

# Seasonal outlook – spring 2017

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**Compiled by:**

Matthew Lieschke, Livestock Officer, South East Local Land Services

Phil Graham, Director, Graham Advisory

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## Table of Contents

Executive summary .....	3
Background .....	4
What drives spring rainfall in southern NSW?.....	5
El Nino Southern Oscillation Index .....	5
Indian Ocean Dipole.....	7
Impacts of ENSO and IOD events.....	7
Climate outlook.....	8
What might happen to pastures and livestock in the next three months? .....	8
Seasonal reports, what do they tell us?.....	9
Some general comments on how to interpret the graphs .....	9
Boorowa.....	11
Rugby .....	12
Bigga.....	13
Laggan .....	14
Taralga.....	15
Wheeo.....	16
Bannister .....	17
Gunning.....	18
Lake Bathurst .....	19
Braidwood.....	20
Cooma .....	<b>Error! Bookmark not defined.</b>
Further information .....	21

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### More information

Matthew Lieschke | Livestock Officer, South East Local Land Services | Goulburn NSW 2580

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Disclaimer: The information contained in this publication is based on knowledge and understanding at the time of writing September 2017. However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer of Local Land Services or the user's independent adviser.

## Executive summary

After a strong start to the growing season, pasture growth during winter was heavily restricted by exceptionally dry conditions (NSW recorded its 10<sup>th</sup> driest winter on record) and cold nights. This winter at Goulburn, 51 nights out of 92 fell below zero degrees, with the biggest frost (-10.7°C) occurring on July 2. By the end of winter, herbage mass at most of the sites was sitting somewhere around the long-term average.

Looking ahead, the modelling work shows that there is a substantial variation between the sites in the potential spring herbage mass. This is driven by the soil moisture levels coming out of winter. When reviewing the pasture graphs, compare where the three tactical lines (solid lines) sit in relation to the historical range which is indicated by the dotted lines. In particular, note how quickly the three solid lines start to separate - if it is fast then there is a greater risk to the pasture outcome. **The dry conditions during September means that herbage mass would be tracking somewhere near 25<sup>th</sup> percentile** (i.e. the red dotted line).

The sites at Bannister, Taralga, Laggan, and Boorowa are sitting in a position where it is unlikely that changes to normal spring decisions will be required. The outlook for Gunning and Wheeo is a bit tighter and pasture conditions are expected to be below average this spring. Bigga is in a less robust position and the situation will need to be reviewed at the end of September.

Rugby, Lake Bathurst and Braidwood are the driest sites, although moisture at Rugby can't be verified due to data connection issues with the probe. At these sites, potential spring herbage mass is at levels that could cause some changes to management strategies. For example, for lamb production, lambs might need to be turned off earlier than normal at lighter weights or finished with grain. If the question marks about the grain harvest due to the season are correct, locking in grain prices before a lift in prices should be considered if grain is part of the finishing plan.

Rainfall between mid-September and mid-October will be critical, especially for the tighter sites. A review date of mid-October for marketing decisions should be considered.

## Background

During 2016 South East Local Land Services, in conjunction with Tablelands Farming Systems and Monaro Farming Systems established a network of soil moisture probes across the Southern Tablelands and Monaro. As part of this network 14 moisture probes have been strategically positioned across the landscape to gather real-time information on what's happening to soil moisture under our pastures. Moisture probes have been installed at the following locations:

- Boorowa
- Bigga
- Laggan
- Taralga
- Bannister
- Rugby
- Wheeo
- Gunning
- Lake Bathurst
- Braidwood
- Cooma (x2)
- Delegate
- Bombala

Soil moisture information is provided in real-time, with measurements taken at 10cm, 20cm, 40cm, 60cm, 80cm and 100cm. Soil temperature is also recorded at these depths. Each site also features an automatic rain gauge which records rainfall on an hourly basis.

One of the major benefits of collecting soil moisture data is it gives us an indication of how much moisture we have in the profile at any given time - i.e. is the 'bucket' full, half full or almost empty? Having some understanding of current soil moisture provides an extra piece of valuable information which can be used to increase your confidence with decision making at critical stages of the season.

To help guide decision making, the following report presents a three month pasture outlook for each of the 'probe' localities across the Southern Tablelands. Information from each probe has been used to help guide the GrassGro outputs contained below (refer to section: 'What might happen to pastures and livestock in the next three months?'). Information on the major drivers of spring rainfall has also been provided, including a summary of the most recent forecast from the Bureau of Meteorology (BOM).



Image: Soil moisture logger recording real-time information on an improved pasture at Bannister (M. Lieschke, South East Local Land Services).

## What drives spring rainfall in southern NSW?

The two key drivers of spring rainfall in southern NSW are:

1. El Nino Southern Oscillation (ENSO)
2. Indian Ocean Dipole (IOD)

### El Nino Southern Oscillation Index

The El Nino Southern Oscillation (ENSO) takes place in the **Pacific Ocean**. Due to its large size and proximity ENSO has a significant influence on rainfall in south eastern Australia during the winter and spring periods. Typically ocean temperatures on the eastern edge of the Pacific (South America) are cooler than those on the Western Pacific (Indonesian Archipelago) creating a temperature and pressure differential which drives south easterly air flow, known as 'Trades' towards Australia. This circulation pattern (known as 'Walker' circulation) can either be enhanced or inhibited by changes in sea surface temperatures.

There are three distinct phases of ENSO:

1. Neutral
2. La Nina (wet)
3. El Nino (dry)

#### Neutral

This is the most dominant phase, characterised by sea surface temperatures within a  $\pm 0.8$  °C anomaly at the mid-Pacific equator. While ENSO sits in the 'neutral' phase for more than half the time, droughts and floods are still possible.

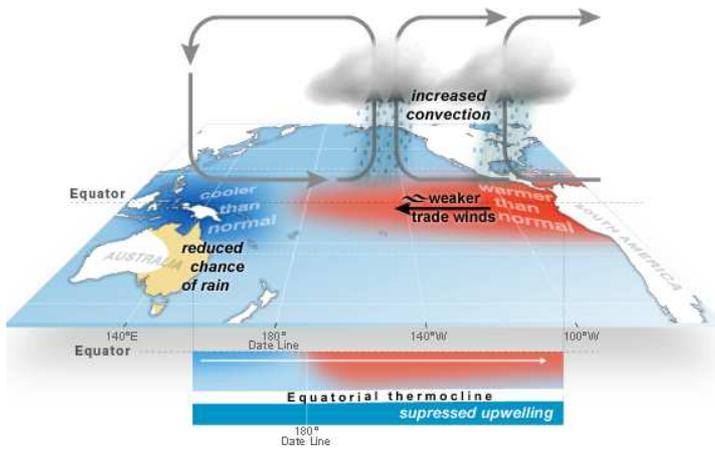
#### La Nina (wet phase)

La Nina is characterised by cool sea surface temperature anomalies below  $-0.8$  °C at the mid Pacific equator at Nino 3.4. These cooler ocean temperatures enhance the trade winds air flow towards Australia and increase the probability of rainfall over south eastern Australia during winter and spring.

