



July – September 2019

Issued: 28 June 2019

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NIWA Outlook: July – September 2019

Outlook Summary

- A weak, central Pacific El Niño continued during June as sea surface temperatures (SSTs) remained more than 0.7°C above average (i.e. the El Niño threshold) for the fourth consecutive month.
- While El Niño is expected to continue over the coming three-month period (60% chance), it may gradually weaken and become less influential on the global climate system.
- For the July to September period, air pressure is forecast to be higher than normal to the northwest of New Zealand and lower than normal to the south. This is expected to be associated with more westerly quarter winds to start the season and mixed flow patterns later. There may be a trend toward more unsettled weather during the coming season, particularly in September.
- Temperatures are forecast to be near average or above average for all regions of New Zealand, owing to warmer than average coastal and regional sea surface temperatures.
- Warm spells are possible on occasions during July and particularly August when air flows extend from Australia from time to time.
- Rainfall is forecast to be near normal or below normal in the north of the North Island and north and east of the South Island. Near normal rainfall is forecast in all other regions of New Zealand.

- As the season progresses, high pressure systems may become less frequent in the New Zealand region, contributing to more regular rainfall events.

July – September 2019 temperatures are about equally likely to be near average (40-45% chance) or above average (40-45% chance) for all regions of New Zealand. Despite a low chance for a season with below average temperatures, cold snaps and frosts remain likely to occur.

July – September 2019 rainfall is about equally likely to be near normal (40% chance) or below normal (35% chance) in the north of the North Island and north and east of the South Island. Rainfall is forecast to be near normal (45% chance) in all remaining regions of New Zealand.

July – September 2019 soil moisture levels and river flows are most likely to be below normal (40% chance) in the north of the North Island. For the north of the South Island, soil moisture levels and river flows are about equally likely to be near normal (35-40% chance) or below normal (35-40% chance). Near normal soil moisture levels and river flows are forecast for the remaining regions of New Zealand (40-45% chance).

Regional predictions for the July – September 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 near average (40% chance) or above average (35% 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 most likely to be below normal (40% chance).

The full probability breakdown is:

	Temperature	Rainfall	Soil moisture	River flows
Above average	35	25	30	30
Near average	40	40	30	30
Below average	25	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 near average (40% chance) or above average (35% chance).

- Rainfall totals, 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	35	30	30	25
Near average	40	45	40	45
Below average	25	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 near average (40% chance) or above average (35% chance).
- Rainfall totals, 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	35	25	30	30
Near average	40	45	40	40
Below average	25	30	30	30

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

The full probability breakdown is:

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

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 (40% chance) or near average (35% chance).
- Rainfall totals, 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	40	25	30	30
Near average	35	45	40	40
Below average	25	30	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 (40% chance) or near average (35% 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 most likely to be near normal (40% chance).

The full probability breakdown is:

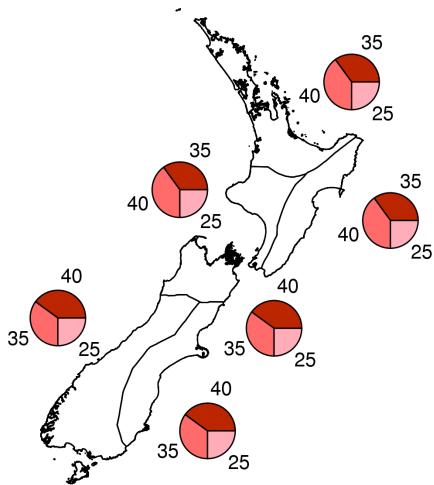
	Temperature	Rainfall	Soil moisture	River flows
Above average	40	25	30	30
Near average	35	40	40	40
Below average	25	35	30	30

