

Air quality in the Namoi/North West Slopes Region

Air quality in the Namoi/North West Slopes region was good throughout all of spring 2022, and all stations met national benchmarks¹ on 100% of days (Figure 1)². Good air quality across the region was sustained by the prevailing climate conditions. A very wet season with above-average rainfall for all spring months, cooler temperatures, and improved ground cover reduced dust activity.

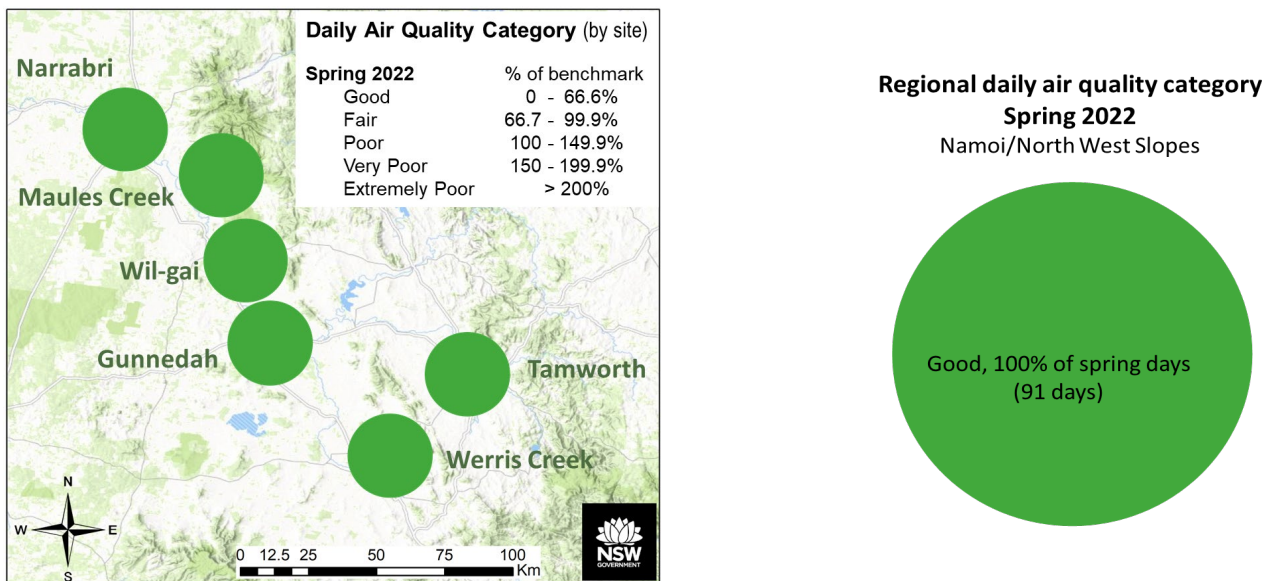


Figure 1 Daily air quality categories at individual monitoring stations (left) and regional air quality in the Namoi/North West Slopes region (right).

Air quality: summary statistics, spring 2022

No days above the national benchmarks was recorded at any station during spring 2022 (Table 1).

Table 1 Number of days above each benchmark, by station, 1 September to 30 November 2022

Station	PM10 daily benchmark [50 µg/m ³]	PM2.5 daily benchmark [25 µg/m ³]	NO ₂ hourly benchmark ^{1a} [8 pphm]	O ₃ 8-hourly benchmark ^{1a} [6.5 pphm]
Gunnedah	0 #	0 #	0	0
Narrabri	0	0	-	-
Tamworth	0	0	0*	0*
Maules Creek	0	0	-	-
Werris Creek	0	0	-	-
Wil-gai	0	0	-	-

= the particle monitor at Gunnedah station did not meet 75% data availability requirement during spring 2022 (see Table 2 for details); * = Tamworth station did not meet the 75% data availability requirement for gaseous parameters as monitors were only commissioned on 30 September 2022. - = not monitored; µg/m³ = micrograms per cubic metre; pphm = parts per hundred million by volume (i.e. parts of pollutant per hundred million parts of air).

^{1, 1a} The National Environment Protection (Ambient Air Quality) Measure (Air NEPM) sets national standards for common urban air pollutants, which in this report are referred to as air quality ‘benchmarks’. 1a: the 2021 amended NEPM strengthened the 1-hour NO₂ standard (from 12 pphm) and replaced the previous O₃ standards with the 8-hour rolling average standard.

² Data for particles at Gunnedah AQM station was only available for 36% of days in spring 2022 (see Table 2). As such, the AQC chart (Figure 1) does not account for particle contribution at Gunnedah on 64% of spring days, and the proportion of ‘good’ air quality days at Gunnedah (100%) is primarily driven by low gaseous concentrations during the season.

Air quality: particle pollution spring 2022

The time series of daily average particle concentrations shows PM10 levels well below the benchmark. No stations recorded PM10 concentrations above the benchmark during spring 2022 (Figure 2).

