New Zealand Climate Summary: **2019** Issued: 9 January 2020

2019: New Zealand's 4th-warmest year on record

Temperature	Annual temperatures were above average (+0.51°C to +1.20°C above the annual average) across the majority of New Zealand. Pockets of well above average (>1.20°C from average) temperatures were observed in the Bay of Plenty and Hawke's Bay. Near average (within -0.50°C to +0.50°C of average) temperatures occurred in parts of the Wairarapa, the West Coast, Tasman, Nelson, Marlborough and coastal Canterbury. 2019 was the 4th-warmest year on record for New Zealand, based on NIWA's seven-station series which began in 1909.
Rainfall	Yearly rainfall in 2019 was below normal (50-79% of normal) across Northland, Auckland, the Bay of Plenty as well as parts of Waikato, Hawke's Bay, the Wairarapa and Marlborough. Conversely, rainfall was above normal (120-149% of normal) in western Southland and parts of Westland. Rainfall was near normal (80-119% of normal) for the remainder of New Zealand.
Soil moisture	A dry and warm January led to the rapid depletion of soil moisture levels, which continued throughout February with drier than normal soils present across much of the country by the end of summer. Below normal soil moisture levels continued into autumn for the North Island, while heavy rain during the end of March contributed to soils becoming wetter for western parts of the South Island. By the end of winter, soil moisture levels were near normal for most of the country. Soil in the North Island began to dry out again during spring. At the end of spring 2019, soil moisture levels were below normal for much of the upper and eastern North Island, along with scattered portions of Tasman, Marlborough and Canterbury. Above normal soil moisture levels were observed in the lower west coast of the North Island and in parts of Otago and Southland. As of 1 January 2020, soils were wetter than normal for the time of year across parts of Southland, Otago, Nelson, Marlborough Sounds and Wellington. Soil moisture levels were much lower than normal for the time of year in Northland, Auckland, northern Waikato and eastern parts of Wairarapa.
Sunshine	The wider Nelson region experienced New Zealand's highest annual sunshine total during 2019 (2859 hours recorded at Richmond).

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Overview

2019 was New Zealand's 4th-warmest year on record. The nationwide average temperature for 2019, calculated using stations in NIWA's seven-station temperature series which began in 1909, was 13.37°C

(0.76°C above the 1981–2010 annual average). 2016 remains NZ's hottest year on record which had a nationwide average temperature of 13.45°C (0.84°C above the 1981–2010 annual average). The years 1998 and 2018 were tied at 2nd-equal (0.80°C above the 1981–2010 annual average).

The year began with New Zealand's 3rd-warmest January on record. Widespread heatwave conditions took hold during the end of the month with several locations experiencing their warmest January day on record. The warmest temperature of 2019 was recorded on 31 January at Hanmer Forest. The high of 38.4°C became New Zealand's 18th-equal warmest temperature on record for all months (See *Significant Weather and Climate Events in 2019* for further details).

A central Pacific El Niño event (which persisted through to July) brought frequent bouts of high pressure with widespread sunny and dry weather to start the year. By the end of February, Nelson observed a 40-day dry spell[1] which was the 4th-longest dry spell on record there (with records extending back to 1862), while Tauranga and Hamilton had 36 consecutive dry days – their 3rd-longest dry spells on record (records began in 1910 and 1935, respectively). The dryness contributed to multiple fires arising during February. Most notably on 5 February, tinder-dry conditions in the Tasman District fuelled a large scrub fire in Pigeon Valley near Wakefield. The fire doubled in size overnight, spreading to cover 1870 hectares within a perimeter of 20 km by 3 a.m. on 6 February. A Civil Defence State of Emergency was declared which lasted until 27 February. It was reportedly the largest aerial firefight in New Zealand's history, with 23 helicopters and two planes used at the peak of the fire.

A key climate driver and contributor to NZ's hot start to 2019 was the presence of above average sea temperatures around our coastlines. Some coastal areas around Hawke's Bay and Canterbury experienced marine heatwave[2] conditions for a time and marine heatwave conditions also persisted in the Tasman Sea through to March. Warmer than average seas contribute to warmer than average temperatures on land but can also provide extra energy for passing storms (all else being equal, increased surface fluxes of latent and sensible heat can provide potential energy to storms). An example of this occurred on 25-27 March when a mix of an 'atmospheric river'[3], extending from Australian cyclones, coupled with extra energy from the Tasman Sea marine heatwave, as well as a strong low-pressure system siphoning moisture toward New Zealand, brought extremely heavy rainfall to the western South Island. A State of Emergency was declared in Westland and the Waiho River bridge on State Highway 6 was claimed by raging floodwaters. Between 25–27 March, a New Zealand 48-hour rainfall record was set at the Hokitika catchment of the Cropp River which recorded 1086 mm, or more than a metre of rain.

Warmth and dryness remained a theme into winter. It was NZ's 4th-warmest autumn and 7th-warmest winter on record. It was also the driest January to June on record for Auckland (321.2 mm, 62% of normal), Hamilton (275.8 mm, 53% of normal), Whangārei (277.8 mm, 44% of normal), Whitianga (332.8 mm, 39% of normal), and Kaitaia (238.4 mm, 36% of normal). In Auckland, Watercare urged residents to use water wisely at the start of July as water storage was 25% less than normal for the time of year. Snow events

[1] A dry spell is defined as a period of 15 days or more with less than 1mm of rain on any one day.

[2] According to Australian research (Hobday et al., 2016), warm sea surface temperature events are considered marine heatwaves (MHWs) if they last for five or more days with temperatures warmer than the 90th percentile based on a 30-year historical baseline period.

[3] Atmospheric rivers are relatively long, narrow corridors in the atmosphere that transport most of the water vapour outside of the tropics. According to the American Meteorological Society, integrated vapour transport (from Earth's surface to about 9000 m) must be at least 250 $kgm^{-1}s^{-1}$ along the periphery of the moisture plume to be considered an atmospheric river.

were infrequent during the winter season and instead the warm and settled weather during June and July resulted in frequent fog events and disruptions at airports.

A strongly negative Southern Annular Mode[4] at the start of August and stronger than normal polar and sub-tropical jet streams fuelled a more active weather pattern to end winter. The cooler temperatures at the end of winter and start of spring were also influenced by a rare major Sudden Stratospheric Warming (SSW) event, which occurred in the polar stratosphere during late-August and peaked in mid-September (this was the Southern Hemisphere's strongest SSW on record and just the second major event on record). Despite several sharp cold snaps, temperatures as a whole were near average for the time of year in September and continued on the near average note in October, before prevailing northwesterlies in November brought unseasonably warm temperatures and New Zealand's warmest November on record.

Another key climate driver during spring 2019 was a strongly positive Indian Ocean Dipole (IOD) event in October and November. The IOD's hallmark is cooler than average sea surface temperatures in the eastern Indian Ocean near Indonesia and warmer than average sea surface temperatures in the Arabian Sea. This particular IOD event was of near-record strength and caused abnormally dry conditions across Indonesia and Australia during the end of 2019 (and contributed to Australia's dangerous fire conditions). For New Zealand, it brought more westerly quarter winds than normal during spring, from cooler, drier southwesterlies in October to warm, moist northwesterlies in November. The year ended on a cool and wet note in the South Island. During the first eight days of December, a prolonged period of northwesterly airflows over the country delivered persistent rainfall to the headwaters of the South Island lakes and rivers. Lake Wanaka and Lake Wakatipu rose considerably, inundating lakeside roads, tracks and reserves. Meanwhile a dry December for the upper North Island led to rapidly depleting soil moisture levels to start the new decade.

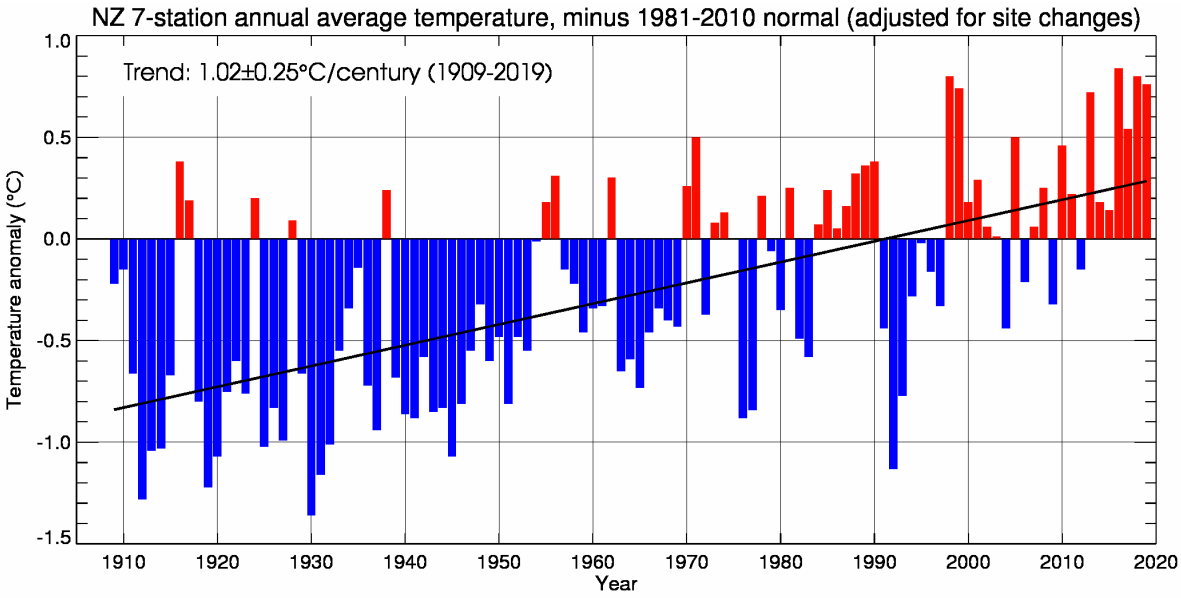
Overall, annual mean sea level pressures for 2019 were slightly lower than normal over the South Island and south of the country while higher than normal pressures occurred over the Tasman sea. This atmospheric pressure pattern produced slightly more westerly wind flows than normal for the year. Frequent bouts of high pressure contributed to a sunny year. The wider Nelson region experienced New Zealand's highest annual sunshine total during 2019[5] (2859 hours recorded at Nelson), followed by Marlborough (2799 hours - Blenheim) and Hawke's Bay (2709 hours – Napier).

Based on the seven-station series, 2019 featured six months with near average temperatures (within -0.50°C to +0.50°C of average), six 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). It has now been 35 months since New Zealand has had a month with below average temperatures (since January 2017). Furthermore, five of the past seven years have been amongst New Zealand's hottest on record. This trend is consistent with the overall pattern of global warming.

[4] https://niwa.co.nz/climate/information-and-resources/southern-annular-mode

[5] NIWA has had a regional sunshine ranking since 2017. This considers the differences between the data recorded by our new high precision electronic sensors and the historic method of recording, using a Campbell Stokes sunshine instrument, which burns a trace in a sun card. The regional sunshine ranking reflects the highest sunshine hours in local authority regions, except for Nelson which has been extended to include the wider Nelson urban area (i.e. including Richmond).

The manual Campbell Stokes recorders are gradually being replaced, and the main table this year primarily contains data from stations with electronic sensors. Three manual sites have been included – Tauranga, Wellington, and Christchurch. They have been included only because they are main centres and there are no electronic sensors nearby. The comparison of data using the different recorders is currently being assessed.



Historical nation-wide annual temperature anomalies (degrees above or below the 1981-2010 normal) from NIWA's seven-station temperature series which begins in 1909. Five of the past seven years have been among New Zealand's warmest on record.

