

Air quality in the Namoi/North West Slopes Region

Winter air quality in 2021 in the Namoi/North West Slopes region was generally good¹, meeting national benchmarks² on 100% of days. The region reported the lowest winter averages since reporting began in 2018. Fair air quality was reported only at the Gunnedah and Werris Creek monitoring stations³ (Figure 1). Across New South Wales, winter 2021 was the warmest and wettest since 2016.

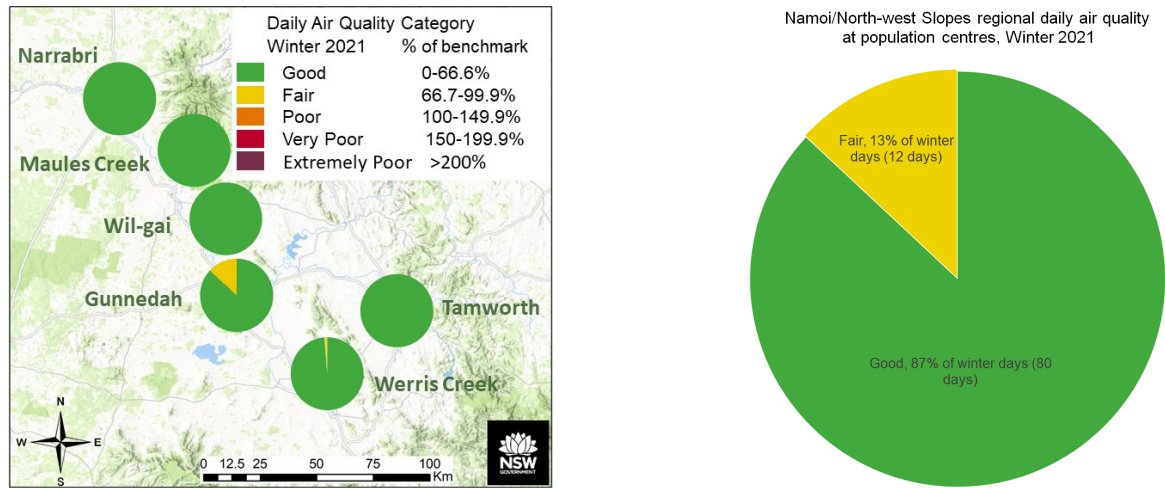


Figure 1 Daily air quality categories at monitoring stations (left) and regional air quality (right)

Air quality summary statistics, winter 2021

No days above the national benchmarks were recorded at any stations during winter 2021 (Table 1).

Table 1 Air quality summary statistics, days above benchmarks by station, 1 June to 31 August 2021

Station	PM10 daily benchmark [50 µg/m ³]	PM2.5 daily benchmark [25 µg/m ³]	NO ₂ hourly benchmark ⁴ [8 pphm]	O ₃ hourly benchmark [10 pphm]	O ₃ 4-hourly benchmark [8 pphm]
Narrabri	0	0	-	-	-
Gunnedah	0	0	0	0	0
Tamworth	0	0	-	0	0
Maules Creek	0	0	-	-	-
Wil-gai	0	0	-	-	-
Werris Creek	0	0	-	-	-

- = not monitored, hr=hour, 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 This newsletter uses revised NSW [air quality categories](#) to compare air pollutants to national benchmarks. The 'Good' category combines the former 'Very Good' and 'Good' categories. 'Extremely Poor' replaces the 'Hazardous' category.

² The [National Environment Protection \(Ambient Air Quality\) Measure \(Air NEPM\)](#) sets national standards for common urban air pollutants. This report refers to the national standards as 'benchmarks' for reporting air quality.

³ Six air quality monitoring stations operate in the region. The NSW Government operates the monitoring stations at Tamworth (from October 2000), Gunnedah and Narrabri (from December 2017). Data are updated hourly on the NSW air quality website. Industries operate the monitoring stations at Maules Creek, Wil-gai and Werris Creek. Industry data are reported weekly on the NSW Environment Protection Authority Namoi air quality monitoring project website. All stations continuously monitor airborne particles with diameters less than 10 and 2.5 micrometres, referred to as PM10 and PM2.5 respectively. The Gunnedah monitoring station also monitors gaseous air pollutants, nitrogen dioxide (NO₂) and ozone (O₃). Temporary ozone monitoring began at Tamworth in November 2020 as part of the NSW regional ozone monitoring campaign.

⁴ Note: The [National Environment Protection \(Ambient Air Quality\) Measure \(Air NEPM\)](#) was updated on 18 May 2021. The new national benchmarks was introduced for hourly NO₂ (now 8 pphm).

