

## Very wet in Northland, dry for many remaining areas

<b>Rainfall</b>	Rainfall was well above normal (>149% of normal) or above normal (120-149% of normal) for Northland, western Otago and inland parts of Southland. Rainfall was below normal (50-79% of normal) or well below normal (<50% of normal) for parts of all remaining North Island regions, and much of the northern, eastern and inland areas of the South Island.
<b>Temperature</b>	Temperatures were above average (0.51-1.20°C above average) or near average ( $\pm 0.50^\circ\text{C}$ of average) for most of the country. Above average temperatures were mostly observed in central and northwestern parts of the South Island, and northern, western and southern parts of the North Island.
<b>Soil Moisture</b>	At the end of the month, soil moisture levels were lower than normal for eastern parts of Otago and Canterbury (south of Ashburton). Near normal soil moisture levels were typical for the remainder of the country.

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### Overview

July 2020 mean sea level air pressure was above normal from southern Australia through to the Southern Ocean, with lower than normal sea level pressure from, and especially southeast, of the South Island. This resulted in more westerly winds than normal for the North Island, and more southwesterly winds than normal across the South Island. However, there were episodes of east to northeast air flows, notably in mid-July. This was associated with very heavy rainfall for portions of the upper North Island, particularly in Northland which suffered significant flooding.

There were considerable spatial differences in monthly rainfall totals observed over the country in July. Rainfall was above normal (120-149% of normal) or well above normal (>149% of normal) for Northland, western Otago and inland parts of Southland. Most of Northland's rainfall occurred during the middle of the month, when a low-pressure system delivered very moist subtropical air to the region. The relatively high rainfall totals observed in western Otago and inland parts of Southland may be partly attributed to more frequent southwesterly winds observed there during the month. In contrast, rainfall was below normal (50-79% of normal) or well below normal (<50% of normal) for many remaining areas of the country. Apart from Northland, parts of all North Island regions observed below normal rainfall, with well below normal rainfall in Wellington. Rainfall was also well below

normal in Marlborough, eastern and inland parts of Canterbury, and North Otago. It was especially dry in Timaru where just 5 mm of rain (10% of the July average) was recorded. Tasman, Nelson, and eastern parts of Central Otago observed below normal rainfall for the month. By the end of July, soils were drier than normal in eastern parts of Otago and southern Canterbury, especially about Timaru. Soil moisture levels were typically near normal for remaining parts of the country.

It was a relatively mild July for most of the country. Temperatures were above average (0.51-1.20°C above average) in central and northwestern parts of the South Island, and southern, western and northern parts of the North Island. Temperatures were typically near average ( $\pm 0.50^\circ\text{C}$  of average) for Hawke's Bay, Wairarapa, Kapiti Coast, as well as western and coastal parts of Otago and Southland. Overall, the nationwide average temperature in July 2020 was 8.6°C. This was 0.8°C above the 1981-2010 July average, making it New Zealand's eleventh-warmest July since NIWA's seven station temperature series began in 1909. It has now been 42 consecutive months since New Zealand's nationwide average temperature was below average.

#### Further Highlights:

- The highest temperature was 20.0°C, observed at Whangarei on 16 July and Kaitaia on 18 July.
- The lowest temperature was -8.9°C, observed at Tara Hills (Omarama) on 16 July and Middlemarch on 18 July.
- The highest 1-day rainfall was 262 mm, recorded at Kaikohe on 17 July.
- The highest wind gust was 191 km/h, observed at Cape Turnagain on 23 July.
- Of the six main centres in July 2020, Auckland was the warmest, Wellington was driest and sunniest, Hamilton was the wettest, Christchurch was the coldest, and Dunedin was the least sunny.
- Of the available, regularly reporting sunshine observation sites, the sunniest four areas in 2020 so far are Bay of Plenty (1583 hours), Greater Nelson (1529), Taranaki (1520 hours) and Marlborough (1456 hours).

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### **Rainfall: A wet month for Northland but dry for many other areas**

It was a wet July throughout Northland, with near-record high rainfall totals observed in Kaikohe, Kerikeri and Whangarei. It marks the third consecutive month of high rainfall for these parts, after a prolonged period of dry conditions. In the six months from November 2019 to April 2020, Whangarei recorded 233 mm of rainfall. In the subsequent three months, the city has recorded 843 mm of rain. July was also wet in Wanaka and Queenstown, where total rainfall was 213% and 198% of normal, respectively. Much of this precipitation fell at marginal temperatures for the Southern Lakes ski areas; higher elevations received ample snowfall, but lower elevations occasionally suffered rainfall.

