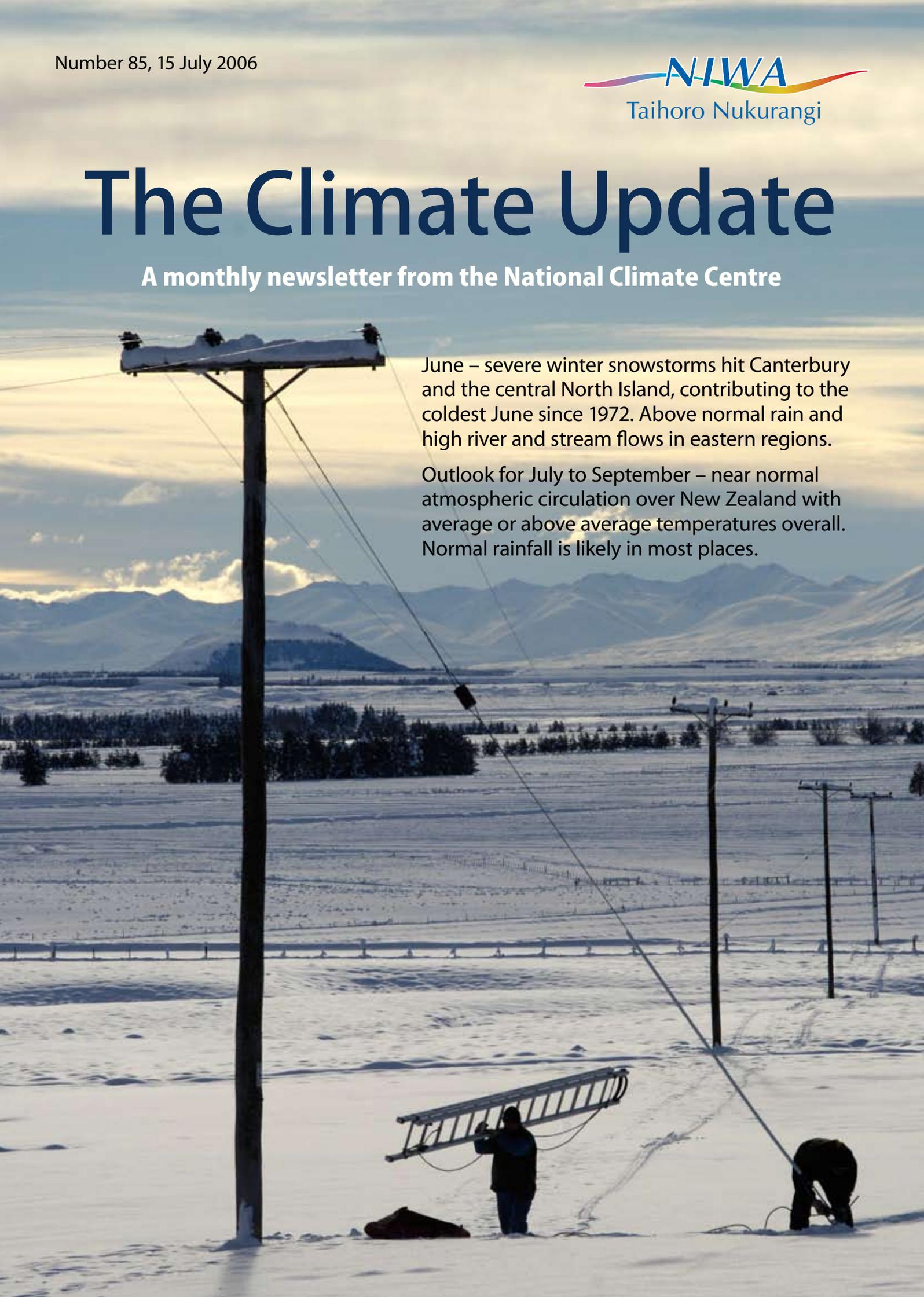


# The Climate Update

A monthly newsletter from the National Climate Centre



June – severe winter snowstorms hit Canterbury and the central North Island, contributing to the coldest June since 1972. Above normal rain and high river and stream flows in eastern regions.

