OFFICE OF climate change
Department of Environment and Resource Management

Queensland Climate Change Centre of Excellence

Monthly Climate Statement

Key messages for the summer season

- Extremely wet start to summer
- Median summer rainfall already exceeded in many parts of Queensland
- High probability of above-median rainfall for the remainder of summer
- Bureau of Meteorology expects higher than average number of cyclones in the Queensland region

Findings for January 2011

The Queensland Climate Change Centre of Excellence (the Centre) considers that there is an increased probability of above-median rainfall throughout most of Queensland for the remainder of this summer.

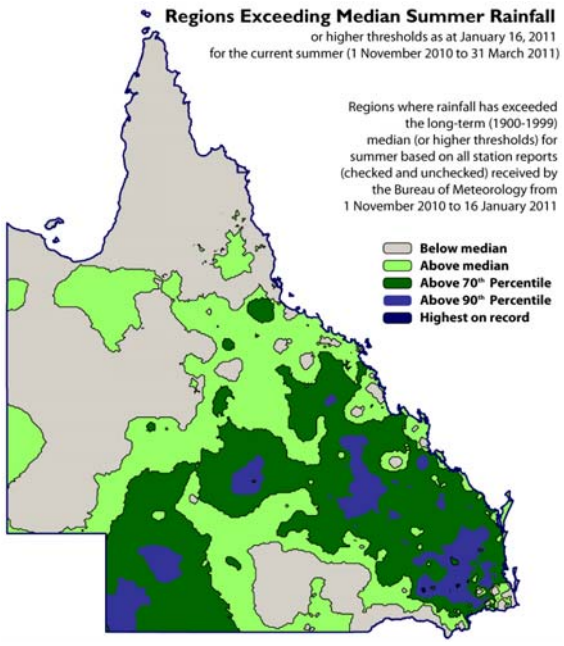
The Centre's understanding is based on the current and projected state of the El Niño-Southern Oscillation (ENSO) phenomenon and on factors which modulate the impact of ENSO on Queensland rainfall (for example the Pacific Decadal Oscillation).

What are La Niña and El Niño?

La Niña and El Niño are of part of ENSO cycle and are manifested by warming and cooling in the tropical Pacific Ocean. La Niña refers to periods when the sea surface temperature in the central and eastern tropical Pacific (off the coast of South America) is significantly cooler than normal, and the waters off the Queensland coast are warmer. La Niña is associated with generally higher than median rainfall in eastern and northern Australia. El Niño is the opposite condition, and is associated with significantly drier conditions across eastern Australia.

As at January 1 2011, the Centre notes that:
A mature La Niña climate pattern exists in the Pacific (see the latest Bureau of Meteorology 'ENSO Wrap-Up') and is likely to persist into summer. In particular:

- The Southern Oscillation Index (SOI) remains very positive when averaged over the last month (December: +26.4), two months (November-December: +21.4), and three months (October-December: +20.8).
- Observed sea surface temperatures in the key Niño 3.4 and Niño 4 regions remain much cooler than normal – typical of a well-established La Niña pattern.
- Associated with this La Niña pattern, the sea surface temperature gradient (west to east) across the South Pacific Convergence Zone (i.e. between eastern Australia and the Central Pacific) was extremely positive leading into summer (e.g. +1.9°C in October). According to the Centre's experimental SPOTA-1 scheme, a positive sea surface temperature gradient across this region, particularly in October, tends to be associated with above-median rainfall in Queensland during the following summer (November to March).
- As reported in recent months, historical evidence suggests that the current La Niña pattern is highly likely to persist through summer. The strong likelihood of a La Niña pattern persisting through summer is also supported by global climate models.



The recent sea-surface temperature pattern in the North Pacific remains consistent with a 'cool phase' of the Pacific Decadal Oscillation (PDO). The PDO modulates the impact of ENSO on summer rainfall in Queensland, particularly under La Niña conditions.

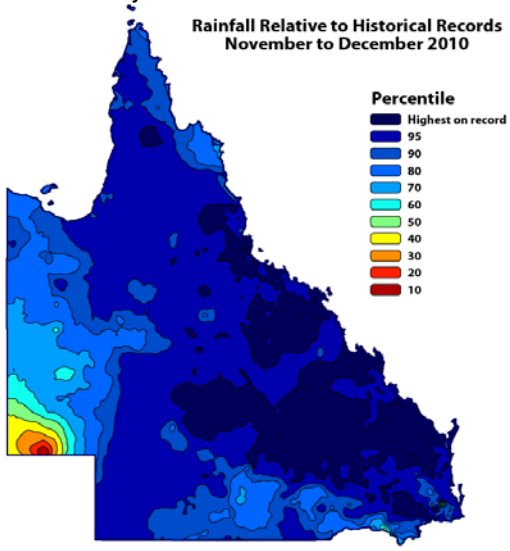
A cool phase of the PDO, coupled with La Niña conditions, is particularly favourable for summer rainfall in Queensland (e.g. see the Centre's experimental SPOTA-1 scheme which incorporates a measure of both ENSO and the PDO). These conditions are also usually associated with enhanced tropical cyclone activity in the Coral Sea, which is discussed in the Bureau of Meteorology's Seasonal Outlook 2010-11 for Queensland and the Coral Sea. So far this summer both November and December have been extremely wet (rainfall between the 90th and 100th percentile) and the two month-period produced record high rainfall totals in many regions. Many regions have already received rainfall totals which exceed the long-term median for the entire summer (November to March). More detailed information regarding December rainfall events is provided in a Special Statement from the Bureau of Meteorology.

There are various approaches to developing probabilistic rainfall outlooks based on the information considered above. The Centre produces two statistical climate risk assessment schemes:

- The Centre's experimental SPOTA-1 scheme integrates the above sea-surface temperature information, including indices of ENSO and the PDO. The final SPOTA-1 outlook for this summer (November to March), issued in November this year, indicated a high probability of exceeding median rainfall across the state. Given the extremely wet start to summer, the Centre has issued a special SPOTA-1 analysis for the remainder of summer (January to March). This analysis indicates a high probability of exceeding median rainfall across much of Queensland for the remainder of summer.
- The Centre's SOI Phase scheme, which relies on the SOI, also indicates a higher than normal probability of exceeding median rainfall across much of the state over the coming three-month period (January to March).

It is important that users understand the nature of seasonal outlooks and take a long-term risk management approach to such information. The above schemes indicate rainfall probabilities based on historical relationships. Users should appreciate that if, for example, an outlook is for a 70 per cent probability of above-median rainfall, this also means there is a 30 per cent probability of below-median rainfall. As such, users should also be aware that an increased risk of above or below-median rainfall in Queensland due to ENSO will not necessarily result in above or below-median rainfall occurring throughout the state (for example, see Australia's Variable Rainfall poster or our archive of historical rainfall maps).

Users should also consider the historical track record of any seasonal outlook scheme and such information is becoming increasingly available. For example, an historical archive of SPOTA-1 reports is available on the Long Paddock website. Users should also consider the wide range of information available each month describing the current state of the ocean/climate system.



ENSO influences other climate variables apart from rainfall (e.g. temperature, pan evaporation and vapour pressure). This means that the impact of ENSO on crop or pasture growth can be stronger than on rainfall alone. The impact of ENSO on pasture growth is also dependent on current pasture condition and soil water status. The Centre's AussieGRASS model takes these factors into account in producing pasture growth seasonal probabilities.

For further information on climate change science and information, visit www.longpaddock.qld.gov.au or contact QCCCE@climatechange.qld.gov.au