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NIWA
Taihoro Nukurangi

The Climate Update

A monthly summary of New Zealand's climate from the National Climate Centre for Monitoring and Prediction

January 2002: a wild start to the year

Storms and highest January rainfalls on record in Canterbury ... *page 2*

Rainfall easing in the north and east?

Some relief from the wet conditions of the last two months with normal or below normal rainfall expected ... *page 3*

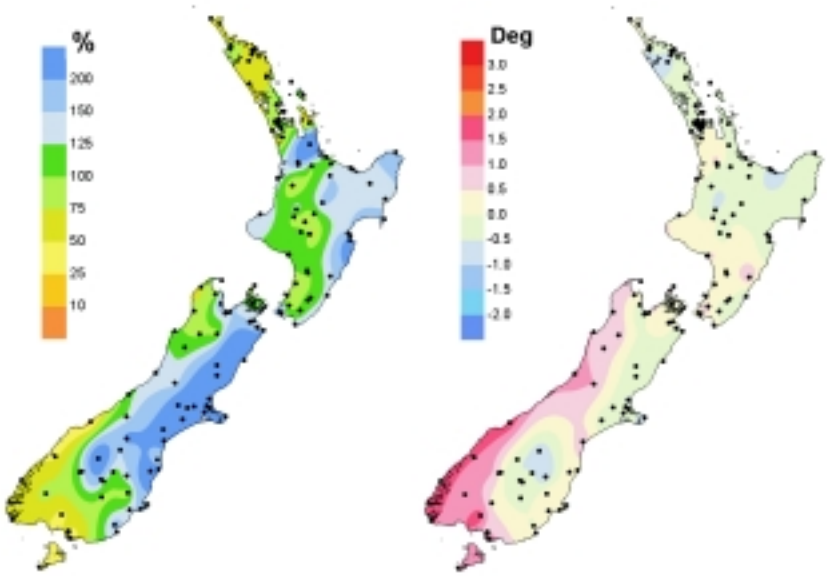
Update on El Niño

Enough indicators to maintain a watching brief ... *page 4*

New Zealand climate in January 2002

Rainfall

Mean air temperature



Percentage of average rainfall (left) and difference from the average air temperature in degrees Celsius (right). Dots indicate recording sites.

A wild start to 2002

Thunderstorms, lightning, torrential rain and localised flooding marked the start of the year. Hokitika recorded 481 lightning flashes on 2 January, and 937 flashes over the first four days of the year. A tornado uprooted trees on the Levin golf course on 4 January. Christchurch had hail up to 7.5 cm deep on 5 January. Westport was flooded on 3 January when up to 38 mm of rain fell in an hour. Wellington city centre was flooded on 10 January when 40 mm fell in 30 minutes. A severe storm on 12–13 January washed out bridges in Canterbury and closed SH1 in several places.

Wet in many areas

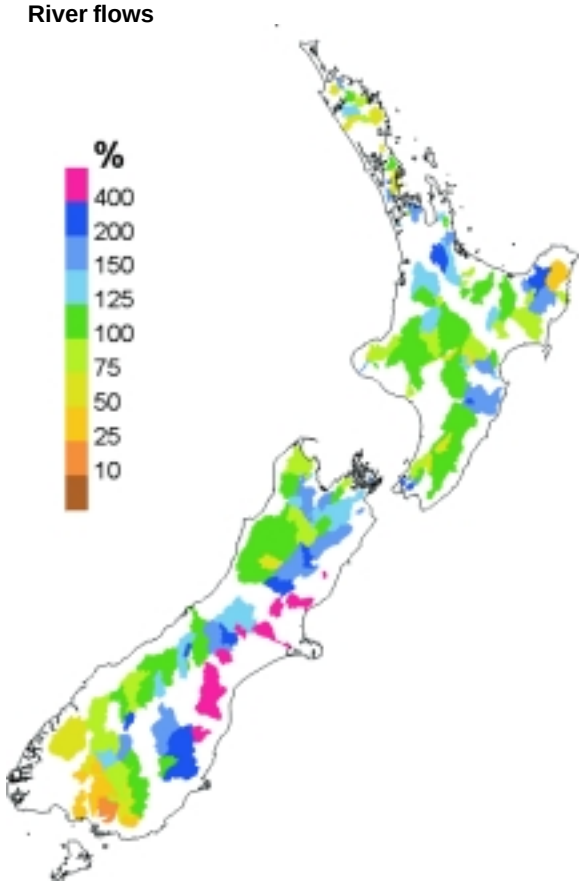
Eastern areas from Bay of Plenty to Canterbury had at least twice their normal rain. Kaikoura recorded more than 400% of normal January rainfall, while Christchurch had its wettest January since records began 135 years ago.

