NSW DEPARTMENT OF
PRIMARY INDUSTRIES

‘The grazier’s guide to pastures’ - Readers’ Note

This document is part of a larger publication. The remaining parts and full version of the publication can be found at:

http://www.dpi.nsw.gov.au/agriculture/field/pastures/management/grazing-management/graziers-guide-pastures

Updated versions of this document can also be found at the above web address.

2. THE AREA

This publication covers the Central and Southern Tablelands, Monaro and Upper South West Slopes of NSW (see map). This area will henceforth be referred to as 'the region'.

Most of the region is at least 500 m above sea level, rising to over 1000 m in many areas. It therefore has relatively cool summers. Rainfall is fairly evenly spread throughout the year. The topography is mainly undulating to hilly and erodible in nature so is best suited to grazing enterprises based on perennial pastures.

3. CLIMATE OF THE REGION

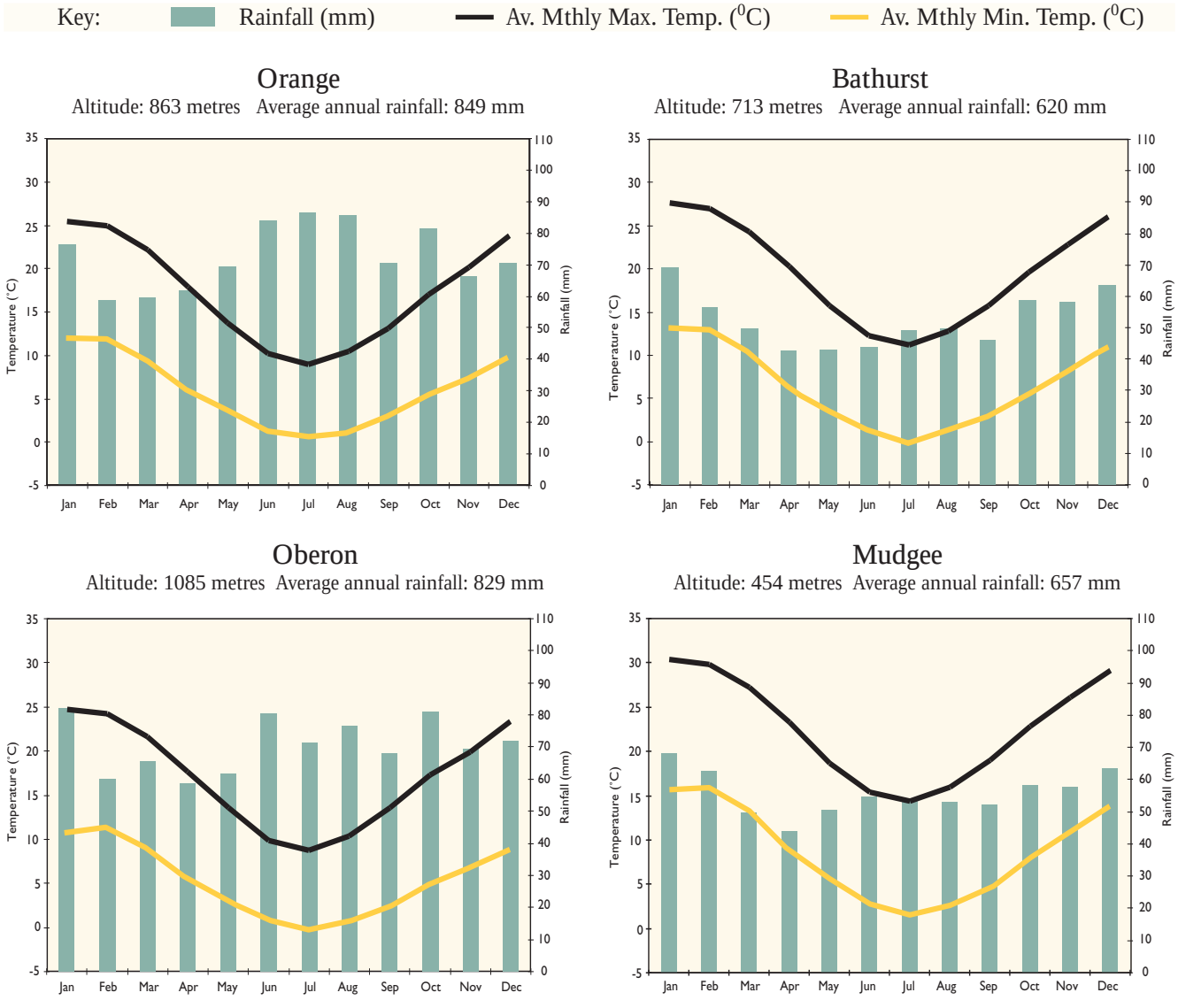
Throughout the region altitude has a marked effect on both rainfall and temperature. In summer, evaporation often exceeds rainfall and pasture growth is limited by moisture. In winter, rainfall normally exceeds evaporation, but pasture growth is restricted by cold temperatures and in some cases by waterlogging.

