Number 66, 15 December 2004

NIWA
Taihoro Nukurangi

The Climate Update

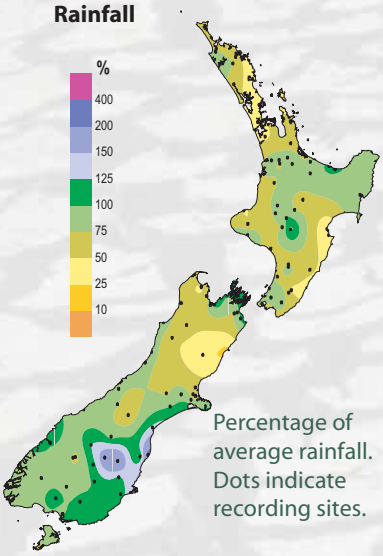
A monthly newsletter from the National Climate Centre

November air temperatures higher than average overall.
Low rainfall in the North Island and north of the South Island.
Low streamflows in the north and east of the North Island.

Outlook for December to February – a tendency for drier conditions in the north and east of the country ranging to wetter in the west and southwest. Average summer temperatures in most places; average to below average in the west and south of the South Island.

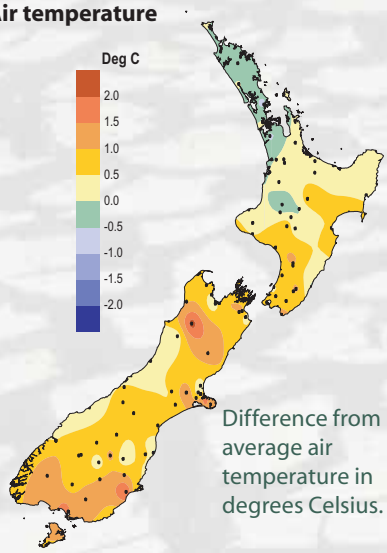
New Zealand climate in November 2004

Rainfall



Percentage of average rainfall. Dots indicate recording sites.

Air temperature



Difference from average air temperature in degrees Celsius.

Mild; dry in the north and east

November was a mild month, with warmer than normal conditions, particularly in the South Island. The national average temperature of 14.3 °C was 0.6 °C above the historical average.

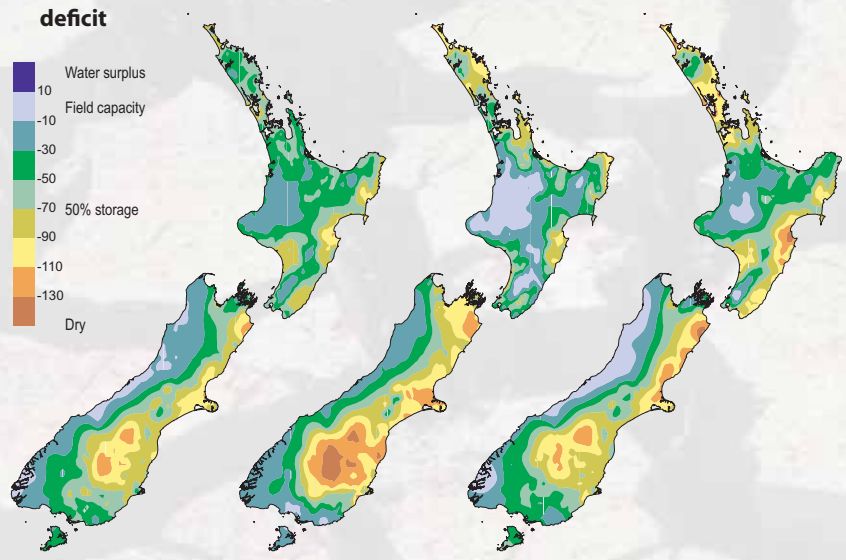
Rainfall was 50% of average in Northland, Auckland, parts of Hawke's Bay, and along the Kaikoura coast and North Canterbury.

For more information on the climate in November, visit the climate summaries page at www.niwa.co.nz/ncc/cs/mclimsum_04_11

Soil moisture: dry spots developing

End of November soil moisture levels were lower than normal in much of Northland, and in Hawke's Bay, Marlborough, and Kaikoura. Elsewhere, moisture conditions were near normal.

