# **Total vegetation cover soil protection Region:NRM Goulburn Broken VIC**

# **Date: October 2010**

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

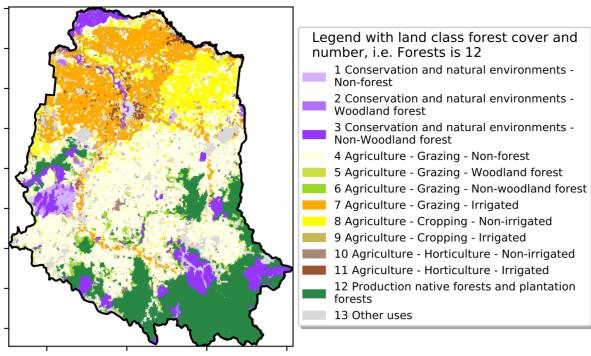


# **Vegetation Cover Oct 2010**

#### Land use and forest cover

#### Proportion of each land class in area





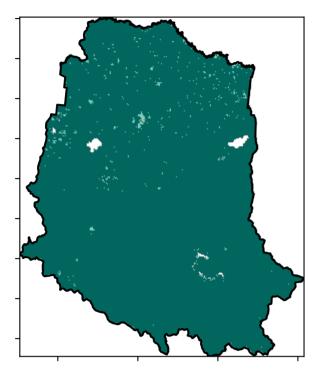
12%-100

52%70

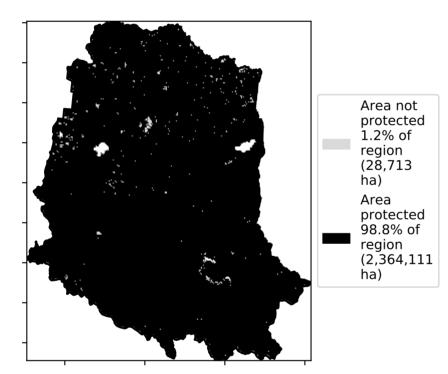
32%50%

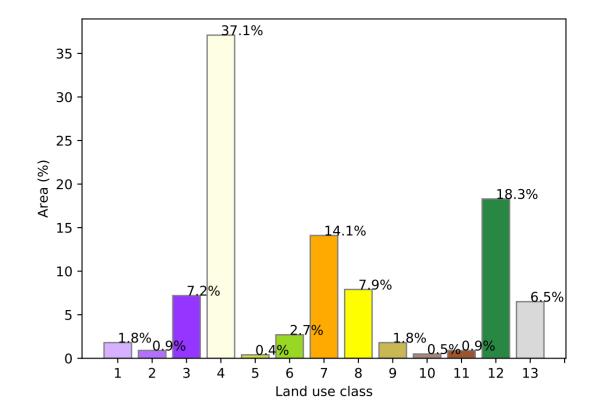
0-30%

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

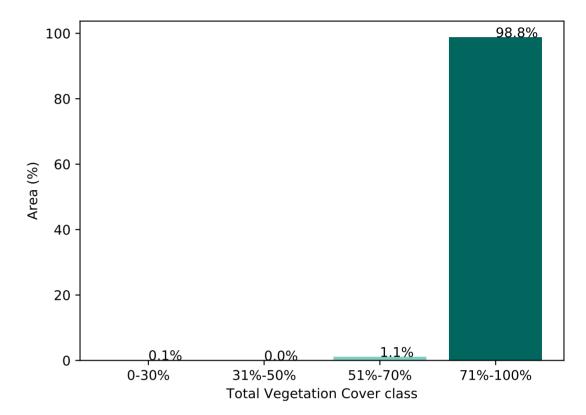


#### % Area protected from water erosion (>70%)

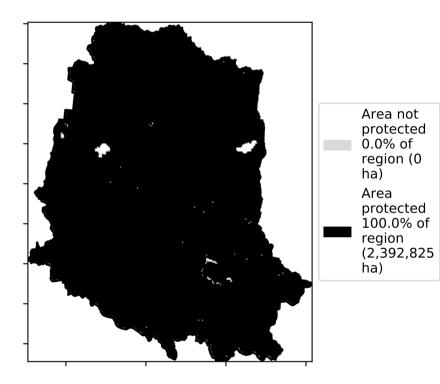




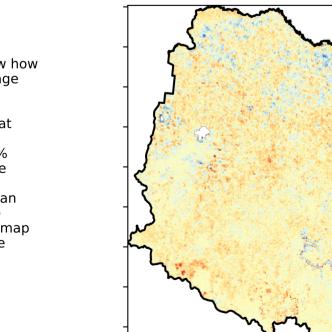
#### Proportion of vegetation cover class in area

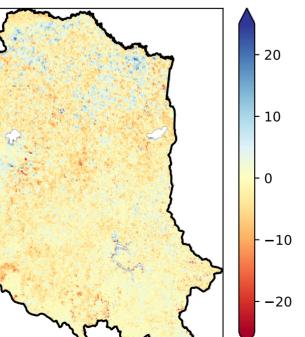


#### % Area protected from wind erosion (>50%)

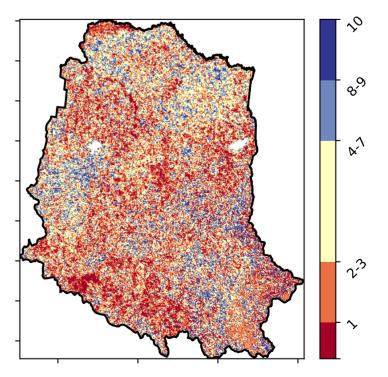


**Total Vegetation Cover Anomaly [%]** 





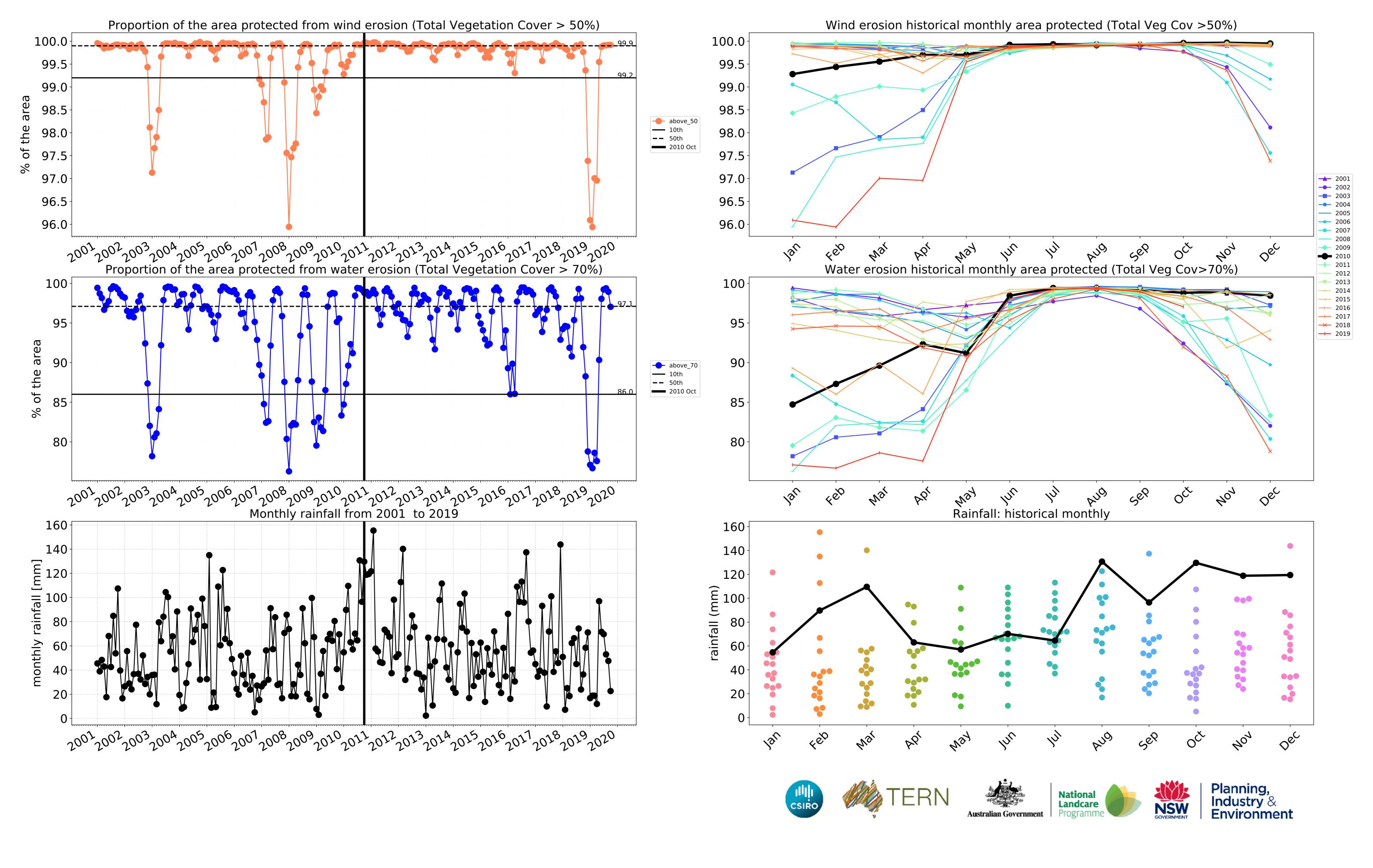
Deciles show where the pixel value lies in the record, from highest to lowest, for that month. That is, red pixels are in the lowest 10% of records for that month of the map using baseline from 2001 to 2019. **Total Vegetation Cover Decile [%]** 

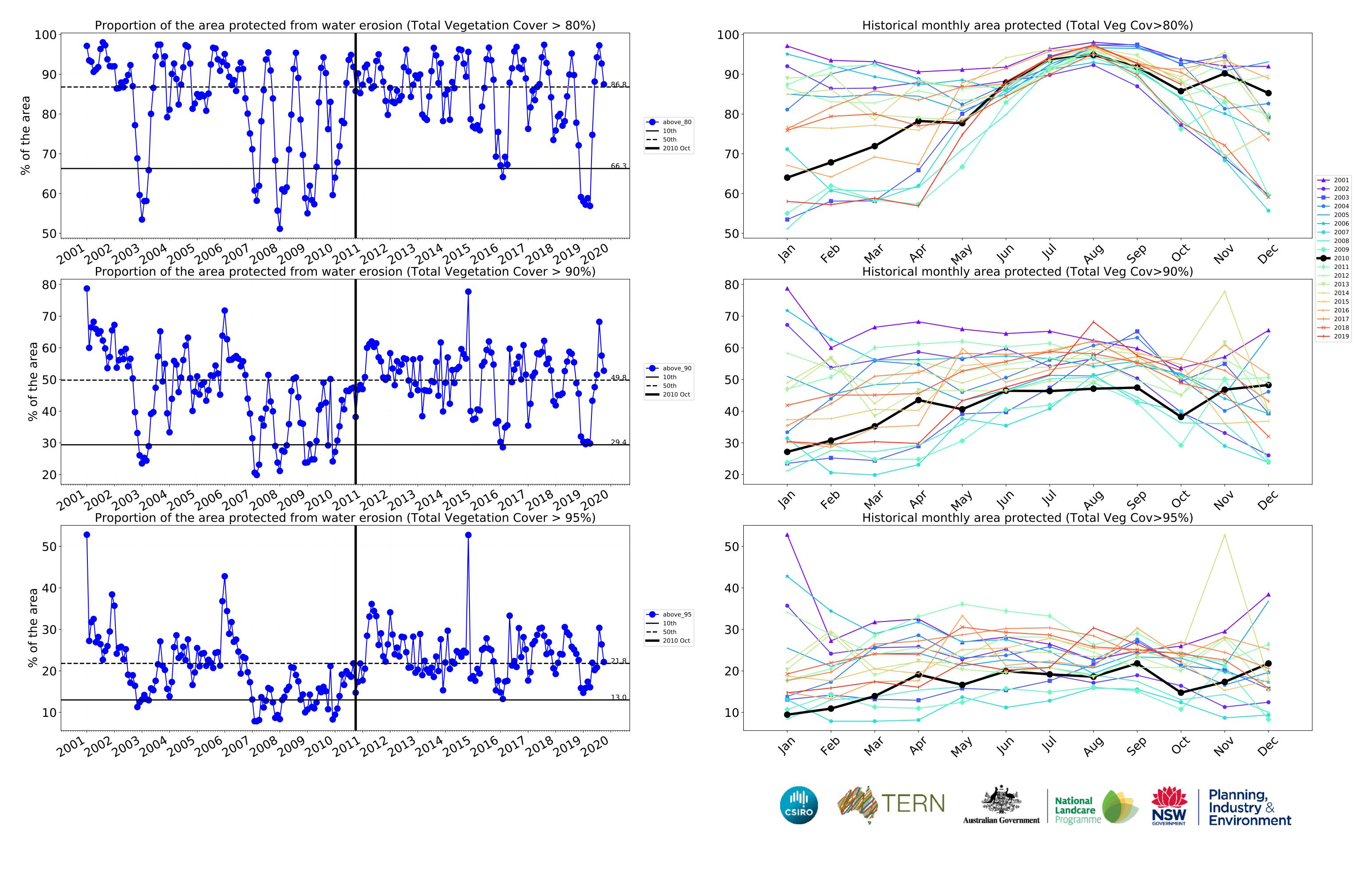




Anomaly show how many percetage points each pixel is from the mean. That is, red pixels are about 20% lower than the mean of that pixel. The mean is only for the month of the map using baseline from 2001 to 2019.

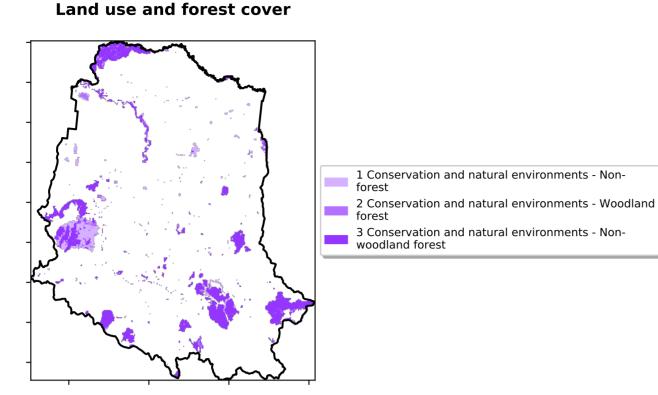
2



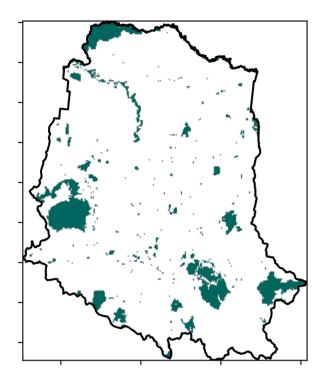


### **Conservation and natural environments**

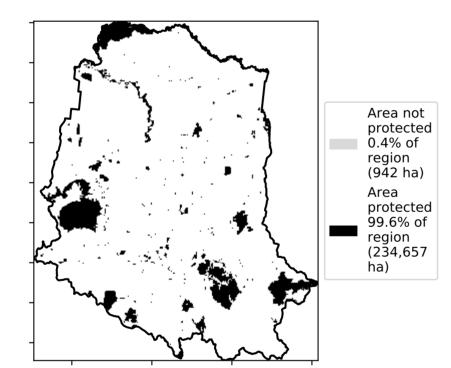
Catchment Scale Land Use and Forests of Australia (2018) Derived from Catchment Scale Land Use of Australia (2018) and Forests of Australia (2018)

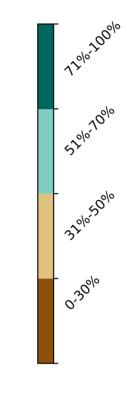


**Total Vegetation Cover [%]** 

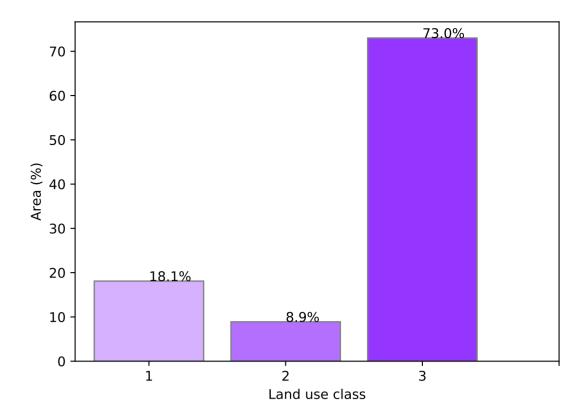


% Area protected from water erosion (>70%)

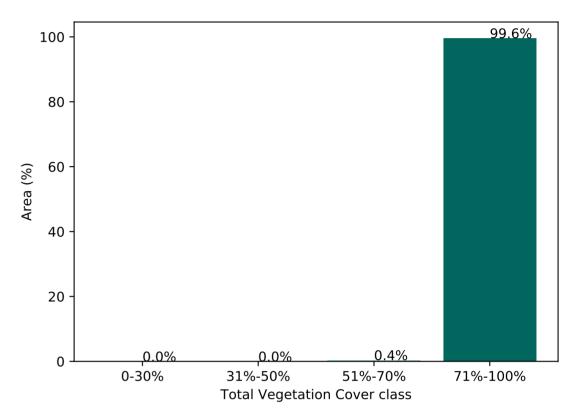




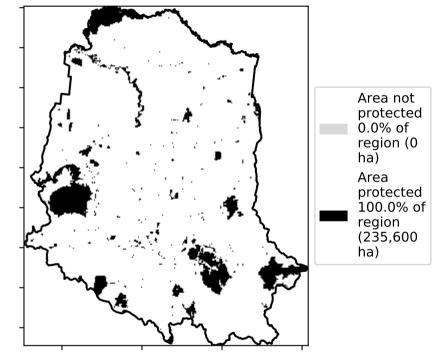
#### Proportion of each land class in area



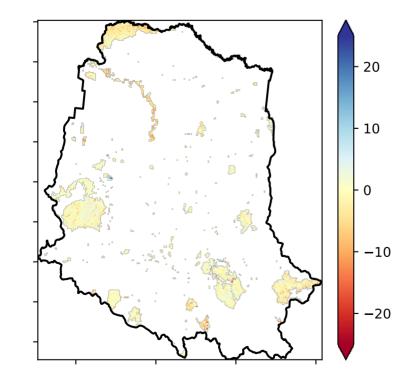
### Proportion of vegetation cover class in area



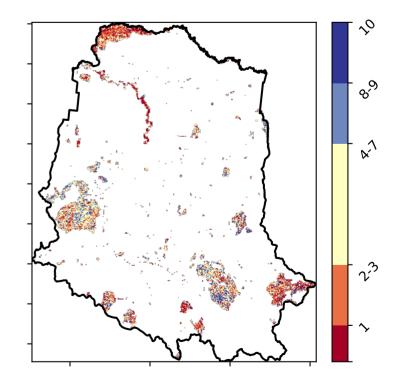
#### % Area protected from wind erosion (>50%)



**Total Vegetation Cover Anomaly [%]** 



**Total Vegetation Cover Decile [%]** 





Deciles show where the

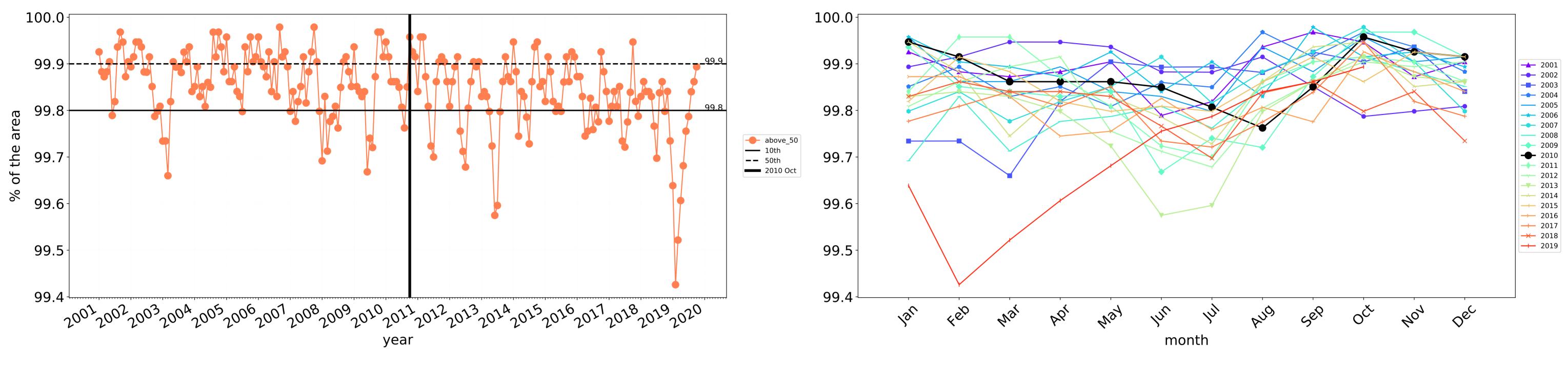
record, from highest to lowest, for that month. That is, red pixels are

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

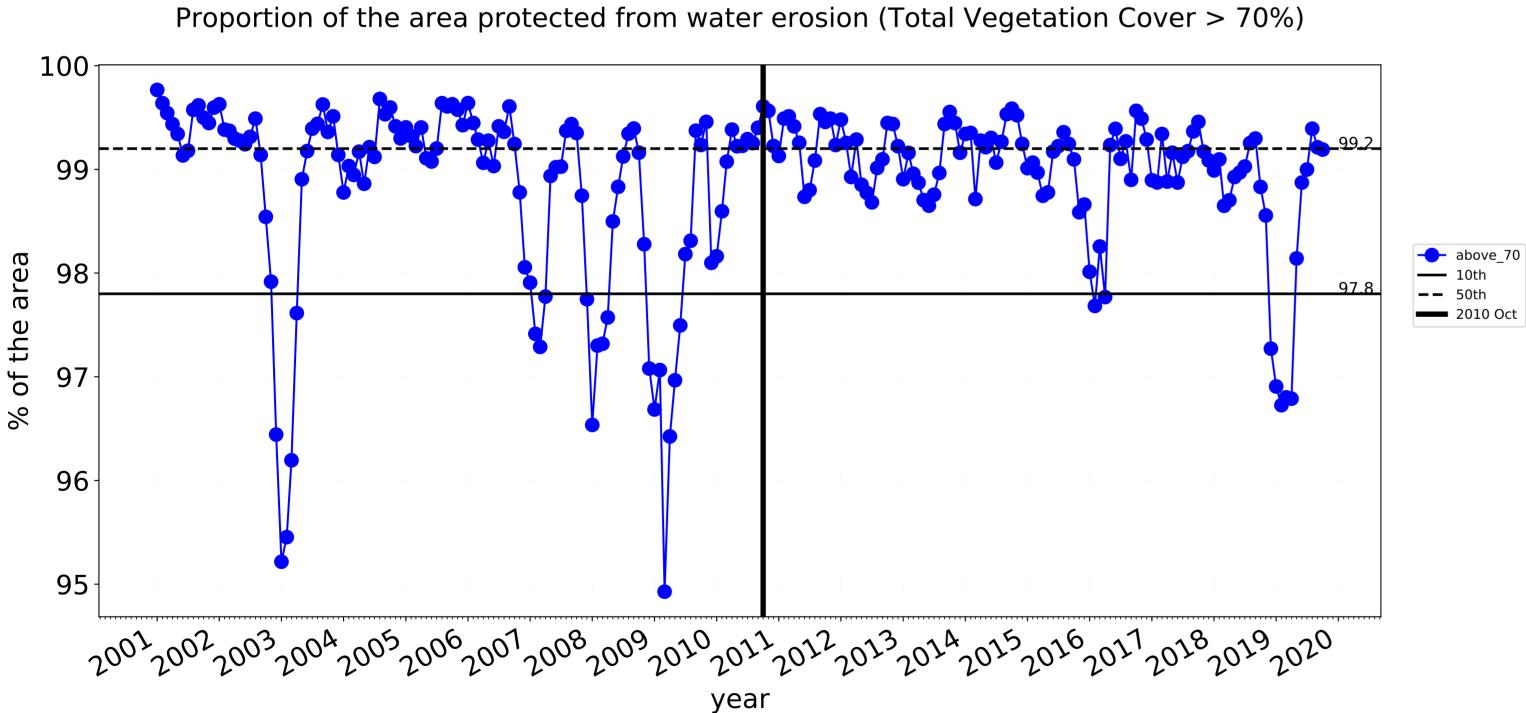
in the lowest 10% of

pixel value lies in the

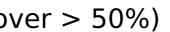
Anomaly show how many percetage points each pixel is from the mean. That is, red pixels are about 20% lower than the mean of that pixel. The mean is only for the month of the map using baseline from 2001 to 2019.



