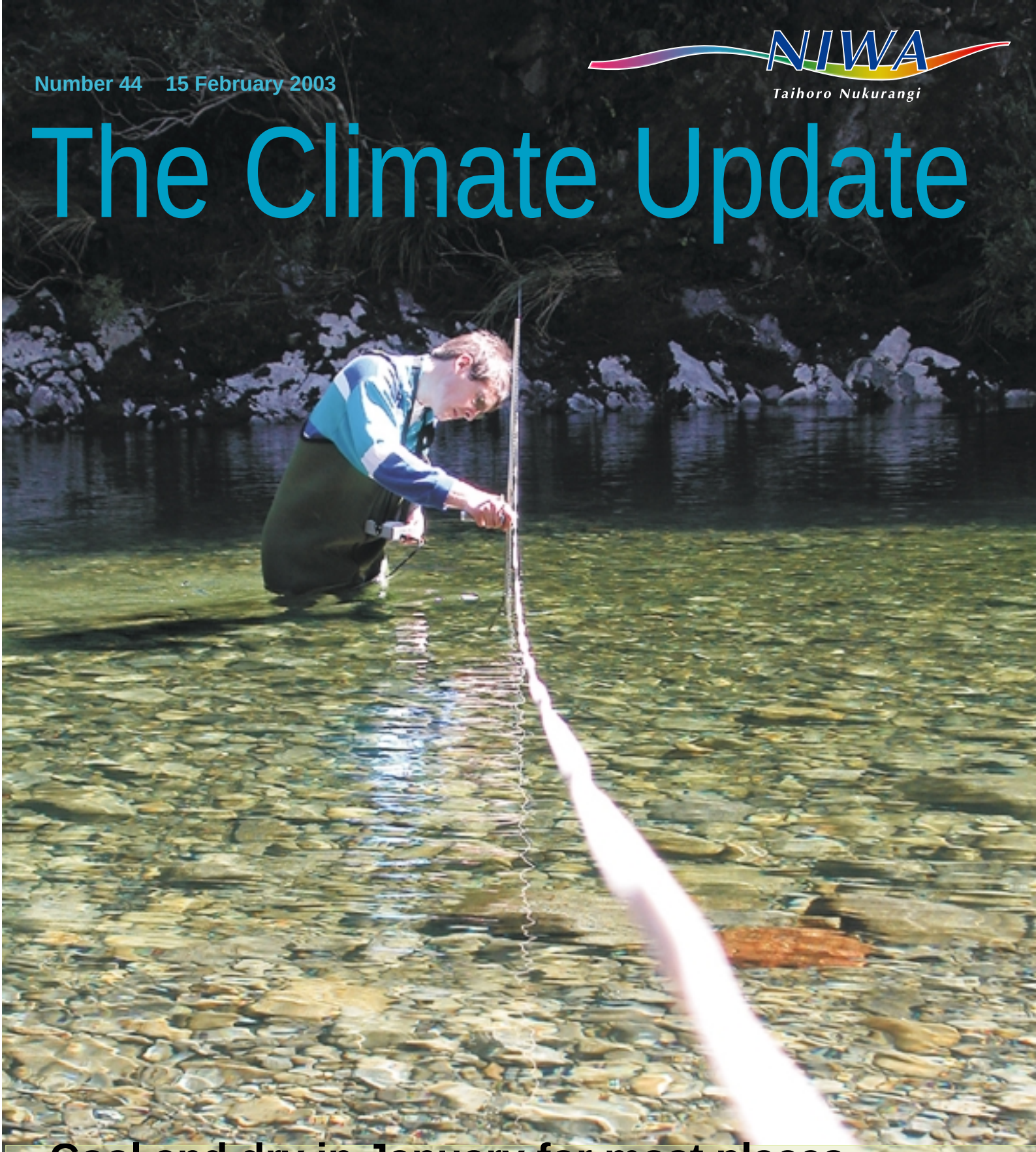
Number 44 15 February 2003

NIWA
Taihoro Nukurangi

The Climate Update



Cool and dry in January for most places

The month was drier than normal apart from northern North Island regions, with low stream flows over much of the country ... *page 2*

Outlook

Drier than normal conditions expected for late summer, particularly in the east.. *page 3*

New Zealand's hydrological observing network

Records dating back to 1905 ... *page 4*

New Zealand climate in January 2003

Air temperature and rainfall

Wet in some northern regions; dry elsewhere

Rainfall was at least 150 % of average in Northland, Auckland, Coromandel, and western Bay of Plenty, and double average in eastern parts of Northland and Coromandel. Whitianga recorded its highest January rainfall since records began in 1991. Surface flooding on the Coromandel Peninsula created washouts in holiday parks, disrupting the plans of many campers.

