DustWatch Report

December 2021

Dust activity	Tripled from November 2021
Wind strength	Almost half of 15-year average; less than November 2021
Groundcover	Stabilising across NSW; dropping in the Mallee
Rainfall	Below average in the west; above average on the coast

Dust activity

Dust activity increased substantially from November 2021 (13h to 31h), with most of the increase occurring in the Victorian Mallee and the Local Land Services Riverina and Central West regions (Figure 2).

Much decreased hours of strong winds (> 40km/h) prevented dust becoming more severe (Figure 1).

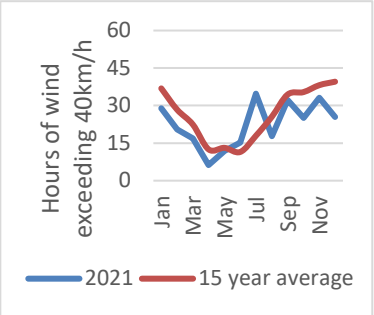

Figure 1 Hours of wind exceeding 40km/h – average across all sites

Groundcover reductions are visible in the regions mentioned above (Figure 4 and Table 1). The groundcover in all other areas covered by this report has stabilised (Figure 5).

Note: Real time dust measurements from all our monitoring sites are at: Rural air quality network – live data

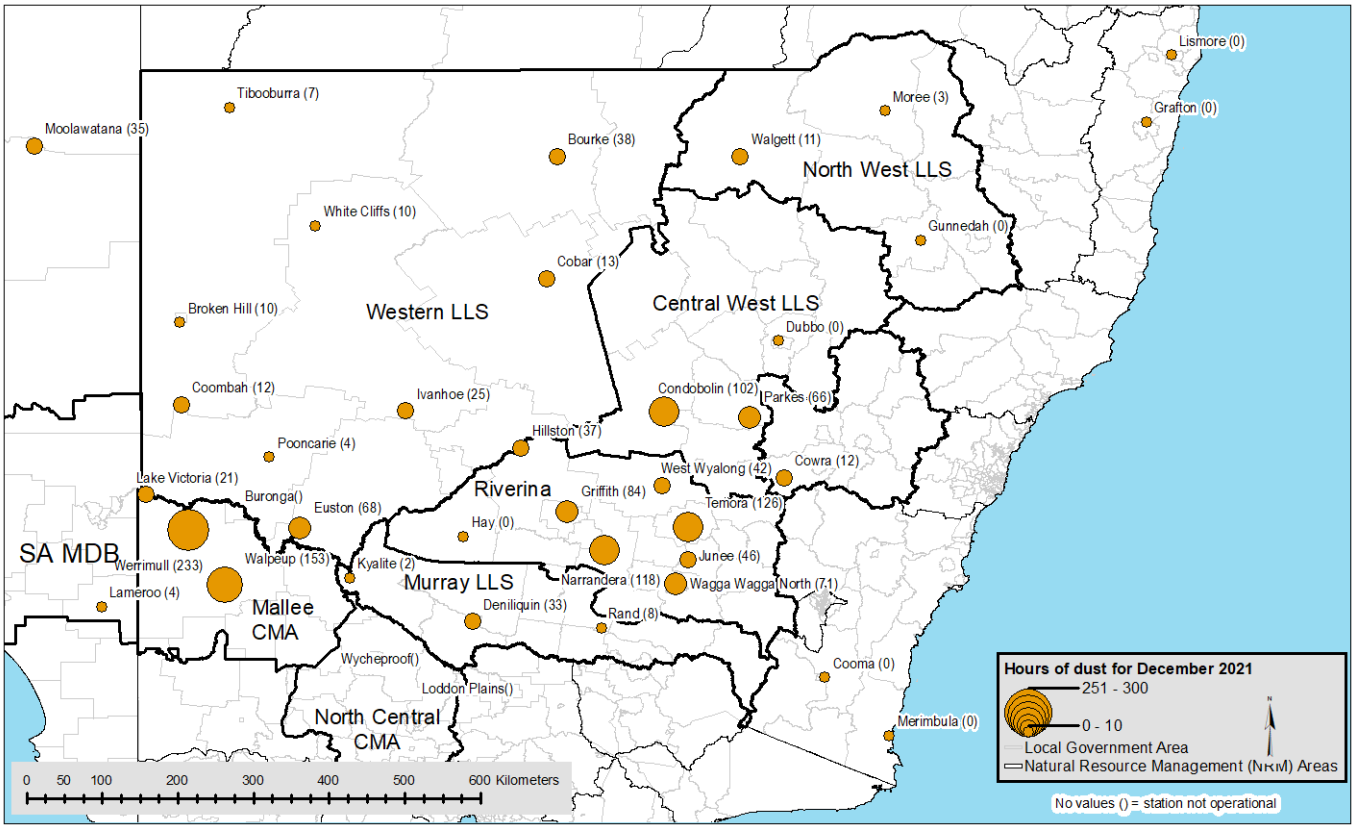

Figure 2 Hours of dust activity (number in brackets) at each DustWatch site in December 2021

Groundcover

The area with > 50% groundcover (green and yellow colours in Figure 3) has decreased in the south west of New South Wales and across the border into South Australia and Victoria (red circle in Figure 3). The area with > 50% groundcover in the Mallee shrank by 11% from 85% in November 2021 to 74% in December 2021 and in the South Australian Murray Darling Basin by 8% from 73% to 65% (Table 1).

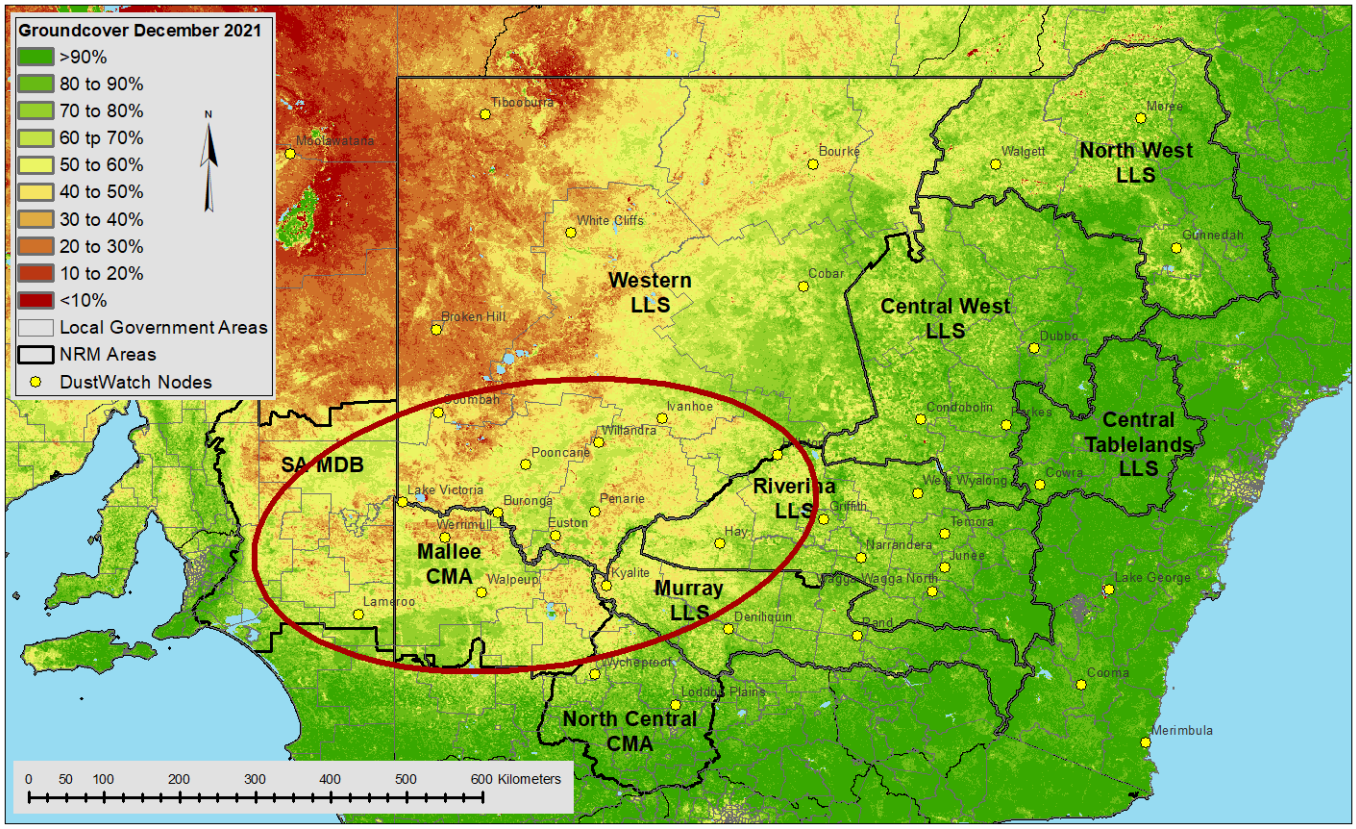

Figure 3 **Groundcover for December 2021 as determined from MODIS by CSIRO**

Table 1 **Percentage of each NRM with cover >50% for November 2020 to December 2021**

