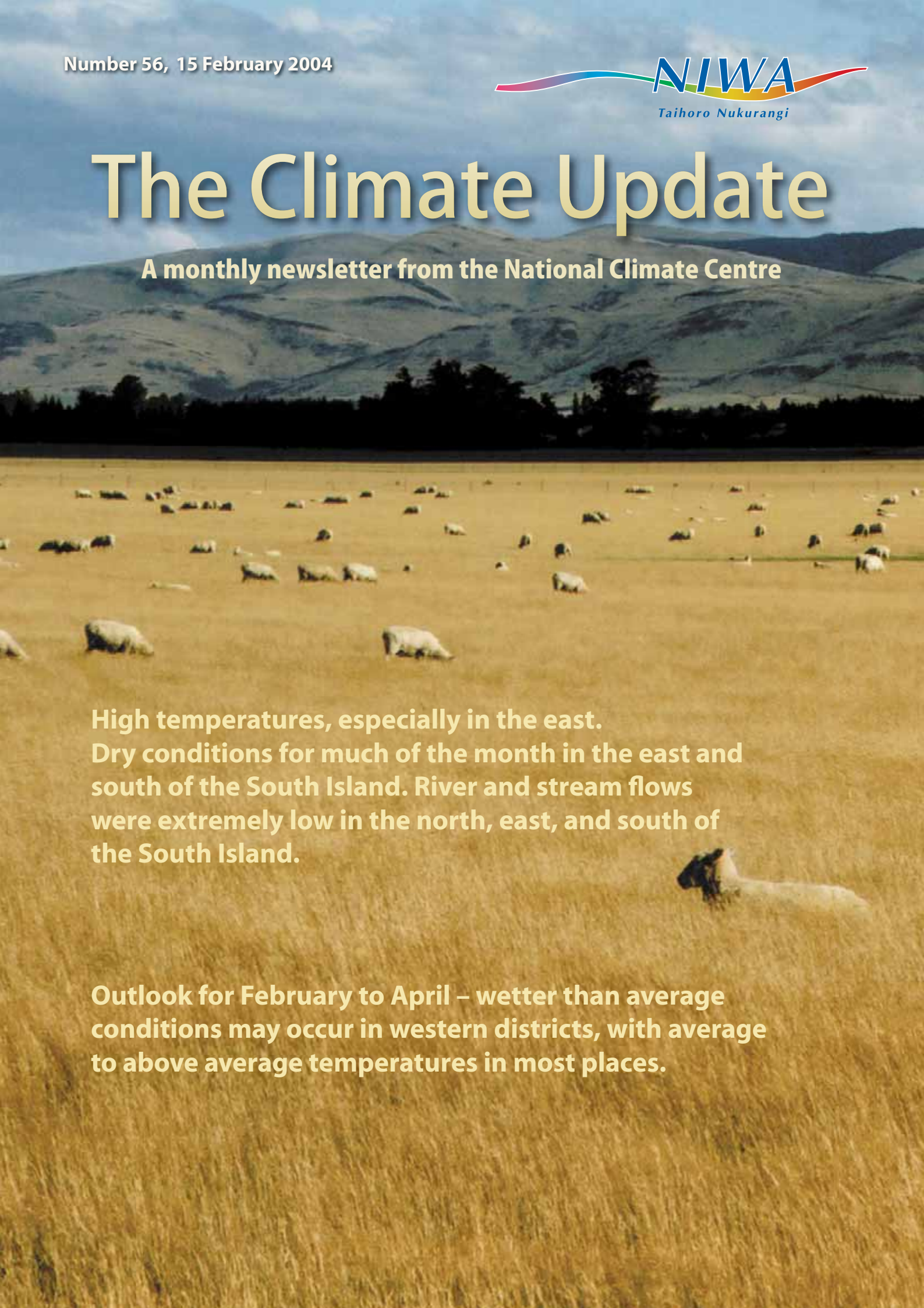
Number 56, 15 February 2004

NIWA
Taihoro Nukurangi

# The Climate Update

## A monthly newsletter from the National Climate Centre

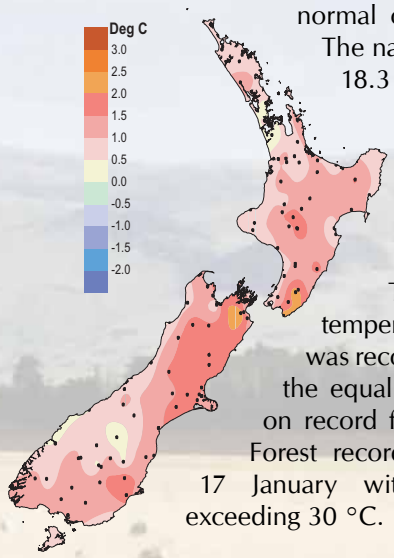


**High temperatures, especially in the east. Dry conditions for much of the month in the east and south of the South Island. River and stream flows were extremely low in the north, east, and south of the South Island.**

