0
AUCKLAND AERO BACKUP AWS	17.0
AUCKLAND AERO	16.9
AUCKLAND, MĀNGERE 2 EWS	16.8
PURERUA AWS	16.8
AUCKLAND, MOTAT EWS	16.8
KERIKERI EWS	16.6
AUCKLAND, ALBANY EWS	16.6
PORT TAHAROA AWS	16.5
FAREWELL SPIT AWS	16.5
DARGAVILLE 2 EWS	16.5
WHANGĀREI EWS	16.5
TAURANGA AERO AWS	16.3
LAKE KARAPIRO CWS	16.3



KERIKERI AERODROME AWS	16.2
HICKS BAY AWS	16.2
AUCKLAND, WHENUAPAI AWS	16.1
WHITIANGA EWS	16.1
PAEROA AWS	16.0
ARDMORE AERO AWS	16.0
TROUNSON CWS	16.0
WHITIANGA AERO AWS	15.8
WHAKATĀNE EWS	15.8
GISBORNE EWS	15.8
WARKWORTH EWS	15.7
FIRTH OF THAMES EWS	15.6
PUKEKOHE EWS	15.6
KAWERAU AWS	15.6
TE PUKE EWS	15.5
WHANGANUI 2 AWS	15.5
WHATAWHATA 2 EWS	15.5
HAMILTON, RUAKURA 2 EWS	15.4
WHAKATĀNE AERO AWS	15.4
WAIROA, NORTH CLYDE EWS	15.4
NGAWI AWS	15.4
WELLINGTON, GRETA POINT CWS	15.2
NAPIER EWS	15.2
GISBORNE AWS	15.2
CASTLEPOINT AWS	15.1
CAPE KIDNAPPERS WXT AWS	15.0
WHANGANUI, SPRIGGENS PARK EWS	15.0
NEW PLYMOUTH AWS	15.0
TOLAGA BAY WXT AWS	14.9
WHANGANUI AWS	14.9
HAMILTON AWS	14.9

WAIKERIA EWS	14.8
NAPIER AERO AWS	14.6
WELLINGTON AERO	14.6
TE KŪITI EWS	14.6
WELLINGTON AERO BACKUP AWS	14.6
WAIROA AERO AWS	14.6
PALMERSTON NORTH EWS	14.5
LEVIN AWS	14.4
WHAKATŪ EWS	14.3
PARAPARAUMU EWS	14.3
OHAKEA AWS	14.3
PORIRUA, ELSDON PARK AWS	14.2
PARAPARAUMU AERO AWS	14.2
PALMERSTON NORTH AWS	14.2
PARAPARAUMU AERO	14.1
WESTPORT EWS	14.1
NELSON AWS	14.0
WESTPORT AERO AWS	14.0
NELSON AERO	14.0
TAUMARUNUI EWS	14.0
ROTORUA EWS	14.0
HĀWERA AWS	13.9
ARAPITO EWS	13.9
MARAEKAKAHO CWS	13.9
GREYMOUTH AERO EWS	13.9
GALATEA AWS	13.9
TAUMARUNUI AWS	13.9
BLENHEIM RESEARCH EWS	13.8
BARING HEAD	13.8
MARTINBOROUGH EWS	13.8
TAUPŌ CWS	13.8

WELLINGTON, KELBURN AWS	13.8
MANA ISLAND AWS	13.7
LOWER RETARUKE CWS	13.7
WAIPAWA EWS	13.7
CAPE CAMPBELL AWS	13.7
TUTIRA CWS	13.7
MASTERTON, TE ORE ORE CWS	13.6
DANNEVIRKE EWS	13.6
TĀKAKA EWS	13.6
ROTORUA AERO AWS	13.6
LEVIN EWS	13.5
FLAT HILLS WXT AWS	13.5
AKAROA EWS	13.5
RICHMOND EWS	13.4
MASTERTON EWS	13.4
UPPER HUTT, TRENTHAM EWS	13.4
PAHIATUA EWS	13.3
HOKITIKA AERO	13.3
MOTU EWS	13.3
HOKITIKA AWS	13.3
BLENHEIM AERO AWS	13.2
KAIKŌURA AWS	13.2
HOKITIKA EWS	13.2
ŌKĀRITO EWS	13.2
AWAKINO EWS	13.2
MASTERTON AERO AWS	13.1
CHRISTCHURCH BOTANIC GARDENS EWS	13.1
REEFTON EWS	13.0
BROMELY EWS	13.0
CHATHAM ISLAND AERO AWS	13.0
STRATFORD EWS	13.0

TURANGI 2 EWS	12.9
TAUPŌ AWS	12.8
PIGEON CREEK CWS	12.8
WAIPARA WEST EWS	12.8
FRANZ JOSEF EWS	12.8
CAPE TURNAGAIN AWS	12.8
HAAST AWS	12.6
DIAMOND HARBOUR EWS	12.6
RANGIORA EWS	12.5
APPLEBY 2 EWS	12.5
TAKAPAU PLAINS AWS	12.5
LINCOLN, BROADFIELD EWS	12.5
WAIKU SCHOOL CWS	12.4
CHRISTCHURCH AERO	12.1
CHRISTCHURCH AERO BACKUP AWS	12.1
DUNEDIN, MUSSELBURGH EWS	12.0
CULVERDEN AWS	12.0
CROMWELL EWS	11.9
WAIMATE CWS	11.9
KAIKŌURA, MIDDLE CREEK	11.9
ROXBURGH WXT AWS	11.8
MILFORD SOUND EWS	11.8
PUREORA FOREST CWS	11.8
LE BONS BAY AWS	11.8
BALMORAL EAST CWS	11.8
MILFORD SOUND AWS	11.8
CHERTSEY CWS	11.8
OHOKA CWS	11.7
QUEENSTOWN EWS	11.7
WĀNAKA AERO AWS	11.7
ASHBURTON AERO AWS	11.7

TIMARU EWS	11.6
METHVEN CWS	11.6
ALEXANDRA EWS	11.6
OAMARU EWS	11.5
MEDBURY CWS	11.5
ORARI ESTATE EWS	11.4
WINCHMORE 2 EWS	11.4
HANMER FOREST EWS	11.4
STEWART ISLAND EWS	11.4
TIWAI POINT EWS	11.4
WĀNAKA CWS	11.4
OAMARU AWS	11.3
ŌTAIO @ SPRINGBANK ROAD	11.3
WINDSOR EWS	11.3
SUGAR LOAF AWS	11.1
TIMARU AERO AWS	11.1
MAYFIELD AT RUAPUNA FORECAST	11.1
CLYDE 2 EWS	11.0
OAMARU AIRPORT AWS	11.0
ALEXANDRA AWS	11.0
TAUTUKU EWS	10.9
INVERCARGILL AERO AWS	10.9
GORE AWS	10.9
TAPANUI EWS	10.9
INVERCARGILL AERO	10.9
NUGGET POINT AWS	10.9
GORE EWS	10.8
MIDDLEMARCH EWS	10.8
FAIRLIE AWS	10.8
BIRCHWOOD WXT AWS	10.8
DUNEDIN AERO AWS	10.8

TE ANAU AT PARK HQ CWS	10.7
LAUDER EWS	10.7
QUEENSTOWN AERO AWS	10.7
WAIOURU EWS	10.6
INVERCARGILL AERO 2 EWS	10.6
BALCLUTHA, TELFORD EWS	10.4
WAIPOUNAMU CWS	10.4
FIVE RIVERS CWS	10.4
CASS EWS	10.3
LUMSDEN AWS	10.3
MANAPOURI, WEST ARM JETTY EWS	10.2
MANAPOURI AERO AWS	10.1
WAIOURU AIRSTRIP AWS	10.1
TARA HILLS AWS	9.9
RANFURLY EWS	9.9
MT COOK EWS	9.8
PUKAKI AERODROME AWS	9.7
MT COOK AERO AWS	9.4
LAKE TEKAPO EWS	9.4
ARTHURS PASS EWS	9.0
MT RUAPEHU, CHATEAU EWS	8.9
ARTHURS PASS AWS	8.9
SWAMPY SUMMIT AWS	8.0
ALBERT BURN	6.3
MURCHISON MTNS EWS	6.0
MUELLER HUT EWS	4.3
MT PHILISTINE EWS	4.1
UPPER RAKAIA EWS	3.6
MAHANGA EWS	3.0
MT LARKINS EWS	2.6

Location	Sunshine (hours)
NEW PLYMOUTH AWS	2659
RICHMOND EWS	2581
WHAKATĀNE SUNSHINE	2526
BLENHEIM RESEARCH EWS	2466 <sup>1</sup>
LAKE TEKAPO EWS	2464
APPLEBY 2 EWS	2449
CROMWELL EWS	2446
TAURANGA AERO AWS	2444 <sup>1</sup>
ROTORUA EWS	2410 <sup>2</sup>
HOKITIKA AWS	2408 <sup>1</sup>
ALEXANDRA EWS	2407 <sup>1</sup>
TĀKAKA EWS	2396
AUCKLAND, MOTAT EWS	2392
LEVIN EWS	2387
QUEENSTOWN AERO AWS	2363 <sup>3</sup>
NELSON AERO	2333 <sup>1</sup>
WESTPORT EWS	2317 <sup>5</sup>
PARAPARAUMU EWS	2308
DIAMOND HARBOUR EWS	2304
BROMLEY EWS	2304
NAPIER EWS	2271 <sup>9</sup>
HAMILTON, RUAKURA 2 EWS	2252 <sup>4</sup>
AUCKLAND, MĀNGERE 2 EWS	2251
PARAPARAUMU AERO	2224 <sup>2</sup>
CHRISTCHURCH AERO	2221 <sup>1</sup>
TURANGI 2 EWS	2210 <sup>1</sup>
WINCHMORE 2 EWS	2208
LINCOLN, BROADFIELD EWS	2170
AUCKLAND ALBANY EWS	2156 <sup>2</sup>

