Aotearoa New Zealand Climate Summary: **2021** Issued: 11 January 2022

2021: New Zealand's warmest year on record

Temperature	Annual temperatures were above average (+0.51°C to +1.20°C above the annual average) for much Aotearoa New Zealand. Well above average temperatures (>1.20˚C above the annual average) occurred in parts of Auckland, Bay of Plenty, Tasman and Fiordland. Near average (within -0.50°C to +0.50°C of average) temperatures occurred in western Waikato, coastal Wairarapa and parts of northern Canterbury and Otago. 2021 was the warmest year on record for New Zealand, based on NIWA's seven-station series which began in 1909.
Rainfall	Rainfall was near normal (80-119% of annual normal) for most of the country. Above normal rainfall (120-149% of annual normal) occurred in parts of Taranaki, coastal Manawatū-Whanganui and western Greater Wellington. Parts of Nelson, interior Canterbury and Otago also experienced above normal rainfall.
Soil moisture	The majority of the country experienced below normal soil moisture levels during the first three months of the year. Meteorological drought was present for a time in the Far North during January and February. By June, soil moisture had recovered and was largely near normal with the exception of parts of the Hawke's Bay where dryness persisted. Near normal soil moisture persisted through to September. By the end of December, soils were drier than normal across much of the upper North Island and Southland while above normal soil moisture levels were present in much of Taranaki, central and southern Manawatū-Whanganui, Wellington, coastal Marlborough, eastern Canterbury and parts coastal Otago.
Sunshine	Taranaki experienced New Zealand's highest annual sunshine total during 2021 (2592 hours recorded at New Plymouth).

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Overview

2021 was Aotearoa New Zealand's warmest year on record, surpassing the previous record set in 2016. Seven of the past nine years have been among New Zealand's warmest on record. This trend is consistent with the overall pattern of global warming. The nationwide average temperature for 2021, calculated using stations in NIWA's seven-station temperature series which began in 1909, was 13.56°C (0.95°C above the

1981–2010 annual average[1]). Based on the seven-station series, 2021 featured three months (January, February and September) with near average temperatures (within -0.50°C to +0.50°C of average), nine months with above average temperatures (greater than +0.50°C of average), and no months with below average temperatures (less than -0.50°C of average). Daily data based on NIWA's Virtual Climate Station Network shows that for the country as a whole, 26% of days in 2021 featured below or well below average temperatures, 19% of days had near average temperatures and 55% of days featured above average or well above average temperatures. The Southern Annular Mode (SAM), an indicator of Southern Hemisphere climate variability, was positive 73% of the time during 2021. The positive SAM phase is associated with higher than normal air pressure around New Zealand, which tends to bring more tranquil weather conditions to the country. Frequent high pressure over the North Island and east of New Zealand, which caused more northerly quarter winds than normal, was a contributor to New Zealand's warmest year on record. Figure 1 shows the air pressure and wind flow as a difference from normal during 2021.

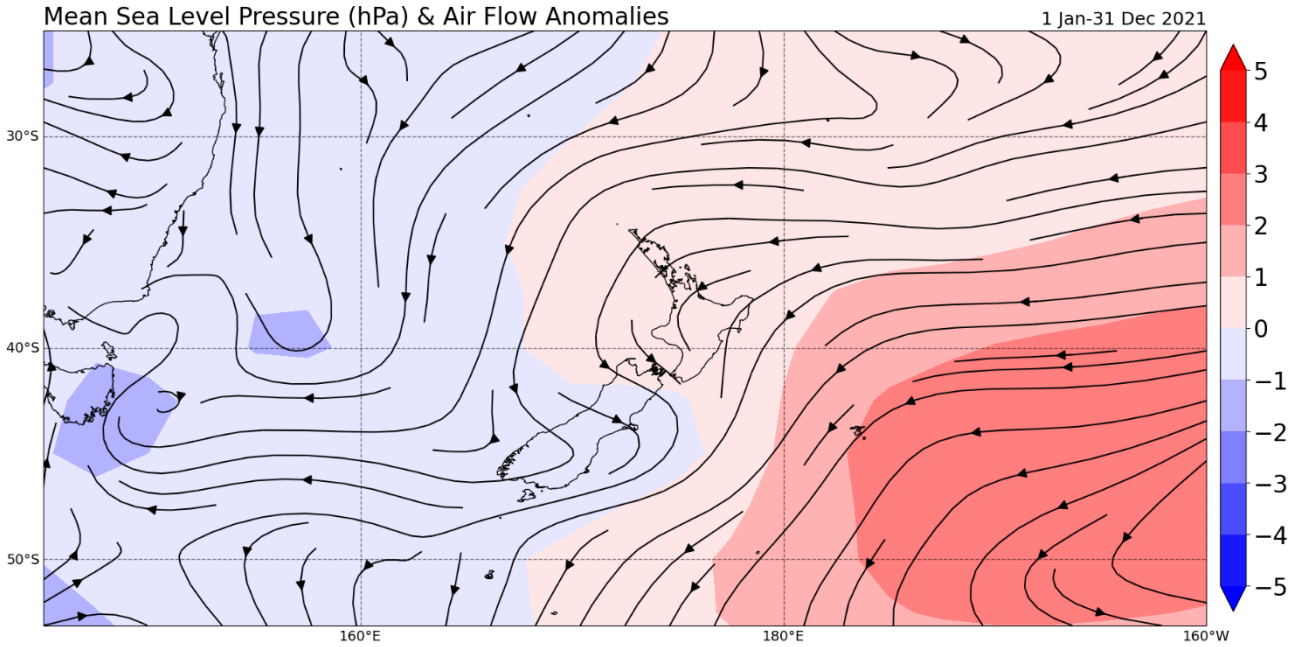

Figure 1: Air pressure as a difference from normal during 2021. Red colours indicate higher than normal pressure, which tends to be associated with tranquil weather, and blue colours indicate lower than normal pressure, typically associated with unsettled weather. The vectors indicate the air flow anomaly. Climatology is based on the 1981 – 2010 period.

The hottest spell of the year took hold over New Zealand from 25-28 January, with several locations observing record or near-record high daily maximum and daily minimum temperatures. The highest temperature of 2021 was recorded on 26 January at Ashburton. The maximum temperature there reached 39.4°C, which is New Zealand's 2nd-highest January temperature on record, and the country's 10th-equal hottest temperature on record for all months. The start of the year also featured extended dry spells in the North Island. Meteorological drought developed in the Far North district during January (based on the NZ Drought Index) while very dry to extremely dry conditions became widespread across large parts of the North Island as well as Marlborough and northern Canterbury during February. Water restrictions were temporarily implemented in Northland, Auckland, Wairarapa and the Hastings District. During January and February, moderate La Niña conditions in the central Pacific (which began in October 2020) gradually eased. La Niña in New Zealand is often associated with north-easterly winds and warmer weather, however the weather patterns from this climate driver at the start of 2021 were generally not consistent with those expected. January featured more south-westerly winds than usual and February featured easterlies. Both

[1] This climate summary refers to differences from average based on the 1981-2010 climatology. A transition to using the 1991-2020 baseline is expected to occur in 2022.

months were some of our coolest of the year (relative to the time of year). The atypical impacts can be attributed, in part, to a non-traditional central Pacific type of La Niña, whereby the minimum sea surface temperature anomalies are located in the central Pacific rather than the east.

Autumn 2021 was characterised by long dry spells and warmth, interspersed by bursts of heavy rainfall. This was because La Niña began its transition to an El Niño Southern Oscillation neutral phase in March and the dominant climate driver became the Madden-Julian Oscillation (MJO), an eastward moving "pulse" of cloud and rain in the tropics. The MJO was often active over Africa and the western Indian Ocean, leading to spells of high pressure over New Zealand. As a result, much of New Zealand experienced warm days, but chilly nights. However, on the occasions when the MJO pulsed across the Maritime Continent (north of Australia) and into the Pacific, notable rain and storm outbreaks occurred, including the Canterbury flood event at the end of May where heavy and persistent rain led to severe flooding in the foothills and a State of Emergency declaration. Research after the event carried out by the Extreme Weather Event Real-time Attribution Machine (EWERAM) project found that the extreme rainfall during this event was 10-15% more intense as a result of human influence on the climate system.

Winter 2021 was the warmest winter on record in New Zealand, surpassing the record recently set in winter 2020, owing to more northerly quarter winds than normal. Several atmospheric rivers, or long, narrow regions in the atmosphere that transport most of the water vapour outside the tropics, affected New Zealand during winter, causing extreme rainfall in some regions. This was typically associated with the active phase of the MJO in the Indian Ocean, Maritime Continent, and western Pacific. This was likely connected to the emergence of a negative Indian Ocean Dipole, which refers to warmer than average ocean temperatures in the tropical eastern Indian Ocean. For New Zealand, this may have allowed for more tropical moisture to become available to passing weather systems in the mid-latitudes. The most notable event occurred in July, when an atmospheric river brought heavy rain to the West Coast, Tasman, Nelson and Marlborough. This event led to the Buller River recording the highest flow rate ever recorded in a New Zealand river. The flooding required evacuations and resulted in an estimated $132.4 million in privately insured damage according to the NZ Insurance Council.

Re-developing La Niña conditions during spring resulted in a transition from a westerly air flow, near average temperatures and widespread wet weather during September to more north-easterly winds during October-December, bringing frequent warm and humid weather and contributing to the country's 5th-warmest October, warmest November and 4th-warmest December on record. A warm end to the year was helped along by increasing coastal sea surface temperatures (SSTs), particularly in November when marine heatwave (MHW) conditions emerged and persisted through December. During December, daily SSTs reached as high as 4˚C to 5˚C above average around the western and northern North Island, qualifying as one of the strongest MHW events in the last four decades in the North Island's coastal waters.

Section 1: The year in review

The monthly sequence of New Zealand climate was as follows:

January 2021: A mild month with mixed rainfall patterns

Above average temperatures (0.51-1.20°C above average) were observed in much of the upper and eastern North Island, along with parts of coastal Canterbury. Below average temperatures (0.51-1.20°C below average) were observed in parts of interior Tasman, Canterbury, and Otago. Widespread record and near-record temperatures were observed across eastern New Zealand from 26-28 January. In Ashburton, a blistering 39.4°C was recorded on 26 January. This was New Zealand's 2nd-hottest January temperature on record. Below normal rainfall (50-79% of normal) or well below normal rainfall (<50% of normal) was

observed in much of Northland, parts of Auckland and Waikato, the Central Plateau, Gisborne south to Wellington, the upper South Island, and coastal central Canterbury. Above normal rainfall (120-149% of normal) or well above normal rainfall (>149% of normal) was observed in much of the lower South Island as well as small portions of interior Canterbury, southern Manawatū-Whanganui, and eastern Bay of Plenty. At the end of January, soil moisture levels were lower than normal for nearly all of the North Island, except Taranaki and coastal Manawatū-Whanganui where soil moisture was near normal. In the South Island, soil moisture levels were lower than normal in Nelson, Marlborough Sounds, northern Tasman, and a small portion of eastern Southland, with higher than normal soil moisture levels from southern Canterbury to Southland.

February 2021: A dry month with mixed temperatures

Below normal rainfall (50-79% of normal) or well below normal rainfall (<50% of normal) was observed in much of the country. Parts of the Far North and Whangārei Districts observed above normal rainfall (120-149% of normal). Temperatures were above average (0.51-1.20°C above average) or well above average (>1.20°C above average) in parts of Waikato, inland areas of Marlborough, southern Tasman, northern and southwestern portions of Canterbury, northern and southern portions of the West Coast, inland Otago, and western and central Southland. However, below average temperatures (0.51-1.20°C below average) were observed in western Taranaki, Kapiti Coast, the southwest fringe of Manawatū-Whanganui, and a small area of Nelson. At the end of February, soil moisture levels were lower than normal for nearly all of the country. The exceptions were the Far North, and small portions of the central West Coast and southern Canterbury, where soil moisture levels were normal or above normal.

