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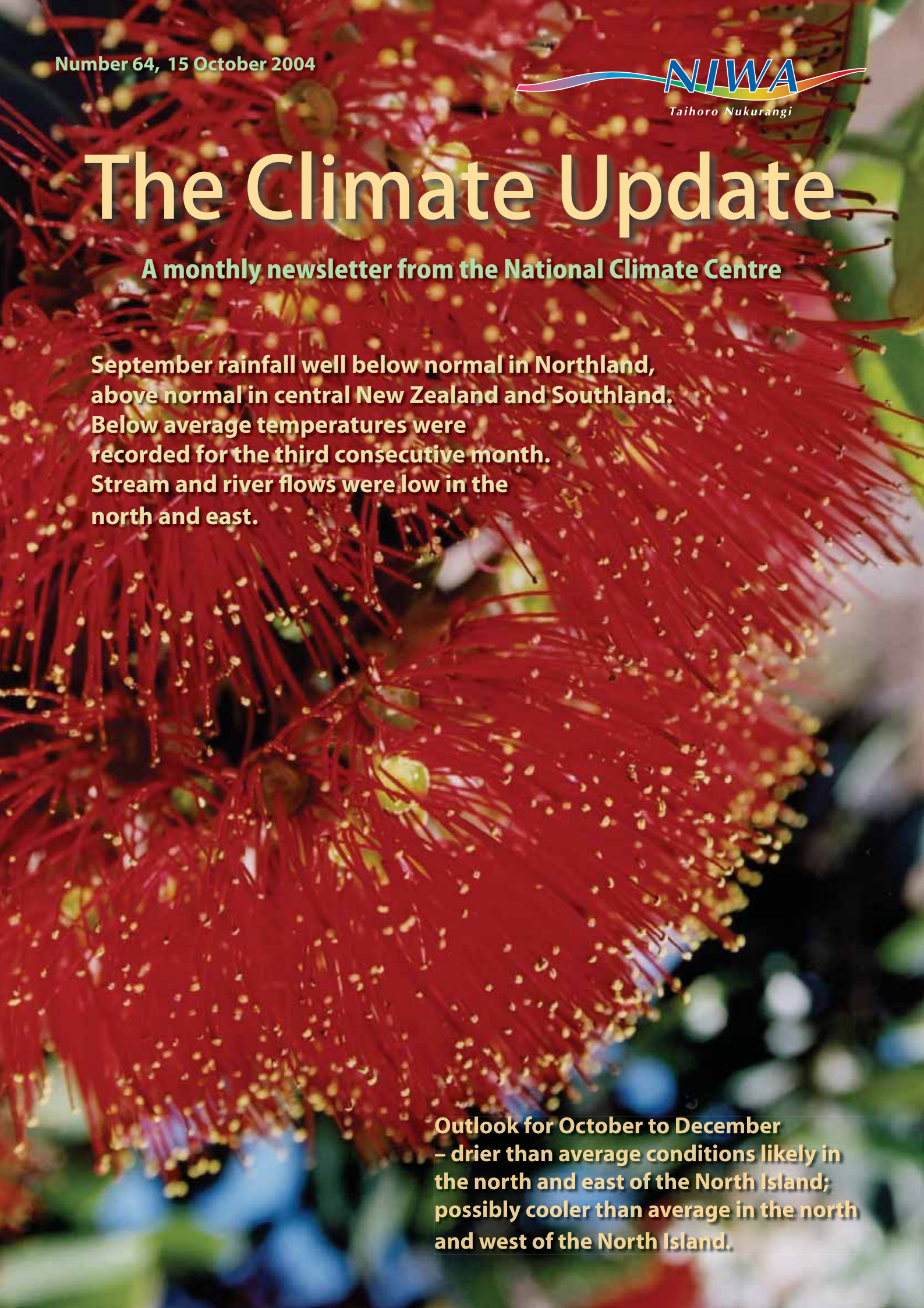
NIWA
Taihoro Nukurangi

