



**Australian Government**

**Bureau of Meteorology**

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# Climate of Nhill



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## Introduction

Weather affects everybody. Consequently it is of interest not only to residents of an area, but also to visitors. This article on the climate of Nhill<sup>2</sup> is designed only as a general survey – one to give residents more knowledge of their environment and tourists an idea of what can be expected. The data for Nhill is presented in Appendix 1 as a month-to-month survey. Appendix II presents a comparison of Nhill's climate with the climate of other locations.



Nhill is a small wheat and cattle grazing town in the northwest of the Wimmera region. This is why knowledge of the actual and historical weather and climate data is important to the inhabitants of Nhill.

It supposedly got its name from the aboriginal word Nyell, meaning “the abode of spirits”, although some claim that the origin of the name is the aboriginal meaning of the word Nhill meaning “mist over the water”.

Nhill's Elevation is 133m, and it is situated approximately 370 km north west of Melbourne, which puts the town halfway between Melbourne and Adelaide. The first people settled here in the 1870's, and since then, the population has grown to 1,900. The local population claim that the town has got the biggest single-bin silo in the southern hemisphere. Some local attractions are the Little Desert National Park, and Lake Hindmarsh, Victoria's largest freshwater lake. Situated a little further away are Lake Albacutya and Wyperfield national parks.



Nhill is located in the Wimmera region of western Victoria, Wimmera Plains. South of the Mallee, the Wimmera Plains form an area of low relief formed from marine sediments, alluvial deposits and wind blown clay materials.

The meteorological data used in this report, ranges from the first recorded observations in 1897, until now, 2004. This data has been entered into the Australian Data Archive for Meteorology (ADAM), the Bureau of Meteorology's database used for storage of hourly and daily meteorological data concerning Australia.



Figure 1: Location of Nhill, Victoria.

Hopefully this report will give the reader a good insight in the climate conditions and variations of Nhill during the course of the year.

<sup>2</sup> Nhill, Latitude: 36°20'05"S Longitude: 141°38'12"E

<sup>3</sup> Archival Database for Australian Meteorology

## General characteristics

Nhill's temperate climate (köppen classification system) is one with relatively warm temperatures, averaging  $16^{\circ}\text{C}$  over the year. With the influence of the Southern ocean, rainfall of 416.1 mm is less than can be expected. These moderate rainfall numbers are caused by hilly terrain upwind, which reduces the effectiveness of rain-producing systems

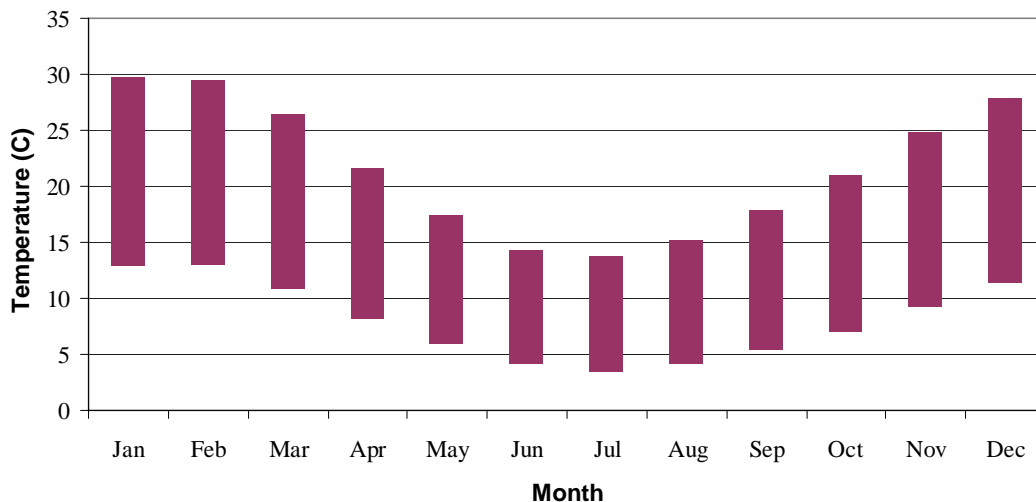
The weather in Nhill is predominantly influenced by weather systems originating in the Southern Ocean. During the winter months, a series of high-pressure systems move across Victoria from west to East, interspersed with low-pressure systems, which bring most of the showers to Victoria.

The weather in spring and autumn is more variable due to the increased mobility of weather systems this time of year.

In summer time, the high-pressure systems in the Southern Ocean move further south. This results in warmer conditions over Victoria, but this is tempered by the passage of cold fronts associated with cooler south-westerly changes and isolated showers.

## Temperature

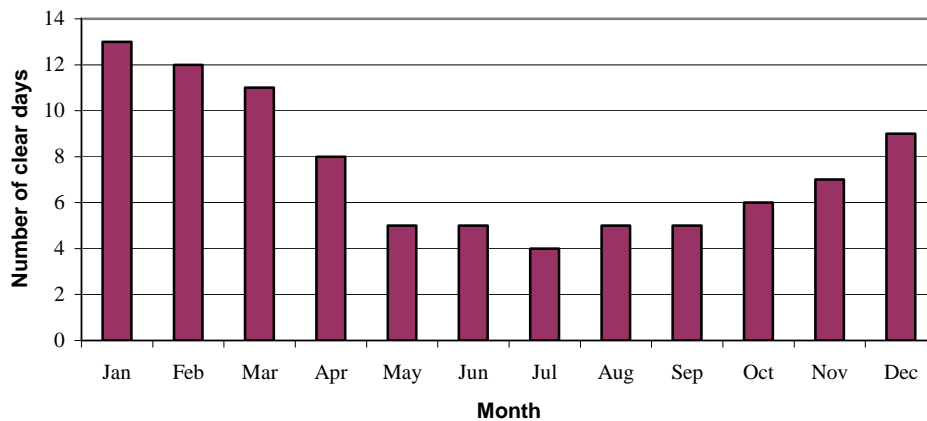
In summertime, daytime temperatures in Nhill reach approximately to the high twenties, while in winter, daytime temperatures dropping to as low between  $10$  and  $15^{\circ}\text{C}$  (figure 2). This makes it a rather moderate climate where temperature is concerned. At night, temperatures can reach up to around  $14^{\circ}\text{C}$ , and drop as low just under  $5^{\circ}\text{C}$ .



**Figure 2:** Average daily minimum and maximum temperature in Nhill per month.

Although moderate during the year, some extremes have been recorded. The lowest temperature recorded in Nhill after 1897 is  $-7.2^{\circ}\text{C}$  in August of 1905, and the highest temperature recorded is  $45.9^{\circ}\text{C}$  in January of 1939. These are extremes, but even daily averages have been known to vary quite a lot. The lowest mean daily temperature was  $-2.5^{\circ}\text{C}$  in July of 1939, August 1976, and June 1996, while the highest mean daily temperature is  $40.6^{\circ}\text{C}$  in February of 1987.

## Sunshine



*Figure 3: Average number of clear days in Nhill per month.*

Obviously the number of clear days, and with it the amount of received sunshine is higher in summer time (figure 3). Also, the position of the sun is higher in summertime. This means that the sun's angle is steeper in summer, which means that the light does not spread out as much as in winter, thus increasing the amount of received energy in one spot.

## Precipitation

The rainfall pattern of Australia is a very seasonal one. The cause of the rainfall pattern being very seasonal is that Australia's climate is dominated by the dry, sinking air of the subtropical high-pressure belt that moves north and south with the seasons. During the winter, these high-pressure systems move north, and the south of Australia comes under the influence of westerly winds, and cold fronts, which hold a lot of rain. More inland these fronts may lead to some frost, but temperatures along the coast are mild all year round. When the high pressure moves south again in summer time, the climate in the south of Australia will be mostly dry and hot, with coastal sea breezes.

This is also the case for Nhill (figure 4). The most rain falls mainly in the winter half of the year, from May to October, averaging about 45 mm per month. The summer months, from November to April, average about 25 mm per month (figure 5). The average yearly amount of precipitation measured from 1884 until 2004 is 416 mm, which is quite low.

Although rainfall is more common in wintertime, the intensity of showers is lower than the showers in summertime. In July for example, 45.7 mm of rain fell in 14 days. That averages 3.3 mm a day, while in January, 20.9mm fell in 4 days, averaging 5.2mm a day. This can be explained by the fact that in summertime, the troposphere is warmer than in wintertime. Warm air can hold a larger amount of moisture before it starts raining, but when it does start raining, it will result in heavier showers.

