

CLIMATE SAVVY FOR GRAZING MANAGEMENT

Northwest Queensland



El Niño – Southern Oscillation

- What:** ENSO has two active phases, El Niño and La Niña, and an inactive or neutral phase.
- When:** Any time between June (start) to April (end). Main impacts of ENSO are usually from December to March. Events can span multiple years, which is more common with La Niña events.
- Where:** Entire region, but increased impacts more likely further east.
- How:** El Niño tends to cause warmer days and less rainfall, fewer cyclones, and there is likely to be a later start to the wet season. La Niña tends to cause wetter weather, increased humidity, and an increased risk of cyclones and flooding, with an earlier start to the wet likely. Day time temperatures are usually lower due to cloud cover.

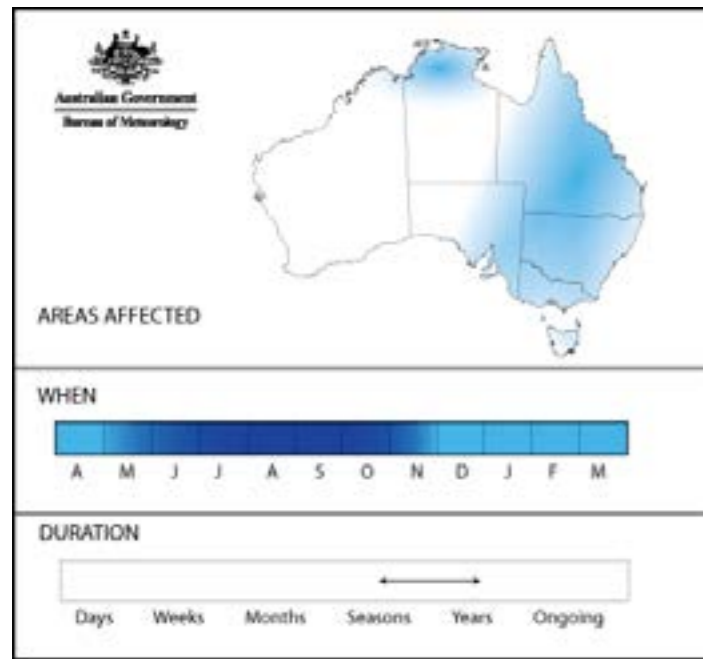
Prediction lead time:

About 2-3 months for a more reliable forecast, up to 6 months in advance for an indication of a possible ENSO event. We start looking for a possible ENSO event in April/May, but become more confident in the forecast in June/July.

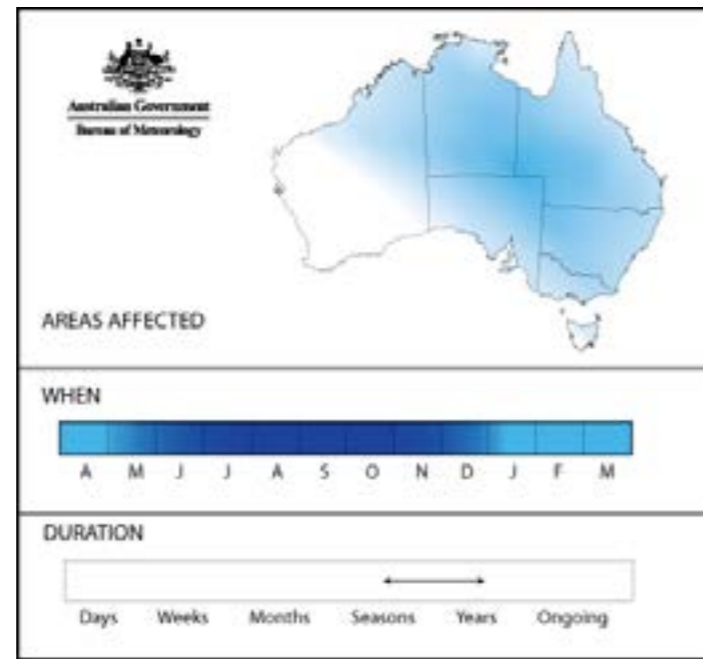
Note: There is a 'prediction gap' from about January to April when it is very difficult to know whether or not an ENSO event will develop in the coming winter. The Southern Oscillation Index, a measure of ENSO, can be a poor indicator from January to April due to the monsoon trough creating low pressure (unrelated to ENSO) over Darwin.