Date	Central West	Mallee	Murray	North Central	North West	Riverina	SA MDB	Western	Central Tablelands
Nov 2020	98	87	97	100	94	97	79	44	100
Dec 2020	97	77	96	99	95	96	74	41	100
Jan 2021	97	73	95	98	93	95	72	42	100
Feb 2021	97	72	96	98	94	96	73	48	100
Mar 2021	98	82	97	99	95	97	80	59	100
Apr 2021	98	87	98	99	91	98	85	67	100
May 2021	99	92	99	100	96	99	89	74	100
Jun 2021	100	96	100	100	99	100	95	82	100
Jul 2021	100	99	100	100	99	100	96	78	100
Aug 2021	100	99	100	100	99	100	91	70	100
Sep 2021	100	98	100	100	98	100	85	61	100
Oct 2021	100	92	99	100	98	99	78	53	100
Nov 2021	99	85	98	99	98	98	73	49	100
Dec 2021	99	74	96	98	97	96	65	49	100

Groundcover change

Groundcover declined across most of the wheat/sheep belt over the last three months (orange colours in Figure 4). This is typical for this time of the year when animal consumption and natural decay exceeds plant growth. Groundcover values seem to have reached the low point for the year for the Local Land Services Western Region, in line with above average rainfall for the early summer period (Figure 7a+b). Other areas with less rainfall are still declining (Figure 5 and Table 1).

