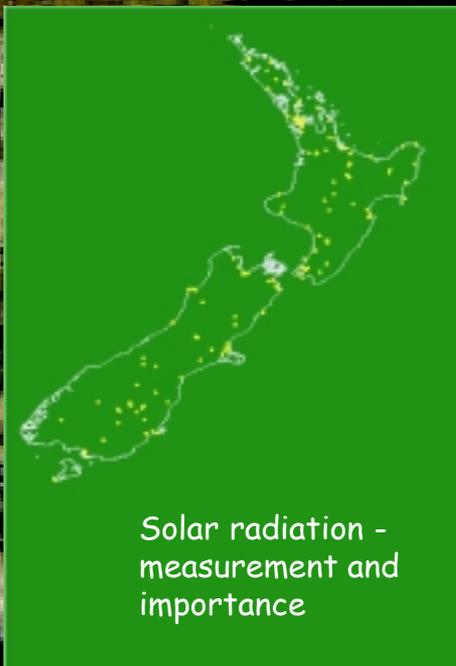


The Climate Update

May - warm in many areas

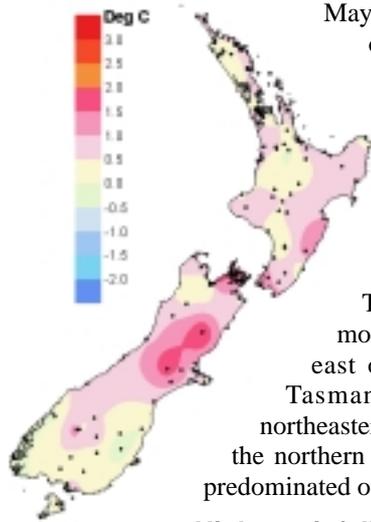
Next three months - mostly normal rainfall and above average temperatures



Solar radiation -
measurement and
importance

New Zealand climate in May 2003

Mean air temperature



May temperatures above average

May was much warmer than average over most of New Zealand. The May national average temperature of 11.6 °C was 1.1 °C above normal, the warmest since May 2000.

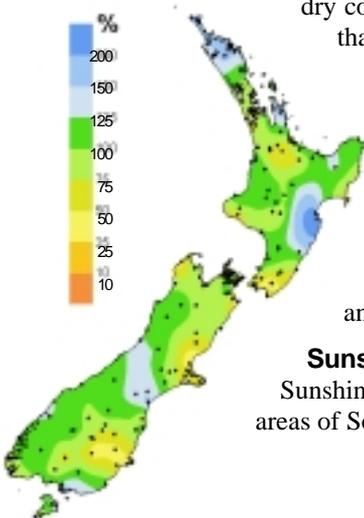
Farewell Spit recorded its highest mean temperature (13.7 °C) since records began in 1971, while Hanmer's temperature for the month was 2.2 °C above its historical May average.

The month's climate was dominated by more frequent anticyclones ('highs') to the east of the North Island and southwest of Tasmania. Between these systems, mild northeasterlies were more frequent than normal over the northern half of the North Island, and westerlies predominated over southern New Zealand.

Higher rainfall than in April

Rainfall was close to normal or above normal in large areas of the country, in contrast to the predominantly dry conditions of April. Conditions were wetter than average throughout northern Northland, King Country, Tongariro-Taupo, Hawke's Bay, and the west coast of the South Island. Rainfall was twice the average at Cape Reinga in the far north and in parts of Hawke's Bay. However, totals were less than a third of average in parts of southern Wairarapa, north Canterbury, coastal Otago and inland Southland.