Outlook for July to September – near normal atmospheric circulation over New Zealand with average or above average temperatures overall. Normal rainfall is likely in most places.

## New Zealand climate in June

June 2006 was the coldest June since 1972, with much of the country recording temperatures of more than 2.0 °C below average. Snow fell to depths of 15–90 cm in Canterbury, and also closed roads in the North Island. There were more frosts than usual across much of the country.

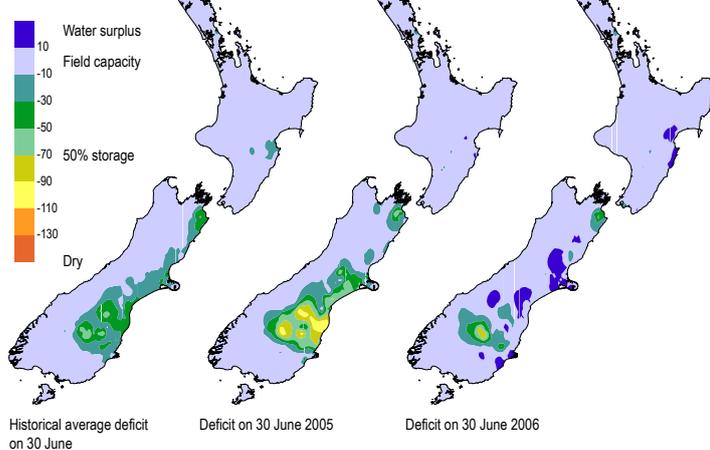
Precipitation was about 200% of normal in South Canterbury, but about half normal in much of Bay of Plenty. June was much sunnier than normal in all western and southern regions.

For more information on the climate in June 2006, visit the climate summaries page at [www.niwascience.co.nz/ncc/cs/mclimsum\\_06\\_06](http://www.niwascience.co.nz/ncc/cs/mclimsum_06_06)

### Soils at or above field capacity

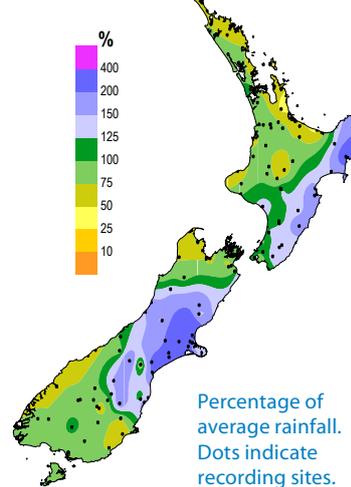
Along the east coast, soils were mostly at or above field capacity at the end of June, and mostly at field capacity elsewhere. Soil conditions in Otago were wetter than at the end of June last year.

### Soil moisture deficit

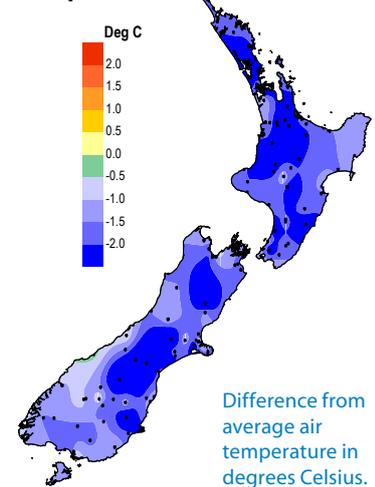


Water balance in the pasture root zone for an average soil type where the available water capacity is taken to be 150 mm.