Section 1: The year in review

The monthly sequence of New Zealand climate was as follows:

January 2019: New Zealand's 3rd-warmest January on record

It was New Zealand's 3rd-warmest January on record. Temperatures were above average (0.51 to 1.20°C above average) and well above average (>1.20°C above average) across the country. The only exceptions were the coastal margins of Westland and western Southland where temperatures were near average (-0.50 to +0.50°C of average). Many locations observed record or near-record warm January temperatures. Rainfall was below normal (50-79% of normal) or well below normal (<50% of normal) across much of the North Island. The only exceptions were the districts of Napier and Hastings where above normal rainfall was observed (120-149% of normal). In the South Island, rainfall was well below normal in Nelson, Marlborough, Tasman and parts of Canterbury. For the remainder of Canterbury and the upper West Coast, rainfall was below normal. Conversely, above normal rainfall was observed in parts of Otago and Southland. By the end of January, soil moisture levels were lower than normal in Northland, Auckland, parts of Waikato, Manawatu-Whanganui, Wellington, Tasman, Nelson, Marlborough and the Buller District. Soil moisture levels were largely near normal around Canterbury, Otago, Southland, Hastings District and Gisborne.

February 2019: Dry for most locations, drought for upper South Island

Temperatures were above average (0.51 to 1.20°C above average) or well above average (>1.20°C above average) for much of New Zealand with areas of near average temperatures (-0.50 to +0.50°C of average) in the eastern and lower North Island as well as the upper and western South Island. February rainfall was below normal (50-79% of normal) or well below normal (<50% of normal) for most of the country. Above normal (120-149% of normal) or well above normal (>149% of normal) rainfall was observed for parts of Gisborne, coastal Southland, and north Canterbury (between Kaikōura and Waipara) while near normal rainfall (80-119% of normal) was mostly restricted to the east coast of the North Island (south of Napier). At the end of February, drier than normal soils were present across much the country. Severely dry soils were present across Northland, Auckland, Bay of Plenty, Waikato and Manawatu-Whanganui and extremely dry

soils were present in the Taranaki, Tasman and Nelson regions. Meteorological drought conditions (as defined by the NZ Drought Index) were present at the end of February in Nelson, Tasman and the Buller District.

March 2019: New Zealand's equal 2nd warmest March on record

It was New Zealand's equal 2nd warmest March on record. Temperatures were above average (0.51°C to 1.20°C above average) or well above average (>1.20°C above average) across the entire country. Many locations observed record or near-record warm March temperatures. Rainfall was below normal (50-79% of normal) or well below normal (<50% of normal) across much of the North Island. The only exceptions were parts of Taranaki and the Central Plateau along with the Kapiti Coast and Wellington City which observed near normal (80-119% of normal) or above normal (120-149% of normal) rainfall. In the South Island, rainfall was generally above normal or well above normal (>149% of normal) in the west and far north, while the east and far south observed below to well below normal rainfall. By the end of March, drier than normal soils were present across the majority of the North Island and a large portion of the South Island. Conversely, soil moisture levels were slightly higher than normal in northern Marlborough and Tasman, along with the West Coast, and parts of Otago. Meteorological drought conditions (as defined by the NZ Drought Index) were present in Western Bay of Plenty as of 30 March.

April 2019: Wet and cool for inland parts of the South Island, variable elsewhere

Inland parts of Southland, Otago and Canterbury experienced below average (-0.51°C to -1.20°C of average) temperatures. In contrast, areas along the west coast of the South Island experienced above average (0.51 to 1.20°C above average) temperatures. Temperatures were near average (-0.50 to +0.50°C of average) for the majority of the North Island. Rainfall was above normal (120-149% of normal) or well above normal (>149% of normal) for much of inland Otago, southern Westland, Canterbury, Marlborough Wellington, Wairarapa and Taranaki. Rainfall was below normal (50-79% of normal) or well below normal (<50% of normal) for eastern Southland, north Otago, Nelson and Tasman, Hawke's Bay, eastern Waikato, western Bay of Plenty and Northland. By the end of April, soils were drier than normal for northern and central parts of the North Island. Soils were also drier than normal for southern parts of Marlborough, north Otago and southern Southland. Soil moisture levels were above normal for northern Fiordland, western Otago, eastern Marlborough, Wellington and northern Taranaki.

May 2019: New Zealand's equal 3rd warmest May on record

Temperatures were above average (0.51°C to 1.20°C above average) or well above average (>1.20°C above average) across the entire country, with the most unusually warm temperatures in the South Island. Many locations observed record or near-record warm May temperatures. Rainfall was below normal (50- 79% of normal) or well below normal (<50% of normal) for the majority of the North Island, with the exception being parts of Waikato, Taranaki, and coastal Manawatu-Whanganui where rainfall was near normal (80-119% of normal). Rainfall was above (120-149% of normal) or well above normal (>149% of normal) for much of the western and lower South Island. Near or below normal rainfall occurred in parts of Marlborough, Canterbury, coastal Otago, and southern Southland. By the end of May, soils were drier than normal for much of the North Island with small areas of wetter than normal soils about western Waitomo and the Kapiti Coast. South Island soil moisture was generally near normal with pockets of below normal soil moisture about Waimate and Waitaki as well as the interior Marlborough region.

June 2019: An unusually dry start to winter

Temperatures were near average (-0.50 to +0.50°C of average) for the majority of the North Island. A portion of south Waikato observed below average temperatures (-0.51°C to -1.20°C of average) while coastal southern Hawke's Bay and interior Manawatu-Whanganui observed above average temperatures (0.51°C to 1.20°C above average). Inland parts of Marlborough and Tasman along with northern Canterbury

and West Coast experienced below average or well below temperatures (< -1.20°C below average). Temperatures were above average or well above average (>1.20°C above average) in much of Southland, coastal Otago, and a portion of interior Canterbury. Rainfall was below normal (50-79% of normal) or well below normal (<50% of normal) for the majority of New Zealand with the only exceptions being parts of lower Hawke's Bay and Wairarapa where above normal rainfall (120-149% of normal) was observed. By the end of June, soil moisture levels for the time of year were near normal across most of the country with pockets of drier than normal soils in Northland, Auckland, eastern Waikato, interior Manawatu-Whanganui, coastal Wairarapa, interior Marlborough and parts of lower coastal Canterbury and northern coastal Otago. Conversely, a small area about Kaikōura observed wetter than normal soils.

July 2019: New Zealand's 2nd-warmest July on record

Temperatures were above average (0.51°C to 1.20°C above average) or well above average (>1.20°C above average) nearly everywhere across New Zealand, with the most unusually warm temperatures in the interior South Island and parts of Manawatu-Whanganui. Many locations observed record or near-record warm July temperatures. Rainfall was above (120-149% of normal) or well above normal (>149% of normal) for the majority of the South Island with the exception being a portion of eastern Southland and lower and interior Otago where below normal rainfall (50-79% of normal) was observed. For the North Island, above or well above normal rainfall was observed in central and southwestern areas while near normal (80-119% of normal) or below normal rainfall was observed in the majority of the north and east. By the end of July, soil moisture was near normal for most locations while a small area in lower coastal Canterbury and upper coastal Otago observed below normal soil moisture.

August 2019: Variable temperature and rainfall patterns with frequent southwesterly winds

Temperatures were above average (0.51°C to 1.20°C above average) in parts of central Southland, north Otago, Taranaki, Whanganui, southern Hawke's Bay, Waikato and the Coromandel. Temperatures were below average (-0.51°C to -1.20°C of average) in parts of the West Coast, Tasman, Marlborough and Wairarapa. Rainfall was above normal (120-149% of normal) or well above normal (>149% of normal) for western and southern parts of the South Island, as well as coastal North Otago, Manawatu-Whanganui, central Waikato and Auckland. Rainfall was below normal (50-79% of normal) or well below normal (<50% of normal) in parts of western Otago, the Mackenzie Basin, eastern Canterbury, Hawke's Bay, Gisborne, Bay of Plenty and eastern Northland. By the end of August, soil moisture was near normal for most of New Zealand. Soils were drier than normal for isolated parts of inland north Otago, and wetter than normal about Kaikōura.

September 2019: Average temperatures overall with variable rainfall patterns

Temperatures were average (-0.50 to +0.50°C of average) for much of the country despite several cold snaps. Below average temperatures (-0.51°C to -1.20°C of average) were observed in a few parts of the South Island including northern Tasman, much of Marlborough, Takaka, and eastern locations between Rakaia and Dunedin. A few isolated locations experienced above normal temperatures (0.51°C to 1.20°C above average), mostly in the North Island. Rainfall was below normal (50-79% of normal) over much of the southern portion of both islands (with a few exceptions) with well below normal rainfall (<50% of normal) observed in parts of the Wellington region and for southern West Coast, southwest Canterbury and northwest Otago. Above normal (120-149% of normal) or well above normal (>149% of normal) rainfall levels were less widely observed, occurring in the Far North, locations between Kaipara and Hamilton (including Auckland), the Coromandel Peninsula, Nelson, and in parts of Otago, Tasman and Marlborough. By the end of September, soil moisture was near normal for most of New Zealand. Soils were drier than normal for coastal parts of the Gisborne and Wellington regions, and for inland Otago, southwest Canterbury, and a small part of north Canterbury near Culverden. Wetter than normal soil moisture levels

were restricted to very small patches along the east coast of the South Island near Kaikōura, Christchurch and Dunedin.

October 2019: Variable rainfall patterns; cool in the lower South Island

October temperatures were near average (-0.50 to +0.50°C of average) across nearly the entire North Island, as well as much of the northern South Island and the West Coast. Isolated above average temperatures (0.51°C to 1.20°C above average) were observed in Northland, the Coromandel Peninsula, Taranaki, Hawke's Bay, and northern Tasman. Meanwhile, widespread below average temperatures (-0.51°C to -1.20°C of average) and isolated well below average temperatures (<1.20°C below average) were observed from central Canterbury to Otago. October rainfall was above normal (120-149% of normal) or well above normal (>149% of normal) for many eastern coastal areas, including Northland, the Coromandel Peninsula, Gisborne, Hawke's Bay, southern Canterbury, Otago, and Southland. Conversely, below normal rainfall (50-79% of normal) was observed in western Northland, parts of Auckland and Waikato, the Central Plateau, and Marlborough. Elsewhere, generally near normal rainfall (80-119% of normal) was observed. By the end of October, soil moisture was near normal across most of New Zealand. Soils were wetter than normal in coastal Gisborne, much of Hawke's Bay, as well as coastal Canterbury, Otago, and Southland. Meanwhile, drier than normal soils were observed in western Northland, Wairarapa, Marlborough, and southern Canterbury to interior Otago.

November 2019: Hottest November on record for New Zealand

Temperatures were well above average (>1.20°C above average) or above average (0.51°C to 1.20°C above average) for most of the country. The exception was parts of Fiordland and the West Coast where temperatures were near average (-0.50 to +0.50°C of average). Rainfall was above normal (120-149% of normal) or well above normal (>149% of normal) in many western and southern parts of the South Island. In contrast, rainfall was below normal (50-79% of normal) or well below normal rainfall (<50% of normal) for many eastern, inland and northern parts of the North Island, eastern Marlborough and South Canterbury. By the end of November, soil moisture levels were lower than normal for much of Northland, Auckland, Waikato, Bay of Plenty, Hawke's Bay and Wairarapa. Soils were wetter than normal for the time of year for parts of Southland and eastern Otago.

December 2019: Wet end to the year for much of New Zealand

December temperatures were well above average (> 1.20°C above average) for Bay of Plenty, and parts of Waikato and Hawke's Bay. Temperatures were mostly above average (0.51°C to 1.20°C above average) for remaining parts of the North Island. Below average (-0.51°C to -1.20°C of average) or well below average (> 1.20°C below average) temperatures were experienced in western and inland parts of Southland, Otago, and many additional areas about the Southern Alps. It was a wet December for much of the South Island, with well above normal rainfall (>149% of normal) in parts of every region. Rainfall was also well above normal in Wellington, Kapiti Coast, northern Hawke's Bay and Gisborne. Above normal rainfall (120-149% of normal) was observed in parts of Taranaki, Manawatu and southeastern Waikato. Rainfall was below normal (50-79% of normal) in Northland, Auckland, northern Waikato and Bay of Plenty, Coromandel, Wairarapa, eastern parts of Central Otago, and coastal Canterbury north of Ashburton. By the end of December, soils were wetter than normal for the time of year across parts of the Southland, Otago, Nelson, Marlborough Sounds and Wellington. Soil moisture levels were much lower than normal for the time of year in Northland, Auckland, northern Waikato and eastern parts of Wairarapa.