Rainfall %



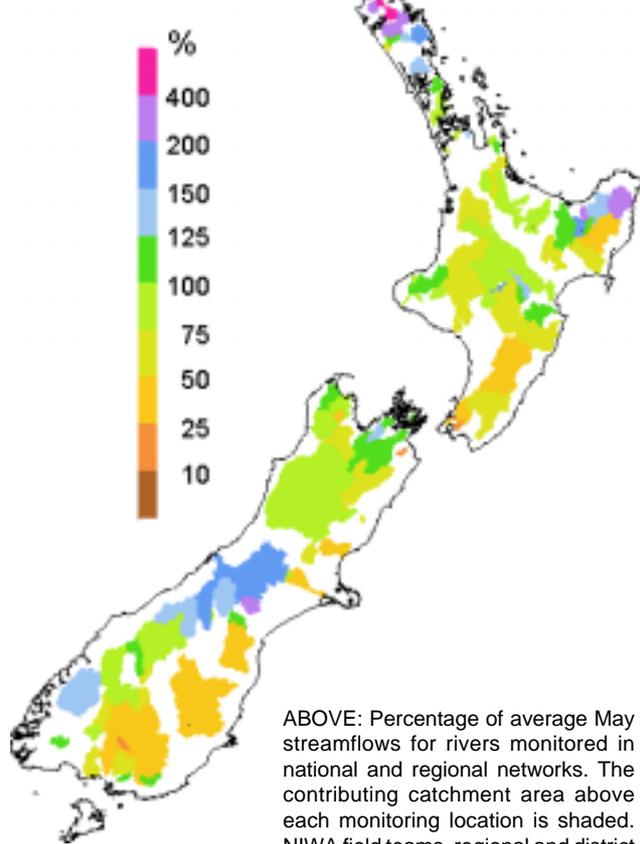
Sunshine

Sunshine hours were well above average in coastal areas of Southland and Otago, and in Wellington.

Improved river flows over the past month

May streamflows were high in parts of Northland, Coromandel, the East Cape and the central Southern Alps and below normal in the southern North Island, south Canterbury, north & central Otago and Southland. Near normal flows occurred in most other locations.

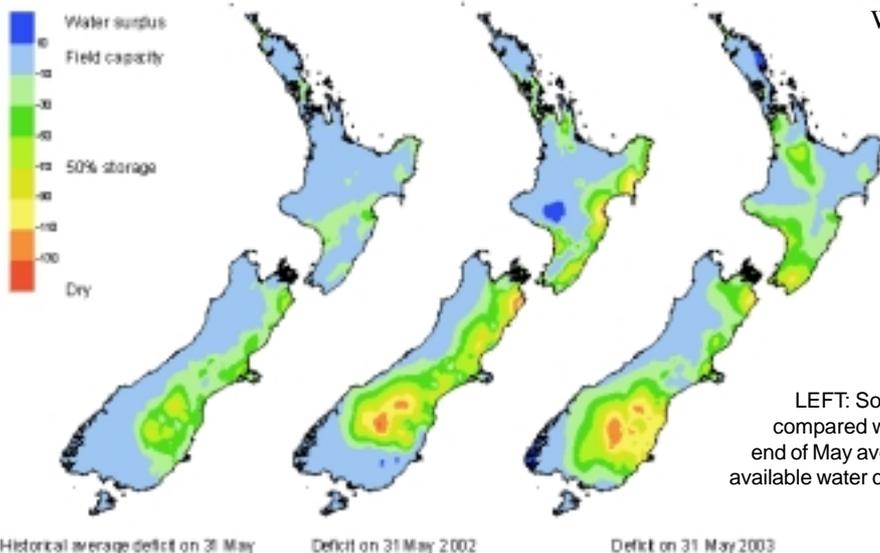
River flows



ABOVE: Percentage of average May 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.

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

Soil moisture deficit



Soil moisture levels much improved

Widespread rain and decreasing evapotranspiration rates in May lifted soil moisture levels in much of the country, with particularly improved conditions in the southern and central North Island. Otago and coastal Marlborough soil profiles contained less than normal available water at the end of the month.

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

Checkpoint

March to May 2003

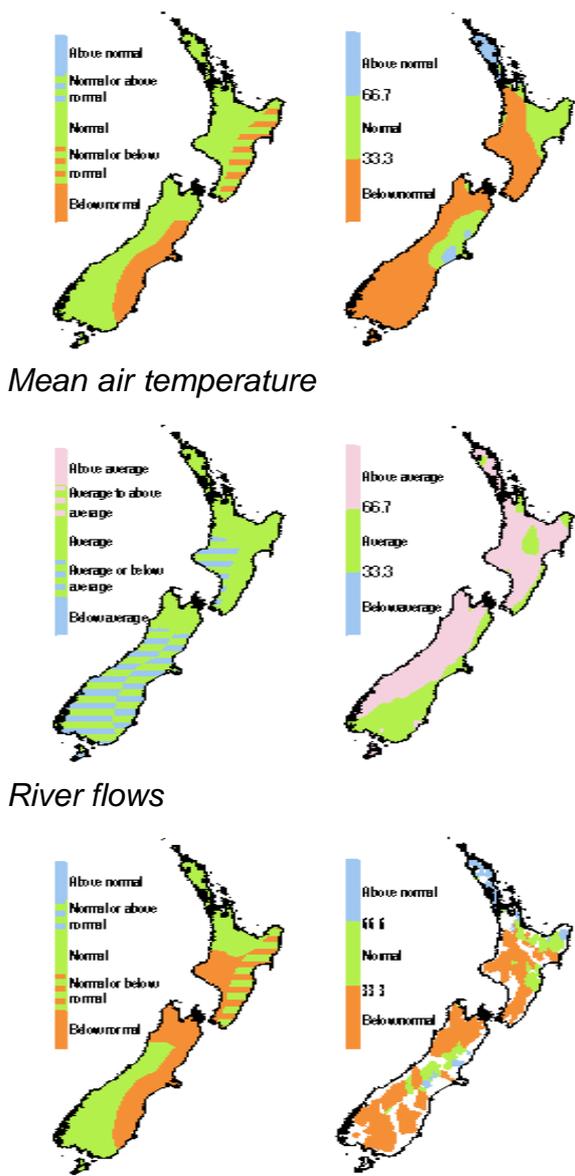
Rainfall was near or below normal as expected in the east of the North Island and in south Canterbury and east Otago. It was wetter than expected in central and north Canterbury, and north of Auckland. Lower than predicted rainfall was recorded in western regions and in the south of the South Island.