The Climate Update

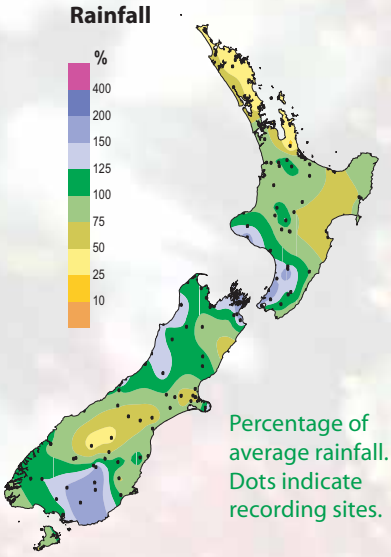
A monthly newsletter from the National Climate Centre

September rainfall well below normal in Northland, above normal in central New Zealand and Southland. Below average temperatures were recorded for the third consecutive month. Stream and river flows were low in the north and east.

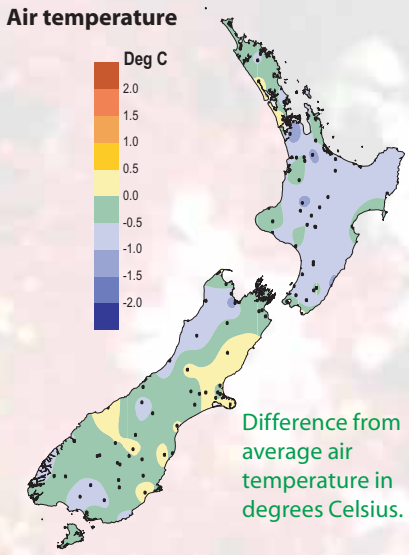


Outlook for October to December – drier than average conditions likely in the north and east of the North Island; possibly cooler than average in the north and west of the North Island.

New Zealand climate in September 2004



Percentage of average rainfall. Dots indicate recording sites.



Difference from average air temperature in degrees Celsius.

Third cool month in a row

September was the third consecutive month with below average temperatures. Much of the North Island was 0.5 to 1.0 °C below average.

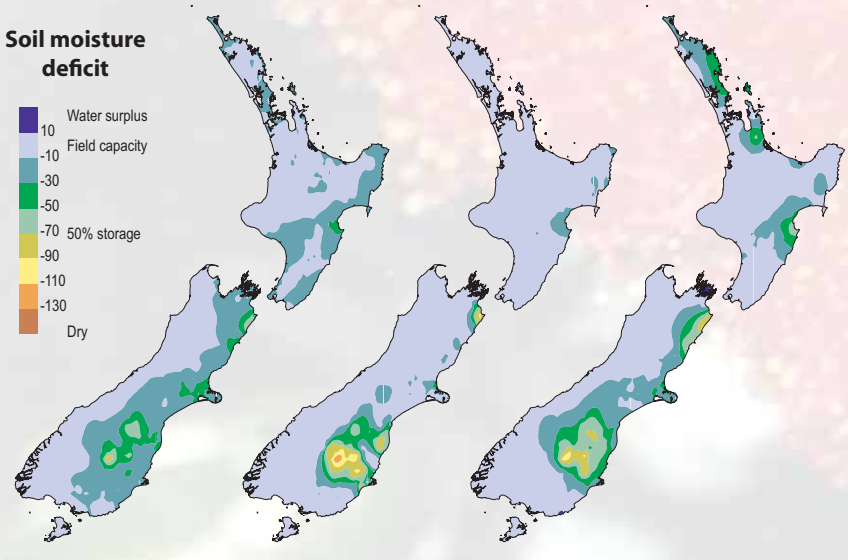
Rainfall was well below average in northern New Zealand and Hawke's Bay. Paeroa recorded its lowest September rainfall since records began in 1914.

Conditions were wetter than average in central New Zealand and much of Southland.