Air quality: particle pollution winter 2021

The time series of daily average particle concentrations shows PM10 levels well below the benchmark. No stations recorded PM10 concentrations above the benchmark during winter 2021 (Figure 2).

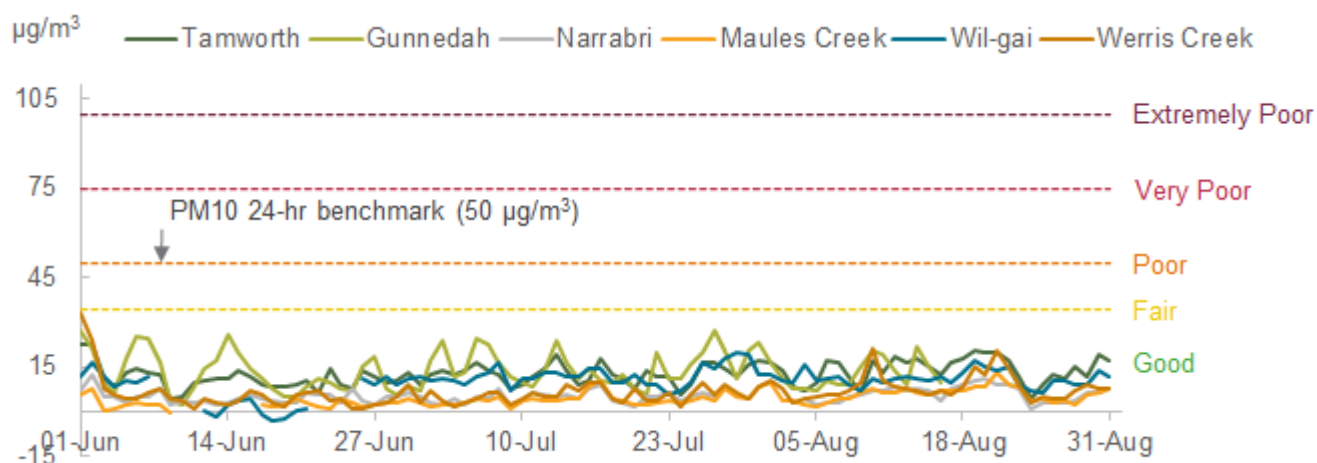


Figure 2 Daily average PM10 in winter 2021, showing concentrations below the benchmark

Daily average PM2.5 levels were below the benchmark. No stations recorded PM2.5 concentrations above the benchmark during winter 2021 (Figure 3).

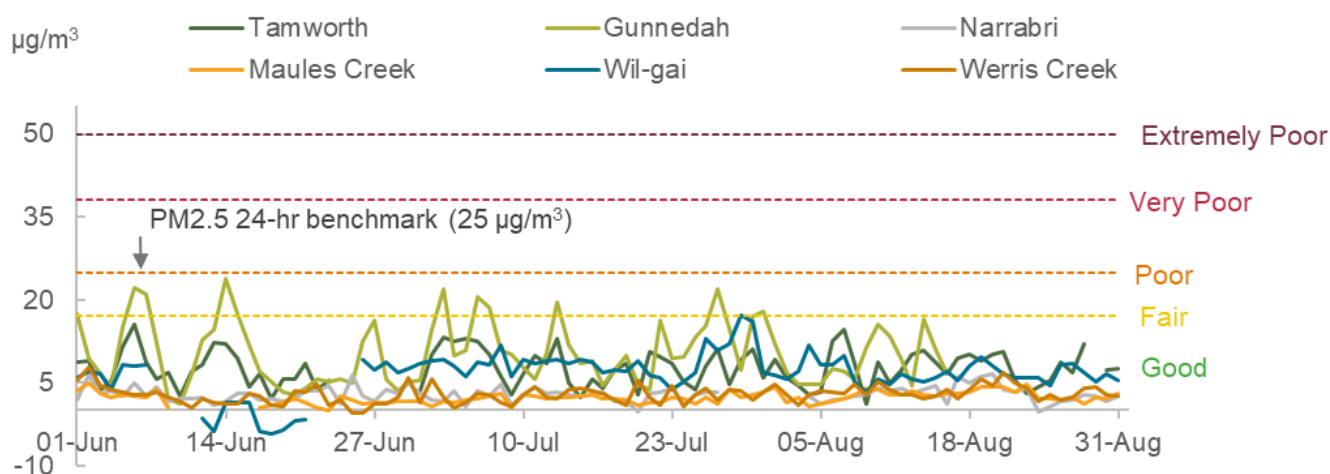


Figure 3 Daily average PM2.5 in winter 2021, showing concentrations below the benchmark

Air quality: gaseous pollution, winter 2021

Figure 4 to Figure 6 show gaseous pollution concentrations were below relevant standards for O₃ and NO₂, respectively, throughout winter 2021. Ozone and nitrogen dioxide concentrations were broadly stable throughout the winter period.