Graphical representation of the regional probabilities

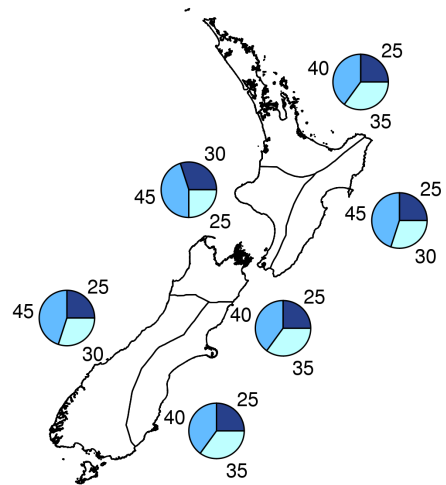
Outlook for July - September 2019



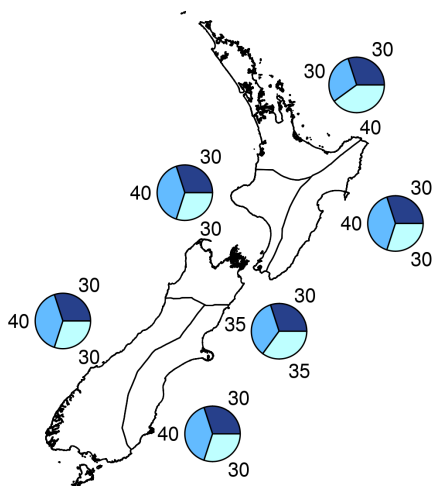
Air Temperature



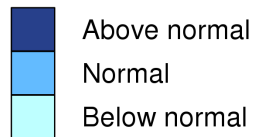
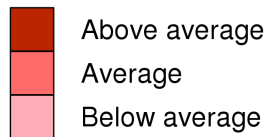
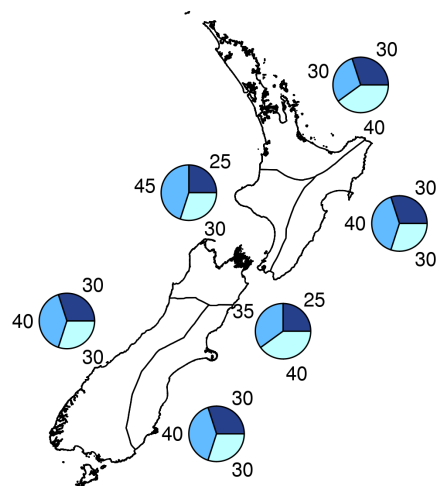
Rainfall



Available Soil Moisture



River Flows



Background

During June 2019, sea surface temperature anomalies remained above El Niño thresholds (i.e. +0.70°C) in the central Pacific for the fourth consecutive month. The NINO3.4 Index (in the central Pacific) anomaly for June (to the 23rd) was +0.75°C. The NINO 1+2 Index (in the far eastern Pacific) was near normal.

Upper-oceanic heat content anomalies once again increased in the central Pacific (170W-150W) but continued to decrease in the eastern (110W-100W) and western (160E to the Dateline) Pacific. The distribution of ocean heat content across the Pacific reflects ongoing El Niño-Modoki conditions.

The Southern Oscillation Index (SOI) was on the El Niño side of neutral for the second consecutive month (preliminary June value -0.7).

Trade winds were slightly stronger than normal in the western and central Pacific during June. A strong westerly wind event is expected across the central Pacific during late June and early July. Later in July, enhanced trade winds are again expected to develop. Therefore, sea surface temperatures may increase during the first half of July followed by a decrease later in the month.

Model guidance suggests that El Niño conditions will most likely (60% chance) continue over the next three months; however, a gradual weakening of sea surface temperature anomalies is possible in the equatorial Pacific. For the October – December 2019 period, the probability for El Niño continues at 60% before increasing to 65% during January – March 2020.

The Madden-Julian Oscillation (MJO) was active in the Indian Ocean and western Pacific during June. In early July, the MJO is forecast to move into phases 1 and 2 (the Indian Ocean). Phase 1 is associated with wetter than normal conditions in the west of New Zealand and slightly above average temperatures nationwide.

New Zealand's coastal water temperatures for June 2019 remain above average for all areas except the east of the North Island. Sea surface temperatures over the Tasman Sea and far Southwest Pacific remain, in general, above average for the time of year with anomalies of around +1.0° to 1.5°C. Warmer than average seas may help to modify cold air masses that move toward New Zealand from late winter into early spring and contribute to spells of above average temperatures.

New Zealand Coastal Sea Surface Temperatures during June 2019*

North NI	West NI	East NI	North SI	West SI	East SI
+0.34°C	+0.48°C	-0.05°C	+0.50°C	+0.42°C	+1.00°C

Warmer than average sea surface temperatures are forecast to persist during the coming three-month period.

The Southern Annular Mode (SAM) was positive for much of June after a brief negative spell very early in the month. Indications are for the index to continue positive, associated with higher

* Derived by interpolating daily SSTs from NOAA OISSTv2 to coastal grid-points and averaging along the coastlines of the 6 forecast regions

pressure than normal in the New Zealand region, early in the month followed by a downturn during mid-July.

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
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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