Seasonal outlook – autumn/winter 2019

Compiled by:

Matthew Lieschke, Senior Agriculture Advisor, South East Local Land Services

Phil Graham, Graham Advisory

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NSW GOVERNMENT Local Land Services

Australian Government | National Landcare Program

TFS Tablelands Farming Systems
Next Generation Agriculture

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This seasonal outlook is part of the $25 million of National Landcare Programme investment that Local Land Services is delivering to boost farm gate productivity and improve economical health across NSW. This project is a joint initiative between Local Land Services and Tablelands Farming Systems.

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More information: Matthew Lieschke | South East Local Land Services | Goulburn NSW 2580

www.lls.nsw.gov.au

Executive summary

While March rainfall was patchy across the region, the soil moisture probe sites recorded between 57mm and 88mm for the month. Pastures have responded quickly to the March rainfall, with most sites showing either above average or slightly below average pasture conditions for this time of the year (early April).

Despite the dry start to April, for the majority of sites the odds are still in favour of an average winter in terms of pasture availability. This is especially the case for those locations that have had recorded 70mm + for March. If your property received 70mm or better during March then you could expect your property to perform in a similar manner to the 70mm + sites presented in this report. Stored soil moisture (rainfall + soil type) at present is having a big influence on the pasture projections. This is indicated in the graphs by the speed at which the solid lines start separating.

The drier sites (e.g. Murrumbateman, Taralga, Bungonia and Lake Bathurst) will need good rain in late April/early May to have reasonable winter pastures. For these locations, keeping livestock off key paddocks at present will help build leaf area and increase growth rates in winter. This will be an important strategy for lambing or calving paddocks - especially if lambing or calving before the end of June. If winter pasture availability ends up being limited, strategic use of nitrogen with gibberellic acid can be very beneficial once pastures reach > 900kg DM/ha.

Sudden changes in the diet often results in animal health issues, especially when stock go from very little green feed onto a lush crop or pasture. If you are you hand feeding livestock at present and trying to build a feed 'wedge', start grazing pastures once they get to around 700 kg DM/ha (i.e. a short, dense pasture around 2-3cm high). Moving stock out of paddocks that contain very short and limited green 'pick' and putting them on a pasture with 1000 kg DM/ha + will increase the risk of animal health issues.

There is no doubt that weeds are going to be a big issue, especially on properties where fodder was brought in and ground cover was pushed hard. Paddocks should be monitored closely for new, emerging weeds. Correct identification is critical to limit the impact of weeds - seek help if you are unsure what you are dealing with.

Some comments regarding pastures

There is considerable variation at present in terms of how pastures are responding to the recent rain and the amount of feed in paddocks. This is due to a range of factors such as rainfall, soil type, soil fertility and current stocking rates. The intensity of drought conditions in 2018 and grazing management also appears to be having an impact.

Some pastures are very 'patchy' and have a lot of bare ground. This effect was also evident after the 2006 drought where the annual grasses failed to set seed. These gaps will fill in over time, but a lack of annual grasses will have an impact on pasture production and stocking rates this winter.

Having a good density of perennial grasses is critical for long-term pasture production and sustainability. It is important to not be too hasty with your decision making for pastures that are of concern due to potential loss of perennial grass species over the extended dry period. It is better to spell these pastures now and see what species regrow. Establishment of a new pasture is an expensive and risky operation and should only occur when you are sure that you do not have enough desirable perennial species still present to work with. Experience from previous droughts is that perennial pastures often return to acceptable levels of production with good management.

Key points to consider when looking at the graphs

- It is the stocking rate run at each site which is important, not the enterprise selected. Most sites are set up on the basis that fertility is good and that the pasture mix is able to respond to moisture in any month of the year. So, a cattle producer can look at a site running sheep and the pasture production range will still apply with minor changes.
- The moisture probes data (rainfall and soil moisture) as of 9 April was checked against the model's values to improve accuracy. At most sites there was good agreement.
- Before reading this report, go to www.soilmoistureprobes.com.au and review both March rainfall and soil moisture levels at the start of April for the sites you are interested in. This information will help explain the graphs in this report and the differences between sites.
- The graphs are reporting green herbage in kg DM/ha for grazed pastures at the stocking rate listed. Any paddocks that you have had shut up or grazed at lower stocking rate will have greater values.
- The critical thing to look at is how the projected values (solid lines) move compared to the historical values (dotted lines). There are four projected lines displayed (10%, 25%, 50% and 75%).
- The longer the projected lines (solid) stay close together the less the site is relying on continuing rain to drive pasture production.
- Pasture benchmark tables for sheep and cattle have been provided as an Appendix to help you interpret the graphs. Refer to these benchmarks to see how stock will perform on the herbage mass indicated in the graphs for each location.

Steps to convert this data to your property

1. Look at the moisture probe website (www.soilmoistureprobes.com.au) and select a site with a similar soil type (detailed soil information is available at the bottom of the webpage). Selecting a site with a similar soil type is more important than selecting the site that is closest to your property.

2. Compare your rainfall to your selected site. If rainfall is similar then you can expect that the pasture projection would be similar to your property. . The starting pasture values will probably be different but the pattern of the solid lines will be driven by moisture.

3. If your rainfall is well below then the spread of the lines will be greater so your pasture supply future is more variable, with rainfall in the next month being critical.

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 20 moisture probes have now 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:

- Murrumbateman
- Yass
- Bookham
- Boorowa
- Bigga
- Laggan
- Wheeo
- Taralga
- Bannister
- Rugby
- Bungonia
- Gunning
- Lake Bathurst
- Sutton Forest
- Braidwood
- Cooma (x2)
- Delegate
- Bombala
- Berry

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 has an automatic rain gauge. For further information go to: www.soilmoistureprobes.com.au

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 the various probe sites across the Southern Tablelands and Highlands. Information from each of these soil moisture probes 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).

Climate outlook

The Bureau of Meteorology (BOM) provide a 3 month climate outlook. These outlooks are updated every fortnight. Key messages from the current outlook (issued 11 April 2019) are:

- The rainfall outlook for May is a slightly higher chance receiving below median rainfall for large parts of South Eastern NSW. The June outlook for this region is more neutral – indicating an equal chance of above or below median rainfall.
- It's important to note that forecasting accuracy at this time of the year is very low.
- Daytime temperatures for the region are expected to be average for the next two months, especially June.
- Nights are also likely to be warmer than average, however the forecast drier than average conditions could bring more cloud-free nights, increasing the risk of frost in susceptible areas.

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

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

Rainfall: the chance of above median for May 2019

Temperature: the chance of above median maximum temperature for May 2019

Source: BOM (2019)

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 18 years and is accepted by producers as providing robust data to assist farm decision making related to the risk from seasonal variation.

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Seasonal reports, what do they tell us?

The logic behind a seasonal report is too see what the next "2-3 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 "2-3 month" period.

The historical weather used to create the pasture projections was daily data from 1960 to 2018. So, GrassGro essentially creates 57 different potential pasture curves all starting from the conditions on 11 April 2019. From this data we can get an estimate/risk of pasture supply for the period examined (i.e. in this case it was from 11 April to 31 July 2019). 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.

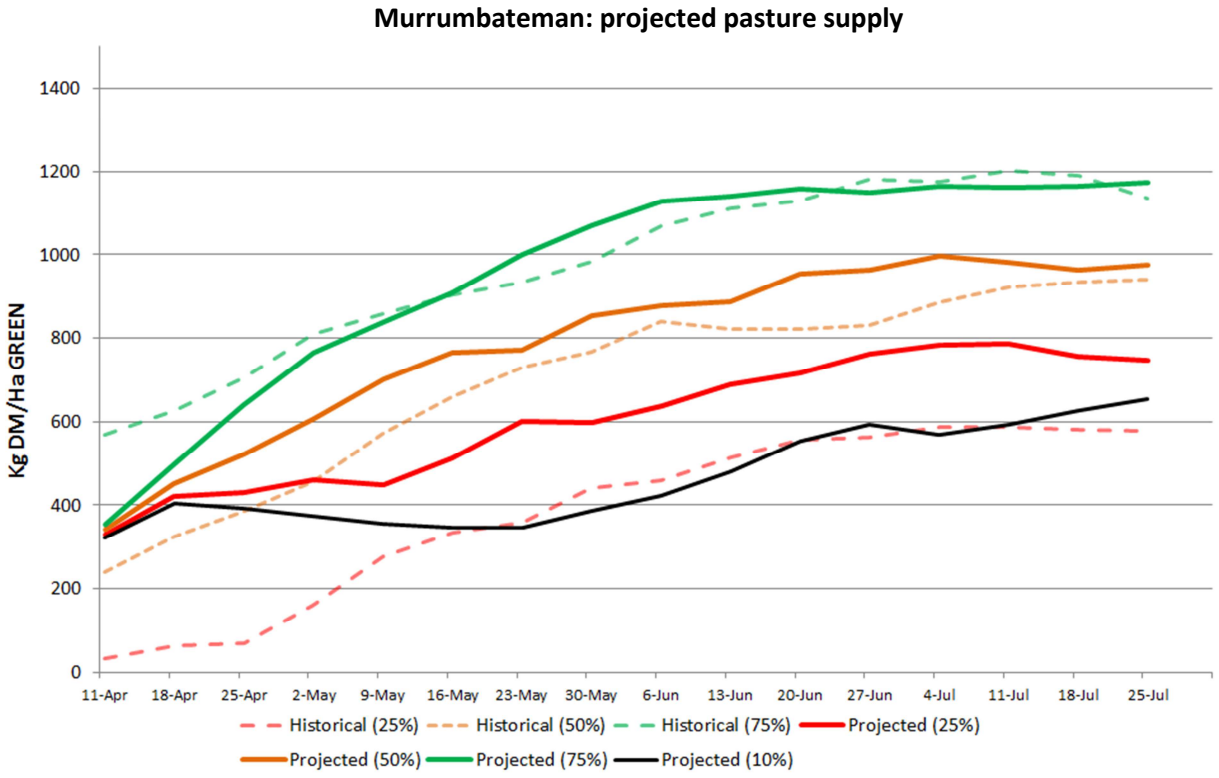
The pasture curves are reported via percentile graphs. The three percentiles used are 10%, 25%, 50%. The 25% line means that in 75% of years (i.e. 42 years) the green pasture supply was better than this line. The 50% line means half the years were above the line and half below. This logic applies to 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.