To illustrate some extremes, the highest monthly rainfall ever recorded is 148.6 mm, while the lowest monthly rainfall ever recorded is 000. In January 1974, the highest amount of daily rainfall was recorded, an astonishing 133.2 mm.

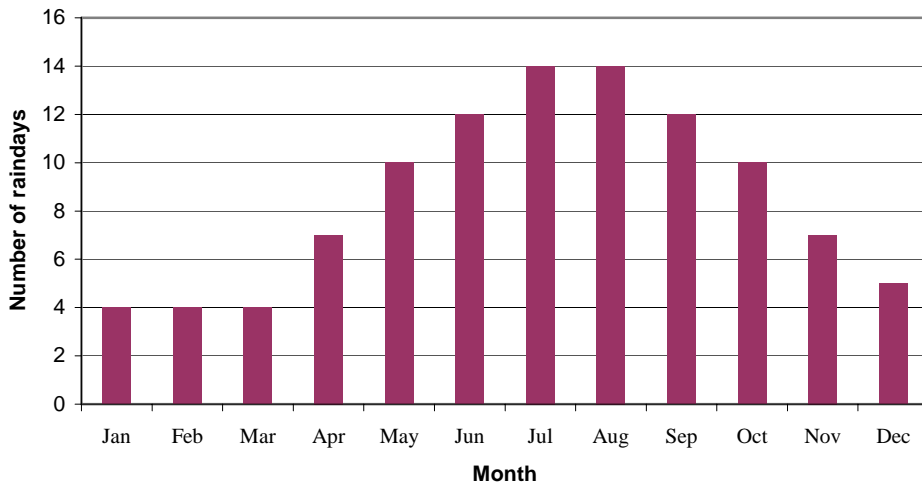


Figure 4: Average number of rain days in Nhill per month.

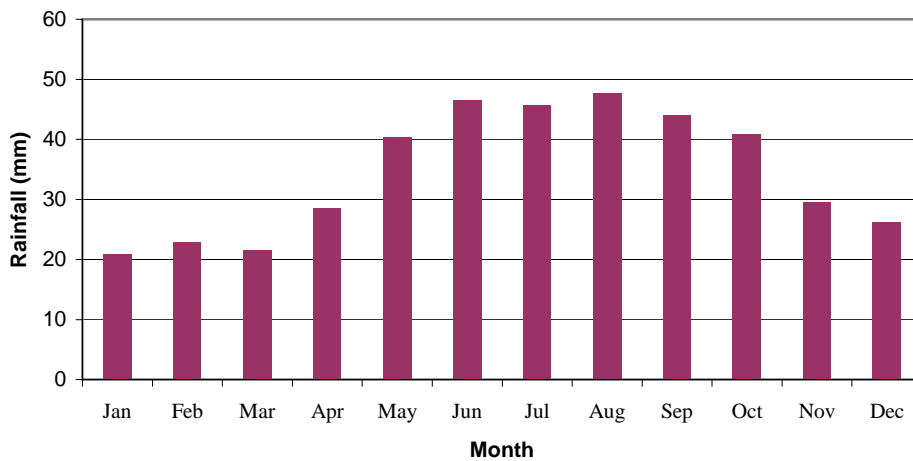


Figure 5: Average amount of precipitation in Nhill per month.

## Wind

As seen in Figure 6, the wind speed at 9 o'clock in the morning is lower than the wind speed at 3 o'clock in the afternoon. These diurnal differences in wind speed can be explained by the changing intensity of the sun. As the sun rises, the temperature at ground level rises, and causes the air to become less dense. This warmer air will rise, replacing the cooler air above. These processes make the air around us turbulent, causing higher wind speeds. As the sun sets again in the evening, the surface cools down, and the air around us stabilizes.

Seasonal differences in the wind speed and wind direction are also caused by differences in intensity of the sun's rays. As the seasons progress, the relative inclination of the Earth towards the sun changes, which in turn changes the amount of radiation received at a certain point on the Earth's surface. In summer time, the wind direction is mainly south to southwest, while in winter time, the wind direction shifts to a north western direction (Appendix II).

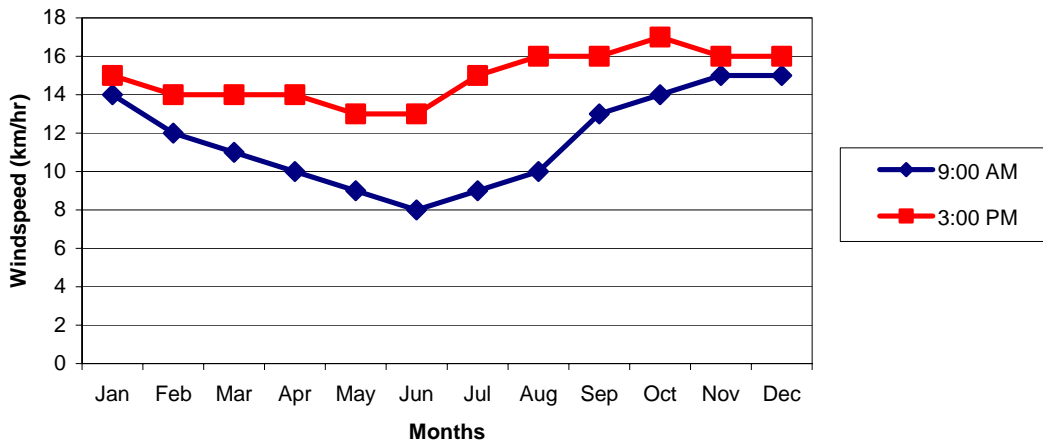


Figure 6: Average wind speed at 9 am and 3 pm in Nhill per month.

## Special Phenomena

### Fog and Frost

In winter and late autumn times, anticyclones, or high-pressure systems can influence Victoria's weather. If this happens, cool, moist westerly winds can cause fog and frost. Fog usually only occurs overnight, but can occasionally persist beyond mid-morning. In Nhill, fog on average occurs approximately 14 days per year, during late autumn and winter.

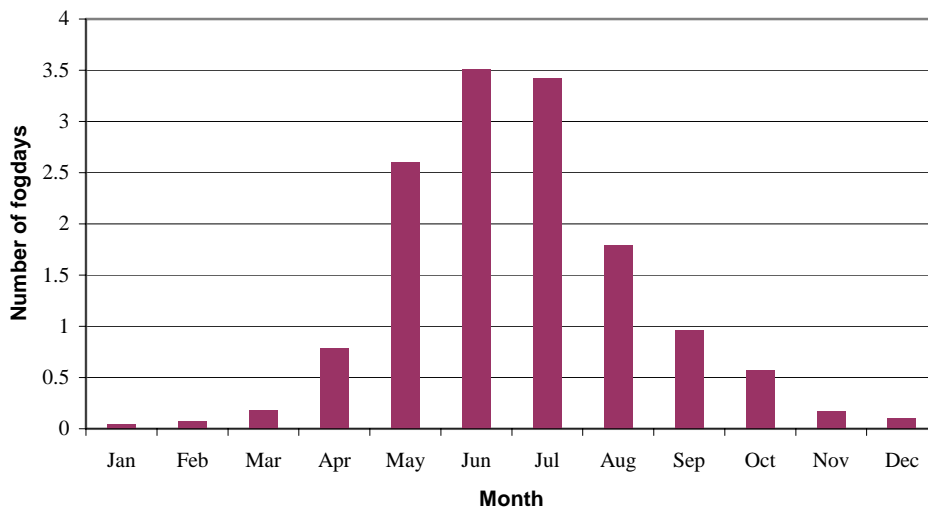


Figure 7: Number of fog days in Nhill per month.

Frost, temperatures below 0°C, can be expected for the first time in April. Although this is normally the case, in 1981, the first frost was actually observed as early as 21st of March. Generally, the period in which frost occurrence can be expected spans from April until November. The frequency of frosts is approximately 2 per year. The frequency is highest in July, about 4, but exceeds 3 frost days a month during the winter months most generally.