FIRTH OF THAMES EWS	2150 <sup>1</sup>
ASHBURTON AERO AWS	2148 <sup>3</sup>
WAIKERIA EWS	2122 <sup>8</sup>
OAMARU EWS	2118
DUNEDIN, MUSSELBURGH EWS	2110
RANGIORA EWS	2109
GREYMOUTH AERO EWS	2103
AKAROA EWS	2099 <sup>1</sup>
WELLINGTON, KELBURN AWS	2096 <sup>1</sup>
WAIPARA WEST EWS	2087 <sup>1</sup>
HOKITIKA AERO	2076
UPPER HUTT, TRENTAM EWS	2076
KAWERAU AWS	2051 <sup>5</sup>
MASTERTON EWS	2036
GISBORNE AWS	2036 <sup>1</sup>
TE KŪITI EWS	2017 <sup>1</sup>
STRATFORD EWS	1997 <sup>8</sup>
ARAPITO EWS	1975 <sup>12</sup>
REEFTON EWS	1960
GORE EWS	1955
TAUMARUNUI AWS	1951 <sup>13</sup>
INVERCARGILL AERO	1930 <sup>10</sup>
PALMERSTON NORTH EWS	1920 <sup>1</sup>
MIDDLEMARCH EWS	1918 <sup>2</sup>
WHANGĀREI EWS	1911 <sup>1</sup>
FRANZ JOSEF EWS	1877
INVERCARGILL AERO 2 EWS	1856 <sup>7</sup>
DARGAVILLE 2 EWS	1845 <sup>1</sup>
KAITAIA EWS	1833
DANNEVIRKE EWS	1818
MT COOK EWS	1785

WAIPAWA EWS	1745 <sup>13</sup>
BALCLUTHA, TELFORD EWS	1691
MARTINBOROUGH EWS	1663

## Section 5: Annual temperature – A record breaking year

2022 was New Zealand’s warmest year on record based on NIWA’s seven-station series, which began in 1909. It surpassed the record set just last year by 0.2°C, a significant margin. Across the country, many locations observed record or near-record high mean, mean maximum, and mean minimum temperatures. It was the warmest year on record for 47 locations while a further 33 locations experienced annual average temperatures within the top four warmest on record (Table 1). No locations experienced a record or near record cold year. 2015 was the last year New Zealand observed any locations where annual temperatures were record or near record cold. The warmth in 2022 was largely driven by La Niña conditions and exceptionally warm SSTs near New Zealand, which remained above average throughout the entire year and featured a protracted marine heatwave event.

**Table 1: Record or near-record high or low annual average temperature departures for 2022<sup>3</sup>.**

Location	Mean air temp. (°C)	Departure from average(°C)	Year records began	Comments
Mean temperature				
Motu	13.3	2.5	1990	Highest
Taupō	13.9	2.2	1949	Highest
Leigh	18.0	1.9	1966	Highest
Franz Josef	12.8	1.8	1953	Highest
Greymouth Airport	14.0	1.8	1947	Highest
Whatawhata	15.6	1.7	1952	Highest
Auckland (Western Springs)	16.8	1.6	1948	Highest
Hamilton (Ruakura)	15.4	1.6	1906	Highest
Hokitika Airport	13.3	1.6	1866	Highest
Reefton	13.0	1.6	1960	Highest
Waiouru	10.6	1.6	1962	Highest
Kaitaia	17.2	1.5	1948	Highest
Te Puke	15.5	1.5	1973	Highest
Auckland Airport	16.9	1.4	1959	Highest
Auckland (Whenuapai)	16.1	1.4	1945	Highest
Castlepoint	15.2	1.4	1972	Highest
Hamilton	15.0	1.4	1946	Highest
Hicks Bay	16.3	1.4	1969	Highest
Mt Ruapehu (Chateau)	8.9	1.4	2000	Highest
New Plymouth	15.1	1.4	1944	Highest
Ōkārīto	13.2	1.4	1982	Highest
Tauranga Airport	16.3	1.4	1913	Highest
Whangaparāoa	17.1	1.4	1982	Highest
Whitianga	16.1	1.4	1962	Highest
Kerikeri	16.6	1.3	1945	Highest

<sup>3</sup> The rankings (1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> etc.) in Tables 1 to 11 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 because of the practical limitations of performing homogeneity checks in real-time.

Milford Sound	11.8	1.3	1934	Highest
Paeroa	16.0	1.3	1947	Highest
Palmerston North	14.6	1.3	1928	Highest
Paraparaumu	14.3	1.3	1953	Highest
Port Taharoa	16.5	1.3	1973	Highest
Rotorua	14.0	1.3	1964	Highest
Stratford	13.1	1.3	1960	Highest
Taumarunui	14.1	1.3	1947	Highest
Waikeria	14.9	1.3	1957	Highest
Lower Retaruke	13.7	1.2	1966	Highest
Wānaka Airport	11.7	1.2	1955	Highest
Mokohinau	17.5	1.1	1994	Highest
Te Anau	10.7	1.1	1963	Highest
Te Kūiti	14.7	1.1	1959	Highest
Turangi	12.9	1.1	1968	Highest
Porirua (Elsdon Park)	14.3	1.0	1968	Highest
Tākaka	13.6	1.0	1978	Highest
Upper Hutt (Trentham)	13.5	1.0	1939	Highest
Whanganui (Spriggens Park)	15.0	1.0	1937	Highest
Middlemarch	10.8	0.9	2000	Highest
Wellington Airport	14.7	0.9	1962	Highest
Campbell Island	7.6	0.5	1991	Highest
Gisborne	15.9	1.6	1905	2nd-highest
Hokitika	13.3	1.6	1866	2nd-highest
Auckland (Māngere)	16.8	1.5	1959	2nd-highest
Westport Airport	14.1	1.5	1937	2nd-highest
Whakatāne	15.9	1.5	1974	2nd-highest
Dargaville	16.6	1.4	1943	2nd-highest
Levin	14.4	1.3	1895	2nd-highest
Whangārei Airport	17.1	1.3	1967	2nd-highest
Christchurch Botanic Gardens	13.1	1.2	1863	2nd-highest
Dannevirke	13.7	1.2	1951	2nd-highest
Kerikeri Airport	16.2	1.1	1945	2nd-highest
Mt Cook Village	9.9	1.1	1929	2nd-highest
Whanganui	14.9	1.1	1937	2nd-highest
Rangiora	12.5	1.0	1965	2nd-highest
Wellington (Kelburn)	13.9	1.0	1928	2nd-highest
Ngawi	15.4	0.9	1972	2nd-highest
Windsor	11.3	0.9	2000	2nd-highest
Queenstown	11.7	1.4	1871	3rd-highest
Whakatāne Airport	15.4	1.4	1974	3rd-highest
Hanmer Forest	11.5	1.2	1906	3rd-highest
Manapouri (West Arm Jetty)	10.2	1.2	1971	3rd-highest
Roxburgh	11.9	1.2	1950	3rd-highest
Lauder	10.7	1.1	1924	3rd-highest
Martinborough	13.9	1.1	1986	3rd-highest
Ranfurlly	10.0	1.1	1897	3rd-highest
Dunedin (Musselburgh)	12.1	1.0	1947	3rd-highest

Five Rivers	10.4	0.8	1982	3rd-highest
Nugget Point	10.9	0.7	1970	3rd-highest
Whitianga Airport	15.9	1.2	1962	4th-highest
Paraparaumu Airport	14.2	1.1	1953	4th-highest
Cromwell	11.9	1.0	1949	4th-highest
Invercargill Airport	10.9	1.0	1905	4th-highest
Orari Estate	11.4	0.5	1972	4th-highest
<b>Mean maximum temperature</b>				
Motu	18.1	2.7	1990	Highest
Taupō	19.3	2.6	1949	Highest
Whatawhata	20.7	2.3	1952	Highest
Franz Josef	17.7	2.1	1953	Highest
Greymouth Airport	18.0	2.1	1947	Highest
Te Kūiti	20.8	2.0	1959	Highest
Cromwell	18.9	1.9	1949	Highest
Waiouru	15.6	1.9	1962	Highest
Levin	19.1	1.8	1895	Highest
Mt Ruapehu (Chateau)	13.8	1.8	2000	Highest
Auckland Airport	20.7	1.7	1959	Highest
New Plymouth	19.1	1.7	1944	Highest
Reefton	18.4	1.7	1960	Highest
Stratford	17.8	1.7	1960	Highest
Taumarunui	20.0	1.7	1947	Highest
Palmerston North	19.2	1.6	1928	Highest
Turangi	18.7	1.6	1968	Highest
Waikeria	20.8	1.6	1957	Highest
Hamilton	20.5	1.5	1946	Highest
Manapouri Airport	16.1	1.5	1963	Highest
Paeroa	21.1	1.5	1947	Highest
Paraparaumu	18.3	1.5	1953	Highest
Whangaparāoa	20.3	1.5	1982	Highest
Auckland (Whenuapai)	20.5	1.4	1945	Highest
Milford Sound	16.3	1.4	1934	Highest
Wānaka Airport	17.5	1.4	1955	Highest
Lower Retaruke	19.2	1.3	1966	Highest
Ōkārīto	17.5	1.3	1982	Highest
Whanganui (Spriggens Park)	19.3	1.3	1937	Highest
Porirua (Elsdon Park)	17.9	1.0	1968	Highest
Port Taharoa	19.6	1.0	1973	Highest
Te Puke	20.0	1.0	1973	Highest
Mokohinau	19.2	0.9	1994	Highest
Wellington Airport	17.5	0.8	1962	Highest
Auckland (Māngere)	20.6	1.8	1959	2nd-highest
Hamilton (Ruakura)	20.7	1.8	1906	2nd-highest
Hokitika Airport	17.5	1.8	1866	2nd-highest
Rotorua	18.8	1.8	1964	2nd-highest
Manapouri (West Arm Jetty)	14.5	1.7	1971	2nd-highest
Invercargill Airport	16.0	1.6	1905	2nd-highest

