



October – December 2015

Issued: 1 October 2015

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NIWA Outlook: October - December 2015

Overview

Strong El Niño conditions were established across the Equatorial Pacific during September 2015. Sea surface temperature anomalies in the central and eastern Pacific remain close to or exceed the +2°C mark. The atmosphere is strongly coupled to these ocean anomalies. The Southern Oscillation Index was -1.7 for September 2015 [value estimated the 29th of September] indicating consolidation of air pressure differences between Tahiti and Darwin. Further, strong pulses of westerly wind anomalies (weaker trade-winds) have affected the central and western equatorial Pacific since August. Consistent with these patterns, convection and rainfall were suppressed over Indonesia and large parts of the Maritime Continent, while enhanced convective activity and rainfall were observed in the central and eastern Equatorial Pacific.

International guidance indicates that El Niño is virtually certain (99% chance) to continue over the next three months. By many measures, the current event is tracking close to the 1997/98 El Niño (the strongest since 1950), and is expected to intensify further over the next 3 months.

For October - December 2015, above normal pressure is forecast to the north and west of New Zealand, while below normal pressure is expected to the east and south of the country. This circulation pattern is likely to be accompanied by anomalous southwesterly wind flows - a signature of El Niño conditions. Sea surface temperatures (SSTs) for the remainder of the calendar year are forecast to be normal or below normal along the west coast of the country, while SSTs are expected to be in the below normal range to the east of New Zealand.

Outlook Summary

October – December 2015 temperatures are about equally likely to be near average (40% chance) or below average (40-45% chance) for all regions of New Zealand. Cold snaps and frosts can still be expected from time to time in spring in some parts of the country.

October – December 2015 rainfall is about equally likely to be in the near normal (40% chance) or below normal (40-45% chance) ranges in the north and east of the North Island, and about equally likely to be in the near normal (35% chance) or below normal (40% chance) ranges in the north of the South Island. Near normal rainfall is the most likely outcome (45% chance) for the west of the North Island. Seasonal rainfall in the west of the South Island is about equally likely to be in the near normal (40% chance) or above normal (35% chance) ranges.

October – December 2015 soil moisture levels are most likely to be near normal (40% chance) or below normal (35% chance) in the north and east of North Island. In the east of the South Island, soil moisture levels are equally likely to be near normal (40% chance) or below normal (40% chance). In the western regions of both Islands as well as the north of the South Island, soil moisture levels are most likely to be in the near normal range (40 or 45% chance).

October – December 2015 river flows are most likely to be in the near normal range (45% chance) for all of the North Island as well as west of the South Island. River flows are about equally likely to be in the near normal (40% chance) or below normal (40-45% chance) ranges for the north and east of the South Island.

Regional predictions for the October to December 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 and rainfall totals are equally likely to be near average (40% chance) or below average (40% chance).
- Soil moisture levels are about equally likely to be in the near normal (40% chance) or below normal (35% chance) ranges.
- River flows are most likely to be near normal (45% chance).

Other outcomes cannot be excluded. The full probability breakdown is:

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

Central North Island, Taranaki, Wanganui, Manawatu, Wellington

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

- Temperatures are equally likely to be near average (40% chance) or below average (40% 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	20	25	30	25
Near average	40	45	40	45
Below average	40	30	30	30

Gisborne, Hawke's Bay, Wairarapa

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

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

The full probability breakdown is:

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

Nelson, Marlborough, Buller

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

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

The full probability breakdown is:

	Temperature	Rainfall	Soil moisture	River flows
Above average	20	25	20	20
Near average	40	35	45	40
Below average	40	40	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 in the average (40% chance) or below average (45% chance) ranges.
- Rainfall totals are about equally likely to be in the near normal (40% chance) or above normal (35% chance) ranges.
- Soil moisture levels and river flows are most likely to be in the near normal range (40% and 45% chance, respectively).

The full probability breakdown is:

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

Coastal Canterbury, east Otago

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

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

The full probability breakdown is:

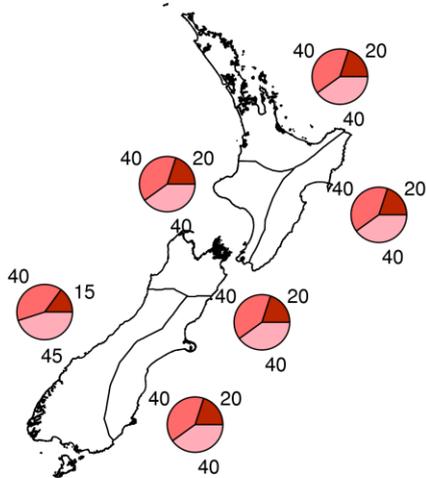
	Temperature	Rainfall	Soil moisture	River flows
Above average	20	15	20	15
Near average	40	40	40	40
Below average	40	45	40	45