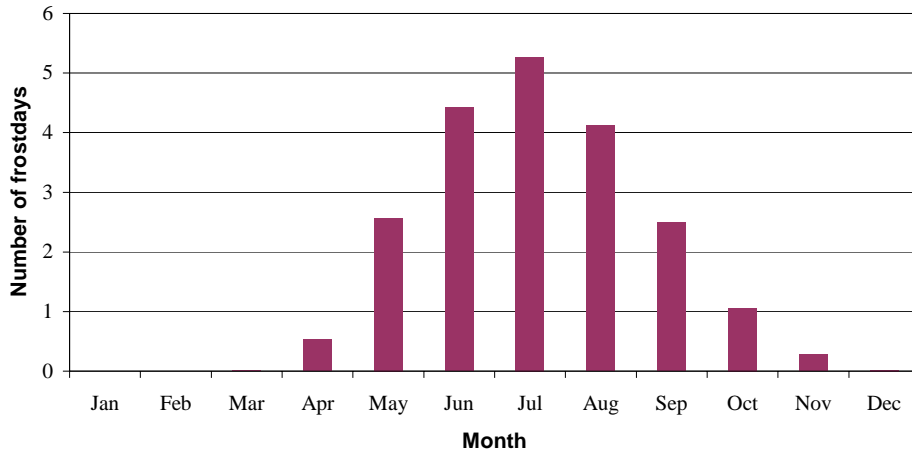


Figure 8: Number of frost days in Nhill per month

### Hail

Hail is not very common in the Nhill area, with an average of 1 hail observation per year. When it does occur however, the most likely month is September. As shown in graph 9, most hail days occur in winter and spring time.

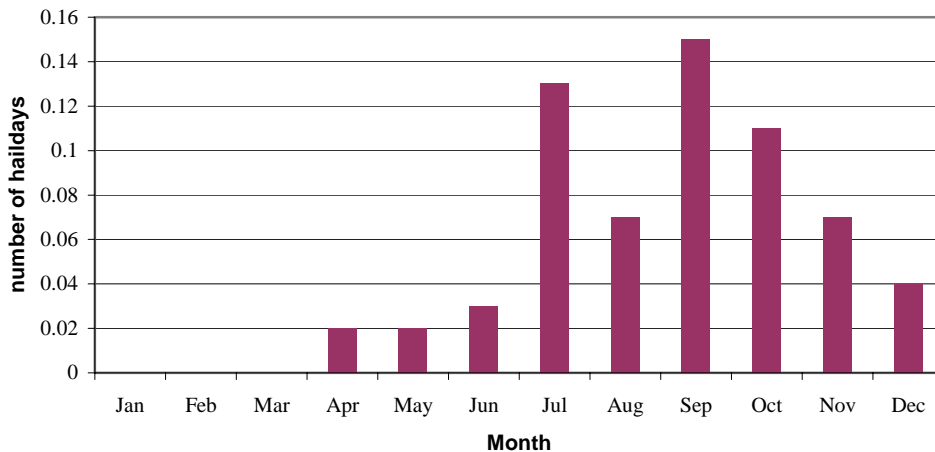


Figure 9: Number of hail days in Nhill per month

### Thunderstorms

On average thunderstorms occur on 6 days per year, and are most frequent during summertime. This can be attributed to the fact that in summertime, the amount of energy provided by the sun is higher in spring and summer compared to other seasons. This energy provides surface heating to provide convection, usually in late afternoons.

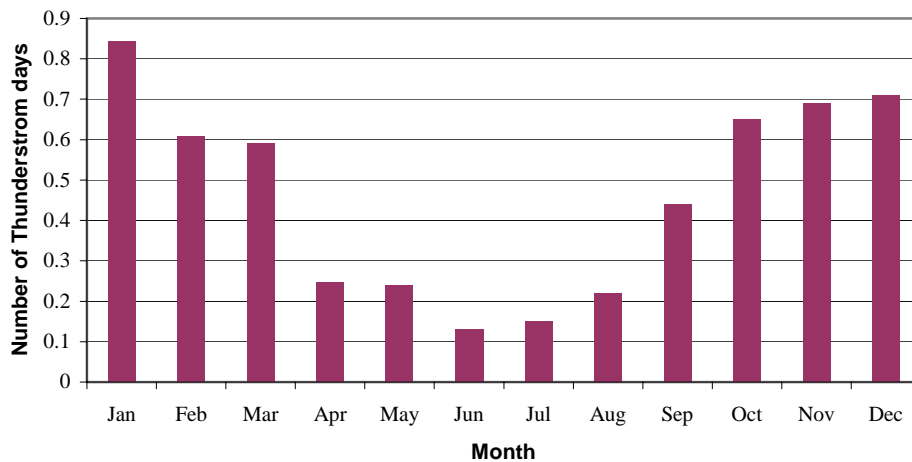


Figure 10: Number of thunderstorm days in Nhill per month

## Climate by months

### January

January is Nhill's warmest and least cloudy month. Most days are warm to hot, with temperatures averaging about 30°C. There are some warm to hot days, with temperatures reaching 30°C on 13 about days. Temperatures up to 45.9°C have even been recorded. The on average the lowest daytime air temperature is 25°C. Overnight temperatures are overall cold to mild, with an average of 12.8°C. The average amount of rainfall is 21 mm, over a period of 4 days, while on the wettest January ever recorded; Nhill received 145 mm of rain. The prevailing wind is southerly in the morning, to south-westerly in the afternoon.

### February

In February, with temperatures still reaching up to the high twenties, days are still hot to warm. The average daytime temperature is 29°C, while the highest and lowest daytime temperatures are respectively 34°C and 24°C. A temperature of 30°C is exceeded on 13 days. Overnight temperatures are still cool, with an average of about 13°C. Rain falls on 4 days, accumulating to 23 mm in total. The prevailing wind is southerly in the morning, to south-westerly in the afternoon.

### March

March is a transitional month between summer and autumn and most daytime temperatures are about 25 to 26°C. During 10 nights of the month, the temperature now falls below 10°C, while the average night-time temperature is 11°C. The daytime temperature now exceeds 30°C on only 8 days of the month. Overnight temperatures average about 11°C. The monthly rainfall of 22 mm falls over 4 days, and the wettest day receives about 12 to 13 mm of rain. The prevailing wind is southerly in the morning, to south-westerly in the afternoon.

### April

Starting with April, the weather becomes noticeably cooler. Daytime temperatures average only 21 to 22°C, and night-time temperatures average as low as 8.2°C. Warm weather is less common although the month's highest maximum temperature is still 30°C. The lowest maximum temperature for April is even 15°C. Rain falls on 7 days during the month, totalling 28.6mm. The prevailing wind is again southerly in the morning, to south-westerly in the afternoon.

## **May**

In May, temperatures now fall below 5°C on 12 days, and it's in May that the first sub-zero reading is usually recorded. Daytime temperatures are usually in the mid to high teens, the warmest day reaching 24°C. Some days are rather cold, the lowest maximum temperatures for the month reaching 12°C. Rain falls on 10 days, totalling 40 mm, and the month's wettest day receives about 14 mm of rain. The prevailing wind is north-westerly in the morning, to south-westerly in the afternoon.

## **June**

June is colder than May, with more than half of the night-time temperatures falling below 5°C. Sub-zero readings are recorded on about 3 nights, while the average daytime temperatures are about 14 to 15°C. In total, June receives about 47 mm of rain over an average of 12 days. The wettest day receives about 13 mm of rain. The prevailing wind is north-westerly in the morning, to westerly in the afternoon.

## **July**

July is Nhill's coldest month, with most daytime temperatures in the low teens and most overnight temperatures failing to reach even 5°C. There are occasional frosts, with temperatures falling below 0°C on about 5 to 6 occasions, but the average daytime temperature is about 13°C. 56 mm of rainfall is received in July, spread out over 14 days. The highest daily rainfall is approximately 113 mm. The prevailing wind north to is north-westerly in the morning, to westerly in the afternoon.

## **Augustus**

August is not as cold as July, but it is the wettest month of the year. Nearly 48 mm fall on 14 days of this month, and the highest daily rainfall is about 13 to 14 mm. There are still occasional frosts, temperatures falling below 0°C on 4 occasions. The average daytime temperature is about 15°C, and at night the temperature reaches an average of just above 4°C. The prevailing wind is westerly generally during the whole day.

## **September**

With temperatures mostly in the high teens, it is a first indication that spring has arrived. On 8 days the temperature exceeds 20°C, but some days can still be cool with the lowest maximum temperature of the month being 14°C. The average daily temperature is 18°C, and the average nighttime temperature is 5-6°C. September is also the first time the maximum daily temperature exceeds 25°C. Nhill receives 44 mm of rainfall in September, over 12 days. The highest daily total is usually about 14 to 15 mm. The prevailing wind is westerly during the whole day.

