Number 90, 15 December 2006

NIWA
Taihoro Nukurangi

The Climate Update

A monthly newsletter from the National Climate Centre

October – Drier than normal in eastern Northland and Gisborne, but wet in many other places. Air temperatures were higher than normal in the east of the North Island, while it was cold in the southwest of the country. Stormy westerlies were frequent over the South Island.

Outlook for December to February – more westerly winds than normal are likely, with wet conditions in the west and south of the South Island. Air temperatures are likely to be below normal or normal in most places.

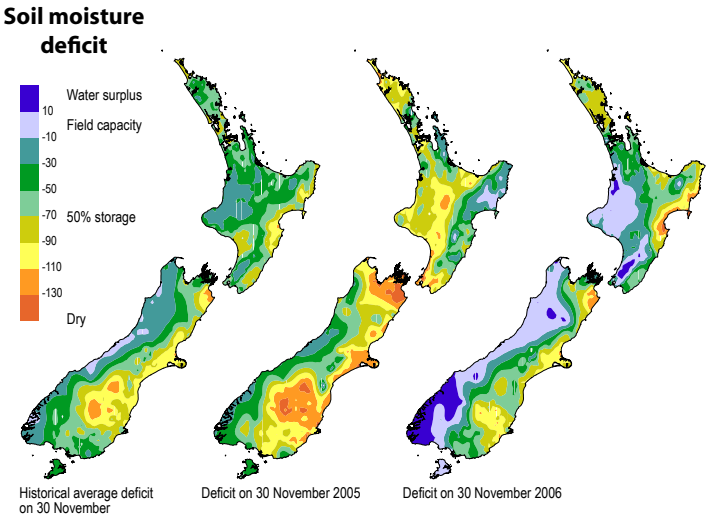
New Zealand climate in November

Contrasts in climate from west to east were a feature of November. Eastern Northland and Gisborne were drier than normal, but it was very wet in Horowhenua, and on the Kapiti Coast, as well as in much of the South Island. The month's temperatures were more typical of midsummer in Gisborne and Hawke's Bay, rather than spring. The southwest of the South Island was cool, and it was windier than usual in the south and east of the North Island and over much of the South Island.

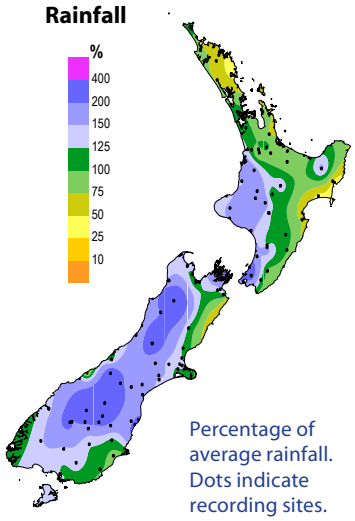
For more information on the climate in November 2006, visit the climate summaries page at www.niwascience.co.nz/ncc/cs/mclimsum_06_11

Dry in Gisborne and Hawke's Bay

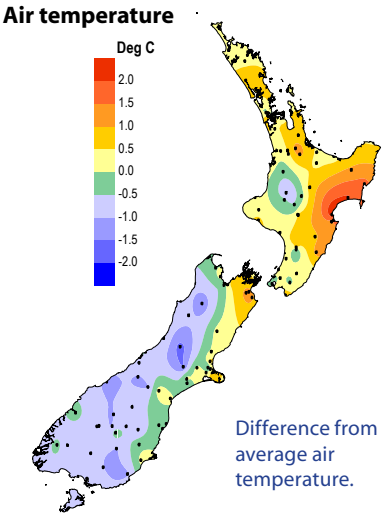
At the end of November soils in parts of Northland, Gisborne, and Hawke's Bay were drier than normal. Soils in much of the west and south of the North Island, and the west of the South Island, were near or at field capacity.



Water balance in the pasture root zone for an average soil type, where the available water capacity is taken to be 150 mm.



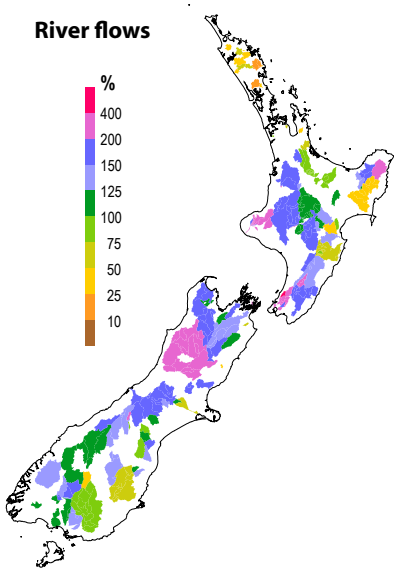
Percentage of average rainfall. Dots indicate recording sites.



