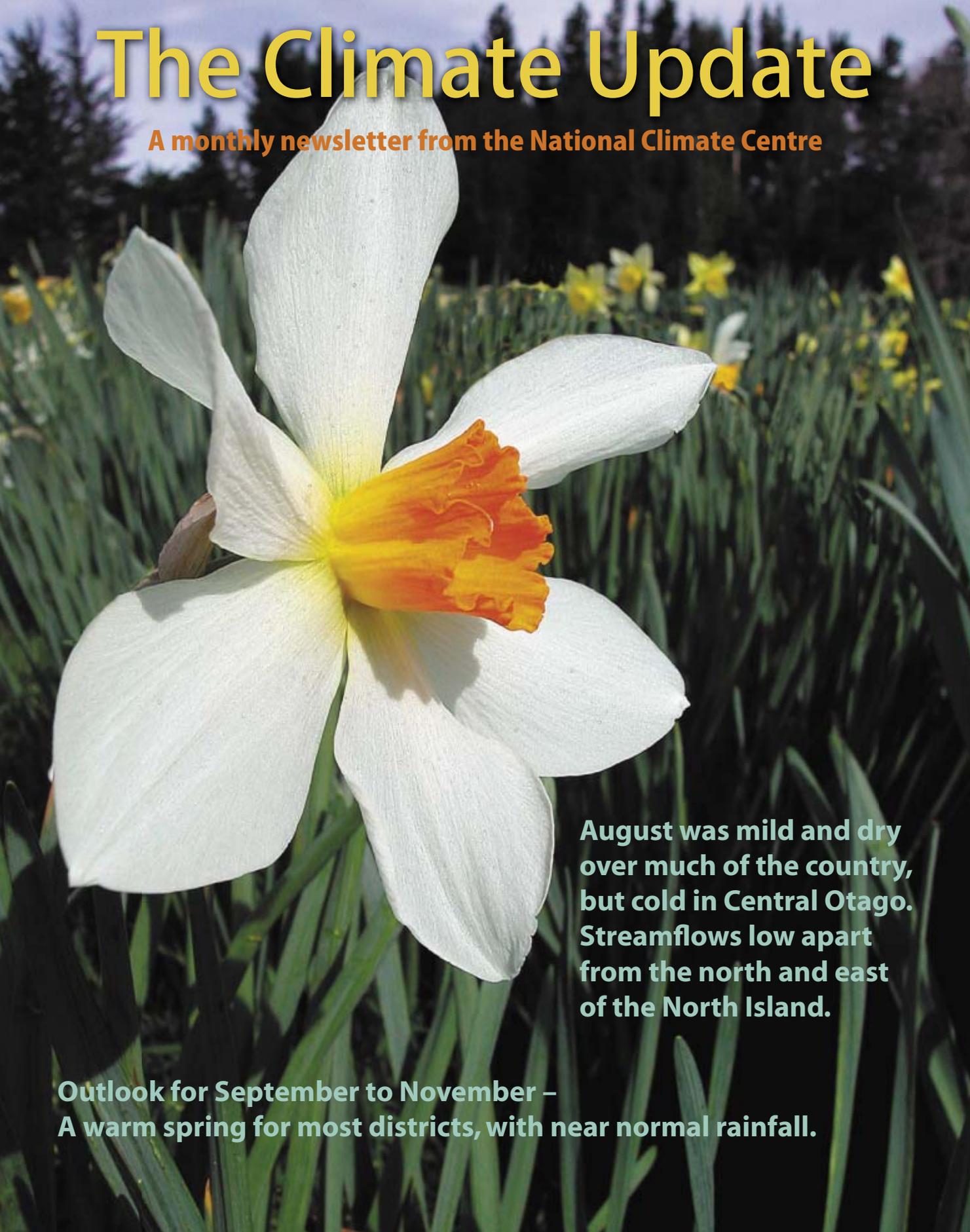


The Climate Update

A monthly newsletter from the National Climate Centre

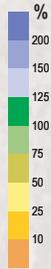


August was mild and dry over much of the country, but cold in Central Otago. Streamflows low apart from the north and east of the North Island.