March 2021: Long dry spells and late-season warmth

Large areas of well below normal rainfall (<50% of normal) or below normal rainfall (50-79% of normal) were observed across much of the northern and eastern North Island and the eastern South Island. The only areas that received above normal rainfall (120-149% of normal) were parts of Waikato, Taranaki, western Manawatū-Whanganui, northern West Coast, northern Tasman and northern Marlborough. Temperatures were above average (0.51-1.20°C above average) or well above average (>1.20°C above average) in parts of Northland, Auckland, inland Waikato, eastern Hawke's Bay and the Wairarapa and Tararua districts, as well as across most of the South Island excluding the northeast. At the end of March, soil moisture levels were lower than normal for the northern and eastern North Island, and eastern, central and southern South Island. Above normal soil moisture were observed in parts of Waikato, Taranaki, western Manawatū-Whanganui, parts of Wellington, northern Marlborough, Nelson, parts of Tasman and Fiordland.

April 2021: Warmer and drier than normal for many

Well below normal rainfall (<50% of normal) was widespread in the eastern North Island and in parts of the central North Island and eastern South Island. Small patches of above normal rainfall (120-149% of normal) were found in southern Northland and lower Westland. Temperatures were well above average (>1.20˚C above average) in parts of eastern Waikato, Coromandel, Bay of Plenty, Gisborne, Hawke's Bay, Manawatū-Whanganui, south coastal Wairarapa, northern Tasman, northern Marlborough, Canterbury, and Otago. At the end of April, soil moisture levels were in severe deficit across the eastern North Island and eastern and interior South Island, particularly across Gisborne, Hawke's Bay, Canterbury, Otago, and Southland.

May 2021: Severe flooding in Canterbury to end the month

An exceptionally heavy rainfall event spanning the final three days of the month caused severe flooding in Canterbury. For the month overall, rainfall was well above normal (>149% of normal) for much of Canterbury, Tasman, and western parts of Taranaki, with considerable portions of Canterbury observing at least 200% of normal rainfall for May. Rainfall was above normal (120-149% of normal) for southern and central Otago, central and northern Southland, Nelson, Marlborough, and the Kapiti Coast. Rainfall was

below normal (50-79% of normal) for coastal parts of the South Island from Invercargill to Oamaru, the southern West Coast, and the majority of the North Island. Rainfall was well below normal (<50% of normal) in parts of Auckland, Waikato and Wairarapa. Temperatures were above average (0.51-1.20°C above average) or well above average (>1.20°C above average) for many parts of the country. At the end of May, soils were wetter than normal for the eastern South Island north of Otago. In contrast, soils were considerably drier than normal for eastern parts of the North Island from Wairarapa to Hawke's Bay, much of Auckland, and northern Northland.

June 2021: New Zealand's warmest June on record

It was New Zealand's warmest June on record, with the nationwide average temperature 2.0°C above average. This was just the 13th occasion since 1909 that a month achieved an anomaly of >1.9˚C relative to the 1981-2010 average. Temperatures were above average (0.51-1.20°C above average) or well above average (>1.20°C above average) throughout the country. Rainfall was above normal (120-149% of normal) or well above normal (>149% of normal) for eastern parts of Northland, inland Bay of Plenty, eastern Waikato, Wairarapa, northern Canterbury, southeastern Otago and western Southland. Rainfall was below normal (50-79% of normal) or well below normal (<50% of normal) for parts of Central Otago, South and Mid Canterbury, Nelson, Tasman, inland Whanganui, Gisborne and eastern Bay of Plenty. At the end of June, soil moisture levels were lower than normal for inland parts of Otago, and higher than normal for eastern parts of Canterbury and Marlborough.

July 2021: Heavy downpours and unseasonable warmth

Large areas of well above normal rainfall (>149% of normal) were observed over Marlborough, Nelson, Tasman, West Coast, Canterbury High Country and inland Otago. Patches of above normal rainfall (120-149% of normal) were seen in coastal northern Northland, inland Bay of Plenty, Wellington and the Kāpiti Coast. Below normal rainfall (50-79% of normal) was observed for western Northland, Auckland, much of Waikato, coastal Taranaki, coastal Manawatū-Whanganui, much of the Wairarapa, parts of the upper and lower Canterbury plains, and southern Otago. Well below normal rainfall (<50% of normal) was seen for the eastern North Island extending from Gisborne to the eastern Wairarapa hills, as well as coastal Canterbury from Selwyn to Kaikōura. 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 July, soil moisture levels were lower than normal for an area extending from Central Hawke's Bay into the Tararua district.

August 2021: A warm finish to winter for most of the country

Temperatures were above average (0.51-1.20°C above average) or well above average (>1.20°C above average) for most of the South Island, Wellington, Whanganui, Taranaki, and parts of Waikato, Auckland, and Northland. Rainfall was below normal (50-79% of normal) or well below normal (<50% of normal) in parts of Northland, Waikato, Bay of Plenty, Hawke's Bay, coastal Canterbury south of Christchurch, and northern Otago. Rainfall was above normal (120-149% of normal) or well above normal (>149% of normal) in southern and western Southland, inland Otago, coastal North Canterbury, Marlborough, Nelson, Tasman, Wellington, Wairarapa, Kāpiti Coast, coastal Manawatū-Whanganui, and parts of Auckland. At the end of August, soil moisture levels were lower than normal in eastern parts of Hawke's Bay to the south of Napier. Soil moisture levels were higher than normal for eastern parts of North Canterbury and Marlborough, and parts of Auckland.

September 2021: A mild and wet month

Temperatures were near average (±0.50°C of average) for most of the country. Small areas of above average temperatures (0.51-1.20°C above average) were observed in the Coromandel, eastern coastal Auckland, and the Canterbury Plains. Discontinuous pockets of below average temperatures (0.51-1.20°C below average) occurred in parts of Waikato, Bay of Plenty, Nelson, Otago and Southland. Rainfall was below normal (50-

79% of normal) or well below normal (<50% of normal) about the Bay of Islands, southern Waikato, northern Taranaki, the Kāpiti Coast, and much of the Canterbury Plains. Above normal (120-149% of normal) or well above normal rainfall (>149% of normal) was observed across most of Northland, Auckland, northern Waikato, Bay of Plenty, eastern and southern Hawke's Bay, parts of Taranaki, Manawatū-Whanganui, Wellington, Tasman, Nelson, Marlborough, along the Southern Alps, and much of Otago and Southland. At the end of September, soil moisture levels were lower than normal near the Bay of Islands, eastern parts of Hawke's Bay to the south of Napier, near Banks Peninsula, and a small area of eastern Otago. Soil moisture levels were higher than normal for eastern parts of North Canterbury and Marlborough, parts of Auckland, parts of Otago, eastern Hawke's Bay and eastern Gisborne.

October 2021: New Zealand's 5th-warmest October on record

Temperatures were above average (0.51-1.20°C above average) to well above average (>1.20°C above average) for the majority of the country. Rainfall was well above normal (>149% of normal) in large parts of Northland and Auckland. Rainfall was above normal (120-149% of normal) in the Coromandel, coastal Bay of Plenty, coastal Taranaki, northern Tasman, an area near Christchurch, and southern Canterbury/northern Otago. Conversely, below normal (50-79% of normal) and well below normal (<50% of normal) rainfall was observed in Manawatū-Whanganui, Wellington, most of the east coast of the North Island, northern and central Canterbury, Fiordland, and much of Southland. At the end of October, soil moisture levels were lower than normal in eastern Wairarapa as well as parts of Canterbury, Otago and Southland. Soil moisture was higher than normal in Auckland, Northland, the Bay of Plenty and parts of Waikato and Marlborough.

November 2021: New Zealand's warmest November on record

Temperatures were well above average (>1.20°C above average) across the entire North Island, along with large portions of the upper, western, and lower South Island. Above average temperatures (0.51-1.20°C above average) were observed across much of Canterbury. Rainfall was above normal (120-149% of normal) or well above normal (>149% of normal) across Gisborne, northern Hawke's Bay, a small portion of eastern Northland, the northern West Coast, southern Canterbury, interior Otago, and parts of Fiordland. Below normal (50-79% of normal) or well below normal (<50% of normal) rainfall was observed in parts of Northland, much of Auckland and the Coromandel Peninsula, Bay of Plenty, the Central Plateau, Manawatū-Whanganui, Wellington-Wairarapa, Nelson, Marlborough, and northern and central Canterbury. At the end of November, soil moisture levels were below normal across northern Waikato, Bay of Plenty, most of the Central Plateau, northern Manawatū-Whanganui, Wairarapa, Nelson, Marlborough, northern and central Canterbury, and the lower West Coast. Soil moisture levels were above normal in a portion of the Far North, coastal Gisborne, interior southern Canterbury, and interior Southland.

December 2021: New Zealand's 4th-warmest December on record

Temperatures were well above average (>1.20°C above average) across the entire North Island and the western and northern South Island, as well as a pocket in Southland. Above average temperatures (0.51°C to 1.20°C above average) were observed elsewhere across the South Island, except for a portion of the Canterbury Plains, where near average temperatures (±0.50°C of average) were found. Rainfall was above normal (120-149% of normal) or well above normal (>149% of normal for parts of Bay of Plenty, much of Gisborne, Taranaki, much of Manawatū-Whanganui, Hawke's Bay, Wellington, Nelson, Tasman, much of Canterbury, parts of northern Otago, and parts of West Coast. Below normal (50-79% of normal) or well below normal (<50% of normal) rainfall was observed in much of Northland, much of Waikato, southern Southland, and pockets of the Southern Alps. Elsewhere, near normal rainfall (80-119% of normal) was observed, including much of Auckland. Soil moisture levels were below normal across much of the upper North Island and Southland while above normal soil moisture levels were present in much of Taranaki, central and southern Manawatū-Whanganui, Wellington, coastal Marlborough, eastern Canterbury and parts of coastal Otago.

Section 2: Monthly temperature

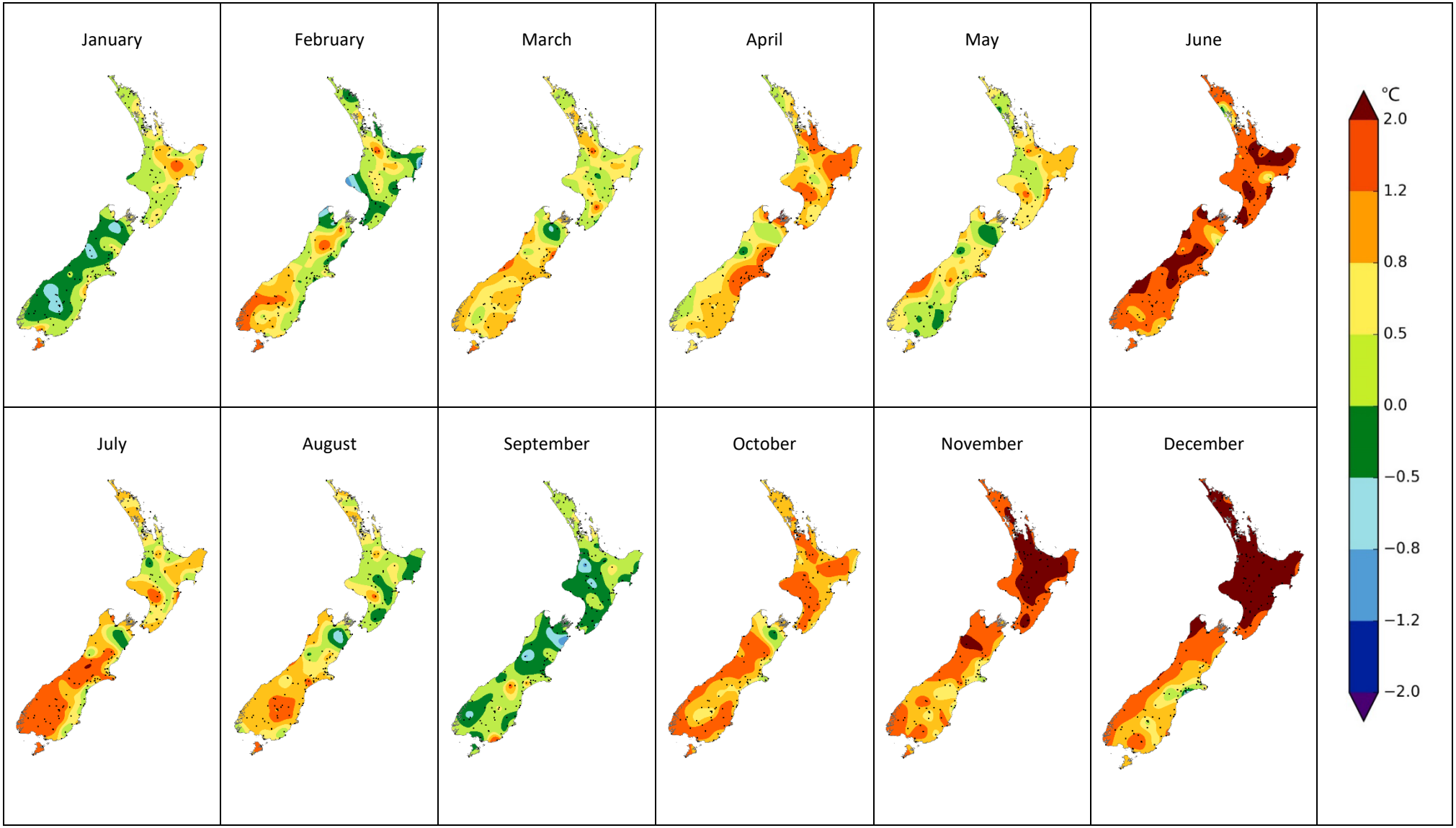

Figure 1: Monthly temperature anomalies (compared to the 1981-2010 monthly averages) for each month of 2021.