## **October**

October sees the end of the year's wettest period, although Nhill still receives 41 mm on 10 days of the month. The highest daily rainfall is still 15 mm in October. The temperature exceeds 25°C on 7 days of the month now, and the average daily temperature is 21°C. A few days are still cool, with the lowest maximum daily temperature being 7°C. Overnight temperatures are still rather cool, averaging 7°C. The prevailing wind is south-westerly in the morning, to westerly in the afternoon.

## **November**

In November most days are mild to warm, with the mean maximum temperatures in the low to mid twenties. A few days are still cool, with the lowest maximum temperature being almost 10°C. Temperatures reach 25°C on 13 occasions now, while nighttime temperatures average almost 10°C. On the wettest day, Nhill receives 13 mm of rainfall, and the whole month receives 30 mm of rain. The prevailing wind is south to south-westerly in the morning, to south-westerly in the afternoon.

## **December**

In December most days are warm, with temperatures in the high twenties. A few days are cool, with the lowest maximum temperature usually being about 11 to 12°C. There are about some hot days, with 10 days reaching 30°C or more. Night-time temperatures are cool, being mostly near 10°C. Rain falls on five days for a month total of 30 mm, falls of 10 mm or more recorded on only 1 day. The wettest day receives 13 mm of rain. The prevailing wind is southerly in the morning, to south-westerly in the afternoon.

## **Climate change**

### **Natural variability**

Apart from the normal annual seasonal cycle of climate, global and regional climates are constantly in a state of change on time-scales from months to millions of years. As a result, society and nature are in a continuous process of adaptation to change. A range of factors can lead to changes in climate on these time-scales, some internal to the climate system and some external, some naturally occurring and some deriving from human activities. In addition to physical mechanisms of climate variability, there are also random, chaotic fluctuations within the climate system. These account for a significant part of the observed natural variability.

### **Anthropological variability**

Broad scale changes in land-use patterns, such as deforestation, can significantly alter the roughness and reflectivity of the surface for solar radiation, and hence the absorbed radiation, evaporation and evapotranspiration. In the process, changes in regional climate can occur. Large scale changes in land use will also have great impacts on the global climate. Reducing the land's capacity to absorb carbon dioxide (e.g. through deforestation) and increasing the carbon emission from the land (e.g. through increased biomass decay), lead to greater concentrations of greenhouse gases, and thus enhancing the natural greenhouse effect.

Any increases in the atmospheric concentrations of greenhouse gasses, have a large impact on the level of surface warming. The changes in atmospheric concentration of methane and nitrous oxide over the past 1000 years have followed much the same pattern as carbon dioxide. Any changes in the relative mix and atmospheric concentration of greenhouse gases, whether natural or human-induced, will lead to changes in the radiative balance of the atmosphere, and hence the level of greenhouse warming. Calculations with global climate models have drawn clear links between increased concentrations of greenhouse gases and large-scale surface warming and other changes of climate. It seems likely that, through the 21st century, enhanced radiative forcing by increases in these gases will have a significant influence on global climate, including a detectable warming 'signal' above and beyond the 'noise' of natural variability.

## Climate change in Nhill

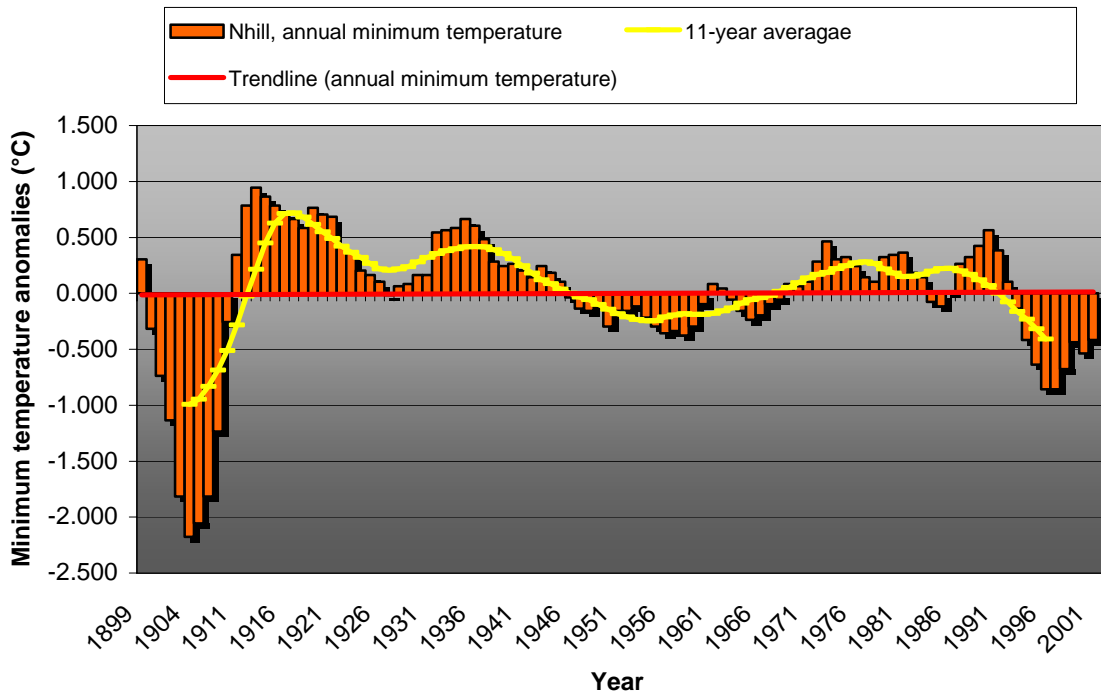


Figure 11: Minimum temperature anomalies for the duration of the instrumental record, for Nhill

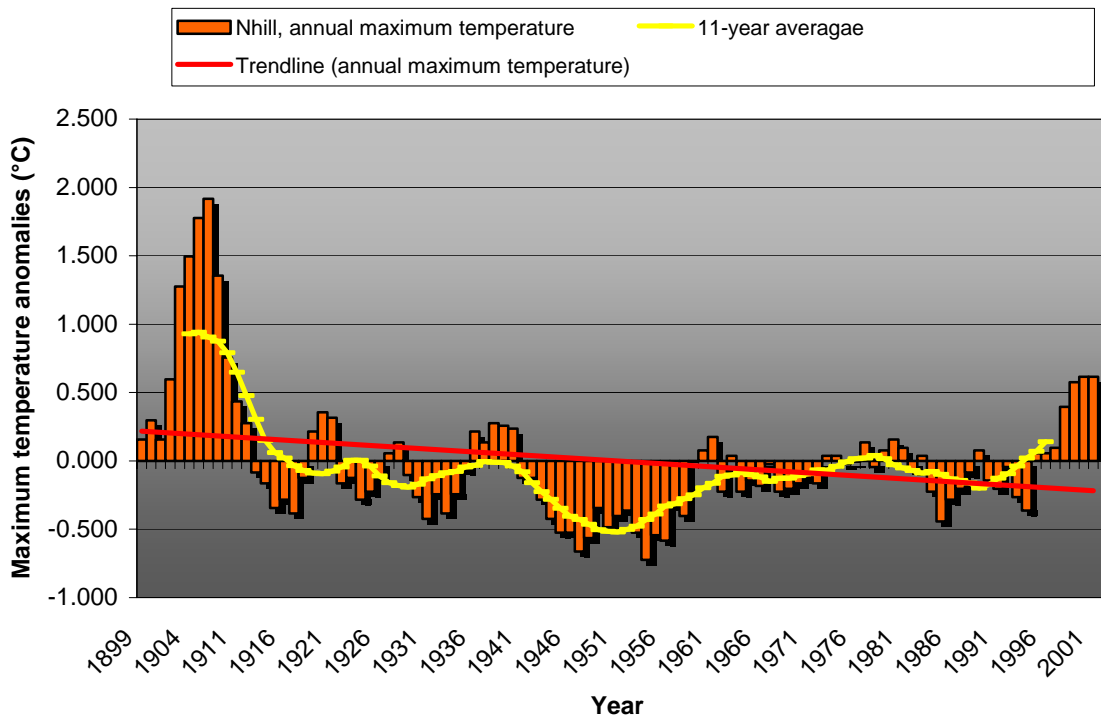


Figure 12: Maximum temperature anomalies for the duration of the instrumental record, for Nhill

