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NIWA
Taihoro Nukurangi

# The Climate Update

## A monthly newsletter from the National Climate Centre

January – Below normal rainfall in much of the east coast, with variable stream and river flows, and increased soil moisture deficits; cool in the southern North Island and the east of the South Island.

Outlook for February to April – stronger than average westerly air flow over the southern half of New Zealand. Rainfall, soil moisture and river flows normal or below normal in the north and east of the North Island. Normal or below normal air temperatures in the south of the country.

# New Zealand climate in January

January rainfall was 50% or more below normal in many eastern regions, but above normal in coastal Northland, Bay of Plenty, Taupo, near East Cape, Wellington, and Nelson. Chatham Islands rainfall was more than 200% of normal.

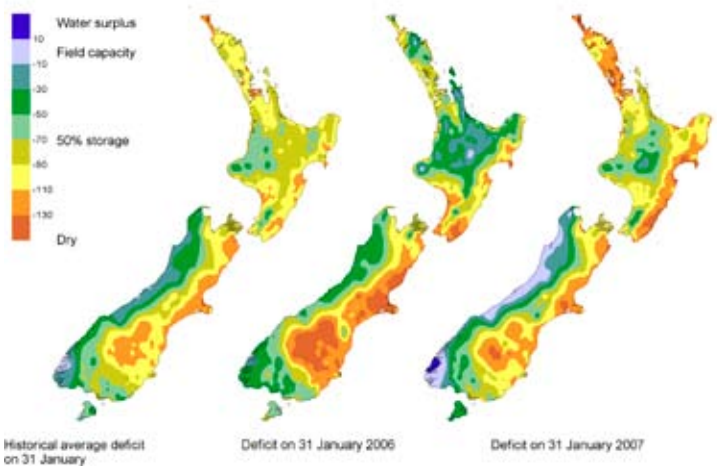
The east of the South Island and the south of the North Island were cool, but elsewhere conditions were warmer than normal. The national average temperature was 16.7 °C (0.4 °C below normal).

For more information on the climate in January 2007, visit the climate summaries page at www.niwascience.co.nz/ncc/cs/mclimsum_07_01

## Average to high deficits

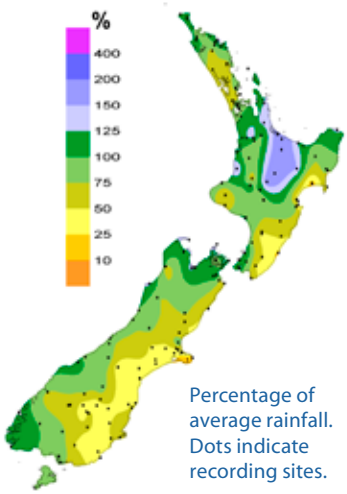
Soil moisture deficits of at least 110 mm developed by the end of January in parts of Northland, Auckland, eastern Bay of Plenty, Nelson, and eastern regions of both islands. Larger deficits developed in eastern regions from Gisborne to Marlborough, and Central Otago.

**Soil moisture deficit**



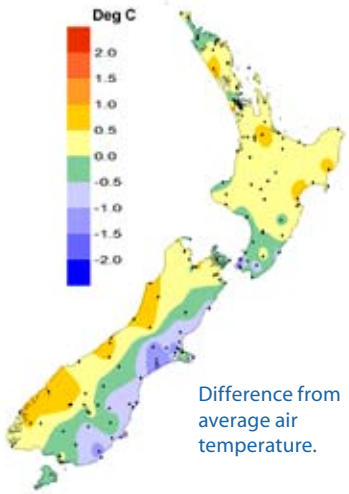

Water balance in the pasture root zone for an average soil type, where the available water capacity is taken to be 150 mm.

**Rainfall**




Percentage of average rainfall. Dots indicate recording sites.

**Air temperature**

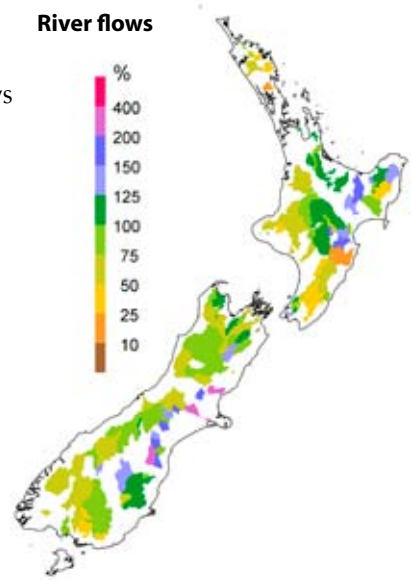



Difference from average air temperature.

