Number 35 15 May 2002

NIWA
Taihoro Nukurangi

The Climate Update

A monthly summary of New Zealand's climate from the National Climate Centre for Monitoring and Prediction

April 2002: Timely rainfall in some dry areas

Some very dry condtions in the east of the country were alleviated by April rains... *page 2*

A warmer than normal start to winter is likely

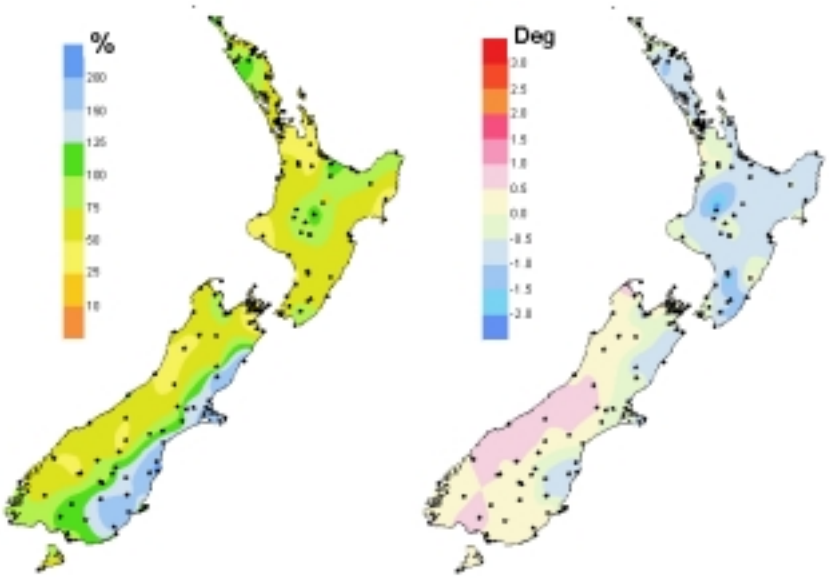
Normal or above normal temperatures are expected over much of the country for the next three months ... *page 3*

Past El Niños: spring rainfall in Marlborough?

45% of past El Niños were drier than average ... *page 4*

New Zealand climate in April 2002

Rainfall **Mean air temperature**



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

East–west divide in the south

Below average rainfall with above normal temperatures and abundant sunshine occurred in the west of the South Island, while the east of the island recorded above average rainfall and cooler than normal conditions.

Over much of the remainder of the South Island temperatures were near normal. Parts of coastal Southland and Buller were warmer than normal.

Much of the North Island was cooler than normal, with temperatures of 0.5 °C or more below average in many areas.

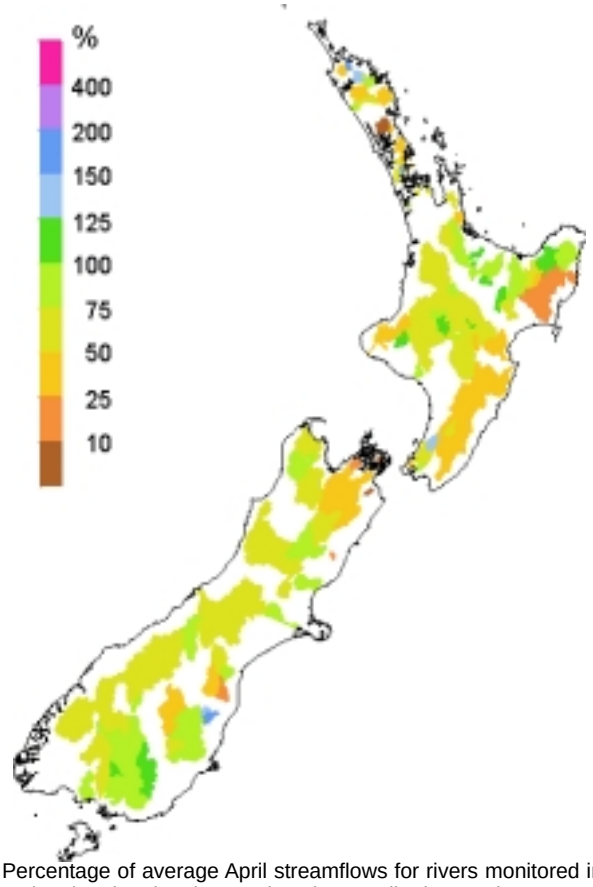
Timely April rain

A few days of rainfall at the beginning and at the end of the month meant conditions were wetter than normal in coastal Bay of Plenty, the Central Plateau, Kaikoura, coastal Canterbury, and much of Otago. Elsewhere, rainfall was below normal and particularly low in south Taranaki, Horowhenua, Wellington, central Marlborough, Buller, north Westland and Fiordland.