**Outlook for February to April – wetter than average conditions may occur in western districts, with average to above average temperatures in most places.**

# New Zealand climate in January 2004

**Mean air temperature**

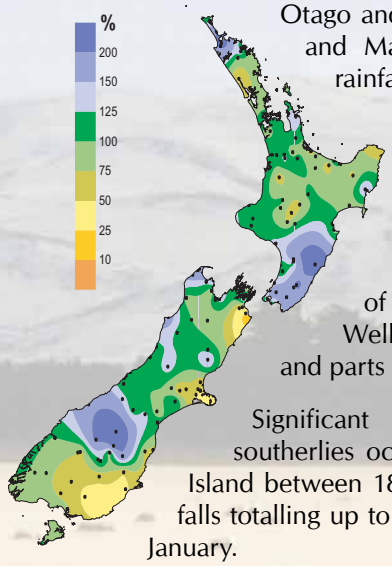



## Warm summer continues

Mean temperatures were above normal over much of New Zealand. The national average temperature of 18.3 °C was 1.2 °C above normal, the warmest since January 1999, and the eleventh warmest January since reliable measurements began in the 1850s.

The highest maximum temperature for the month, 38.4 °C, was recorded at Darfield on 1 January, the equal highest January temperature on record for the South Island. Hanmer Forest recorded 7 days between 1 and 17 January with maximum temperatures exceeding 30 °C.

**Rainfall**




## Late relief to some dry eastern areas

Rainfall was below average in parts of Otago and Southland, mid Canterbury, and Marlborough. However, useful rainfall, particularly in the last week of January, brought relief to dry soils in Wairarapa, Northland, and some areas of the South Island. About twice the average January rainfall occurred in parts of Hawke's Bay, Wairarapa, Wellington, the Southern Alps, and parts of North Otago.

Significant rainfall and gale force southerlies occurred over the lower North Island between 18 and 23 January, with heavy falls totalling up to 100 mm in Wairarapa on 20 January.

High rainfall of 150 to 200 mm occurred in parts of Northland on 29–30 January. In Otago, St Bathans recorded 74 mm on 30 January, with reports of flash flooding in Wanaka.

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

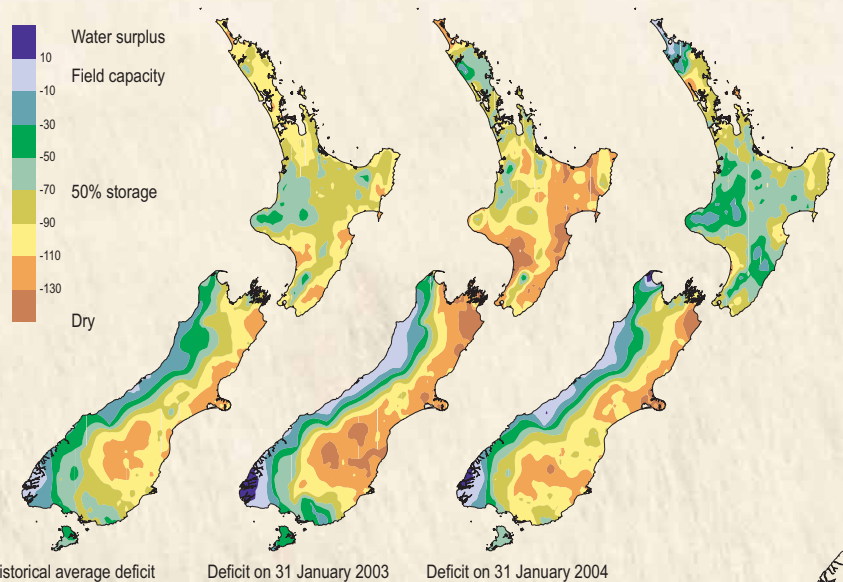
## Soil moisture deficit reduced in some areas

Moisture deficits in Northland and the southern North Island were lower at the end of January in comparison to the beginning of the month. There was some relief for dry soils in Nelson, mid Canterbury, south Canterbury, North Otago, and parts of Southland. Soil moisture availability in the pasture root zone was generally better than at the end of January last year, particularly in the North Island.