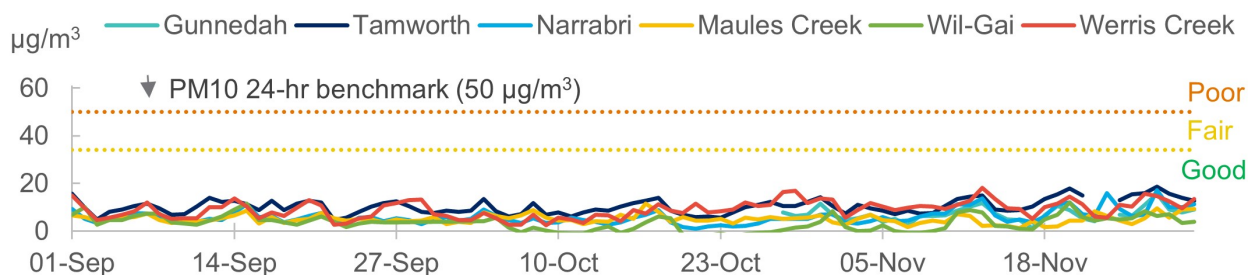


Figure 2 Daily average PM10 in spring 2022, showing concentrations below the benchmark.

Daily average PM2.5 levels were below the benchmark. No stations recorded PM2.5 concentrations above the benchmark during spring 2022 (Figure 3).

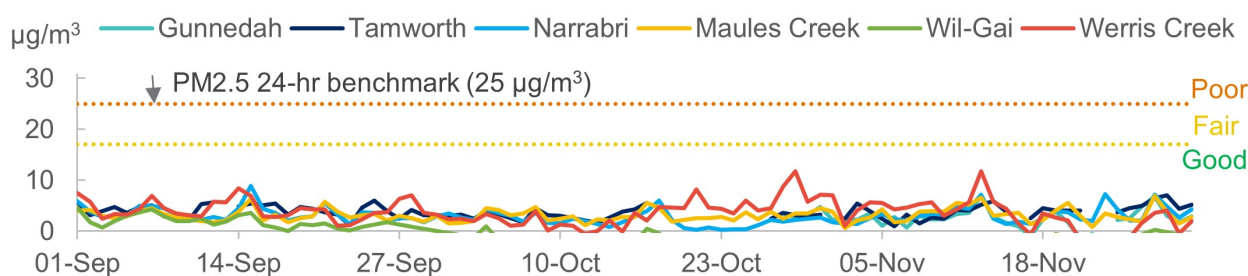


Figure 3 Daily average PM2.5 in spring 2022, showing concentrations below the benchmark.

Air quality: gaseous pollution spring 2022

Figure 4 and Figure 5 show spring 2022 trends at both stations were characterised by broadly stable ozone and nitrogen dioxide concentrations³, trailing well below the stricter O₃ and NO₂ standards⁴.

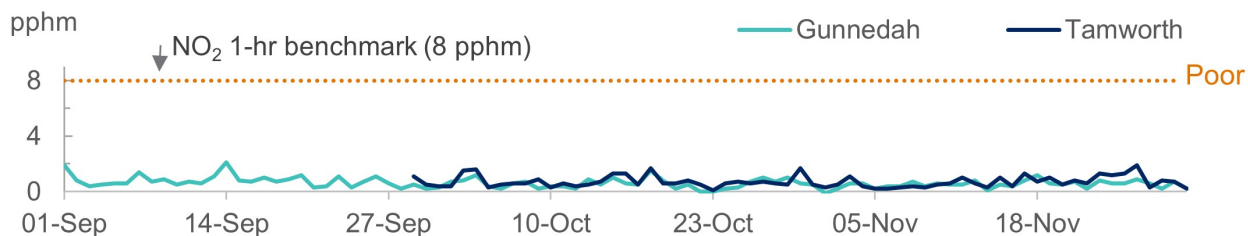


Figure 4 Ozone daily maximum 8-hour average concentrations at Gunnedah and Tamworth, during spring 2022, showing levels below the benchmark

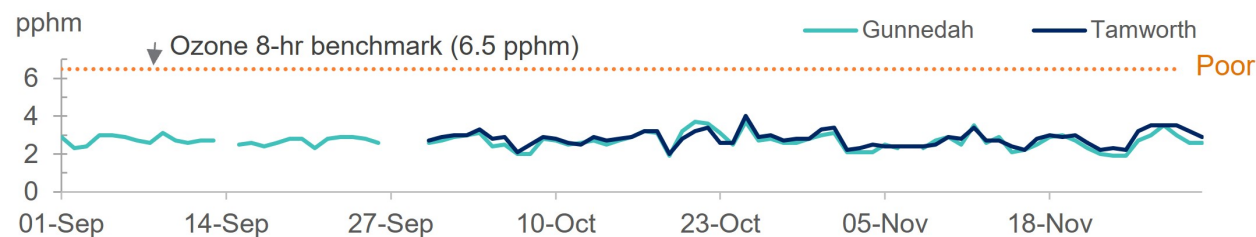


Figure 5 Nitrogen dioxide daily maximum 1-hour average concentrations at Gunnedah and Tamworth, during spring 2022, showing levels below the benchmark

³ Tamworth station gaseous monitors were recommissioned for spring/summer on 30 September 2022.

