NSW Department of Primary Industries

NSW Seasonal Conditions Report - June 2014

Highlights

- Rainfall over May was below median across much of NSW, particularly over the north west and coast.
- Drier and warmer than normal conditions are likely between June to August.
- ENSO is still neutral, but there is about a 70% chance of an El Niño event occurring during winter-spring.
- Pasture growth was good in the south and west, but slowed over the tablelands and coast. Over the quarter it was average or better over 93% of NSW. Biomass levels are low in the north west. Some areas are experiencing a 'green drought'.
- Crop development is generally good, especially in the south, although development of late sown crops is slow.
- Stock water supplies remain variable in some areas.
- Resources to assist in management for areas suffering poor rainfall and growth are available at www.dpi.nsw.gov.au/agriculture/emergency/drought/managing

1. Summary

Rainfall during May was below median across much of NSW, except over areas of the south west and south, and was least across the north west.

Good pasture growth continued, particularly across the south and west, where it benefitted from the rainfall and mild temperatures. It deteriorated in areas of the north and slowed along the tablelands and coast. Some areas experienced a 'green drought'. Winter crop development was variable. Early sown winter forage and grain crops were well developed, but late sown crops developed slowly. Crop condition was generally good in the south and reasonable to good in central areas. It was reasonable in the north east but poor in the north west.

Drier than normal conditions are likely between June and August across most of the State, with warmer than normal daytime and overnight temperatures. Over June, drier than normal conditions are likely across northern NSW, with an equal chance of drier or wetter than normal conditions across the remainder of NSW.

ENSO is still neutral, but there is about a 70% chance of El Niño event developing in winter or spring. A moderate event is considered likely. The Bureau of Meteorology's El Niño alert is still active. Equatorial Pacific sea surface and sub-surface temperatures are warm, consistent with the development of an event. While some indicators are still not showing El Niño trends, others are consistent or are expected to develop.

Most of NSW had below median rainfall during May. In relative terms, it was low across much of the north and east, but ranged between deciles 4-7 over much of central, southern and western NSW. Rainfall over most areas ranged from 10-50 mm, but was lower in the north. Daytime temperatures were above average, particularly over the west, but near normal over the north east. Overnight temperatures were above average over the west and near normal over the eastern and central areas.

In relative terms, quarterly rainfall was average over 38% of NSW and above average over 60%. Half yearly relative rainfall was average or above over 74% of NSW, but low across the north west, north east and the north and central coast.

Modelled topsoil moisture, which had improved during March and April, declined across northern and much of central NSW. Levels remained moderate over much of the south, the southern tablelands and areas of the coast. Subsoil moisture was relatively unchanged during May.

Stock water supplies remained variable. Streamflow analysis for the last year showed well below average run off over areas of the tablelands, north coast, north west and Riverina.

Relative pasture growth was poor over the north west, but was average or better across 75% of NSW. Quarterly relative growth was average or above over 93% of NSW and relative growth was similarly high over the last 6 months with only the north west and south east being low. Biomass levels were generally similar to April, but were low over the north west tablelands, areas of the far west and coast. Relative biomass levels were above average over half of NSW and lowest over the north west and some coastal areas.

The seasonal outlooks presented in this report are obtained from the Australian Bureau of Meteorology & other sources. These outlooks are general statements about the likelihood (chance) of (for example) exceeding the median rainfall or minimum or maximum temperatures. Such probability outlooks should not be used as categorical or definitive forecasts, but should be regarded as tools to assist in risk management & decision making. Changes in seasonal outlooks may have occurred since this report was released. Outlook information was up to date as at 11 June 2014.

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2. Seasonal outlook

Seasonal outlook and ENSO information are sourced from the Australian Bureau of Meteorology (BoM) and international sources. The BoM's official outlooks are based on modelled output from the Predictive Ocean Atmosphere Model for Australia (POAMA), which is a dynamical (physics-based) climate model developed by the BoM and CSIRO Marine and Atmospheric Research. Further information on POAMA outlooks can be obtained here and at http://poama.bom.gov.au/.

Outlooks should be treated with caution when skill is low and strong climate drivers are lacking. In these situations, secondary influences (such as sea surface temperatures around the continent) may have a higher impact.

Changes in seasonal outlooks may have occurred since this report was released, and can be determined by clicking on the links provided.

Seasonal outlook and ENSO information were collated in late May and early June and were up to date as at 11 June 2014.

2.1 Seasonal outlook summary

Table 1: Seasonal outlook summary

	Current Outlook	Previous Outlook
Rainfall (quarter)	Drier	Neutral (Wetter – south eastern & areas of eastern NSW)
Max Temperature (quarter)	Warmer	Neutral (Possibly cooler – central NSW)
Min Temperature (quarter)	Warmer	Neutral (west & central NSW) Warmer (eastern & southern NSW)

Outlook Legend: Grey = Neutral, i.e. equal chance of drier/wetter or warmer/cooler.
Red = Drier or warmer.
Blue = Wetter or cooler.

Source: Derived from information provided by the Australian Bureau of Meteorology.

2.2 Seasonal rainfall outlook (BoM)

- For the three month period from June to August, drier than normal conditions are likely across most of the State, with the chances of exceeding median rainfall at between 25-35%. That is, the chances of receiving below median rainfall are 65-75%.
- In the far north the chances are marginally better, with a 35-40% probability of exceeding median rainfall.
- In the far south east corner of the State (south of Bega), the chances of drier or wetter than normal conditions are near equal (Figure 7).
- This means that for every ten years with similar climate patterns to those at present, across most of NSW about three to four June to August periods would be expected to be wetter than normal and six to seven drier than normal.
- The outlook accuracy (confidence or skill) is moderate across most of NSW, ranging from 55-65%. However, accuracy is low (less than 55%) across southern and south-western NSW, and also in areas of the north west (between Walgett, Lightning Ridge, Goodooga, Carinda and Brewarrina) (Figure 10).

2.3 Seasonal temperature outlook

- Over the three month period from June to August, warmer than normal daytime temperatures are likely across NSW (Figure 8).
- The chance of exceeding median maximum temperatures ranges from 70% to more than 80% across NSW, with the highest probabilities across the coast and Hunter valley.
- This means that for every ten years with similar climate patterns to those at present, across most of NSW about seven to eight June to August periods would be expected to have warmer than normal daytime temperatures, and two to three cooler than normal daytime temperatures.
- The outlook accuracy (confidence or skill) is moderate to high (55-75% or more) across NSW, except for a small area in the central west (Figure 10).
- Warmer than normal overnight temperatures are likely across eastern and southern NSW between June and August.
- The probability for warmer than normal overnight temperatures is highest across eastern and areas of southern NSW, being greater than 80%. Over most of the State, probabilities of exceeding the median minimum temperature range between 60-80%. There is a slightly lower probability (55-65%) across areas of the central west, Riverina and western NSW (between Hay, Ivanhoe, Nymagee, Griffith and Parkes) (Figure 9).
- The outlook accuracy (confidence or skill) for the minimum temperature outlook is low

(less than 55%) across most of central, north western and areas of far western NSW, and moderate (55-65%) for the remainder of NSW (Figure 10).

2.4 Monthly rainfall and temperature outlook (BoM, experimental)

The monthly experimental climate outlooks from the POAMA model are provided with thanks to, and by special agreement with, the Bureau of Meteorology. However, they are experimental only, do not currently form part of the BoM's standard services and are not yet fully calibrated. They also may differ from the operational seasonal outlooks as they may be based on a different number of scenarios (ensembles). They should therefore be used with some caution.

Feedback on the experimental outlooks can be provided to climate.helpdesk@bom.gov.au.

Monthly outlook summary

Table 2: Monthly outlook summary

	June	July
Rainfall	Neutral Drier - northern NSW	Drier
Max Temperature	Warmer	Warmer
Min Temperature	Warmer	Warmer

Outlook Legend: Grey = Neutral, i.e. equal chance of drier/wetter or warmer/cooler.
Red = Drier or warmer.
Blue = Wetter or cooler.

Source: Derived from information provided by the Australian Bureau of Meteorology.

June

- Drier than normal conditions are likely across northern NSW on the experimental June outlook, with an equal chance of drier or wetter than normal conditions across the rest of the State (Figure 11). The outlook has a moderate accuracy (skill) over most of the State, but low skill in the far south west.
- Warmer than normal daytime temperatures are likely across NSW during June (Figure 11). This outlook has a moderate accuracy (skill).
- Warmer than normal overnight temperatures are likely across most of NSW during June, particularly across the northern, central and coastal areas (Figure 11). However, this outlook has a low accuracy (skill).

June multi-week (as at 8 June)

- Weekly experimental outlook information suggests that in the third and fourth week of June drier than normal conditions are likely across NSW, with a less than 30% chance of exceeding the median rainfall. There is a near equal chance of drier or wetter conditions for the far north coast and areas of central western NSW. The accuracy (skill) for this outlook is moderate for most of NSW, but low in the north east and south west.
- Daytime temperatures over the third and fourth week of June are likely to be warmer than normal across northern NSW. There is a near equal chance of warmer or cooler than normal daytime temperatures for southern NSW. This outlook has moderate accuracy (skill).
- Overnight temperatures over the third and fourth week of June are likely to be cooler than normal across most of NSW, except for areas of the central and south coast. The accuracy (skill) level for this outlook is low.

July

- The experimental outlook for July indicates a drier than normal conditions are likely across NSW, particularly in the north east and Hunter valley, and in the far south west. There is a 20-40% probability of exceeding the median rainfall across the State (Figure 12). The accuracy (skill) for this outlook is low, except for far north eastern NSW where it is moderate.
- Warmer than normal daytime temperatures are likely over July, particularly along the central to north coast (Figure 12). The skill for this outlook is moderate.
- Warmer than normal overnight temperatures are likely across most of NSW in July, particularly in the north and along the coast. Across some areas of the central west adjacent to and over the tablelands, there is an equal chance for cooler or warmer than normal conditions (Figure 12). However, the accuracy (skill) for this outlook is low.

2.5 Other climatic models

Bureau of Meteorology statistical model (superseded)

The Bureau of Meteorology statistical outlook is based on past trends in sea surface temperatures and their relationship to rainfall and temperatures across Australia. These historical relationships and current observations are used to produce the outlook. The statistical model outlooks have been superseded by the outlooks from the POAMA model, and the information is provided for comparative purposes only.

In comparison, the output of the POAMA model takes account of more data and has better skill.

Skill assessments for the statistical model are available via this link.

- The Bureau of Meteorology's statistical model indicates wetter than normal conditions are likely across northern and eastern NSW over next three months (a 55-65% probability), with an increasing probability towards the north eastern corner of the State (60-65%). A nearly equal probability for wetter or drier conditions exists over the south west of NSW (45-55%), with lower rainfall likely in the far south and south west (40-45%).
- The statistical model indicates that there is a nearly equal probability of warmer or cooler than normal daytime temperatures across the northern and eastern NSW, with a slightly elevated chance of warmer than normal daytime temperatures in the south and west (a 55-60% probability of exceeding the median maximum temperature).
- The statistical model indicates a near-equal probability of warmer or cooler than normal overnight temperatures across the State (a 50-60% probability), with a slightly increased probability of warmer temperatures over the north and north east (55-60%).

UK Meteorology Office

The output from this model is provided for the use of international meteorological centres, and not as general seasonal outlooks. It should therefore be used with caution.

- The UK Meteorology Office's global long range probability modelled output indicates a roughly equal probability (40-60%) for wetter or drier conditions across most of NSW between June and August. Some areas in the far north east and south west have a reduced probability of exceeding average rainfall (20-40%). The skill assessment for this outlook is low to moderate over most of central and eastern NSW, but low for the west and the northern tablelands. The model indicates that above average temperatures are likely for the period across most of NSW, particularly in eastern, central and north western NSW. The skill assessment for this outlook is low across most of western and central NSW, and moderate over most of the east.
- For July to September, the UK Meteorology Office's global long range probability modelled output indicates drier conditions are likely across the far north eastern corner of NSW and in the south and south west. For the remainder of the State, there is an equal probability for wetter or drier conditions. The skill assessment for this outlook is low to moderate for the north east and coastal areas, and moderate to high for the remainder of NSW. For temperature, the outlook indicates that warmer than normal conditions are likely with a 60-80% probability of exceeding the average temperature over western and central NSW and a more than 80% probability across the south, east, north east and areas of the north west. The temperature outlook has a low-moderate skill for the coastal areas, far north east and far north west, and a moderate-high skill over most of the remainder of NSW.

APEC Climate Centre

- The APEC Climate Centre's deterministic multi-model ensemble outlook of rainfall anomalies for June to August indicates that near normal rainfall is likely across most of the State. The temperature anomaly outlook indicates the likelihood of increased temperatures across the State during June to August, across the east and parts of central NSW. No skill assessment is available for these outlooks.
- During June, the APEC Climate Centre's rainfall anomaly outlook indicates a likelihood of near normal rainfall across the State. The temperature anomaly outlook indicates higher than normal temperatures are likely during June across eastern and parts of central NSW. No skill assessment is available for these outlooks.

2.6 El Niño-Southern Oscillation (ENSO)

ENSO summary

- ENSO is currently neutral, but there is about a 70% chance that El Niño conditions will develop by late winter or spring.
- The continued neutral ENSO rating is in part due to the lack of a clear atmospheric response to the sea surface temperature anomalies, and the lack of a west-east differential in equatorial Pacific sea surface temperatures.
- The weekly sea surface temperature anomaly in the key NINO3.4 region is currently +0.56°C, with +0.5°C considered a borderline El Niño level by many international meteorological organisations.
- Most climate models are indicating a weak to moderate El Niño event, and forecasters consider a moderate event is likely. However, there is reasonable variability in the forecast scenarios (ensembles). The

latest long range outlook from the Bureau of Meteorology indicates a potential weakening of sea surface temperatures in the key NINO3.4 region.

- The severity of an El Niño event does not necessarily directly relate to the severity of the impact on rainfall.
- A continuation of warm sea surface temperatures around Australia, Indonesia and the eastern Indian Ocean may assist in mitigating the effects of El Niño conditions.

ENSO outlook and comments

Table 3: ENSO/Climatic Outlook

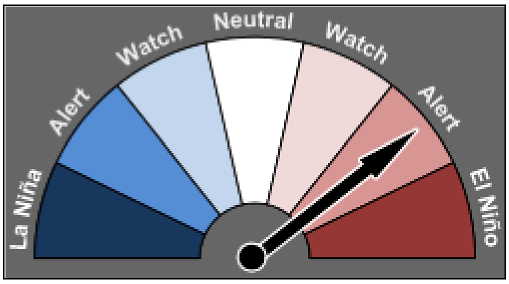
	Current Outlook (early June)	**Previous Outlook** (early May)
ENSO (overall)	Neutral – El Niño likely	Neutral – El Niño likely
BoM ENSO Tracker Status	El Niño Alert	El Niño Alert
SOI	Neutral (positive trend)	Neutral
Pacific Ocean SST (NINO3.4)	Neutral- slightly warm (warming trend)	Neutral (warming trend)
Indian Ocean (IOD)	Neutral	Neutral
Southern Annular Mode (SAM/AAO)	Weakly-moderately positive	Neutral/ weakly-moderately negative

Summary Legend: Grey = Neutral, i.e. neither El Niño nor La Niña.
Red = El Niño range or trend.
Blue = La Niña range or trend.