### Rainfall



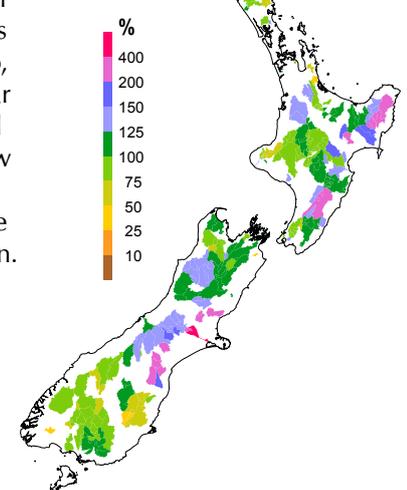
### Air temperature



### High river flows in the east

High stream flows occurred in eastern regions of both islands and in some rivers in Waikato, Bay of Plenty, and Buller. Near normal stream flows occurred in most other rivers, but below normal flows occurred in some rivers, particularly in the Wellington/Kapiti Coast region.

### River flows



## April to June: the climate we predicted and what happened

### Rainfall

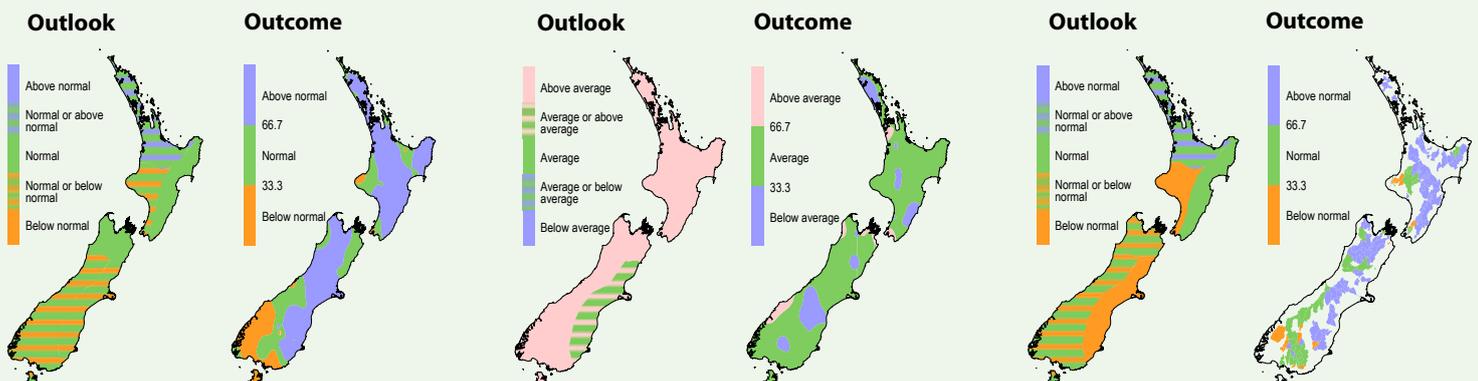
Rainfall was normal or above in most districts, and higher than predicted in the east of the country. Predictions of drier than normal conditions in parts of the west and south of the country were correct.

### Air temperature

Air temperatures were near average, and lower than expected, over much of New Zealand.

### River flows

Stream flows were above normal in the north and east of both islands, and near normal in most other locations. Below normal flows occurred in the far southwest of the South Island.



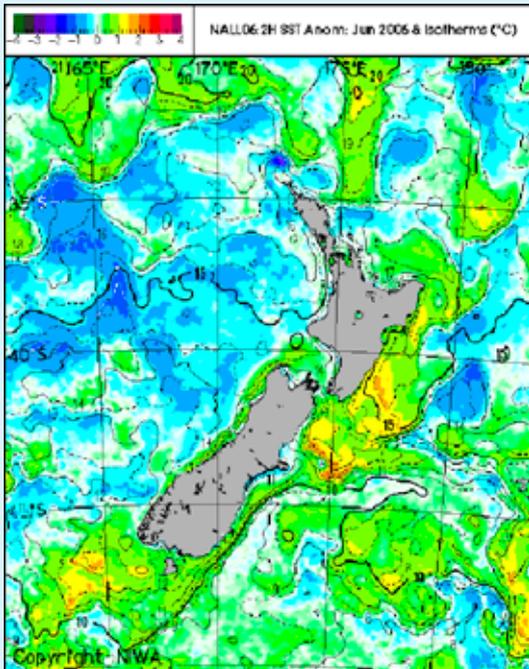
The three outcome maps give the tercile rankings of the rainfall totals, mean air temperatures, and mean river flows that eventuated from April to June, in comparison with the forecast conditions.