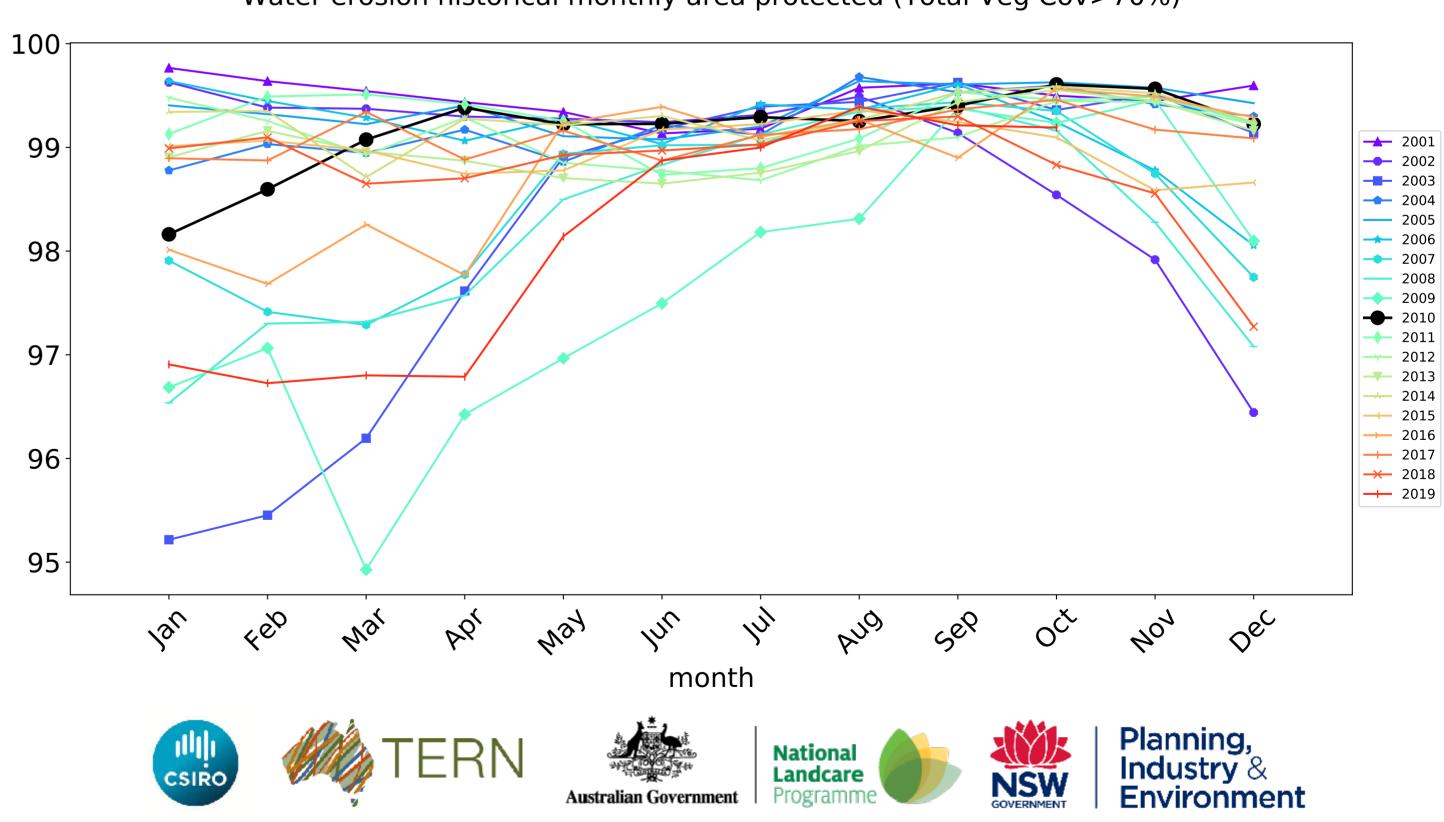
Proportion of the area protected from wind erosion (Total Vegetation Cover > 50%)



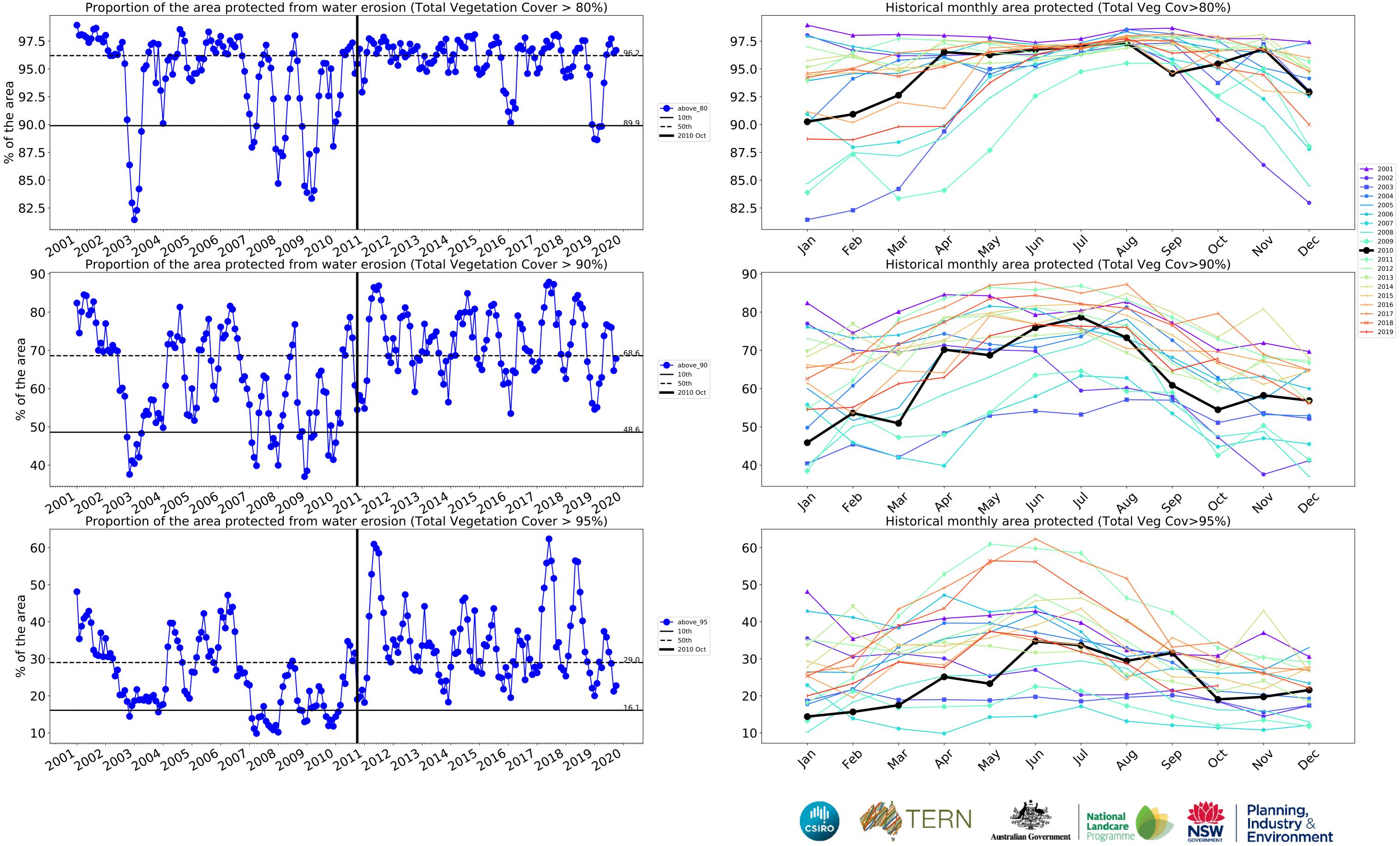
## **Conservation and natural environments timeseries**



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



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



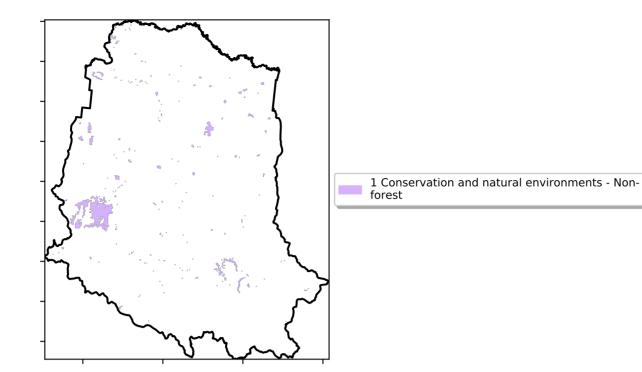
Proportion of the area protected from water erosion (Total Vegetation Cover > 80%)



Australian Government

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

Land use and forest cover



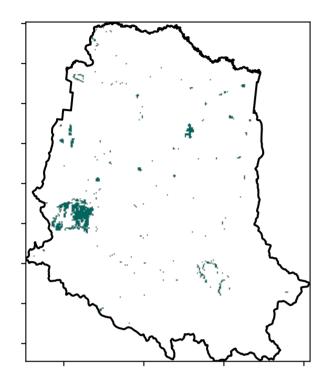
12%100%

· 52°101001

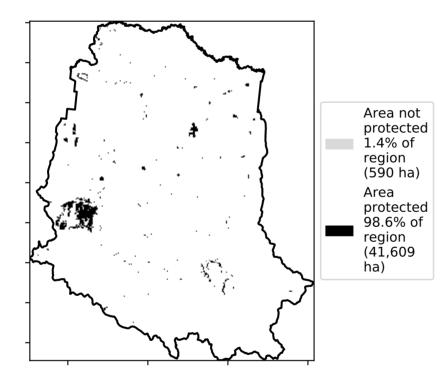
32%50%

0-30%

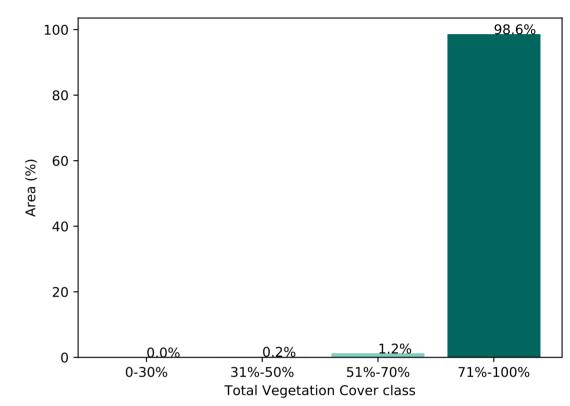
**Total Vegetation Cover [%]** 



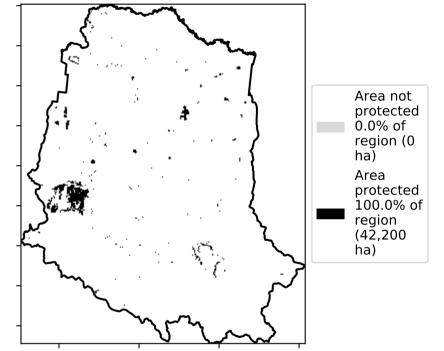


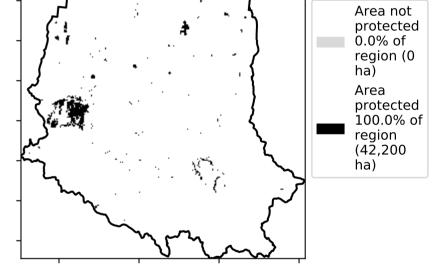






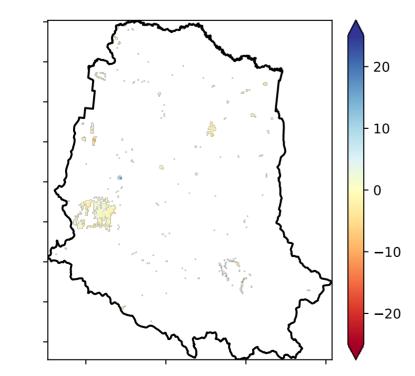
% Area protected from wind erosion (>50%)





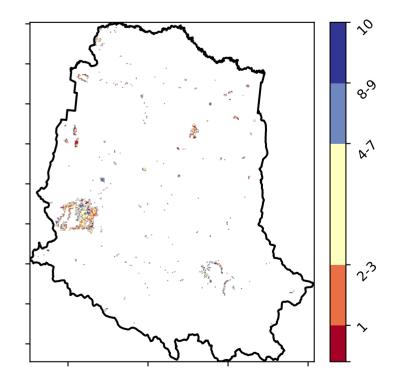
Catchment Scale Land Use and Forests of Australia (2018) Derived from Catchment Scale Land Use of Australia (2018) and Forests of Australia (2018)

**Total Vegetation Cover Anomaly [%]** 



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.

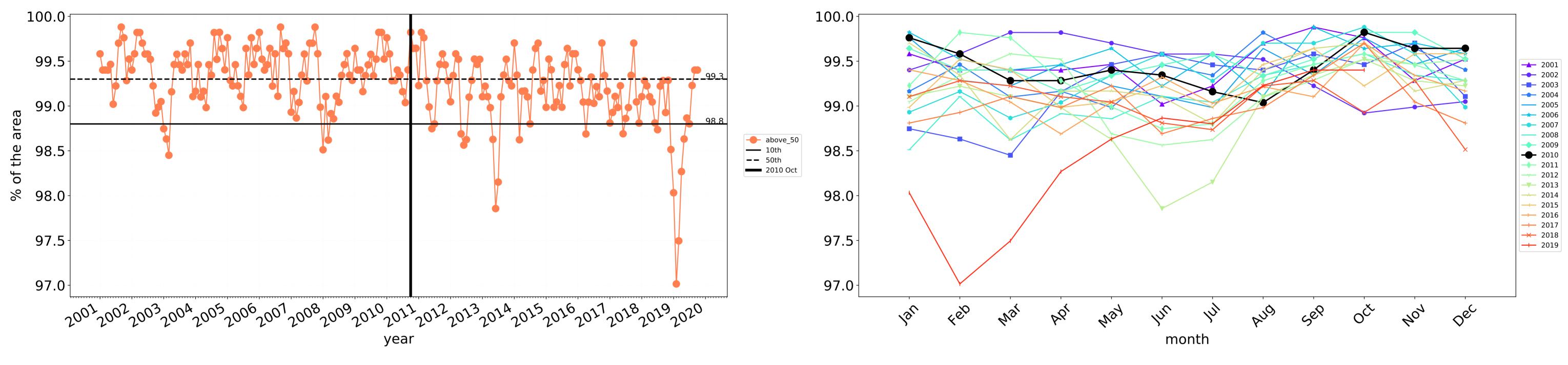
**Total Vegetation Cover Decile [%]** 



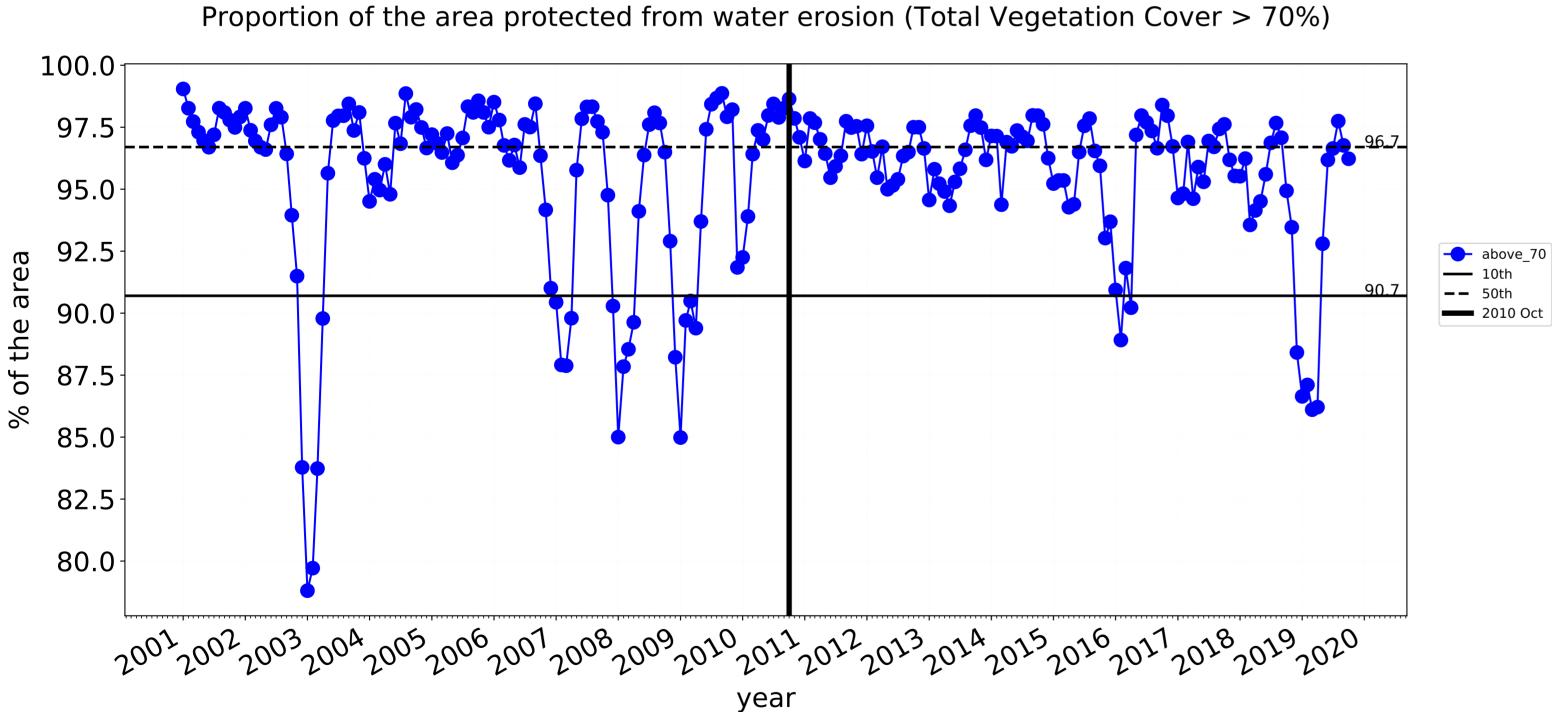


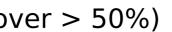
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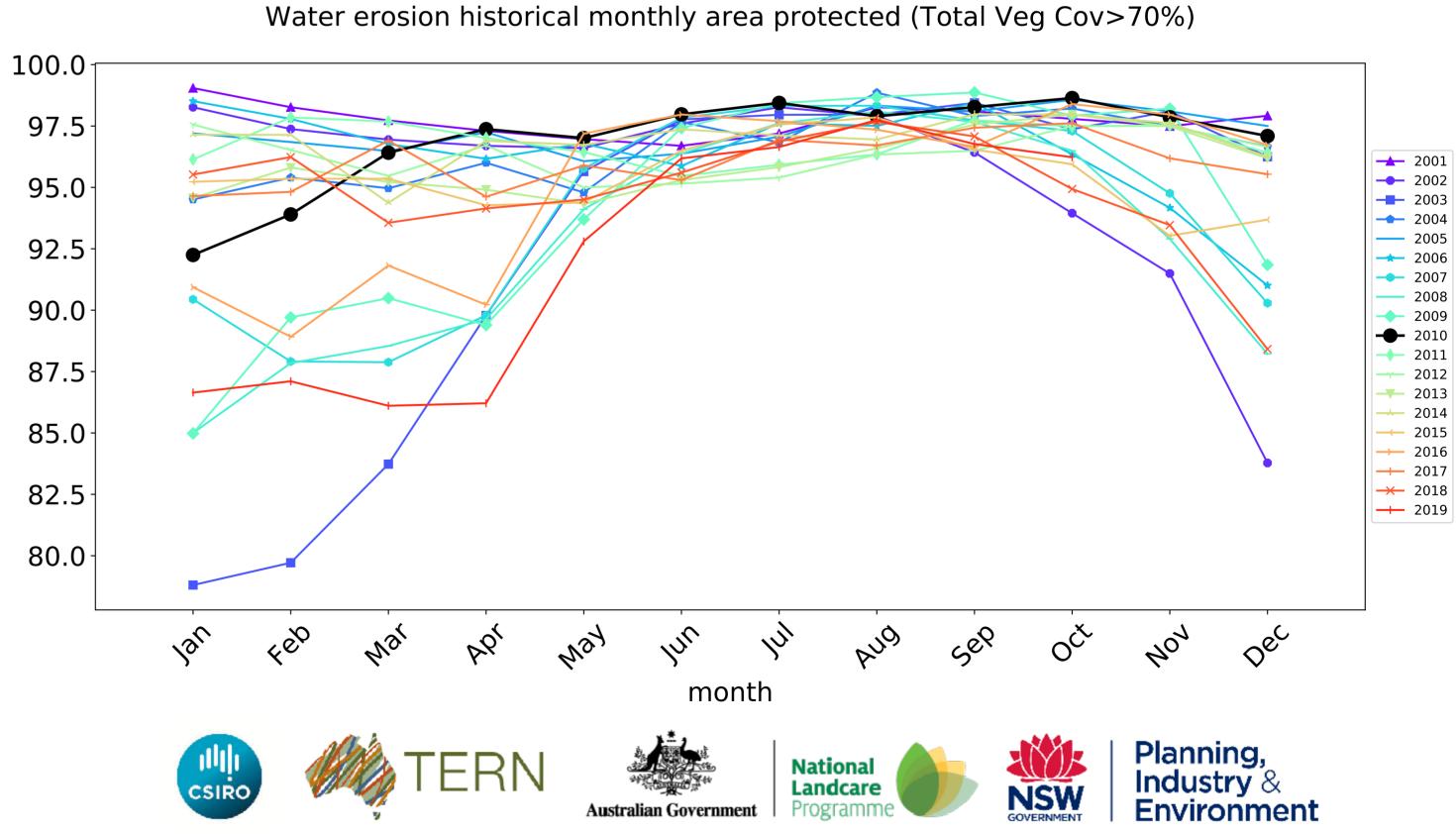


