

Climate

Use this section to find out more about the climate of the Evans sub-catchment. Learn about rainfall, drought, temperature, frosts, and the variability of our local climate.

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How much rain?

An important measure of rainfall for an area is the **average annual rainfall**. This shows how much rain, on average, a place receives per year. In the Evans sub-catchment the Bathurst Agricultural Station receives 631 mm per annum and Bathurst Gaol 622 mm. Although it is not in the Evans sub-catchment, the town of Blayney will be used to demonstrate how climate changes with attributes such as distance from the coast and altitude. Generally, the higher the altitude of an area the higher the rainfall it receives. Blayney, approximately 150 metres higher than Bathurst, receives 766 mm per annum.

Average annual rainfall gives a general indication of how much rainfall an area receives but it does not show the variation of rainfall that can occur between years or the time of year rain generally falls.

When does it fall?

Annual patterns

Apart from the amount of rain that falls it is also important to know when it falls during the year and how reliable the rain will be.

The Evans sub-catchment lies in between the predominantly summer rainfall area of northern Australia and the winter rainfall areas of the south. For Bathurst, the **seasonal distribution** of rain is, on average, slightly summer dominant (Table 1). This contrasts to Blayney that is further west and tends to have a slightly winter dominant rainfall pattern. The influence of each system shifts from year to year - so some years have more winter rain and others a predominant summer pattern.

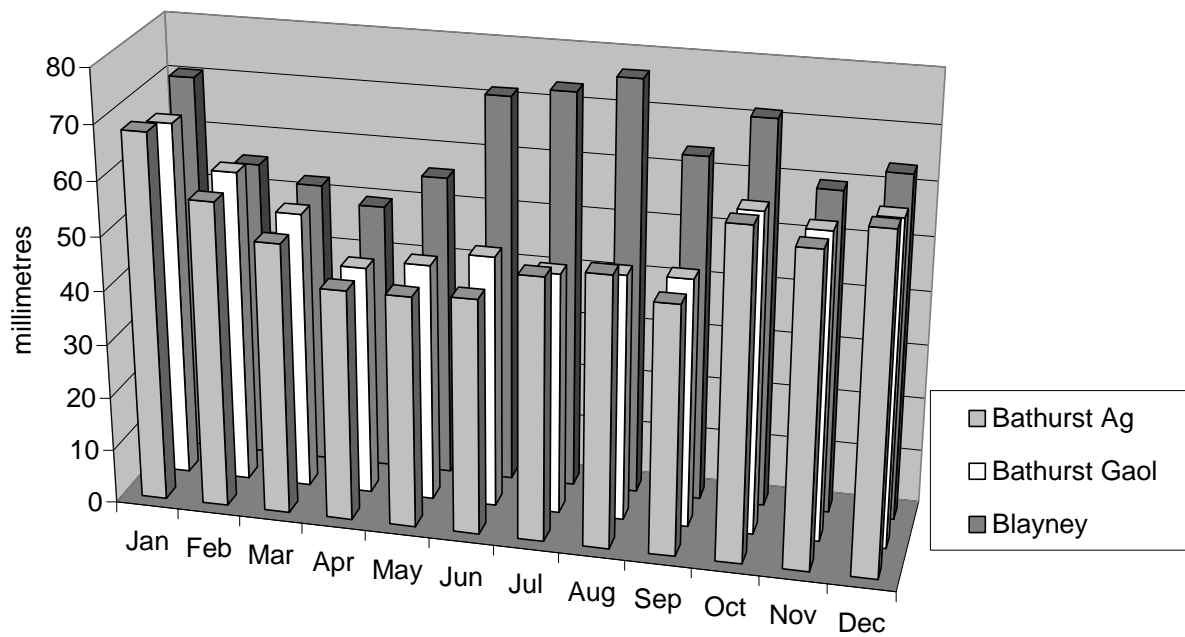
Table 1
Summer/winter rainfall (mm) for areas of the Evans sub-catchment. (Bureau of Meteorology)

Location	Summer Rainfall	Winter Rainfall	Winter dominance*
Blayney	190.1	222	1.17
Bathurst Gaol	181	137	0.76
Bathurst Agriculture Station	188	143	0.76

* Winter dominance is ratio of the sums of the mean rainfall for the 3 winter months compared to the 3 summer ones. A ratio of 0.5 indicates summer dominance where as 1.5 indicates winter dominance.