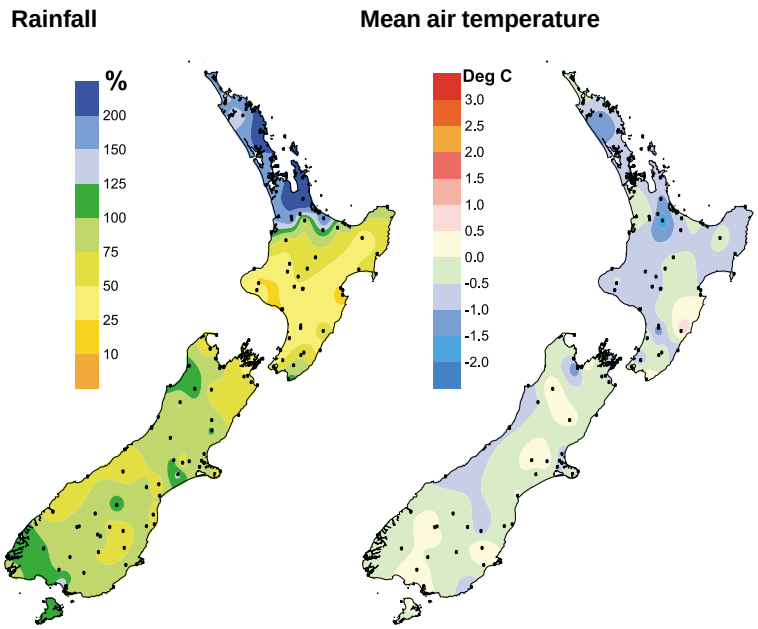
In contrast, Horowhenua got about a quarter of its average January rainfall, with the southwest of the North Island, Hawke's Bay, and parts of Marlborough receiving half their normal rainfall. Whakatu had its lowest January rainfall since records began in 1983. Much of the South Island, Gisborne, and Wairarapa got about three-quarters of their normal rainfall.

Cool in most places

It was a cool month with below average temperatures in many areas. Temperatures were at least 1 °C below normal in parts of Northland and Waikato. Most of the South Island was near normal, but it was cooler than average in Westland. The national average temperature of 16.4 °C was 0.6 °C less than the 1961–90 normal.

A sunny January for the south

Sunshine and solar radiation totals were above average in Marlborough, Canterbury, the west of the South Island, and the south west of the North Island. They were below average in Northland and the Bay of Plenty, with near average totals elsewhere.