Section 3: Monthly rainfall

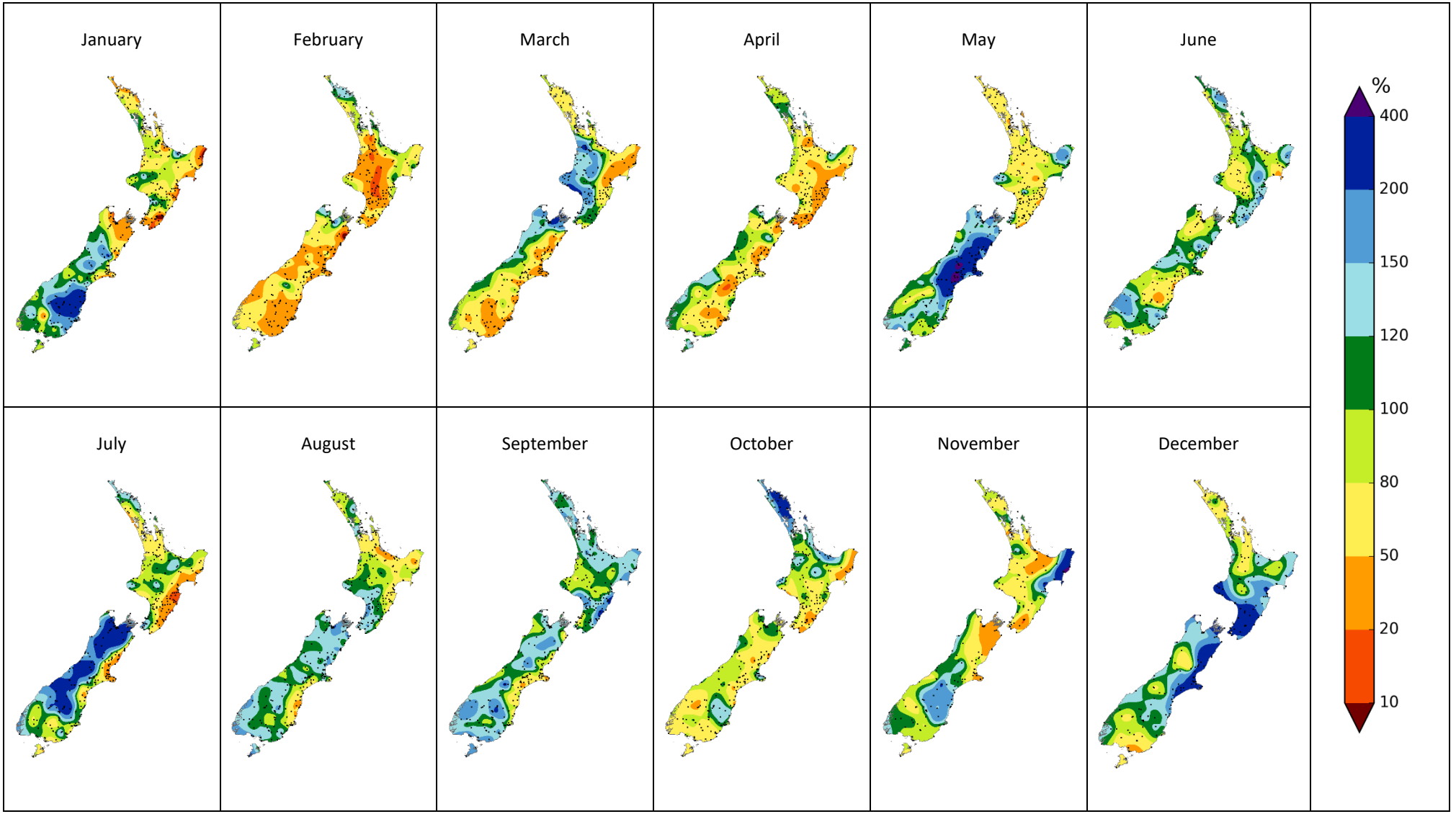

Figure 2: Monthly rainfall as a percentage of each 1981-2010 monthly normal for each month of 2021.

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 2021 was 13.56°C (0.95°C above the 1981–2010 annual average). Using NIWA's seven-station temperature series, 2021 was the warmest year on record since records began in 1909.
- Leigh recorded the highest annual average temperature for 2021 with 17.6°C, followed by Whangārei, Kaitaia and Auckland (Whangaparāoa) with 16.7°C.
- The highest air temperature of the year was 39.4°C, recorded at Ashburton, followed by 38.9°C at Wakanui and 38.3°C at Orari Estate. These temperatures were all observed on 26 January.
- The lowest air temperature of the year was -10.8°C recorded at Tara Hills, followed by -10.1°C at Middlemarch and -9.7°C at Ophir. These temperatures were all observed on 27 May.
- The top three daily rainfall totals from regularly reporting gauges in 2021 were 699 mm at Mt Philistine on 20 December, 411 mm at Castle Mount on 20 December, and 355 mm at Ivory Glacier on 16 July.
- The top three daily rainfall totals from regularly reporting gauges in 2021 *excluding* high elevation stations were: 260 mm at Pigeon Creek on 25 June, 210 mm at Arthur's Pass on 16 July and 209 mm at Milford Sound on 8 May.
- Of all the regularly reporting gauges, the wettest locations in 2021 were: Cropp River (West Coast, 975 metres above sea level) with 14,090 mm, Tuke River (West Coast, 990 metres above sea level) with 12,506 mm, and Mt Philistine (Arthur's Pass, 1655 metres above sea level) with 12,384 mm.
- The lowest rainfall recording locations for 2021 were Alexandra with 402 mm, Crowmell with 477 mm, and Hakataramea Valley (south Canterbury) with 487 mm.
- Taranaki experienced New Zealand's highest annual sunshine total during 2021 (2592 hours recorded at New Plymouth), followed by Hawke's Bay (2566 hours - Napier) and the wider Nelson region (2537 hours - Richmond).
- The highest confirmed wind gust for 2021 was 222 km/h recorded at Cape Turnagain on 10 September.
- Of the six main centres in 2021, Auckland was the warmest, Dunedin was the coolest, Wellington was the wettest, Dunedin was the driest, Tauranga was the sunniest and Hamilton 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 five 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	14090
TUKE AT TUKE HUT	12506
MT PHILISTINE EWS	12384[3]
IVORY AT RIPPLEROCK	9880
IVORY GLACIER CWS	9855[2]
HOKITIKA AT PRICES FLAT	9832
HOKITIKA AT RAPID CK	9128
NORTH EGMONT RAINE	8866
HOKITIKA AT COLLIERS CK	8824
DOON AT MIDDLE ARM	8376
HAAST AT CRON CK	7882
WAIHO AT DOUGLAS HUT	7611
MILFORD SOUND EWS	6793
RAKAIA AT LAKE RAMSAY	6589
WHATAROA AT SHB	6517
MILFORD SOUND AWS	6366
ARTHURS PASS RAINE EWS	5937
ARTHURS PASS AWS	5913[2]
HAAST AT ROARING BILLY	5808
GODLEY AT EADE HUT	5604
ARTHURS PASS EWS	5474
MATHIAS AT NZDSA HUT	5384
PIGEON CREEK CWS	5172
GODLEY AT PANORAMA RIDGE	5067[19]
FRANZ JOSEF EWS	4776
BUTCHERS CK AT BUTCHERS GULLY	4613
AORAKI / MT COOK EWS	4110
MUELLER HUT EWS	4039[3]
MANAPOURI, WEST ARM JETTY EWS	3886
HAAST AT MOA CK	3788
HAAST AWS	3592[19]
OKARITO EWS	3408
MURCHISON MTNS EWS	3324
HOKITIKA AERO	3291[1]
ALBERT BURN	3241
HOKITIKA AWS	3172[2]
AHURIRI AT CASSINIA MORAINE	3105
HOKITIKA EWS	3056
MAHANGA EWS	3024[1]
GREYMOUTH AERO EWS	2893
COBB AT TRILOBITE	2605
AORAKI / MT COOK AERO AWS	2557[5]
WAIPAOA AT MANGATU DIVIDE	2492
ARAPITO EWS	2481
TĀKAKA EWS	2474
EGLINTON, KNOBS FLAT CWS	2359
UPPER RAKAIA EWS	2352
MAKOTUKU AT F TRIG	2330
WESTPORT EWS	2317
MOTU AT WAITANGIRUA	2270
STRATFORD EWS	2260
REEFTON EWS	2230
MOTU EWS	2163
KERIKERI AERODROME AWS	2125
WHAKAPAPA AT MT RUAPEHU EWS	2110
TONGARIRO AT MANGATOETOE	2101
KERIKERI EWS	1997
NGAHERE AT NGAHERE HUT	1995
AWAKINO EWS	1747[8]
KAIKOHE AWS	1719[1]
TAURANGA-TAUPO AT KIKO RD	1644
SOUTH WEST CAPE AWS	1624[7]
NEW PLYMOUTH AWS	1595
WHITIANGA AERO AWS	1558[2]
WHATAWHATA 2 EWS	1516
WHANGĀREI AERO AWS	1514
WHAKATĀNE AT TARAPOUNAMU	1500
TE PUKE EWS	1491
FAREWELL SPIT AWS	1490
PURUKOHUKOHU AT NO 4	1479
WHITIANGA EWS	1463
HICKS BAY AWS	1429[3]
WHANGANUI AT TE PORERE	1425
MOTUEKA, RIWAKA EWS	1405[7]
WAIPAPA AT TTT RD CULVERT	1386
KAITAIA AERO AWS	1384[10]
WHANGĀREI EWS	1371
ROTORUA AERO AWS	1366[1]
WELLINGTON, KELBURN AWS	1365
MT POTTS EWS	1361
TROUNSON CWS	1349
MAUNGARAKI 3	1346
RANGITAIKI AT ANIWHENUA	1340
LEVIN AWS	1330[1]
UPPER HUTT, TRENTHAM EWS	1326
MAYFIELD AT RUAPUNA	1319
WARKWORTH EWS	1315

WELLINGTON, KELBURN 2	1300
WAIKATO AT CAMBRIDGE GOLF COURSE	1293
LOWER RETARUKE CWS	1291
POKAIWHENUA AT PUKETURUA	1290
WAIPAPA AT WAITETI STATION[14]	1290
PUREORA FOREST CWS	1288
TE KUITI EWS	1283
LEVIN EWS	1270
KAITAIA EWS	1269
TONGARIRO AT TŪRANGI	1260
PURERUA AWS	1260
TŪRANGI 2 EWS	1259
NELSON AERO	1245
LEIGH 2 EWS	1242
HAMILTON AWS	1240
TAUMARUNUI AWS	1240[1]
ROTORUA EWS	1237
MANGARE STM AT MANGARE RD	1230
AUCKLAND, WHENUAPAI AWS	1228
KAITAIA AERO EWS	1213[7]
NELSON AWS	1213
WHAKATĀNE AERO AWS	1211[1]
WAIMARINO AT KEPA RD	1203
TARAPOUNAMU EWS	1197
MANAPOURI AERO AWS	1191[1]
PARAPARAUMU AERO AWS	1180
MANGAKINO AT DILLON RD	1175
PALMERSTON NORTH AWS	1166
HĀWERA AWS	1166[8]