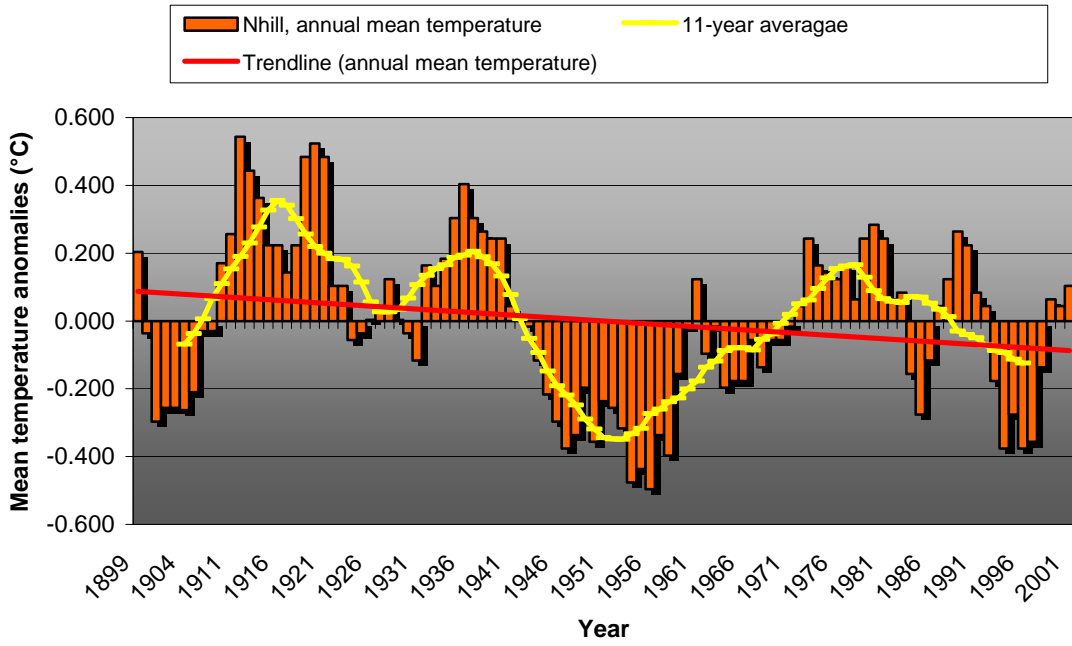


Figure 13: Mean temperature anomalies for the duration of the instrumental record, for Nhill

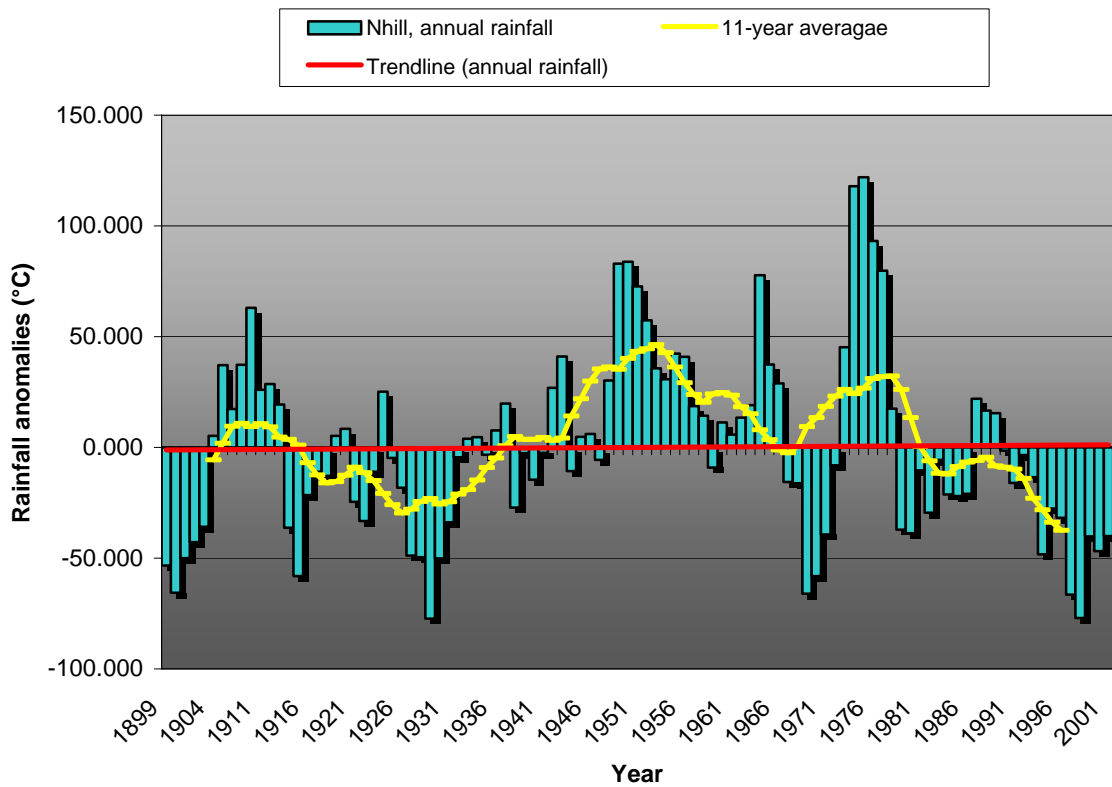


Figure 14: rainfall anomalies for the duration of the instrumental record, for Nhill

## Climate change: Nhill compared to Australia

The annual mean temperature series over Australia is generally consistent with the global trend in showing warming, particularly in recent decades. However, this warming trend is not uniform throughout the country, nor is it the same for maximum and minimum temperatures. Enhancement of the greenhouse effect may lead to changes in the hydrological cycle, such as increased evaporation, drought and precipitation, and it is likely that such changes would have a higher regional variation than temperature effects. Comparison of graphs below clearly indicates that the climate change in Nhill is not the same as the climate change in the whole of Australia over the last century.

Analysis of mean temperature data indicates that the whole of Australia, as well as Victoria, has experienced a temperature increase of about  $0.9^{\circ}\text{C}$ . The mean temperature in Nhill however, has decreased by  $0.2^{\circ}\text{C}$  over the last century.

Analysis of the rainfall data reveals that the average increase in rainfall for the whole of Australia has been 1% over the 20<sup>th</sup> century; average increase in Nhill has been approximately 0% (0.003%). This is mainly due to a strong decline in rainfall in the last 15 years in Nhill.

The differences in the Australian values and the values of Nhill, is a clear example of the fact that temperature changes are noticeably different over relatively short spatial distances.

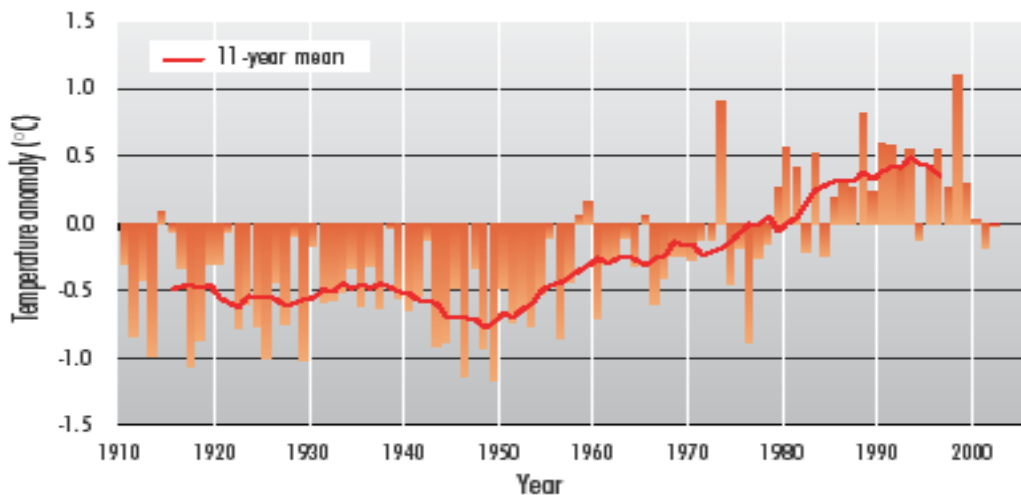


Figure 15: Minimum temperature anomalies for the duration of the instrumental record, for Nhill