As an approximate guide, middle tercile rainfalls typically range from 80 to 115% of the historical normal, and middle tercile temperatures range about the average by plus or minus 0.5 °C.

# Global setting and climate outlook

## Sea surface temperatures around New Zealand

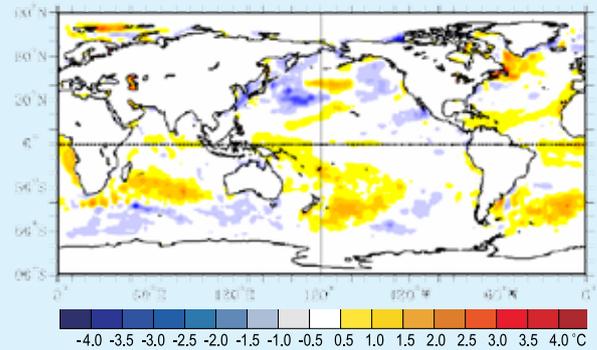
In June, surface temperature anomalies in the New Zealand region dropped back to near their April values, averaging +0.3 °C in June (+0.8 °C in May), with an April to June average of +0.5 °C. Surface temperatures immediately to the east of the South Island have fallen, and the largest positive anomalies now lie just east of the Chatham Islands. Temperatures in the New Zealand region are expected to remain near or below average in the Tasman, and near or above average east of the country.



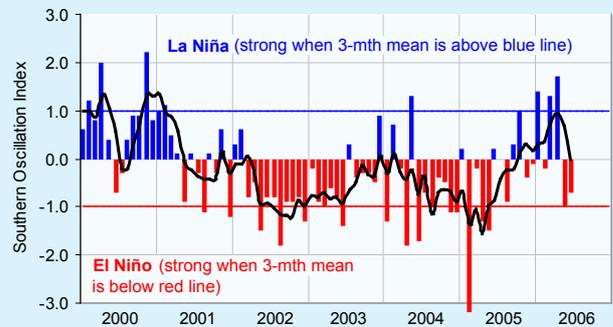
Average difference from normal June surface temperatures in the seas around New Zealand.

## ENSO neutral

The tropical Pacific is in a neutral state. The equatorial trade winds, whose changing strengths typically indicate changes in ENSO (El Niño Southern Oscillation), were close to their normal strength across the Pacific in June.



Difference from average global sea surface temperatures for June 2006. Map courtesy of NOAA Climate Diagnostics Center.



Monthly values of the Southern Oscillation Index (SOI), a measure of the changes in atmospheric pressures across the Pacific, and the three-month mean (black line). The SOI was -0.7 in June, showing little change from May, with an April - June mean of zero.

