

The Climate Update

February cool, and dry in many places

February was cooler than normal in many places, with some unseasonal frosts. Dry conditions persisted in many northern and eastern districts ... *page 2*

Outlook: drier than normal in the east

The current El Niño is waning, but its influence may linger into autumn... *page 2*

El Niño summer was much as expected

El Niño summers are mostly cooler than normal and dry in the east – this one was no exception ... *page 4*



New Zealand climate in February 2003

Air temperature and rainfall

Low rainfall in central regions of New Zealand

Waikato, Taranaki, and Nelson all received less than a quarter of their normal February rainfall, while less than half of the average fell in the far north of Northland, and in most central and southwestern areas of the North Island. Totals were less than 75% normal in southern Wairarapa, north Canterbury, and west Otago. In some northern and eastern North Island regions the dry conditions were relieved by heavy rainfall towards the end of the month, with flooding in Paeroa.

Cooler than normal

February was cooler than average over the country, particularly in western regions. Unseasonably early frosts, extreme in some areas for February, occurred in inland and eastern regions between the 20th and 23rd.

Mean temperatures were at least 1.0 °C below average on the West Coast, in Southern Lakes, south Canterbury, and western Southland, and more than 2.0 °C below average in parts of Fiordland. The national average temperature was 16.4 °C, which was 0.7 °C below normal.

High sunshine hours

February was sunnier than average over much of New Zealand, with extremely high sunshine and solar radiation totals recorded in many eastern locations from Hawke's Bay to Southland.

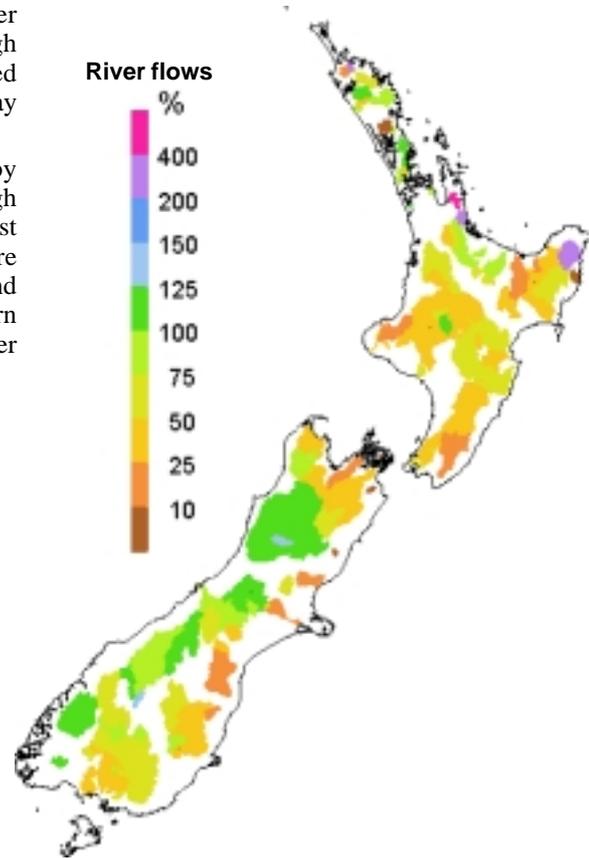
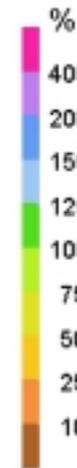
The February climate was influenced by more frequent than usual anticyclones (high pressure zones) in the Tasman Sea and east of the Chatham Islands. Westerlies were stronger than usual south of New Zealand as were easterlies to the north. This pattern produced more frequent onshore winds over the country.

River and streamflows

February flows low over much of New Zealand

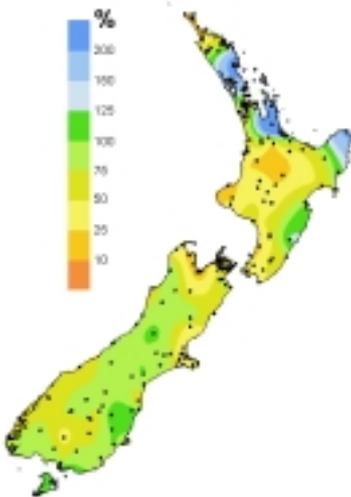
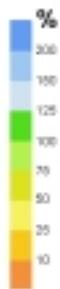
Apart from high streamflows in parts of Northland, Coromandel, and East Cape, and normal flows for the South Island west coast, most rivers and streams were running lower than normal over the country.