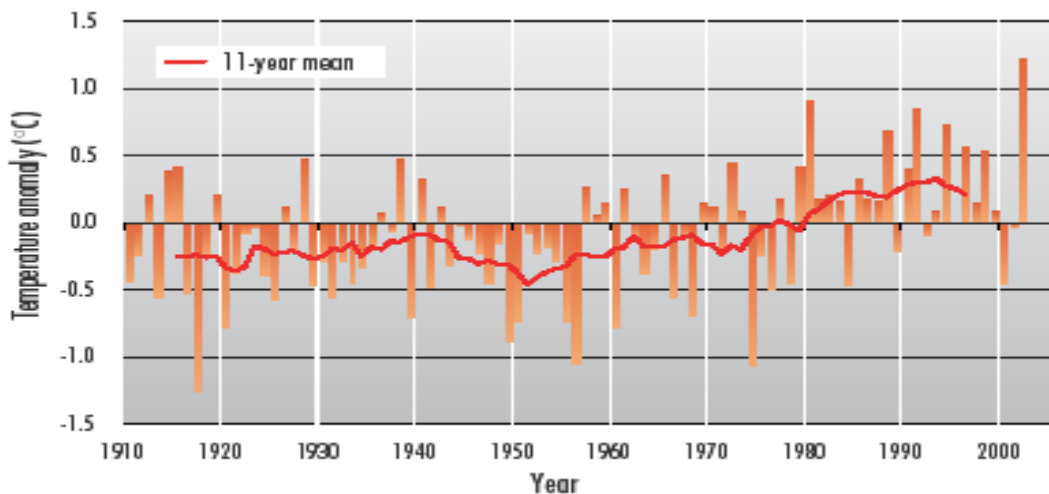


Figure 16: Maximum temperature anomalies for the duration of the instrumental record, for Nhill

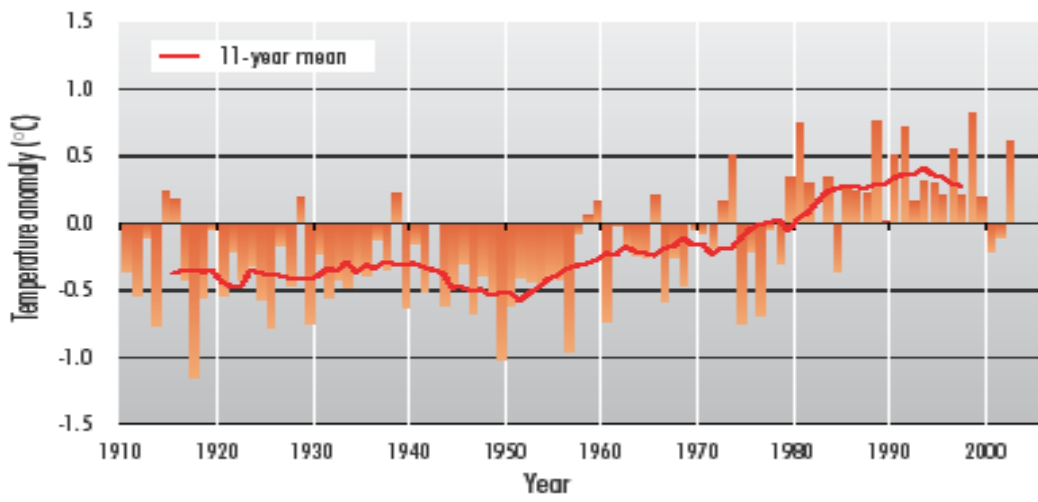


Figure 17: Mean temperature anomalies for the duration of the instrumental record, for Nhill

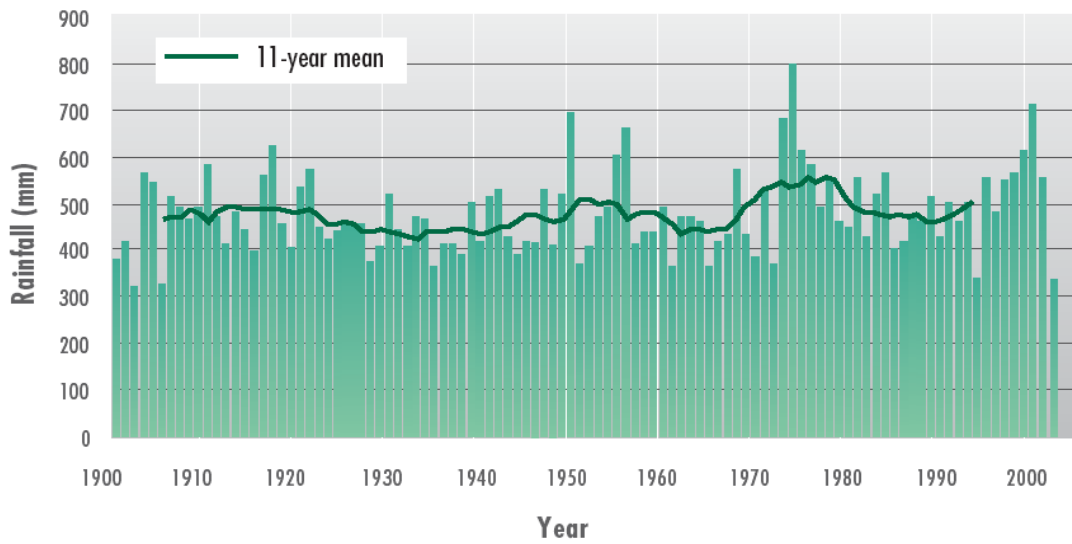


Figure 18: Mean temperature anomalies for the duration of the instrumental record, for Nhill

# Appendix I

## Nhill wind roses data between 1910 and 2004

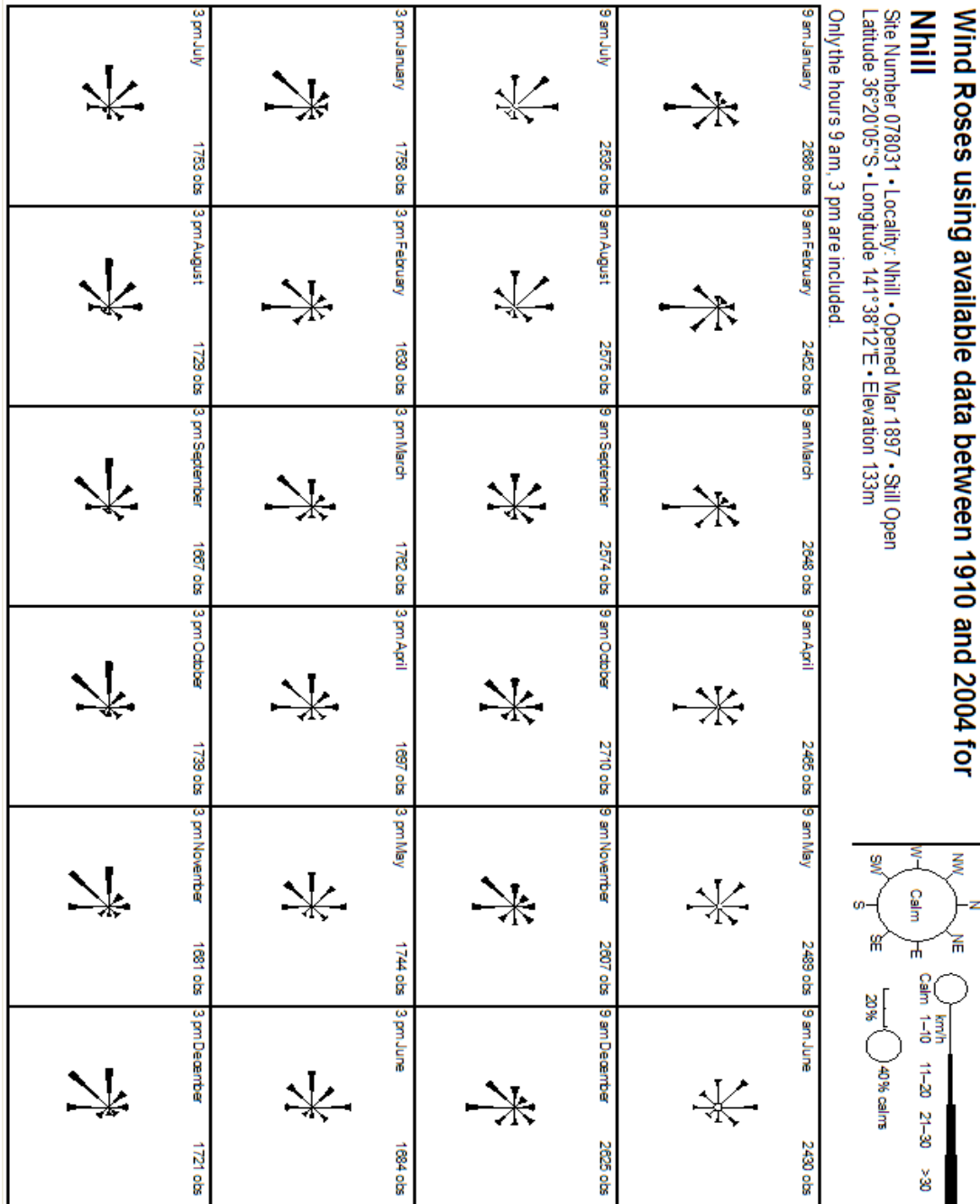
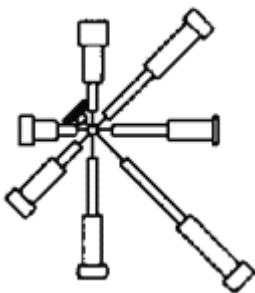


