

National Climate Summary – July 2007: A month of extremes and contrasts – severe floods; numerous damaging tornadoes and destructive winds in the north; ice and severe frost in the south

- **Rainfall: Well above normal in the north and east of the North Island, and coastal South Canterbury and Otago; below normal in the north and west of the South Island**
- **Temperature: Below average in the lower South Island; above average throughout much of the North Island**
- **Sunshine: Above average in the west and south of the South Island; below average in the east of the North Island**
- **Wind: Easterly gales in the north, but quieter in the south**

July 2007 was a month of extremes and contrasts with depressions (lows) often tracking over or to the north of the North Island. These produced floods and at least twice the normal July rainfall in parts of Northland (more than 400 mm in places), Hawke's Bay, coastal South Canterbury and Otago, damaging windstorms to Northland, Auckland, and the Coromandel, and thunderstorms and tornadoes to Taranaki, Auckland, and Bay of Plenty. In contrast, calm conditions in the south, often with periods of freezing fog, produced dry, cold and very icy conditions during the first three weeks of July to the southern half of the South Island.

The national average temperature of 8.1 °C was 0.2 °C above normal. However this belies the north/south contrast with mean temperatures at least 1.0 °C below average over much of the southern half of the South Island. Freezing conditions existed for much of July in Central Otago and inland Southland. At Lauder (Central Otago), air temperatures were constantly below zero from July 12th to 21st, and there were 13 days from July 7 to 22 with minimum air temperatures below -10.0 °C. In contrast, temperatures were at least 0.5 °C above average throughout much of the North Island. Rainfall was double normal in Hawke's Bay, parts of Northland, and the South Canterbury–Otago coast, but was 50 percent (half) or less of average in the north and west of the South Island. July was very sunny in inland South Island areas not affected by fog, as well as coastal Otago and north Westland, but rather cloudy in the east of the North Island.

These extremes and contrasting patterns were formed by much more frequent depressions ('lows') in the central Tasman Sea and over northern New Zealand, and anticyclones ('highs') in the southern Tasman Sea and over southern New Zealand. These produced more easterly winds over the South Island and more northeasterlies over much of the North Island. The mainly easterly anomaly over New Zealand as a whole was the strongest for July since 2001. Five depressions tracked across the North Island during the month (on the 6th, 9-12th, 15-18th, 20-21st, and 30-31st).

Taranaki Tornadoes

A depression west of the North Island on 4 – 5 July with unstable northwesterlies produced thunderstorms and swarms of damaging tornados in Taranaki. Tornadoes producing severe damage in Taranaki occur on average once in four years, however, this is a statistical average and they occasionally occur in clusters. The episode of 4–5 July 2007 was the first time that a swarm of at least seven or more damaging tornadoes has been recorded in New Zealand, all within a 24 hour period. Another small tornado occurred on 31 July. The estimated damage is \$7 million.

Northland Storms

Gale easterlies and heavy rainfall, due to a deep depression with an intense pressure gradient, tracked across the north of the North Island, producing widespread severe flooding, property, infrastructure damage and stock losses throughout much of Northland on the 10th. Winds gusted as high as 180 km/h on the offshore island of Tititiri Matangi, with 254 mm of rain in 12 hours in Kaeo. On average, gusts this high from the east only occur about once every 20 years. The estimated damage is \$60 million.

Hawke's Bay Floods

Major flooding, due to moist easterly conditions, occurred in parts of Hawke's Bay, particularly near

Hastings on the 17th, with further heavy rainfall resuming on the 18th. As much as 300 mm of rain fell in a 48 hour period at a few locations.

South Canterbury–Otago Floods

More flooding, also due to moist easterly conditions, occurred in south Canterbury and Otago on the 30th, affecting roads and houses. Dunedin received more than a month's rainfall within 24 hours. As much as 110 mm was reported at Morven, and over 100 mm in North and East Otago. High rainfall and slips also affected parts of Stewart Island.