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.

Murrumbateman

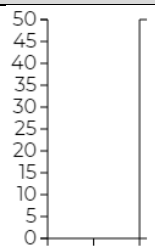
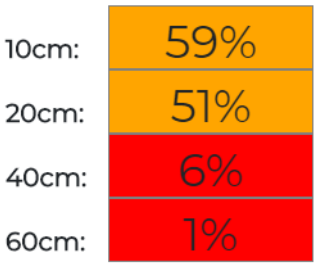
Self replacing merino flock, 10.0 DSE, microlaena, sub clover and annual grass pasture



While this site recorded 64mm of rain for March, significant rain didn't arrive until the very end of the month. As such, the starting position is below the long-term average, sitting around 350kg DM/ha.

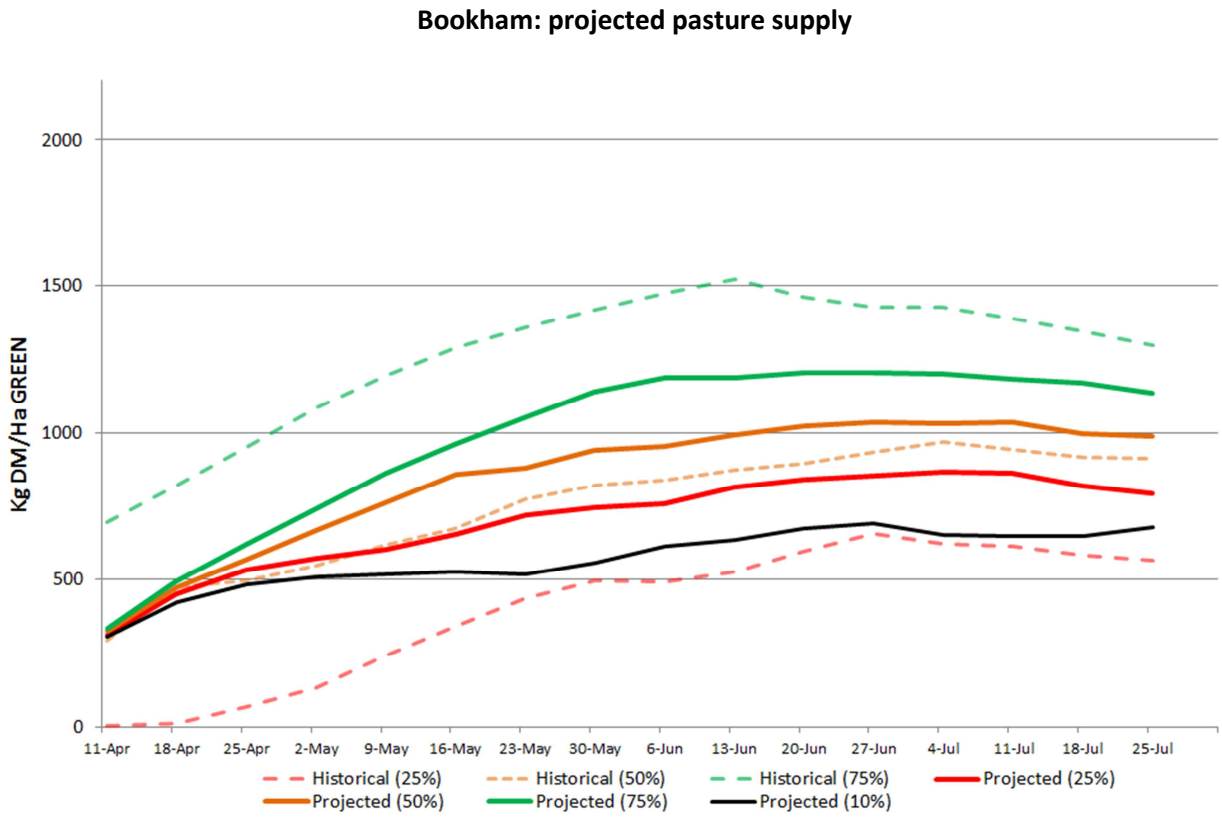
The key point at this site is the speed with which the projected lines spread apart. This isn't surprising given the amount of moisture in the profile at the time of doing the pasture projection, with the top 20cm starting to dry out.

Rain in late April/early May will be critical at this site. A dry finish to autumn will lead to a tight winter period. Keeping livestock off key paddocks during autumn will help build leaf area and increase growth rates in winter. This will be an important strategy for lambing or calving paddocks - especially if lambing or calving before the end of June.

March rainfall	Soil moisture (as of 17 April 2019)
 64mm	

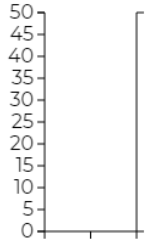
Bookham

Self replacing merino flock, 10.7 DSE, mircorlaena, sub clover and annual grass pasture



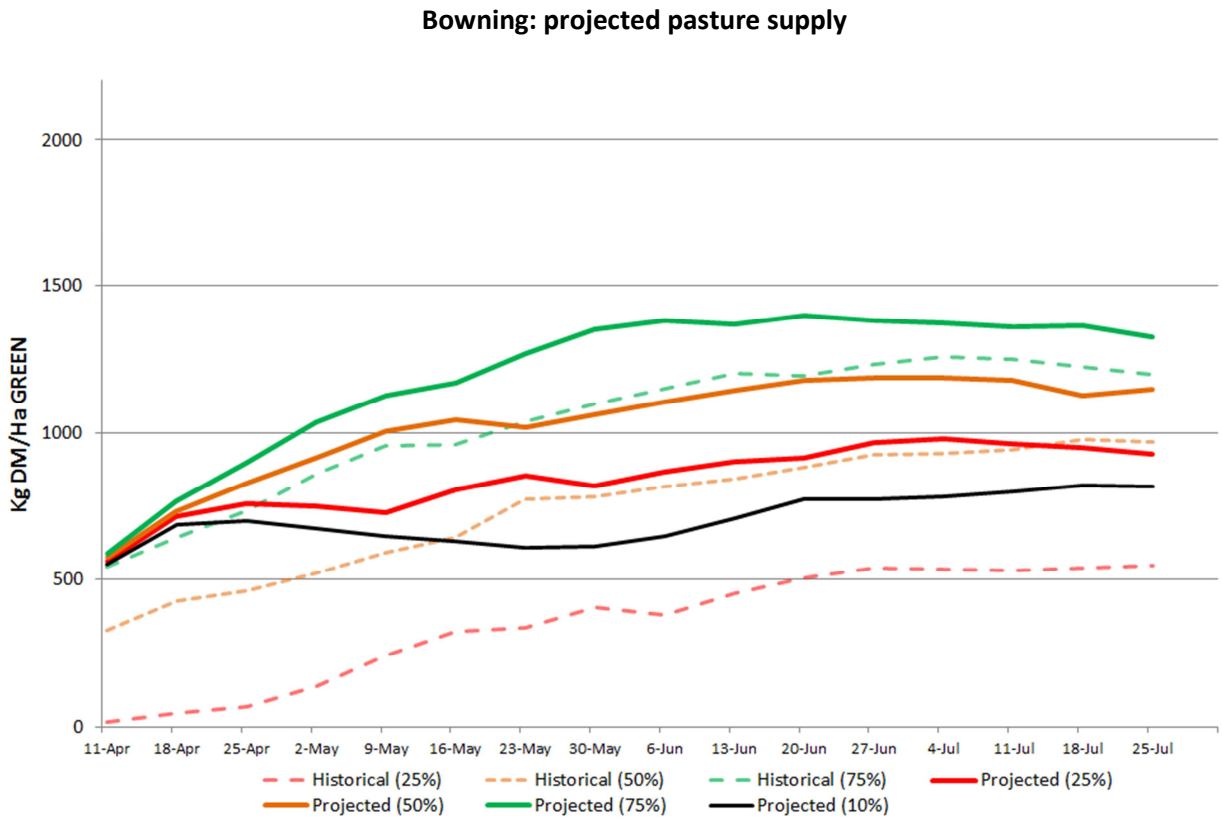
Like Murrumbateman, significant rain didn't arrive until the very end of March. As such, the starting position is sitting around the long-term average of 300kg DM/ha.

Looking at the above pasture projection, there is a strong chance that pasture conditions this winter will be around the long-term average for this location. Even if conditions turn out to be particularly dry and solid red line is followed (10th percentile), pasture mass (kg DM/ha) is still above the 25% historical line. This would result in a tight, but manageable position.