Cold intervals

Cold southerlies and southeasterlies at the start of April brought early snowfalls to high country areas, and huge swells damaged roads and property in some eastern coastal regions.

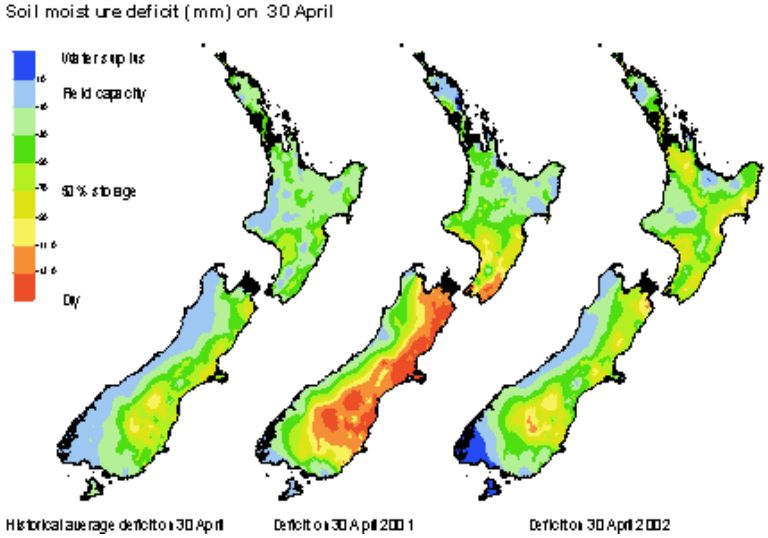
River flows



Percentage of average April 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.

Mostly below normal streamflows in April

April flows were below normal in most places. Nearer normal flows occurred in Bay of Plenty, some parts of Northland, the South Island east coast, and Southland.



End of month rainfalls relieve dry soils

The very dry soil conditions that developed in eastern and some inland regions during early April were alleviated by some timely rainfall late in the month. Notable were significant rainfalls along the east coast of the South Island from Kaikoura to south Otago. Falls of over 60 mm were also recorded in some locations in inland Otago.

In the southern half of the North Island, and across most of the South Island, soil moisture levels were higher at the end of April than at the same time last year. However, Marlborough and parts of the east coast of the North Island remained drier than normal.