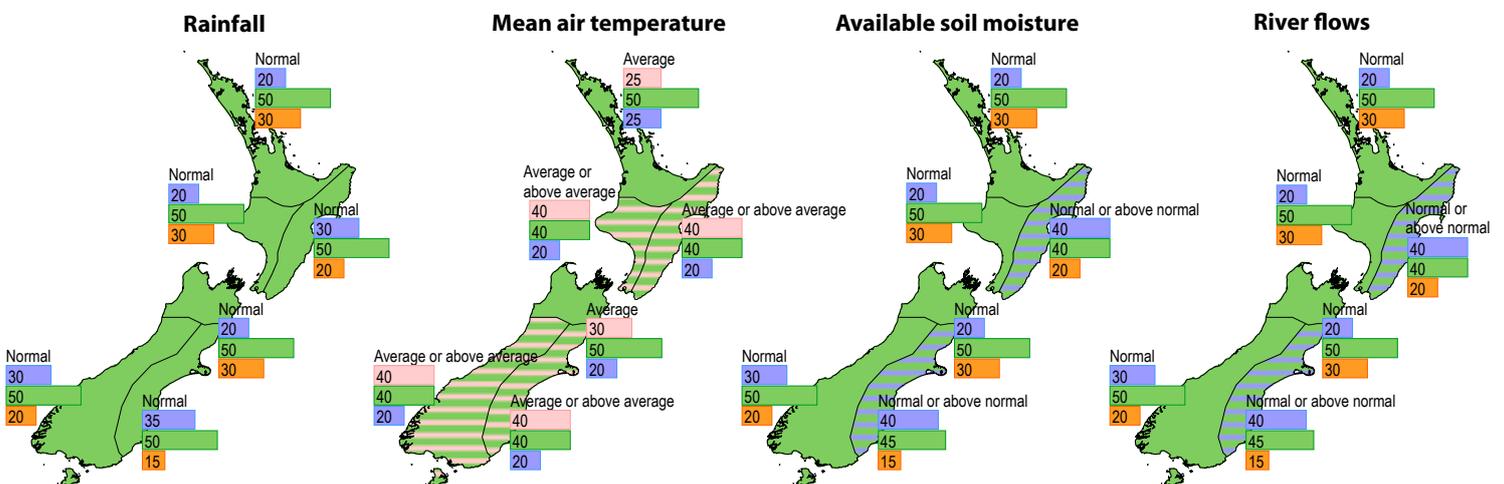
## Outlook for July to September 2006

During late winter 2006, atmospheric circulation patterns in the Tasman Sea are likely to be more anticyclonic than usual at the start of the period, with near normal conditions likely for the season as a whole.

Air temperatures are likely to be average in the north of both main islands, and average or above average in other regions. Despite

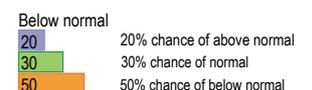
the overall temperature expectation, cold outbreaks typical of winter will occur from time to time.

Rainfalls are likely to be near normal in all regions. Normal or above normal soil moisture levels and stream flows are likely on the east coast of both islands. Elsewhere, normal soil moisture and stream flows are expected.



### How to interpret these maps

In the example here the climate models suggest that below average conditions are likely (50% chance), but, given the variable nature of the climate, the chance of normal or above normal conditions is also shown (30% and 20% respectively).

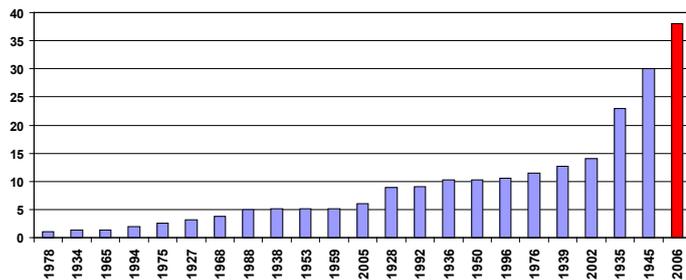


# Climate Explorer <http://climate-explorer.niwa.co.nz>

## Advance warning of cold conditions

Parts of New Zealand have experienced near record low air temperatures in the past month. For example, Tara Hills, near Omarama, recorded a minimum temperature of  $-14\text{ }^{\circ}\text{C}$  on 14 June, the lowest overnight temperature since records began in 1950. The cold conditions disrupted electricity and water supplies, and caused more problems than usual for winter feeding programmes for livestock.

An example of the extreme conditions is shown in the figure below, which gives the maximum snow depths at Ashburton. The snowfall of 12 June was measured at 38 cm, the deepest on record.



Maximum annual snow falls of at least 1 cm at Ashburton, 1927–2006, ranked in order of depth. The June 2006 fall of 38 cm exceeded all previous recorded depths.