Difference from average air temperature.

High flows in wet areas

Many catchments across New Zealand delivered high river flows in November, although low flows were recorded in the far north and in some eastern districts.



Percentage of average November river and stream flows at monitored catchments. NIWA field teams, regional and district councils, and hydropower companies are thanked for providing data.

September to November – the climate we predicted and what happened

Rainfall

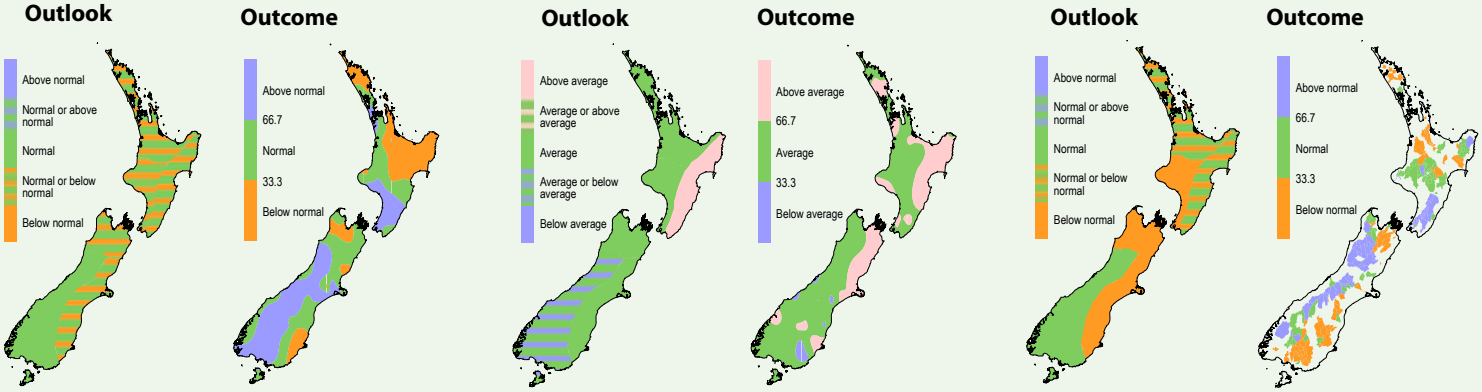
Rainfall was higher than predicted in the southwest of both the North and South Islands. Elsewhere the outlook was generally correct.

Air temperature

Air temperatures were higher than expected in Marlborough and mid to north Canterbury, and in the south and west of the South Island temperatures were mostly in line with the prediction.

River flows

The outlook was correct for many North Island and eastern South Island flows. Some catchments in the southern North Island and western South Island had higher flows than predicted.



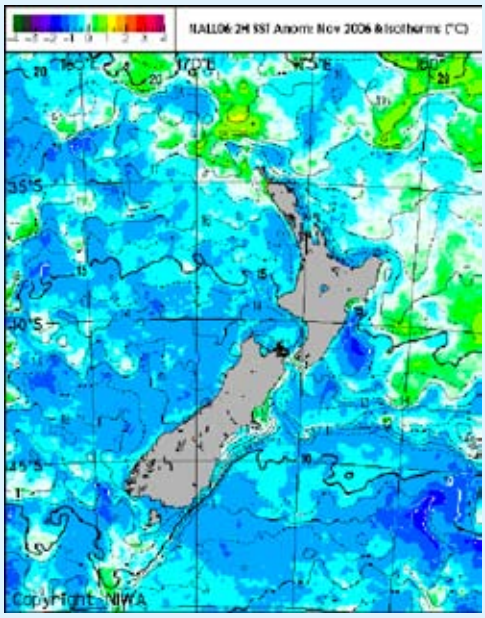
The three outcome maps give the tercile rankings of the rainfall totals, mean air temperatures, and mean river flows that eventuated from September to November, in comparison with the forecast conditions.

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.