**Outlook for September to November –
A warm spring for most districts, with near normal rainfall.**

New Zealand climate in August 2003

Rainfall



The end of a mild, mainly dry winter

August was settled, and drier than normal in many inland and western regions, but wetter than usual in some areas exposed to the east. Temperatures were near or above average in most places, the exception being parts of Central and south Otago.

Dry in many places

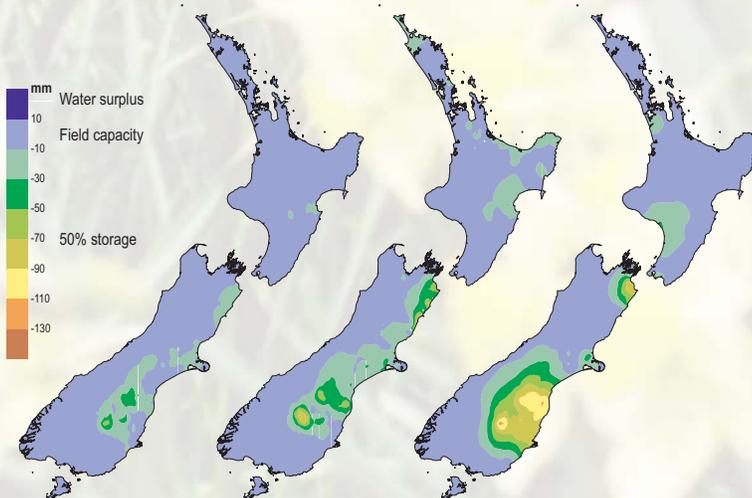
Central and western areas of the North Island from Waikato to Kapiti had less than half their normal August rainfall. Levin recorded only 19 mm, its lowest August total since records began in 1895. Tara Hills in the Mackenzie District received less than 10 percent of its normal August rainfall. In contrast, it was wetter than normal in Northland, and in the east from Gisborne to north Canterbury. Whakatu in Hawke's Bay recorded 259 percent of normal August rain, its second wettest since 1983, with two-thirds of the rain falling in a storm between 20 and 24 August. The same storm also brought heavy rain to Northland, Coromandel, and the southern Wairarapa coast on 21 and 22 August.

Some relief for soils in the north and east

Soils in Northland, Bay of Plenty, East Cape, Hawke's Bay, and north Canterbury were at field capacity at the end of August following the heavy rain. The area of soils at less than field capacity in Marlborough was smaller than last month, but coastal soils had become drier and had less than 50 percent storage capacity. The situation in inland and south Canterbury and much of Otago also worsened during August.

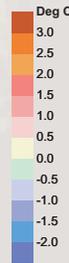
In the North Island, soils in South Taranaki–Whanganui–Rangitikei were at less than field capacity.

Soil moisture deficit



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

Mean air temperature



Sunny and crisp in the South

Southland had well above average sunshine hours, with Buller and Westland also sunnier than average. Northland had less than normal sunshine, while the other regions were near normal.

Parts of Otago had mean temperatures more than 1 °C below the August average.

Heavy ground frosts of -12.2 °C were recorded at Ettrick on 14 August, and -10 to -12 °C in several parts of inland Canterbury and Otago. Cold southeasterlies brought snow to Canterbury and Otago on 11–13 and 20–22 August, with snow settling to 400 m. Temperatures were also below average in Northland, southern Hawke's Bay and, Whanganui.

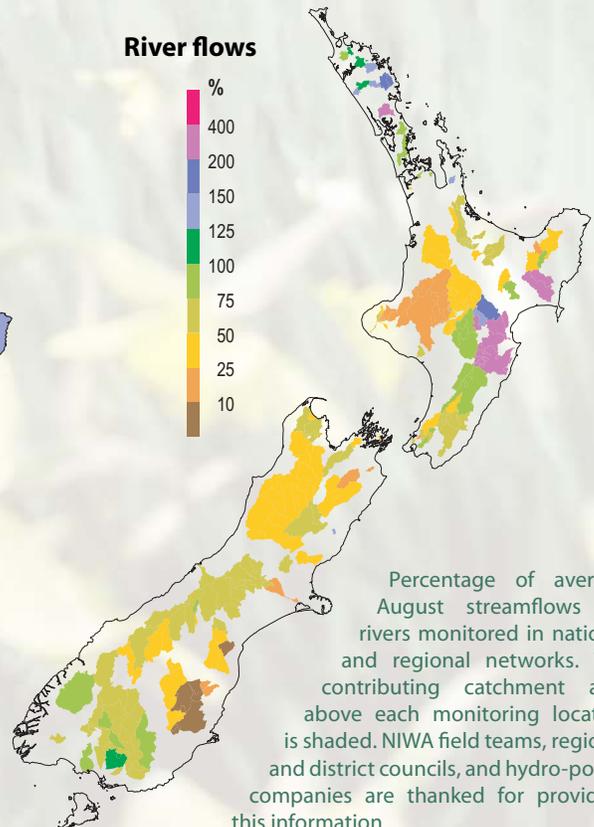
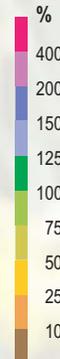
It was 1.5–2.0 °C warmer than average in south Westland and Fiordland, and at least 0.5 °C above average in Nelson, western Southland, Wellington, Rangitikei, northern Taranaki, coastal Waikato, Auckland, and Bay of Plenty.