Further Highlights:

- The highest temperature during July 2007 was 20.4 °C recorded at Gisborne Airport on the 1st and in Christchurch on the 26th.
- The lowest air temperature during the month was -15.4 °C recorded at Lauder on the 18th, the lowest there since July 1995. Many other inland South Island locations recorded minimum air temperatures below -10.0 °C during July, often accompanied by freezing fog and treacherous ice.
- Several damaging tornadoes affected parts of the north (Auckland and Tauranga) and west of the North Island. Damage was particularly severe in parts of Taranaki over 4-5 July. The first tornado affected New Plymouth's central business district, lifting a large part of the roof off a major hardware store and destroying a wall. Other shops and houses were also damaged, along with cars. Trees were uprooted and signs destroyed. On the 5th, multiple tornadoes affected Taranaki resulting in the declaration of a state of emergency. The township of Oakura was severely affected, with a substantial number of houses damaged. Other towns such as Opunake, Motunui, Stratford, Hawera, Normanby, Oakiawa, Egmont Village, Inglewood, Waitara, Urenui, and Pungarehu were also affected. Another, although small, tornado occurred in Brixton, near New Plymouth, on the 31st, tipping a truck and trailer unit on its side, and tearing roofing iron off and crumpling a building's large roller doors.
- A state of emergency was declared on the 10th in the far north as gale easterlies and heavy rainfall produced widespread severe flooding and landslips throughout much of Northland. Thousands of residents were without phones and electricity, and some had to evacuate. The town of Kaeo was worst hit, and Whangarei was completely blocked off by floodwaters and slips. The same weather system produced damaging winds in Northland, Auckland, and Coromandel which resulted in fallen trees, broken power lines, and other damage. More than 140,000 people were without electricity throughout Northland, Auckland, and the Coromandel. A wind gust as high as 180 km/h was recorded on the offshore island of Tititiri Matangi and 148 km/h at Mokohinau Island, north of Auckland, during this event.
- Major flooding also occurred in parts of Hawke's Bay, particularly near Hastings on the 17th, with further heavy rainfall resuming on the 18th, and along the south Canterbury–Otago coast on the 30th.
- Of the five main centres, Auckland was the warmest, and Christchurch was the coldest and driest. Dunedin was the sunniest of the main centres.

Temperature: Mean temperatures were more than 1.0 °C below average in north and Central Otago, and inland Southland, and also below average in south Canterbury, and areas along the Otago-Southland coast. In contrast, mean temperatures were at least 1.0 °C above average in parts of Northland, Thames-Coromandel, Waikato, and Gisborne, and also above average throughout most other North Island regions. The national average temperature was 8.1 °C (0.2°C above normal).

Rainfall: Rainfall totals were at least 200 percent (twice) of normal in parts of Northland, Hawke's Bay, and coastal areas of South Canterbury and Otago, and also above normal throughout Thames-Coromandel. In contrast, rainfall was less than 50 percent (half) of normal in throughout much of the north and west of the South Island.

Sunshine: July sunshine hours and/or solar radiation were more than 120 percent of normal in north Westland, inland south Canterbury, and coastal Otago, and also above normal in other parts of Otago and Southland. In contrast, sunshine hours were below normal in the east from Gisborne to Marlborough.

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TEMPERATURE: BELOW AVERAGE IN THE LOWER SOUTH ISLAND, ABOVE AVERAGE THROUGHOUT MUCH OF THE NORTH ISLAND

Mean temperatures were more than 1.0 °C below average in north and Central Otago, and inland Southland, and at least 0.5 °C below average in south Canterbury, and areas along the Otago-Southland coast. In contrast, mean temperatures were at least 0.5 °C above average throughout much of the North Island, and more than 1.0 °C above average in parts of Northland, Thames-Coromandel, Waikato, the central North Island volcanic plateau, and Gisborne. The national average temperature was 8.1 °C (0.1 °C above normal).