In contrast, it was a dry month for many remaining parts of the country. It was especially dry in parts of north Otago, eastern Canterbury (Winchmore and Akaroa) and Marlborough where rainfall was about 10-25% of normal for the time of year.

**Record<sup>1</sup> or near-record July rainfall totals were recorded at:**

Location	Rainfall total (mm)	Percentage of normal	Year records began	Comments
<b>High records or near-records</b>				
Kerikeri	459	224	1935	2nd-highest
Kaikohe	489	259	1956	2nd-highest
Whangarei	452	267	1937	3rd-highest
<b>Low records or near-records</b>				
Akaroa	32	24	1977	2nd-lowest
Winchmore	10	15	1909	3rd-lowest
Wellington (Airport)	34	30	1958	4th-lowest

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## Temperature: A mild month throughout the country

July 2020 temperatures were mild for most of New Zealand, with relatively few record mean, mean maximum and mean minimum temperatures observed. New Zealand’s warmest location compared to normal was Lake Tekapo. The mean temperature there was 3.1°C, which is 1.5°C warmer than average. The nationwide average temperature in July 2020 was 8.6°C. This was 0.8°C above the 1981-2010 July average, making it New Zealand’s eleventh-warmest July since NIWA’s seven station temperature series began in 1909.

Inland parts of the South Island observed a tranquil spell of weather in mid-July allowing an inversion to form. An inversion is when the air temperature near the ground warms with increasing elevation, instead of cooling with increasing elevation (as is typically the case). This acts like a ‘lid’ in the atmosphere, trapping moisture and pollutants. Residents of inland Otago and Canterbury will be familiar with inversions in winter – these events are characterised by persistent cold temperatures and are often accompanied by a thick layer of low cloud, with consecutive days without sunshine. Although inversions can bring dour weather to low elevation areas, conditions can be conducive to the formation of [hoar frost](#), and those lucky enough to be skiing enjoy bright sunshine on the mountains high about the valley cloud.

From 14-19 July, Cromwell experienced six consecutive days under an inversion. The daily mean temperature during this time was -0.6°C, with extreme minimum and maximum temperatures ranging from -6.4°C to 2.4°C, respectively. The town received a meagre total of 1.2 hours of sunshine over the six-day period; this was observed between 3-5 p.m. on 17 July. This cold and cloudy spell in Cromwell

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<sup>1</sup> The rankings (1st, 2nd, 3rd.etc) in all Tables in this summary are relative to climate data from a group of nearby stations, some of which may no longer be operating. The current climate value is compared against all values from any member of the group, without any regard for homogeneity between one station’s record, and another. This approach is used due to the practical limitations of performing homogeneity checks in real-time.

was offset by conditions experienced there over the remainder of the month. Both July mean temperature (3.0°C, 0.2°C below the July average) and total sunshine (100 hours, 102% of normal July sunshine) were close to usual for Cromwell overall.

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

Location	Mean air temp. (°C)	Departure from normal (°C)	Year records began	Comments
<b>High records or near-records</b>				
Medbury	6.6	1.7	1927	3rd-highest
<b>Low records or near-records</b>				
None observed				

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

Location	Mean maximum air temp. (°C)	Departure from normal (°C)	Year records began	Comments
<b>High records or near-records</b>				
Te Kuiti	14.9	1.4	1959	3rd-highest
Porirua	13.5	1.1	1968	3rd-highest
Takaka	14.4	1.1	1978	3rd-highest
Appleby	14.1	1.3	1932	3rd-highest
Arapito	14.1	1.0	1978	4th-highest
Greymouth	13.2	1.1	1947	4th-highest
<b>Low records or near-records</b>				
None observed				

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

Location	Mean minimum air temp. (°C)	Departure from normal (°C)	Year records began	Comments
<b>High records or near-records</b>				
Kerikeri	8.5	1.4	1945	4th-highest
Medbury	1.1	2.0	1927	4th-highest
<b>Low records or near-records</b>				
None observed				

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## July climate in the six main centres

When comparing July mean temperature to normal, our six main centres were remarkably similar. Specifically, mean temperatures were 0.6-0.7°C higher than normal for all main centres. Also, unusually similar were sunshine totals, which ranged from 114-119 hours at five of the main centres. The exception was Wellington, where the July sunshine total of 148 hours was at least 29 hours higher than the remaining main centres. Wellington's total rainfall of 59 mm was just 43% of normal for the time of year. For 2020 so far, Auckland has received just 60% of its usual January-July rainfall. Of the six main centres in July 2020, Auckland was the warmest, Wellington was driest and sunniest, Hamilton was the wettest, Christchurch was the coldest, and Dunedin was the least sunny.