## High river flows in parts of the North Island

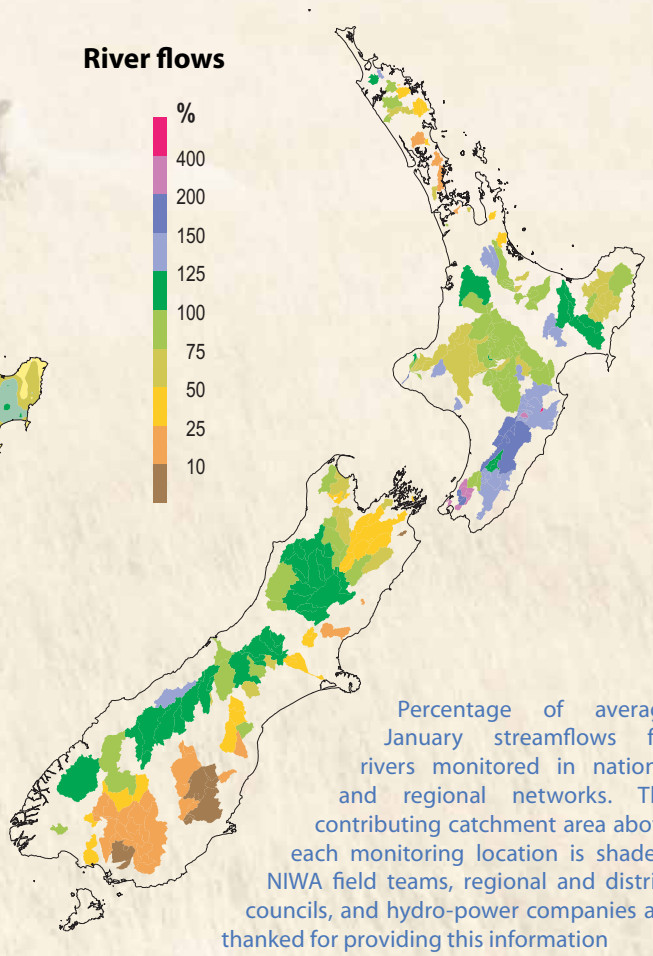
January streamflows were above normal in the east and south of the North Island, and varied from below to above normal in the rest of the North Island. January streamflows were below normal in the north, east, and south of the South Island, and normal to above normal in the west of the South Island.

**Soil moisture deficit**




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

**River flows**




Percentage of average January 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

# Checkpoint

## November 2003 to January 2004

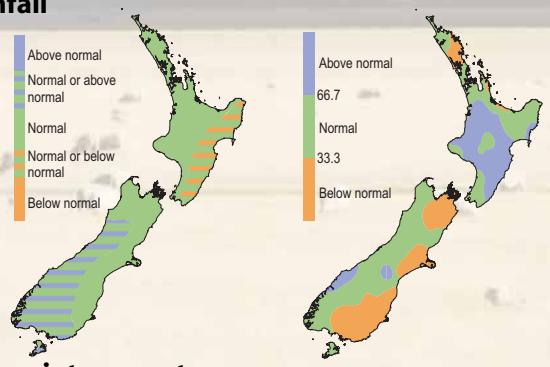
Rainfall was higher than predicted in parts of the east and centre of the North Island, and lower than predicted in the east of the South Island and in parts of Northland.

Air temperatures were average or above average as predicted in many areas, and higher than predicted in parts of the west of the North Island.

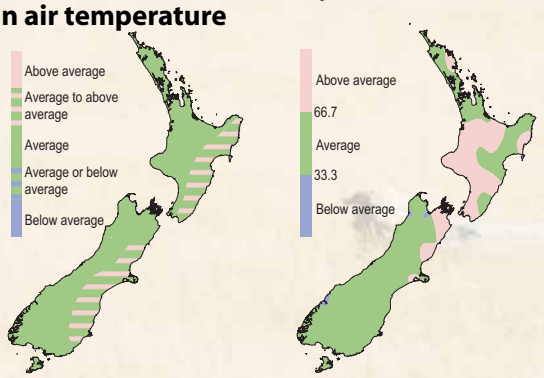
River flows were normal or above normal in the North Island apart from Northland, Auckland, Bay of Plenty, and East Cape where they were normal or below normal. River flows were below normal in the South Island, apart from the west, where they were normal as was predicted.