All areas are prone to severe frosts. Higher areas are cooler, have high rainfall, severe winters, occasional snowfalls and milder summers. Lower areas are drier in summer due to higher temperatures and greater evaporation.

In the main, long-term average monthly rainfall shows a relatively even distribution throughout the year. However, between and within year variation is large. Autumn break rains tend to be particularly unreliable.

Central Tablelands: Annual rainfall in the central tablelands varies from around 600 mm to 900 mm while the frost free period varies from 150 to 240 days a year depending on altitude. **Fig 3.1** provides data from four central tablelands towns covering the climatic range.

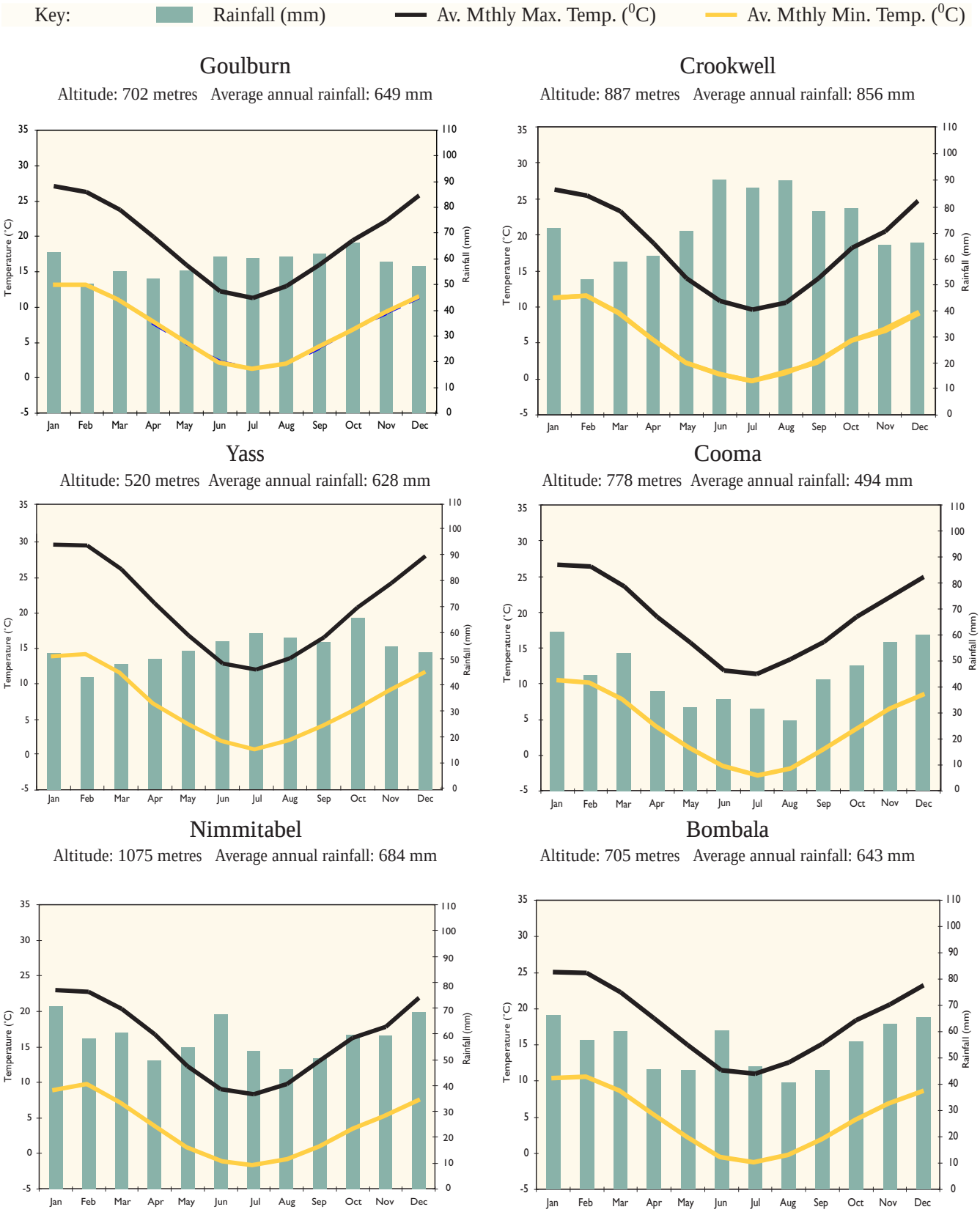
Fig 3.1 Temperature and rainfall distribution across the Central Tablelands[1]



