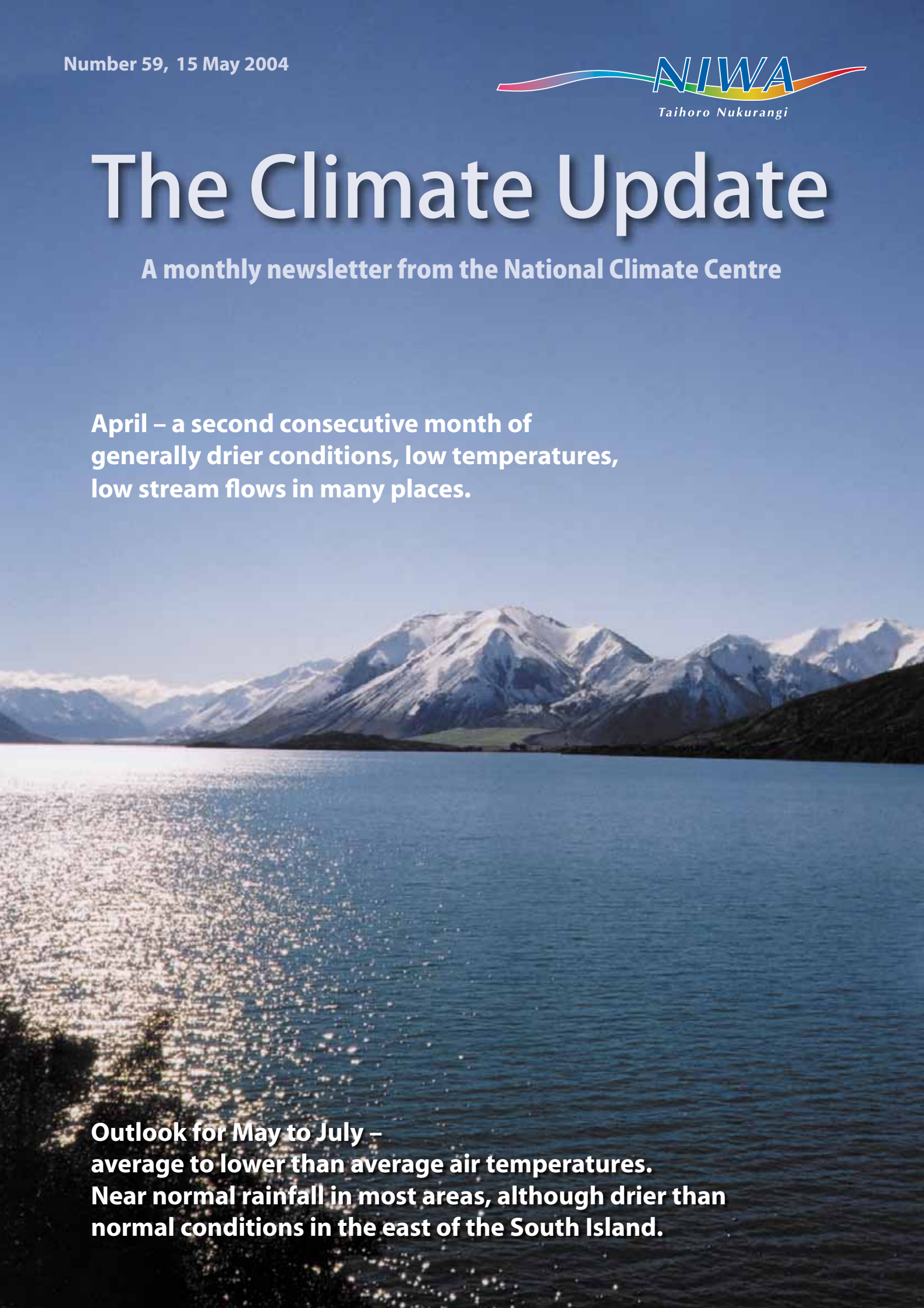
Number 59, 15 May 2004

NIWA
Taihoro Nukurangi

# The Climate Update

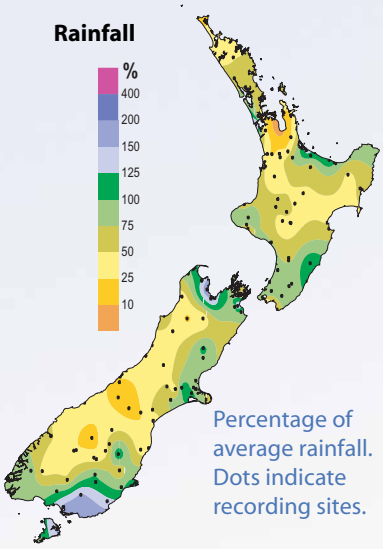
A monthly newsletter from the National Climate Centre



