# Total vegetation cover soil protection Region:NRM Mackay Whitsunday QLD

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

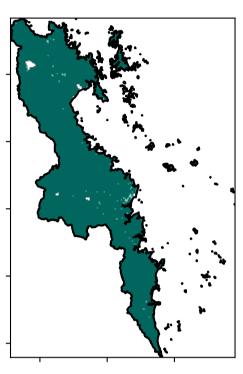


# **Vegetation Cover Aug 2019**

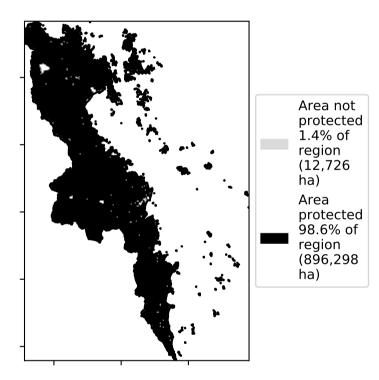
### Land use and forest cover

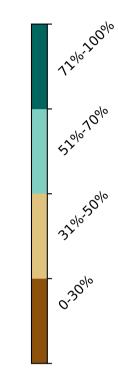
Legend with land class forest cover and number, i.e. Forests is 12 1 Conservation and natural environments - Non-forest 2 Conservation and natural environments - Woodland forest 3 Conservation and natural environments - Non-Woodland forest 4 Agriculture - Grazing - Non-forest 5 Agriculture - Grazing - Woodland forest 6 Agriculture - Grazing - Non-woodland forest 7 Agriculture - Grazing - Irrigated 8 Agriculture - Cropping - Non-irrigated 9 Agriculture - Cropping - Irrigated 10 Agriculture - Horticulture - Non-irrigated **11** Agriculture - Horticulture - Irrigated 12 Production native forests and plantation forests 13 Other uses

### Total Vegetation Cover [%]

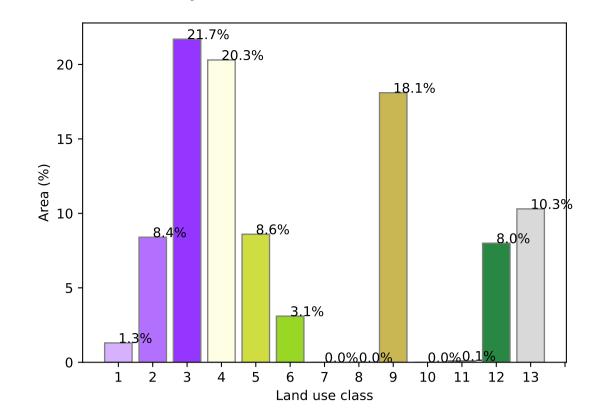


### % Area protected from water erosion (>70%)

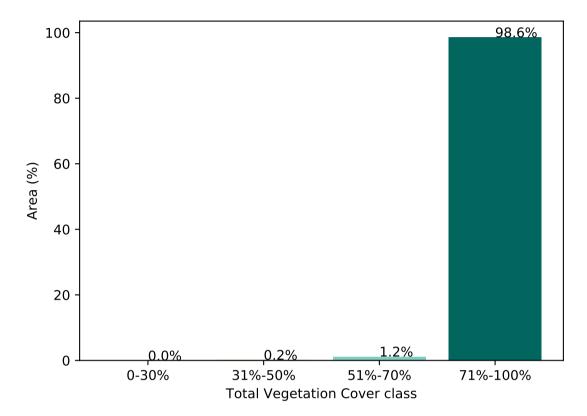




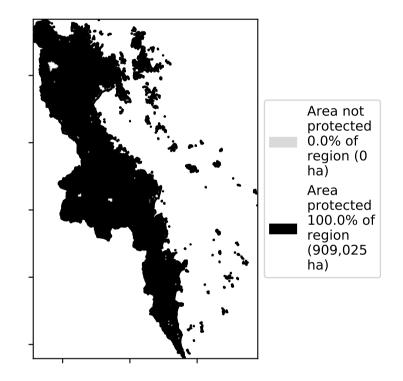
### Proportion of each land class in area



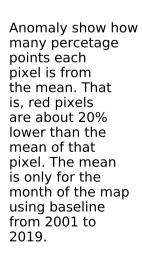
### Proportion of vegetation cover class in area



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



**Total Vegetation Cover Anomaly [%]** 



Catchment Scale

of Australia (2018)

(2018) and Forests

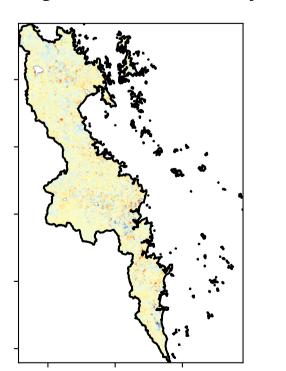
of Australia (2018)

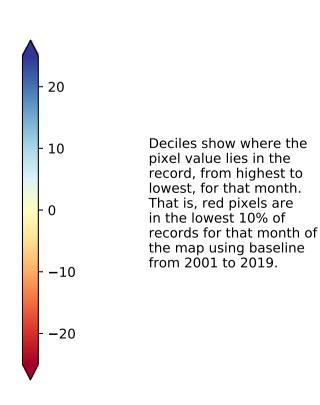
Derived from

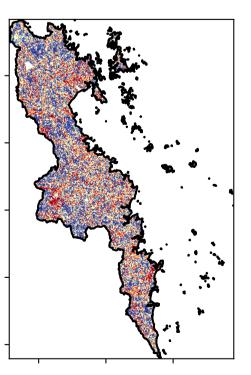
Use of Australia

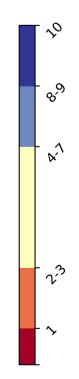
Land Use and Forests

Catchment Scale Land

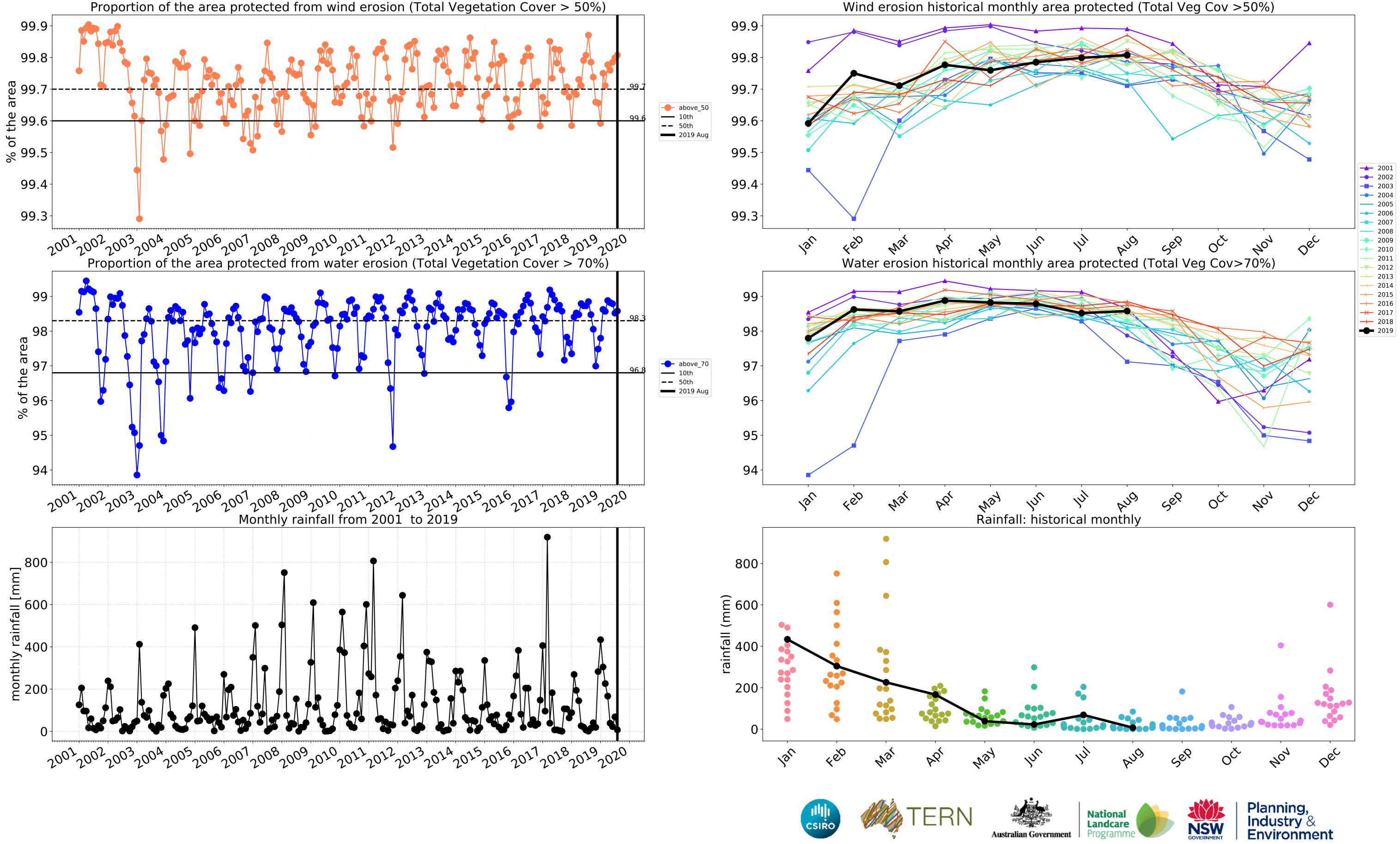


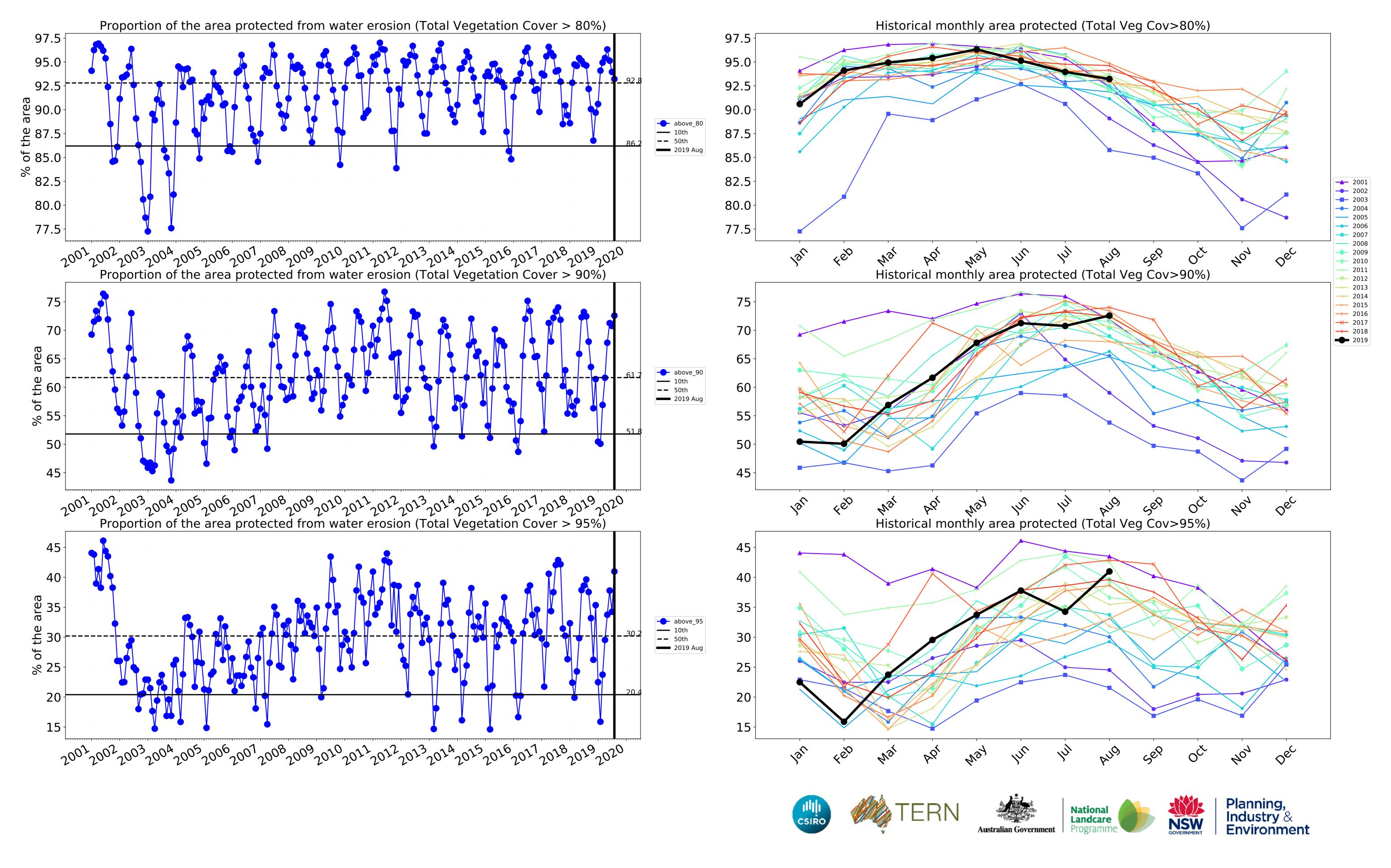










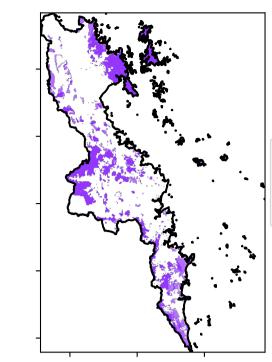


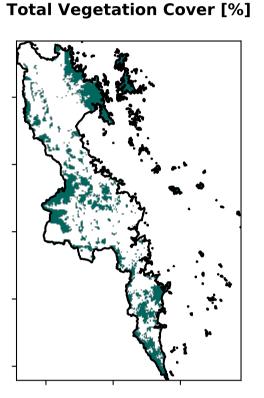
## **Conservation and natural environments**

forest

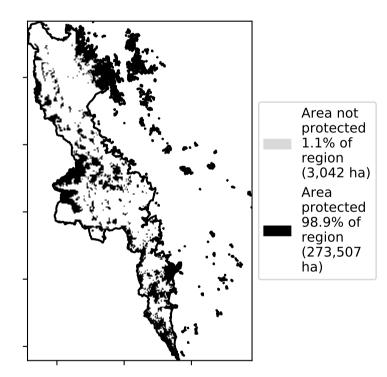
forest

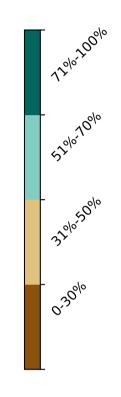
### Land use and forest cover







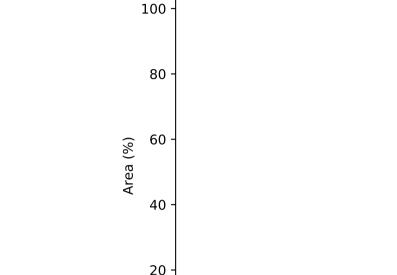




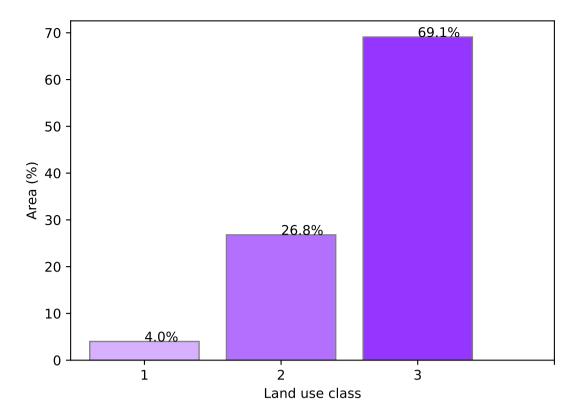
1 Conservation and natural environments - Non-