Proportion of the area protected from wind erosion (Total Vegetation Cover > 50%)

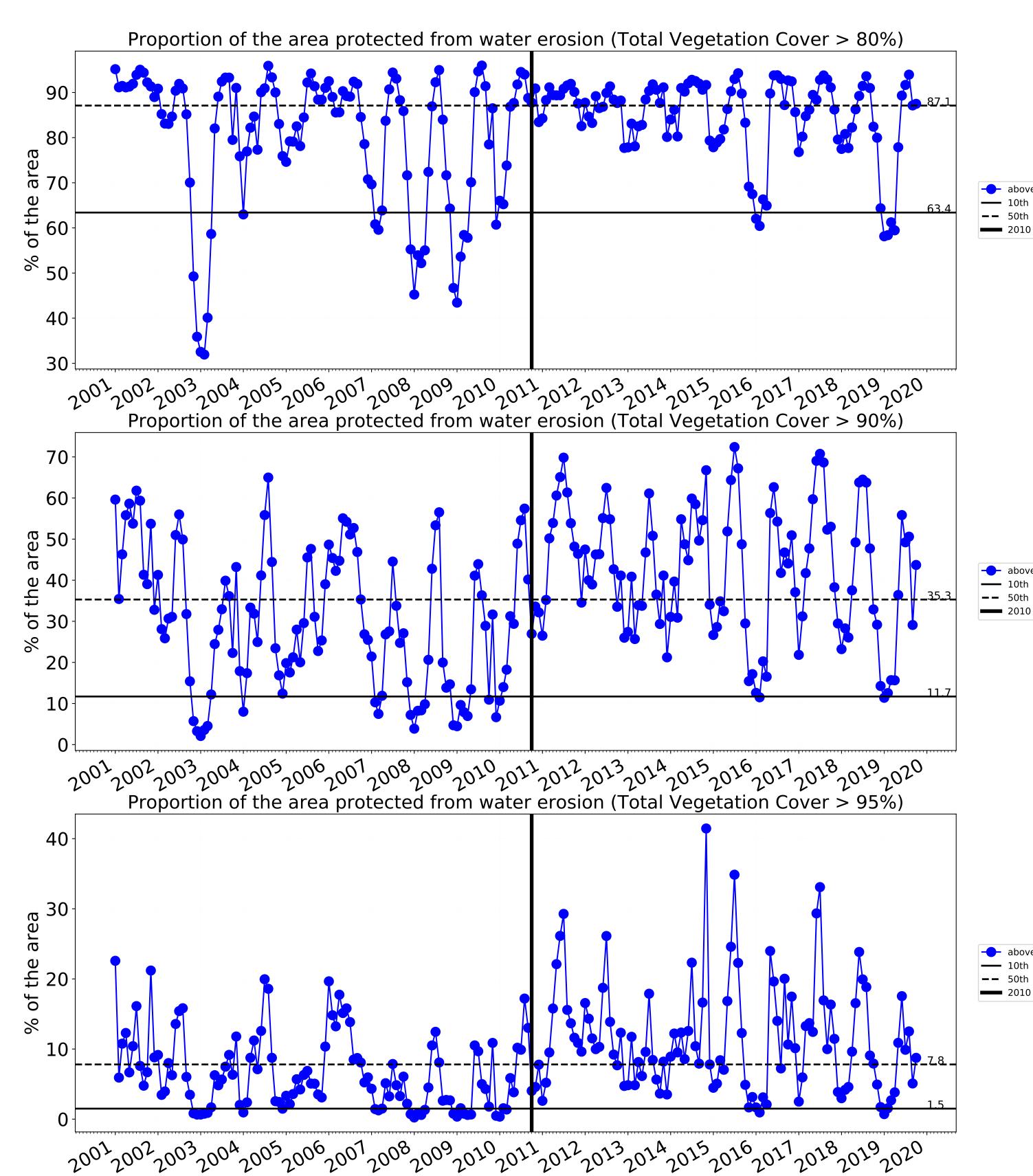


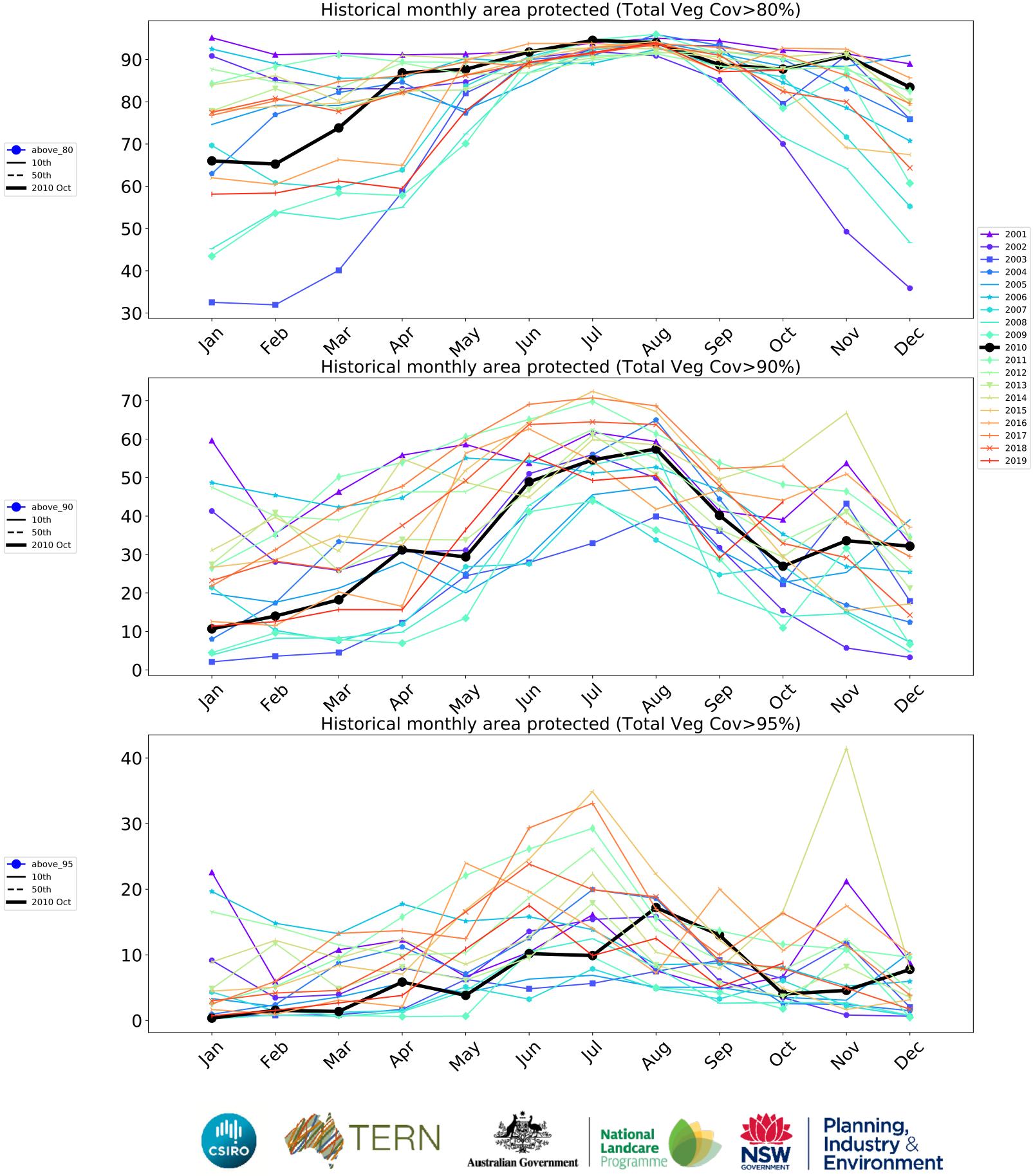


Wind erosion historical monthly area protected (Total Veg Cov >50%)









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

Land use and forest cover

Conservation and natural environments - Non-woodland forest

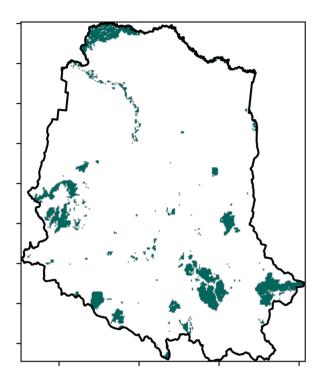
12010

52% TO

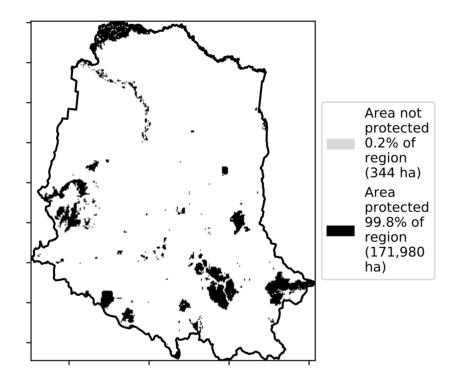
32%50%

0.30%

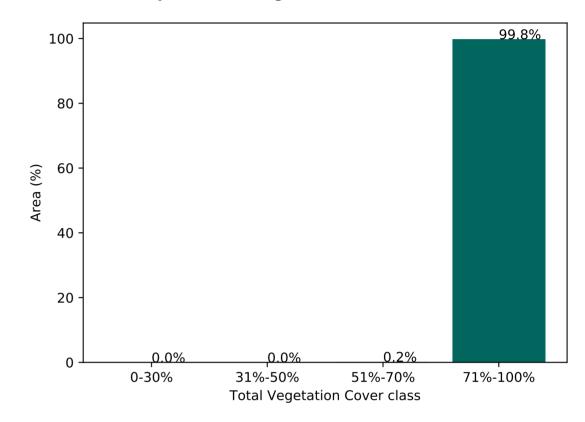
**Total Vegetation Cover [%]** 



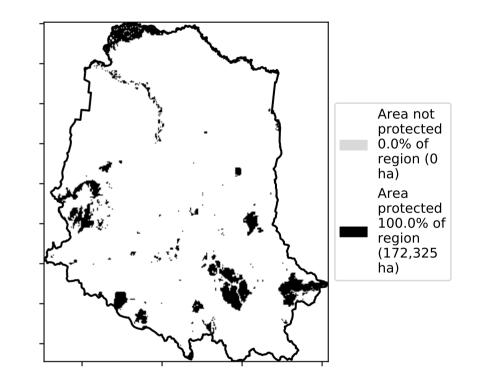
% Area protected from water erosion (>70%)



Proportion of vegetation cover class in area



% Area protected from wind erosion (>50%)



Total Vegetation Cover Anomaly [%]

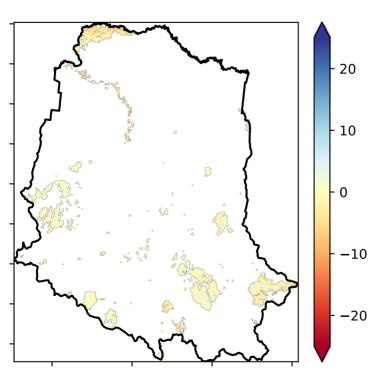
Anomaly show how many percetage points each pixel is from the mean. That is, red pixels are about 20% lower than the mean of that pixel. The mean is only for the month of the map using baseline from 2001 to 2019.

Catchment Scale Land Use and Forests of Australia (2018)

Catchment Scale Land

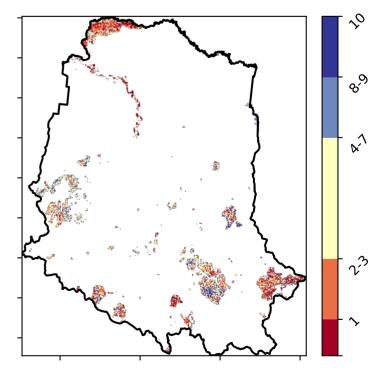
Derived from

Use of Australia (2018) and Forests of Australia (2018)

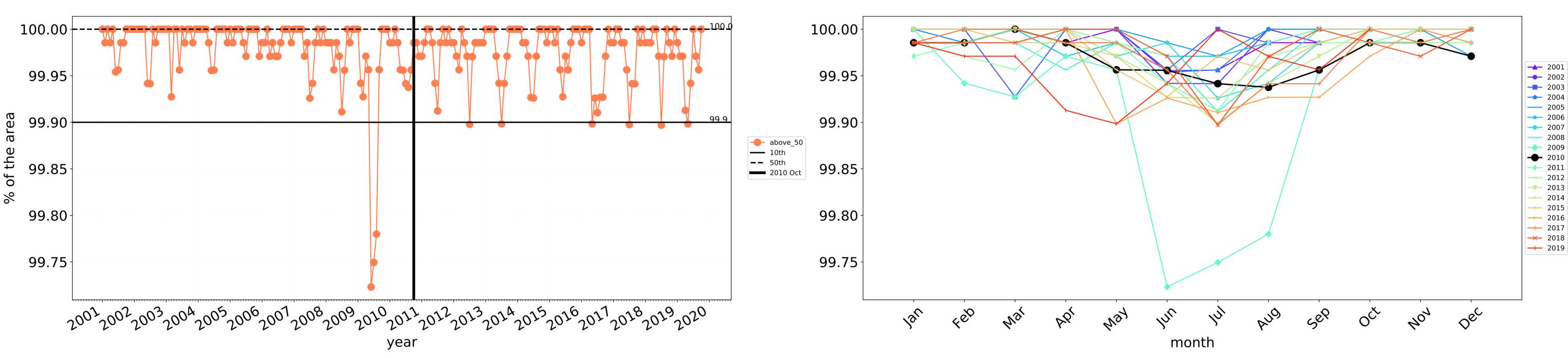


**Total Vegetation Cover Decile [%]** 

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.

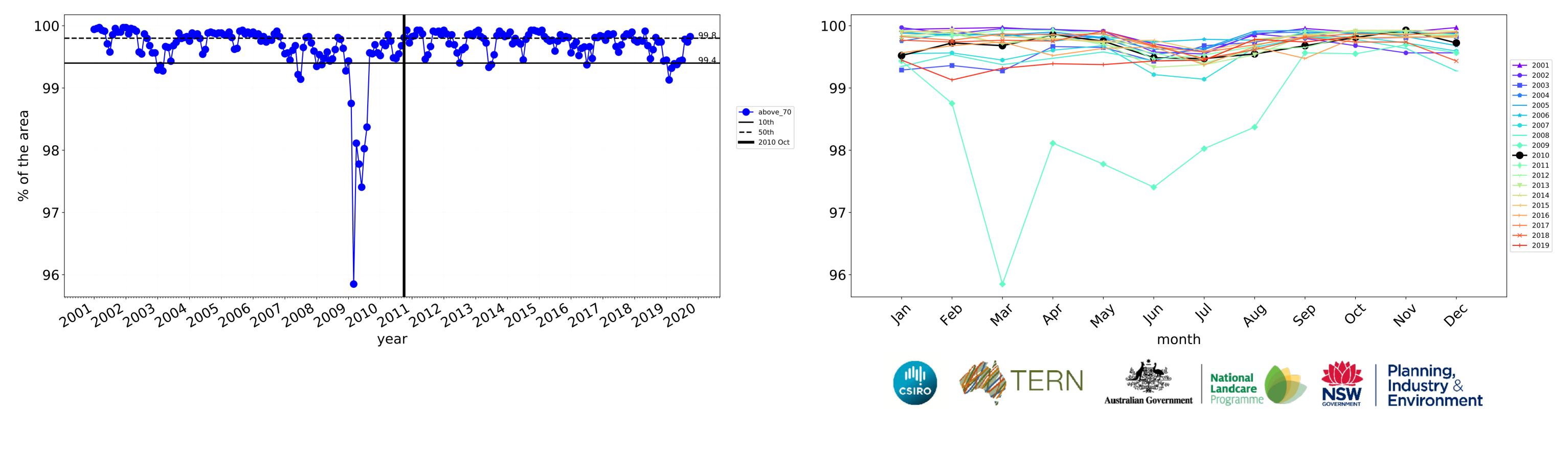






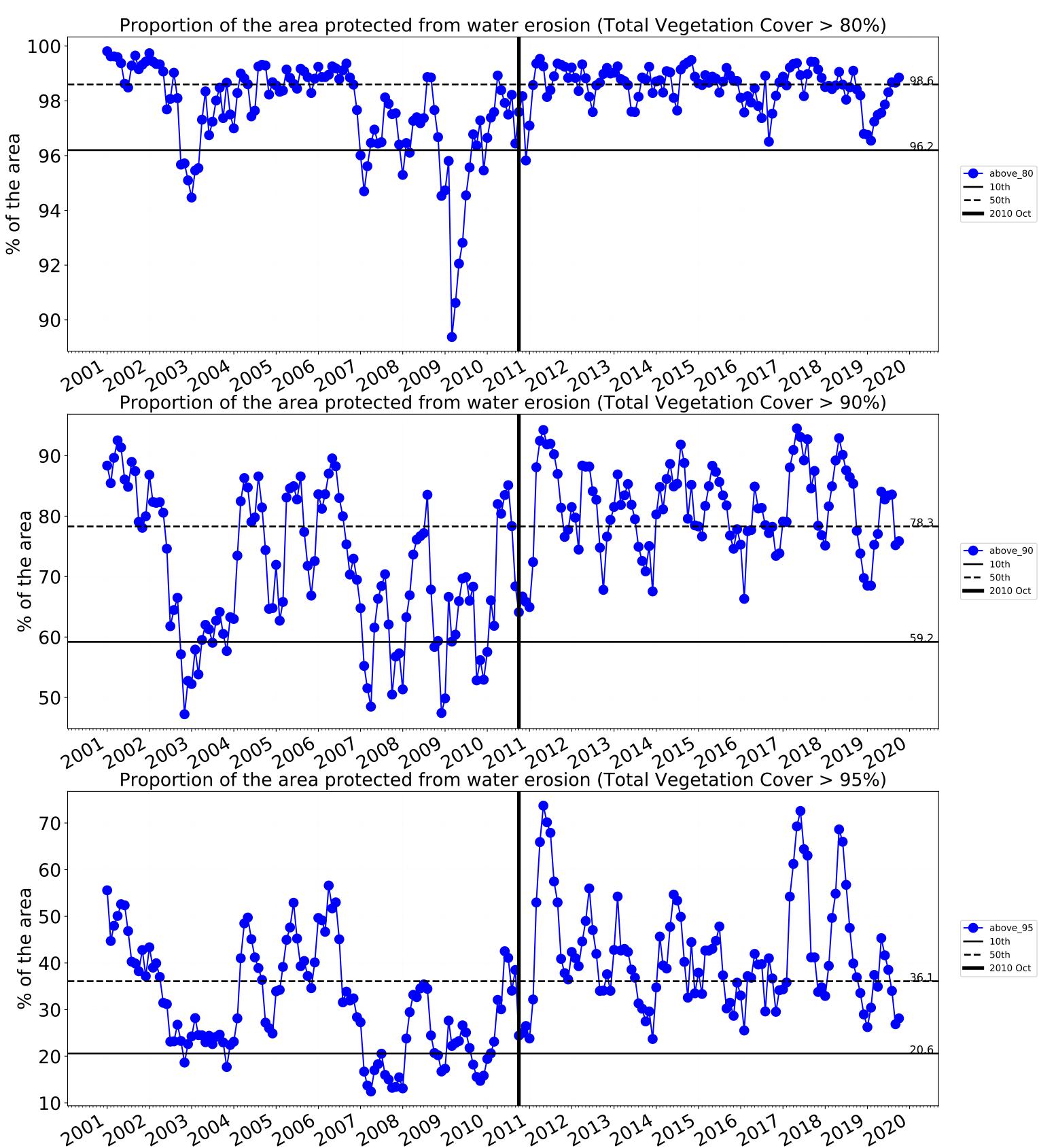
Proportion of the area protected from wind erosion (Total Vegetation Cover > 50%)

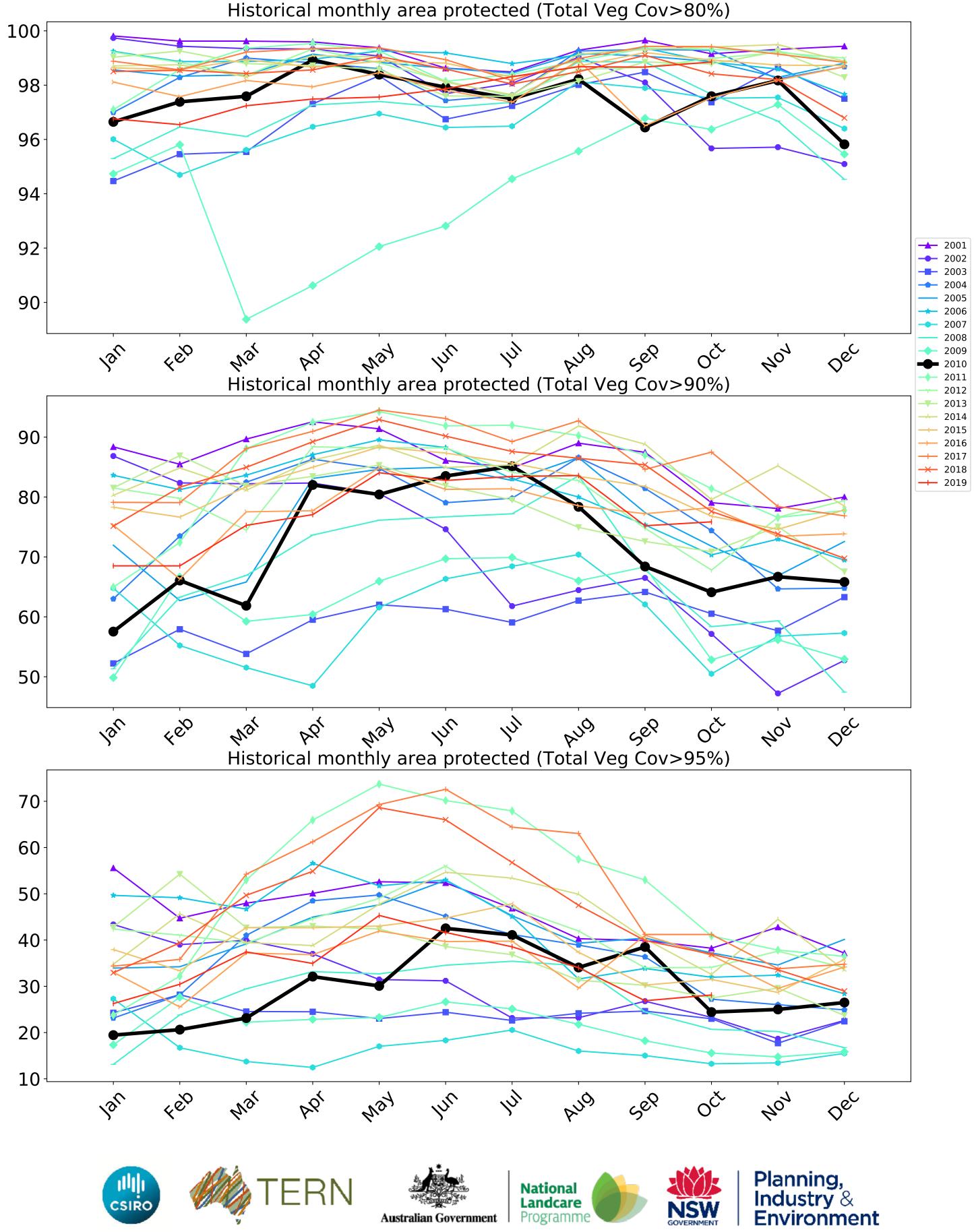
Proportion of the area protected from water erosion (Total Vegetation Cover > 70%)