Middlemarch	17.6	1.5	2000	2nd-highest
Westport Airport	17.6	1.4	1937	2nd-highest
Hicks Bay	19.3	1.3	1969	2nd-highest
Paraparaumu Airport	18.2	1.3	1953	2nd-highest
Castlepoint	18.0	1.2	1972	2nd-highest
Lake Tekapo	15.8	1.2	1927	2nd-highest
Tākaka	19.3	1.1	1978	2nd-highest
Whakatāne	20.6	1.1	1974	2nd-highest
Akaroa	18.5	1.0	1978	2nd-highest
Wellington (Kelburn)	16.8	0.9	1928	2nd-highest
Oamaru	16.2	0.8	1967	2nd-highest
Campbell Island	9.8	0.4	1991	2nd-highest
Dargaville	20.6	1.9	1943	3rd-highest
Hokitika	17.5	1.8	1866	3rd-highest
Clyde	18.2	1.4	1978	3rd-highest
Whangārei	21.3	1.4	1967	3rd-highest
Dannevirke	18.2	1.2	1951	3rd-highest
Five Rivers	15.9	1.0	1982	3rd-highest
Upper Hutt (Trentham)	18.1	1.0	1939	3rd-highest
Ngawi	18.5	0.9	1972	3rd-highest
Whitianga	20.9	1.6	1962	4th-highest
Ranfurlly	16.5	1.4	1897	4th-highest
Mt Cook Airport	15.3	1.3	1929	4th-highest
Wānaka	17.1	1.3	1955	4th-highest
Whanganui	18.9	1.3	1937	4th-highest
Tauranga Airport	20.2	1.1	1913	4th-highest
Rotorua Airport	18.3	1.0	1964	4th-highest
Windsor	17.0	1.0	2000	4th-highest
Kerikeri	21.0	0.9	1945	4th-highest
Lumsden	15.7	0.8	1982	4th-highest
<b>Mean minimum temperature</b>				
Motu	8.5	2.3	1990	Highest
Te Puke	11.0	2.1	1973	Highest
Kaitaia	13.6	1.8	1948	Highest
Gisborne	10.9	1.7	1905	Highest
Port Taharoa	13.3	1.7	1973	Highest
Taupō	8.5	1.7	1949	Highest
Tauranga Airport	12.4	1.7	1913	Highest
Kerikeri	12.2	1.6	1945	Highest
Reefton	7.7	1.6	1960	Highest
Christchurch Botanic Gardens	8.3	1.5	1863	Highest
Franz Josef	7.9	1.5	1953	Highest
Hicks Bay	13.3	1.5	1969	Highest
Ōkārīto	9.0	1.5	1982	Highest
Queenstown	6.5	1.5	1871	Highest
Rangiora	7.4	1.5	1965	Highest
Whitianga Airport	11.6	1.5	1962	Highest
Auckland (Whenuapai)	11.7	1.4	1945	Highest

Castlepoint	12.3	1.4	1972	Highest
Greymouth Airport	9.9	1.4	1947	Highest
Hokitika	9.1	1.4	1866	Highest
Milford Sound	7.4	1.4	1934	Highest
Mokohinau	15.8	1.4	1994	Highest
Auckland (Western Springs)	12.6	1.3	1948	Highest
Hamilton (Ruakura)	10	1.3	1906	Highest
Secretary Island	10.1	1.3	1985	Highest
Martinborough	8.9	1.2	1986	Highest
Mt Cook Village	4.7	1.1	1929	Highest
New Plymouth	11	1.0	1944	Highest
Nugget Point	7.9	1.0	1970	Highest
Wellington Airport	11.8	1.0	1962	Highest
Cape Campbell	11.6	0.9	1953	Highest
Dunedin (Musselburgh)	8.5	0.9	1947	Highest
Porirua (Elsdon Park)	10.6	0.9	1968	Highest
Windsor	5.6	0.9	2000	Highest
Le Bons Bay	9.0	0.8	1984	Highest
Whakatāne	11.1	1.9	1974	2nd-highest
Hokitika Airport	9.1	1.4	1866	2nd-highest
Kerikeri Airport	12.1	1.4	1945	2nd-highest
Whangaparāoa	14.0	1.4	1982	2nd-highest
Whangārei Airport	13.2	1.4	1967	2nd-highest
Lincoln (Broadfield)	7.8	1.2	1881	2nd-highest
Waiouru	5.6	1.2	1962	2nd-highest
Auckland Airport	13.1	1.1	1959	2nd-highest
Leigh	14.4	1.1	1966	2nd-highest
Lower Retaruke	8.2	1.1	1966	2nd-highest
Wairoa (North Clyde)	10.4	1.1	1964	2nd-highest
Wellington (Kelburn)	11.0	1.1	1928	2nd-highest
Whanganui	11.0	1.1	1937	2nd-highest
Dannevirke	9.1	1.0	1951	2nd-highest
Mt Ruapehu (Chateau)	4.0	1.0	2000	2nd-highest
Ngawi	12.3	1.0	1972	2nd-highest
Upper Hutt (Trentham)	8.8	1.0	1939	2nd-highest
Palmerston North	9.9	0.9	1928	2nd-highest
Stratford	8.4	0.9	1960	2nd-highest
Campbell Island	5.5	0.7	1991	2nd-highest
Timaru	7.4	0.7	1885	2nd-highest
Whakatāne Airport	10.6	1.8	1974	3rd-highest
Westport Airport	10.5	1.6	1937	3rd-highest
Culverden	6.6	1.5	1928	3rd-highest
Paeroa	11.0	1.3	1947	3rd-highest
Whitianga	11.4	1.3	1962	3rd-highest
Blenheim	8.9	1.2	1932	3rd-highest
Paraparaumu	10.4	1.1	1953	3rd-highest
Whatawhata	10.4	1.1	1952	3rd-highest
Dargaville	12.5	0.9	1943	3rd-highest



Rotorua	9.3	0.9	1964	3rd-highest
Kaikōura	9.9	0.7	1963	3rd-highest
Roxburgh	6.7	2.0	1950	4th-highest
Hastings	9.4	1.8	1965	4th-highest
Te Anau	6.1	1.6	1963	4th-highest
Nelson	10.0	1.5	1862	4th-highest
Auckland (Māngere)	13.0	1.2	1959	4th-highest
Waikeria	8.9	0.8	1957	4th-highest
Orari Estate	5.9	0.7	1972	4th-highest

Unlike 2021, which featured searing hot temperatures in the high 30s during summer, no station recorded a temperature over 35°C in 2022. The last time New Zealand failed to reach a temperature higher than 35°C during a calendar year was 2007. However, there were still spells of extreme temperatures. Several locations experienced record or near-record temperatures during early February amid a very warm and humid tropical airflow from Vanuatu and Fiji. During this time, Auckland recorded its highest February dew point temperature (a measure of humidity) since records began in 1965.

**Table 2: Record or near-record high or low annual temperature extremes for 2022.**

Location	Temperature (°C)	Date of occurrence	Year records began	Comments
<b>Highest extreme maximum temperatures</b>				
Taupō	33.2	Jan-04th	1949	Highest
Whanganui	32.7	Feb-10th	1937	Highest
Farewell Spit	29.8	Mar-09th	1971	Highest
Greymouth Airport	29.8	Feb-08th	1947	Highest
Ōkārito	28.2	Feb-08th	1982	Highest
Te Kūiti	32.6	Jan-04th	1959	2nd-highest
Nugget Point	31.5	Feb-02nd	1970	2nd-highest
Balclutha	33.2	Feb-02nd	1964	3rd-highest
Rotorua	30.8	Jan-03rd	1964	3rd-highest
Leigh	30.2	Feb-10th	1966	3rd-highest
Auckland (Whenuapai)	30.1	Jan-04th	1945	3rd-highest
Franz Josef	29.0	Feb-08th	1953	3rd-highest
Invercargill Airport	32.2	Jan-02nd	1905	4th-highest
Palmerston North	31.8	Feb-09th	1918	4th-highest
Porirua (Elsdon Park)	28.0	Jan-04th	1968	4th-highest
Lower Retaruke	31.5	Jan-04th	1966	Equal 4th-highest
Five Rivers	30.3	Feb-02nd	1982	Equal 4th-highest
Lumsden	30.3	Jan-02nd	1982	Equal 4th-highest
<b>Lowest extreme maximum temperatures</b>				
Waiau School	2.6	Aug-08th	1974	3rd-lowest
Balclutha	3.8	Jun-11th	1972	Equal 3rd-lowest
Akaroa	5.4	Aug-08th	1978	4th-lowest

Highest extreme minimum temperatures				
Kaitaia	24.2	Feb-12th	1948	Highest
Whangārei	24.0	Feb-12th	1967	Highest
Rangiora	23.2	Feb-03rd	1972	Highest
Dargaville	23.1	Feb-12th	1951	Highest
Paeroa	23.1	Feb-12th	1971	Highest
Kerikeri	23.0	Feb-12th	1952	Highest
Auckland (Western Springs)	22.9	Feb-12th	1971	Highest
Leigh	22.7	Feb-12th	1966	Highest
Auckland (Whenuapai)	22.6	Feb-12th	1951	Highest
Whitianga Airport	22.0	Feb-13th	1971	Highest
Whitianga	22.0	Feb-13th	1971	Highest
Hicks Bay	21.5	Feb-13th	1972	Highest
Levin	21.4	Feb-10th	1950	Highest
Palmerston North	20.7	Feb-11th	1940	Highest
Taupō	20.5	Feb-13th	1950	Highest
Motu	18.9	Dec-10th	1990	Highest
Auckland (Māngere)	23.0	Feb-09th	1961	Equal highest
Waipara West	24.4	Feb-03rd	1973	2nd-highest
Whangārei Airport	23.8	Feb-12th	1967	2nd-highest
Kerikeri Airport	22.8	Feb-12th	1952	2nd-highest
Akaroa	22.7	Feb-03rd	1978	2nd-highest
Whakatāne Airport	22.3	Feb-13th	1975	2nd-highest
Hamilton	22.0	Feb-06th	1946	2nd-highest
Warkworth	22.0	Feb-12th	1966	2nd-highest
New Plymouth	21.4	Feb-05th	1944	2nd-highest
Kaikōura	20.7	Feb-03rd	1972	2nd-highest
Rotorua	20.6	Feb-12th	1972	2nd-highest
Lower Retaruke	19.9	Feb-05th	1972	2nd-highest
Greymouth Airport	18.9	Feb-09th	1972	2nd-highest
Whanganui	21.7	Feb-05th	1972	Equal 2nd-highest
Waikeria	21.4	Feb-06th	1972	Equal 2nd-highest
Paraparaumu Airport	20.5	Feb-03rd	1972	Equal 3rd-highest
Farewell Spit	19.3	Feb-02nd	1972	Equal 2nd-highest
Franz Josef	18.0	Feb-09th	1953	Equal 2nd-highest
Waiouru	18.0	Feb-13th	1972	Equal 2nd-highest
Waiau School	21.6	Feb-03rd	1974	3rd-highest
Wellington Airport	20.9	Feb-04th	1972	3rd-highest
Upper Hutt (Trentham)	20.6	Feb-04th	1972	3rd-highest
Rotorua Airport	20.5	Feb-12th	1972	3rd-highest
Nugget Point	15.7	Feb-02nd	1972	3rd-highest
Martinborough	21.7	Feb-11th	1986	Equal 3rd-highest
Masterton (Te Ore Ore)	21.0	Feb-11th	1943	4th-highest
Orari Estate	19.0	Feb-03rd	1972	4th-highest
Reefton	18.8	Feb-10th	1972	4th-highest
Waiouru Airstrip	17.7	Feb-13th	1972	4th-highest
Wellington (Kelburn)	19.4	Feb-04th	1931	Equal 4th-highest
Arthurs Pass	15.7	Feb-03rd	1973	Equal 4th-highest