3 Conservation and natural environments - Non-woodland forest

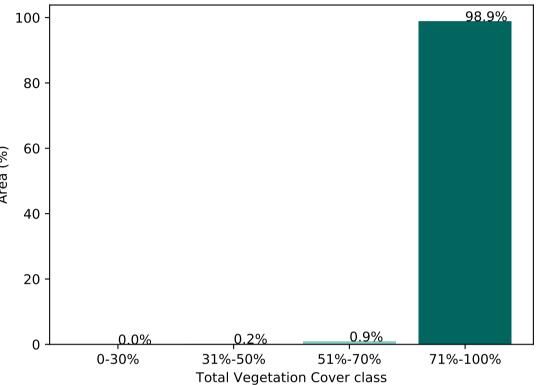
2 Conservation and natural environments – Woodland



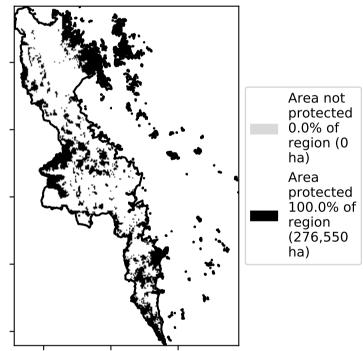
### Proportion of each land class in area



## 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)

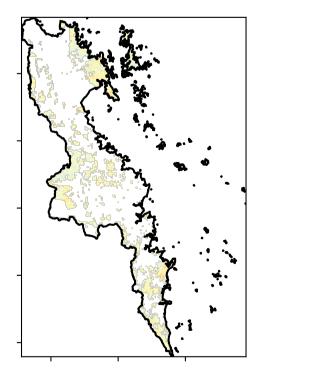
(2018) and Forests

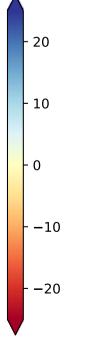
of Australia (2018)

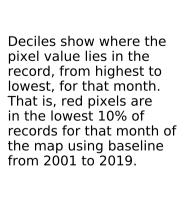
Catchment Scale Land

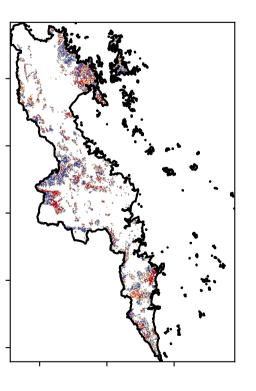
Derived from

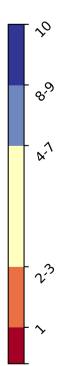
Use of Australia



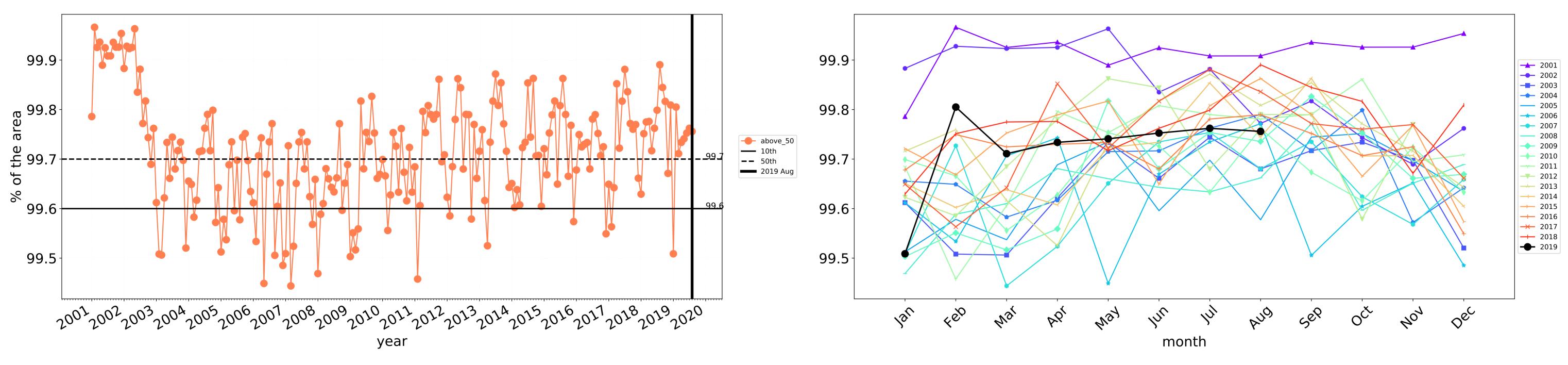






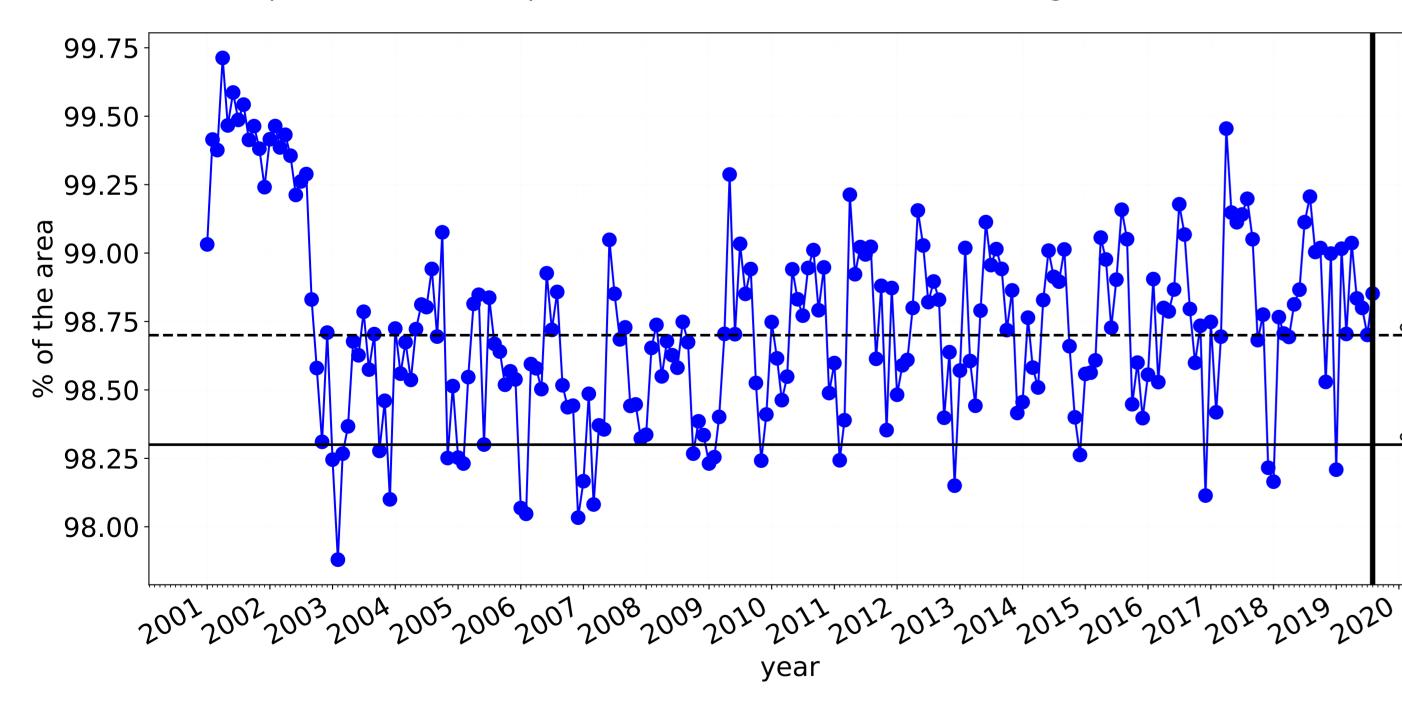






Proportion of the area protected from wind erosion (Total Vegetation Cover > 50%)