River flows

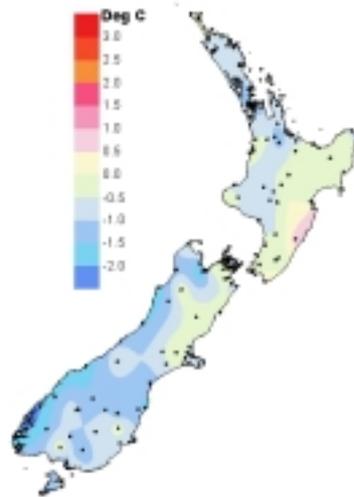
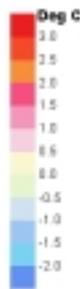


ABOVE: Percentage of average February streamflows for rivers monitored in national and regional networks. The contributing catchment area above each monitoring location is shaded. NIWA field teams, regional and district councils, and hydro-power companies are thanked for providing this information.

Rainfall

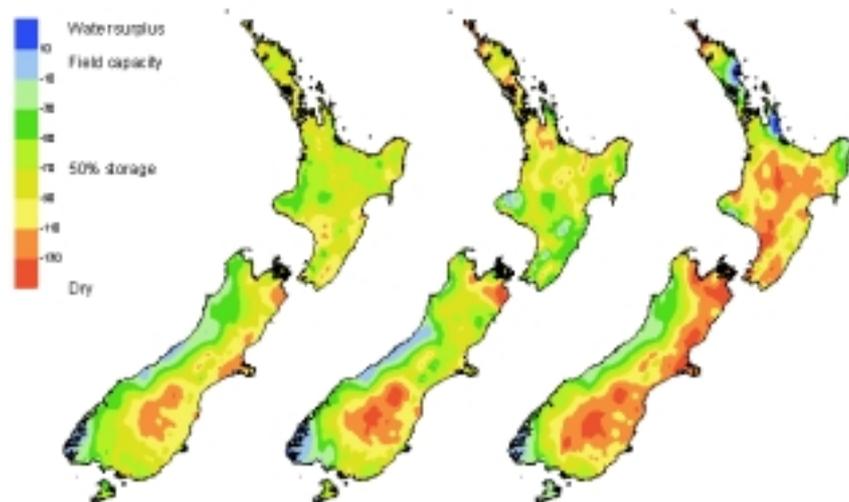
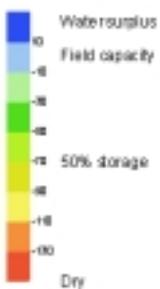


Mean air temperature



ABOVE: Percentage of average rainfall (left) and difference from the average air temperature in degrees Celsius (right). Dots indicate recording sites.

Soil moisture deficit



Historical average deficit on 28 February Deficit on 28 February, 2002 Deficit on 28 February 2003

Soil moisture

Severe soil moisture deficits along the east coast of the South Island, and in Nelson and parts of Otago, remained through much of February. North Island soils were dry for much of the month. The extent of the dry conditions across the country was unusual.

The dry surface conditions resulted in total fire bans in Gisborne, Hawke's Bay, and Bay of Plenty, with restrictions applied in most other areas of New Zealand.

Rain late in the month brought some relief to northern and eastern areas, and to western Taranaki.

LEFT: Soil moisture deficit in the pasture root zone at the end of February (right) compared with the deficit at the same time last year (centre) and the long-term end of February average (left). The water balance is for an average soil type where the available water capacity is taken to be 150 mm.

Checkpoint

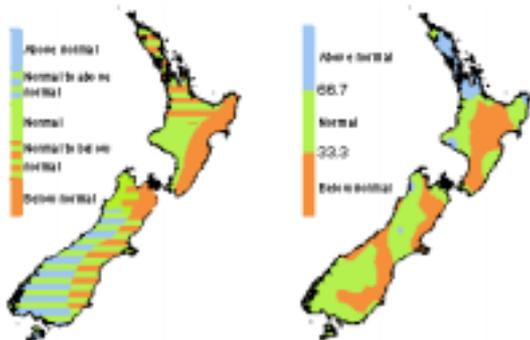
December 2002 to February 2003

Rainfall was near or below average as predicted in most regions, but above average in a few areas of the northern North Island. It was drier than expected in the southwest North Island.