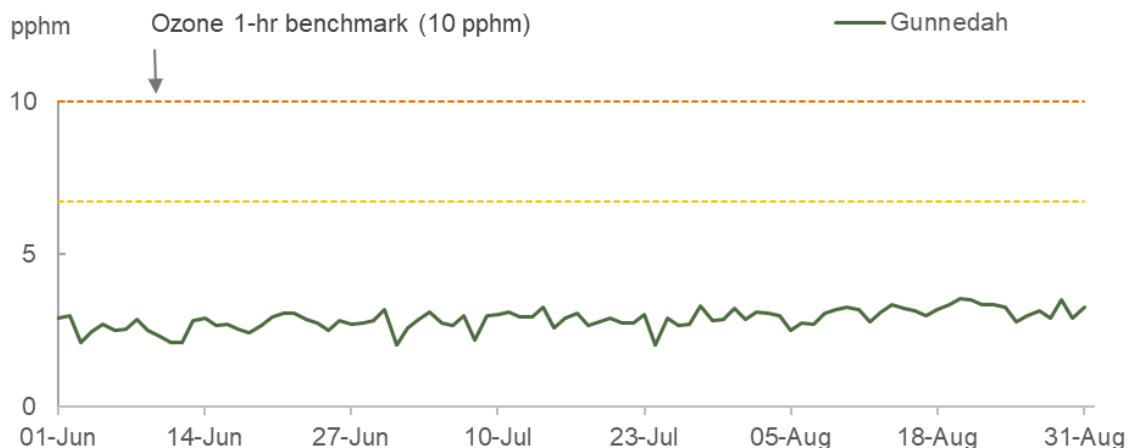


Figure 4 Ozone daily maximum 1-hour average concentrations at Gunnedah, during winter 2021, showing levels below the benchmark

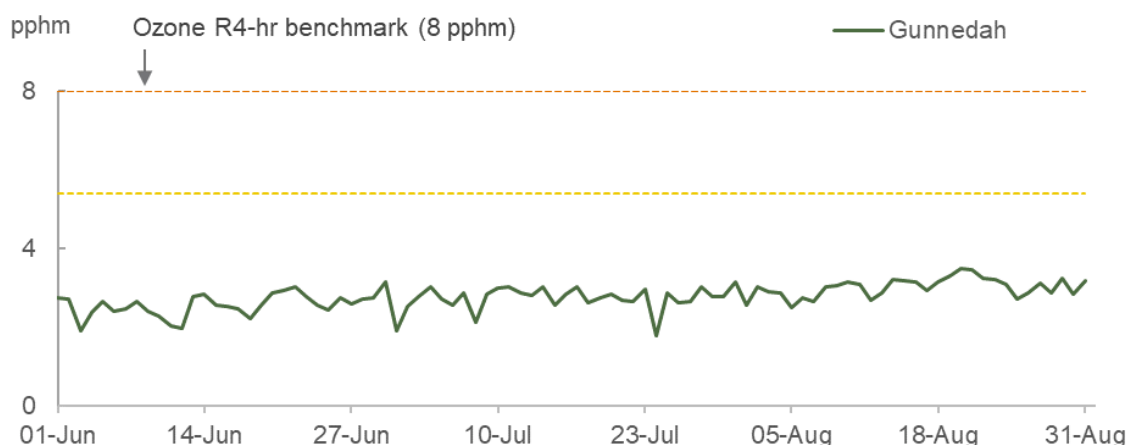


Figure 5 Ozone daily maximum rolling 4-hour average concentrations at Gunnedah, during winter 2021, showing levels below the benchmark