[1] *Data extracted from the MetAccess weather decision support system, using all historical data available.*

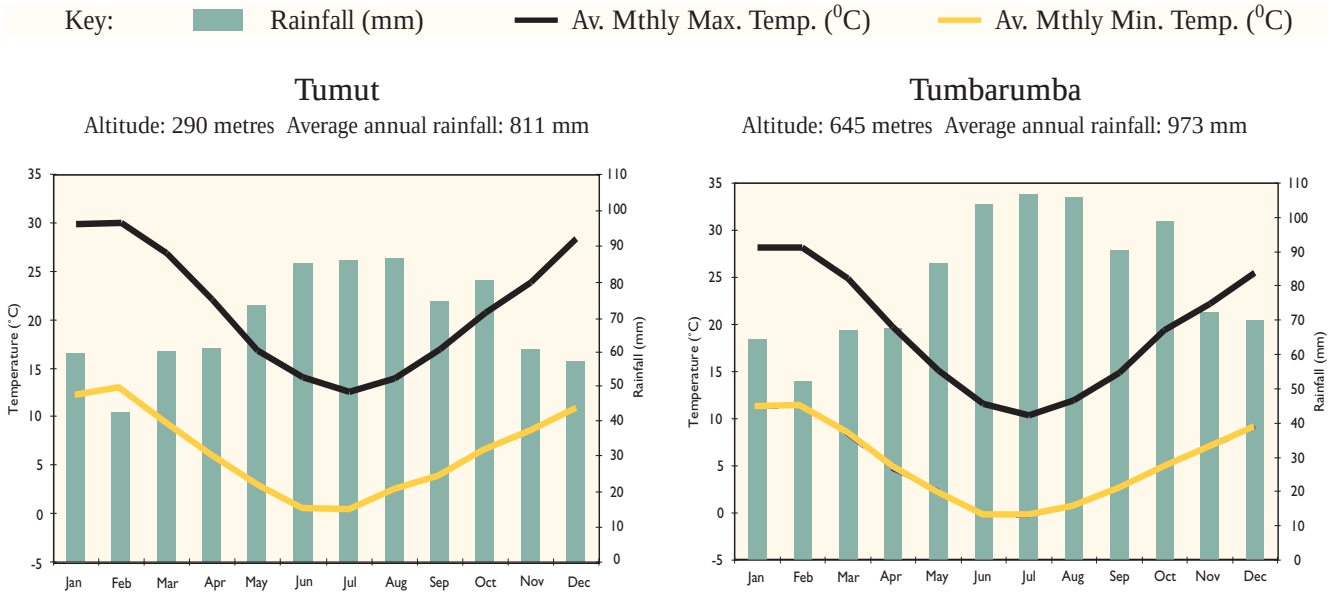
Southern Tablelands, Monaro & Upper South West Slopes: Annual rainfall in this diverse region varies from below 500 mm to 1200 mm and frost free periods vary from 140 to 260 days a year depending on altitude. **Fig 3.2** provides data from eight towns within this area. The Upper South West Slopes has the most pronounced Mediterranean climate (wet winter; dry summer pattern).