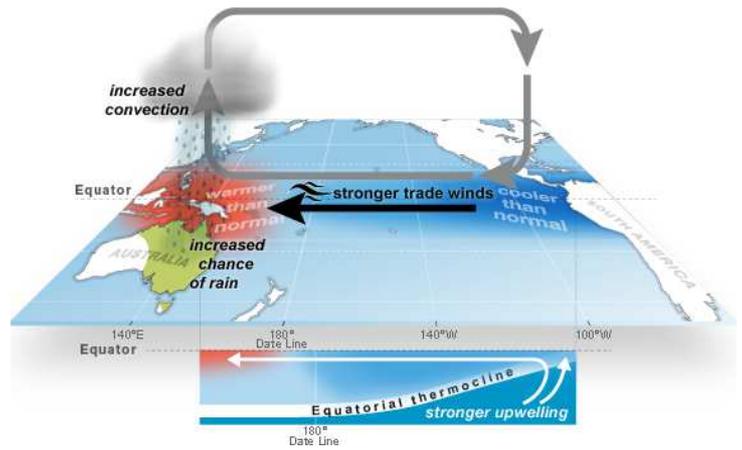
#### El Nino (dry phase)

The El Nino is characterised by warm sea surface temperatures above  $+0.8$  °C at the mid-Pacific equator at Nino 3.4. The warmer ocean temperatures reduce the south easterly trade winds air flow, and reduce the probability of rain during winter and spring.

### El Nino (dry phase)



### La Nina (wet phase)



Source: Bureau of Meteorology (2016)

### Southern Oscillation Index

The Southern Oscillation Index (SOI) gives an indication of the development and intensity of El Niño or La Niña events in the Pacific Ocean. The SOI is calculated using the pressure differences between Tahiti and Darwin. Sustained negative values of the SOI lower than  $-7$  often indicate El Niño episodes. Sustained positive values greater than  $+7$  are typical of a La Niña episode.

## Indian Ocean Dipole

The Indian Ocean Dipole (IOD) is a similar ocean-atmosphere phenomenon like ENSO operating in the Indian Ocean at an inter-annual time scale. It appears to impact on rainfall in south eastern Australia from June to November, before fading with the onset of the tropical monsoon. The IOD also has three distinct phases:

1. Positive
2. Neutral
3. Negative

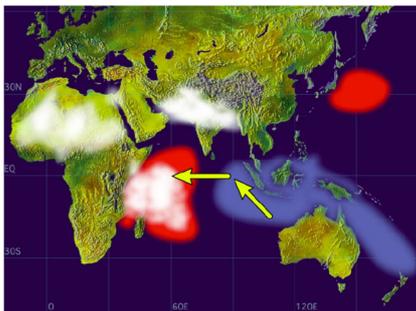
### Positive IOD (dry phase)

The positive phase is characterised by cooler sea surface temperatures in the south eastern equatorial Indian Ocean off the coast of Sumatra and warmer sea surface temperatures in the western Indian Ocean off the coast of Madagascar, Africa. This temperature differential enhances westerly air flows across the Indian Ocean, decreasing the probabilities of rainfall for south eastern Australia during winter and spring period.

### Negative IOD (wet phase)

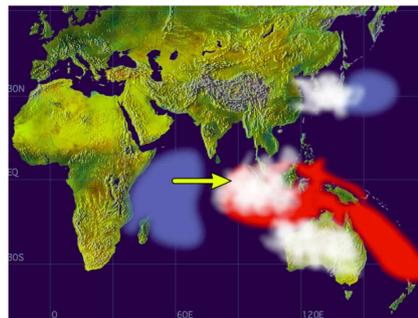
In its negative phase IOD is characterised by warmer sea surface temperatures in the south eastern equatorial Indian Ocean near Australia and cooler sea surface temperatures in the western equatorial Indian Pacific near Africa, increasing the probability of rainfall over south-eastern Australia during winter and spring.

#### Positive IOD mode (dry phase)



[Source: NSW DPI \(2011\)](#)

#### Negative IOD mode (wet phase)



## Impacts of ENSO and IOD events

Studies have shown a strong link between rainfall variability in eastern Australia and sea surface temperatures around northern Australia and Indonesia. ENSO and IOD both influence rainfall over south-eastern Australia.

Our wettest winter/spring periods occur when a La Nina and negative IOD interact. Our driest winter/spring periods occur when El Nino and positive IOD interact.

NSW DPI has developed videos to help explain how the various climate systems work:

[www.dpi.nsw.gov.au/climate-and-emergencies/seasonal-reports/climatedogs](http://www.dpi.nsw.gov.au/climate-and-emergencies/seasonal-reports/climatedogs)

## Climate outlook

The Bureau is now updating its 3 month outlook on a fortnightly basis. The key points to note from the 14 September update are:

- While the Indian Ocean Dipole is sitting in 'neutral' territory (and is expected to remain in the neutral band for the remainder of spring), it is currently displaying a weak drying influence. This is currently being countered by a slightly wetter influence from the Pacific Ocean.
- Because the two major climate drivers are cancelling each other out, it's not surprising that the rainfall outlook for October is 'neutral' for the state (see maps below).
- Locally, day and night time temperatures are expected to be warmer than average for both October and November.

For further information, including the latest outlook video from BOM go to:

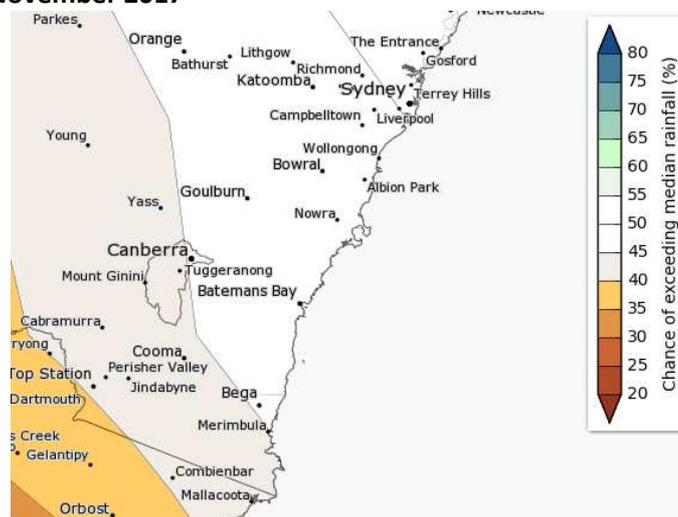
[www.bom.gov.au/climate/outlooks/#/overview/summary](http://www.bom.gov.au/climate/outlooks/#/overview/summary)

### Rainfall – the chance of above median for October 2017



Source: BOM (2017)

### Rainfall – the chance of above median for November 2017



## What might happen to pastures and livestock in the next three months?

The outcome is a combination of current soil moisture, pasture mass and stock condition at the assessment date and expectations regarding weather over the future period. Unfortunately no one has a crystal ball, so what other method can be used?

CSIRO released a program called GrassGro in the 1990s. This program uses daily weather data, local soil types, relevant pasture species and suitable livestock parameters to model livestock production systems across southern Australia. It has been used extensively in the south east region of NSW for the last 15 years and is accepted by producers as providing robust data to assist farm decision making related to the risk from seasonal variation.

## Seasonal reports, what do they tell us?

The logic behind a seasonal report is to see what the next “3 months” could look like by using current conditions (pasture mass, soil moisture, body weights etc.) and then projecting forward using historical weather for the same “3 month” period.

The historical weather used to create the pasture projections was daily data from 1960 to 2016. So, GrassGro essentially creates 56 different potential pasture curves all starting from the starting conditions on 1 Sept 2017. From this data we can get an estimate/risk of pasture supply for the period examined (i.e. in this case it was from 2 September to 30 November 2017). The tactical runs (projected) are reported against the long term historical data for the same period to give you a feel of how pasture conditions are currently positioned (compared to history) and the potential risk for the future.