Air temperatures

The west coast and much of Southland were warmer than normal. Temperatures were near normal in many other places, but below normal in inland Otago. The daily mean temperature in parts of Canterbury slipped from 5 °C above average at the beginning of the month to 5 °C below average a few days later.

January atmospheric circulation was dominated by higher than normal pressures to the south of New Zealand, with low pressures over the Tasman Sea and the North Island. This pattern helped to produce the heavy easterly rainfall, and the cloudy periods that occurred along the country's east coasts.

River flows



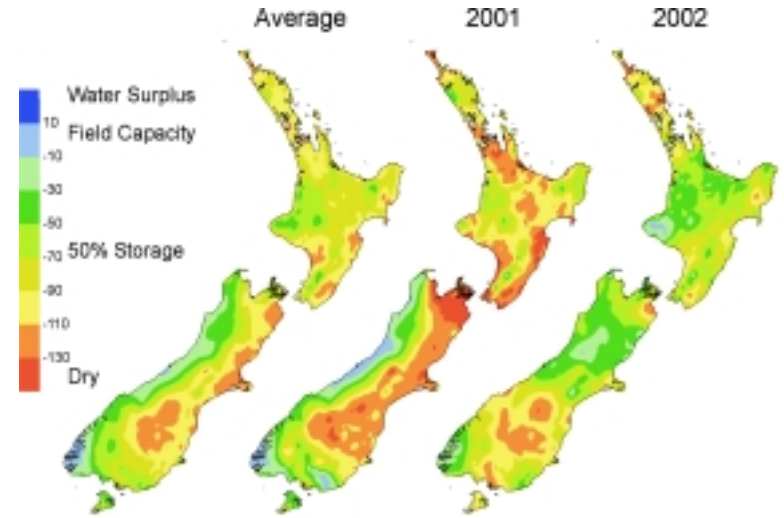
Percentage of average January streamflows for rivers monitored in national and regional networks. The contributing catchment area above each monitoring location is shaded. NIWA field teams, regional and district councils, and hydro-power companies are thanked for providing this information.

High January flows in the eastern South Island

January flows were near average for North Island rivers and for rivers draining the Southern Alps. Record high January average flows were recorded in parts of Marlborough, and in the Canterbury foothills and north Otago. Scouring of the rail track beside the Rangitata River derailed a freight train on 4 January.

Rivers flowed at above normal levels in Nelson. Conversely, many Southland rivers had lower flows than usual.

Soil moisture deficit on 31 January



Above average soil moisture levels from Auckland to Christchurch

High January rainfalls lifted soil moisture levels in many areas from Auckland city south to the northern half of the South Island.

Northland, Otago, and Southland total soil moisture storage was mostly lower than average at the end of the month. However, top soils in south Canterbury and Otago were generally moist following the rain.

Soils in most parts of the country had more available soil moisture than at the same time last year.

LEFT: Soil moisture deficit in the pasture root zone at the end of January (right) compared with the deficit at the same time last year (centre) and the long-term end of January average (left). The water balance is for an average soil type where the available water capacity is taken to be 150 mm.