March rainfall	Soil moisture (as of 17 April 2019)
 73mm	10cm: 59% 20cm: 64% 40cm: 42% 60cm: 19%

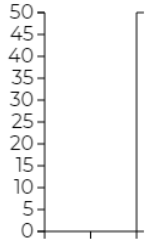
Bowning

Self replacing merino flock, 10.7 DSE, microlaena, sub clover and annual grass pasture



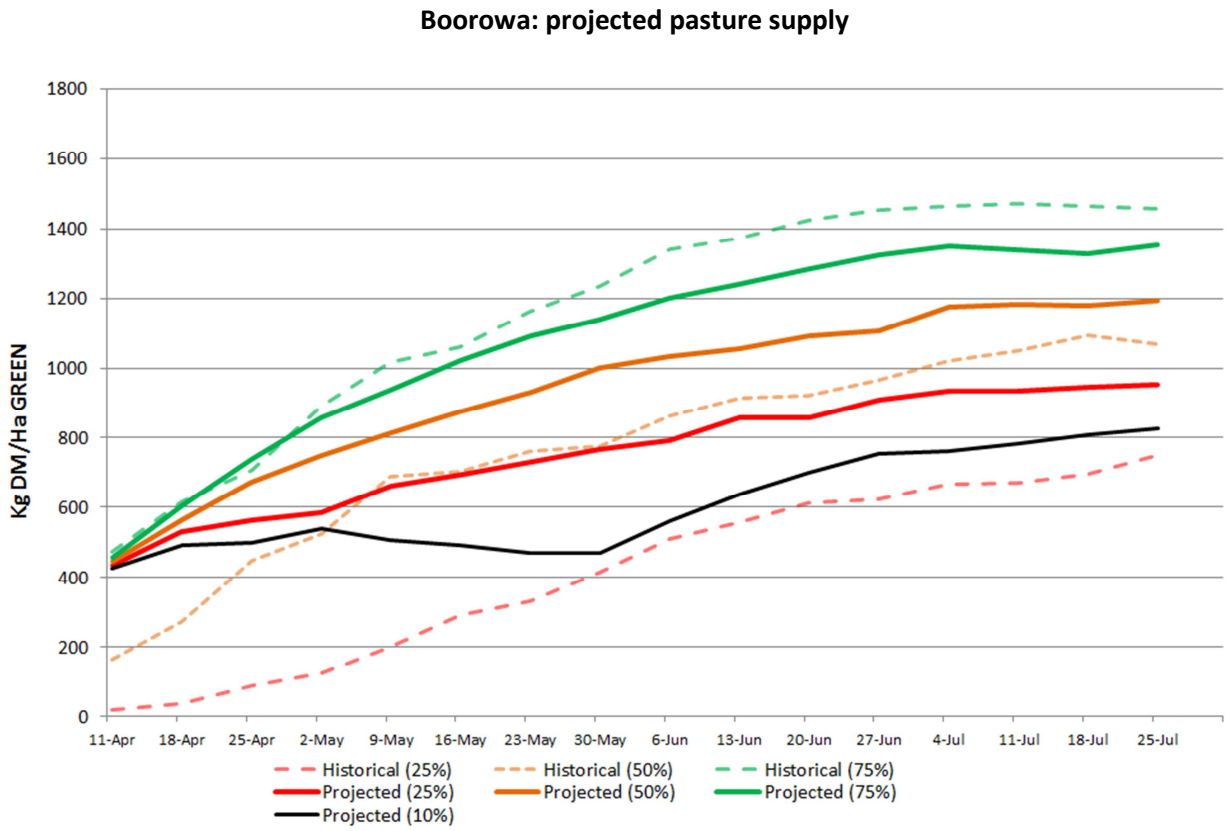
The starting point is quite high this site (sitting around the 75th percentile) and is a result of good March rainfall, with the Bowning site recording 82mm for the month. This rainfall resulted in a significant increase in soil moisture down to 40cm.

Looking at the above pasture projection, there is a strong chance that pasture conditions this winter will be above the long-term average for this location. Even if conditions turn out to be particularly dry and solid black line is followed (10th percentile), pasture mass (kg DM/ha) is still above the 25% historical line - a tight, but manageable position.

March rainfall	Soil moisture (as of 17 April 2019)
 82mm	10cm: 48% 20cm: 53% 40cm: 66% 60cm: 25%

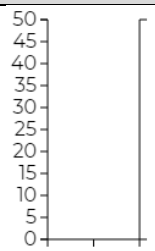
Boorowa

Self replacing merino flock, 10.0 DSE, phalaris, sub clover and annual grass pasture



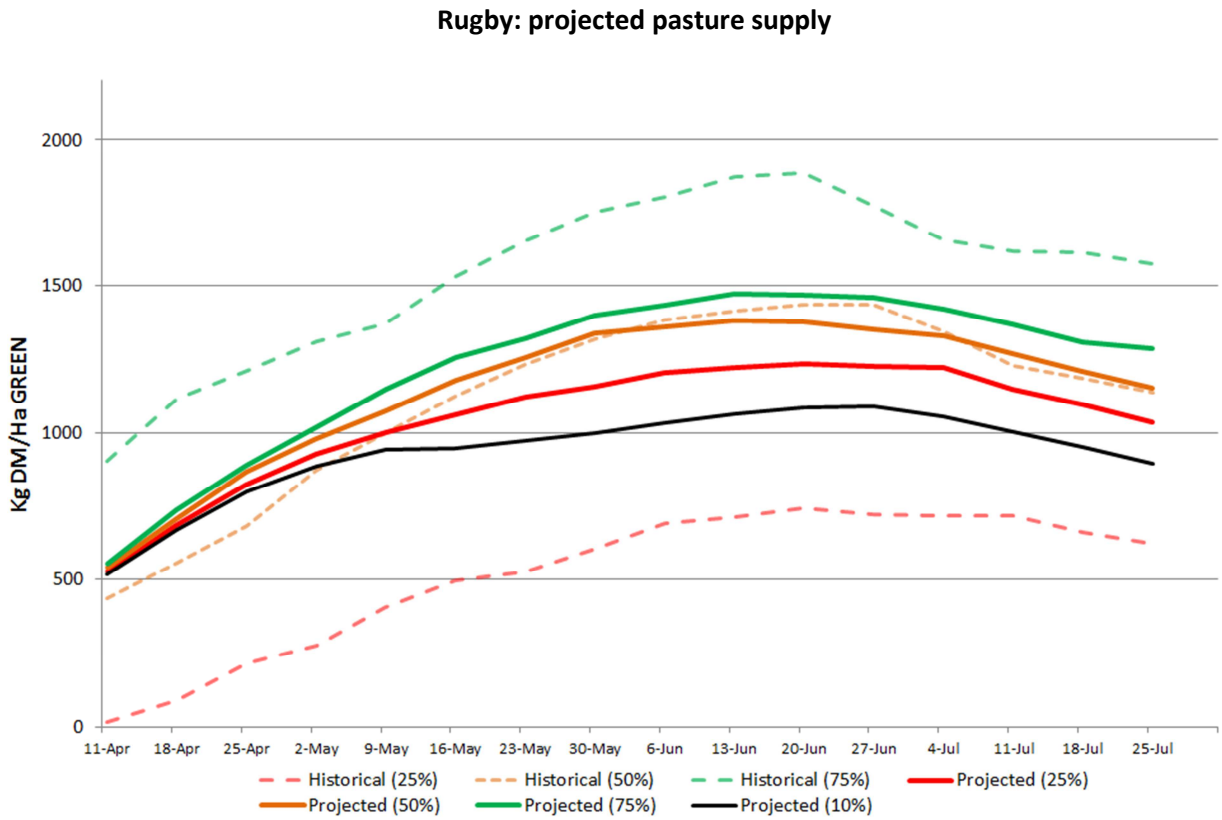
The starting point is quite high this site (sitting around the 75th percentile) and is a result of good March rainfall, with the Boorowa site recording 72mm for the month. This rainfall resulted in a significant increase in soil moisture down to 40cm.

Looking at the above pasture projection, there is a strong chance that pasture conditions this winter will be above the long-term average for this location. Even if conditions turn out to be particularly dry and solid black line is followed (10th percentile), pasture mass (kg DM/ha) is still above the 25% historical line - a tight, but manageable position.

March rainfall	Soil moisture (as of 17 April 2019)
 72mm	10cm: 41% 20cm: 56% 40cm: 30% 60cm: 9%

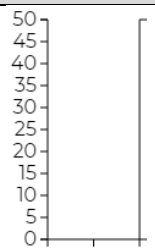
Rugby

Prime lamb enterprise, 11.4 DSE, phalaris, sub clover and annual grasses



This site was one of the wetter locations during March, with 82mm recorded for the month.

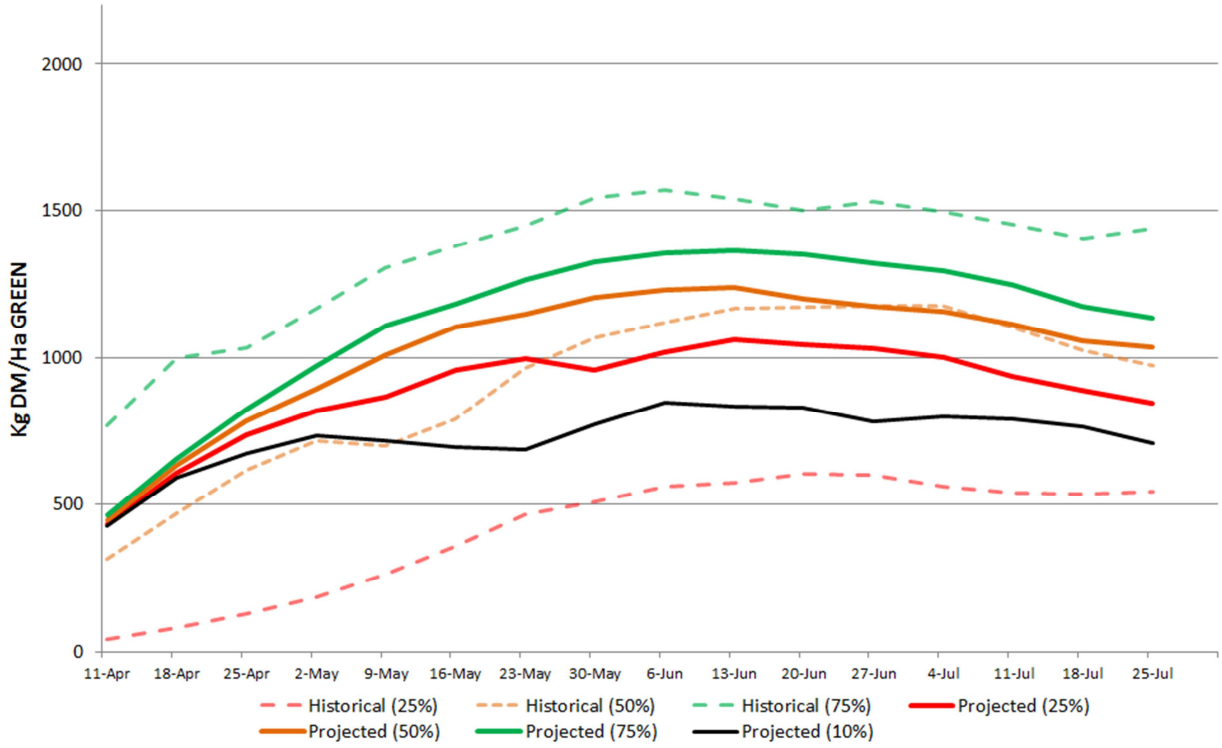
The projected lines remain close, indicating a strong likelihood that average winter pasture conditions will be achieved. This is particularly important at this site as lambing commences at the start of winter. The pasture decline in July is driven by the increased intake of lactating ewes.