Section 2: Monthly temperature (in °C, as a departure from the 1981-2010 monthly averages)

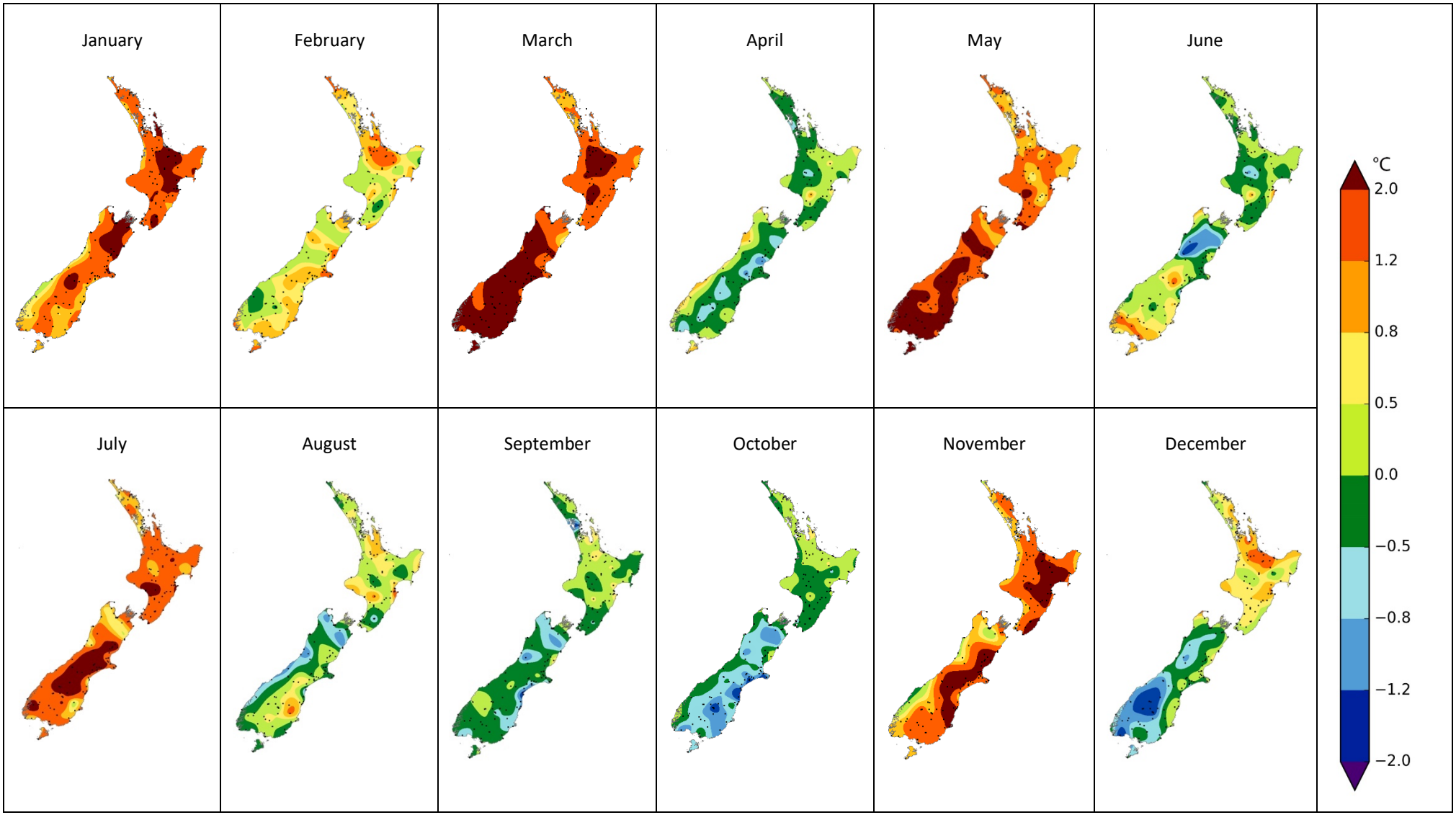


Figure 1: Monthly temperature anomalies (compared to the 1981-2010 monthly averages) for each month of 2019.

Section 3: Monthly rainfall (as a percentage of the 1981-2010 monthly normals)

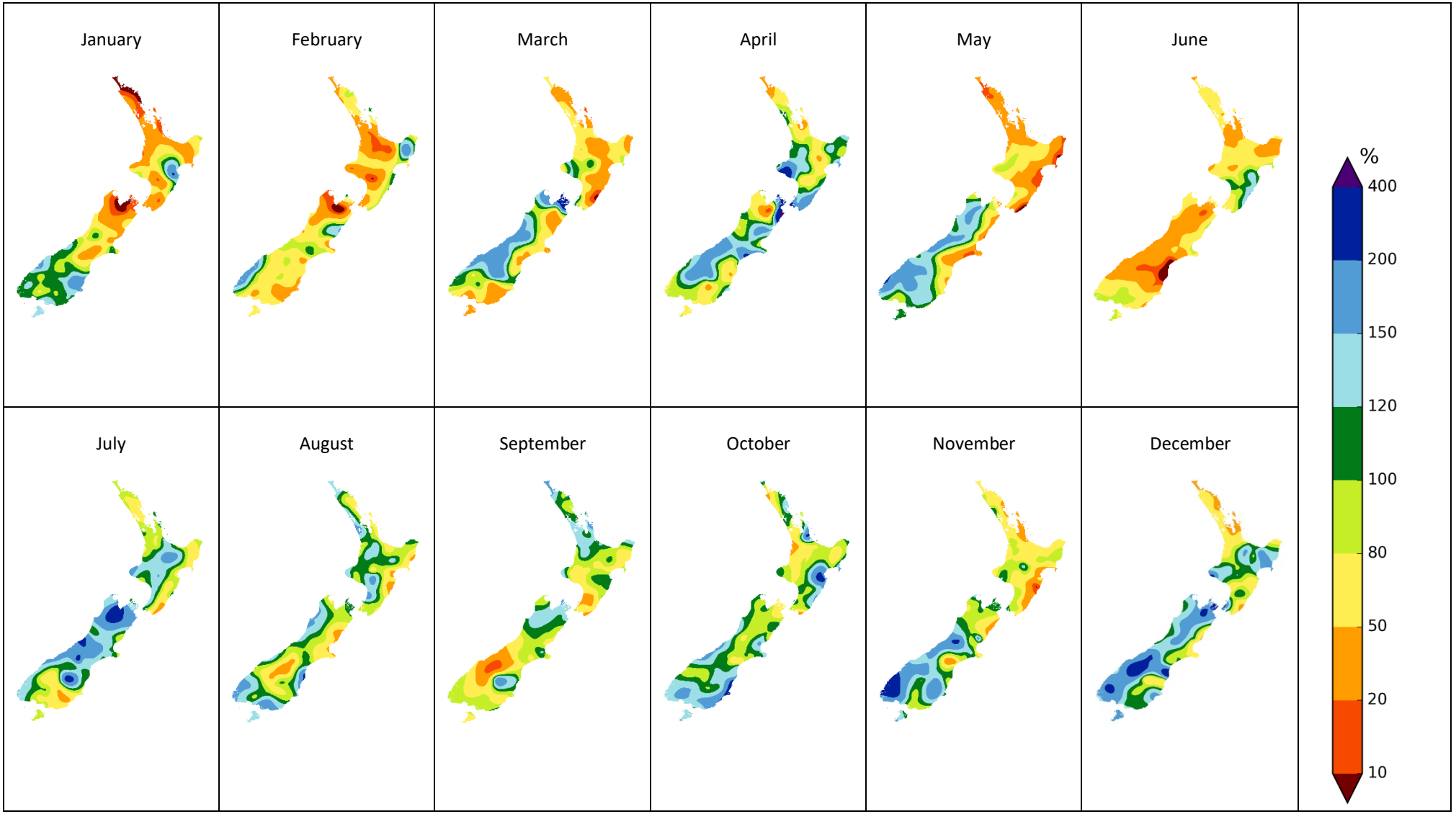


Figure 2: Monthly rainfall as a percentage of each 1981-2010 monthly normal for each month of 2019.

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 2019 was 13.37°C (0.76°C above the 1981–2010 annual average). Using NIWA's seven-station temperature series, 2019 was the 4th-warmest year on record since records began in 1909.
- Whangārei recorded the highest annual average temperature for 2019 with 16.5°C, followed by Whangaparaoa (Auckland) with 16.4°C.
- The highest air temperature of the year was 38.4°C recorded at Hanmer Forest, followed by 37.9°C at Medbury and 37.8°C at Waiau, all of which occurred on 31 January.
- The lowest air temperature of the year was -9.2°C recorded at Lake Tekapo on 3 June, followed by -9.1°C at Hanmer Forest on 28 June, and -9.0°C at Tara Hills on 19 August.
- The top three daily rainfall totals from regularly reporting gauges in 2019 were 463 mm at Castle Mount on 25 March, 402 mm at Ivory Glacier on 2 December, and 401 mm at Milford Sound on 25 March.
- The top three daily rainfall totals from regularly reporting gauges in 2019 *excluding* high elevation stations were: 401 mm at Milford Sound on 25 March, 291 mm at Aoraki / Mt Cook Village on 26 March, and 226 mm at Rings Beach on 9 September.
- Of all the regularly reporting gauges, the wettest locations in 2019 were: Cropp River (West Coast, 975 metres above sea level) with 14,227 mm, Tuke River (West Coast, 975 metres above sea level) with 12,098 mm, and Doon River (Southland, 1211 metres above sea level) with 10,371 mm.
- Of the regularly reporting gauges, the wettest locations in 2019 *excluding* high elevation stations were: Milford Sound with 8,417 mm, Aoraki / Mt Cook with 5,546 mm, and Manapouri (West Arm Jetty) with 5,135 mm.
- The lowest rainfall recording locations for 2019 were Clyde and Cromwell with 417 mm, Ranfurly with 433 mm, and Windsor with 435 mm.
- The wider Nelson region experienced New Zealand's highest annual sunshine total during 2019 (2859 hours recorded at Nelson), followed by Marlborough (2799 hours - Blenheim) and Hawke's Bay (2709 hours – Napier).
- The highest confirmed wind gust for 2019 was 196km/h recorded at Cape Turnagain on 15 May.
- Of the six main centres in 2019, Tauranga was the warmest, Dunedin was the coolest, Wellington was the wettest, Christchurch was the driest, Auckland was the sunniest and Dunedin 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	14227
CROPP AT CROPP HUT	12541
TUKE AT TUKE HUT	12098
DOON AT MIDDLE ARM	10371
HOKITIKA AT PRICES FLAT	9850
HAAST AT CRON CK	9503
IVORY AT RIPPLEROCK	9458
IVORY GLACIER CWS	9457
HOKITIKA RAPID CK	8792
MILFORD SOUND EWS	8417
HOKITIKA AT COLLIERS CK	8431
GODLEY AT PANORAMA RIDGE	8040
WAIHO AT DOUGLAS HUT	7956
CASTLE MOUNT EWS	7951[2]
RAKAIA AT LAKE RAMSAY	7410
GODLEY AT EADE HUT	6661
WHATAROA AT SHB	6608
HAAST AT ROARING BILLY	6125[6]
MT PHILISTINE EWS	6609[6]
ARTHURS PASS AWS	5888[10]
MT COOK EWS	5546
ARTHURS PASS EWS	5516
MURCHISON AT ROSE RIDGE	5377
MUELLER HUT EWS	5375[1]
TAIPO AT SHBR	5374
MANAPOURI, WEST ARM JETTY EWS	5135
PIGEON CREEK CWS	4873
HAAST AT MOA CK	4669
BUTCHERS CK AT BUTCHERS GULLY	4351
MURCHISON MTNS EWS	3798
ALBERT BURN	3724
AHURIRI AT CASSINIA MORAINE	3667
HOKITIKA AERO	3517
HOKITIKA AWS	3491[2]
MT COOK AERO AWS	3252[8]
HOKITIKA EWS	3163
PUYSEGUR POINT AWS	3024[11]
WAITUTU CWS	2922
UPPER RAKAIA EWS	2783
MAHANGA EWS	2724
MAKOTUKU AT F TRIG	2707
EGLINTON, KNOBS FLAT CWS	2692
MT RUAPEHU, CHATEAU EWS	2626
GREYMOUTH AERO EWS	2432[13]
WESTPORT EWS	2422
COBB AT TRILOBITE	2311
WAIPAOA AT MANGATU DIVIDE	2283
REEFTON EWS	2183[1]
WESTPORT AERO AWS	2124[2]
NGAHERE AT NGAHERE HUT	2067
WHAKAPAPA AT MT RUAPEHU EWS	2053
TONGARIRO AT MANGATOETOE	1969
MOTU EWS	1941[4]
STRATFORD EWS	1882[2]
TAURANGA-TAUPO AT KIKO RD	1812
MOTU AT WAITANGIRUA	1785
OTAMATUNA, TE MAPOU HUT CWS	1765
NEW PLYMOUTH AWS	1557[2]
TAKAKA EWS	1551[13]
WHANGANUI AT TE PORERE	1498[7]
LOWER RETARUKE CWS	1489
WAIPAPA AT WAITETI STATION	1486
PUREORA FOREST CWS	1457
RANGITAIKI AT ANIWHENUA	1444
MT POTTS EWS	1411[1]
MANAPOURI AERO AWS	1405
PURUKOHUKOHU AT NO 4	1398
TAUMARUNUI EWS	1380[5]
WAIMARINO AT KEPA RD	1369
WELLINGTON, KELBURN 2	1367
TAUMARUNUI AWS	1355[12]
TURANGI 2 EWS	1345
TONGARIRO AT TURANGI	1345
WHANGANUI AT BELOW PIRIAKA	1344
WHITIANGA AERO AWS	1306[6]
OHAKUNE EWS	1285
TROUNSON CWS	1260
WELLINGTON, KELBURN AWS	1249[3]
INVERCARGILL AERO	1239[2]
FAREWELL SPIT AWS	1238[6]
KERIKERI AERODROME AWS	1234[1]
WHITIANGA EWS	1232[1]
TE PUKE EWS	1230
WHATAWHATA 2 EWS	1212
WAIOURU EWS	1198[2]
ROTORUA EWS	1194[1]
HAWERA AWS	1187[7]
INVERCARGILL AERO 2 EWS	1184[1]
INVERCARGILL AERO AWS	1170
WAIPAPA AT TTT RD CULVERT	1183
KERIKERI EWS	1167