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

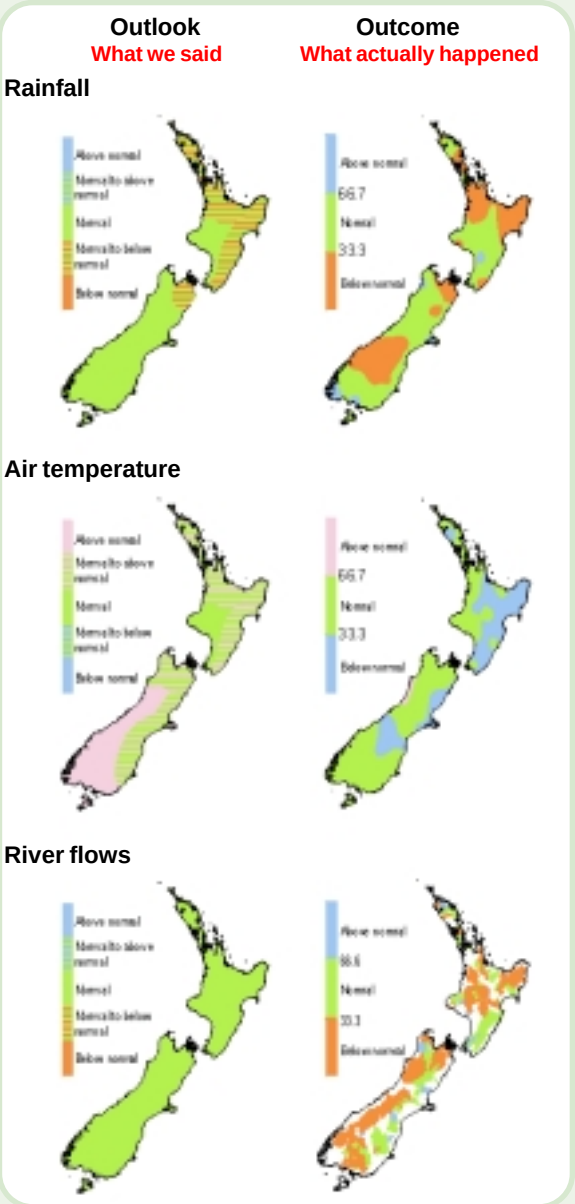
Checkpoint

February to April 2002

Rainfall was below average, as forecast, in the northern North Island, Gisborne and eastern Marlborough. It was lower than expected in inland South Canterbury and Central Otago, and higher than expected in Southland.

Air temperatures were expected to be normal or above normal in all districts. This was correct for much of the country, but eastern regions from Bay of Plenty to Canterbury were cooler than predicted.

River flows were near normal, as expected, in the east of both islands. Elsewhere, flows were normal or below normal in the North Island, and below normal in the South Island.



The three outcome maps (right column) give the tercile rankings of the rainfall totals, mean temperatures, and river flows that eventuated for February to April 2002. Terciles were obtained by dividing ranked February to April 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.
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

May to July 2002

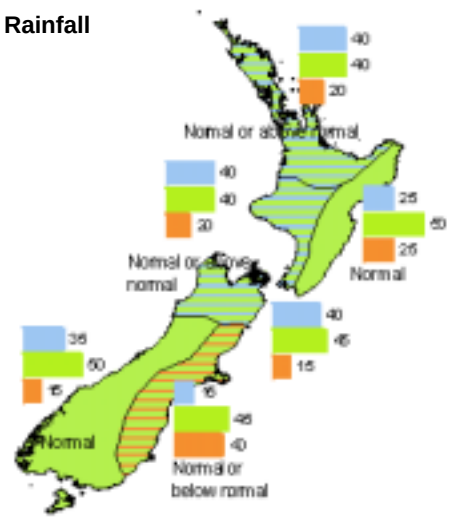
It is still possible that a developing El Niño event may influence New Zealand climate by spring 2002, but it is not expected to affect New Zealand climate over the coming winter. Conditions in the tropical Pacific that indicate how El Niño is developing have changed little between March and April. Present indications are that this El Niño is likely to be a weak to moderate event.

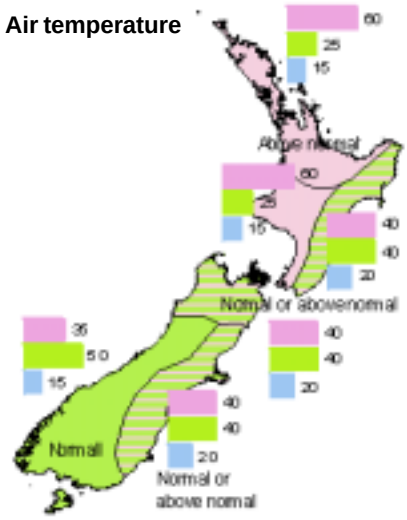
Sea-surface temperatures around New Zealand are expected to be near normal for the May-July period.

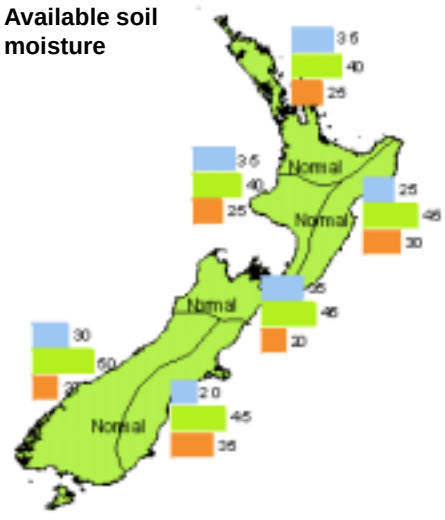
New Zealand temperatures are expected to be above normal in the north and west of the North Island, normal in the west of the South Island, and normal or above elsewhere.

