# Total vegetation cover soil protection Region:LGA Carrathool\_(A) NSW

# Date: October 2019

This report describes vegetation protecting the soil surface from erosion during a chosen month compared to previous years. This report has been generated using MODIS fractional vegetation cover information available in Rangelands and Pasture Productivity (RAPP) map tool https://map.geo-rapp.org/#australia. The report is based on 500 metre pixel data on monthly time steps. Land use forest cover:

Results can be shown for the whole region (polygon), and separated by land use and forest cover classes which are likely to show different cover patterns and targets. Land use is divided into four broad classes: Conservation and natural environments, Agriculture, production native forests and plantation forests (no report), and other (no report). Agriculture is divided into grazing, crops and horticulture which are sub-divided into non-irrigated and irrigated. If forest is present land use is further divided into: non-forest, woodland forest and non-woodland forest. The area of each land use and forest class are shown as a map and chart. The report content is repeated for each land use and forest covers at least 1% of the area of the chosen region. Total vegetation Cover:

The total vegetation cover indicates where soil is likely to be protected from wind and or water hillslope erosion. Total vegetation cover for this month is shown on a map and chart classified into 4 classes.

• 71-100% High cover – protected from wind and usually water erosion (high rainfall, steep slopes, and erodible soils may need greater than 80, 90, 95 and up to 100% cover)

- 51-70% Moderate cover protected from wind erosion
- 31-50% Low cover not protected
- 0-30% Very Low cover not protected

Erosion protection: Wind erosion 50% total vegetation cover

The vegetation cover threshold required to prevent soil erosion is usually 50% to reduce wind erosion, 70% or 80% to reduce water (hillslope) erosion depending on the steepness and rainfall. Areas protected from erosion for the month:

- Map: water erosion protection (>70% cover) percentage area and hectares.
- Map: wind erosion protection (>50% cover) percentage area and hectares. Comparison with previous years:
  - Map: anomaly comparing this month to the average cover from the same month in previous years.
  - Map: deciles rank of month against the same month in previous years.

Anomalies and deciles until September 2019 are calculated comparing to the same months 2001 to 2019. Extra monthly data will be used to calculate anomalies and deciles post September 2019 as they become available. Time series monthly from January 2001 to current:

#### **Erosion protection**

- Wind erosion protection time series: percentage of the area of the region with greater than 50% cover for each month (orange lines). Horizontal lines are 10th (cover target) and 50th percentiles.
- Water erosion protection time series: percentage of the area of the region with greater than 70% cover for each month (blue line). Horizontal lines are 10th (cover target) and 50th percentiles.

#### Rainfall

• Millimetres rainfall each month (black line).

Each time series is also stacked by year. The black line shows the current year of data. Water erosion protection for higher rainfall and steeper slopes:

Water erosion protection on higher slopes. As slope increases, more cover is required to control water erosion. The thresholds reported are:

- the percentage area with pixels greater than 80% total cover.
- the percentage area with pixels greater than 90% total cover.
- the percentage area with pixels greater than 95% total cover.

#### Acknowledgment of data:

- 1. http://www.agriculture.gov.au/abares/aclump/land-use/alum-classification
- 2. http://www.agriculture.gov.au/abares/forestsaustralia/sofr/sofr-2018
- 3. https://www.dpi.nsw.gov.au/agriculture/pastures-and-rangelands/establishment-mgmt/production-management2/groundcover
- 4. MODIS Fractional cover algorithm:

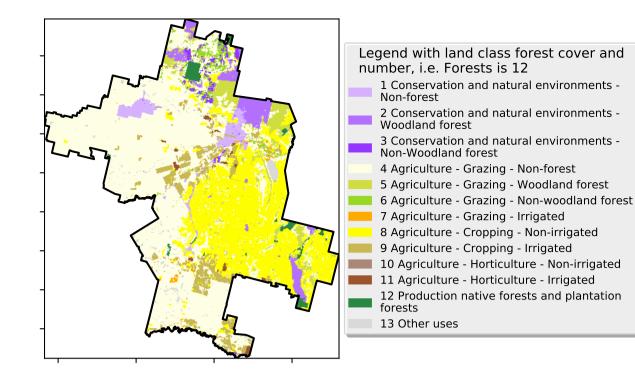
https://doi.org/10.4225/08/5848a3f19a7b3



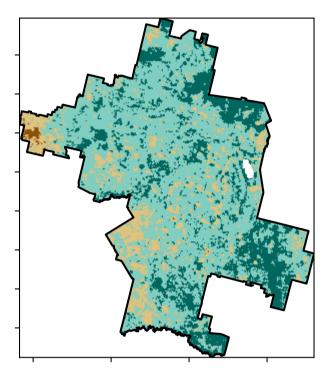
# **Vegetation Cover Oct 2019**

#### Land use and forest cover

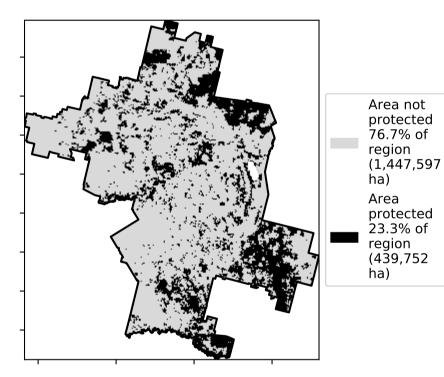
Proportion of each land class in area

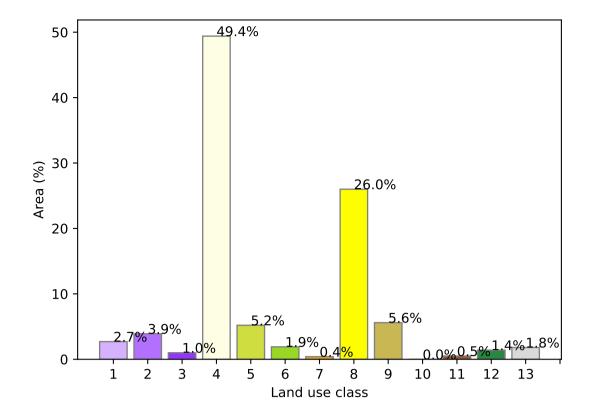


#### **Total Vegetation Cover [%]**

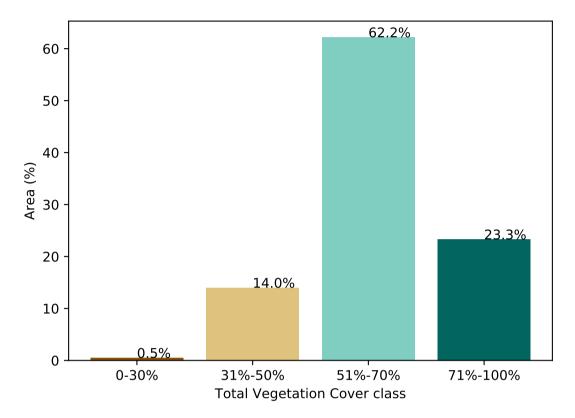


#### % Area protected from water erosion (>70%)

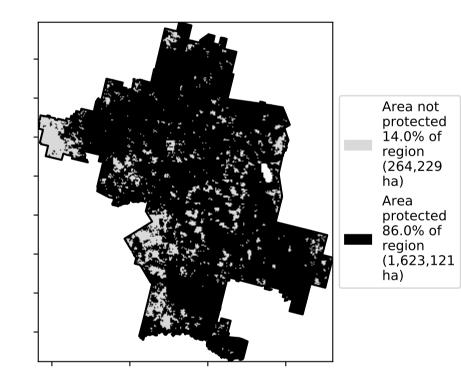




#### Proportion of vegetation cover class in area



#### % Area protected from wind erosion (>50%)



**Total Vegetation Cover Anomaly [%]** 

**Total Vegetation Cover Decile [%]** 

Anomaly show how many percetage points each pixel is from the mean. That is, red pixels are about 20% lower than the mean of that pixel. The mean is only for the month of the map using baseline from 2001 to 2019.

Catchment Scale

of Australia (2018)

(2018) and Forests

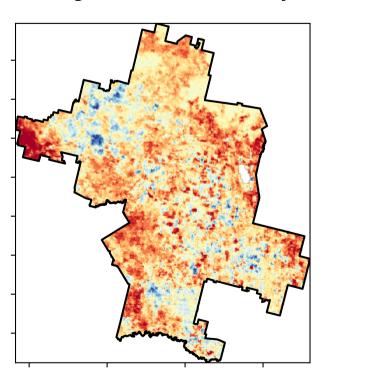
of Australia (2018)

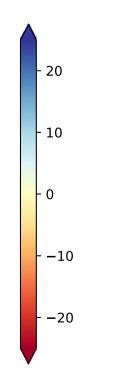
Derived from

Use of Australia

Land Use and Forests

Catchment Scale Land





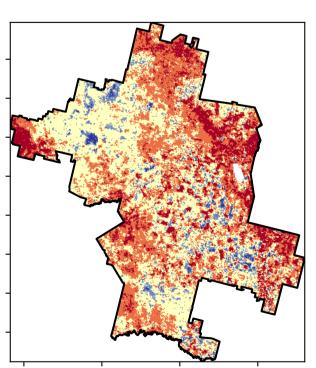
12º100010

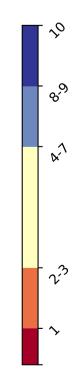
· 52% 70%

3201050010

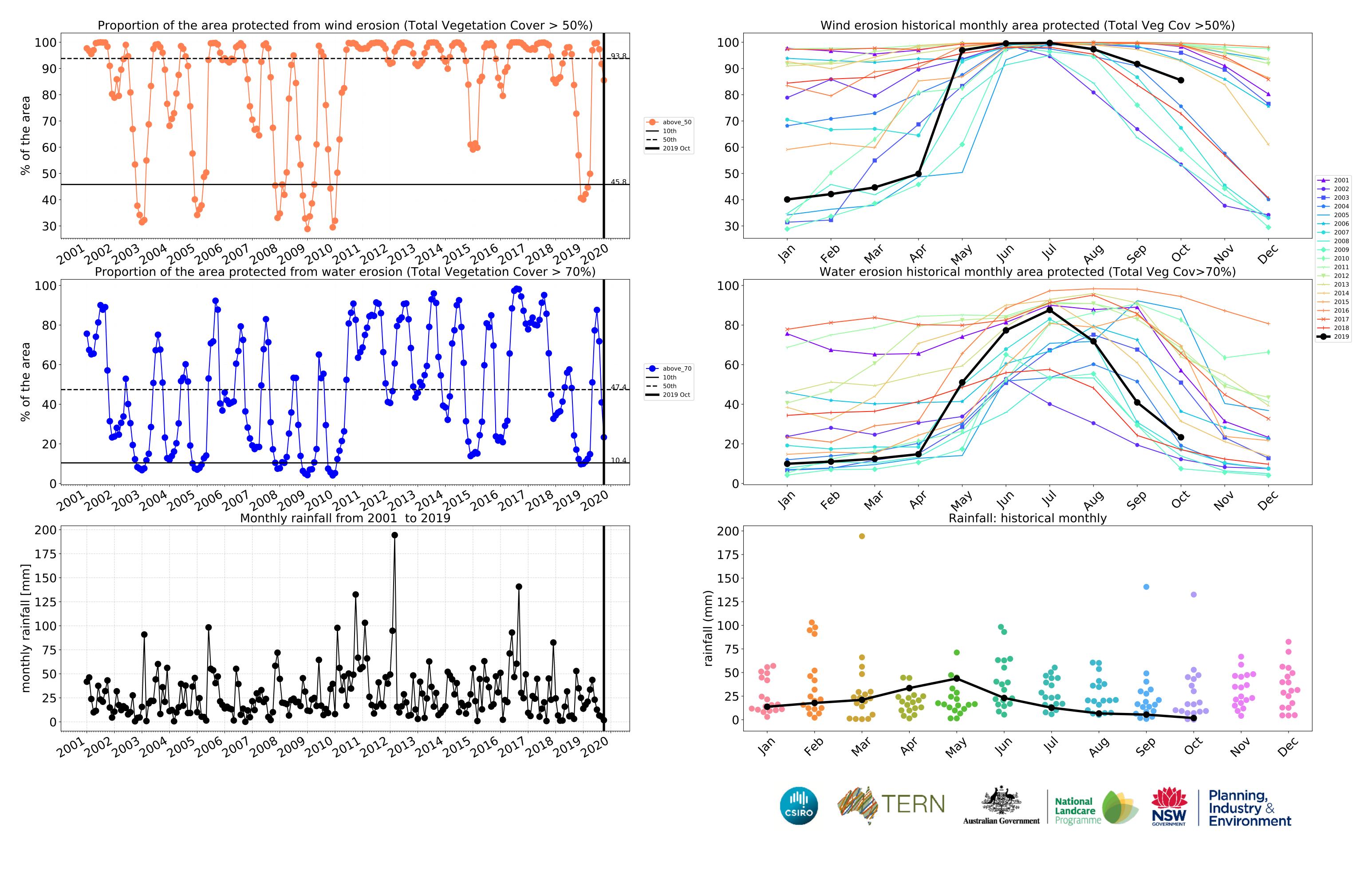
· 0.30%

Deciles show where the pixel value lies in the record, from highest to lowest, for that month. That is, red pixels are in the lowest 10% of records for that month of the map using baseline from 2001 to 2019.



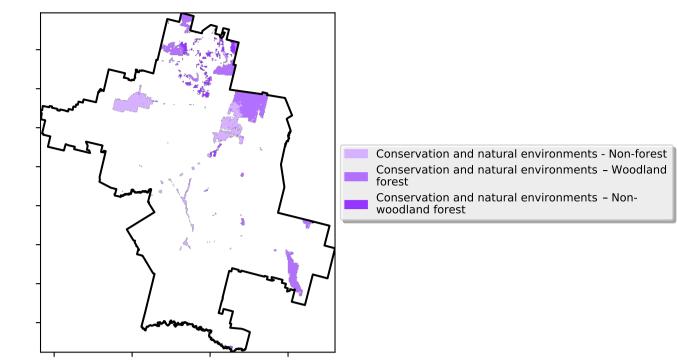




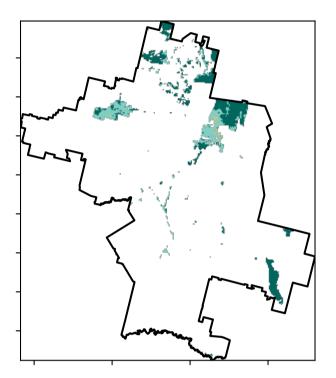


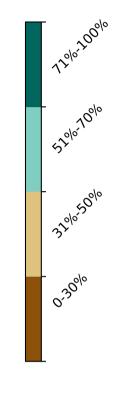
#### **Conservation and natural environments**

Land use and forest cover

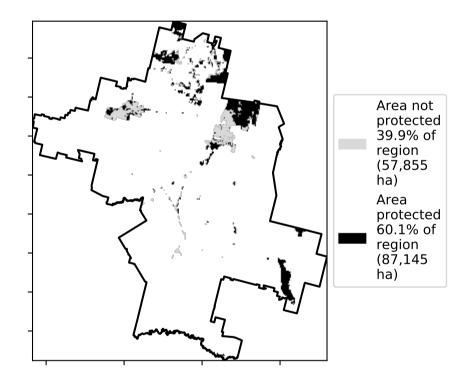


**Total Vegetation Cover [%]** 

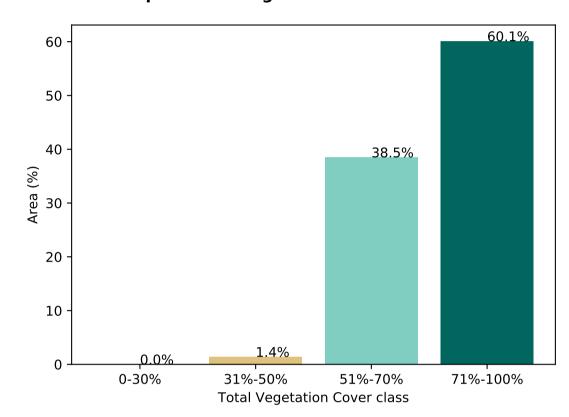




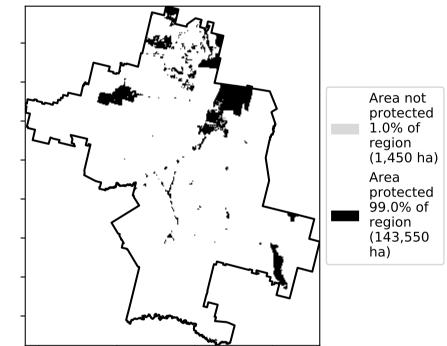
% Area protected from water erosion (>70%)



Proportion of vegetation cover class in area

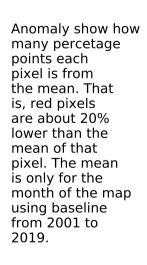


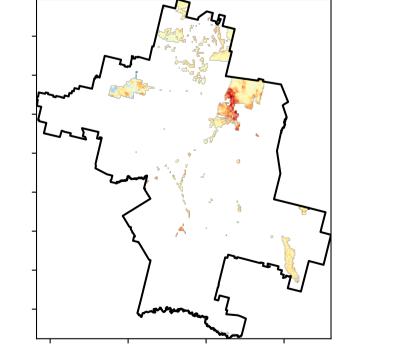
#### % Area protected from wind erosion (>50%)

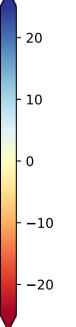


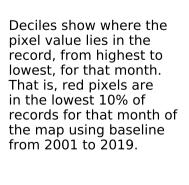
Catchment Scale Land Use and Forests of Australia (2018) Derived from Catchment Scale Land Use of Australia (2018) and Forests of Australia (2018)