Fig 3.2 (a) Temperature and rainfall distribution at six Southern Tablelands and Monaro towns[1]



[1] *Data extracted from the MetAccess weather decision support system, using all historical data available.*

Fig 3.2 (b) Temperature and rainfall distribution at two South West Slope towns[1]



Implications of Climate for Pasture Growth

The interaction of temperature, effective rainfall and radiation directly influences pasture growth. Effective rainfall is often the most limiting factor to pasture growth for most of the year while in winter, low temperatures are the most limiting factor, especially at high altitude.

a. Temperature

Temperatures between 12°C and 30°C favour plant growth by most temperate species. Pasture growth increases with warmer temperatures, provided there is adequate moisture. However, once temperature drops below 8°C, pasture growth is minimal.

The effect of frost depends on the pasture species. Frost damage is most severe on older leaves, even in more frost tolerant species, in all cases reducing feed quality. Frost sensitive species such as Kangaroo grass *(Themeda)* and red grass *(Bothriochloa)* stop growing at warmer winter temperatures than the more frost tolerant, winter green species like microlaena, wallaby grass *(Austrodanthonia)*, phalaris and ryegrass. Thus frost sensitive species do not provide any feed for 4-6 months in this region.

b. Rainfall

Actual rainfall and *effective* rainfall in a period are not the same and can have vastly different effects on pasture growth. For example, rain falling in summer when evaporation rates are high will not be as effective as the same amount of rain falling mid autumn when evaporation rates are lower. Similarly, a high proportion of very intense summer storm rain becomes run-off, doesn't enter the soil and is less effective than the same amount of gentle rain.

The response of pastures to summer moisture varies with the species. Species that respond to summer rainfall include fescue, lucerne, microlaena and red grass. By comparison, phalaris has a heat dormancy mechanism and does not respond as well to summer rainfall while annuals are only present as seed over the summer months.

c. Radiation (Sunlight)

Pasture growth increases as radiation increases and radiation is directly related to day-length and cloud cover. During winter, cloudy weather can severely limit the already minimal winter pasture growth.