MATUKITUKI AT WEST WANAKA	1153
HICKS BAY AWS	1142[7]
UPPER HUTT, TRENTHAM EWS	1125
MAHIA AWS	1115[11]
PAHIATUA EWS	1115
BIRCHWOOD WXT AWS	1101[4]
LEVIN EWS	1101
FIVE RIVERS CWS	1079
WAIROA AERO AWS	1066[6]
WAIOURU AIRSTRIP AWS	1062[1]
CAPE TURNAGAIN AWS	1055[7]
WELLINGTON, GRETA POINT CWS	1051
TAUPO CWS	1047[4]
PUKEKOHE EWS	1036
PARAPARAUMU AERO	1030
AKAROA EWS	1028
AKITIO EWS	1028
TIWAI POINT EWS	1026[14]
WELLINGTON AERO BACKUP AWS	1024[2]
PORIRUA, ELSDON PARK AWS	1022[5]
RUSSELL CWS	1021
WELLINGTON AERO	1017
WHAKATANE EWS	1014
NELSON AERO	1013
WAIKERIA EWS	1010[1]
MANGAKINO AT DILLON RD	1008
MANGARE STM AT MANGARE RD	1006
TAHUNAATARA AT OHAKURI RD	1006
WHIRINAKI AT GALATEA	994
PORT TAHAROA AWS	992[10]
GORE AWS	991[7]

WAIPARA N. BRANCH @ LANGS GULLY	990
QUEENSTOWN EWS	988
WHAKAURU AT MOSSOP RD	983
NELSON AWS	967[1]
PARAPARAUMU EWS	962
POKAIWHENUA AT PUKETURUA	955
MAYFIELD @ RUAPUNA	954
GALATEA AWS	946[5]
AUCKLAND AERO	942[1]
LEVIN AWS	942[3]
APPLEBY 2 EWS	941[6]
GORE EWS	934[2]
RICHMOND EWS	933
TAURANGA CWS	931
AUCKLAND, MOTAT EWS	921
AUCKLAND, MANGERE 2 EWS	920
AUCKLAND, N. SHORE ALBANY EWS	919
WAIKATO AT REIDS FARM	919
WHAKATANE AERO AWS	918[8]
KAITAIA EWS	910
DARGAVILLE 2 EWS	906
TUTIRA CWS	900
LUMSDEN AWS	897[5]
TOLAGA BAY WXT AWS	875[5]
HANMER FOREST EWS	873
HAMILTON, RUAKURA 2 EWS	871
PARAPARAUMU AERO AWS	871[1]
PALMERSTON NORTH AWS	868[1]
HAMILTON AWS	853
WAIOTAPU AT REPOROA	848
PURERUA AWS	847[3]

METHVEN CWS	842[10]
TAUPO AWS	840[1]
WAIPOUNAMU CWS	838
WHANGAREI AERO AWS	837[2]
MATAMATA, HINUERA EWS	835
MANA ISLAND AWS	830[2]
WANAKA CWS	805
GISBORNE AWS	791[2]
TAURANGA AERO AWS	787
TAKAPAU PLAINS AWS	782[4]
BALMORAL EAST CWS	781
LEIGH 2 EWS	779
DIAMOND HARBOUR EWS	774
WANGANUI, SPRIGGENS PARK EWS	773[12]
AHURIRI AT STH DIADEM	769
KAITAIA AERO EWS	768[7]
WAIKATO @ CAMBRIDGE GOLF COURSE	762
QUEENSTOWN AERO AWS	761
ASHBURTON AERO AWS	757[4]
WHANGAREI EWS	755
WANAKA AERO AWS	749[3]
NUGGET POINT AWS	746[10]
BLENHEIM AERO AWS	743
STANTON AT CHEDDAR VALLEY	740
DANNEVIRKE EWS	721
WANGANUI AWS	717[2]
DUNEDIN, MUSSELBURGH EWS	712[1]
HASTINGS AWS	711[2]
DUNEDIN AERO AWS	702
LAKE KARAPIRO CWS	702
FLAT HILLS WXT AWS	697[6]

PUKAKI AERODROME AWS	689
MASTERTON, TE ORE ORE CWS	686
BALCLUTHA, TELFORD EWS	682
FAIRLIE AWS	680[3]
MARAEKAKAHO CWS	679
CAPE CAMPBELL AWS	670[3]
KAIKOURA AWS	668[1]
BLENHEIM RESEARCH EWS	661
WINCHMORE 2 EWS	657[1]
NAPIER EWS	651
WAIAU SCHOOL CWS	651
WAIPAWA EWS	651[9]
WHANGAPARAOA AWS	649[11]
WAKANUI 2 CWS	640
GISBORNE EWS	638[1]
CULVERDEN AWS	635[7]
NAPIER AERO AWS	633
MOKOHINAU AWS	627[9]
ASHCOTT ROAD CWS	624
LISMORE, RACEMANS HOUSE CWS	617
OHOKA CWS	607
MASTERTON EWS	602
NGAWI AWS	600[1]
BARING HEAD	596
OAMARU AIRPORT AWS	591[2]
OAMARU AWS	591[2]
MASTERTON AERO AWS	582[3]
CHRISTCHURCH AERO	574
LAKE TEKAPO EWS	572[9]
CHRISTCHURCH AERO BACKUP AWS	571[5]
RANGIORA EWS	554

CHERTSEY CWS	549
OAMARU EWS	549
CHRISTCHURCH, KYLE ST EWS	546
TIMARU EWS	539
LINCOLN, BROADFIELD EWS	525
TARA HILLS AWS	521[8]
MEDBURY CWS	518
WAIPARA WEST EWS	514
LAUDER EWS	508
CASTLEPOINT AWS	503[9]
TIMARU AERO AWS	483[1]
ALEXANDRA CWS	435
WINDSOR EWS	435
RANFURLY EWS	433
ALEXANDRA AWS	427[7]
CLYDE 2 EWS	417
CROMWELL EWS	417
Location	**Mean temp(°C)**
WHANGAREI AERO AWS	16.5
WHANGAPARAOA AWS	16.4
KAITAIA AERO EWS	16.2
LEIGH 2 EWS	16.2
PURERUA AWS	16.2
AUCKLAND AERO	16.0[1]
TAURANGA CWS	15.9
TAURANGA AERO AWS	15.9
AUCKLAND, MANGERE 2 EWS	15.8
KERIKERI AERODROME AWS	15.8[1]
HICKS BAY AWS	15.7
DARGAVILLE 2 EWS	15.6

RUSSELL CWS	15.6
WHANGAREI EWS	15.6
KERIKERI EWS	15.5
PORT TAHAROA AWS	15.5
AUCKLAND, N. SHORE ALBANY EWS	15.4
KAITAIA EWS	15.4
WHITIANGA EWS	15.4
NGAWI AWS	15.4[1]
AUCKLAND, MOTAT EWS	15.3
FAREWELL SPIT AWS	15.3
KAIKOHE AWS	15.3
WHITIANGA AERO AWS	15.3
PAEROA AWS	15.2
NAPIER EWS	15.1
LAKE KARAPIRO CWS	15.0
GISBORNE AWS	15.0[1]
WHAKATANE AERO AWS	15.0
WHAKATANE EWS	15.0
GISBORNE EWS	14.9
WAIROA, NORTH CLYDE EWS	14.9
NAPIER AERO AWS	14.8[1]
HASTINGS AWS	14.8
PUKEKOHE EWS	14.7
MAHIA AWS	14.7
TOLAGA BAY WXT AWS	14.7
FIRTH OF THAMES EWS	14.6
TROUNSON CWS	14.4
HAMILTON, RUAKURA 2 EWS	14.4[1]
CASTLEPOINT AWS	14.4
WANGANUI AWS	14.3
WELLINGTON AERO	14.3

WAIROA AERO AWS	14.3
HAMILTON AWS	14.2[1]
NEW PLYMOUTH AWS	14.2[1]
WELLINGTON, GRETA POINT CWS	14.1
TE KUITI EWS	14.0
BROTHERS ISLAND AWS	14.0
MATAMATA, HINUERA EWS	13.8
PARAPARAUMU EWS	13.8
WAIKERIA EWS	13.8
LEVIN AWS	13.8[1]
PORIRUA, ELSDON PARK AWS	13.8
NELSON AWS	13.7[1]
PALMERSTON NORTH AWS	13.7[1]
PARAPARAUMU AERO AWS	13.7[1]
TUTIRA CWS	13.6
WELLINGTON, KELBURN AWS	13.6
BARING HEAD	13.5
LEVIN EWS	13.5
MARTINBOROUGH EWS	13.5
CAPE CAMPBELL AWS	13.5
GALATEA AWS	13.5
RICHMOND EWS	13.4
HAWERA AWS	13.4
KAIKOURA AWS	13.4
PALMERSTON NORTH EWS	13.4
ROTORUA EWS	13.3
MANA ISLAND AWS	13.3
ROTORUA AERO AWS	13.2
FLAT HILLS WXT AWS	13.2
UPPER HUTT, TRENTHAM EWS	13.1
BLENHEIM AERO AWS	13.1[1]

MASTERTON, TE ORE ORE CWS	13.0
WESTPORT EWS	13.0
WESTPORT AERO AWS	13
CAPE TURNAGAIN AWS	13
TAUMARUNUI AWS	13
WAIPAWA EWS	13
TAUPO CWS	12.9
WHATAWHATA 2 EWS	12.9
WAIPARA WEST EWS	12.8
MASTERTON AERO AWS	12.8[1]
STRATFORD EWS	12.8
ASHCOTT ROAD CWS	12.7
CHRISTCHURCH, KYLE ST EWS	12.7
AKITIO EWS	12.7
DANNEVIRKE EWS	12.6
DIAMOND HARBOUR EWS	12.6
MASTERTON EWS	12.6
PAHIATUA EWS	12.6
TAUMARUNUI EWS	12.6
WAIAU SCHOOL CWS	12.6
TAKAKA EWS	12.5
AKAROA EWS	12.4
MEDBURY CWS	12.4
TAUPO AWS	12.4
APPLEBY 2 EWS	12.4
GREYMOUTH AERO EWS	12.4
LINCOLN, BROADFIELD EWS	12.3
CULVERDEN AWS	12.3
CHRISTCHURCH AERO	12.2[1]
SECRETARY ISLAND AWS	12.2
TAKAPAU PLAINS AWS	12.2