⁴ Air quality categories based on the updated national gaseous standards (or benchmarks) are not yet established. Hence these plots do not show any other air quality category other than 'poor' which are defined by benchmarks.

Seasonal weather and climate

Spring 2022 was the wettest on record since 1900 for New South Wales, with rainfall inland of the Dividing Range 2 to 4 times the spring average⁵. The state recorded well above-average rainfall during September, October, and November. September was the fifth-wettest on record for the state. October rainfall for the state was a new monthly record and the fifth-highest total for any month since 1990. November rainfall for many inland areas was very much above average.

Drought conditions and dust activity

Spring 2022 rainfall was above average for most of New South Wales, with well above average rainfall in the northeast. The high soil moisture and above-average rainfalls across most parts of the Namoi/North West region helped enhance ground cover. The NSW DPI Combined Drought Indicator (CDI) shows that 100% of New South Wales was in the non-Drought category at the end of November 2022⁶ (Figure 6).

DustWatch⁷ reported low levels of dust activity in the Northwest New South Wales region during spring 2022. In addition to enhanced ground cover and wetter-than-average conditions, wind strength was very low for September, increased from October but below average for November. In terms of hours of dust activity, Gunnedah recorded zero hours of dust activity.

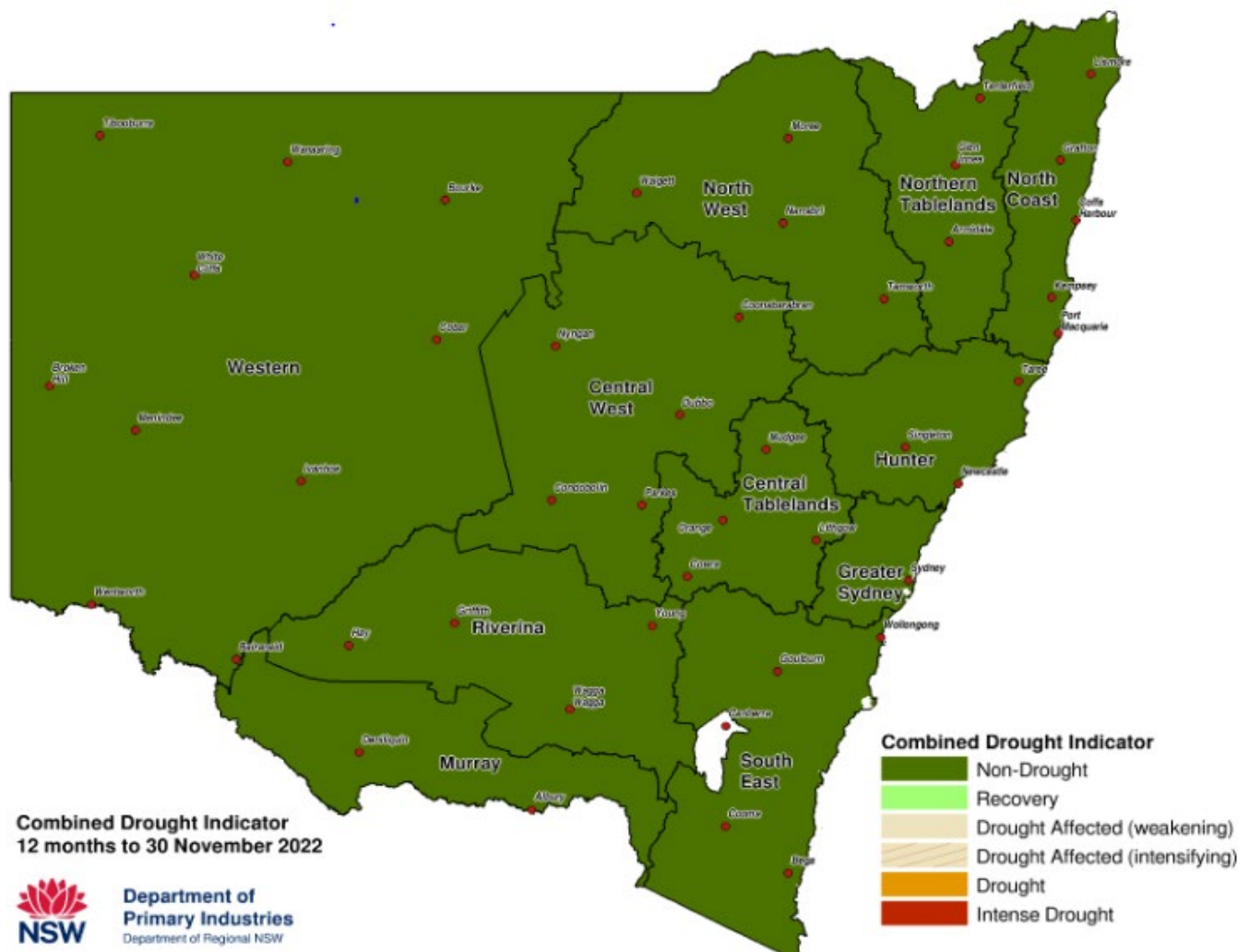


Figure 6 NSW Combined Drought Indicator – 12 months to 30 November 2022, showing non-drought conditions across the Namoi/Northwest region and generally across the state.

⁵ Seasonal Climate Summary for New South Wales in spring 2022, Bureau of Meteorology, accessed March 2023.

⁶ Combined Drought Indicator for 12 months to 30 November 2022, Department of Primary Industries, accessed June 2023.

⁷ DustWatch Reports: September 2022, October 2022 and November 2022, Department of Planning and Environment, accessed June 2023.

Rainfall

The Bureau of Meteorology’s (BOM) seasonal rainfall summary at Figure 7⁸ shows that rainfall during spring 2022 was ‘very much above average’ for most of the Namoi/North West Slopes region. In terms of rainfall totals, these ranged between 300–400 millimetres (mm)⁹, much higher compared to spring totals for the region in the past 3 years (2019, 2020, 2021).

Seasonal rainfall totals for spring 2022 at individual BOM stations Tamworth AWS (393mm)¹⁰ and Gunnedah AWS (423 mm)¹¹, were at least double their respective long-term spring totals (187mm and 170 mm)^{12,13}. The department’s Gunnedah air quality monitoring station (Gunnedah AQM) recorded 466 mm of rainfall (Figure 8)¹⁴, at least 2 times the Gunnedah AWS long-term total for spring (170 mm).

The climatic drivers La Niña and negative Indian Ocean Dipole combined during 2022 for a very wet year across Australia¹⁵, which led to above average rainfall, particularly for the eastern half of the continent. Together they also increase the chances of warmer nights for northern Australia, and cooler days for much of the eastern mainland.