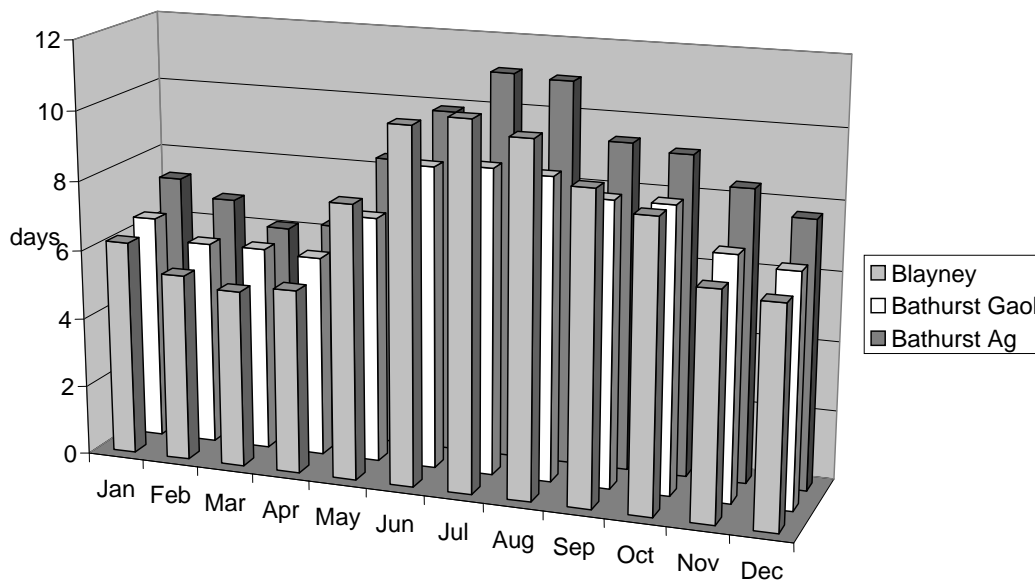
Rainfall information can be reduced further to show the **monthly distribution** of rain throughout the year. The monthly distribution for Bathurst and Blayney is shown below (Figure 1) and shows lower rainfall for Bathurst in the winter months.

Figure 1
Annual distribution of rainfall (mm) by monthly rainfall means. (Bureau of Meteorology)



The average number of raindays, another representation of distribution, indicates how many days during a period that rain falls in a locality. It can be measured per month, season or for a year. Bathurst Ag Station has 103 raindays per year and although it is only few kilometers away, Bathurst Gaol has 87, suggesting Bathurst gaol may be in a rain shadow. In comparison, Blayney has 91 raindays per year. Raindays are also recorded on a monthly basis and are shown below in Figure 2.

Figure 2
Average number of raindays per month for towns in the Evans sub-catchment.