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

Low flows in central and southern regions

August streamflows were above normal in Northland, Coromandel, East Coast, Poverty Bay, and Hawke's Bay. Flows were below normal in the rest of the North Island and nearly all of the South Island. Exceptionally low flows occurred in southern Waikato, the south and west of the North Island, and parts of Otago.

River flows



Checkpoint

The expected mild winter was experienced in most places. Buller was cooler than predicted. It was drier than expected in central and western North Island and eastern South Island. Elsewhere rain was as expected.

Soil moisture levels were normal as expected in most regions, but below average in south Canterbury and north Otago, and slightly below average in Manawatu and Horowhenua.

River flows were expected to be normal in northern and western regions, and normal or below normal in eastern districts. They were higher than expected in Hawke's Bay and Fiordland, and lower than expected in central, western, and southern North Island regions

Outlook

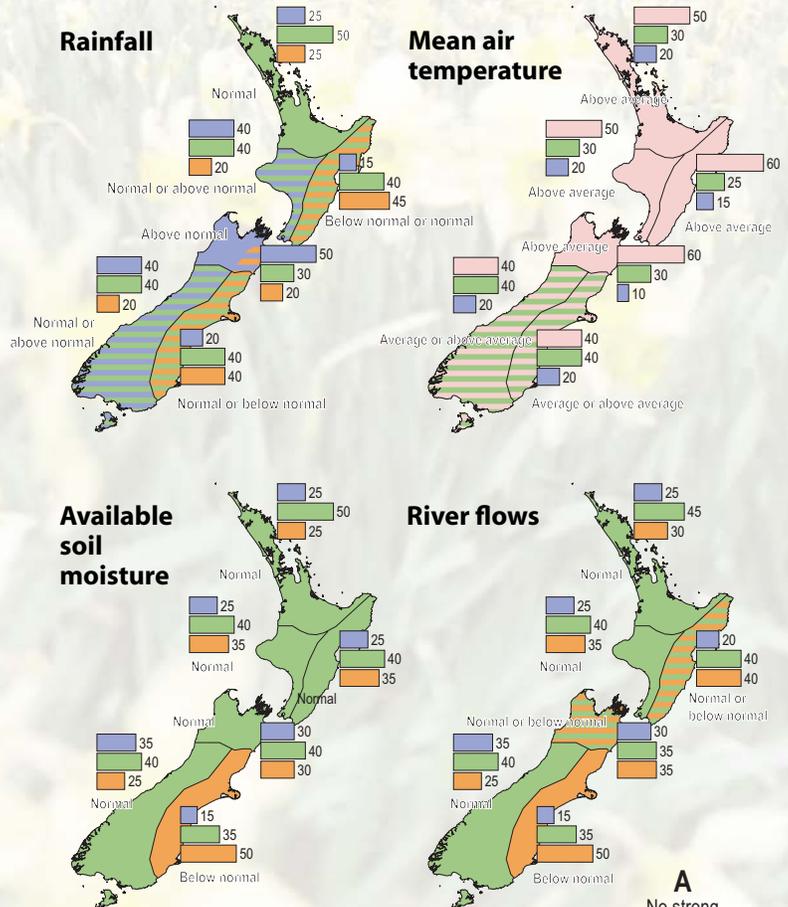
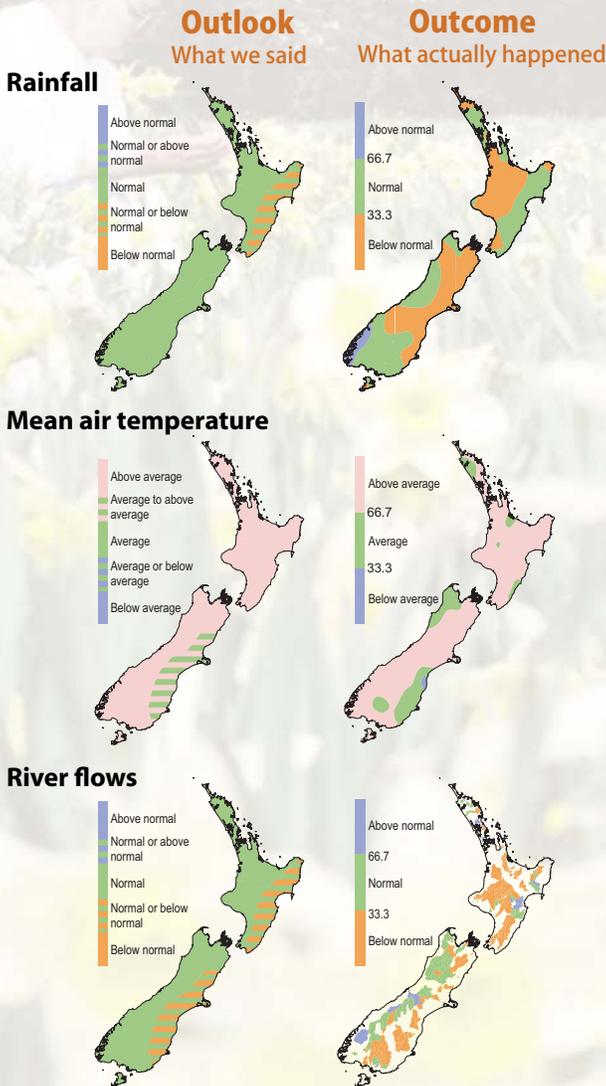
September to November