Global setting and climate outlook

Sea surface temperatures around New Zealand

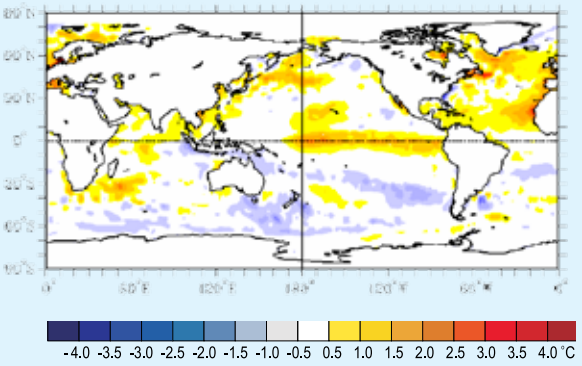
SST anomalies in the New Zealand region were -0.2°C in November (+0.0 °C in October; Sep–Nov average anomaly 0.0 °C). Local SST anomalies have been decreasing for over a year, after a marked warming in early 2005. This is the first month since January 2005 that SST anomalies have become negative. Sea surface temperatures in the New Zealand region are expected to be below normal, for summer.



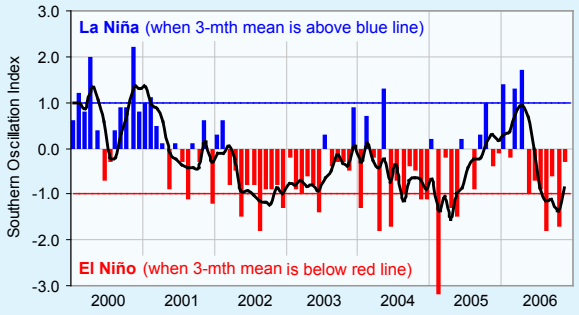
Difference from normal November surface temperatures in the seas around New Zealand.

El Niño remains in place

A moderate El Niño event remains in place in the tropical Pacific, and is expected to influence New Zealand's climate through to at least the end of summer 2006–07.



Difference from average global sea surface temperatures for November 2006. Map courtesy of NOAA Climate Diagnostics Center.

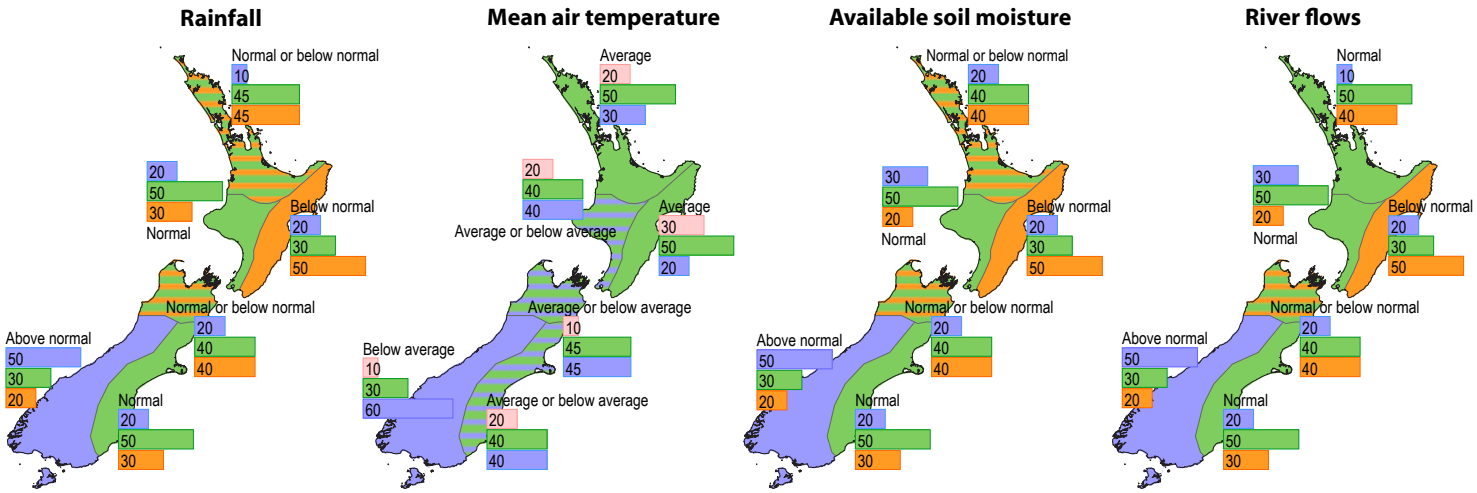


Monthly values of the Southern Oscillation Index (SOI), a measure of the changes in atmospheric pressures across the Pacific, and the three-month mean (black line). The SOI weakened during November to a three month (September to November) average of -0.9.

Outlook for December 2006 to February 2007

Atmospheric circulation patterns for December-February are likely to favour a stronger than average westerly or southwesterly airflow over the country, with below average pressures to the south or southeast of New Zealand.