Source: Derived from information provided by the Australian Bureau of Meteorology and the US National Oceanic and Atmospheric Administration.

- Sea surface temperatures have warmed since March across the Pacific Ocean along the equator, particularly near the International Date Line and in the eastern Pacific.
- In the key NINO3.4 region, the weekly sea surface temperature anomaly is above average (+0.56°C) and is considered by CPC/IRI as being borderline for an El Niño event (the Bureau of Meteorology uses an anomaly level of +0.8°C).
- Tropical rainfall has been slightly enhanced over Indonesia and the western tropical Pacific, as indicated by weak negative outgoing long-wave radiation (OLR) anomalies. For an El Niño event to occur, rainfall tends to be reduced in this area.
- Some other indicators (such as the thermocline slope index and equatorial Pacific upper ocean heat anomalies) are consistent with the development of an El Niño event.
- Sea sub-surface temperatures have warmed to levels that can occur prior to the development of an El Niño event. Positive sub-surface temperature anomalies are widespread across most of the equatorial Pacific.
- However, a decrease in the intensity of the sea sub-surface anomalies indicates a slightly reduced risk of a strong El Niño event developing. At present, the Climate Prediction Centre (CPC) considers that a moderate event is slightly more likely. Most climatic models are indicating the likelihood of a weak-moderate El Niño event. Sea surface temperatures tend to lag the sub-surface temperatures, generally by a few months and with lesser intensity.
- A strong west to east gradient in temperatures is not yet occurring. This indicates that El Niño-like oceanic and atmospheric coupling has not yet occurred and helps explain why the SOI and trade winds are not showing consistent El Niño trends.
- The Bureau of Meteorology's new ENSO tracker (Figure 1) remains at El Niño 'Alert' level. In the past, about 70% of the time that this level has been reached, an El Niño event has occurred.

Figure 1: Bureau of Meteorology ENSO tracker status

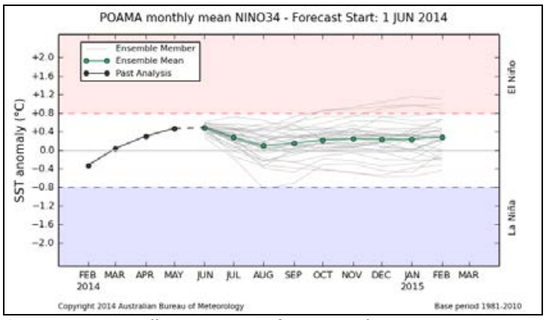


Source: Australian Bureau of Meteorology

- The Bureau of Meteorology's POAMA model's latest long range outlook indicates that the sea surface temperature anomalies in the NINO3.4 Pacific Ocean region may peak this month and then could decline to neutral levels (Figure 2). However, the range of the ensembles (grey lines) varies reasonably widely.
- Five of the eight climate models surveyed by the Bureau indicate El Niño levels in the NINO 3.4 region will be met or exceeded by August, and seven of the eight indicate that the levels will be met or exceeded by

October. However, this information has not been updated since the 20th May, and the range in possible forecast values (ensemble values) for each model is wide.

Figure 2: Current Bureau of Meteorology POAMA NINO3.4 Forecast



Source: Australian Bureau of Meteorology

- The CPC/IRI ENSO Alert System Status remains on 'El Niño watch'. This indicates conditions are favourable for the development of an El Niño event within the next six months.
- The CPC/IRI consensus ENSO forecast of the NINO3.4 index (as at 5 June) indicates an increasing likelihood of an El Niño event developing during the remainder of the year. CPC/IRI rate the chances of an El Niño event occurring as 69% during winter, reaching 80% in the spring and summer (Table 4).

Table 4: Current consensus ENSO forecast probabilities (as at 5 June)

Season	La Niña	Neutral	El Niño
May-Jul	0%	39%	61%
Jun-Aug	1%	30%	69%
Jul-Sep	1%	26%	73%
Aug-Oct	1%	22%	77%
Sep-Nov	1%	19%	80%
Oct-Dec	1%	17%	82%
Nov-Jan	1%	17%	82%
Dec-Feb	2%	18%	80%
Jan-Mar	2%	22%	76%

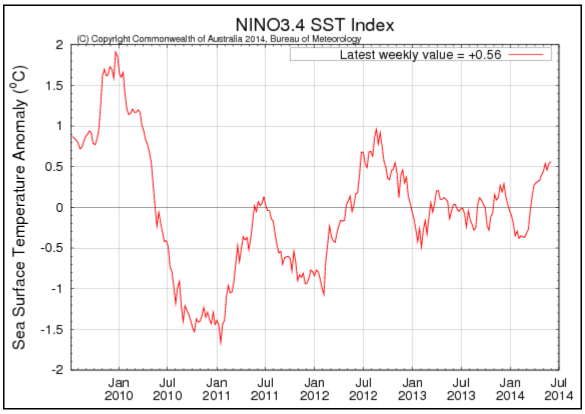
Source: Climate Prediction Centre/International Research Institute for Climate and Society.

- If an El Niño event does occur, it is still too early to reliably determine its strength. Most forecasters consider that a moderate event is likely. If an event does occur, it is likely to continue throughout the remainder of 2014.
- It should be noted, however, that ENSO forecasts during autumn and early winter have low predictive skill due to the variable nature of ocean-atmosphere system between March and June. El Niño conditions do not always develop, even when the various indicators suggest they are possible.
- Note that the CPC/IRI classifies values of the NINO3.4 index between -0.5°C and +0.5°C as indicating neutral conditions, rather than the -0.8°C to +0.8°C range used by the Bureau of Meteorology. This will result in differences in when various meteorological organisations report that El Niño or La Niña conditions are developing.
- ENSO neutral conditions also do not guarantee normal seasonal conditions, as more localised weather extremes can and do occur due to the influence of secondary or local factors, such as warmer than normal sea surface temperatures occurring around parts of the Australian coastline.

Sea temperatures

- Monthly sea surface temperatures from the Bureau of Meteorology and the US National Oceanic and Atmospheric Administration (NOAA) indicate that the majority of the equatorial Pacific is now warmer than normal.
- The most recent monthly temperature index value in the NINO3.4 region is 0.5°C for May, an increase of 0.3°C since April.
- Most warming has occurred in the eastern tropical Pacific near the coast of South America and near the International Date Line.
- Weekly sea surface temperatures have increased, with above-average anomalies across the entire equatorial Pacific. The latest weekly sea surface temperature index over the NINO3.4 region is +0.56°C (Figure 3), an increase of +0.12°C since early May and a steady increase from early February's index value of -0.38°C.
- Warm anomalies are present around most of the Australian coastline, and extend into the Indian Ocean and East China Sea. These conditions are not typical of an El Niño event, and may help to minimise its effects on rainfall.
- A west to east gradient in sea surface temperatures is not yet occurring, which means that El Niño-type atmospheric coupling is not yet occurring.

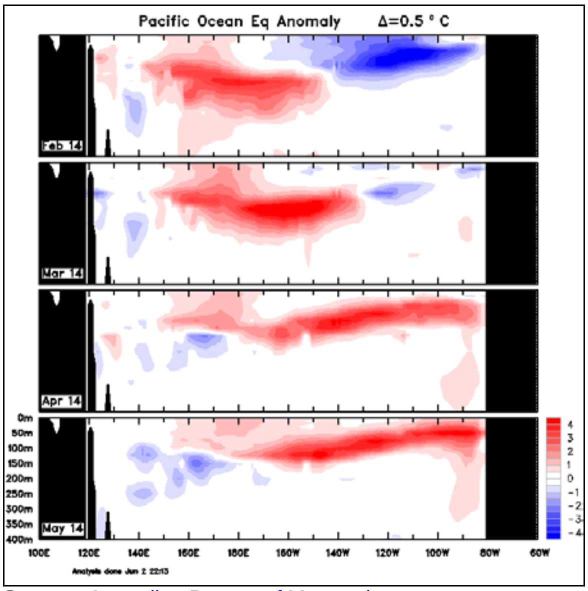
Figure 3: NINO3.4 Sea Surface Temperature Index



Source: Australian Bureau of Meteorology

- The sub surface sea temperatures in the equatorial Pacific show the development of the strong warm anomaly in the western Pacific and its movement eastwards (Figure 4).
- Sub surface temperatures in the central and eastern equatorial Pacific are currently more than 4°C warmer than normal.
- These anomalies have weakened somewhat, but still remain strong. This weakening represents the upwelling phase of the Kelvin wave. Downwelling and warming occurs in the leading edge of a Kelvin wave, and upwelling and cooling in the trailing edge.

Figure 4: Monthly sea sub-surface temperatures



Source: Australian Bureau of Meteorology

Southern oscillation index (SOI)

- The monthly value of the Southern Oscillation Index is currently in the neutral range.
- After falling to near zero in early-mid May, the SOI rose to a value of +10.1 in early June. It has since declined to a value of +7.2 (Figure 5, Table 5).

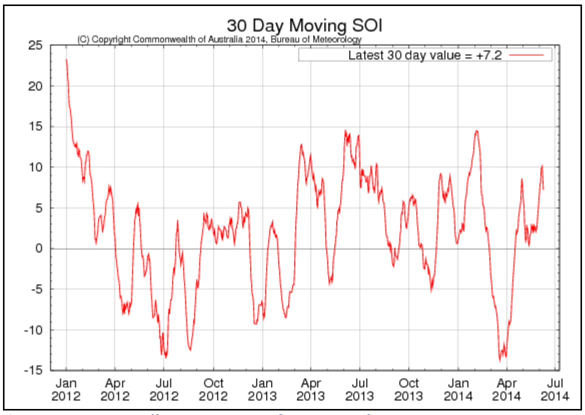
Table 5: Values of the Southern Oscillation Index

	Current monthly value (9 June)	Previous monthly value (7 May)
SOI (30 day)	+7.2	+0.9

Source: Australian Bureau of Meteorology.

- The late March SOI level was the lowest 30-day value since March 2010, during the last El Niño event.

Figure 5: 30 day moving SOI



Source: Australian Bureau of Meteorology

- The Southern Oscillation Index is one factor indicating the development and intensity of El Niño and La Niña events in the Pacific Ocean. It is calculated from variations in surface atmospheric pressure between Darwin and Tahiti. Values of the SOI between -8 and +8 indicate neutral conditions, sustained values above +8 may indicate a La Niña event, and sustained values below -8 may indicate an El Niño event.

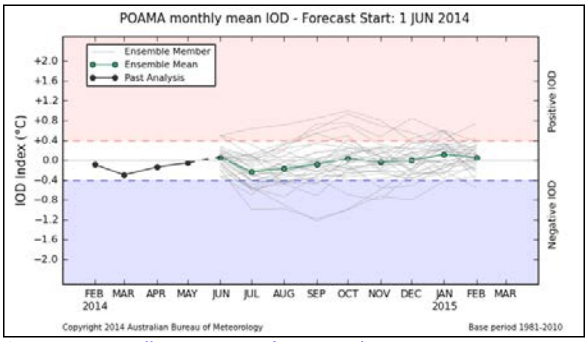
Sub-tropical ridge (STR)

- The sub-tropical ridge moved slightly north during the month, as indicated on NOAA and Bureau of Meteorology mean sea level pressure charts, and roughly reached its normal winter position during the month.
- The sub-tropical ridge is a zone of high pressure which between November and April is normally located south of Australia at about 40°S, and tends to suppress cold front activity. During winter, it generally moves northwards to around 30°S, allowing cold fronts to extend further into southern Australia.

Indian Ocean dipole (IOD)

- The Indian Ocean dipole remains neutral. The latest IOD index value for the week ending 8 June is -0.07°C, decreasing from the previous weekly value of +0.08°C (to 1 June).
- The Bureau of Meteorology's POAMA model and most climate models surveyed by the Bureau of Meteorology favour a neutral IOD over the coming months, with a slight trend for a positive IOD developing later in spring (Figure 6). Variability in the ensemble members (grey lines) of the outlook is quite high.
- There are indications that the warm sea surface temperatures in the eastern tropical Indian Ocean and near Indonesia are likely to return to near normal or slightly below normal during the August-October or September-November periods.
- Two of the international climate models surveyed by the Bureau of Meteorology indicate the possibility of a positive IOD event in October.
- The chances for a positive IOD event will increase if an El Niño event occurs. The IOD is consistent with El Niño or La Niña conditions in the Pacific about 70% of the time. A positive IOD in conjunction with an El Niño event can cause further reductions in rainfall.

Figure 6: Current Bureau of Meteorology POAMA Indian Ocean Dipole Forecast



Source: Australian Bureau of Meteorology.

- The IOD has little effect on Australian climate until late autumn or winter. An IOD event usually starts between May and June, peaks in August to October and rapidly decays afterwards.
- A negative IOD period (a sustained IOD index value of -0.4°C or less) is caused by warmer than normal water in the tropical eastern Indian Ocean and cooler than normal water in the tropical western Indian Ocean. A negative IOD period increases the chances of above normal rainfall during winter and spring across southern and much of western and central NSW, as shown in this link. A negative IOD can also contribute to below-average mean sea level pressure over Darwin, which may cause an increase in the SOI.
- A positive IOD period (a sustained IOD index value of +0.4°C or more) is the result of cooler than normal water in the tropical eastern Indian Ocean and warmer than normal water in the tropical western Indian Ocean. Positive IOD periods have been associated with a decrease in rainfall during winter and spring across southern, western and central NSW.

Trade winds and Pacific cloud conditions

- Trade winds are now near normal along the equator near the central to eastern tropical Pacific.
- Over the last 30 days, low-level westerly wind anomalies occurred in the eastern equatorial Pacific. Weak low level easterly wind anomalies occurred in the western equatorial Pacific.
- There were two particularly strong westerly wind bursts during January and February, and a weaker burst in early April. This allowed the movement of warm water from the north/north east of Australia to the east, and assisted in warming the sea surface in the central and eastern Pacific.
- Easterly trade winds strengthen across the tropical Pacific during La Niña events and weaken or reverse during El Niño events. Weakening of the trade winds allows warmer than normal water to move into the central and eastern tropical Pacific Ocean.
- Weakening of the trade winds over the last few months allowed a strong warm anomaly in the sea sub surface of the western tropical Pacific to move eastwards into the central Pacific (an equatorial Kelvin wave - Figure 4).
- Cloud conditions at the equator near the International Date Line are close to average.
- They were generally above average between late February and late April, decreased between late April and early May, and are currently slightly above average.
- Cloudiness in this area decreases during La Niña events and increases during El Niño events.

2.7 Other climatic indicators

Southern annular mode (SAM)

- The experimental Southern Annular Mode or Antarctic Oscillation (AAO) index is currently moderately positive.
- As at 8 June, the SAM index from POAMA was moderately positive at about +1.5, and as at 10 June the AAO index from NOAA was similar.
- The outlook from POAMA indicates the SAM index is likely to rise to about +2, declining to be weakly-moderately positive later in the month. The NOAA outlook is similar, but suggests it may decline to near neutral or weakly negative before rising again.
- SAM outlooks tend to be extremely variable, particularly at lead times of two weeks or more.
- A negative SAM event indicates an expansion of the belt of strong westerly winds towards the equator, resulting in more or stronger low pressure systems across southern Australia and potentially increased rainfall.
- A positive SAM event indicates the contraction of the belt of strong westerly winds towards Antarctica and higher pressures over southern Australia. During autumn and winter, a positive SAM event can potentially mean a decrease in rainfall across southern Australia. However, a strongly positive SAM in spring and summer can mean southern Australia is influenced by the northern half of high pressure systems, leading to a slightly higher likelihood of increased rainfall over south eastern and central NSW.