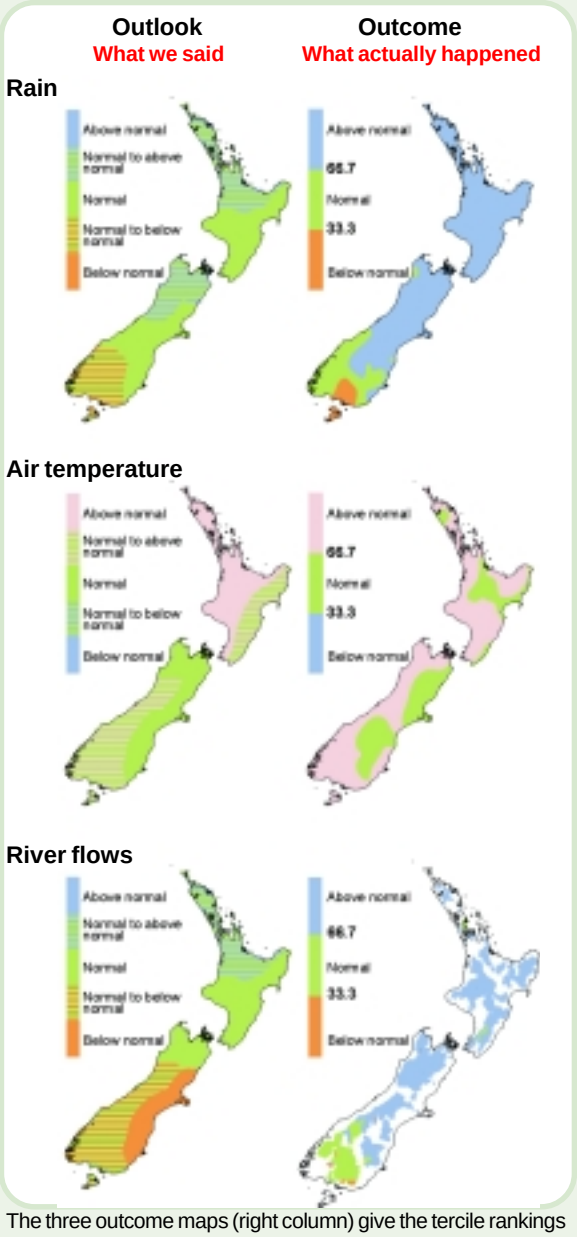
Checkpoint

November 2001 to January 2002

Normal to above normal rainfall was predicted in the north of both islands and near normal elsewhere. Rainfall was above normal in most regions, with near normal totals in the southwest South Island.

Temperatures were expected to be above normal over northern and western North Island regions, and nearer normal elsewhere. This was correct for most regions except the southwest of South Island where temperatures were higher than normal.

A gradient was predicted in river flows from normal to above normal flows in the north to below normal in the south. Flows were above normal everywhere except in inland Otago and Southland.



The three outcome maps (right column) give the tercile rankings of the rainfall totals, mean temperatures, and river flows that eventuated for November 2001 to January 2002. Terciles were obtained by dividing ranked November to January data from the past 30 years into three groups of equal frequency (lower, middle, and upper one-third values) and assigning the data for the present year to the appropriate group.

As an approximate guide, middle tercile rainfalls (33.3 to 66.7%) often range from 80 to 115% of the historical average. Middle tercile air temperatures typically occur in the range of the average plus or minus 0.5 °C.

Note that in the maps above, the upper, middle, and lower tercile ranges are described by the terms *Above normal*, *normal*, and *Below normal,* respectively.