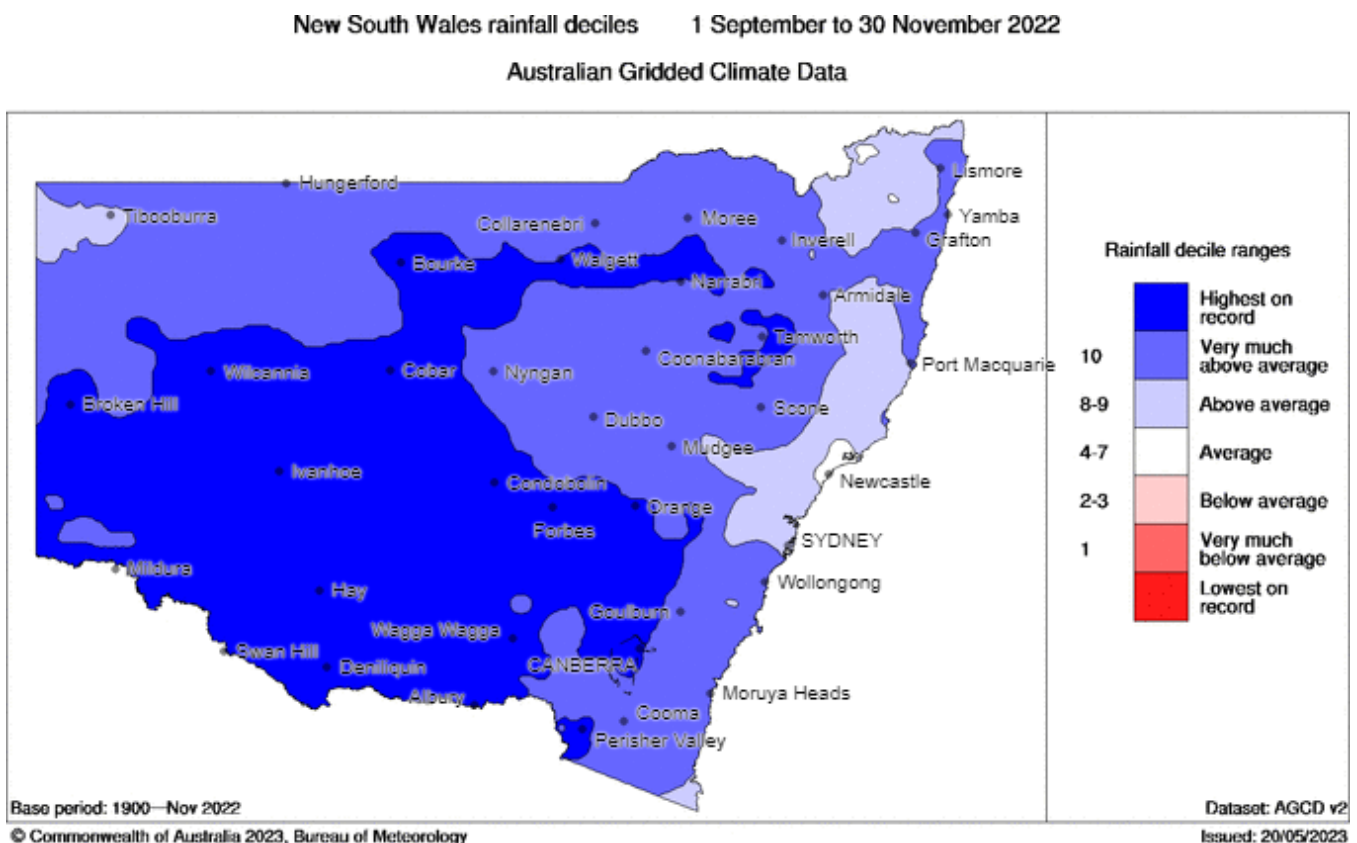


Figure 7 NSW rainfall deciles for spring, 1 September to 30 November 2022, showing very much above average rainfall in the Namoi/North West Slopes region.

⁸ Rainfall decile map for 3 months to 30 November 2022 for NSW, Bureau of Meteorology, accessed June 2023.

⁹ Spring 2022 rainfall totals and 1-year to 3-year differences, Bureau of Meteorology, accessed June 2023.

¹⁰ Daily Weather Observations – Tamworth Airport Automatic Weather Station (AWS), accessed June 2023.

¹¹ Daily Weather Observations – Gunnedah Airport Automatic Weather Station (AWS), accessed June 2023.