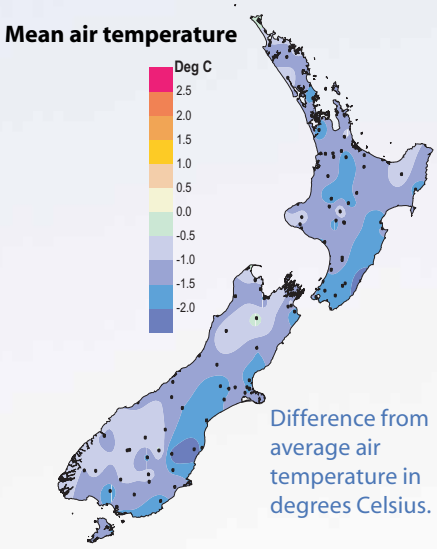
**April – a second consecutive month of generally drier conditions, low temperatures, low stream flows in many places.**

**Outlook for May to July –**
**average to lower than average air temperatures.**
**Near normal rainfall in most areas, although drier than normal conditions in the east of the South Island.**

# New Zealand climate in April 2004




Percentage of average rainfall. Dots indicate recording sites.




Difference from average air temperature in degrees Celsius.

## Dry and cool

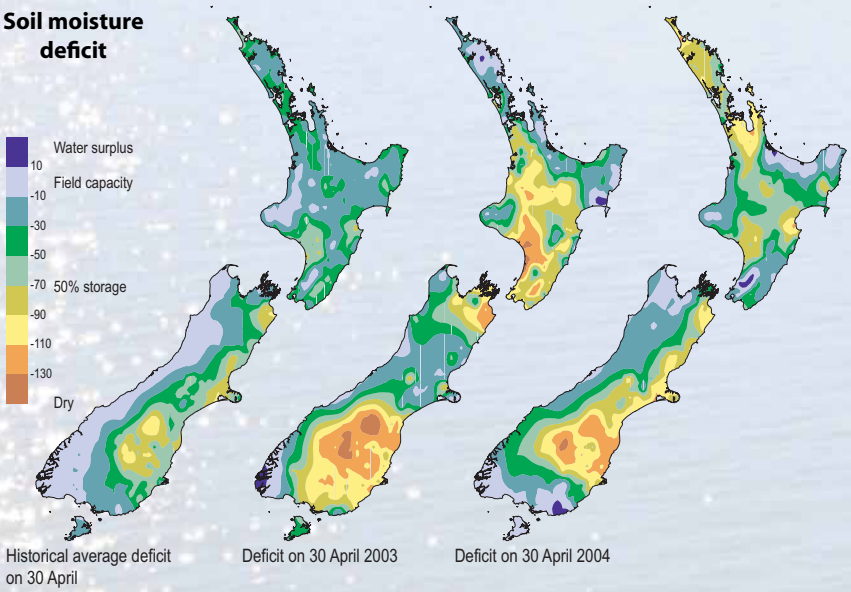
April continued the generally cold dry theme of March. Rainfall was well below average over much of the northern half of the North Island until almost the end of the month. Less than 50% of average April rain fell in Northland, Auckland, much of Waikato, the central North Island Plateau, Westland, Fiordland, south Canterbury, and the Southern Lakes district. In contrast, rainfall was well above average in parts of Bay of Plenty and Southland.

Mean temperatures were well below average throughout much of New Zealand, especially in King Country, Wairarapa, and eastern and southern parts of the South Island.

**For more information on the climate in April, visit the climate summaries page at www.niwa.co.nz/ncc/cs/mclimsum_04_04**