LE BONS BAY AWS	12.2
CHERTSEY CWS	12.0
HOKITIKA EWS	11.9
TURANGI 2 EWS	11.9
HOKITIKA AWS	11.9[1]
DUNEDIN, MUSSELBURGH EWS	11.8
METHVEN CWS	11.8
PUYSEGUR POINT AWS	11.8[1]
ASHBURTON AERO AWS	11.8
ROXBURGH WXT AWS	11.8
KAIKOURA, MIDDLE CREEK	11.7
RANGIORA EWS	11.7
REEFTON EWS	11.7
OAMARU AWS	11.7[1]
OHOKA CWS	11.6
WAKANUI 2 CWS	11.6
PIGEON CREEK CWS	11.6
BALMORAL EAST CWS	11.5
LISMORE, RACEMANS HOUSE CWS	11.5
HAAST AWS	11.4
CROMWELL EWS	11.3
OAMARU EWS	11.2
TIWAI POINT EWS	11.2
WINCHMORE 2 EWS	11.2
OAMARU AIRPORT AWS	11.2[1]
WANAKA AERO AWS	11.2
MOTU EWS	11.2
FRANZ JOSEF EWS	11.2
ALEXANDRA CWS	11.1
SOUTH WEST CAPE AWS	11.1
TIMARU AERO AWS	11.1

FAIRLIE AWS	11.1
MILFORD SOUND AWS	11.0[1]
MAYFIELD @ RUAPUNA	10.9
PUREORA FOREST CWS	10.9
WAIPARA N. BRANCH @ LANGS GULLY CWS	10.9
WANAKA CWS	10.9
WINDSOR EWS	10.9
DUNEDIN AERO AWS	10.9[1]
BIRCHWOOD WXT AWS	10.9
ALEXANDRA AWS	10.9
NUGGET POINT AWS	10.9
GORE AWS	10.9
INVERCARGILL AERO 2 EWS	10.8
INVERCARGILL AERO AWS	10.8[1]
OHAKUNE EWS	10.7
CLYDE 2 EWS	10.7
BALCLUTHA, TELFORD EWS	10.5
QUEENSTOWN EWS	10.5
QUEENSTOWN AERO AWS	10.4[1]
LUMSDEN AWS	10.4
TARAPOUNAMU EWS	10.3
TIMARU EWS	10.3
FIVE RIVERS CWS	10.2
HANMER FOREST EWS	10.2
WAIPOUNAMU CWS	10.2
LAUDER EWS	10.1
GORE EWS	10.0
WAITUTU CWS	9.9
TARA HILLS AWS	9.9
PUKAKI AERODROME AWS	9.8
MANAPOURI AERO AWS	9.7[1]
RANFURLY EWS	9.6
MANAPOURI, WEST ARM JETTY EWS	9.5
WAIOURU EWS	9.5
MT COOK AERO AWS	9.4
WAIOURU AIRSTRIP AWS	9.3
MT COOK EWS	9.2
EGLINTON, KNOBS FLAT CWS	8.8
ARTHURS PASS AWS	8.4
ARTHURS PASS EWS	7.9
MT RUAPEHU, CHATEAU EWS	7.8
MURCHISON MTNS EWS	5.6
ALBERT BURN	5.4
IVORY GLACIER CWS	4.4
UPPER RAKAIA EWS	4.2
MT PHILISTINE EWS	3.6
MUELLER HUT EWS	3.2
MAHANGA EWS	2.8
MT POTTS EWS	1.7
CASTLE MOUNT EWS	0.5
Location	**Sunshine (hours)**
RICHMOND EWS	2859
BLENHEIM RESEARCH EWS	2799
APPLEBY 2 EWS	2734[7]
NAPIER EWS	2709
WHAKATANE SUNSHINE	2690
NEW PLYMOUTH AWS	2682[1]
TAKAKA EWS	2630[14]
NELSON AERO	2606
GISBORNE AWS	2566[3]
AUCKLAND, MOTAT EWS	2555[1]
RAOUL ISLAND AWS	2527[13]
ROTORUA EWS	2513[2]
AUCKLAND, MANGERE 2 EWS	2496
TAURANGA AERO	2494
AKITIO EWS	2459
DIAMOND HARBOUR EWS	2438[1]
MASTERTON EWS	2399
LINCOLN, BROADFIELD EWS	2368[1]
ASHBURTON AERO AWS	2359[2]
CROMWELL EWS	2333[1]
LEVIN EWS	2329
WAIPARA WEST EWS	2323
RANGIORA EWS	2313
AUCKLAND, N. SHORE ALBANY EWS	2304[2]
CHRISTCHURCH AERO	2285
WINCHMORE 2 EWS	2285[12]
OAMARU EWS	2273
WESTPORT EWS	2264
AKAROA EWS	2257
UPPER HUTT, TRENTHAM EWS	2257
KAWERAU AWS	2252[5]
HAMILTON, RUAKURA 2 EWS	2245[2]
STRATFORD EWS	2240[2]
WHANGAREI EWS	2231
WAIKERIA EWS	2228[2]
QUEENSTOWN AERO AWS	2213[1]
WELLINGTON, KELBURN	2207
DARGAVILLE 2 EWS	2198[1]
PARAPARAUMU AERO	2189

KAITAIA EWS	2167
TURANGI 2 EWS	2165[1]
TE KUITI EWS	2146[1]
HOKITIKA AWS	2106[1]
DUNEDIN, MUSSELBURGH EWS	2089[2]
TAUMARUNUI AWS	2065[4]
MARTINBOROUGH EWS	2023
GREYMOUTH AERO EWS	1974[15]
DANNEVIRKE EWS	1890
INVERCARGILL AERO 2 EWS	1890
FRANZ JOSEF EWS	1883[16]
REEFTON EWS	1854[1]
HOKITIKA AERO	1842
GORE EWS	1814[2]
PALMERSTON NORTH EWS	1767[16]
INVERCARGILL AERO	1757[3]
BALCLUTHA, TELFORD EWS	1591[1]
MT COOK EWS	1526

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

2019 was New Zealand's 4th-warmest year on record based on NIWA's seven-station series, which begins in 1909. Many locations observed record or near-record high mean, mean maximum, and mean minimum temperatures. Notably, Tauranga had its warmest year since records began there in 1913.

Table 1: Near-record or record high or low annual average temperature departures for 2019[6].

Location	Mean air temp. (°C)	Departure from normal (°C)	Year records began	Comments
Mean temperature				
Tauranga	16.0	1.1	1913	Highest
Ngawi	15.4	0.9	1972	Highest
Farewell Spit	15.3	1.4	1971	Highest
Kaikōura	13.5	1.1	1963	Highest
Whangaparaoa (Auckland)	16.6	0.9	1982	2nd-highest
Motu	12.0	1.2	1990	2nd-highest
South West Cape	11.0	0.8	1991	2nd-highest
Dunedin (Musselburgh)	11.8	0.7	1947	Equal 2nd-highest
Kerikeri	16.0	0.7	1945	3rd-highest
Whangārei	16.6	0.8	1967	3rd-highest
Paeroa	15.4	0.7	1947	3rd-highest
Whakatāne	15.1	1.1	1974	3rd-highest
Hicks Bay	15.8	0.9	1969	3rd-highest
Hastings	14.8	1.7	1965	3rd-highest
Wairoa	15.3	1.0	1964	3rd-highest
Mahia	14.9	0.8	1990	3rd-highest
Puysegur Point	11.8	0.8	1978	3rd-highest
Lumsden	10.4	0.8	1982	3rd-highest
Invercargill	11.0	1.0	1905	3rd-highest
Tiwai Point	11.4	0.8	1970	3rd-highest
Nugget Point	10.9	0.7	1970	3rd-highest
Rotorua	13.5	0.8	1964	4th-highest
Paraparaumu	13.9	0.8	1953	4th-highest
Levin	14.0	0.9	1895	4th-highest
Mean maximum temperature				
Kerikeri	21.3	1.2	1945	Highest
Whangārei	21.3	1.4	1967	Highest
Whangaparaoa	20.0	1.2	1982	Highest

[6] The rankings (1st, 2nd, 3rd….etc) in Tables 1 to 12 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.

Whenuapai (Auckland)	20.1	1.0	1945	Highest
Whitianga	21.2	1.9	1962	Highest
Paeroa	20.7	1.1	1947	Highest
Tauranga	20.4	1.3	1913	Highest
Te Puke	20.0	1.0	1973	Highest
Rotorua	18.8	1.8	1964	Highest
Taupō	19.0	2.3	1949	Highest
Hamilton (Airport)	20.1	1.1	1946	Highest
Te Kuiti	20.8	2.0	1959	Highest
Ngawi	18.7	1.1	1972	Highest
Gisborne	21.1	1.6	1905	Highest
Wairoa	21.0	1.7	1964	Highest
Upper Hutt (Trentham)	18.3	1.2	1939	Highest
Ohakune	17.0	1.9	1962	Highest
Farewell Spit	19.0	1.4	1971	Highest
Blenheim	19.6	1.2	1932	Highest
Hanmer Forest	19.4	2.4	1906	Highest
Kaikōura	17.1	1.3	1963	Highest
Medbury	18.6	1.1	1927	Highest
Waiau	19.5	1.8	1974	Highest
Christchurch	18.2	1.3	1863	Highest
Tara Hills	17.0	1.2	1949	Highest
Ōamaru	16.6	1.1	1967	Highest
Dunedin (Musselburgh)	16.1	1.4	1947	Highest
Whakatāne	20.3	1.2	1974	2nd-highest
Motu	17.3	1.9	1990	2nd-highest
Trangi	18.1	1.0	1968	2nd-highest
Hicks Bay	19.2	1.2	1969	2nd-highest
Hastings	20.5	2.0	1965	2nd-highest
Porirua	17.5	0.6	1968	2nd-highest
Waipara West	18.9	0.8	1973	2nd-highest
Timaru	17.4	1.1	1885	2nd-highest
Ranfurly	16.6	1.5	1897	2nd-highest
Leigh	21.3	2.4	1966	3rd-highest
Napier	20.4	1.5	1870	3rd-highest
Puysegur Point	14.3	0.9	1978	3rd-highest
Dunedin (Airport)	17.0	1.0	1962	3rd-highest
Tiwai Point	15.0	1.0	1970	3rd-highest
Balclutha	16.1	0.8	1964	3rd-highest
South West Cape	13.5	0.8	1991	3rd-highest
Mokohinau	19.0	0.7	1994	4th-highest
Martinborough	19.0	1.0	1986	4th-highest
Mahia	17.9	0.8	1990	4th-highest
Palmerston North	18.7	1.0	1928	4th-highest
Hawera	17.1	0.7	1977	4th-highest
Akaroa	18.2	0.7	1978	4th-highest
Nugget Point	14.2	0.7	1970	4th-highest
Mean minimum temperature				

Aoraki / Mt Cook Village	4.6	1.0	1929	Highest
Lumsden	5.3	0.9	1982	Highest
Port Taharoa	12.6	1.0	1973	2nd-highest
Ngawi	12.1	0.8	1972	2nd-highest
Hawera	9.8	1.0	1977	2nd-highest
Brothers Island	12.1	0.6	1997	2nd-highest
Medbury	6.3	1.0	1927	2nd-highest
Five Rivers	5.2	0.8	1982	2nd-highest
Gore	6.3	0.8	1907	2nd-highest
Invercargill	6.6	1.1	1905	2nd-highest
Mahia	11.9	0.8	1990	3rd-highest
Porirua	9.9	0.2	1968	3rd-highest
Farewell Spit	11.6	1.4	1971	3rd-highest
Puysegur Point	9.3	0.8	1978	3rd-highest
Cape Campbell	11.3	0.6	1953	3rd-highest
Kaikōura	9.9	0.7	1963	3rd-highest
Culverden	6.4	1.3	1928	3rd-highest
Ōamaru	7.1	0.3	1967	3rd-highest
Dunedin (Musselburgh)	8.3	0.7	1947	3rd-highest
Roxburgh	6.7	2.0	1950	3rd-highest
Tiwai Point	7.8	0.6	1970	3rd-highest
South West Cape	8.6	0.9	1991	3rd-highest
Paraparaumu	10.0	0.7	1953	4th-highest
Wellington (Kelburn)	10.8	0.9	1927	4th-highest

During 2019 many high record and near-record extreme temperatures occurred. Most notably, several record and near-record high temperatures occurred during the last few days of January. Hanmer Forest reached 38.4°C on 31 January which was New Zealand's 18th-equal warmest temperature all-time. The lowest air temperature of the year was -9.2°C recorded at Lake Tekapo on 3 June. This was the lowest annual minimum temperature this decade.