Other Information:

During an El Niño Modoki, there is a warm pool of water in the central Pacific Ocean near the dateline (180°) and the equator (0°), which is different to a 'traditional' El Niño where the warm water is closer to South America (eastern Pacific). Recent research shows that Modoki events may have more dry/warm impacts on northern Australia than a 'traditional' El Niño event and may occur more regularly in the future.



The diagram above shows the area affected by El Niño, when it occurs and how long it may last.



The diagram above shows the area affected by La Niña, when it occurs and how long it may last.

Where to find information:

- BOM: <http://www.bom.gov.au/climate/enso/>
 NOAA: <https://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/enso.shtml>
 ESRL: <https://www.esrl.noaa.gov/psd/enso/>
 SOI: <https://www.longpaddock.qld.gov.au/soi/>

Madden-Julian Oscillation

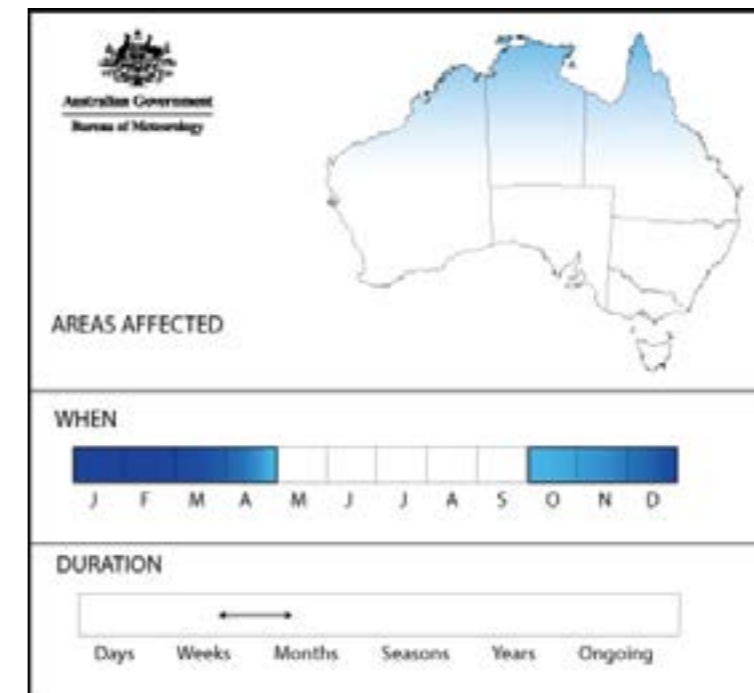
- What:** A large band of clouds that influence alternating wet/dry conditions during the wet/summer season. The MJO can increase the availability of moisture in the area during an MJO 'wet' phase, leading to an increased chance of rain.
- When:** Year-round, but mainly during wet season (December to April)
- Where:** All of Northwest QLD region
- How:** Impact varies by season and location.

Period	Wet Phases	Dry Phases
June, July, August (minimal impact)	4	7
September, October, November (minimal impact)	6 & 7	1 & 2
December, January, February	4 & 6	1 & 2
March, April, May	4, 5, 6	8, 1, 2

Prediction lead time:

The MJO can be predicted up to 21-28 days in advance. The MJO forecast on the BOM website is for 21-days in advance and the CPC/NOAA MJO forecast is issued 14-days in advance.

Note: Looking at the MJO forecast starting in early December can be useful, as an active 'wet' MJO phase in December can bring on the first of the summer rains.



The diagram above shows the general area most affected by the Madden-Julian Oscillation (MJO), the seasons during which the MJO's influence on Australia is greatest, and for how long each active phase of the MJO typically lasts.

Where to find information:

- BOM: <http://www.bom.gov.au/climate/enso/#tabs=Tropics>
 NOAA: <https://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/mjo.shtml>

Monsoon

What: An annual change in the direction of the prevailing winds to be from west to east associated with the start of the northern wet season.

When: November/December to March/April

Where: All of Northwest QLD region

How: Areas in Northern Australia are subject to influence from the monsoon trough, which moves south with the Intertropical Convergence Zone during Austral summer.