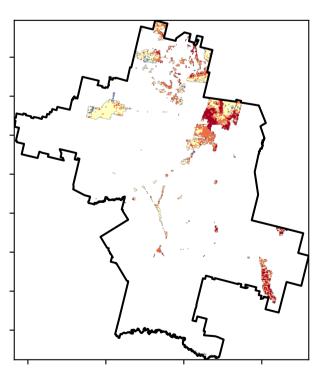
**Total Vegetation Cover Anomaly [%]** 





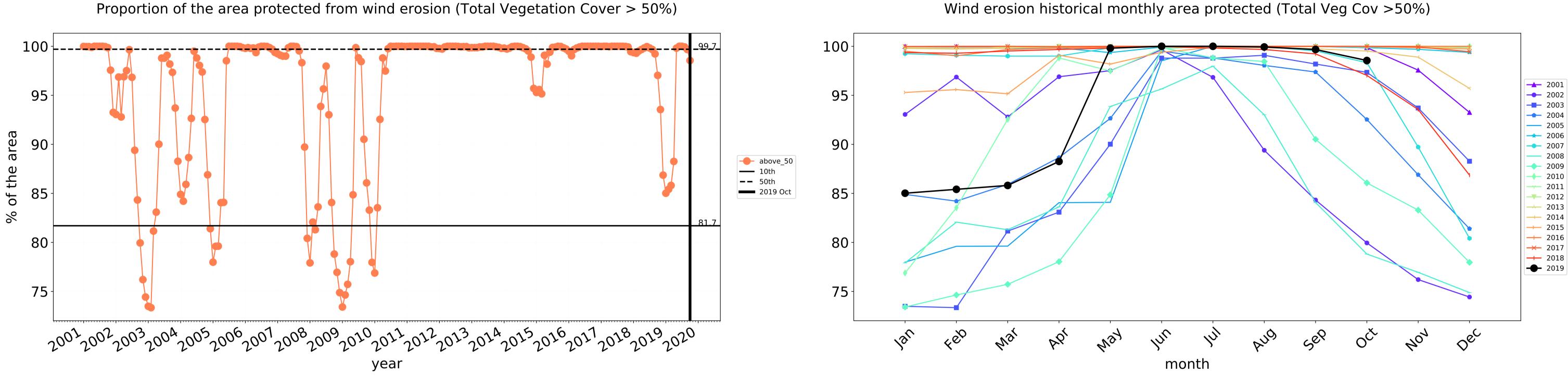




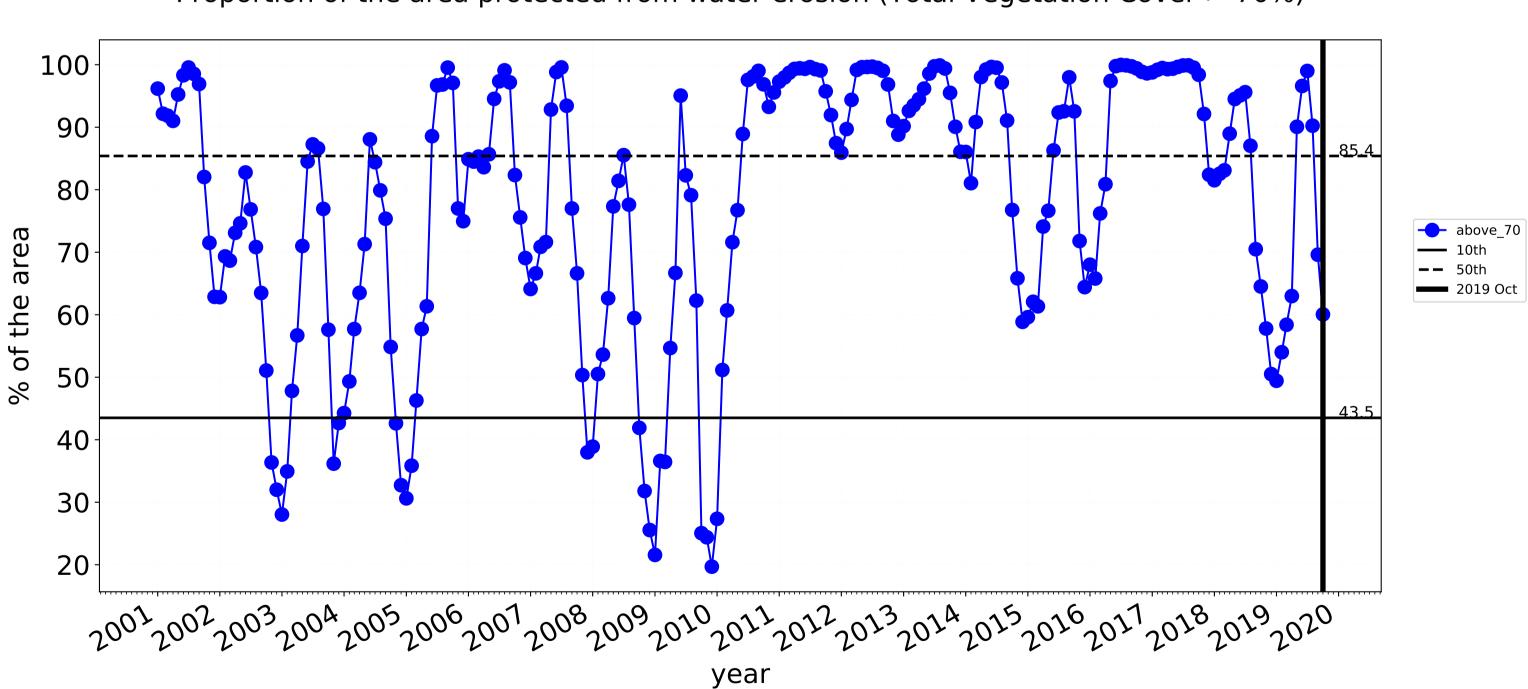






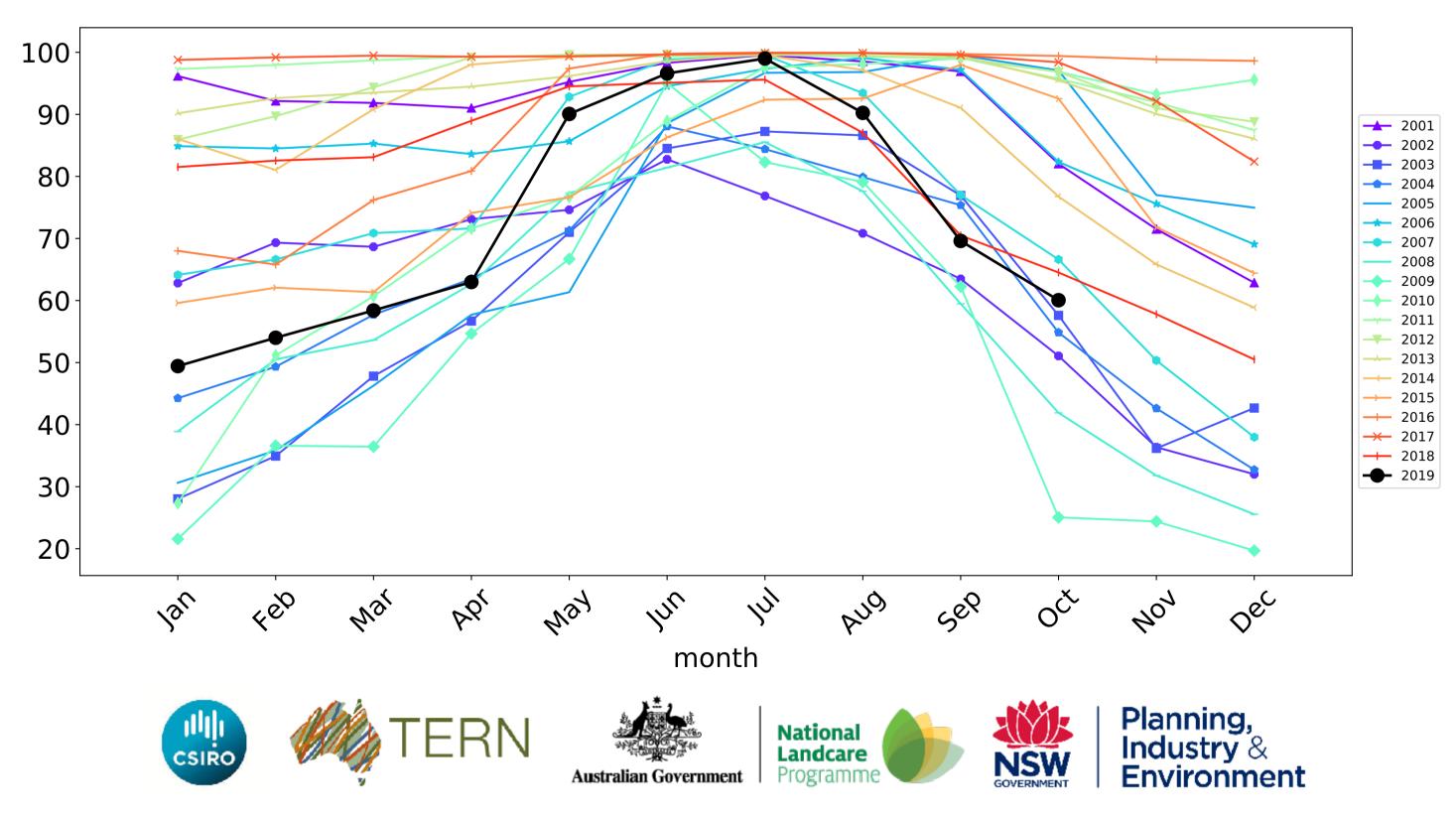


Proportion of the area protected from wind erosion (Total Vegetation Cover > 50%)



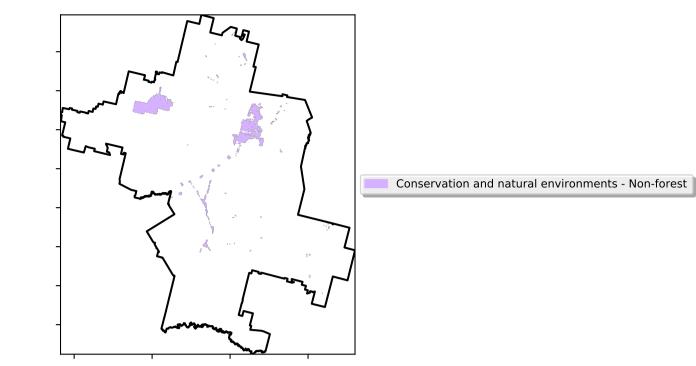
Proportion of the area protected from water erosion (Total Vegetation Cover > 70%)

Water erosion historical monthly area protected (Total Veg Cov>70%)

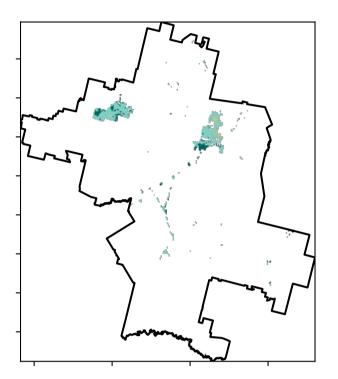


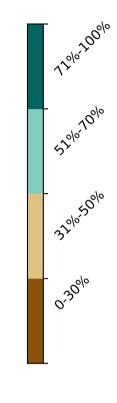
#### **Conservation and natural environments non forest**

Land use and forest cover

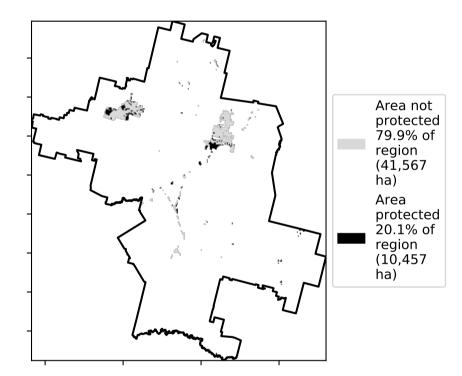


**Total Vegetation Cover [%]** 

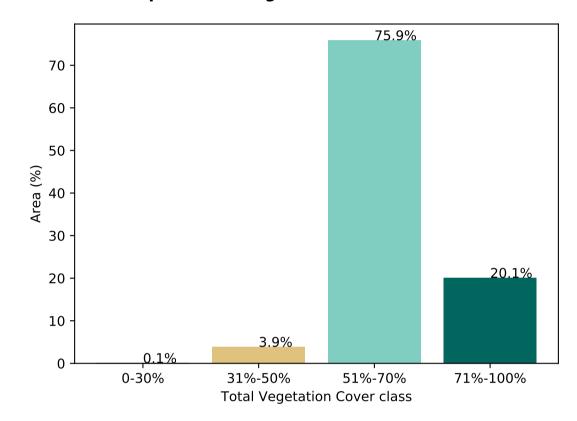




% Area protected from water erosion (>70%)



Proportion of vegetation cover class in area



% Area protected from wind erosion (>50%)

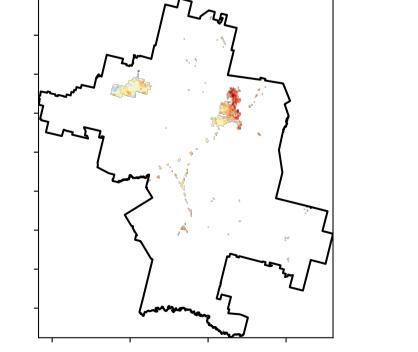


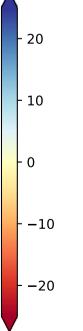


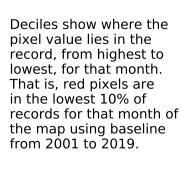
Catchment Scale Land Use and Forests of Australia (2018) Derived from Catchment Scale Land Use of Australia (2018) and Forests of Australia (2018)

**Total Vegetation Cover Anomaly [%]** 

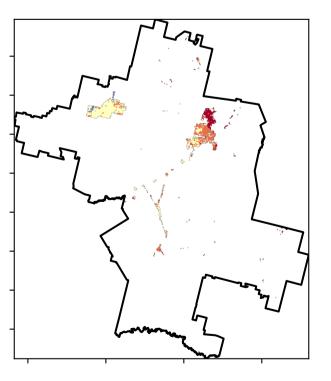
Anomaly show how many percetage points each pixel is from the mean. That is, red pixels are about 20% lower than the mean of that pixel. The mean is only for the month of the map using baseline from 2001 to 2019.

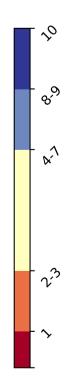






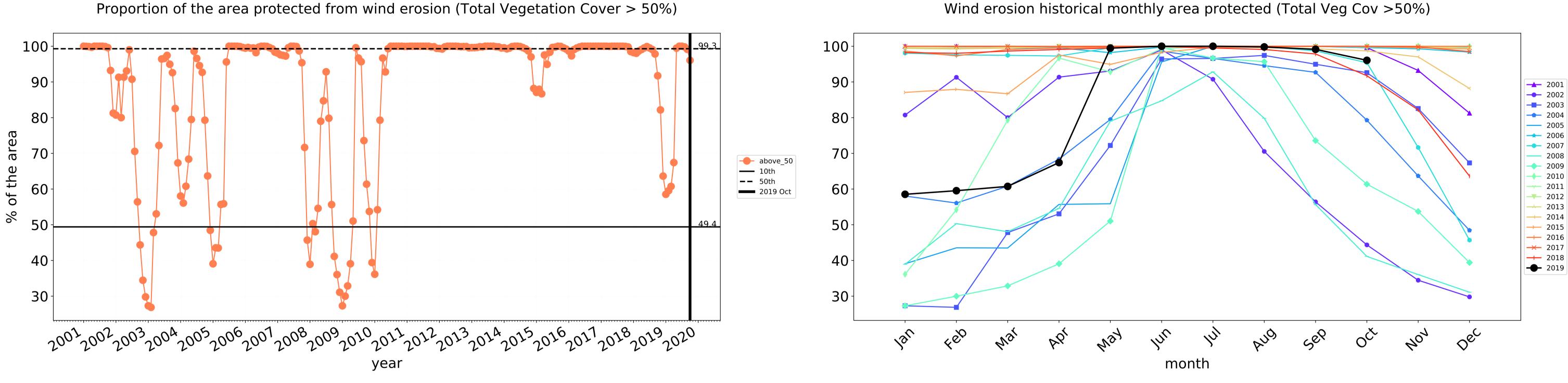
Area not protected 4.0% of region (2,081 ha) Area protected 96.0% of region (49,944 ha)





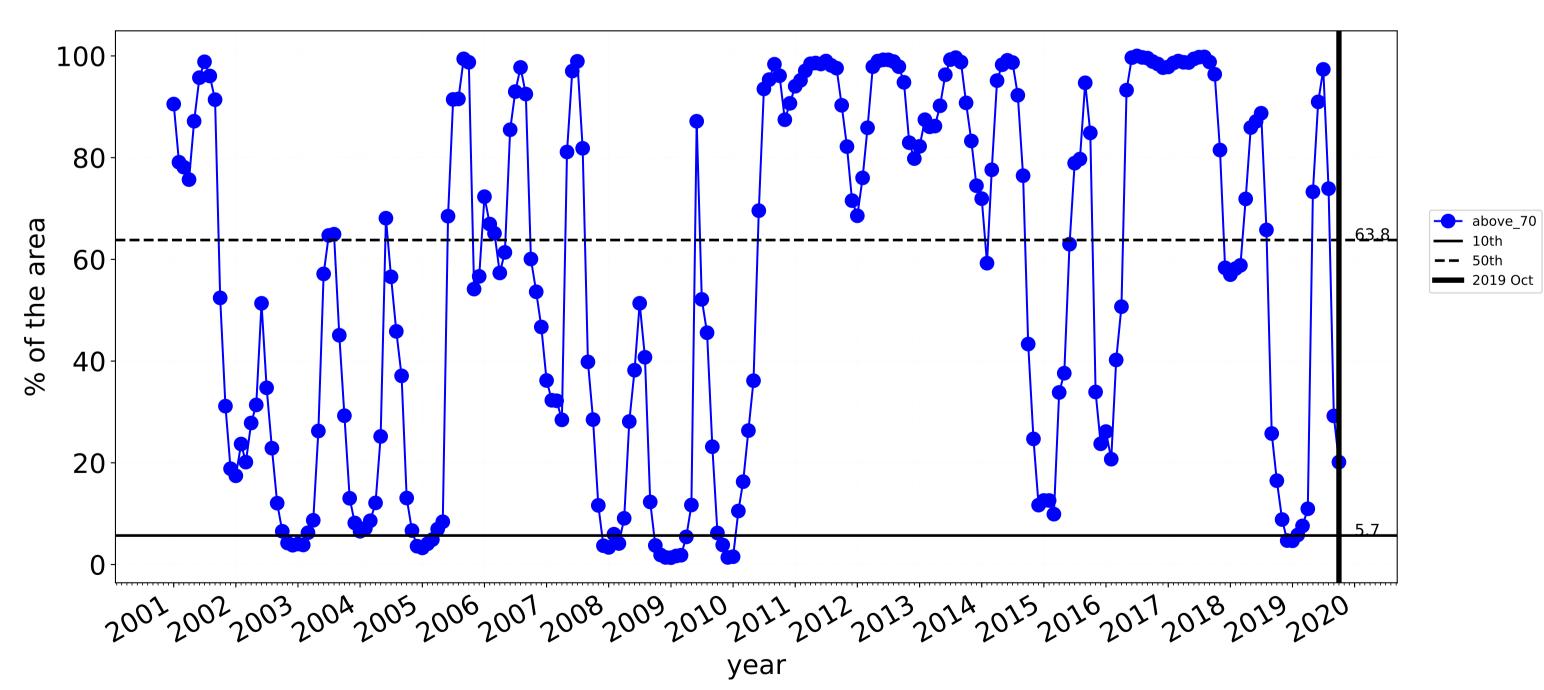


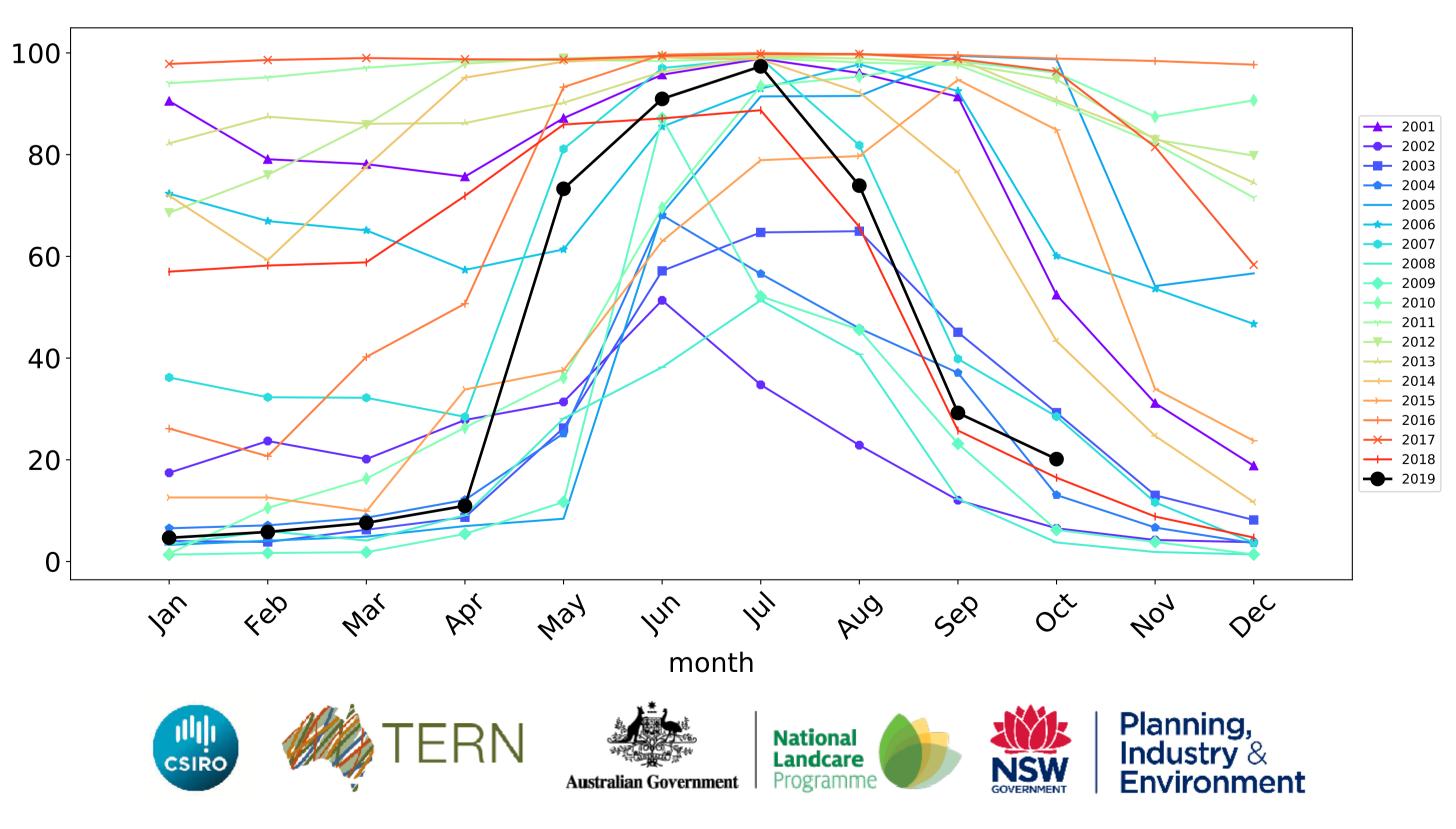
### **Conservation and natural environments non forest timeseries**



Proportion of the area protected from wind erosion (Total Vegetation Cover > 50%)

Proportion of the area protected from water erosion (Total Vegetation Cover > 70%)





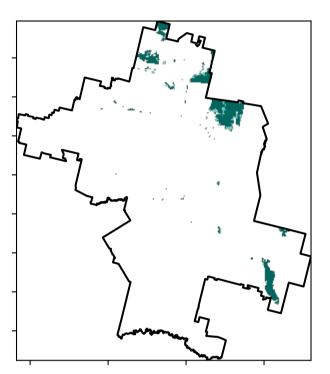
#### **Conservation and natural environments Woodland forest**

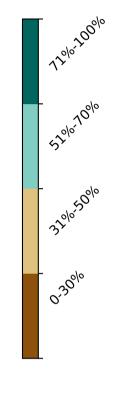
Catchment Scale Land Use and Forests of Australia (2018) Derived from Catchment Scale Land Use of Australia (2018) and Forests of Australia (2018)

Conservation and natural environments – Woodland forest

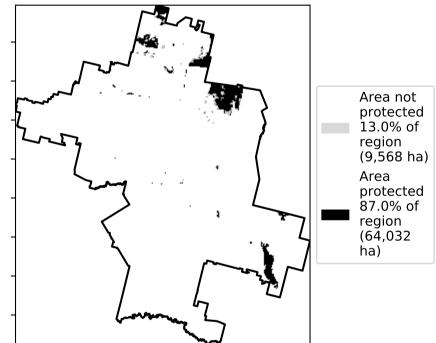
**Total Vegetation Cover [%]** 

Land use and forest cover

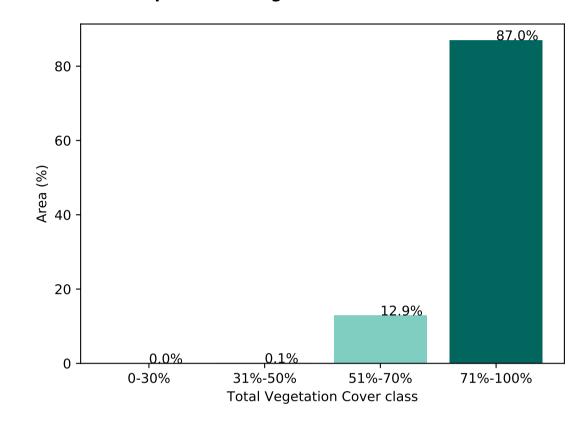




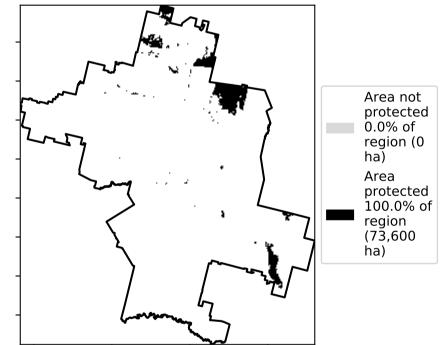
% Area protected from water erosion (>70%)



Proportion of vegetation cover class in area

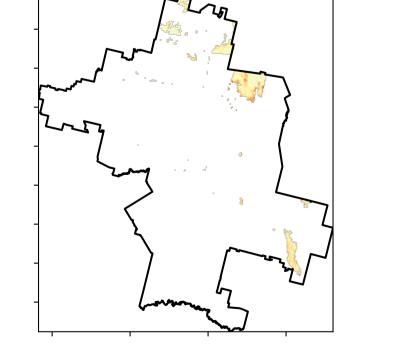


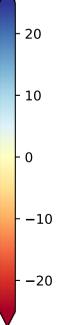
% Area protected from wind erosion (>50%)

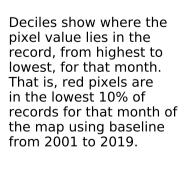


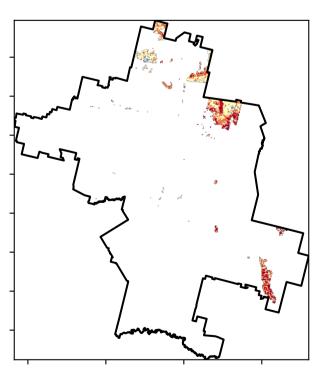
**Total Vegetation Cover Anomaly [%]** 

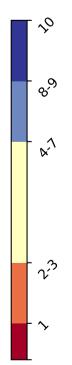
Anomaly show how many percetage points each pixel is from the mean. That is, red pixels are about 20% lower than the mean of that pixel. The mean is only for the month of the map using baseline from 2001 to 2019.