March rainfall	Soil moisture (as of 17 April 2019)
 **82 mm**	Unknown due to technical issues with the probe at this site

Bigga

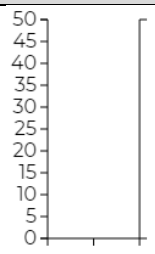
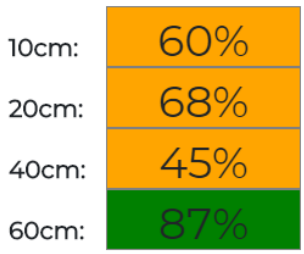
Self replacing merino flock, 11.5 DSE, perennial grass, annual grass, sub clover

Bigga: projected pasture supply



The starting position is sitting slightly above the long-term average of 300kg DM/ha.

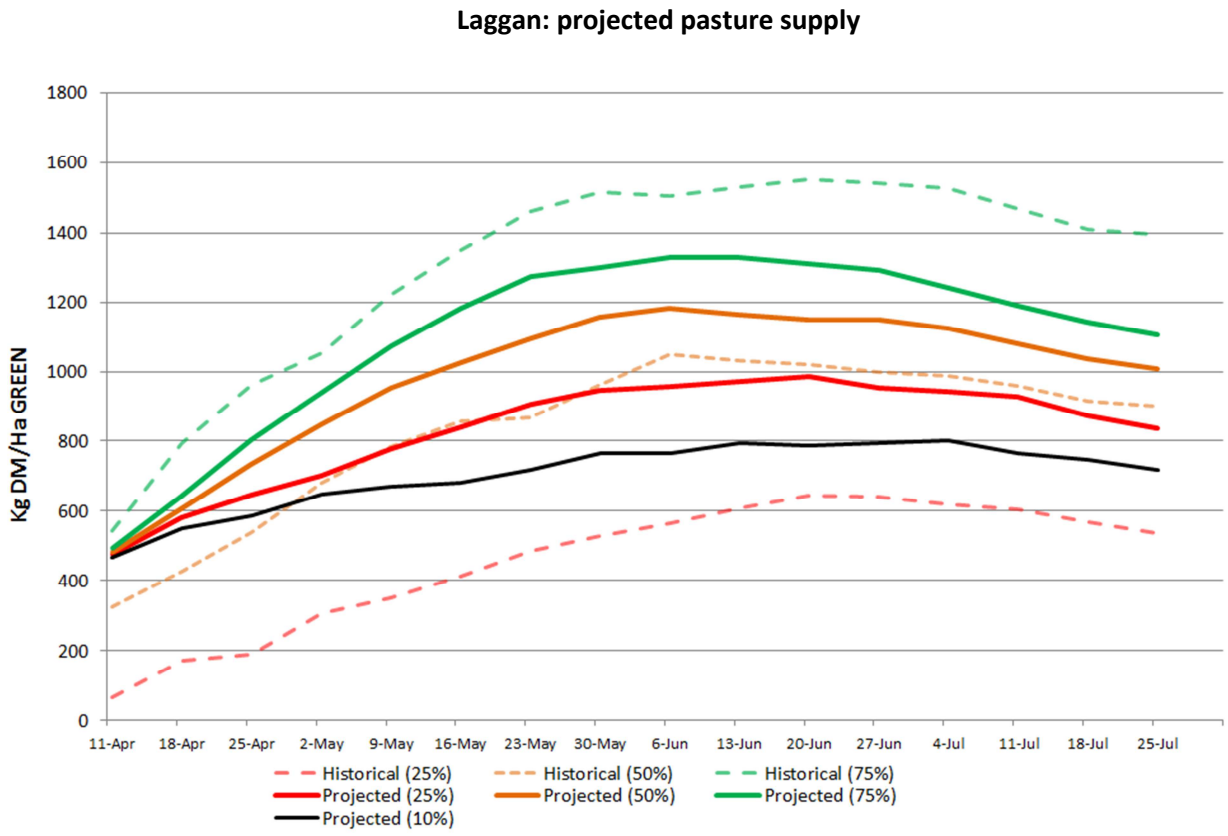
Looking at the above pasture projection, there is a 50% chance that pasture conditions this winter will be around the long-term average for this location, however rainfall in early May will be important for this to occur. Even if conditions turn out to be extremely dry and solid black line is followed (10th percentile), pasture mass (kg DM/ha) is still above the 25% historical line. This would result in a tight, but manageable position.

March rainfall	Soil moisture (as of 17 April 2019)
 **68mm***	

* Rainfall data from Bigga Street BOM weather station.

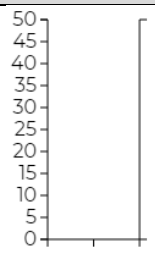
Laggan

Self replacing merino flock, 7.3 DSE, microlaena, sub clover and annual grasses



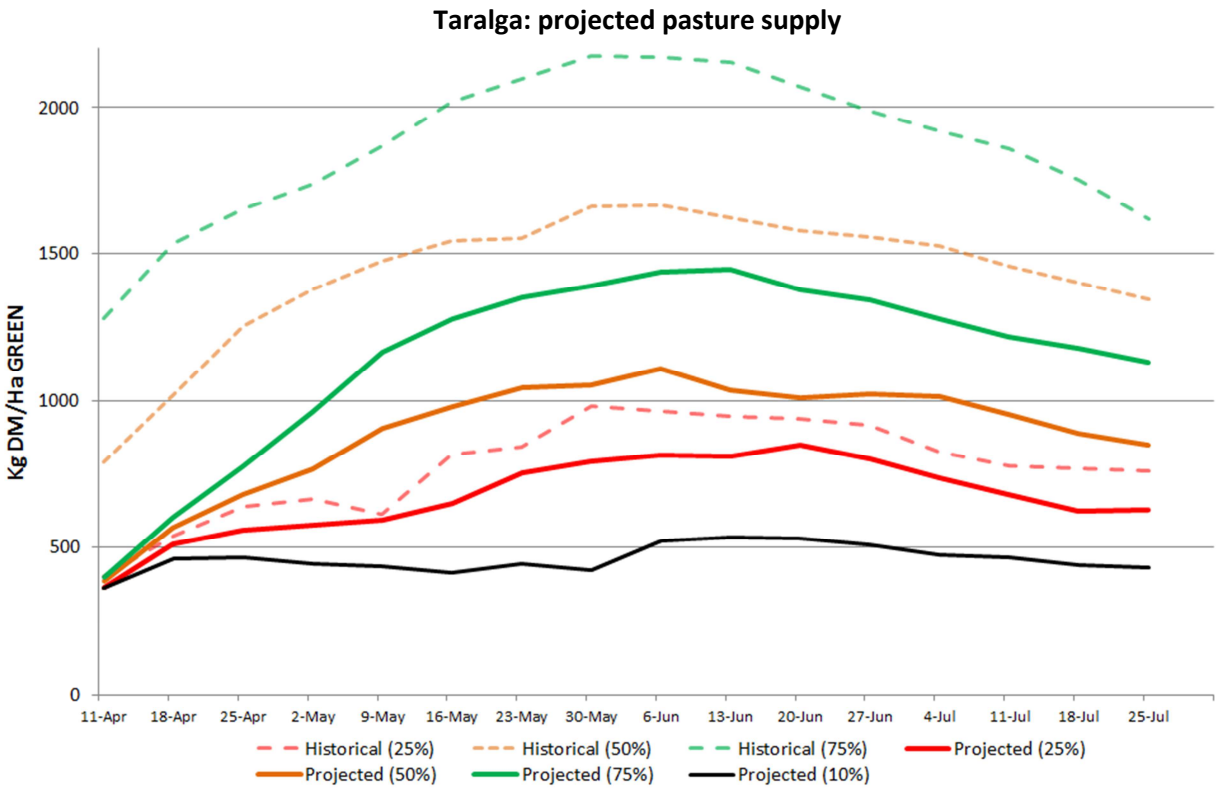
This site had good growth in March with three lots of 20mm falling between 17 and 30 March. This meant that the pasture starting position was sitting around 450kg DM/ha, which is above the long term average.

The pasture outlook for Laggan is looking positive, with a high chance that winter herbage mass will be somewhere near the long-term average. Even if conditions turn out to be extremely dry and solid black line is followed (10th percentile), pasture mass (kg DM/ha) is still above the 25% historical line. This would result in a tight, but manageable position.

March rainfall	Soil moisture (as of 17 April 2019)	
	10cm:	42%
	20cm:	42%
	40cm:	29%
59mm	60cm:	52%

Taralga

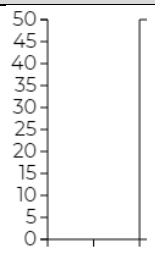
Prime lamb enterprise, 17.2 DSE, phalaris, sub clover and annual grasses



This site has a very high stocking rate which places pressure on the pasture if seasonal conditions are not favourable. The site is starting from a low value compared to history and soil moisture levels were not high, shown by the quick and wide separation of the projected lines. The odds are that a tough winter will be expected. A lower stocking rate would have given a better starting point but it would not affect the spread of the projections lines.