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

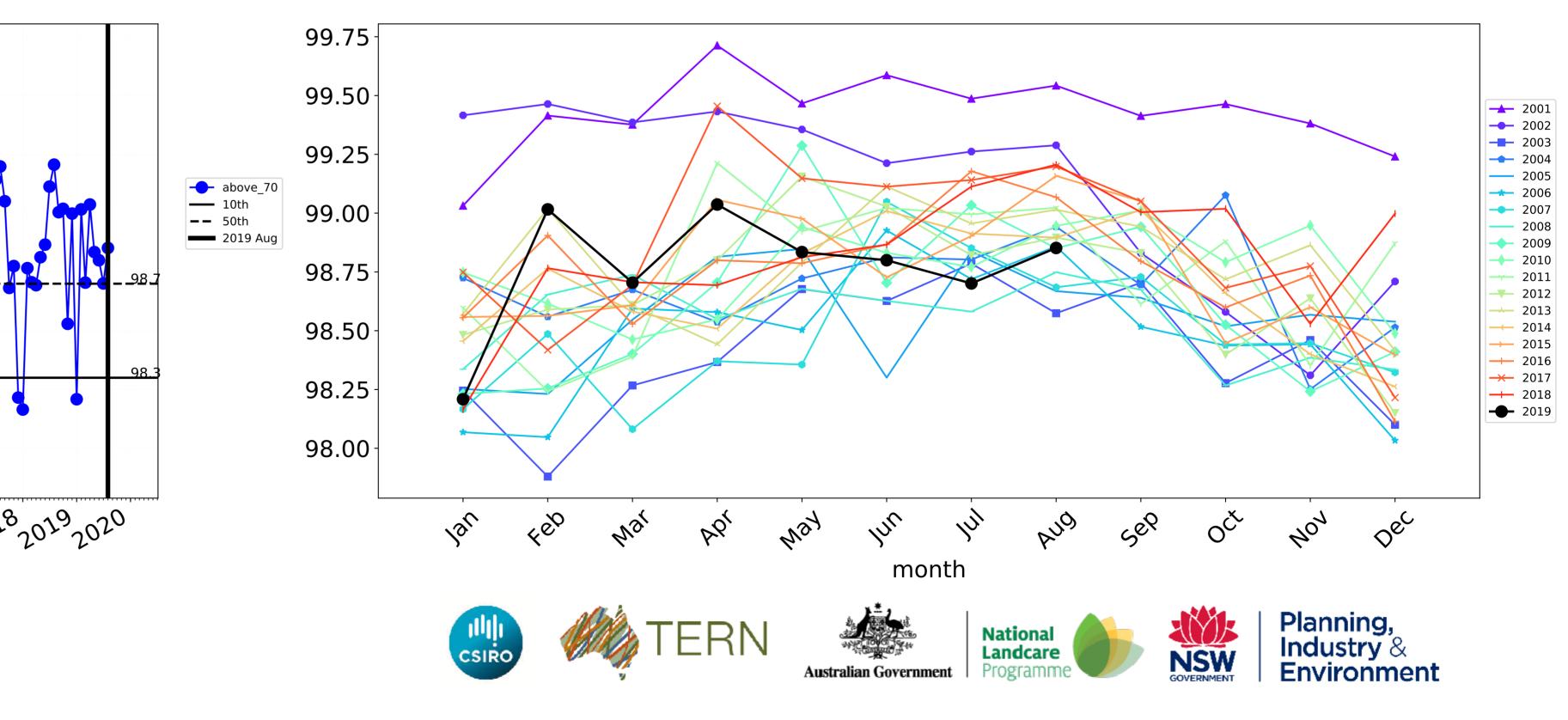


## **Conservation and natural environments timeseries**

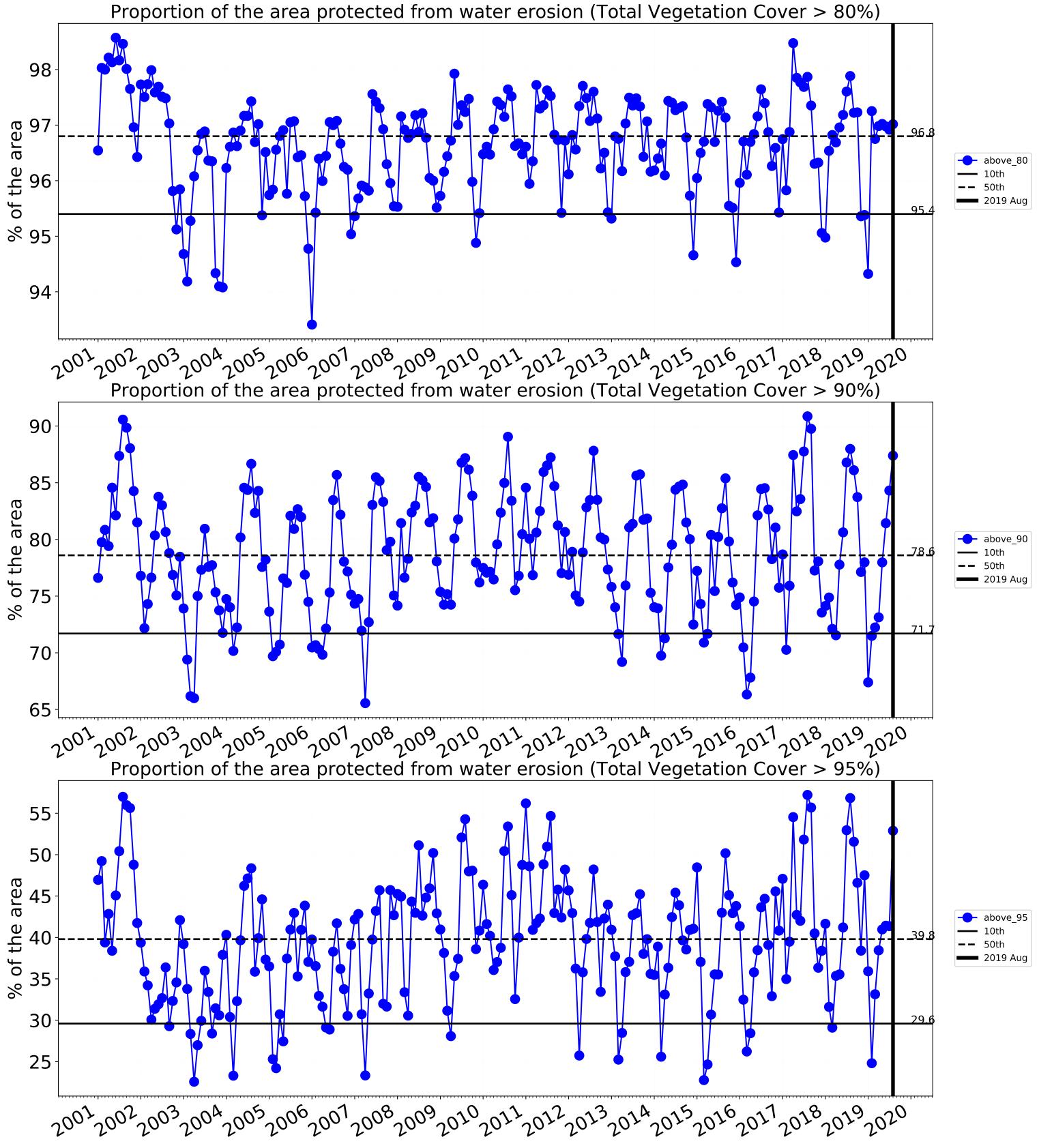


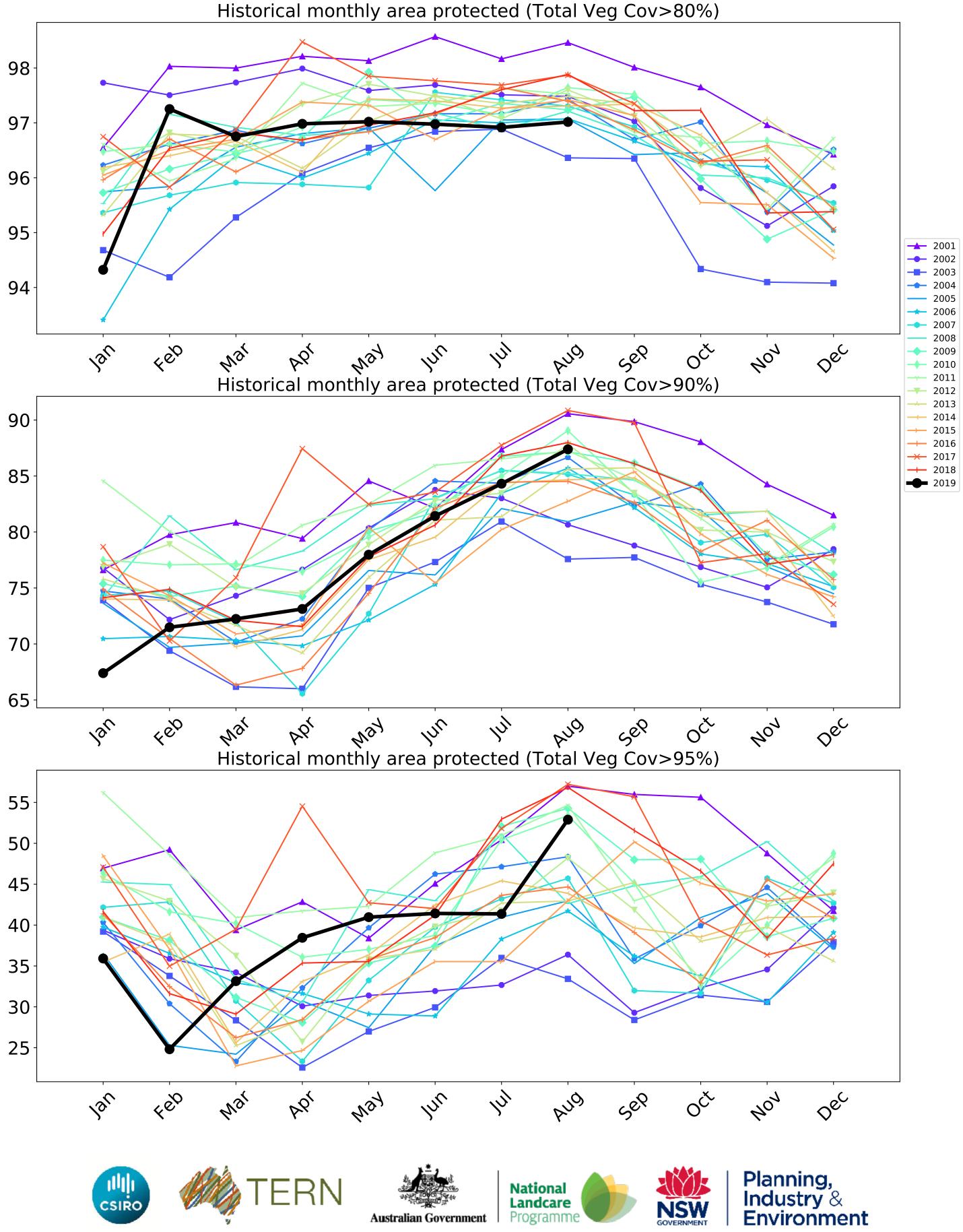
Wind erosion historical monthly area protected (Total Veg Cov >50%)







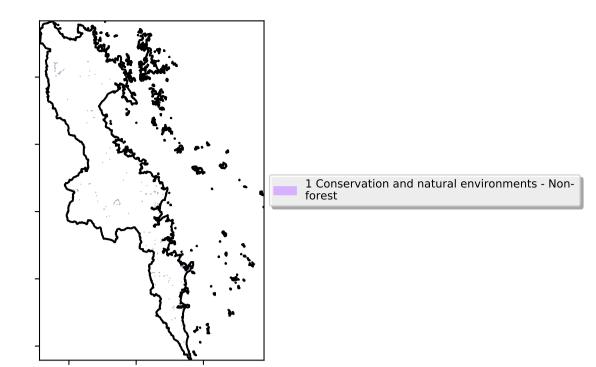




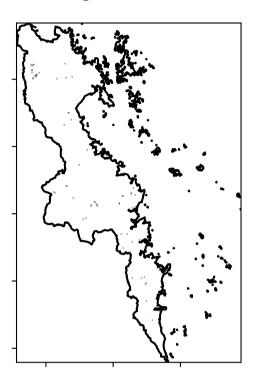


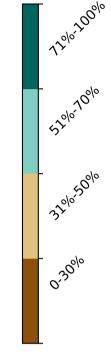
## **Conservation and natural environments non forest**

Land use and forest cover

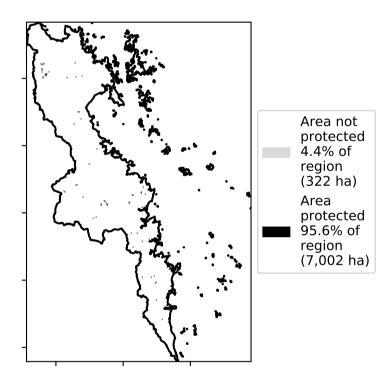


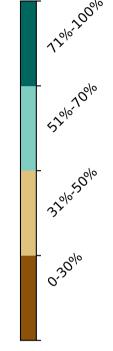
**Total Vegetation Cover [%]** 

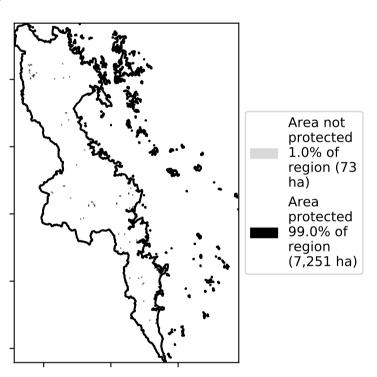




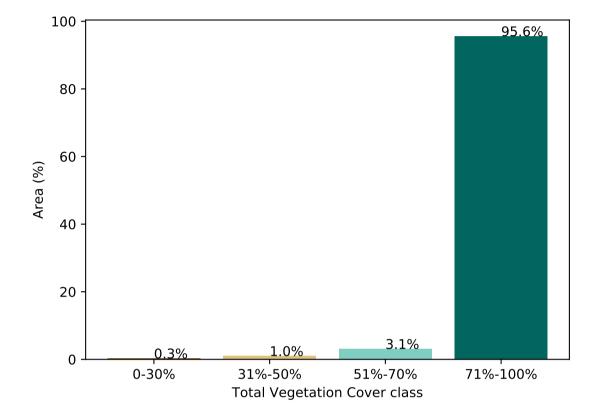
% Area protected from water erosion (>70%)





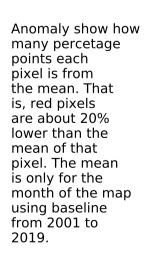


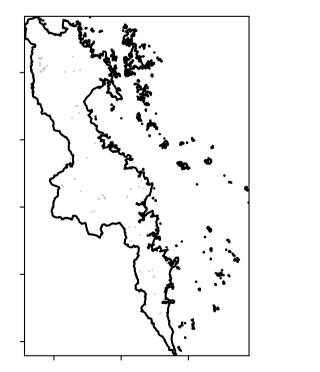
Proportion of vegetation cover class in area

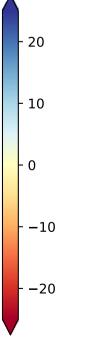


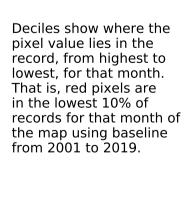
% Area protected from wind erosion (>50%)