**It is important to note that the pasture curves are not forecasts** as they are based on historical weather data for each location.

The pasture curves are reported via percentile graphs. The three percentiles used are 25%, 50% and 75%. The 25% line means that in 75% of years (i.e. 42 years) the green pasture supply was better than this line. The 50% line means half the years were above the line and half below. This logic applies to both the historical and projected lines.

The seasonal forecast from BOM can be used to assist with deciding which percentile data is the most relevant for the current year. If the BOM forecast for the next month was a 70 per cent chance of below median rainfall then you might only look at the projection lines below 50 per cent. The 75 per cent line is from a favourable period for rainfall and temperature and this does not match with the current BOM forecast

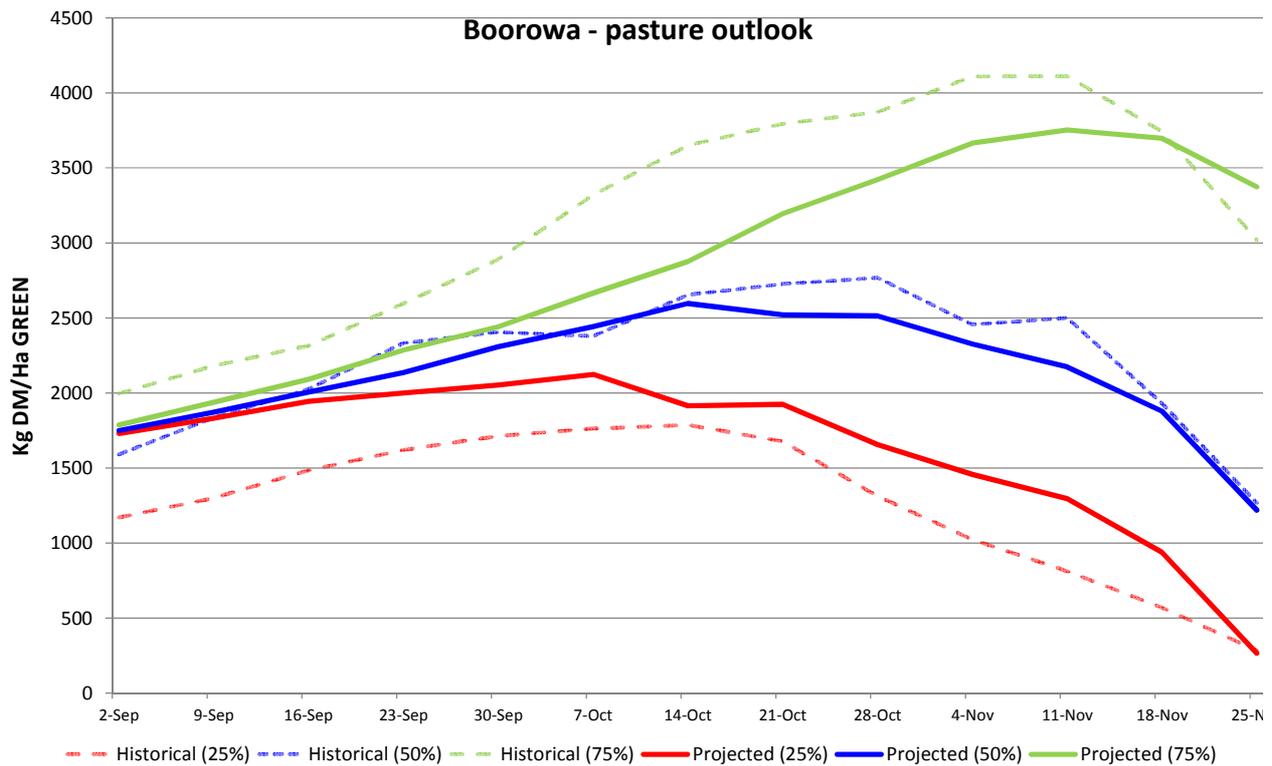
There is no process that can provide a precise forecast. We need to use all available information to improve our confidence in making farm management decisions.

## Some general comments on how to interpret the graphs

- All sites have been set up with a pasture that contains perennial grasses (with the capacity to grow over summer if moisture allows), annual grasses and clovers. The fertility has been set to reflect a good to very good level. The stocking rate is then set so that a minimum ground cover of 70 % is achieved in 7 out of 10 years. This reflects what producers have done in the region for many years. Changing the pasture fertility level will change the amount of pasture grown, but if stocking rate is matched accordingly then the decision you would make might not change.
- The livestock enterprises vary between sites as does the calving and lambing dates.
- The following graphs show the available green pasture in kilograms of dry matter/ha (kg DM/ha) for the period 2 September to 30 November 2017.
- Three levels are presented:
  - 25<sup>th</sup> percentile – this is regarded as dry or ‘hard’ conditions
  - 50<sup>th</sup> percentile – median figure (i.e. half the years are above and half below)
  - 75<sup>th</sup> percentile – this is regarded as exceptional or ‘very good’ growing conditions.

- The dotted lines are from the 1962 to 2016 period (historical).
- The solid lines are the projected lines starting from the pasture mass on the 2 September 2017. The program uses the weather data for the autumn period from 1960 to 2016 to create the potential pasture spread.
- Look to see where the 50 percentile projected line (solid blue line) finishes on the graph at 30 November. Does the projected line follow or finish in a similar position to the historical line? If so, that should be seen as a positive outlook and indicates that no unusual actions are required.
- Some general comments are provided below for each site. Look at the site nearest your property, but also look at other sites so see what the trends are across the district.