Low July mean air temperatures were recorded at:

Location	Mean air temperature (°C)	Departure from normal	Year records began	Comments
Mt Cook Village	0.8	-1.4	1929	Well below normal
Lauder	-1.0	-2.3	1963	3 rd lowest
Campbell Island	3.5	-1.5	1941	Well below normal

High July mean air temperatures were recorded at:

Location	Mean air temperature (°C)	Departure from normal	Year records began	Comments
Pareoa	11.1	+1.6	1947	Well above normal
Hamilton Airport	10.0	+1.5	1971	Equal 3 rd highest
Palmerston North Airport	9.8	+1.5	1962	3 rd highest
Raoul Island	17.6	+1.2	1940	Equal 2 nd highest

RAINFALL: WELL ABOVE NORMAL IN THE NORTH AND EAST OF THE NORTH ISLAND, COASTAL SOUTH CANTERBURY AND OTAGO; BELOW NORMAL IN THE NORTH AND WEST OF THE SOUTH ISLAND

Rainfall totals were at least 200 percent (twice) of normal in parts of Northland, Hawke’s Bay, and coastal areas of South Canterbury and Otago, and at least 125 percent of normal throughout Thames-Coromandel. In contrast, rainfall was less than 50 percent (half) of normal in throughout much of the north and west of the South Island, and near normal in most other regions.

Near or record high July rainfall was recorded at:

Location	July Rainfall (mm)	Percentage of normal	Year records began	Comments
Kerikeri EWS	389	222	1982	Highest
Whangarei Airport	456	281	1937	2 nd highest, 498 mm in 1946
Whitianga Airport	401	188	1991	2 nd highest, 658 mm in 1998
Napier Airport	246	293	1951	Highest
Middlemarch	89	266	1916	Highest
Dunedin Airport	110	223	1963	3 rd highest
Dunedin, Musselburgh	122	182	1918	Well above normal

SUNSHINE: WELL ABOVE AVERAGE IN THE SOUTH AND WEST OF THE SOUTH ISLAND, BELOW AVERAGE IN THE EAST OF THE NORTH ISLAND

July sunshine hours and/or solar radiation were more than 120 percent of normal in north Westland, inland south Canterbury, and coastal Otago, and at least 110 percent of normal in other parts of Otago and Southland. In contrast, sunshine hours were below normal in the east from Gisborne to Marlborough.

High July sunshine hours were recorded at:

Location	July Sunshine (hrs)	Percentage of normal	Year records began	Comments
Hokitika Airport	148	122	1964	Well above normal
Lake Tekapo	136	125	2003	Well above normal
Dunedin, Musselburgh	128	126	1948	Well above normal

JULY'S CLIMATE IN THE FIVE MAIN CENTRES

Auckland was the warmest, Christchurch was the coldest and driest, and Dunedin the sunniest of the five main centres. Rainfall was near normal in Christchurch, and above normal in the four other main centres. Temperatures were above normal in Auckland and Hamilton, near normal in Christchurch, and below normal elsewhere. Sunshine hours were well above normal in Dunedin, near normal in Hamilton, and below normal in the three other main centres.

July 2007 main centre climate statistics:

Location	July mean temp. (°C)	Dep. from normal (°C)		July rainfall (mm)	% of normal		July Sunshine (hours)	% of normal	
Auckland	11.8	+0.9	Above normal	190 ^a	130	Above normal	124	95	Below normal
Hamilton	10.2	+1.3	Above normal	158	123	Above normal	120	99	Near normal
Wellington	8.6	-0.3	Below normal	177	130	Above normal	99	84	Below normal
Christchurch ^b	5.9	0.1	Near normal	66	91	Near normal	103	83	Below normal
Dunedin	6.3	-0.3	Below normal	122	182	Well above normal	128	126	Well above normal

^a Owairaka ^b Christchurch Airport

HIGHLIGHTS AND EXTREME EVENTS

- **Temperature**

The highest temperature during July 2007 was 20.4 °C recorded at Gisborne Airport on the 1st and in Christchurch on the 26th.

The lowest air temperature during the month was -15.4 °C recorded at Lauder on the 18th, the lowest there since July 1995 (-19.7 °C). Numerous other locations recorded minimum air temperatures below -10.0 °C at times between the 7th and 22nd of July - Hanmer Forest, Arthurs Pass, Mt Cook Village, Lake Tekapo, Fairlie, St Bathans, Tara Hills, and Ranfurly. The severe frosts were often accompanied by freezing fog and treacherous black ice. Many water pipes in houses in Otago and Southland burst following particularly severe frost over 8/9 July.