Soil moisture deficit



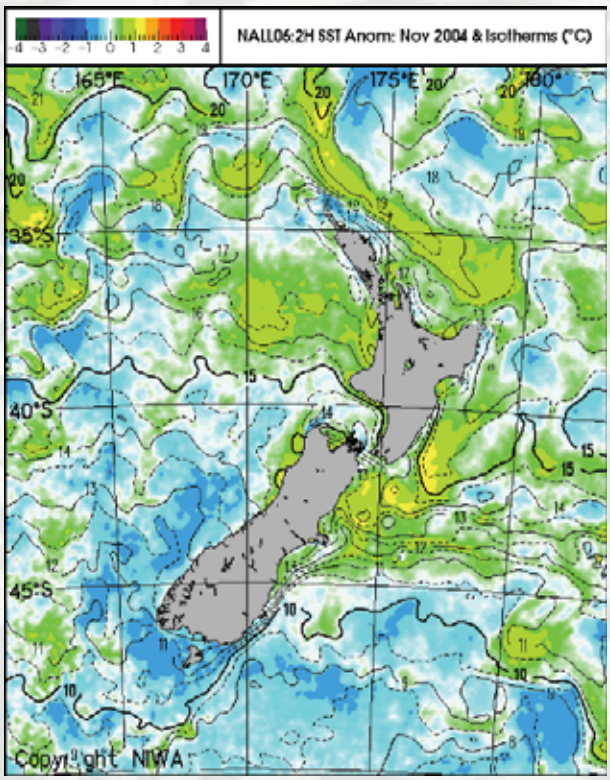
Historical average deficit on 30 November

Deficit on 30 November 2003

Deficit on 30 November 2004

Soil moisture deficit in the pasture root zone at the end of November (right) compared with the deficit at the same time last year (centre) and the long-term end of November 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

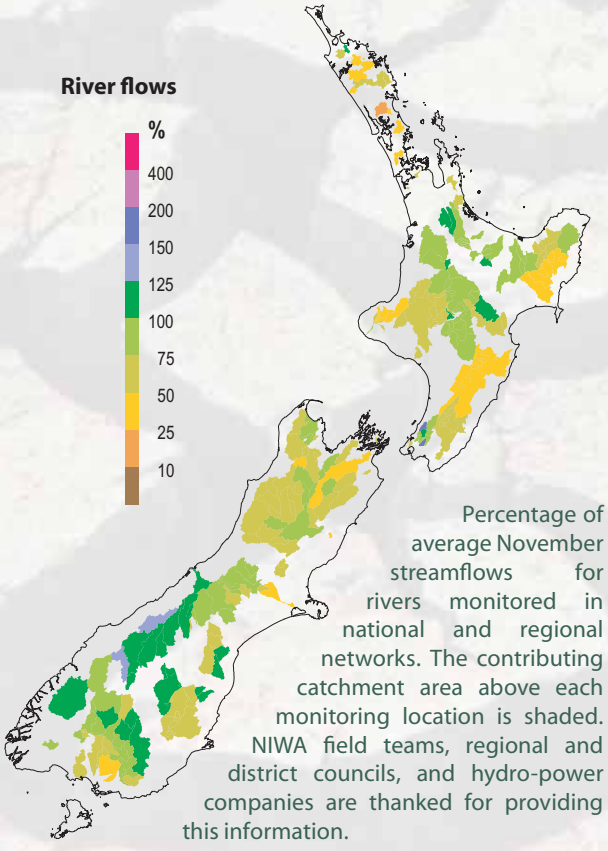


Difference from normal surface water temperatures in the seas around New Zealand. Temperatures of seas adjacent to New Zealand were near average for November.

North Island flows low in some areas

Streamflows were below normal in the north and east of the North Island and the northern South Island. Elsewhere, streamflows were near normal, with a trend to above normal in some South Island alpine catchments.

River flows



Percentage of average November 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

September to November 2004

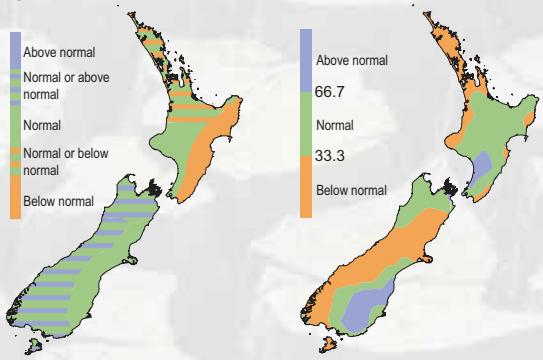
Rainfall was normal to below normal in the north and east of the North Island, as predicted. Higher rainfalls than forecast occurred in the west and southwest of the South Island, and it was drier than predicted in the northeast of the South Island.

Air temperatures were lower than predicted in Waikato, and in the east of the North Island and north of the South Island.

