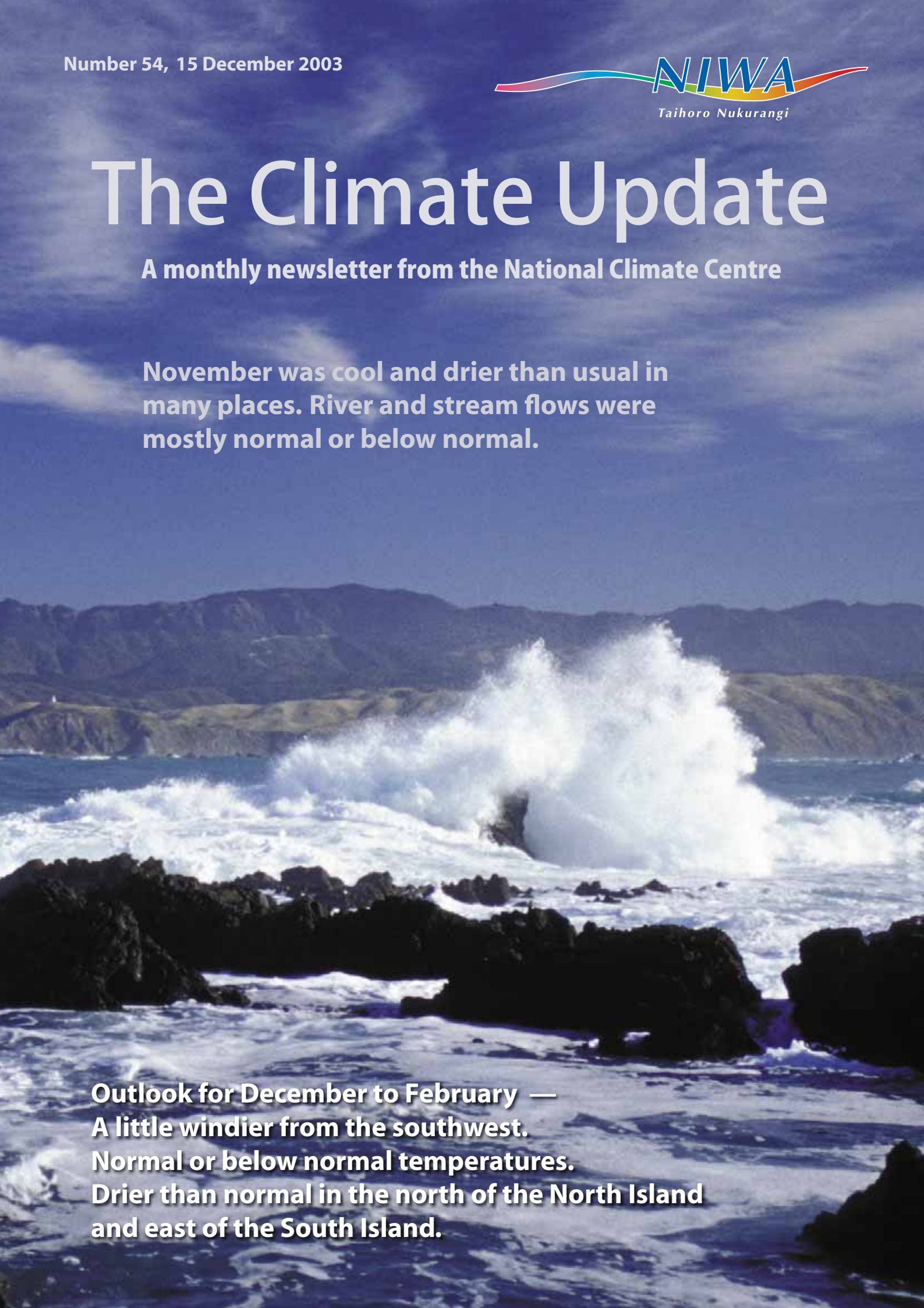
Number 54, 15 December 2003

NIWA
Taihoro Nukurangi

The Climate Update

A monthly newsletter from the National Climate Centre

November was cool and drier than usual in many places. River and stream flows were mostly normal or below normal.