Reliability

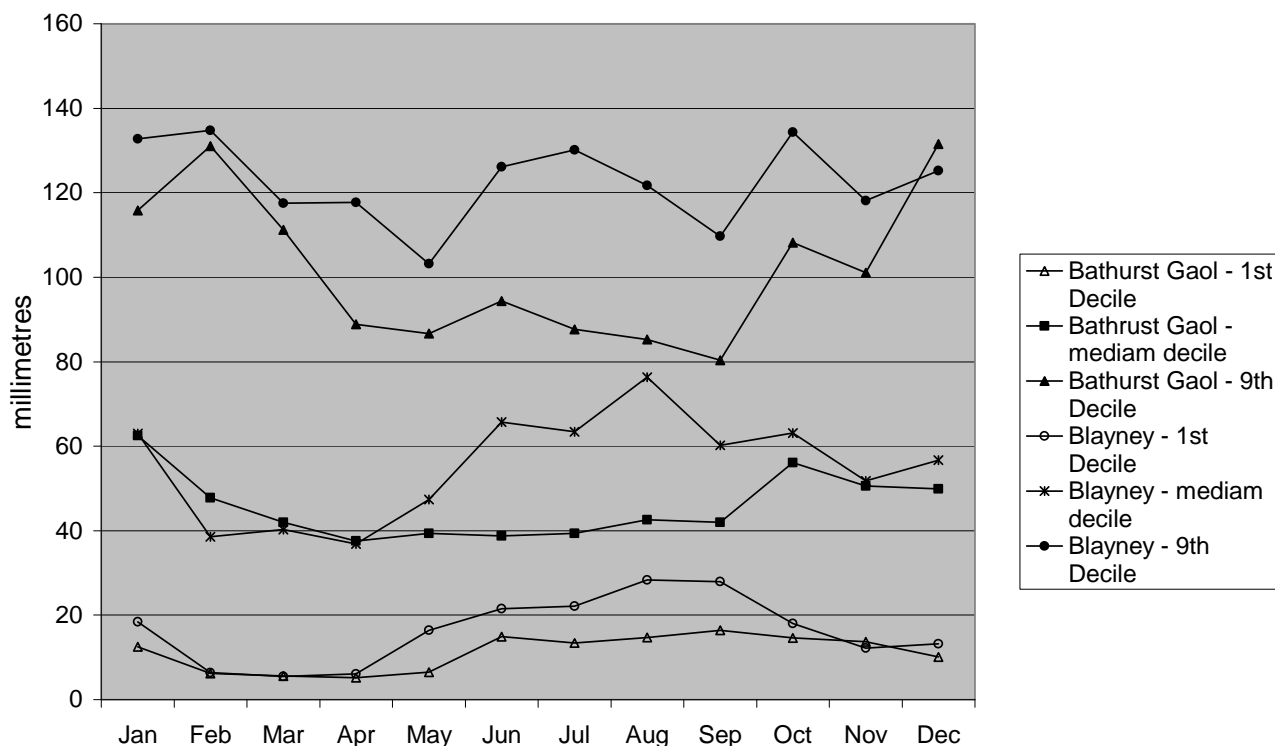
Expressing rainfall as deciles gives an idea of reliability and is a better measure of reliability than the average annual rainfall (see the main climate section of the toolkit for more information on deciles). The percentiles for towns in the Evans sub-catchment are shown below (Table 2).

Table 2
The 1st, median and 9th decile for rainfall (mm) in Blayney, Bathurst Ag Station and Bathurst Gaol (Bureau of Meteorology).

Town	1 st decile	Median decile	9 th decile
Blayney	512	751	1018
Bathurst Ag Station	436	627	855
Bathurst Gaol	407	617	833

As for other climate data, deciles can be expressed on a monthly basis. The graph below (Figure 3) shows the median decile for locations in the Evans sub-catchment on a monthly basis.

Figure 3
The median decile rainfall for towns in the Evans sub-catchment expressed on a monthly basis.



Drought

Drought is a widely used term to describe periods of low rainfall. More accurate terms are used to describe a drought and these are covered in the main climate chapter. It is important to remember that *the maintenance of ground cover is essential in times of drought*. This should become a major goal for landholders. With at least minimal ground cover and the good root mass that accompanies this, recovery of pastures is much quicker when adequate rains do return. Ground cover protects the farmer's major asset - his soil - from wind and water erosion both during and at the end of a drought. Compaction and loss of soil structure make the problem worse if ground cover is not maintained.

What influences our temperatures?

Local influences

For more detailed information on local influences consult the main climate section of the toolkit. It is important to remember general rules, such as; places that are situated in a valley may experience a greater number of frosts than places higher up. This is because cold air drains at night down slopes and hillsides. Also, wind can make exposed places seem cooler than protected areas. **Clouds** reduce the occurrence of frost by trapping heat at night so places with cloudy nights generally have milder nights with less frosts occurring. Each location is unique and so it is important to get local knowledge for effective land management.

How hot and how cold?

Two measurements of temperature for a location are the **mean annual maximum** and the **mean annual minimum temperatures**. Mean temperatures give an overall indication of how hot or cold it is.

Heat

Of the sites in our sub-catchment, Bathurst Gaol has the highest average annual maximum temperature whereas the Agricultural Station has the lowest (Table 3). This difference is likely due to a combination of elevation, local geography (i.e. Bathurst Ag Station being on an open hillside) and features in the surrounding area. Bathurst Gaol has large amounts of brick and concrete which can increase the heat in a given area whereas the agricultural station is largely surrounded by open grassed areas. The **average number of days above 30°C** a location gets each year and the **highest temperature ever recorded** are also measures of how hot a region is. Table 3 (below) shows that Bathurst Gaol and Agricultural Station are both hotter than the much higher Blayney. The average numbers of days above 30°C is also recorded on a monthly basis (Figure 4).