Keeping livestock off key paddocks until pastures reach 700 - 800kg DM/ha will help increase pasture growth rates in winter. This will be an important strategy for lambing or calving paddocks - especially if lambing or calving before the end of July. Strategic use of nitrogen with gibberellic acid with any rain event would also be very beneficial once pastures reach > 900kg DM/ha.

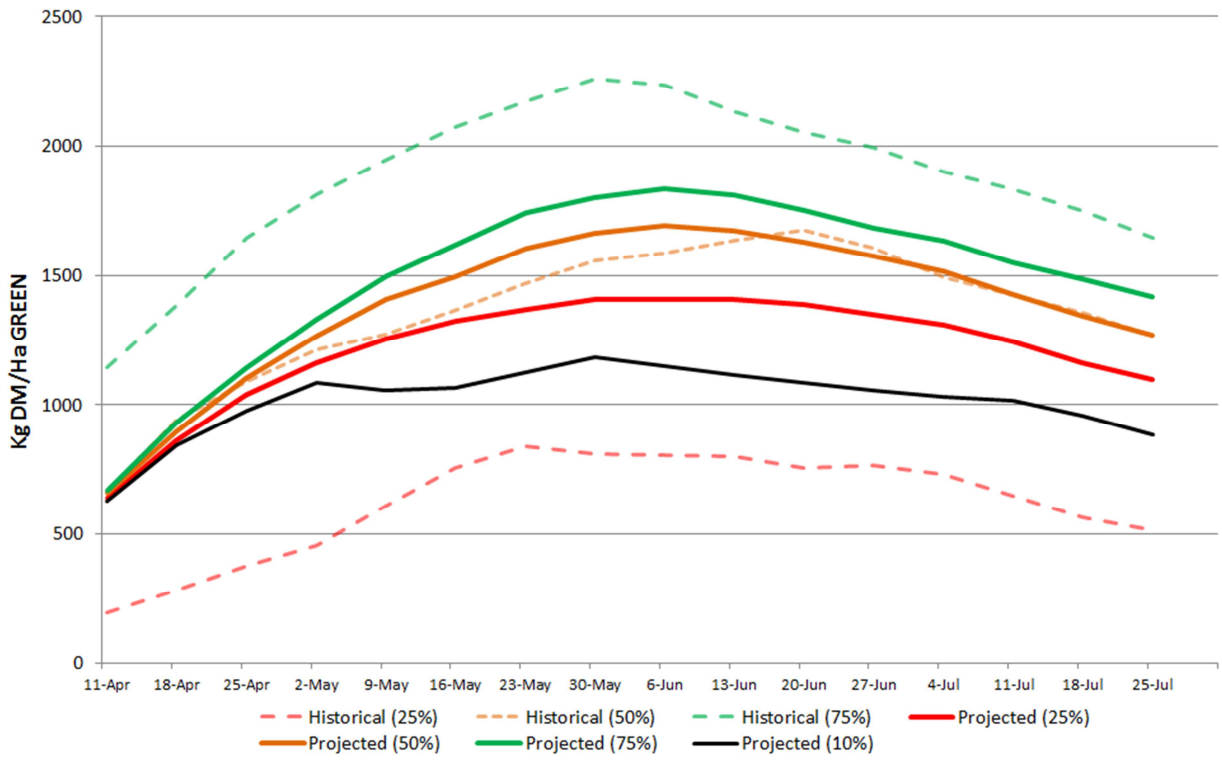
Note: This probe is not working at present so the soil moisture has been based on the model's prediction.

March rainfall	**Soil moisture** (as of 17 April 2019)
 **57mm**	Unknown due to technical issues with the probe at this site

Wheeo

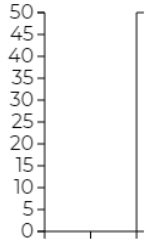
Self replacing merino enterprise, 13 DSE, perennial grass, sub clover and annual grasses

Wheeo: projected pasture supply



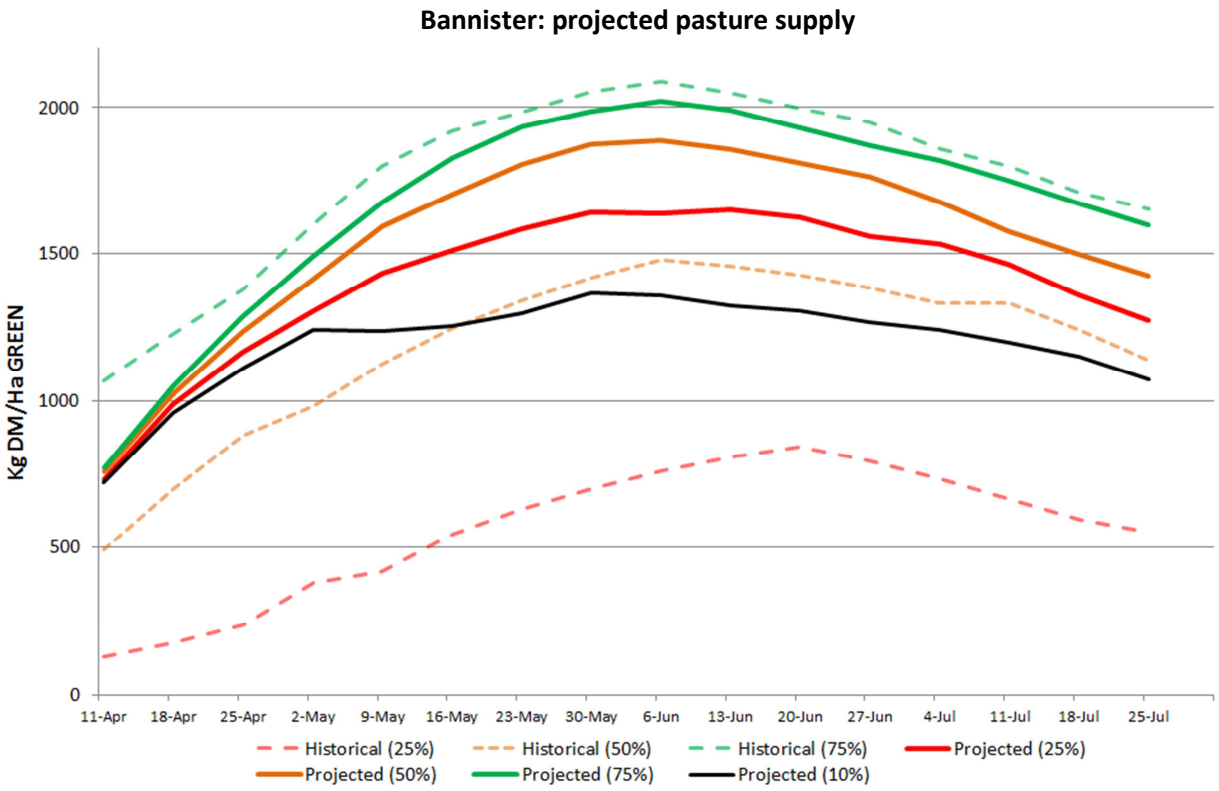
The starting point is sitting around 650kg DM/ha which is the long term average for this location. The pasture at Wheeo was inspected on 10 April and had a very good density of both annual and perennial species.

Looking at the above pasture projection, it is likely that pasture conditions this winter will be around the long-term average for this location. Even if conditions turn out to be particularly dry and solid black line is followed (10th percentile), pasture mass (kg DM/ha) is still above the 25% historical line and in a manageable position.

March rainfall	Soil moisture (as of 17 April 2019)
 **69mm**	10cm: 19% 20cm: 64% 40cm: 52% 60cm: 12%

Bannister

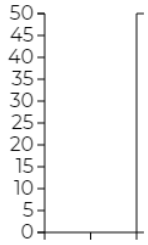
Beef breeding operation, 11.9 DSE, perennial grass, sub clover and annual grasses



This site was one of the wetter monitoring sites at the start of the projection period. Not only did this site receive good March rainfall (86mm), but the basalt soil was able to capture this moisture very effectively. As such, the pasture response at this site has been particularly strong.