Table 2: Near-record or record high or low annual temperature extremes for 2019.

Location	Temperature (°C)	Date of occurrence	Year records began	Comments
Highest extreme maximum temperatures				
Hanmer Forest	38.4	Jan-31st	1906	Highest
Waiau	37.8	Jan-31st	1974	Highest
Rotorua	32.2	Feb-13th	1964	Highest
Wellington (Kelburn)	30.3	Jan-29th	1928	Highest
Stratford	29.5	Jan-29th	1960	Highest
Lake Tekapo	35.0	Jan-31st	1925	Highest
Kaitaia	31.2	Jan-29th	1948	Highest
Hamilton (Airport)	32.0	Jan-29th	1946	Highest
Te Kuiti	33.3	Jan-29th	1959	Highest

Levin	32.6	Jan-29th	1895	Highest
Porirua	31.0	Jan-29th	1968	Highest
Upper Hutt (Trentham)	33.5	Jan-29th	1939	Highest
Ohakune	31.1	Jan-29th	1962	Highest
Medbury	37.9	Jan-31st	1927	Highest
Ranfurly	33.7	Jan-31st	1897	Equal highest
Paeroa	32.3	Feb-14th	1947	2nd-highest
Taumarunui	33.6	Jan-29th	1947	2nd-highest
Takaka	32.6	Jan-28th	1978	2nd-highest
South West Cape	27.0	Feb-13th	1991	2nd-highest
Whenuapai (Auckland)	30.3	Jan-29th	1945	2nd-highest
Whakatāne	32.3	Jan-6th	1975	2nd-highest
Taupō	32.9	Jan-29th	1949	2nd-highest
Richmond	33.8	Jan-27th	1862	2nd-highest
Te Puke	32.4	Feb-13th	1973	Equal 2nd-highest
Whitianga	31.7	Jan-11th	1962	Equal 2nd-highest
Waiouru	29.7	Jan-29th	1962	3rd-highest
Kerikeri	31.2	Jan-6th	1945	Equal 3rd-highest
Five Rivers	30.3	Dec-31st	1982	Equal 3rd-highest
Nelson	32.9	Jan-27th	1862	4th-highest
Blenheim	35.3	Jan-27th	1932	4th-highest
Ngawi	31.5	Jan-30th	1972	Equal 4th-highest
Lowest extreme maximum temperatures				
Balclutha	2.4	Aug-4th	1972	Lowest
Auckland (Western Springs)	9.0	Aug-18th	1971	2nd-lowest
Highest extreme minimum temperatures				
Milford Sound	19.1	Mar-26th	1935	Highest
Puysegur Point	19.6	Feb-10th	1978	Highest
Richmond	24.3	Jan-28th	1862	Highest
South West Cape	17.3	Feb-10th	1991	Highest
Ngawi	21.8	Feb-5th	1972	3rd-highest
Whitianga	21.2	Jan-30th	1971	Equal 3rd-highest
Balclutha	15.5	Mar-26th	1972	4th-highest
Martinborough	20.1	Mar-27th	1986	Equal 4th-highest
Medbury	21.5	Feb-1st	1927	Equal 4th-highest
Lowest extreme minimum temperatures				
Manapouri (West Arm Jetty)	-6.2	Jul-10th	1971	3rd-lowest

Section 6: Annual rainfall – a dry year for the North Island

2019 was a dry year for many parts of the North Island with below normal (50-79% of normal) rainfall recorded across Northland, Auckland and the Bay of Plenty as well as parts of Waikato, Hawke's Bay, the Wairarapa and Marlborough. Many locations observed record or near-record low rainfall amounts. Kaitaia, Whangārei, Hamilton, Masterton and the Auckland (Western Springs) site

all had their driest year on record. In Tauranga, where observations extend all the way back to 1898, it was the 4th-driest year on record.

Conversely, more westerly winds than normal mean that western Southland and parts of Westland observed above normal rainfall (120-149% of the annual normal). For Hokitika, it was the 4th-wettest year on record with records extending back to 1866. Milford Sound also had its 4th-wettest year on record (records began in 1929) with an astonishing 8,417 mm of rain recorded there in 2019. That's more than 20 times the rainfall observed in Cromwell and Clyde - New Zealand's driest locations for 2019 (417 mm of rain each) just 100 km away as the crow flies but on the leeward side of the Southern Alps. These large differences in New Zealand's rainfall occur due to the föhn effect[7] and are a striking feature of our climate.

Table 3: Record or near-record annual rainfall totals for the year 2019.

Location	Rainfall total (mm)	Percentage of normal	Year records began	Comments
High records or near-records				
Manapouri (West Arm Jetty)	5135	125	1971	2nd-highest
Manapouri (Airport)	1405	124	1961	3rd-highest
Hokitika	3517	121	1866	4th-highest
Milford Sound	8417	125	1929	4th-highest
Low records or near-records				
Kaitaia	910	65	1948	Lowest
Whangārei	755	54	1937	Lowest
Leigh	779	70	1966	Lowest
Auckland (Western Springs)	921	76	1948	Lowest
Hamilton (Airport)	853	71	1935	Lowest
Masterton	602	65	1926	Lowest
Dannevirke	721	70	1951	Lowest
Te Puke	1230	75	1973	2nd-lowest
Whatawhata	1212	75	1952	2nd-lowest
Hamilton (Ruakura)	871	78	1905	3rd-lowest
Dargaville	906	80	1943	4th-lowest
Auckland (North Shore)	919	76	1966	4th-lowest
Tauranga	787	66	1898	4th-lowest

There were no locations that experienced their record or near-record highest 1-day extreme rainfall in 2019.

Table 4: Record or near-record high extreme 1-day rainfall totals that occurred in 2019.

Location	1-day extreme rainfall (mm)	Date	Year records began	Comments
None observed				

[7] Watch NIWA's föhn wind explainer here: NIWA's https://www.youtube.com/watch?v=4AVMUIw2E_k

Section 8: 2019 climate in the six main centres

Five out of the six main centres observed above average temperatures during 2019 while only one (Auckland) had near average temperatures. Hamilton had its driest year on record, Tauranga its 4th-driest year and Auckland also had below normal rainfall. The remaining main centres had near normal rainfall. Of the six main centres in 2019, Tauranga was the warmest, Dunedin was the coolest, Wellington was the wettest, Christchurch was the driest, Auckland was the sunniest and Dunedin was the least sunny.

Table 5: 2019 climate in the six main centres.

Rainfall			
Location	**Rainfall (mm)**	**% of normal**	**Comments**
Auckland[a]	920	82%	Below normal
Tauranga[b]	787	66%	Well below normal (4th-lowest on record)
Hamilton[c]	853	71%	Well below normal (lowest on record)
Wellington[d]	1249[8]	103%	Near normal
Christchurch[e]	574	97%	Near normal
Dunedin[f]	712[9]	96%	Near normal
Temperature			
Location	**Mean temp. (°C)**	**Departure from normal (°C)**	**Comments**
Auckland[a]	15.8	+0.4	Near average
Tauranga[b]	16.0	+1.1	Above average (warmest on record)
Hamilton[c]	14.4	+0.8	Above average
Wellington[d]	13.6[9]	+0.7	Above average
Christchurch[e]	12.3	+0.7	Above average
Dunedin[f]	11.8	+0.7	Above average (equal 2nd-warmest on record)
Sunshine			
Location	**Sunshine (hours)**		
Auckland[a]	2496		
Tauranga[b]	2494		
Hamilton[g]	2245[10]		
Wellington[d]	2207		
Christchurch[e]	2285		
Dunedin[f]	208[10]		

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

[8] Missing 3 days of data
[9] Missing 1 day of data
[10] Missing 2 days of data

Section 9: Significant weather and climate events in 2019

This section contains information pertaining to some of the more significant weather and climate events that occurred in 2019. Note that a more detailed list of significant weather events for 2019 can be found in the *Highlights and extreme events* section of NIWA's Monthly Climate Summaries. These summaries are available online at http://www.niwa.co.nz/climate/summaries.

Drought and low rainfall

On 5 February, tinder-dry conditions in the Tasman region fuelled a large scrub fire in Pigeon Valley near Wakefield. The fire doubled in size overnight, spreading to cover 1870 hectares within a perimeter of 20 km by 3 a.m. on 6 February. A Civil Defence State of Emergency was declared which lasted until 27 February as firefighting efforts continued to work on hot spots, fight flareups and contain the fire. By 13 February, the wildfires had burned through 2300 hectares in the Nelson-Tasman region, destroyed one home, and led to evacuations of more than 1000 people. By 24 February, the fire was contained and controlled with a 30 m boundary black-out zone. It was reportedly the largest aerial firefight in New Zealand's history, with 23 helicopters and two planes used at the peak of the fire. Fire and Emergency New Zealand stated that the cost of the aircraft, ground machinery, and other firefighting resources had been $1 million a day for the first week of the fire.

At the end of February several dry spells came to an end. Nelson observed a 40-day dry spell which was the 4th-longest dry spell on record there (with records extending all the way back to 1862) while Hamilton and Tauranga had 36 consecutive dry days –their 3rd-longest dry spells on record. Auckland (Mangere) observed a 23-day dry spell which was the region's 9th-longest on record.

At the start of July, Watercare urged residents in Auckland to use water wisely, as the city's total water storage was down to 59.2%, 25% less than normal for the time of year.

Floods and high rainfall

Extremely heavy rainfall occurred in the western South Island on 25-27 March. The weather event was a mix of an 'atmospheric river[3]' extending from Australian cyclones coupled with extra energy from the Tasman Sea marine heatwave, as well as a strong low-pressure system siphoning moisture toward New Zealand. On 26 March, a State of Emergency was declared in Westland as torrential rainfall and strong winds battered the region and caused evacuations, power outages and road closures. The Waiho River bridge on SH6, the link between Franz Josef and Fox Glacier, was claimed by raging floodwaters. Haast River at Roaring Billy recorded a water level of 7.423 m, the 2nd-highest water level at the station since 1969 (highest 7.580 m in 1978). Between 25-27 March, a New Zealand 48-hour rainfall record was set at the Hokitika catchment of the Cropp River which recorded 1086 mm, or more than a metre of rain. That beat the previous New Zealand two-day record, also from Cropp River in December 1995, by about 40 mm.

On 29 April, heavy rain hit Christchurch and the Canterbury region. There were widespread reports of surface flooding in Christchurch city, with 27 streets affected. Heavy rain was thought to have triggered a slip on SH73 between Otira and Kumara Junction, forcing the temporary closure of one lane in the area.

On 30 May, rain flooded parts of SH6 which caused Westland District Council to activate its Emergency Operations Centre to monitor the situation. The Buller River reached its alarm point of 8.4 m at Te Kuha (village east of Westport) forcing SH6 at Inangahua Junction to close.

On 10 August, heavy rain fell in eastern parts of Otago and South Canterbury. Flooding forced the closure of SH1 between Ōamaru and Timaru.