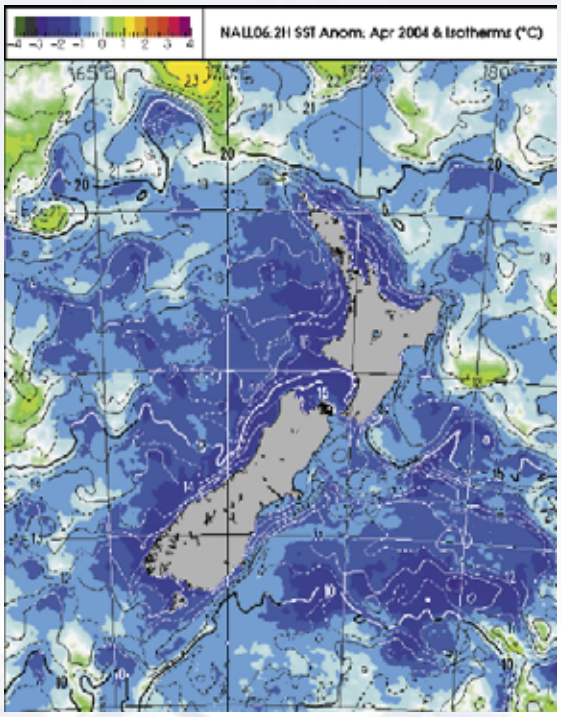
## Dry spots linger

Soil moisture levels in eastern regions of the South Island, in North and Central Otago, and in parts of the north and east of the North Island remained lower than normal at the end of April. Southland soils, and western parts of the North Island, were wetter than at the same time last year.




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.

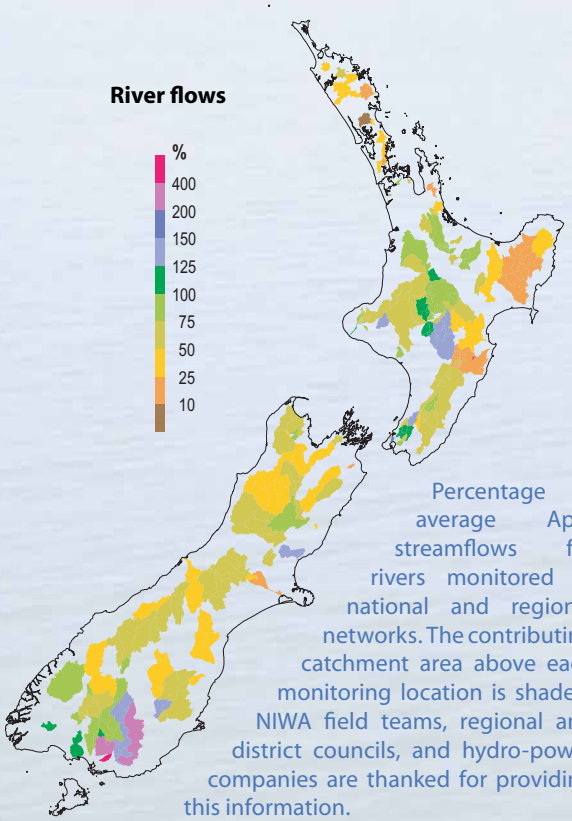
## Sea surface temperatures




Difference from normal surface water temperatures in the seas around New Zealand. Temperatures were generally 1–2 °C below average during April.

## Low stream flows widespread

Despite low April rainfalls in the Waikato and central North Island, stream flows in that area were still receding from very high rates at the end of February and were near normal. Stream flows were also near normal in the western North Island, above normal in South Otago and eastern Southland, and below normal in most other areas.




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.