PUKEKOHE EWS	1162
PARAPARAUMU AERO	1159[5]
PARAPARAUMU EWS	1148
PAHIATUA EWS	1124
WHAKAURU AT MOSSOP RD	1121
RICHMOND EWS	1116
HANMER FOREST EWS	1113
WELLINGTON AERO BACKUP AWS	1110
OHAKEA AWS	1102
WELLINGTON, GRETA POINT CWS	1097
WELLINGTON AERO	1096
INVERCARGILL AERO	1084[8]
PALMERSTON NORTH EWS	1084
MATUKITUKI AT WEST WĀNAKA	1083
HAMILTON, RUAKURA 2 EWS	1081
OHAKUNE EWS	1075
TOLAGA BAY WXT AWS	1060[17]
MAKOTUKU AT SH49A BR	1056
MĀHIA AWS	1051[11]
INVERCARGILL AERO AWS	1042
DARGAVILLE 2 EWS	1039
BIRCHWOOD WXT AWS	1038[1]
KAIKŌURA, MIDDLE CREEK	1029
AUCKLAND, MOTAT EWS	1027
WHANGANUI, SPRIGGENS PARK EWS	1024
WANGANUI AWS	1013[1]
MANA ISLAND AWS	990[1]
TAHUNAATARA AT OHAKURI RD	980
APPLEBY 2 EWS	965

INVERCARGILL AERO 2 EWS	964
TAURANGA AERO AWS	955[4]
PAEROA AWS	953[2]
AKITIO EWS	952
STEPHENS ISLAND AWS	947[15]
WAIROA AERO AWS	945[1]
MATAMATA, HINUERA EWS	940
LUMSDEN AWS	936[1]
MASTERTON AERO AWS	935[2]
AKAROA EWS	923
WAIOTAPU AT REPOROA	922
TAUPO AWS	919
CAPE REINGA AWS	917[1]
AUCKLAND AERO	912[1]
WAIOURU EWS	906[11]
WAIOURU AIRSTRIP AWS	903[2]
TIWAI POINT EWS	902
WHIRINAKI AT GALATEA	898
WHANGANUI AT BELOW PIRIAKA	887
TAKAPAU PLAINS AWS	872
LAKE KARAPIRO CWS	870
BALMORAL EAST CWS	868
LISMORE, RACEMANS HOUSE CWS	865
QUEENSTOWN EWS	856
WHANGAPARĀOA AWS	845[13]
LAKE TEKAPO EWS	834
DANNEVIRKE EWS	830
WAIKATO AT REIDS FARM	829
FIVE RIVERS CWS	829
MASTERTON, TE ORE ORE CWS	824

QUEENSTOWN AERO AWS	818[1]
GORE AWS	817[1]
FIRTH OF THAMES EWS	817[6]
BLENHEIM AERO AWS	811
MASTERTON EWS	807
NGAWI AWS	806
GISBORNE EWS	804
ASHBURTON AERO AWS	801[1]
STANTON AT CHEDDAR VALLEY	797
GORE EWS	782
WĀNAKA CWS	773
WINCHMORE 2 EWS	771
KAIKŌURA AWS	769[1]
TAPANUIEWS	758
WAIPARA WEST EWS	757
FAIRLIE AWS	755[1]
NAPIER AERO AWS	746
WAIPOUNAMU CWS	740
PUKAKI AERODROME AWS	738[1]
WĀNAKA AERO AWS	736[2]
MARTINBOROUGH EWS	726
DIAMOND HARBOUR EWS	721
OHOKA CWS	719
BLENHEIM RESEARCH EWS	719[1]
NUGGET POINT AWS	711[1]
OAMARU AWS	705[1]
CHRISTCHURCH AERO	694
MEDBURY CWS	678
RANGIORA EWS	674
CHERTSEY CWS	668
MASTERTON, TE ORE ORE SRIG	660

CASTLEPOINT AWS	651[8]
CHRISTCHURCH AERO BACKUP AWS	649
DUNEDIN AERO AWS	641
WAIPAWA EWS	640
BARING HEAD	629[4]
NAPIER EWS	626
LINCOLN, BROADFIELD EWS	616
WAIMATE CWS	616
AHURIRI AT STH DIADEM	614[6]
LAUDER EWS	599
CULVERDEN AWS	592[2]
CHRISTCHURCH, KYLE ST EWS	588
TIMARU EWS	582
MIDDLEMARCH EWS	572
BROMLEY EWS	571
WHAKATU EWS	570
OAMARU EWS	569
DUNEDIN, MUSSELBURGH EWS	552
WINDSOR EWS	550
TARA HILLS AWS	546[3]
ALEXANDRA AWS	545[1]
CAPE CAMPBELL AWS	542[2]
CHEVIOT EWS	542
LE BONS BAY AWS	532[2]
ROXBURGH WXT AWS	527[9]
RANFURLY EWS	520
MARAEKAKAHO CWS	509
TIMARU AERO AWS	508[1]
CLYDE 2 EWS	497
HAKATARAMEA VALLEY CWS	487

CROMWELL EWS	477
HASTINGS AWS	411[13]
ALEXANDRA EWS	402

Location	**Mean temp(°C)**
LEIGH 2 EWS	17.6
KAITAIA EWS	16.7
WHANGĀREI AERO AWS	16.7
WHANGAPARĀOA AWS	16.7
CAPE REINGA AWS	16.5
AUCKLAND AERO	16.5
AUCKLAND, MANGERE 2 EWS	16.4
KERIKERI EWS	16.1
HICKS BAY AWS	16.1
FAREWELL SPIT AWS	16.1
KERIKERI AERODROME AWS	15.9
PUKEKOHE EWS	15.7
AUCKLAND, WHENUAPAI AWS	15.6
WAIROA, NORTH CLYDE EWS	15.6
KAIKOHE AWS	15.5
WHITIANGA AERO AWS	15.5
PAEROA AWS	15.5
NGAWI AWS	15.4
GISBORNE AWS	15.1
WHAKATĀNE AERO AWS	15.0
MĀHIA AWS	14.9
NAPIER AERO AWS	14.8
WHANGANUI, SPRIGGENS PAR	14.8
MATAMATA, HINUERA EWS	14.7
HAMILTON, RUAKURA 2 EWS	14.7

WHATAWHATA 2 EWS	14.6
WELLINGTON AERO	14.6
WANGANUI AWS	14.6
HAMILTON AWS	14.4
NEW PLYMOUTH AWS	14.4
PALMERSTON NORTH EWS	14.2
BROTHERS ISLAND AWS	14.1
TE KUITI EWS	14.0
WHAKATU EWS	14.0
PARAPARAUMU AERO AWS	14.0
PALMERSTON NORTH AWS	14.0
LEVIN AWS	14.0
MARTINBOROUGH EWS	13.9
PARAPARAUMU AERO	13.9
BLENHEIM RESEARCH EWS	13.9
WELLINGTON, KELBURN AWS	13.7
NELSON AERO	13.7
NELSON AWS	13.7
AKAROA EWS	13.7
CAPE CAMPBELL AWS	13.6
HĀWERA AWS	13.5
TĀKAKA EWS	13.4
WESTPORT AERO AWS	13.4
ROTORUA AERO AWS	13.3
BLENHEIM AERO AWS	13.3
KAIKŌURA AWS	13.3
CHRISTCHURCH, KYLE ST EW	13.2
HOKITIKA AERO	12.7
LINCOLN, BROADFIELD EWS	12.7
STRATFORD EWS	12.6
HOKITIKA AWS	12.6

TAUPO AWS	12.5
TŪRANGI 2 EWS	12.5
TAKAPAU PLAINS AWS	12.4
REEFTON EWS	12.4
APPLEBY 2 EWS	12.4
RANGIORA EWS	12.4
CHRISTCHURCH AERO	12.4
DUNEDIN, MUSSELBURGH EWS	12.3
FRANZ JOSEF EWS	12.1
LE BONS BAY AWS	11.9
TIMARU EWS	11.9
CROMWELL EWS	11.8
HANMER FOREST EWS	11.6
WĀNAKA AERO AWS	11.6
OHAKUNE EWS	11.5
MILFORD SOUND AWS	11.4
TIMARU AERO AWS	11.2
WINDSOR EWS	11.2
OAMARU AIRPORT AWS	11.1
TIWAI POINT EWS	10.9
NUGGET POINT AWS	10.9
DUNEDIN AERO AWS	10.8
GORE AWS	10.8
INVERCARGILL AERO	10.8
INVERCARGILL AERO AWS	10.7
LAUDER EWS	10.6
QUEENSTOWN AERO AWS	10.5
LUMSDEN AWS	10.3
TARA HILLS AWS	10.1
MANAPOURI AERO AWS	10.1
MANAPOURI, WEST ARM JETT	10.0

RANFURLY EWS	9.9
LAKE TEKAPO EWS	9.7
AORAKI / MT COOK EWS	9.6
ARTHURS PASS EWS	8.5

Location	**Sunshine (hours)**
NEW PLYMOUTH AWS	2592[<1]
NAPIER EWS	2566
RICHMOND EWS	2537
BLENHEIM RESEARCH EWS	2519[1]
LAKE TEKAPO EWS	2472
ROTORUA EWS	2426
TĀKAKA EWS	2423[1]
AKITIO EWS	2394
APPLEBY 2 EWS	2381
BROMLEY EWS	2375
AUCKLAND, MOTAT EWS	2358
CROMWELL EWS	2337
ALEXANDRA EWS	2335[<1]
LEVIN EWS	2330
PARAPARAUMU AERO AWS	2321
DIAMOND HARBOUR EWS	2316
TAURANGA AERO	2305
NELSON AERO	2302[1]
WHAKATĀNE SUNSHINE	2291
CHRISTCHURCH AERO	2288[2]
AUCKLAND, MANGERE 2 EWS	2279
WINCHMORE 2 EWS	2270[<1]
WESTPORT EWS	2264
TŪRANGI 2 EWS	2262

CHEVIOT EWS	2249[17]
RAOUL ISLAND AWS	2243[17]
MASTERTON EWS	2240
PARAPARAUMU EWS	2237
QUEENSTOWN AERO AWS	2231[1]
RANGIORA EWS	2205
ASHBURTON AERO AWS	2199[7]
LINCOLN, BROADFIELD EWS	2184[<1]
HOKITIKA AWS	2177[1]
AKAROA EWS	2164
WAIPARA WEST EWS	2158
PARAPARAUMU AERO	2155[5]
OAMARU EWS	2153[<1]
WELLINGTON, KELBURN AWS	2145
KAWERAU AWS	2136[4]
DUNEDIN, MUSSELBURGH EWS	2135
UPPER HUTT, TRENTHAM EWS	2122
STRATFORD EWS	2066
ARAPITO EWS	2061
DARGAVILLE 2 EWS	2017[<1]
WHANGĀREI EWS	1996[<1]
HAMILTON, RUAKURA 2 EWS	1995[<1]
WAIPAWA EWS	1981[5]
TAUMARUNUI AWS	1956[5]
TE KUITI EWS	1950
KAITAIA EWS	1941[<1]
DANNEVIRKE EWS	1911
GREYMOUTH AERO EWS	1891[<1]
GORE EWS	1890
HOKITIKA AERO	1865[1]

MARTINBOROUGH EWS	1841
PALMERSTON NORTH EWS	1827[<1]
INVERCARGILL AERO	1774[8]
MIDDLEMARCH EWS	1756[11]
REEFTON EWS	1751
INVERCARGILL AERO 2 EWS	1704[4]
AORAKI / MT COOK EWS	1652
BALCLUTHA, TELFORD EWS	1628

Section 5: Annual temperature – record or near-record warmth for many locations

2021 was New Zealand's warmest year on record based on NIWA's seven-station series, which began in 1909. Many locations observed record or near-record high mean, mean maximum, and mean minimum temperatures. It was the warmest year on record for 12 locations and a further 50 locations experienced annual average temperatures in the top four warmest on record.

Table 1: Record or near-record high or low annual average temperature departures for 2021[2].