Temperatures were near average as predicted in the east and far south of the country, but higher than predicted elsewhere.

Normal or below normal **river flows** were expected in most regions. Above normal flows occurred in Northland, Coromandel, and the East Cape. Normal flows occurred in Bay of Plenty, Hawke's Bay, and the central Southern Alps, and below normal flows occurred elsewhere.

Rainfall Outlook Outcome

What we said What actually happened



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

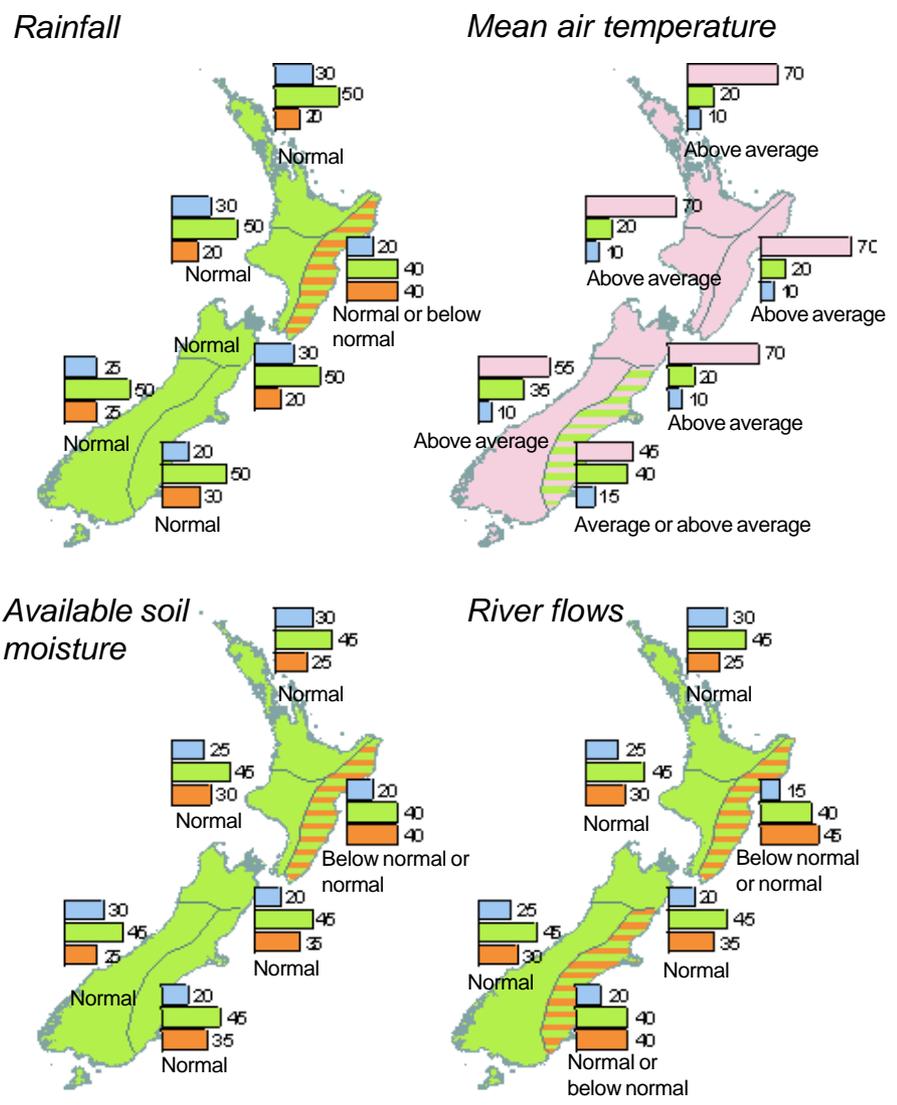
June to August 2003

A mild winter is expected, with above average temperatures in all districts except the east of the South Island, where above average or average temperatures are expected. Despite this, some typical winter cold spells are likely, with frosty conditions in inland places. Local sea surface temperatures are likely to remain above average and local circulation patterns are expected to favour enhanced northerly or northwesterly wind flow.