Prediction lead time:

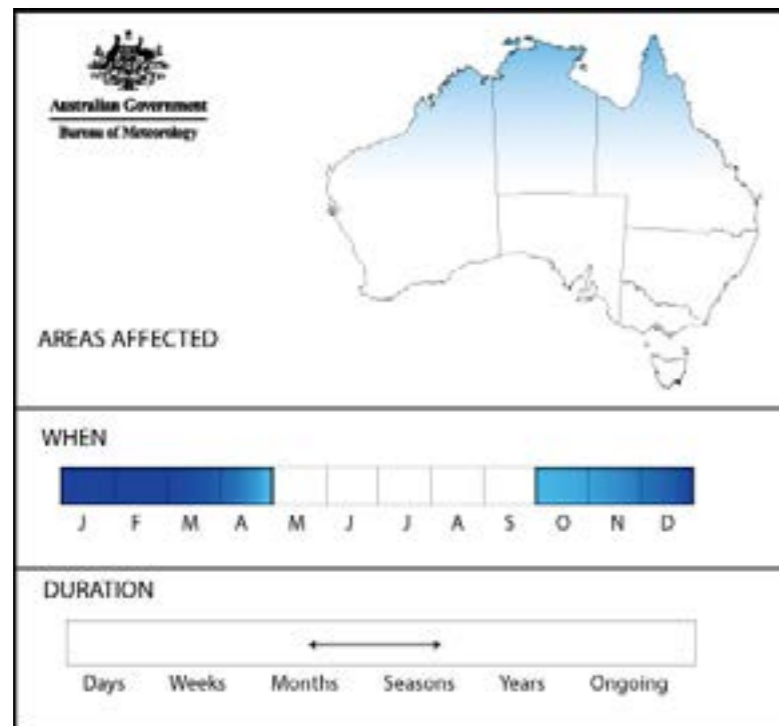
BOM currently issues a 'Northern Rainfall Onset' forecast and also has information about timing of monsoon onset during El Niño and La Niña events, but there is not specific 'Monsoon Onset' forecast.

Note: The Monsoon can be delayed by El Niño and brought forward by La Niña.

Different definitions:

Monsoon: Seasonal reversal of winds over the tropics, from mostly easterly winds to westerly winds; has 'active' (rain) and 'inactive' (dry) phases. Active and inactive phases can be associated with the MJO.

Northern Rainfall Onset: The day after 1 September that an area receives an accumulated total of 50mm of rain.



The diagram above shows the area affected by the monsoon, when it occurs and how long it may last.

Where to find information:

BOM Monsoon: <http://www.bom.gov.au/climate/about/?bookmark=monsoon>

BOM Northern Rainfall Onset Forecast: <http://www.bom.gov.au/climate/rainfall-onset/>

BOM Weekly Tropical Climate Note: <http://www.bom.gov.au/climate/tropical-note/>

Other Climate Drivers

Indian Ocean Dipole

What: The IOD has two active phases, Positive and Negative, and an inactive/neutral phase.

When: It can only occur between June/July and the end of December.

Where: IOD Positive events mainly impact Western and SE Australia, with a minor impact on Northwest QLD; IOD negative events mainly impact SE Australia, extending up into QLD (refer to maps below – NOTE: These maps show maximum temperature deciles).

How: IOD Positive events tend to bring warmer temperatures and drier conditions; IOD Negative events are the opposite, with cooler temperatures and an increased chance for rain.