Location	Mean air temp. (°C)	Departure from average(°C)	Year records began	Comments
Mean temperature				
Cape Reinga	16.5	0.7	1951	Highest
Kerikeri	16.1	0.8	1945	Highest
Leigh	17.6	1.5	1966	Highest
Auckland (Whangaparāoa)	16.7	1.0	1982	Highest
Whitianga	15.9	1.2	1962	Highest
Hicks Bay	16.1	1.2	1969	Highest
Waipawa	13.6	0.8	1945	Highest
Wellington (Airport)	14.6	0.8	1962	Highest
Ohakune	11.5	1.1	1962	Highest
Farewell Spit	16.1	2.2	1971	Highest
Hanmer Forest	11.6	1.3	1906	Highest
Dunedin (Musselburgh)	12.3	1.2	1947	Highest
Kaitaia	16.7	1.0	1948	2nd-highest
Auckland (Whenuapai)	15.6	0.9	1945	2nd-highest
Auckland (Pukekohe)	15.7	1.2	1969	2nd-highest
Taumarunui	13.9	1.1	1947	2nd-highest
Dannevirke	13.6	1.1	1951	2nd-highest
Ngawi	15.4	0.9	1972	2nd-highest
Gisborne	15.8	1.5	1905	2nd-highest
Wairoa (North Clyde)	15.6	1.3	1964	2nd-highest
Porirua	13.8	0.5	1968	2nd-highest
Hāwera	13.5	0.9	1977	2nd-highest
Whanganui (Spriggens Park)	14.8	0.8	1937	2nd-highest
Rangiora	12.4	0.9	1965	2nd-highest
Lincoln (Broadfield)	12.7	1.0	1881	2nd-highest
Windsor	11.2	0.8	2000	2nd-highest
Whangārei	16.7	0.9	1967	3rd-highest
Paeroa	15.5	0.8	1947	3rd-highest
Whakatāne	15.3	0.9	1974	3rd-highest

[2] The rankings (1st, 2nd, 3rd….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.

Rotorua	13.7	1.0	1964	3rd-highest
Auckland (Airport)	16.5	1.0	1959	3rd-highest
Martinborough	13.9	1.1	1986	3rd-highest
Māhia	14.9	0.8	1990	3rd-highest
Paraparaumu	14.0	1.0	1953	3rd-highest
Palmerston North	14.2	0.9	1928	3rd-highest
Levin	14.0	0.9	1895	3rd-highest
Upper Hutt (Trentham)	13.3	0.8	1939	3rd-highest
Tākaka	13.4	0.8	1978	3rd-highest
Hokitika	12.7	1.0	1866	3rd-highest
Franz Josef	12.1	1.1	1953	3rd-highest
Milford Sound	11.4	0.9	1934	3rd-highest
Kaikōura	13.3	0.9	1963	3rd-highest
Medbury	12.3	0.9	1927	3rd-highest
Waiau	12.6	1.2	1974	3rd-highest
Aoraki / Mt Cook Village	9.6	0.8	1929	3rd-highest
Wānaka	11.6	1.1	1955	3rd-highest
Te Anau	10.5	0.9	1963	3rd-highest
Manapouri	10.0	1.0	1971	3rd-highest
Lauder	10.6	1.0	1924	3rd-highest
Nugget Point	10.9	0.7	1970	3rd-highest
Auckland (Western Springs)	16.2	1.0	1948	4th-highest
Whatawhata	14.6	0.7	1952	4th-highest
Tūrangi	12.5	0.7	1968	4th-highest
Lower Retaruke	13.3	0.8	1966	4th-highest
Stratford	12.6	0.8	1960	4th-highest
Reefton	12.4	1.0	1960	4th-highest
Brothers Island	14.1	0.6	1997	4th-highest
Waipara West	13.1	0.6	1973	4th-highest
Akaroa	13.7	1.2	1978	4th-highest
Le Bons Bay	11.9	0.5	1984	4th-highest
Ranfurly	9.9	1.0	1897	4th-highest
Cromwell	11.8	0.9	1949	4th-highest
Mean maximum temperature				
Matamata	20.6	1.8	1999	Highest
Auckland (Airport)	20.2	1.2	1959	Highest
Tūrangi	18.4	1.3	1968	Highest
Waipawa	20.2	2.0	1945	Highest
Porirua	17.7	0.8	1968	Highest
Stratford	17.3	1.2	1960	Highest
Ohakune	17.4	2.3	1962	Highest
Whanganui (Spriggens Park)	19.0	1.0	1937	Highest
Tākaka	19.4	1.2	1978	Highest
Farewell Spit	20.5	2.9	1971	Highest
Akaroa	18.6	1.1	1978	Highest
Lake Tekapo	16.0	1.4	1927	Highest
Dunedin (Musselburgh)	16.1	1.4	1947	Highest
Whangārei	21.3	1.5	1967	2nd-highest

Auckland (Whangaparāoa)	20.0	1.2	1982	2nd-highest
Paeroa	20.6	1.0	1947	2nd-highest
Rotorua	18.5	1.5	1964	2nd-highest
Taumarunui	19.8	1.5	1947	2nd-highest
Dannevirke	18.5	1.5	1951	2nd-highest
Ngawi	18.6	1.0	1972	2nd-highest
Hicks Bay	19.3	1.3	1969	2nd-highest
Wairoa (North Clyde)	21.2	1.9	1964	2nd-highest
Wellington (Airport)	17.4	0.7	1962	2nd-highest
Auckland (Whenuapai)	20.0	0.9	1945	3rd-highest
Whitianga	20.9	1.6	1962	3rd-highest
Te Kuiti	20.0	1.2	1959	3rd-highest
Martinborough	19.2	1.2	1986	3rd-highest
Gisborne	21.0	1.5	1905	3rd-highest
Hastings	20.4	1.9	1965	3rd-highest
Paraparaumu	17.9	1.0	1953	3rd-highest
Greymouth	16.7	0.8	1947	3rd-highest
Hanmer Forest	19.3	2.3	1906	3rd-highest
Medbury	18.4	0.9	1927	3rd-highest
Windsor	17.1	1.1	2000	3rd-highest
Manapouri	13.6	0.8	1971	3rd-highest
Whakatāne	20.2	0.7	1974	4th-highest
Lower Retaruke	18.7	0.8	1966	4th-highest
Palmerston North	18.8	1.2	1928	4th-highest
Levin	18.4	1.1	1895	4th-highest
Hāwera	17.3	0.9	1977	4th-highest
Waiau	19.0	1.3	1974	4th-highest
Waipara West	18.5	0.4	1973	4th-highest
Rangiora	18.2	1.2	1965	4th-highest
Ranfurly	16.2	1.1	1897	4th-highest
Cromwell	18.2	1.2	1949	4th-highest
Clyde	18.1	1.3	1978	4th-highest
Mean minimum temperature				
Kaitaia	13.2	1.4	1948	Highest
Reefton	7.4	1.3	1960	Highest
Secretary Island	9.8	1.0	1985	Highest
Brothers Island	12.2	0.7	1997	Highest
Cape Campbell	11.5	0.8	1953	Highest
Lincoln (Broadfield)	7.9	1.3	1881	Highest
Le Bons Bay	9.0	0.8	1984	Highest
Dunedin (Musselburgh)	8.4	0.8	1947	Highest
Cape Reinga	14.0	0.9	1951	2nd-highest
Kerikeri	11.5	0.8	1945	2nd-highest
Auckland (Pukekohe)	11.4	1.0	1969	2nd-highest
Ngawi	12.2	0.9	1972	2nd-highest
Hicks Bay	12.9	1.1	1969	2nd-highest
Gisborne	10.5	1.4	1905	2nd-highest
Māhia	12.0	0.9	1990	2nd-highest

Wellington (Airport)	11.7	0.9	1962	2nd-highest
Upper Hutt (Trentham)	8.6	0.8	1939	2nd-highest
Farewell Spit	11.8	1.6	1971	2nd-highest
Hokitika	8.8	1.1	1866	2nd-highest
Franz Josef	7.6	1.2	1953	2nd-highest
Culverden	6.6	1.5	1928	2nd-highest
Timaru	7.4	0.7	1885	2nd-highest
Whangārei	12.7	0.9	1967	3rd-highest
Leigh	13.9	0.6	1966	3rd-highest
Auckland (Whenuapai)	11.2	0.9	1945	3rd-highest
Whitianga	11.2	1.1	1962	3rd-highest
Whakatāne	10.4	1.1	1974	3rd-highest
Porirua	9.9	0.2	1968	3rd-highest
Wellington (Kelburn)	10.9	1.0	1928	3rd-highest
Hāwera	9.7	0.9	1977	3rd-highest
Westport	9.9	1.0	1937	3rd-highest
Arapito	9.2	1.0	1978	3rd-highest
Milford Sound	7.4	1.4	1934	3rd-highest
Blenheim	8.7	1.0	1932	3rd-highest
Aoraki / Mt Cook Village	4.5	0.9	1929	3rd-highest
Waimate	7.0	1.3	1908	3rd-highest
Te Anau	6.3	1.8	1963	3rd-highest
Roxburgh	6.8	2.2	1950	3rd-highest
Nugget Point	7.7	0.8	1970	3rd-highest
Auckland (Western Springs)	12.0	0.7	1948	4th-highest
Tauranga	11.8	1.1	1913	4th-highest
Whatawhata	10.0	0.7	1952	4th-highest
Lower Retaruke	7.9	0.8	1966	4th-highest
Mt Ruapehu (Chateau)	3.6	0.6	2000	4th-highest
Martinborough	8.5	0.8	1986	4th-highest
Paraparaumu	10.2	0.9	1953	4th-highest
Nelson	9.6	1.1	1862	4th-highest
Kaikōura	9.9	0.7	1963	4th-highest
Medbury	6.2	0.9	1927	4th-highest
Windsor	5.4	0.7	2000	4th-highest
Manapouri (West Arm)	6.3	1.2	1971	4th-highest
Gore	6.2	0.7	1907	4th-highest

During 2021 several high record and near-record extreme temperatures occurred. Most notably, from 25-28 January, a very warm air mass originating in Australia combined with westerly foehn winds resulted in widespread record and near-record temperatures across eastern New Zealand. A high of 39.4°C was reached in Ashburton on 26 January. This was the hottest temperature of the year and New Zealand's equal 10th-hottest temperature on record for all months. The 26 of January was also the fourth-hottest day on record in the country (higher temperatures in New Zealand have only been observed on 7 February 1973, 6 February 2011 and 22 January 1908).

Table 2: Record or near-record high or low annual temperature extremes for 2021.

Location	Temperature (°C)	Date of occurrence	Year records began	Comments
Highest extreme maximum temperatures				
Ashburton (Council)	39.4	Jan-26th	1928	Highest
Akaroa	38.0	Jan-26th	1978	Highest
Matamata	31.7	Jan-27th	1999	Highest
Farewell Spit	29.6	Jan-26th	1971	Highest
Waipara West	37.4	Jan-26th	1973	2nd-highest
Christchurch (Airport)	37.1	Jan-26th	1863	2nd-highest
Lincoln (Broadfield)	37.2	Jan-26th	1881	2nd-highest
Whitianga	31.9	Jan-06th	1962	3rd-highest
Rotorua	30.4	Jan-26th	1964	3rd-highest
Wairoa (North Clyde)	36.4	Jan-27th	1964	3rd-highest
Hanmer Forest	36.8	Jan-26th	1906	3rd-highest
Waiau	36.5	Jan-26th	1974	3rd-highest
Timaru	37.9	Jan-26th	1885	3rd-highest
Masterton	35.0	Jan-27th	1906	4th-highest
Lake Tekapo	32.9	Jan-26th	1925	4th-highest
Windsor	31.6	Jan-26th	2000	4th-highest
Lowest extreme maximum temperatures				
None observed				
Highest extreme minimum temperatures				
Milford Sound	18.3	Feb-24th	1935	2nd-highest
Akaroa	22.2	Feb-24th	1978	2nd-highest
Windsor	18.5	Jan-27th	2000	2nd-highest
Te Anau	18.7	Jan-27th	1973	2nd-highest
Five Rivers	20.3	Jan-27th	1982	2nd-highest
Cromwell	20.9	Feb-24th	1949	3rd-highest
Tiwai Point	17.7	Jan-27th	1972	3rd-highest
Balclutha	16.2	Dec-20th	1972	3rd-highest
Farewell Spit	18.8	Feb-24th	1972	4th-highest
Aoraki / Mt Cook	20.0	Jan-27th	1929	Equal 4th-highest
Lowest extreme minimum temperatures				
Dunedin (Airport)	-8.8	May-27th	1962	Equal lowest

Section 6: Annual rainfall – dry weather interspersed with extreme rainfall

Rainfall during 2021 featured extended dry spells owing to frequent high pressure interspersed with extreme rainfall events. When looking at the year as a whole, rainfall was near normal for large parts of the country with some exceptions. Lake Tekapo experienced its 3rd-wettest year on record since records began in 1925, while Lauder and Greymouth experienced their 4th-wettest year. Conversely, Ohakune and Western Springs in Auckland experienced their 3rd-driest year on record and the 4th-driest year on record was observed at Tiwai Point.