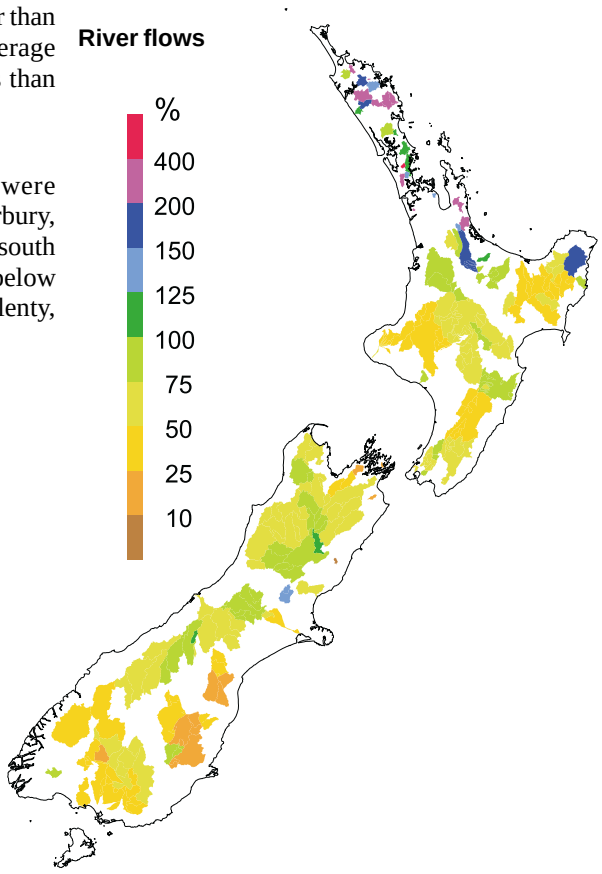


ABOVE: Percentage of average rainfall (left) and difference from the average air temperature in degrees Celsius (right). Dots indicate recording sites.

River and streamflows

January streamflows mostly low

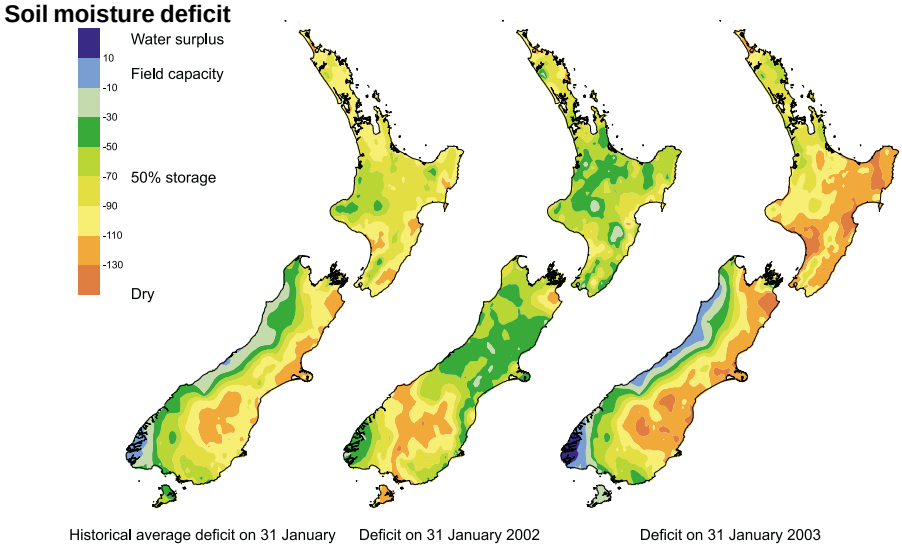
January flows were below normal in many areas. Only Northland, inland Bay of Plenty, and East Cape recorded high flows.



ABOVE: 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.

Soil moisture

North Island soils from Waikato south were much drier than normal by the end of January. The soil moisture deficit was particularly severe in eastern areas, Manawatu, and Horowhenua. Northern and eastern South Island regions also had severe soil moisture deficit. Significant rainfall during January improved the moisture levels in upper North Island soils.



RIGHT: 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 2002 to January 2003

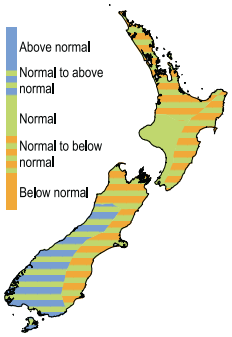
Rainfall was near normal or below normal in many areas of the country as expected, but in the west and south of the South Island it was drier than predicted.

Air temperatures were expected to be near average for the North Island and the north of the South Island, and average or below average elsewhere. Temperatures were lower than expected over the North Island and were close to those predicted for the South Island.

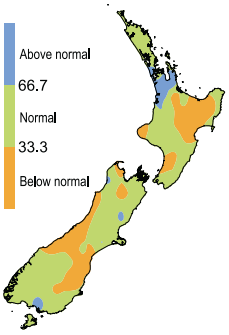
River flows were higher than predicted over most of the North Island and the north of the South Island. They were lower than predicted in Westland. They were as expected in southwestern North Island regions, south and east South Island regions.