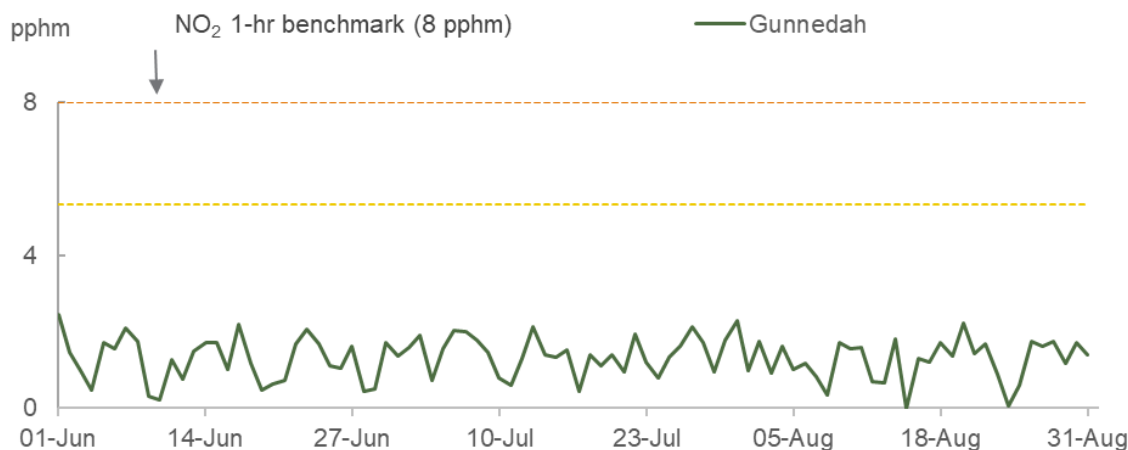


Figure 6 Nitrogen dioxide daily maximum 1-hour average concentrations at Gunnedah, during winter 2021, showing levels below the benchmark

Seasonal weather and climate⁵

Winter 2021 in New South Wales was the warmest and wettest winter since 2016. Winter rainfall was 14% above average across the State. Statewide, the mean temperature was 0.93°C above the 1961–1990 average and winter 2021 was the tenth warmest on record. Strong cold fronts combining with tropical moisture produced above average rainfall for inland NSW in June and July as a result of a developing negative Indian Ocean Dipole⁵. While August rainfall was below average, a cold front and associated low resulted in significant falls on the South Coast. Mean temperatures were above average for all 3 months of winter in 2021, with clear skies resulting in warmer maximums in August.⁵

Drought conditions and dust activity

Drought recovery stabilised during winter 2021. The NSW Department of Primary Industries reported that the percentage of the State in the Recovery or Non-Drought categories fell slightly from 94% at the end of June 2021 to 93% at the end of August 2021. However, this was an improvement on the 65% of the State in Recovery or Non-Drought categories in the 12 months to the end of August 2020⁶. Drought recovery was likely stabilised by above average winter rainfall in 2021, particularly June and July (Figure 7).

DustWatch⁷ reported that little dust was recorded in the north of the State during June and August 2021, due to above average rainfall in June and below average wind strengths in August. Gunnedah recorded 2 hours of activity in June and zero hours in July and August. Areas with over 50% groundcover expanded in winter across the State, with some loss of groundcover experienced in the Namoi region near Gunnedah during winter.

