# The Climate Upolate 

## A monthly newsletter from the National Sllmate Centre

June rainfalls were above average in the west of New Zealand, but very low in Canterbury. A warm month with high temperatures in the eastern South Island. River flows high in the west, low in the east, normal to low in Northland.

Outlook for July to September typical late winter conditions are expected.

## New Zealand climate in June 2004



Above average temperatures and wet in the west
Air temperatures of more than $0.5{ }^{\circ} \mathrm{C}$ above average in most places, and more than $1.0^{\circ} \mathrm{C}$ above average in many places, ranked last month as the fifth warmest June on record. The largest temperature anomaly was at Hanmer Forest, with $+2.6^{\circ} \mathrm{C}$. Rangiora and Christchurch Airport recorded their highest June mean temperatures.

More northwesterlies than usual produced the milder conditions. They also caused well below average rainfall in some eastern South Island districts, with less than 10 mm recorded in some places, but above average rainfall in many western regions.

The North Island received more rainfall than normal in central areas and from East Cape to Mahia.

For more information on the climate in June, visit the climate summaries page at www.niwa.co.nz/ncc/cs/mclimsum_04_06

## Dry spots in Kaikoura and Canterbury

Low rainfalls in Kaikoura and in parts of mid Canterbury have delayed soil moisture recharge to normal levels in those areas. Elsewhere in the country, soil moisture levels are near or above normal, except in parts of Otago, where soil moisture deficits were greater than normal at the end of June.


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

## Sea surface temperatures



Difference from normal sea surface temperatures in the seas around New Zealand. SSTs around New Zealand were mostly a little below average, with an area of above average temperatures to the east.

## High river flows in the west

Stream flows were above normal in the west and the centre of the North Island, East Cape, and Wairarapa, and in northern, alpine, and southwest South Island. Stream flows were below normal in coastal Canterbury and Marlborough, and in northern Hawke's Bay, and normal elsewhere.


## Checkpoint

## April to June 2004

Rainfall was near normal as predicted in many areas, but was higher than predicted for the northern North Island. Bay of Plenty and East Cape and the northern and southern extremities of the South Island were wetter than predicted.

Temperatures were near average in the North Island, in line with the outlook for April to June, but higher than forecast in most of the South Island.

Soil moisture levels were below normal as predicted in north Otago and coastal Canterbury. River flows were above normal in west Otago, northwest South Island, and western North Island, low in Northland (as predicted), and low in Hawke's Bay, east Otago, coastal Canterbury, and Marlborough. Elsewhere, flows were normal.

## Outlook <br> Rainfall <br> What we said

## Outcome

What actually happened


## Mean air temperature



## River flows



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

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 $0.5^{\circ} \mathrm{C}$.

## Outlook

## July to September 2004

During the next three months, mean sea-level pressures are expected to be near average in the Tasman Sea and over New Zealand, with slightly enhanced westerly quarter winds to the south of the country during late winter. Sea surface temperatures are likely to be near or slightly above average around New Zealand.

Temperatures are expected to be average or above average in the North Island, and average in the South Island.

Rainfalls are expected to be near normal in all regions. Normal soil moisture levels and streamflows are expected in all regions.

The El Niño-Southern Oscillation remains in a neutral state - no El Niño or La Niña is expected through spring 2004.


## 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).

## Backgrounder



## Fifteen decades of climate record

The New Zealand instrumental air temperature record goes back to 1853 and provides us with a valuable indication of how the climate has changed since the mid 19th century.

The figure below shows the mean temperature anomaly for spring (green), summer (yellow), autumn (pink), and winter (blue) for each decade from the 1850s. Note that the first and last decades are incomplete. The line traces the all-season average anomaly over the period, from -0.54 in 1853-60 to +0.54 in 2001-03.

Winter temperatures appear to have changed the most over this period, from $\mathbf{- 0 . 7 4}$ to +0.84 , a change of more than $1.5^{\circ} \mathrm{C}$.


Mountain mists on a warm winter's day near Hanmer. June air temperatures at Hanmer were $2.6^{\circ} \mathrm{C}$ above average.

Cover photo: Alan Blacklock
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## 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

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