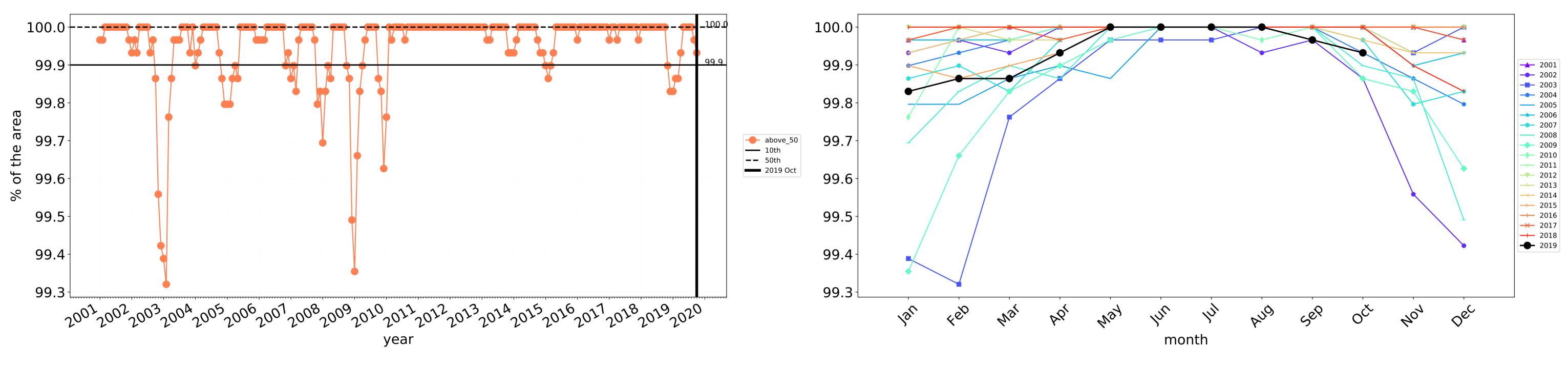






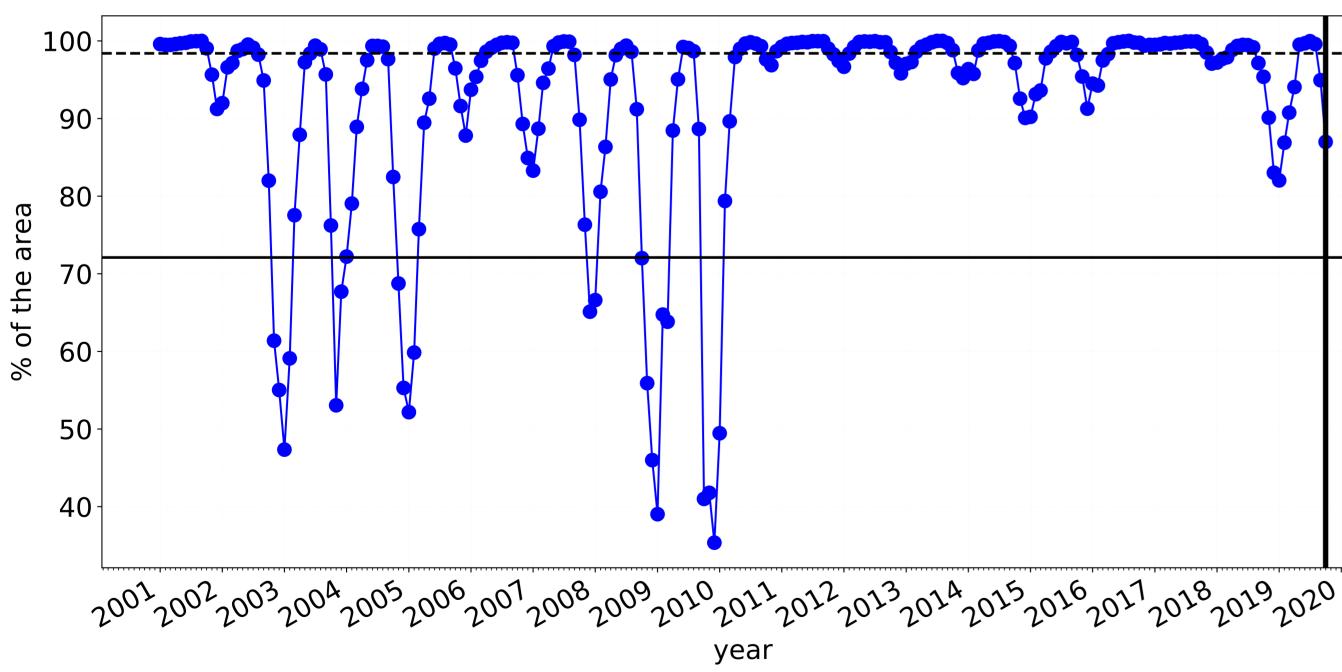


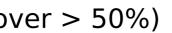




Proportion of the area protected from wind erosion (Total Vegetation Cover > 50%)

Proportion of the area protected from water erosion (Total Vegetation Cover > 70%)

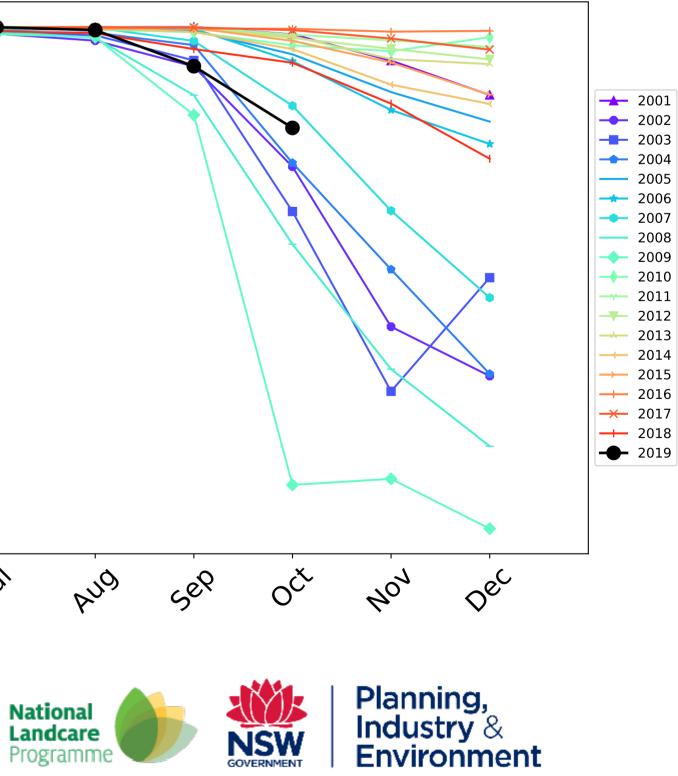




Wind erosion historical monthly area protected (Total Veg Cov >50%)

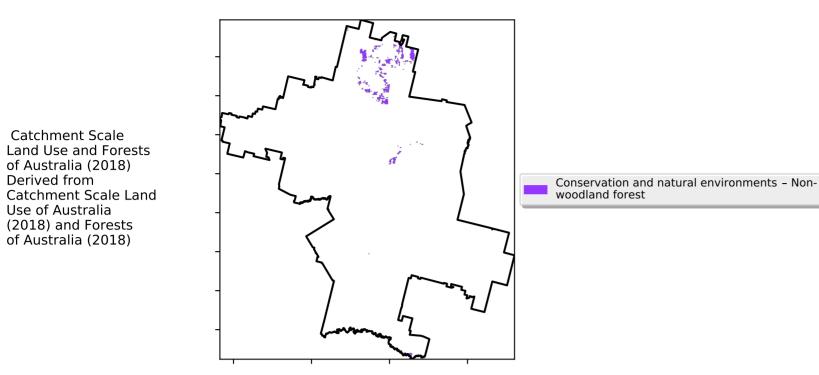
100 98.4 90 80 ---- above\_70 **—** 10th **——** 50th 72 **—** 2019 Oct 70 60 50 40 feb Jan way PP In Mar In In month ERN **HORA** Landcare CSIRC Programme Australian Government

Water erosion historical monthly area protected (Total Veg Cov>70%)

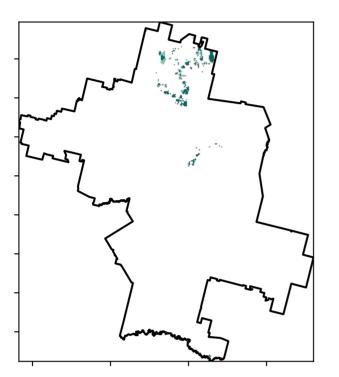


#### **Conservation and natural environments Forest (non woodland)**

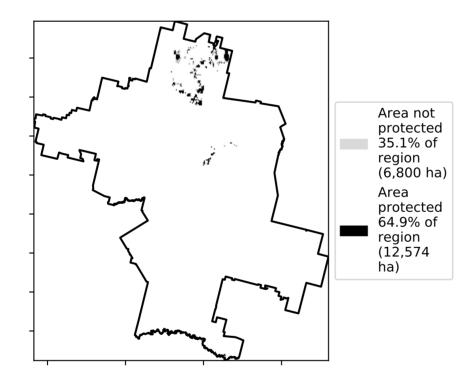
Land use and forest cover

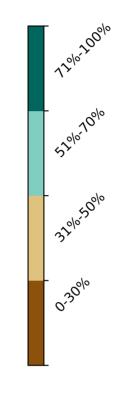


**Total Vegetation Cover [%]** 

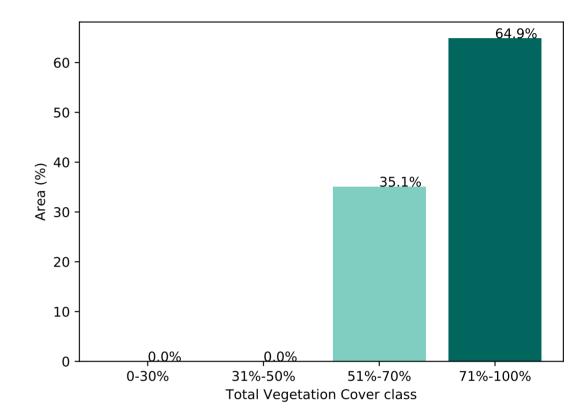




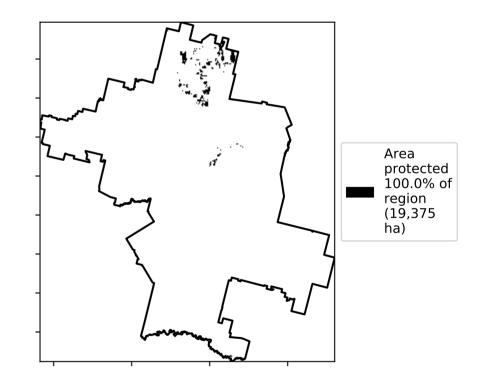








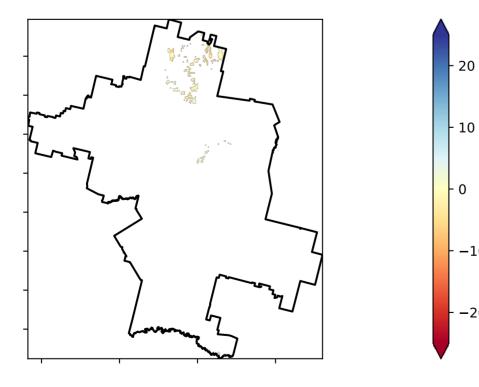
% Area protected from wind erosion (>50%)

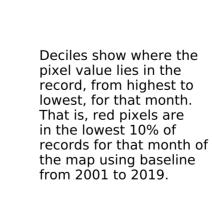


**Total Vegetation Cover Anomaly [%]** 

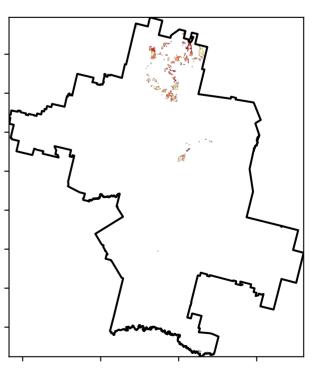
Anomaly show how many percetage points each pixel is from the mean. That is, red pixels are about 20% lower than the mean of that pixel. The mean is only for the month of the map using baseline from 2001 to 2019.

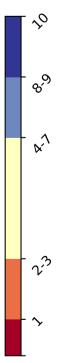
Derived from





**Total Vegetation Cover Decile [%]** 







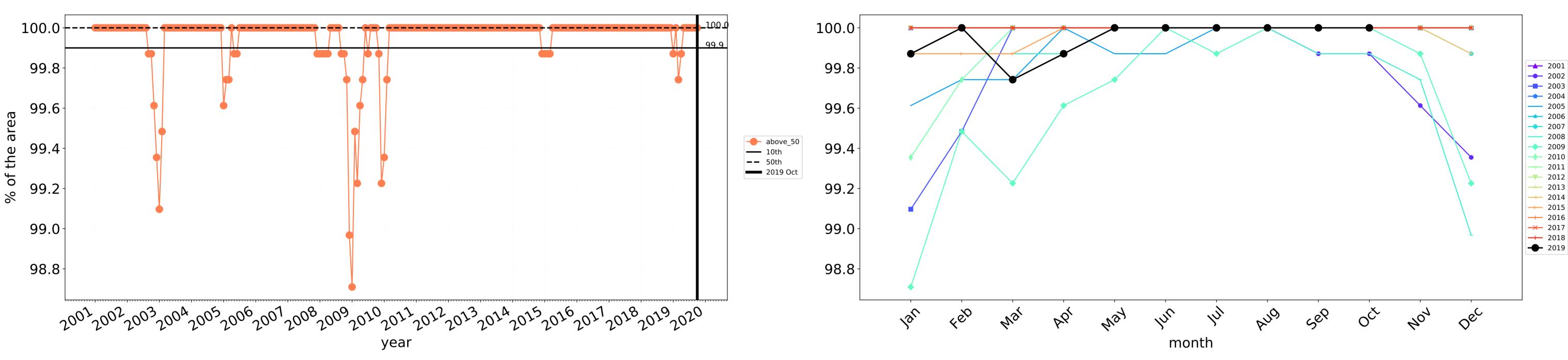
· 10

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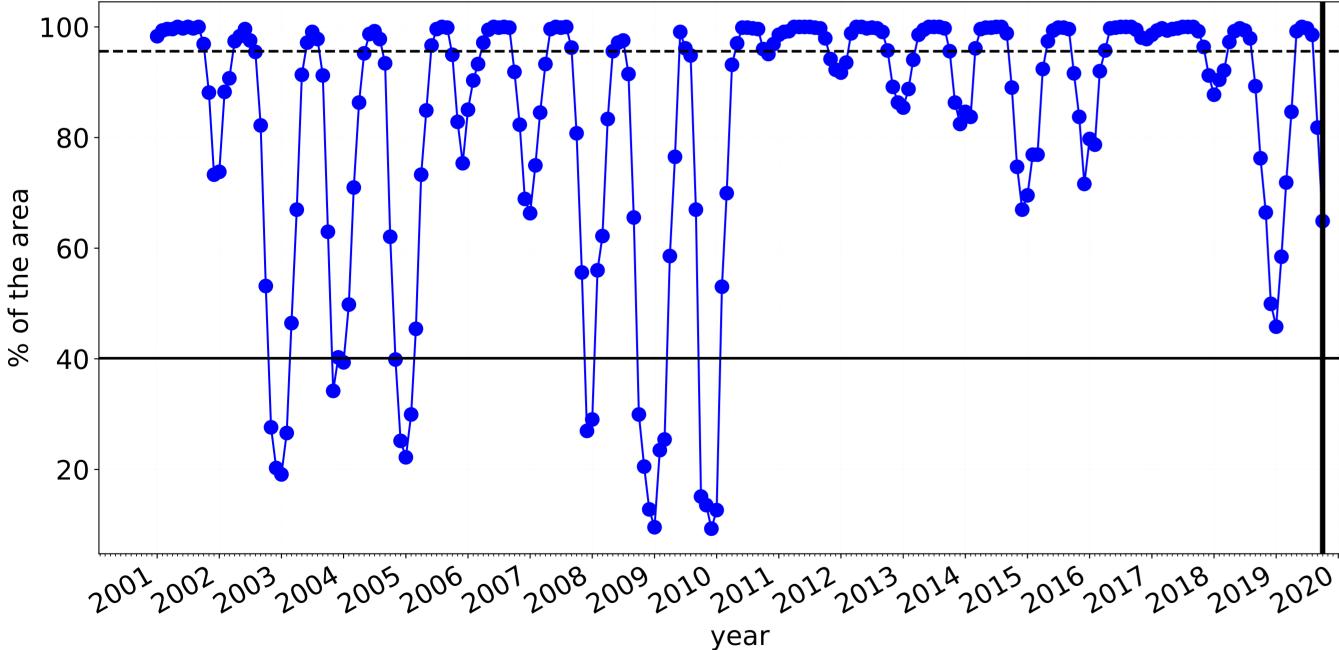
-20

### **Conservation and natural environments Forest (non woodland) timeseries**



Proportion of the area protected from wind erosion (Total Vegetation Cover > 50%)

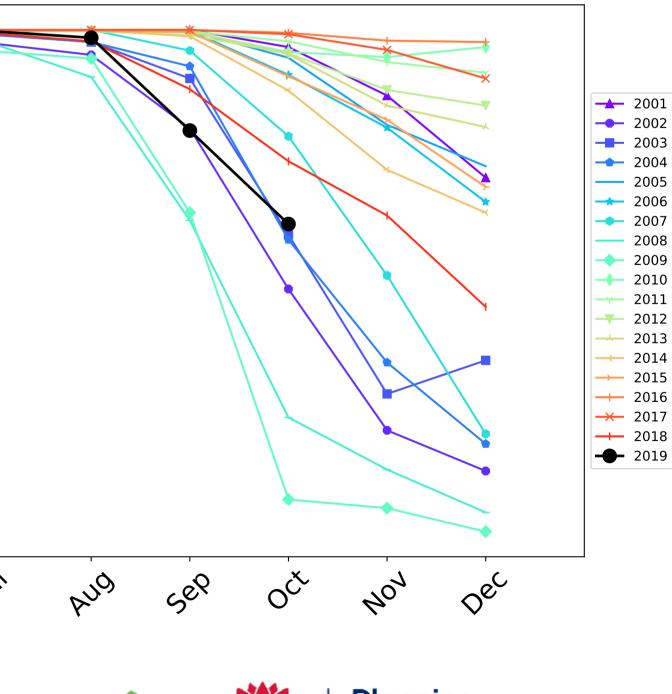
Proportion of the area protected from water erosion (Total Vegetation Cover > 70%)



100 95.6 80 ---- above\_70 **—** 10th **——** 50th 60 **—** 2019 Oct 10 ' 40 20 Jan 4eb May PP In Mar 1/2/ month ERN **HARD** Australian Government

Wind erosion historical monthly area protected (Total Veg Cov >50%)

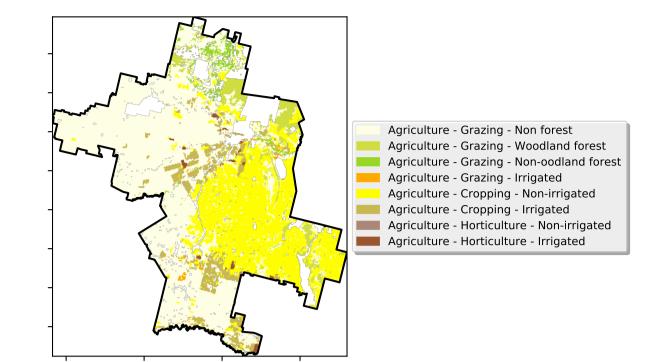
Water erosion historical monthly area protected (Total Veg Cov>70%)



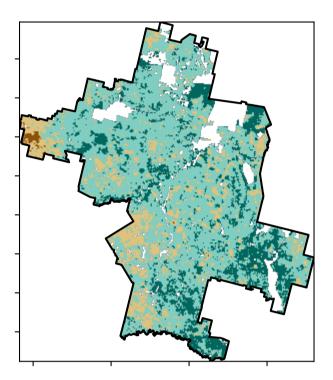


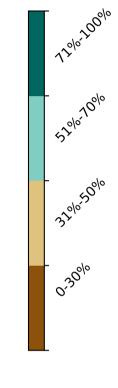
#### Agriculture

Land use and forest cover

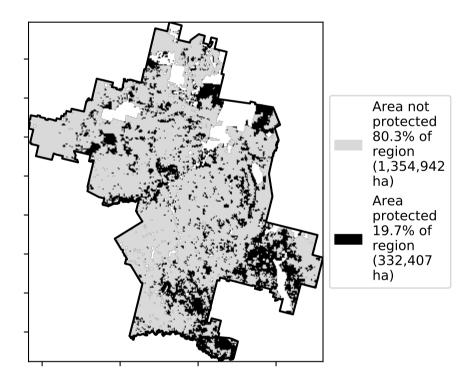


**Total Vegetation Cover [%]** 

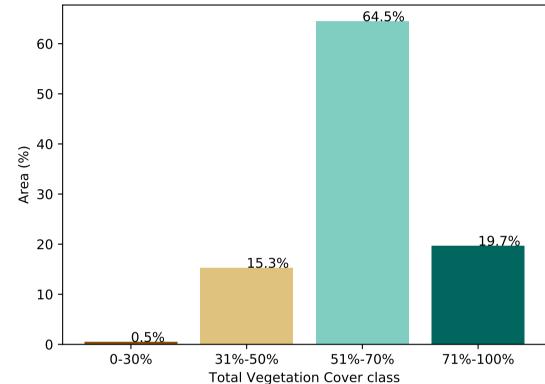




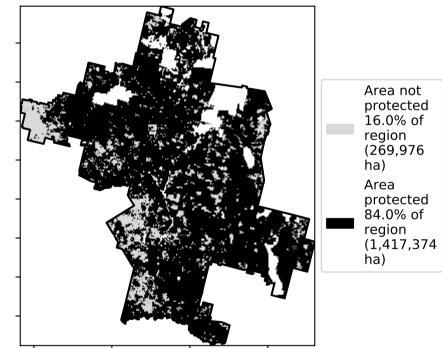
% Area protected from water erosion (>70%)