For more information on the climate in September, visit the climate summaries page at www.niwa.co.nz/ncc/cs/mclimsum_04_09

Dry spots in the north and east

Soil moisture levels in eastern Northland, along the Marlborough-Kaikoura coast, and in parts of inland Otago were lower than average at the end of September. Soils elsewhere remained near field capacity during the month.



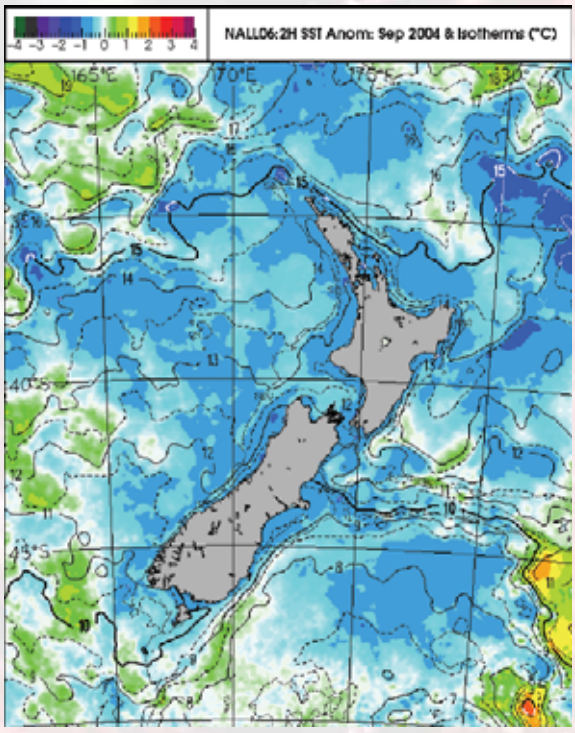
Historical average deficit on 30 September

Deficit on 30 September 2003

Deficit on 30 September 2004

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

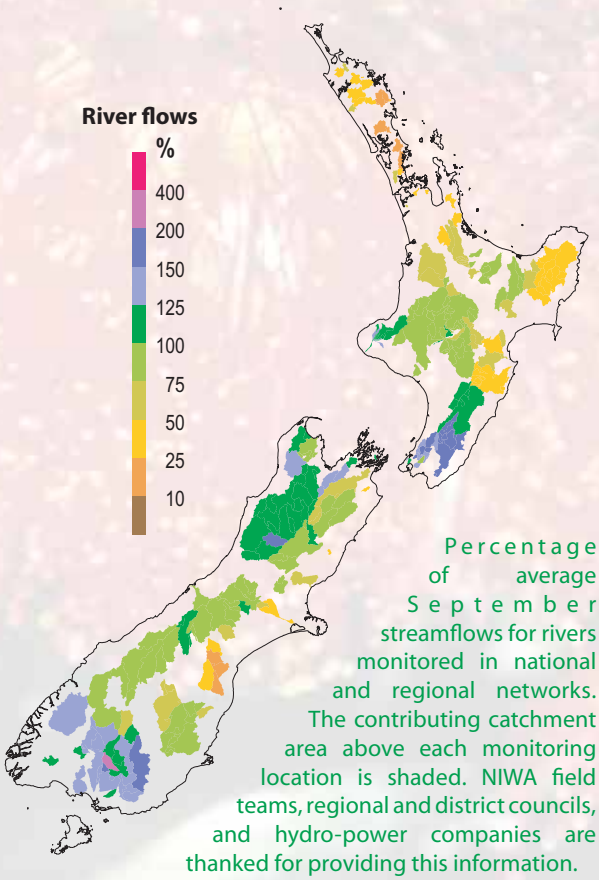
Sea surface temperatures



Difference from normal surface water temperatures in the seas around New Zealand. Seas adjacent to New Zealand have been cooler than average.

Low flows in the north and east

Streamflows were below normal in the northern North Island, and mid, and South Canterbury; above normal in the southern North Island, Southland, and parts of Taranaki, Tasman, and Buller; and normal elsewhere.