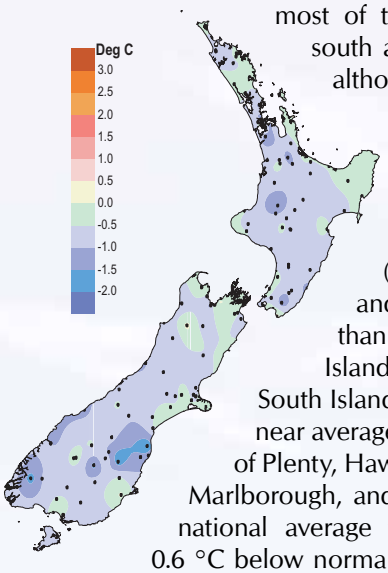


Outlook for December to February —
A little windier from the southwest.
Normal or below normal temperatures.
Drier than normal in the north of the North Island and east of the South Island.

New Zealand climate in November 2003

Mostly cool and drier than normal

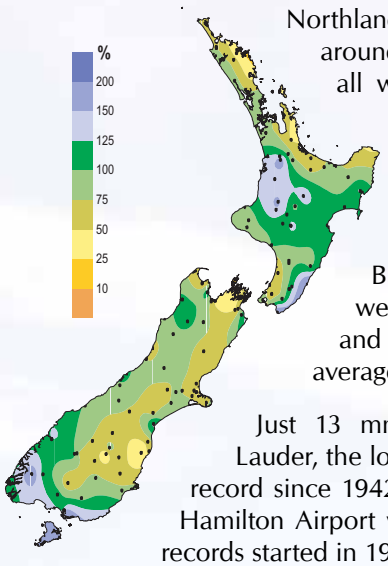
November was cooler than usual over most of the North Island and in the south and west of the South Island, although sunnier than average in many South Island regions. Mean air temperatures were at least 1.5 °C below average in inland sheltered regions of King Country (-2 °C), Tongariro, Fiordland, and Otago. It was also cooler than usual in many other North Island and southern and western South Island regions. Temperatures were near average in Coromandel, western Bay of Plenty, Hawke's Bay, Wellington, Nelson, Marlborough, and Canterbury. The November national average temperature of 13.2 °C was 0.6 °C below normal. At Clyde, in Central Otago, it was one of the coolest Novembers in the last two decades.



Low rainfall in Northland and Otago

Rainfall was well below average in eastern Northland and Otago, as well as around Nelson and Christchurch, all with totals of 50% or less of normal. It was also drier than usual in Bay of Plenty and Kapiti. Above average rainfall occurred in Waikato, Taupo, Hawke's Bay, Wairarapa, Fiordland, western areas of Central Otago, and Southland. Rainfalls were near average elsewhere.

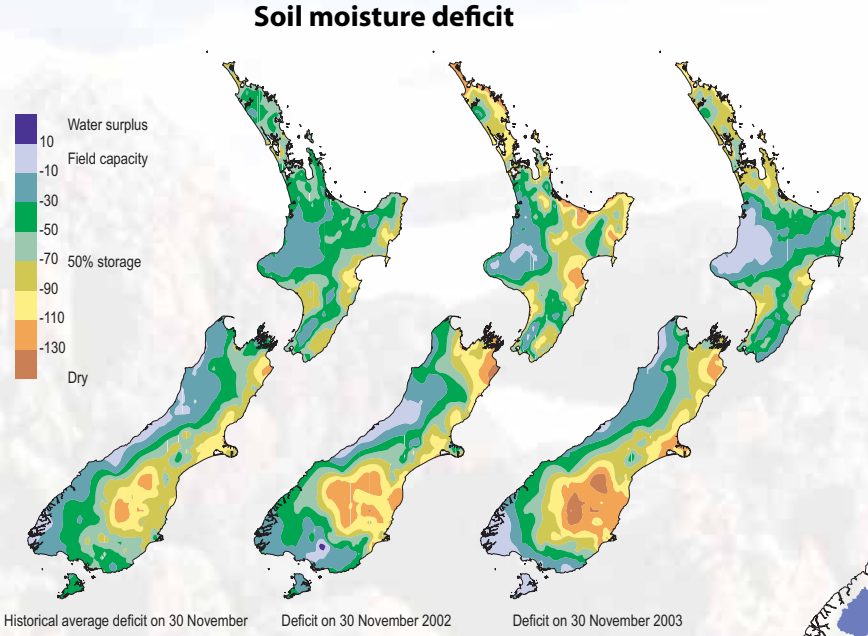
Just 13 mm of rain was recorded at Lauder, the lowest November rainfall in the record since 1942. In contrast, the 206 mm at Hamilton Airport was the second highest since records started in 1922.