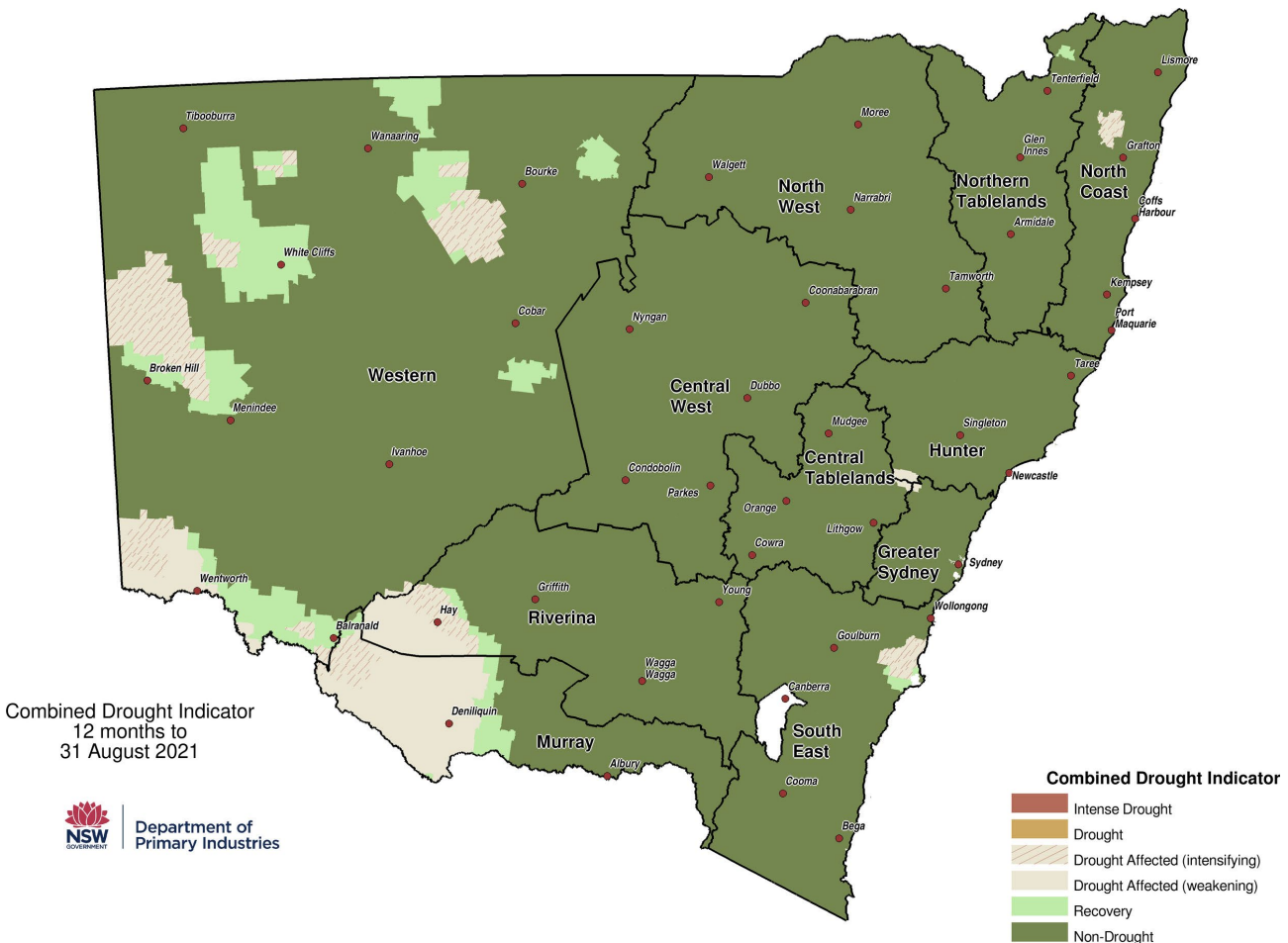


Figure 7 NSW Combined Drought Indicator – 12 months to 31 August 2021 Error! Bookmark not defined., showing non-drought conditions across the Namoi/North West region

⁵ Seasonal Climate Summary for New South Wales - Winter 2021, Monthly Climate Summary for New South Wales in June, July and August 2021, accessed December 2021.

⁶ Department of Primary Industries State Seasonal Updates, August 2020, June 2021 and August 2021, accessed December 2021.

⁷ DustWatch Reports, June, July, August 2021, accessed December 2021.

Rainfall and temperature

Winter 2021 rainfall was above average to very much above average across the region (Figure 8)⁸. Regional rainfall ranged between 100–400 millimetres (mm)⁹. Compared with previous winter seasons, rainfall totals were up to 200 mm higher than winter 2020 and 100 to 400 mm higher than winter 2019 and winter 2018.

Maximum temperatures were above average, while minimum temperatures were above average to very much above average¹⁰ (Figure 9).

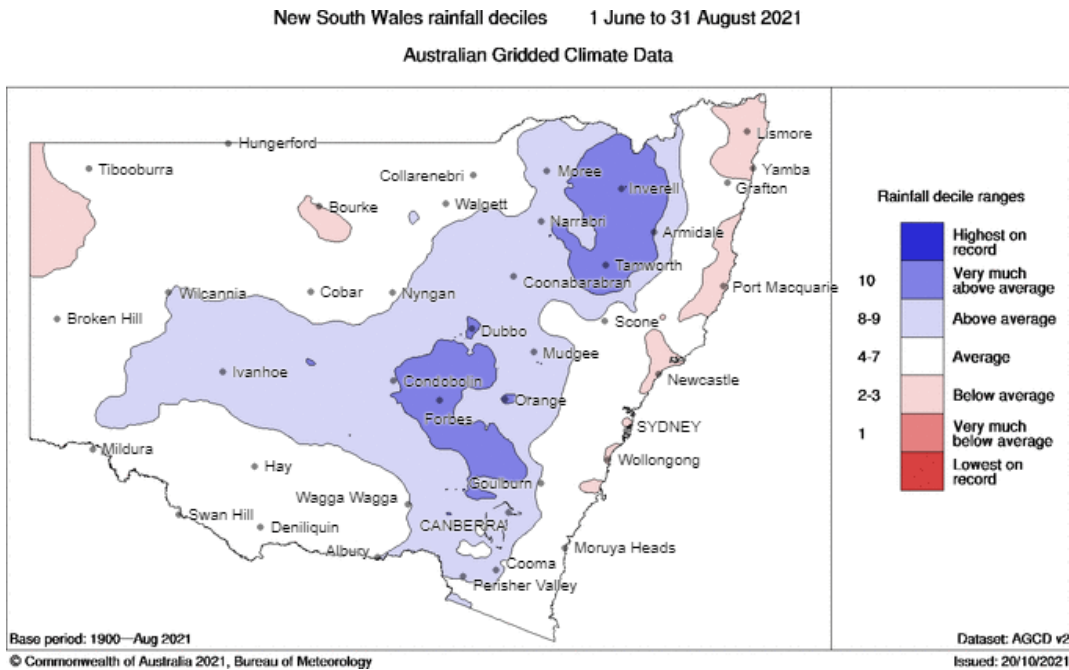


Figure 8 NSW rainfall deciles for winter, 1 June to 31 August 2021⁸, showing above average rainfall in the Namoi/North West Slopes