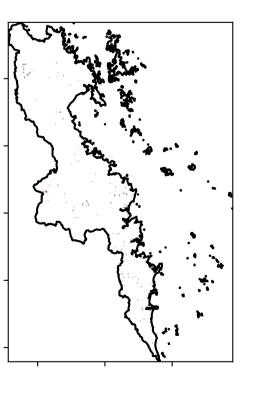
**Total Vegetation Cover Anomaly [%]** 

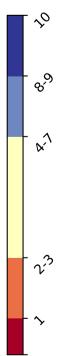




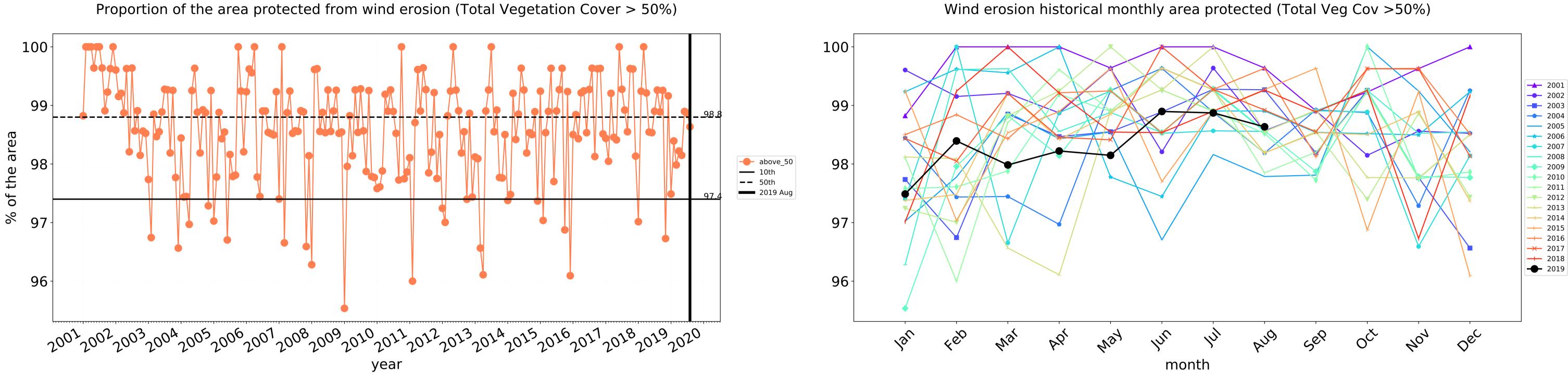




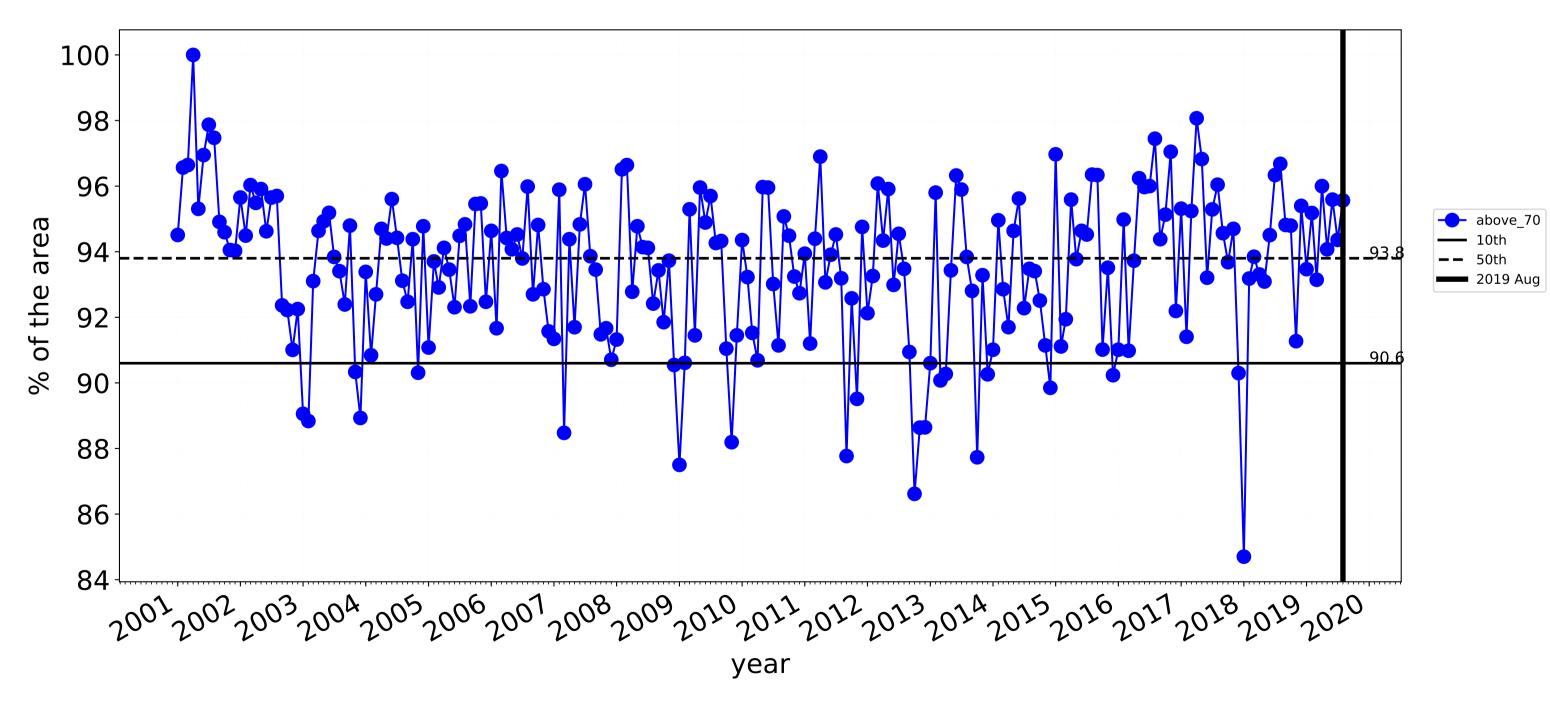




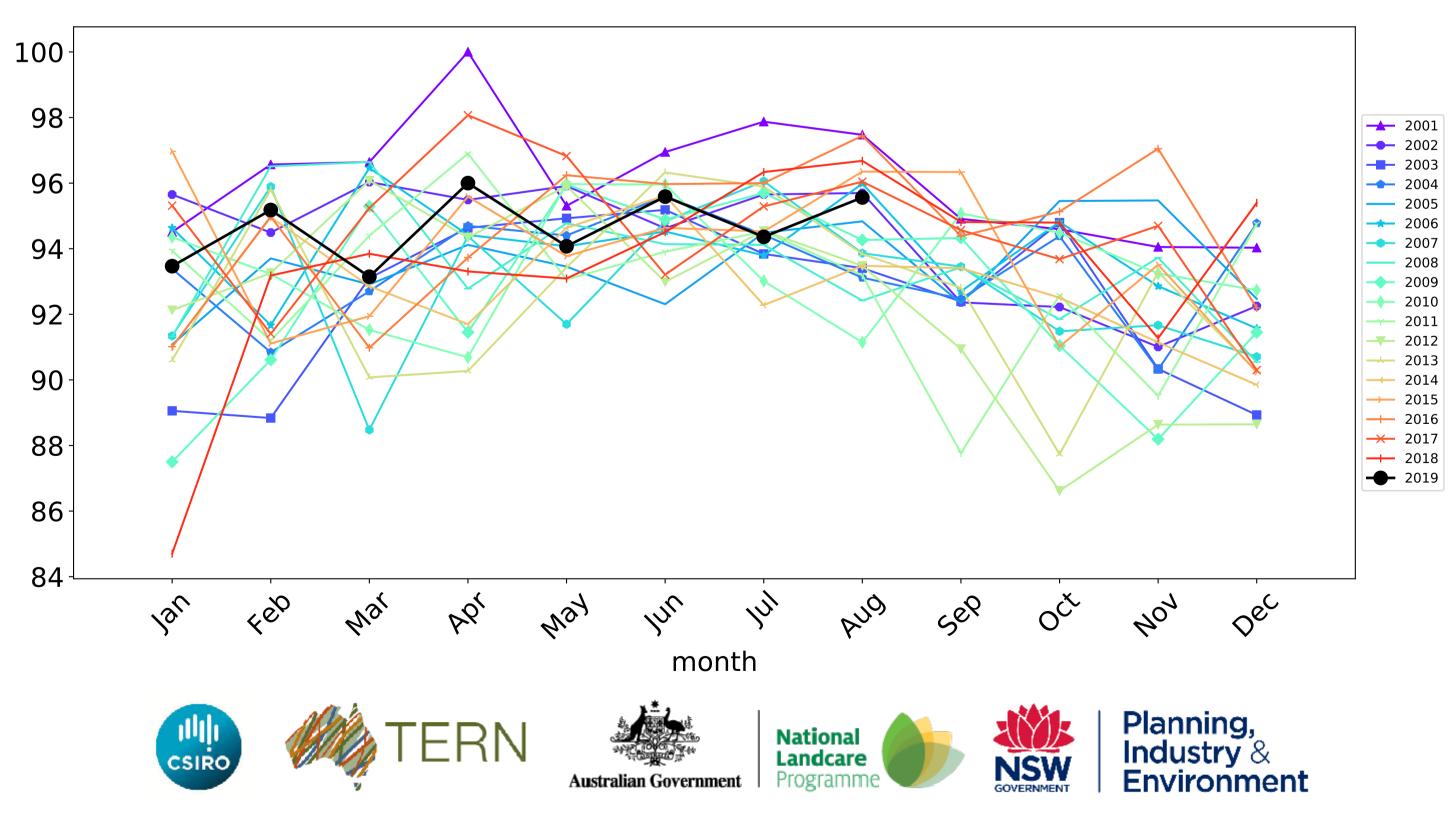


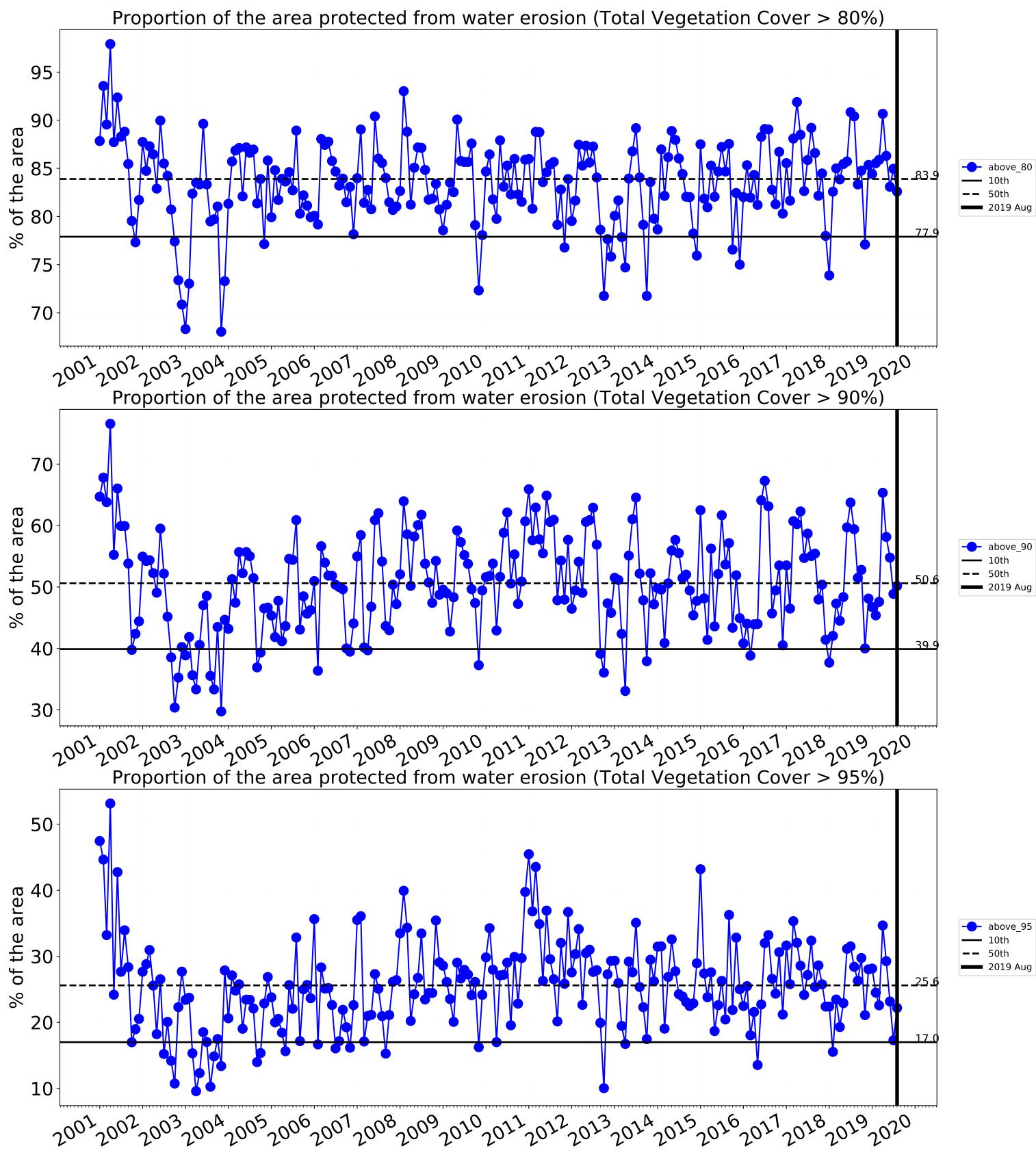


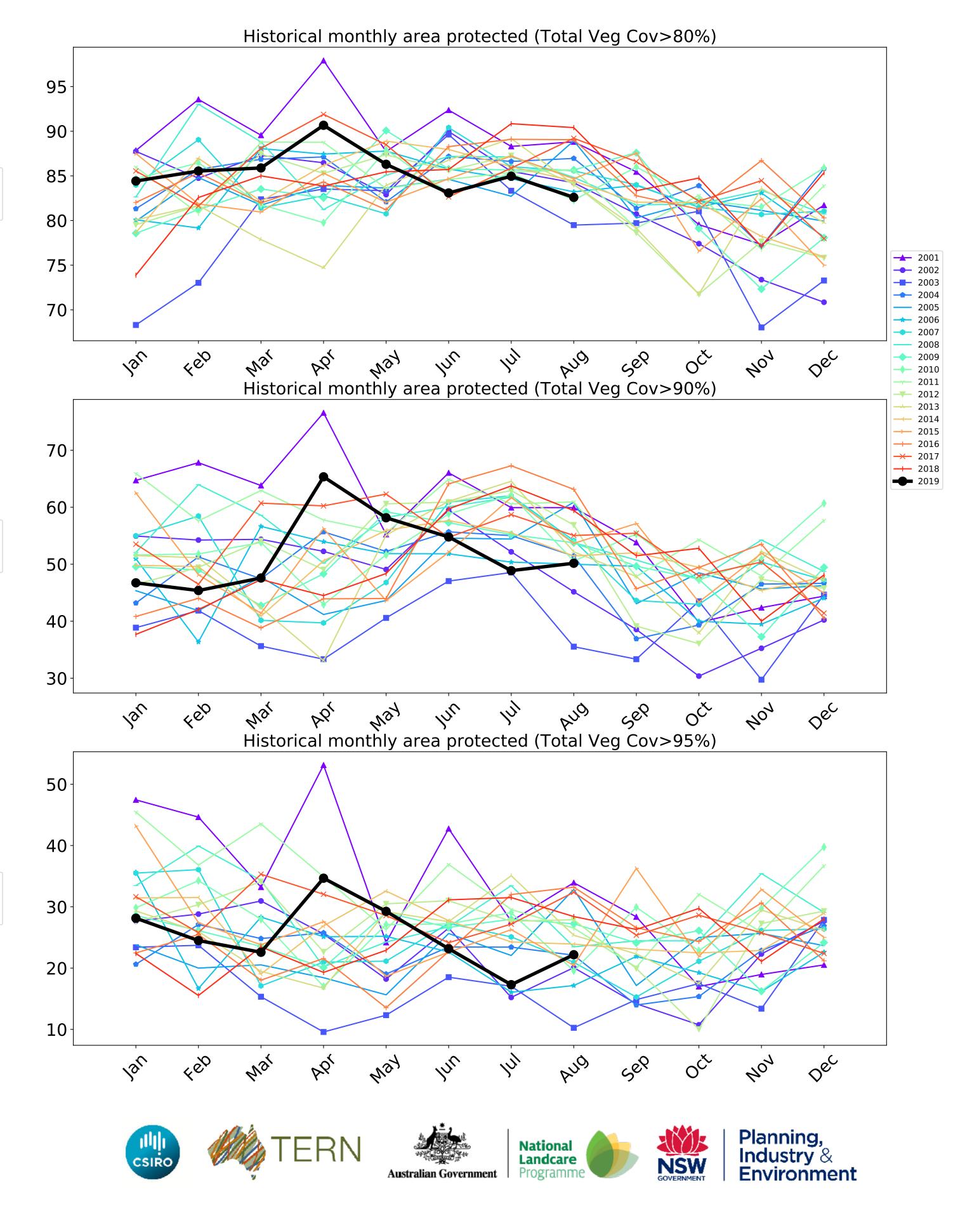
Proportion of the area protected from water erosion (Total Vegetation Cover > 70%)



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

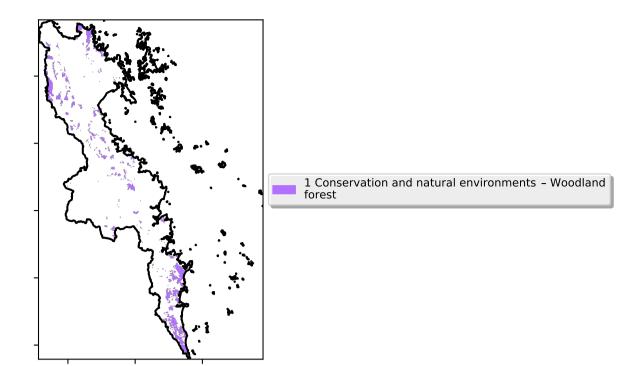




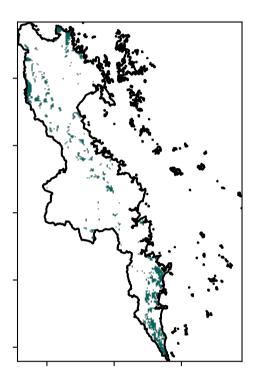


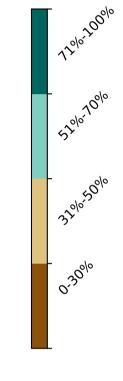
## **Conservation and natural environments Woodland forest**

Land use and forest cover

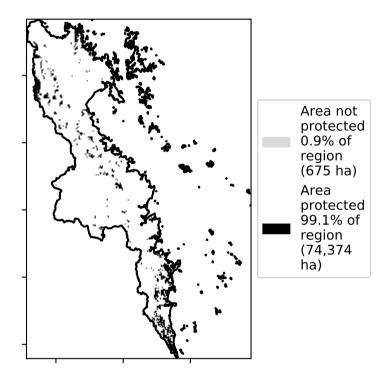


**Total Vegetation Cover [%]** 

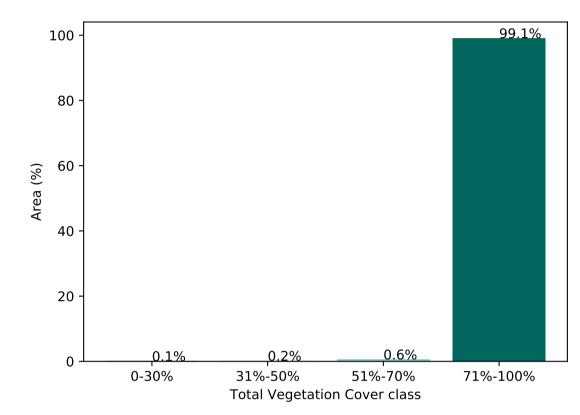




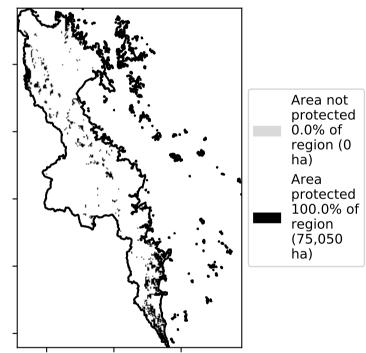
% Area protected from water erosion (>70%)







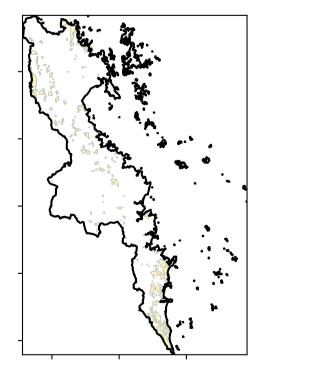
### % Area protected from wind erosion (>50%)

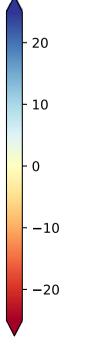


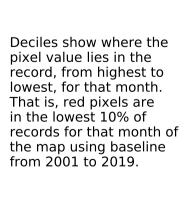
Catchment Scale Land Use and Forests of Australia (2018) Derived from Catchment Scale Land Use of Australia (2018) and Forests of Australia (2018)

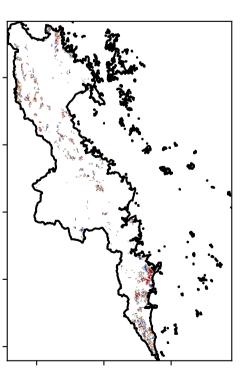
**Total Vegetation Cover Anomaly [%]** 

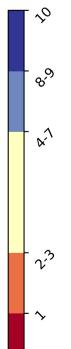
Anomaly show how many percetage points each pixel is from the mean. That is, red pixels are about 20% lower than the mean of that pixel. The mean is only for the month of the map using baseline from 2001 to 2019.