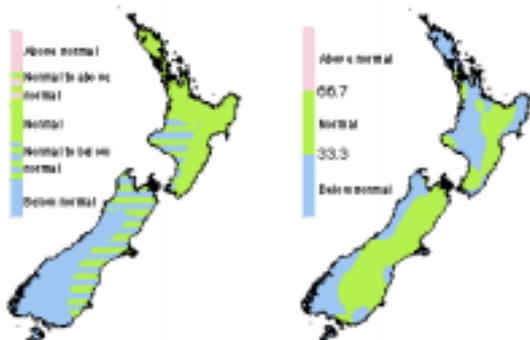
Air temperatures were near or below average in most regions as expected.

River flows were variable. Above normal flows occurred in parts of Northland, Waikato, and East Cape. Normal or below normal flows occurred in other locations, with a tendency for below normal for streams in Taranaki, central North Island, Bay of Plenty, Gisborne, and Hawke's Bay, and the north, east, and south of the South Island.

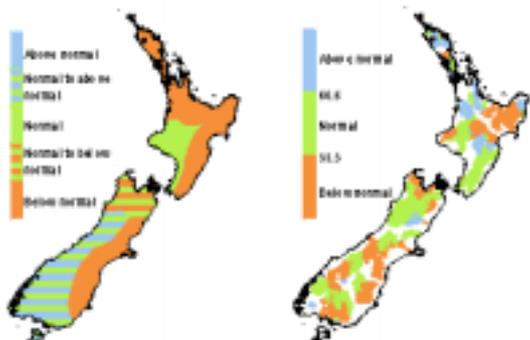
Rainfall **Outlook** **Outcome** What we said What actually happened



Mean air temperature



River and stream flows



The three outcome maps (right col) give the tercile rankings of the rainfall totals, mean temperatures, and river flows that eventuated for December 2002 to February 2003. Terciles were obtained by dividing ranked December to February data from the past 30 years into three groups of equal frequency (lower, middle, and upper one-third values) and assigning the data for the present year to the appropriate group. As an approximate guide, middle tercile rainfalls (33.3 to 66.7%) often range from 80 to 115% of the historical average. Middle tercile air temperatures typically occur in the range of the average plus or minus 0.5°C. The upper, middle, and lower tercile ranges are indicated in the maps by the terms *Above normal*, *Normal*, and *Below normal*, respectively.

Outlook

March to May 2003

The El Niño event in the tropical Pacific is nearing its end, but its influence should be felt on New Zealand into April. Autumn 2003 is expected to be influenced by higher than normal pressures over the Tasman Sea with stronger than normal southwesterly winds across New Zealand in March and April.

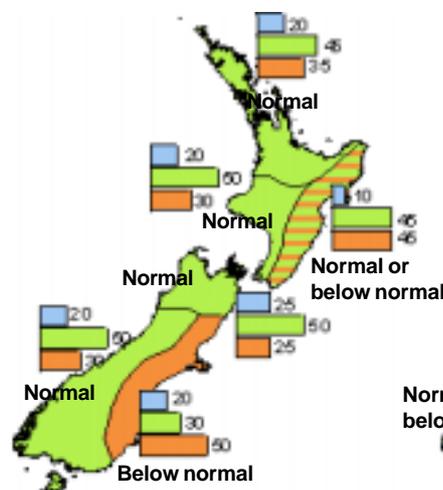
Temperatures are expected to be near average over the north and east of the North Island and northern South Island, and average or below average elsewhere.

Below normal rainfall is expected in the east of the South Island with normal or below normal rainfall in the eastern North Island. Near normal rainfall is expected elsewhere in New Zealand.

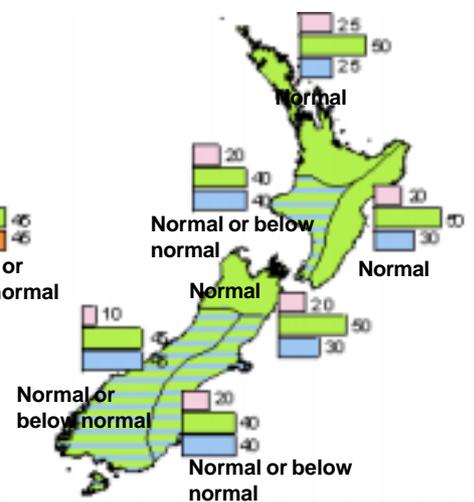
Normal or below normal soil moisture levels and river flows are expected in most regions.