Rainfall

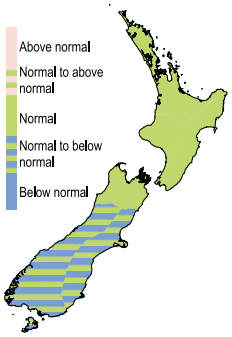
Outlook
What we said

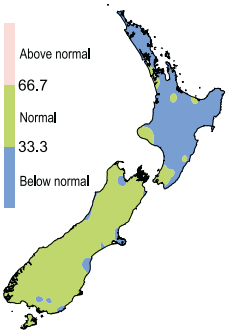


Outcome
What actually happened

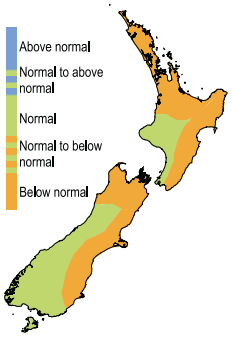


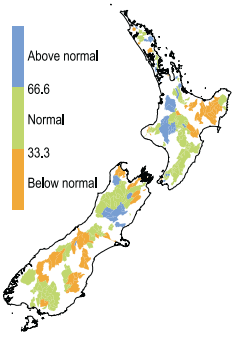
Mean air temperature





River and stream flows





The three outcome maps (right column) give the tercile rankings of the rainfall totals, mean temperatures, and river flows that eventuated for November2002 to January 2003. 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 2003

Early autumn is expected to be influenced by enhanced anticyclone activity over the Tasman Sea with episodes of stronger than normal southwesterly winds across New Zealand. The moderate El Niño event in the tropical Pacific is weakening, but its influence should be felt on New Zealand's climate into April.

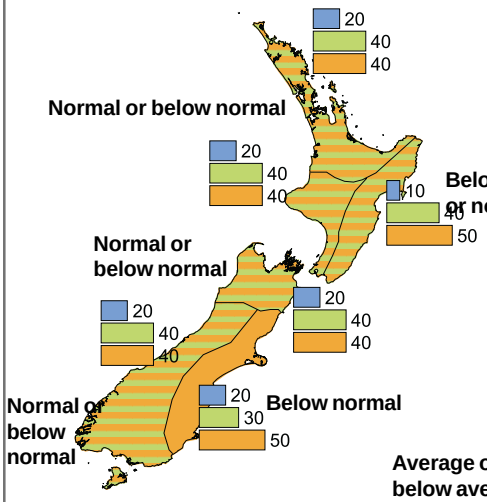
Temperatures are expected to be near average over the North Island and northern South Island, and average or below average over the rest of the South Island.

Normal or below normal rainfall is expected in the North Island, and south and west of the South Island. Below normal rainfall is likely in eastern South Island regions.

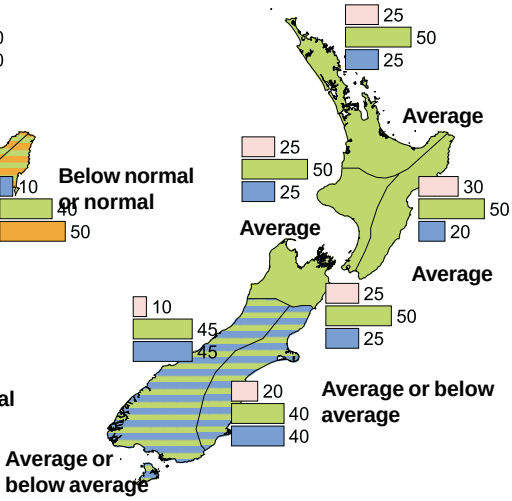
Below normal soil moisture levels and river flows are expected in eastern regions. Normal to below normal conditions are expected elsewhere.

There is a near-average risk of a tropical cyclone affecting New Zealand during the remainder of the cyclone season. On average, one ex-tropical cyclone affects the country during the cyclone season.