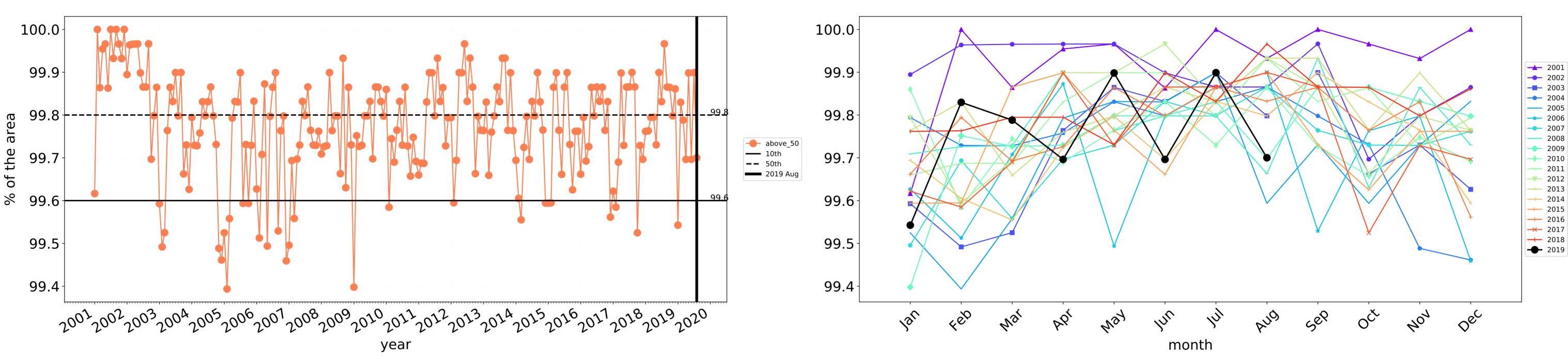






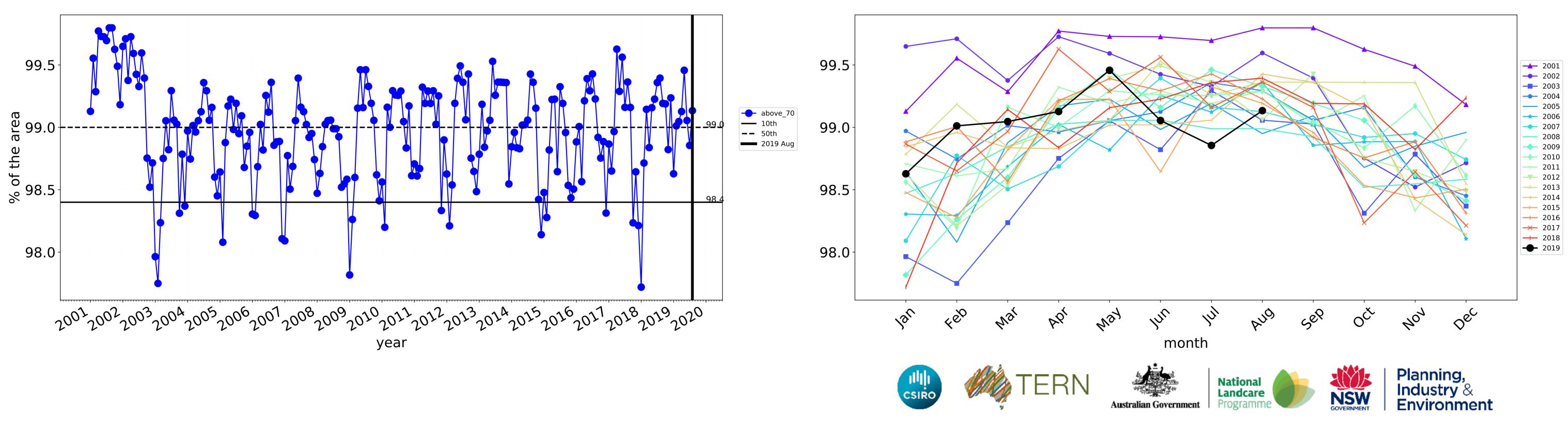






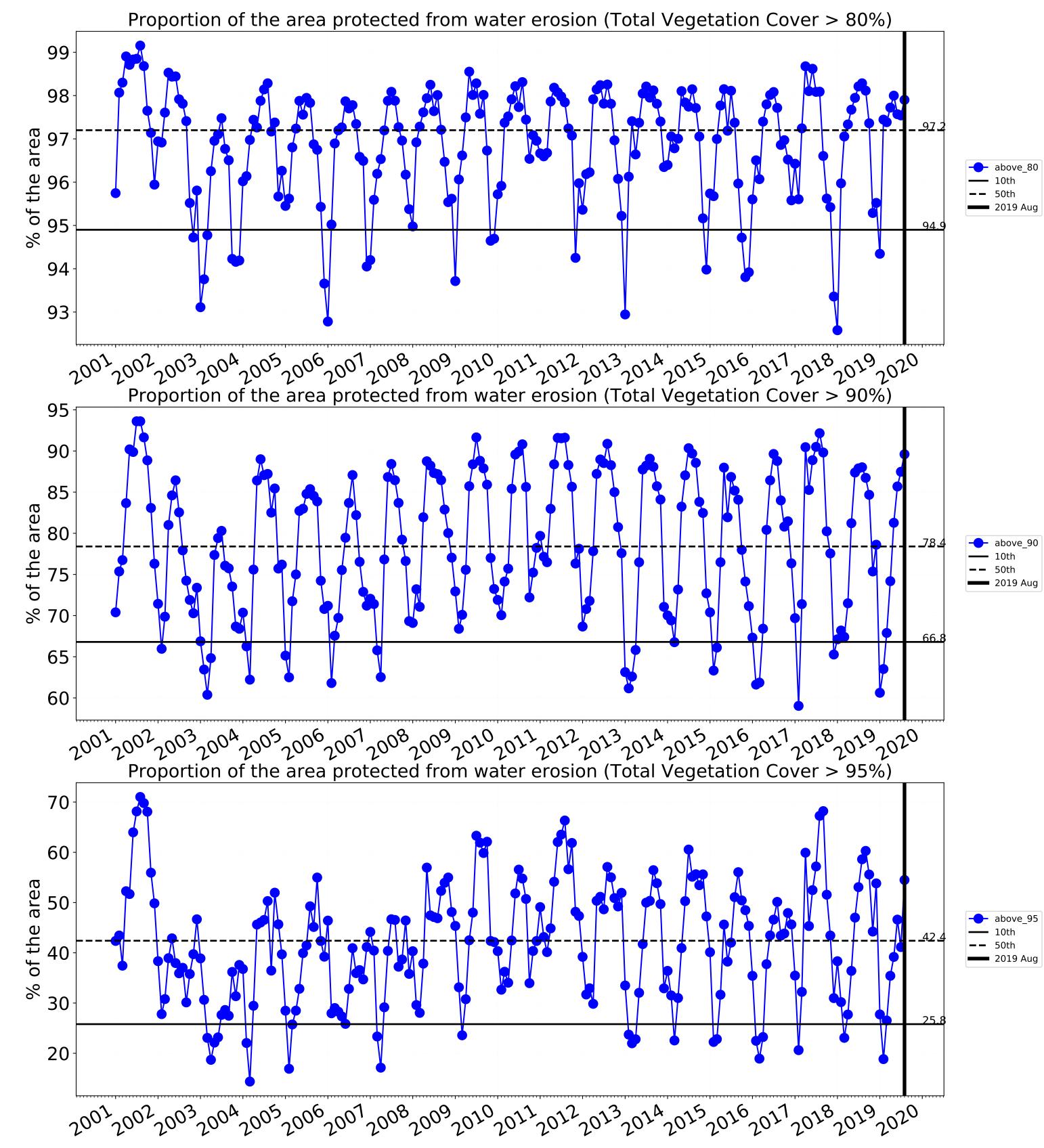
Proportion of the area protected from wind erosion (Total Vegetation Cover > 50%)

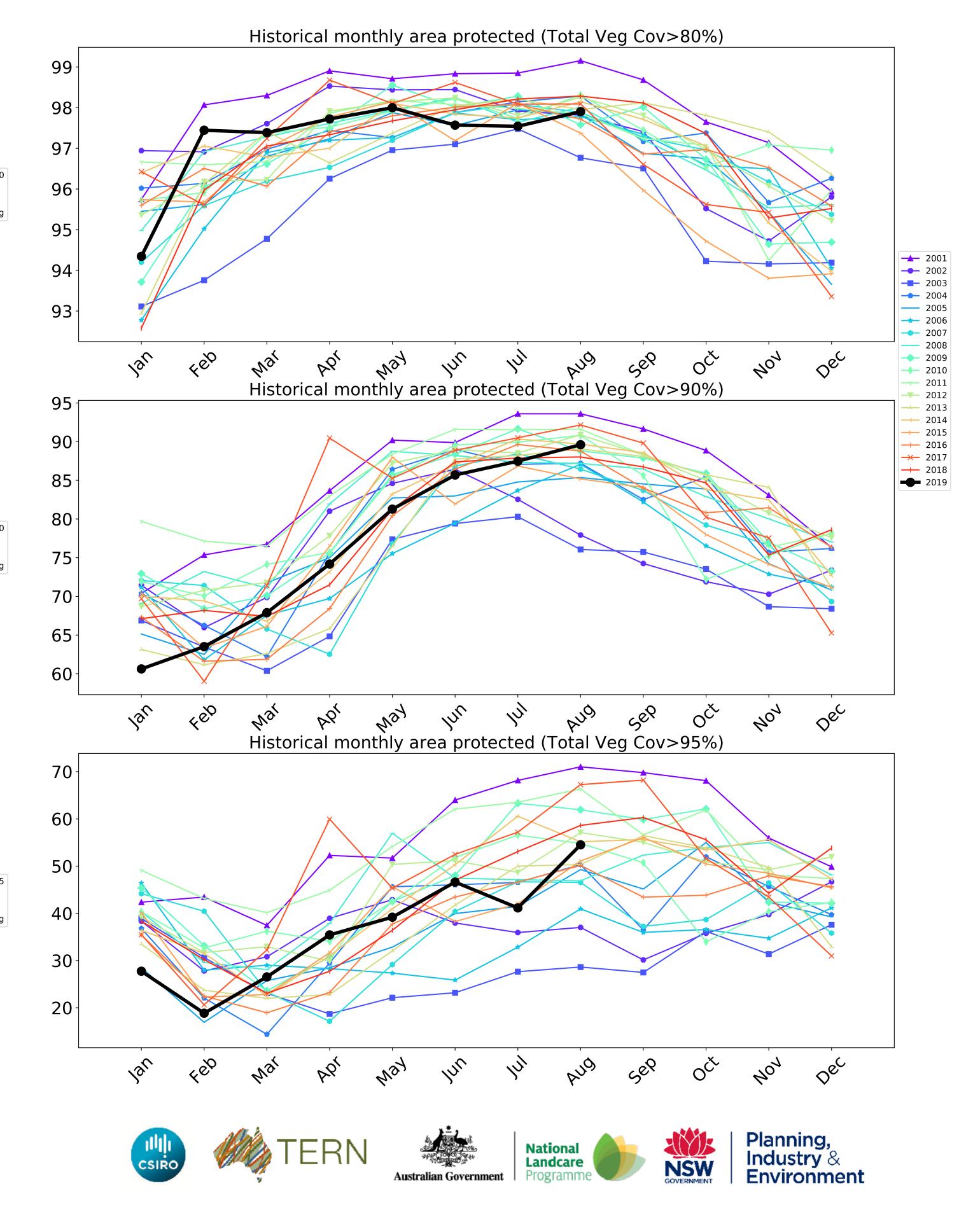
Proportion of the area protected from water erosion (Total Vegetation Cover > 70%)



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

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

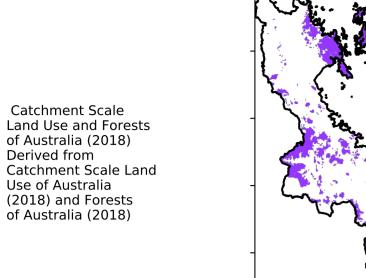




**3** 

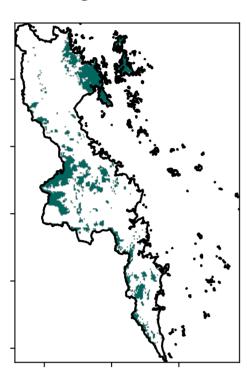
## **Conservation and natural environments Forest (non woodland)**

Land use and forest cover

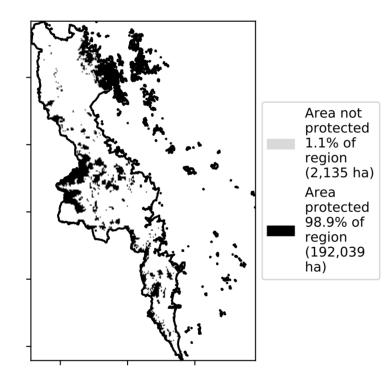


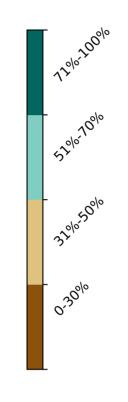
1 Conservation and natural environments – Nonwoodland forest

**Total Vegetation Cover [%]** 



% Area protected from water erosion (>70%)





- 20

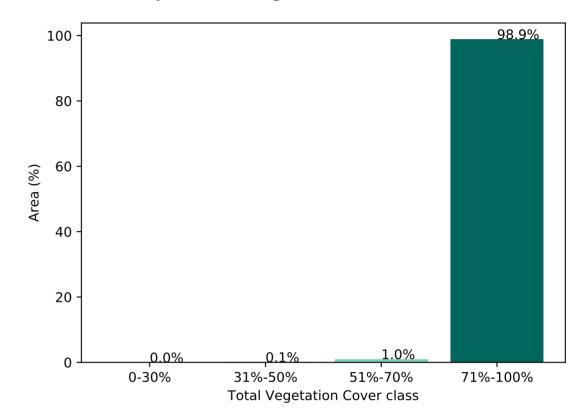
· 10

0

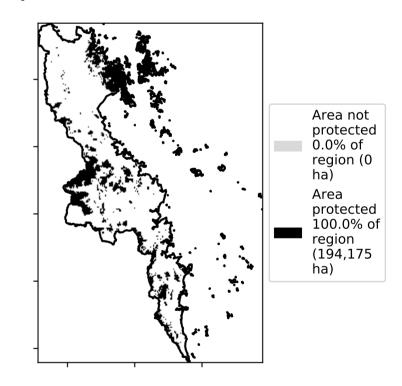
-10

-20



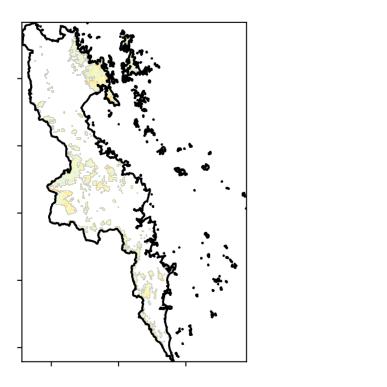


% Area protected from wind erosion (>50%)



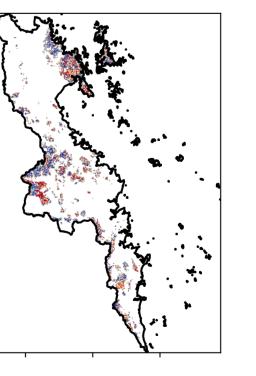
**Total Vegetation Cover Anomaly [%]** 

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.



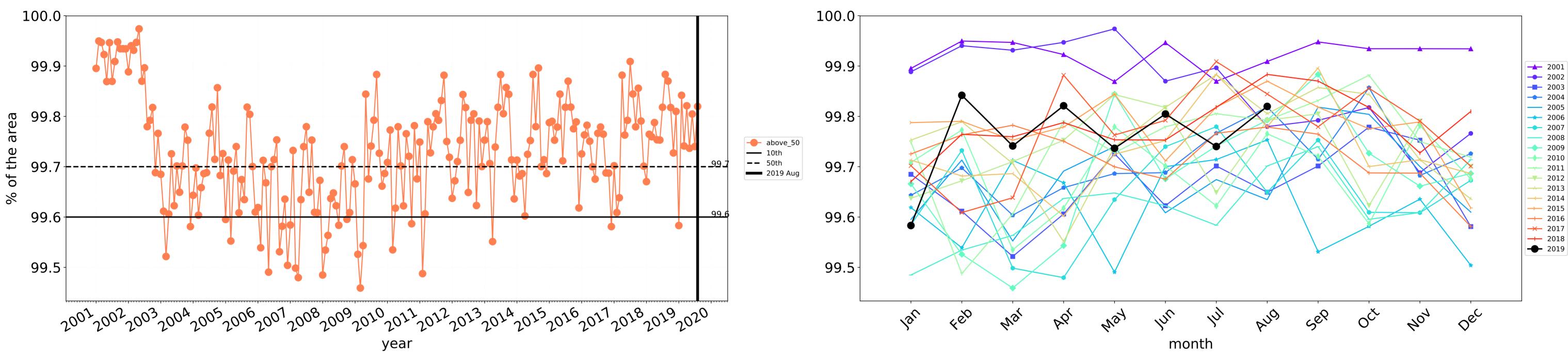
**Total Vegetation Cover Decile [%]** 

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.