Table 3: Record or near-record annual rainfall totals for the year 2021.

Location	Rainfall total (mm)	Percentage of normal	Year records began	Comments
High records or near-records				
Lake Tekapo	834	141	1925	3rd-highest
Lauder	599	136	1924	4th-highest
Greymouth	2893	118	1947	4th-highest
Low records or near-records				
Auckland (Western Springs)	1027	85	1948	3rd-lowest
Ohakune	1075	76	1961	3rd-lowest
Tiwai Point	902	80	1970	4th-lowest

Three flooding events during 2021 led to State of Emergency declarations (See Significant weather and climate events in 2021 section for more detail). From 29-31 May, a prolonged and heavy rainfall event struck Canterbury and set numerous May rainfall records. From 15 July to 18 July, an air mass of tropical origin contributed to heavy rain in the West Coast, Tasman, Nelson and Marlborough. The event led to flood levels at the Buller River reaching the highest they had been since 1926 and the evacuation of parts of Westport and Marlborough. Between 3-5 November, a slow-moving subtropical low caused persistent heavy rainfall that affected the eastern North Island and brought flooding and slips to parts of Gisborne. The 1-day rainfall totals from these events do not feature in the table below (with the exception of Lake Tekapo) as it was the prolonged nature of the rainfall lasting several days that resulted in the extensive impacts.

Table 4: Record or near-record high extreme 1-day rainfall totals that occurred in 2021.

Location	1-day extreme rainfall (mm)	Date	Year records began	Comments
Greymouth	165	Nov-27th	1947	Highest
Lake Tekapo	107	May-29th	1925	3rd-highest
Clyde	63	Jan-02nd	1978	3rd-highest

Section 7: 2021 climate in the six main centres

Temperatures were above average at all main centres. Dunedin experienced its warmest year on record since records began in 1947 and Auckland (Airport) experienced its 3rd-warmest year on record since records began in 1959. Dunedin experienced below normal rainfall while the remaining main centres experienced near normal rainfall (albeit on the drier side of normal in Tauranga and Auckland and on the wetter side of normal in Wellington and Christchurch). Of the six main centres in 2021, Auckland was the warmest, Dunedin was the coolest, Wellington was the wettest, Dunedin was the driest, Tauranga was the sunniest and Hamilton was the least sunny.

Table 5: 2021 climate in the six main centres.

Rainfall			
Location	**Rainfall (mm)**	**% of normal**	**Comments**
Auckland[a]	912	82%	Near normal
Tauranga[b]	955[3]	80%	Near normal
Hamilton[c]	1081	97%	Near normal
Wellington[d]	1365	112%	Near normal
Christchurch[e]	694	117%	Near normal
Dunedin[f]	552	75%	Below normal
Temperature			
Location	**Mean temp. (°C)**	**Departure from normal (°C)**	**Comments**
Auckland[a]	16.5	+1.0	Above average (3rd-highest on record)
Tauranga[b]	16.1[3]	+1.2	Above average
Hamilton[c]	14.7	+0.9	Above average
Wellington[d]	13.7	+0.8	Above average
Christchurch[e]	12.4	+0.8	Above average
Dunedin[f]	12.3	+1.2	Above average (Highest on record)
Sunshine			
Location	**Sunshine (hours)**		
Auckland[a]	2279		
Tauranga[b]	2305		
Hamilton[g]	1995[4]		
Wellington[d]	2145		
Christchurch[e]	2288[5]		
Dunedin[f]	2135		

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

[3] Missing 4 days of data
[4] Missing 4 hours of data
[5] Missing 2 days of data

Section 8: Significant weather and climate events in 2021

This section contains information pertaining to some of the more significant weather and climate events that occurred in 2021. Note that a more detailed list of significant weather events for 2021 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

Beginning the week of 11 January, Level 3 water restrictions were imposed in Kaitaia due to low flow in the Awanui River, while restrictions were extended by all three district councils in Wairarapa. Restrictions were also enacted in Kawakawa-Moerewa and Paihia. On 28 January, Level 4 restrictions were imposed in Waimarama by the Hastings District Council.

In mid-February, water restrictions were implemented in part of the Tasman District, requiring some areas to cut their groundwater use by 20%. Gardens could only be watered using a handheld hose or timer system every second day - even numbered addresses water on even numbered days and likewise for odd numbers.

Parts of the Waikato (Matamata-Piako District) moved into level 3 water restrictions in the beginning of March due to dry conditions. This followed the elevation of water level restrictions in this area from level 1 in December 2020, to level 2 in February 2021.

Much of the east had extended dry periods during March 2021. In the South Island, Blenheim, Kaikōura, Culverden, Cheviot, parts of Christchurch, Akaroa, Oamaru, Windsor, Cromwell, Clyde, Lauder, Alexandra, Wānaka and Middlemarch all recorded over 25 dry days during March (a dry day is a day with less than 1 mm of rainfall recorded). In the North Island, Napier, Whakatu, Masterton and parts of Wellington city all recorded over 25 dry days.

On 28 April, it was announced that a lack of rainfall and low hydro lake levels led to the Tiwai Point aluminium smelter agreeing to lower its consumption of electricity. At the time, South Island hydro storage levels were below the 10th percentile for the time of year and wholesale power prices had spiked. It was reported that actual hydro lake levels were at 67 percent of normal.

Also on 28 April, the Ministry for Primary Industries extended the classification of a large scale adverse event for drought to include Mid Canterbury, South Canterbury, and Otago, unlocking up to an extra $900,000 to help farmers. The event had first been classified on 12 March 2020, when it included the North Island, upper South Island, and the Chatham Islands.

Floods and high rainfall

On 2 January, between 150-200 holidaymakers had to be evacuated when the Otematata River burst its banks. Emergency services cleared about 50 campsites right beside the river. Another 200 people attending the Whare Flat Folk Festival northwest of Dunedin were stranded due to rising water levels on Silverstream. In Central Otago, the water supply for Patearoa was shut down due to the flooding, with a water tanker brought in for affected residents. In Middlemarch, residents were advised not to flush their toilets and avoid drinking water from bores as it was likely to be contaminated. Similarly, the Dunedin City Council advised residents to avoid flushing their toilets until further notice. In Earnscleugh (near Clyde), the Fraser River breached its banks, inundating

orchards and vineyards in the area. Floodwaters were reportedly 1 metre deep on some properties, with orchards noting extensive damage and significant crop losses. In the 48-hour period from 9 a.m. on 1 January, Alexandra recorded 120.4 mm of rain, which is equivalent to 33% of the town's normal annual rainfall.

From 29-31 May, a prolonged and heavy rainfall event struck Canterbury. A state of emergency was declared across the region, with severe flooding occurring in many areas east of the eastern foothills. The government declared a medium-scale adverse event, unlocking funding for recovery measures. Damage caused by flooding was widespread, with numerous roads closed, bridges damaged and impassable, and farms suffering considerable impacts to infrastructure and stock. Hundreds of residents from several settlements were forced to evacuate, including the entire town of Springfield. There were several reports of people getting caught by the floodwaters and requiring rescue, including people becoming trapped after driving into floodwaters, and two individuals who were rescued from trees after being swept away in the floods.

Six Canterbury locations observed record or near-record high 1-day rainfall totals for May, but it was the prolonged nature of this heavy rainfall event that was especially notable. For example, Winchmore recorded 77 mm of rain on 29 May, establishing a new record for its highest 1-day rainfall total in May. However, the very next day this record was superseded: Winchmore recorded 78 mm of rain on 30 May. A similar situation occurred in Akaroa, which recorded 89 mm of rain on 29 May. At that point, it was Akaroa's 3rd-highest 1-day rainfall total for May on record. However, on 30 May Akaroa recorded 98 mm of rain, replacing the near-record high total from the previous day. Research after the event carried out by the EWERAM project found that the extreme rainfall was 10-15% more intense as a result of human influence on the climate system.

On 20 June, heavy rainfall caused flooding in Tokomaru Bay, with four homes and the local school seriously damaged by the floodwaters. Extensive damage was reported on many district roads in Gisborne, while SH35 around the East Cape was closed due to a slip. Farther south, several roads in the Wairarapa were closed due to flooding, including the main route into Martinborough over the Waihenga Bridge. Heavy rain also caused flooding and road closures in parts of Marlborough near Blenheim. Road closures included Queen Charlotte Drive at Wedge Point, Old Renwick Rd, Jacksons Rd and Taylor Pass Rd. Blenheim sports fields were also closed for several days due to surface water.

From 15 July to 18 July, a pulse of tropical air deriving from the Indian Ocean combined with an upper level trough and front to direct a humid and gusty northerly flow to the central and northern South Island. Within a 72-hour period, Ivory Glacier recorded 697 mm, Arthur's Pass recorded 413 mm and Motueka recorded 105 mm. In response to this persistent heavy rain, the Buller River swelled. Flood levels measured at the Buller River reached the highest they had been since 1926. Floodwaters cut off areas of the Marlborough and nearly 1000 people had to evacuate. Residents in parts of Westport were also forced to evacuate as the Buller River burst its banks, leaving waist-high water in many areas. A State of Emergency was declared by the local council. In the aftermath of the flood, at least 200 homes in Westport were deemed uninhabitable and the army was brought in to help clean the damage. At least 1000 stock were lost due to the floods. The Ministry for Primary Industries (MPI) declared a medium-scale adverse event, unlocking funds to help flood affected farmers and growers. The flooding resulted in an estimated $97.2 million in privately insured damage, ranking third for weather-related disasters over the past half century according to the NZ

Insurance Council. Preliminary findings by the EWERAM project show that extreme precipitation events in the Buller basin were 1.5 times as likely because of anthropogenic greenhouse gas emissions.

From 30-31 August, near-record rainfall occurred in parts of Auckland. The rainfall was associated with a stalled low pressure system that, in conjunction with a strong ridge of high pressure near the South Island, contributed to an enhanced thermal gradient over the Auckland region. Along this gradient, a concentrated area of unusually strong winds formed about 1,500 m above the Earth's surface (low level jet), rapidly transporting moisture toward Auckland from the Pacific Ocean. This slow-moving weather feature enabled sustained heavy rainfall and thunderstorm activity to recur over northwestern Auckland for over 12 hours. Considerable flooding was reported in some areas including Kumeū, Helensville, Henderson Valley and Rānui, with an evacuation centre set up for the approximately 60 households forced to leave their home. Approximately 400 homes were without power, with slips and downed trees causing issues for the electricity infrastructure. At least 11 roads were closed due to flooding and slips. Kumeū (West Auckland) received 201 mm of rain during a 14-hour period from 30-31 August. The daily total of 208 mm represents 149% of the normal August monthly rainfall total at Kumeū. This total was New Zealand's highest daily rainfall total for August 2021. In addition, it was the highest daily rainfall total recorded in the Auckland region since 7 March 2017, when 210 mm was recorded at Waiheke Island.

Between 3-5 November, a slow-moving subtropical low caused persistent heavy rainfall that affected the eastern North Island and brought flooding and slips to parts of Gisborne, resulting in a State of Emergency being declared. A search and rescue squad used boats to evacuate residents from flooded homes. Additional flooding occurred in the Gisborne suburb of Sponge Bay, where electricity was turned off as a precautionary measure. Flooding was also reported in Rototahi on 4 November. The heavy rain caused Gisborne District Council to open the emergency sewer valve at Wainui Road into the Turanganui River to prevent sewage from overflowing back into homes and onto roads.

By 4 November, Gisborne had received more than its normal November rainfall total in less than one day, and it was already the town's wettest month in 2021. In less than one day Gisborne also received more rainfall than it did during all of summer 2020-2021 (67 mm). By the end of the rain event, some locations in the Gisborne region had received well above 200 mm of rainfall.

On 6 December, an airmass laden with tropical moisture combined with brisk southerly change to generate flooding rainfall for the Wellington region. Over 25 mm of rainfall was recorded at Kelburn in an hour, the heaviest hourly rainfall rate recorded in over 14 years. Palmerston North recorded 26 mm in an hour, the heaviest hourly rainfall rate recorded in 3 years. As a result, roadways were flooded as the Waikanae River and Hutt River burst its banks. Twenty-five homes near Paraparaumu were cut off after a serious slip. Over 24 hours, Paraparaumu collected 80 mm of rainfall, the highest December rainfall on record, while Wellington Airport received 76 mm of rainfall, the 2nd-highest December rainfall on record.