Atmospheric pressure and NSW cloud conditions

- Atmospheric pressure during May was near normal in the central areas of the State, lower than normal in the west and higher than normal along the coast. High atmospheric pressure can be linked to drier than normal conditions.

  Cloud conditions over NSW during May were not available.

2.8 Possible effects of El Niño events

- El Niño conditions are often associated with below normal rainfall and above normal daytime temperatures across much of NSW in the second half of the year (Figure 13). However, this is not always the case.
- Lower than normal rainfall is more likely if a positive IOD event occurs in conjunction with an El Niño event (Figure 14).

  The severity of an El Niño event does not necessarily directly relate to the severity of the impact on rainfall. In some cases, severe El Niño events have had a limited effect on rainfall, while mild-moderate El Niño events have had a major effect.

3. Rainfall

3.1 Relative rainfall

Relative rainfall information is sourced from the AussieGRASS project of the Queensland Department of Science, Information Technology, Innovation and the Arts and from the Bureau of Meteorology.

Relative rainfall is calculated by comparing and ranking the current rainfall against that for the same period over every year since 1890 (percentile ranks).

This means that if the current period has a rank of between 30 to 70 against all other years, it is regarded as being “average” and the conditions experienced will occur over about 4 out of every 10 years.

Summary

Table 6: Rainfall relative to historical records – percentage area of NSW in each class

Period	Missing data	Below Average (0-30%)	Average (31-70%)	Above Average (71-100%)
Month	0%	32%	67%	1%
Quarter	0%	2%	38%	60%
Half year	0%	26%	56%	18%
Year	0%	34%	59%	7%

Source: Derived from information supplied by the Queensland Department of Science, Information Technology, Innovation and the Arts.

May

- Relative to historical records, rainfall for May was average over 67% of NSW, that is, rainfall of between the 4th and the 7th decile.
- However, most of the State had rainfall that was below median (at or below the 5th decile, or in the lowest 50% of years).
- Above average rainfall was limited to just 1% of NSW (Figure 15, Table 6), in isolated areas of the south and south west.
- Below average rainfall (rainfall in the 3rd decile or below) occurred over 32% of NSW

during May, and extended across most of the north, north west, coastal areas and areas of the northern and central tablelands.

- LLS districts with areas below average rainfall during May included Greater Sydney (94% of the LLS), Hunter (89%), North Coast (76%), North West (52%), Northern Tablelands (49%), South East (46%), Central Tablelands (39%), Central West (38%) and Western (15%). Most of these areas had rainfall of 20 to 60% of normal or less.
- However, rainfall over 1 and 2 June partly compensated for the low May rainfall in some of these areas, particularly the central west, tablelands and south coast.
- The remainder of the State, including most of the south, west and central areas of the State received average rainfall for the month.

March to May (3 months)

- Over the 3 month period from March to May, relative rainfall was average or above over 98% the State (Figure 16, Table 6).
- Below average rainfall was restricted to areas of the North West, North Coast, Hunter and Greater Sydney LLS districts. In these areas, rainfall was 40-80% of normal.
- Above average to well above average rainfall occurred across 60% of the State, primarily across the western and central areas. Limited areas of the far south and west received well above average rainfall for the period, that is, rainfall in the highest 10% of years,

December to May (6 months)

- Over the six months to May, relative rainfall was average across 56% of NSW, and above average across 18% (Figure 17, Table 6).
- Much of the North West, Northern Tablelands, North Coast, Hunter and Greater Sydney LLS districts, and areas of the South East LLS district received below average or worse relative rainfall.
- These areas generally received less than 80% of their normal rainfall over the period, with rainfall of 100-200 mm or more below average across the north west and 200-800 mm below average across the north and mid north coast.
- A large proportion of this area received rainfall in the lowest 10-20% of years.
- Areas in the far south and south west of NSW extending between Broken Hill, Wentworth, Deniliquin and Albury and areas in the central west between Nyngan, Parkes and Orange received above average rainfall.

September to May (9 months, BoM)

- Over the 9 month period from September to May, relative rainfall across the State was below average across the North West, Northern Tablelands North Coast and Greater Sydney LLS districts, and across areas of the Central Tablelands, Hunter and Greater Sydney LLS districts.
- Scattered areas of below average rainfall also occurred across areas of the Western, Riverina and South East LLS districts (Figure 18).
- Most of these areas received between 40-80% of their normal rainfall, with an area between Walgett, Collarenebri and Lightning Ridge receiving 20-40% of normal rainfall.
- Areas of very much below average relative rainfall occurred in the far north west between Coonabarabran, Pilliga, Walgett, Collarenebri and Goodooga. Other areas extended from Moree to the east across most of the Northern Tablelands LLS district, across the north of the Hunter and Central West LLS districts and much of the North Coast LLS district.
- The remainder of the State has generally average relative rainfall over the period, with areas in the far south west along the Murray River receiving above average rainfall.

June to May (12 months)

- Over the twelve months to May, below average relative rainfall extended across most of the North West, Northern Tablelands and North Coast LLS districts, as well as areas of the Western, Central West, Hunter, Greater Sydney and Central Tablelands LLS districts (Figure 19, Table 6), and covering 34% of NSW.
- Areas of Western, North West, Northern Tablelands, North Coast, Central West and Hunter LLS districts received extremely low rainfall over the period, that is, rainfall in the lowest 10% of years.
- Some 59% of the State, including most of the south east, southern, central and western areas had average relative rainfall for the period. Isolated areas, particularly in the far south, far south west and across the central west, received above average relative rainfall.

3.2 Total rainfall

Total rainfall information is sourced from the AussieGRASS project of the Queensland Department of Science, Information Technology, Innovation and the Arts and from the Bureau of Meteorology.

May

- Overall, NSW received a State-wide average rainfall of 21 mm for the month, in comparison to the historical average of 47 mm, making it the driest May since 2008.
- Most of the rainfall over inland NSW fell either on the 3rd or between 27th-28th May, and was associated with cold fronts crossing the State.
- Rainfall during May was between 20-80% of average (based on historical records between 1961 and 1990) across most of NSW. In the south and south west, rainfall was between 80-150% of average.
- Some 67% of the State received average rainfall during the month, that is, rainfall of between the 4th and 7th decile (Table 6). However, most of the State had rainfall that was below median (5th decile and below) and had a rainfall deficit of between 25-100 mm for the month.
- Total rainfall over most of the State ranged from 0-200 mm. The majority of the State received between 10-50 mm. Some areas in the south and along parts of the coastal strip over the north coast and Hunter region received 50-100 mm. The alpine area received falls of between 100-200 mm (Figure 20).
- Areas across the north of the State, including areas of the Western, North West, Central West LLS districts, received 0-10 mm over the month. Rainfall in these areas was generally less than 20% of average for the month. Rainfall of below 10 mm also occurred in other limited areas around the State, such as in the Greater Sydney LLS district and near Moree, Armidale, Scone and Wollongong.

March to May (3 months)

- Total rainfall over the three months to May ranged from 50-300 mm over most of the State, with areas of the coast and the alpine areas receiving 300-600 mm (Figure 21).
- An area between Walgett and Lightning Ridge in the North West LLS district received 25-50 mm over the period. Areas around Tibooburra in the Western LLS district also received less than 50 mm. Much of the rainfall in these areas was patchy, and was less than 80% of normal.
- Most of the western and central areas of the State received 50-200 mm. The eastern areas of the State, including most of the tablelands, received 200 mm or more.
- Much of the State had above normal rainfall, with the exception of areas in the north west, near Hay and along the coast.

December to May (6 months)

- Rainfall across the State during the December to May period generally ranged from 100-600 mm (Figure 22), with most areas receiving between 100-400 mm.
- Some of the lowest rainfall over the period (50-100 mm) fell in the north west of Western LLS district near Packsaddle and Tibooburra, and in the North West LLS district between Walgett and Lightning Ridge.
- The plains generally received between 100-300 mm and the central areas of the State, including the slopes and much of the tablelands, received 200-400 mm during the period.

  The coastal LLS districts generally received 400-600 mm. Some areas of the coast received up to 800 mm.

4. Temperature anomalies

Temperature information is sourced from the Bureau of Meteorology.

The data used to create the temperature anomaly maps in Figure 24 and Figure 25 are slightly different from that used to create the anomaly maps on the Bureau of Meteorology website. The comments below reflect the website maps, which are more accurate, rather than those included in this report. The maps in Figure 24 and Figure 25 are provided for a general assessment only.

- Daytime temperatures across the State during the month averaged 2°C above normal.
- Average monthly daytime temperatures were warmer in the western half of the State, and around the central coast and Hunter valley. These areas had maximum temperature anomalies of 2-4°C above normal.
- In the eastern half of the State, average monthly daytime temperatures were generally 1-2°C above normal, except for the north east where they were near normal.

- Average monthly minimum temperatures were 1.1°C above normal.
- The western and north western areas of the State recorded monthly average overnight temperatures of between 1-3°C above normal. The eastern and central areas were near normal, with some areas in the central and northern tablelands recording monthly average overnight temperatures of below normal.

5. Relative soil moisture

Soil moisture information is sourced from the joint CSIRO and Bureau of Meteorology Australian Water Availability Project (AWAP).

The soil moisture maps (presented in Figure 26 and Figure 27) show the average monthly soil moisture content for the topsoil and subsoil, as a proportion of its saturated capacity. They do not show monthly soil moisture relative to historical records (percentile ranking).

5.1 Summary

Table 7: Average monthly relative soil moisture – percentage area of NSW in each class

Layer	Low (0-0.3)	Moderate (0.3-0.7)	High (0.7-1.0)
Topsoil	71%	29%	0%
Subsoil	44%	51%	5%

Source: Derived from information supplied by CSIRO and the Australian Bureau of Meteorology.

5.2 Topsoil

- Modelled topsoil moisture declined between April and May, as a result of the below-normal May rainfall. In April, 53% of NSW had moderate topsoil moisture levels, which declined to 29% in May (Figure 26, Table 7).
- On a percentile rank basis, most of State ranked as having average relative topsoil moisture over the month, with the exception of areas across the north west (in North West and Western LLS districts), around Hay and across areas of the Northern Tablelands, North Coast, Hunter, Greater Sydney and South East LLS districts. Areas of the far south west of the State in Western and Murray LLS districts had above average relative topsoil moisture for the month.
- Declines in modelled topsoil moisture occurred across the north of the State, across the west and central west, and along the coast.
- Modelled topsoil moisture levels remained moderate over much of the south, the southern tablelands and areas of the coast. This included most of the Murray and Riverina LLS district (with the exception of the far west of Riverina near Hay), as well as the south of the Central Tablelands LLS district, the south east of Central West, areas of the South East and areas in the south of Western LLS district.
- Across the western and central areas of the State, total modelled topsoil moisture for May averaged 10-40 mm or less.
- Along the coast and tablelands, total topsoil moisture levels averaged 20-80 mm. In the north west, total topsoil moisture was less than 20 mm.

5.3 Subsoil

- Modelled subsoil moisture levels remained unchanged between April and May, with 51% of the State having moderate levels (Figure 27, Table 7). There was a slight improvement in subsoil moisture over some areas in the south of the State, and a slight decrease in the north. This followed a general improvement in subsoil moisture over much of the eastern-central areas of NSW between March and April.
- Only 5% of the State remained in the high subsoil moisture category during May (Table 7).
- The North West LLS district had the lowest overall relative subsoil moisture during the month, with 77% of its area in the low category. This was followed by 55% of Western and Murray, 45% of Central West and 41% of Riverina LLS districts. All LLS districts apart from North West, Murray and Western had more than 50% of their area in the moderate-high category.
- Total modelled subsoil moisture for the month was less than 100-200 mm across most of the State, less than 50 mm near Walgett in the North West LLS district, and generally ranged from 200-400 mm in the east.
- On a percentile rank basis, the southern half of Western and Central West LLS districts had above average modelled subsoil moisture for the month. Similarly, the western areas of Hunter LLS district, the eastern and southern areas of Murray and the western and southern areas of South East LLS districts had above average subsoil moisture.

- On a percentile rank basis, the west of North West LLS district, as well as areas of the Northern Tablelands and North Coast and the south of Central Tablelands LLS districts had below average subsoil moisture, as did an area around Hay. Areas near Hay, Walgett and Lismore had extremely low subsoil moisture levels.

6. Pasture growth and biomass

Pasture growth and biomass information is sourced from the AussieGRASS project of the Queensland Department of Science, Information Technology, Innovation and the Arts.

The modelled total pasture growth and biomass levels should be used with some caution in the higher rainfall areas of NSW such as across the tablelands and coast. The pasture growth model is not as well calibrated for these areas as for the rangelands, plains and slopes.

6.1 Modelled pasture growth

- During May, modelled pasture growth slowed or declined across the north west, coastal and alpine areas, and some areas of the central west (Figure 28).
- Over most of the Riverina and Murray LLS districts and the southern half of Central West LLS district, modelled growth maintained similar levels to those of April (with the exception of the higher altitude areas in the east of Murray and Riverina LLS districts). Over most of these districts, modelled growth ranged between 200 kg/ha of dry matter (DM) to more than 1,000 kg/ha DM and generally in the range of 500–1,000 kg/ha DM.
- Across the southern and central areas of Western LLS district, modelled growth over May was similar to April at 50-500 kg/ha DM.
- Modelled pasture growth across the north of the Western LLS district, the west of the North West LLS district, the east of the Northern Tablelands and most the coastal LLS districts declined to less than 20 kg/ha DM.
- Growth declined across much of the tablelands and Monaro from levels of 200-500 kg/ha DM during April to levels of 20-200. In the far southern tablelands, growth was less than 20 kg/ha.
- Anecdotal information suggests that the best responses over the last few months have been in improved pastures, with native pastures not responding as dramatically. Also, in some areas, growth has been restricted by patchy rainfall or by the onset of colder overnight temperatures. In the latter case, these areas may experience a ‘green drought’ until spring.

6.2 Modelled biomass

- Modelled total standing dry matter (biomass) levels during May were generally similar to those in April (Figure 29).
- Declines in modelled biomass occurred over the Northern Tablelands LLS district. Over most of this district, modelled biomass fell from 500-1,000 kg/ha dry matter (DM) to 250-500 kg/ha DM.
- Declines also occurred across the southern tablelands, from the north west of South East LLS district and along the east of the Murray and Riverina LLS districts.
- A small decline also occurred across all but the west of Central Tablelands LLS district, with modelled biomass levels dropping to below 1,000 kg/ha DM.
- Low levels of modelled biomass (generally less than 500 kg/ha DM) were maintained across the north west and north of the Western LLS district and across most of North West LLS district. Low modelled biomass levels were also maintained across most of the North Coast, Hunter, Greater Sydney and South East LLS districts. Low modelled biomass levels also occurred over the north of the Central West LLS district.
- There was some improvement during May in modelled biomass levels in the south eastern area of Western LLS district, and the southern half of Central West LLS district. Here levels improved to between 1,000-1,500 kg/ha DM.
- The greatest improvement in modelled biomass occurred across the western and central areas of the Riverina and Murray LLS districts, where levels improved to 1,500 kg/ha DM and above. Exceptions to this were in the Hay area and the area between Deniliquin and Balranald.