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







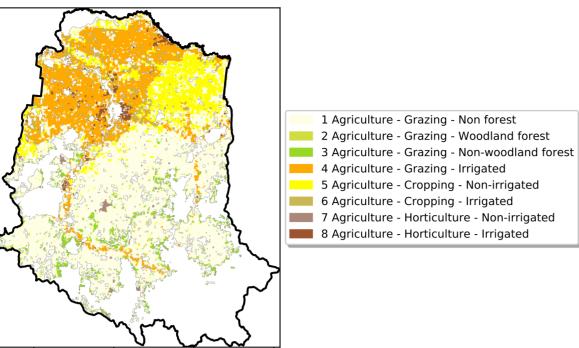


### Agriculture

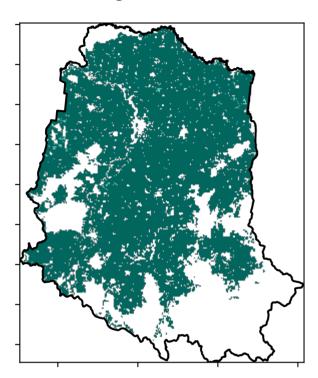
Catchment Scale Land Use and Forests of Australia (2018) Derived from Catchment Scale Land Use of Australia (2018) and Forests of Australia (2018)

#### Land use and forest cover

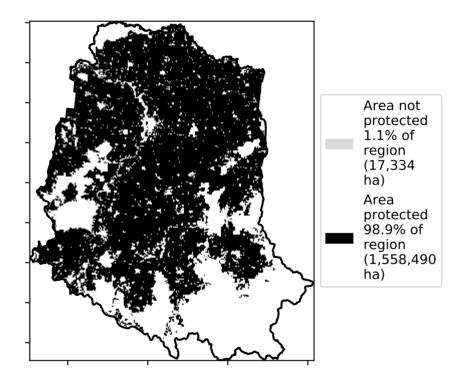
Proportion of each land class in area

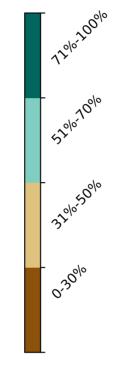


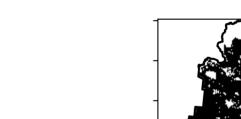
**Total Vegetation Cover [%]** 

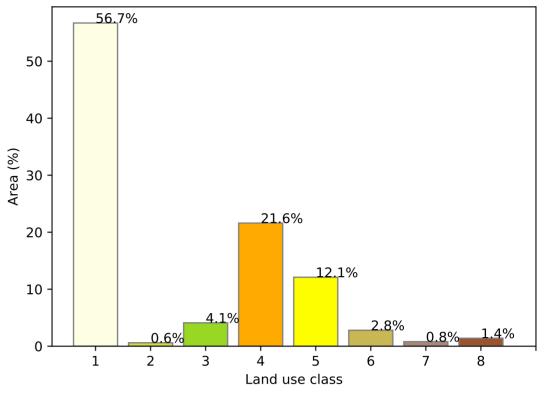




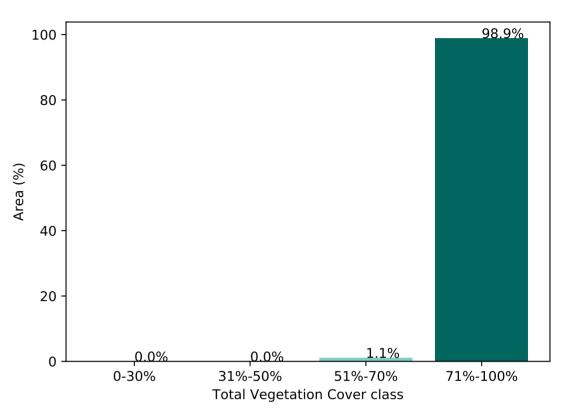








Proportion of vegetation cover class in area

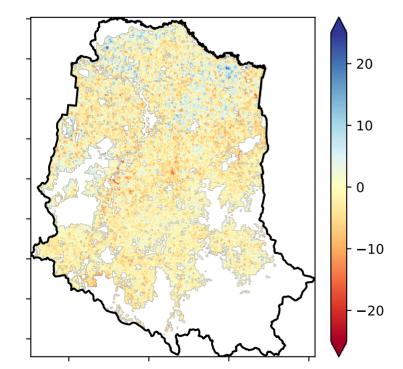


% Area protected from wind erosion (>50%)

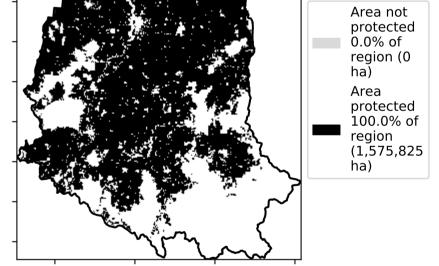


**Total Vegetation Cover Anomaly [%]** 

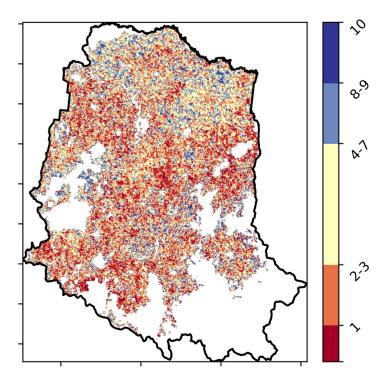
Anomaly show how many percetage points each pixel is from the mean. That is, red pixels are about 20% lower than the mean of that pixel. The mean is only for the month of the map using baseline from 2001 to 2019.



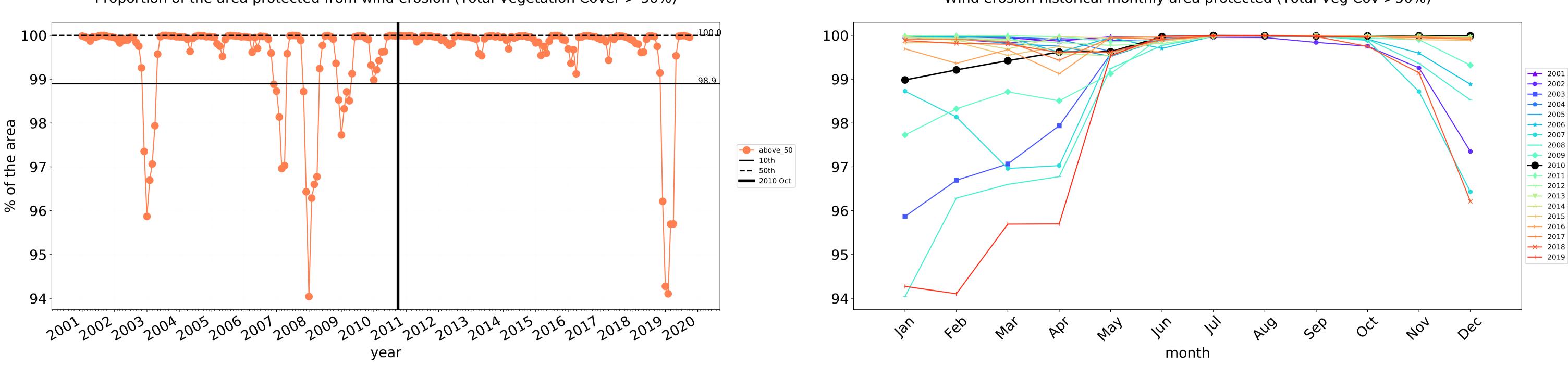
Deciles show where the pixel value lies in the record, from highest to lowest, for that month. That is, red pixels are in the lowest 10% of records for that month of the map using baseline from 2001 to 2019.



**Total Vegetation Cover Decile [%]** 

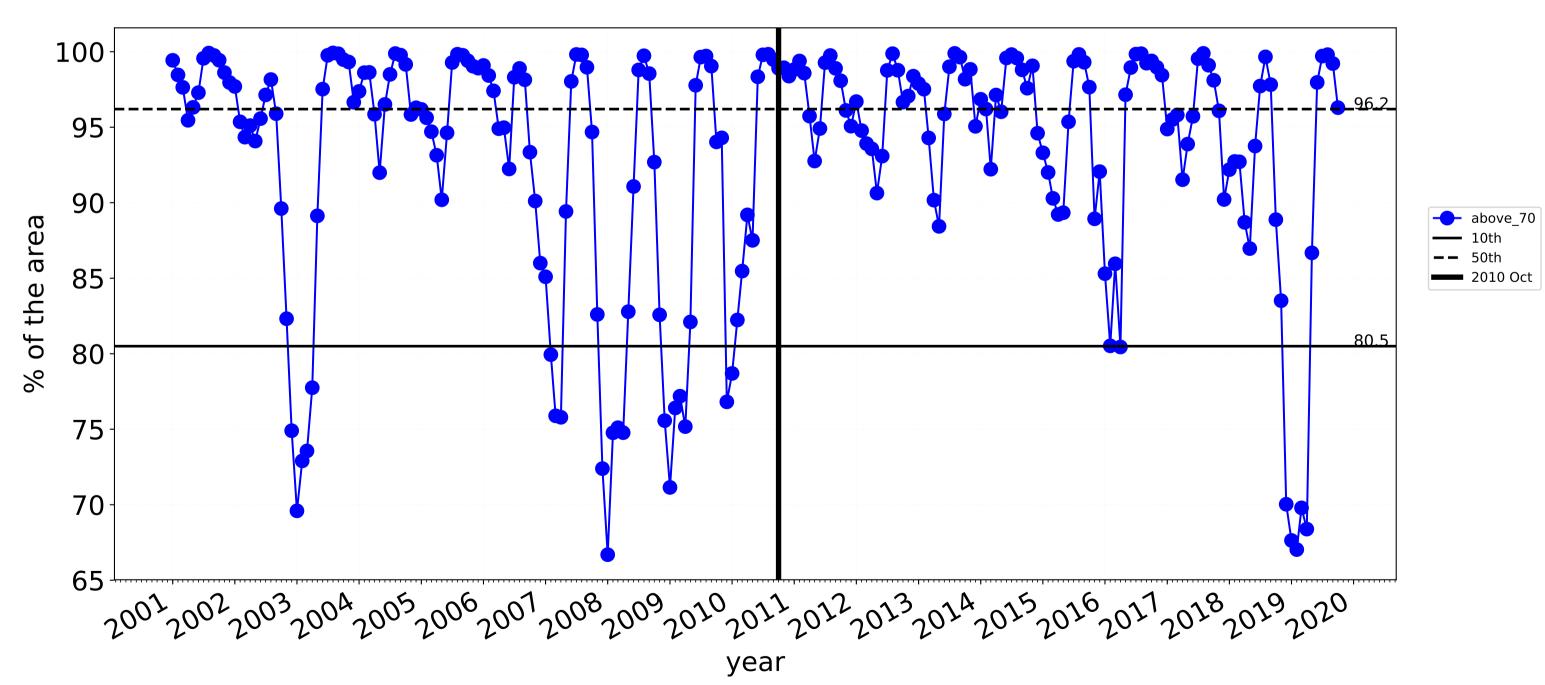






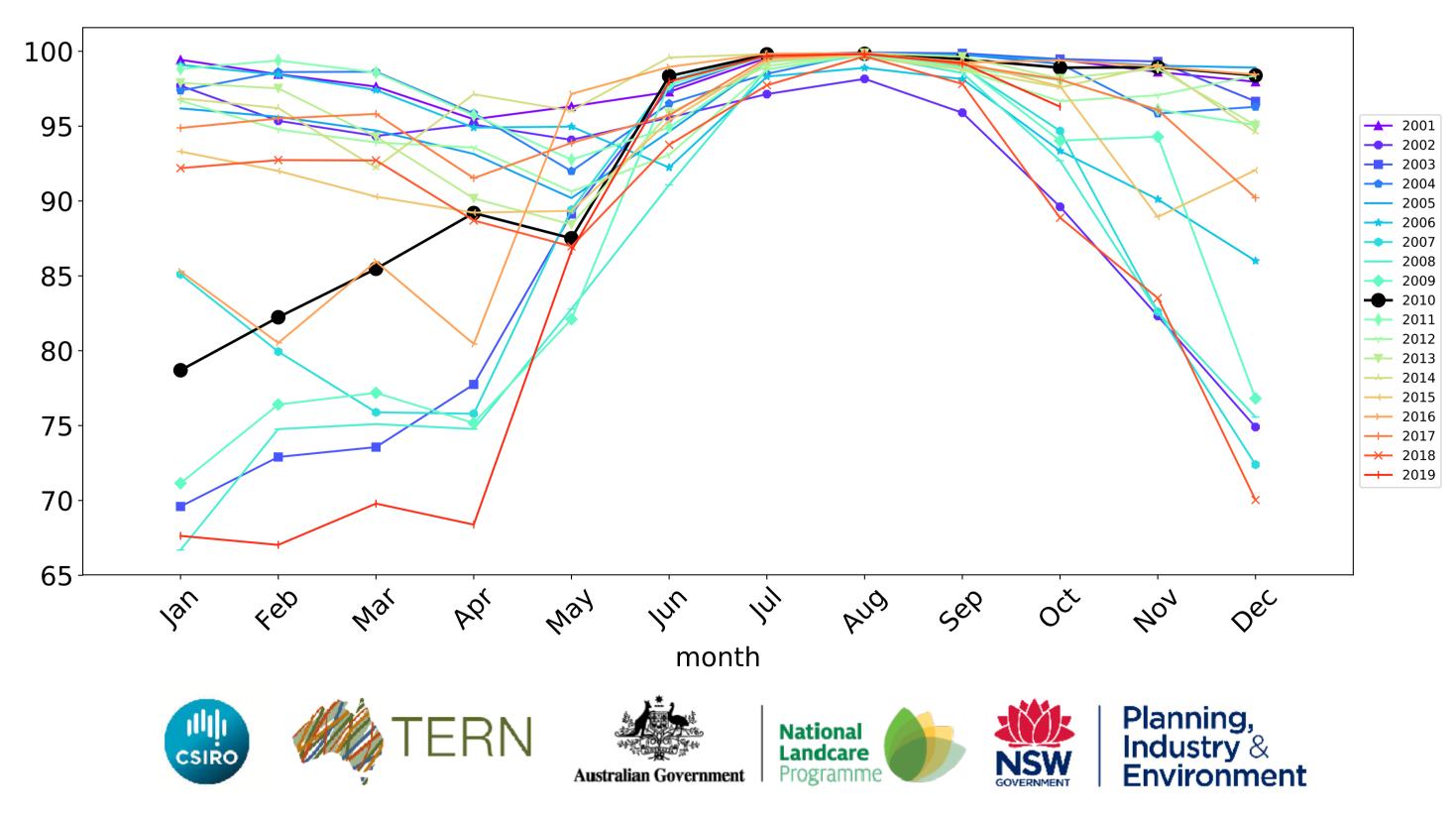
Proportion of the area protected from wind erosion (Total Vegetation Cover > 50%)

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

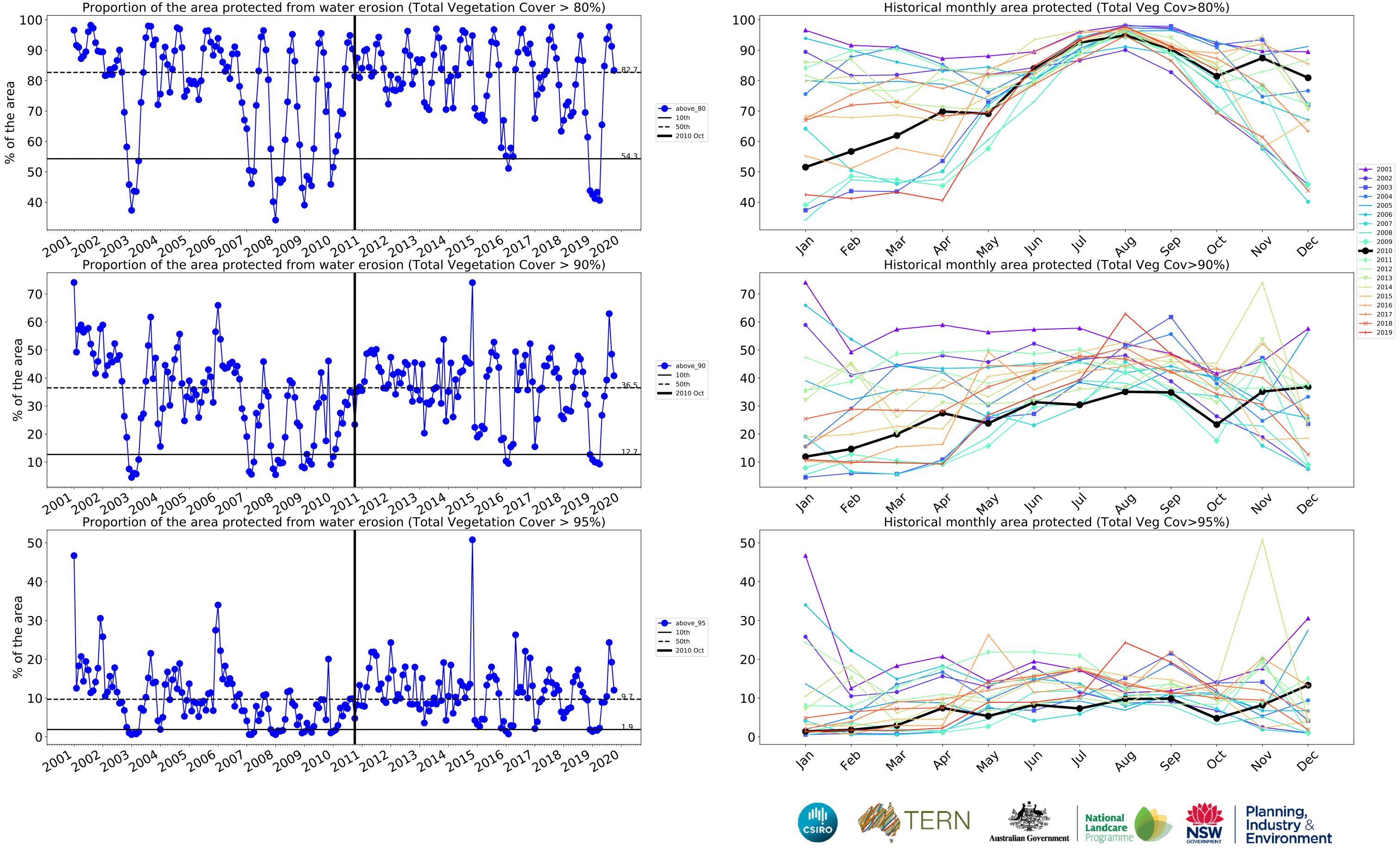


# **Agriculture timeseries**

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

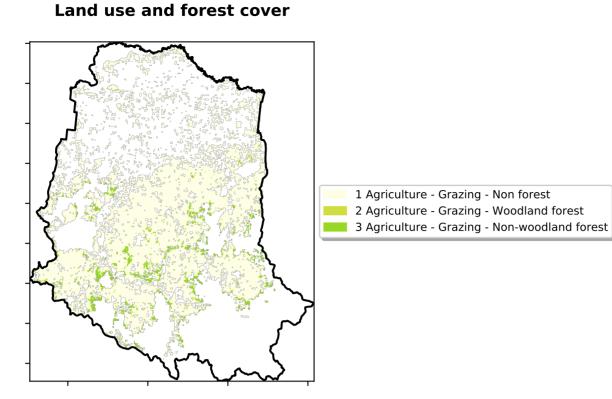


Wind erosion historical monthly area protected (Total Veg Cov >50%)

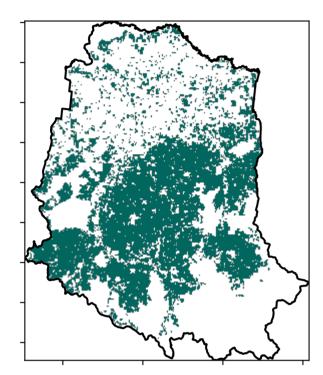


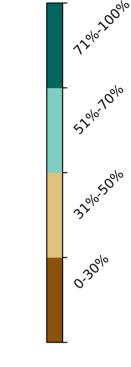
### Grazing

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

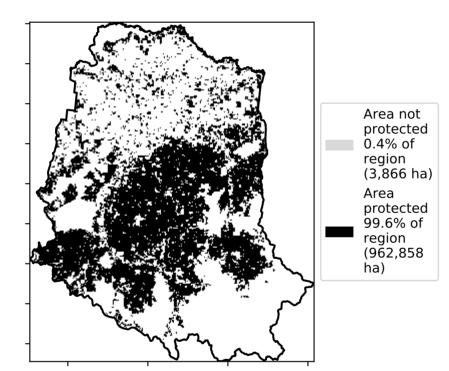


**Total Vegetation Cover [%]** 





% Area protected from water erosion (>70%)