A mild spring is expected, with above average temperatures over all the North Island and north of the South Island, with average or above average temperatures over the rest of the South Island.

Normal or below normal rainfall is expected in the east of both islands, while normal or above normal rainfall is expected in western areas of both islands and in Northland. Overall, above normal rainfall is expected in the north of the South Island, but it may tend towards below normal in the east.

Normal soil moisture levels and flows are predicted for most of the country, except for normal or below normal flows for the east of the North Island, and below normal soil moisture levels and flows for the east coast of the South Island.

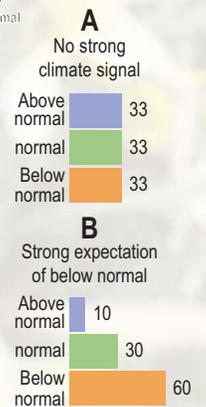
Sea surface temperatures around New Zealand are expected to remain above average, with local circulation patterns likely to favour enhanced westerly winds.



The three outcome maps (right column) give the tercile rankings of the rainfall totals, mean temperatures, and river flows that eventuated for June to August 2003. Terciles were obtained by dividing ranked June to August 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.

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).

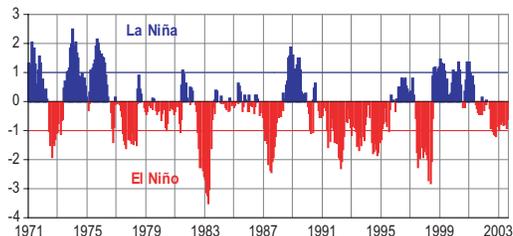


Global setting

ENSO remains quiet

The Equatorial Pacific atmosphere and ocean surface conditions suggest that the El Niño-Southern Oscillation (ENSO) was in a neutral state in August (see diagram). The current neutral conditions are likely to remain through to the end of summer 2004.

The current three month value of the SOI is -0.5 , while the SOI at the end of August was -0.4 . 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.