Lowest extreme minimum temperatures				
Ōkārīto	-2.6	Oct-06th	1982	2nd-lowest
Manapouri Airport	-8.2	Aug-10th	1963	3rd-lowest
Akaroa	-2.3	Oct-06th	1978	4th-lowest
Dunedin Airport	-8.6	Jun-23rd	1962	Equal 4th-lowest

## Section 6: Annual rainfall – Summer dryness giving way to heavy rainfall events

Widespread abnormally dry and localised meteorological drought developed in January, but quickly gave way to several extreme rainfall events brought about by landfalling atmospheric rivers (ARs) and ex-tropical cyclones (see *Highlights and Extreme Events* for more info) – except in the lower South Island where drought persisted until April. Abnormally dry conditions were common across the country during autumn, culminating in an out-of-season drought for Waikato. A relatively wetter May across central New Zealand segued into a very wet winter. This particularly affected the lower North Island where Wellington, Levin, and Paraparaumu experienced their wettest winters on record, which then paved the way for their wettest years on record (Table 3). 2022 was the most unusually wet year since 2018 and the 8<sup>th</sup> most unusually wet year since the start of NIWA’s Virtual Climate Station Network in 1960 (Figure 2b). Soil moisture levels were frequently above normal in the North Island from winter onward.

**Table 3: Record or near-record annual rainfall totals for the year 2022.**

Location	Rainfall total (mm)	Percentage of normal	Year records began	Comments
<b>High records or near-records</b>				
Paraparaumu Airport	1462	150	1945	Highest
Levin	1438	133	1895	Highest
Wellington (Kelburn)	1763	145	1928	Highest
Te Puke	2538	155	1973	2nd-highest
Kerikeri	2428	142	1935	3rd-highest
Napier Airport	1313	159	1870	3rd-highest
Wellington Airport	1405	147	1958	4th-highest
Tākaka	2770	138	1976	4th-highest
Waipara West	879	142	1973	4th-highest
<b>Low records or near-records</b>				
Manapouri (West Arm Jetty)	2753	67	1971	2nd-lowest

Although several extreme rainfall events affected New Zealand in 2022, February was punctuated by significant rainmakers, including a landfalling AR in the South Island and ex-tropical cyclone Dovi making landfall in the North Island. This led to eight locations experiencing record or near-record 1-day rainfall during early and mid-February.

**Table 4: Record or near-record high extreme 1-day rainfall totals that occurred in 2022.**

Location	1-day extreme rainfall (mm)	Date	Year records began	Comments
Westport Airport	169	Feb-09th	1928	Highest
Reefton	167	Feb-09th	1960	Highest
Te Kūiti	139	Feb-11th	1957	2nd-highest
Martinborough	108	Feb-12th	1924	2nd-highest

Wellington (Kelburn)	127	Feb-12th	1928	2nd-highest
Wellington Airport	116	Feb-12th	1958	2nd-highest
Mt Cook Village	371	Jul-18th	1928	2nd-highest
New Plymouth	125	Feb-05th	1944	4th-highest
Masterton (Te Ore Ore)	108	Feb-12th	1926	4th-highest
Windsor	65	Jul-26th	2000	4th-highest

## Section 7: 2022 climate in the six main centres

Auckland, Tauranga, Hamilton, and Wellington experienced a record or near-record warm year, while Christchurch and Dunedin were above average, highlighting 2022's exceptional warmth. Wellington had a record-wet year, while Tauranga, Hamilton and Christchurch all experienced an above or well-above normal year in terms of rainfall. Meanwhile, Auckland and Dunedin recorded near normal rainfall. Of the six main centres in 2022, Tauranga was the wettest, Dunedin was the driest and coolest, Auckland was the warmest, Hamilton was the sunniest, and Wellington was the least sunny.

**Table 5: 2022 climate in the six main centres.**

Rainfall			
Location	Rainfall (mm)	% of normal	Comments
Auckland <sup>a</sup>	1280	113%	Near normal
Tauranga <sup>b</sup>	1812	152%	Well above normal
Hamilton <sup>c</sup>	1422	127%	Above normal
Wellington <sup>d</sup>	1763	145%	Well above normal (Highest on record)
Christchurch <sup>e</sup>	942	159%	Well above normal
Dunedin <sup>f</sup>	589	80%	Near normal
Temperature			
Location	Mean temp. (°C)	Departure from normal (°C)	Comments
Auckland <sup>a</sup>	16.8	+1.5	Well above average (2nd-highest on record)
Tauranga <sup>b</sup>	16.3	+1.4	Well above average (Highest on record)
Hamilton <sup>c</sup>	15.4	+1.6	Well above average (Highest on record)
Wellington <sup>d</sup>	13.9	+1.0	Above average (2 <sup>nd</sup> -highest on record)
Christchurch <sup>e</sup>	12.2	+0.6	Above average
Dunedin <sup>f</sup>	12.1	+1.0	Above average
Sunshine			
Location	Sunshine (hours)		
Auckland <sup>a</sup>	2251		
Tauranga <sup>b</sup>	2444 <sup>h</sup>		
Hamilton <sup>e</sup>	2252 <sup>i</sup>		
Wellington <sup>d</sup>	2096 <sup>h</sup>		
Christchurch <sup>e</sup>	2221 <sup>h</sup>		
Dunedin <sup>f</sup>	2110		

<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>one day missing <sup>i</sup>Four days missing

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## Section 8: Significant weather and climate events in 2022

This section contains information pertaining to some of the more significant weather and climate events that occurred in 2022. Note that a more detailed list of significant weather events for 2022 can be found in the *Highlights and extreme events* section of NIWA’s Monthly Climate Summaries. These summaries are available online at <https://niwa.co.nz/climate/summaries>.

### Drought and low rainfall

Auckland City experienced a 37-day dry spell from 17 December 2021 to 22 January 2022, which was its second-longest dry spell since records began in 1943.

A plethora of locations around New Zealand instituted water restrictions during January due to the very dry month. Wellington and South Wairarapa entered Level 2 water restrictions, limiting outdoor water use. Level 2 restrictions were also enacted in the Matamata-Piako District, Te Kūiti, Levin, Ōhau, and Lake Hāwea, while restrictions on sprinkler usage began in Picton, Richmond, Stratford, much of Southland, Masterton, and Carterton. Kaipara District Council moved to Level 3 restrictions in Dargaville and Bayliss Beach, as did the Hauraki District Council.

The impact of a record dry summer and start to autumn led to water restrictions being implemented for the first time since 2018 in Southland. During March, Southland District Council declared a ban on unattended sprinklers and hoses while announcing it would restrict all carting of water from its networks until further notice. Invercargill also banned unattended hosing and sprinklers. On 31 March, Environment Southland issued a “Water Shortage Direction”, with the entire Southland region ordered to stop irrigation for two weeks.

On 30 March, Queenstown Lakes District Council notified residents that they had received numerous reports of extremely low water levels on rivers and lakes in the region, which posed a risk to the health and safety of water users. Issues included the exposure of rocks, sand bars and other obstacles that are typically well under water. On 31 March, the level of Lake Wakatipu was 309.378 metres above sea level, the lake’s lowest level since 12 June 2017. The lowest level measured at Lake Wakatipu was 309.295 metres above sea level on 16 September 1966, with records going back to 1962. Lake Te Anau in Southland observed its lowest inflow on record (since at least 1926) during March. Inflows (to 27 March) at Clutha lakes and Lake Te Anau were 66% and 44% of normal, respectively.

On 31 March, the Ministry for Primary Industries classified a medium-scale adverse event for the drought conditions in Southland, Clutha and Queenstown Lakes District, unlocking \$100,000 of funds for affected farmers and growers until October 2022.

Many inland and lower South Island locations experienced prolonged dry spells (consecutive days with <1 mm of daily rainfall) during March and early April:

- Alexandra: 28 days from 8 March - 4 April
- Balclutha: 19 days from 16 March - 3 April
- Clyde: 28 days from 8 March - 4 April
- Cromwell: 28 days from 8 March - 4 April
- Five Rivers: 23 days from 8 - 30 March



- Lake Tekapo: 44 days from 20 February - 4 April
- Lauder: 28 days from 8 March - 4 April
- Middlemarch: 26 days from 16 March - 10 April
- Queenstown: 27 days from 8 March - 3 April
- Tapanui: 16 days from 8-23 March
- Wānaka: 28 days from 8 March - 4 April

Dozens of locations experienced 25 dry days (<1 mm of daily rainfall) or more during the month of April. The following locations had the most dry days during the month (all recording 29 dry days): Blenheim, Appleby, Le Bons Bay, Bromley, and Pukeiti.

### **Floods and high rainfall**

From 3-5 February, an atmospheric river of moisture impacted the upper South Island with very heavy rainfall, leading to flooding, slips, and evacuations. 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.

Another AR 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 21 March, a sub-tropical low pressure system generated a band of severe thunderstorms which produced flooding in Northland and Auckland. At Maungatapere near Whangārei, 103 mm of rain was recorded from 4 a.m. – 5 a.m., making it the [new national hourly rainfall record](#) for a low elevation station (less than 500 metres above sea level). Whangārei also observed its wettest hour on record (64.4 mm) since at least January 1979.

Elsewhere, Albany on Auckland’s North Shore recorded 76.8 mm of rain in an hour between 8 a.m. – 9 a.m., qualifying as the location’s wettest hour on record (since December 2009) as well as the second-wettest hour on record in the Auckland region (from top-of-hour to top-of-hour). The Auckland region’s wettest hour on record stands as 100.6 mm at Whenuapai in February 1996. Auckland (Māngere) also observed its wettest hour on record (56.6 mm) since at least November 1965.