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

Drier than average soils in much of the South Island

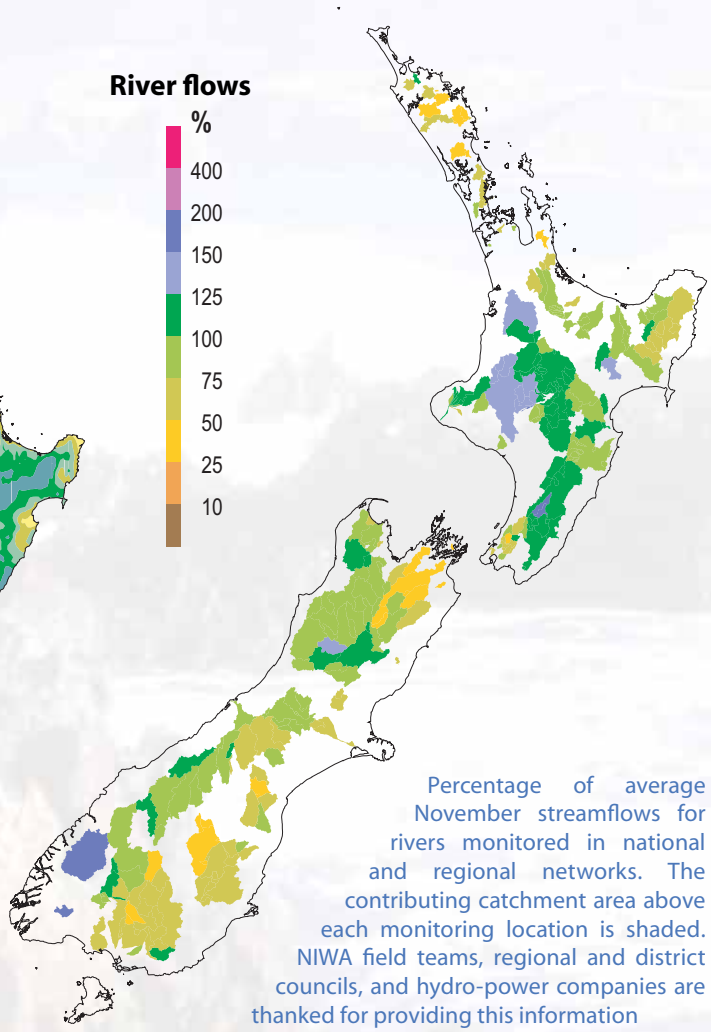
Soil moisture levels reduced more quickly than normal for November in the east of the South Island and much of Otago. At the end of the month, mid Canterbury and Otago were drier than at the same time last year. Moisture levels in Northland soils were also lower than normal. Much of Taranaki was wetter than average.



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

Low flows in parts of Northland, Marlborough, and Otago

November river and stream flows were below normal or normal over much of New Zealand. Flows were above normal in Fiordland and parts of western North Island.



Percentage of average November 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

Checkpoint

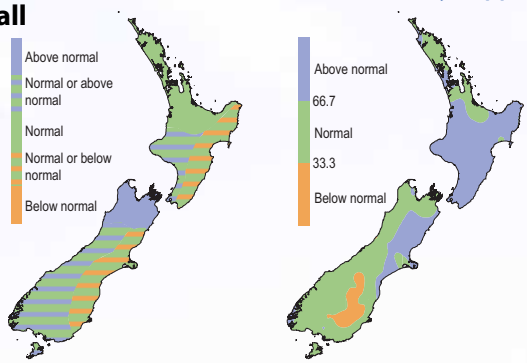
September to November 2003

Rainfall was as predicted in the north and southwest of the North Island, but higher than normal in the east and in parts of Waikato. Canterbury was wetter than expected, while parts of the west and southwest of the South Island received near normal rain as predicted.

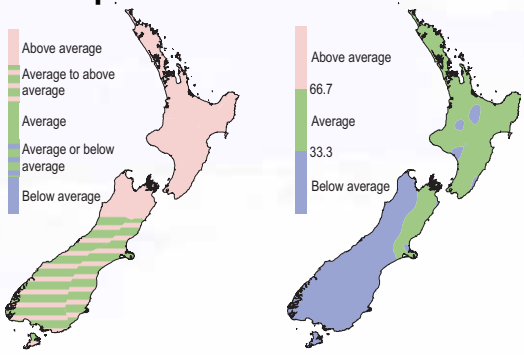
Spring temperatures were mostly lower than expected. River flows were higher than predicted in Canterbury and Fiordland and in most of the North Island. Below normal flows in central Otago, and normal elsewhere in the South Island, were much in line with predictions.

