

Monthly Climate Statement—December 2012

Key messages

- Oceanic and atmospheric indicators remain within the 'ENSO-neutral' range
- Spring (September to November) was drier than average in southern and eastern Queensland
- Near-average (decile 3-7) rainfall is most likely for much of Queensland this summer (November to March)
- Near average, or slightly below average, tropical cyclone activity is likely in Queensland this cyclone season (November to April)

Findings for December 2012

The Science Delivery Division of the Department of Science, Information Technology, Innovation and the Arts (DSITIA) considers that **there is a 40 to 60 per cent probability of receiving above-median rainfall for the next three-month period (December to February) across most of Queensland.** DSITIA also considers that, for the summer as a whole (November 2012 to March 2013), the most likely outcome is for near-average (decile 3 to 7) rainfall for much of Queensland. However, the odds shift to toward a drier summer for southern parts of Queensland.

This assessment is based on the current and projected state of the El Niño-Southern Oscillation (ENSO) phenomenon and on factors which alter the impact of ENSO on Queensland rainfall (e.g. the Pacific Decadal Oscillation (PDO)). The outlook for the December to February period is based on an historical analysis of Queensland rainfall and the Southern Oscillation Index (SOI). The long-lead outlook for summer is based on the sea-surface temperature pattern in the tropical and extra-tropical Pacific.

Furthermore, the Queensland Regional Office of the Bureau of Meteorology has indicated in its [Tropical Cyclone Seasonal Outlook for the Coral Sea](#), that a return to near average, or slightly below average, tropical cyclone activity is likely in Queensland this season (November to April). The Bureau notes, "The average number of cyclones sits around four in the Queensland region and although they don't all cross the coast, even the risk of a single cyclone or flood makes the preparation worthwhile."

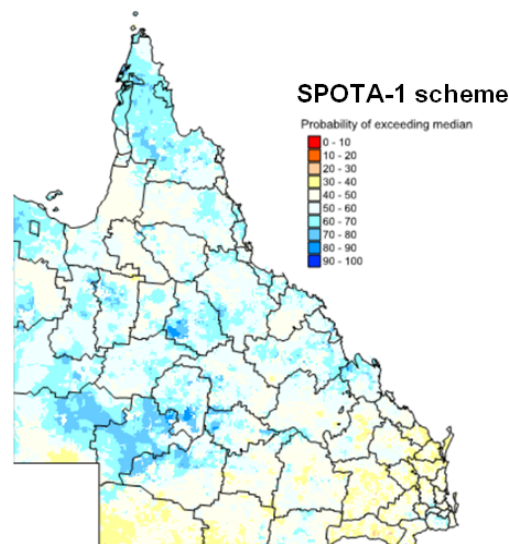
As at 1 December 2012, it is noted that while sea-surface temperature anomalies in the central equatorial Pacific are slightly above-average, they remain within the 'ENSO-neutral' range. Atmospheric indicators of ENSO, in particular the SOI, also remain within the 'ENSO-neutral' range. The majority of [international global climate models](#), and those surveyed by the Bureau of Meteorology (['ENSO Wrap-Up'](#) December 4), suggest that sea-surface temperatures in the tropical Pacific Ocean will remain within the 'ENSO-neutral' range throughout summer.

In addition:

- The [SOI](#), a key atmospheric measure of ENSO, remained slightly positive in September (+3.2), October (+2.3) and November (+3.8).
- In November, observed [sea-surface temperatures](#) in the key Niño 3.4 region were 0.4 °C warmer than average.

DSITIA has closely monitored sea-surface temperatures in specific regions of the Pacific Ocean since April this year, to provide long-lead rainfall probabilities for the coming summer. These long-lead outlooks are based on the experimental Seasonal Pacific Ocean Temperature Analysis (SPOTA-1) scheme. SPOTA-1 takes into account both ENSO and a more persistent, but related, coupled ocean-atmosphere phenomenon known as the PDO. Last month's SPOTA-1 update was the final update for the current 2012/13 summer season (November to March).