The adjacent figures illustrate the likelihood of low temperatures during July. The data are derived from international models downscaled to New Zealand locations, and weather observations at each location during the past 30 years. These forecasts, accessible on Climate Explorer, are updated on a daily basis for over 100 climate measuring sites around New Zealand.

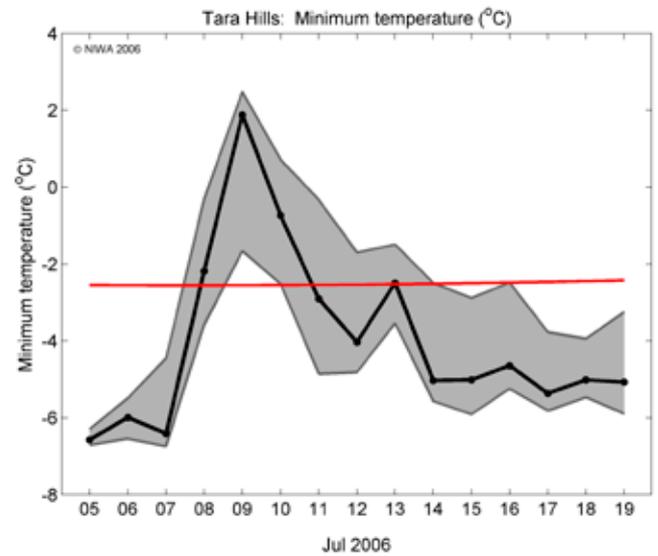
The forecasts show both the expected minimum temperature and the probability each day of temperatures dropping below  $0\text{ }^{\circ}\text{C}$ . In each case, the red line shows the climatological (or historical average) values. The dark line gives the mean model output, while the shaded band is a measure of the agreement between models – when the band is narrow, the models agree reasonably well, and higher confidence can be placed on the output.

The forecasts shown in these figures indicate that overnight temperatures at Tara Hills are likely to be lower than average on most nights during the two weeks. One exception, on 9 July, predicts the minimum temperature at almost  $+2\text{ }^{\circ}\text{C}$ , but there is still a 20% chance that it will be below zero.

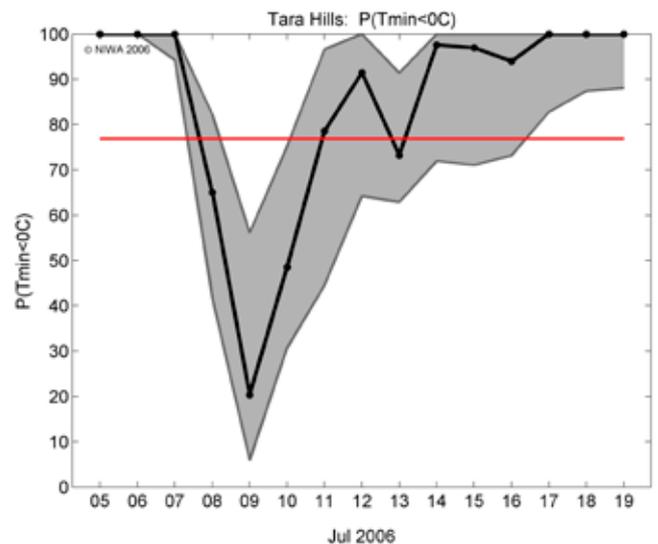
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The likely daily minimum temperature at Tara Hills, 5 to 19 July. The red line indicates the historical average minimum temperature for the period.



The probability, expressed as percentages, that the minimum temperature will be below zero at Tara Hills, Omarama, during 5 to 19 July. The red line indicates that overnight temperatures typically drop below zero on 77% of days during this period.



Canterbury snowscape. Line engineers contended with knee-deep snow and restricted vehicle access to restore electricity supplies.

Cover photo: Alan Blacklock

*The Climate Update* is a monthly newsletter from NIWA's National Climate Centre, and is published by NIWA, Private Bag 14901, Wellington. It is also available on the web. Comments and ideas are welcome. Please contact Alan Porteous, Editor  
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