## High flows in central North Island

January river and stream flows were above normal over the central North Island and the South Island east coast, and normal to below normal elsewhere.

**River flows**




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

## November to January – the climate we predicted and what happened

### Rainfall

Rainfall was higher than expected in the southwest of the North Island, and eastern South Island, and lower than expected in the southwest of the South Island.

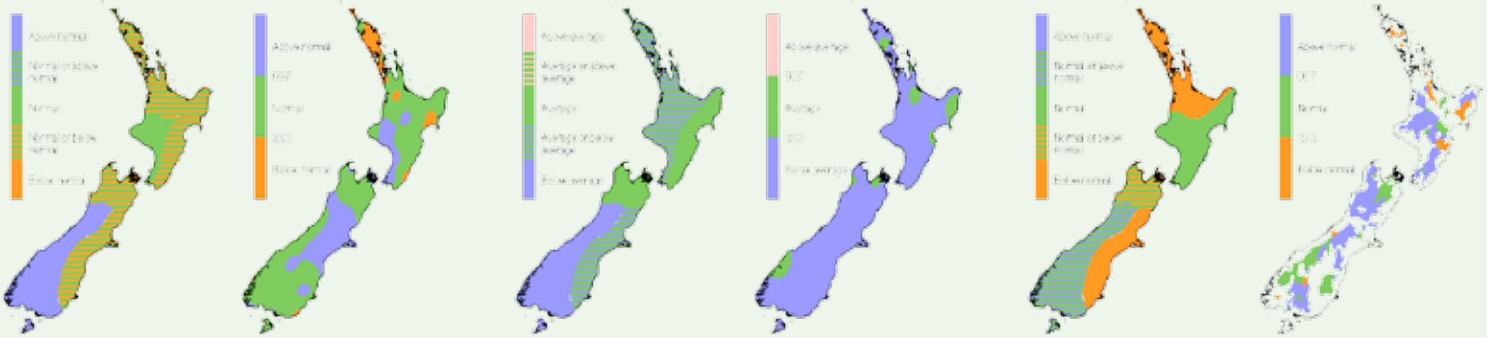
### Air temperature

Air temperatures were below normal as predicted in many districts, but lower than predicted in the east of the North Island and north of the South Island.

### River flows

Streamflows were below normal in parts of northern New Zealand, and above normal in the southern South Island, as was predicted. The high January flows in South Island east coast streams were a consequence of a wet December.

**Outlook** **Outcome** **Outlook** **Outcome** **Outlook** **Outcome**



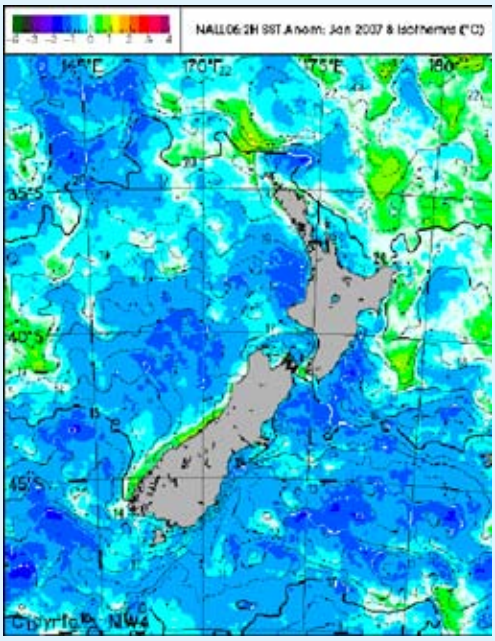
The three outcome maps give the tercile rankings of the rainfall totals, mean air temperatures, and mean river flows that eventuated from November 2006 to January 2007, in comparison with the forecast conditions.