1 Agriculture - Grazing - Non forest

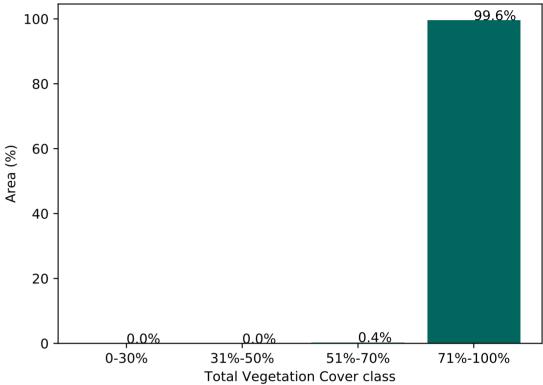
2 Agriculture - Grazing - Woodland forest

100 80

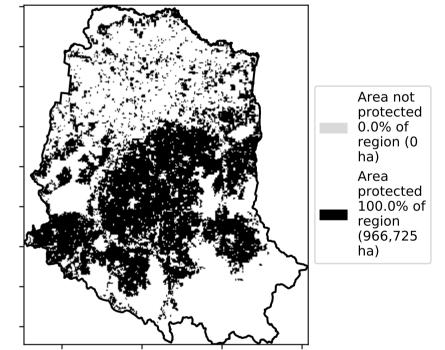
92.3% 80 60 Area (%) 0 20 6.7% 1.0% 0 2 3 1 Land use class

# Proportion of each land class in area

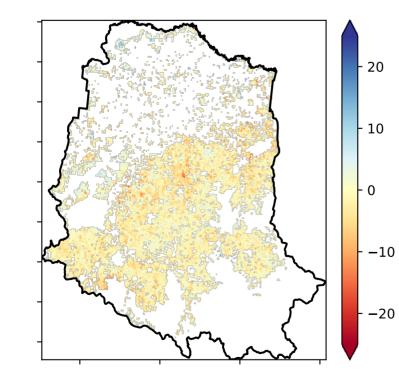
Proportion of vegetation cover class in area



% Area protected from wind erosion (>50%)

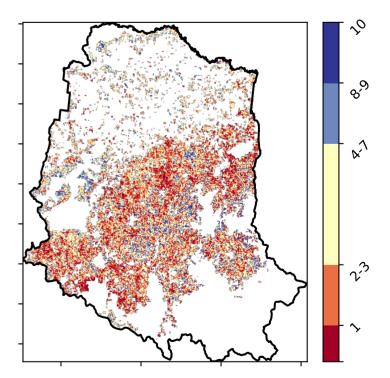


**Total Vegetation Cover Anomaly [%]** 



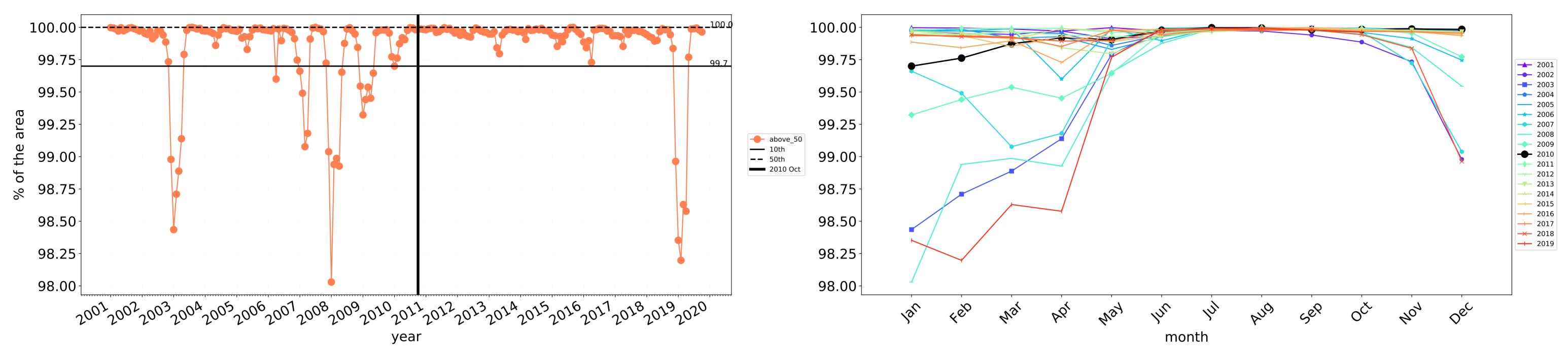
Deciles show where the pixel value lies in the record, from highest to lowest, for that month. That is, red pixels are in the lowest 10% of records for that month of the map using baseline from 2001 to 2019.

**Total Vegetation Cover Decile [%]** 



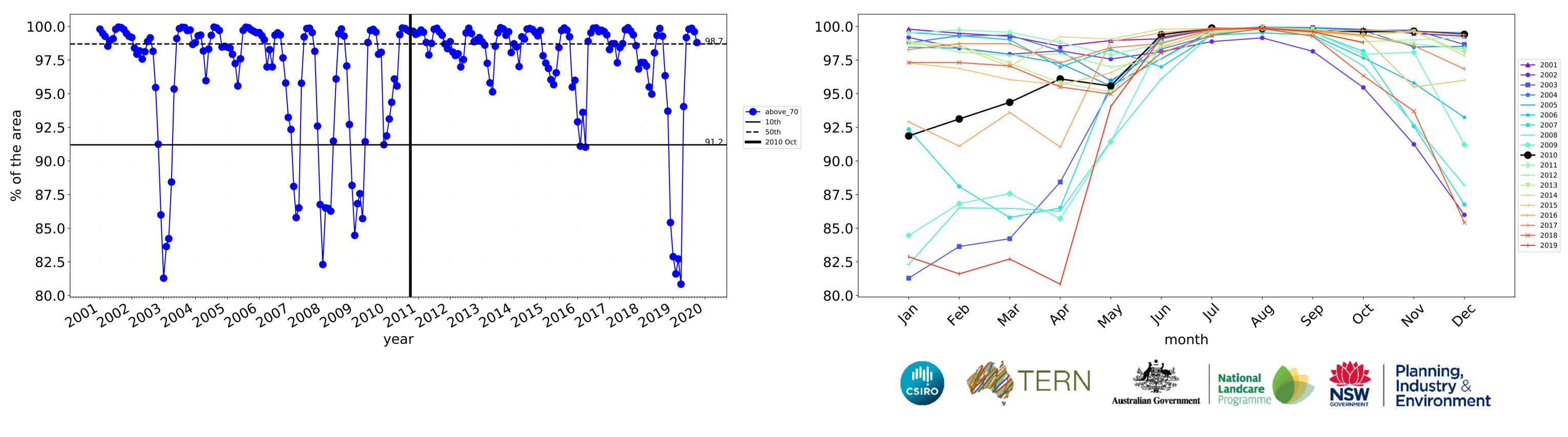


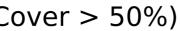
Anomaly show how many percetage points each pixel is from the mean That the mean. That is, red pixels are about 20% lower than the mean of that pixel. The mean is only for the month of the map using baseline from 2001 to 2019.



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

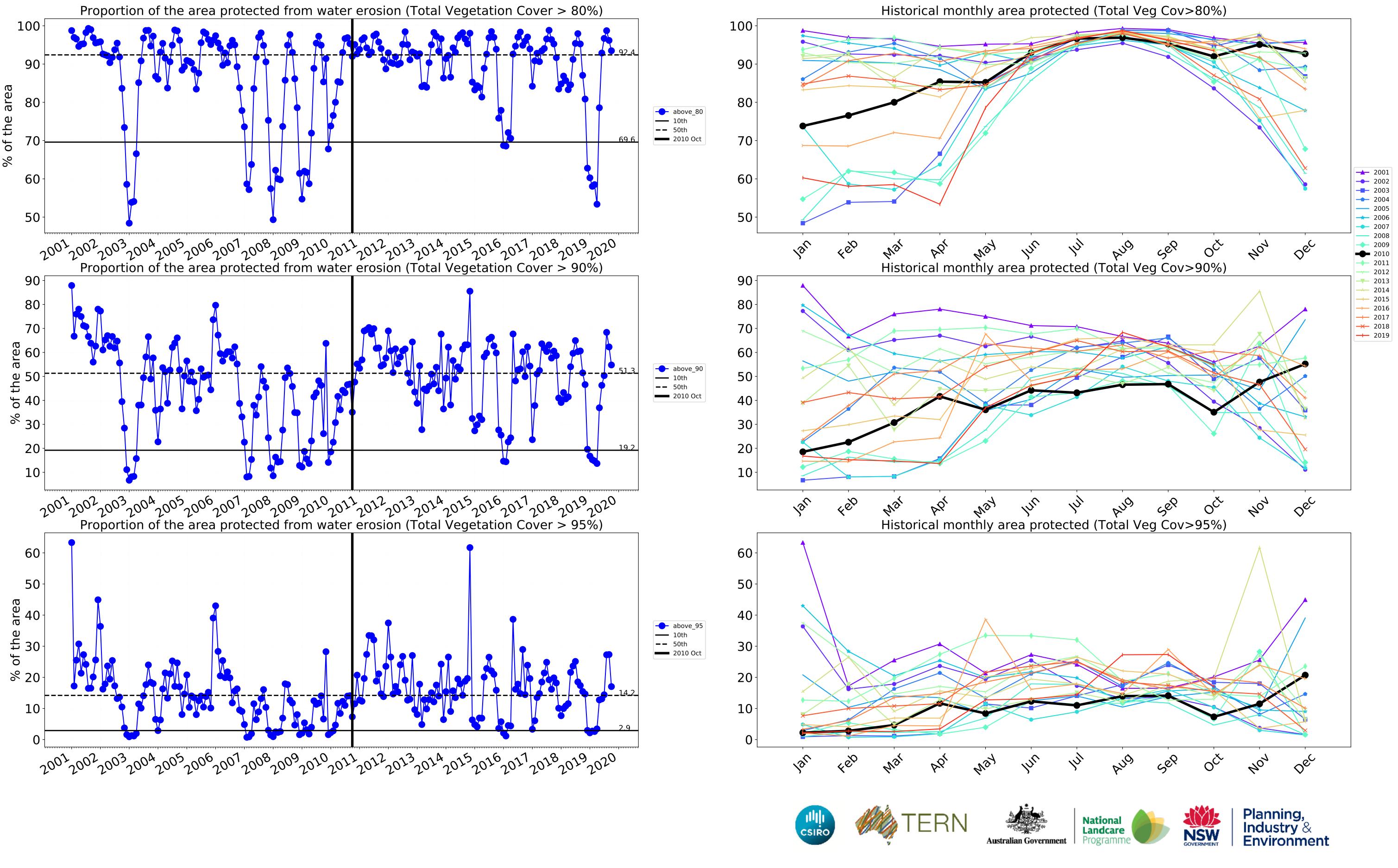
Proportion of the area protected from water erosion (Total Vegetation Cover > 70%)





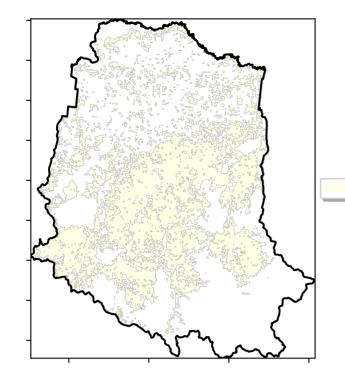
Wind erosion historical monthly area protected (Total Veg Cov >50%)

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



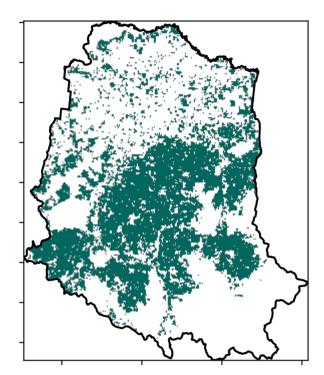
### **Grazing non forest**

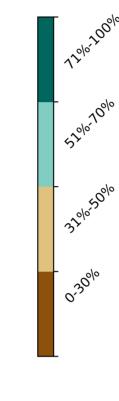
#### Land use and forest cover



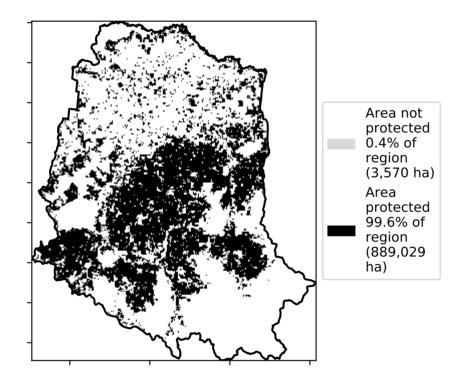
1 Agriculture - Grazing - Non forest

**Total Vegetation Cover [%]** 

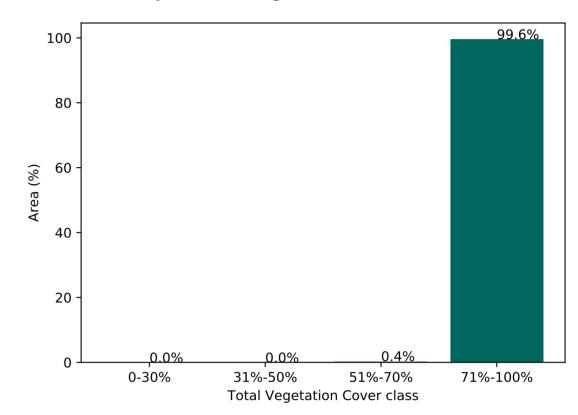




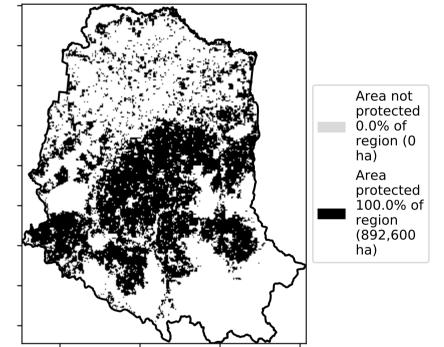
% Area protected from water erosion (>70%)



#### Proportion of vegetation cover class in area

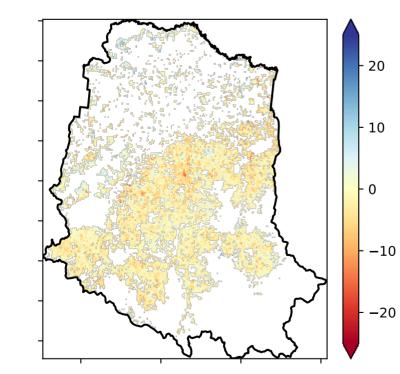


% Area protected from wind erosion (>50%)



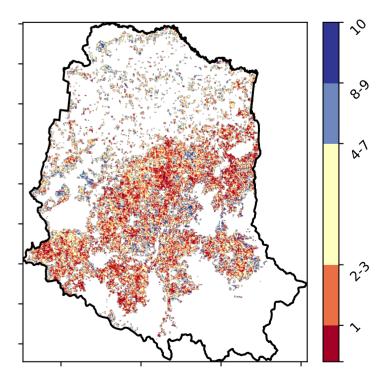
Catchment Scale Land Use and Forests of Australia (2018) Derived from Catchment Scale Land Use of Australia (2018) and Forests of Australia (2018)

**Total Vegetation Cover Anomaly [%]** 



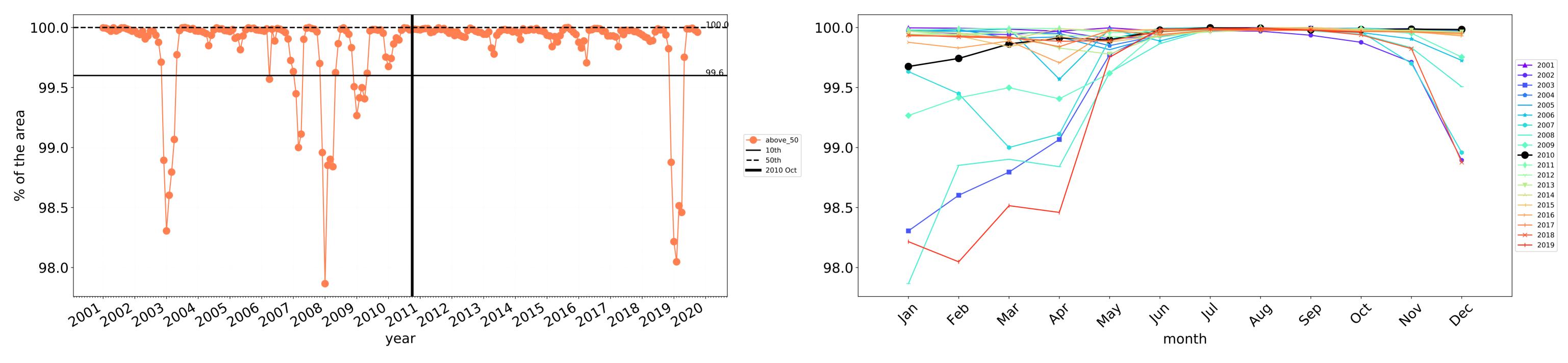
Deciles show where the pixel value lies in the record, from highest to lowest, for that month. That is, red pixels are in the lowest 10% of records for that month of the map using baseline from 2001 to 2019.

**Total Vegetation Cover Decile [%]** 



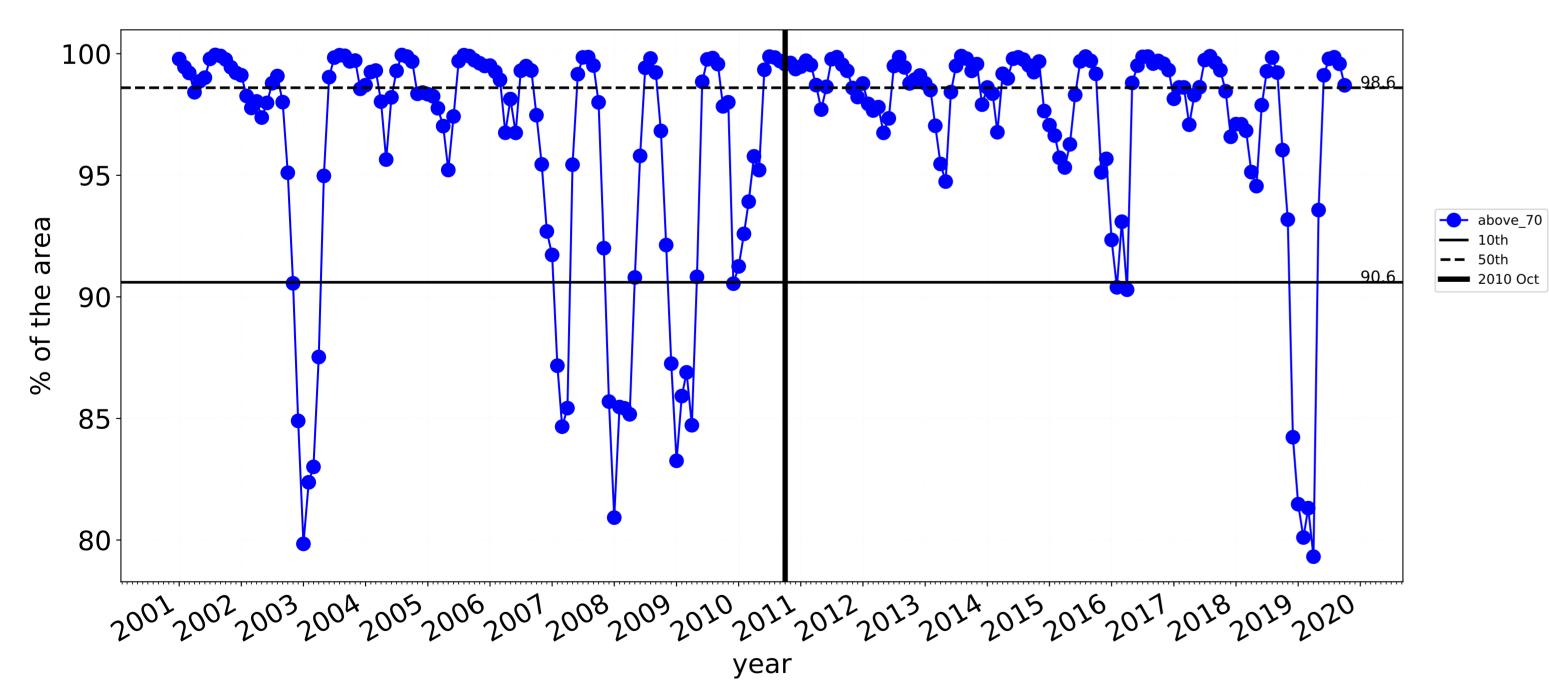


Anomaly show how many percetage points each pixel is from the mean. That is, red pixels are about 20% lower than the lower than the mean of that pixel. The mean is only for the month of the map using baseline from 2001 to 2019.