Temperatures are expected to be average or below average in all regions. Rainfall is expected to be normal or below normal in all regions except the south and west of the South Island, where above normal rainfall is expected. Above normal soil moisture and river flows are expected in the south and west of the South Island, with normal or below normal soil moisture and river flows in all other regions.



How to interpret these maps

In the example here the climate models suggest that below average conditions are likely (50% chance), but, given the variable nature of the climate, the chance of normal or above normal conditions is also shown (30% and 20% respectively).

Below normal
20 — 20% chance of above normal
30 — 30% chance of normal
50 — 50% chance of below normal

ClimateExplorer

http://climate-explorer.niwa.co.nz

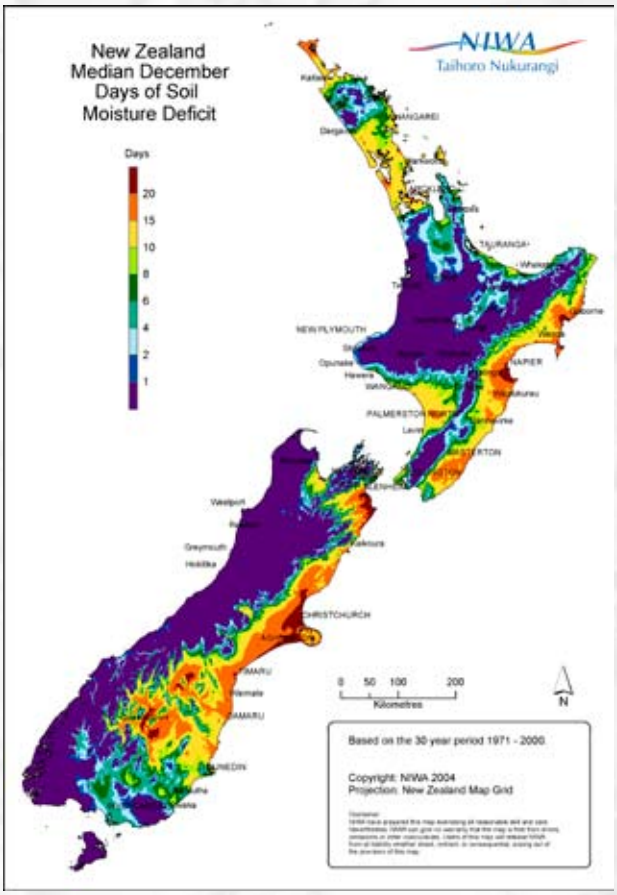
Figures showing daily water balance at over 100 climate stations around New Zealand are available on ClimateExplorer. The model that generates the figures makes some broad assumptions. The available water capacity, for example, is taken to be 150 mm, which is about right for the pasture root zone of an average silt loam soil. The model works best for level paddocks under pasture. Evapotranspiration is assumed to continue at a potential or atmospheric demand rate until about half of the available water is used up, at which point it decays linearly to near zero as the water content approaches permanent wilting, at 150 mm deficit.

The figure above shows the daily July to June water balance at Winchmore, Canterbury. The black curve gives the average daily plant-available water, in mm; the green, blue, and red curves track the 2003–04, 2004–05, and 2005–06 seasons respectively. Field capacity is shown at 0 deficit. Rain falling after the soil reaches field capacity is assumed to be lost by surface runoff or by rapid gravitational drainage through the soil profile, and is therefore not available to pasture for subsequent growth.

The assumptions and parameterisation of the model are based on field measurements on a number of farms, and can therefore be used with confidence in comparing relative soil moisture availability between seasons, and with long-term average conditions.

The model can be used at any site with a record of daily rainfall. The water balance maps shown on page 2 of this publication are generated from a base map of over 1900 rainfall stations.

A range of soil moisture maps created from the model is available from ClimateExplorer. An example, shown in the next column, gives the median number of soil moisture deficit days for December. These are days when the moisture available in the soil is insufficient to meet the atmospheric demand, leading to plants starting to wilt and produce less than their potential growth.



For more information, and to obtain an annual subscription for all routinely updated products, please contact explorerhelp@niwa.co.nz.

Take advantage of the three month trial subscription by contacting Andrew Tait, a.tait@niwa.co.nz.

Next month

Using the water balance model described above, there is typically a good relationship between modelled and measured soil moisture deficit. Next month we will show this for the Winchmore climate site.

Environment Canterbury river gauging station at the Rakaia Gorge.
Cover photo: *Alan Blacklock*

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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