On 10 September, heavy rain in the Coromandel Peninsula caused closures for sections of SH25 from Coromandel to Whitianga, Tairua to Whitianga and Tairua to Hikuai. Kuaotunu bore the brunt of the storm's damage and a large slip just south of Cemetery Rd in Kuaotunu caused a road closure until 12 September. Several local roads in Kuaotunu were also affected by flooding and slips, while garages, backyards and paddocks were fully submerged. Several people in Kuaotunu were displaced by flooding with some on standby to be evacuated.

During the first eight days of December, a stationary high to the northeast of New Zealand and low pressure to the southwest brought a prolonged period of northwesterly airflows over the country. These delivered persistent rainfall to the headwaters of the South Island lakes and rivers. Lake Wanaka and Lake Wakatipu rose considerably, inundating lakeside roads, tracks and reserves. Many Wanaka businesses sand-bagged their properties as floodwaters threatened buildings in the central business district.

On 7-8 December, heavy rain caused significant issues for many parts of the South Island and lower North Island. The Rangitata River rose rapidly due to heavy rain in the headwaters, causing extensive flooding in areas along the lower reaches of the river. A local State of Emergency was declared in the Timaru District due to flooding, and residents were evacuated from several areas including Rangitata Island and Rangitata Huts

Table 6: Record high monthly extreme 1-day rainfall totals were recorded in 2019 at:

Location	Extreme 1-day rainfall (mm)	Date of extreme rainfall	Year records began	Ranking
January				
None observed				
February				
None observed				
March				
Manapouri (West Arm Jetty)	140	25th	1971	Highest
April				
None observed				
May				
Akaroa	114	31st	1977	Highest
June				
None observed				
July				
Taupō	84	4th	1949	Highest

August				
Ōamaru	78	10th	1950	Highest
September				
None observed				
October				
Paeroa	148	14th	1914	Highest
November				
None observed				
December				
None observed				

Temperature extremes

From 27 January – 1 February a combination of warm seas, high pressure over the country and a hot airmass originating from Australia led to heatwave conditions across New Zealand. Several locations across the country observed record or near-record high daily maximum and minimum summer temperatures. The warmest temperature during the period was 38.4°C recorded in Hanmer Forest on 31 January. This was Hanmer Forest's highest temperature on record (data since 1906) and the 18th-equal warmest temperature on record for all months in New Zealand.

Several record or near-record high daily maximum and minimum temperatures were broken on 3-4 July as a mild air flow from the sub-tropics brought above average temperatures to most regions. Notably, Dunedin (Musselburgh) observed 20.3°C on 3 July which is the warmest July temperature since records began there in 1947. On the same day, a new July maximum temperature record of 17.6°C was set in Ranfurly, with records dating all the way back to 1897.

The first week of November saw unusually high temperatures nationwide. The heat was associated with a northwesterly airflow delivering warm and dry air from interior Australia. Several locations observed record or near-record high daily maximum temperatures for spring during this time. Most notable was Kawerau (Bay of Plenty), which recorded a maximum temperature of 34.6°C on 3 November. This was New Zealand's third-highest spring temperature on record.

Several locations across Southland and Otago observed one of their warmest December days on record on 31 December. In Ranfurly, the temperature reached 32.3°C, making it Ranfurly's highest December temperature since records began in 1897.

Table 7: Extremes of high daily maximum temperature in 2019 were recorded at:

Location	Extreme maximum (°C)	Date of extreme temperature	Year records began	Ranking
January				
Kaitaia	31.2	29th	1948	Highest
Whangaparaoa	29.4	29th	1982	Highest
Auckland (Whenuapai)	30.3	29th	1945	Highest
Whitianga	31.7	11th	1962	Highest
Whakatāne	33.3	28th	1975	Highest
Taupō	32.9	29th	1949	Highest

Whatawhata	32.2	29th	1952	Highest
Hamilton (Ruakura)	32.9	29th	1906	Highest
Hamilton (Airport)	32.0	29th	1946	Highest
Te Kuiti	33.3	29th	1959	Highest
Taumarunui	33.6	29th	1947	Highest
Levin	32.6	29th	1895	Highest
Porirua	31.0	29th	1968	Highest
Wellington (Kelburn)	30.3	29th	1928	Highest
Upper Hutt (Trentham)	33.5	29th	1939	Highest
Stratford	29.5	29th	1960	Highest
Ohakune	31.1	29th	1962	Highest
Waiouru	29.7	29th	1962	Highest
Takaka	32.6	28th	1978	Highest
Motueka	34.0	27th	1956	Highest
Appleby	32.6	28th	1932	Highest
Richmond	33.8	27th	1862	Highest
Brothers Island	27.0	29th	1997	Highest
Hanmer Forest	38.4	31st	1906	Highest
Medbury	37.9	31st	1927	Highest
Waiau	37.8	31st	1974	Highest
Lake Tekapo	35.0	31st	1925	Highest
Paeroa	31.9	29th	1947	Equal highest
Farewell Spit	29.0	29th	1971	Equal highest
Ranfurly	33.7	31st	1897	Equal highest
February				
Tauranga	31.6	13th	1913	Highest
Te Puke	32.4	13th	1973	Highest
Rotorua	32.2	13th	1964	Highest
Motu	30.0	15th	1990	Highest
Te Kuiti	32.1	14th	1959	Highest
South West Cape	27.0	13th	1991	Highest
March				
Whitianga	28.7	4th	1962	Highest
South West Cape	26.0	31st	1991	Highest
Paeroa	29.2	3rd	1947	Equal highest
April				
None observed				
May				
Arthurs Pass	17.6	6th	1973	Highest
June				
Arapito	20.3	13th	1978	Highest
Farewell Spit	18.1	14th	1971	Equal highest
July				
Porirua	17.4	24th	1968	Highest

Ranfurly	17.6	3rd	1897	Highest
Dunedin (Musselburgh)	20.3	3rd	1947	Highest
Manapouri (West Arm Jetty)	18.7	9th	1971	Highest
August				
Whitianga	20.8	11th	1962	Highest
Greymouth	19.4	11th	1947	Highest
September				
Ohakune	21.1	4th	1962	Highest
October				
Whangārei	25.6	27th	1967	Highest
Whangaparaoa	23.1	27th	1982	Highest
Whitianga	25.2	27th	1962	Highest
Te Puke	25.3	27th	1973	Highest
Whakatāne	28.2	27th	1975	Highest
Motu	26.3	27th	1990	Highest
Farewell Spit	24.0	26th	1971	Highest
Ranfurly	26.8	26th	1897	Highest
November				
Kaitaia	26.4	4th	1948	Highest
Kerikeri	29.4	4th	1945	Highest
Kaikohe	28.4	4th	1973	Highest
Whangārei	29.4	5th	1967	Highest
Mokohinau	23.6	5th	1994	Highest
Whitianga	30.9	4th	1962	Highest
Tauranga	29.2	3rd	1913	Highest
Te Puke	31.5	3rd	1973	Highest
Kawerau	34.6	3rd	1954	Highest
Rotorua	30.9	23rd	1964	Highest
Taupō	32.8	23rd	1949	Highest
Te Kuiti	29.2	25th	1959	Highest
Lower Retaruke	29.5	23rd	1966	Highest
Waipawa	29.5	5th	1945	Highest
Ohakune	27.8	3rd	1962	Highest
Hanmer Forest	32.5	28th	1906	Highest
Cheviot	33.1	3rd	1982	Highest
Waipara West	32.1	3rd	1973	Highest
Rangiora	31.7	28th	1965	Highest
Akaroa	31.1	3rd	1978	Highest
Le Bons Bay	26.9	3rd	1984	Highest
Lumsden	27.5	2nd	1982	Highest
Clyde	32.5	2nd	1978	Highest
Balclutha	28.6	2nd	1964	Highest
Hamilton (Airport)	28.3	7th	1946	Equal highest
Wairoa	34.1	27th	1964	Equal highest
Alexandra	32.2	2nd	1928	Equal highest
December				
Ranfurly	32.3	31st	1897	Highest
Five Rivers	30.3	31st	1982	Highest

Table 8: Extremes of low daily maximum temperature in 2019 were recorded at:

Location	Extreme low maximum (°C)	Date of extreme temperature	Year records began	Ranking
January				
None observed				
February				
Akaroa	12.3	24th	1978	Lowest
March				
None observed				
April				
None observed				
May				
None observed				
June				
None observed				
July				
None observed				
August				
Auckland (Western Springs)	9.0	18th	1971	Lowest
Haast	4.8	4th	1949	Lowest
Balclutha	2.4	4th	1972	Lowest
Nugget Point	1.2	4th	1972	Lowest
Campbell Island	0.8	13th	1991	Lowest
September				
Taupō	7.2	9th	1950	Lowest
Akaroa	6.1	8th	1978	Lowest
Hawera	8.3	8th	1977	Equal lowest
October				
None observed				
November				
None observed				
December				
None observed				

Table 9: Extremes of low daily minimum temperature in 2019 were recorded at:

Location	Extreme minimum (°C)	Date of extreme temperature	Year records began	Ranking
January				
None observed				
February				
Porirua	4.8	26th	1968	Lowest
Arapito	3.8	25th	1978	Lowest

March				
None observed				
April				
None observed				
May				
None observed				
June				
None observed				
July				
None observed				
August				
Greymouth	-3.1	4th	1947	Lowest
September				
Timaru (Airport)	-5.3	10th	1885	Lowest
October				
None observed				
November				
None observed				
December				
None observed				

Table 10: Extremes of high daily minimum temperature in 2019 were recorded at:

Location	Extreme high minimum (°C)	Date of extreme temperature	Year records began	Ranking
January				
Tauranga	21.6	30th	1941	Highest
Te Puke	20.4	29th	1973	Highest
Appleby	20.5	28th	1941	Highest
Richmond	24.3	28th	1862	Highest
Tara Hills	19.9	6th	1949	Equal highest
February				
Secretary Island	19.2	11th	1988	Highest
Puysegur Point	19.6	10th	1978	Highest
South West Cape	17.3	10th	1991	Highest
March				
Mahia	20.3	14th	1990	Highest
Farewell Spit	19.6	27th	1972	Highest
Milford Sound	19.1	26th	1935	Highest
Secretary Island	18.5	26th	1988	Highest
Cheviot	19.7	26th	1982	Highest
Ashburton	21.1	26th	1928	Highest
Le Bons Bay	19.7	26th	1984	Highest