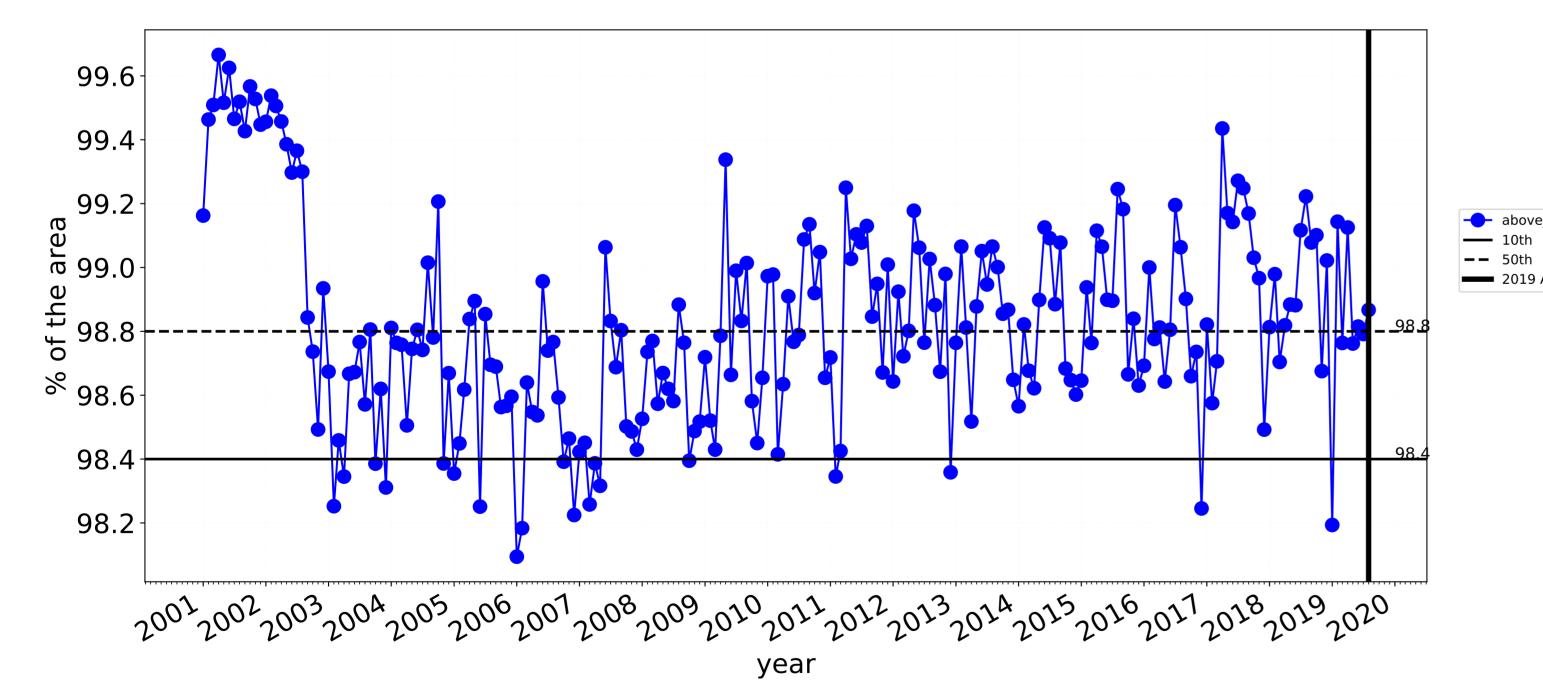


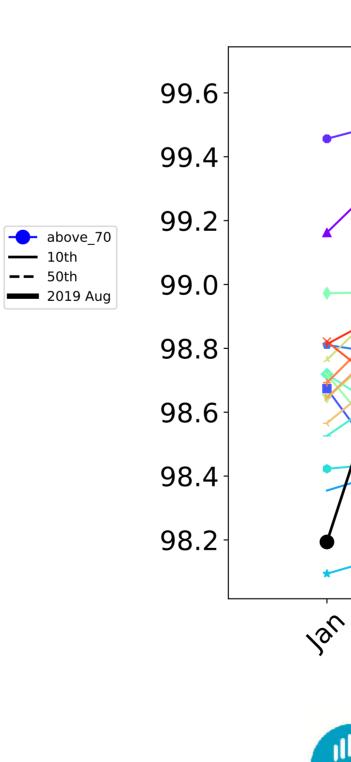


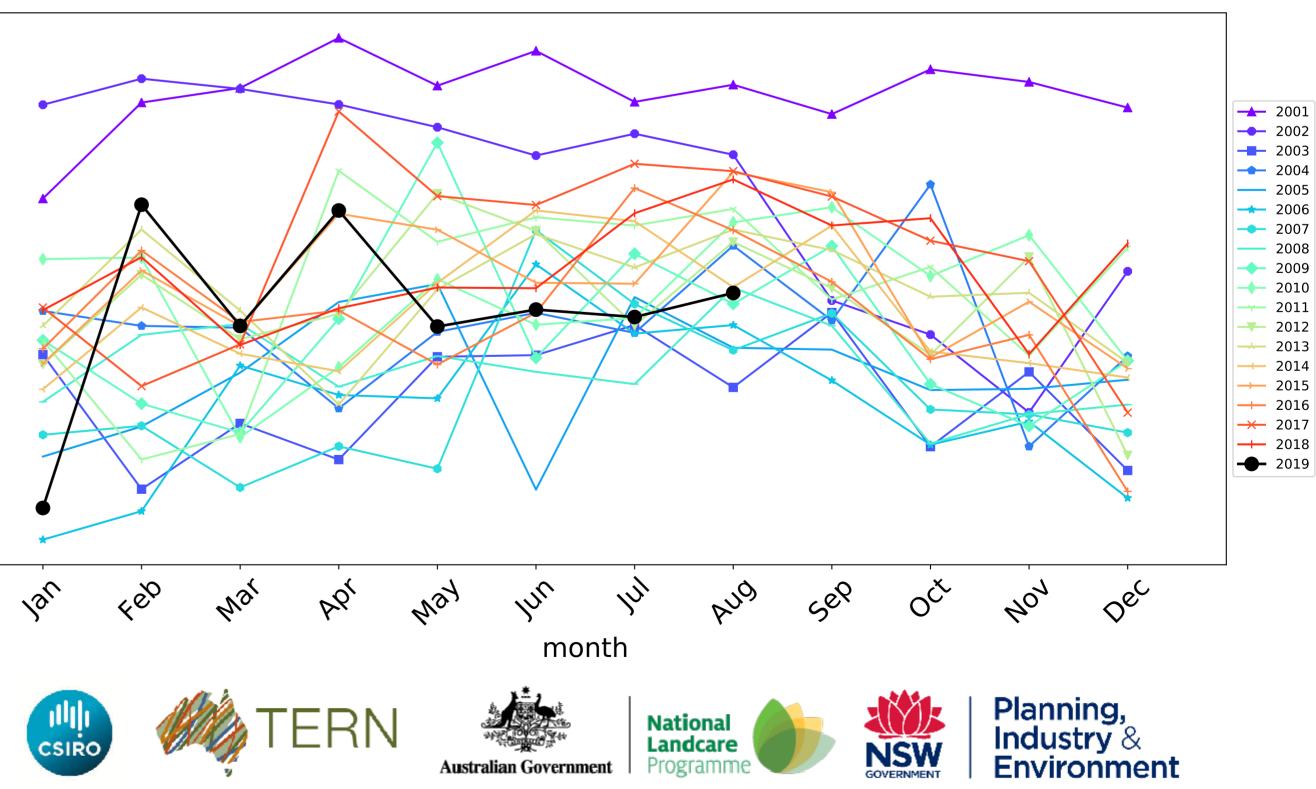


Proportion of the area protected from wind erosion (Total Vegetation Cover > 50%)

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



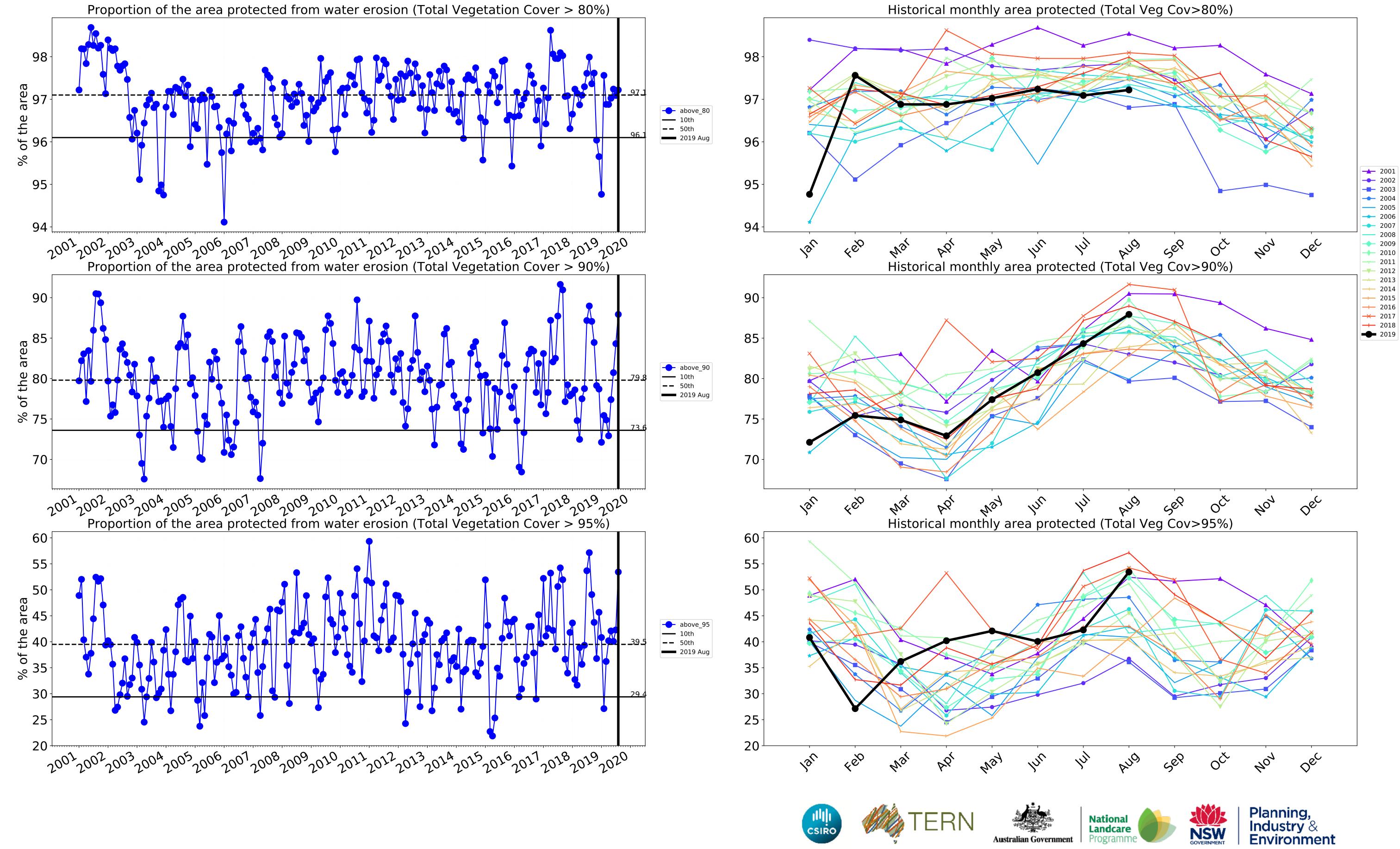




15

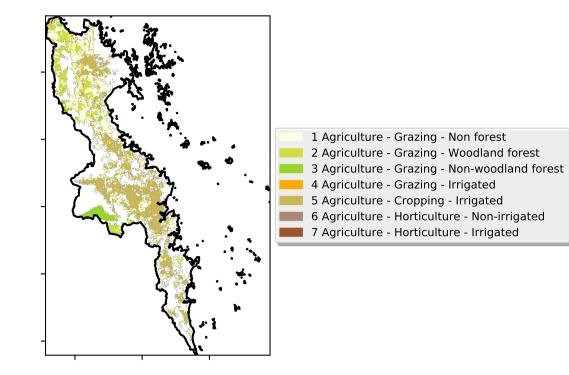
Wind erosion historical monthly area protected (Total Veg Cov >50%)

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

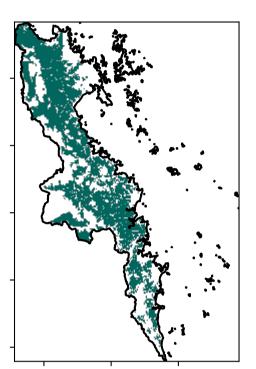


## Agriculture

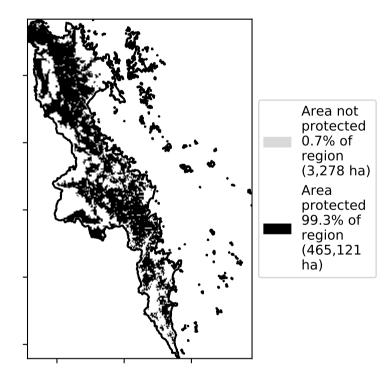
Land use and forest cover

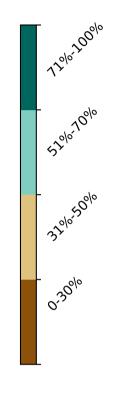


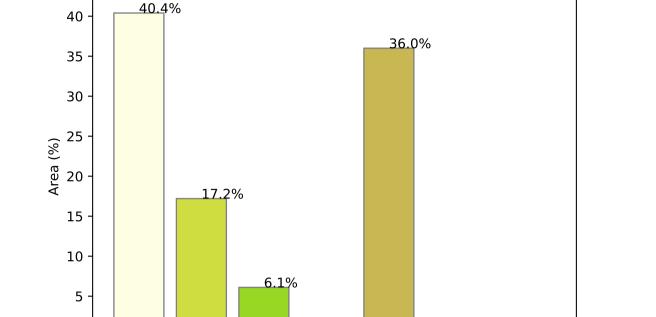
**Total Vegetation Cover [%]** 



% Area protected from water erosion (>70%)







## Proportion of each land class in area

Proportion of vegetation cover class in area

4

Land use class

0

1

2

3

0.0%

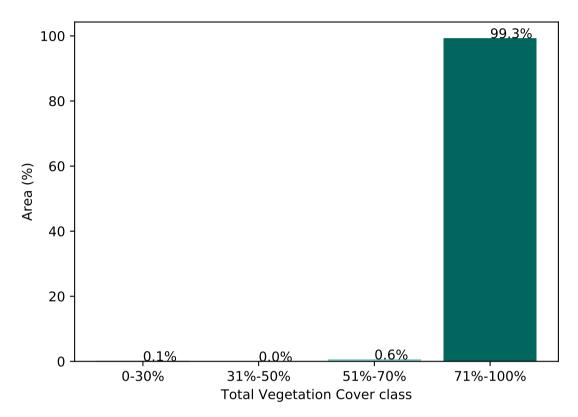
5

0.2%

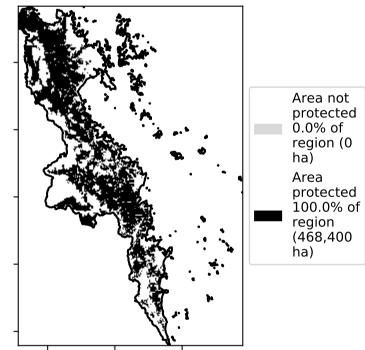
7

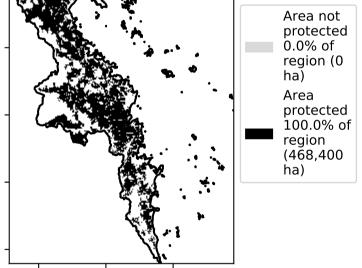
0.0%

6

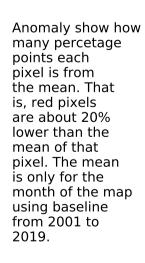


## % Area protected from wind erosion (>50%)





**Total Vegetation Cover Anomaly [%]** 



Catchment Scale

of Australia (2018)

Derived from

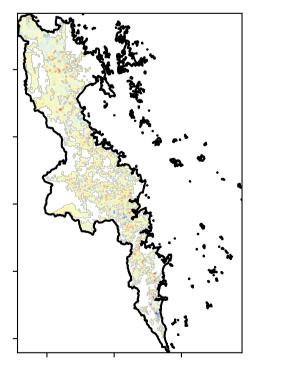
Use of Australia

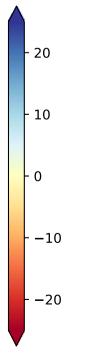
(2018) and Forests

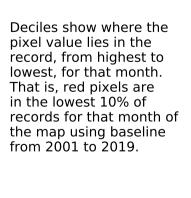
of Australia (2018)