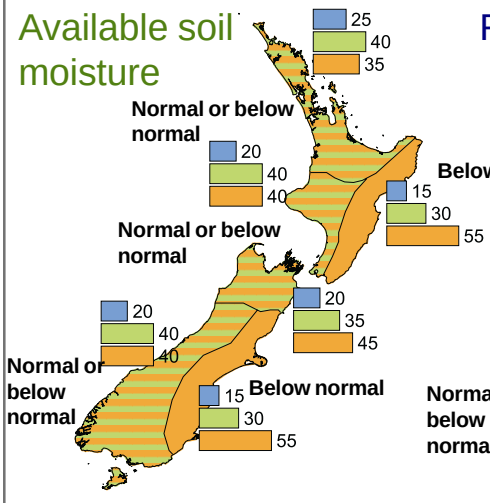
Rainfall



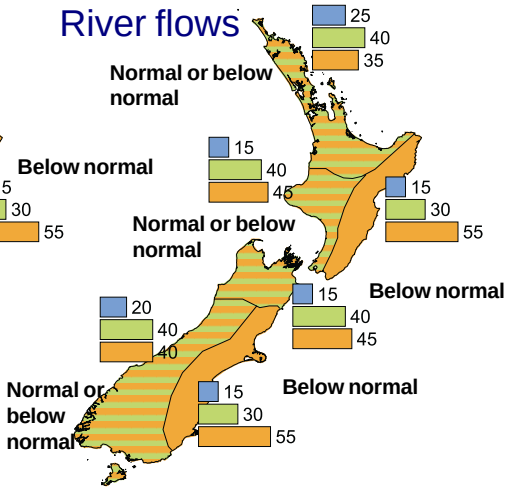
Mean air temperature



Available soil moisture



River flows



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).

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

Backgrounder

Hydrological observation network

The New Zealand hydrological network dates from 1905, when measurements of levels and outflows started at Lake Taupo to investigate hydroelectric potential. In the 1930s, measurements for irrigation investigation began, and later, catchment boards monitored rivers for soil conservation and river control. In the 1960s, a national "representative basin" network was established to provide information about water resources, flood sizes, and effects of land use changes such as afforestation. Today more than 400 streamflow stations are operated, mainly by regional/district council or NIWA staff.

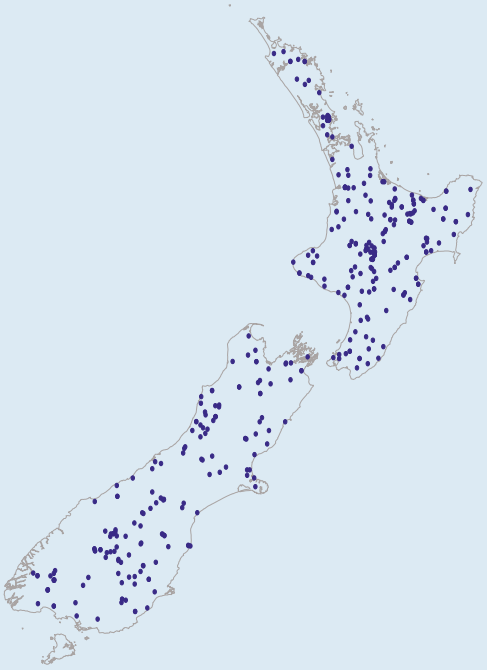
Rainfall is measured with standard recording raingauges. River water level is monitored by water level recorders housed in concrete or steel towers adjacent to the river. Levels are converted to flow using a relationship known as a rating curve. River flow is commonly expressed in cubic metres per second (m^3/s or cumecs), or litres per second (L/s) for low flows. The flow can be at a particular time such as flood peak, or it can be as an average of hours, days, months, or years.

Hydrological parameters measured

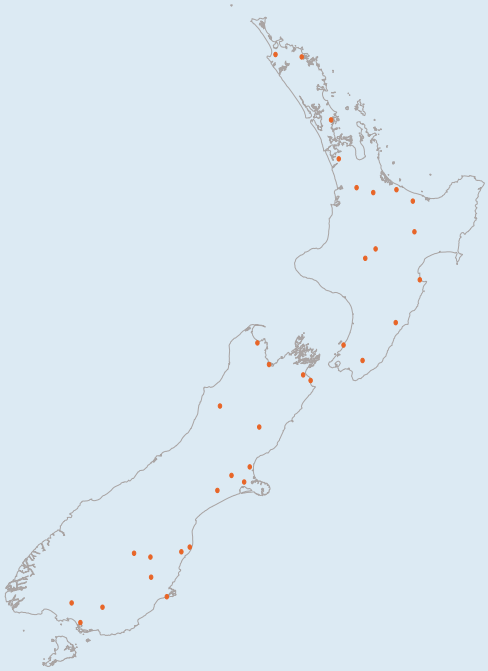
- Rainfall
- Water level
- River flow rate
- Sediment concentration
- Water temperature
- Soil moisture
- River cross section shape