## Boorowa

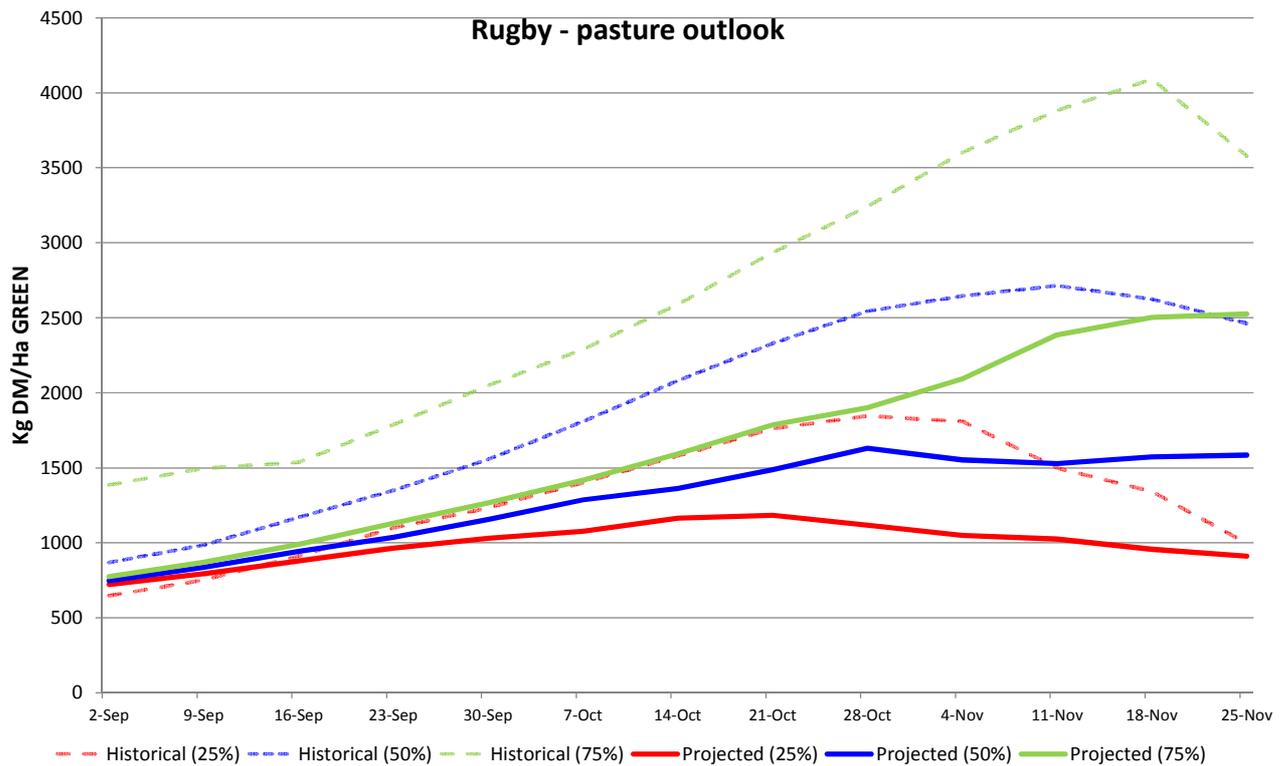


- While pasture conditions at the start the projection period are good, limited soil moisture means that rainfall starts to become a factor by mid-September. This is indicated by the separation of the solid red, blue and green lines.
- Rainfall in late September and early October will be important to keep pastures growing.
- However, the encouraging aspect of this site is the solid blue and red lines both track very similar to the long-term historical lines (when compared with the dotted blue and red lines). This indicates that even a drier than average spring is likely to result in pasture conditions remaining in the ‘normal range’.
- **In summary, pasture conditions are expected to remain in the ‘normal’ range for the September – November period with pasture tracking somewhere between the solid blue and red lines.**

### Boorowa assumptions

<b>Enterprise</b>	Self-replacing Merino flock lambing late July/ early Aug
<b>DSE rating</b>	10.8 DSE
<b>Pasture</b>	Phalaris, sub clover and annual grasses
<b>Elevation</b>	488 m

## Rugby

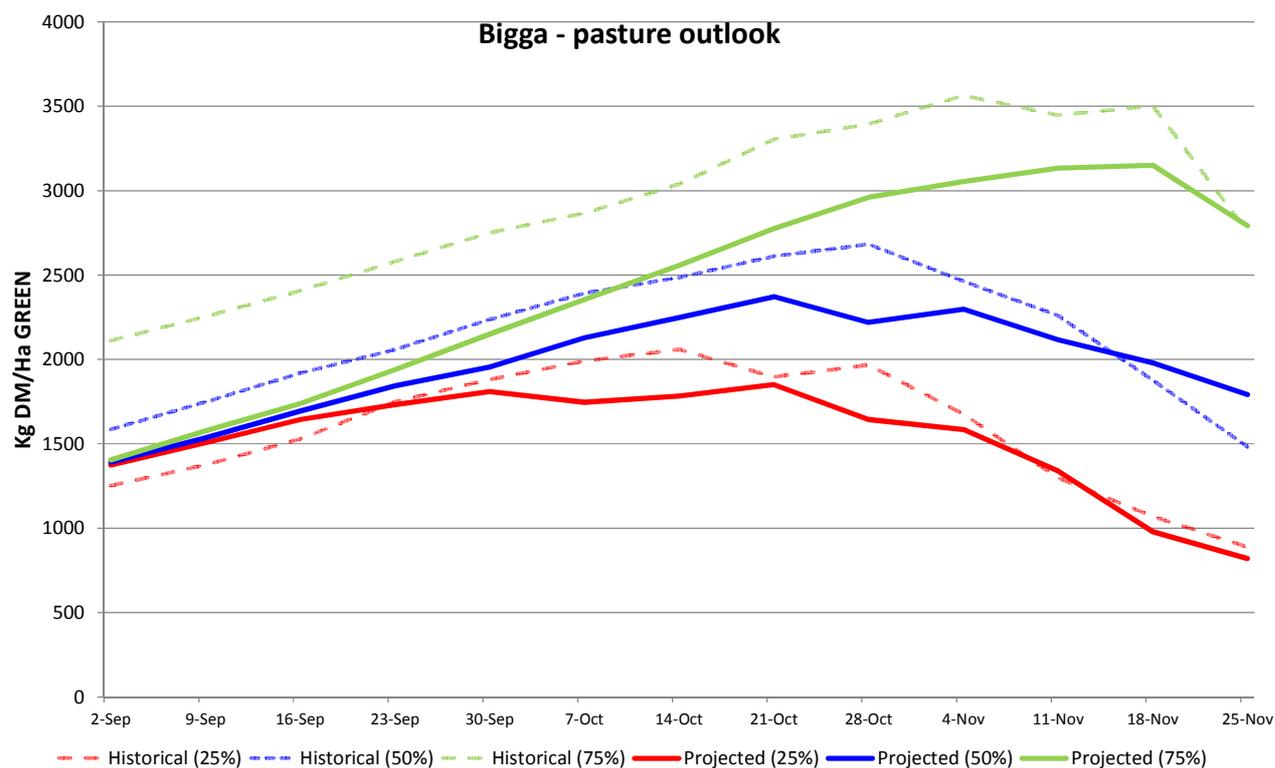


- The outlook for Rugby is a tough spring. This is indicated by the graph with the solid blue line tracking below the dotted red line for most of the projected period. In other words, even if pasture growth is equal to the long term average from 2 Sept to 30 Nov, the overall amount of pasture in the paddock is expected to be lower than the historical 25<sup>th</sup> percentile.
- In summary, pasture conditions are expected to well below average for the September – November period.

### Rugby assumptions

<b>Enterprise</b>	1 <sup>st</sup> Cross ewes producing 2 <sup>nd</sup> Cross lambs, lambing late May
<b>DSE rating</b>	13.2 DSE
<b>Pasture</b>	Phalaris, sub clover and annual grasses
<b>Elevation</b>	610 m