¹² Summary climate statistics – Gunnedah Airport AWS, Bureau of Meteorology, accessed June 2023.

¹³ Summary climate statistics – Tamworth Airport AWS, Bureau of Meteorology, accessed June 2023.

¹⁴ DPE observations at Gunnedah air quality monitoring (AQM) station. These data are not NATA accredited.

¹⁵ Climate update – tracking Australia’s climate and water resources through 2022, Bureau of Meteorology, accessed June 2023.

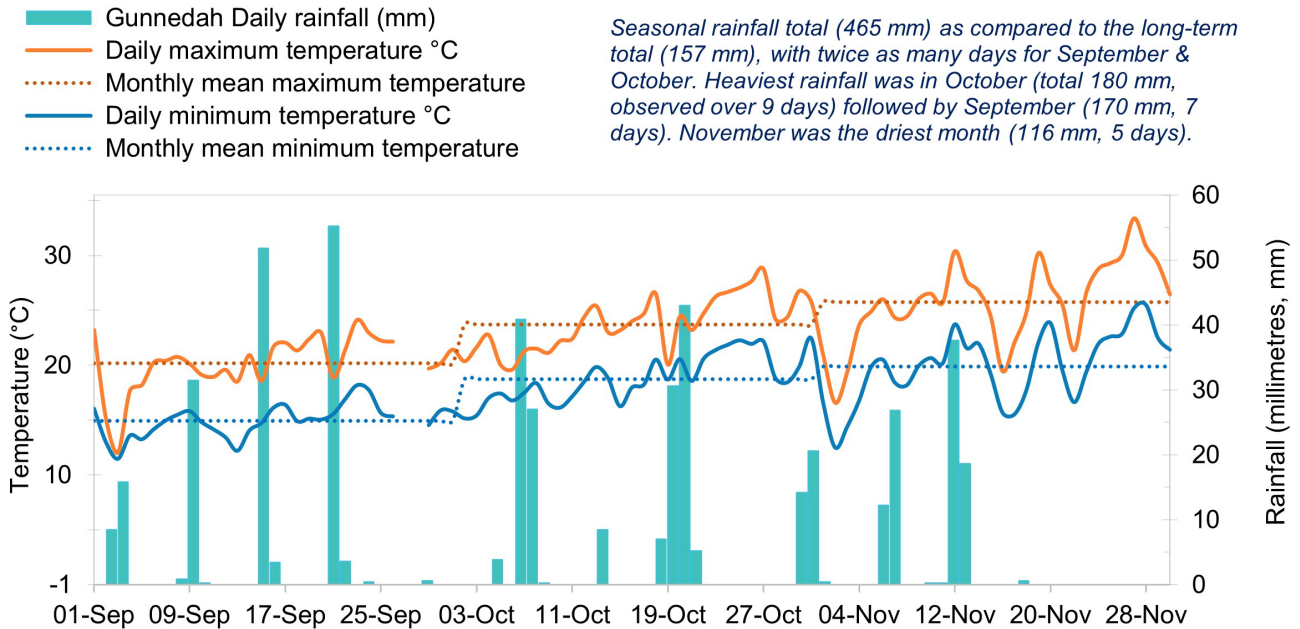


Figure 8 Gunnedah AQM station meteorology conditions, showing rainfall days and seasonal maximum and minimum temperatures during spring, 1 September to 30 November 2022.