Probability of Exceeding Median Summer Rainfall
November 2012 – March 2013 based on the SPOTA-1 Index
as at November 1, 2012



Rainfall outlook

There are various approaches used to provide rainfall outlooks. These approaches tend to differ in terms of the components of the climate system that are considered and, for this reason, each approach may convey a different outlook, particularly for specific locations.

DSITIA produces two statistical climate risk assessment schemes. They are:

- the experimental [SPOTA-1 scheme](#), which integrates sea-surface temperature information, including indices of ENSO and the PDO; and
- the [SOI Phase scheme](#), which relies solely on the SOI, an atmospheric measure of ENSO.

The experimental [SPOTA-1 scheme](#) provides long-lead probabilities of summer (November to March) rainfall for Queensland from mid-April through to mid-November each year.

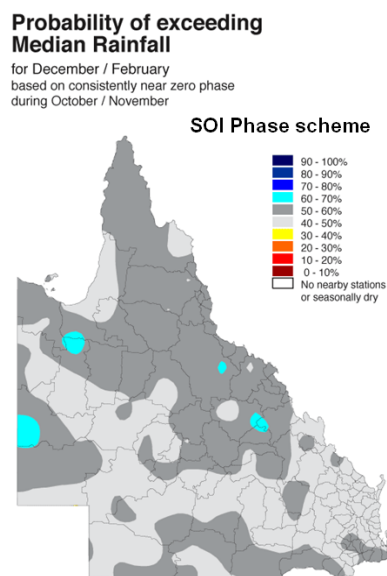
As at 1 November 2012, the final assessment of rainfall probabilities for the 2012/13 summer, based on the experimental SPOTA-1 scheme, indicated that near-average (decile 3-7) rainfall is most likely for much of Queensland this summer (November to March).

However, the odds shift to toward a drier summer for southern parts of Queensland. This assessment is based, in part, on an index of March sea-surface temperature anomalies which reflected a 'cool' state of the PDO. This assessment also takes into account a monthly ENSO index, based on the sea-surface temperature gradient (west to east) across the South Pacific Convergence Zone (i.e. between eastern Australia and the central Pacific).

DSITIA's SOI Phase scheme provides probabilities of rainfall for the coming three-month season based on SOI values over the previous two months. The SOI Phase scheme currently indicates that the [probability of above-median rainfall](#) across most of Queensland is 40 to 60 per cent for the next three-month period (December to February). This analysis is based on the SOI being in a 'Consistently Near-Zero' phase at the end of November, as discussed further in the [Commentary on Rainfall Based on 'Phases' of the SOI](#).

The SPOTA-1 and SOI Phase schemes indicate probabilities based on historical relationships. It is important that the probabilistic nature of seasonal outlooks is understood and long-term risk management is undertaken. For example, if an outlook indicates a 70 per cent probability of above-median rainfall, this also means there is a 30 per cent probability of below-median rainfall.

An increased risk of above- or below-median rainfall in Queensland will not necessarily result in above- or below-median rainfall occurring throughout all of the state (see [Australia's Variable Rainfall poster](#), or the Department's [archive of historical rainfall maps](#)).



Each of the above schemes may have their own particular following. Although such schemes cannot provide outlooks with absolute certainty, users of the information who follow a skilful scheme should benefit from doing so in the long-term. Users should consider the historical track record of any scheme, and such historical information is becoming increasingly available.

DSITIA's Long Paddock website provides the historical archive of [SPOTA-1 reports](#) and [past commentaries](#) on the SOI Phase scheme. Users should also consider the wide range of information available each month describing the current state of the ocean/climate system, for example the ['ENSO Wrap-Up'](#).

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 upon current pasture condition and soil water status. DSITIA's AussieGRASS model takes these factors into account in producing [seasonal pasture growth probabilities](#).

For more information, please visit www.LongPaddock.qld.gov.au/climatestatement or contact Ken.A.Day@science.dsitia.qld.gov.au.