## Bigga

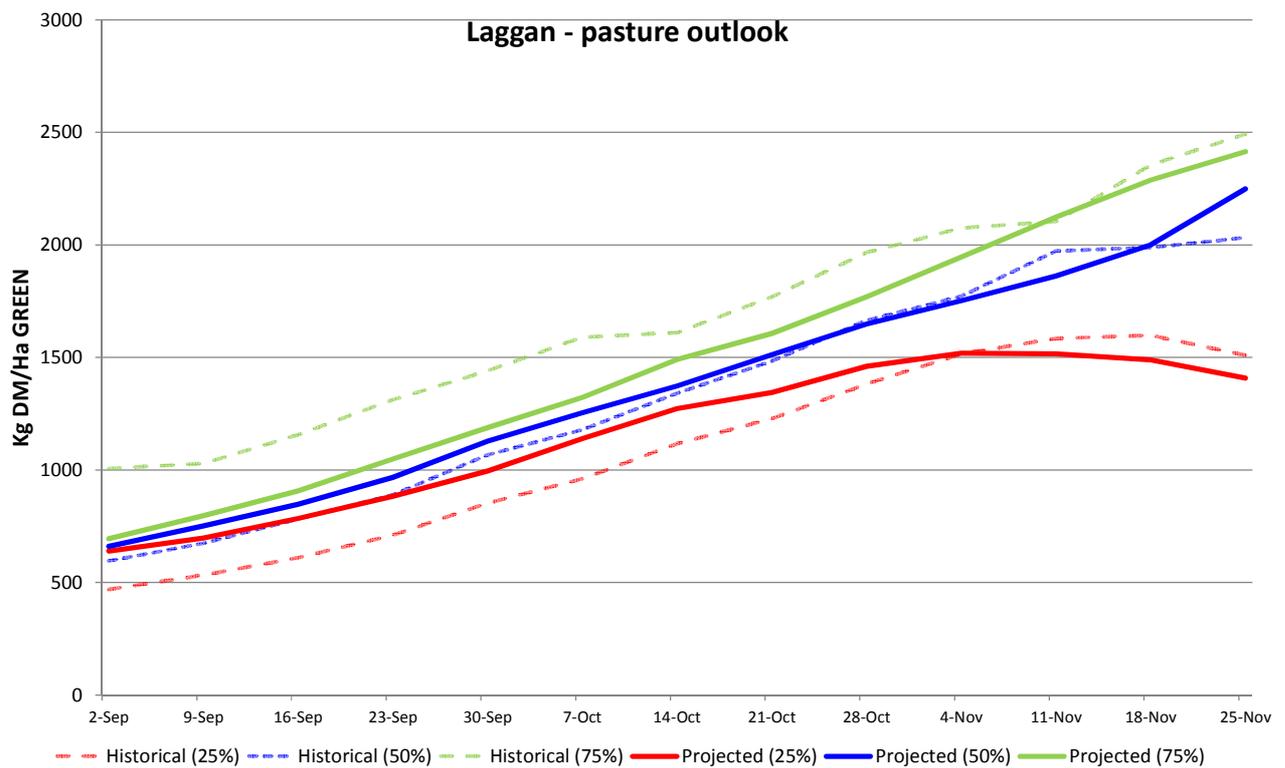


- While pasture conditions at the start the projection period are ok, limited soil moisture means that rainfall starts to become a factor by late September. This is indicated by the separation of the solid red, blue and green lines around 23 September.
- Rainfall in late September and early October will be important to keep pastures growing and prevent the available pasture from dipping below the long term 25<sup>th</sup> percentile (dotted red line).
- Given the current neutral outlook from BOM the most likely scenario is pasture tracking somewhere between the solid blue and red lines, which in turn indicates a relatively tough spring.
- **In summary, the outlook at Bigga is a fairly tough spring with pasture conditions tracking towards the bottom of the ‘normal’ range.**

### Bigga assumptions

<b>Enterprise</b>	Self-replacing Merino flock lambing mid-August
<b>DSE rating</b>	12.2 DSE
<b>Pasture</b>	Perennial grass, annual grass, sub clover
<b>Elevation</b>	644 m

## Laggan

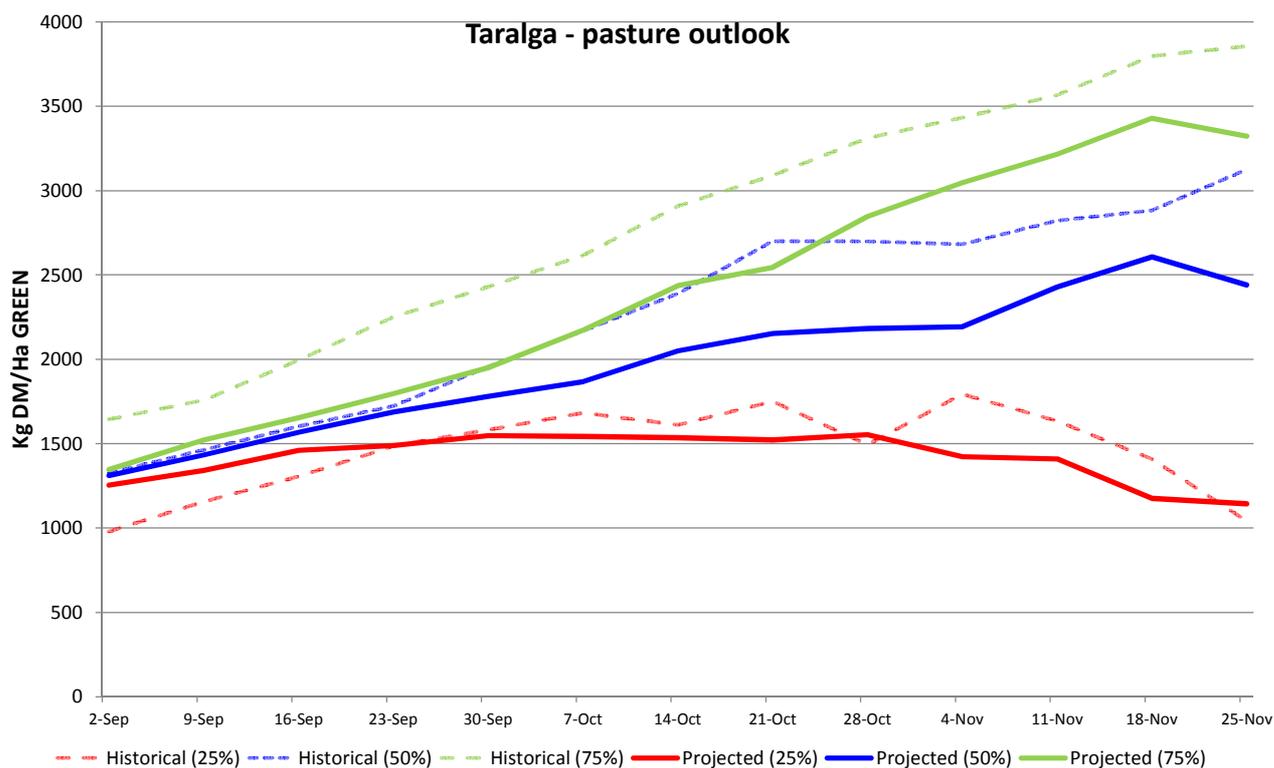


- Strong autumn rainfall combined with higher elevation means that moisture does not become a limiting factor until mid-October – this is where the three solid lines start to separate.
- Late October/early November rainfall is important at this site. Any rainfall prior to this will be an advantage and will provide a buffer going into November.
- At this stage you would expect pasture conditions to remain in the normal range for spring. November rainfall will determine how long pastures remain green heading into summer.
- **In summary, pasture conditions are expected to fall in the 'normal' range for spring.**

### Laggan assumptions

<b>Enterprise</b>	Self-replacing Merino flock lambing in August
<b>DSE rating</b>	7.3 DSE
<b>Pasture</b>	Microlaena, sub clover and annual grasses
<b>Elevation</b>	887 m