Percentage of average September 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

July to September

Atmospheric circulation over New Zealand was more southwesterly than expected.

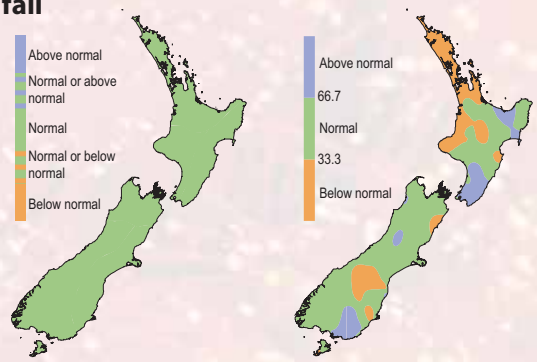
Normal rainfall was predicted for most of New Zealand. The outcome was drier than normal conditions in parts of the north and west of the North Island, Kaikoura, and Otago, and above average rain in Bay of Plenty, the southern North Island, and parts of Southland.

Air temperatures were lower than predicted across the country.

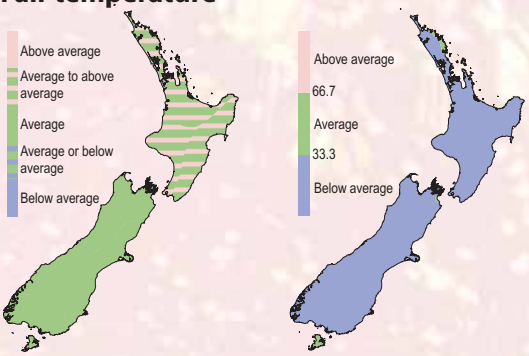
River flows were expected to be generally normal. River flows were below normal in the northern North Island and the South Island east coast, above normal in the eastern Bay of Plenty and the southern North Island, and near normal elsewhere.

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

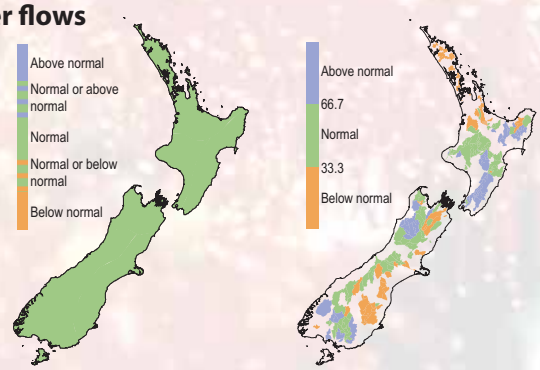
Rainfall



Mean air temperature



River flows



The three outcome maps (right column) give the tercile rankings of the rainfall totals, mean air temperatures, and river flows that eventuated from July to September, in comparison with the forecast conditions (left column).

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.

Outlook

October to December

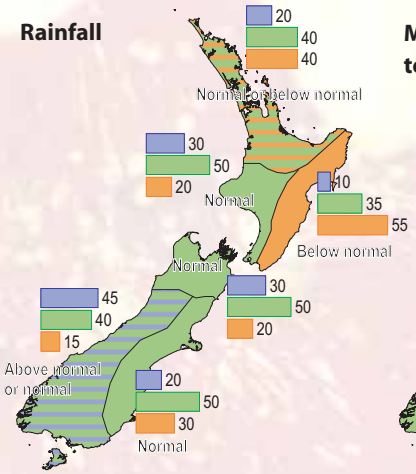
Mean sea-level pressures are expected to be lower than normal to the south of New Zealand, with more west to southwest wind flow than usual over the country for the remainder of 2004. Sea surface temperatures are likely to remain slightly below average around New Zealand over the next three months.

Temperatures are expected to be average or below average in the north and west of the North Island, and near average elsewhere. Normal or below normal rainfall is expected in the north and east of the North Island, with normal or above normal rainfall for the west and south of the South Island. Near normal rainfalls are expected elsewhere.