Dunedin Airport recorded -8.8 °C on the 8th, the lowest there for July and equal lowest in annual records

which commenced in 1963. Central Otago curlers' were able to play their sport on the frozen Idaburn Dam for the first time since 2001, where air temperatures fell as low as -10 °C on the 17th. On the same day, ice was seen floating down the Shotover River near Queenstown, where the maximum temperature reached just -2 °C.

- **Disruptive fog, 1-2 July**

Fog caused major disruptions, at Nelson Airport, resulting in the cancellation of many flights and delays for hundreds of passengers.

- **Damaging tornadoes, 4-5 July**

Several damaging tornadoes affected parts of the north and west of the North Island, as active frontal bands crossed the country from the Tasman Sea.

The first tornado, which originated about 300 m offshore, hit the central business district in New Plymouth at about 1pm on the 4th. The tornado was reported to have been 10 m high and 15 m wide (described as a dark column, with a huge amount of noise, including thunder and lightning), with a damage path 800 m in length. Damage was severe, with a large section, roughly a third, of the Placemaker's roof lifted off and a wall destroyed. 56 staff and customers were in the building at the time. Other shops (about 6) and about 20 houses were also damaged (with roofs lifted and windows broken). Cars were also damaged (one was crushed with the roof right down to the seats) by fallen debris, trees uprooted, and signs destroyed. One person was in his car when the rear windscreen shattered covering him in glass, and another He also saw the tornado, with chairs and corrugated iron flying above him. The La Mer Racecourse to the south-southeast was also badly affected, probably by the same tornado, with a trail of damage across the raceway, windows blown out (described as 'popping'), and a small building and perimeter fence flattened, with a parked car moved about 4 metres. Damages in New Plymouth were estimated at \$1.5 million.

Another tornado occurred on the 4th in southeast Auckland (Botany Bay) damaging about 25 homes (including fences) in four streets at about 3.30pm. Nine houses had damage to their roofs. One person was injured by falling roof tiles. A further tornado occurred in Tauranga at about 5.30pm, ripping tiles off a house.

Multiple tornadoes, possibly as many as eight, affected Taranaki after 5.30pm on the 5th, with a state of emergency declared in the New Plymouth District. There was a swath of damage along a 140 km front, and temporary supplies and accommodation had to be found for affected residents. There were reports of minor, but not severe, injuries. At least 7000 homes throughout the region were without electricity due to damaged lines and lightning strikes.

The township of Oakura was severely affected. There reports by a group of people of as many as three (two small and one large) tornadoes seen simultaneously, accompanied by lightning, coming in from the sea at about 5.40 pm, with a lot of flying debris. About 50 Oakura houses were damaged, of which 80 percent were destroyed. Some people were trapped in a car by fallen power lines, and many people were without electricity due to broken lines. An Oakura caravan was flung into the air and damaged as it was turned upside down upon landing; the man inside it was knocked out, but later escaped with only a few scratches.

In Opunake, eight people were trapped in a motor vehicle surrounded by damaged, but live, powerlines. Motunui, Stratford, Hawera, and Normanby, also suffered damage, with trees uprooted, roofs lifted, and powerlines broken, with a car crushed, hay barn wrecked, and glasshouse damaged in Oakiawa. Egmont Village, Inglewood, and Waitara, and to a lesser extent Urenui and Pungarehu, were also affected.

Damaging winds, also attributed to tornadoes (preceded by a severe hailstorm), were reported at Tutaenui, north of Marton at about 8pm on the 5th, and also at Aramoho in Wanganui (during a thunderstorm at 7.30 pm) which ripped a bus shelter from its foundations and knocked over several trees and fences. Damages due to the tornadoes in Taranaki were estimated at \$7 million.