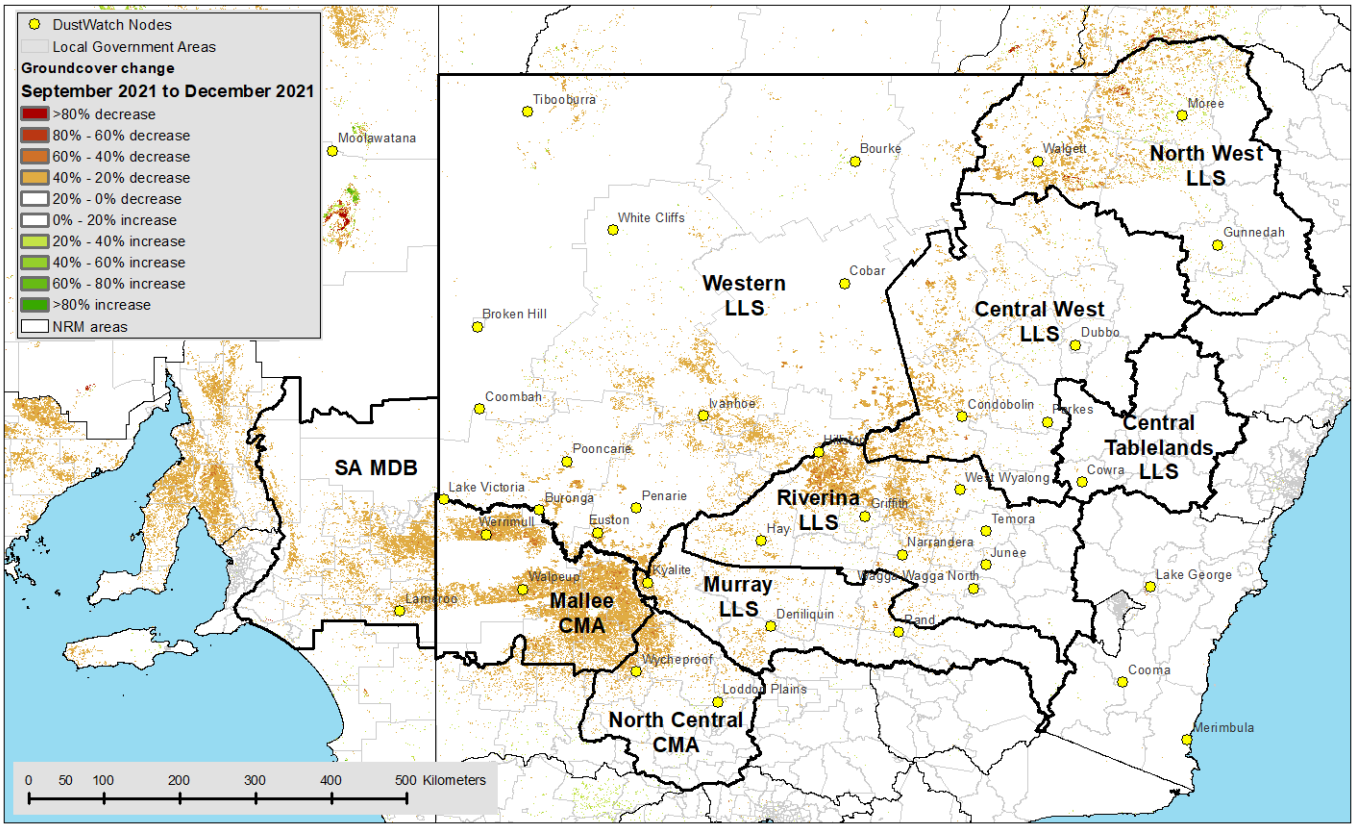

Figure 4 Groundcover difference between September 2021 and December 2021

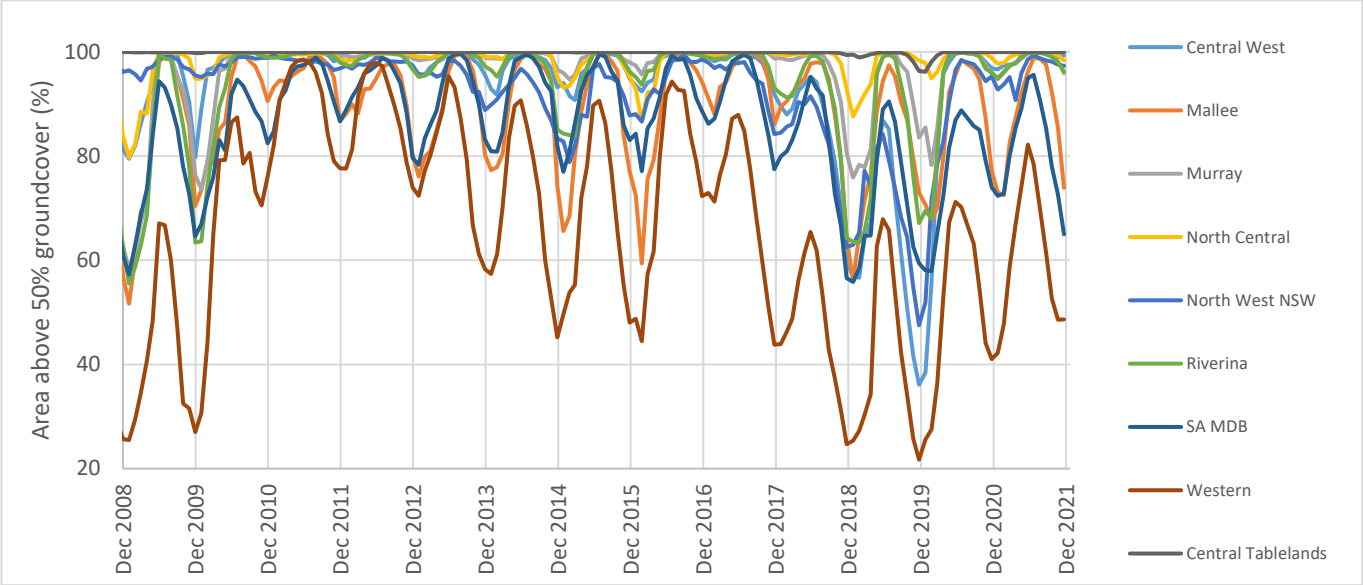

Figure 5 Area (%) of NRM with more than 50% cover since December 2008

Rainfall

Rainfall in December 2021 was below 25mm west of a line from Bourke to Hay. Further east areas around Walgett and Narrandera also recorded low rainfall (Figure 6).

In contrast, some coastal zones received more than 200mm leading to localised flooding.

This rainfall was well above average for the coast and well below average for the far west for the month of December (Figure 7a). This brings most of New South Wales well into above average rainfall for the last 3 months (October 2021 to December 2021 - Figure 7b).

