

# The Climate Update

A monthly newsletter from the National Climate Centre



March – devastating floods in Northland, but, in marked contrast, the rest of the month was warm and sunny in most of New Zealand, with low rainfall in the east. Apart from in Northland, river and stream flows were low.

Outlook for April to June – possibly more southwesterly winds than usual over southern New Zealand, with average to below average air temperatures in the south. Rainfall near normal, except for lower than normal totals in the east of the South Island.

# New Zealand climate in March

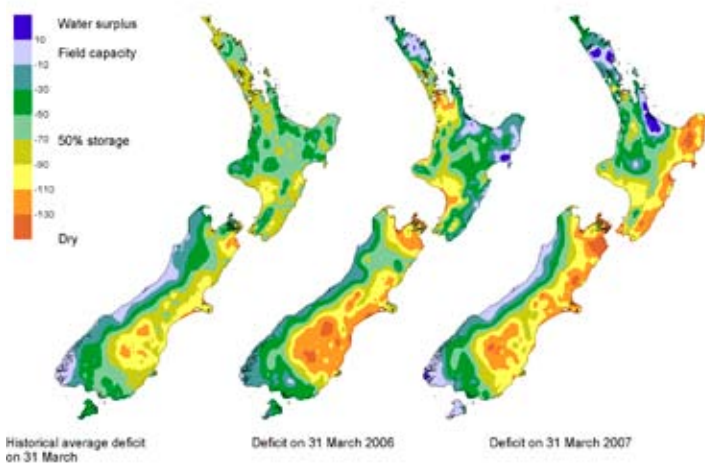
Historical daily rainfall records were swept aside in eastern parts of Northland as exceptionally high rainfall rates produced flooding and extensive infrastructure damage at the end of the month. In marked contrast, the rest of the month was summer-like, with a mix of anticyclones and winds from the northerly sector producing warmth and plentiful sunshine, and mainly dry conditions in the east.

For more information on the climate in March 2007, visit the climate summaries page at [www.niwa.science.co.nz/ncc/cs/mclimsum\\_07\\_03](http://www.niwa.science.co.nz/ncc/cs/mclimsum_07_03)

## Low soil moisture in the east

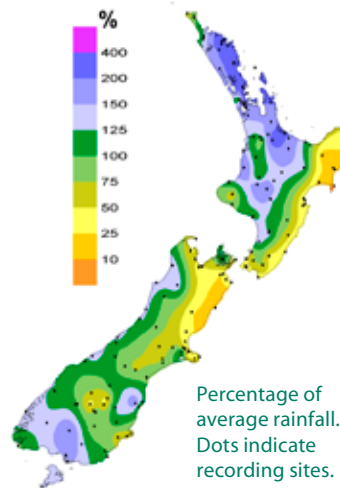
The relatively dry weather in most parts of the country kept March soil moisture deficits large in many eastern regions from Gisborne to north Canterbury, and in Central Otago. At the end of the month, soils were drier than normal elsewhere in Otago, and in Wellington, Kapiti, Nelson, and mid Canterbury.

### Soil moisture deficit



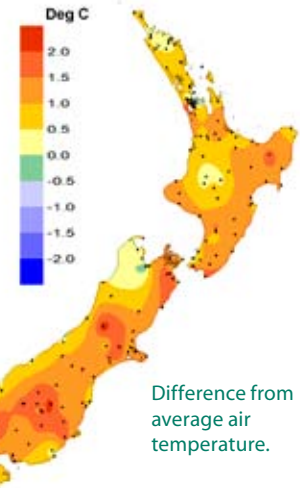
Water balance in the pasture root zone for an average soil type, where the available water capacity is taken to be 150 mm.

### Rainfall



Percentage of average rainfall. Dots indicate recording sites.

### Air temperature

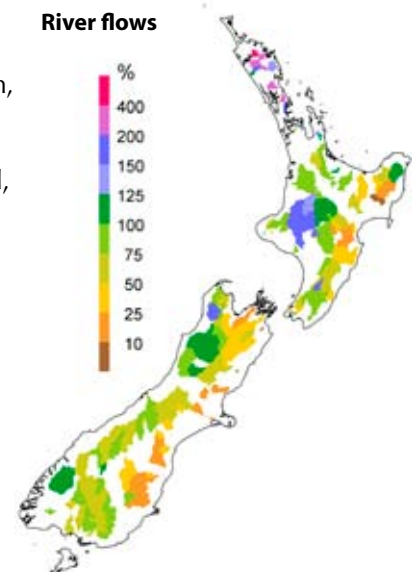


Difference from average air temperature.

