Number 42 15 December 2002

NIWA
Taihoro Nukurangi

The Climate Update

November cold and windy

Dry and cold weather, and near normal river flows, in many areas ... *page 2*

Summer outlook

Cooler than normal in some places; drier than normal in the east ... *page 3*

New Zealand's rainfall observation network

Records dating back to 1853 ... *page 4*

New Zealand climate in November 2002

Air temperature and rainfall

Cold, windy November

Cold and windy, and relatively dry in many places, November conditions overall were generally uncharacteristic of spring.

Air temperatures were more than 2.0 °C below normal in central and northern parts of the North Island, and in parts of central and eastern Otago. Taumarunui at 12.2 °C, and Gore at 9.4 °, both recorded their coldest November mean temperatures on record.

The national average temperature of 12.9 °C was 0.9 °C below normal.

Low rainfall in many areas

Rainfall was below average for the fifth consecutive month in central Marlborough, and was 50% or more below average in Northland and Bay of Plenty.

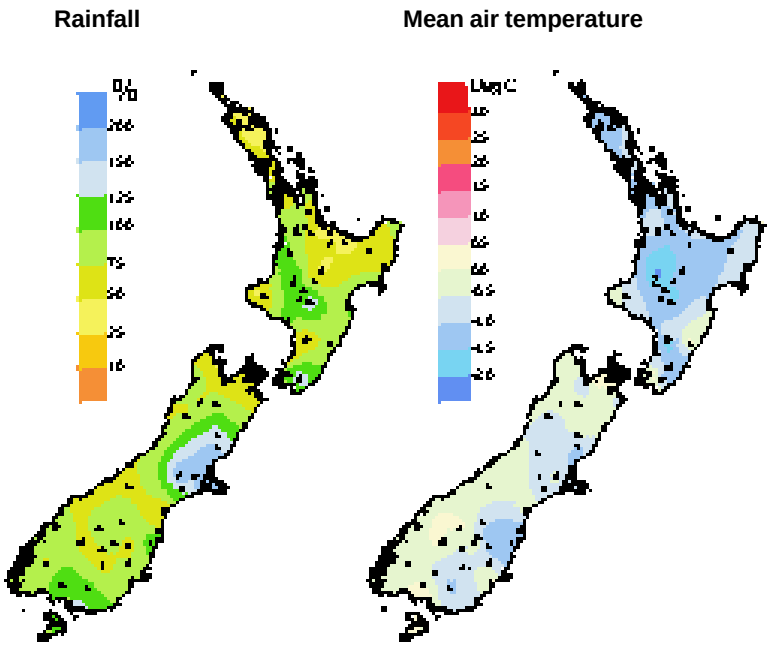
Strong winds

Gale force northwesterlies with gusts up to 130 km/h buffeted Wellington on 1 November, and there were more strong winds later in the month. Spectacular lightning was observed over Northland, Auckland, and Coromandel on the night of 1–2 November.

Damaging hailstorm

Hailstorms brought severe damage to crops around Motueka on 17 November, with estimates of export losses put at $20 million.

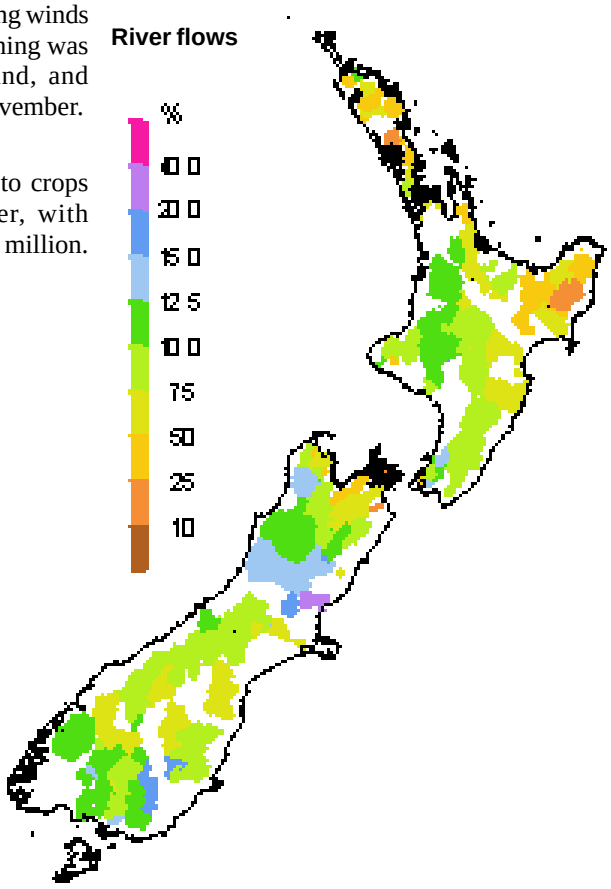
BELOW: Percentage of average rainfall (left) and difference from the average air temperature in degrees Celsius (right). Dots indicate recording sites.



