



December 2018 – February 2019

Issued: 28 November 2018

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## NIWA Outlook: December 2018 – February 2019

### Outlook Summary

- The atmospheric circulation around New Zealand is forecast to be characterised by higher pressure than normal extending from the Chatham Islands to the Australian Bight. Over New Zealand, the circulation will be characterised by westerly quarter flow anomalies and mixed flows.
- Mean summer temperatures are about equally likely to be near or above average.
- Near normal summer rainfall is likely for most regions; however, the north of the North Island has about equal chances for below normal or near normal rainfall and the west of the South Island has about equal chances for above normal or near normal rainfall.
- The tropical Pacific Ocean is exhibiting weak El Niño conditions, although the atmosphere has failed to follow suit – meaning the ocean and atmosphere are not coupled.
- An El Niño event is occurring when the tropical Pacific Ocean and the overlying atmosphere behave in unison and reinforce one another.
- The prospect of the ocean and atmosphere failing to fully couple in the next three months may increase variability this summer (e.g. not persistently warm like summer 2017-18 and more changeable air flow patterns).
- Above average or near average sea surface temperatures (SSTs) are expected in New Zealand coastal waters during the next three months. Coastal SSTs are currently above average.

- For the current tropical cyclone season (November 2018 to April 2019), [NIWA's Southwest Pacific Tropical Cyclone Outlook](#) indicates that the risk for New Zealand is near normal. On average, at least one ex-tropical cyclone passes within 550km of New Zealand each year. Significant rainfall, damaging winds, and coastal damage can occur during these events.

December 2018 – February 2019 temperatures are forecast to be above average (45% chance) or near average (40% chance) for all regions of New Zealand.

December 2018 – February 2019 rainfall totals are forecast to be near normal (40% chance) or below normal (35% chance) for the north of the North Island and near normal (40% chance) or above normal (35% chance) for the west of the South Island. Near normal rainfall (45% chance) is most likely for all remaining regions of New Zealand.

December 2018 – February 2018 soil moisture levels and river flows are about equally likely to be near normal (40% chance) or below normal (35–40% chance) for the east and north of the North Island. Near normal (40–45% chance) soil moisture and river flows are expected for all other regions of New Zealand.

## Regional predictions for the November 2018 – January 2019 season

### Northland, Auckland, Waikato, Bay of Plenty

The table below shows the probabilities (or percent chances) for each of three categories: above average, near average, and below average. In the absence of any forecast guidance there would be an equal likelihood (33% chance) of the outcome being in any one of the three categories. Forecast information from local and global guidance models is used to indicate the deviation from equal chance expected for the coming three-month period, with the following outcomes the most likely (but not certain) for this region:

- Temperatures are about equally likely to be above average (45% chance) or near average (40% chance).
- Rainfall totals are about equally likely to be near normal (40% chance) or below normal (35% chance).
- Soil moisture levels and river flows are equally likely to be near normal (40% chance) or below normal (40% chance).

The full probability breakdown is:

	Temperature	Rainfall	Soil moisture	River flows
Above average	45	25	20	20
Near average	40	40	40	40
Below average	15	35	40	40

### Central North Island, Taranaki, Whanganui, Manawatu, Wellington

Probabilities are assigned in three categories: above average, near average, and below average.

- Temperatures are about equally likely to be above average (45% chance) or near average (40% chance).
- Rainfall totals are mostly likely to be in the near normal range (45% chance).
- Soil moisture levels and river flows are most likely to be in the near normal range (40-45% chance).

The full probability breakdown is:

	Temperature	Rainfall	Soil moisture	River flows
Above average	45	30	30	25
Near average	40	45	40	45
Below average	15	25	30	30

### Gisborne, Hawke's Bay, Wairarapa

Probabilities are assigned in three categories: above average, near average, and below average.

- Temperatures are about equally likely to be above average (45% chance) or near average (40% chance).
- Rainfall totals are mostly likely to be in the near normal range (45% chance).
- Soil moisture levels and river flows are about equally likely to be near normal (40% chance) or below normal (35% chance).

The full probability breakdown is:

	Temperature	Rainfall	Soil moisture	River flows
Above average	45	30	25	25
Near average	40	45	40	40
Below average	15	25	35	35

### Tasman, Nelson, Marlborough, Buller

Probabilities are assigned in three categories: above average, near average, and below average.

- Temperatures are about equally likely to be above average (45% chance) or near average (40% chance).
- Rainfall totals, soil moisture levels and river flows are all mostly likely to be in the near normal range (45% chance).