- **Damaging tornado, 31 July**

A small Tornado hit a trucking firm's yard in Brixton, 15 km north of New Plymouth, at about 8.30am, tipping a truck and trailer unit on its side, and tearing roofing iron off and crumpling the buildings large roller doors. The tornado was seen by several people, as it made its way inland from the sea.

- **Severe weather – heavy rainfall and high winds, northern North Island, 9-11 July**

A state of emergency was declared in the far north as gale easterlies and heavy rainfall, due to a deep depression with an intense pressure gradient, tracked across the north of the North Island, producing widespread severe flooding throughout much of Northland on the 10th. Floodwaters and several massive landslips resulted in the closure of many roads. There were many landslips between Whangarei and Opoua. Water supplies were also affected. Thousands of residents were without phones and electricity, and some had to evacuate. The town of Kaeo was worst hit, with 254 mm of rainfall in 12 hours, and at least 23 houses flooded, the water being a metre high in places. At one stage, Whangarei was completely blocked off by floodwaters and slips. In Kaitaia, floodwaters resulted in the evacuation of a rest home and pensioner flats. A house at Totara North was damaged by a landslip. Rainfall for the 48 hours to 9am on the 11th totalled at least 150 mm throughout much of central and eastern Northland.

The same weather system produced damaging winds in Northland, Auckland, and Coromandel which resulted in fallen trees and broken power lines. In Northland, at least two houses were reported to have lost their roofs due to high winds. In Auckland, a roof was lifted off an apartment block, and two motorcyclists were blown off their bikes on the Auckland Harbour Bridge. Several large containers were toppled at Auckland's Bledisloe Wharf, and two boats washed ashore at Torpedo Bay in Devonport. Roofs were also lifted in Coromandel. More than 140,000 people were without electricity throughout Northland, Auckland, and the Coromandel (where power was out everywhere except Waihi and Whangamata), and more than 20,000 customers without land-line phone usage. Major power outages occurred in Auckland's East Coast Bays districts as far north as Warkworth. A Dairy shop in Te Puru, near Thames, was almost totally demolished by the high winds, and boats were blown across a road in Tararu, north of Thames. A wind gust as high as 180 km/h was recorded on the offshore island of Tititiri Matangi and 148 km/h at Mokohinau Island, north of Auckland, during this event. Easterly gust speeds between 100 and 120 km/h occurred at many Northland, Auckland, and Thames Valley recording sites during the late afternoon and evening, with higher speeds (150 km/h) reported in the Coromandel.

Damage due to the flooding and high winds was estimated to be almost \$60 million, with almost 70 houses left uninhabitable.

- **Sea ice, Fiordland, mid month**

Sea ice, a few cm thick, was observed in parts of Doubtful Sound

- **High rainfall and floods, Hawke's Bay 17-18 July**

Major flooding, due to moist easterly conditions, occurred in parts of Hawke's Bay, particularly near Hastings on the 17th, with further heavy rainfall resuming on the 18th. The worst affected areas were Flaxmere, where water was at least a metre deep in some streets. Rainfall totalling as much as 300 mm was reported within 48 hours and 150 mm within 24 hours in some areas, with 75 mm recorded at Maraekakaho (west of Hastings) between 6am and 9am on the 17th. Children were transported, via army vehicles, from two flooded country schools, as floodwaters blocked several roads, bridges, and streets.

- **South Canterbury-Otago Floods 30 July**

More flooding, also due to moist easterly conditions, and a state of civil emergency, occurred in south Canterbury and Otago on the 30th. Roads were flooded and some people left their homes in Morven, Milton, and Palmerston; Milton being isolated by surrounding floodwaters, knee deep in places. Surface flooding was also widespread in Mosgiel (with several homes threatened) and in Dunedin City, and SH1 was closed both north and south of Dunedin. Other roads through the south Canterbury-Otago region were also affected, some with slips. Dunedin streams became torrents, with many basements flooded. The Waikouaiti River burst its banks by SH1. Rainfall exceeded 100 mm at several recording sites in the North Otago, Dunedin, and Taieri districts. High rainfall and slips also affected parts of Stewart Island.

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