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

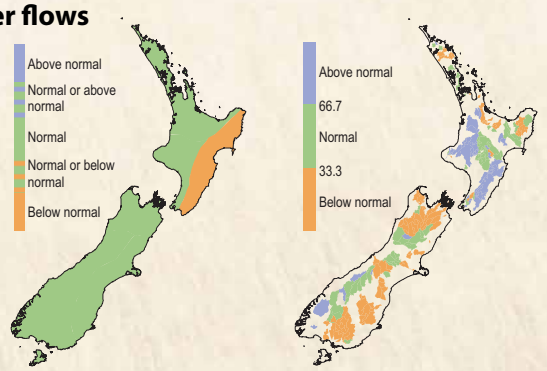
**Rainfall**




**Mean air temperature**




**River flows**




The three outcome maps (right column) give the tercile rankings of the rainfall totals, mean temperatures, and river flows that eventuated for November 2003 to January 2004. Terciles were obtained by dividing ranked November to January 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

## February to April 2004

Lower atmospheric pressures than normal are likely to the south of New Zealand over the next three months, giving an increased westerly wind over the country. Local sea surface temperatures are likely to remain near average during autumn.

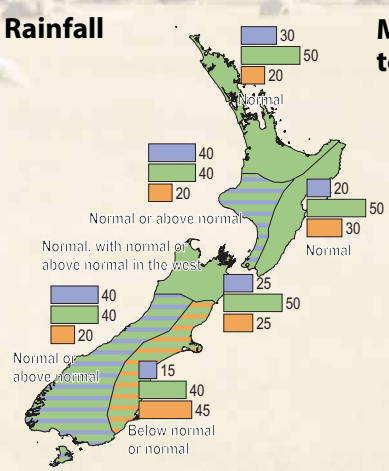
Equatorial sea surface temperatures are slightly higher than normal (which is typical of El Niño), but other indicators show that no El Niño is expected through autumn 2004.

Normal or above normal rainfall is expected in western regions, with below normal or normal rainfall in the eastern South Island, and near normal falls elsewhere.

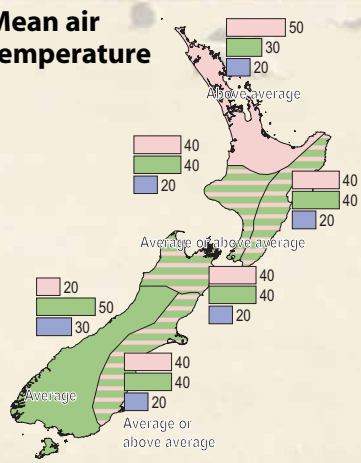
Average or above average temperatures are likely in all regions, apart from the west and south of the South Island, where near average temperatures are expected.

Below normal soil moisture levels and river flows are predicted for the east of the South Island. Elsewhere, soil moisture levels and river flows are expected to be normal, apart from below normal or normal river flows in the Nelson Marlborough region.

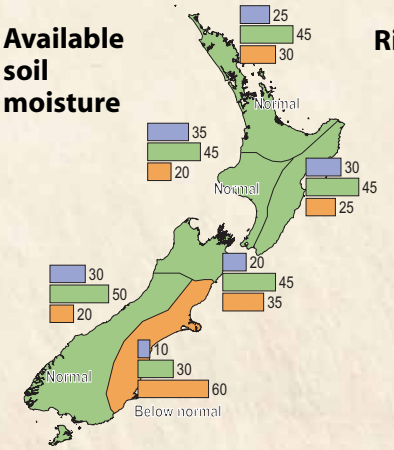
**Rainfall**



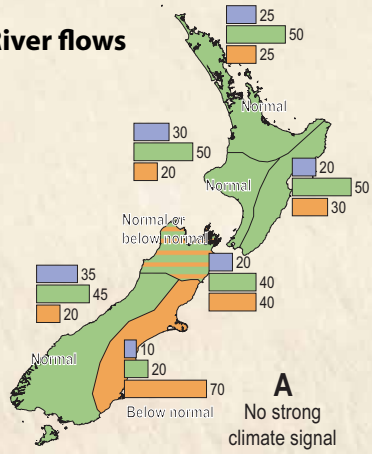

**Mean air temperature**




**Available soil moisture**



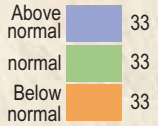

**River flows**



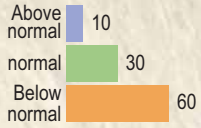

## Key to maps (example interpretation)

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).