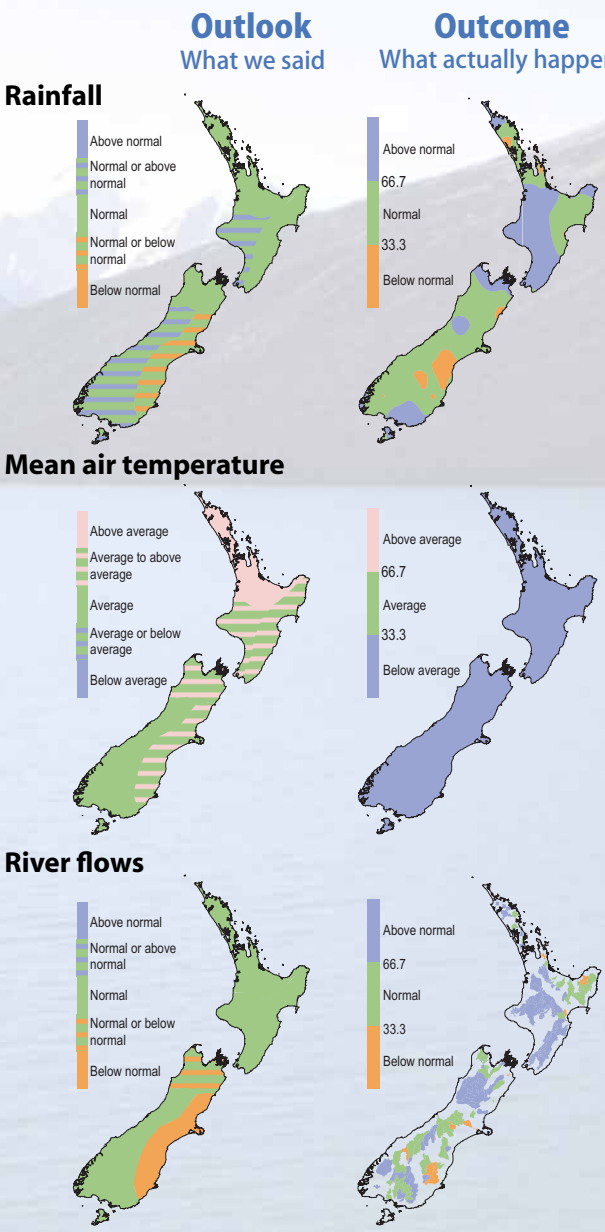
# Checkpoint

## February to April 2004

Mean atmospheric pressure was below average to the south of New Zealand as predicted, but wind patterns were more southwesterly than expected, bringing lower than average air temperatures over the country.

Rainfall was well predicted in most places.

Although April was a dry month over much of the country, a sequence of severe February floods gave exceptionally high February-April streamflows for most of the North Island apart from the Bay of Plenty, East Cape, and northern Hawke's Bay regions, where normal or above normal flows occurred. In the South Island, February-April river flows were above normal in the Buller region and normal to above normal elsewhere.




The three outcome maps (right column) give the tercile rankings of the rainfall totals, mean air temperatures, and river flows that eventuated from February to April, 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 in the range of the average plus or minus 0.5 °C.

# Outlook

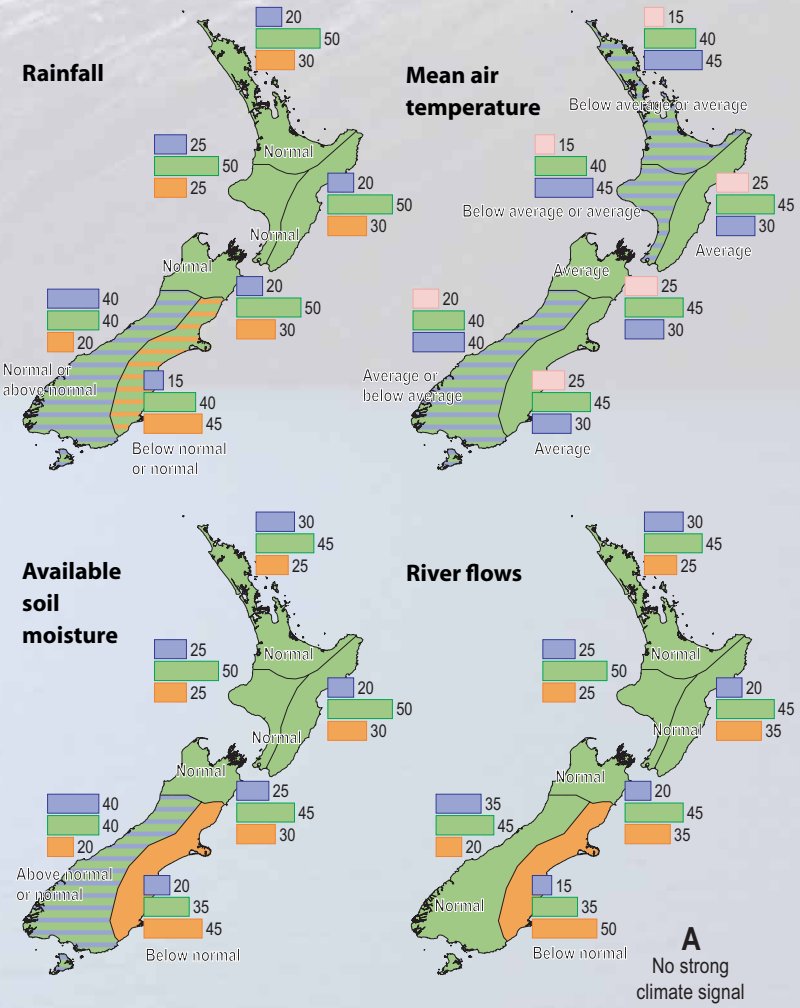
## May to July 2004

Above average mean sea level pressures are expected to the north of New Zealand with a tendency towards more cool westerly winds than usual.

Local sea surface temperatures are likely to remain below average around New Zealand over the coming three months. Air temperatures are expected to be below average or average in all regions.

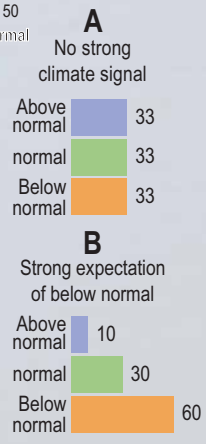
Rainfalls are expected to be near normal in the North Island and northern South Island, normal or above normal in the western South Island, and normal or below normal in the eastern South Island. Below normal soil moisture levels and streamflows are expected in the east of the South Island, while above normal or normal soil moisture levels are likely in the west and south of the South Island. Elsewhere, normal soil moisture levels and streamflows are expected.