## High flows in Northland

March streamflows were above normal in the far north, near normal in the central North Island, Wairarapa, Buller, and coastal Southland, and generally below normal elsewhere.

### River flows



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

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

### Rainfall

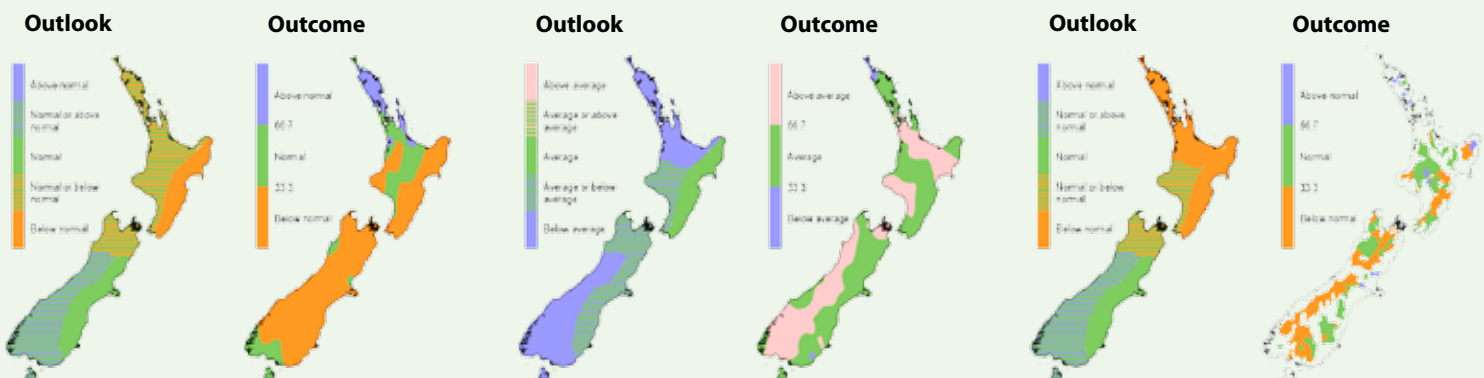
Rainfall in the North Island, apart from Northland, and in the north of the South Island, was normal or below normal as predicted. Elsewhere, the South Island was drier than expected.

### Air temperature

Air temperatures were higher than expected in many parts of the country, although normal as predicted in much of the east of the North Island.

### River flows

Streamflows were normal or below normal as predicted in the North Island apart from the far north, and the north and east of the South Island. Western South Island flows were lower than predicted.



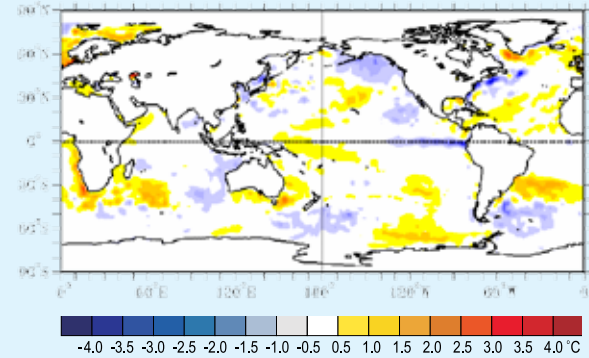
The three outcome maps give the tercile rankings of the rainfall totals, mean air temperatures, and mean river flows that eventuated from January to March, in comparison with the forecast conditions.

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.

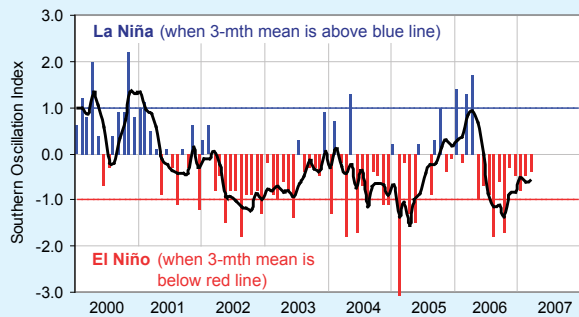
## Global setting and climate outlook

### Pacific conditions near neutral but ENSO, signals mixed

The tropical Pacific is showing some signs of a move towards La Niña, but signals are mixed, suggesting a level of uncertainty that is typical for this time of year. Pacific equatorial sea surface temperatures (SSTs) remain above normal to the west of the Date Line, but there is development of an enhanced 'cold tongue' in SSTs off the South American coast. There is a possibility of a La Niña event developing over the coming 3–6 months, although most models of ENSO favour near neutral conditions for the next 6–9 months.