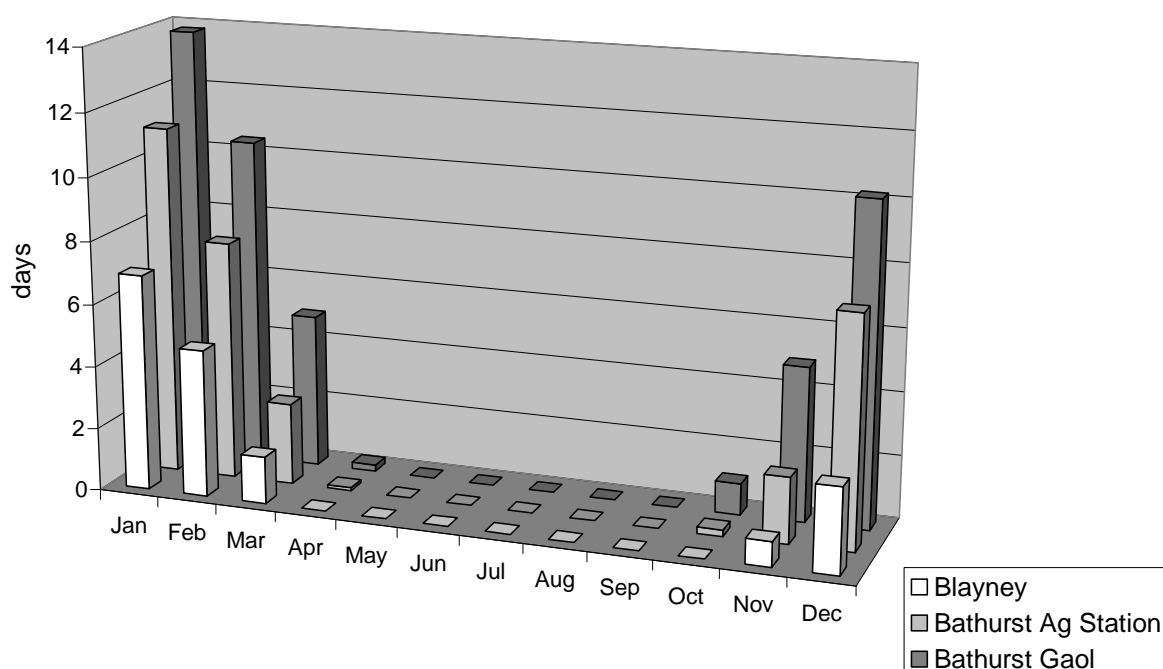
Table 3.

Mean annual maximum temperature, highest ever maximum temperatures and number of days over 30°C maximum for Blayney, Bathurst Gaol and Bathurst Agricultural Station

Location	Mean annual maximum (°C)	Highest ever temp °C	Days > 30 °C
Blayney	18.3	37.5	16.6
Bathurst Gaol	21	44.7	45.4
Bathurst Agricultural Station	19.7	40.1	31

Figure 4

Average number of days the temperature exceeds 30°C for Blayney, Bathurst Gaol and Bathurst Agricultural Station on a monthly basis (Bureau of Meteorology)