Between 13-15 December, an influx of tropical moisture from Tropical Cyclone Ruby was drawn across New Zealand by an upper trough. This also resulted in the formation of a surface low pressure system. The resulting weather system lead to heavy rainfall, spreading from the north to the south over several days. Parts of Auckland received 25 mm in an hour, while over a month's worth of rain

fell within a 72 hour period as rainfall totals reached 94 mm. This resulted in several road collisions due to slippery motorways. In Akaroa, 79 mm of rain fell in 24 hours, the heaviest December rainfall on record, while in Christchurch, 61 mm fell in 24 hours, the 3rd heaviest December rainfall on record. Flooding and slips were observed around Le Bons Bay, closing roads.

Table 6: Record high monthly extreme 1-day rainfall totals were recorded in 2021 at:

Location	Extreme 1-day rainfall (mm)	Date of extreme rainfall	Year records began	Ranking
January				
Windsor	37	1st	2000	Highest
Islay Downs (Otago)	95	2nd	1969	Highest
Ophir	61	1st	1924	Highest
Clyde	63	2nd	1978	Highest
February				
None observed				
March				
None observed				
April				
Opouriao (Bay of Plenty)	159	20th	1962	Highest
May				
Whalesback Station (Canterbury)	149	31st	1937	Highest
Cheviot	80	29th	2000	Highest
Lake Coleridge	186	29th	1911	Highest
Hororata West	104	29th	1948	Highest
Rakaia	108	29th	1949	Highest
Mt Somers	163	29th	1980	Highest
Lyndhurst	93	30th	1934	Highest
Winchmore	78	30th	1947	Highest
Waipara West	75	29th	1973	Highest
Prebbleton	52	31st	1969	Highest
Mcqueens Valley	61	29th	1947	Highest
Motunau (Canterbury)	66	29th	1992	Highest
Lake Tekapo	107	29th	1925	Highest
Kimbell	111	29th	1971	Highest
Kakahu Bush (Canterbury)	148	29th	1909	Highest
Coldstream (Canterbury)	80	29th	1964	Highest
June				
Waiawa (Wairarapa)	99	20th	1968	Highest
Hanmer Forest	111	20th	1905	Highest
Ferniehurst (Canterbury)	107	20th	1949	Highest
Mt Somers	110	1st	1980	Highest
Waipara	64	20th	1923	Highest
July				
Upper Tākaka	200	16th	1995	Highest

Murchison	116	16th	1997	Highest
August				
Kumeū	208	30th	1943	Highest
Tiri Tiri Lighthouse	103	30th	1946	Highest
Bainesse (Manawatū)	63	17th	1974	Highest
Upper Tākaka	116	27th	1995	Highest
South West Cape	67	25th	1991	Highest
September				
Makairo (Manawatū)	64	13th	1968	Highest
Waituna	54	13th	1984	Highest
Sanson	60	13th	1973	Highest
Palmerston North	69	13th	1928	Highest
Opiki	61	13th	1945	Highest
Whanganui	73	13th	1937	Highest
Motueka	112	22nd	1956	Highest
Tapawera (Tasman)	49	22nd	1992	Highest
October				
Kaeo (Northland)	160	23rd	1981	Highest
November				
Westport	97	27th	1944	Highest
Greymouth	165	27th	1947	Highest
December				
Masterton	59	13th	1926	Highest
Paraparaumu	80	6th	1951	Highest
Akaroa	79	15th	1977	Highest

Temperature extremes

From 25-28 January, a very warm air mass originating in Australia combined with westerly foehn winds resulted in widespread record and near-record temperatures across eastern New Zealand. Notably, on 26 January, Akaroa reached 38.0°C, shattering its all-time record by 2.5°C. Cheviot reached 37.9°C, breaking its all-time record by 0.1°C, while Timaru also recorded 37.9°C, its 2nd-hottest January temperature since records began in 1885.

Meanwhile, on 26 January a blistering 39.4°C was recorded at Ashburton. This was New Zealand's 2nd-hottest January temperature on record, surpassed only by 40.0°C at Timaru on 22 January 1908.

On 26 and 27 January, Christchurch Airport reached a daily maximum temperature of 37.1°C and 35.8°C, respectively. This is only the second time the city has exceeded 35°C on consecutive days since records began in 1863. The previous occurrence was on 5 and 6 February 1973, when the Christchurch Gardens station reached 35.2°C and 35.5°C, respectively.

Between 19-24 Feb, parts of the northern Canterbury experienced a prolonged spell of 30°C heat. Hanmer Forest recorded six consecutive days above 30°C, with the average daily maximum temperature during this period reaching 33.3°C (this is 10.4°C higher than the average February daily maximum temperature at this site). Culverden and Cheviot recorded four consecutive days above 30°C. During this period, Christchurch also recorded two consecutive days above 30°C.

On 4-5 April, numerous record and near-record temperatures occurred in the South Island, including a maximum temperature of 31.7˚C in Orari Estate (Canterbury, approximately 30 km north of Timaru) on 4 April, New Zealand's highest April temperature on record. Timaru recorded 30.8˚C on 4 April, New Zealand's 5th-highest April temperature on record. On 5 April, the temperature reached 30.7˚C in Bromley (Christchurch), New Zealand's equal 6th-highest April temperature on record. On 5 April, the temperature reached 30.6˚C in Wairoa, New Zealand's equal 7th-highest April temperature on record.

From 9-11 May, exceptionally high daily maximum and minimum temperatures were observed in many parts of the country, but especially about eastern areas. The most notable temperature observations are listed below:

- 28.3°C in Rangiora on 11 May: New Zealand's 3rd-highest May temperature on record.
- 28.2°C in Cheviot on 9 May: New Zealand's 4th-highest May temperature on record.
- 28.1°C in Hastings on 10 May: New Zealand's 5th-highest May temperature on record.
- 28.0°C in Christchurch (Gardens) on 11 May: New Zealand's 6th-highest May temperature on record
- 27.8°C in Napier on 10 May: New Zealand's 7th-highest May temperature on record.

On 26 and 27 May, severe frosts were observed in many South Island areas. Most notable was Tara Hills (Omarama), which recorded -10.8°C on 27 May. This was New Zealand's coldest May temperature since 2001, when -10.9°C was recorded in Ophir. The temperature at Timaru Airport dipped as low as -7.8°C on 26 May, making it the city's lowest May temperature since records began in 1885. The cold temperatures persisted throughout the day in some parts due to an inversion associated with a high pressure system. Dunedin Airport's maximum temperature on 27 May was just 3.2°C, which was that location's lowest daily maximum air temperature for May on record.

Table 7: Extremes of high daily maximum temperature in 2021 were recorded at:

Location	Extreme maximum (°C)	Date of extreme temperature	Year records began	Ranking
January				
Whitianga	31.9	6th	1962	Highest
Masterton	35.6	27th	1906	Highest
Waipawa	35.4	27th	1945	Highest
Blenheim	36.5	27th	1932	Highest
Cheviot	37.9	26th	1982	Highest
Peel Forest	37.0	26th	1973	Highest
Ashburton	39.4	26th	1928	Highest
Waipara West	37.4	26th	1973	Highest
Christchurch (Airport)	37.1	26th	1863	Highest
Lincoln	37.2	26th	1881	Highest
Akaroa	38.0	26th	1978	Highest
Le Bons Bay	31.7	26th	1984	Highest

Orari Estate	38.3	26th	1972	Highest
Timaru	37.9	26th	1885	Highest
Māhia	32.6	28th	1990	Equal highest
February				
None observed				
March				
Campbell Island	18.8	1st	1991	Highest
April				
Wairoa	30.6	5th	1964	Highest
Tākaka	26.7	5th	1978	Highest
Motueka	27.3	5th	1956	Highest
Rangiora	29.9	5th	1965	Highest
Christchurch (Gardens)	30.3	5th	1863	Highest
Akaroa	30.0	4th	1978	Highest
Le Bons Bay	29.0	5th	1984	Highest
Orari Estate	31.7	4th	1972	Highest
Timaru	30.8	4th	1885	Highest
Windsor	26.1	4th	2000	Highest
Dunedin (Musselburgh)	28.5	4th	1947	Highest
Oamaru	27.5	4th	1967	Highest
Whitianga	27.8	11th	1962	Equal highest
May				
Tauranga	24.9	19th	1913	Highest
Napier	27.8	10th	1868	Highest
Hastings	28.1	10th	1965	Highest
Whakatu	26.7	10th	1965	Highest
Waipawa	26.9	10th	1945	Highest
Porirua	21.7	6th	1968	Highest
Tākaka	26.2	5th	1978	Highest
Pelorus Sound, Crail Bay	21.7	5th	1982	Highest
Nelson	22.9	6th	1862	Highest
Hanmer Forest	26.0	11th	1906	Highest
Medbury	25.7	9th	1927	Highest
Waiau	27.1	9th	1974	Highest
Cheviot	28.2	9th	1982	Highest
Rangiora	28.3	11th	1965	Highest
Christchurch (Gardens)	28.0	11th	1863	Highest
Akaroa	27.0	11th	1978	Highest
June				
Taumarunui	20.6	9th	1947	Highest
Porirua	19.5	9th	1968	Highest
Ohakune	19.1	14th	1962	Highest
Puysegur Point	18.1	5th	1978	Highest
Five Rivers	19.5	5th	1982	Highest
Campbell Island	14.1	5th	1991	Highest
Hokitika	18.6	21st	1866	Equal highest
July				

Porirua	18.3	31st	1968	Highest
Greymouth	18.1	31st	1947	Highest
Arthur's Pass	12.7	31st	1978	Highest
South West Cape	16.3	29th	1991	Highest
Middlemarch	18.2	6th	2000	Equal highest
August				
Taumarunui	21.7	13th	1947	Highest
Middlemarch	21.5	24th	2000	Highest
Akaroa	23.0	24th	1978	Equal highest
September				
Warkworth	23.5	16th	1966	Highest
Dannevirke	23.0	22nd	1951	Highest
October				
Kaikohe	23.2	26th	1973	Highest
Whatawhata	24.3	26th	1952	Highest
November				
Māhia	28.1	14th	1990	Highest
Waipawa	29.5	14th	1945	Equal highest
December				
Te Puke	32.2	24th	1973	Highest
Taupō	30.8	24th	1949	Highest
Rotorua	30.4	23rd	1964	Highest
Kaikohe	28.4	25th	1973	Highest
Westport	27.3	15th	1937	Highest
Hicks Bay	26.3	24th	1969	Highest
Secretary Island	26.0	14th	1985	Highest
Mt Ruapehu (Chateau)	25.0	23rd	2000	Highest

Table 8: Extremes of low daily maximum temperature in 2021 were recorded at:

Location	Extreme low maximum (°C)	Date of extreme temperature	Year records began	Ranking
January				
Mt Ruapehu (Chateau)	8.7	21st	2000	Lowest
Arapito	14.8	20th	1978	Lowest
Reefton	11.2	20th	1972	Lowest
Arthur's Pass	5.8	20th	1973	Lowest
Te Anau	9.8	19th	1973	Lowest
Greymouth	13.8	20th	1972	Equal lowest
February				
Secretary Island	10.9	11th	1989	Equal lowest
March				
None observed				
April				
Franz Josef	7.6	26th	1953	Lowest
May				

Dunedin (Airport)	3.2	27th	1972	Lowest
June				
None observed				
July				
Mokohinau	9.8	8th	1994	Lowest
August				
Westport	8.4	8th	1966	Equal lowest
September				
None observed				
October				
None observed				
November				
None observed				
December				
Oamaru	10	11th	1972	Lowest

Table 9: Extremes of low daily minimum temperature in 2021 were recorded at:

Location	Extreme minimum (°C)	Date of extreme temperature	Year records began	Ranking
January				
Warkworth	4.6	30th	1966	Lowest
Tiri Tiri Lighthouse	10.8	21st	1982	Lowest
February				
Appleby	1.0	17th	1932	Equal lowest
Winchmore	1.6	17th	1949	Equal lowest
March				
None observed				
April				
None observed				
May				
Timaru	-7.8	26th	1885	Lowest
Tara Hills	-10.8	27th	1949	Lowest
Middlemarch	-10.1	27th	2000	Lowest
Dunedin (Airport)	-8.8	27th	1962	Equal lowest
June				
None observed				
July				
Cheviot	-6.3	5th	1982	Lowest
August				
None observed				
September				
None observed				
October				
Puysegur Point	1.7	22nd	1978	Lowest

November				
None observed				
December				
None observed				

Table 10: Extremes of high daily minimum temperature in 2021 were recorded at:

Location	Extreme high minimum (°C)	Date of extreme temperature	Year records began	Ranking
January				
Windsor	18.5	27th	2000	Highest
Lumsden	20.4	27th	1982	Highest
February				
Milford Sound	18.3	24th	1935	Highest
Wānaka	20.4	24th	1972	Highest
Alexandra	19.4	24th	1992	Highest
March				
Campbell Island	12.8	2nd	1991	Highest
April				
Hicks Bay	19.3	12th	1972	Highest
Pelorus Sound, Crail Bay	19.0	5th	1986	Highest
Cheviot	18.0	5th	1982	Highest
Ashburton	19.5	5th	1928	Highest
Akaroa	19.5	5th	1978	Highest
Le Bons Bay	17.5	5th	1984	Highest
Tara Hills	15.3	5th	1949	Highest
Ranfurly	16.0	5th	1897	Highest
Palmerston	14.0	12th	1972	Highest
Middlemarch	18.4	5th	2000	Highest
Cromwell	17.8	5th	1949	Highest
Lauder	17.3	5th	1924	Highest
Clyde	19.1	5th	1978	Highest
Alexandra	18.6	5th	1930	Highest
Roxburgh	18.3	5th	1950	Highest
Campbell Island	11.2	10th	1991	Highest
Whakatāne	19.4	13th	1975	Equal highest
May				
Martinborough	18.1	11th	1986	Highest
Ngawi	18.6	11th	1972	Highest
Palmerston North	16.9	10th	1940	Highest
Porirua	16.0	10th	1972	Highest
Hāwera	16.2	11th	1977	Highest
Milford Sound	14.4	31st	1935	Highest
Arthur's Pass	11.3	10th	1978	Highest

Peel Forest	11.3	10th	1973	Equal highest
June				
Porirua	14.3	14th	1972	Highest
Wellington (Kelburn)	14.1	27th	1931	Highest
Secretary Island	13.9	13th	1988	Highest
Motueka	13.2	7th	1972	Highest
Orari Estate	8.2	6th	1972	Highest
Windsor	9.7	14th	2000	Highest
Dannevirke	14.2	27th	1951	Equal highest
Māhia	14.2	27th	1990	Equal highest
July				
Porirua	13.2	16th	1972	Highest
Hokitika	12.3	17th	1866	Highest
Reefton	11.5	17th	1972	Highest
Motueka	13.2	17th	1972	Highest
Te Anau	9.7	6th	1973	Highest
South West Cape	12.8	30th	1991	Highest
August				
Motueka	11.3	28th	1972	Highest
Windsor	12.6	25th	2000	Highest
Middlemarch	13.6	25th	2000	Highest
Dunedin (Airport)	13.8	25th	1972	Highest
Manapouri (West Arm Jetty)	9.2	25th	1972	Highest
Cromwell	12.2	25th	1949	Highest
Tiwai Point	10.3	25th	1972	Highest
South West Cape	11.9	24th	1991	Highest
Westport	12.3	28th	1966	Equal highest
Cheviot	11.8	25th	1982	Equal highest
September				
None observed				
October				
Tūrangi	14.0	27th	1968	Highest
Mt Ruapehu (Chateau)	10.0	27th	2000	Highest
Hicks Bay	16.2	29th	1972	Highest
Pelorus Sound, Crail Bay	14.5	31st	1986	Highest
Manapouri (West Arm Jetty)	12.3	26th	1972	Highest
Auckland (Whenuapai)	16.1	28th	1951	Equal highest
November				
Cape Reinga	17.5	14th	1971	Highest
Kaitaia	19.8	14th	1948	Highest
Kerikeri	19.4	14th	1952	Highest
Kaikohe	18.7	14th	1973	Highest
Whangārei	20.2	14th	1967	Highest
Mokohinau	18.0	29th	1994	Highest
Auckland (Whangaparāoa)	17.7	14th	1982	Highest
Auckland (Whenuapai)	19.1	14th	1951	Highest
Auckland (Western Springs)	19.2	14th	1971	Highest

Whitianga	19.0	14th	1971	Highest
Paeroa	19.1	14th	1971	Highest
Te Puke	18.0	14th	1973	Highest
Whakatāne	18.1	22nd	1975	Highest
Motu	15.8	14th	1990	Highest
Auckland (Māngere)	19.0	14th	1961	Highest
Hamilton	18.2	14th	1946	Highest
Masterton	18.7	13th	1943	Highest
Dannevirke	19.0	14th	1951	Highest
Waiouru	14.8	14th	1972	Highest
Reefton	15.9	13th	1972	Highest
Dargaville	19.2	14th	1951	Equal highest
Gisborne	20.1	14th	1940	Equal highest
South West Cape	13.0	9th	1991	Equal highest
December				
Kaitaia	20.7	13th	1948	Highest
Tauranga	20.6	12th	1941	Highest
Whakatāne	20.4	12th	1975	Highest
Hicks Bay	19.2	25th	1972	Highest
Motu	16.8	12th	1990	Highest
Brothers Island	16.7	28th	1997	Highest
Tiwai Point	16.6	20th	1972	Highest

Strong winds

On 16 February, strong winds broke branches, uprooted trees, lifted roofs and caused power outages in Taranaki. State Highway 3 was partially blocked in several areas by several toppled trees and branches, causing heavy traffic. New Plymouth's clock tower was also closed off due to safety concerns when gusts caused one of the window fittings to come loose.

On 4 April, strong northwesterly winds caused damage in the lower North Island and South Island:

- Winds flipped a caravan onto State Highway 2 north of Wellington on the Remutaka Hill Rd.
- Winds flipped a caravan being towed by a ute on Tekapo-Twizel Rd (State Highway 8).
- Winds fanned several wildfires in the South Island. This included a forest fire near Fairlie in the Mackenzie District that tore through a 10 hectare plantation, a vegetation fire in Temuka, South Canterbury, fires in Owaka and Waikouaiti, Otago, and three fires in Southland (two of which were in the Waimea Valley).
- Winds downed trees and power lines in the Temuka area north of Timaru, causing a few hundred power outages.

From 23-24 May, a low pressure system east of the North Island generated strong winds and large swells. The swells battered eastern parts of the North Island, especially from Northland through to Bay of Plenty. Brophy's Beach in the Coromandel Peninsula was particularly hard hit, with Civil Defence staff working to secure two private properties and other infrastructure by pushing up

protective barriers of sand and rocks. The beach was reportedly wiped out, with other coastal areas of the Coromandel suffering extensive damage. Storm surges flooded roads in Whitianga and Tairua, and Buffalo Beach Road was closed.

On 3 August, strong winds battered parts of Auckland, toppling over trees, powerlines, as well as shipping containers at *Ports of Auckland*. Approximately 4,500 customers were temporarily without power, while *Fire and Emergency New Zealand* were called to 128 weather-related incidents. Farther south, approximately 2,000 homes in Waikato and the Coromandel Peninsula were without power due to downed power lines.

The first in a series of strong cold fronts hit the South Island on 10 September, causing widespread gusts over 100 km/h, including 150 km/h gust at Waipara West and Upper Rakaia, 130 km/h at Lake Tekapo, 115 km/h at Cass, and 113 km at Methven. The Canterbury and Otago regions were among the worst affected areas, as small buildings were damaged, roads were blocked by fallen trees, and almost 7000 homes were left without power. These winds also fanned several fires across the Canterbury and Otago regions.

On 13 September, another powerful cold front hit the South Island, causing gusts over 138 km/h at Upper Rakaia West, 116 km/h at Winchmore, 112 km/h at Waipara West and 104 km/h at Methven. The winds caused several fires to start burning out of control in Canterbury and Otago, as well as down tree and caused localised power outages.

On 20 December, powerful west-northwesterly winds ahead of a front develop across the south Island and lower North Island. Wellington Airport experienced a gust of 100 km/h, while the Upper Hutt had a gust of 82 km/h, the equal 3rd-highest December gust on record. The highest gust recorded was 135 km/h at Mt Kaukau, the strongest gust since October.

Table 11. Maximum wind gust extremes in 2021 were recorded at:

Location	Maximum wind gust (km/h)	Date of maximum wind gust	Year records began	Ranking
January				
South West Cape	180	26th	1991	Highest
February				
Middlemarch	98	23rd	2000	Highest
March				
None observed				
April				
Aoraki / Mt Cook (Airport)	145	5th	2000	Highest
Gore	117	4th	1987	Highest
South West Cape	178	4th	1991	Highest
May				
Diamond Harbour	102	30th	1980	Equal highest
June				
Secretary Island	161	5th	1994	Highest
Lincoln	96	29th	1999	Highest
July				

Secretary Island	146	25th	1994	Highest
Palmerston North	95	17th	1991	Equal highest
Reefton	70	7th	1999	Equal highest
August				
Pukekohe	83	3rd	1986	Highest
Dannevirke	96	17th	1961	Highest
Upper Hutt (Trentham)	89	16th	1999	Highest
Reefton	61	16th	1999	Highest
Brothers Island	148	9th	1997	Highest
Kaikohe	89	3rd	1986	Equal highest
Māhia	115	9th	1991	Equal highest
Hāwera	95	9th	1986	Equal highest
September				
Castlepoint	178	10th	1972	Highest
Hanmer Forest	107	10th	1995	Highest
Winchmore	117	13th	1970	Highest
October				
Mt Kaukau	150	12th	1969	Highest
Secretary Island	163	17th	1994	Highest
Te Puke	61	12th	1987	Equal highest
November				
Rotorua	93	3rd	1972	Highest
Mt Ruapehu (Chateau)	115	3rd	2000	Highest
Te Puke	59	3rd	1987	Equal highest
December				
Puysegur Point	185	20th	1986	Highest
South West Cape	185	20th	1991	Highest

Snow and ice

Canterbury's heavy rainfall event from 29-31 May also resulted in significant snowfalls at high elevations. Measuring the depth of new snowfall proved difficult for many ski areas due to access issues (e.g. damage to access roads due to flooding and slips) and wind effects. Mount Hutt ski area reported snow depths of 4 metres at the summit of their ski area along the wind fence (~2,080 metres above sea level), tapering to 30-40 cm at the base area (~1,610 m above sea level), and to just 5 cm at the bottom of their triple chair (~1,440 metres above sea level).

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

From 16-17 August, a front passing over the South Island delivered heavy snowfalls to most alpine areas of New Zealand. This resulted in the closure of the Crown Range Road between Queenstown

and Wānaka, SH94 between Hollyford Road Junction and Chasm, while chains were required on SH73 between Springfield and Arthur's Pass. Up to 1 metre of fresh snowfall was reported at Ōhau ski area, 40-50 cm was reported at ski areas in the northern Craigieburn Range, and 25-40 cm was reported for Queenstown and Wānaka ski areas. The fresh snow remained untouched at many ski areas, due to a community outbreak of Covid-19 forcing a nationwide Level 4 lockdown from 11:59 p.m. on 17 August.

Lightning, hail and tornadoes

On 14 April around 5:00 pm local time, a waterspout (tornado over the water) formed just off the coast of Napier's marine parade. On this day, a pocket of cold pocket air aloft (upper level low pressure system) moving over warmer and more humid air near the ground, like the relatively warm ocean, caused the necessary instability and vertical motion needed for thunderstorms and the waterspout to form. Vertical wind shear, or change in wind direction and speed with height, also likely contributed to the waterspout's formation and sustainment. Additionally, over 5900 cloud-to-ground lightning strikes were observed across the North Island and in coastal waters.

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

Cloud and fog

On 26 March, sections of the Waikato Expressway were closed due to multiple crashes during a morning of heavy fog.

On 8 November, volcanic gases from Whakaari/White Island mixed with atmospheric moisture to create a rare phenomenon known as vog (volcanic fog). Light northerly winds brought the volcanic fog onshore in Bay of Plenty, resulting in complaints about the strong smell and watery eyes.

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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.