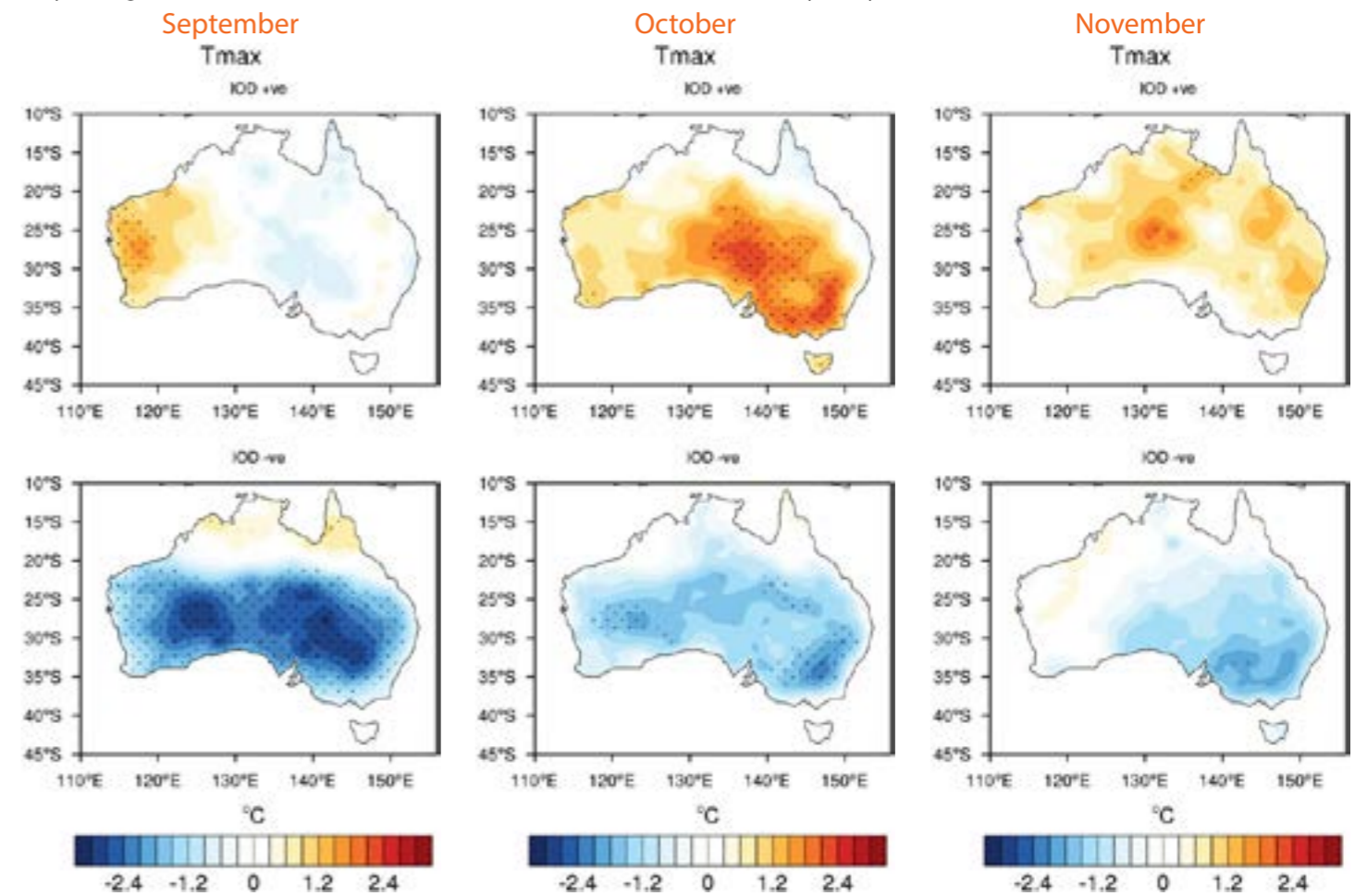
Prediction lead time:

The IOD can be predicted about 2-3 months in advance. Forecasters start looking for signs of an IOD event around May/June. The forecast will be more accurate from July onwards.

Note: Because IOD is active during the dry season in Central QLD, it won't have much of an impact either way in regard to rainfall, but it can impact temperatures (refer to maps below – These maps show changes – warmer or cooler – to usual maximum temperature).

Other:

Very strong IOD Positive events, like what was observed in 2019, can indirectly delay the start of the monsoon.



Deviation of Maximum Temperatures from the mean during September (left), October (middle), and November (right) for IOD Positive (top row) and IOD Negative (bottom row) phases.

Where to find information:

BOM IOD information and forecast: <http://www.bom.gov.au/climate/enso/#tabs=Indian-Ocean>

Cyclones

When: November/December to April/May

Where: All of Northwest QLD

How: Useful rain which can lead to flooding or infrastructure damage.

Prediction lead time:

Minimal. General storm tracks can be predicted up to 7 days in advance, but actual path is hard to determine more than a day in advance.

Where to find information:

BOM, Current Cyclones: <http://www.bom.gov.au/cyclone/index.shtml>

BOM, General Info: <http://www.bom.gov.au/climate/about/?bookmark=tc>

ECMWF: <https://www.ecmwf.int/en/forecasts/charts/latest-tropical-cyclones-forecast>

Links to other cyclone websites: <https://www.cawcr.gov.au/research/cyclone-exchange/>

Local Convection/Thunderstorms

When: Late Spring, Summer, Autumn

Where: All over Northwest QLD, though impact can be very patchy, with one area getting rain and another area 1km away not getting rain.