This same system then moved on to produce downpours across parts of the Bay of Plenty, Gisborne and Hawke’s Bay area. Tolaga Bay recorded 35 mm of rain in an hour on 22 March and Rotorua recorded 34 mm in an hour on 23 March. A state of emergency was declared in Tairāwhiti on 23 March as river levels rose rapidly. Tairāwhiti Civil Defence evacuated residents from several areas, including Mangatuna, Tokomaru Bay and Tolaga Bay. Huge slips and flooding caused roads and

bridges to be destroyed, cutting off some towns. On 25 March, the Ministry for Primary Industries classified a medium-scale adverse event for the impact of the flooding in Tairāwhiti and Hawke's Bay, unlocking \$150,000 of funds for affected farmers and growers.

On 18-19 July an active front brought persistent rain to the West Coast with large amounts of spillover into Otago as well as southern Canterbury and the high country. Flooding and a slip cut off the villages of Aoraki/Mount Cook and Lake Ōhau from SH8 Ōmarama to Tarras (Lindis Pass) and the section between Ōmarama and Twizel was also closed overnight due to slips. *Environment Canterbury* reported that some rivers and streams originating from the main divide (Ahuriri and Ōmarama) had caused localised flooding issues. Aoraki/Mt Cook Village experienced its wettest July day on record with observations extending back to 1928. It was also the wettest July day on record at Tara Hills and Clyde with records beginning in 1949 and 1978, respectively.

In August, persistent rain falling on sodden soil in the Wellington region led to a number of major slips, as well as dozens of moderate and minor ones throughout the hill suburbs. On 1 August, two lanes on Bowen Street were closed due to slips. Again on 8 August, multiple slips due to heavy rain in Wellington led to road closures and home evacuations. Most notably, more than 25 residents living in eight homes were forced to evacuate after a steep bank collapsed at The Terrace. Other slips were reported in Horokiwi, Aro Valley, Wadestown, and Wilton, while there was flooding in Karaka Bay and Seatoun.

From 16-20 August, an atmospheric river of moisture extending from the tropics impacted New Zealand with a long-duration heavy rain and flooding event. An analysis by NIWA indicated it was the strongest August atmospheric river in the New Zealand region on record since at least 1950, with a maximum integrated water vapour transport value of 1749 kg/m/s. Values above 1250 kg/m/s are considered exceptional ([Figure 9](#)). The landfalling AR resulted in a 1-in-120 year rain event in Nelson.

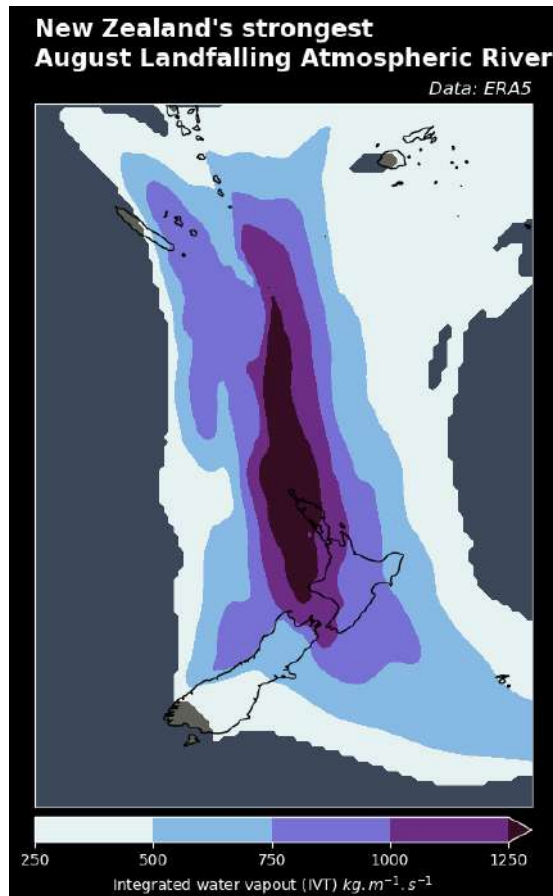


Figure 6: Atmospheric water vapour content of the AR that made landfall in mid-August 2022 (shown here is 12pm on August 2022). Values higher than 1250  $\text{kg}/\text{m}/\text{s}$  are considered to be "exceptional".

The most heavily impacted areas from this event included Northland, Taranaki, Wellington, and particularly Nelson, which observed severe flooding as rainfall amounts reached 2-4 times August normals in just a few days. States of Emergency were declared in Nelson-Tasman, West Coast, and Marlborough, while \$200,000 was announced for the Nelson-Tasman mayoral fund for immediate assistance. The mayor of Nelson said that the city's recovery may take years.

In Nelson, severe flooding was observed as the Maitai River burst its banks, with residents living near the river asked to evacuate. The river's flow reached a maximum of 459 cumecs on 17 August, nearly double its previous record flow of 237 cumecs in December 2011. Nearly 500 homes were evacuated in and around Nelson. In Tāhunanui, an entire house fell into a gully during a slip. Flooding also occurred in Dodson Valley in the suburb of Atawhai. The flooding at Devenish Place in Atawhai was so severe that the road surface was washed away, exposing underground pipes. Additionally, residents were evacuated from Paines Ford in Golden Bay, and extensive flooding was observed in parts of Richmond, Brightwater, and Appleby on 20 August. Flooding and slips resulted in the shutdown of the main water supply line from Maitai Reservoir to Nelson, with a backup line providing much reduced flow rates.

Numerous road closures occurred in the top of the South Island due to flooding and slips, most notably State Highway 6 between Hira and Havelock, severing the direct link between Nelson and Blenheim. The detour via SH63 was also closed for a time, along with a small portion of SH1 in Blenheim. The Rocks Road section of SH6 in Nelson was also closed. SH60 saw flooding from Upper Tākaka to Collingwood, along with sections near Riwaka. Several roads were also closed due to

flooding and slips about Marlborough Sounds, cutting off access to isolated communities there. On 20 August, SH1 south of Picton was closed for several hours due to the threat of flooding on the Wairau and Tuamarina rivers.

On 17 August, a voluntary evacuation order was announced for parts of Westport, Seddonville, and Mokihinui in the West Coast, covering about 140 households.

In Northland, the Kaeo River bridge along SH10 flooded on 18 August, as did SH1 at Rangiahua. Flooding cut off Kaitaia with no detours available, as nine local roads were closed due to flooding and slips, including SH1 through Mangamuka Gorge. *Top Energy* reported power cuts at six different places across the Far North, with a maximum of 1500 customers without power on 18 August. On SH1 near Hikurangi, three people were injured in a crash due to a fallen tree on the road.

**Table 6: Record high monthly extreme 1-day rainfall totals were recorded in 2022 at:**

Location	Extreme 1-day rainfall (mm)	Date of extreme rainfall	Year records began	Ranking
<b>January</b>				
None observed				
<b>February</b>				
Masterton	124	12th	1926	Highest
Martinborough	108	12th	1924	Highest
Wellington (Kelburn)	127	12th	1928	Highest
Wellington (Airport)	116	12th	1958	Highest
Hāwera	153	5th	1977	Highest
Tākaka	190	2nd	1976	Highest
Westport	169	9th	1928	Highest
Arapito	107	3rd	1978	Highest
Reefton	167	9th	1960	Highest
<b>March</b>				
Māhia	79	23rd	1990	Highest
Takapau Plains	101	23rd	1962	Highest
<b>April</b>				
None observed				
<b>May</b>				
Ohakune	78	17th	1961	Highest
<b>June</b>				
South West Cape	41	11th	1991	Highest
<b>July</b>				
Aoraki/Mt Cook Village	371	18th	1928	Highest
Tara Hills	84	18th	1949	Highest
Clyde	26	18th	1978	Highest
South West Cape	111	26th	1991	Highest
<b>August</b>				
Kaitaia	86	17th	1948	Highest
New Plymouth	100	18th	1944	Highest

Mt Ruapehu (Chateau)	97	6th	2000	Highest
Dannevirke	52	8th	1951	Highest
Māhia	538	5th	1990	Highest
Paraparaumu	68	18th	1951	Highest
Stratford	148	18th	1960	Highest
Ōkārīto	114	16th	1981	Highest
Oamaru	120	18th	1950	Highest
South West Cape	172	27th	1991	Highest
September				
None observed				
October				
Te Puke	98	1st	1973	Highest
November				
None observed				
December				
Stewart Island	59	5th	1975	Highest

## Temperature extremes

On 11 February, the dew point temperature 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. Cloudy and humid conditions contributed to several record and near-record high daily minimum temperatures (i.e., warm nights) in mid-February.

May started on a very warm note for much of the country. The warmth was especially persistent in parts of the South Island where a warm spell<sup>4</sup> was observed. In Cromwell for example, the average daily maximum temperature for May is 12.7°C. From 1-8 May, Cromwell's average daily maximum temperature was 19.6°C, and reached as high as 21.1°C on 2 May. The warm spell lasted eight days in Cromwell and Lauder, seven days in Invercargill and Mount Cook Village, and five days in Gore. Invercargill observed an average daily maximum temperature of 19.4°C during its seven-day warm spell. This is higher than the normal daily maximum temperature observed there in January (18.8°C). The city's highest temperature recorded during this hot spell was 21.6°C, just 0.1°C lower than Invercargill's highest May temperature on record (21.7°C, observed in 1924).

From 15 June, a ridge of high pressure began extending over New Zealand, resulting in a prolonged period of calm, clear weather over much of the South Island during the second half of June. This brought low overnight temperatures, and in some locations the temperature struggled to rise above freezing during the day. The low daytime temperatures resulted from a combination of features, including i) an inversion meant cooler air remained trapped near the earth surface, ii) snow cover on the ground reflected incoming energy from the sun when skies were clear, and iii) periods of low cloud and/or fog stopped energy from the sun reaching the earth's surface.

<sup>4</sup> Defined here as at least five consecutive days where the daily maximum temperature is ≥5°C higher than *normal* for the time of year. *Normal* in this context is the 1981-2010 average daily maximum temperature for May.