There is a near-average risk of a tropical cyclone affecting New Zealand during the remainder of the cyclone season. On average, one ex-tropical cyclone affects the country during the cyclone season.

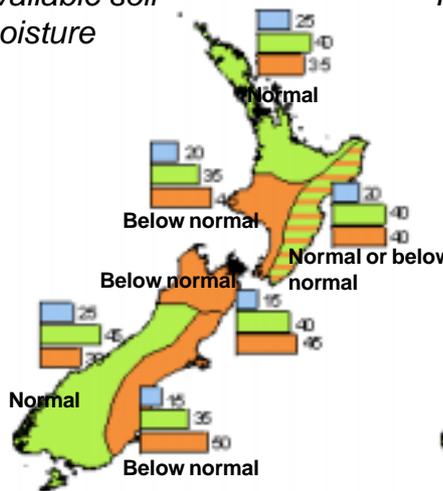
Rainfall



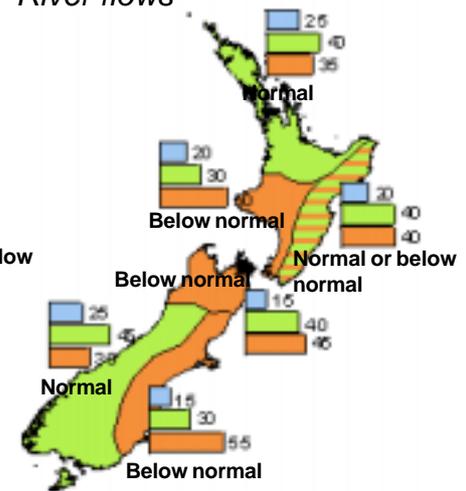
Mean air temperature



Available soil moisture



River flows



KEY to maps (Example interpretation)

In example A, climate models give no strong signals about how the climate will evolve, so we assume that there is an equal chance (33%) of the climate occurring in the range of the upper, middle, or lower third (tercile) of all previously observed conditions.

In example B there is a relatively strong indication by the models (60% chance of occurrence) that conditions will be below normal, but, given the variable nature of climate, the chance of normal or above-normal conditions is also shown (30% and 10% respectively).

	No strong climate signal	Strong expectation of below normal
Above normal	33	10
Normal	33	30
Below normal	33	60

Climate summary

Summer was cooler and drier than normal, as expected

The summer of 2002–03 was the coolest El Niño summer since 1991–92 and 1992–93 (see dark bars in the figure below). Summer was generally drier than normal in many parts of New Zealand.

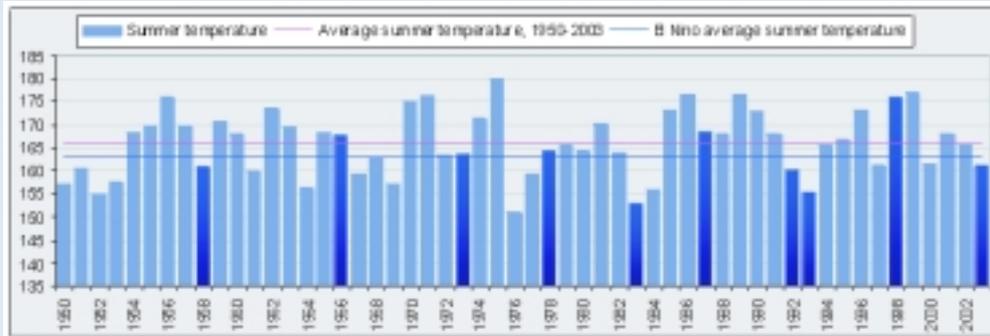
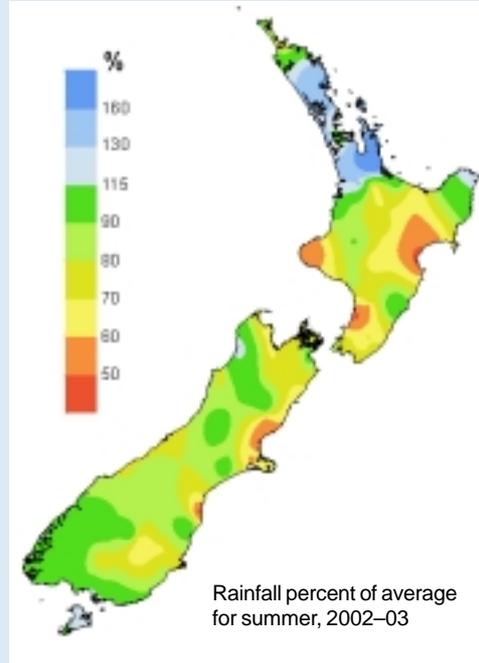
Rainfall was about 50% of normal in parts of central Hawke's Bay and Horowhenua (see adjacent rainfall map), and drier than average in parts of Taranaki, eastern Bay of Plenty, Taupo, Kapiti, Nelson, and in many eastern South Island areas from Kaikoura to Central Otago.