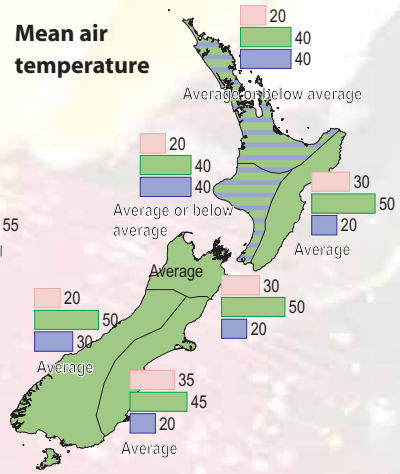
Soil moisture levels are expected to be normal or below normal over most of the country, apart from normal or above normal conditions for the western South Island. Stream flows are expected to be below normal in the north and east of the North Island, normal or below normal in the eastern South Island, and normal or above normal elsewhere.

The tropical Pacific is presently in a weak El Niño state. It is likely that weak El Niño conditions will continue through the rest of 2004 and into early 2005.

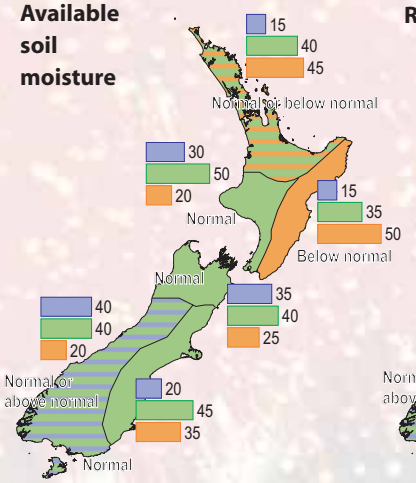
Rainfall



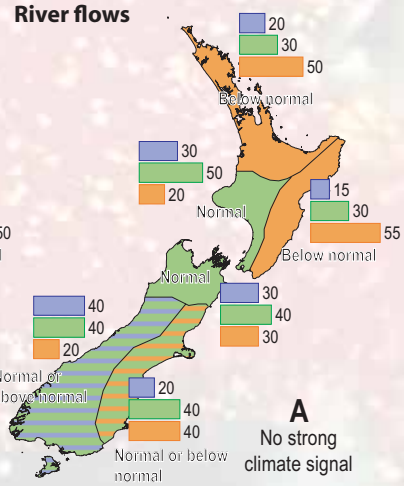
Mean air temperature



Available soil moisture



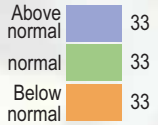
River flows



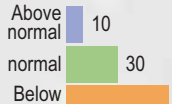
Key to maps (example interpretation)

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).

A
No strong climate signal



B
Strong expectation of below normal



Backgrounder

Climate forecasting with traditional Māori knowledge

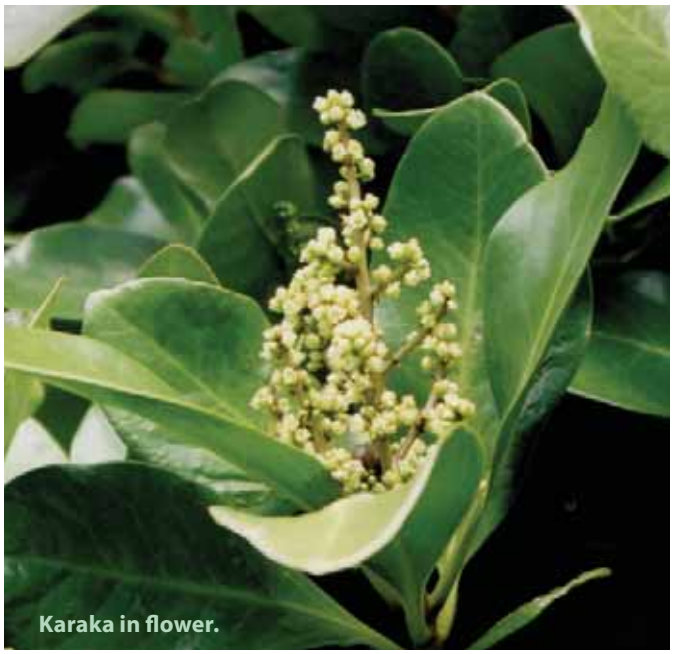
Darren NT King & Apanui Skipper
Te Kūwaha – Māori Research Unit (NIWA)