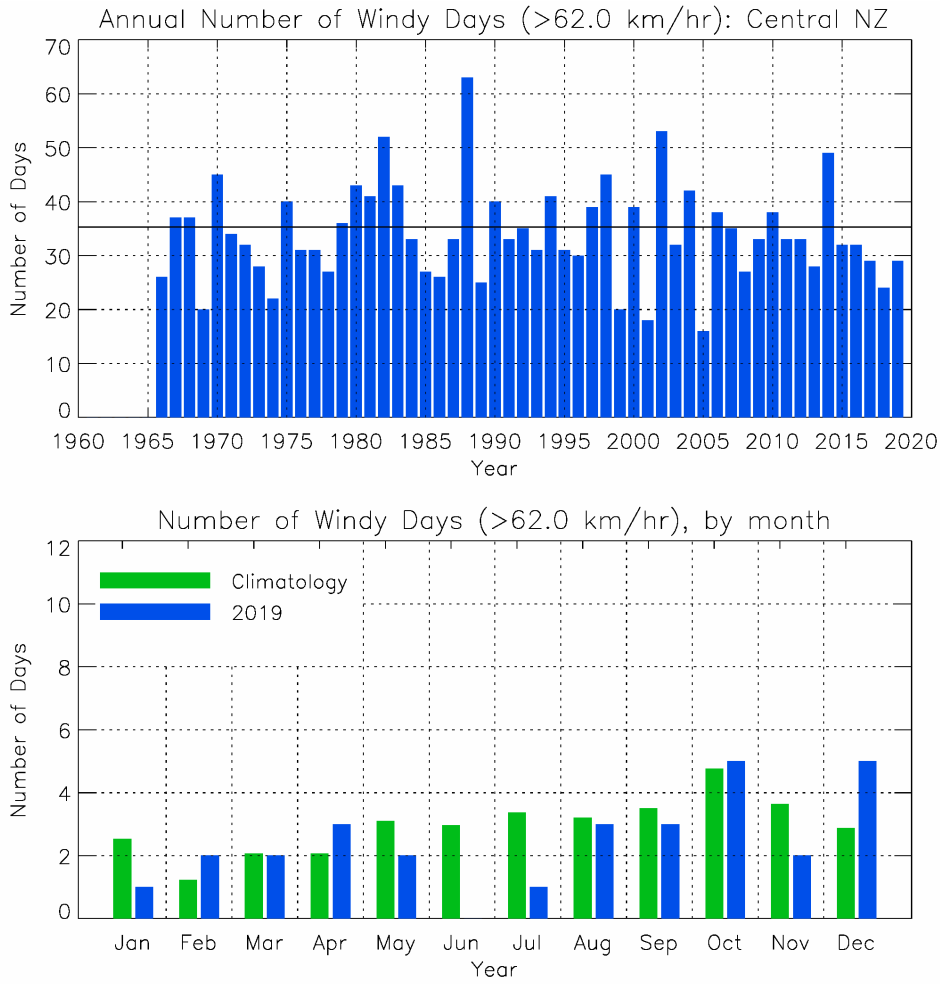
Ōamaru	16.8	26th	1972	Highest
Dunedin (Musselburgh)	17.9	6th	1947	Highest
Roxburgh	19.4	6th	1950	Highest
Porirua	18.8	27th	1972	Equal highest
Gore	17.9	6th	1907	Equal highest
April				
None observed				
May				
Porirua	15.6	11th	1972	Highest
Te Anau	13.5	5th	1973	Highest
June				
None observed				
July				
Cape Reinga	16.0	4th	1971	Highest
Kaitaia	17.0	4th	1948	Highest
Kerikeri	16.9	4th	1952	Highest
Kaikohe	15.6	4th	1973	Highest
Whangārei	16.7	4th	1967	Highest
Mokohinau	16.5	4th	1994	Highest
Whangaparaoa	15.3	4th	1982	Highest
Whitianga	16.2	4th	1971	Highest
Paeroa	14.8	4th	1971	Highest
Tauranga	16.0	4th	1941	Highest
Te Puke	15.3	4th	1973	Highest
Whakatāne	16.1	4th	1975	Highest
Rotorua	13.6	4th	1972	Highest
Taupō	12.6	4th	1950	Highest
Motu	11.7	4th	1990	Highest
Auckland (Mangere)	16.1	4th	1961	Highest
Pukekohe	14.7	4th	1969	Highest
Hicks Bay	15.9	4th	1972	Highest
August				
None observed				
September				
Cheviot	13.3	13th	1982	Highest
October				
None observed				
November				
Akaroa	20.5	28th	1978	Highest
Dunedin (Airport)	18.3	27th	1972	Highest
Motueka	16.7	8th	1972	Equal highest
December				
Five Rivers	20.5	30th	1982	Highest
Balclutha	18.1	30th	1972	Highest
Ngawi	20.5	31st	1972	Equal highest
Nugget Point	16.4	30th	1972	Equal highest

Strong winds

For 'central New Zealand' (between Auckland and Christchurch), for the year as a whole (and a 62km/hr threshold), 2019 continued a run of below-average windy years, being the fifth year in a row with the annual number of windy days below the 1981-2010 climatology[11].

In 2019, 29 days exceeded 62 km/hr (gale force) for the average 9 a.m. wind speed between Auckland and Christchurch (compared to the climatological number of 35.3 days).

The least windy months in 2019 were January, June and July, and the windiest months were October and December (with 5 days each exceeding the gale force threshold).



(Top) Annual number of 'windy days' for central New Zealand, 1966 to 2019, with horizontal line indicating the 1981-2010 average (35.3 days); (Bottom) Number of 'windy days' by month, comparing the months of 2019 (blue histogram) with the 1981-2010 average (green). The threshold of 62 km/hr corresponds to the Beaufort scale "gale force" wind.

[11] In these graphs, a 'windy day' is defined as one where the daily 9am pressure difference corresponds to a geostrophic wind speed exceeding a specified threshold (either westerly or easterly). Thus, it is a broad measure, and won't capture southerlies or local wind enhancements. The threshold selected in the following graphs is 62 km/hr. (Note: On the Beaufort wind scale, a mean speed of 62 km/hr or greater corresponds to Gale Force or greater). The wind index used is known as the "Z1 Index", representing the pressure gradient between Auckland and Christchurch, referred to as "Central NZ" in the figure below.

On 23 January, a strong southerly change caused damage to the electricity network across Queenstown Lakes and Central Otago and brought rain and cooler temperatures to the lower South Island. Downed trees and powerlines resulted in the loss of power for 4500 homes and/or businesses as well as road closures throughout the region. The maximum gust in Queenstown was 106 km/h and this was the equal highest wind gust on record there.

On 29 April, strong winds in eastern parts of Canterbury caused damage to the power network, especially about Banks Peninsula. Approximately 4000 homes were without power for a time.

On 15 May, flights were delayed out of Invercargill Airport and shipping containers were blown into Bluff Harbour as strong winds battered the region.

On 3-4 August, a combination of a deep low-pressure system and strong winds generated large swells along the western coasts of New Zealand. Coastal erosion of up to 10 m was reported in Cobden (Greymouth), where a make-shift sea wall had been erected. Residents of six properties in the coastal settlements of Hector and Ngakawau (north of Westport) self-evacuated, with one property inundated with seawater.

On 11 August, strong winds in Auckland tore part of the roof off The Cloud on Queen's Wharf. Ports of Auckland reported 20 shipping containers were knocked over by the wind.

On 14 October, almost 2000 homes and businesses were without power in the Coromandel Peninsula and Bay of Plenty where strong winds brought down trees and power lines. Additional downed trees and scattered power outages were reported in Northland and Auckland.

On 30 October, a southerly change moving up the South Island dislodged roofing tiles and solar panels and blew over a fence in Christchurch, as wind gusts approached 100 km/h. Fire and Emergency NZ also needed to clear multiple roads and remove trees that had fallen on houses. Orion reported about 1,300 customers without power in the Christchurch area.

On 3 December, strong winds forced the cancellation of approximately 40 flights to and from Wellington Airport.

Table 11. Maximum wind gust extremes in 2019 were recorded at:

Location	Maximum wind gust (km/hr)	Date of maximum wind gust	Year records began	Ranking
January				
Kaikōura	172	23rd	1972	Highest
Queenstown	106	23rd	1972	Equal highest
February				
Secretary Island	137	1st	1994	Highest
March				
None observed				
April				
None observed				
May				

Motu	109	13th	1991	Highest
June				
None observed				
July				
Secretary Island	130	7th	1994	Highest
August				
Secretary Island	161	2nd	1994	Highest
September				
Secretary Island	139	26th	1994	Highest
October				
Waiouru	115	19th	1970	Highest
South West Cape	182	4th	1991	Highest
Te Puke	61	24th	1987	Equal highest
November				
Clyde	96	22nd	1983	Highest
South West Cape	191	22nd	1991	Highest
December				
Te Puke	69	18th	1987	Highest
Napier	104	3rd	1973	Highest
Levin	93	8th	1971	Highest
Winchmore	100	4th	1970	Equal highest

Snow and ice

1 June, the first day of meteorological winter, started on a chilly note with snow falling in the South Island and in the Central Plateau. Arthur's Pass to Springfield (SH73) and Lewis Pass between Hanmer Springs and Springs Junction (SH7) were closed due to heavy snow. Two people were temporarily stuck in their car on a remote section of SH8 between Burkes Pass and Kimbell as rockfalls and snow closed main thoroughfares. Another vehicle was stranded for more than four hours in a snow-filled ditch on the highway between Geraldine and Fairlie in Canterbury.

On 4 August, snow fell to sea level in southern and western parts of the South Island, and to approximately 300 metres above sea level in Dunedin inland parts of Otago. Snowfall was reported in Greymouth, Hokitika, Kumara, Moana, Runanga and Serpentine Beach, which is a particularly uncommon occurrence in those places. The prevailing southwesterly flow during this event meant southern parts of Southland and South Otago received the heaviest snowfalls. There were a raft of road closures due to snow throughout the country from 4-5 August, including the Desert Road (SH1), Takaka Hill road (SH60), SH7 between Reefton and Springs Junction, the Lewis (SH7) and Lindis (SH8) Passes, the Crown Range road between Queenstown and Wanaka, Dunedin to Waitati highway (SH1), SH1 between Clinton and Milton, SH93 between Clinton and Mataura, SH8 from Milton to Lawrence and about Raes Junction, and the Milford Road (SH94).

Tornadoes and waterspouts

On 5 June, Northland recorded 3200 lightning strikes and a microburst caused damage in Coopers Beach in the Far North as roofs were ripped from buildings and caravans were flipped. One couple suffered minor injuries.

On 12 July, a tornado near New Plymouth caused damage to trees, two buildings, and a trampoline.

On 12 August, several tornadoes were reported in Taranaki. A trampoline hit a car on Devon Rd (SH3) just north of New Plymouth. On nearby Paraite Rd, 40-year-old trees were brought down with roofs torn off several buildings, and a woman suffered a broken collarbone after being blown into a wall. A tornado was observed in south Taranaki, causing damage to a power pole on Oeo Rd near Opunake. Later in the evening, a thunderstorm struck central Auckland's waterfront, with reports of a tornado there. Trees were shredded of their branches and metal construction fencing had been brought down. A shipping container was blown onto a car at Jellicoe Wharf, trapping and injuring the driver. Several yachts lost their moorings at Westhaven Marina, and a catamaran was overturned, with significant damage reported to numerous recreational vessels.

On 18 November, a tornado struck parts of Christchurch. Damage was reported from Sydenham to New Brighton, including roofing material being torn off buildings and severed vegetation. The storm briefly cut power to 1000 homes. As the severe thunderstorm moved offshore, waterspouts were reported over the ocean.

Lightning and hail

On 14 May, two houses were struck by lightning in Waianiwa, 18 km northwest of Invercargill, as an active front moved through the region. The occupants were home, but no one was injured.

On 31 May an Air NZ plane had to return to Auckland shortly after take-off as it was struck by lightning.

On 13 July, a family outside of Aranga, Northland was left shaken after their car windscreen was struck by a lightning strike. However, the family was left unharmed.

On 14 July, over 5500 lightning strikes were recorded over central New Zealand and two Air New Zealand flights, one from Wellington to Dunedin and one from Hamilton to Wellington were struck by lightning.

On 11 August, thundery weather brought strong winds and heavy rain to parts of Auckland. Five homes in St Heliers had damaged roofs, while a home in Kumeu was struck by lightning. Over 700 lightning strikes were recorded over western and inland parts of the upper North Island during a one-hour period during the evening.

On 26 September, hail pelted many parts of northern Canterbury. Nets were ripped and plants damaged by falling hail at a plant nursery on the outskirts of Amberley.

On 1 October a severe thunderstorm brought significant hail (up to 3 centimetres deep) to the Napier-Hastings portion of Hawke's Bay, where there was concern that some of the early grape crops may have sustained damage. One orchard owner described the hailstorm as "the heaviest in 20 years".

On 18 November, lightning and hail were reported in Christchurch. Lightning strikes were thought to have started four small fires in trees in Leeston, with another fire in the sand dunes at Waikuku Beach. Approximately 1100 lightning strikes were recorded over Christchurch city. Farther south,

considerable falls of hail were reported about Waimate, with local strawberry growers reporting some damage to their crops.

On 20 November, significant hail struck Timaru about midday. The thunderstorm associated with the hail travelled slowly north along the Canterbury plains during the early-to-mid afternoon, with 1500 lightning strikes recorded.

On 8 December, over 300,000 lightning strikes occurred around New Zealand and offshore waters associated with the passage of an active front. Lightning set trees on fire in Akatarawa (near Upper Hutt) and Martinborough. Farther south, lightning and hail struck Dunedin during the afternoon. Fire crews were called to fires in Green Island and Outram, which were believed to have been caused by lightning strikes. Lightning struck the Dunedin Airport power centre, knocking out the airfield lighting system temporarily.

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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 on-line. 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.