River and streamflows

November flows mostly near normal

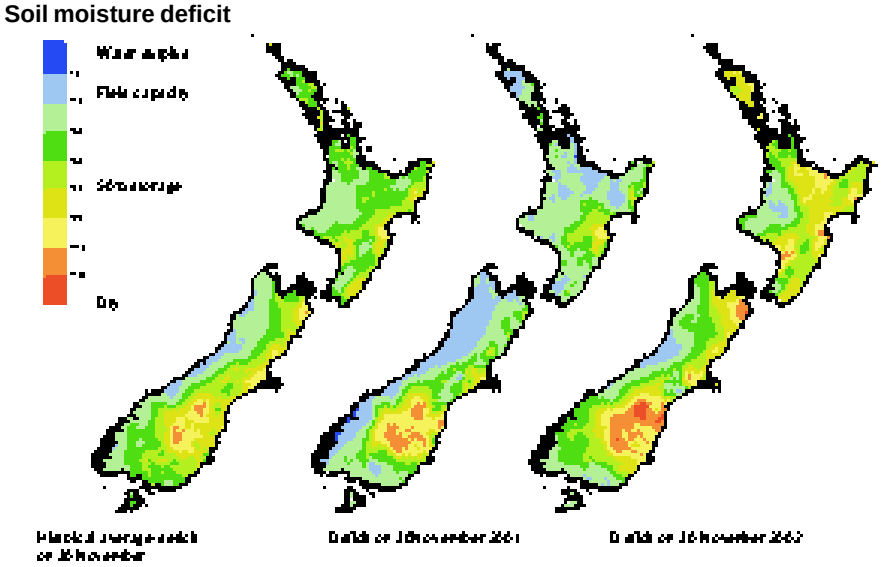
November streamflows were low in the north and northeast of the North Island, Nelson, coastal Marlborough, and South Canterbury. Flows were near normal elsewhere, except for some above average flows in north Canterbury.



ABOVE: Percentage of average November 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.

Soil moisture

At the end of November, soil moisture levels were lower than normal in much of Northland, and in parts of Bay of Plenty, Hawke's Bay, Manawatu, Marlborough, and Otago.



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

Checkpoint

September to November 2002

Rainfall was lower than expected in the north and east of the North Island, and in Marlborough and parts of north and east Otago. Parts of the southwest of the country were wetter than expected.

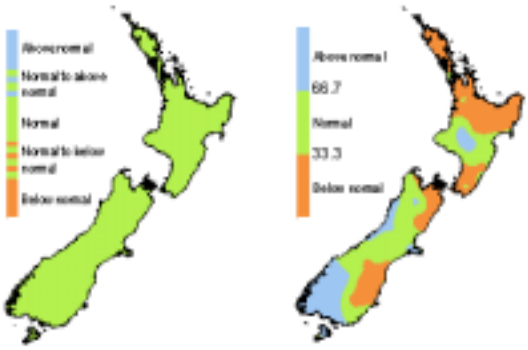
Air temperatures were as expected in parts of the northeast and east of the South Island, and generally cooler than predicted over the rest of the country.

River flows were near normal, as predicted, in the southwest of the North Island and the west of the South Island, higher than predicted in Southland, and lower than predicted everywhere else.