6.3 Relative pasture growth

Relative pasture growth and biomass are calculated by comparing and ranking the current modelled growth and biomass against that for the same period over every year since 1957 (percentile ranks).

This means that if the current period has a rank of between 30 to 70 against all other years, it is regarded as being “average” and the conditions experienced will occur over about 4 out of every 10 years.

Relative monthly pasture growth should be compared to modelled pasture growth for interpretation. 'Average' levels of relative growth may correlate with modelled levels (in kg/ha) that are quite low or high at certain times of year.

Summary

Table 8: Pasture growth and biomass relative to historical records – percentage area of NSW in each class

Period	No Data	Below Average (0-30%)	Average (31-70%)	Above Average (71-100%)	Other
Growth					
Month	12%	12%	26%	49%	1%
Quarter	3%	3%	18%	75%	1%
Half Year	0%	11%	40%	48%	1%
Year	0%	20%	48%	31%	1%
Biomass					
Month	0%	12%	36%	51%	1%

Source: Derived from information supplied by the Queensland Department of Science, Information Technology, Innovation and the Arts.

May

- Relative to historical records, 75% of NSW had average or above average pasture growth during May, a similar figure to that of April (Table 8, Figure 30).
- However, in May the area of above average growth declined from that of April, and the area of average growth increased (from 9% in April to 26% in May). This reflected the below normal May rainfall in many areas.
- In April, much of the Central West, Northern Tablelands and Northern Tablelands had extremely high relative growth, as did large areas of the Hunter and South East LLS district. However, in May, the majority of the areas of extremely high relative growth were restricted to the Riverina, Murray and Northern Tablelands LLS districts, as well as the far south west of the Western LLS district.
- Areas of major declines in relative growth during May were in the North West LLS district, where the area of below average relative growth increased from 4% in April to 41% in May. In total, 12% of the State had below average relative growth during the month.
- During May, relative growth also declined over the north east of the Western LLS district, the north of the Central West LLS district, and in the west of the Greater Sydney LLS district.
- In most other areas, relative growth declined from above average or better to the average range.
- Areas of missing data accounted for 12% of the area of NSW, primarily across the west of the State and in coastal areas.

March to May (3 months)

- Over the three months to May, relative pasture growth across the State remained high, and generally similar to the previous period.
- Some 75% of the area of NSW had above average relative growth, similar to the previous quarterly period (Table 8, Figure 31).
- The area of the State with below average relative growth across the State was just 3%, and included areas of the South East LLS district along the far south coast, areas of the North West LLS district between Walgett, Lightning Ridge and Carinda, an area to the north of Moree and an area around Hay.
- Some 11% of the South East and 16% of the North West LLS districts continued to show below average growth.
- A belt of extremely high relative pasture growth during the quarter extended across the tablelands and into the western areas of the Hunter LLS district, and into the Central West LLS district.

December to May (6 months)

- The six month period from December to May showed similar relative pasture growth to the previous six month period.
- Relative growth over the period was average or above over 88% of the State (Table 8, Figure 32), and above average over 48% of the State.
- Above average relative growth extended across much of the Northern Tablelands and Hunter LLS districts, to the Central Tablelands, Central West, Riverina and Murray LLS districts and the southern half of the Western LLS district.
- However, large areas of below relative average growth still remained across much of the North West LLS district (47% of the area of the LLS district, compared to 54% last month). These areas extended into the

west of the Northern Tablelands and the north of the Central West LLS districts.

- Areas of below average relative growth also remained in the South East LLS district, and amounted to 25% of its area.

June to May (12 months)

- Relative pasture growth over the last 12 months was average or above across 79% of the State (Table 8, Figure 33).
- The best relative growth extended across the central and southern tablelands, and areas of western NSW, and made up 38% of the State (an increase of 7% from the yearly period ending in April).
- Below average relative growth extended across the north west and the north eastern corner of NSW, covering the majority of the North West, Northern Tablelands and North Coast LLS districts. Areas of Hunter and Greater Sydney LLS districts also showed below average growth. The extent of extremely low relative growth in these areas increased.
- Relative growth across the far west and much of central and south east NSW was average (41% of the State), with pockets of above average growth.

6.4 Relative biomass

Relative monthly biomass should be compared to modelled biomass for interpretation. “Average” levels of relative biomass may correlate with modelled levels (in kg/ha) that are quite low or high at certain times of year.

- Modelled relative total standing dry matter (biomass) levels remained similar to April (Table 8, Figure 34).
- Relative to historical records, biomass remained high across the Northern Tablelands, Central Tablelands, Central West, Riverina and Murray LLS districts, as well as the west of Hunter and South East LLS districts.
- Above average relative biomass made up 51% of the State in May (Table 8).
- However, relative biomass remained low across the western half of the North West LLS district. It also remained low over the coastal areas of the South East LLS district, areas of the North Coast, the far north east of Western LLS district and around Hay.
- The majority of Western and Greater Sydney LLS districts had average relative biomass.

7. Crop production

Crop production information is sourced from the NSW DPI grains report. An updated grains report was not available at the time of publication.

8. Water storage and irrigation allocations

8.1 Storage levels

Storage levels are given as at 11 June 2014.

- Levels in water storages are low-moderate, with the average capacity being 48%. Changes in storage levels were minor, with the exception of Lake Cargelligo (-19%).

Table 9: Capacity of storages

Storage	Current Volume (GL)	Effective Capacity (%)	Monthly Change (%)
Toonumbar	-	-	-
Glenbawn	668	89	-2
Glennies	248	87	-1
Lostock	-	-	-
Brogo	9	101	0
Cochrane	-	-	-
Dartmouth	3457	89	0
Hume	1351	45	7
Blowering	916	55	6
Burrinjuck	585	57	2
Brewster	-	-	-
Carcoar	10	28	1
Cargelligo	21	49	-19
Wyangala	554	45	0
Glenlyon	96	-	-
Pindari	-	-	-
Copeton	462	33	0
Chaffey	25	37	-
Keepit	81	18	0
Split Rock	-	-	-
Burrendong	256	19	1
Oberon	29	65	-1
Windamere	183	50	0
Lake Cawndilla	139	10	0
Lake Menindee	-	0	0
Lake Pamamaroo	162	56	3
Wetherell	72	35	-1
Total	**9324**		
Average		**48**	

8.2 Irrigation allocations

Allocations are given as at 11 June 2014.

- General and high security allocations remained the same as last month.

Table 10: Irrigation allocations

River valley	Allocation	Licence category
NSW Border Rivers*	100%	General security A Class
	1.7%	General security B Class
	100%	High security
Richmond	90%	General security
	100%	High security
Gwydir*	0%	General security
	100%	High security
Hunter	100%	General security
	100%	High security
Paterson	100%	General security
	100%	High security
Lachlan*	0%	General security
	100%	High security
Belubula*	0%	General security
	100%	High security
Lower Darling*	100%	General security
	100%	High security
Macquarie and Cudgegong*	6%	General security
	100%	High security
Murray*	100%	General security
	100%	High security
Murrumbidgee*	63%	General security
	95%	High security
Lower Namoi*	6%	General security
	100%	High security
Upper Namoi*	100%	General security
	100%	High security
Peel	45%	General security
	100%	High security
Bega Brogo	67%	General security
	100%	High security

* Carry over water may be available

9. Appendix

Maps and data used in the production of this report.

Seasonal outlook

Figure 7: Quarterly rainfall outlook

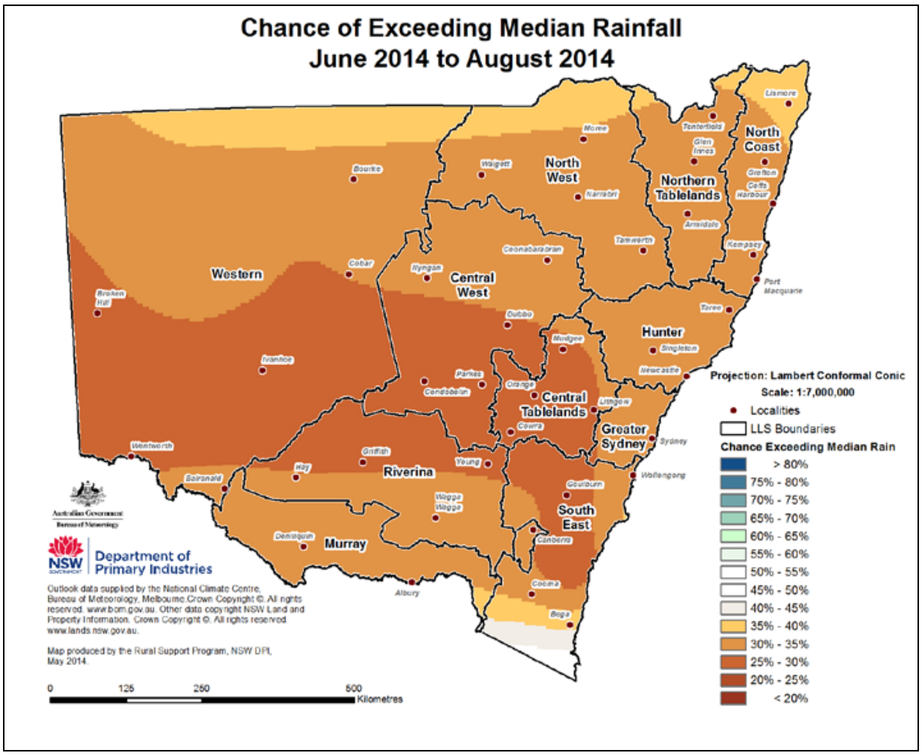


Figure 8: Quarterly maximum temperature outlook

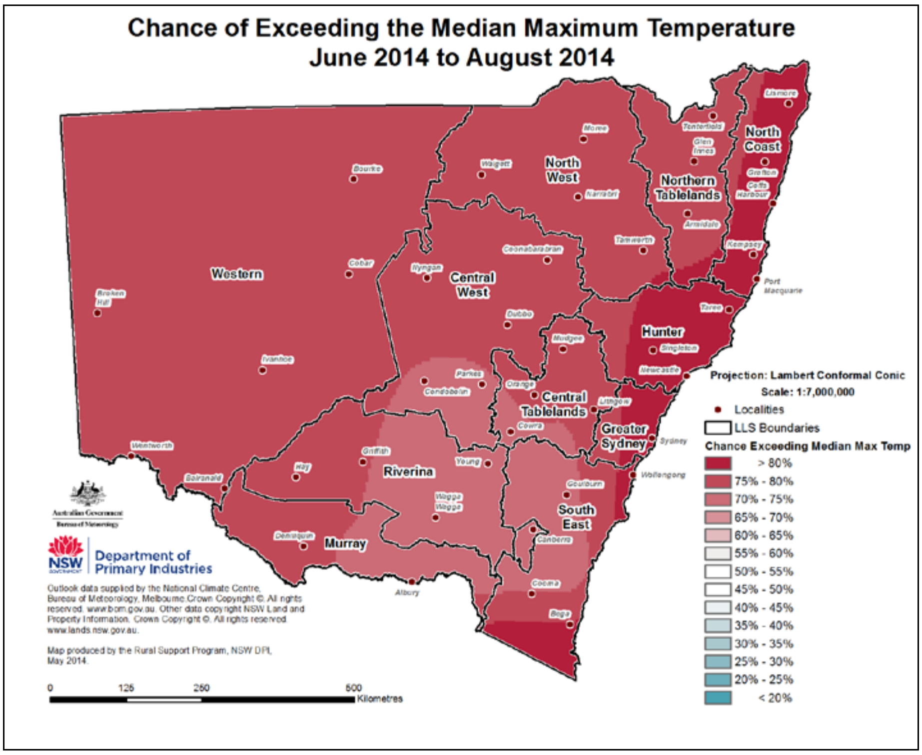


Figure 9: Quarterly minimum temperature outlook

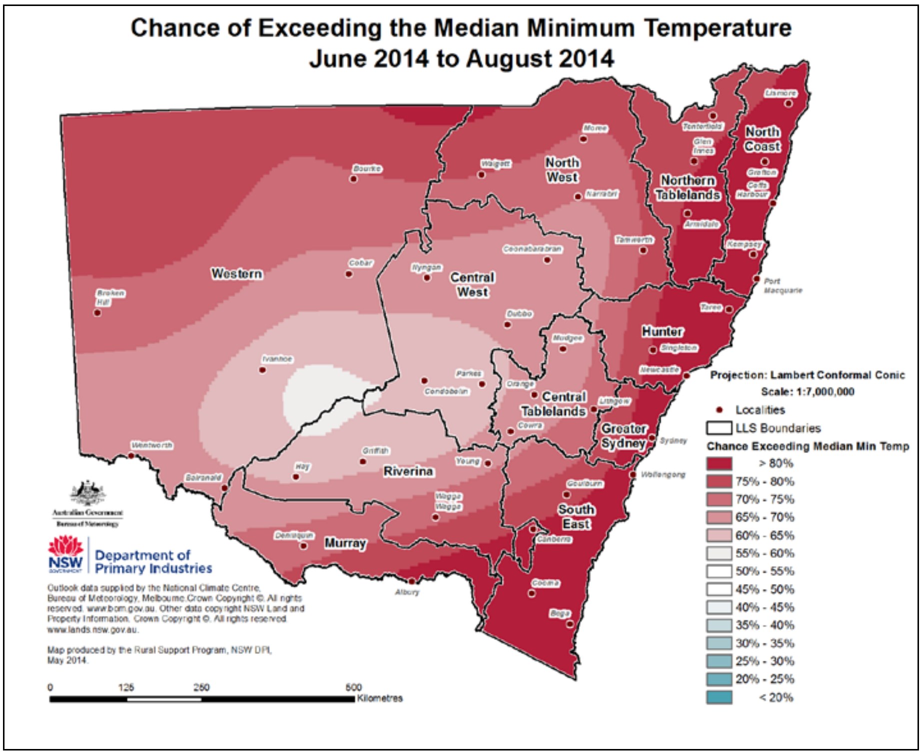
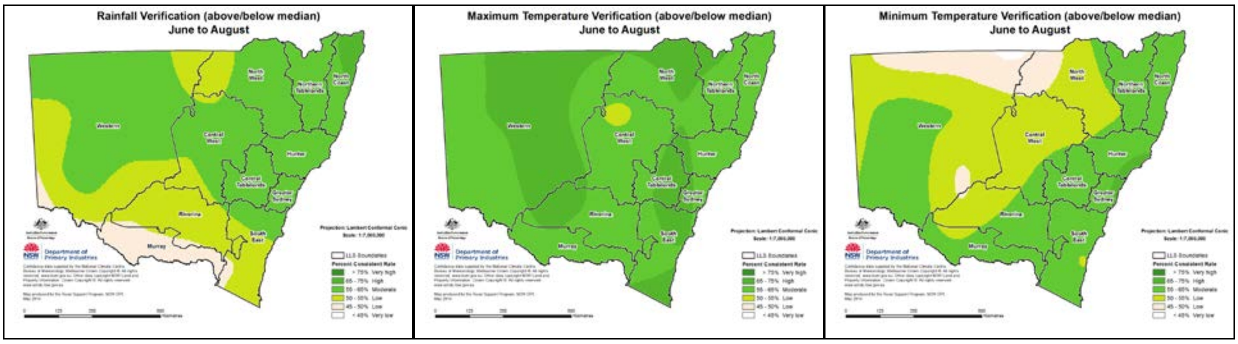