### July 2020 main centre climate statistics:

Temperature			
Location	Mean temp. (°C)	Departure from normal (°C)	Comments
Auckland <sup>a</sup>	11.6	+0.7	Above average
Tauranga <sup>b</sup>	10.9	+0.6	Above average
Hamilton <sup>c</sup>	9.3	+0.6	Above average
Wellington <sup>d</sup>	9.6	+0.7	Above average
Christchurch <sup>e</sup>	6.4	+0.6	Above average
Dunedin <sup>f</sup>	7.2	+0.7	Above average
Rainfall			
Location	Rainfall (mm)	% of normal	Comments
Auckland <sup>a</sup>	94	69	Below normal
Tauranga <sup>b</sup>	85	66	Below normal
Hamilton <sup>c</sup>	106	82	Near normal
Wellington <sup>d</sup>	59	43	Well below normal
Christchurch <sup>e</sup>	67	103	Near normal
Dunedin <sup>f</sup>	70	123	Above normal
Sunshine			
Location	Sunshine (hours)		
Auckland <sup>a</sup>	116		
Tauranga <sup>b</sup>	118		
Hamilton <sup>g</sup>	116		
Wellington <sup>d</sup>	148		
Christchurch <sup>e</sup>	119 <sup>2</sup>		
Dunedin <sup>f</sup>	114		

<sup>a</sup> Mangere <sup>b</sup> Tauranga Airport <sup>c</sup> Hamilton Airport <sup>d</sup> Kelburn <sup>e</sup> Christchurch Airport <sup>f</sup> Musselburgh <sup>g</sup> Ruakura

<sup>2</sup> Missing one day of data.

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## Highlights and extreme events

### Temperatures

During the middle stages of the month, an inversion developed over many areas of the South Island, bringing persistent cold temperatures which were notably cool during daylight hours. The maximum temperature at Tiwai Point (near Invercargill) on 17 July was just 2.3°C, making it the coldest July day there since records began in 1972. The temperature stayed below freezing throughout 17 July in Lauder, reaching a maximum of just -2.8°C.

From 18-20 July, a warm northerly airflow covered many parts of the North Island, with several locations observing record or near-record high daily maximum temperatures. The warmth was notably widespread in Taranaki: on 20 July New Plymouth, Stratford and Hawera observed their highest or equal second-highest July temperature on record, respectively.

The highest temperature was 20.0°C, observed at Whangarei on 16 July and Kaitaia on 18 July. The lowest temperature was -8.9°C, observed at Tara Hills (Omarama) on 16 July and Middlemarch on 18 July.

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

Location	Extreme maximum (°C)	Date of extreme temperature	Year records began	Comments
<b>High records or near-records</b>				
Te Kuiti	19.3	19th	1959	Highest
New Plymouth	18.2	20th	1944	Highest
Porirua	17.6	20th	1968	Highest
Stratford	18.3	19th	1960	Highest
Arapito	19.0	18th	1978	Equal highest
South West Cape	16.0	29th	1991	Equal highest
Hamilton (Ruakura)	19.6	18th	1906	2nd-highest
Hawera	17.8	20th	1977	Equal 2nd-highest
Wellington (Airport)	17.3	20th	1962	3rd-highest
Greymouth	17.8	16th	1947	3rd-highest
Matamata	19.0	18th	1999	4th-highest
Levin	18.6	20th	1895	4th-highest
Port Taharoa	18.2	19th	1973	Equal 4th-highest
<b>Low records or near-records</b>				
Tiwai Point	2.3	17th	1972	Lowest
Lumsden	-0.3	16th	1982	3rd-lowest

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

Location	Extreme minimum (°C)	Date of extreme temperature	Year records began	Comments
<b>High records or near-records</b>				
Roxburgh	9.9	31st	1950	Equal highest

South West Cape	11.1	31st	1991	2nd-highest
Kaitaia	15.2	19th	1948	Equal 2nd-highest
Secretary Island	11.8	30th	1988	3rd-highest
Gore	8.7	30th	1907	Equal 4th-highest
Balclutha	7.6	7th	1972	Equal 4th-highest
<b>Low records or near-records</b>				
Matamata	-4.7	3rd	1999	Equal 2nd-lowest

### Rain and slips

On 2 July, heavy rain caused surface flooding in parts of Masterton, with slips reported on rural roads near Castlepoint.