Temperature

Maximum (daytime) temperatures across the Namoi/North West Slopes region were very much below average according to the Bureau's spring 2022 seasonal summary (Figure 9)¹⁶. High cloud cover and rainfall during September and October across the region likely led to cooler-than-average days.

Maximum Temperature Deciles 1 September to 30 November 2022

Distribution Based on Gridded Data
Australian Bureau of Meteorology

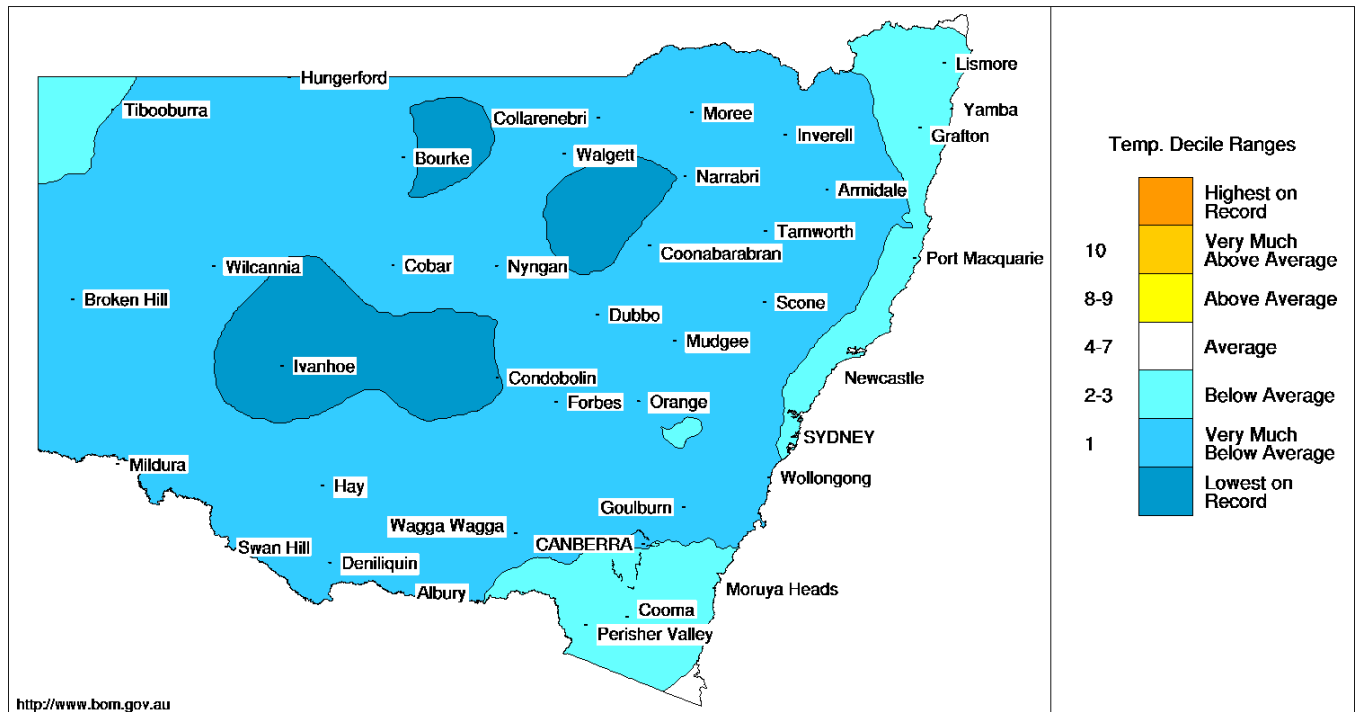


Figure 9 NSW maximum temperature deciles, showing very much below average maximum temperatures in the North West Slopes region during spring, 1 September to 30 November 2022

¹⁶ <http://www.bom.gov.au> Temperature (maximum) decile map for 3 months to 30 November 2022, Bureau of Meteorology, accessed June 2023.

The department's Gunnedah AQM station recorded cooler-than-average days (maximum temperatures) compared to long-term spring maximum at Gunnedah AWS. Spring maximum temperatures at Gunnedah AQM station ranged from 11.5–32.9°C (orange line at Figure 8), with an average of 22.8°C, about 4°C lower compared to the long-term spring maximum at Gunnedah AWS (27.2°C)¹³.