Figure 10: Outlook skill maps



Monthly rainfall & temperature outlook
(Bureau of Meteorology, POAMA - experimental)

Figure 11: Experimental June rainfall and temperature outlooks

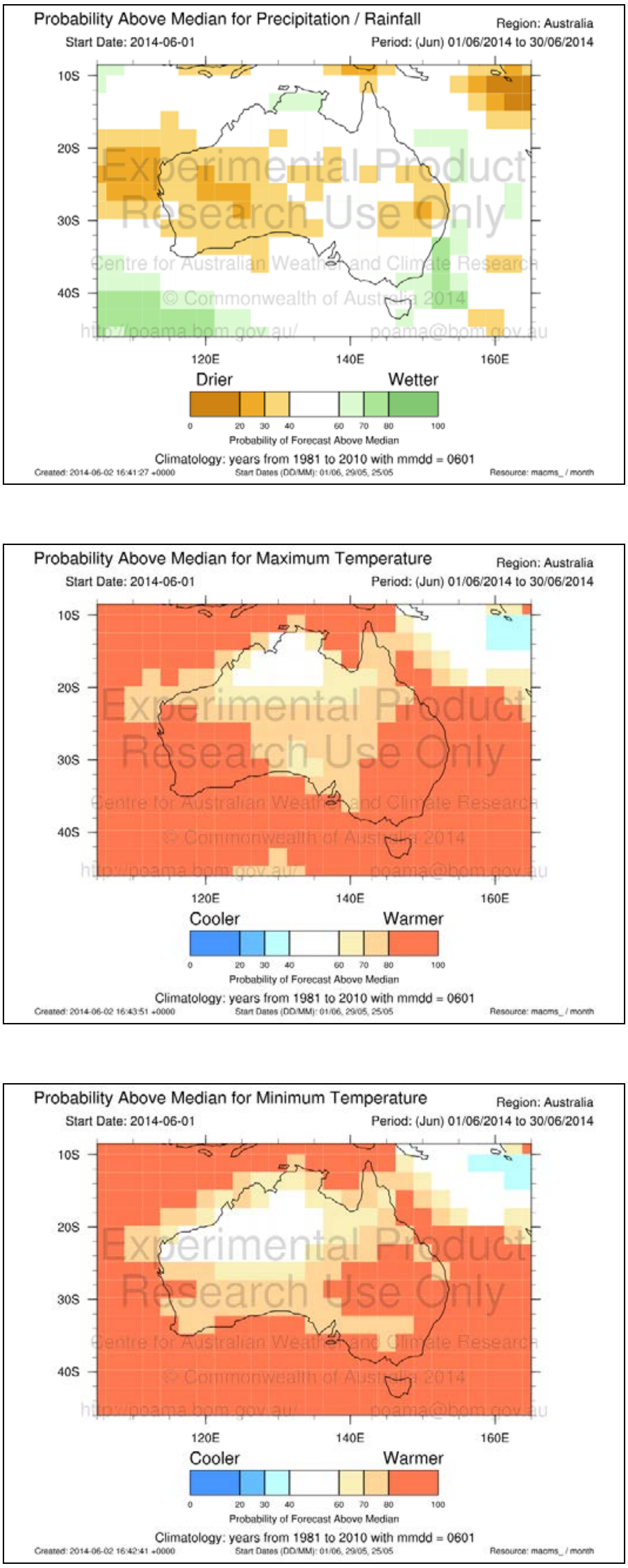
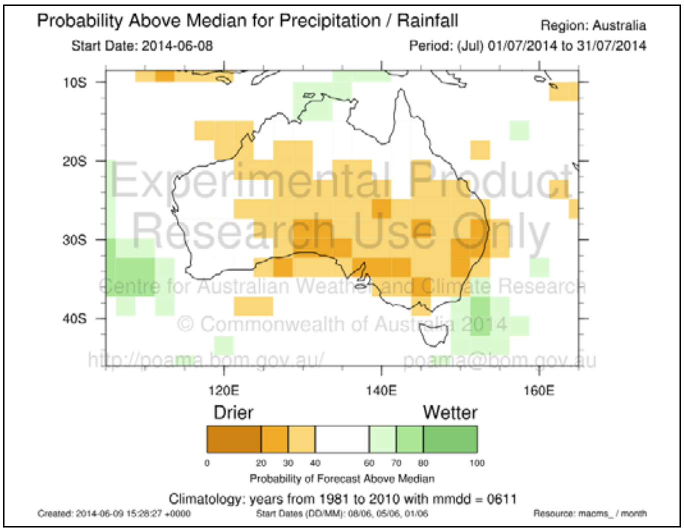
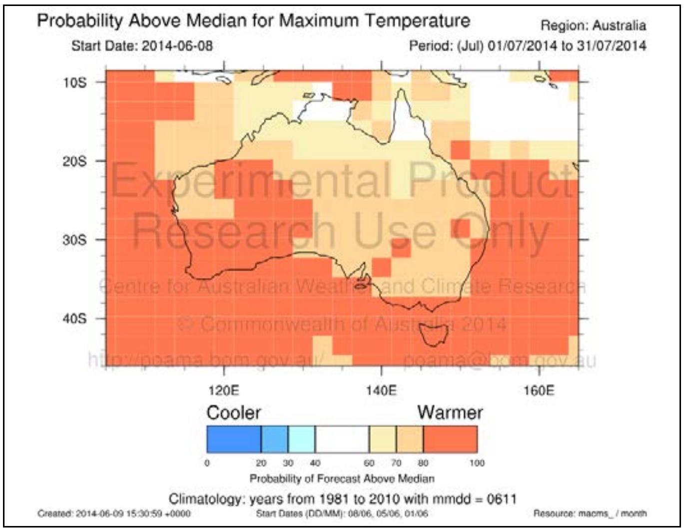
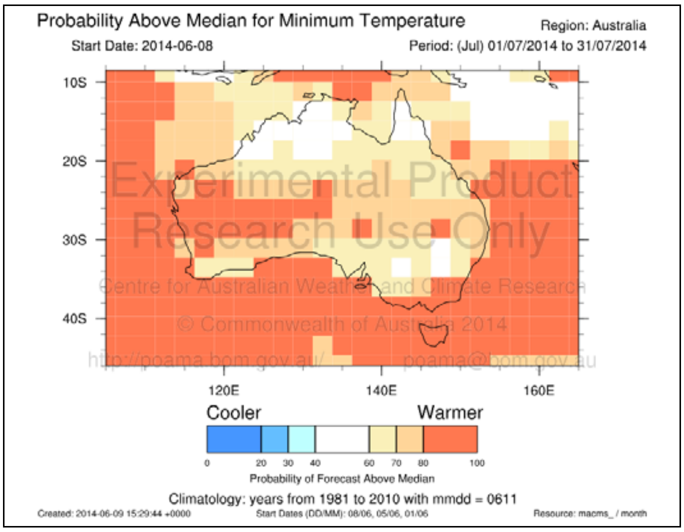


Figure 12: Experimental July rainfall and temperature outlooks

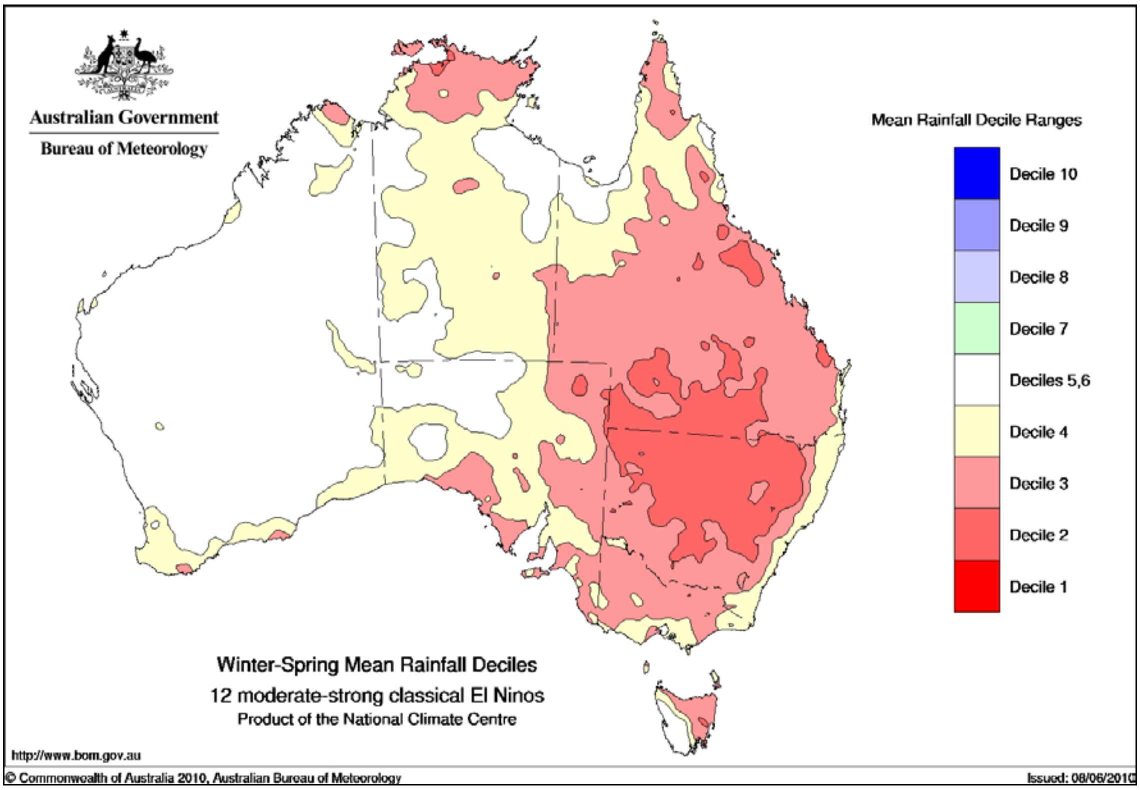






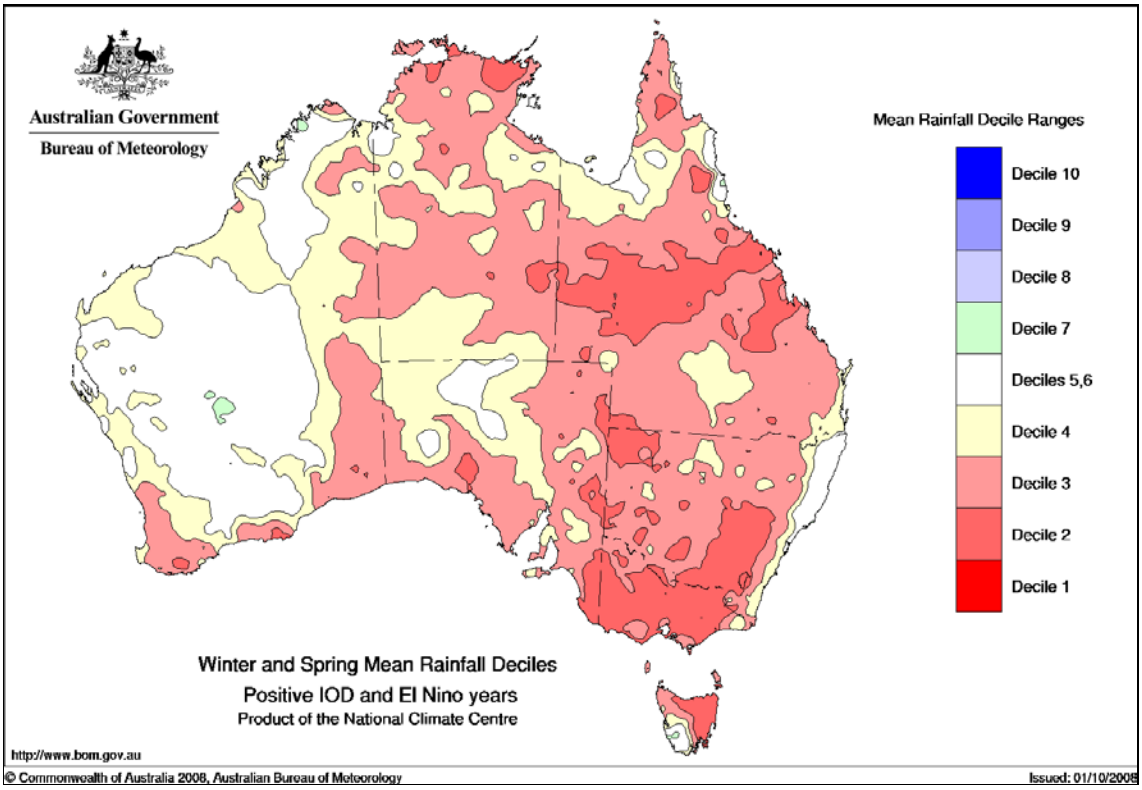
Possible effects of an El Nino event

Figure 13: Australian winter-spring mean rainfall deciles for twelve El Nino events



Source: Australian Bureau of Meteorology

Figure 14: Australian winter-spring mean rainfall deciles for seven positive IOD events coinciding with El Nino events