**A**
No strong climate signal




**B**
Strong expectation of below normal



# Backgrounder

**Managing the end of a drought is an annual challenge for many New Zealand farmers. While no two droughts are identical, historical drought information, aided by astute reading of current climate behaviour, can help ease the way through the eventual end to the dry conditions.**

The recovery of pasture at the end of a drought depends on both the timing and amounts of rainfall received. Pasture plants that remain alive through the dry period may green up rapidly following a rainfall of 15 to 30 mm. Dead pasture replacement will depend on seed germination, requiring frequent falls of rain to prevent wilting of new seedlings.

Drought devastated brassica crop. Recent rain may fill some gaps if viable seed remains (photo: David Turner).

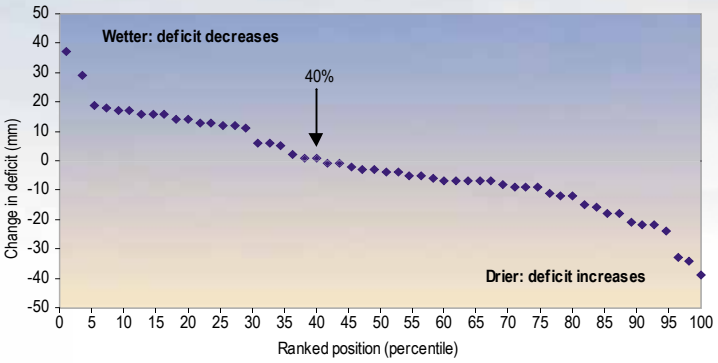
Hence, in the present dry conditions, some pastures will recover quickly, while others will take a lot longer, and may even need to be re-sown. In either case the key factor is sustained availability of sufficient soil moisture.

Taking Lincoln as an example, the historical data from Lincoln climate station show that soils in the area are typically driest in February, with a mean daily soil moisture deficit in the pasture root zone of 120 mm. This is not much different from January (118 mm). By March the mean deficit reduces to 107 mm, and, by April, to 89 mm, well on the way to sufficient moisture for water-satisfied pasture growth.

| JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 118 | 120 | 107 | 89 | 63 | 34 | 14 | 12 | 27 | 57 | 92 | 109 |

Mean daily soil moisture deficit (mm) at Lincoln, 1949 to 2003, for soils with 150 mm of available water in the pasture root zone.

From the historical data, we can calculate the climatological probability of soils being wetter in February than in January by examining the differences between the two months in previous years, as in the figure. Average soil moisture levels were higher (i.e., soils were wetter) in February in 40% of years.

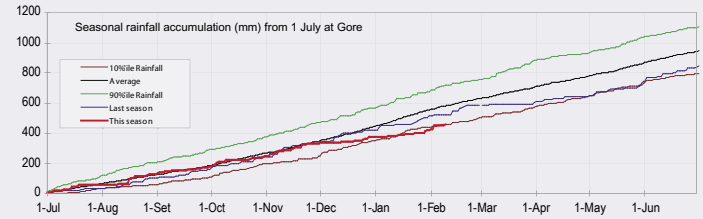



Changes in mean daily soil moisture deficit (mm) from January to February at Lincoln, for all years from 1949 to 2003, ranked from the most positive to the most negative. Decreases in the deficit (40% of cases) are shown as positive changes.

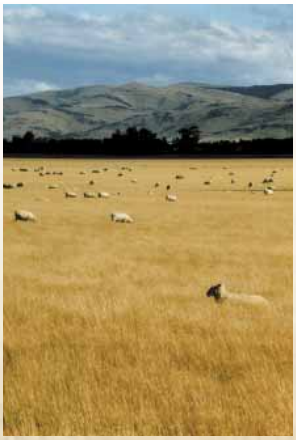
We know now that the mean soil moisture deficit in January 2004 at Lincoln was 145 mm, higher than any other January deficit since before 1949. The historical data tell us that very dry conditions in January (deficits of more than 130 mm) occurred 19 times since 1949, and that similarly dry Februaries followed in 9 of these cases. From this we can reasonably deduce that the probability of a very dry January being followed by a similarly dry February is about 47% (or 9/19).

The art of climate forecasting is to be able to give due consideration to information like this, and then alter the odds depending on the expected influence of global climate features such as El Niño.

## On-line climate graphics




Climate maps and line plots of climate site observations are available on subscription from the Climate Now website at www.niwa.co.nz/ncc/climatenow.



Unusually parched Southland pickings – but a green tinge on the hills renews hope of an end to the drought.

Cover photo: *David Turner*



*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 on the web. Comments and ideas are welcome. Please contact Alan Porteous, Editor
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