How: The land heats up faster than surrounding air, causing warming of the air near the surface. Warm air always wants to rise and is considered to be an unstable airmass. As the air rises, any water vapor condenses and cools. If there is sufficient moisture and condensation nuclei (such as dust particles), it will rain.

Prediction lead time:

Minimal. Sometimes a few days (general prediction), but only a few hours for a more precise prediction.

Other: Currently, convection is extremely hard to forecast in general circulation models due to the spatial resolution required, which limits forecasting ability/lead time.

Where to find information:

BOM MetEye: <http://www.bom.gov.au/australia/meteye/>



DESTOCK EARLY – PENDING PREDICTED WET SEASON ONSET

In a dry year, it is important to adjust stocking rates according to feed availability and to have a plan as to which you sell first.

Timing of decision:

August to October (second round muster); prior to wet season start.

Climate drivers to watch for this decision:

ENSO (El Niño), IOD (Positive Phase), MJO

El Niño Year and/or Strong Positive IOD – Increased chance of a late start to summer rains and a drier than usual summer – hoping for rain is unlikely to be realistic. Feed is likely to be short due to a later start to pasture growth and reduced chance of rain and it may be opportunistic to reduce stock numbers early while cattle are still in OK condition.

MJO – An active ‘wet’ MJO phase in December can bring the first seasons’ rains. If there is no active wet phase in December, there is unlikely to be meaningful rain until January.

Even in El Niño/IOD Positive years, there can still be storms and cyclones that bring a ‘normal’ amount of rain during the wet season; however, the odds of this are reduced and they are likely to start later in the season.

Information needed for decision:

ENSO and/or IOD forecast; Northern Rainfall Onset Forecast; reliable rainfall predictions.

Information sources:

ENSO/IOD Forecast: <http://www.bom.gov.au/climate/enso/>

Northern Rainfall: <http://www.bom.gov.au/climate/rainfall-onset/>

Rainfall outlook: <http://www.bom.gov.au/climate/outlooks/#/rainfall/summary>

DESTOCK EARLY PRE-DRY SEASON – FAILED WET SEASON/PASTURE GROWTH RESPONSE DRASTICALLY REDUCED

Failed wet seasons can lead to cattle in poor condition and limited options. Decisions need to be made in the early dry Season (April–May) and will depend on what has occurred during the wet season in terms of rainfall, and also pasture growth response to the season or a failed season. To be in the best position, it is imperative to have a destocking plan, decision dates, and the upcoming seasonal climate forecast.

Timing of decision:

April/May

Climate drivers to watch for this decision:

ENSO, IOD

El Niño Year and/or Strong Positive IOD in previous spring/summer – Feed is likely to be short due to a later start to summer rains and likely reduced rainfall. Therefore, stocking rates would need to be lower for the winter season.

Note: Sometimes in April, we have indications as to whether there will be an El Niño or La Niña in the coming winter/spring. Forecast skill is usually poor from March to June, but if there is going to be a strong ENSO event, we may have an indication in April. If it looks like an El Niño, there is a decreased chance for winter rain and an increased chance for a late start to the following growing season. The opposite would be true for a La Niña.

Information needed for decision:

Realistic forage budget.

Information sources:

Rainfall outlook: <http://www.bom.gov.au/climate/outlooks/#/rainfall/summary>

Forage: <https://www.longpaddock.qld.gov.au/forage/>

DETERMINING A 'GREEN DATE' AND 'PRODUCTION DATE'

The Green Date is the date after 1 September that you can expect to get 50mm of rainfall within 3 consecutive days in 7 out of 10 years (or 70% of the time). This is generally considered to be the amount of rain required to start pasture growth. Note that the Green Date will vary by soils (type and current moisture), land cover and type, and other climatic considerations (like high temperatures and high winds). A Production Date is when there is enough pasture growth to translate into kg gains and occurs about 2-6 weeks after the Green Date.

Timing of decision:

Has the Green Date changed? Is it coming later than in previous years? It is often a lot later than managers think! Looking at the Green Date will give an indication as to the best time to aim for returning stock to particular paddocks and when you want calves hitting the ground to ensure there is sufficient feed available to last the dry season.

Climate drivers to watch for this decision:

Historical Climate Records; ENSO, IOD

El Niño Year and/or Strong Positive IOD – Green Date likely to be later than usual.

La Niña Year and/or Strong Negative IOD – Green Date likely to be earlier than usual.