Difference from average global sea surface temperatures for March 2007. Map courtesy of NOAA Climate Diagnostics Centre.

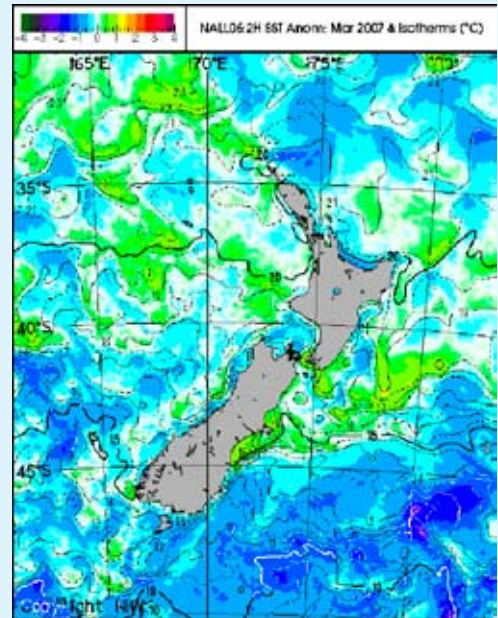


Monthly values of the Southern Oscillation Index (SOI), a measure of the changes in atmospheric pressures across the Pacific, and the three-month mean (black line).

SOI mean values:  
March: -0.4  
January to March: -0.6

### Sea surface temperatures around New Zealand

Sea surface temperature differences from normal in the New Zealand region were small for March. Anomalies were slightly positive at +0.1 °C, a rise of around 0.5 °C since the start of 2007. The January to March mean anomaly was about -0.1 °C. Sea waters to the southeast are relatively cool, while the Tasman is slightly warm, at least near the surface.



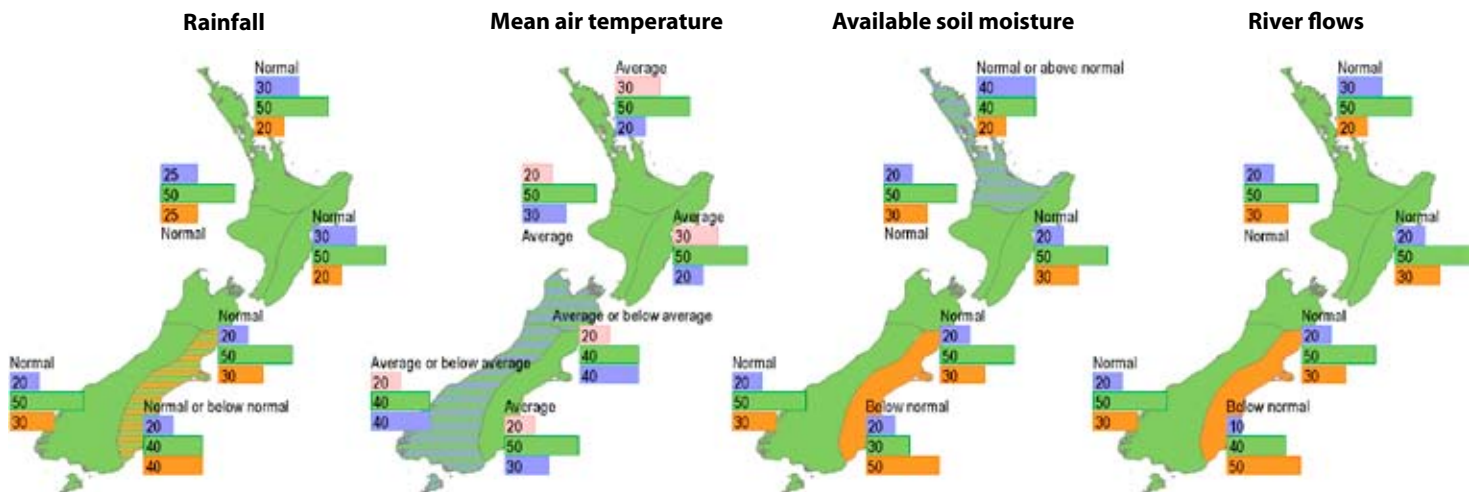
Differences from normal March surface temperatures in the seas around New Zealand.