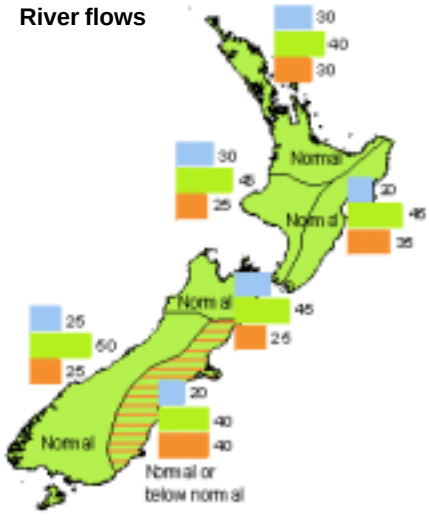
Rainfall is expected to be normal or above normal in the north and west of the North Island, normal or below normal in the east of the South Island, and near normal elsewhere.

Normal soil moisture levels and river flows are predicted for all regions of the country, except for normal or below normal river flows in the east of the South Island.





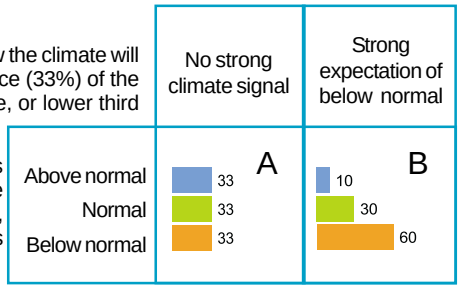




KEY to maps (Example interpretation)

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.

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).



Global setting

El Niño and Marlborough spring rainfall

Signs remain in place that a weak to moderate El Niño may develop by spring (see the Climate Outlook on page 3). The best indication of the effect that might have on spring rainfall can be found in the historical record of previous El Niño springs. Rainfall observations at Sevenoaks, Marlborough, show that an El Niño spring in Marlborough tips the balance in favour of drier than normal conditions.

Marlborough spring rainfall

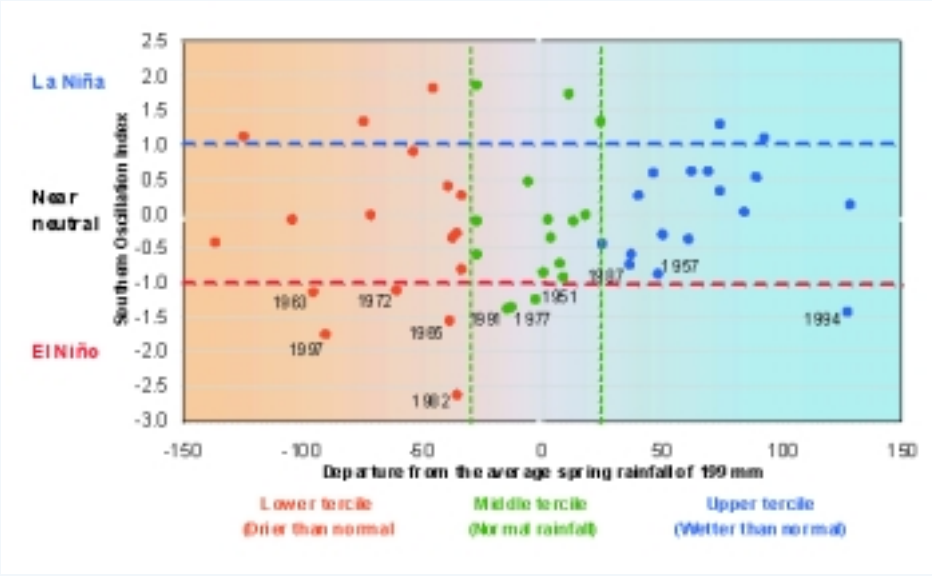
Rainfall in Marlborough during spring typically amounts to 150–200 mm across much of the region, with less along the coast, and over 300 mm in parts of the hill country.

At Sevenoaks the rainfall record indicates that spring rainfall is highly variable (see figure below). Notable in the data shown here is that the lower tercile spring rainfalls, shown in orange, occur across almost the full range of values of the SOI. Droughts in Marlborough are not confined to El Niño years, and have in fact occured three times in strong La Niña springs.

El Niño years

Rainfalls occuring during El Niño springs are shown in the figure below. The number of El Niño spring rainfalls occurring in the lower, middle, and upper terciles, is 5, 3 and 3 respectively, suggesting a 45% chance of drier than average conditions during an El Niño spring. The probability of above average rainfall is about 25%.