## Taralga

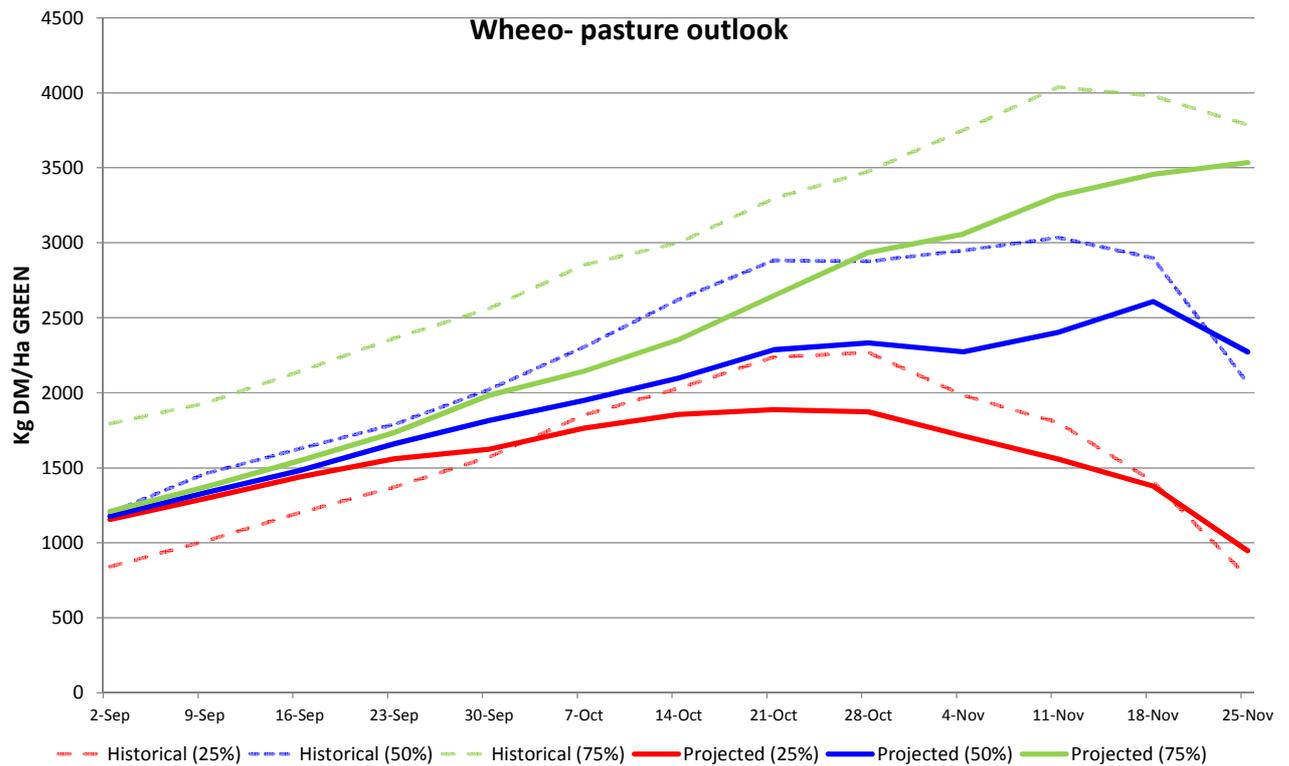


- Like a number of areas across the region, despite a strong autumn pasture conditions slipped during winter and were back in line with the long-term average by the start of spring.
- Rainfall in late September/early October will be important at this site– this is where soil moisture becomes a factor and the three solid lines start to separate.
- Given the current neutral outlook from BOM, the most likely scenario is pasture tracking somewhere between the solid blue and red lines.
- While herbage mass is likely to be below average this spring, the solid lines largely remain within the ‘normal’ band (indicated by the dotted lines).
- **In summary, pasture conditions are expected to fall in the ‘normal’ range for spring.**

### Taralga assumptions

<b>Enterprise</b>	1 <sup>st</sup> Cross ewes producing 2 <sup>nd</sup> cross lambs, lambing late August
<b>DSE rating</b>	16 DSE
<b>Pasture</b>	Phalaris, sub clover and annual grasses
<b>Elevation</b>	965 m

## Wheeo

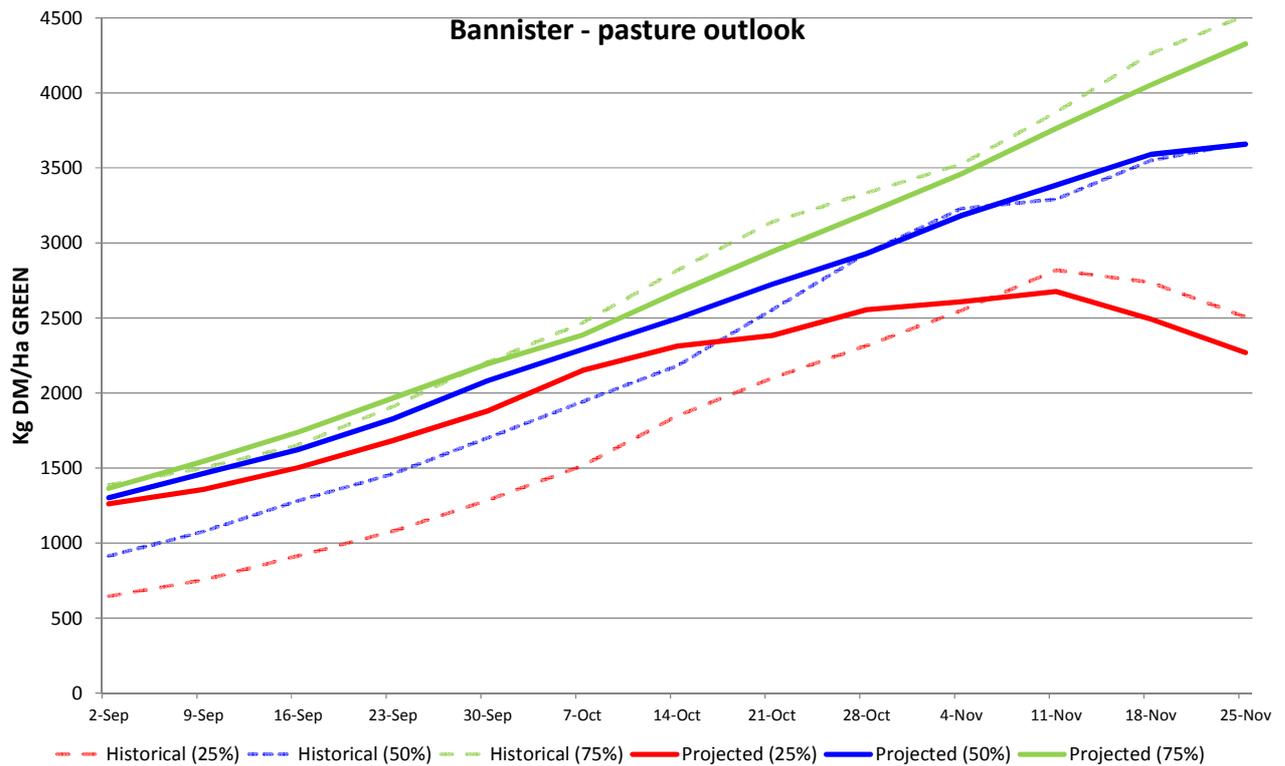


- Herbage mass is good at the start of the period but like a lot of other sites, rainfall in late September/early October is important. This is indicated by the separation of the solid lines which takes place around 23 September.
- Given the current neutral outlook from BOM, the most likely scenario is pasture tracking somewhere between the solid blue and red lines, which in turn indicates a relatively tough spring.
- **In summary, the outlook at Wheeo is a fairly tough spring with pasture conditions tracking towards the bottom of the 'normal' range.**