Cold

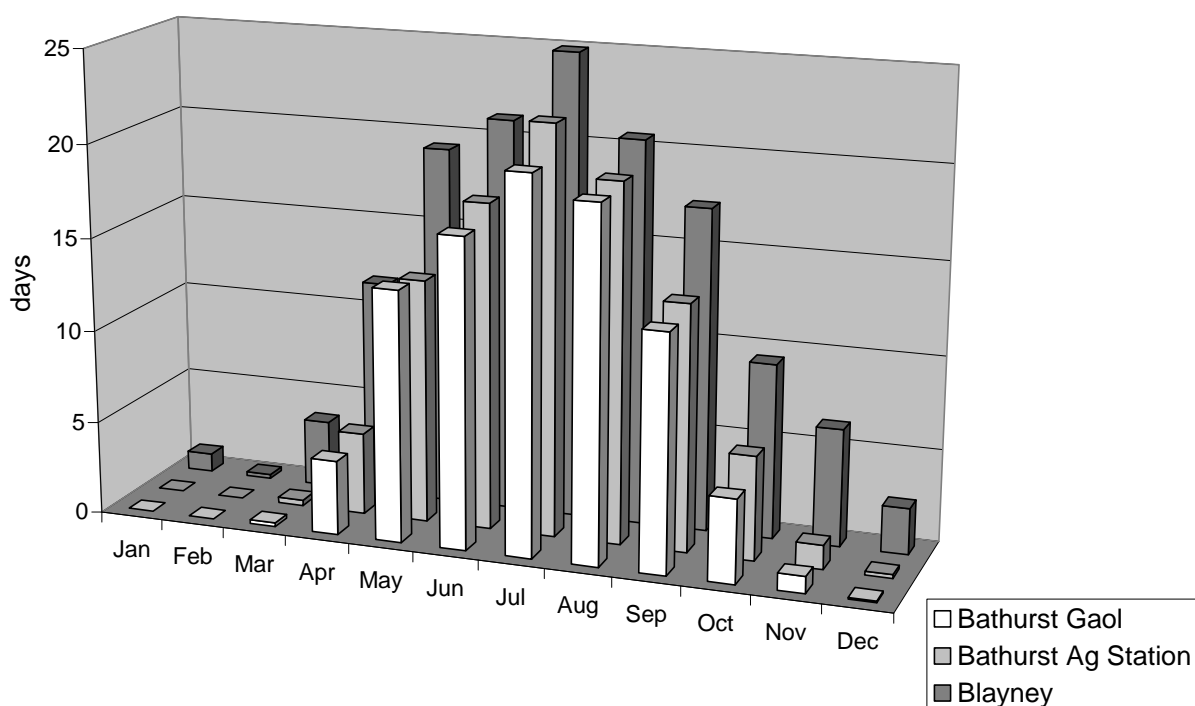
The mean annual minimum temperature measures the average minimum daily temperature of a place for the whole year. Table 4 shows Bathurst Gaol has a lower mean annual minimum temperature than the Agricultural Station. This is likely to be because Bathurst Gaol sits in a basin whereas the cold air can drain from the Agricultural Station. This would also account for the Gaol having a greater number of frost days (Table 4). Frosts can occur when temperatures fall below 2 °C and are referred to as 'light frosts'. Light frosts are just as important as heavy frosts as they can damage crops. Frosts that occur when the temperature falls below 0 °C are classed as severe frosts. The severity of frosts can be measured by determining the percentage of frosts that are severe and for both locations over 60% of frosts are severe (Table 4).

The measure of the average number of frost days per year does not tell when the frosts occur. This is important because frosts occurring in spring, summer and autumn can restrict pasture growth on livestock properties and affect horticulture crops and revegetation activities by damaging seedlings in spring or blossoms and fruits later in the year. The number of frosts on a monthly basis are shown in Figure 5.

Table 4.
Lowest ever temperature, no. of frost days, mean annual minimum temperature and % heavy frosts for towns in the Evans sub-catchment. (Bureau of Meteorology)

Location	Lowest ever temp °C	Frost days (Days < 2 °C)	Mean annual minimum (°C)	% heavy frosts
Blayney	-10.6	137.8	4.4	62
Bathurst Gaol	-10.6	91.6	6.4	65
Bathurst Agricultural Station	-8.9	96.8	6.8	61

Figure 5.
Average number of days the temperature is at or below 2°C for Blayney, Bathurst Gaol and Bathurst Agricultural Station on a monthly basis (Bureau of Meteorology).