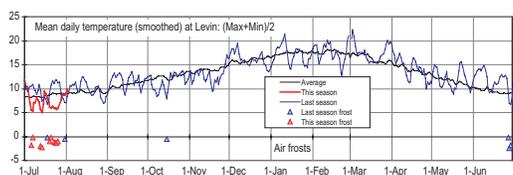


Above: The Southern Oscillation Index (SOI), a measure of changes in the atmospheric pressures across the Pacific, smoothed over three months.

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



Spring daffodils at Middle Run Estate near Carterton, Wairarapa. Each year the public can pick flowers in return for a donation to charity.

Cover photo:
Alan Blacklock.

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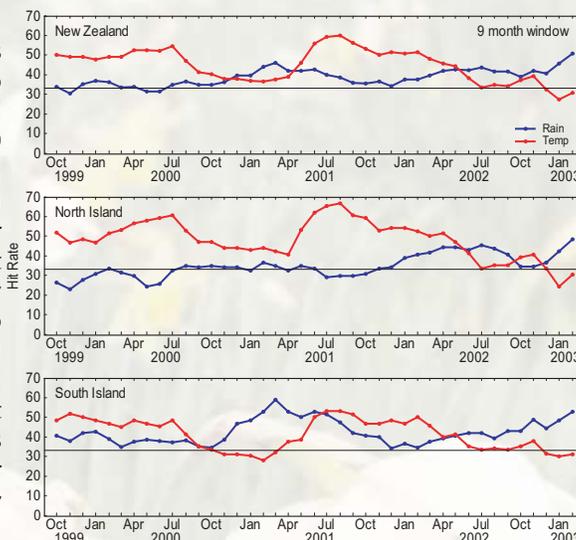
Backgrounder

Scoring National Climate Centre seasonal outlooks

Jim Renwick, National Centre for Climate Monitoring and Prediction

Climate forecasts, like all predictions of the future, are inherently uncertain. Chaos in the weather renders about half of New Zealand seasonal climate variability completely unpredictable. Hence, seasonal outlooks for New Zealand (or anywhere else) must reflect uncertainty and can never be completely categorical. The NCC outlooks convey this by predicting the probability of a set of three tercile outcomes for each element and region. That is, we predict the chance that the coming season's climate will fall into the lowest third of the historical record (coolest, driest; "below normal"), the middle one third ("near normal"), or the highest one third (warmest, wettest; "above normal").

Because the forecast is always uncertain, no tercile is ever assigned a probability of 100 percent or 0 percent. But that doesn't mean the forecast is never wrong! We still want the highest probability to be assigned to the tercile which actually occurs, and we'd like the forecast probabilities to be as close to 0 percent or 100 percent as they can be, and so on.



A simple measure of accuracy is the "hit rate", the fraction of times the tercile predicted with the highest probability actually occurs. Skilful forecasts should have a hit rate near 100 percent. If we are predicting one of three tercile outcomes, a complete guess would get the right answer one third (33 percent) of the time. Given the unpredictability mentioned above, a hit rate of about 70 percent is about the best that can be achieved on theoretical grounds.

We have taken the full period of *The Climate Update* outlooks and scored the forecasts, using a moving nine-month window, to show how forecast accuracy varies in time. The figure shows the hit rate for rainfall and temperature forecasts, for New Zealand as a whole and for the North and South Islands, in successive nine-month periods. The dates assigned correspond to the middle month of each period. Note that skill for river flow outlooks is similar to that for rainfall.

There are a number of interesting features. Temperature forecasts are generally more skilful than those for rainfall, as New Zealand temperature is more closely related to the El Niño-Southern Oscillation (ENSO) cycle, especially in the North Island. The overall hit rate is about 45 percent, but there have been prolonged periods above 50 percent. The drop in skill in late 2000 corresponds with the end of La Niña conditions. The recent drop in skill occurred during the last El Niño, an event that exhibited decidedly non-El Niño-like climate patterns over New Zealand.

Rainfall forecasts have been improving over time. In the first year, the hit rate was down about the 33 percent no-skill mark, but more recently it has consistently been between 40 percent and 50 percent. Rainfall is most skilfully forecast over the South Island, while the reverse is true for temperature. This effect is probably because of the strong dependence of South Island rainfall patterns on the westerly winds and their interactions with the steep topography. Seasonal changes in the westerlies show some predictability. Conversely, temperatures in the north are more strongly influenced by ENSO, and are therefore more predictable on average.