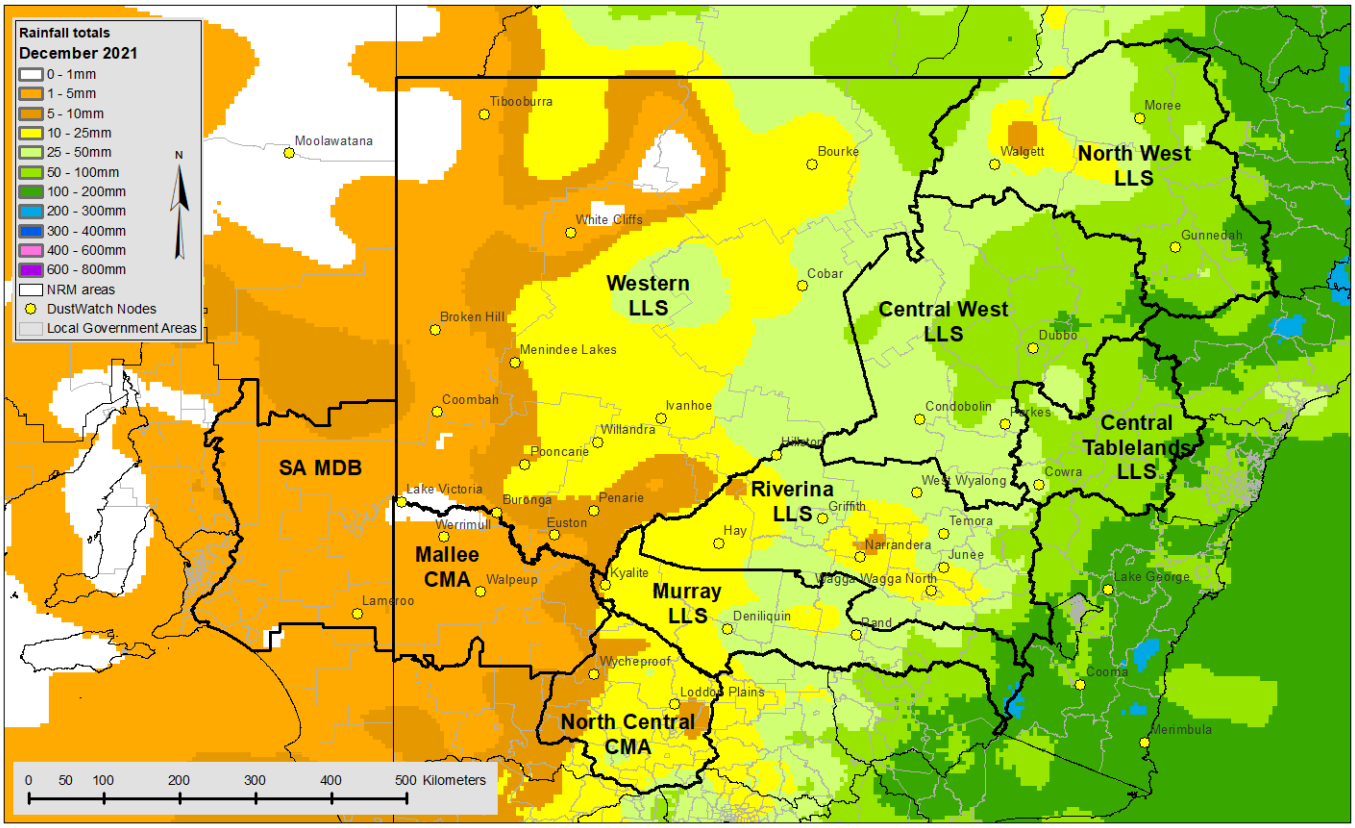

Figure 6 **Rainfall totals for December 2021 (source: Bureau of Meteorology)**

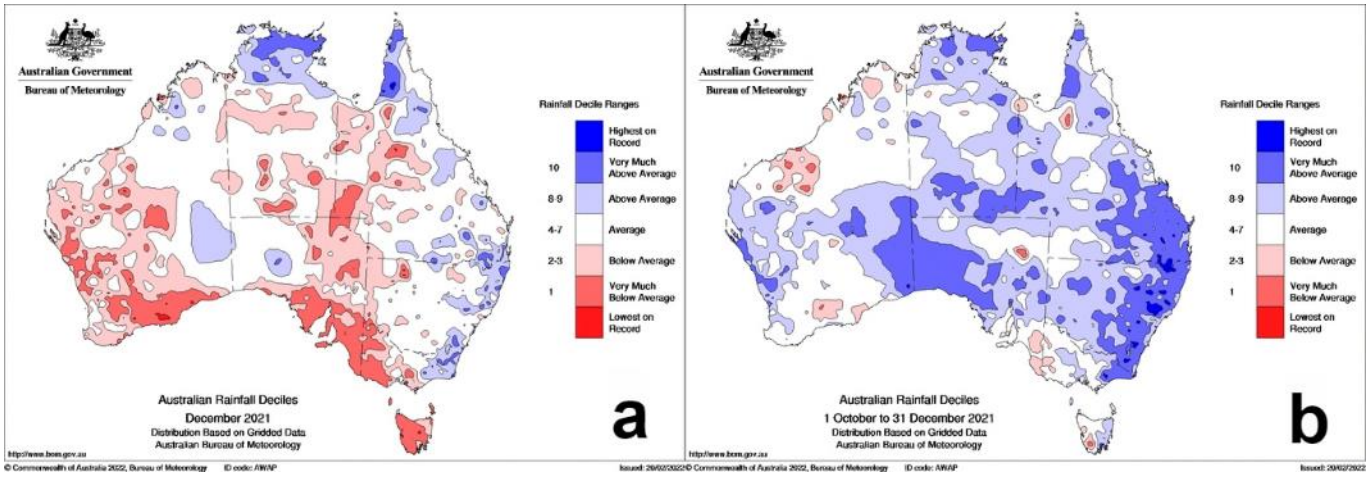

Figure 7 **Rainfall deciles for December 2021 (a) and 1 October 2021 to 31 December 2021 (b)**

VIIRS fires and satellite image

Haze from smoke and dust is difficult to separate. We use satellite imagery to manually classify every measurement into dust or smoke. The satellite detected 2943 hot spots (375m pixel with temperature anomalies) in December 2021 (Figure 8), a sharp rise from the 340 hot spots detected in November 2021 (Figure 9). Most of the hotspots were detected in 2 large fires around Christmas in the Local Land Services Western region (>2000).

Note: **The number of hot spots is not equal to the number of fires**. Large fires have multiple hot spots thereby increasing the number of detections. Cloud or fog can obscure hot spots thereby reducing the number of detections.