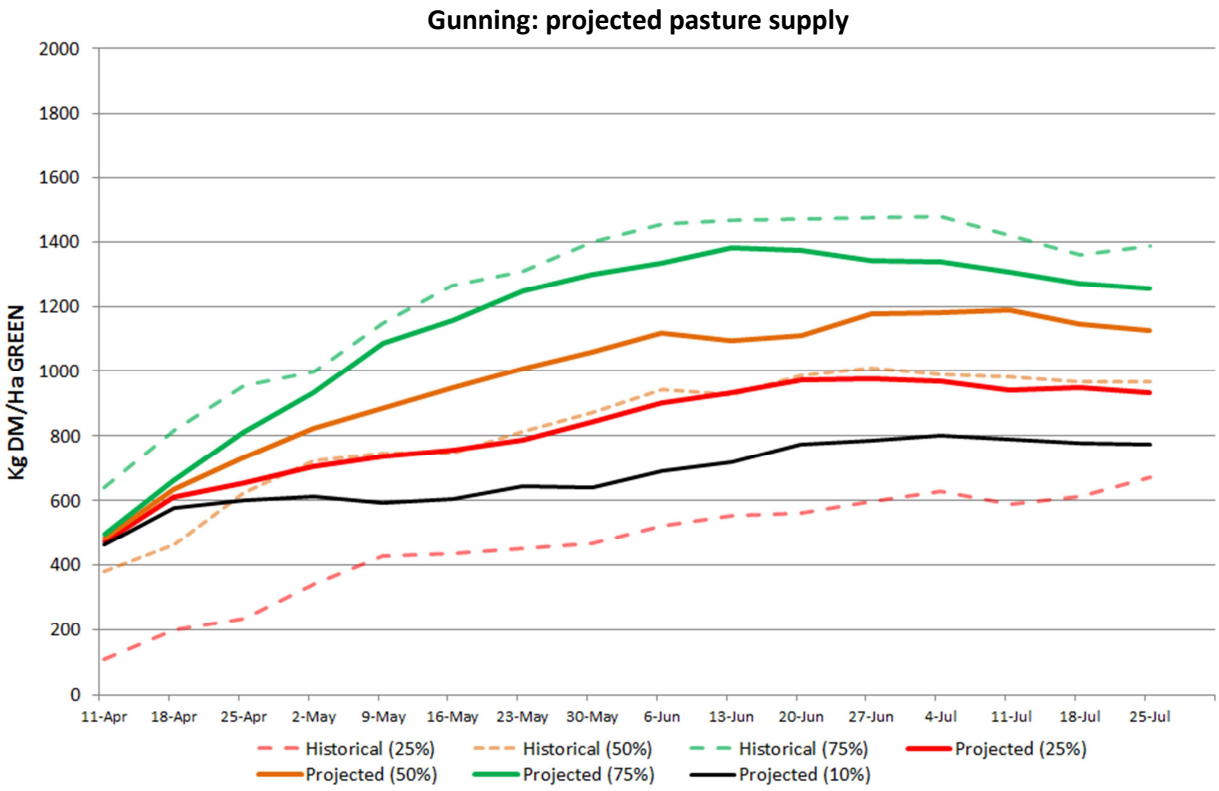
The projected lines remain close, indicating a strong likelihood that above average winter pasture conditions will be achieved.

Given the strong starting position and existing soil moisture, this site has the opportunity to carry some extra stock (+15%) or take existing stock through to heavier weights. Good rain in late April/early May will strengthen this option.

March rainfall	Soil moisture (as of 17 April 2019)	
 86mm	10cm:	65%
	20cm:	67%
	40cm:	56%
	60cm:	56%

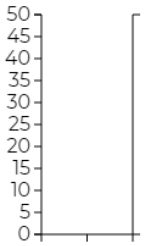
Gunning

Self replacing merino flock, 12 DSE, microlaena, sub clover and annual grasses



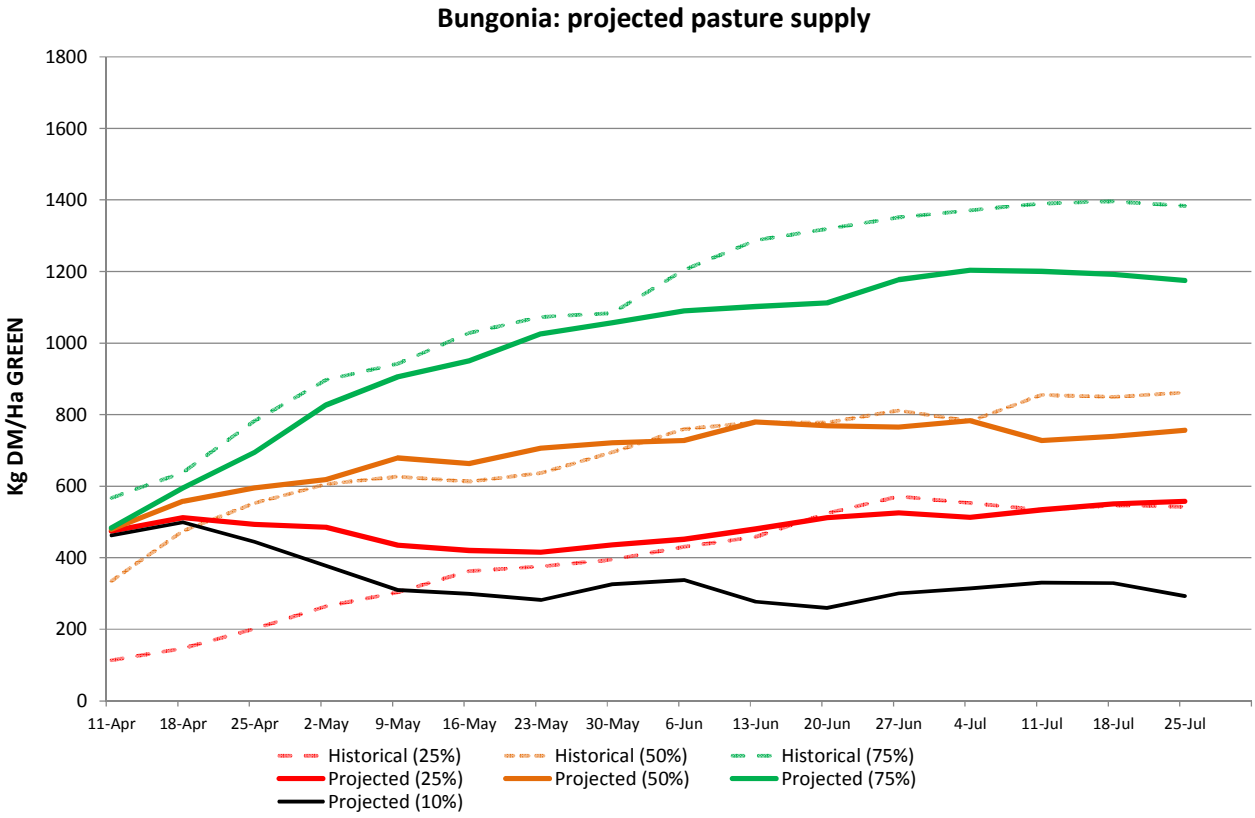
Herbage mass at the start of the projection period is sitting slightly above the long-term average as a result of good March rainfall, with 69mm recorded for the month. The moisture probe showed a significant response in moisture levels down to 60cm.

Looking at the above pasture projection, it is likely that pasture conditions this winter will sit somewhere around the long-term average for this location. A dry finish to autumn is will lead to a somewhat tight but manageable winter.

March rainfall	Soil moisture (as of 17 April 2019)	
 69mm	10cm:	39%
	20cm:	54%
	40cm:	57%
	60cm:	63%

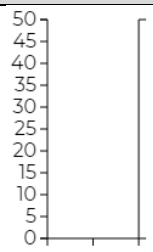
Bungonia

Self replacing merino flock, 7.0 DSE, phalaris, microlaena, sub clover and annual grasses



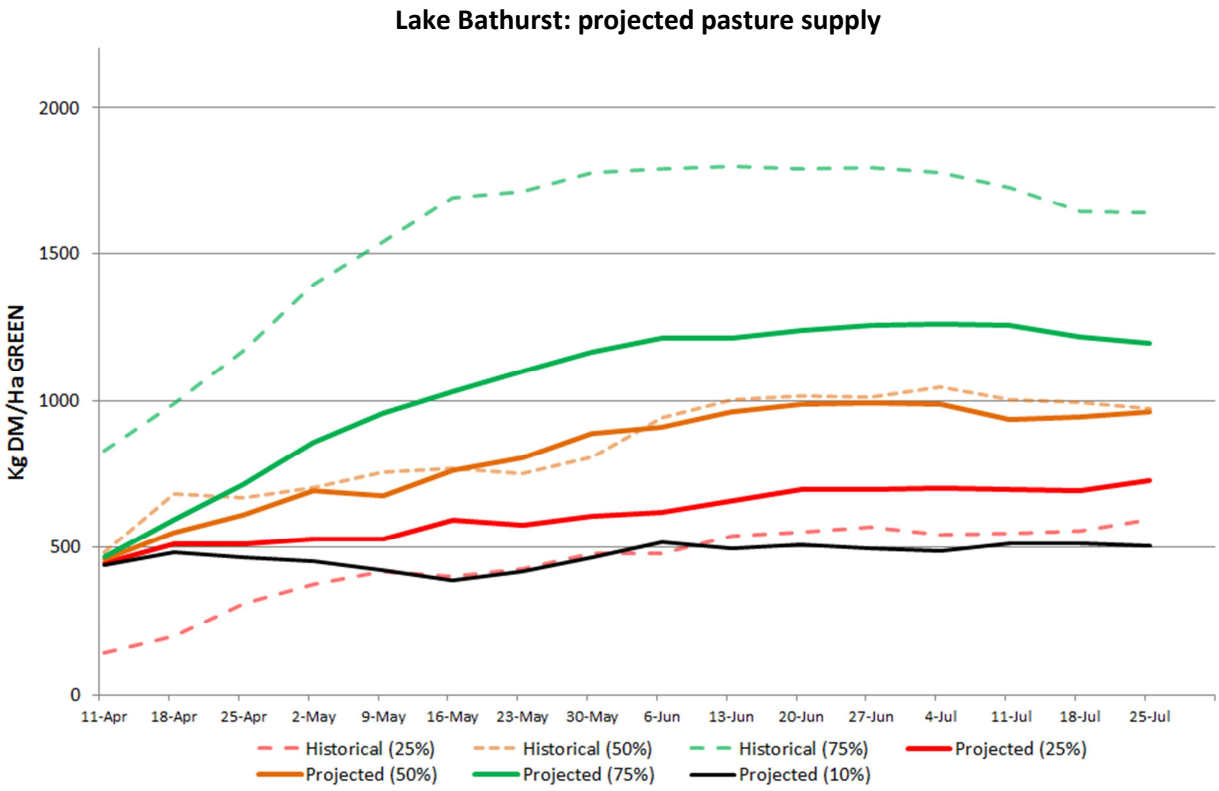
Even though this site received good March rainfall, soil moisture levels were still quite low at the start of the projection period. The low soil moisture is reflected in the graph above with the solid lines quickly spreading apart. This spread is also partly due to the easterly location of this site and therefore autumn/winter rainfall from the west is not as reliable.