At Tara Hills (near Ōmarama, Waitaki District), the mean temperature for the 7-day period from 19-25 June was -2.7°C. The lowest daily minimum temperature recorded during this stretch was -11.0°C on 22 June, followed by -10.6°C on 23 June. The daily maximum temperature recorded on 23 June was just 0.3°C.

On 19 August, Kaitaia recorded a minimum temperature of 18.2°C, the warmest August minimum temperature on record for all New Zealand. Meanwhile, Whangārei and Auckland set records for their warmest August night for the third consecutive night. Numerous additional North Island locations also set their own record or near-record warmest August minimum temperature mark between 19-20 August. These extremely warm overnight temperatures were driven by an air mass reaching New Zealand directly from the tropics.

From 5-7 September, a cold front delivered a pool of cold air over New Zealand, with low daily maximum and minimum temperatures observed in many regions of the country. Pukekohe recorded a daily maximum of 9.8°C on 5 September; its equal-lowest daily maximum temperature for September since records began in 1969. Mount Cook Airport recorded a daily minimum temperature of -9.6°C on 6 September; its lowest daily minimum temperature for September since records began in 1929.

From 4-5 October, the polar jet stream bucked northwards and over New Zealand. This resulted in a strong high pressure system to south of Tasmania and drove a series of polar fronts over New Zealand across 5-7 October. The cold snap was particularly severe for the time of year, as the surface airmass experienced in New Zealand derived from the deep Southern Ocean and Antarctic continent. Numerous locations observed record or near-record low daily maximum and minimum temperatures during this period.

From 29-31 October, a warm and humid northerly airflow covered the country. Dozens of locations observed record or near-record high daily maximum and daily minimum temperatures. Perhaps most notably, Nelson recorded a daily minimum temperature of 15.8°C on 29 October, making it the city's highest daily minimum temperature for October since records began in 1862.

**Table 7: Extremes of high daily maximum temperature in 2022 were recorded at:**

Location	Extreme maximum (°C)	Date of extreme temperature	Year records began	Ranking
<b>January</b>				
Taupō	33.2	4th	1949	Equal highest
Lower Retaruke	31.5	4th	1966	Equal highest
<b>February</b>				
Whatawhata	33.0	10th	1952	Highest
Whanganui	32.7	10th	1937	Highest
Westport	29.2	8th	1937	Highest
Arapito	29.2	8th	1978	Highest
Greymouth	29.8	8th	1947	Highest
Ōkārīto	28.2	8th	1982	Highest
<b>March</b>				

None observed				
<b>April</b>				
Paeroa	27.1	2nd	1947	Highest
Rotorua	25.9	1st	1964	Highest
Castlepoint	27.3	21st	1972	Highest
<b>May</b>				
Whangaparāoa	22.7	17th	1982	Highest
Castlepoint	23.7	3rd	1972	Highest
<b>June</b>				
Kerikeri	21.3	1st	1945	Equal highest
<b>July</b>				
Auckland (Whenuapai)	20.8	8th	1945	Highest
Taupō	17.2	26th	1949	Highest
Auckland (Airport)	19.6	8th	1959	Highest
Paraparaumu	19.5	26th	1953	Highest
Porirua	19.2	26th	1968	Highest
Hāwera	19.0	8th	1977	Highest
Whanganui	21.1	8th	1937	Highest
Palmerston North	19.6	8th & 26th	1918	Highest
Arapito	19.4	26th	1978	Highest
Hanmer Forest	20.5	19th	1906	Highest
Gisborne	21.2	26th	1905	Equal highest
Westport	17.8	26th	1937	Equal highest
<b>August</b>				
Whangārei	23.0	20th	1967	Highest
Warkworth	21.0	20th	1966	Highest
Whangaparāoa	19.7	21st	1982	Highest
Whitianga	21.7	21st	1962	Highest
Ngawi	22.1	19th	1972	Highest
Hastings	23.8	21st	1965	Highest
Waipawa	23.8	20th	1945	Highest
Wairoa	24.3	20th	1964	Highest
Porirua	18.8	19th	1968	Highest
Hāwera	18.3	20th	1977	Highest
Ohakune	18.8	19th	1962	Highest
Waiouru	16.5	19th	1962	Highest
Whanganui	21.4	20th	1937	Highest
Westport	19.3	26th	1937	Highest
Waiau	24.0	17th	1974	Highest
<b>September</b>				
None observed				
<b>October</b>				
Takapau Plains	25.6	29th	1962	Highest
Dannevirke	25.1	29th	1951	Highest
Hanmer Forest	28.8	23rd	1906	Highest
<b>November</b>				
Stratford	24.8	15th	1960	Equal highest

Waipawa	29.5	2nd	1945	Equal highest
December				
Farewell Spit	27.8	30th	1971	Equal highest

**Table 8: Extremes of low daily maximum temperature in 2022 were recorded at:**

Location	Extreme low maximum (°C)	Date of extreme temperature	Year records began	Ranking
<b>January</b>				
None observed				
<b>February</b>				
Paraparaumu	14.7	13th	1972	Lowest
Cheviot	11.6	13th	1982	Lowest
Te Anau	10.3	4th	1973	Lowest
<b>March</b>				
None observed				
<b>April</b>				
None observed				
<b>May</b>				
None observed				
<b>June</b>				
None observed				
<b>July</b>				
None observed				
<b>August</b>				
None observed				
<b>September</b>				
Pukekohe	9.8	5th	1969	Equal lowest
<b>October</b>				
Castlepoint	6.5	6th	1972	Lowest
Puysegur Point	6.4	5th	1978	Lowest
Le Bons Bay	5.1	6th	1984	Lowest
Five Rivers	4.9	5th	1982	Lowest
Tapanui	2.5	5th	1900	Lowest
Gore	3.0	5th	1907	Lowest
Tiwai Point	6.6	5th	1972	Lowest
Oban (Stewart Island)	6.3	5th	1975	Lowest
Balclutha	5.2	5th	1972	Lowest
Nugget Point	4.4	5th	1972	Lowest
South West Cape	5.4	5th	1991	Lowest
Campbell Island	2.8	5th	1991	Lowest
<b>November</b>				
None observed				
<b>December</b>				
None observed				



**Table 9: Extremes of low daily minimum temperature in 2022 were recorded at:**

Location	Extreme minimum (°C)	Date of extreme temperature	Year records began	Ranking
<b>January</b>				
None observed				
<b>February</b>				
None observed				
<b>March</b>				
None observed				
<b>April</b>				
None observed				
<b>May</b>				
None observed				
<b>June</b>				
Dunedin (Airport)	-8.6	23rd	1962	Lowest
<b>July</b>				
None observed				
<b>August</b>				
None observed				
<b>September</b>				
Mt Cook (Airport)	-9.6	6th	1929	Lowest
<b>October</b>				
Whitianga	-1.8	7th	1962	Lowest
Paeroa	-1.8	7th	1947	Lowest
Matamata	-2.4	7th	1999	Lowest
Rotorua	-3.5	7th	1964	Lowest
Hamilton (Airport)	-2.9	7th	1946	Lowest
Waikeria	-2.8	7th	1957	Lowest
Te Kūiti	-2.5	7th	1959	Lowest
Taumarunui	-4.2	7th	1947	Lowest
Tūrangi	-4.4	7th	1968	Lowest
New Plymouth	-1.3	7th	1944	Lowest
Lower Retaruke	-3.3	7th	1966	Lowest
Westport	-0.6	6th	1937	Lowest
Greymouth	-1.8	6th	1947	Lowest
Ōkārīto	-2.6	6th	1982	Lowest
Franz Josef	-2.1	6th	1953	Lowest
Haast	-3.4	6th	1949	Lowest
Arthurs Pass	-6.1	6th	1973	Lowest
Akaroa	-2.3	6th	1978	Lowest
Le Bons Bay	-1.3	6th	1984	Lowest
Middlemarch	-5.3	4th	2000	Lowest
Manapouri (Airport)	-7.3	6th	1963	Lowest

South West Cape	0.5	6th	1991	Lowest
Whatawhata	-0.3	7th	1952	Equal lowest
Clyde	-3.4	7th	1978	Equal lowest
<b>November</b>				
None observed				
<b>December</b>				
None observed				

**Table 10: Extremes of high daily minimum temperature in 2022 were recorded at:**

Location	Extreme high minimum (°C)	Date of extreme temperature	Year records began	Ranking
<b>January</b>				
Paraparaumu	21.1	2nd	1972	Highest
<b>February</b>				
Cape Reinga	21.8	12th	1971	Highest
Kaitaia	24.2	12th	1948	Highest
Kerikeri	23.0	12th	1952	Highest
Kaikohe	22.6	12th	1973	Highest
Dargaville	23.1	12th	1951	Highest
Whangārei	24.0	12th	1967	Highest
Mokohinau	22.7	12th	1994	Highest
Whangaparāoa	21.9	12th	1982	Highest
Auckland (Whenuapai)	22.6	12th	1951	Highest
Auckland (Western Springs)	22.9	12th	1971	Highest
Paeroa	23.1	12th	1971	Highest
Taupō	20.5	13th	1950	Highest
Motu	18.8	12th	1990	Highest
Auckland (Māngere)	23.0	9th	1961	Highest
Pukekohe	22.3	12th	1969	Highest
Hamilton (Ruakura)	22.0	13th	1940	Highest
Hamilton (Airport)	22.0	6th	1946	Highest
Port Taharoa	22.4	10th	1974	Highest
Mt Ruapehu (Chateau)	16.1	12th	2000	Highest
Palmerston North	20.7	11th	1940	Highest
Levin	21.4	10th	1950	Highest
Hāwera	21.1	11th	1977	Highest
Whanganui	22.2	5th	1972	Highest
Westport	21.2	10th	1966	Highest
Arapito	20.4	10th	1978	Highest
Ōkārīto	18.8	10th	1983	Highest
Rangiora	23.2	3rd	1972	Highest
Whakatāne	22.4	13th	1975	Equal highest
Waīouru	18.0	13th	1972	Equal highest
Franz Josef	18.0	9th	1953	Equal highest