Proportion of vegetation cover class in area



#### % Area protected from wind erosion (>50%)



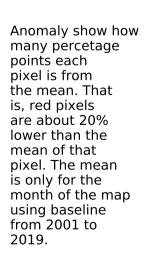
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**Total Vegetation Cover Anomaly [%]** 



Catchment Scale

Derived from

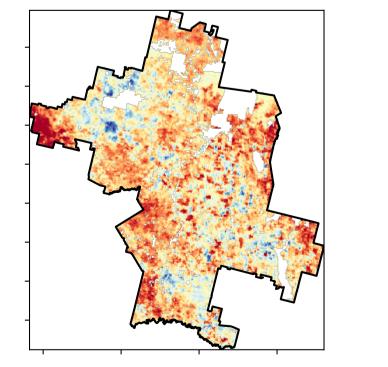
Use of Australia

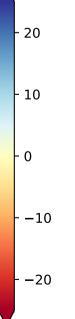
(2018) and Forests

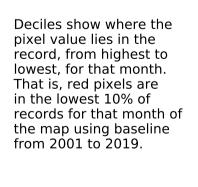
of Australia (2018)

Land Use and Forests of Australia (2018)

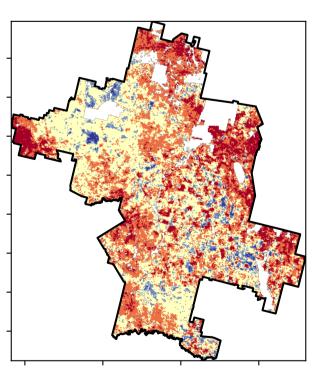
Catchment Scale Land



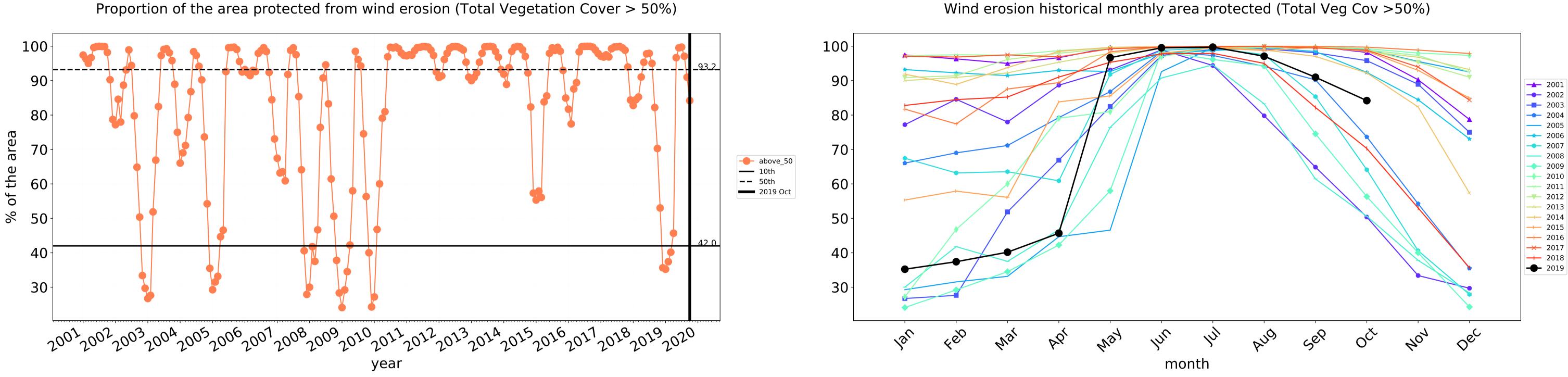




**Total Vegetation Cover Decile [%]** 



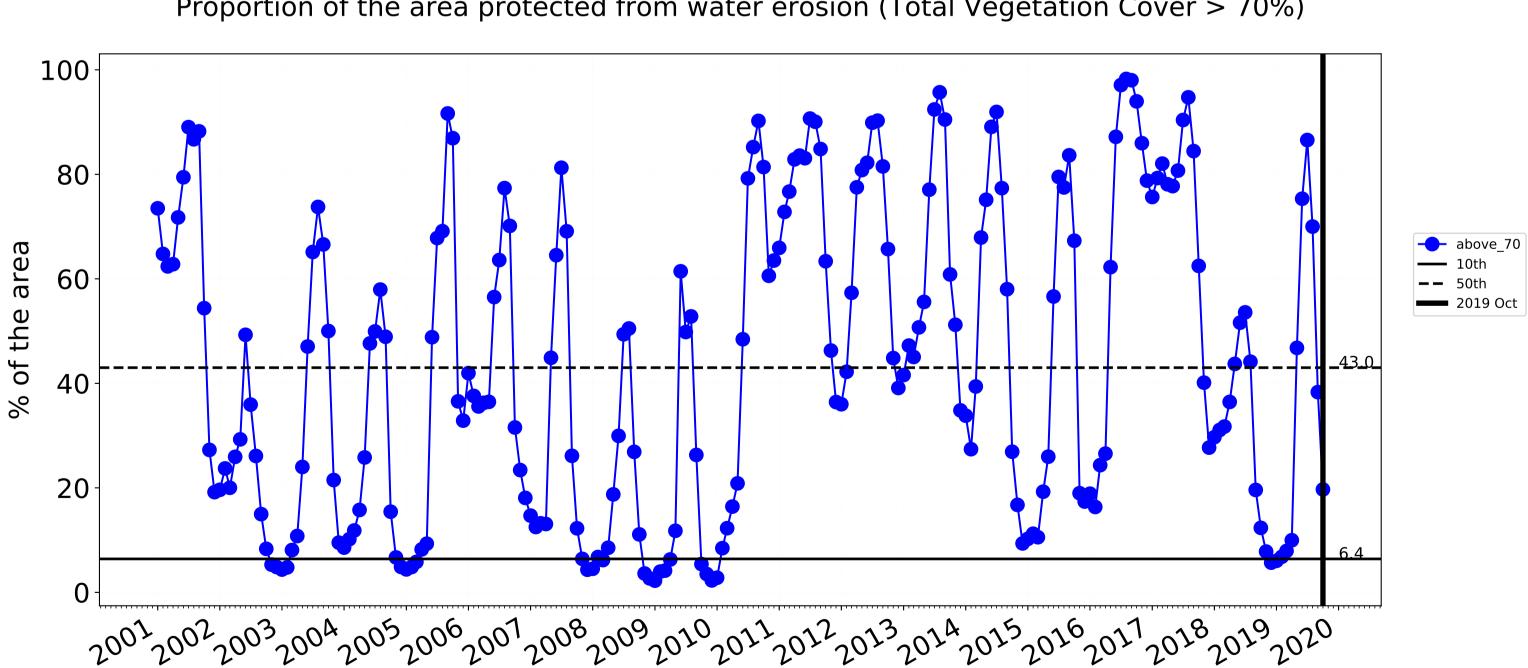




**——** 10th

**——** 2019 Oct

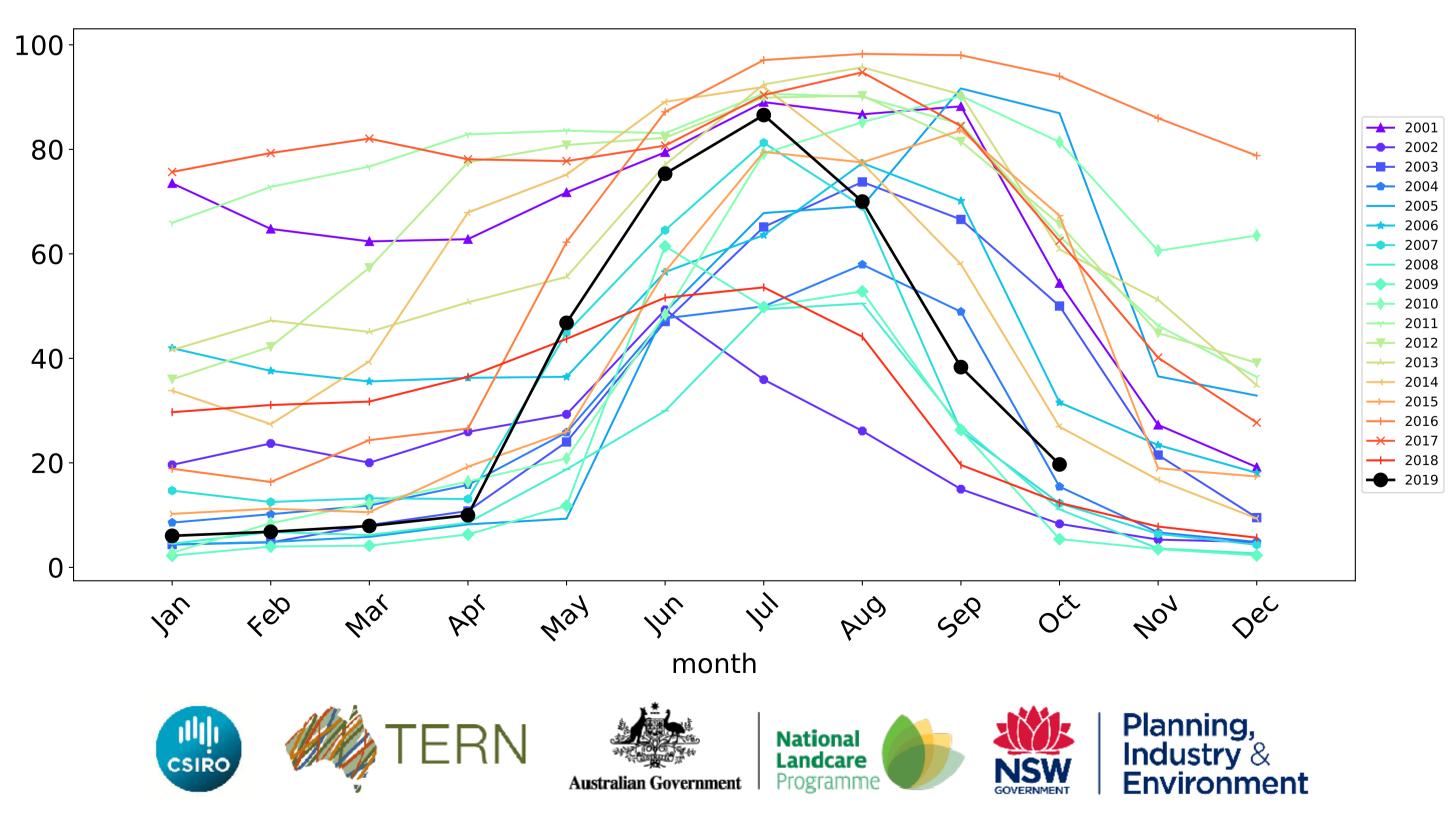
Proportion of the area protected from wind erosion (Total Vegetation Cover > 50%)



year

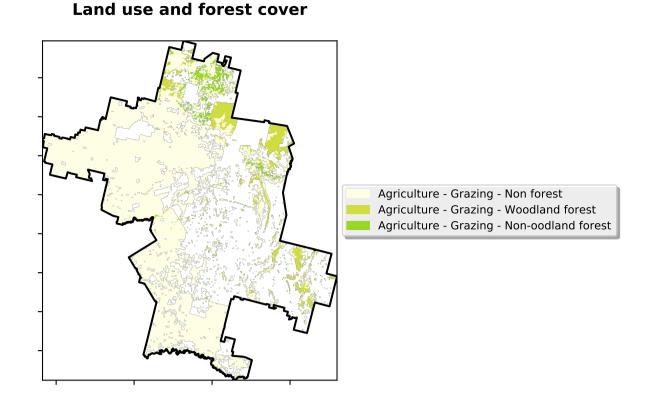
Proportion of the area protected from water erosion (Total Vegetation Cover > 70%)

### **Agriculture timeseries**

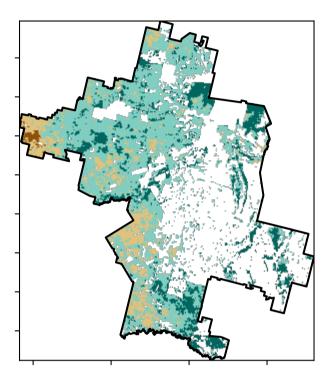


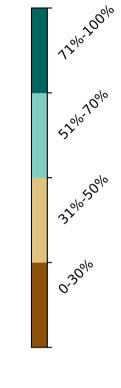
#### Grazing

Catchment Scale Land Use and Forests of Australia (2018) Derived from Catchment Scale Land Use of Australia (2018) and Forests of Australia (2018)

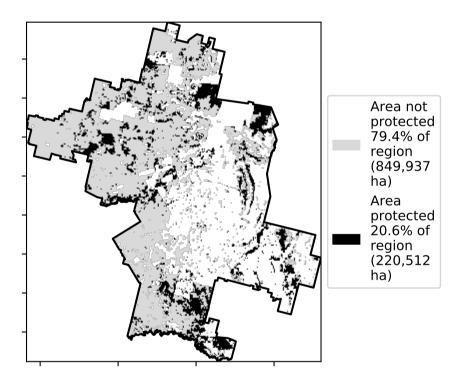


**Total Vegetation Cover [%]** 

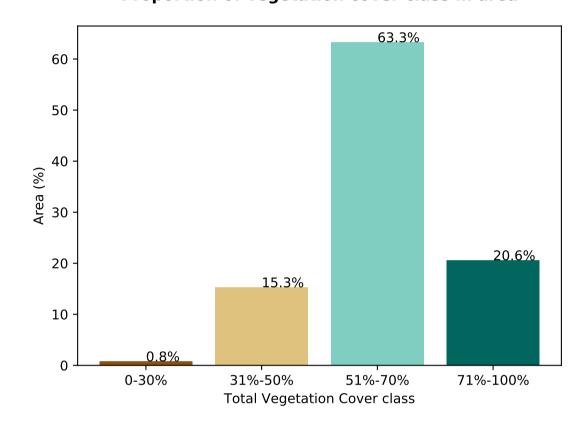




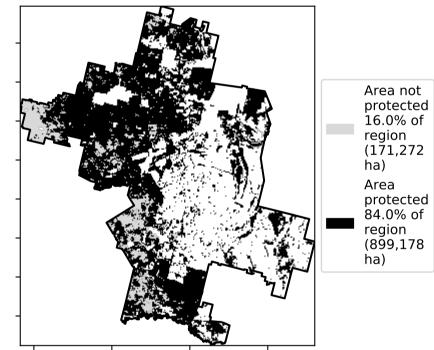
% Area protected from water erosion (>70%)



Proportion of vegetation cover class in area



% Area protected from wind erosion (>50%)



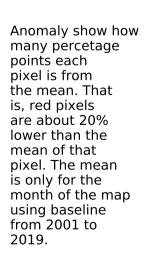
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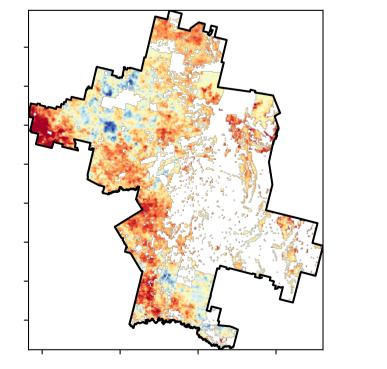
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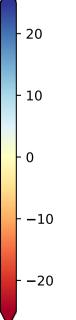
A-1

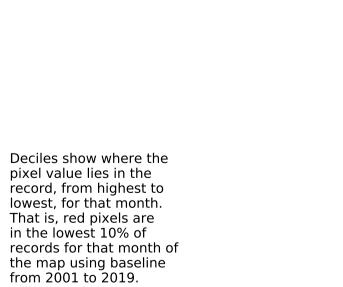
2?3

**Total Vegetation Cover Anomaly [%]** 

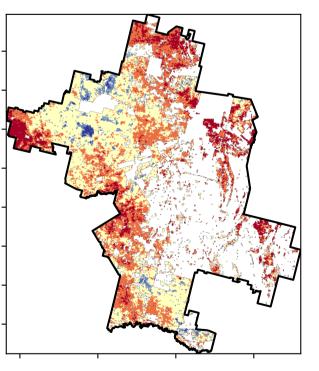




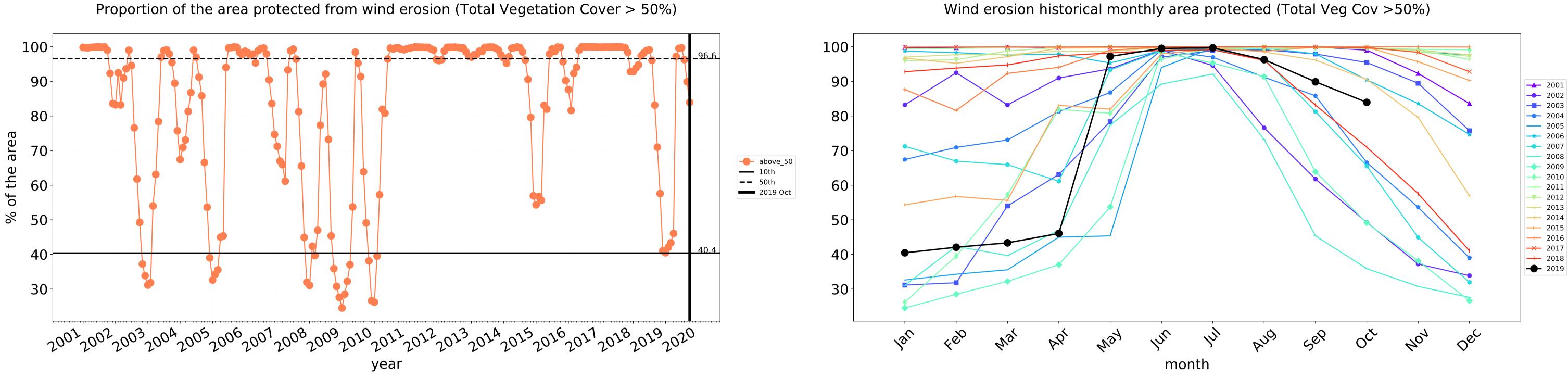




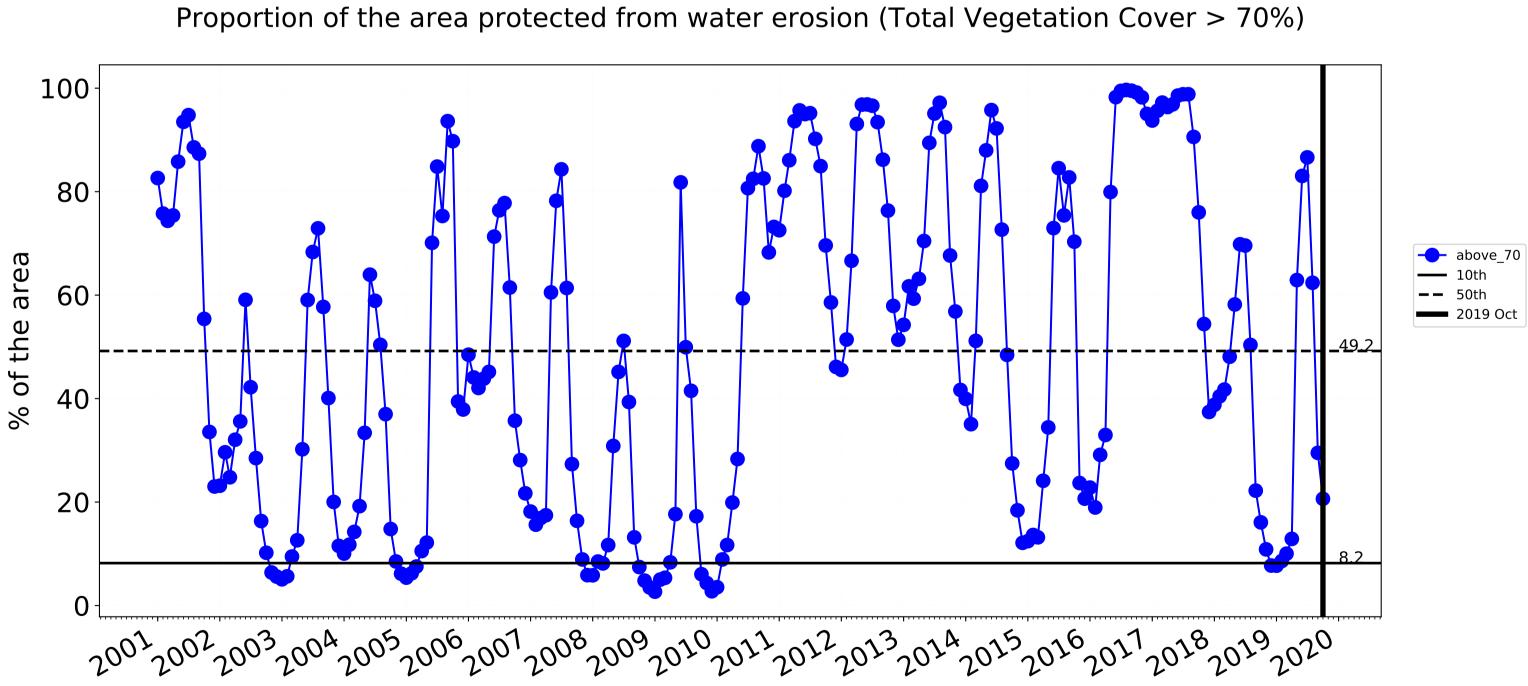
Total Vegetation Cover Decile [%]