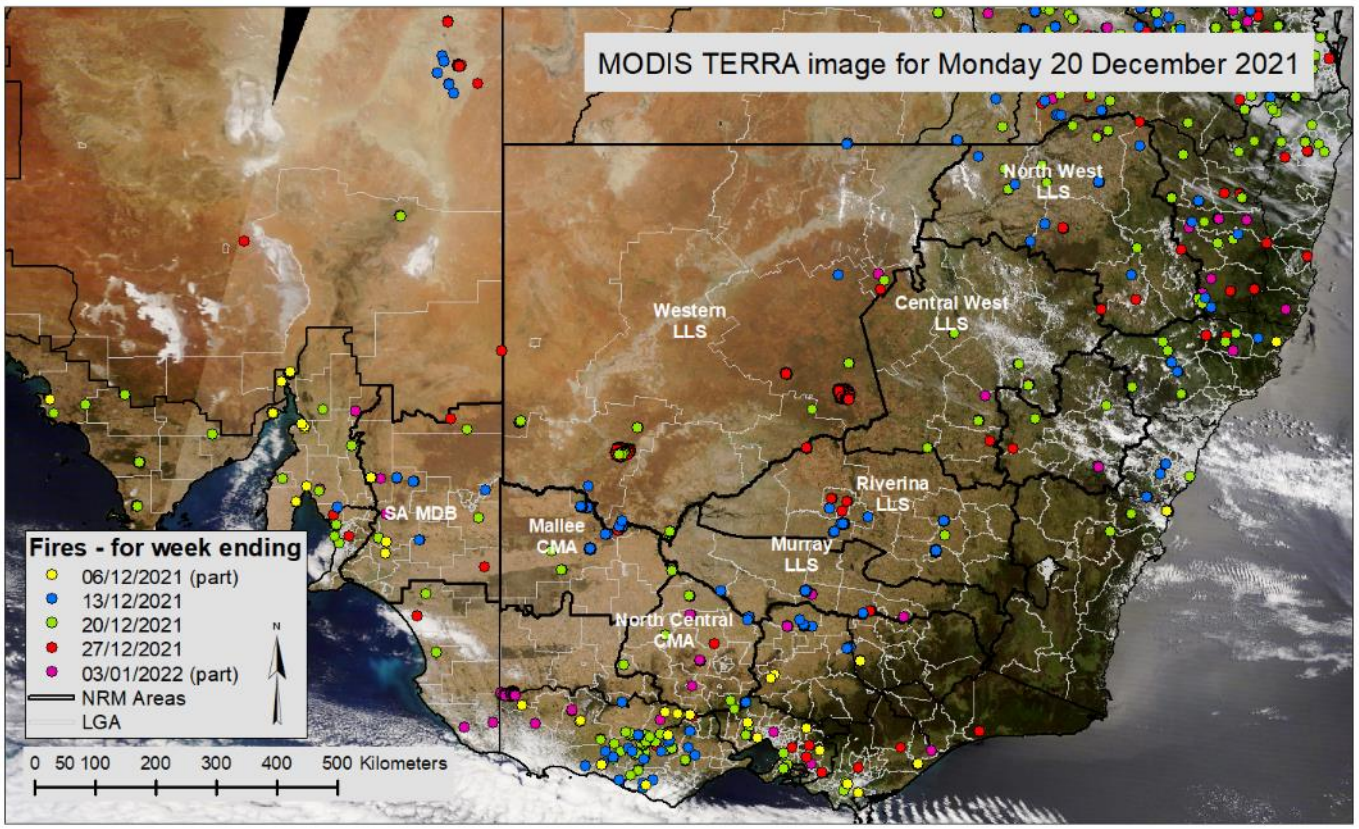

Figure 8 **Pixels (375m) with active burning fires in December 2021 as determined from VIIRS satellite**

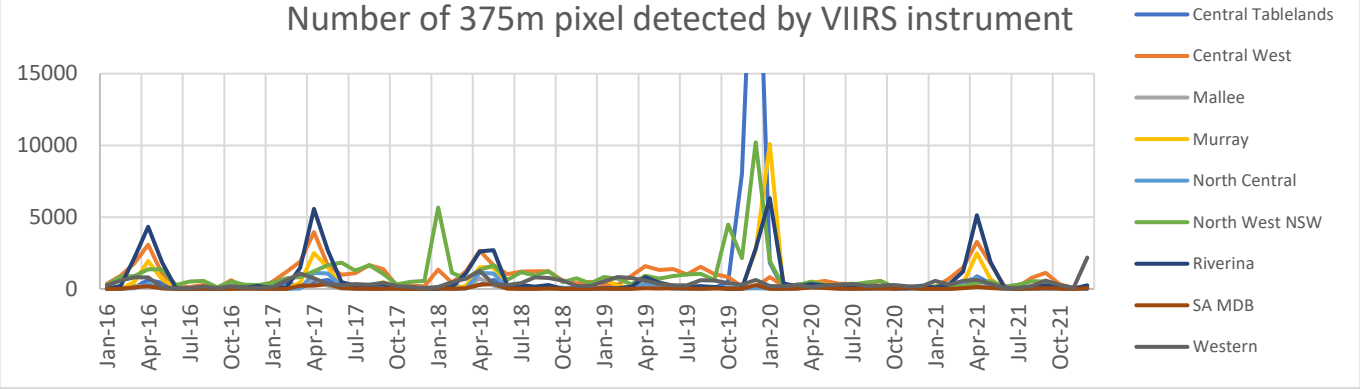

Figure 9 **Number of 375m pixels with active burning fires between January 2016 and December 2021**

The DustWatch team Contact us at dustwatch@environment.nsw.gov.au

Dust data supplied by the Department of Planning and Environment Rural Air Quality network. The MODIS image is courtesy of MODIS Rapid Response Project at NASA/GSFC; the VIIRS fire data is courtesy of the Fire Information for Resource Management System (FIRMS) and the rainfall maps are from the Australian Bureau of Meteorology. This project would not be possible without funding from: The National Landcare Program; Western and Murray Local Land Services (LLS) in NSW; the NSW EPA, the Mallee and North Central CMAs in Victoria and Murray Darling Basin NRM in South Australian, CSIRO, TERN and the Australian National University. We particularly thank our many DustWatch volunteers who provide observations and help maintain the instruments.

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