### Wheeo assumptions

<b>Enterprise</b>	Self-replacing Merino flock lambing late August
<b>DSE rating</b>	12.9 DSE
<b>Pasture</b>	Perennial grass, sub clover and annual grasses
<b>Elevation</b>	880 m

## Bannister

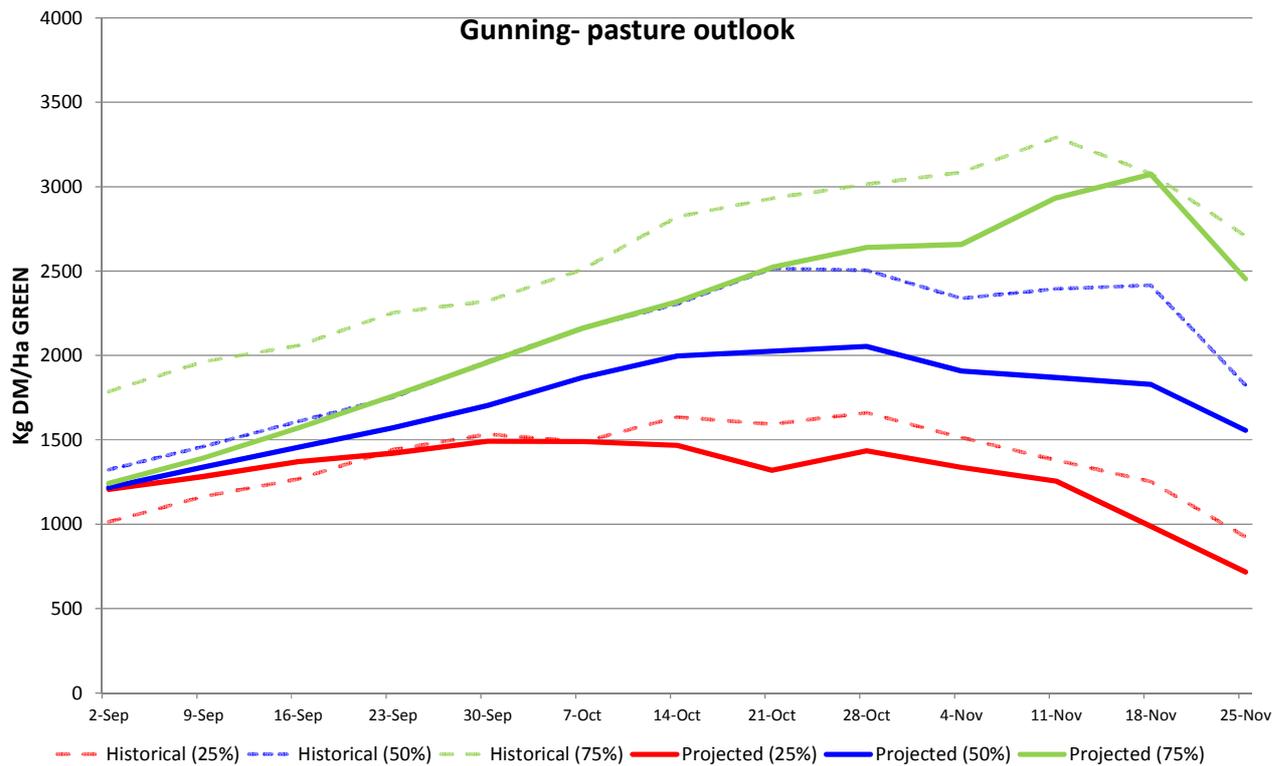


- This site is in the strongest position heading into spring – the result of a very strong autumn and the capacity of the basalt soil to store moisture.
- Not only does this site have a strong starting position in terms of herbage mass, but all three of the solid lines fall within the “normal band” (between red and green dotted lines).
- Given the BOM forecast it is likely that pasture will follow somewhere between the solid blue and red lines. Both of these lines track above the long term average (dotted blue line) until mid-October. After this point they taper off and both finish in line with the long-term average.
- **In summary, Bannister is in a good position heading into spring. Pasture conditions at the start of September are above average and are likely to slip slightly by the end of November.**

### Bannister assumptions

<b>Enterprise</b>	Breeding cows calving mid-July
<b>DSE rating</b>	13.1 DSE
<b>Pasture</b>	Perennial grass, sub clover and annual grasses
<b>Elevation</b>	890 m

## Gunning

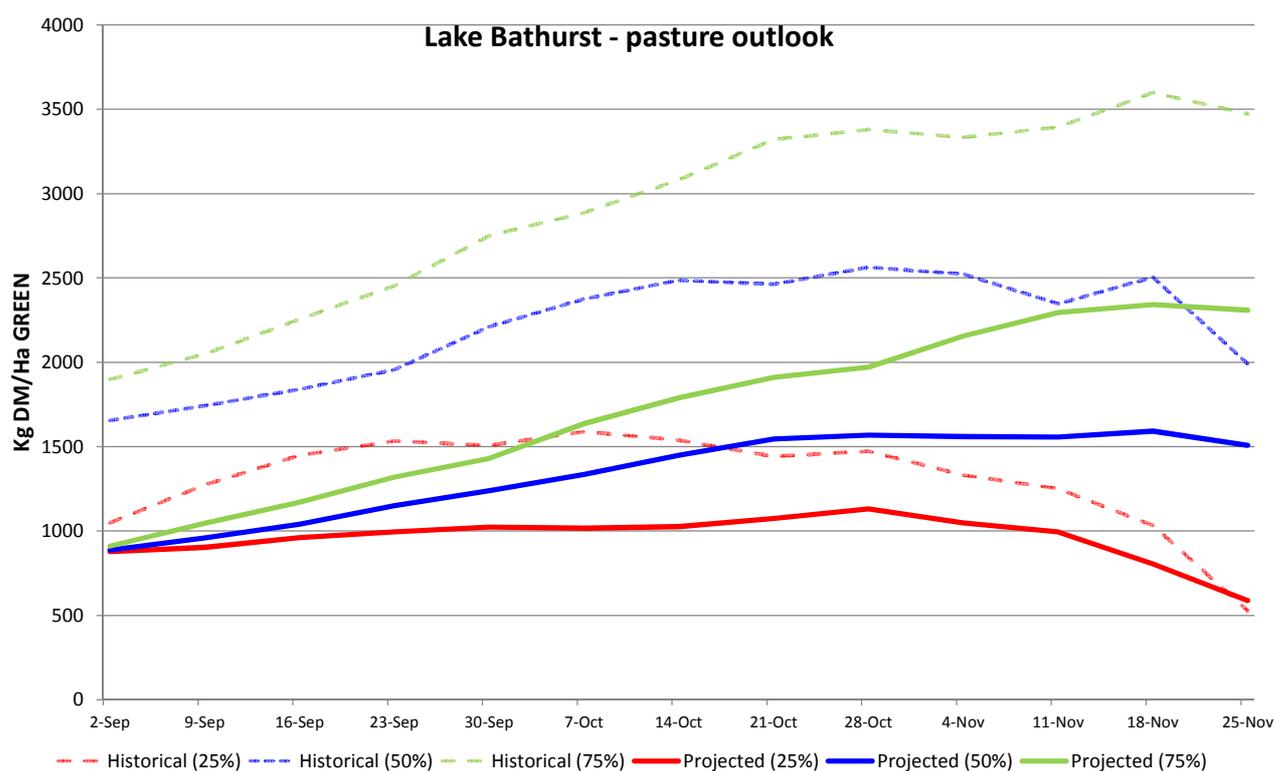


- While herbage mass is okay at the start of the period, the three solid lines quickly separate, highlighting that this site is particularly sensitive to spring rainfall.
- Given the current neutral outlook from BOM, the most likely scenario is pasture tracking somewhere between the solid blue and red lines, which in turn indicates a relatively tough spring.
- **In summary, the outlook for Gunning is a relatively tough spring with pasture conditions tracking towards the bottom end of the 'normal' range.**