On 6 July, a boil water notice was issued for Coromandel Town. The local water treatment plant was unable to operate effectively due to heavy rain resulting in very dirty incoming water.

In mid-July, rain was recorded on at least seven consecutive days in many parts of Hawke's Bay, with heavy falls and high rainfall totals reported about the inland ranges of the region. The rainfall was welcomed by many farmers, contributing to grass growth that was reportedly better than usual for the time of year.

On 16 July, a driver was rescued from the roof of their Ute after becoming trapped in floodwaters at Falls Road, Warkworth.

On 17 July, very heavy rain and thunderstorms hammered much of Northland. Civil Defence welfare centres were activated as people were forced to leave their homes due to flooding. Approximately 65 homes were evacuated, and four of these homes were left uninhabitable due to damage sustained by floodwaters. Police advised against non-essential travel throughout Northland due to widespread and considerable flooding, particularly about Whangarei. Many businesses in Whangarei's CDB were flooded causing considerable clean-up costs. Whangarei (Airport) observed 50.8 mm of rain in the hour between 9-10 p.m., which was the city's second-highest hourly rainfall total for all months on record (records began 1978). Several road closures resulted from the heavy rain and floods, including SH1 between Ohaeawai and Kawakawa. A large slip on SH1 through the Mangamuku Gorge resulted in the closure of that section of road for several days. Heavy rain also fell over the Coromandel Peninsula causing widespread flooding and road closures. Two people were rescued after driving into floodwaters on Hikuia Settlement Road (near Pauanui).

On 18 July, heavy rain caused flash flooding and slips in the Gisborne region. Three families were evacuated from Mangatokerau (north of Gisborne), and SH35 was closed from Tolaga Bay to Makarika Road (just south of Ruatoria). The beach at Tolaga Bay was blanketed in forestry slash which had been washed down from inland areas by rivers.

On 21 July, heavy rain caused surface flooding on some Queenstown roads, with rockfalls reported on the Queenstown-Glenorchy road, the Crown Range road and SH6 between Frankton and Kingston.

The highest 1-day rainfall was 262 mm, recorded at Kaikohe on 17 July.

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

Location	Extreme 1-day rainfall (mm)	Date of extreme rainfall	Year records began	Comments
Kerikeri	175	17th	1945	Highest
Kaikohe	262	17th	1956	Highest
Whangarei	251	17th	1943	Highest
Hicks Bay	101	16th	1916	Highest
Kaitaia	91	17th	1948	2nd-highest
Nugget Point	33	6th	1930	3rd-highest

### Wind

On 2 July, strong southerly winds brought down several trees in the Wellington suburbs of Khandallah, Karori and Vogeltown. Wellington's *East by West* ferry services were cancelled due to large swells driven by the strong winds, and Cook Strait ferry crossings were also cancelled. The strong winds blew down power lines in Wainuiomata, while a tree was brought down onto power lines in Naenae. Farther north, 90 customers near Martinborough were without power due to downed power lines.

On 15 July, strong winds toppled trees in parts of Northland, with firefighters called out 16 times for downed trees between 6:30-8:40 p.m. A car hit a fallen tree on Mangakahia Road in Kaikohe.

On 16 July, trees were felled by strong winds on the Hauraki Plains, with arching power lines reported in Onewhero. Approximately 150 homes were without power, including 86 homes in Te Aroha.

On 22 July, strong winds brought down trees and damaged power lines in southern and western parts of Auckland.

The highest wind gust was 191 km/h, observed at Cape Turnagain on 23 July.

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

Location	Extreme wind gust (km/h)	Date of extreme gust	Year records began	Comments
Hanmer Forest	106	9th	1995	2nd-highest
Te Puke	70	8th	1987	Equal 2nd-highest
Pukekohe	76	22nd	1986	Equal 3rd-highest
Dannevirke	93	23rd	1961	Equal 3rd-highest
Paeroa	100	16th	1991	4th-highest
Port Taharoa	111	22nd	1978	4th-highest
Secretary Island	124	23rd	1994	4th-highest

### Snow and ice

On 2 July, snow fell to low elevations in the central North Island. Several roads were closed due to snow, including the Desert Road (SH1), SH46 from Rangipo to the SH47 junction, and SH47 from National Park to the SH41 junction near Turangi.