No El Niño or La Niña is expected through winter 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

## The state of hydroelectric power storage

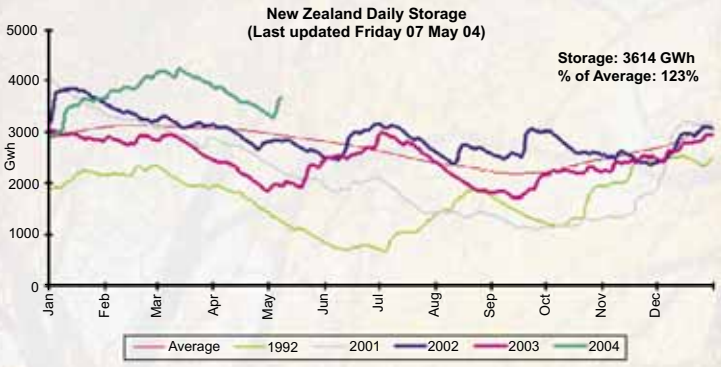
New Zealand's electricity usage rises with the onset of winter. This rise in use matches the winter increase of inflows to hydroelectric power stations in the North Island. In contrast, in the South Island, there is a mismatch. Inflows into the major South Island hydroelectric catchments fall in winter because winter precipitation is somewhat lower than in summer and because at higher elevations winter precipitation accumulates as snow. The mismatch for the South Island hydroelectric stations is particularly important because these stations have over 40% of the country's electricity generation capacity.

Three storages, Lakes Tekapo and Pukaki in the central South Island and Lake Taupo in the central North Island dominate the national scene. Lakes Tekapo and Pukaki together provide 55% of the country's controlled storage, and Lake Taupo provides a further 19%.

As well as smoothing out flow variations between dry and wet periods, controlled hydroelectric water storages provide buffers for managing the mismatch between low South Island winter inflows (supplies) and high winter power demands. Managing the storages is a continuous juggling act. Generating companies have to balance the immediate returns provided by the wholesale electricity market against potential future returns. If climate scientists can reliably predict exceptional seasons (both in terms of precipitation, which supplies inflows, and temperatures that influence demand), generators may be able to manage storages more efficiently to achieve better returns.

The Marketplace Company provides regular updates on the status of hydro storages (www.comitfree.co.nz/fta/ftaPage.hydrology). The graph top right, from this web page, displays the total quantity of potential electrical energy held in all storages in New Zealand for the year to date. The graph also shows the average values for the time of year and the pattern of storage variations for the last three years and the extreme year of 1992. Years 2003, 2001 and 1992 were notable because inflows were low and electricity shortages occurred. Typically the total storage reaches a peak in February, following the snow melt of spring and summer which give higher South Island inflows, and reflecting lower summer usage of electricity. Storage usually is least in September, following higher winter demands and lower South Island winter inflows.

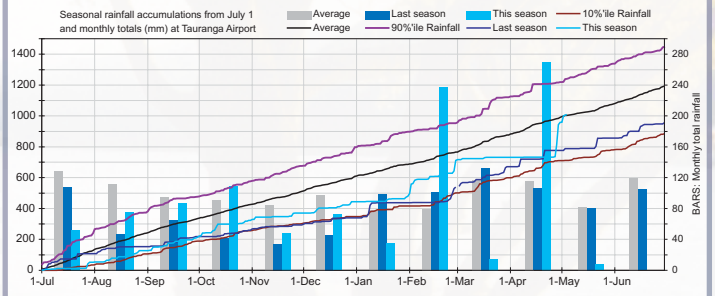
Lake Tekapo




The total potential electrical generation stored in hydro lakes in New Zealand. (Graph by courtesy of M-co, The Marketplace Company.) www.comitfree.co.nz/fta/ftaPage.hydrology

The storages were virtually full early in March 2004, reflecting the exceptional North Island February rainfalls and above normal South Island inflows. Through April the storage levels have fallen, but are still well above normal for the time of year. Shortages of the severity experienced in recent years are unlikely in the next few months. However, the predicted cooler than normal winter conditions will probably see the storages dropping steadily over the next few months.

## 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.

Lake Coleridge in mid April. Hydro lake levels were high in mid March, but inflows declined in April.

Cover photo: *Alan Porteous*



*The Climate Update* is a monthly newsletter from NIWA's National Climate Centre, 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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