Outlook What we said | **Outcome** What actually happened

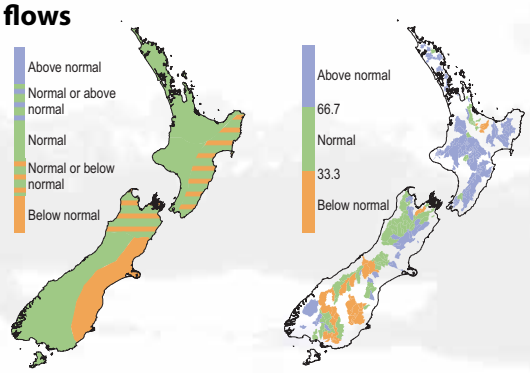
Rainfall



Mean air temperature



River flows



The three outcome maps (right column) give the tercile rankings of the rainfall totals, mean temperatures, and river flows that eventuated for September to November 2003. Terciles were obtained by dividing ranked September to November 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. The upper, middle, and lower tercile ranges are indicated in the maps by the terms Above normal, Normal, and Below normal, respectively.

Outlook

December 2003 to February 2004

Local circulation patterns are expected to favour below average mean sea-level pressures southeast of the country and somewhat enhanced southwesterly winds over New Zealand.

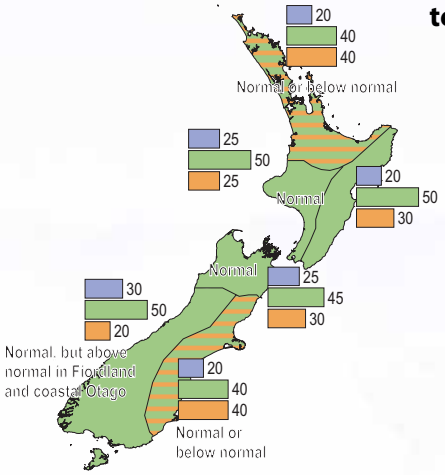
Normal or below normal rainfall is expected for the eastern South Island and northern North Island, with normal rainfalls elsewhere. Average temperatures are likely in the North Island and northern South Island, with average or below average temperatures expected for the rest of the South Island.

Soil moisture levels and river flows are predicted to be below normal in the north of the North Island and east of the South Island, normal or below normal in the east of the North Island, and normal elsewhere, except for normal or below normal flows in the northern South Island.

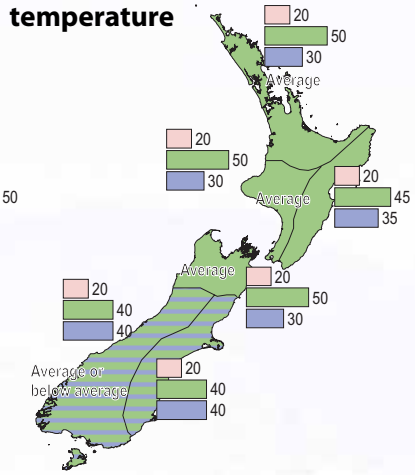
There is a near-average risk of an ex-tropical cyclone coming within 500 km of New Zealand over the November–April cyclone season.

The tropical Pacific is in a neutral state and is expected to remain neutral (no El Niño or La Niña) through to early autumn 2004.

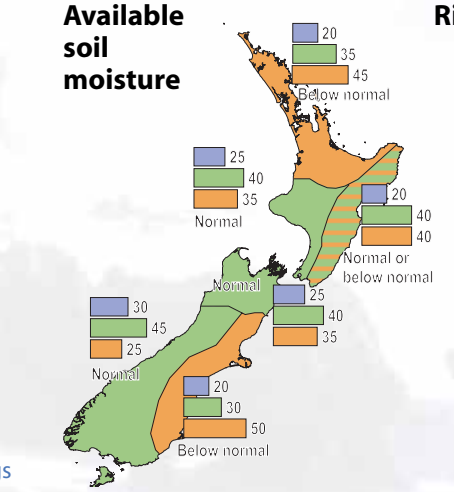
Rainfall



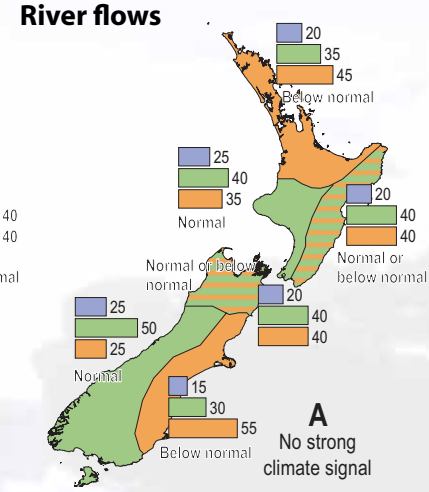
Mean air temperature



Available soil moisture

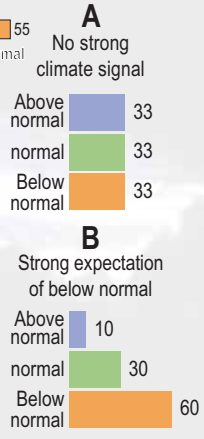


River flows



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).