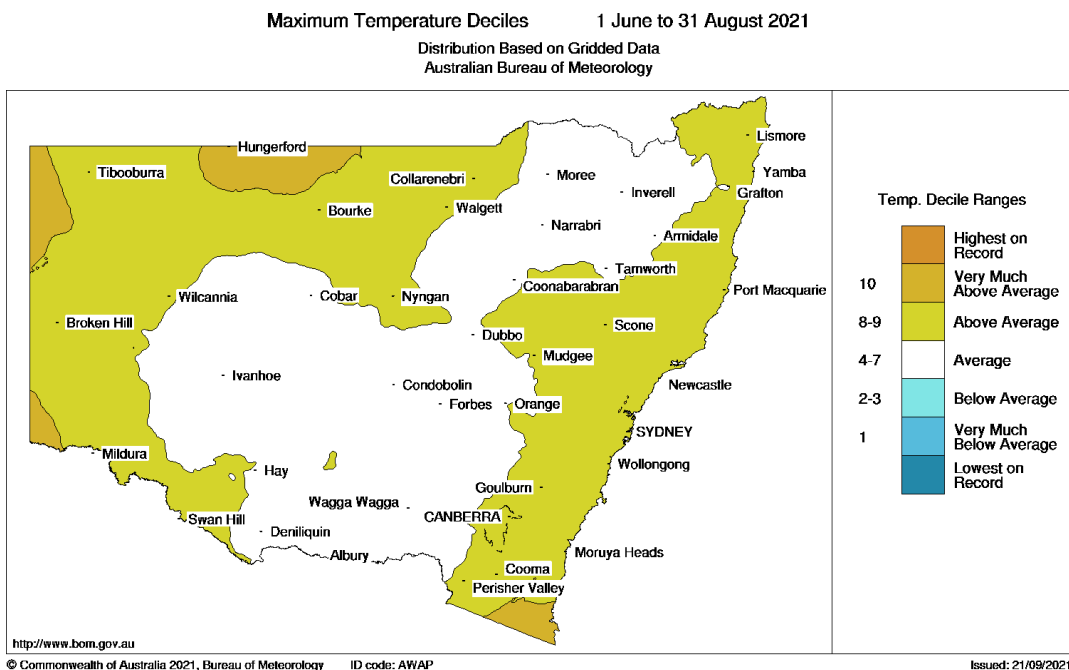


Figure 9 NSW maximum temperature deciles for winter, 1 June to 31 August 2021⁸, showing temperatures very much below average in the Namoi/North West Slopes.

⁸ NSW rainfall and temperature deciles for three months 1 June to 31 August 2021, Bureau of Meteorology, accessed December 2021.

⁹ Regional winter rainfall totals 2021 and 1-year to 3-year differences, Bureau of Meteorology, accessed December 2021.

¹⁰ NSW maximum and minimum temperature anomaly, 1 June to 31 August 2021, Bureau of Meteorology, accessed December 2021.

Figure 10 shows rainfall and maximum and minimum temperatures¹¹, compared to long-term averages¹² at Gunnedah air quality monitoring station in winter 2021. Maximum temperatures ranged from 7.5 to 25.6 °C, with an average maximum temperature of 17.4 °C compared to the long-term winter mean maximum of 18.3 °C. Minimum temperatures ranged from -0.3 to 13.4 °C, with an average minimum temperature of 5.5 °C compared to the long-term winter mean minimum of 2.7 °C. Rain was recorded on 31.5% of winter days (29 days). Heaviest rainfall was associated with the passage of low-pressure systems and associated troughs and cold fronts on 8 June, 24 June and 9 July¹³.