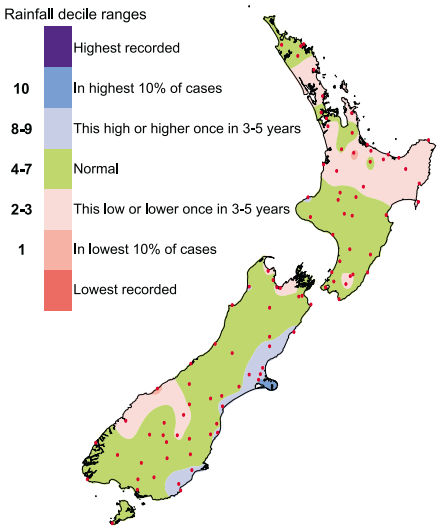
Note that one of the wettest springs since 1950, 1994, was also an El Niño year. This was in spite of the fact that conditions along the east coast of both the North and South Islands were drier than normal, as would be expected during an El Niño. This highlights the uncertainty of predicting rainfall patterns in El Niño years, because the typically wetter conditions in the west of the country in those years can spread at times into eastern regions.



ABOVE: Spring rainfall in Sevenoaks, Marlborough, 1950 to 2001. Data points are classified by colour into three equal groups (terciles). Tercile ranges for Sevenoaks are: lower tercile, 34 mm or more below average, orange points; middle tercile, 33 mm below average to 24 mm above average, green points; upper tercile, 25 mm or more above average. The mean three month Southern Oscillation Index (SOI) is shown on the vertical axis. El Niños typically have a strong influence on the New Zealand climate when the three month SOI is at or less than -1 (at or below the dashed red line), and similarly, strong La Niñas occur when the SOI is plus 1 or more (at or above the dashed blue line). El Niño springs are labeled.

2002 rainfall to date

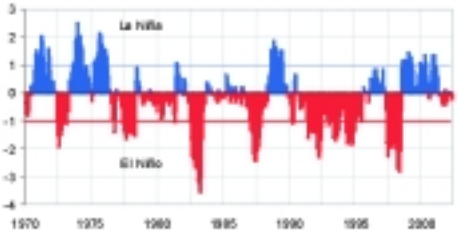
Rainfall so far this year has been lower than average in much of the north of the North Island and in parts of the north and west of the South Island. Eastern areas of the South Island have been wetter than average.



ABOVE: Total rainfalls for 1 January to 7 May 2002, shown according to decile rankings of all rainfalls for this period from 1972. Dots indicate observation sites used in the analysis.

Update on the SOI

The Southern Oscillation Index (SOI) for April was -0.5, with the three month average at about -0.2. A weak to moderate El Niño is expected to develop by spring.

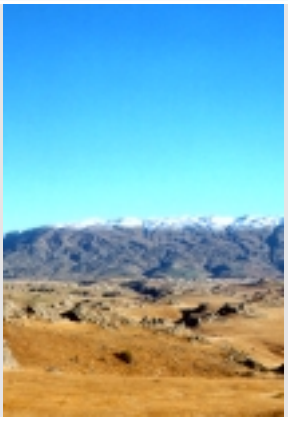


ABOVE: The Southern Oscillation Index (SOI), a measure of changes in the atmospheric pressures across the Pacific, smoothed over three months. La Niña or El Niño typically have an observable effect on the New Zealand climate when the SOI is greater than 1 or less then -1 respectively.

The Climate Update

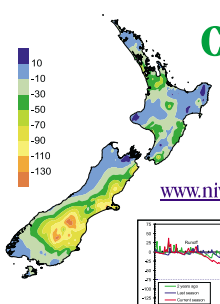
The Climate Update is a monthly newsletter from NIWA's National Climate Centre for Monitoring and Prediction and is published by NIWA, PO Box 14-901, Wellington. It is also available via the web.

Comments and ideas are welcome. Please contact:
Alan Porteous, Editor,
E-mail: ncc@niwa.co.nz
Telephone: 0-4-386 0300
Facsimile: 0-4-386 0341
Visit our **website**: www.niwa.co.nz/ncc



Cover picture: First dusting of snow in Central Otago.

Photograph: David Turner



Climate Now

For on-line updates of climate maps and line plots. See:

www.niwa.co.nz/ncc/climatenow/