Ever since Māori first arrived in New Zealand, the ability to understand and adapt to local climate has been vital to their survival. Through interacting with local environments over the centuries Māori have developed an extensive knowledge of climate, and the lessons learnt have been incorporated into traditional and modern practices of agriculture, fishing, medicine, education, and conservation. To Māori, the climate was governed by the months and seasons – marked by the local sequence of natural events, including the movements of stars, the blooming of certain trees and flowers, the arrival and departure of migratory birds, and the age of the moon. Learning to monitor and predict changes in climate, such as shifts in temperature, the direction of the winds, and even changes in the style of rainfall, ultimately helped Māori to determine the timing for different classes of work and has been a major factor in their successfully responding to past climate variability and change.

Name	Indicator	Expected Outcome	Iwi / Region
Pipiwharauroa (Shining cuckoo)	The return of the Pipiwharauroa	The beginning of warmer weather	Ngā Puhi: N North Island
Pōhutukawa	Early, bright flowering	Long summer and drought	Ngāti Wai: NE North Island
Koekoeā (Long-tailed cuckoo)	The Koekoeā returns	Improved weather is on the way	Ngāti Pare: NE North Island
Karaka	Heavy flowering	Dry conditions ahead	Ngai Tuhoe: NE Central North Island
Marama (Moon)	In the first five nights of the month, the moon is at an angle or straight up and down	A very dry month lies ahead	Te Whanau a Apanui: E North Island
Kohoperoa (Long-tailed cuckoo)	The kohoperoa stops singing	The wind is about to blow from the south	Te Ati Awa: SW North Island
Matariki (Pleides)	The stars of Matariki appear wide apart	Warmer seasonal temperatures expected	Kai Tahu: E South Island
Matariki (Pleides)	The stars of Matariki appear to be close together	Cooler seasona temperatures expected	Kai Tahu: E South Island

Examples of environmental indicators used by Māori to forecast changes in climate.

NIWA's Māori Research Unit, Te Kūwaha, in collaboration with iwi from across New Zealand, has initiated a project to explore traditional Māori knowledge of weather and climate variability and change. Thus far, the project has documented what Māori in participating localities know about climate variability and change. Of particular interest is the linking of events in the natural world to the forecasting of climate. Learning about this traditional knowledge provides an opportunity to understand what has helped Māori to be strong and able to adjust to variability in the past. It also provides clues on how to build resilience and formulate adaptation strategies for the future. This pilot project presupposes that by combining traditional Māori knowledge with western meteorology and climatology there is potential to improve Māori and western understanding of local weather and climate.



Karaka in flower.

The table shows a selection of environmental indicators used by Māori across New Zealand to forecast various aspects of climate. While the indicators have their greatest utility in their respective localities, many of them are shared by different iwi in other locations. Often more than one indicator is used to forecast for the month or season ahead. This consensus-based approach to climate forecasting is similar to western science forecasting methods, which also rely on a consensus among different computer models to forecast changes in climate. While western forecasting methods have demonstrated significant skill and continue to improve, there exist substantial opportunities to increase the certainty of these tools by integrating traditional Māori knowledge of local climate. By building a collective database of traditional Māori knowledge related to weather and climate, a process of building greater resilience to future climate variability can be initiated.

Pōhutukawa blossom.

Cover photo: *Alan Blacklock*

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
Email: ncc@niwa.co.nz
Phone: 0-4-386 0300. Visit our webpage: www.niwa.co.nz