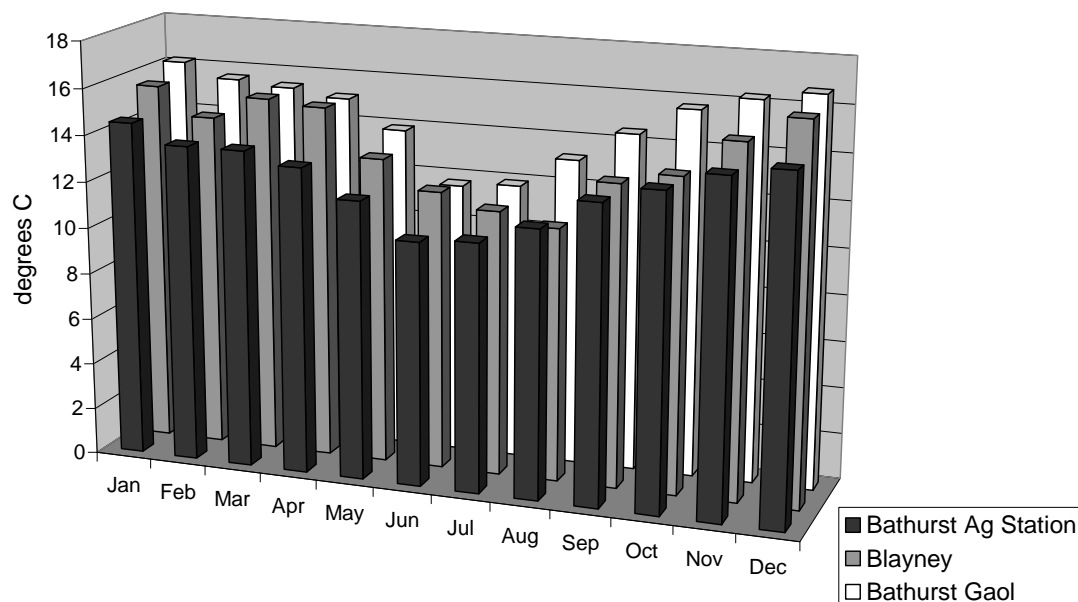
Temperature variability

Maximum and minimum temperatures do not reveal the variations in temperature a place may receive through the seasons and the change in temperature a location may experience between day and night. Temperature varies throughout the year changing with each of the seasons. Changes in temperature between night and day, daily diurnal temperature variations, have an important effect on plant growth and animal production.

Daily variations

A daily variation is known as the **diurnal temperature fluctuation**. In some locations high daytime temperatures are followed by very cold nights so even on moderately warm days, frosts can occur overnight. Figure 6 (below) shows that Bathurst Gaol has greater temperature fluctuations than Bathurst Agricultural Station.

Figure 6.
The daily diurnal temperature fluctuations Blayney, Bathurst Gaol and Bathurst Agricultural Station on a monthly basis . (Bureau of Meteorology)

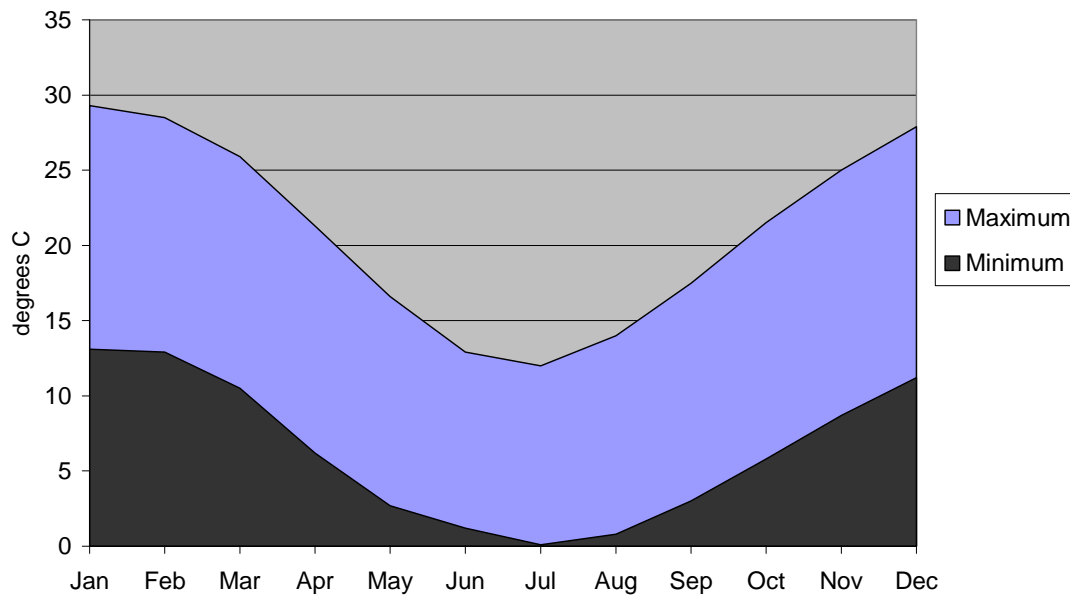


Seasonal patterns

As most of the Evans sub-catchment is temperate, the seasonal changes in temperature for locations follow four distinct seasons. The warm summer is followed by falling temperatures in autumn, then the coldest period of winter and finally the rising temperatures of spring as the year moves onto the next summer.