### Outlook for April to June 2007

Pressures are expected to be higher than average to the east of the North Island over the coming season, with more southwesterly flows than usual over southern New Zealand. Sea surface temperatures in the New Zealand region are expected to remain near normal for the coming three months.

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

rainfalls are expected in most districts, but near or below normal falls are expected in the eastern South Island. Normal or above normal soil moisture levels are likely in the north of the North Island. Below normal soil moisture levels and streamflows are likely in the east of the South Island. Elsewhere, normal soil moisture and streamflows are expected.



#### How to interpret these maps

In the example here the climate models suggest that below normal 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

# Climate change – impacts on New Zealand agriculture

## IPCC Fourth Assessment Report

The Intergovernmental Panel on Climate Change (IPCC), in its Fourth Assessment Report, has released further information on climate change impacts, adaptation, and vulnerability.

Key findings for New Zealand agriculture, excerpted below, are taken from the final draft of the report, Chapter 11: Australia and New Zealand. This draft is subject to final editing changes, and is expected to be published in full at [www.ipcc.ch](http://www.ipcc.ch) on 20 April 2007.

## Cropping

For temperate crops, such as wheat and barley, higher temperatures could lead to decreased yields, but the fertilising effect of increased CO<sub>2</sub> is likely to more than compensate for this. The net impact in irrigated areas depends on the availability of water.

For maize (a crop that shows little or no yield response to higher levels of carbon dioxide), a reduction in time required to reach maturity may reduce crop water requirements, while locations further south than are presently cropped for maize may become more suitable for production.

## Horticulture

**Kiwifruit:** Higher summer temperatures for Hayward kiwifruit are likely to increase vegetative growth at the expense of fruit growth and quality. Kiwifruit budbreak is likely to occur later, reducing flower numbers and yield in northern zones. Current kiwifruit varieties are likely to become uneconomic in Northland by 2050 because of lack of winter chilling. Production in the Bay of Plenty is likely to be dependent

on dormancy-breaking agents and varieties bred for warmer winter temperatures. In contrast, more areas in the South Island are likely to be suitable.

**Apples:** Current varieties are very likely to flower and reach maturity earlier, with increased fruit size, especially after 2050.

**Grapes:** Red wine production is increasingly likely to be practised in the south, with higher yields. Higher CO<sub>2</sub> levels increase vine vegetative growth and subsequent shading is likely to reduce fruitfulness.

**Pests:** New Zealand is likely to be more susceptible to the establishment of new horticultural pests. For example, under the current climate, only small areas in the north are suitable for oriental fruit fly, but by the 2080s it is likely that much of the North Island will be suitable.

## Pastoral farming

In cool areas of New Zealand, higher temperatures, higher CO<sub>2</sub> concentrations, and fewer frosts are very likely to increase annual pasture production by 10 to 20% by 2030, although gains may decline thereafter.

Subtropical pastoral species with lower feed quality such as paspalum are likely to spread southwards, reducing productivity, particularly in the Waikato. The range and incidence of many pests and diseases are likely to increase.

Water security problems are likely to make irrigated agriculture vulnerable, e.g., intensive dairying in Canterbury.

A leaflet summarising the impacts of climate change in New Zealand and the South Pacific, produced by NIWA and the Royal Society of New Zealand, accompanies postal copies of this newsletter.

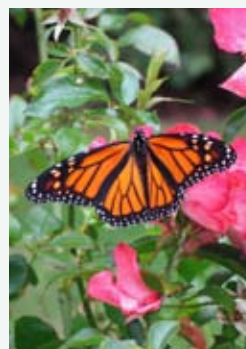
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Also available online at: [www.niwa.co.nz/ncc](http://www.niwa.co.nz/ncc)



A Monarch butterfly in the Hutt Valley. There were fewer sightings this year, perhaps reflecting the cool winter in 2006?

Cover photo: Wendy St George

*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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