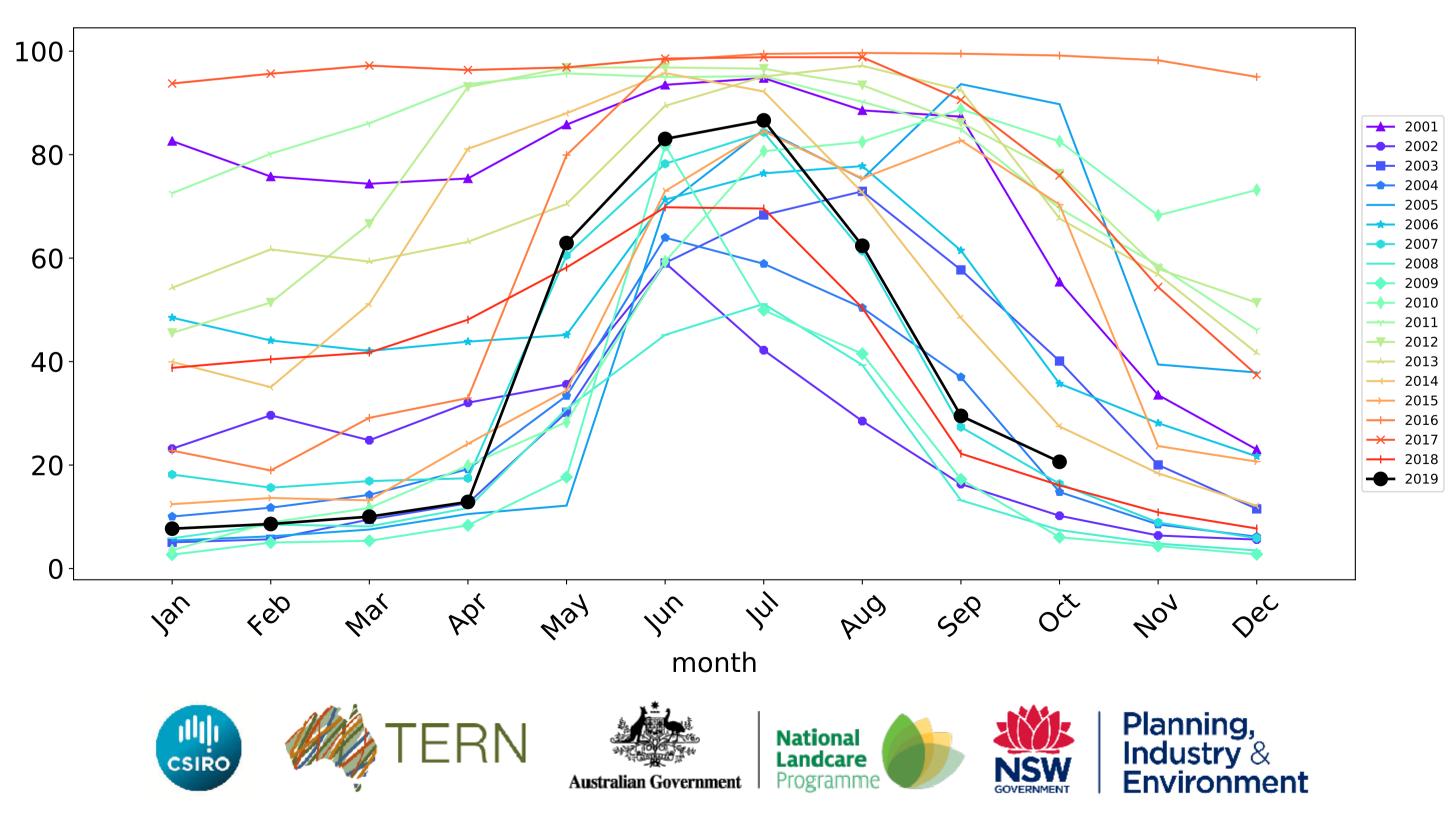


Proportion of the area protected from wind erosion (Total Vegetation Cover > 50%)



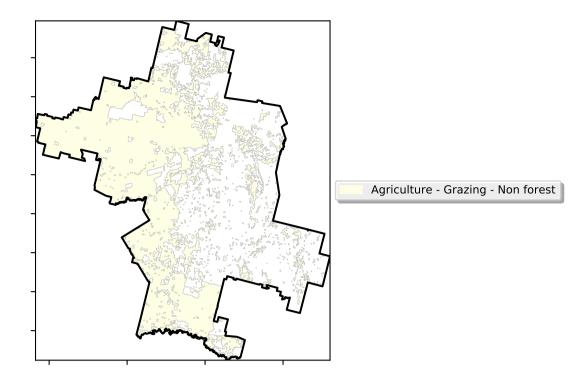
year

### Grazing timeseries

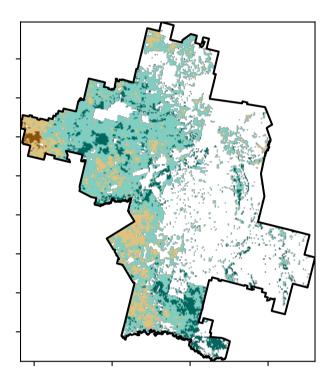


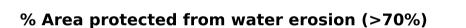
#### **Grazing non forest**

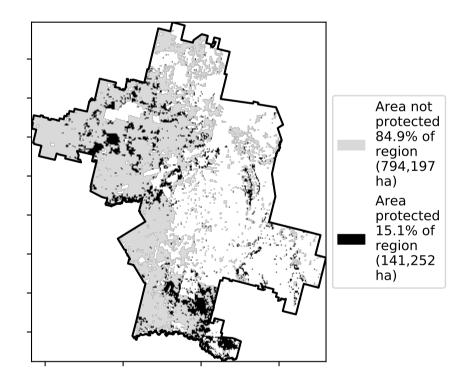
Land use and forest cover

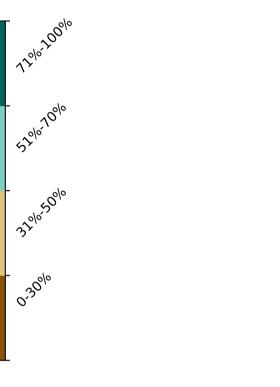


**Total Vegetation Cover [%]** 



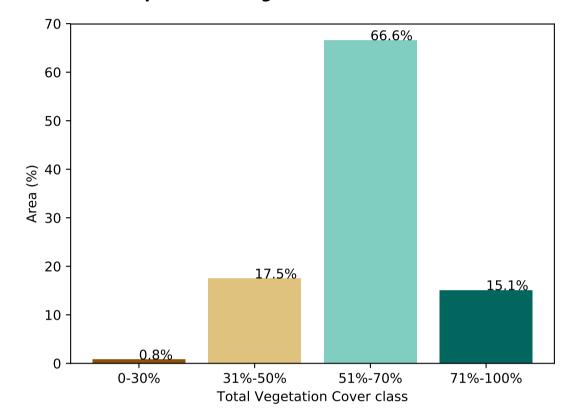




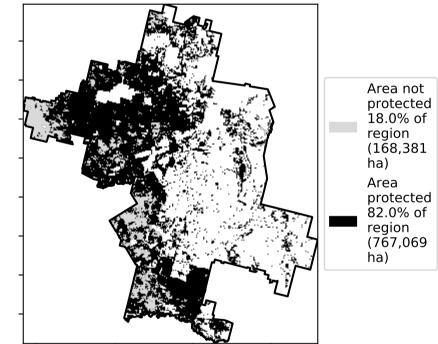


0.30%

Proportion of vegetation cover class in area



% Area protected from wind erosion (>50%)



\$

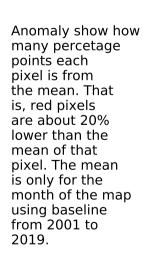
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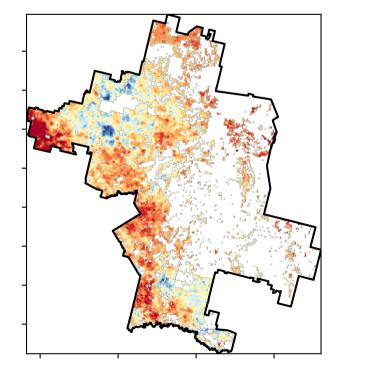
A-1

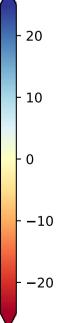
2?3

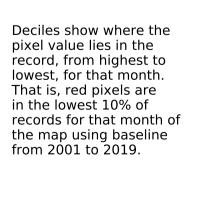
Catchment Scale Land Use and Forests of Australia (2018) Derived from Catchment Scale Land Use of Australia (2018) and Forests of Australia (2018)

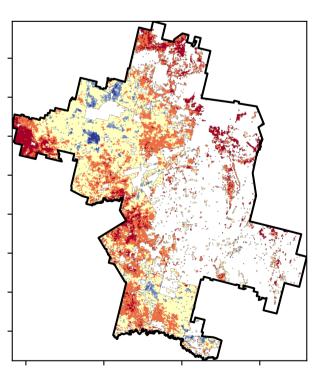
**Total Vegetation Cover Anomaly [%]** 



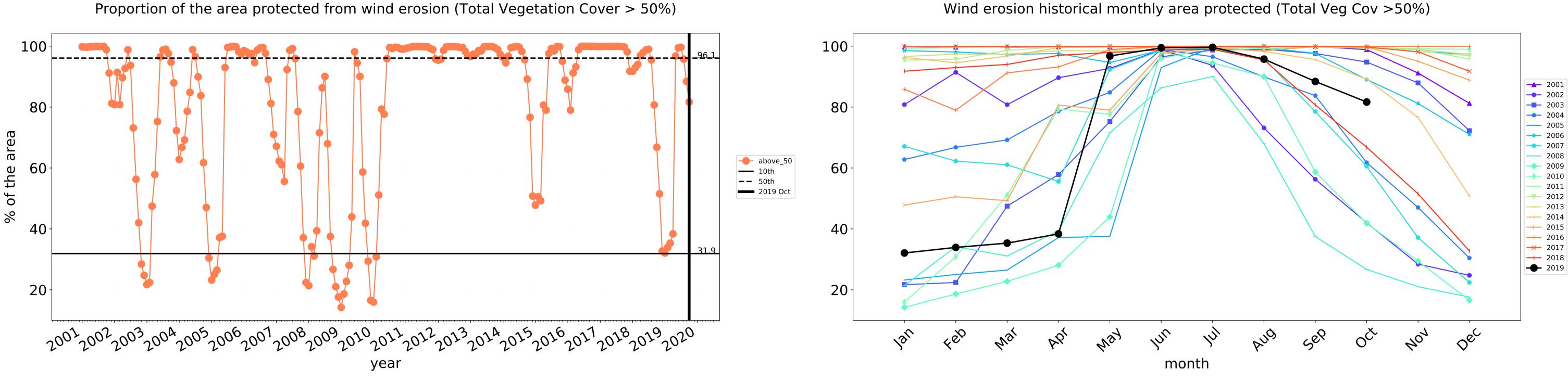




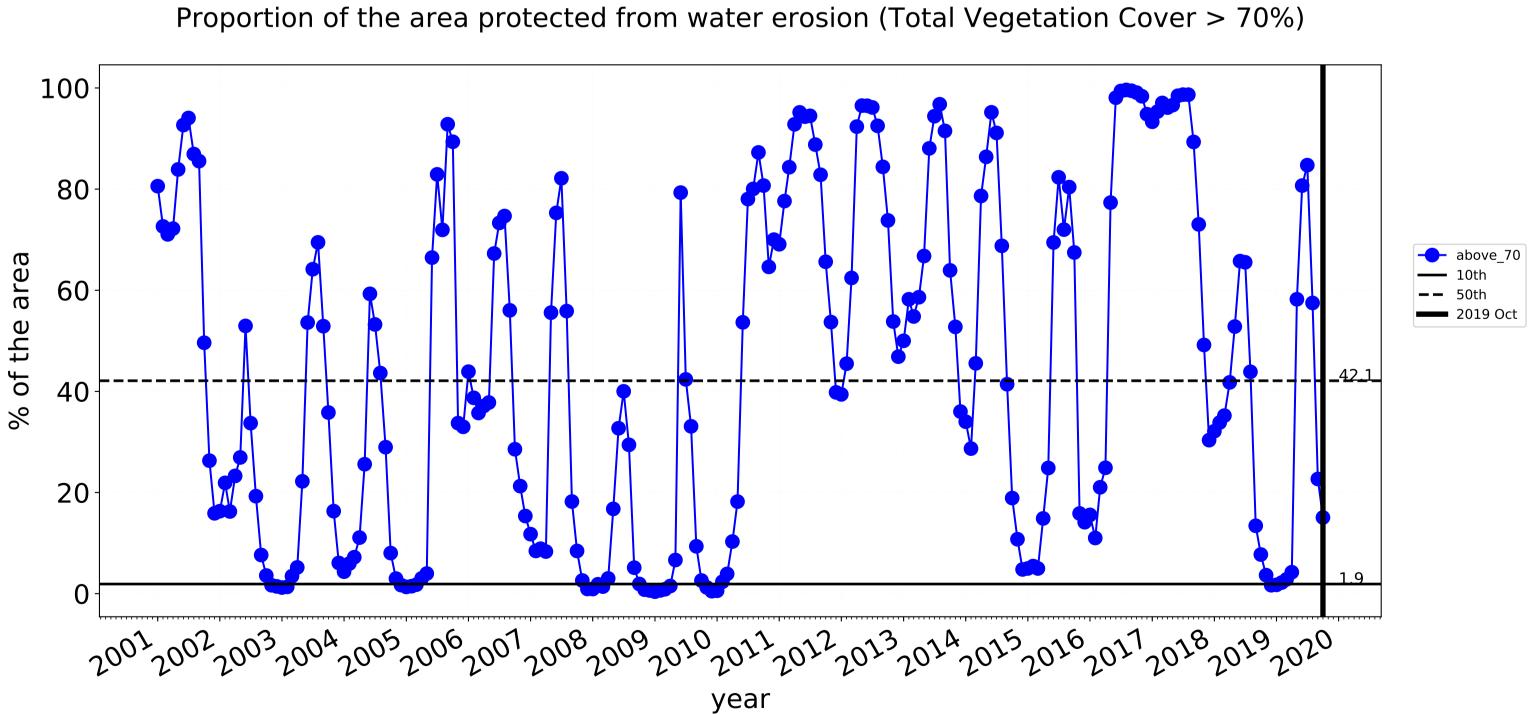




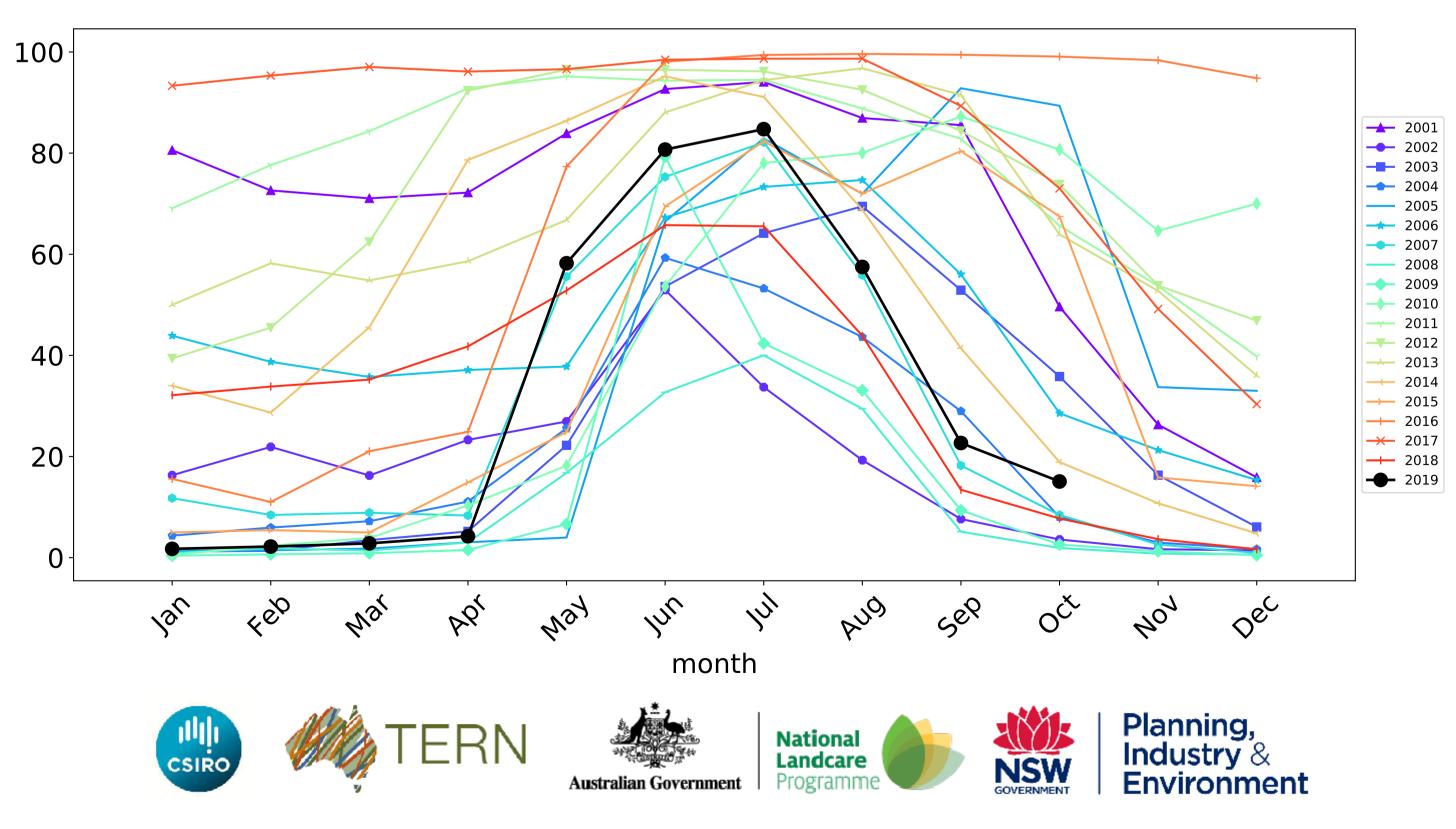




Proportion of the area protected from wind erosion (Total Vegetation Cover > 50%)

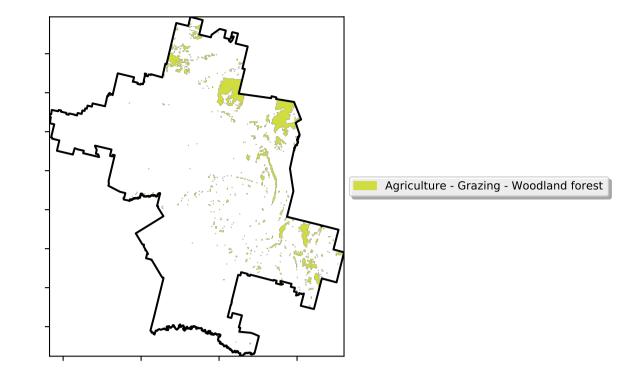


### Grazing non forest timeseries

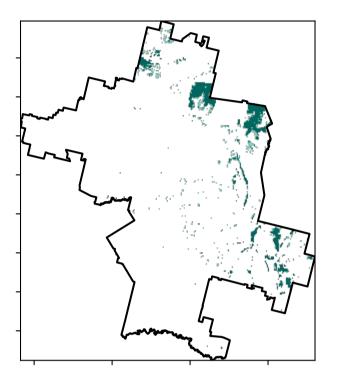


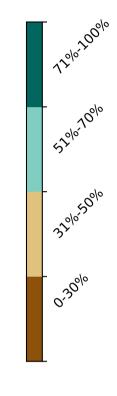
#### **Grazing Woodland forest**

Land use and forest cover

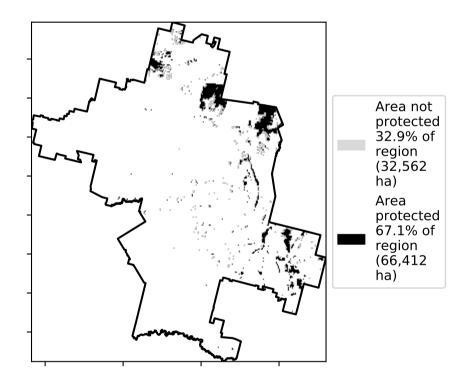


**Total Vegetation Cover [%]** 

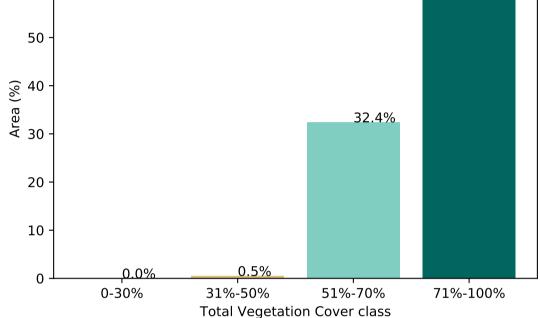




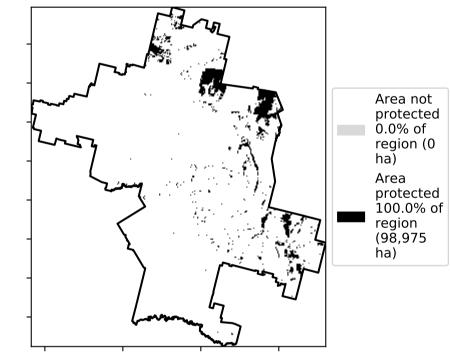
% Area protected from water erosion (>70%)



60



#### % Area protected from wind erosion (>50%)



67.1%

Land Use and Forests of Australia (2018) Derived from Catchment Scale Land Use of Australia (2018) and Forests of Australia (2018)

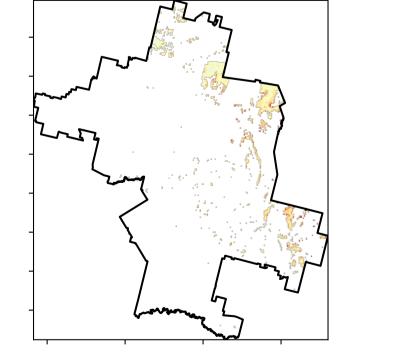
Catchment Scale

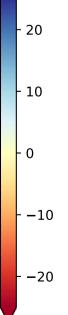
Proportion of vegetation cover class in area

70

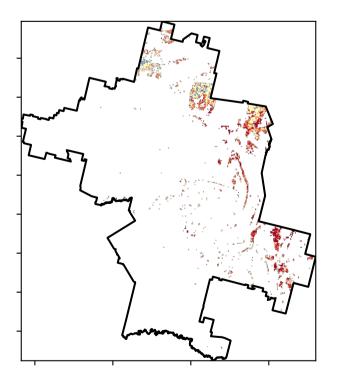
**Total Vegetation Cover Anomaly [%]** 

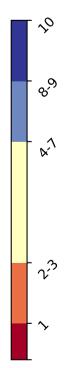
Anomaly show how many percetage points each pixel is from the mean. That is, red pixels are about 20% lower than the mean of that pixel. The mean is only for the month of the map from 2001 to 2019.