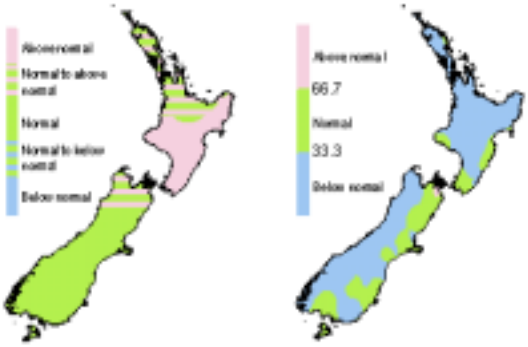
Rainfall

Outlook
What we said

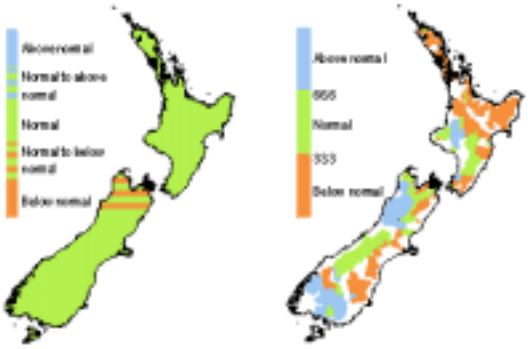
Outcome
What actually happened



Mean air temperature



River and stream flows



The three outcome maps (right column) give the tercile rankings of the rainfall totals, mean temperatures, and river flows that eventuated for September to November 2002. Terciles were obtained by dividing ranked September to November data from the past 30 years into 3 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. Note that in the maps above, the upper, middle, and lower tercile ranges are described by the terms *Above normal*, *Normal*, and *Below normal*, respectively.

Outlook

December 2002 to February 2003

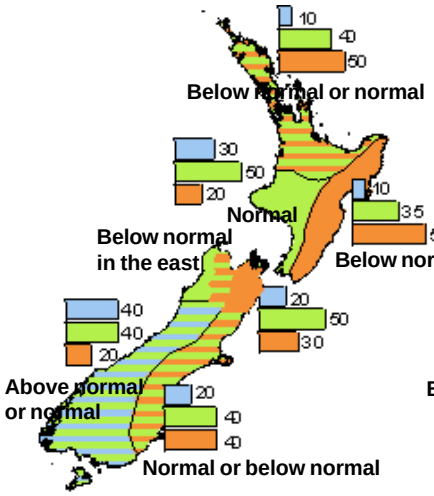
The present moderate El Niño event in the tropical Pacific is expected to last through summer, but should remain weaker than the 1997–98 event. A weakening of El Niño is likely during autumn 2003.

Summer in New Zealand is expected to be influenced by a continuation of enhanced cyclonic (low atmospheric pressure) activity across southern New Zealand, accompanied by episodes of stronger than normal westerly or southwesterly winds.

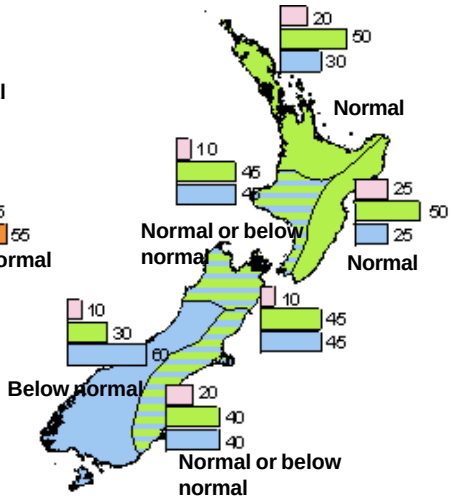
Temperatures are expected to be near average in the north and east of the North Island, below average in the western South Island, and average or below average elsewhere. Below normal or normal rainfall is expected in most places, except for the west and south of the South Island where normal or above normal rainfall is expected. River flows and soil moisture levels are expected to follow a pattern similar to that for rainfall.

During El Niño conditions there is a slightly reduced risk of a tropical cyclone affecting New Zealand during the summer. The risk is usually greatest in the late summer and early autumn.