Normal or below normal rainfall is expected in the east of the North Island and in parts of Southland and inland Otago, with near normal rainfall likely elsewhere.

Soil moisture levels are predicted to be normal in most regions. River flows are predicted to be normal everywhere, except for normal or below normal flows in eastern regions of both islands.

The tropical Pacific is moving towards a moderate La Niña, which is likely to last through the winter. Conditions are changing rapidly at present, and there is not yet a clear consensus for spring and summer.



KEY to maps (Example interpretation)

	A	B
No strong climate signal	33	10
Strong expectation of below normal	33	30
Strong expectation of above normal	33	60

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).

Backgrounder



Global radiation

Radiation from the sun drives the circulation of the earth's atmosphere, and gives us our weather and seasons. Global radiation commonly refers to the total radiation from the sun, both direct and diffuse (reflected), that is received at the earth's surface. Radiation can be measured right through the day from soon after sunrise, until just before sunset.



	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
2001-02	5.6	7.5	12.7	14.5	19.1	19.9	17.9	17.4	16.1	8.4	6.0	4.3
2002-03	4.8	7.8	13.0	19.2	20.0	25.2	22.5	22.4	15.5	8.7	5.8	
Average 1990-2003	5.3	8.3	12.8	17.2	21.4	23.4	22.5	19.6	15.3	9.5	6.1	4.7

ABOVE: Global radiation data, shown as megajoules per square metre per day, for Lincoln. The curves show average (black), 1 July 2001 to 30 June 2002 (blue), and the current season, 2002–2003, red.

Global radiation differs from the typical measure of sunshine hours, which detects only direct light from the sun, uninterrupted by clouds or other interference. Global radiation can sometimes be high on days with light cloud layers, when direct sunshine might not be detectable.

Solar radiation is critical to any agricultural economy, because it is the main driver of evapotranspiration, and provides the energy that plants use to produce cells and grow.

While warm, sunny conditions can encourage faster plant development, overcast skies can lead to problems such as high humidity that might encourage disease infection, or low bee activity during spring pollination.

The figure below shows the difference in summer global radiation between the 2001–02 and the 2002–03 seasons at Lincoln. The earlier season was characterised by cloudy conditions along the Canterbury coast, associated with a La Niña event, and caused problems with crop ripening. The latter season, associated with a moderate El Niño, had higher radiation levels.

The difference between the two seasons highlights the possibility of typical, and therefore perhaps predictable, differences in solar radiation that can be associated with large scale variations in atmospheric circulation.

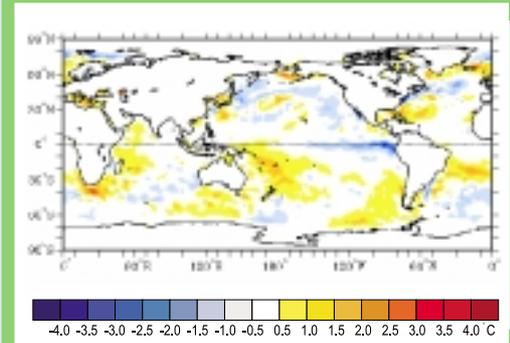
With the possibility of La Niña affecting the coming growing season, it could be worthwhile for agricultural managers to investigate this further.

Global setting

La Niña-like conditions developing

The tropical Pacific is moving towards a moderate La Niña, which is likely to last through the winter. Conditions are changing rapidly at present, and there is not yet a clear consensus for spring and summer.

Around New Zealand the margin between average and current sea surface temperatures has slowly increased in the past six months, reaching +0.4 °C in May.



ABOVE: Mean sea surface temperature departures from normal for May 2003. Reproduced courtesy of NOAA/Climate Diagnostics Center.

Update on the SOI

The mean Southern Oscillation Index (SOI) for May was -0.8, with the three month average now at -0.8. 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.



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.
Email: ncc@niwa.co.nz **Phone:** 0-4-386 0300 **Fax:** 0-4-386 0341
Visit our website: www.niwa.co.nz/ncc

Cover picture:
 Pelorus River in the Richmond Range, northern South Island. A distinctive change to smaller vegetation marks the high flow level.
Photograph: Alan Porteous

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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