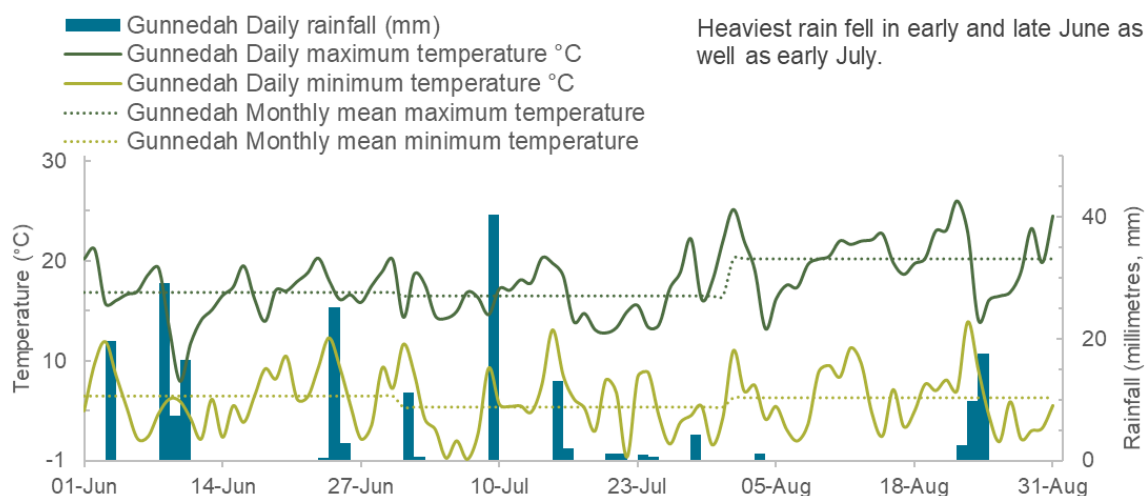


Figure 10 Gunnedah temperatures and rainfall in winter 2021, showing heaviest rain in July.

Wind

Wind directions across the North West Slopes generally align with the south-east to north-west direction of the Namoi and Peel River valleys¹⁴. Prevailing winds were generally light to moderate south-easterlies and north-westerlies in winter 2021. Narrabri also recorded light and moderate to strong north to north-easterly winds (to 12.5 metres per second, m/s). Gunnedah recorded moderate winds predominately from the south-east as well as from the west and south-west (to 7.2 m/s) (Figure 11).

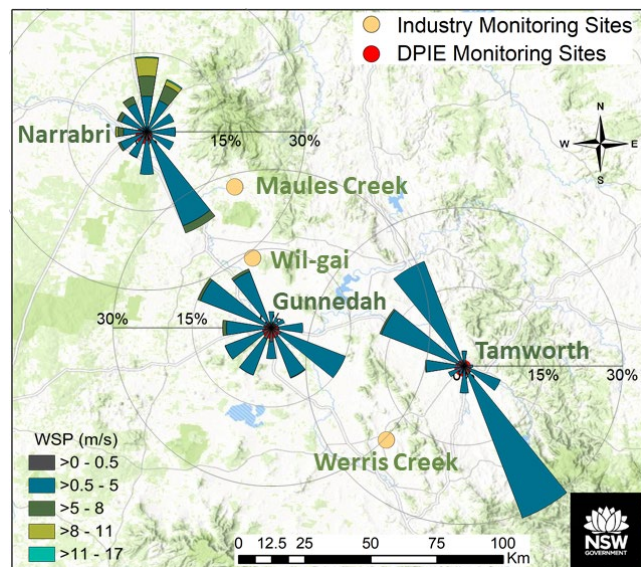


Figure 11 Wind rose map¹⁵ for the Namoi/North West Slopes during winter 2021, showing generally light south-easterly winds. Narrabri recorded stronger winds, from the north to north-east

¹¹ DPIE observations at Gunnedah air quality monitoring station. This data is not NATA accredited.

¹² [Gunnedah summary climate statistics](#) accessed December 2021.

¹³ [Synoptic weather charts archive](#), Bureau of Meteorology, accessed December 2021.

¹⁴ The Namoi River flows north-west, through Gunnedah and Narrabri. The Peel River flows north-west through Tamworth, joining the Namoi River near Gunnedah.

¹⁵ Wind roses show wind direction and speed at a location. The length of each bar around the circle shows the percentage of time that the wind blows from each direction. The colours along the bars indicate the wind speed categories.

Pollution roses

The pollution roses¹⁶ for regional centres during winter 2021 show higher hourly PM₁₀ levels generally associated with south-easterly winds at Tamworth and Narrabri and south-easterly to south-westerly winds at Gunnedah. Higher hourly PM_{2.5} levels were also associated with south-easterly winds at Narrabri and Tamworth and south-east to south-westerly winds at Gunnedah (Figure 12).