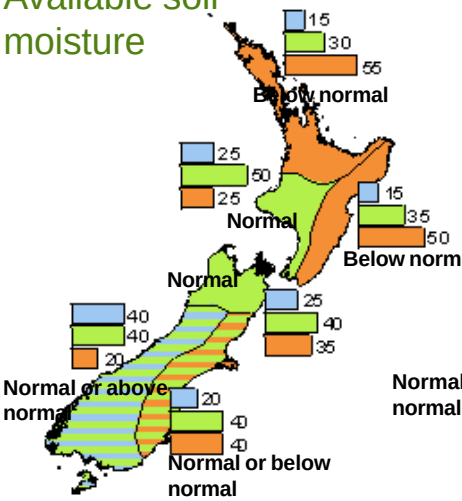
Rainfall



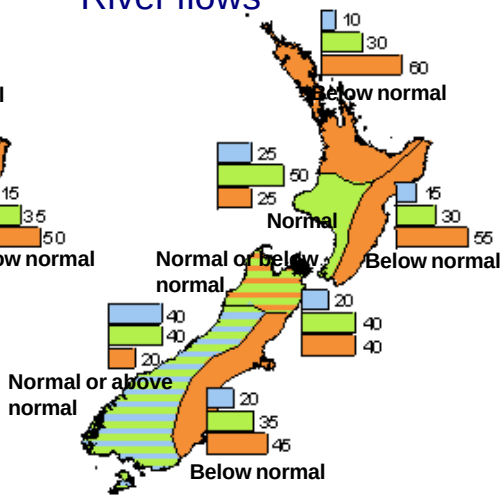
Mean air temperature



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
	A	B
Above normal	33	10
Normal	33	30
Below normal	33	60

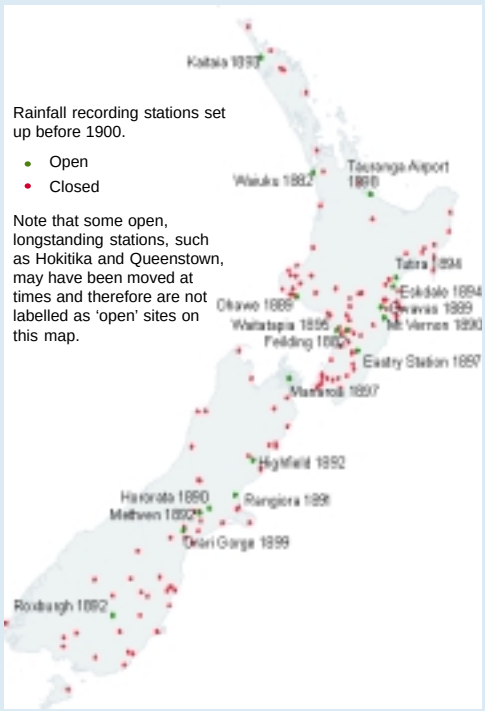
Backgrounder

Rainfall observation network

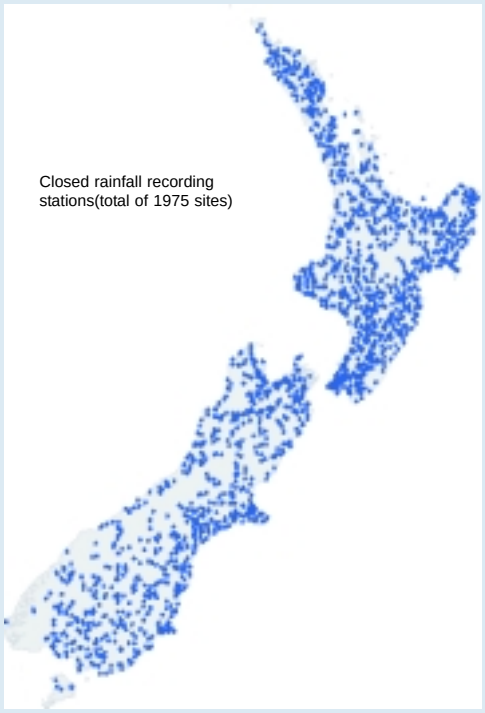
Rainfall has been measured in New Zealand for over 150 years. The earliest recorded observations held by NIWA date from January 1853, and were made by the Royal Engineers at the Albert Park Barracks in Auckland.