Source: Australian Bureau of Meteorology

Rainfall

Figure 15: Relative rainfall – monthly

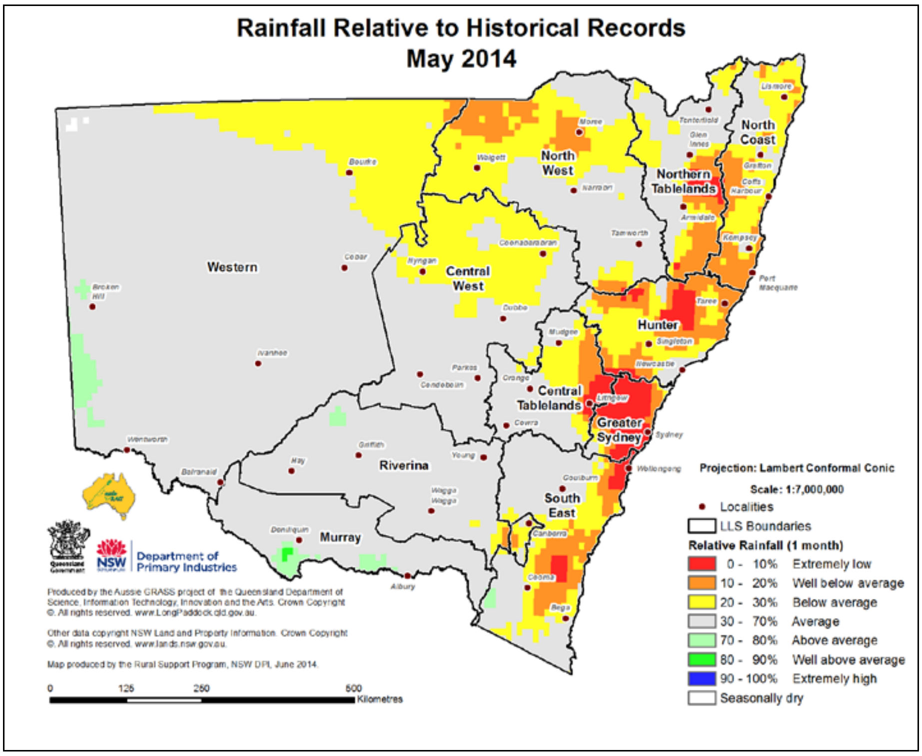


Figure 16: Relative rainfall – quarterly

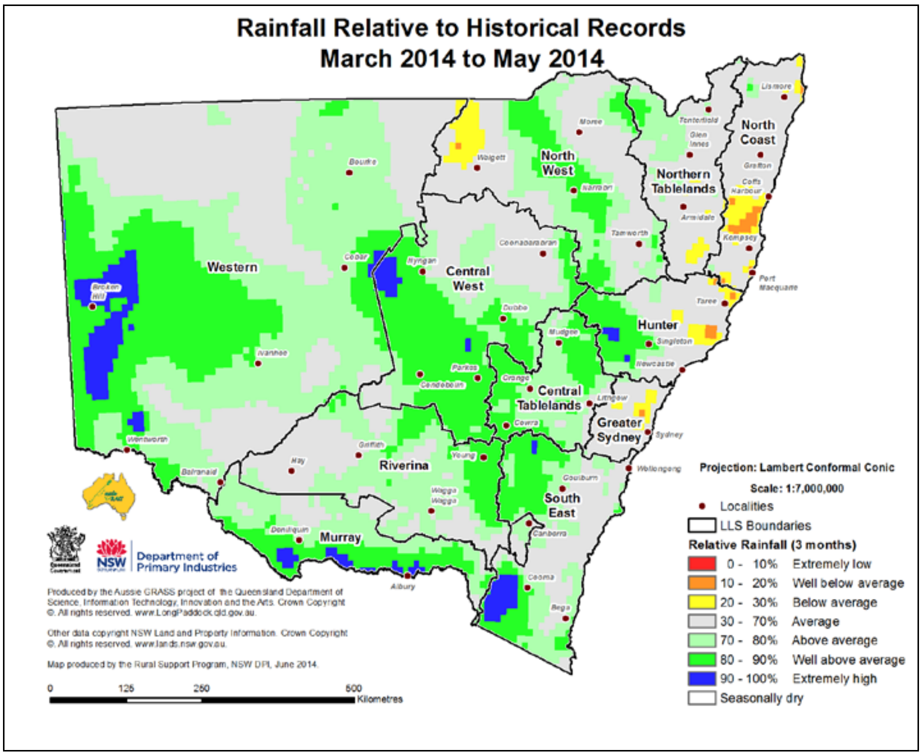


Figure 17: Relative rainfall – half yearly

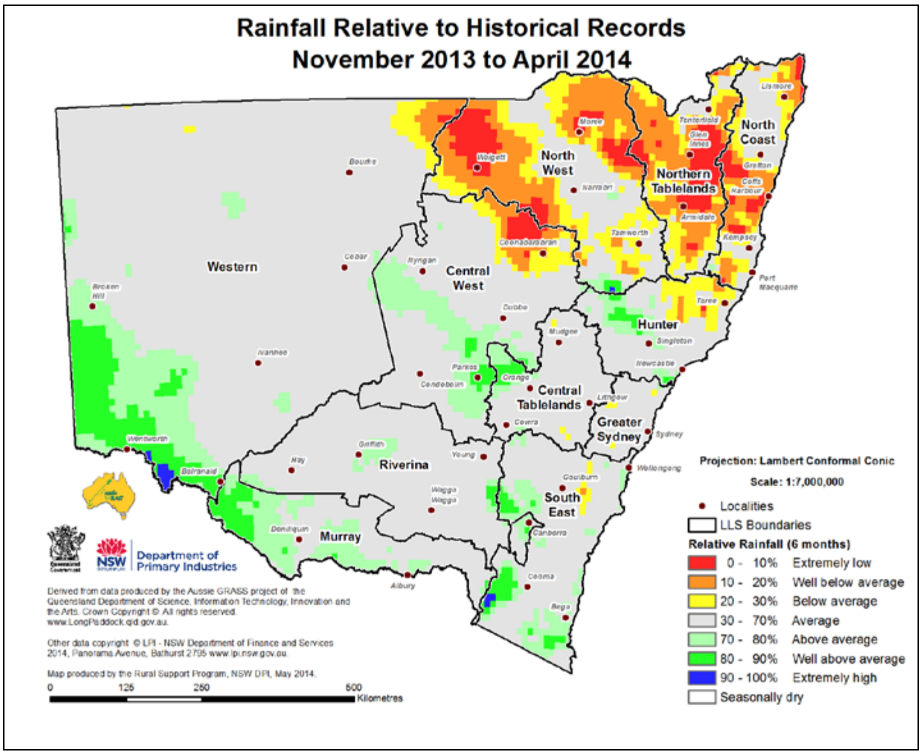


Figure 18: Relative rainfall – nine monthly

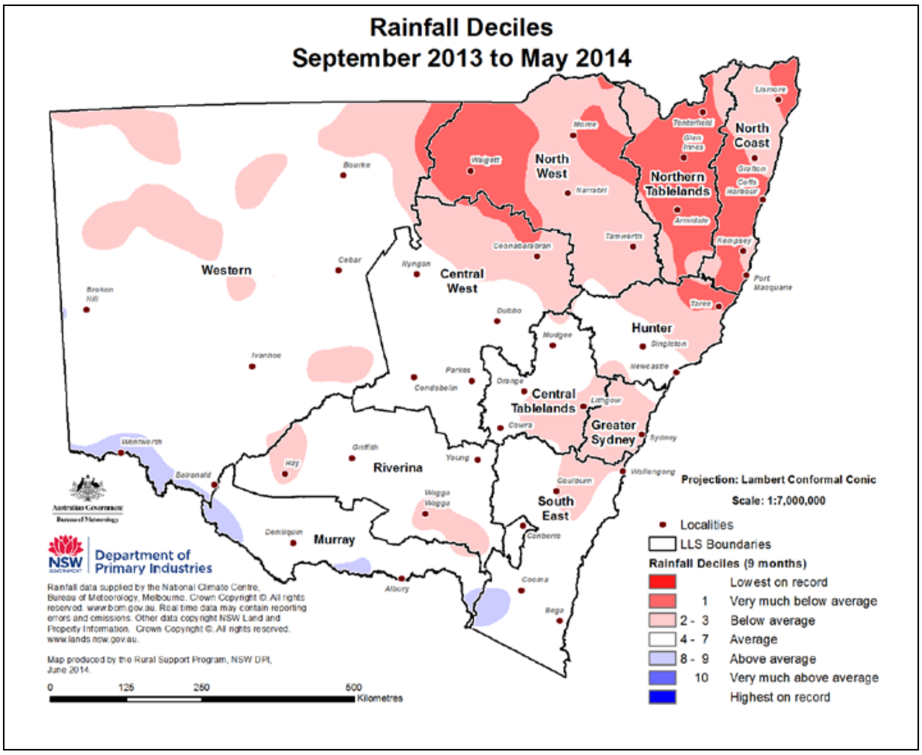


Figure 19: Relative rainfall – yearly

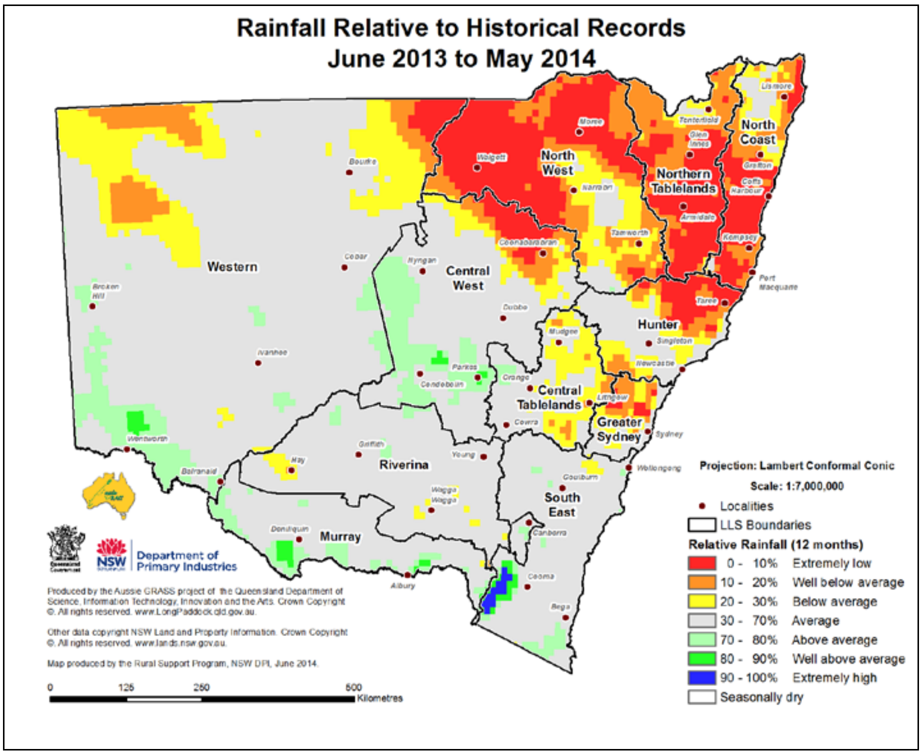


Figure 20: Total rainfall – monthly

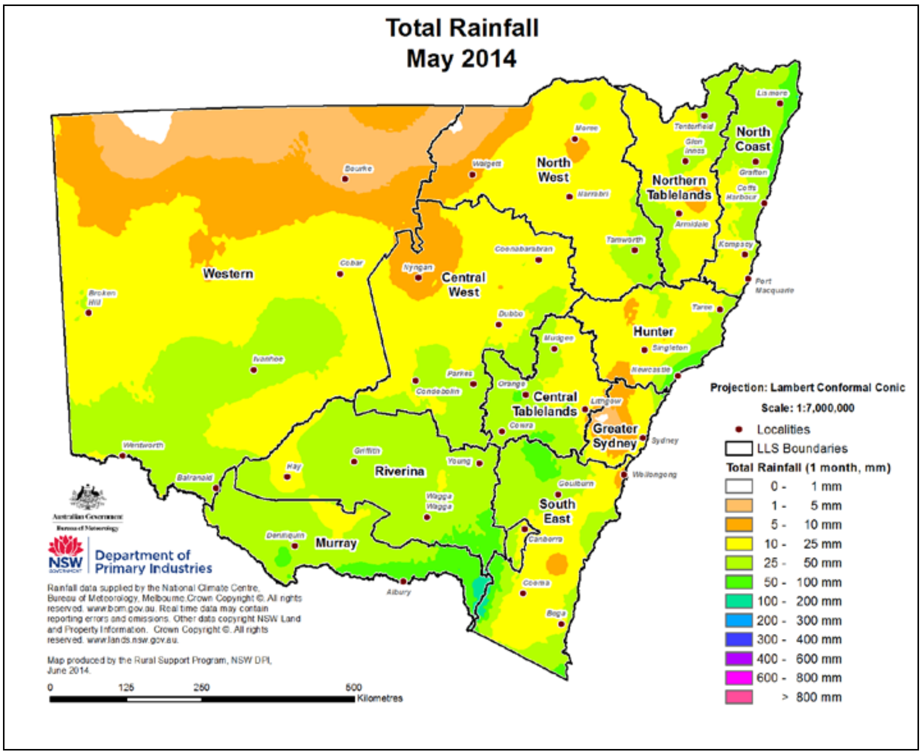