On 21 July, black ice was reported on SH85 from Kyeburn to Palmerston, and SH87 from Outram to Kyeburn.

On 23 July, snow settled down to around 200 metres above sea level in southeastern parts of the South Island, especially near Balclutha. Snow was also reported in the hill suburbs of Dunedin. The Southland District Council urged extreme caution on roads in the southeast of the province, especially around Edendale, Wyndham, Glenham and the Catlins due to slushy road conditions. A bus rolled onto its side near Glenham (south-east of Gore), with the driver taken to hospital. Snow fell to around 400 metres above sea level near Queenstown. Chains were required on vehicles travelling over the Crown Range Road. The Milford Road (SH94) was closed due to heavy snow.

### **Lightning and hail**

On 17 July, approximately 500 lightning strikes were recorded near Northland. They were associated with thunderstorms that delivered heavy downpours of rain to the region.

### **Cloud and fog**

Low cloud persisted in many inland basins of the South Island during the second week of the school holidays (13-19 July). The cloud was trapped under an inversion, resulting in consecutive days without sunshine in areas including Wanaka, Cromwell, Alexandra and the Mackenzie Basin. Cold air was trapped near the valley floors by the inversion, and combined with the humid air to create hoar frost (see example picture below). In many parts, daytime temperatures barely rose above freezing (0°C).

On 16 July, three flights were unable to land at Invercargill Airport due to fog.



**Hoar frost in the Mackenzie Basin.** Picture taken alongside Lake Ohau Rd (south of Twizel and west of SH8), on 19 July 2020 at 11 a.m. *Credit: Thom Ibbotson*

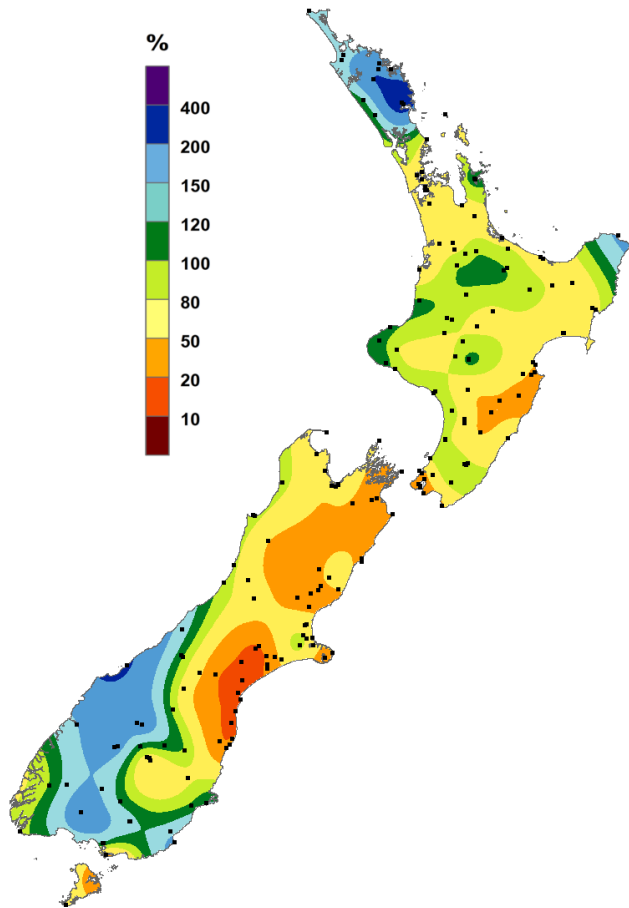
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July 2020 rainfall expressed as a percentage of normal (1981-2010 July normal).

It was a wet month in Northland, as well as southern and western parts of the South Island, as indicated by the blue colours. Much of Northland's rainfall fell during a short period in the middle of the month, resulting in considerable flooding there.

In contrast, it was a dry month for many areas, as indicated by yellow and orange colours.

Note: black dots indicate stations with data available for the generation of this map. As a result, the map accuracy may be constrained by the both the number and location of contributing stations. We are aware of considerable rainfalls that occurred in the ranges of Hawke's Bay during July 2020 – this isn't apparent in the month's rainfall anomaly map presented here.

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

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