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

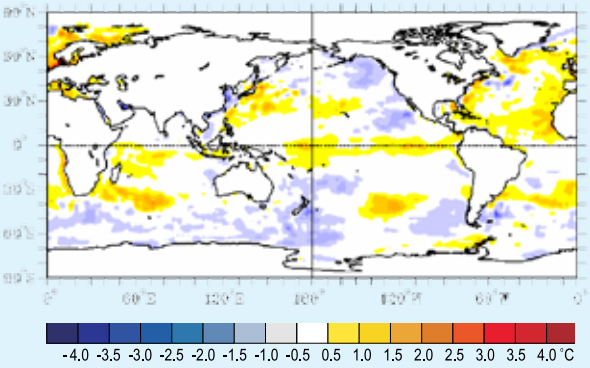
Average sea surface temperatures (SST) in the New Zealand region were 0.9 °C below normal in January. The 3-month (November to January) mean departure from normal of -0.6°C is the largest negative seasonal anomaly in at least the last 10 years. SST are expected to continue to be below normal over the next three months.



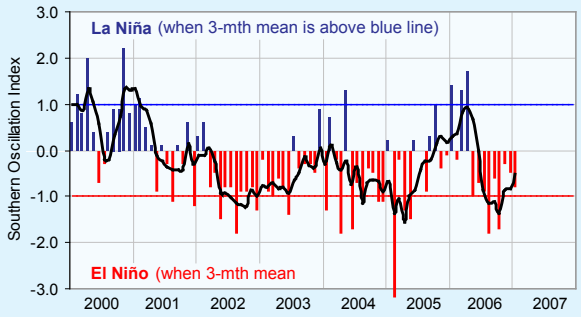
Difference from normal January surface temperatures in the seas around New Zealand.

## El Niño weakening

The current moderate El Niño episode has peaked in the tropical Pacific and is now weakening, but could still influence New Zealand's climate over the coming season. Most models of the evolution of ENSO suggest that neutral conditions are likely by the end of autumn.




Difference from average global sea surface temperatures for January 2007. Map courtesy of NOAA Climate Diagnostics Centre. Positive temperature anomalies in the equatorial eastern Pacific peaked in December. Note the cool seas around New Zealand.



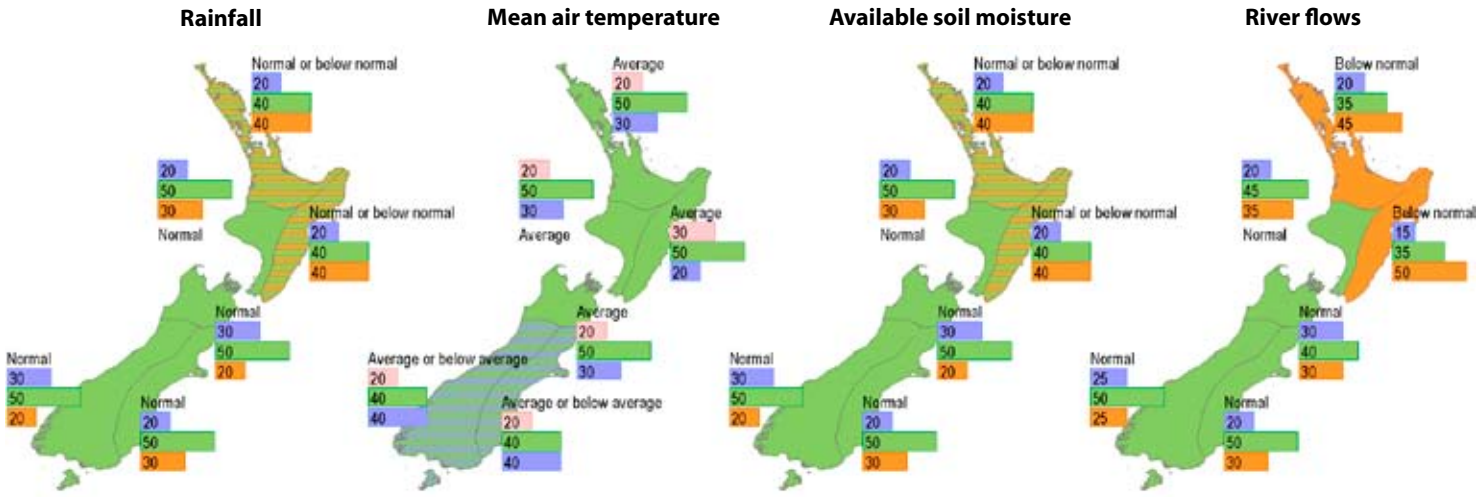

Monthly values of the Southern Oscillation Index (SOI), a measure of the changes in atmospheric pressures across the Pacific, and the three-month mean (black line).