Late April/early May rainfall will be critical at this site to keep pastures going. A dry finish to autumn will result in a tight winter. Keeping livestock off key paddocks until pastures reach 700 - 800kg DM/ha will help increase pasture growth rates in winter. This will be an important strategy for lambing or calving paddocks - especially if lambing or calving before the end of July. Strategic use of nitrogen with gibberellic acid with any rain event would also be very beneficial once pastures reach > 900kg DM/ha.

March rainfall	**Soil moisture** (as of 17 April 2019)
 **103mm**	10cm: 19% 20cm: 33% 40cm: 42% 60cm: 24%

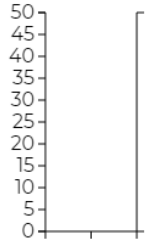
Lake Bathurst

Merino x Terminal flock, 12.1 DSE, perennial grass, sub clover and annual grasses



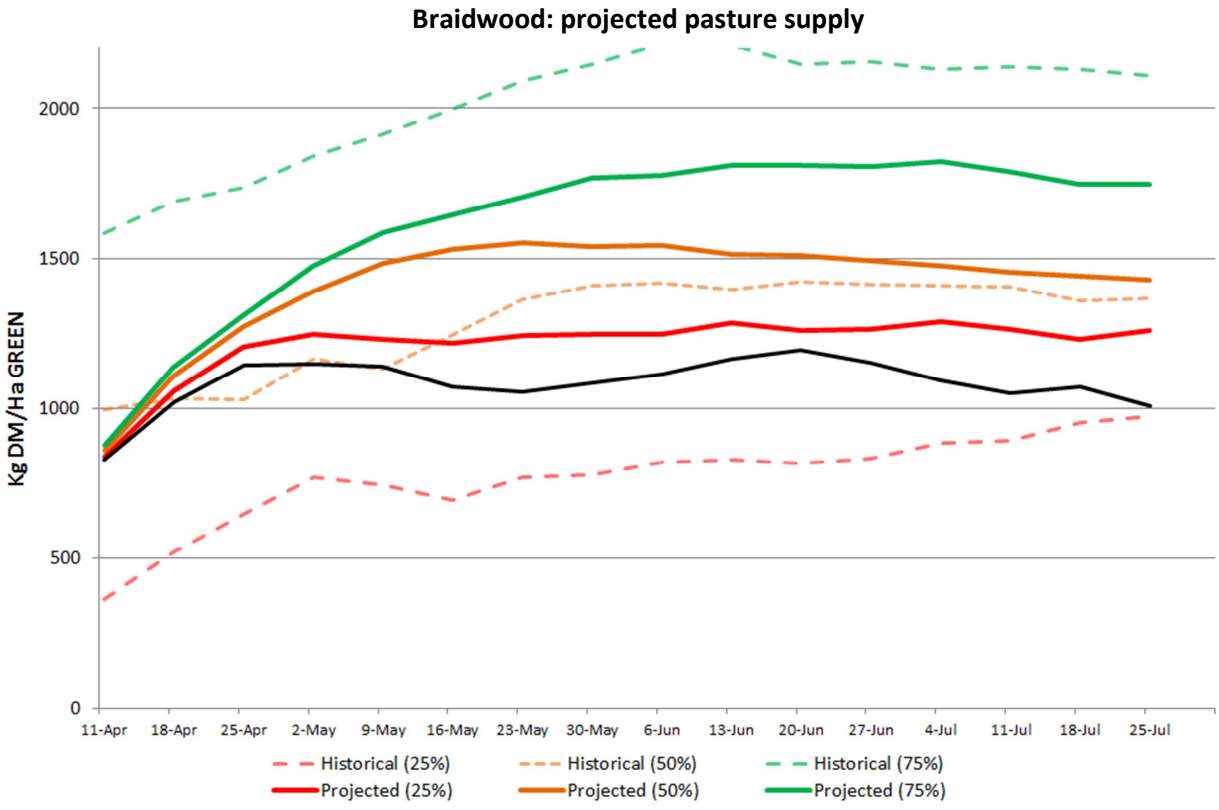
Herbage mass at the start of the projection period is sitting around the long-term average as a result of the March rainfall; however soil moisture levels were still quite low at the start of the projection period. The low soil moisture is reflected in the graph above with the solid lines quickly spreading apart.

Late April/early May rainfall will be critical at this site to keep pastures going. There is a 10% chance (black line) that winter pasture could be at tough levels in winter, but there is a 50% chance that an average winter will be experienced. The outcome will be set by the end of May.

March rainfall	Soil moisture (as of 17 April 2019)
 65mm	10cm: 29% 20cm: 56% 40cm: 43% 60cm: 5%

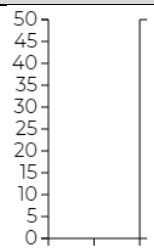
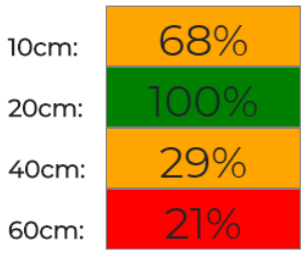
Braidwood

Self-replacing beef enterprise, 10.4 DSE, phalaris, cocksfoot and sub clover pasture



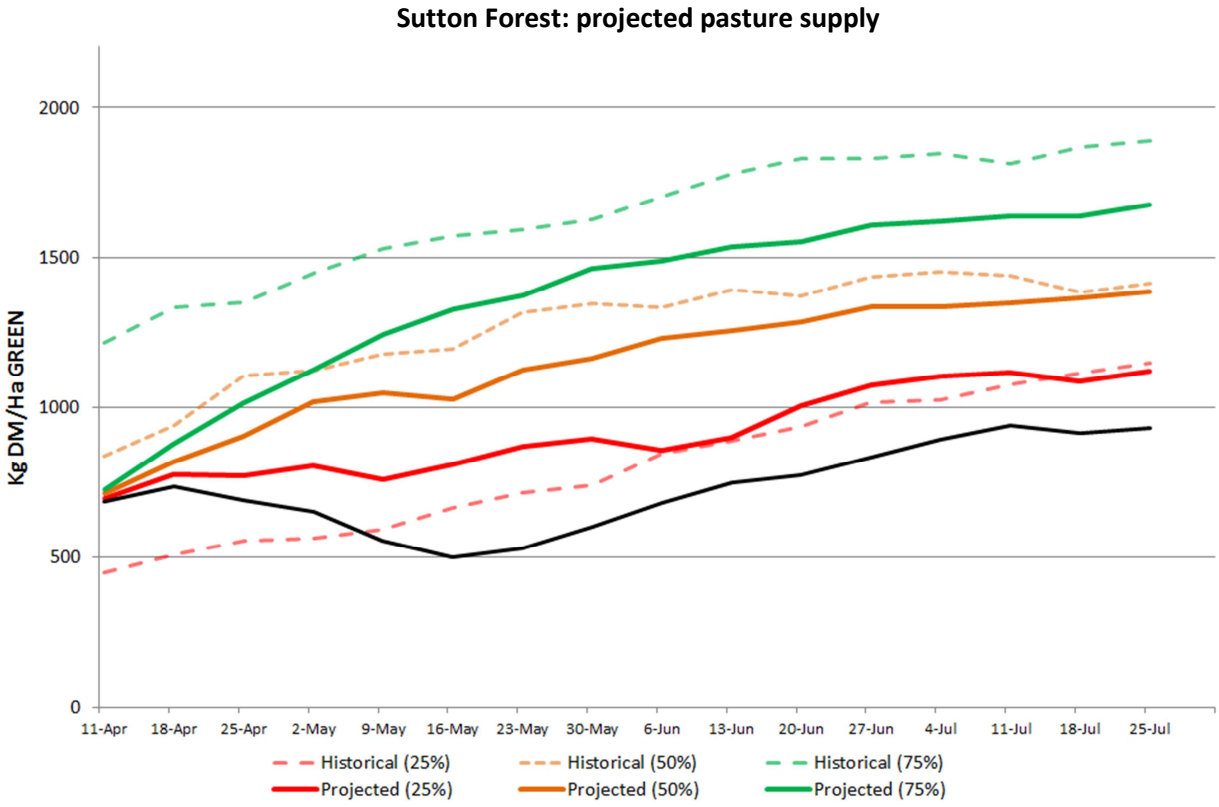
Soil moisture and pasture conditions in early April were quite good at this site as a result of good rainfall in both February (91mm) and March (75mm).

Given the strong starting position and existing soil moisture, it is likely that pasture conditions this winter will sit somewhere around the long-term average for this location. Even if conditions turn out to be particularly dry and solid black line is followed (10th percentile), pasture mass (kg DM/ha) is still well above the 25% historical line and in a manageable position.

March rainfall	Soil moisture (as of 17 April 2019)
 75mm	

Sutton Forest

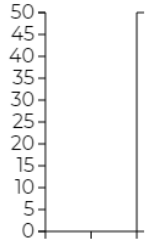
Self-replacing beef enterprise, 10DSE, cocksfoot, perennial ryegrass and white clover pasture



Even though March rainfall was good at this site, extremely dry conditions in February means that starting pasture mass is sitting slightly below the long term average.

Despite reasonable soil moisture levels, the solid lines start to separate quite early in the projection period. This spread is largely due to due to the easterly location of this site and the autumn/winter rainfall from the west is not as reliable.

May rainfall will be important at this site to keep pastures going. Depending on the number of stock being run, a dry finish to autumn will result in a relatively tight winter. Where stocking rates are up, keeping livestock off key paddocks during autumn and building leaf area will help increase pasture growth rates in winter.