The extensive, and continually growing, archives of streamflow data for the stations shown on the map, from NIWA's National Hydrometric Network, are used for a wide range of investigations, such as hydropower, irrigation, flood studies, and drought assessments. They are stored in databases of the Water Resources and Climate Archive.

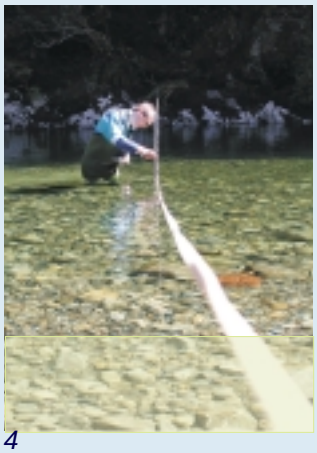
More recently, a soil moisture network has been established (see figure for location of stations). The data from this network will provide ground-truth checking for the soil moisture maps produced on page 2.



ABOVE: River level and water quantity monitoring network.



ABOVE: Soil moisture monitoring network.



The Climate Update is a monthly newsletter from NIWA's National Climate Centre for Monitoring and Prediction, and is published by NIWA, Private Bag 14901, Wellington. It is also available via the web. Comments and ideas are welcome. Please contact Alan Porteous, Editor.
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Visit our website: www.niwa.co.nz/ncc

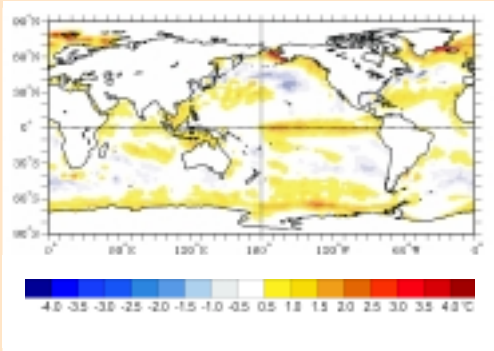
Cover picture:
Measuring river flow rate in the Hutt River. Observational data like this supplement the National Hydrometric Network to provide a comprehensive picture of the nation's water resources.
Photograph: Alan Blacklock

Global setting

El Niño signal weakening in Equatorial Pacific SSTs

The El Niño event has passed its peak and is now waning. Equatorial subsurface temperature anomalies have weakened east of the dateline and westerly zonal wind anomalies have reduced in horizontal extent to a region near the dateline. The area of suppressed convection in the west still affects eastern and central Australia, the Coral Sea, and the north Tasman Sea.

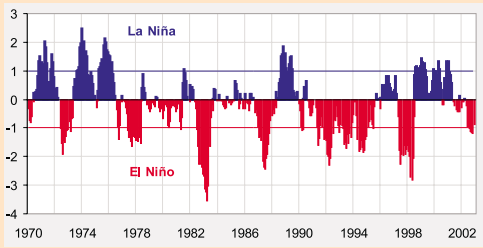
Almost all forecast models are predicting a return to neutral conditions by the end of autumn 2003.



ABOVE: Mean sea surface temperature departures from normal for the period from 25 December 2002 to 23 January 2003. Image from NOAA web site.

Update on the SOI

The mean Southern Oscillation Index (SOI) for January was -0.2, with the three month average now at -0.8. The present moderate El Niño has passed its peak, and is now waning. Further general information on El Niño is available on the World Meteorological Organization web site, www.wmo.ch



ABOVE: The Southern Oscillation Index (SOI), a measure of changes in the atmospheric pressures across the Pacific, smoothed over three months. La Niña or El Niño typically have an observable effect on the New Zealand climate when there is a large departure of the SOI from zero.

Online climate graphics

Climate maps and line plots of climate site observations are updated each week on the Climate Now website at:
www.niwa.co.nz/ncc/climatenow