Is there enough feed to carry cattle through to the Green Date or, even better, the Production Date? Are cows at peak lactation around the Production Date?

Information needed for decision:

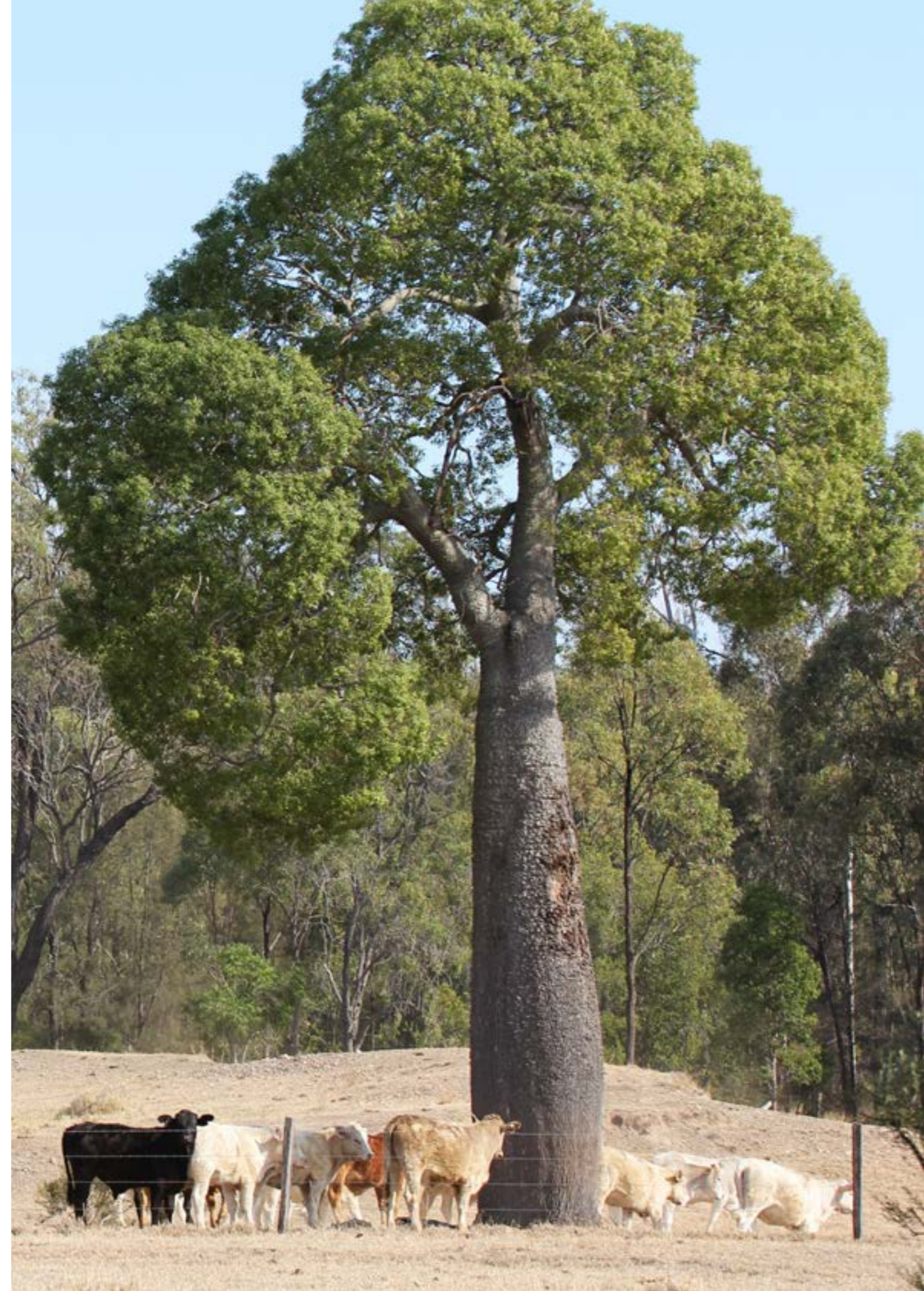
Data to determine when the Green Date is and if it has changed over time. There is concern around the change/late pasture response due to the later onset of rainfall occurring more often.

Information sources:

CliMate App: <https://climateapp.net.au/>

Climate data on-line: <http://www.bom.gov.au/climate/data/>

Climate change: <https://www.climatechangeinaustralia.gov.au/en/>



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