The SOI showed little change from December (-0.5) to January (-0.8), with the 3-month November to January mean at -0.5.

## Outlook for February to April 2007

Atmospheric circulation patterns for February to April are likely to feature higher than average pressures to the north of the North Island, with stronger than average westerly airflow over the southern half of the country. Temperatures are expected to be average or below average in the lower South Island, and average elsewhere.

Rainfall is expected to be normal or below normal in the north and east of the North Island, and normal in other regions. Soil moisture and riverflows are expected to be normal in all regions except in the north and east of the North Island, where soil moisture is likely to be normal or below normal and riverflows below normal.




**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

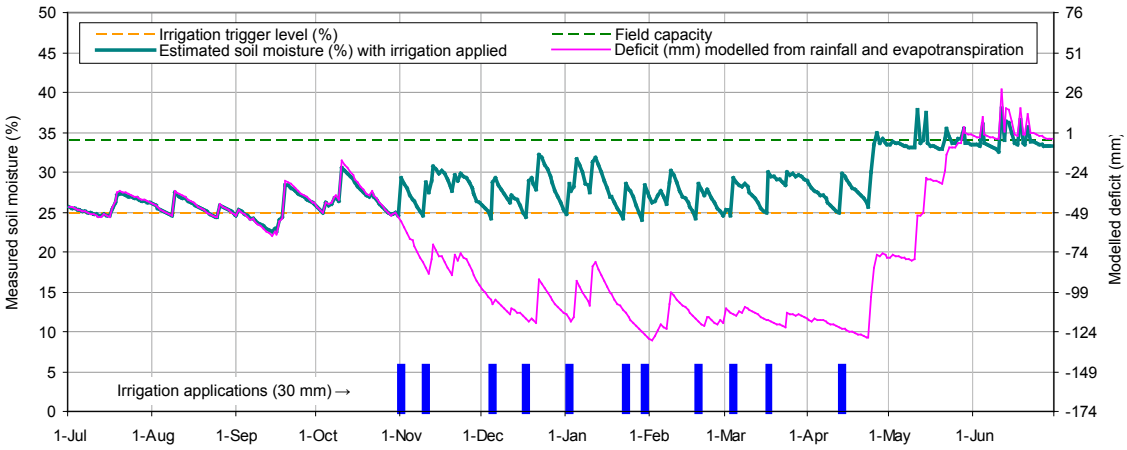
| | |
|---|---|
| 20 | 20% chance of above normal |
| 30 | 30% chance of normal |
| 50 | 50% chance of below normal |

# Calculating irrigation need

Estimating likely irrigation need is an important aspect of efficient farm management and feed budgeting.

Last month's issue of The Climate Update illustrated the close relationship between measured and modelled soil moisture content at Winchmore. A soil moisture model, once calibrated from measured water content, can easily be run on a computer spreadsheet to track ongoing moisture status in the pasture root zone on a daily basis. This is a particular advantage when subsequent soil moisture measurements are not available or are costly to obtain.

The adjacent figure shows modelled water deficit at Winchmore for 2005–2006 (magenta curve), and the same model (green curve) adjusted for irrigation applications (illustrated by the dark blue bars shown at each irrigation date). The model assumes that, from November to April, when a trigger level deficit of 25% moisture content by volume is reached (orange dashed line), a 30 mm irrigation is applied.




Here we assume that a 30 mm irrigation will raise the soil moisture content by a little over 5%. The model adjusts the level of soil water by this amount, while also taking into account evapotranspiration, rainfall, and irrigation efficiency where this is important.

In this example the model shows that 11 irrigation applications would have been needed, adding to a total depth of 330 mm of applied water, or 3300 cubic metres per hectare. Running the model over several seasons would quickly show the typical range of water volumes required.

Daily water balance data and 15 day rainfall predictions are updated daily on NIWA's ClimateExplorer webpage (http://climate-explorer.niwa.co.nz). 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.

Canterbury straw bales in March 2006. The current season in Canterbury has been wetter and cooler than normal.
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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