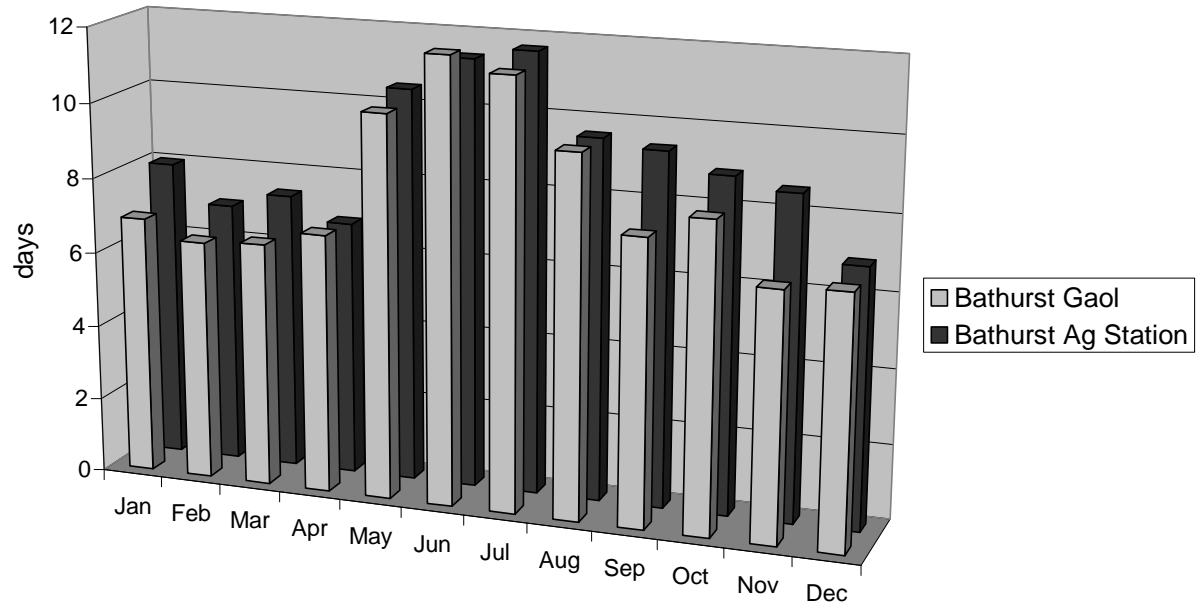
This pattern, typical for all places in our district, can be seen for Bathurst Gaol in Figure 7 below.

Figure 7.
Average maximum and minimum temperatures for Bathurst Gaol on a monthly basis.



Direct solar radiation is reduced by cloud cover. Different locations have different amounts of cloud cover which affects the amount of solar energy received. Cloudiness during daytime can reduce temperatures which can in turn slow plant growth and reduce evaporation. Conversely night time cloudiness can keep the environment warmer and so reduce the incidence of frost. Naturally, cloudiness is closely related to raindays. The number of cloudy days (a day where there is predominantly more cloud than clear sky) are shown below (Figure 8) for Bathurst Gaol and Bathurst Agricultural Station.

Figure 8.
The numbers of cloudy days for Bathurst Gaol and Bathurst Agricultural Station on a monthly basis . (Bureau of Meteorology)



Conclusion

The climate within any sub-catchment is highly variable. Elevation is the main driver of these variations (e.g. the higher the elevation the colder the temperature and the higher the rainfall). Local variation in the landscape, however, can affect climate (e.g. cold air drains into valleys and basins) and may be why Bathurst Gaol is colder than Bathurst Agricultural Station. Variations within a local landscape are quite noticeable on a frosty morning; the creek line will have a heavier frost where the top of the ridge 50 - 100 vertical metres higher will have only a light frost or no frost at all.

It is also important, when considering rainfall, to focus on the median value and *not* the mean value. The mean is the average of all records taken for an area whereas the median is *the value that occurred most frequently*.

Remember that the climate data provided in this section should be used only as a guide, unless you live at the specified locations. For a more detailed picture on the climate at your location you should consider keeping records.

References

- Bureau of Meteorology - Australia
www.bom.gov.au