Meanwhile, overnight (minimum) temperatures Gunnedah AQM station were slightly above average. Minimum temperatures ranged from 10.9–25°C (blue line at Figure 8), with an average of 17.4°C, about 7°C higher than the Gunnedah AWS¹³ long-term average spring minimum (10°C). The Bureau's spring 2022 seasonal summary¹⁷ shows 'average' to 'above-average' minimum temperatures in the region, as cloud cover kept nights relatively warm.

Wind

The topography of the North West Slopes region is characterised by highlands in the east and south, and to the west lies a broad floodplain, with Namoi River flowing north-west through Gunnedah and Narrabri, and Peel River flowing north-west through Tamworth. Prevailing winds across the region generally align with direction of the Namoi and Peel River valleys, that is, along the south-east to north-west sector.

The wind rose map at Figure 10 shows wind direction and speed in the region, with the length of the bars showing the percentage of time wind blows from each direction, and colours along the bars indicating wind speed categories.

As is typical for the Namoi region during spring months, prevailing winds in spring 2022 were generally light to moderate south easterlies. At Tamworth and Gunnedah some influence from other sectors was observed, while at Narrabri the south easterlies dominated, and winds were stronger at this station than at other locations.

Gunnedah AQM station¹⁸ is located within the region's population centre, as is Tamworth AQM station¹⁹ and both stations are surrounded by high population densities. Narrabri AQM station²⁰ is located at Narrabri Airport, outside of the regional population centre which is located to the west.

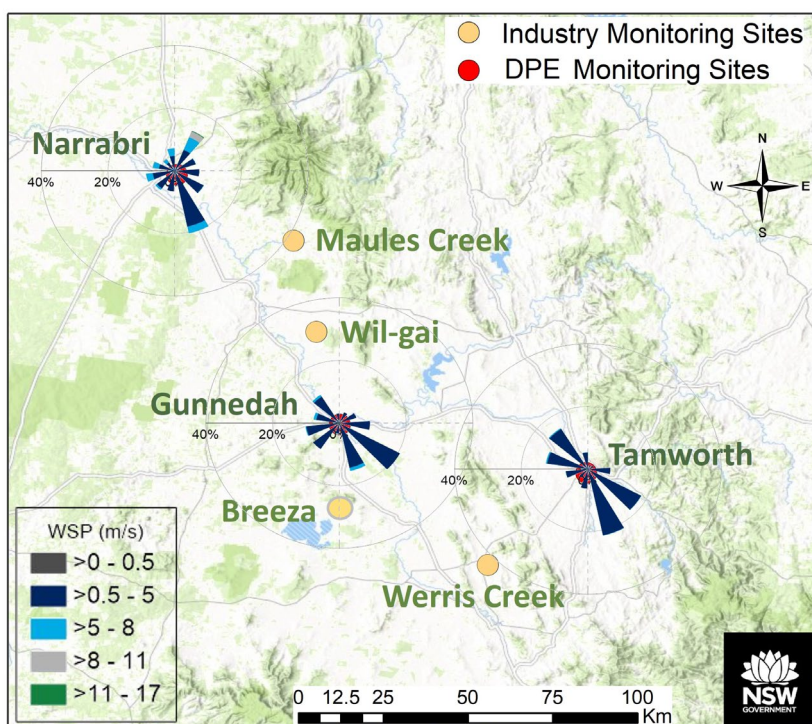


Figure 9 Wind rose map for the Namoi/North West Slopes during spring 2022

¹⁷ [Temperature \(minimum\) decile map for 3 months to 30 November 2022](#), Bureau of Meteorology, accessed June 2023.

¹⁸ [About the DPE Gunnedah Air Quality Monitoring station](#).

¹⁹ [About the DPE Tamworth Air Quality Monitoring station](#).

²⁰ [About the DPE Narrabri Air Quality Monitoring station](#).

Pollution roses from hourly particle data

Pollution roses show the wind direction and particle levels at a location, with the length of each bar around the circle showing the percentage of time wind blows from each direction. The colours along the bars indicate the concentration of particle levels. Figure 11 shows spring 2022 pollution roses for the 3 regional centres (Narrabri, Gunnedah, and Tamworth).

High levels of hourly PM10 and PM2.5 were predominantly associated with south-easterly winds at all stations, with some distinctions. At Gunnedah elevated particle levels were also associated with southwesterlies and occasionally north westerlies. At Tamworth, elevated particle levels were also observed under north westerlies. At Narrabri, higher levels were associated with northeasterlies.