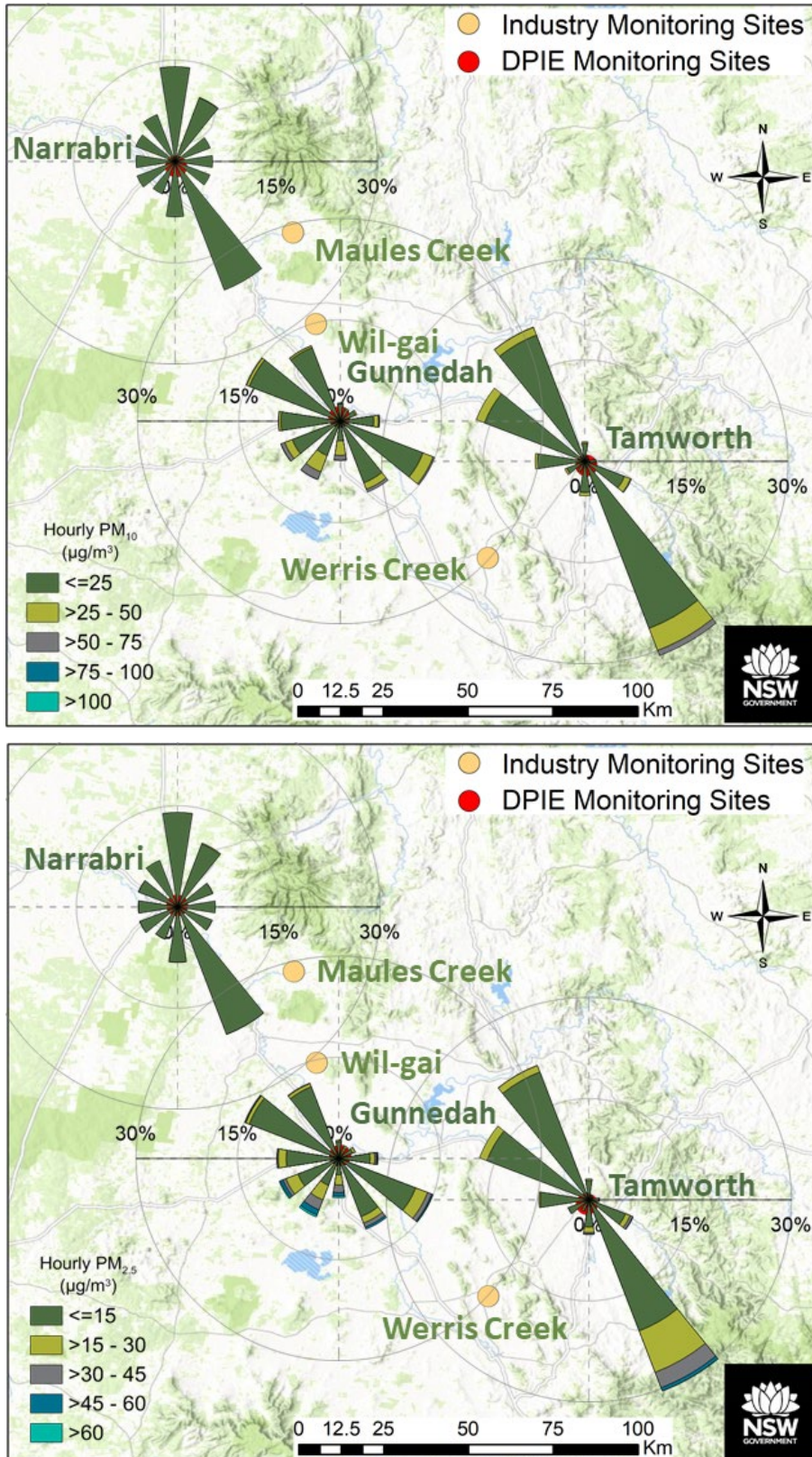


Figure 12 Pollution roses for hourly PM₁₀ (top) and PM_{2.5} (bottom) in winter 2021

¹⁶ Pollution roses show the wind direction and particle levels at a location. The length of each bar around the circle shows the percentage of time the wind blows from each direction. The colours along the bars indicate the concentration of particle levels.
Air quality in the Namoi/North-west Slopes Region: Winter 2021

Online performance of monitoring stations, winter 2021

The target performance for air quality monitoring at the Department of Planning, Industry and Environment sites 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, from 1 June to 31 August 2021:

- all stations met online targets for monitoring of meteorology and gases
- Tamworth met the online target for PM2.5 monitoring.

Table 2 Online performance (%) from 1 June to 31 August 2021

Station	Particles PM10 daily	Particles PM2.5 daily	Gases NO ₂ hourly	Gases O ₃ hourly	Meteorology wind hourly
Gunnedah	84	84	94	96	100
Narrabri	92	92	-	-	100
Tamworth	100	91	-	-	100

'-' not monitored

Reduced online times were due to:

- Gunnedah PM10 and PM2.5 – power outage in August 2021. Instrument required replacing. COVID-19 restrictions delayed maintenance.
- Narrabri PM10 and PM2.5 – Maintenance in July 2021 found instrument required replacement.
- Tamworth PM2.5 – Instrument fault, required maintenance in June 2021.

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