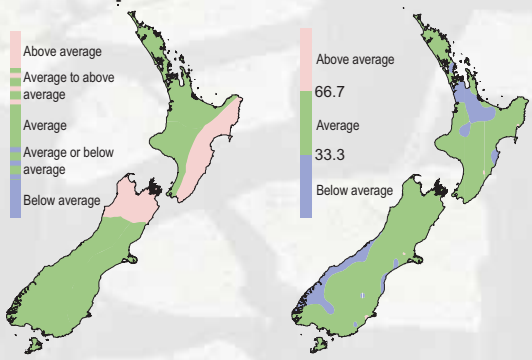
Streamflows were below normal in the northern North Island, and normal in the southwest of the North Island, as predicted. Lower flows than predicted occurred in some catchments in the west of the South Island. Flows were normal or below normal in other locations.

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

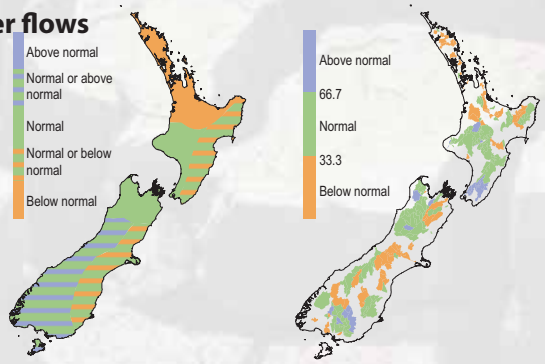
Rainfall



Mean air temperature



River flows



The three outcome maps (right column) give the tercile rankings of the rainfall totals, mean air temperatures, and river flows that eventuated from September to November, 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 °C.

Outlook

December 2004 to February 2005

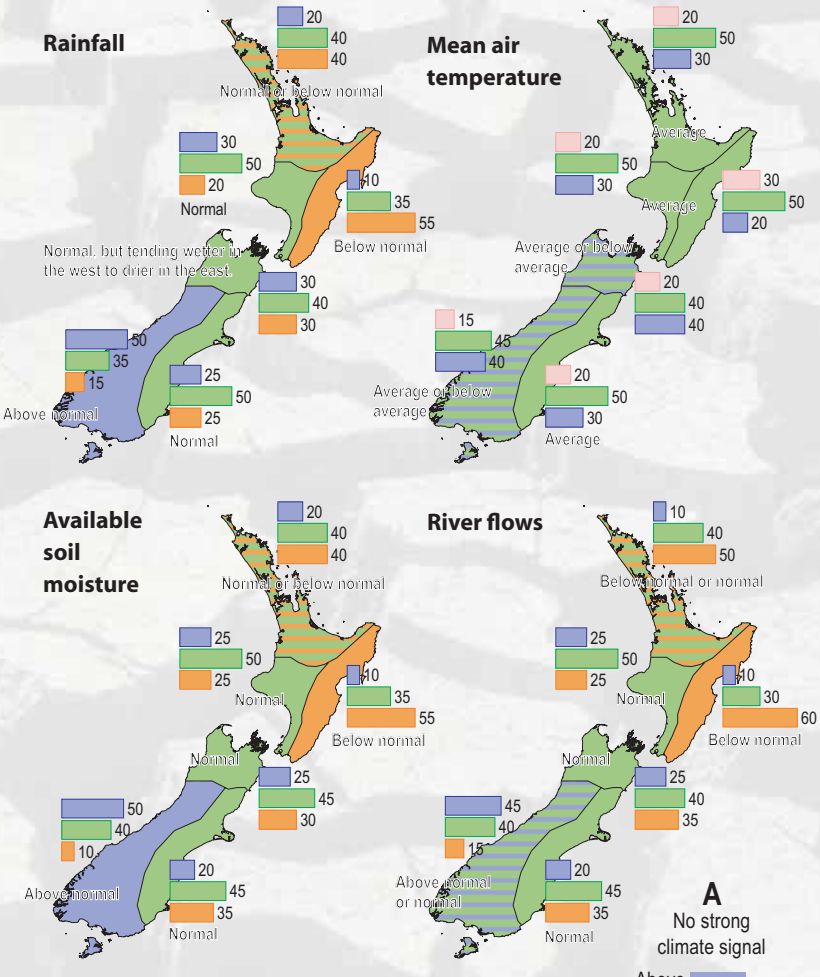
Lower than normal mean sea-level pressures are expected southeast of New Zealand, with stronger than normal west to southwest wind flow over the country. Sea surface temperatures around New Zealand are expected to be near average over the coming three months.

Air temperatures are expected to be near average in the North Island and eastern South Island, and average or below average elsewhere in the South Island.

Normal or below normal rainfall is expected in the north and east of the North Island, and above normal rainfall is expected in the west and south of the South Island. Rainfalls are expected to be near normal elsewhere.