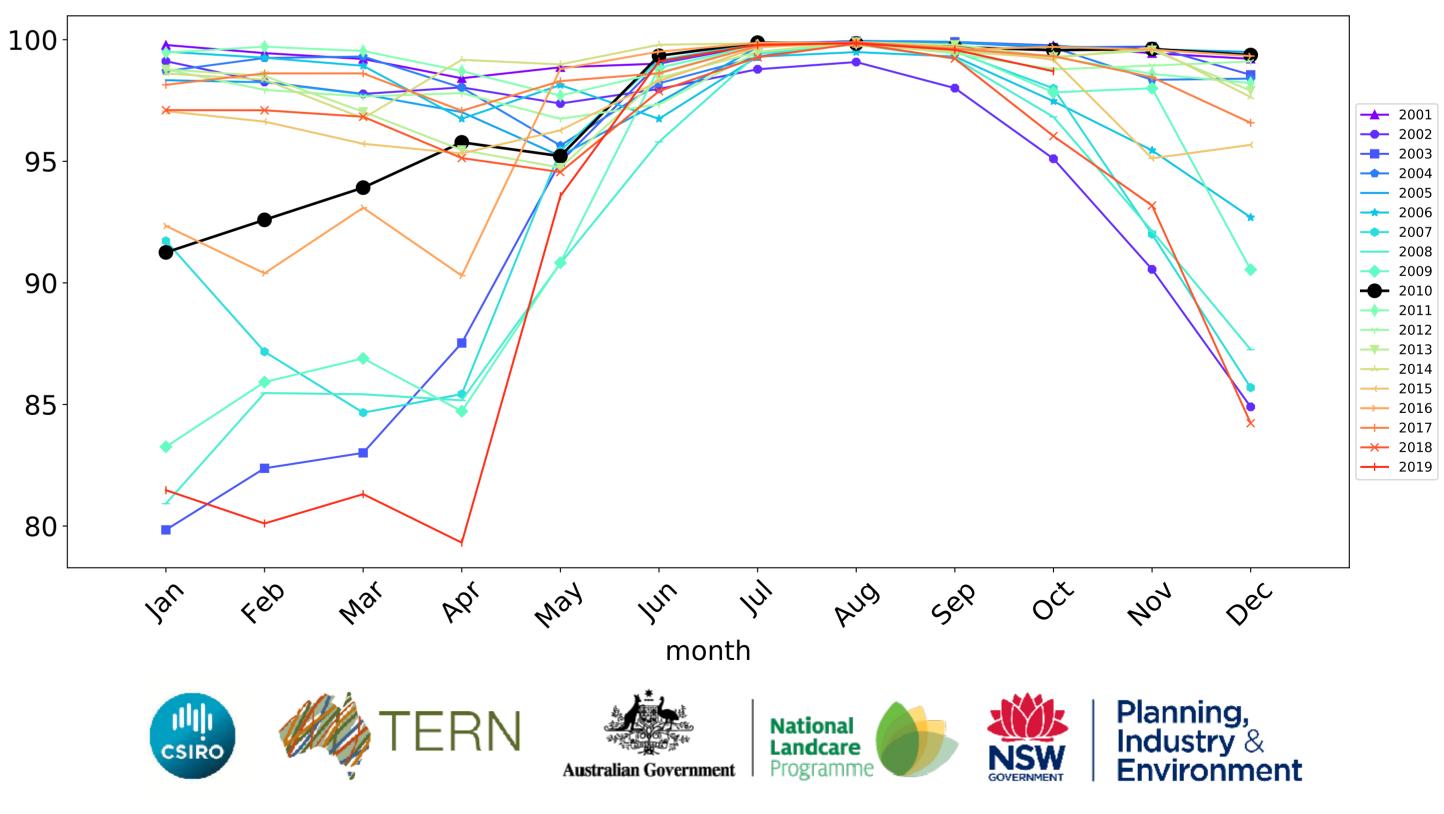
Proportion of the area protected from wind erosion (Total Vegetation Cover > 50%)

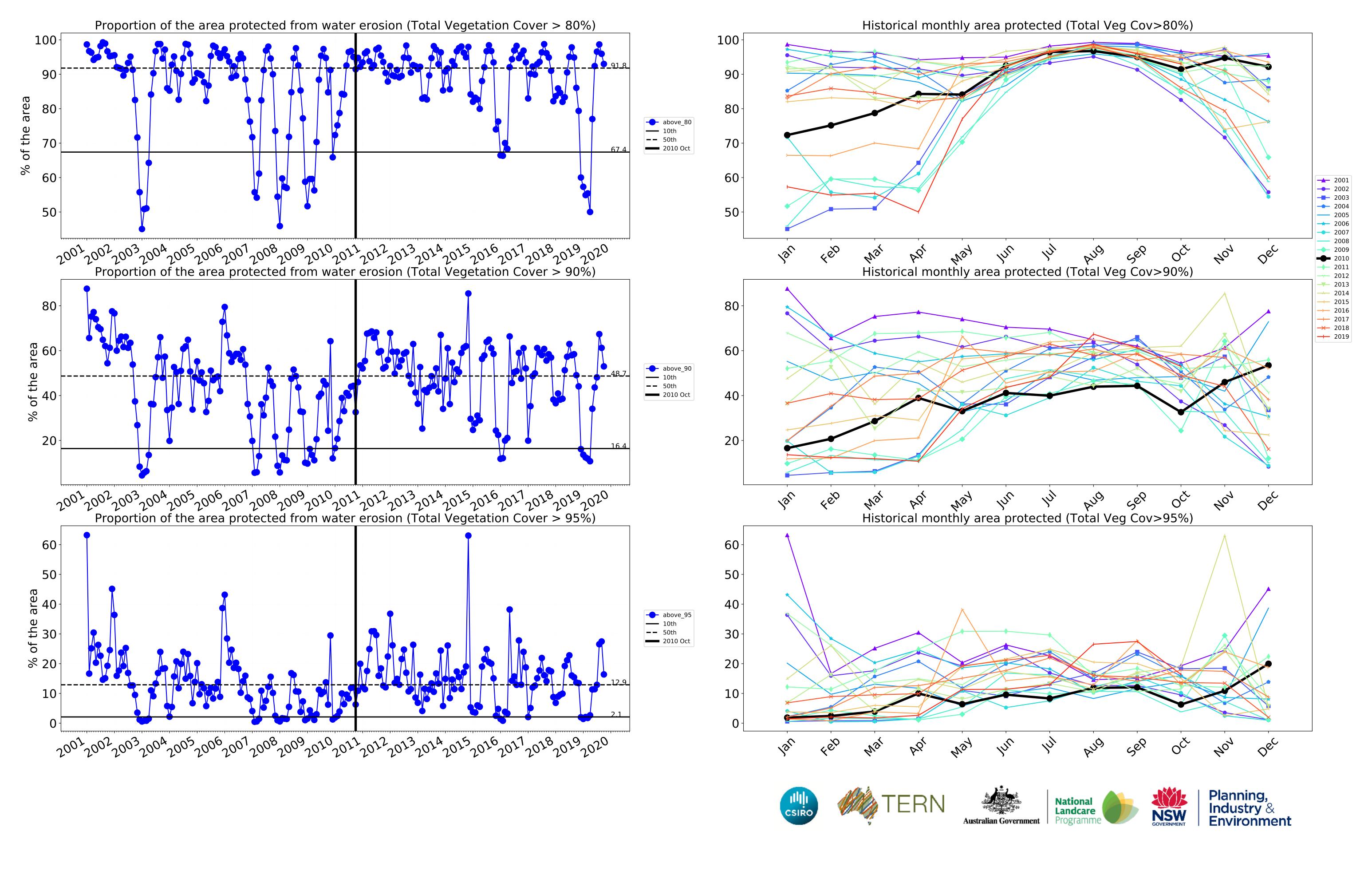
Proportion of the area protected from water erosion (Total Vegetation Cover > 70%)



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

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





**4** 

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

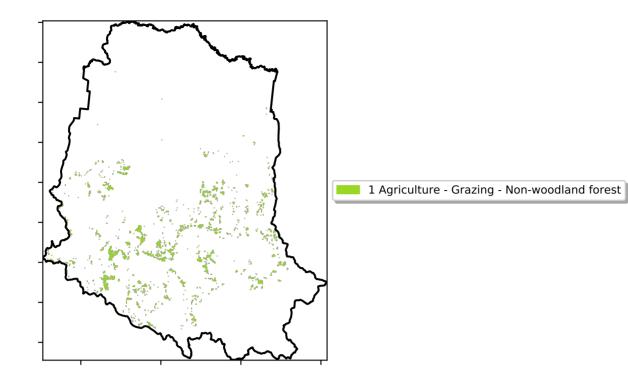
12%-200%

52% 70%

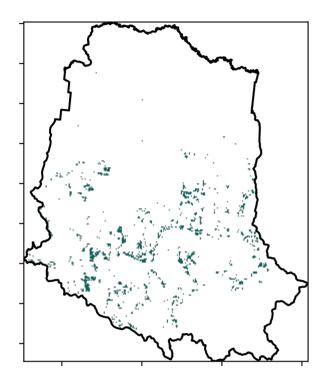
320/05/001

0.30%

Land use and forest cover



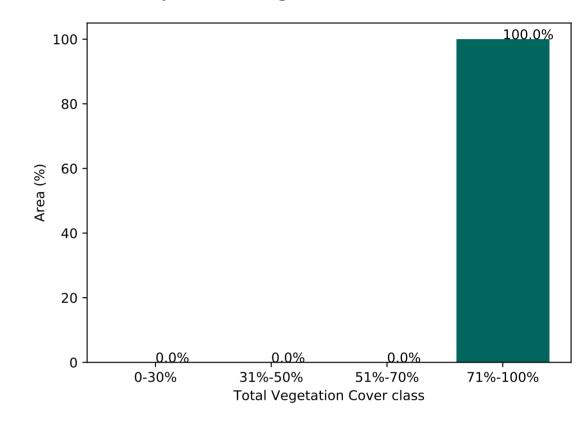
**Total Vegetation Cover [%]** 



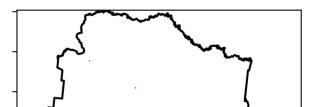




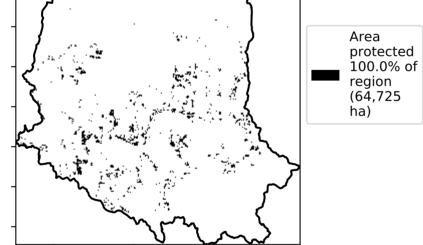
Proportion of vegetation cover class in area



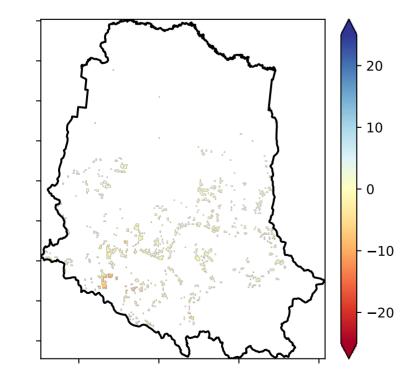
% Area protected from wind erosion (>50%)



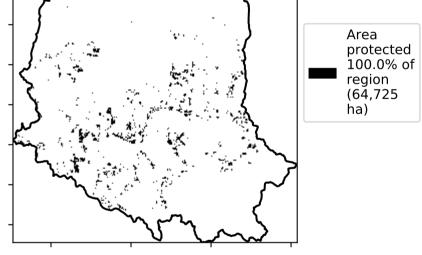
Catchment Scale Land Use and Forests of Australia (2018) Derived from Catchment Scale Land Use of Australia (2018) and Forests of Australia (2018)



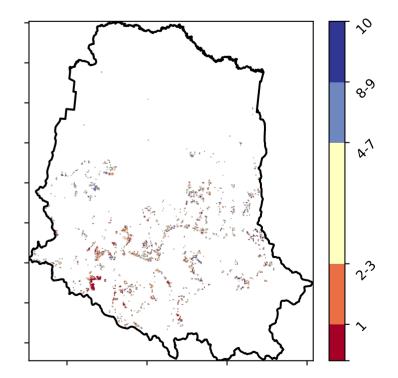
**Total Vegetation Cover Anomaly [%]** 



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.

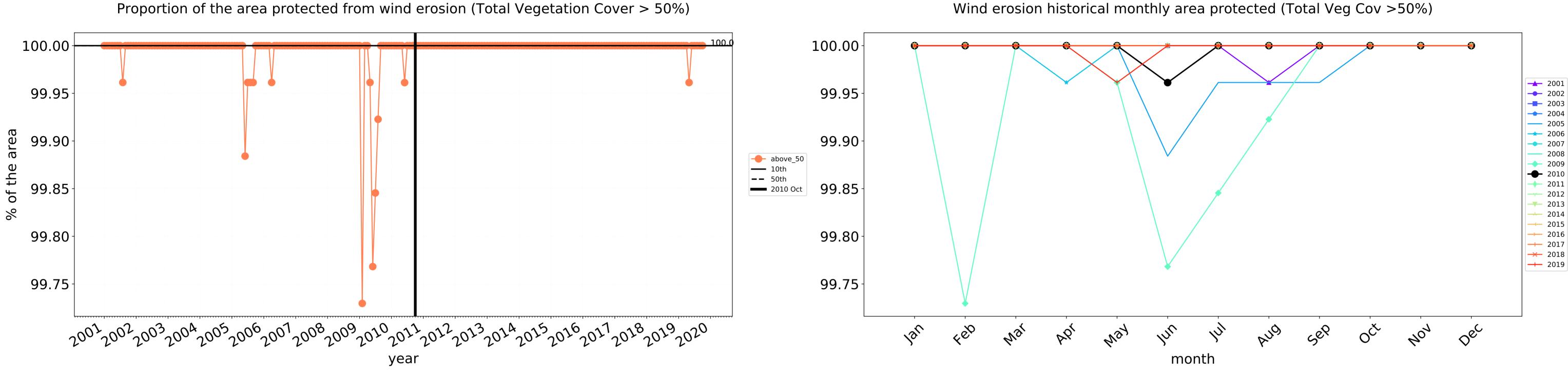


**Total Vegetation Cover Decile [%]** 



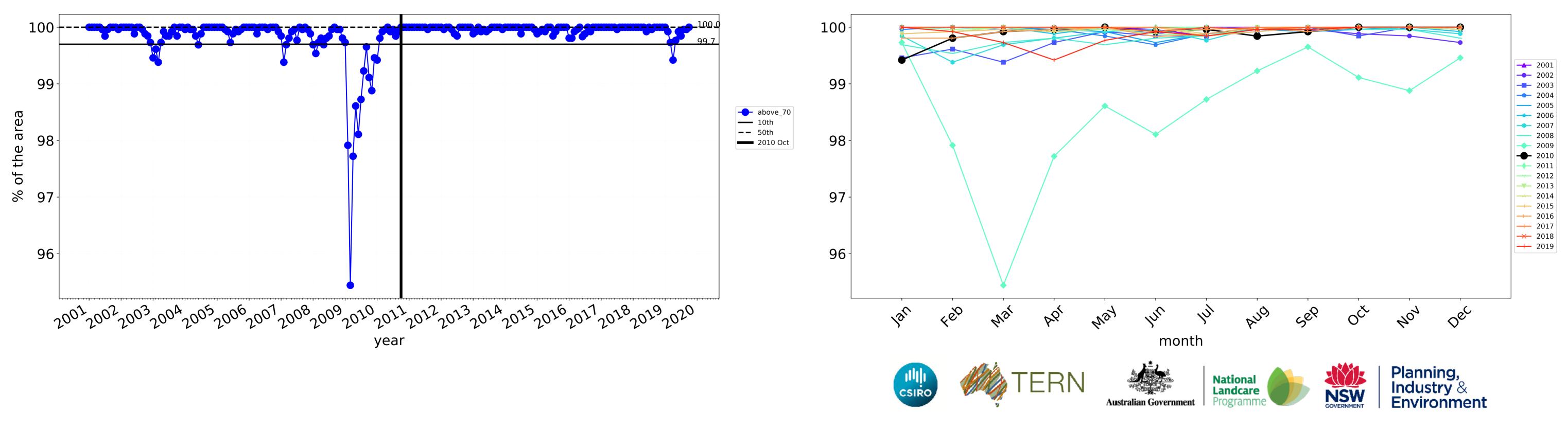


Anomaly show how many percetage points each pixel is from the mean. That is, red pixels are about 20% lower than the mean of that pixel. The mean is only for the month of the map using baseline from 2001 to 2019.

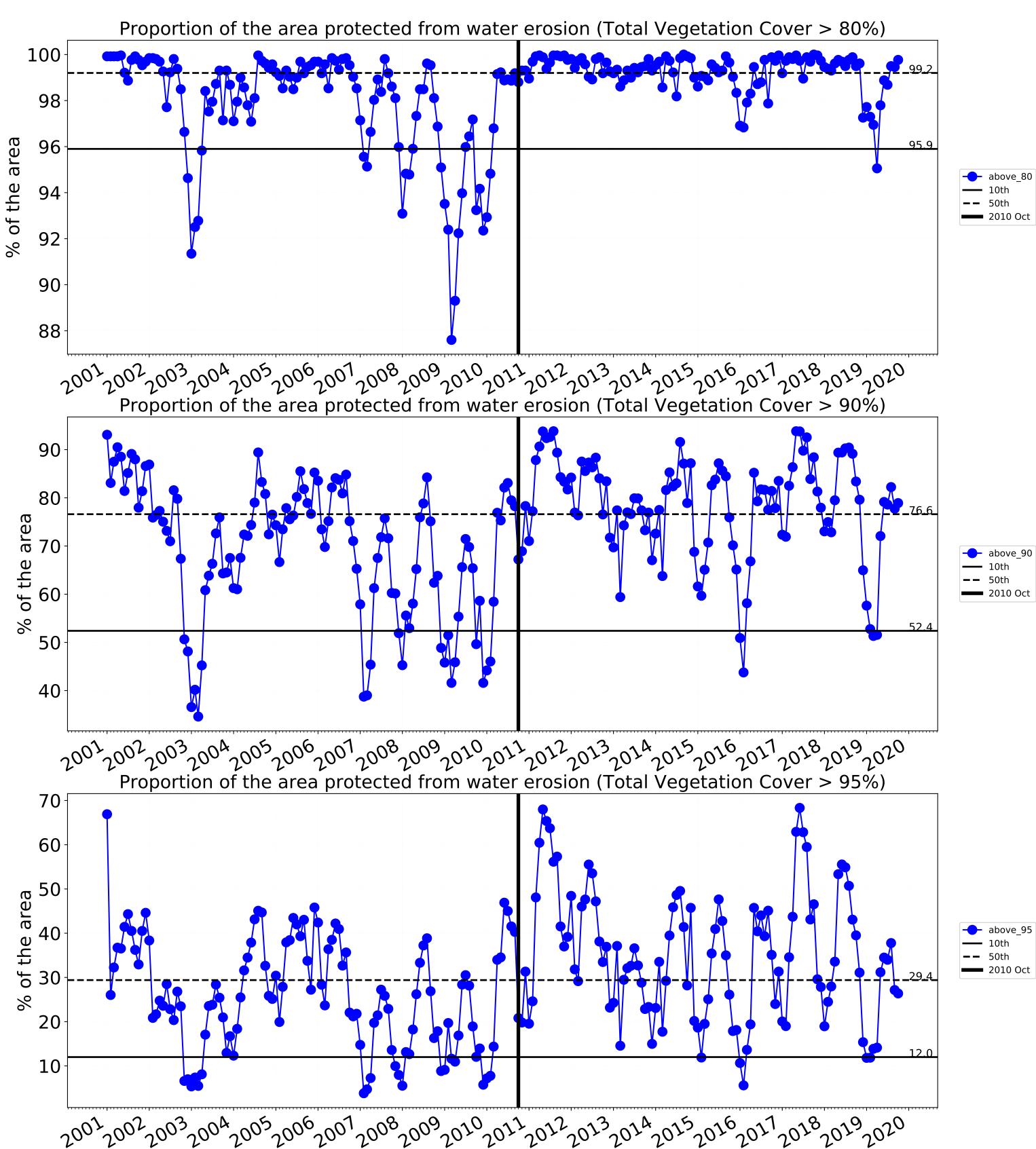


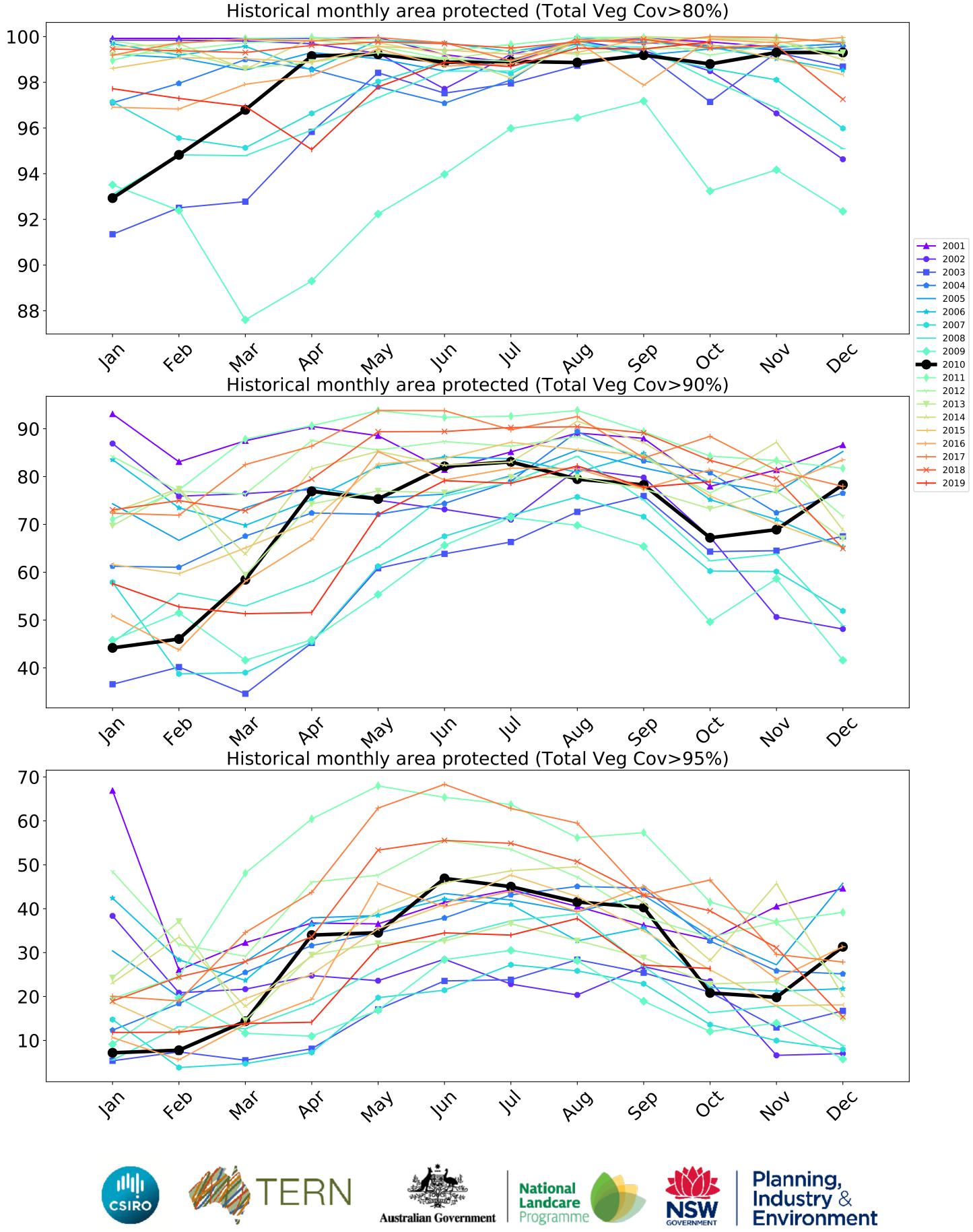
Proportion of the area protected from wind erosion (Total Vegetation Cover > 50%)