Backgrounder

Although the mean Southern Oscillation Index (SOI) for the past three months has been below normal (-0.4), and equatorial sea surface temperatures are above average, the El Niño–Southern Oscillation (ENSO) is predicted to be in "neutral" mode over the summer. So how different from normal do conditions need to be, to be declared an ENSO event?

Brett Mullan, NIWA

Given the very wide interest in the climate impacts of ENSO, it is perhaps surprising that there is no universally accepted definition of an ENSO event. There is certainly qualitative agreement on typical characteristics associated with El Niño and La Niña periods. El Niños are characterised by:

- higher than normal sea surface temperatures (SSTs) across much of the central and eastern tropical Pacific
- weaker easterly trade winds
- higher than normal pressures over Indonesia
- an eastward shift in rainfall into the central tropical Pacific.

Opposite conditions characterise La Niñas.

Improved observations now allow important subsurface oceanographic features to be identified too. For example, El Niños have higher than normal subsurface temperatures in the eastern tropical Pacific, and a deeper thermocline (the boundary between warm well-mixed surface waters and colder deep water).

However, when it comes to a quantitative definition of ENSO, and an unambiguous list of past events, there is no single agreed approach. ENSO events have been identified most commonly using either the Southern Oscillation Index or an index of tropical Pacific sea surface temperatures. Other researchers have suggested various combinations of these and other factors, such as rainfall and wind.

Any quantitative definition of an ENSO event requires choices to be made about a number of aspects, including:

- what index to use
- what threshold values to use for those indexes
- how long should the condition persist
- whether to allow short-lived exceptions within a period defined as an event.

For research purposes, the use of an SST index (derived from an area of the equatorial Pacific known as Niño3.4) is now the most common method for defining ENSO, at least for events from about 1950 and later. The SOI is still preferred for events earlier in the historical record. The adjacent table lists ENSO seasons based on the Niño3.4 five month running mean SST exceeding ±0.4 °C for at least 6 consecutive months (a definition that is gaining acceptance).

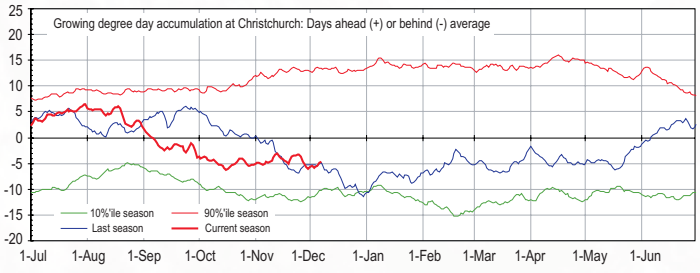
	Summer	Autumn	Winter	Spring
	(DJF)	(MAM)	(JJA)	(SON)
1950				
1951				
1952				
1953				
1954				
1955				
1956				
1957				
1958				
1959				
1960				
1961				
1962				
1963				
1964				
1965				
1966				
1967				
1968				
1969				
1970				
1971				
1972				
1973				
1974				
1975				
1976				
1977				
1978				
1979				
1980				
1981				
1982				
1983				
1984				
1985				
1986				
1987				
1988				
1989				
1990				
1991				
1992				
1993				
1994				
1995				
1996				
1997				
1998				
1999				
2000				
2001				
2002				
2003				
2004	***	?	?	?

ENSO seasons based on Niño3.4 index as defined in text, shaded orange for El Niño and blue for La Niña. Darker shaded years also have the seasonal mean SOI exceeding -1.0(El Niño) or +1.0(La Niña). Note that autumn of 1953 does not quite reach the SST threshold, but is commonly accepted as an El Niño event.

*** Dec 2003–Feb 2004 predicted to be neutral

On line 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



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 on the web. Comments and ideas are welcome. Please contact Alan Porteous, Editor. Phone: 0-4-386 0300 Email: ncc@niwa.co.nz. Visit our webpage: www.niwa.co.nz

Waves breaking over Wellington's south coast. Somewhat enhanced on-shore winds are expected from the southwest over the next three months.

Cover photo: *Alan Blacklock.*