Rainfall Pattern and Variability

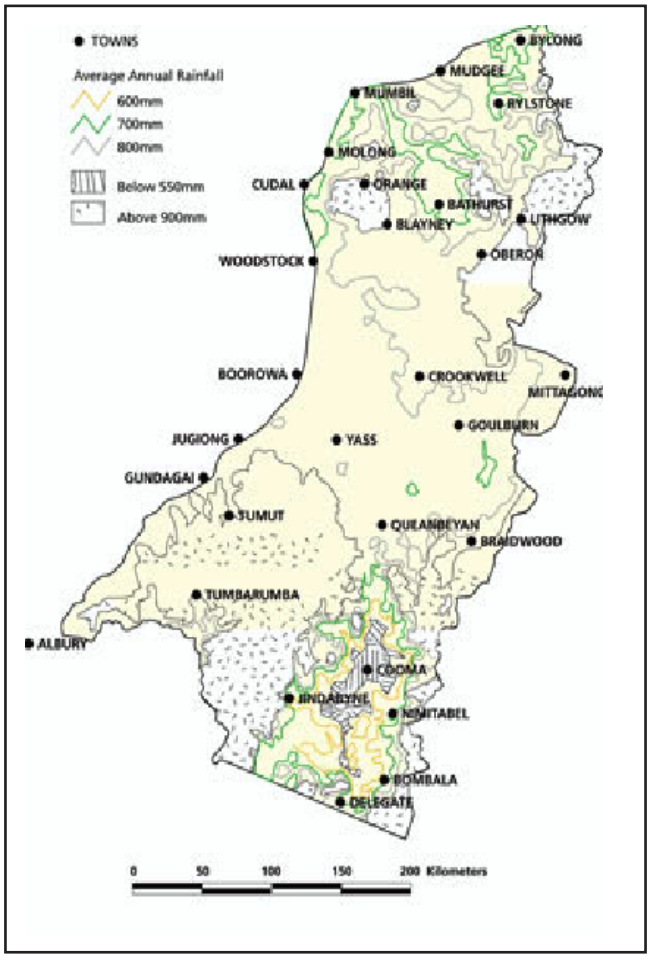
The pattern of rainfall throughout the year is a key determinant of plant growth. If adequate rain falls at critical times during the year it can make the difference between a good season and a bad one, irrespective of total annual rainfall. Four situations which highlight this are:

- A dry autumn may produce a winter feed drought but a very wet winter may also produce little feed due to cold temperatures and waterlogging that limit pasture growth.
- Similarly, high intensity summer storms are often less effective due to high evaporation and high run-off.
- Good summer rain often allows annual species, particularly sub clover, to germinate. However this often leads to a *false break* with seedlings often unable to survive a subsequent warm, dry autumn.
- Where no significant rain has fallen in autumn, rain falling in June is called a *late break*. In this situation cold temperatures allow very little growth to occur

[1] *Data extracted from the MetAccess weather decision support system, using all historical data available.*

before winter sets in and so there is a green, winter drought. Conversely, a good *early break* in March or April can provide ample feed over winter, even though the actual winter rainfall might be low.

Fig 3.3 Average annual rainfall across the region



Annual and Seasonal Rainfall

Fig 3.3 shows the general trend of average annual rainfall across the region. Rainfall can vary considerably in any particular season and thus average monthly rainfall figures are only suitable as a guide.

Variability

The variability of rainfall from year to year for a location is important and can be evaluated by comparing the long-term averages with the range of values that occur over a period of years.

Throughout the region rainfall is extremely variable between years. Table 3.1 shows how rainfall during summer (Dec–Feb) varies at Yass. The figures show that while the long-term averages are reasonably high, there are rarely two successive months with good above average summer falls. Therefore summer pasture production is quite unreliable.

A more precise climatic indicator is the probability of getting a certain amount of rain at a particular time based on historical rainfall records.

Computer software packages are available which help users better understand climate trends. An example is the CSIRO developed decision support system, MetAccess available from Horizon Technology, phone (02) 9805 1941.

Table 3.1 Monthly Rainfall Variability During Summer at Yass (1898-1997)

	Dec (mm)	Jan (mm)	Feb (mm)
100 year mean	**52.3**	**52.1**	**42.8**
1996/7	71.6	23.8	17.0
1997/8	21.1	37.5	34.6
1998/9	19.7	60.2	8.4

Points to Remember

- Annual and seasonal rainfall variability is the key climatic factor influencing the amount of pasture grown.
- Temperature is usually the most limiting climatic factor influencing pasture growth during winter, especially at higher altitudes.

Further Information

NSW Agriculture publications:

Agnote 1/ET *What drives NSW weather?*
Agnote 2/ET *The southern oscillation index and southern Australia.*
Agnote 3/ET *Guidelines for drought management.*
Agnote 4/ET *Where does the wind come from?*
Agnote 5/ET *Air masses influencing Australian weather.*
Agnote 6/ET *Understanding the statistics used to describe your rainfall.*
Agnote 7/ET *Understanding the weather map.*
Agnote 8/ET *El Nino and the southern oscillation index.*