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



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

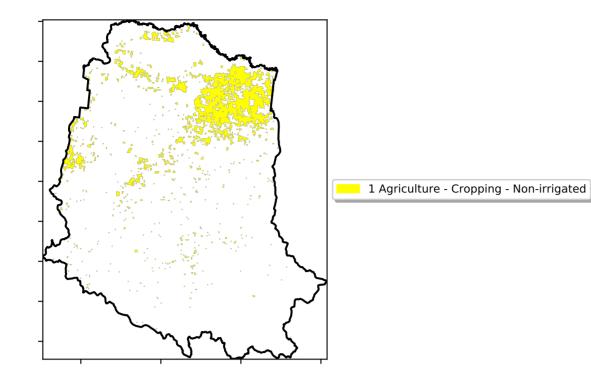




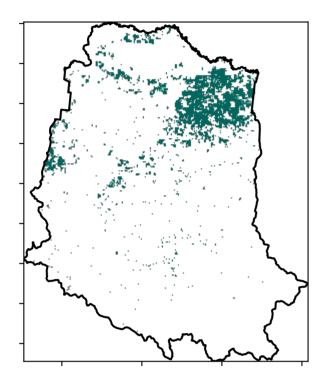


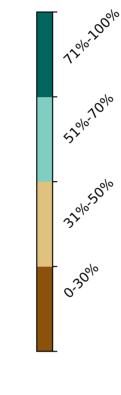
### Cropping

#### Land use and forest cover

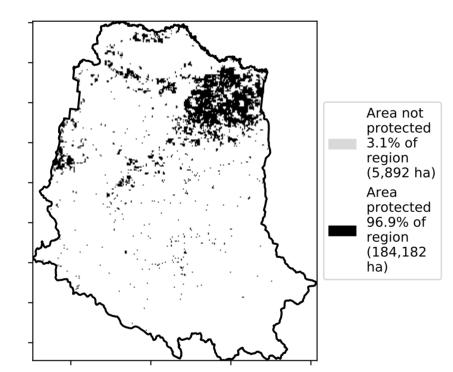


**Total Vegetation Cover [%]** 



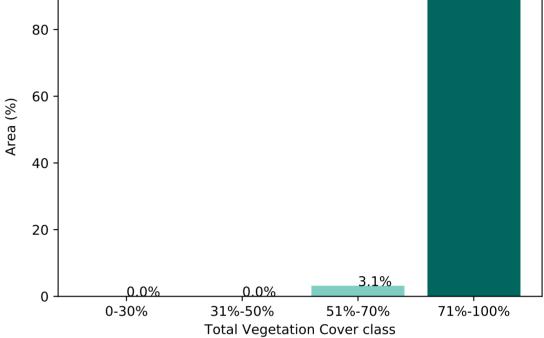


% Area protected from water erosion (>70%)

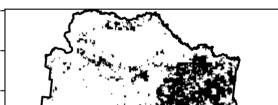




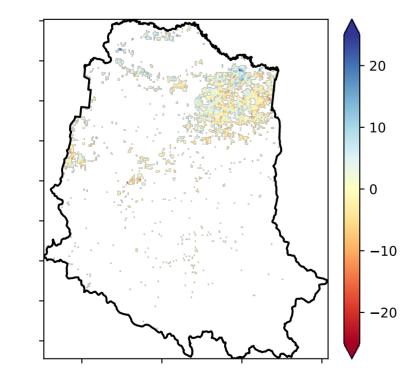
Proportion of vegetation cover class in area



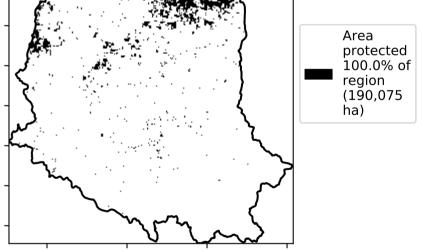
% Area protected from wind erosion (>50%)



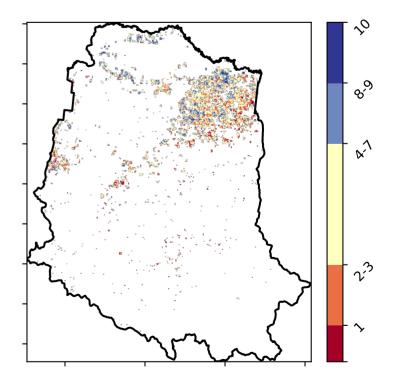
**Total Vegetation Cover Anomaly [%]** 



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.



**Total Vegetation Cover Decile [%]** 





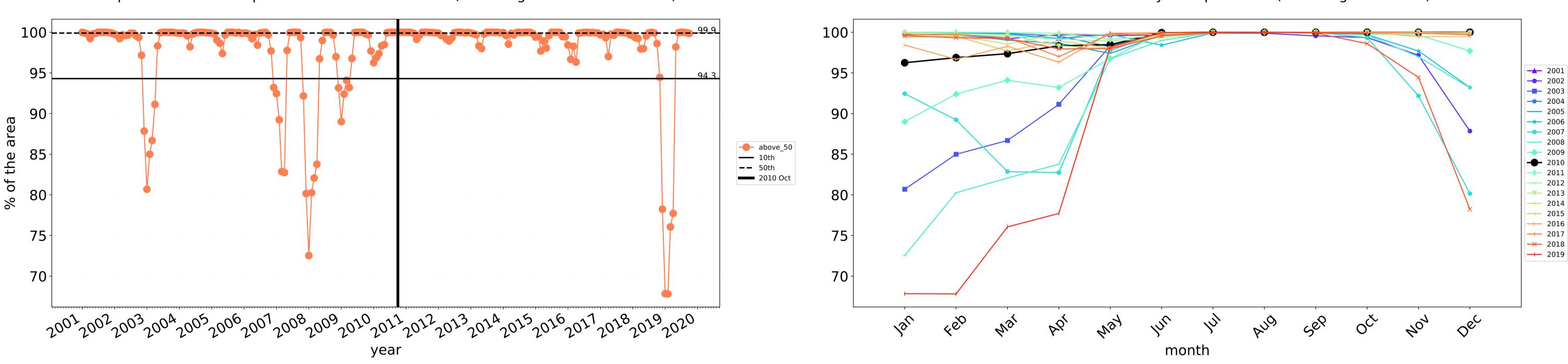
Anomaly show how many percetage points each pixel is from the mean. That is, red pixels are about 20% lower than the mean of that pixel. The mean is only for the month of the map using baseline from 2001 to 2019.

Catchment Scale Land Use and Forests of Australia (2018)

Catchment Scale Land Use of Australia (2018) and Forests

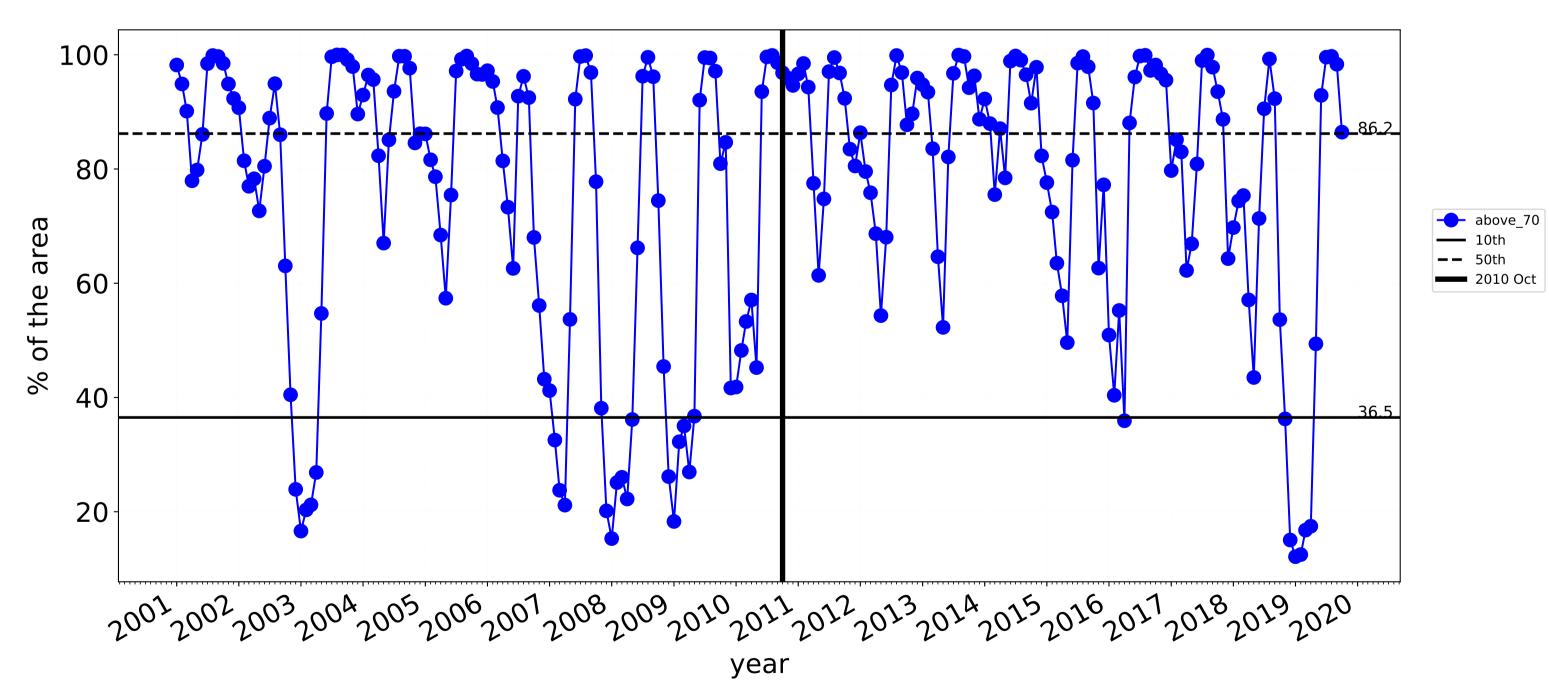
of Australia (2018)

Derived from



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

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

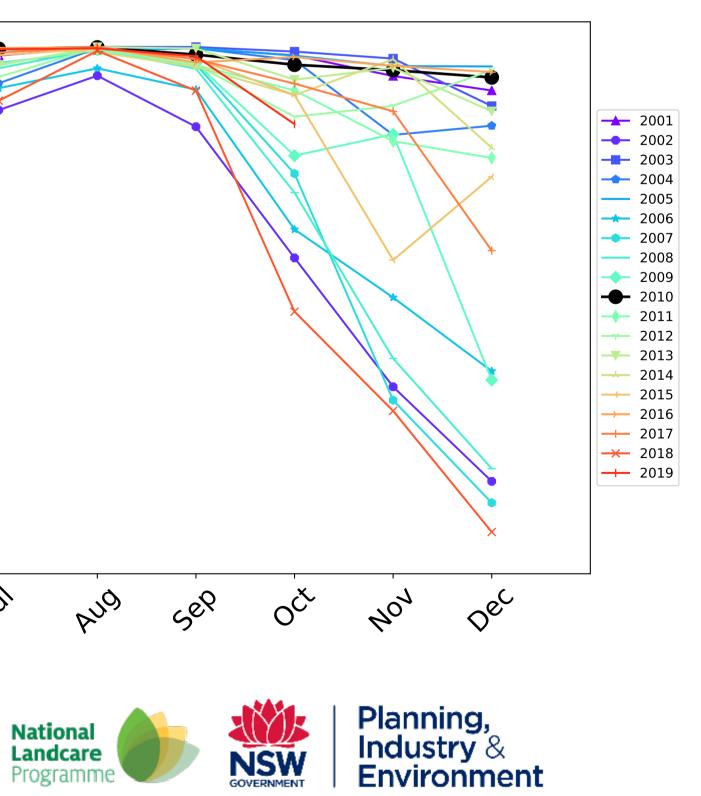


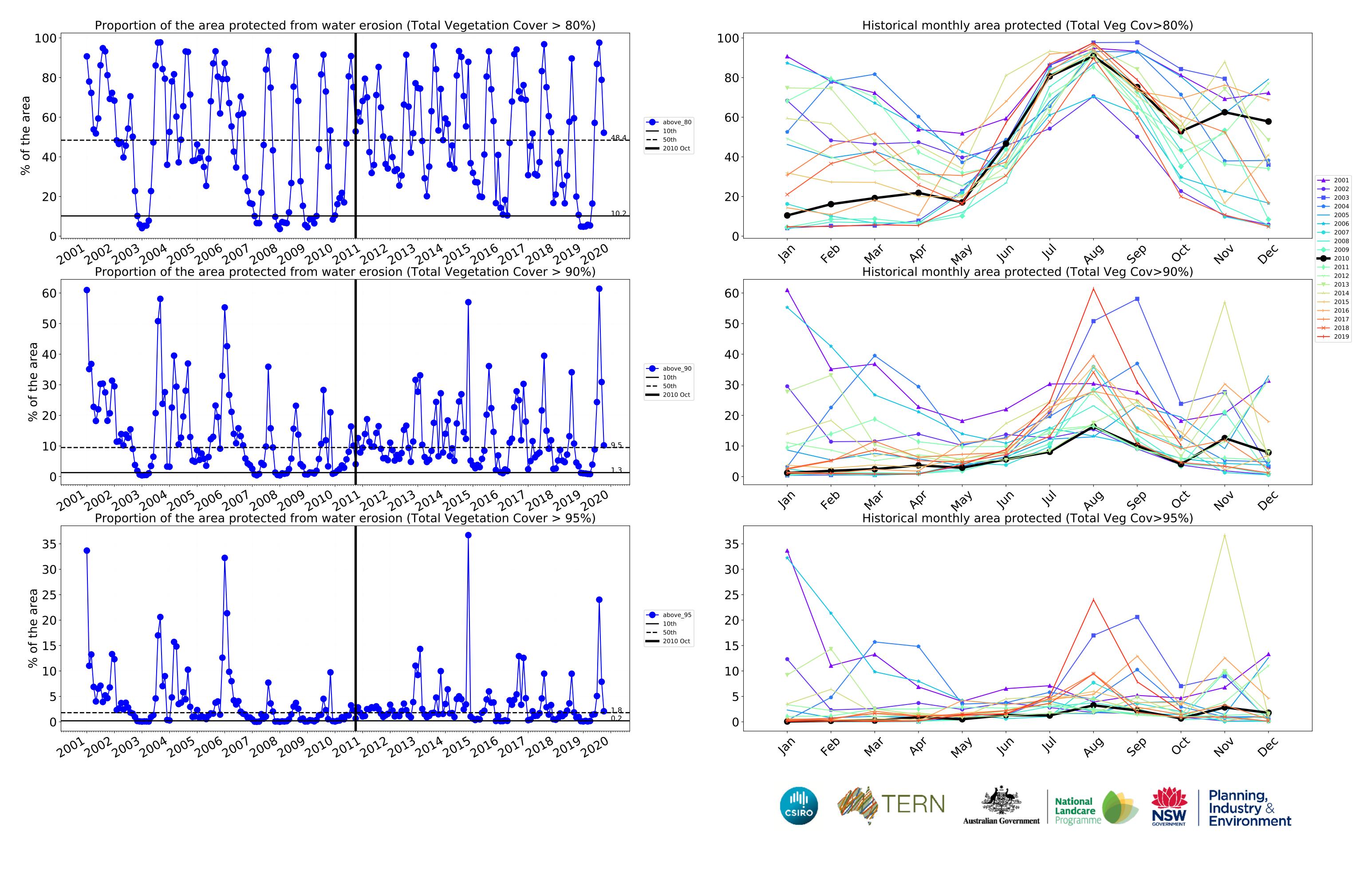
# **Cropping timeseries**

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

100 80-60 40 20feb May In lar In In 291 Mai month TERN (1910) CSIRO Australian Government

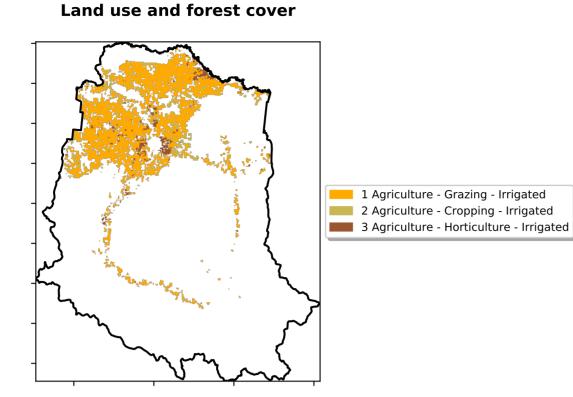
Water erosion historical monthly area protected (Total Veg Cov>70%)

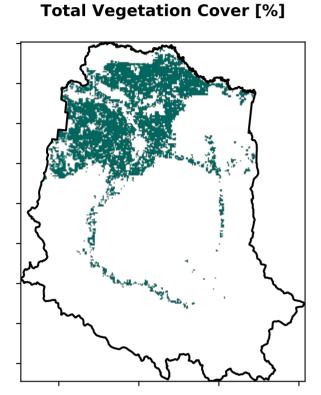


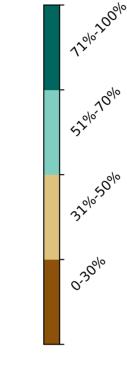


### Irrigation

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

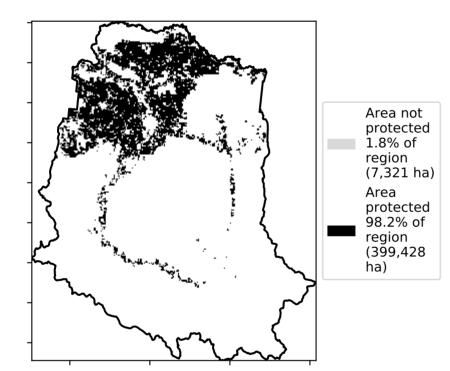


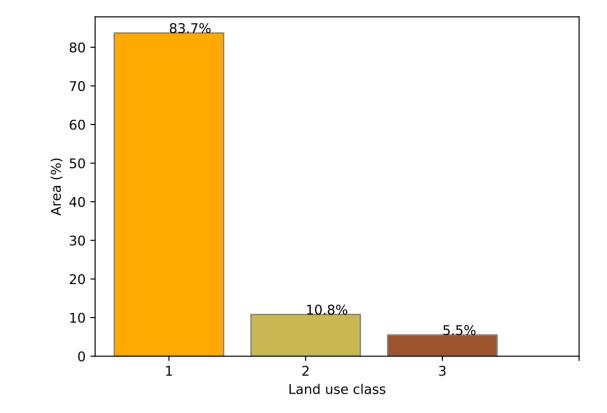




1 Agriculture - Grazing - Irrigated

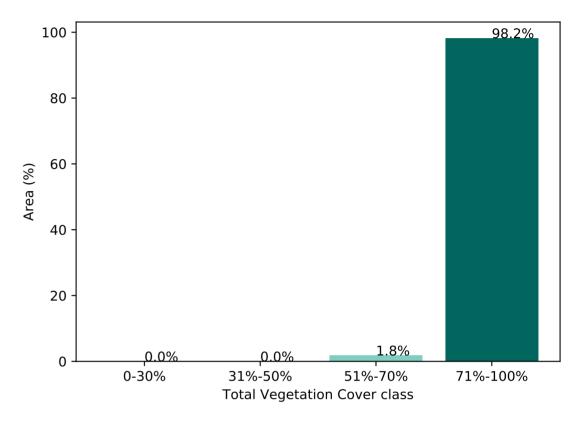
% Area protected from water erosion (>70%)



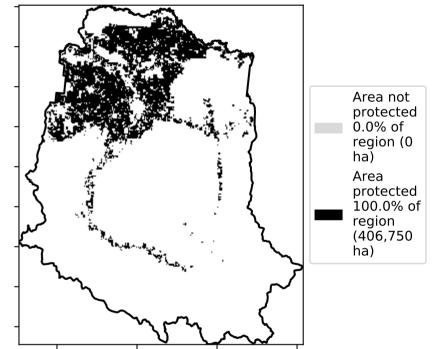


#### Proportion of each land class in area

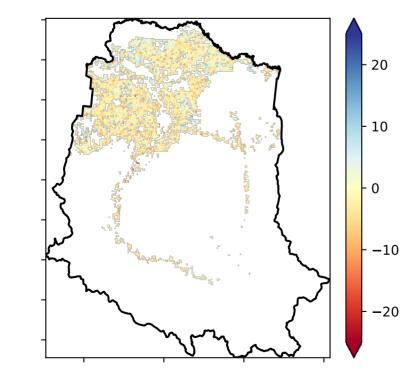
Proportion of vegetation cover class in area



% Area protected from wind erosion (>50%)

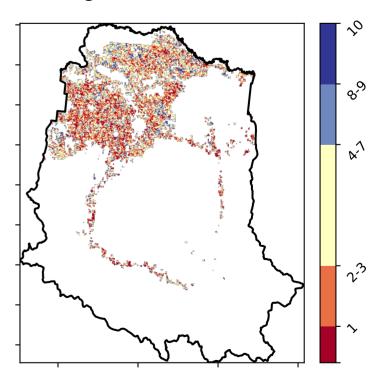


**Total Vegetation Cover Anomaly [%]** 



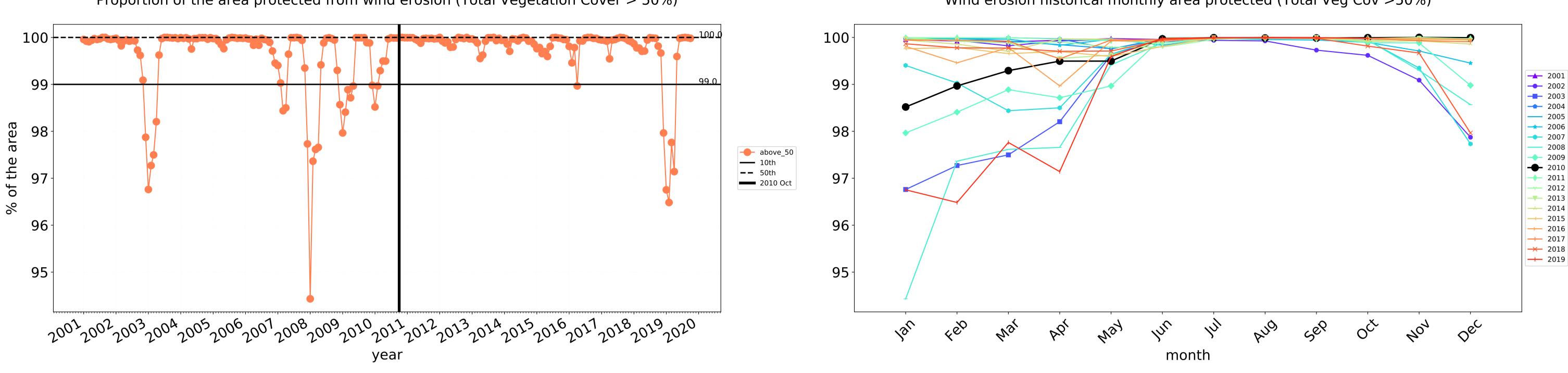
Deciles show where the pixel value lies in the record, from highest to lowest, for that month. That is, red pixels are in the lowest 10% of records for that month of the map using baseline from 2001 to 2019.