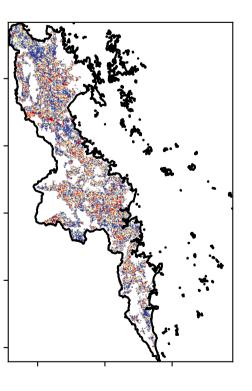
Land Use and Forests

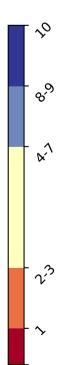
Catchment Scale Land



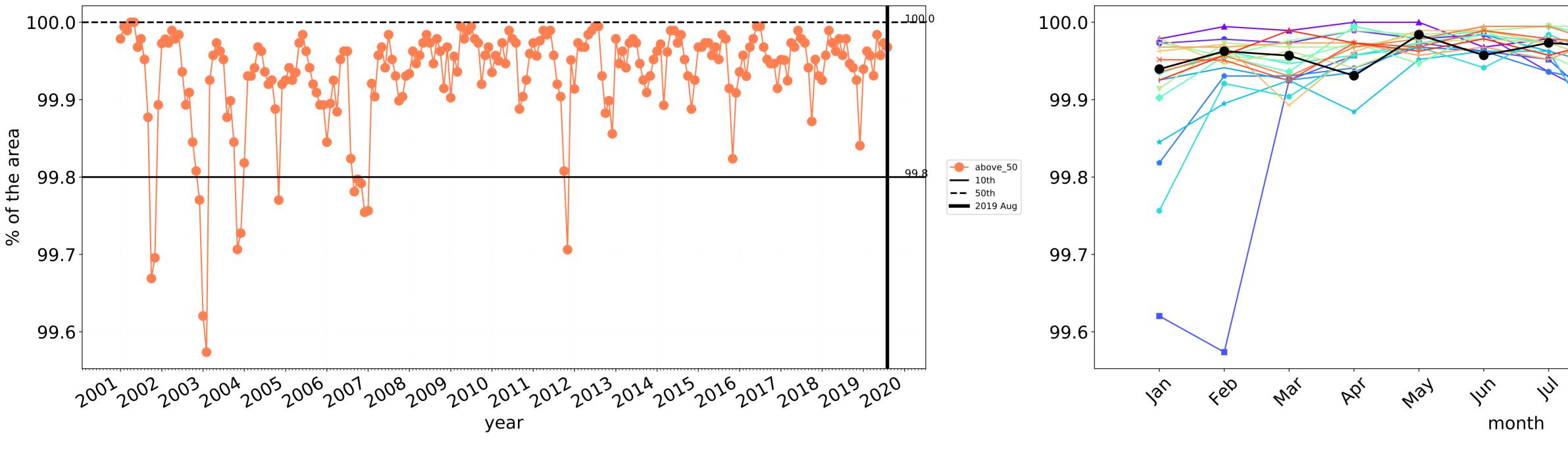




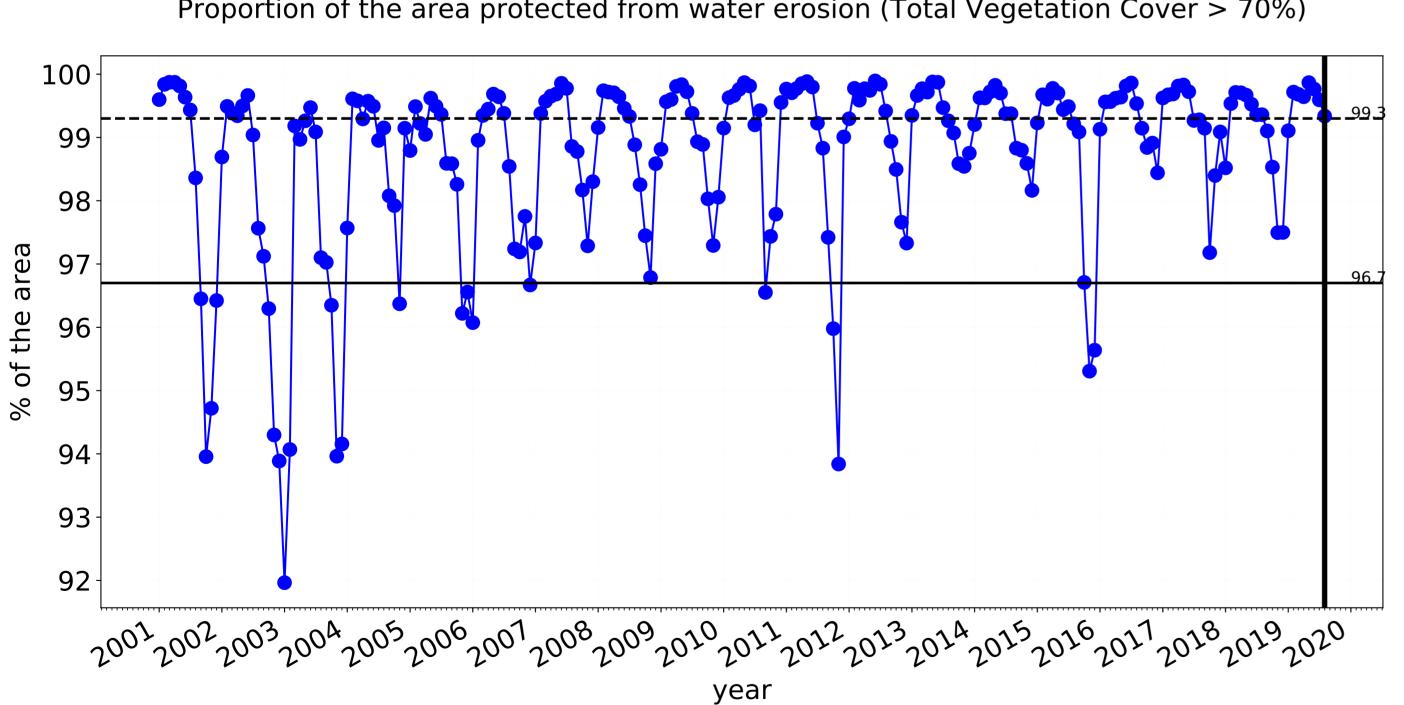






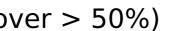


Proportion of the area protected from wind erosion (Total Vegetation Cover > 50%)



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

# Agriculture timeseries



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

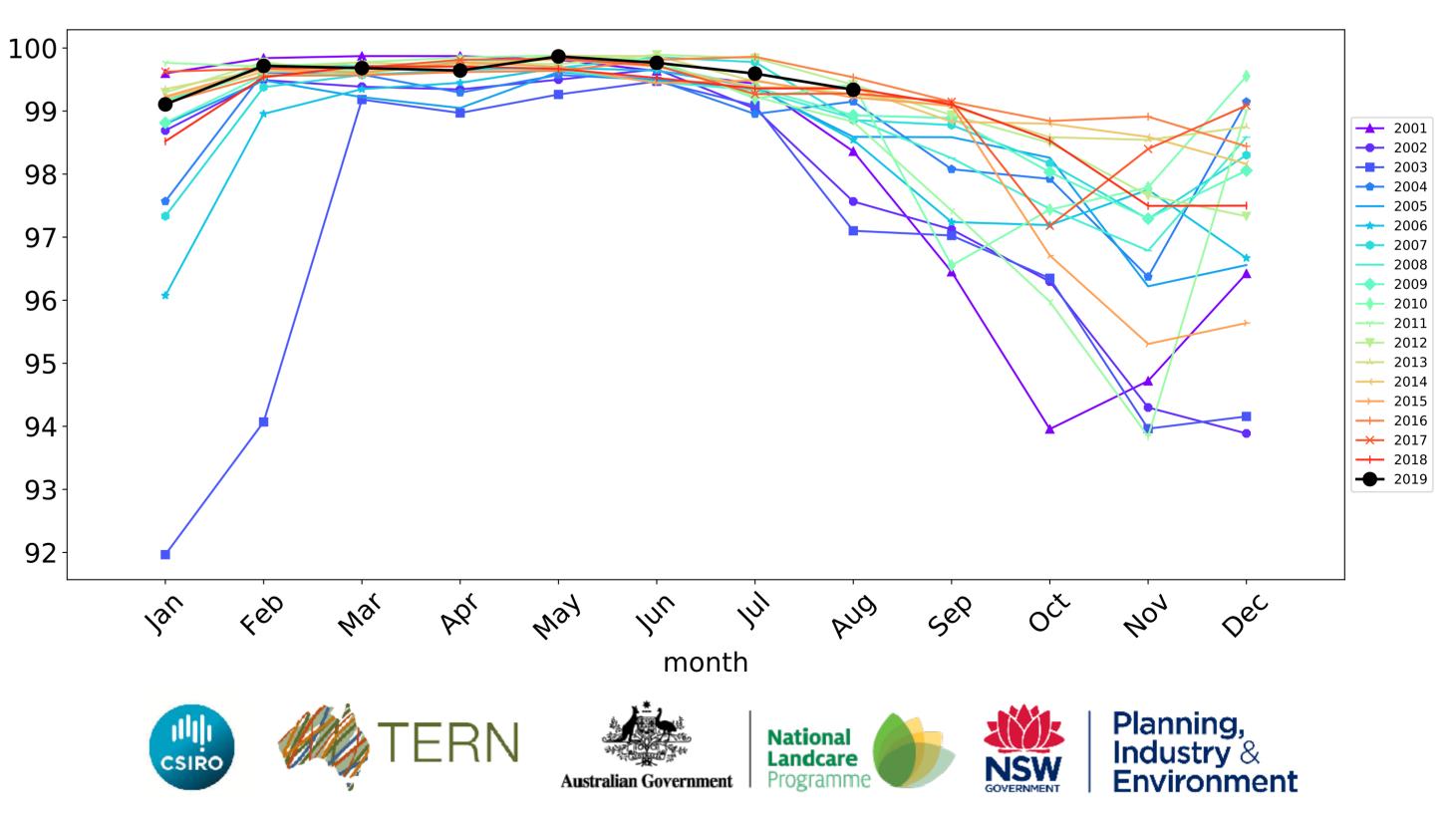
--- above\_70

**—** 2019 Aug

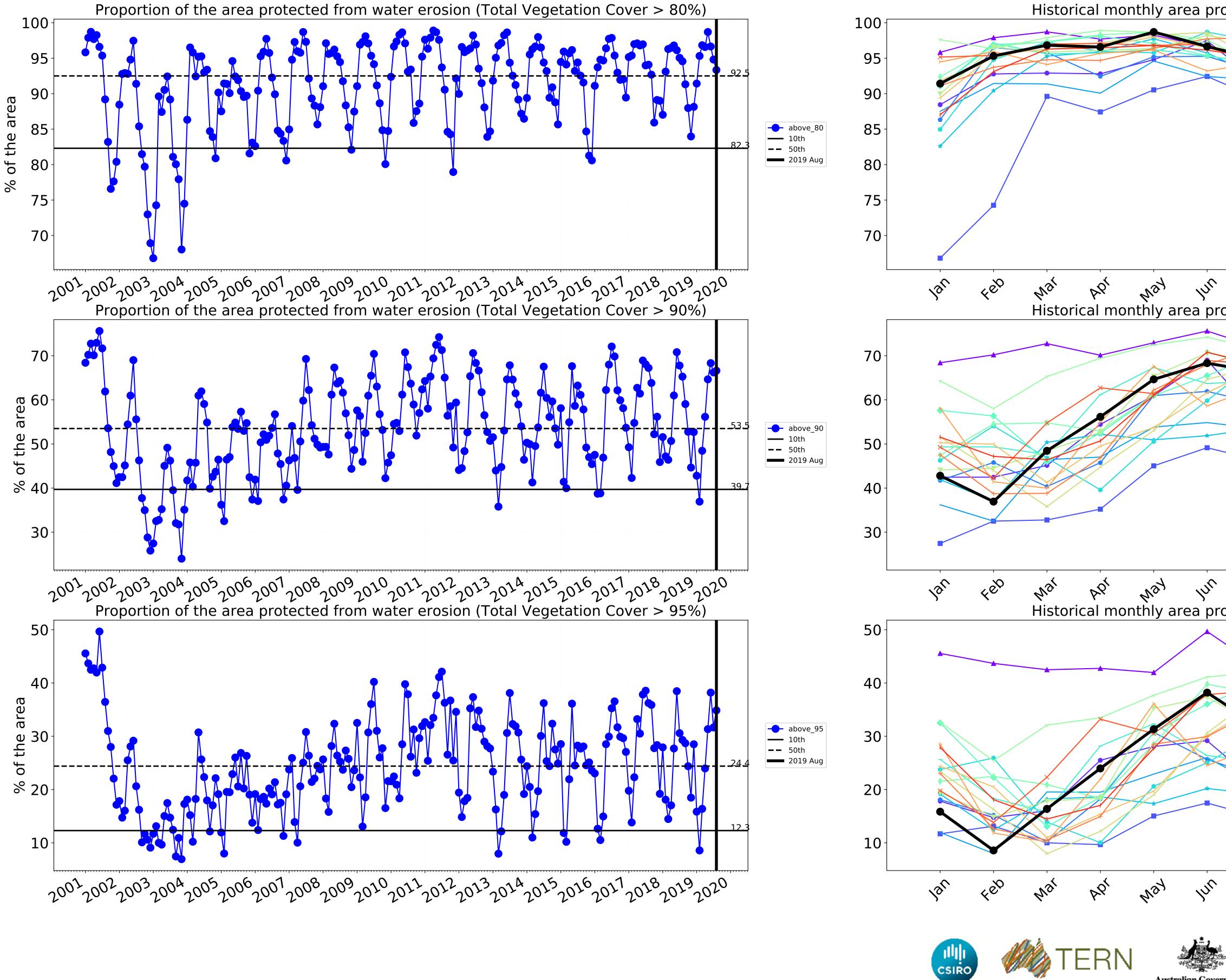
**—** 10th

**——** 50th

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

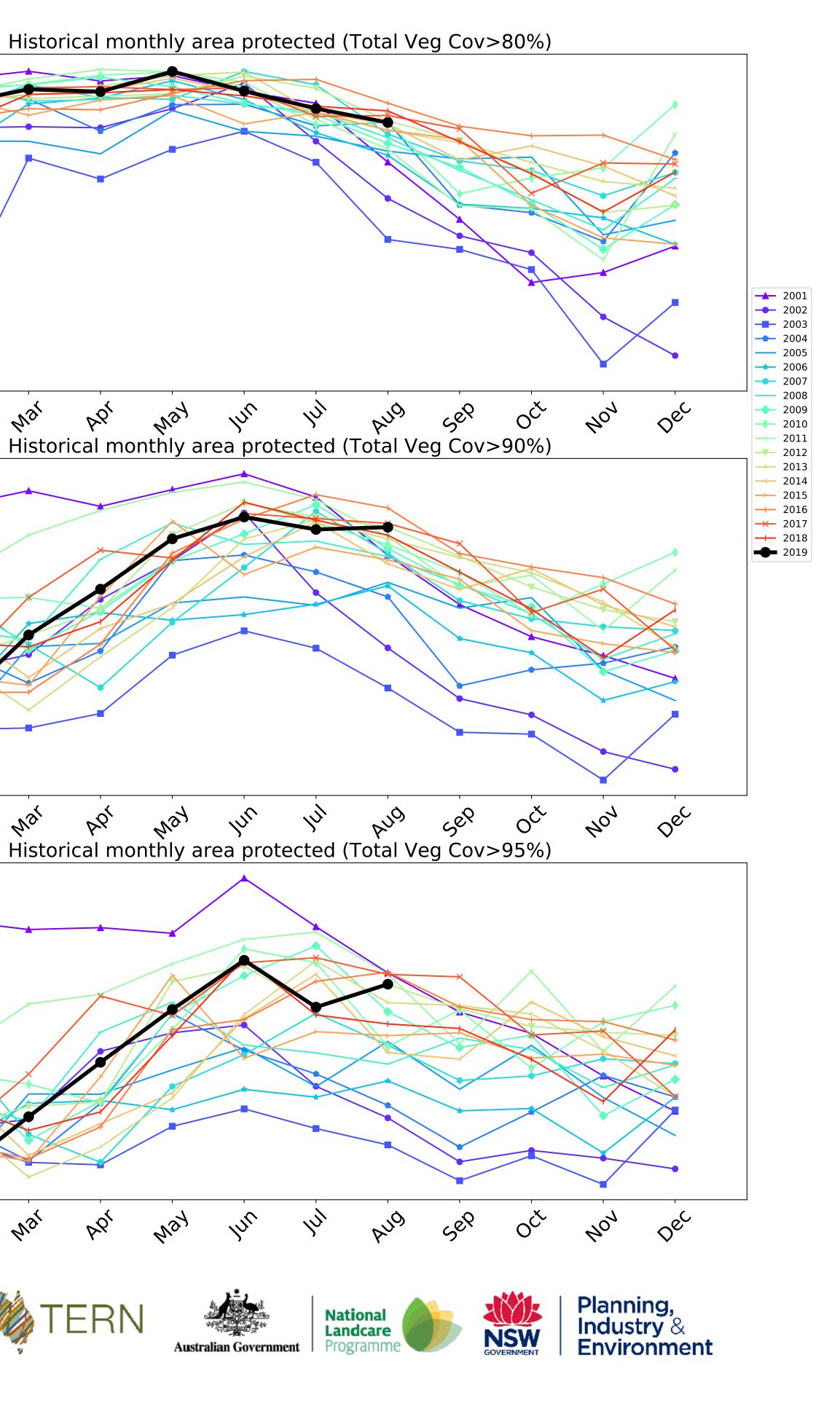


**—** 2001 --- 2002 ---- 2003 **---** 2004 \_\_\_\_ 2005 **----** 2006 ---- 2007 ----- 2008 ----- 2009 **---** 2010 2011 ---- 2012 \_\_\_\_ 2013 <u>→</u> 2014 <mark>→</mark> 2015 <del>---</del> 2016 <del>→</del> 2017 --- 2018 ---- 2019 401 AUG OČ Dec Ser