**Total Vegetation Cover Decile [%]** 





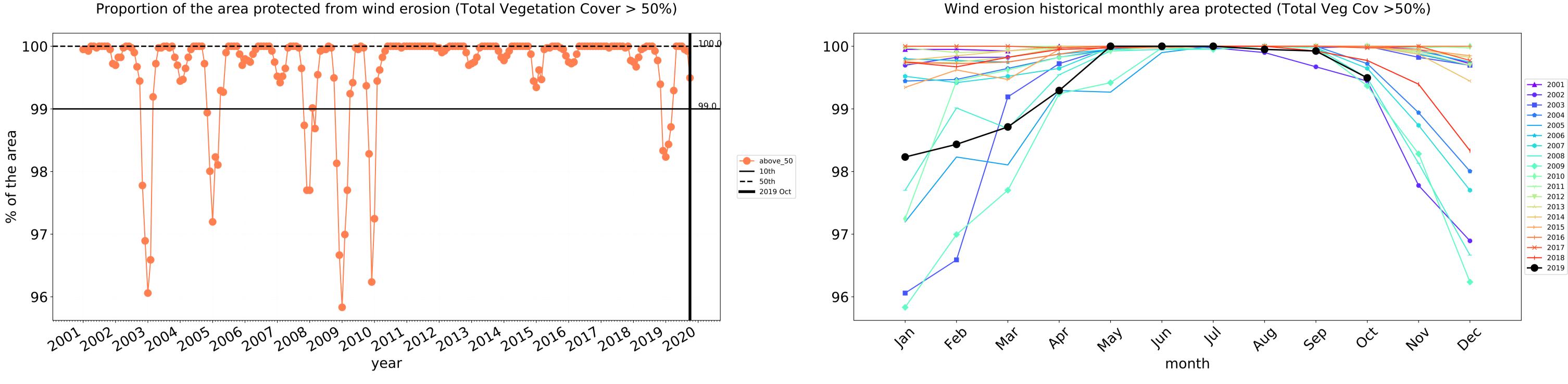


Deciles show where the pixel value lies in the

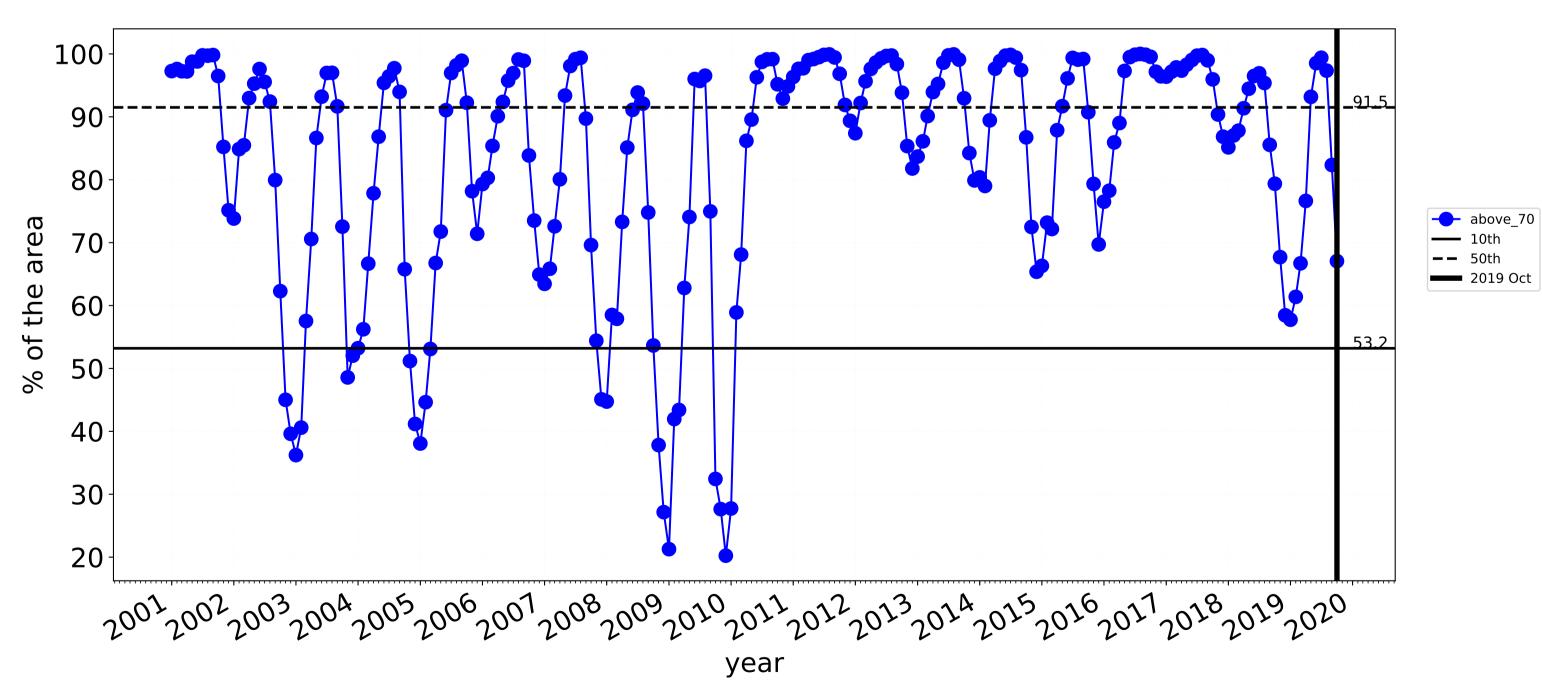
record, from highest to lowest, for that month. That is, red pixels are in the lowest 10% of

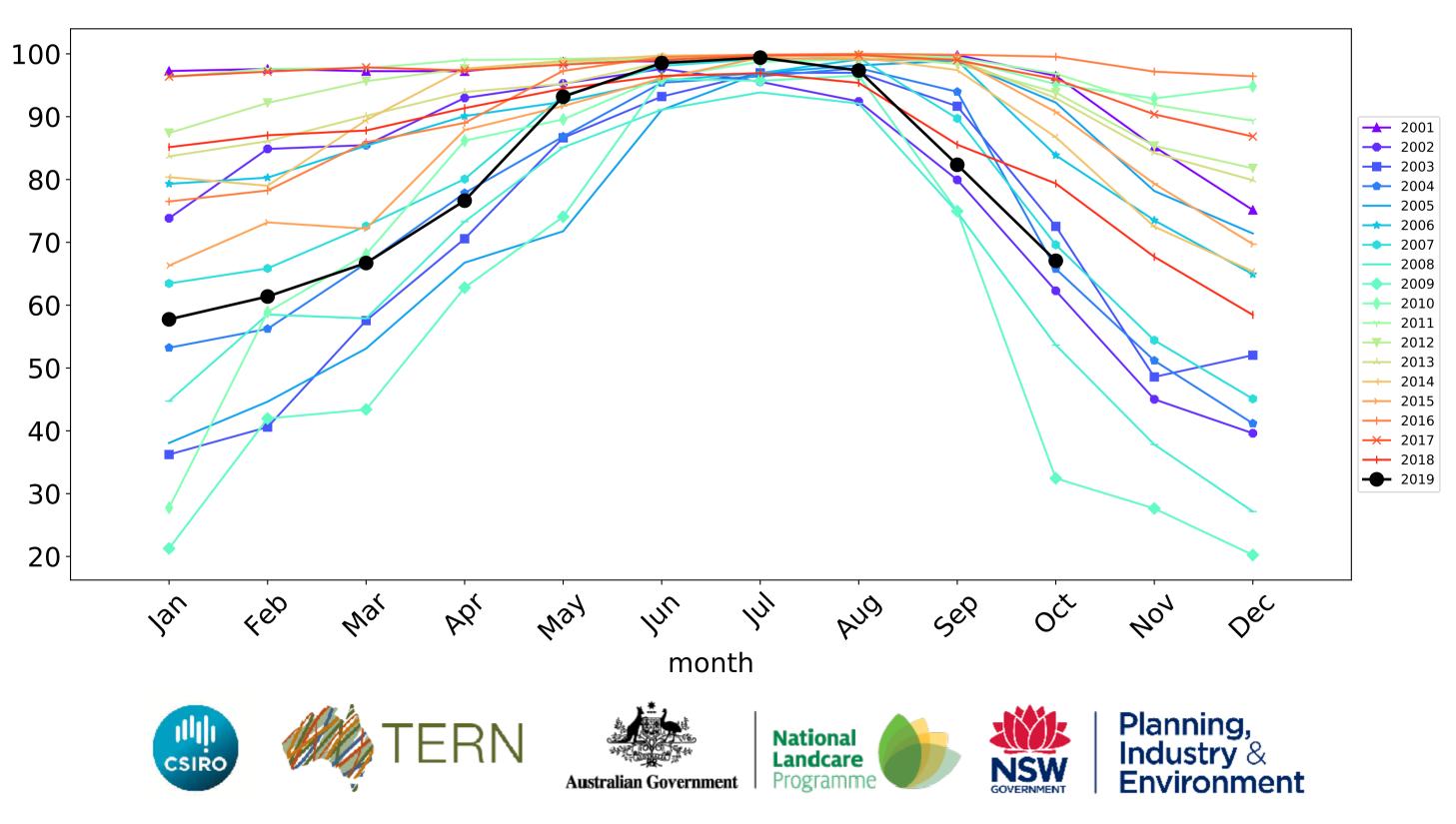
records for that month of the map using baseline from 2001 to 2019.

### **Grazing Woodland forest timeseries**



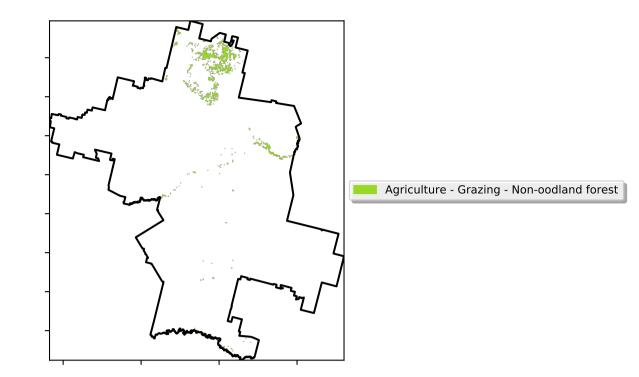




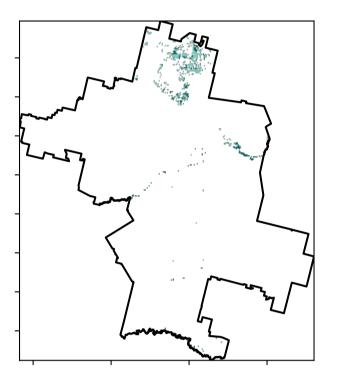


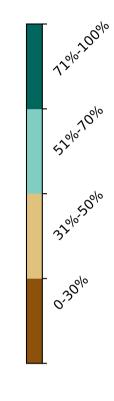
#### **Grazing - Forest (non woodland)**

Land use and forest cover

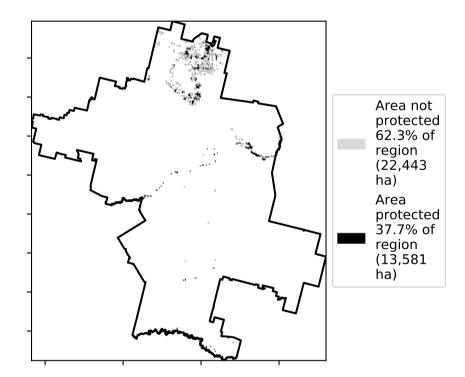


**Total Vegetation Cover [%]** 

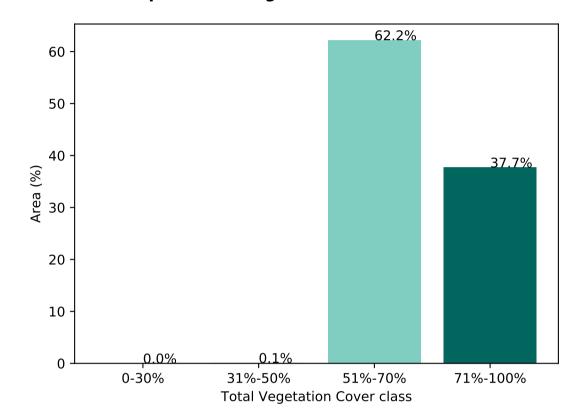




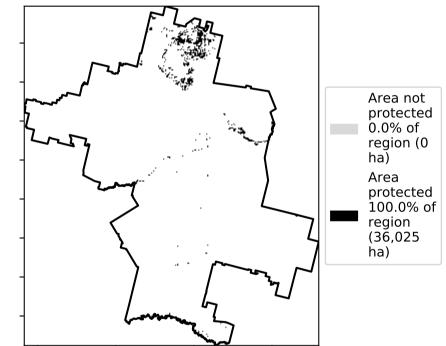
% Area protected from water erosion (>70%)



Proportion of vegetation cover class in area



#### % Area protected from wind erosion (>50%)



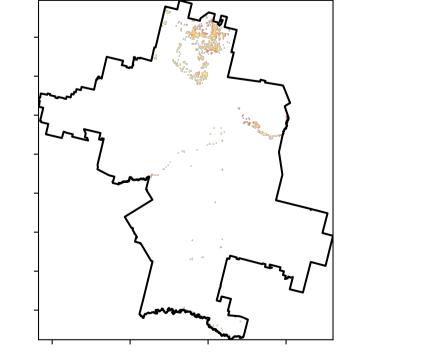
**Total Vegetation Cover Anomaly [%]** 

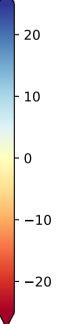
Anomaly show how many percetage points each pixel is from the mean. That is, red pixels are about 20% lower than the mean of that pixel. The mean is only for the month of the map using baseline from 2001 to 2019.

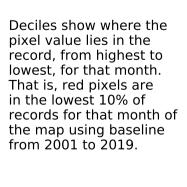
Catchment Scale Land Use and Forests of Australia (2018)

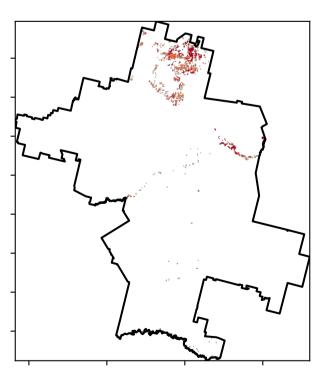
Catchment Scale Land Use of Australia (2018) and Forests of Australia (2018)

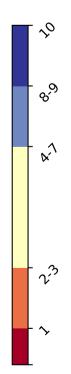
Derived from



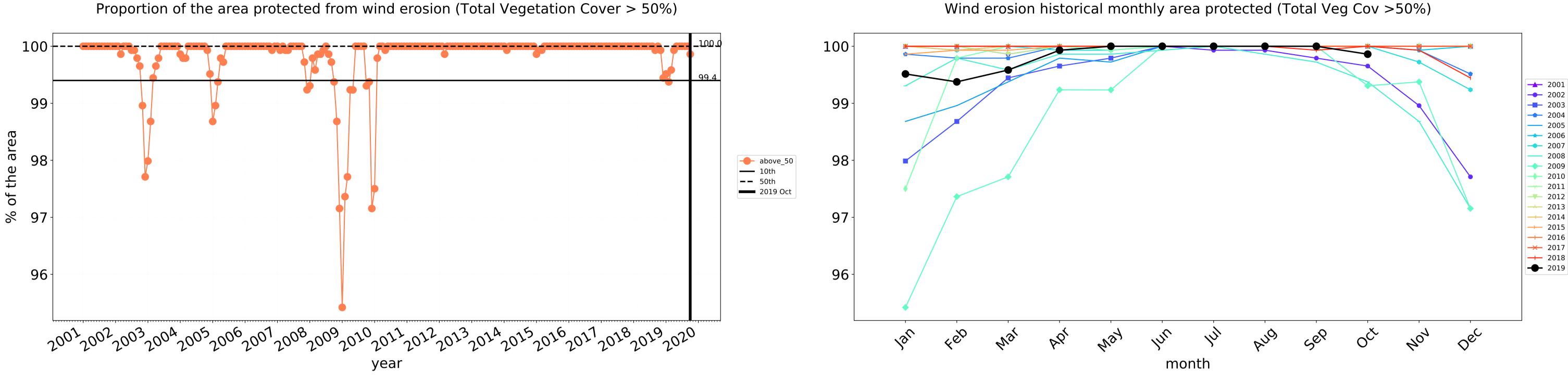


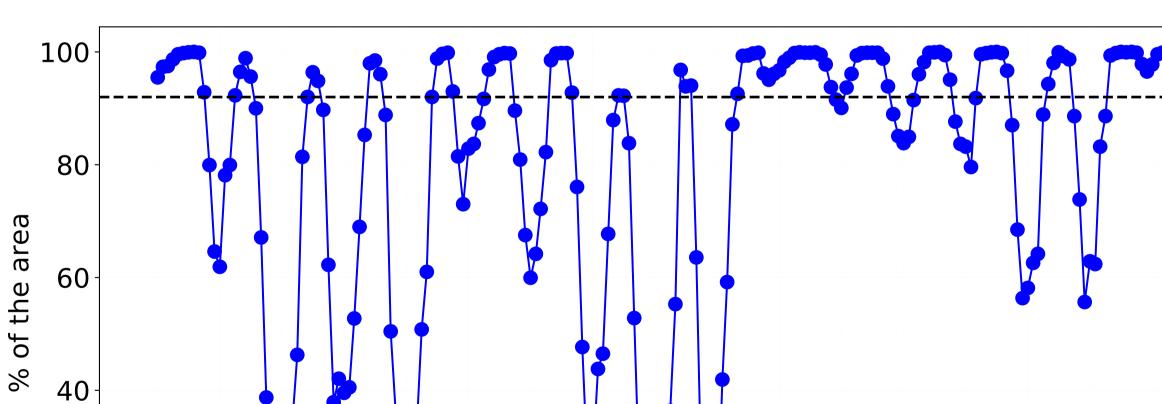










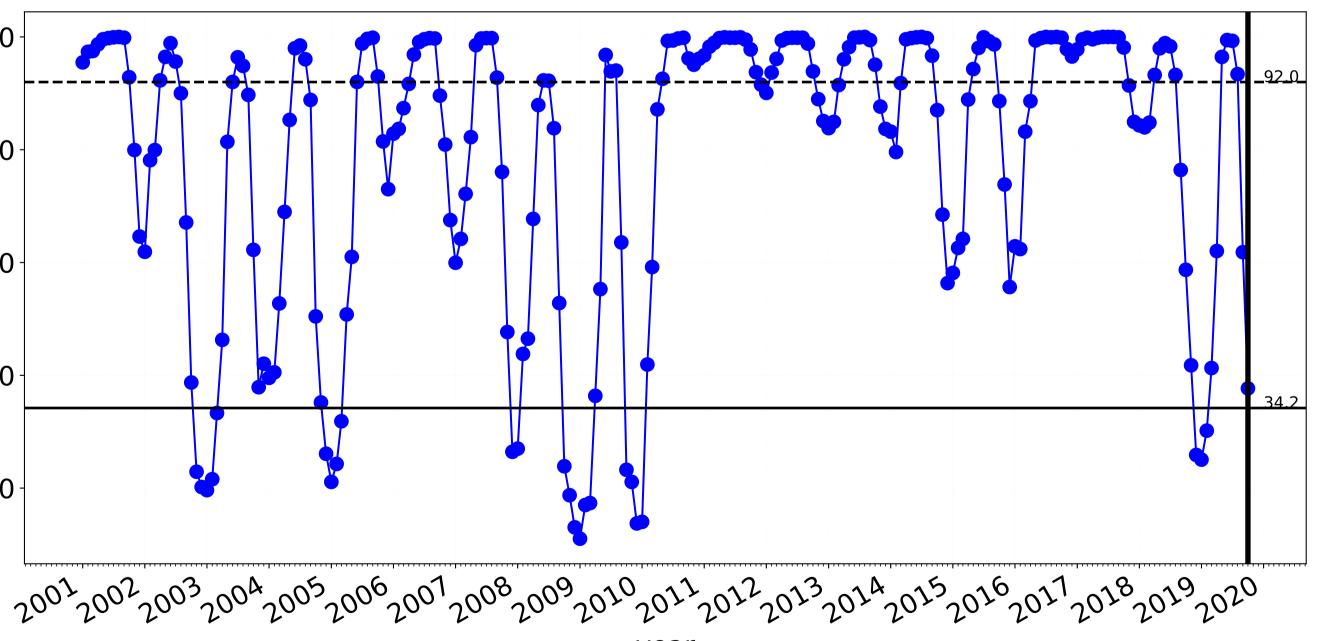


20

Proportion of the area protected from water erosion (Total Vegetation Cover > 70%)

year

### Grazing - Forest (non woodland) timeseries



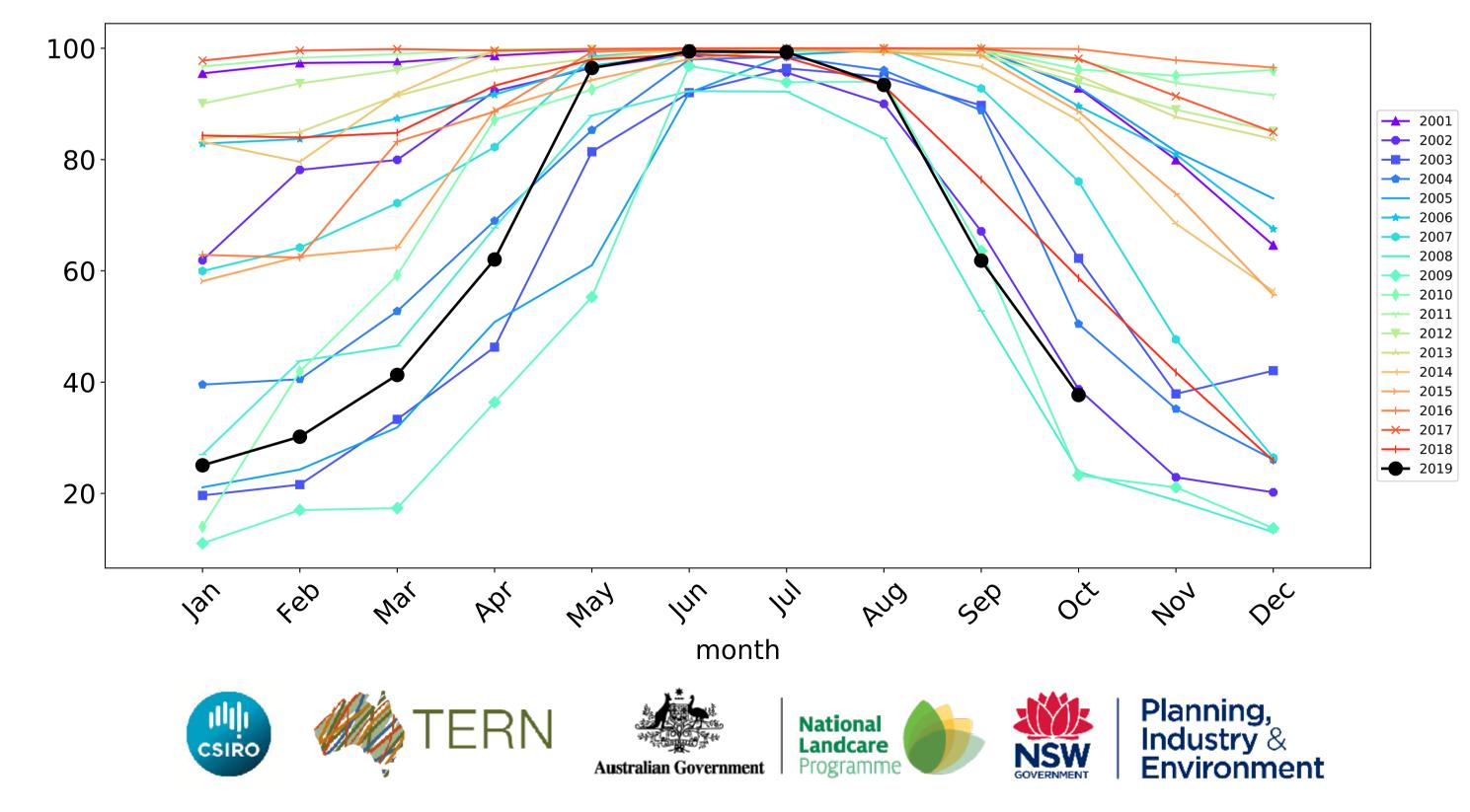
---- above\_70

**——** 2019 Oct

**——** 10th

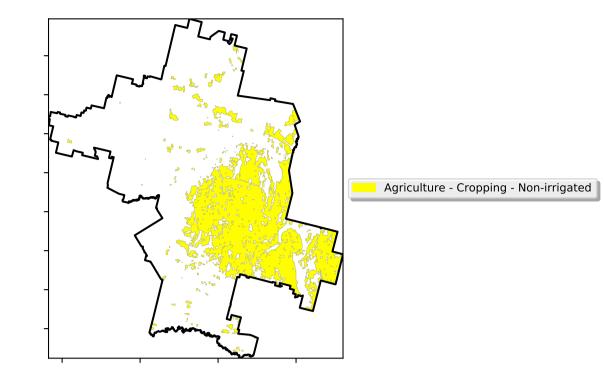
**——** 50th

Water erosion historical monthly area protected (Total Veg Cov>70%)