Figure 6: Average wind speed at 9 am and 3 pm in Nhill per month.



Wind roses summarise the occurrence of winds at a location, showing their strength, direction, and frequency. The percentage of calms is represented by the size of the centre circle. Each branch represents wind coming from that direction, with north to the top of the diagram. The branches are divided into segments of different thickness, which represent wind speed ranges from that direction. For example, the thinnest segment may represent winds between 1 and 10 km/h. The length of each branch segment is proportional to the percentage of winds in that speed range, blowing from that particular direction.

## **Appendix II**

### **Data for Nhill month by month**

Appendix II shows the data for Nhill in a month to month survey. It consists of data of

- Temperature
- Rainfall
- Humidity
- Cloud cover
- Wind
- MSL pressure
- Phenomena ( including thunderstorms and fog days)

		Month:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
<b>Element:</b>															
<b>TEMPERATURE</b>															
Max Temp (°C)	Average	29.7	29.5	26.4	21.6	17.4	14.3	13.7	15.1	17.8	21.0	24.8	27.9	21.6	
	Average high	40.6	39.6	36.4	30.3	24.4	18.9	18.1	21.1	26.0	31.5	36.1	38.9	42.0	
	All time high	45.9	45.7	41.9	36.8	30.6	25.0	25.0	28.2	34.4	37.9	42.8	44.4	45.9	
	Average low	20.5	20.7	18.5	15.1	12.1	10.2	9.6	10.5	12.2	14.1	16.6	18.8	9.0	
	All time low	14.4	13.3	13.0	11.0	8.4	5.6	5.0	6.7	6.0	10.0	11.7	10.0	5.0	
	% below 10°C	0.0	0.0	0.0	0.0	0.0	3.0	4.0	2.0	0.0	0.0	0.0	0.0	1.0	
	% below 15°C	0.0	0.0	0.0	4.0	28.0	67.0	76.0	56.0	27.0	7.0	1.0	0.0	22.0	
	% below 20°C	2.0	3.0	10.0	44.0	80.0	98.0	99.0	94.0	76.0	51.0	23.0	7.0	49.0	
	% above 20°C	98.0	98.0	92.0	60.0	22.0	2.0	1.0	7.0	26.0	52.0	80.0	94.0	53.0	
	% above 25°C	77.0	77.0	57.0	24.0	4.0	0.0	0.0	1.0	6.0	22.0	45.0	65.0	31.0	
	% above 30°C	45.0	46.0	27.0	6.0	0.0	0.0	0.0	0.0	0.0	6.0	20.0	35.0	15.0	
	% above 35°C	21.0	20.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	6.0	14.0	6.0	
% above 40°C	5.0	4.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	2.0	1.0		

Min Temp (°C)	Average	12.8	13.0	10.9	8.2	6.0	4.2	3.4	4.1	5.4	7.0	9.3	11.5	8.0	
	Average low	6.3	6.3	4.3	1.9	0.0	-1.3	-1.6	-1.0	-0.1	0.7	2.8	4.9	-2.5	
	All time low	0.0	1.7	-0.6	-2.8	-5.0	-6.5	-6.1	-7.2	-6.1	-5.0	-4.4	-1.1	-7.2	
	Average high	22.3	21.9	19.5	15.5	12.4	9.5	8.3	9.3	11.9	14.9	18.1	21.4	24.2	
	All time high	28.4	27.2	26.1	24.3	17.7	13.3	13.3	12.8	20.6	22.0	24.8	28.3	28.4	
	% below 0°C	0.0	0.0	0.0	1.0	5.0	12.0	13.0	9.0	6.0	2.0	0.0	0.0	4.0	
	% below 5°C	1.0	2.0	7.0	23.0	40.0	59.0	70.0	63.0	48.0	36.0	18.0	5.0	31.0	
	% below 10°C	33.0	30.0	47.0	72.0	88.0	98.0	100.0	99.0	93.0	79.0	62.0	45.0	70.0	
	% below 15°C	74.0	71.0	82.0	96.0	100.0	100.0	100.0	100.0	100.0	98.0	90.0	80.0	91.0	
	% above 15°C	29.0	32.0	20.0	5.0	1.0	0.0	0.0	0.0	0.0	3.0	12.0	22.0	10.0	
	% above 20°C	9.0	9.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	6.0	2.0	

<b>RAINFALL</b>															
Rainfall (mm)	Average	20.9	23.0	21.6	28.6	40.4	46.5	45.7	47.9	44.0	40.8	29.6	26.2	416.1	
	All time low	0.0	0.0	0.0	0.0	0.0	3.5	5.1	1.3	4.0	1.8	0.0	0.0	194.0	
	All time high	145.8	110.5	133.5	141.8	139.9	120.8	103.4	108.7	120.2	148.6	102.5	121.8	745.8	
Rain days	Average no.	4.0	4.0	4.0	7.0	10.0	12.0	14.0	14.0	12.0	10.0	7.0	5.0	102.0	
	All time low no.	0.0	0.0	0.0	0.0	0.0	2.0	2.0	2.0	2.0	1.0	0.0	0.0	48.0	
	All time high no.	11.0	10.0	10.0	16.0	24.0	21.0	25.0	23.0	20.0	20.0	16.0	12.0	163.0	
	% below 1 mm	1.0	1.0	1.0	2.0	3.0	4.0	5.0	4.0	3.0	3.0	2.0	2.0	33.0	
	% above 1 mm	9.0	9.0	10.0	16.0	23.0	28.0	31.0	32.0	28.0	23.0	16.0	12.0	20.0	
	% above 5 mm	4.0	4.0	4.0	5.0	9.0	10.0	9.0	10.0	9.0	8.0	6.0	5.0	7.0	
% above 10 mm	2.0	2.0	2.0	3.0	3.0	4.0	3.0	3.0	4.0	3.0	3.0	2.0	3.0		
Daily highs (mm)	Average high	12.8	13.5	12.6	11.8	12.9	13.1	13.1	13.4	14.5	14.8	13.1	13.2	36.7	
	All time high	133.2	100.6	120.1	64.3	45.0	44.5	36.6	43.7	58.2	53.1	50.0	76.5	133.2	