Figure 21: Total rainfall – quarterly

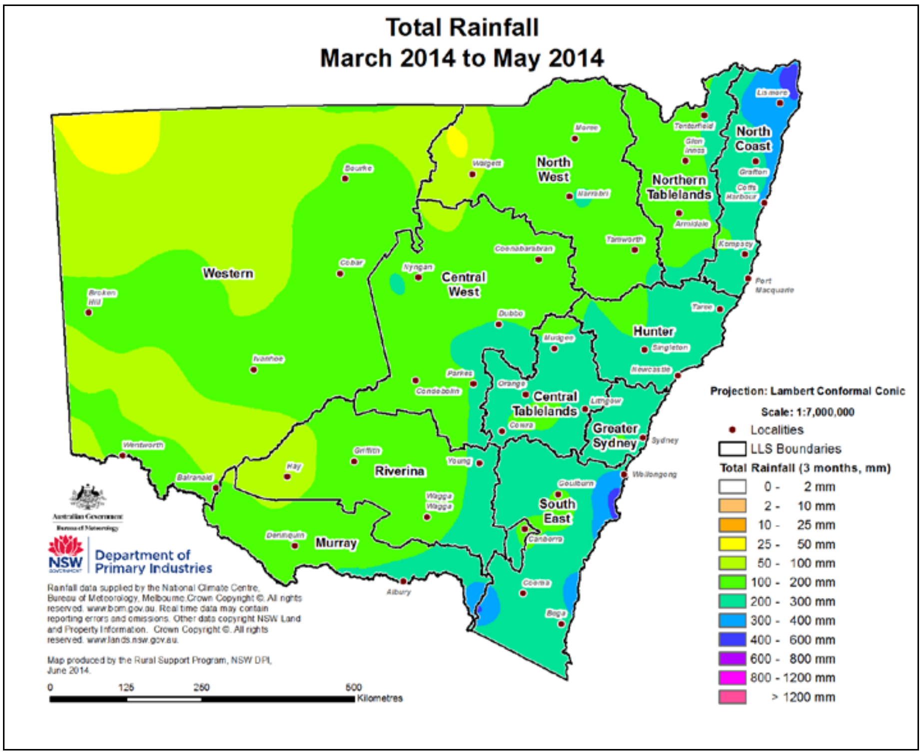


Figure 22: Total rainfall – half yearly

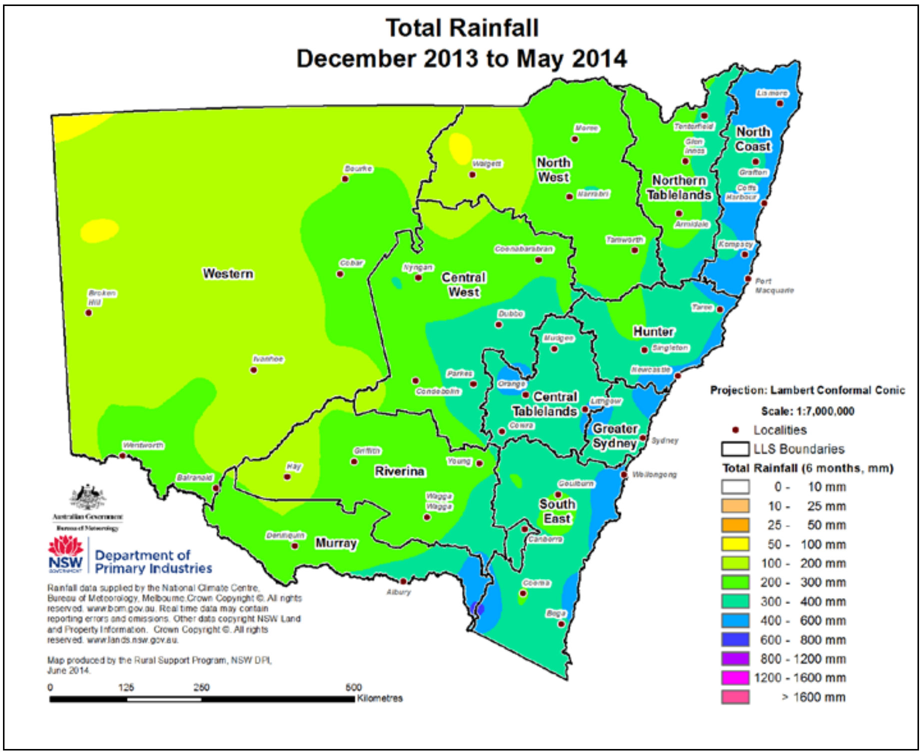
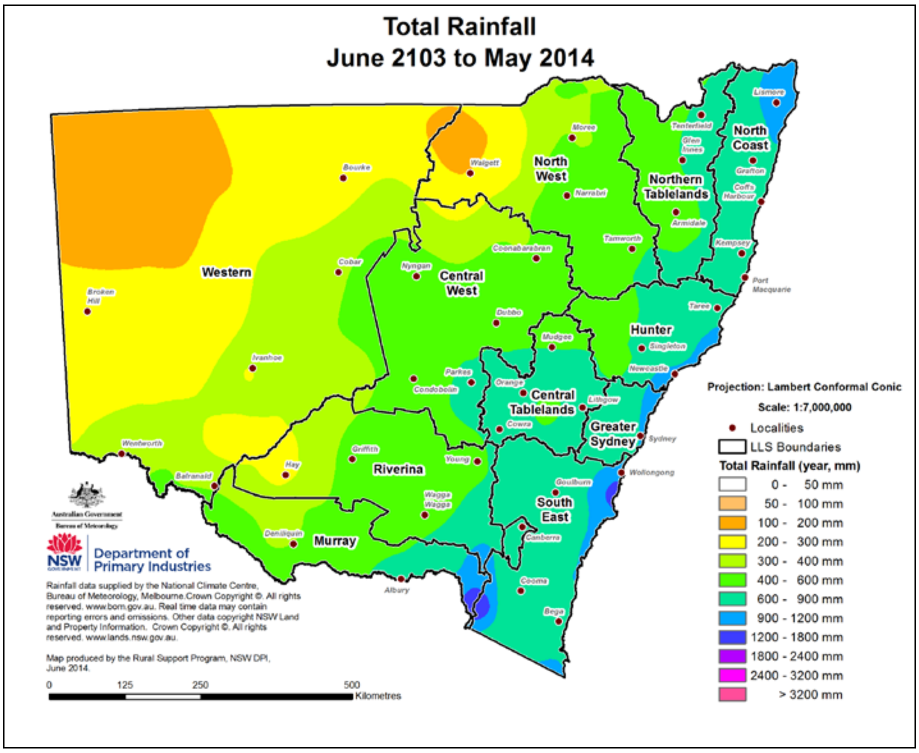


Figure 23: Total rainfall – yearly



Temperature

Figure 24: Maximum monthly temperature anomaly

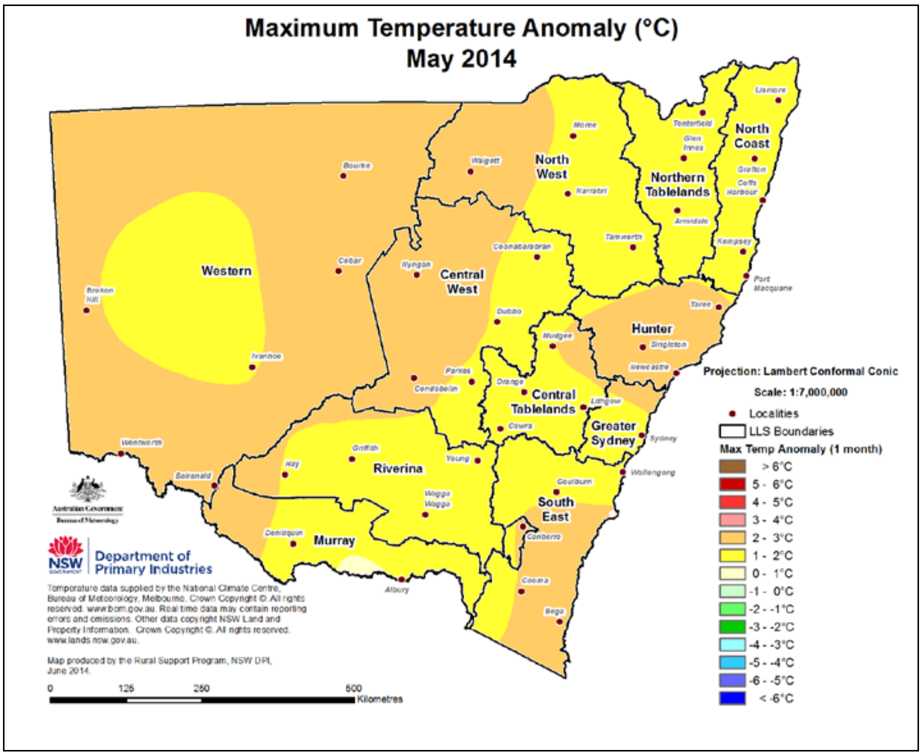
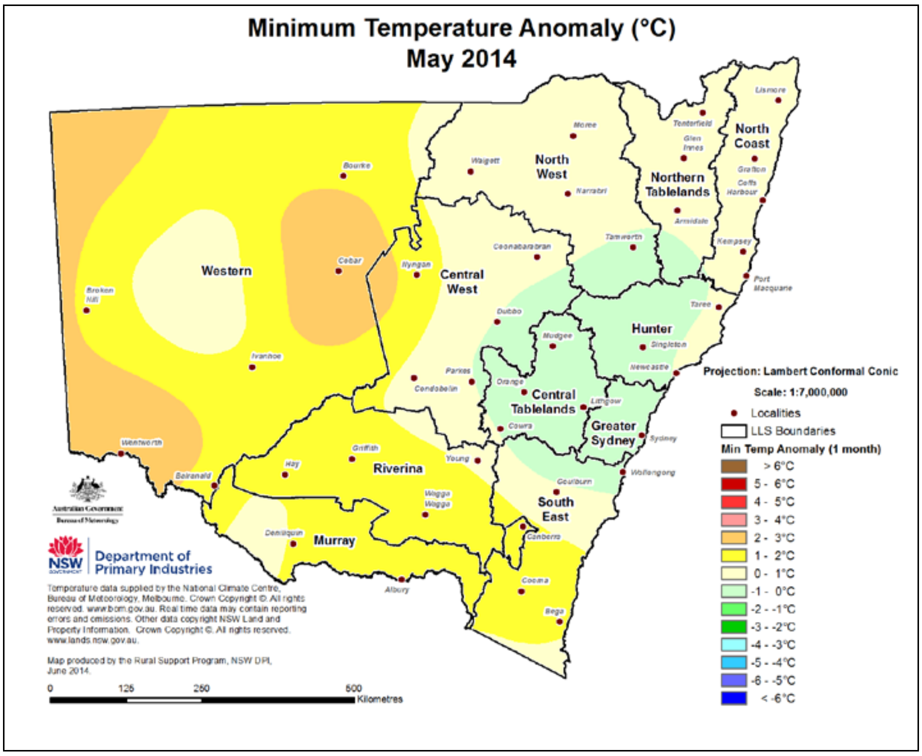


Figure 25: Minimum monthly temperature anomaly



Soil moisture

Figure 26: Relative monthly topsoil moisture

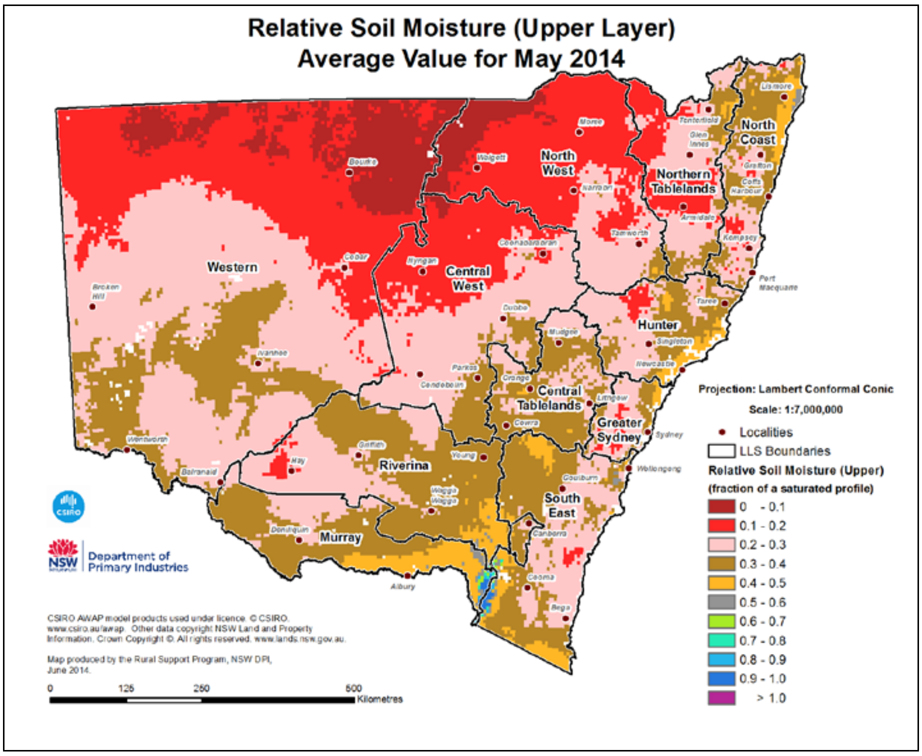
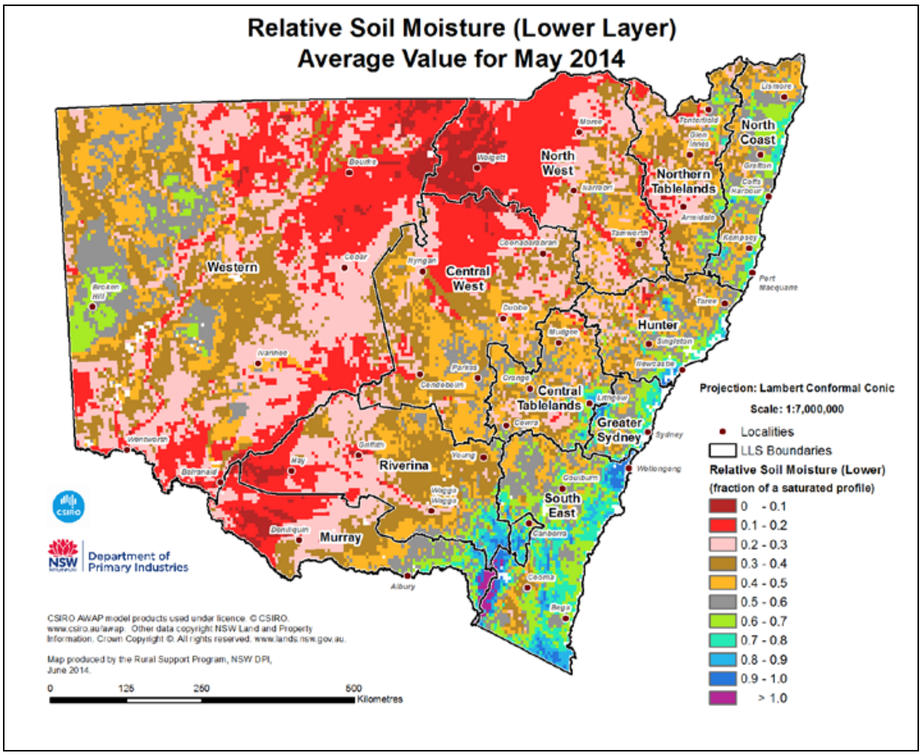