Significant soil moisture deficits occurred throughout the summer in much of the eastern South Island, spreading to much of the North Island from January onwards. Extreme fire risk also developed in many areas.

Sunshine hours were above average in most regions, especially from Marlborough to Otago, with Christchurch recording its sunniest summer in over 50 years.

The Pacific El Niño event had some effect on the New Zealand summer climate pattern. Anticyclones (zones of high

atmospheric pressure) were more frequent than usual in the Tasman Sea and east of the Chatham Islands, keeping pressures a little higher than normal over New Zealand. More frequent westerly winds occurred south of the country over the Southern Ocean.



ABOVE: Summer (DJF) average temperatures from 1949–50 (first bar) to 2002–03 (last bar). El Niño summers, including the summer just ended, are indicated by darker bars. The horizontal lines indicate the historical average summer temperature for this period (pink), and the historical average El Niño summer temperature (blue). El Niños are mostly cooler than normal (7 out of 10 cases shown here). The present summer temperature, 16.1°C, was 0.5°C below normal for all summers, and 0.2°C lower than the average for El Niño. The temperatures shown here are calculated from a composite set of 7 stations around New Zealand.



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Visit our website: www.niwa.co.nz/ncc

Cover picture:
 Little Barrier Island capped by orographic cloud. Cirrus clouds emanating from tropical cyclone Zoe cover much of the sky. Zoe, in common with other tropical cyclones this summer, had little impact on New Zealand weather (note the calm state of the sea).
Photograph: Georgina Griffiths

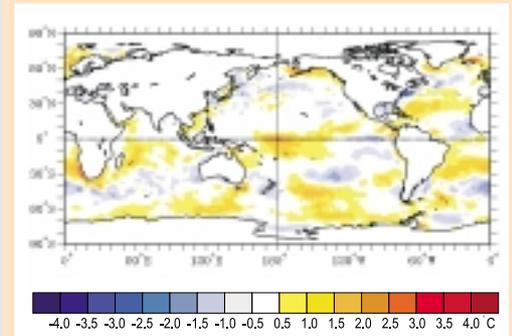
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Global setting

ENSO signal approaching neutral

The current El Niño phase of the El Niño-Southern Oscillation is nearing its end. Sea surface temperatures in the equatorial region of the eastern Pacific have fallen, and subsurface temperatures are now close to zero.

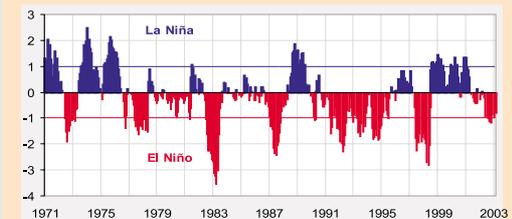
Most forecast models of the development of the El Niño-Southern Oscillation are predicting neutral conditions through autumn and winter.



ABOVE: Mean sea surface temperature departures from normal for the period from 23 February to 1 March 2003. Note the below average sea surface temperatures around New Zealand, which, if they persist, could be associated with lower than average air temperatures over the country in the coming months.

Update on the SOI

The mean Southern Oscillation Index (SOI) for February was -0.9, with the three month average now at -0.8. The present El Niño is waning. Further general information on El Niño is available on the World Meteorological Organization web site, www.wmo.ch



ABOVE: The Southern Oscillation Index (SOI), a measure of changes in the atmospheric pressures across the Pacific, smoothed over three months. La Niña or El Niño typically have an observable effect on the New Zealand climate when there is a large departure of the SOI from zero.

Online climate graphics

Climate maps and line plots of climate site observations are updated each week on the [Climate Now](http://www.niwa.co.nz/ncc/climateNOW) website at: www.niwa.co.nz/ncc/climateNOW