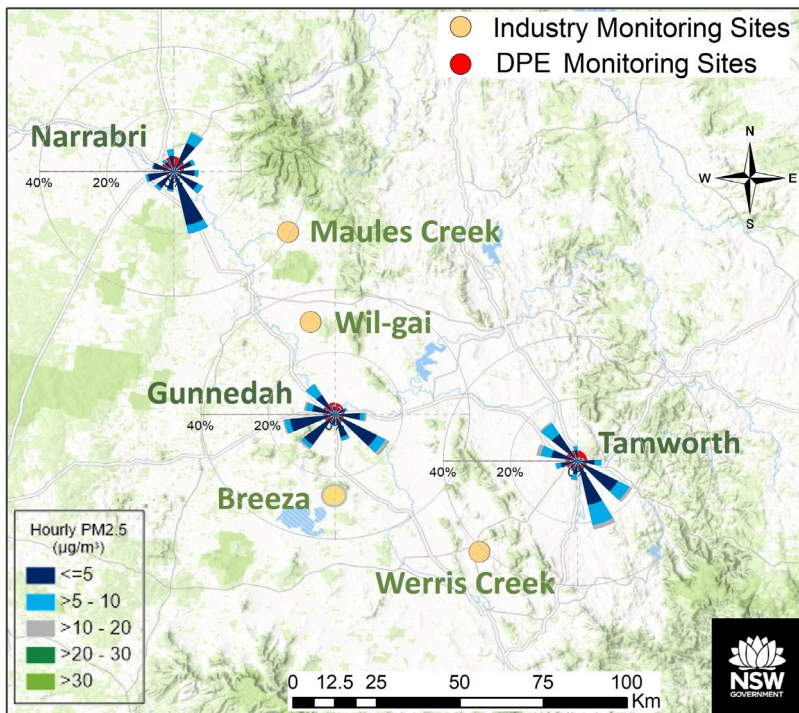
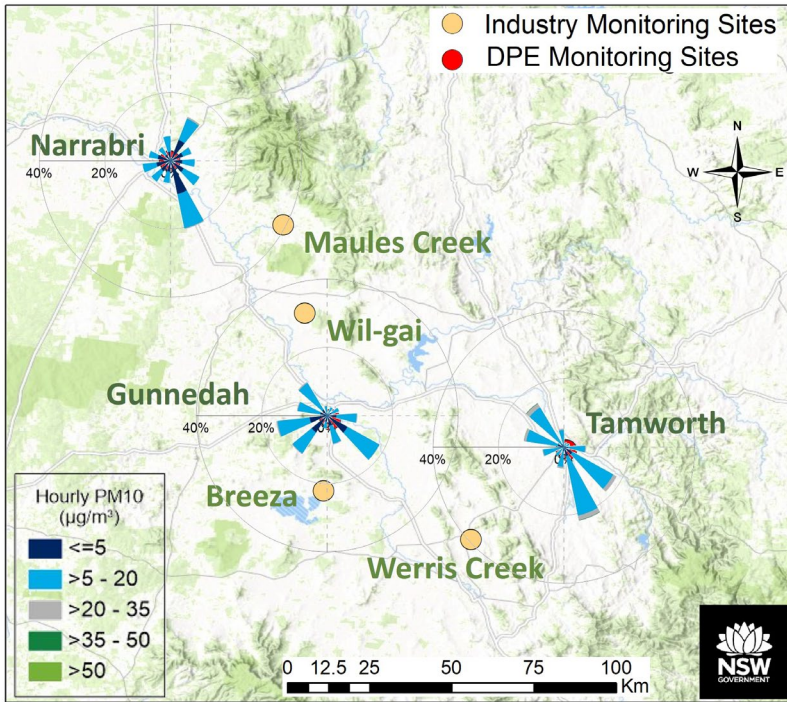


Figure 10 Pollution roses for hourly PM10 (top) and PM2.5 (bottom) in spring 2022

Online performance of monitoring stations

The target performance for air quality monitoring at the Department of Planning and Environment stations is at least 95% data availability for all criteria pollutants and meteorological parameters. The maximum online time attainable for gases, NO₂ and O₃, is 96% due to daily calibrations.

Table 2 presents online performance of monitoring stations at Gunnedah, Narrabri, and Tamworth during spring 2022:

- all stations met online targets for monitoring of meteorology
- Narrabri and Tamworth met online targets for monitoring of PM10 and PM2.5
- Gunnedah **did not** meet online targets for PM10 and PM2.5
- Tamworth **did not** meet online targets for NO₂ and ozone.

Table 2 Online performance (%) from 1 September to 30 November 2022

Station	Particles PM10 daily	Particles PM2.5 daily	Gases NO ₂ hourly	Gases O ₃ hourly	Meteorology wind hourly
Gunnedah	36.3	36.3	92.6	93.5	98.3
Narrabri	100	100	-	-	99.9
Tamworth	97.8	85.7	65.0	65.1	99.7

'-' not monitored

Reduced online times were due to:

- Gunnedah PM10 and PM2.5: intermittent data loss occurred during April to October 2022 due to ongoing instrumentation problems. Data from 29/07/22 to 27/10/22 was deemed invalid, leading to data loss during spring 2022.
- Tamworth NO₂ and O₃: monitors were recommissioned for spring/summer on 30 September 2022.

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