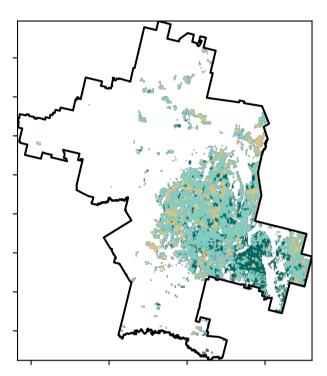


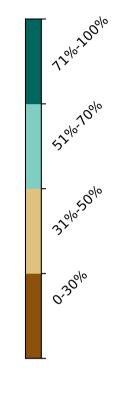
### Cropping

Land use and forest cover

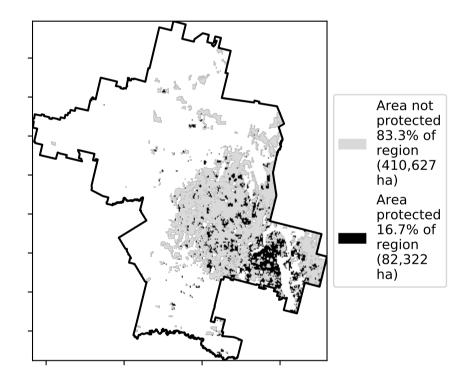


**Total Vegetation Cover [%]** 

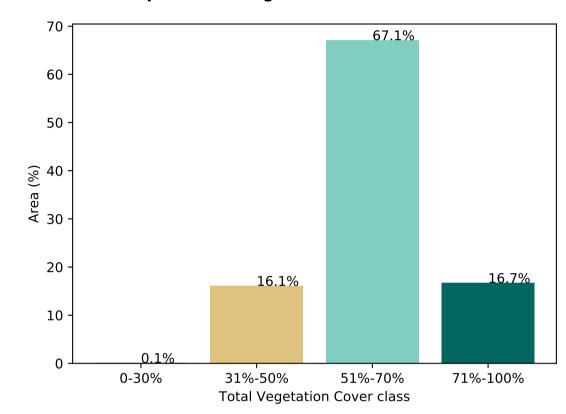




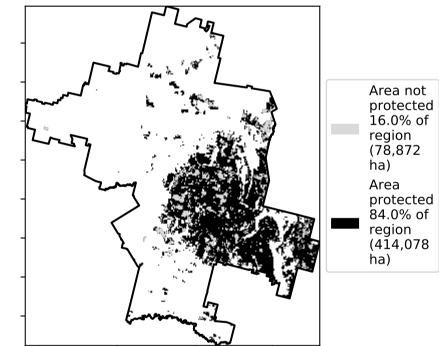
% Area protected from water erosion (>70%)



Proportion of vegetation cover class in area

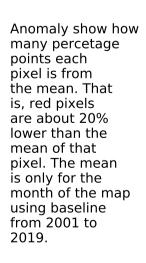


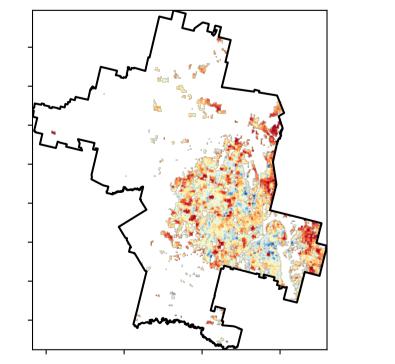
#### % Area protected from wind erosion (>50%)

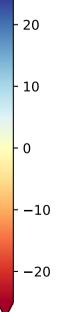


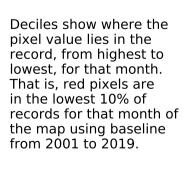
Catchment Scale Land Use and Forests of Australia (2018) Derived from Catchment Scale Land Use of Australia (2018) and Forests of Australia (2018)

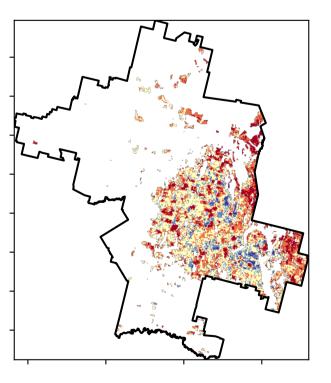
**Total Vegetation Cover Anomaly [%]** 

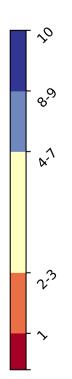




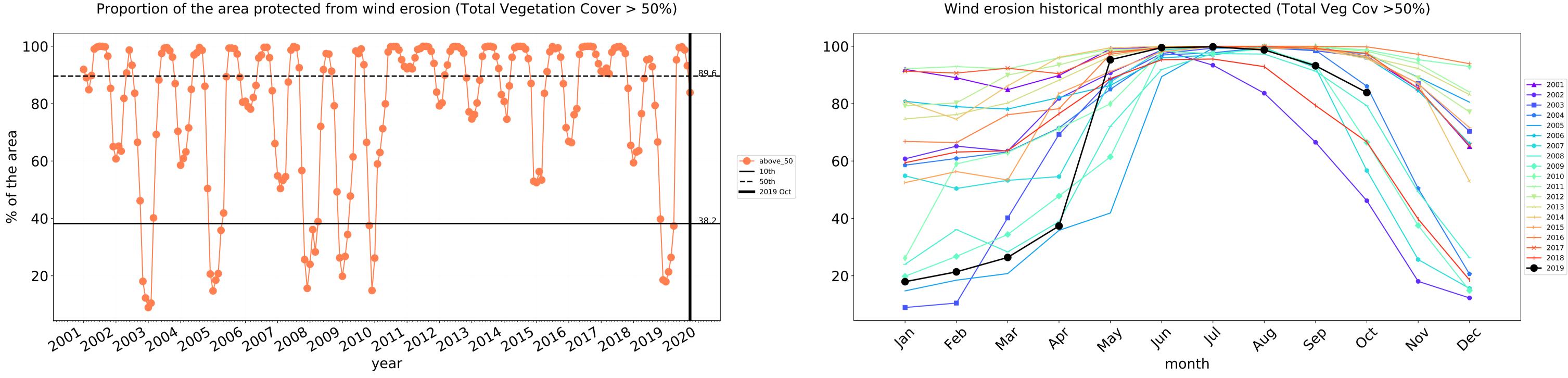










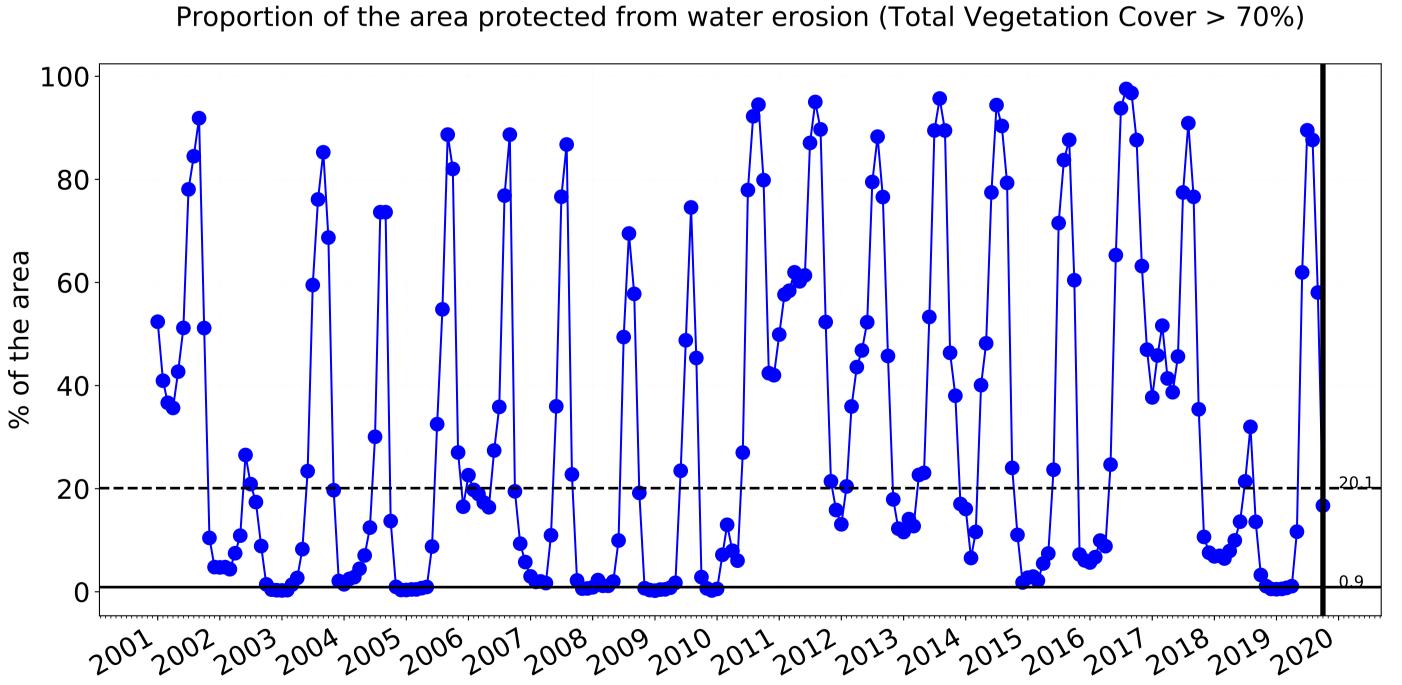


---- above\_70

**——** 2019 Oct

**——** 10th

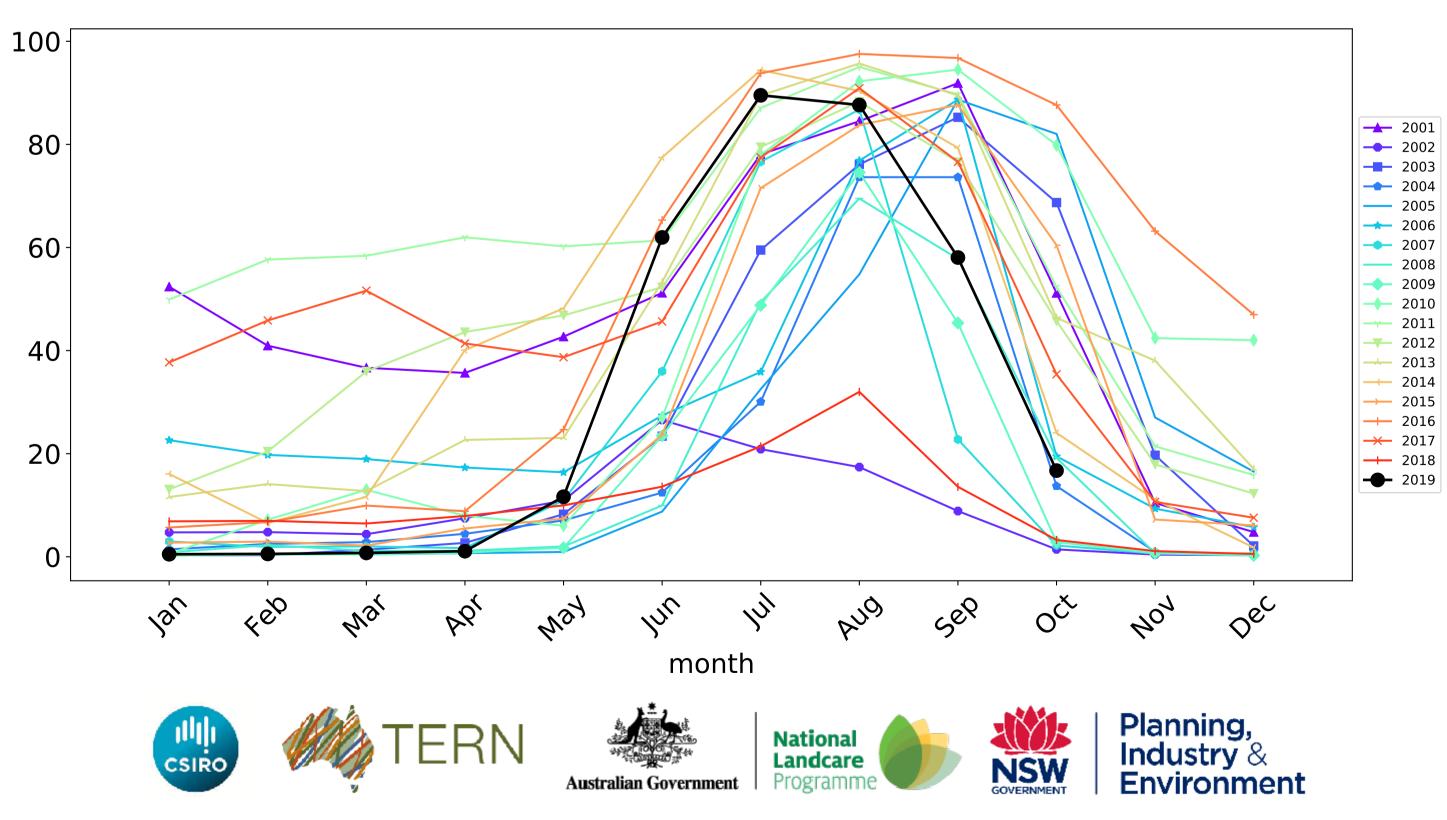
**——** 50th



year

### **Cropping timeseries**

Water erosion historical monthly area protected (Total Veg Cov>70%)

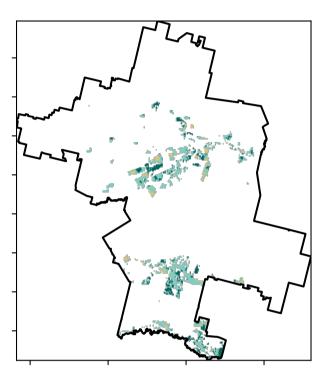


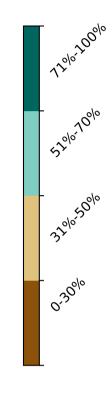
#### Irrigation

Agriculture - Grazing - Irrigated Agriculture - Cropping - Irrigated Agriculture - Horticulture - Irrigated

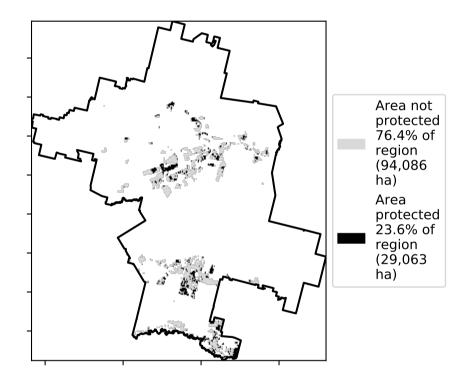
**Total Vegetation Cover [%]** 

Land use and forest cover

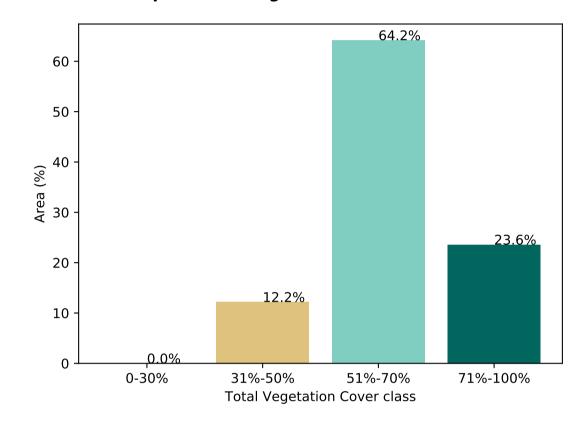




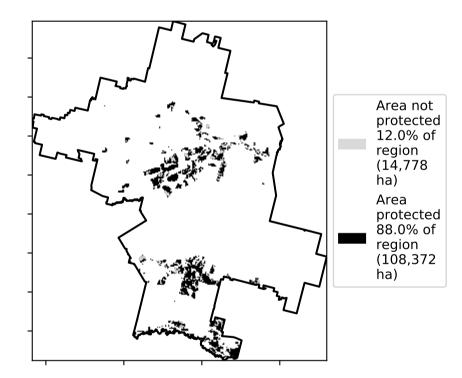
% Area protected from water erosion (>70%)



Proportion of vegetation cover class in area

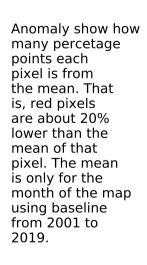


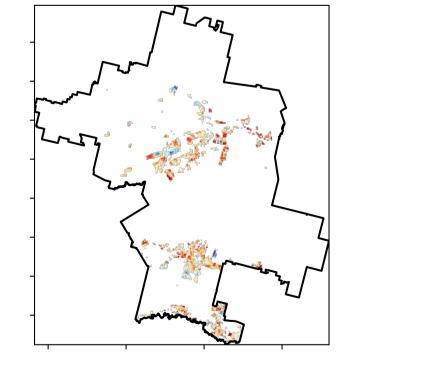
% Area protected from wind erosion (>50%)

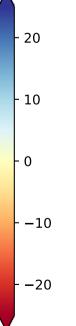


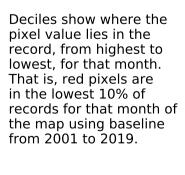
Catchment Scale Land Use and Forests of Australia (2018) Derived from Catchment Scale Land Use of Australia (2018) and Forests of Australia (2018)