Month:		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	
		Element:													
<b>HUMIDITY</b>															
% at 9 am		55.0	60.0	64.0	74.0	84.0	89.0	89.0	85.0	77.0	65.0	59.0	55.0	71.0	
% at 3 pm		30.0	32.0	36.0	45.0	57.0	64.0	64.0	60.0	53.0	45.0	38.0	33.0	46.0	
<b>CLOUD COVER</b>															
cloud amount	9 am	3.0	3.0	3.0	4.0	5.0	5.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0	
(oktas)	3 pm	3.0	3.0	4.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0	4.0	4.0	4.0	
Clear sky	No. days	13.0	12.0	11.0	8.0	5.0	5.0	4.0	5.0	5.0	6.0	7.0	9.0	91.0	
Partly cloudy sky	No. days	10.0	9.0	11.0	10.0	10.0	11.0	12.0	12.0	12.0	12.0	12.0	11.0	132.0	
Cloudy sky	No. days	6.0	5.0	7.0	10.0	13.0	13.0	13.0	12.0	11.0	11.0	10.0	9.0	122.0	
<b>WIND</b>															
Prevailing wind (direction)	9 am	S	S	S	S	NW	NNW	NW	NW	SW	SW	SW	S	-	
	% at 9 am	25.0	27.0	26.0	20.0	15.0	16.0	19.0	20.0	17.0	18.0	21.0	23.0	-	
	3 pm	SW	S	SSW	SSW	W	W	W	W	W	SW	SW	SW	-	
	% at 3 pm	25.0	24.0	22.0	19.0	18.0	19.0	22.0	25.0	25.0	24.0	25.0	25.0	-	
Speed	Average 9 am	13.7	12.4	11.6	10.4	8.7	8.2	8.8	10.5	12.9	14.5	14.9	14.7	-	
	Average 3 pm	15	13.7	14	13.8	13.3	13.4	14.7	15.7	16.2	16.8	16.4	16.3	-	
Gale force wind	No. days	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	
Strong wind	No. days	1.0	1.0	1.0	1.0	1.0	0.0	1.0	1.0	2.0	1.0	2.0	1.0	12.0	
<b>MSL<sup>1</sup> PRESSURE</b>															
MSL Pressure (hPa, 1000+)	Average 9 am	13.6	14.9	17.8	20.4	20.6	20.9	20.0	19.0	18.0	16.4	14.9	13.4	17.5	
	Average 3 pm	11.4	12.7	15.4	17.9	18.5	19.0	18.2	16.9	15.7	14.1	12.8	11.3	15.3	
<b>PHENOMENA</b>															
Fog	No. days	0	0	0	1	3	3	3	2	1	1	0	0	14	
Frost	No. days	0	0	0	1	3	4	5	4	2	1	0	0	21	
Hail	No. days	0	0	0	0	0	0	0	0	0	0	0	0	1	
Thunder	No. days	1	1	1	0	0	0	0	0	0	1	1	1	6	

<sup>1</sup> MSL pressure: Air pressure at mean sea level.

## Appendix III

### Comparison with other locations

In order to provide a broad comparison of Nhill's climate with other locations, appendix 2 offers a comparison of Nhill's mean minimum and maximum temperature and mean rainfall with corresponding figures for major towns and cities in Victoria (those with a population in excess of 10000 inhabitants), other Australian state and territory capitals, and the world's largest cities (those with a population in excess of 10 million inhabitants) in addition to Oceanian capitals of nations and territories with a population in excess of 100000 inhabitants.

Month:	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov			
Season:	summer			autumn			winter			spring			year		
Element:	Min	Max	Rain	Min	Max	Rain	Min	Max	Rain	Min	Max	Rain	Min	Max	Rain
	(°C)	(°C)	(mm)	(°C)	(°C)	(mm)	(°C)	(°C)	(mm)	(°C)	(°C)	(mm)	(°C)	(°C)	(mm)
location:															
Nhill	12	29	70	8	22	91	4	14	140	7	21	114	8	22	416
<b>Rest of Victoria</b>															
Bairnsdale	12	24	178	9	20	172	4	14	158	8	20	191	8	20	692
Ballarat	11	24	133	8	18	162	4	11	207	6	17	198	7	17	701
Colac	10	25	117	8	20	171	4	13	241	7	18	208	7	19	735
Geelong	12	24	101	10	20	140	6	14	150	8	18	166	9	19	518
Horsham	11	30	66	7	22	64	3	14	121	6	21	113	7	22	374
Melbourne	14	25	154	11	20	165	6	14	148	9	20	185	10	20	654
Mildura	16	32	57	10	24	61	5	16	79	10	25	71	10	25	267
Yallourn	12	25	199	9	19	225	4	13	236	8	19	237	8	19	902
Queenscliff	14	22	115	12	18	150	7	13	173	10	18	166	11	18	605
Portland	12	21	113	10	18	196	7	14	317	9	17	208	10	18	835
Sale	12	26	147	9	21	149	4	14	136	8	20	176	8	20	606
Shepparton	14	31	76	8	22	93	4	14	130	8	21	129	8	22	446
Traralgon	12	26	151	9	21	150	4	15	124	7	20	166	8	20	591
Wangaratta	13	30	119	7	22	149	3	14	207	7	21	175	8	22	667
Warrnambool	13	22	112	10	19	185	7	14	251	9	17	195	10	18	743
Wodonga	15	31	130	9	23	165	4	14	239	8	22	181	9	22	715
<b>Rest of Australia</b>															
Adelaide	15	27	60.3	12	22	112	7	16	169	11	21	112	11	21	451
Brisbane	20	29	451	16	26	307	10	21	170	16	26	218	16	26	1149
Canberra	13	25	143	8	18	147	3	10	161	7	18	156	8	18	609
Darwin	25	33	965	24	33	375	21	31	6	25	34	189	24	33	1536
Hobart	12	22	132	9	18	118	4	13	124	7	17	133	8	17	503
Perth	17	29	36	14	25	188	9	18	490	12	22	156	13	23	868
Sydney	18	26	299	15	22	382	9	17	308	13	22	229	14	22	1221

Rest of Oceania															
Agana (Guam)	24	29	8	24	31	25	25	30	1443	24	31	340	23	30	1816
Apia (W. Samoa)	17	29	249	12	22	27	6	14	178	10	21	249	11	22	950
Auki (Solomon Is.)	24	31	1075	23	30	908	23	30	644	23	30	663	23	30	3290
Noumea (N. Caledonia)	23	29	309	21	27	336	18	23	272	19	25	155	20	26	1072
Nukualofa (Tonga)	22	29	452	21	28	488	18	25	356	19	26	315	20	27	1611
Tahiti (F. Polynesia)	23	29	309	21	27	336	18	23	272	19	25	155	20	26	1072
Ponape (Micronesia)	24	29	1064	24	29	1295	23	30	1278	23	30	1222	23	29	4859
Port Moresby (N. guinea)	24	31	483	24	31	340	23	28	79	24	30	109	24	30	1011
Port Vila (vanuatu)	23	30.1	803	22	29	697	20	26	365	21	28	358	21	28	2222
Suva (Fiji)	24	30	864	23	30	1029	21	27	465	22	28	682	22	29	3040
Wellington (N. Zealand)	14	21	190	11	17	262	7	13	330	10	16	236	10	17	1018
Rest of the world															
Bombay (India)	17.3	31.3	8	23	33	14	25	30	1995	23	32	384	22	32	2401
Buenos Aires (Argentina)	19	29.1	347	13.7	23	353	8	15.9	166	12.9	22	348	13	22.5	1215
Cairo (Egypt)	10	20	16	15	28	6	21	34	0	17	29	4	16	28	26
Jakarta (Indonesia)	24	31	779	25	32	492	25	32	148	25	32	237	25	32	1655
London (great Britain)	3	8	146	6	13	146	13	22	152	8	15	167	8	14	611
San Francisco (U.S.A.)	6	14	270	9	18	117	12	22	5	11	20	109	9	18	500
Manila (Philippines)	24	30	102	26	33	198	26	31	1171	25	31	731	25	31	2201
Mexico City (Mexico)	7	22	26	11	26	98	12	24	513	10	23	211	10	24	848
Moscow (Russia)	-11	-5	134	1	10	129	12	22	246	2	8	182	1	9	691
New Delhi (India)	9	22.8	43	20.9	35	40	27	35.9	545	18.9	32	169	19	31.4	797
New York (U.S.A.)	-3	4	244	6	14	287	19	27	276	10	18	250	8	16	1056
Osaka (Japan)	3	10	140	10	19	360	23	31	455	15	23	351	13	21	1306
Paris (France)	3	8	156	7	15	167	15	24	161	9	16	166	9	16	650
Rio de Janeiro (Brazil)	23	29	388	22	28	326	19	25	187	20	26	271	21	27	1173
Sao Paulo (Brazil)	18	27	657	16	25	309	12	22	139	15	25	350	16	25	1455
Seoul (Korea)	-5	3	70	7	17	225	21	28	809	10	19	240	8	17	1344
Shanghai (China)	1	9	133	10	18	298	23	30	413	15	22	268	12	20	1112
Tokyo (Japan)	3	11	148	10	18	373	22	28	482	15	22	464	13	20	1467
Wageningen (The Netherlands)	-0.1	5	62	4	13	53	11	21	71	6	14	67	5	14	72

The data in the tables above was obtained from the Bureau of Meteorology, the World Meteorological Organisation, and the Meteorological and Air Quality department of Wageningen University and Research Center.