The rainfall recording network from which data are archived on the National Climate Database is illustrated here. Rainfall stations at any given location need to report continuously for at least 20-30 years for a reasonably reliable understanding of the features of the rainfall pattern at that site to be built up. Records from shorter term stations can be compared to longer nearby records to improve information at the short record sites. Stations with long records (50 years or more) help build a picture of long–term climate variability and change.

The three figures here show sites that currently measure rainfall or have measured rainfall in the past. Rainfall is also observed in other NIWA networks, and by local authorities around New Zealand.



ABOVE: Of the 154 rainfall stations that opened in the 19th century, the 18 stations named above (locations indicated by green dots) remain open. The longest standing stations are at Feilding and Waiuku, opened July and August, respectively, 1882.

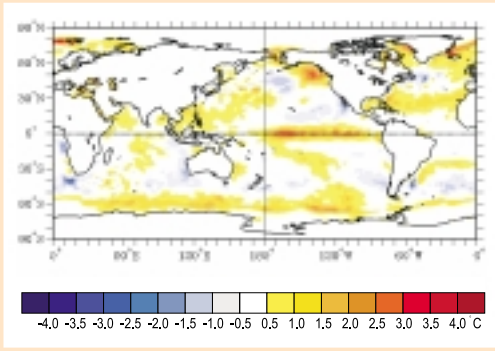


ABOVE: Locations of closed rainfall stations for which observations are held on the National Climate Database. Stations which are open and currently reporting are shown in the map below. Note that these maps show only the sites where rainfall is the only observation made – there are many additional sites (such as 'Climate Stations') where a number of weather parameters, including rainfall, are measured. See next month's issue of *The Climate Update*.

Pacific ENSO signal

The orange-yellow shading along the equator, stretching west from Ecuador, is a typical 'footprint' of the El Niño phase of the El Niño -Southern Oscillation. The shading indicates that sea surface temperatures in the area are 1–2 °C or more above normal. The grey-blue shading around New Zealand shows below normal sea surface temperatures, which is also characteristic of El Niño.

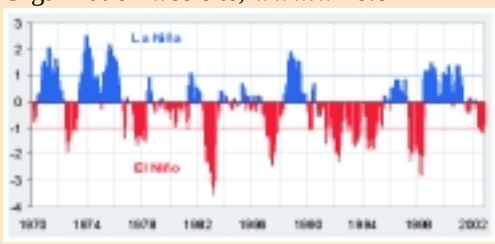
An unusual feature of the current situtation is the higher than normal sea surface temperatures around the Antarctic.



ABOVE: Mean sea surface temperature departures from normal for the period from 25 October to 23 November, 2002. *Map courtesy of NOAA/Climate Diagnostics Centre.*

Update on the SOI

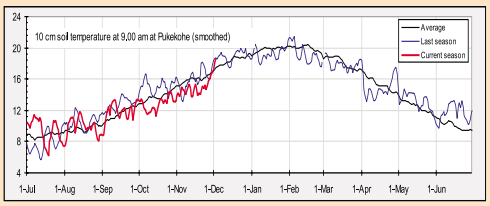
The mean Southern Oscillation Index (SOI) for November was –0.8, with the three month average now at –0.9. The present moderate El Niño is expected to last through summer, and is likely to be weaker than the 1997–98 event. Further general information on El Niño is available on the World Meteorological 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 website at: www.niwa.co.nz/ncc/climatenow



The Climate Update is a monthly newsletter from NIWA's National Climate Centre for Monitoring and Prediction, and is published by NIWA, Private Bag 14901, Wellington. It is also available via the web. Comments and ideas are welcome. Please contact Alan Porteous, Editor.
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Visit our website: www.niwa.co.nz/ncc

Cover picture:
Kevin McGill of NIWA downloading data from the logger of an automatic rain gauge at the climate station at Kelburn, Wellington. Electronic gauges record the timing and intensity of rain as well as total precipitation. An evaporation pan in the background measures water loss to the air.
Photograph: Alan Blacklock