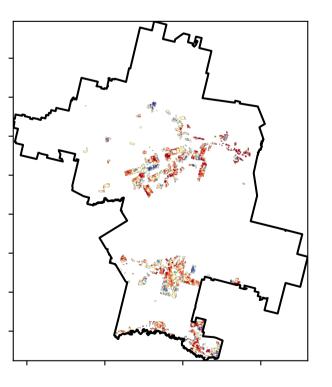
**Total Vegetation Cover Anomaly [%]** 

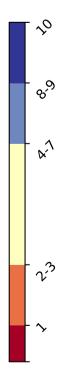




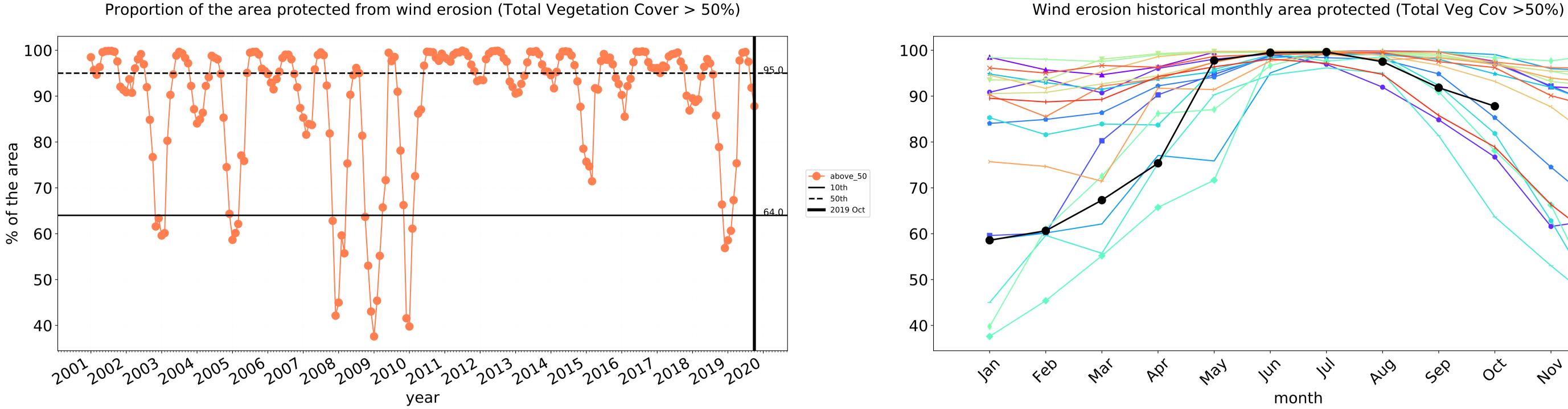






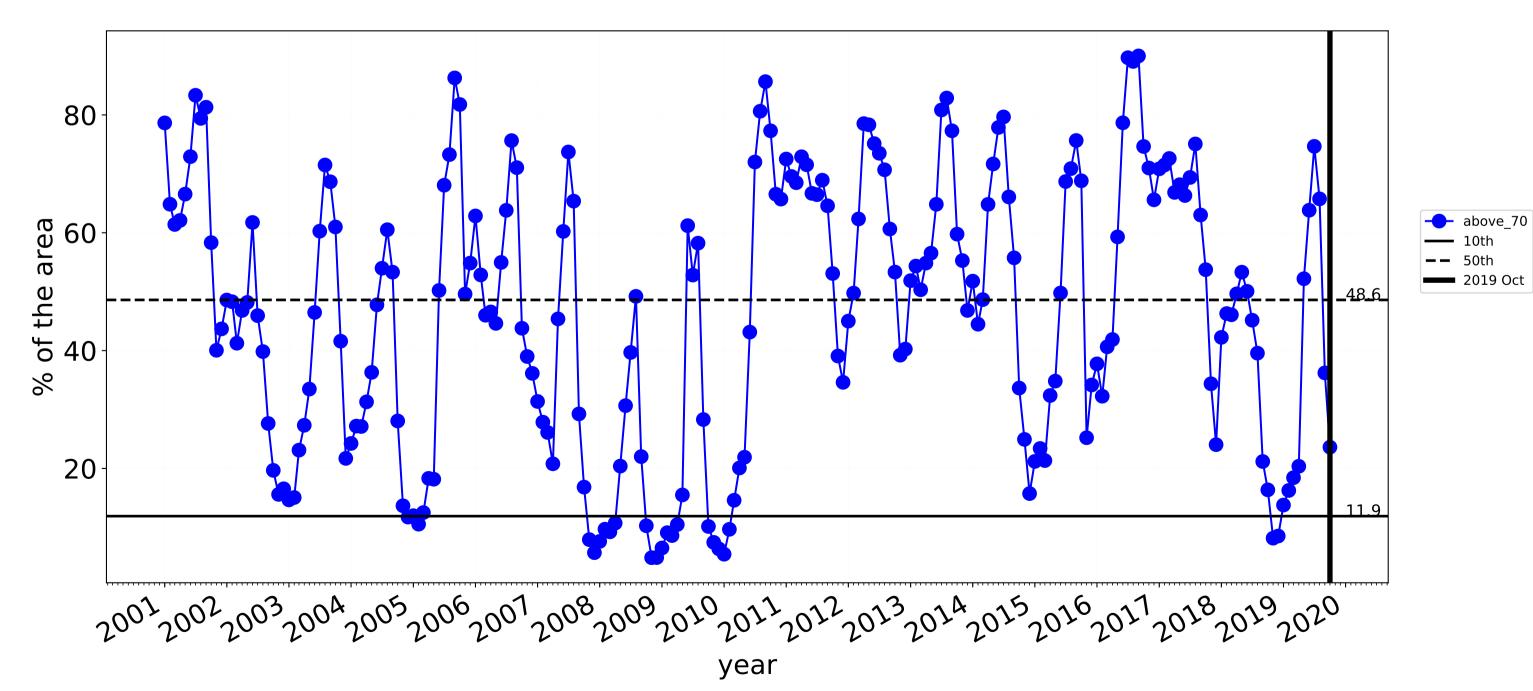




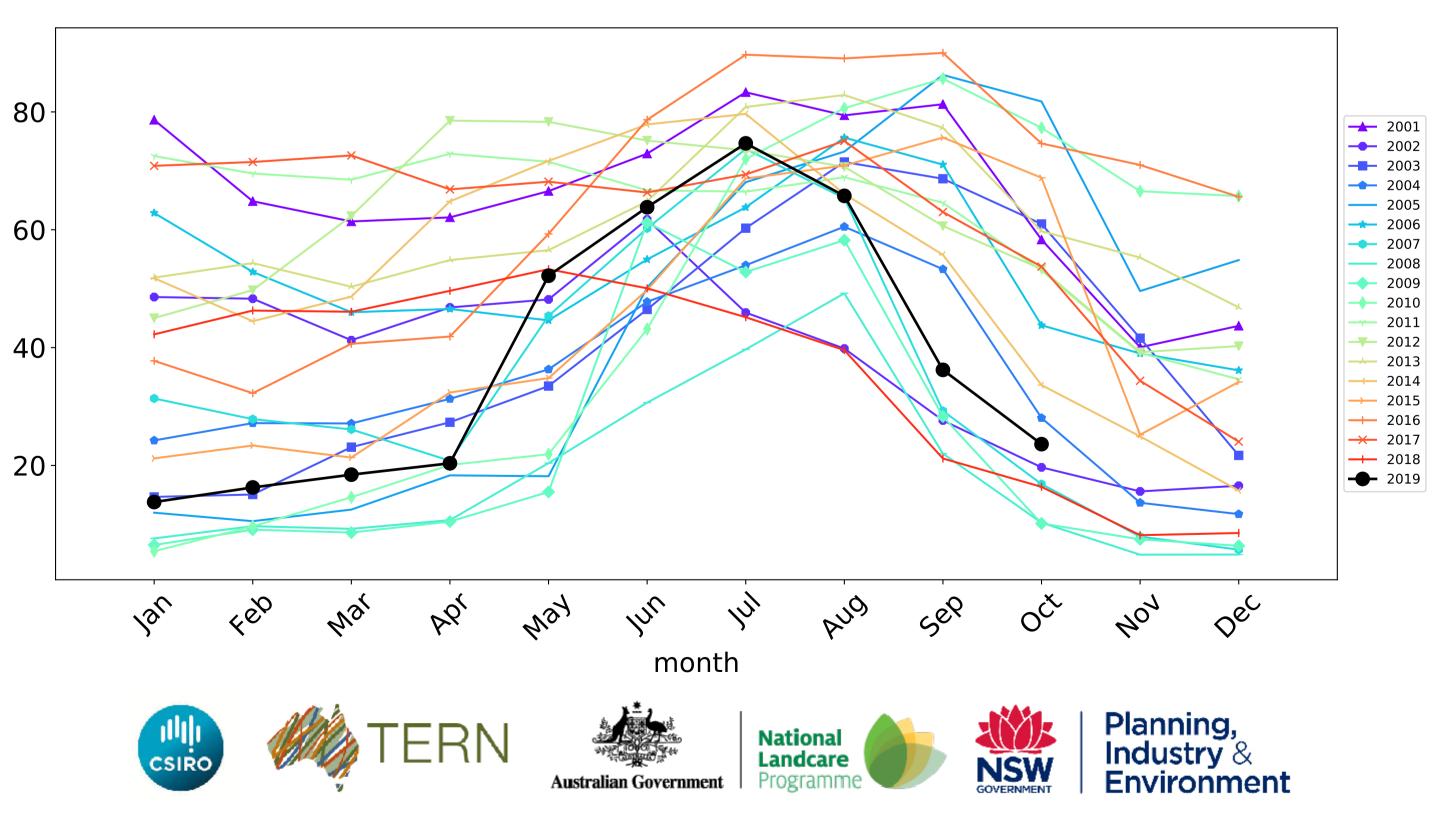


Proportion of the area protected from wind erosion (Total Vegetation Cover > 50%)

Proportion of the area protected from water erosion (Total Vegetation Cover > 70%)



### Irrigation timeseries



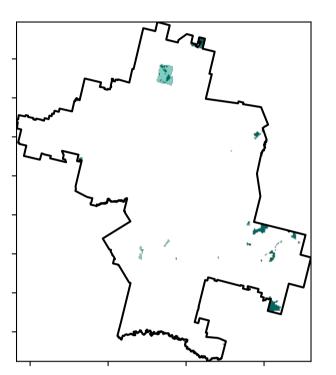
**----** 2001 --- 2002 ---- 2003 **---** 2004 2005 **----** 2006 --- 2007 2008 **---** 2009 **—** 2010 2011 2013 **→** 2014 <mark>→</mark> 2015 **→** 2016 <del>→</del> 2017 → 2018 → 2019 404 AUG Sel Dec OČ

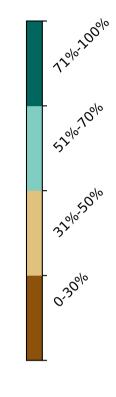
#### **Production native forests and plantation forests**

Land use and forest cover

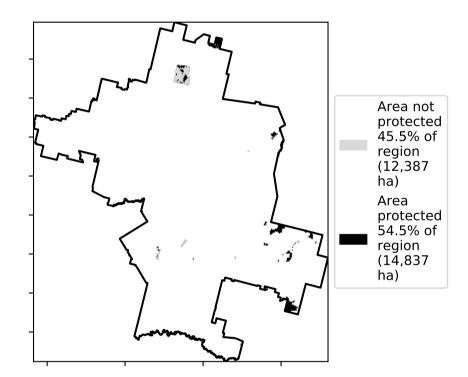
Production native forests and plantation forests

**Total Vegetation Cover [%]** 

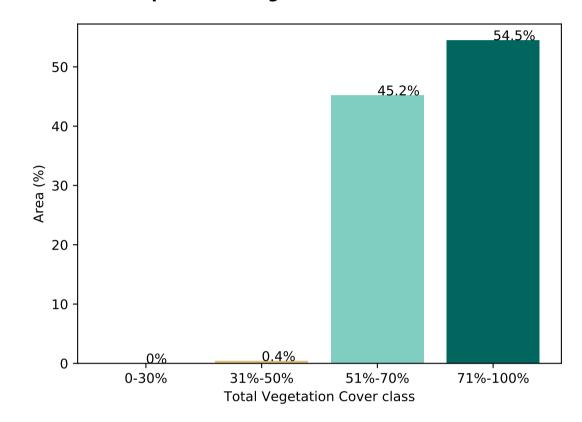




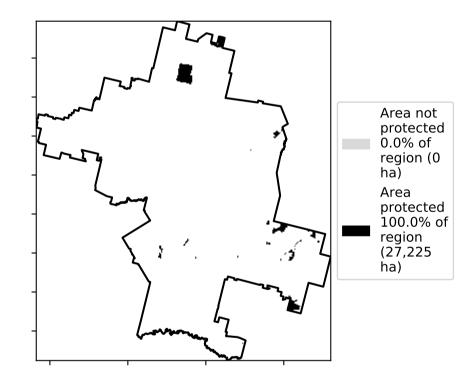
% Area protected from water erosion (>70%)



Proportion of vegetation cover class in area



% Area protected from wind erosion (>50%)



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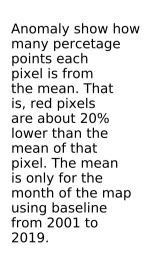
<sub>ଚ</sub>ି

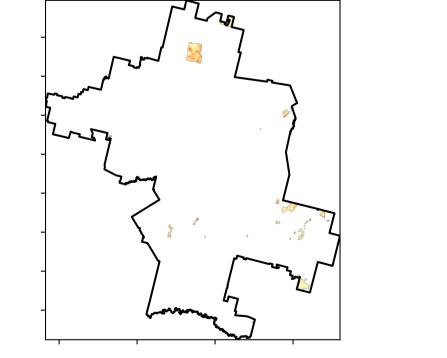
A-1

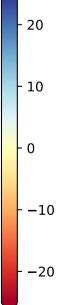
2?3

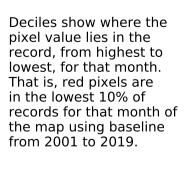
Catchment Scale Land Use and Forests of Australia (2018) Derived from Catchment Scale Land Use of Australia (2018) and Forests of Australia (2018)

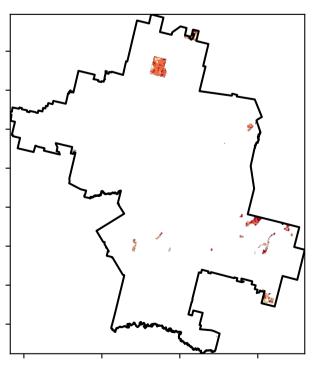
**Total Vegetation Cover Anomaly [%]** 



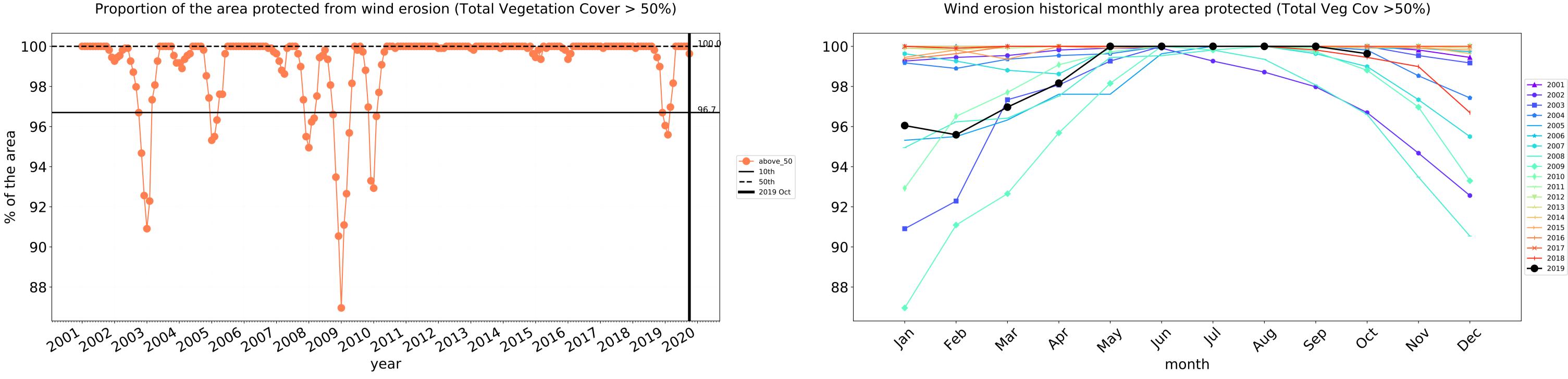












100

90-

80-

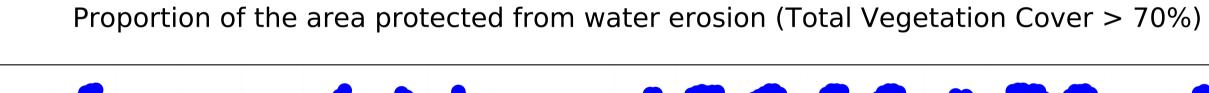
70-

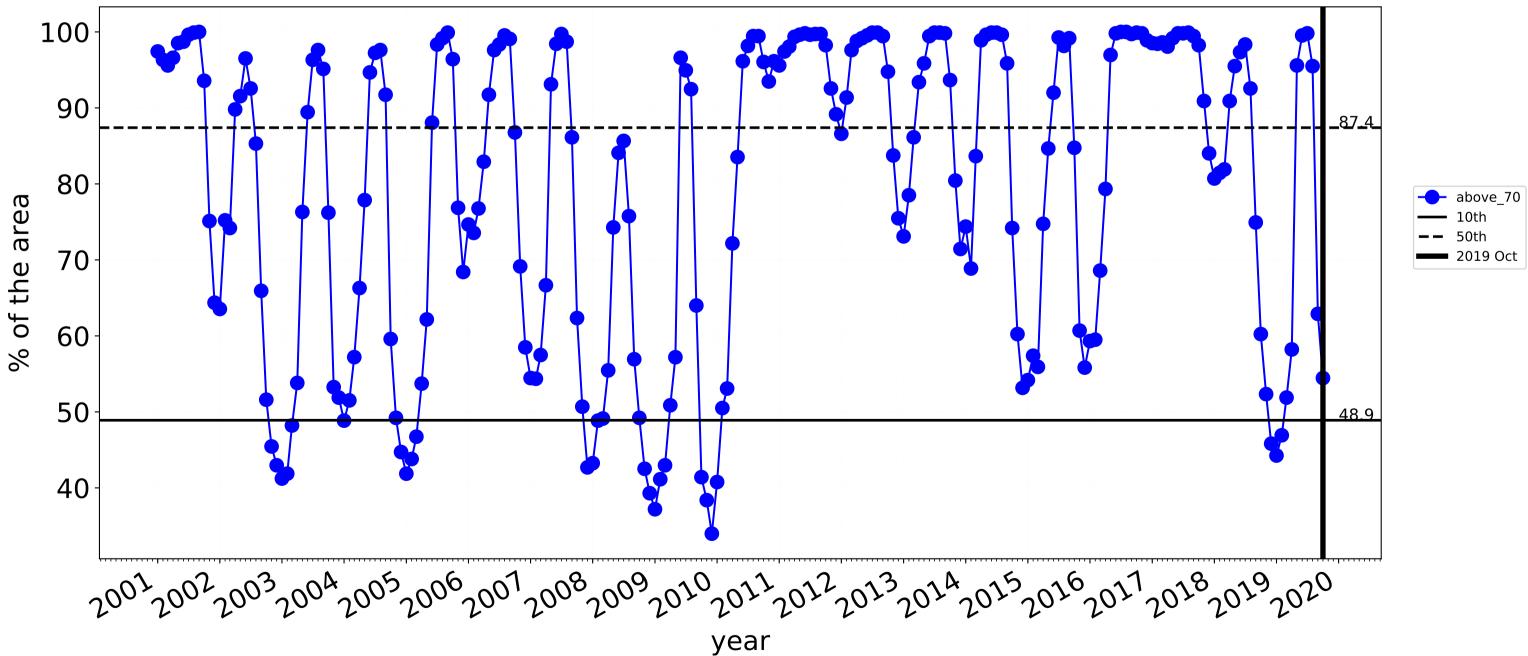
60

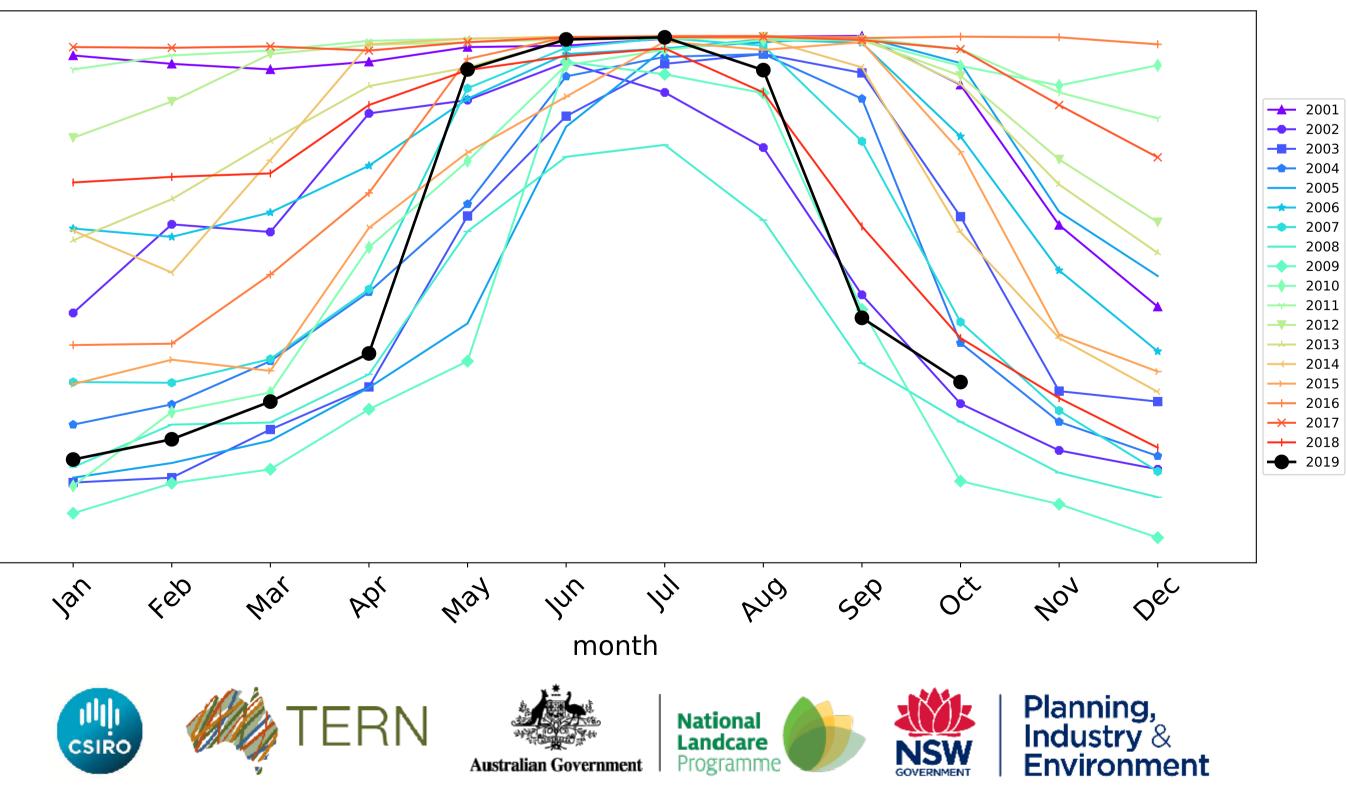
50-

40-

Proportion of the area protected from wind erosion (Total Vegetation Cover > 50%)







Water erosion historical monthly area protected (Total Veg Cov>70%)

# Carrathool\_(A) (1,887,350 ha and no data 5,546 ha) Percentage area and hectares protected with TVC threshold 30,50,70,80,90 and 95%

Land use and forest cover Class	area(ha)	above_30	above_50	above_70	above_80	above_90	above_95
Entire region	1,887,350	99.6% 1,879,000	85.5% 1,614,150	23.3% 440,275	4.3% 81,575	0.3% 5,725	0.1% 1,000
Conservation and natural environments	145,000	100.0% 145,000	98.6% 142,900	60.1% 87,075	11.2% 16,250	0.8% 1,175	0.0%
Conservation and natural environments non forest	52,025	100.0% 52,025	96.1% 49,975	20.1% 10,475	2.6% 1,375	0.0%	0.0%
Conservation and natural environments Woodland forest	73,600	100.0% 73,600	99.9% 73,550	87.0% 64,025	17.6% 12,925	1.4% 1,025	0.0%
Conservation and natural environments Forest (non woodland)	19,375	100.0% 19,375	100.0% 19,375	64.9% 12,575	10.1% 1,950	0.8% 150	0.0%
Agriculture	1,687,350	99.5% 1,679,050	84.2% 1,420,600	19.7% 332,300	3.4% 57,100	0.3% 4,225	0.1% 1,000
Grazing	1,070,450	99.3% 1,062,425	83.9% 898,450	20.6% 220,825	3.4% 36,025	0.1% 1,550	0.0% 225
Grazing non forest	935,450	99.1% 927,425	81.7% 764,000	15.1% 140,875	2.3% 21,600	0.1% 1,200	0.0% 200
Grazing Woodland forest	98,975	100.0% 98,975	99.5% 98,475	67.1% 66,375	11.7% 11,625	0.3% 325	0.0%
Grazing - Forest (non woodland)	36,025	100.0% 36,025	99.9% 35,975	37.7% 13,575	7.8% 2,800	0.1% 25	0.1% 25
Cropping	492,950	99.9% 492,675	83.9% 413,400	16.7% 82,400	2.7% 13,475	0.4% 1,825	0.1% 550
Irrigation	123,150	100.0% 123,150	87.8% 108,125	23.6% 29,075	6.2% 7,600	0.7% 850	0.2% 225
Production native forests and plantation forests	27,225	100.0% 27,225	99.6% 27,125	54.5% 14,825	25.5% 6,950	0.6% 175	0.0%