March rainfall	Soil moisture (as of 17 April 2019)
 88mm	10cm: 66% 20cm: 49% 40cm: 46% 60cm: 34%

Appendix 1: Pasture benchmarks for sheep and cattle

Minimum herbage mass (kg green DM/ha) to maintain satisfactory production levels in sheep

	Pasture digestibility (green)		
Sheep Class	75%	68%	60%
Dry sheep	400	600	1200
Pregnant ewes			
mid	500	700	1700
last month	700	1200	ns
Lactating ewes			
single	1000	1700	ns
twins	1500	ns	ns
Growing stock, % of potential growth			
30 [116 g/d]*	400	700	1700
50 [194 g/d]	600	1000	ns
70 [270 g/d]	800	1700	ns
90 [348 g/d]	1600	ns	ns

*Predicted growth rates in brackets are based on a weaned 4-month old crossbred lamb of approximately 32 kg from a ewe with a standard reference weight of 80 kg.

Minimum herbage mass (kg green DM/ha) to maintain satisfactory production levels in cattle

	Pasture digestibility (green)		
Cattle Class	75%	68%	60%
Dry cow	700	1100	2600
Pregnant cow (7–8 months/ not lactating)	900	1700	ns
Lactating cow + 2 mth old calf	1100	2200	ns
Growing stock, % of potential growth			
30 [0.45 kg/d]*	600	1100	2900
50 [0.76 kg/d]	800	1600	ns
70 [1.07 kg/d]	1200	2600	ns
90 [1.37 kg/d]	2200	ns	ns

*Predicted growth rates in brackets are based on a weaned 13-month old steer of approximately 320 kg from a cow with a standard reference weight of 550 kg.

ns = not suitable, that is, at these digestibilities no matter how much pasture is available dry or pregnant stock are unlikely to maintain weight, lactating stock are likely to experience an unacceptable level of weight loss and growing stock will not achieve the targeted weight gain.

Note: The benchmarks relate specifically to the nutritional requirements of livestock. At lower herbage masses, particularly those indicated for sheep, there is a risk of excessive run-off and soil erosion through lack of ground cover.

Note: The predictions in Tables 2.1 and 2.2 are based on a pasture which also includes 500 kg DM/ha of dead pasture with a digestibility of 47% and a legume content of 15%.

Source: *PROGRAZE™: profitable, sustainable grazing*, Ninth edition, NSW Department of Primary Industries 2017.

Appendix 2: 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 ±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.

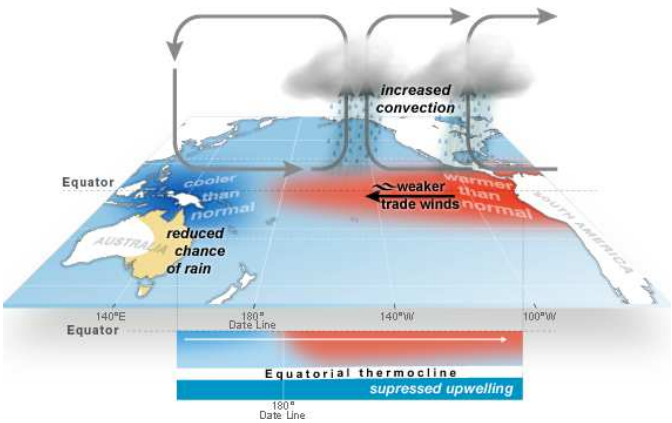
La Nina (wet phase)

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.

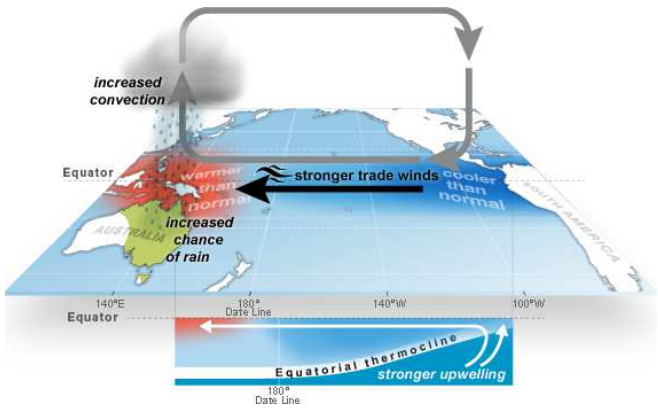
El Nino (dry phase)

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 Nino or La Nina 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 Nino episodes. Sustained positive values greater than +7 are typical of a La Nina 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

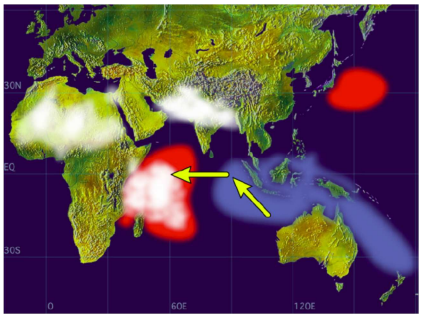
Positive IOD (dry phase)

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.

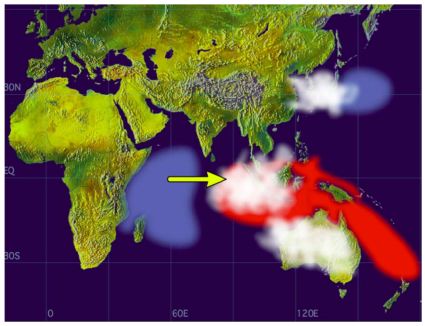
Negative IOD (wet phase)

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)



Negative IOD mode (wet phase)



Source: NSW DPI (2011)

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.

Often our wettest winter/spring periods occur when a La Nina and negative IOD interact. Often our driest winter/spring periods occur when El Nino and positive IOD interact. It is important to note though there are exceptions to this e.g. 2006 was a neutral ENSO and neutral IOD year and in many locations was recorded as one of the driest years on record.

Appendix 3: Managing ground cover to reduce erosion and protect pastures

Drought puts significant pressure on the whole farming system, including pastures and soil. Managing pastures to maintain adequate levels of ground cover is the most cost-effective way to reduce soil erosion and nutrient loss. Your soil is your most valuable asset. Eroded soil cannot be readily replaced and will have a major impact on the future productivity of your property. Bare soil also presents a big opportunity for weeds to invade pastures.

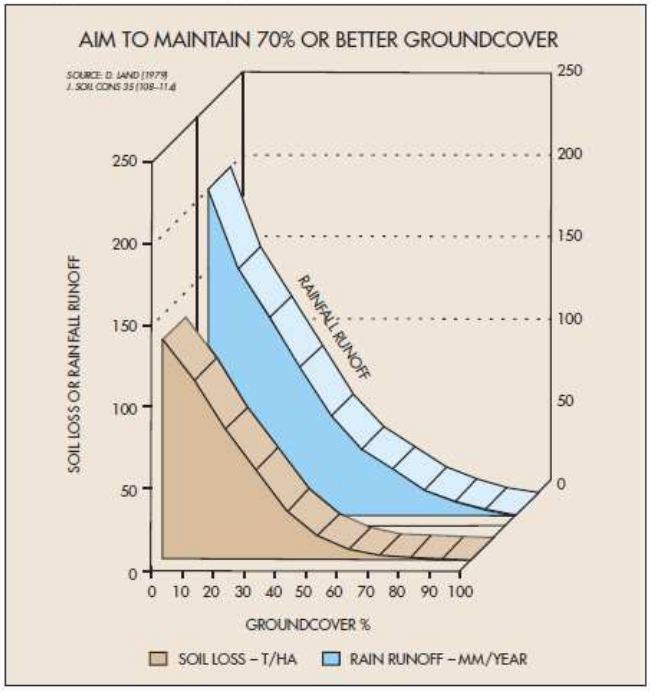
Research done at Scone (625mm rainfall) shows that at least 70% ground cover is required to prevent excessive run-off and erosion. As shown in Figure 1, once groundcover falls below the 70% mark the risk of soil loss via erosion increases exponentially.

While the 70% is the general rule of thumb, the minimum amount of ground cover required to prevent excessive erosion will largely depend on soil characteristics, slope gradient and length of slope (Table 1).

The following page contains some examples of varying levels of ground cover.

For further information refer to the NSW DPI Agfact: *Maintaining groundcover to reduce erosion and sustain production* (available here).

Figure 1: Effect of groundcover on the amount of soil loss and water run-off from pastures.



Source: Lang 2005

Table 2: Estimates of minimum amounts of groundcover (%) required to reduce excessive run-off and erosion in Tableland regions

Armidale, Orange		Paddock slope			
Erodibility	Typical soil types	Flat	Gentle	Moderate	Steep
Low	• deep sands	60	65	80	90
Low—moderate	• sandy loams, light clays • uniform clays, kraznozems and euchrozems (ferrosols)	60	70	85	95
Moderate—high	• loams • self-mulching black earths (vertosols)	60	75	85	100
High	• silts, fine sandy loams • red-brown earths (chromosols), red and yellow earths (kandosols) • solodics (sodosols)	60	80	90	100
Low—high	• drainage lines (all soil types)	100	100	100	100

Source: Lang 2005

A guide to estimating of ground cover

Ground cover levels will vary across a paddock, so it's important to assess a representative part of the paddock. A visual assessment of ground cover involves standing with your feet around half a metre and looking down on the pasture. Visualise a 0.5 x 0.5m square in front of your feed and assess the proportion of area covered by plant material and litter. 100% ground cover means you can't see any bare ground. 50% ground cover means that around half of the area is bare ground.

Photo 1: 90% ground cover

Photo 1 is a very short native pasture that still has a good amount of ground cover – approximately 90%.

When referring to Table 2, this would be a safe level of ground cover for all soil types and slopes, except for really steep country (slope gradient > 20%).

Photo 2: 50% ground cover

In photo 2 we are starting to see some bigger gaps. Ground cover is estimated to be around 50%.

Going from the previous table, even on flat country this level of ground cover is below the minimum 60% level required to prevent excessive erosion.

NSW GOVERNMENT Local Land Services
Australian Government National Landcare Program
TFS Tablelands Farming Systems Next Generation Agriculture

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

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

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/

NSW DPI Agfact: "Maintaining groundcover to reduce erosion and sustain production":
https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0018/162306/groundcover-for-pastures.pdf