March				
None observed				
April				
Castlepoint	19.4	6th	1972	Highest
Westport	19.6	21st	1966	Highest
Ngawi	20.2	21st	1972	Equal highest
Porirua	17.0	5th	1972	Equal highest
Wellington (Airport)	18.0	21st	1972	Equal highest
May				
Porirua	17.0	9th	1972	Highest
Secretary Island	15.2	7th	1988	Highest
Puysegur Point	16.8	7th	1978	Highest
Le Bons Bay	15.5	2nd	1984	Highest
South West Cape	15.0	7th	1991	Highest
Campbell Island	10.5	1st	1991	Highest
Brothers Island	16.1	4th	1997	Equal highest
June				
Whangaparāoa	16.1	2nd	1982	Highest
Motu	12.5	2nd	1990	Highest
Port Taharoa	16.1	1st	1974	Highest
Māhia	14.8	2nd	1990	Highest
Porirua	14.4	1st	1972	Highest
Orari Estate	9.0	2nd	1972	Highest
South West Cape	12.3	1st	1991	Highest
Castlepoint	16.0	2nd	1972	Equal highest
July				
Medbury	14.0	19th	1927	Highest
Waipara West	14.5	19th	1973	Highest
August				
Cape Reinga	15.9	19th	1971	Highest
Kaitaia	18.2	19th	1948	Highest
Kerikeri	16.7	19th	1952	Highest
Kaikohe	16.3	19th	1973	Highest
Dargaville	17.4	19th	1951	Highest
Whangārei	17.6	19th	1967	Highest
Mokohinau	16.7	19th	1994	Highest
Warkworth	15.8	19th	1966	Highest
Whangaparāoa	15.2	19th	1982	Highest
Auckland (Whenuapai)	16.4	19th	1951	Highest
Whitianga	16.8	19th	1971	Highest
Paeroa	17.3	19th	1971	Highest
Matamata	15.5	19th	1999	Highest
Tauranga	16.0	20th	1941	Highest
Whakatāne	16.1	20th	1975	Highest
Rotorua	13.9	19th	1972	Highest
Taupō	14.6	19th	1950	Highest
Motu	14.4	20th	1990	Highest

Auckland (Māngere)	16.3	19th	1961	Highest
Whatawhata	15.5	20th	1952	Highest
Hamilton (Ruakura)	15.6	19th	1940	Highest
Hamilton (Airport)	16.2	19th	1946	Highest
Port Taharoa	16.7	19th	1974	Highest
Waikeria	16.1	19th	1972	Highest
Te Kūiti	15.4	19th	1959	Highest
Taumarunui	15.6	19th	1947	Highest
Turangi	13.3	20th	1968	Highest
New Plymouth	15.3	19th	1944	Highest
Lower Retaruke	15.7	19th	1972	Highest
Mt Ruapehu (Chateau)	9.9	19th	2000	Highest
Masterton	15.7	20th	1943	Highest
Dannevirke	14.0	20th	1951	Highest
Martinborough	15.3	20th	1986	Highest
Ngawi	15.5	20th	1972	Highest
Hicks Bay	15.8	19th	1972	Highest
Hastings	14.5	19th	1972	Highest
Waipawa	14.3	20th	1945	Highest
Wairoa	16.5	19th	1972	Highest
Mahia	14.3	20th	1990	Highest
Paraparaumu	15.9	19th	1972	Highest
Palmerston North	14.3	19th	1940	Highest
Levin	16.1	19th	1950	Highest
Porirua	14.7	19th	1972	Highest
Wellington (Kelburn)	14.4	19th	1931	Highest
Wellington (Airport)	15.0	20th	1972	Highest
Upper Hutt	15.7	19th	1972	Highest
Stratford	13.3	19th	1972	Highest
Hāwera	15.5	19th	1977	Highest
Ohakune	14.0	19th	1972	Highest
Waiouru	12.2	19th	1972	Highest
Whanganui	16.8	20th	1972	Highest
Tākaka	12.9	20th	1978	Highest
Farewell Spit	14.0	19th	1972	Highest
Hokitika	13.5	18th	1866	Highest
Reefton	12.3	20th	1972	Highest
Ōkārīto	13.6	18th	1983	Highest
Franz Josef	12.6	18th	1953	Highest
Nelson	14.2	19th	1862	Highest
Appleby	13.0	18th	1941	Highest
Blenheim	15.0	20th	1947	Highest
Brothers Island	13.6	19th	1997	Highest
Pukekohe	15.1	19th	1969	Equal highest
Napier	15.1	21st	1940	Equal highest
<b>September</b>				
Motu	13.6	30th	1990	Highest
Cape Reinga	14.8	29th	1971	Equal highest

October				
Cape Reinga	16.1	30th	1971	Highest
Kaitiāia	17.6	29th	1948	Highest
Mokohinau	17.6	30th	1994	Highest
Auckland (Whenuapai)	17.1	30th	1951	Highest
Auckland (Western Springs)	17.7	30th	1971	Highest
Whitiānga	17.8	30th	1971	Highest
Paeroa	17.4	30th	1971	Highest
Matamata	15.8	29th	1999	Highest
Te Puke	16.9	30th	1973	Highest
Whakatāne	17.9	30th	1975	Highest
Port Taharoa	17.1	29th	1974	Highest
Tūrangi	14.3	30th	1968	Highest
Castlepoint	17.8	30th	1972	Highest
Hicks Bay	16.8	30th	1972	Highest
Hastings	19.1	30th	1972	Highest
Palmerston North	16.6	30th	1940	Highest
Tākaka	15.6	29th	1978	Highest
Franz Josef	13.6	29th	1953	Highest
Nelson	15.8	29th	1862	Highest
Kaikōura	15.6	30th	1972	Highest
South West Cape	14.1	9th	1991	Highest
Leigh	16.8	30th	1966	Equal highest
Rotorua	15.6	30th	1972	Equal highest
Whakatū	18.2	30th	1972	Equal highest
Hāwera	15.3	29th	1977	Equal highest
Waiau	16.8	30th	1974	Equal highest
November				
Christchurch Botanic Gardens	23.4	5 <sup>th</sup>	1863	Highest
Motu	15.9	3 <sup>rd</sup>	1990	Highest
Puysegur Point	16.4	16 <sup>th</sup>	1978	Highest
South West Cape	14.7	16 <sup>th</sup>	1991	Highest
December				
Motu	18.9	10th	1990	Highest
Westport	19.4	16th	1966	Highest

### Strong winds

On 20 May, strong and damaging winds struck many parts of the North Island. In Cambridge, a woman died after being trapped under a tree that had toppled in the wind. Farther north, several lanes of the Auckland Harbour Bridge were closed because of the strong winds. Levin recorded a wind gust of 141 km/h – the highest May gust for the town since records began in 1971. The strong winds (and possible tornado on this day) caused considerable damage to a number of buildings and trees.

On 13 June, strong winds and high seas resulted in damaging waves along the West Coast, and inundation of coastal land by sea surges. Residents of Ngakawau, Granity, Hector and Mokihinui

(north of Westport) were advised to evacuate due to large swells in the area. In Greymouth, Domett Esplanade was closed due to debris washed ashore by large waves. Farther north, swells of up to 6 metres occurred about the Kāpiti Coast, with at least one property having a concrete fence, pavers and a wooden gate torn away by the large waves. The Plimmerton Fire Brigade on Sunset Parade reported large pieces of wood and rocks had been deposited over the road from sea surges. Waves were regularly crashing over Marine Drive (Eastern Bays, Wellington), however the road remained open. Foxton Beach also suffered flooding and debris issues because of high seas. The Kāpiti Coast District Council closed Reikorangi Road (southeast of Waikanae) due to the risk of falling trees, which left around 400 residents of the Reikorangi community isolated. Approximately 200 customers in the area were without power due to a downed tree damaging power lines. A possible tornado may have caused property damage. In Taranaki, power outages at around 1,000 properties were caused due to downed trees taking out power lines.

**Table 11. Maximum wind gust extremes in 2022 were recorded at:**

Location	Maximum wind gust (km/h)	Date of maximum wind gust	Year records began	Ranking
<b>January</b>				
None observed				
<b>February</b>				
Auckland (Western Springs)	78	13th	1994	Highest
Tauranga	104	13th	1973	Highest
Te Puke	76	13th	1987	Highest
Motu	98	13th	1991	Highest
Hamilton (Ruakura)	83	13th	1996	Highest
New Plymouth	128	13th	1972	Highest
Baring Head	159	13th	1991	Highest
Mahia	98	13th	1991	Highest
Kaukau Top	148	13th	1969	Highest
Dargaville	93	13th	1997	Equal highest
<b>March</b>				
Māhia	93	25th	1991	Highest
<b>April</b>				
Māhia	102	13th	1991	Highest
<b>May</b>				
Levin	141	20th	1971	Highest
Clyde	87	21st	1983	Highest
<b>June</b>				
Martinborough	115	13th	2001	Highest
Palmerston North	95	13th	1991	Highest
Upper Hutt (Trentham)	93	13th	1999	Highest
Farewell Spit	115	13th	1973	Highest
Reefton	57	7th	1999	Highest
<b>July</b>				
Baring Head	158	21st	1991	Highest
Puysegur Point	163	18th	1986	Highest

Winchmore	132	18th	1970	Highest
Windsor	89	18th	2001	Highest
August				
Mt Ruapehu (Chateau)	133	7th	2000	Highest
Mt Cook (Airport)	141	5th	2000	Highest
Wānaka	115	5th	1992	Highest
Windsor	91	2nd	2001	Highest
Middlemarch	128	2nd	2000	Highest
Clyde	102	5th	1983	Highest
Alexandra	141	5th	2001	Highest
September				
None observed				
October				
Puysegur Point	169	10th	1986	Equal highest
November				
Oamaru	98	2 <sup>nd</sup>	1984	Highest
Te Puke	65	30 <sup>th</sup>	1987	Highest
December				
None observed				

### Ex-Tropical Cyclone Dovi

On 13 February, the landfall of 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. Widespread power outages occurred in Auckland due to gusts at 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.

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.

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 Opua. Power outages were reported in several parts of Taranaki due to high winds, with power also out in parts of Northland and Waikato.