Outlook

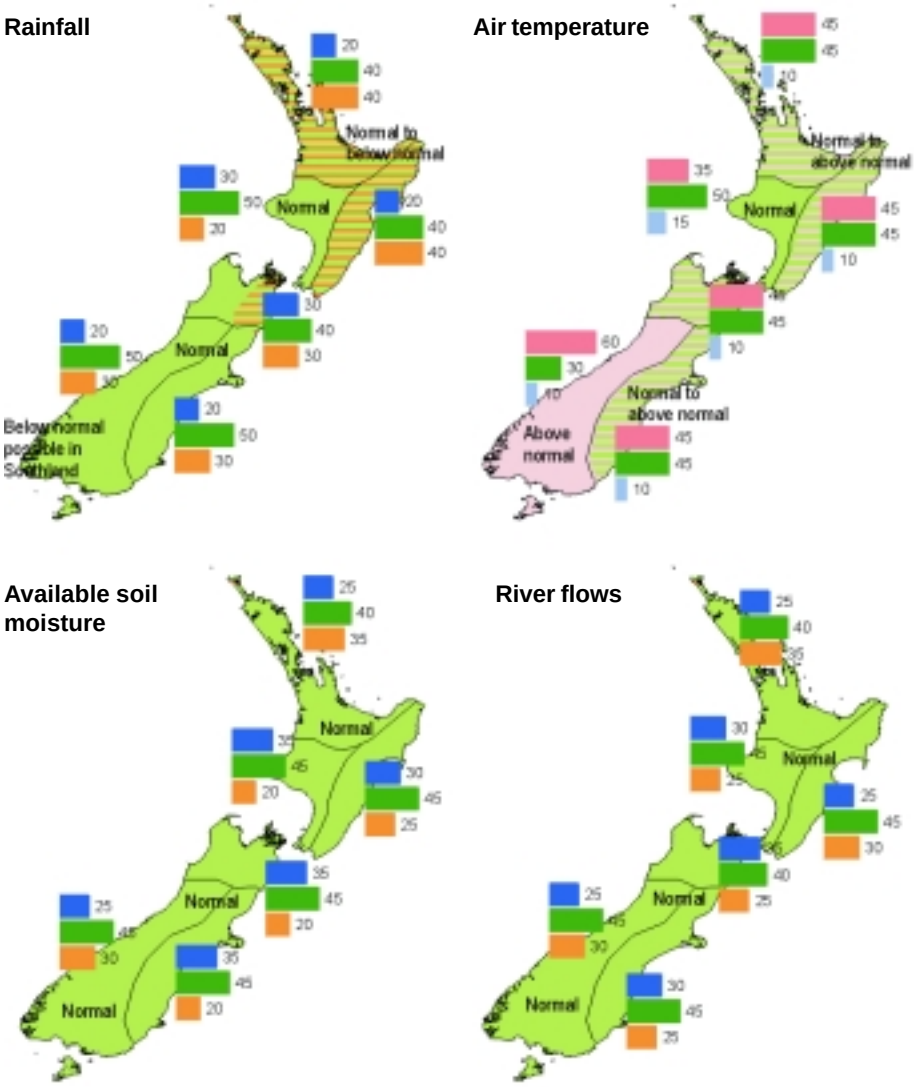
February to April 2002

Recent changes in the Pacific mean an El Niño "alert" is in place, but it is too early in the year for a confident El Niño prediction to be made (see page 4). Large scale pressure patterns are likely to favour higher than usual air pressures in the north Tasman Sea, with a slightly enhanced westerly windflow over the country.

Sea surface temperatures near New Zealand should remain higher than usual through the period, except possibly to the northwest of the country, where they should remain near normal.

Temperatures are expected to be normal or above normal (i.e., middle or upper tercile) in all districts. Rainfall is expected to be normal to below normal in the north and east of the North Island, in eastern Marlborough, and in Southland, but normal elsewhere.

Soil moisture levels and river flows are expected to be near normal for the period.



KEY to maps (Example interpretation)

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.

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).

	No strong climate signal	Strong expectation of below normal
Above normal	A: 33	B: 10
Normal	A: 33	B: 30
Below normal	A: 33	B: 60

Global setting

El Niño update

The following is based on a statement prepared for the United Nations Interagency Task Force on Natural Disaster Reduction as a collaborative effort between the World Meteorological Organization and the International Research Institute for Climate Prediction (IRI), drawing also on contributions from regional climate authorities including NIWA. NIWA will continue to monitor the situation and, should an El Niño develop, will provide readers with information on possible impacts on New Zealand climate.

Climate patterns in the Pacific

Interactions between the atmosphere and ocean in the tropical belt of the Pacific Ocean modulate global weather and climate patterns. During El Niño events, for example, sea temperatures at the surface in the central and eastern tropical Pacific Ocean become substantially higher than normal.

During La Niña events, the sea surface temperatures in these regions become lower than normal. These temperature changes can drive major climate fluctuations around the globe, and, once initiated, such events can last for at least 12 months. The last El Niño event occurred during 1997–98 and was followed by a prolonged La Niña phase that extended from mid 1998 to early 2001.