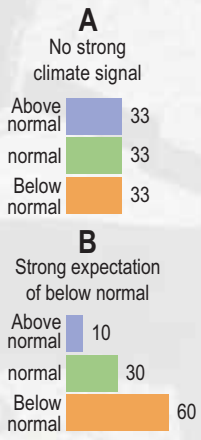
A gradation of soil moisture levels and streamflows is expected, ranging from below normal conditions in the north and east of the North Island to normal or above normal conditions in the west and south of the South Island.

The present weak El Niño in the tropical Pacific should continue through summer 2004–05.



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

Measuring drought

Drought is often hard to quantify, and its severity and duration affect different enterprises in different ways.

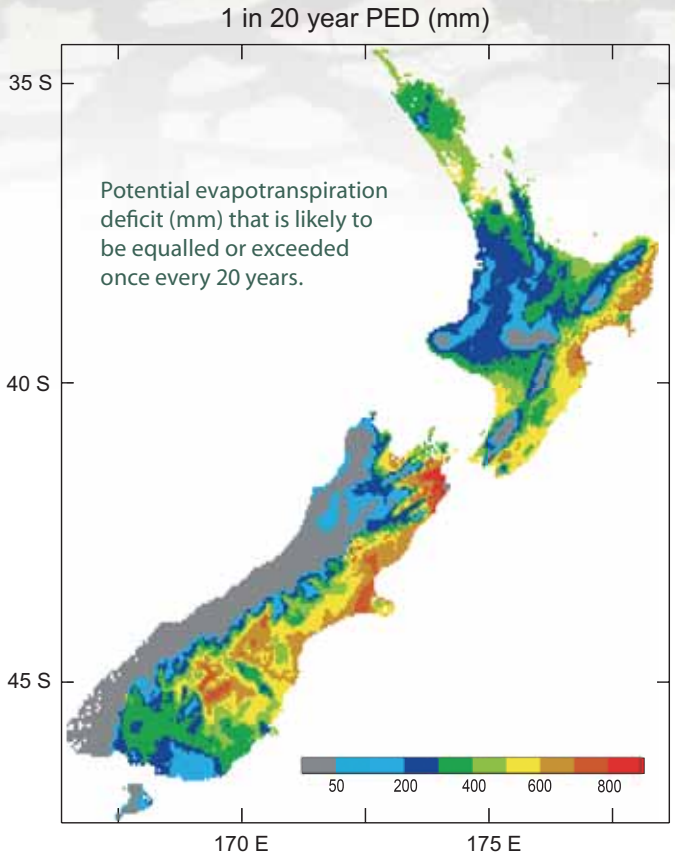
One way of measuring drought is to calculate the amount of water typically available for a particular purpose, and then estimate the reduction in water available for that purpose during low rainfall seasons.

For example, we can estimate the amount of water that is 'consumed' during normal pasture growth in an average season. We can quantify production loss during dry seasons by estimating reduction in outputs like dry matter production or lower stock numbers. When we compare these data with the levels of water deficit that caused them, we can establish critical water deficit thresholds.

Potential evapotranspiration refers to the estimated use of water by pasture when there is no shortage of water available for pasture growth, both through transpiration and evaporation.

Irrigating near Luggate, Central Otago.

When water is short, pasture growth is limited. This water shortage can be referred to as a potential evapotranspiration deficit (PED), or the amount of water needed (by irrigation or rainfall) to keep pasture growing at its potential rate for the season or time of year.



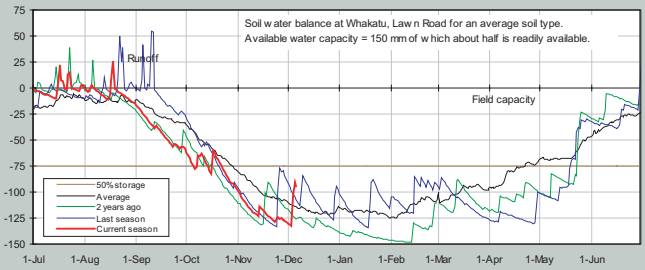
Using a soil water balance, we can calculate PED from daily rainfall (input) and expected water use and losses (output). Most east coast regions of New Zealand, for example, experience a PED of 200 to 400 mm each year.

This approximately equates to 50 to 100 days of reduced pasture growth per year.

The map above shows the level of PED that can be expected about once every 20 years or so, the kind of drought farmers might expect, for example, two or three times during their working lives.

On-line climate graphics

www.niwa.co.nz/ncc/climatenow



Soil water balance at Whakatu, Hawke's Bay. Soil moisture levels have been low during spring, but were boosted by recent rain.

Travelling irrigator, Canterbury Plains. Potential evapotranspiration deficit estimates can improve calculations of water requirements for irrigation.

Cover photo: *Alistair McKerchar*

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
Email: ncc@niwa.co.nz
Phone: 0-4-386 0300. Visit our webpage: www.niwa.co.nz