## **Ex-Tropical Cyclone Fifi**

On 13 April, Fifi, a deep low pressure system, passed just offshore of East Cape during the mid-afternoon hours. Several hundred power cuts were reported, along with surface flooding on State Highway (SH) 35, causing closures between Hicks Bay and Te Araroa and between Tokomaru Bay and Te Puia. A long-time Ruatoria resident commented “pines are snapping like twigs. Some probably 100-200 year old trees.” By late afternoon, Gisborne’s wastewater system was struggling to cope with the amount of water draining from residential properties, prompting the council to open an emergency sewer valve at Gladstone Bridge. In coastal Hawke’s Bay, south of Hastings, localised flooding damaged bridges and fences that were repaired after the March deluge. According to a weather station operated by Gisborne District Council at the East Cape Lighthouse, storm total rainfall from 13-14 April reached 200 mm.

## **Snow and ice**

From 7-14 June, a prolonged period of low pressure over and to the south of the South Island delivered considerable snowfalls to mountainous areas, as well as to lower elevations. The timing was ideal for ski areas, with several opening for the season in mid-June. With that said, the large quantity of snowfall and snowdrifts meant considerable work was required to clear ski area access roads, carparks, and base lodge facilities. Many roads and mountain passes were closed due to snow, some for several consecutive days. Some of the key highlights of this event are listed in chronological order below:

- On 10 June, snowfall occurred down to approximately 500 metres above sea level in parts of the South Island. In Canterbury, SH73 from Springfield to Arthur’s Pass was closed due to snow. Chains were required for vehicles travelling over the Crown Range Road due to snow.
- On 11 June, snow fell to sea level in Stewart Island. The Milford Road was closed, with local contractors reporting half a metre of snow at the Homer Tunnel. The Lindis Pass also closed, and was only reopened on 14 June after several days of regular and relatively heavy snowfall.
- On 13 June, snow settled in several inland towns including Glenorchy, Wānaka, Cromwell, Ōmarama, Twizel and Lake Tekapo. In Wānaka, two schools were closed due to snow. All major mountain passes in the South Road were closed due to snow including SH6 from Haast to Makarora, SH7 from the Hanmer turnoff to Springs Junction, SH8 between Tekapo and Fairlie (Burkes Pass). The ski area manager of Coronet Peak (Queenstown) said the field faced unprecedented issues with avalanches over the ski field and access road. Contractors were required to remove fallen trees near Arthurs Point (Queenstown) and Diamond Lake (Glenorchy) because of the weight of snow on branches.
- On 14 June, the Queenstown Lakes District Council stated that the Crown Range Road (between Queenstown and Wānaka) would remain closed between Eastburn Gates and Cardrona until an avalanche assessment had been completed for the summit.

On 12 July, an atmospheric river that brought flooding to parts of the country also brought snow to Canterbury and Otago. SH8 between Fairlie and Lake Tekapo was closed due to snow and ice. SH73 between Springfield and Castle Hill was also closed. Around 50 cm of snow was reported by mid-afternoon in Mount Cook Village.



On 24 August, operations became significantly limited at Mt Ruapehu's ski field Whakapapa and Tūroa was temporarily closed due to warm weather and a lack of snow. Operator Ruapehu Alpine Lifts indicated that both fields would lose a third of their 405 total staff.

On 5-6 September, a cold outbreak resulted in snow falling to low elevations for parts of New Zealand. Snow flurries were reported in central Dunedin on 5 September, with snow and ice causing treacherous conditions about the hill suburbs of the city on 6 September. Farther north, snow fell to sea level at Christchurch with light accumulations of snow reported in parts of the city. The snowfalls caused road closures in both the South and North Islands.

Early on 5 October the first of several cold fronts passed over the South Island, delivering snowfall to near sea level in Southland, and to approximately 100 m above sea level in Canterbury during the morning. A second, much colder front passed over in the afternoon and evening, delivering snowfall to sea level for widespread parts of Southland, Otago and Canterbury. Overnight on 5 October through to the morning hours of 6 October, this second cold front passed over the North Island, delivering snow to low elevations about the lower North Island and Taranaki. The following list outlines some of the more notable observations of this snowfall event:

- Heaviest snowfalls were reported for inland and northern parts of Southland, where approximately 25-30 cm of snow was recorded down to elevations of approximately 300 m above sea level near Five Rivers and Garston. Snowfall was recorded at sea level along the southern coastline and in Rakiura/Stewart Island.
- Dunedin motorists were asked to stay at home due to treacherous roads, particularly in the hill suburbs, with snowfall blanketing the city down to the beaches at sea level.
- Snow settled to low elevations in Wellington and the Manawatū, including reports of snow on Saddle Road, Pahiatua Track and in Kimbolton.
- Widespread snowfalls were reported in Taranaki, including at Stratford, Pembroke, Cardiff, Ngaere and Eltham.

### **Lightning, hail and tornadoes**

In the early morning hours of 21 April, a thunderstorm developed near Lake Wakatipu in Central Otago, leading to the closure of the Glenorchy-Queenstown road due to a slip and leaving hundreds without power in Queenstown, Glenorchy, Frankton, and parts of Arrowtown. Queenstown locals commented on the thunder being particularly loud, whose acoustics may have been enhanced by the presence of a shallow inversion layer, or when temperature increases with height, in the lower atmosphere.

On 20 May, severe thunderstorms occurred over much of the country, but especially southern parts of the North Island. At around 6:15-6:30 am, a tornado hit Levin, damaging between 30-50 homes, and bringing down numerous powerlines and mature trees. In Ōhau (just south of Levin), a severe hailstorm caused considerable damage to property and crops. One farmer described the damage as catastrophic and the worst hail damage in 44 years of farming, with nothing left of their cabbage, silverbeet and lettuce crop. Around 12,000 lightning strikes were recorded about New Zealand in the 6 hours to 11:30 a.m.

June was a particularly stormy month for parts of New Zealand. Over 23,000 lightning strikes were recorded over the land or just offshore throughout the month, and several severe thunderstorms

struck the greater Wellington Region, leading to hail and a series of powerful convective wind events. On 1 June, squally thunderstorms struck the Kāpiti Coast in association with the passage of a cold front. Small tornadoes were reported in Waikanae and Otaihangā, causing damage to property including roofs and fences, and bringing down mature trees.

On 9 June, a possible tornado was reported in Waikanae, with two Norfolk Pine tree trunks smashing through the roof of a warehouse on Omaha Street. Further damage was reported on nearby Kapanui Road, with downed trees and fences there. A severe thunderstorm in Wellington caused power outages at Wellington Hospital, Parliament, the CDB, and Hutt Valley. Farther north, a water spout was seen off the coast of Waiiti (north of New Plymouth).

On 12 June, lightning struck a power pylon on Horokiwi Road in Newlands (Wellington), causing a power outage to 4,000 customers in Newlands and Johnsonville. A funnel cloud was sighted off the coast of Waikanae in the afternoon, while two possible tornadoes caused damage to properties and infrastructure in Waikanae in the evening hours. In New Plymouth, large hailstones of around 2.5 cm were reported, while small hail of around 1 cm were reported in Wellington's CBD.

On 13 June, a funnel cloud was reported over Paraparaumu Beach, and a possible small tornado in Ngakawau (West Coast) lifted a garage off its foundations.

On 5 October, several lightning strikes were reported over inland parts of Southland at the same time as snowfall was occurring, a phenomenon known as thundersnow. Farther north, lightning and hail were reported in Christchurch, and later in Wellington, in association with the passage of a cold front.

November had frequent thunderstorm outbreaks. Over 35,000 lightning strikes were observed over the month. In a particularly prolonged outbreak from 16-21 November, a warm and humid air was drawn over New Zealand. A slow-moving upper cold pool then generated widespread instability, resulting in several days of thunderstorms for the North Island. From Thursday morning to Saturday afternoon, over 5,000 lightning strikes were recorded across New Zealand. Thunderstorms also brought heavy downpours, with Manakau Heads recording 24 mm in an hour, Mt Ruapehu recording 19.2 mm in an hour, and Tauranga recording 20.2 mm in an hour. A waterspout was seen off the North Shore of Auckland, associated with a severe thunderstorm on 20 November.

On 17 December, a tornado moved through rural Alexandra and Springvale, causing extensive damage to some properties. This included a house whose roof was partially torn off and a shed that was destroyed.

### **Cloud and fog**

Warmer than average sea surface temperatures combined with cool southeasterly air to bring several days of very low cloud, fog and drizzle from 28-31 March. Hundreds of flights to Wellington were cancelled. Some flights circled the city for as long as 40 minutes waiting for visibility to clear, before returning to their origin.

From 4-6 August, thick fog resulted in numerous flight cancellations each morning at Auckland Airport. On 4 August, 22 Air New Zealand regional flights were cancelled. On 5 August, 26 domestic regional flights were cancelled and nine were delayed, while on 6 August, 43 domestic flights were

cancelled and 28 delayed, including flights from Wellington and Christchurch. Some Auckland ferry sailings were also cancelled on these days.

On 8 August, another 22 domestic regional flights were cancelled and 19 flights were delayed at Auckland Airport due to fog.

### **Volcanic activity**

On 15 January, the Hunga Tonga–Hunga Ha’apai volcano in Tonga experienced a powerful eruption, with the volcanic plume reaching 53 km, a height unmatched by any measured volcanic eruption. An estimated 400,000 tonnes of sulphur dioxide into the atmosphere, along with huge quantities of water vapour into the stratosphere.

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

A tsunami caused by the eruption reached northern NZ 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.

Throughout autumn and winter, vibrant colourful hues in the sky just before sunrise and just after sunset. Measurements from NIWA Lauder (Central Otago) confirmed unusual increases in aerosols in the stratosphere, about 20-25 km above New Zealand. These aerosols originated from the Hunga Tonga-Hunga Ha'apai volcanic eruption, and contributed the colourful skies.

The presence of unusually high amounts of water vapour in the stratosphere, a layer of the atmosphere some 10-20 km above sea level, caused cooling in the stratosphere across the Southern Hemisphere. This effect may continue to occur over the next three years, which is the time it takes the excess water to circulate out of the stratosphere. However, as of yet, there is not any evidence or research to suggest that the eruption was the direct cause of the very wet, warm weather New Zealand experienced during 2022.

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**Note for editors:**

Climate measurements have been made in New Zealand for about 150 years, with reasonable coverage of reliable data from at least the early 1900s. NIWA makes its raw climate data publicly available for free online. Journalists are advised, however, to take extreme care when interpreting trends from raw data to ensure they have not been compromised by changes in site location, urbanisation, exposure, or instrumentation over time. If in any doubt, please call us.

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