Figure 27: Relative monthly subsoil moisture



Pasture growth and biomass

Figure 28: Modelled pasture growth

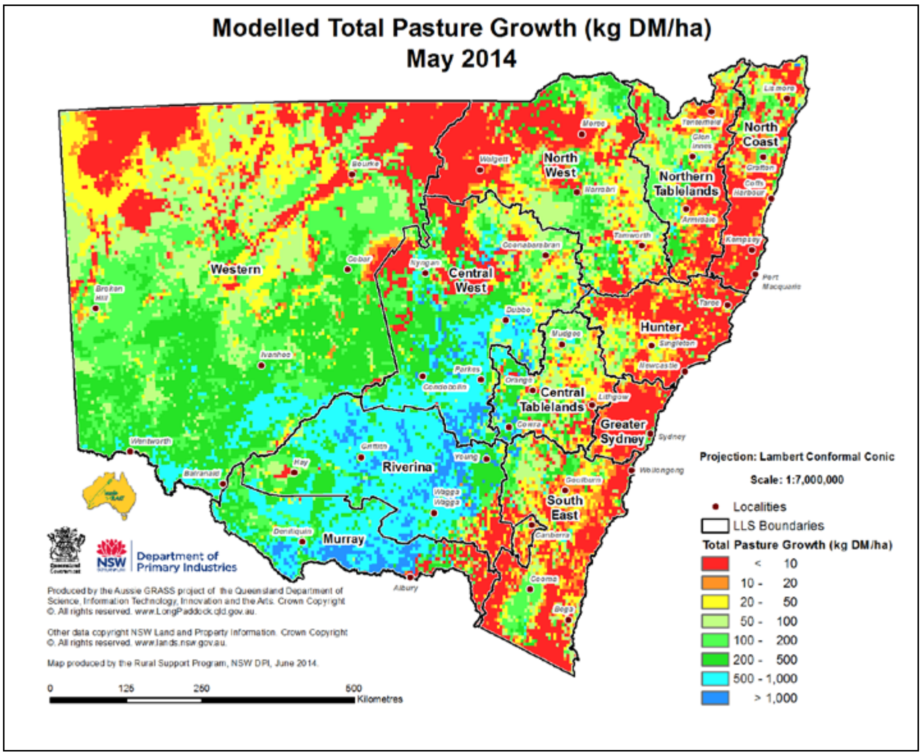


Figure 29: Modelled biomass

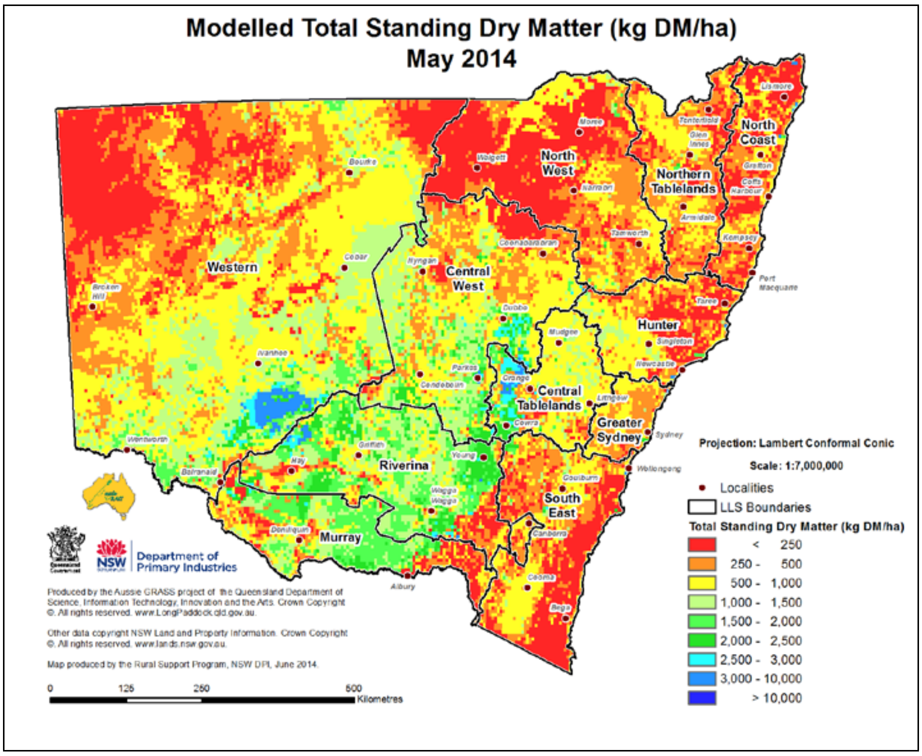


Figure 30: Relative pasture growth – monthly

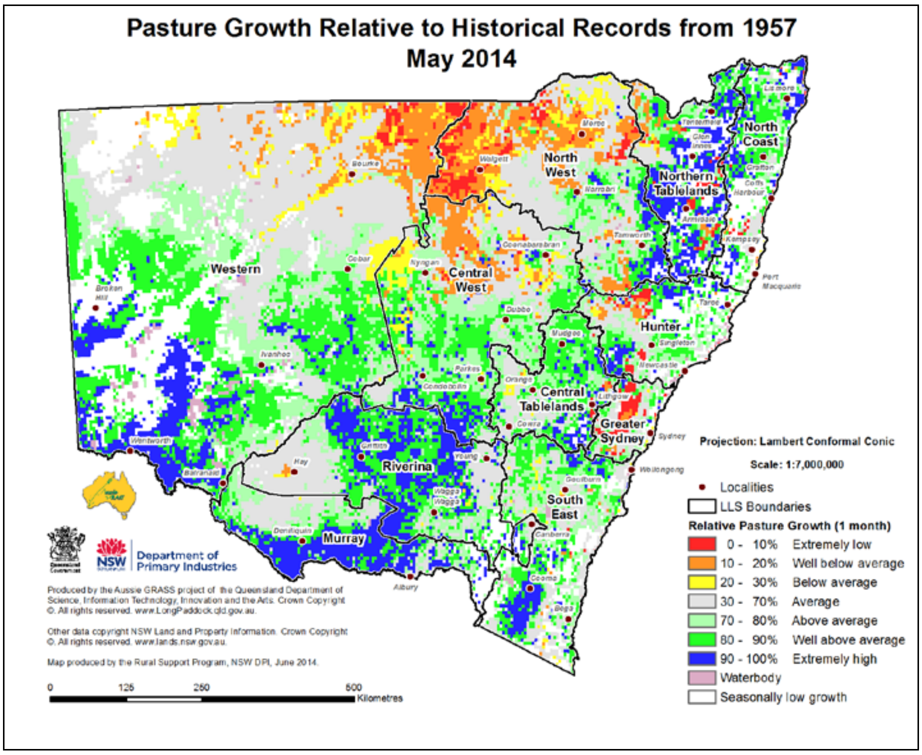


Figure 31: Relative pasture growth – quarterly

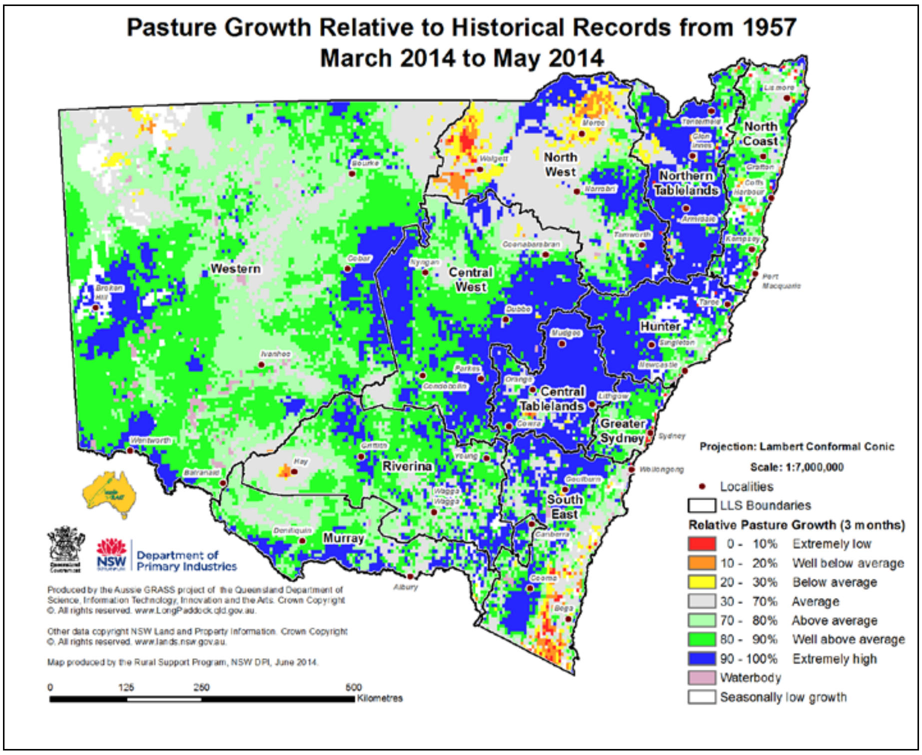


Figure 32: Relative pasture growth – half yearly

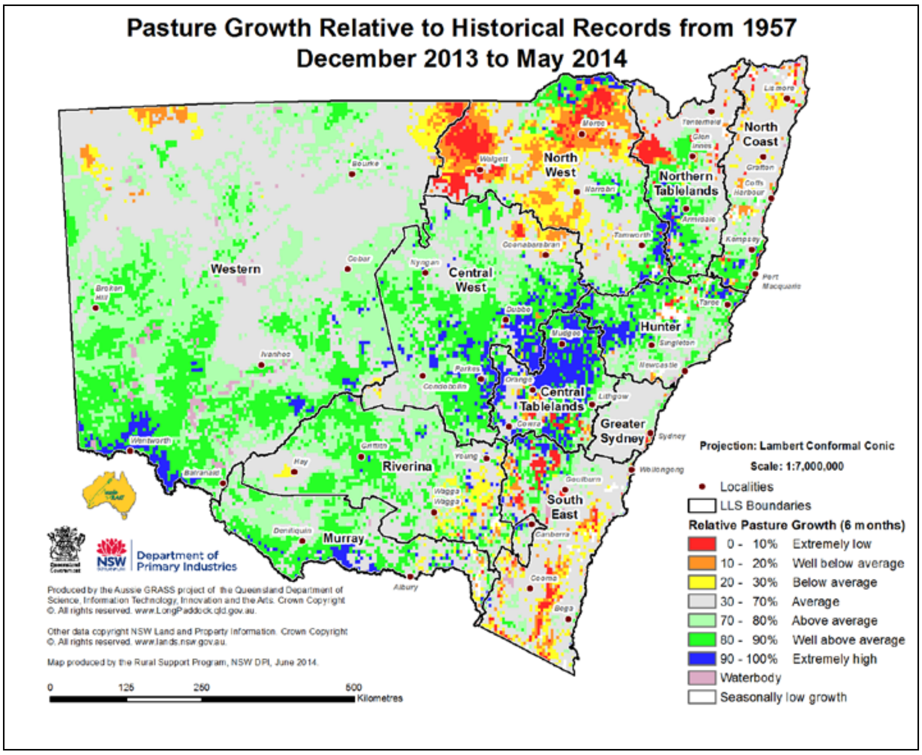


Figure 33: Relative pasture growth – yearly

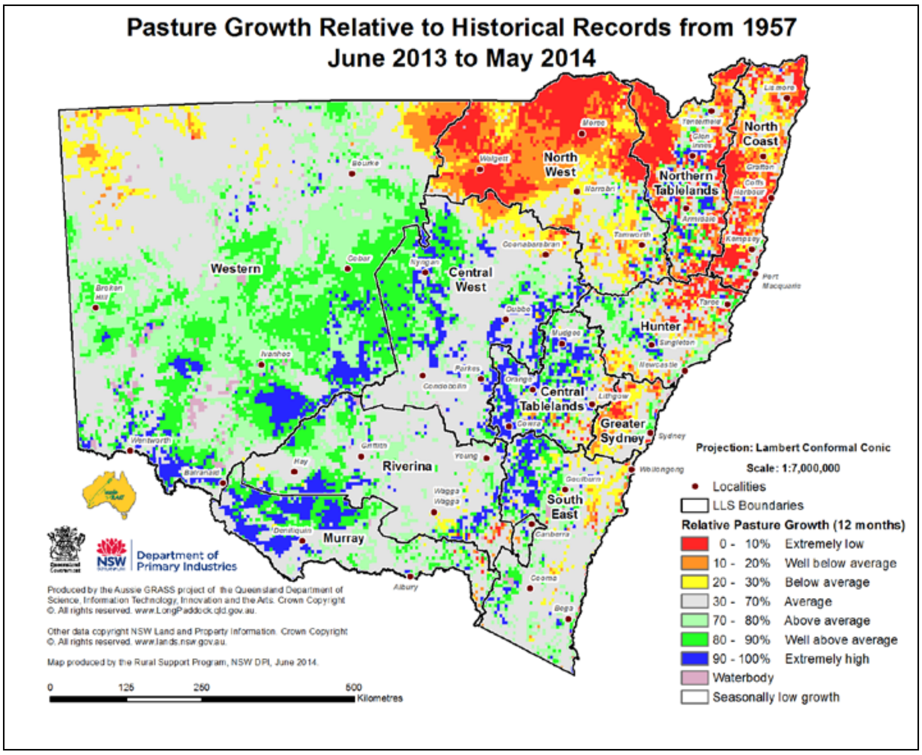


Figure 34: Relative biomass – monthly

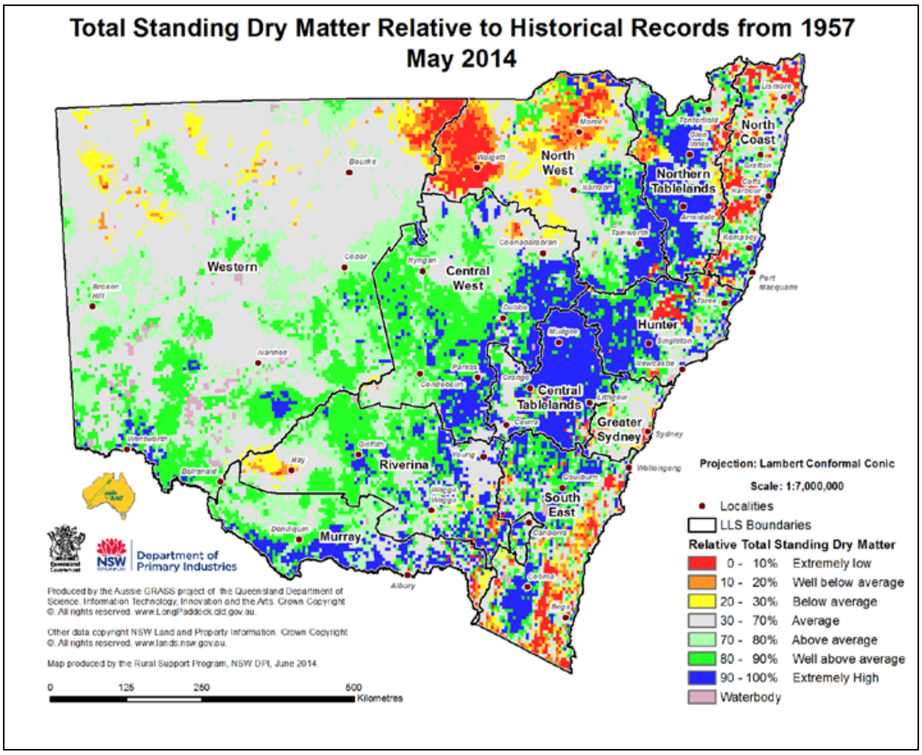
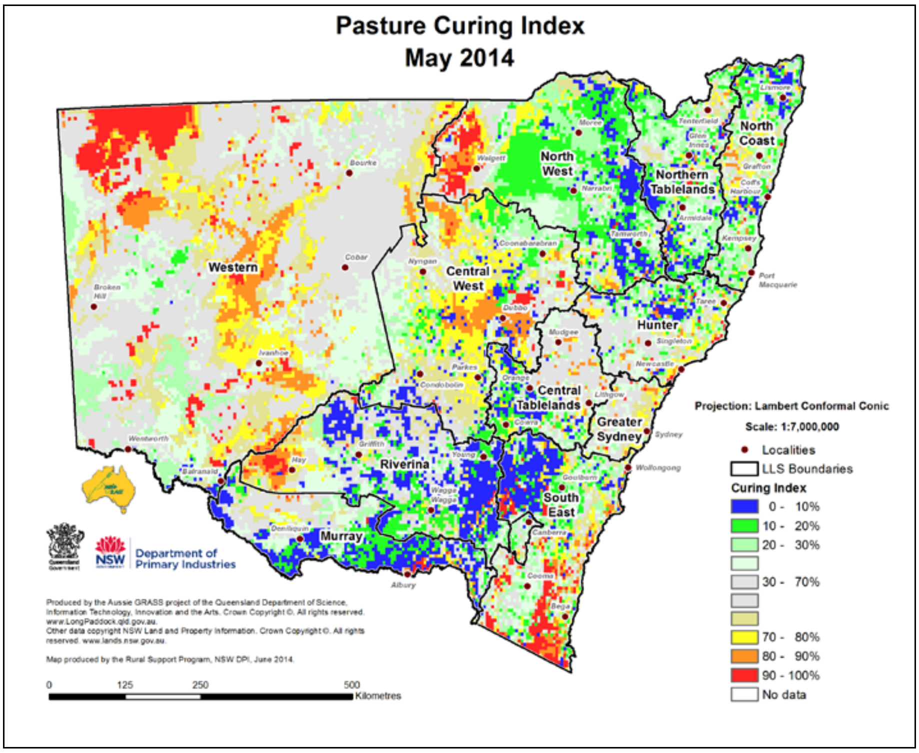


Figure 35: Pasture curing index



More information

For more information, contact the NSW Department of Primary Industries on 02 6391 3100 or Local Land Services on 1300 795 299.

A four-page simplified summary of the seasonal outlook and the current conditions is provided in the NSW Climate Summary, available at www.dpi.nsw.gov.au/agriculture/emergency/seasonal-conditions/summary.

Acknowledgments

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