Current situation and outlook

Historical records show the approximate March-June period to be the most likely time for transitions to El Niño or La Niña.

Most expert interpretations indicate that it is still too early in the year for a confident El Niño outlook to be made for the remainder of 2002.

However, developments in the tropical Pacific are leading climate scientists to watch the situation very closely and to remain on alert.

The conditions beneath the surface of the Equatorial Pacific that have attracted attention were largely triggered by a burst of westerly winds in the Equatorial western Pacific during December. This burst created a pulse of warmer than normal water beneath the surface that is currently migrating toward the eastern Pacific and is expected to rise to the surface during February.

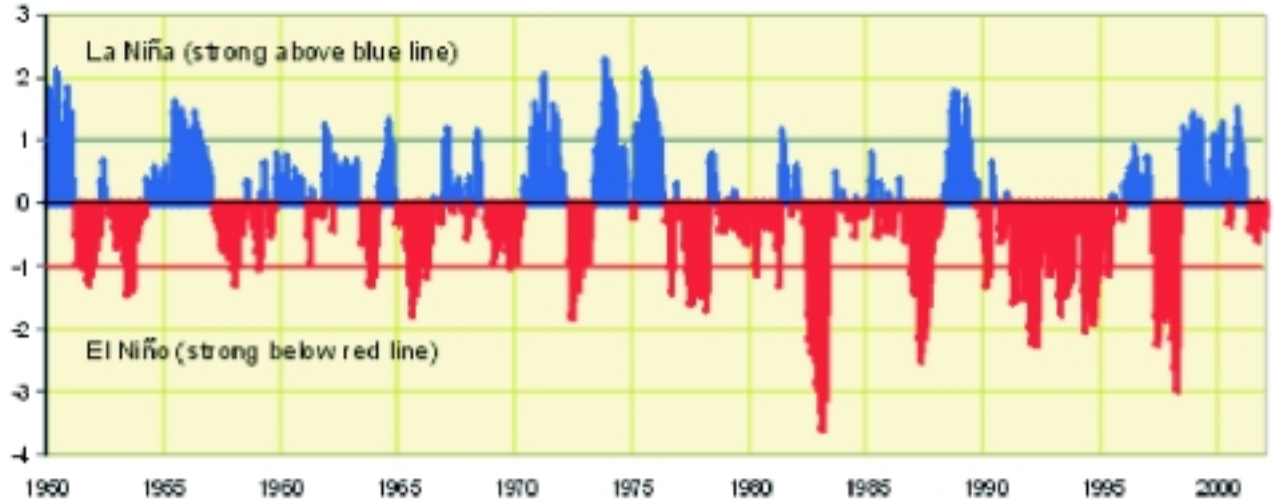
Current conditions in the tropical Pacific are thought to be unlikely by themselves to trigger an El Niño, and further initiating signals will be watched for in the next few weeks and months.

The onset of further westerly wind bursts in the Equatorial western Pacific could enhance the development of an El Niño. Unusually warm conditions at present in the Equatorial Pacific near the dateline could also contribute to an El Niño onset.

Summary of the present situation

- **Warm water is expected to appear at the surface in the eastern Equatorial Pacific in February.**
- **Computer models vary on whether the situation will develop further into an El Niño event.**
- **The potential for the onset of El Niño events in the past has generally been clearer towards the end of the first quarter of the year.**

El Niño–Southern Oscillation Index



The El Niño–Southern Oscillation Index (SOI) is an indicator of the changes in pressure patterns across the Equatorial Pacific that occur as part of the development of El Niño (red curve) and La Niña (blue curve) conditions. The most recent La Niña phase ended in early 2001, with the SOI over the last few months hovering near neutral (far right of graph).

The Climate Update

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For more information visit our **websites**:
The Climate Update: www.niwa.co.nz/ncc/
NIWA homepage: www.niwa.co.nz

Cover picture:
South Wairarapa newly planted vineyard and adjacent climate station (in background). Unusually heavy rainfall in January resulted in excessive vegetative growth on mature vines.

Photograph:
Deborah Wardle
MetService