### Gunning assumptions

<b>Enterprise</b>	Self-replacing Merino flock lambing mid-August
<b>DSE rating</b>	12.4 DSE
<b>Pasture</b>	Microlaena, sub clover and annual grasses
<b>Elevation</b>	590m

## Lake Bathurst

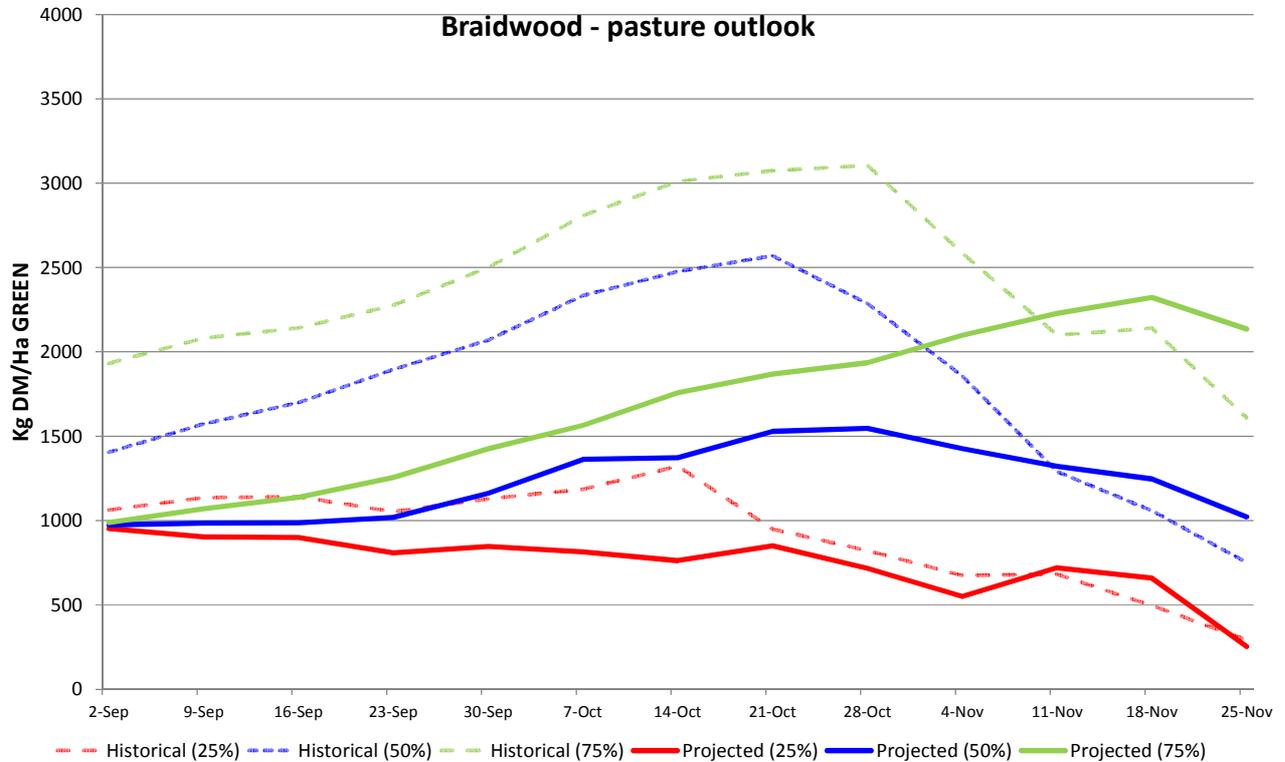


- After a strong start to the growing season, an extremely dry winter resulted in herbage mass slipping considerably. The Lake Bathurst and Braidwood sites have been impacted the most from the dry winter as they are on the eastern side of the range. These sites are also more likely to receive summer rain which can help offset a poor spring.
- Given the current neutral outlook from BOM, the most likely scenario is pasture tracking somewhere between the solid blue and red lines, which in turn indicates a tough spring.
- Despite the poor outlook at this site, GrassGro predicts that ewes will perform okay during the reporting period. Ewe condition is likely to become an issue in late summer and will need to be closely monitored to ensure that conception rates aren't heavily affected.
- In the short term, rainfall in late September/ early October will influence how severe spring becomes and therefore decisions around what stock are sold, what stock are retained and fed etc.
- **In summary, spring pasture conditions at Lake Bathurst are expected to be well below average. Rainfall in late September/early October will influence how severe spring becomes and key decisions around what stock are sold and what stock are retained and fed.**

### Lake Bathurst assumptions

<b>Enterprise</b>	Merino x Terminal flock, lambing mid-August
<b>DSE rating</b>	12 DSE
<b>Pasture</b>	Perennial grass, sub clover and annual grasses
<b>Elevation</b>	685 m

## Braidwood



- After a strong start to the growing season, an extremely dry winter resulted in herbage mass slipping considerably. The Braidwood and Lake Bathurst sites have been impacted the most from the dry winter as they are on the eastern side of the range. These sites are also more likely to receive summer rain which can help offset a poor spring.
- Given the current neutral outlook from BOM, the most likely scenario is pasture tracking somewhere between the solid blue and red lines, which in turn indicates a tough spring.
- Rainfall in late September/ early October will influence how severe spring becomes and therefore decisions around what stock are sold, what stock are retained and fed etc.
- **In summary, spring pasture conditions are expected to be well below. Rainfall in late September/early October will influence how severe spring becomes and key decisions around what stock are sold and what stock are retained and fed.**

### Braidwood assumptions

<b>Enterprise</b>	Self-replacing beef enterprise, August calving
<b>DSE rating</b>	11.3 DSE
<b>Pasture</b>	Phalaris, cocksfoot and sub clover pasture
<b>Elevation</b>	665 m

## Further information

For further information on weather forecasting and climate drivers see:

**NSW DPI fact sheet “Drivers of Climate Variability in the Murray Darling Basin”**

[http://www.dpi.nsw.gov.au/\\_data/assets/pdf\\_file/0005/402863/climate-variability-drivers-in-mdb.pdf](http://www.dpi.nsw.gov.au/_data/assets/pdf_file/0005/402863/climate-variability-drivers-in-mdb.pdf)

**Tablelands Farming Systems fact sheet “Weather forecasting explained”**

[http://www.tablelandsfarmingsystems.com.au/wp-content/uploads/2016/07/TFS-Factsheet-no1\\_April-2016\\_weather-forecasting-explained.pdf](http://www.tablelandsfarmingsystems.com.au/wp-content/uploads/2016/07/TFS-Factsheet-no1_April-2016_weather-forecasting-explained.pdf)

**Bureau of Meteorology ENSO wrap up:** <http://www.bom.gov.au/climate/enso/>

**Bureau of Meteorology Climate Outlook:**

<http://www.bom.gov.au/climate/outlooks/#/overview/summary/>