**Total Vegetation Cover Decile [%]** 



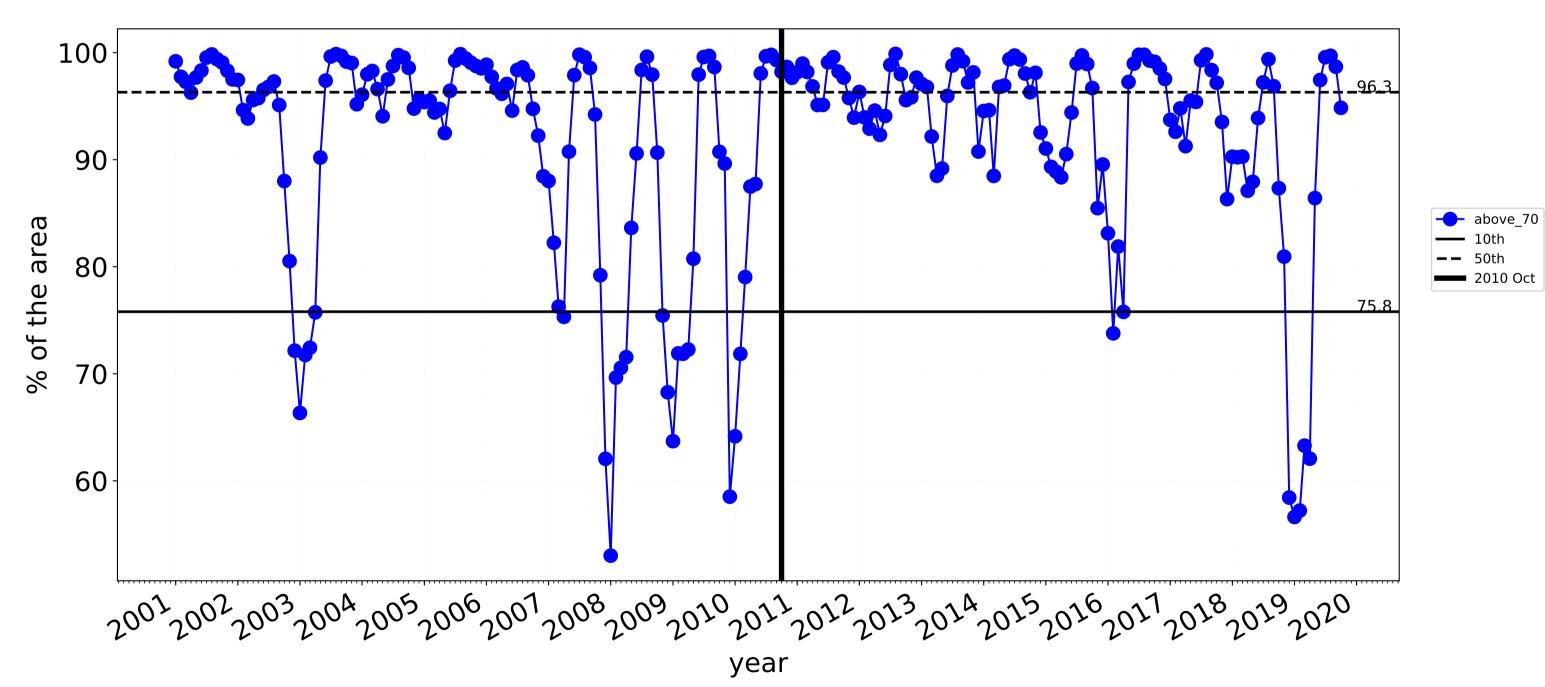


Anomaly show how many percetage points each pixel is from the mean. That is, red pixels are about 20% lower than the mean of that pixel. The mean is only for the month of the map using baseline from 2001 to 2019.



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

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

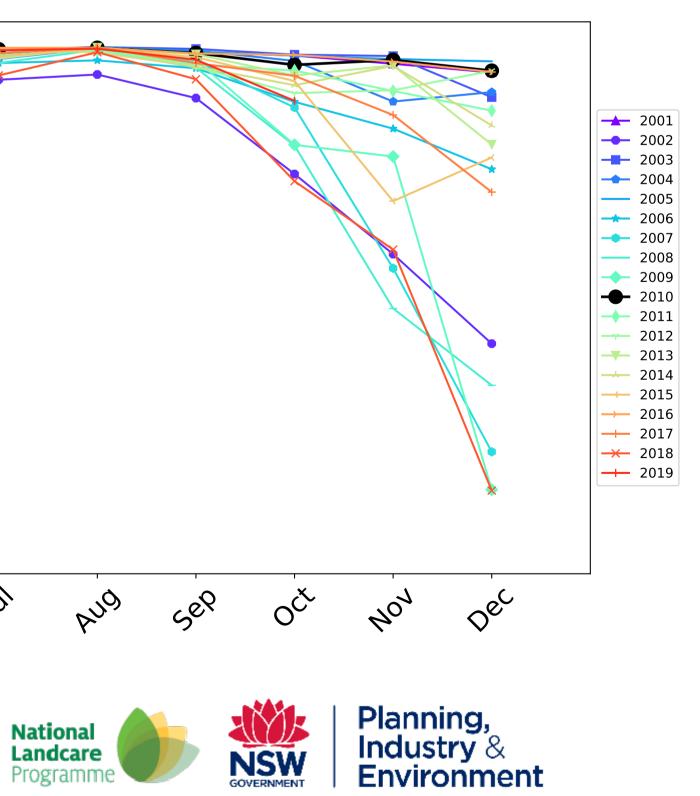


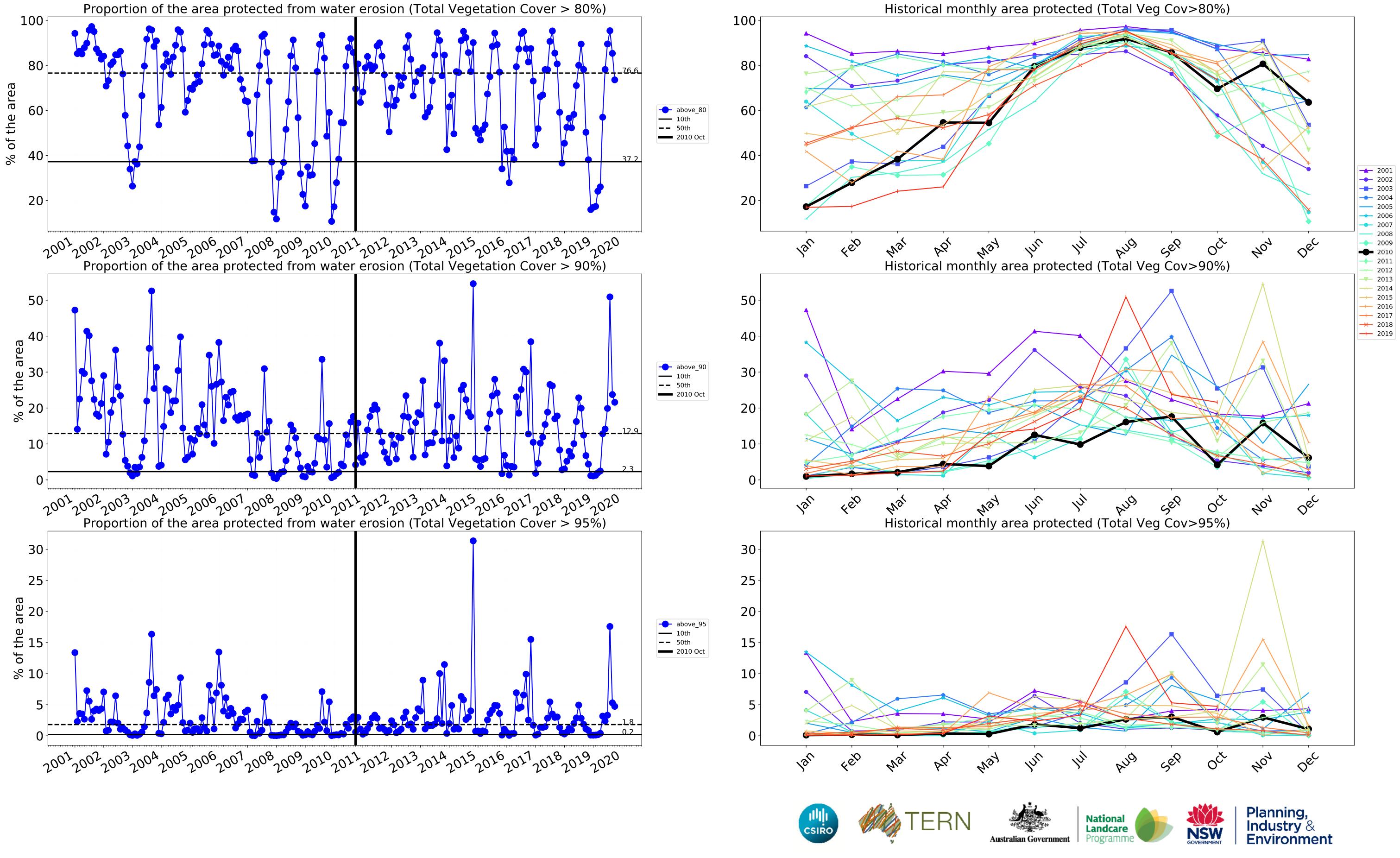
# Irrigation timeseries

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

100-90-80 70-60feb way In Jan Mai PQ1 1/2/ month TERN (1910) CSIRO Australian Government

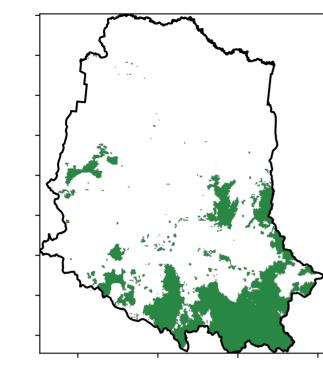
Water erosion historical monthly area protected (Total Veg Cov>70%)





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

Land use and forest cover



1 Production native forests and plantation forests

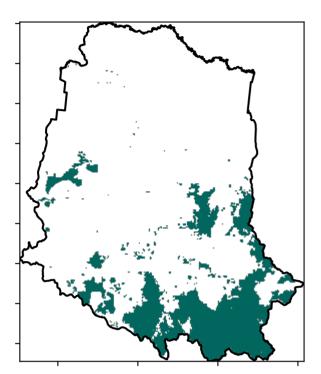
12%200%

52%70%

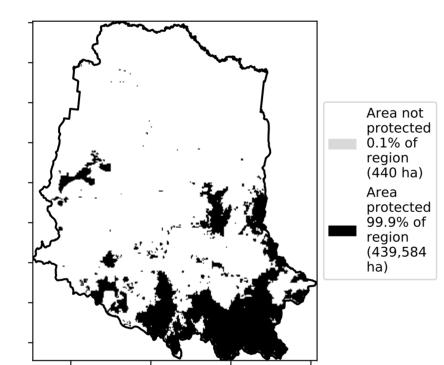
32%50

0.30%

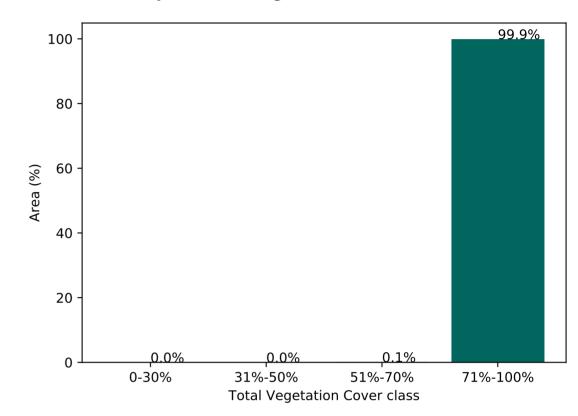
**Total Vegetation Cover [%]** 







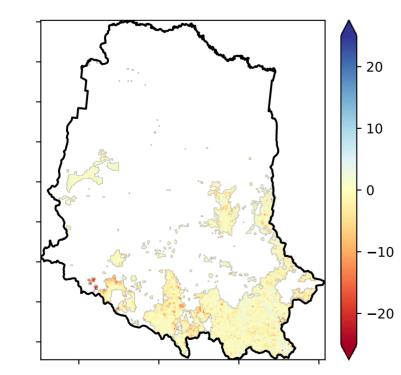
#### Proportion of vegetation cover class in area



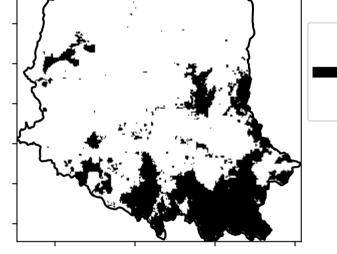
% Area protected from wind erosion (>50%)



**Total Vegetation Cover Anomaly [%]** 



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.



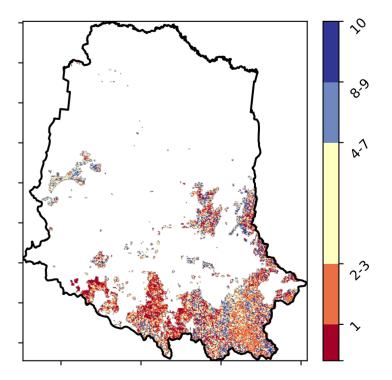
Area

ĥa)

protected 100.0% of

region (440,025

**Total Vegetation Cover Decile [%]** 





records for that n the map using ba from 2001 to 201

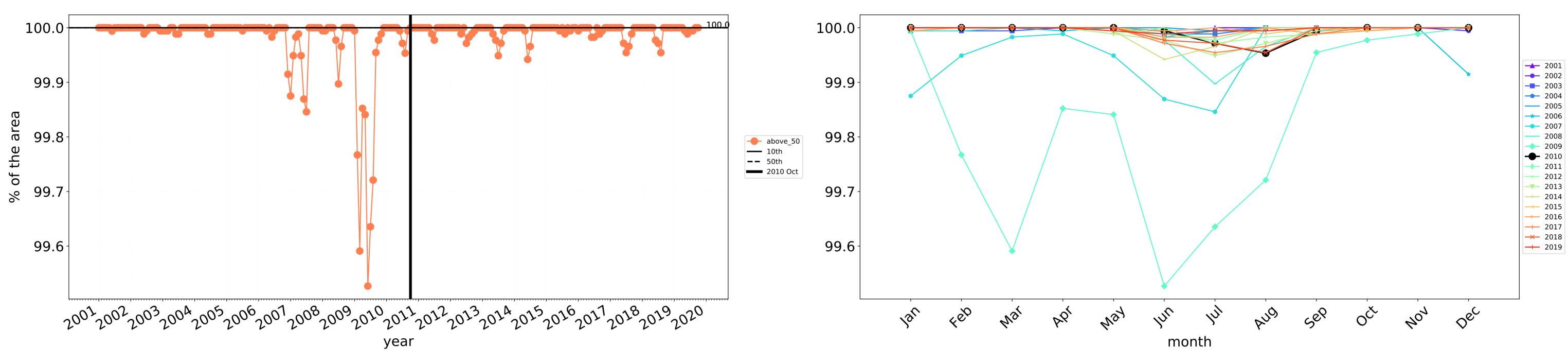
Anomaly show how many percetage points each pixel is from the mean. That is, red pixels are about 20% lower than the mean of that pixel. The mean is only for the month of the map using baseline from 2001 to 2019.

Catchment Scale Land Use and Forests of Australia (2018)

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

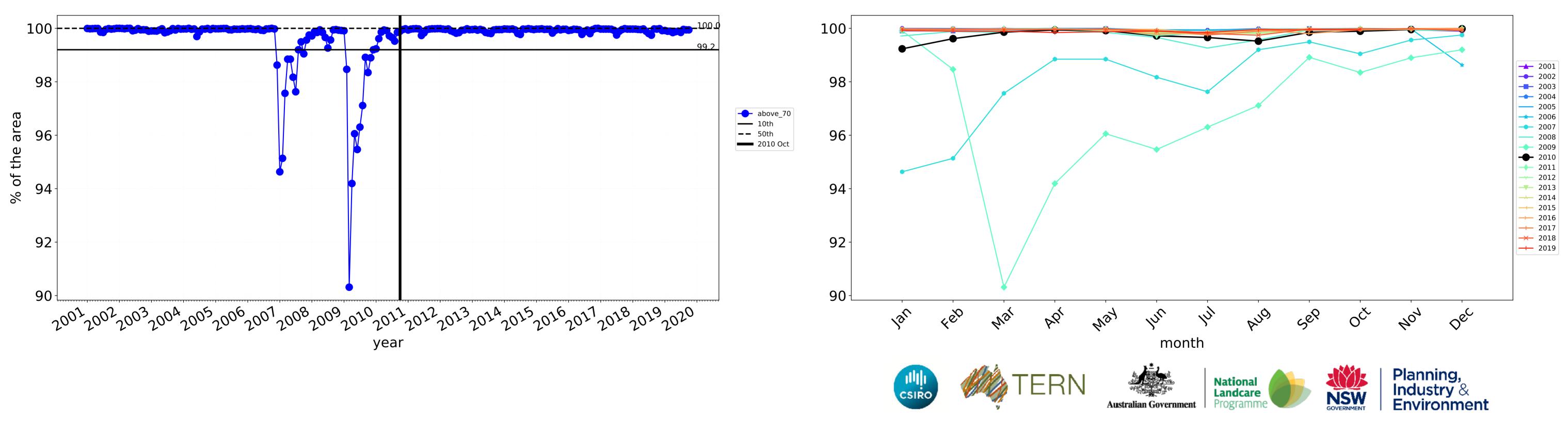
Derived from

# Production native forests and plantation forests timeseries



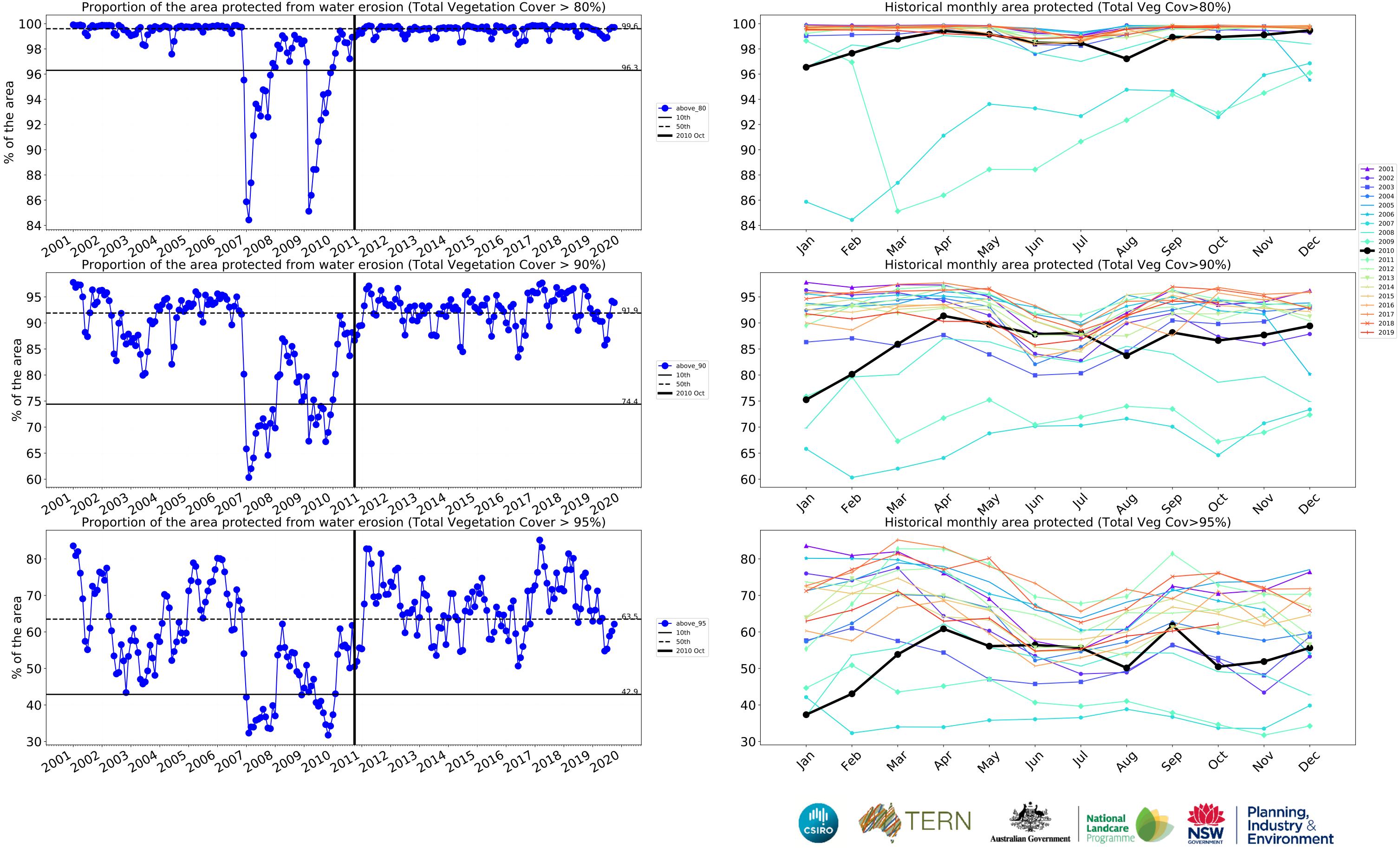
Proportion of the area protected from wind erosion (Total Vegetation Cover > 50%)

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



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

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



# Goulburn Broken (2,392,825 ha and no data 14,638 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	2,392,825	100.0% 2,392,700	100.0% 2,391,875	98.8% 2,364,398	85.8% 2,051,956	38.2% 913,770	14.7% 352,883
Conservation and natural environments	235,600	100.0% 235,600	100.0% 235,500	99.6% 234,675	95.5% 224,900	54.5% 128,350	19.0% 44,875
Conservation and natural environments non forest	42,200	100.0% 42,200	99.8% 42,125	98.6% 41,625	87.7% 37,025	27.0% 11,375	4.0% 1,700
Conservation and natural environments Forest (non woodland)	172,325	100.0% 172,325	100.0% 172,300	99.8% 172,000	97.6% 168,175	64.1% 110,475	24.4% 42,100
Agriculture	1,575,825	100.0% 1,575,800	100.0% 1,575,650	98.9% 1,558,525	81.5% 1,283,675	23.4% 368,125	4.8% 75,400
Grazing	966,725	100.0% 966,700	100.0% 966,575	99.6% 962,875	92.0% 889,300	35.1% 339,025	7.3% 70,575
Grazing non forest	892,600	100.0% 892,575	100.0% 892,450	99.6% 888,750	91.4% 816,225	32.6% 291,025	6.3% 55,975
Grazing - Forest (non woodland)	64,725	100.0% 64,725	100.0% 64,725	100.0% 64,725	98.8% 63,950	67.2% 43,500	20.8% 13,475
Cropping	190,075	100.0% 190,075	100.0% 190,075	96.9% 184,100	52.8% 100,450	4.1% 7,700	0.7% 1,275
Irrigation	406,750	100.0% 406,750	100.0% 406,725	98.2% 399,425	69.6% 283,100	4.2% 17,075	0.6% 2,450
Production native forests and plantation forests	440,025	100.0% 440,025	100.0% 440,025	99.9% 439,550	98.9% 435,350	86.6% 381,200	50.5% 222,100