Graphical representation of the regional probabilities

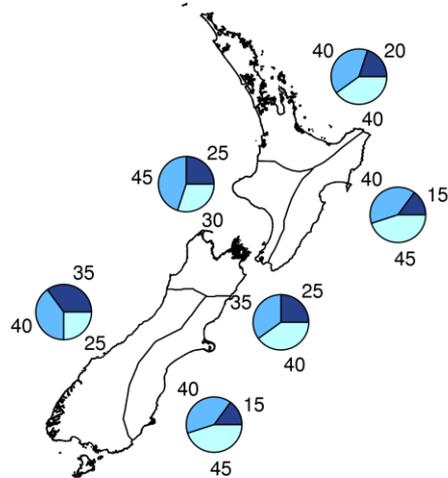
Outlook for October - December 2015



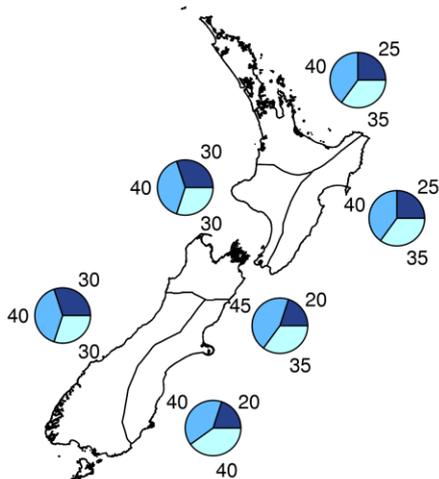
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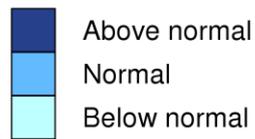
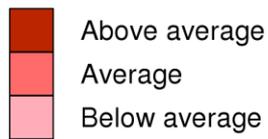
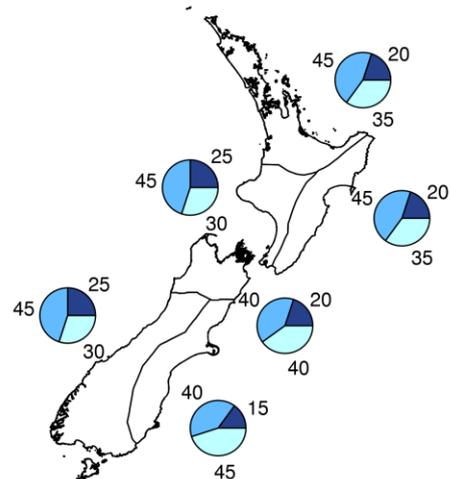
Rainfall



Available Soil Moisture



River Flows



Background

Sea surface temperature (SSTs) remained much warmer than average in the eastern and central Pacific during September 2015. Sub-surface ocean temperatures in the eastern Pacific have also remained much warmer than usual in September 2015, with anomalies exceeding +7°C off the South American coast.

The Southern Oscillation Index (SOI) has remained strongly negative since July 2015 and is at -1.7 for the month of September 2015 (value estimated on the 29th of September). Episodes of intense westerly wind anomalies (with occasional reversal of the climatological easterly trade winds) continued to dominate the central and western Pacific Ocean. Consistent with these circulation patterns, convection and rainfall along the Equator were shifted eastward: Indonesia and large parts of the Maritime Continent experienced much drier than normal conditions, while much more intense than normal rainfall and convection was observed in the central and eastern Pacific. Collectively, these atmospheric and oceanic features reflect current strong, fully coupled El Niño conditions.

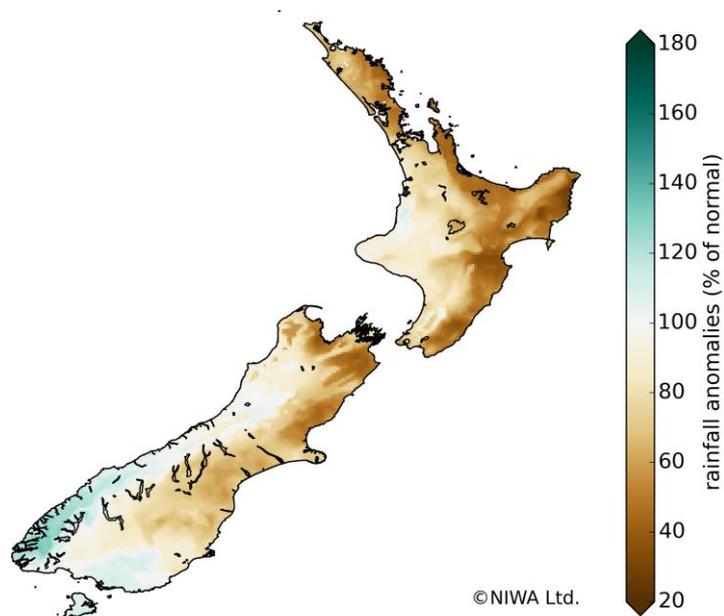
International guidance indicates that El Niño conditions are virtually certain (99% chance) to continue over the next three month period (October – December 2015) and highly likely (95% chance) to carry on through the summer (January – March 2016). By many measures, the current event is tracking close to the 1997/98 El Niño (the strongest since 1950) and is expected to intensify further over the next 3 months.

Note that El Niño events are typically (but not always) associated with stronger and/or more frequent south-westerly winds during spring in New Zealand. Such a circulation pattern usually leads to cooler conditions in most regions of the country, and potentially wetter than normal conditions to the west of the Southern Alps and drier conditions in northern and eastern regions of both Islands. The next three months (October – December 2015) circulation and temperature forecasts, in particular, broadly reflect these typical impacts.

For reference the figure below shows the average rainfall amounts, in percentage of the 1981-2010 normal, that were recorded for the summer season (December – February) during the three strongest El Niño events since 1950 (1972/73, 1982/83, 1997/98). Based on this record, an elevated risk for drought for parts of New Zealand is anticipated later during summer, in particular for eastern parts of both islands as well as northern areas of the North Island.

Waters surrounding New Zealand are currently close to normal. Ocean models generally suggest that coastal waters will be in the normal or below normal range along the west coast of the country, while SSTs are expected to be in the below normal range to the east of New Zealand.

December - February
(1972/73, 1982/83, 1997/98)



To find out more about normal conditions for this outlook period, refer to [NIWA's website](#), where daily updates on climate maps are available.

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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