The full probability breakdown is:

	Temperature	Rainfall	Soil moisture	River flows
Above average	45	25	25	25
Near average	40	45	45	45
Below average	15	30	30	30

### **West Coast, Alps and foothills, inland Otago, Southland**

Probabilities are assigned in three categories: above average, near average, and below average.

- Temperatures are about equally likely to be above average (45% chance) or near average (40% chance).
- Rainfall totals are about equally likely to be near normal (40% chance) or above normal (35% chance).
- Soil moisture levels and river flows are most likely to be in the near normal range (40% chance).

The full probability breakdown is:

	Temperature	Rainfall	Soil moisture	River flows
Above average	45	35	30	30
Near average	40	40	40	40
Below average	15	25	30	30

### **Coastal Canterbury, east Otago**

Probabilities are assigned in three categories: above average, near average, and below average.

- Temperatures are about equally likely to be above average (45% chance) or near average (40% chance).
- Rainfall totals, soil moisture levels and river flows are all mostly likely to be in the near normal range (40-45% chance).

The full probability breakdown is:

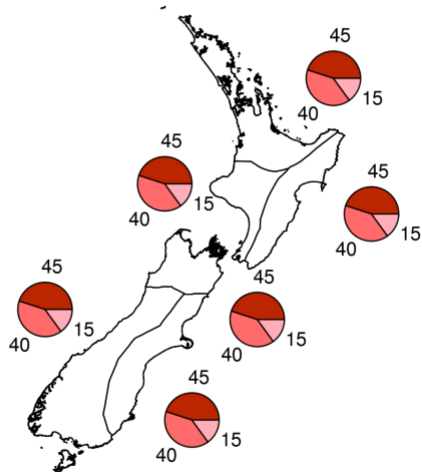
	Temperature	Rainfall	Soil moisture	River flows
Above average	45	25	30	30
Near average	40	45	40	40
Below average	15	30	30	30

Graphical representation of the regional probabilities

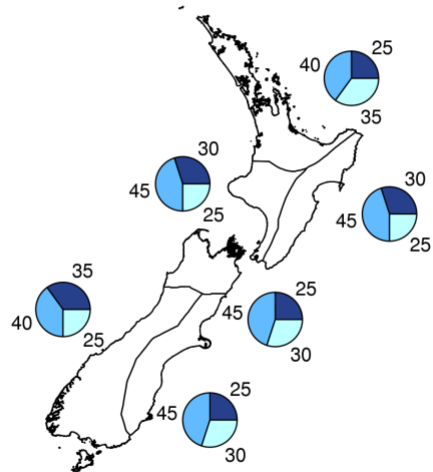
Outlook for December 2018 - February 2019



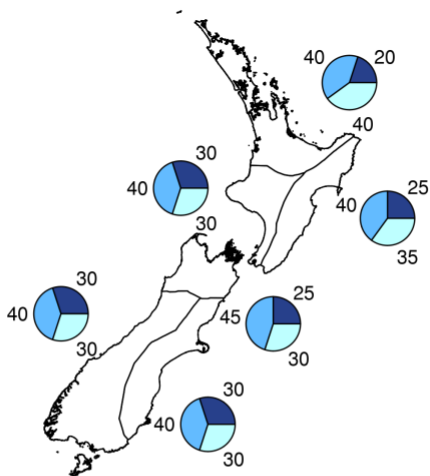
**Air Temperature**



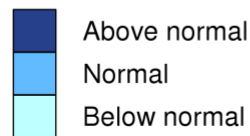
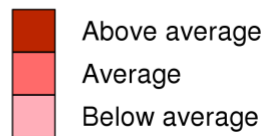
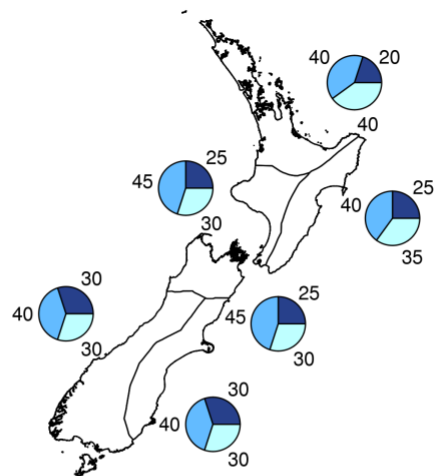
**Rainfall**



**Available Soil Moisture**



**River Flows**



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## Background

Sea surface temperatures (SSTs) across the east-central tropical Pacific have reached weak El Niño conditions. Over the past month, SSTs in the central Pacific (NINO3.4 Index) have continued to warm, increasing to an anomaly of +0.9°C. This marks the third consecutive month SST anomalies in the central Pacific have exceeded 0.7°C, which meets NIWA'S technical *oceanic* definition for El Niño.

However, the atmosphere has yet to respond to this additional warmth and become truly coupled with the ocean in a manner typically associated with an El Niño event. One reflection of this is the Southern Oscillation Index (SOI), which was at -0.2 for November, i.e. in the neutral range.

An El Niño event is considered to have formally occurred when the tropical Pacific Ocean and the overlying atmosphere act in concert and reinforce each other, operating as a key driver of global weather and climate patterns.

Trade winds, until recently, have been generally near or weaker than average for the month of November. However, a significant Westerly Wind Burst (WWB) between the Date Line and 120°W is expected through to the first week of December. This WWB will likely result in an additional downwelling Kelvin wave, which will may tip the atmosphere toward El Niño over the coming weeks in what would become an unusually late onset.

It is possible that over the coming months the ocean and atmosphere do not act in unison or at least are slow to do so, i.e. the ocean suggests El Niño but the atmosphere does not. In this case, the impact on New Zealand's weather patterns may differ from what is typically experienced during a conventional El Niño event.

The consensus from international models is for the tropical Pacific to transition towards El Niño over the next three-month period (94% chance over December 2018 – February 2019). The probability for El Niño remains high through autumn 2019, with an 85% chance for occurrence in the March – May 2019 period. In fact, the probability of El Niño remains unusually elevated (66% chance) through to the next Southern Hemisphere winter season (signalling the possibility of a *protracted* El Niño event extending over 2 years).

It should be noted that SST anomalies are used to articulate the probability of an El Niño occurring, and that it is *not* the prospect for a fully coupled ocean-atmosphere event. Essentially, it is possible for the ocean to exhibit El Niño, and therefore the forecast models would be accurate. However, if the atmosphere is not coupled with the ocean, e.g. the atmosphere does not reflect El Niño, then a formal acknowledgment of El Niño will not occur.

New Zealand coastal SSTs remained above average during November. The most anomalous SSTs were found near the northern South Island (+1.05°C). The expectation is for average or above average SSTs during the December – February period, although above average SSTs are likely for the month of December.

[For comment, please contact](#)

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## Notes to reporters and editors

1. NIWA's outlooks indicate the likelihood of climate conditions being at, above, or below average for the season as a whole. They are not 'weather forecasts'. It is not possible to forecast precise weather conditions three months ahead of time.
2. The outlooks are the result of the expert judgment of NIWA's climate scientists. They take into account observations of atmospheric and ocean conditions and output from global and local climate models. The presence of El Niño or La Niña conditions and the sea surface temperatures around New Zealand can be a useful indicator of likely overall climate conditions for a season.
3. The outlooks state the probability for above average conditions, near average conditions, and below average conditions for rainfall, temperature, soil moisture, and river flows. For example, for winter (June–July–August) 2007, for all the North Island, we assigned the following probabilities for temperature:
  - Above average: 60 per cent
  - Near average: 30 per cent
  - Below average: 10 per centWe therefore concluded that above average temperatures were very likely.
4. This three-way probability means that a random choice would be correct only 33 per cent (or one-third) of the time. It would be like randomly throwing a dart at a board divided into three equal parts, or throwing a dice with three numbers on it. An analogy with coin tossing (a two-way probability) is not correct.
5. A 50 per cent 'hit rate' is substantially better than guesswork, and comparable with the skill level of the best overseas climate outlooks. See, for example, analysis of global outlooks issued by the International Research Institute for Climate and Society based in the US published in the Bulletin of the American Meteorological Society (Goddard, L., A. G. Barnston, and S. J. Mason, 2003: Evaluation of the IRI's "net assessment" seasonal climate forecasts 1997–2001. *Bull. Amer. Meteor. Soc.*, 84, 1761–1781).
6. Each month, NIWA publishes an analysis of how well its outlooks perform. This is available online and is sent to about 3500 recipients of NIWA's newsletters, including many farmers. See [www.niwa.co.nz/our-science/climate/publications/all/cu](http://www.niwa.co.nz/our-science/climate/publications/all/cu)
7. All outlooks are for the three months as a whole. There will inevitably be wet and dry days, and hot and cold days, within a season. The exact range in temperature and rainfall within each of the three categories varies with location and season. However, as a guide, the "near average" or middle category for the temperature predictions includes deviations up to  $\pm 0.5^{\circ}\text{C}$  for the long-term mean, whereas for rainfall the "near normal" category lies between approximately 80 per cent and 115 per cent of the long-term mean.
8. The seasonal climate outlooks are an output of a scientific research programme, supplemented by NIWA's Capability Funding. NIWA does not have a government contract to produce these outlooks.
9. Where probabilities are within 5% of one another, the term "about equally" is used.

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