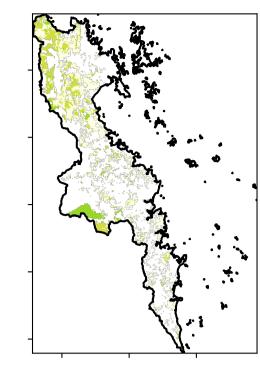
19

Australian Government

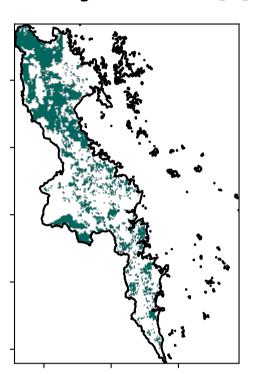


## Grazing

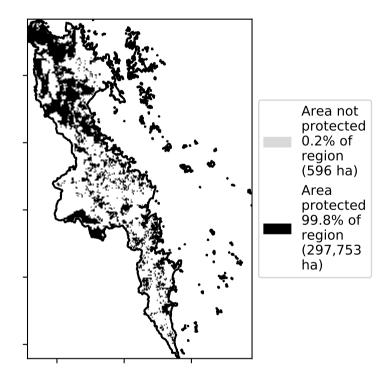
Land use and forest cover

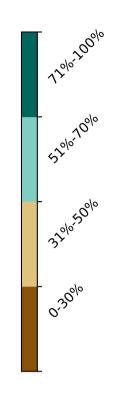


**Total Vegetation Cover [%]** 



% Area protected from water erosion (>70%)

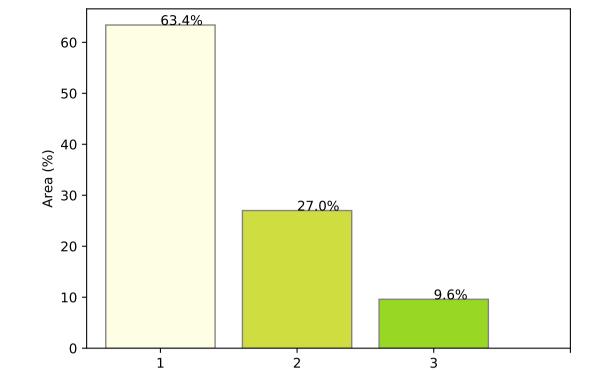




1 Agriculture - Grazing - Non forest

2 Agriculture - Grazing - Woodland forest

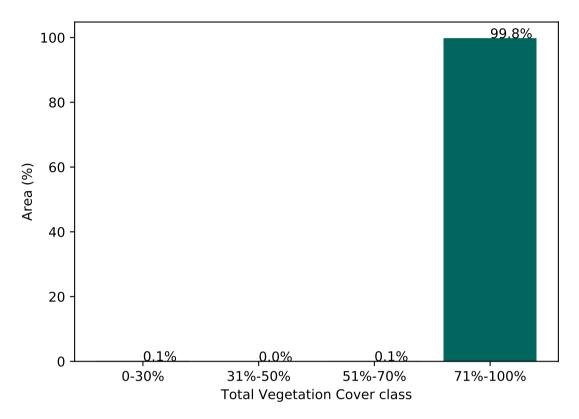
3 Agriculture - Grazing - Non-woodland forest



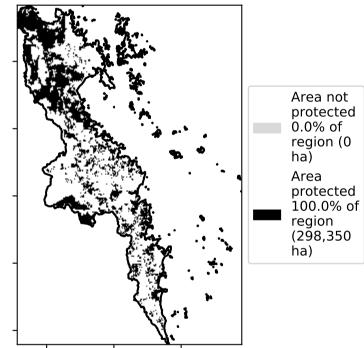
### Proportion of each land class in area

Proportion of vegetation cover class in area

Land use class

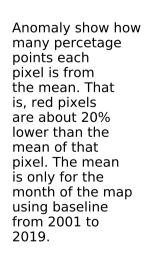


### % Area protected from wind erosion (>50%)





**Total Vegetation Cover Anomaly [%]** 



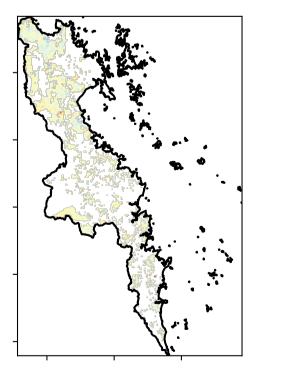
Catchment Scale Land Use and Forests of Australia (2018)

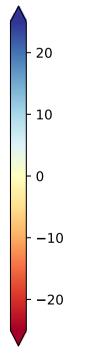
Catchment Scale Land

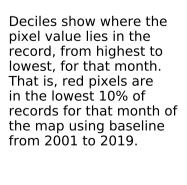
Derived from

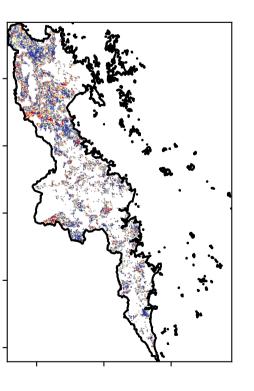
Use of Australia

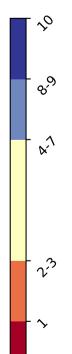
(2018) and Forests of Australia (2018)



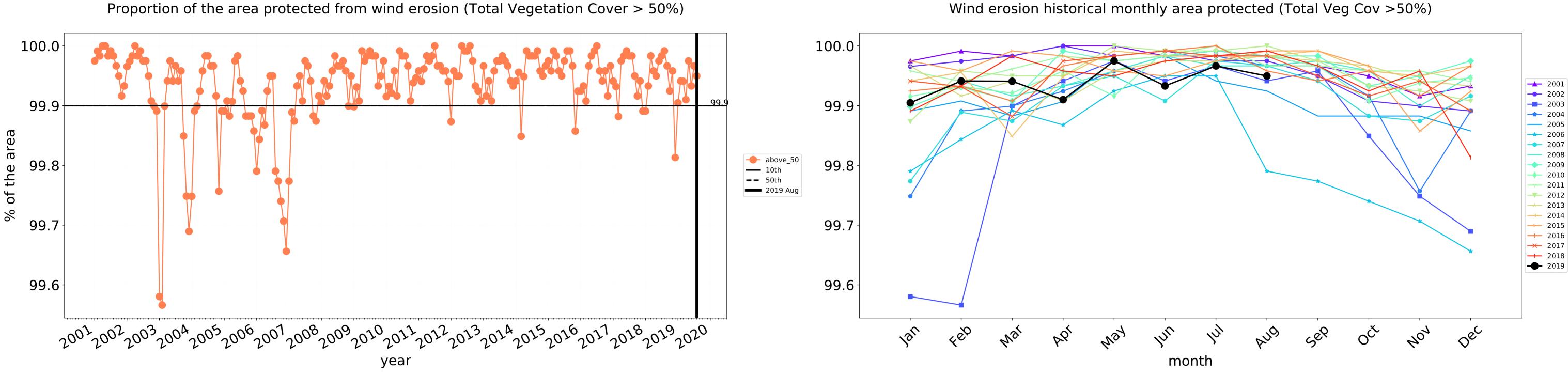






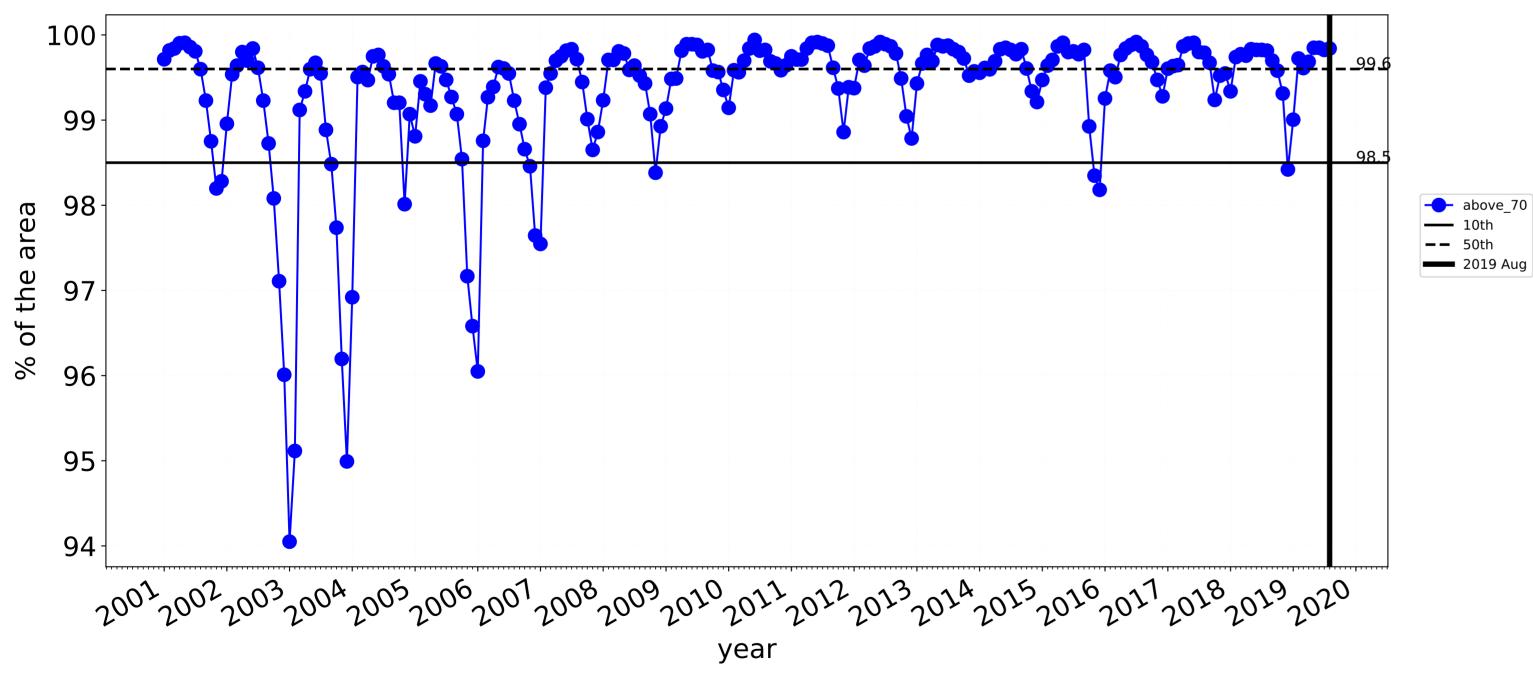




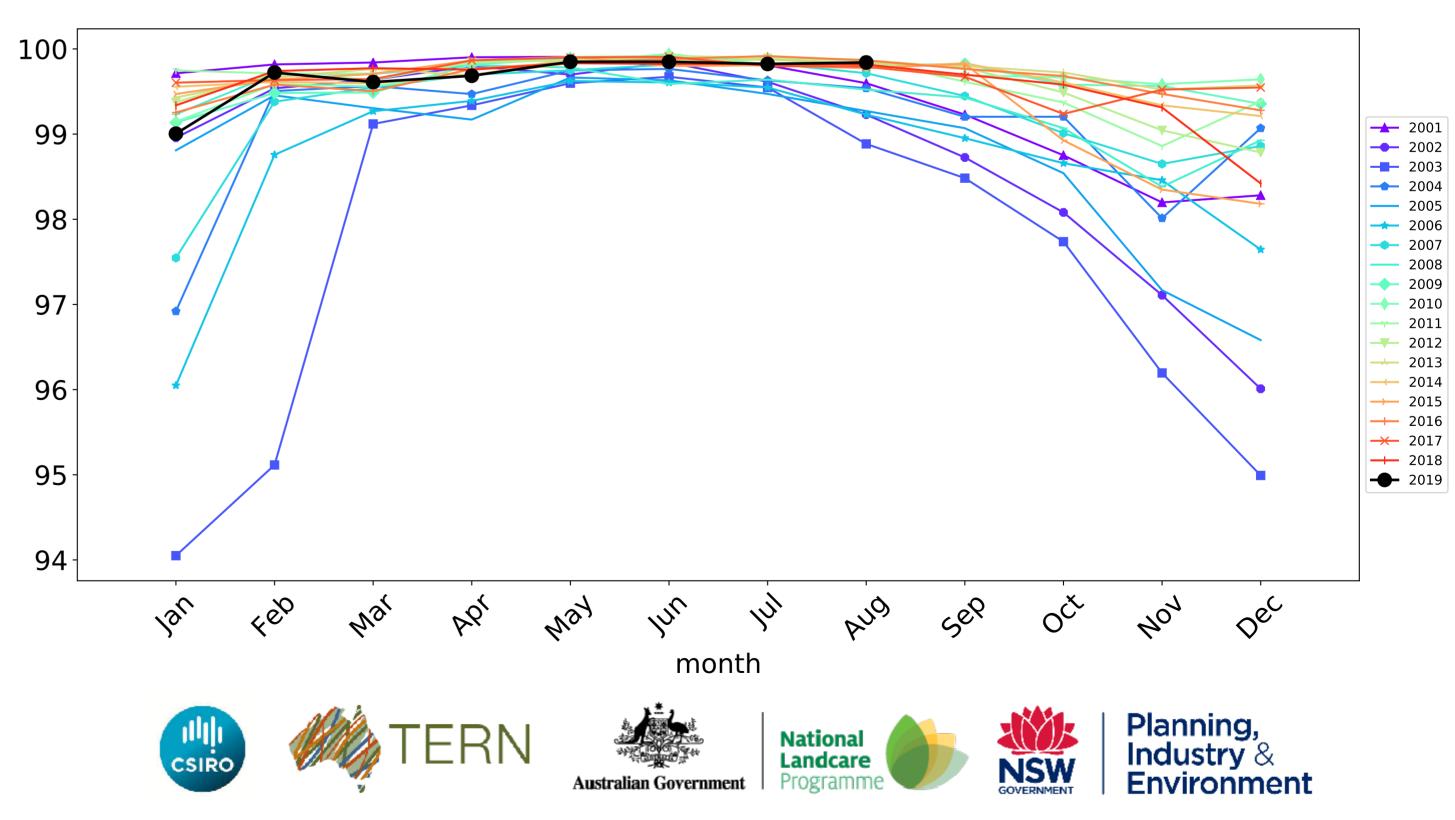


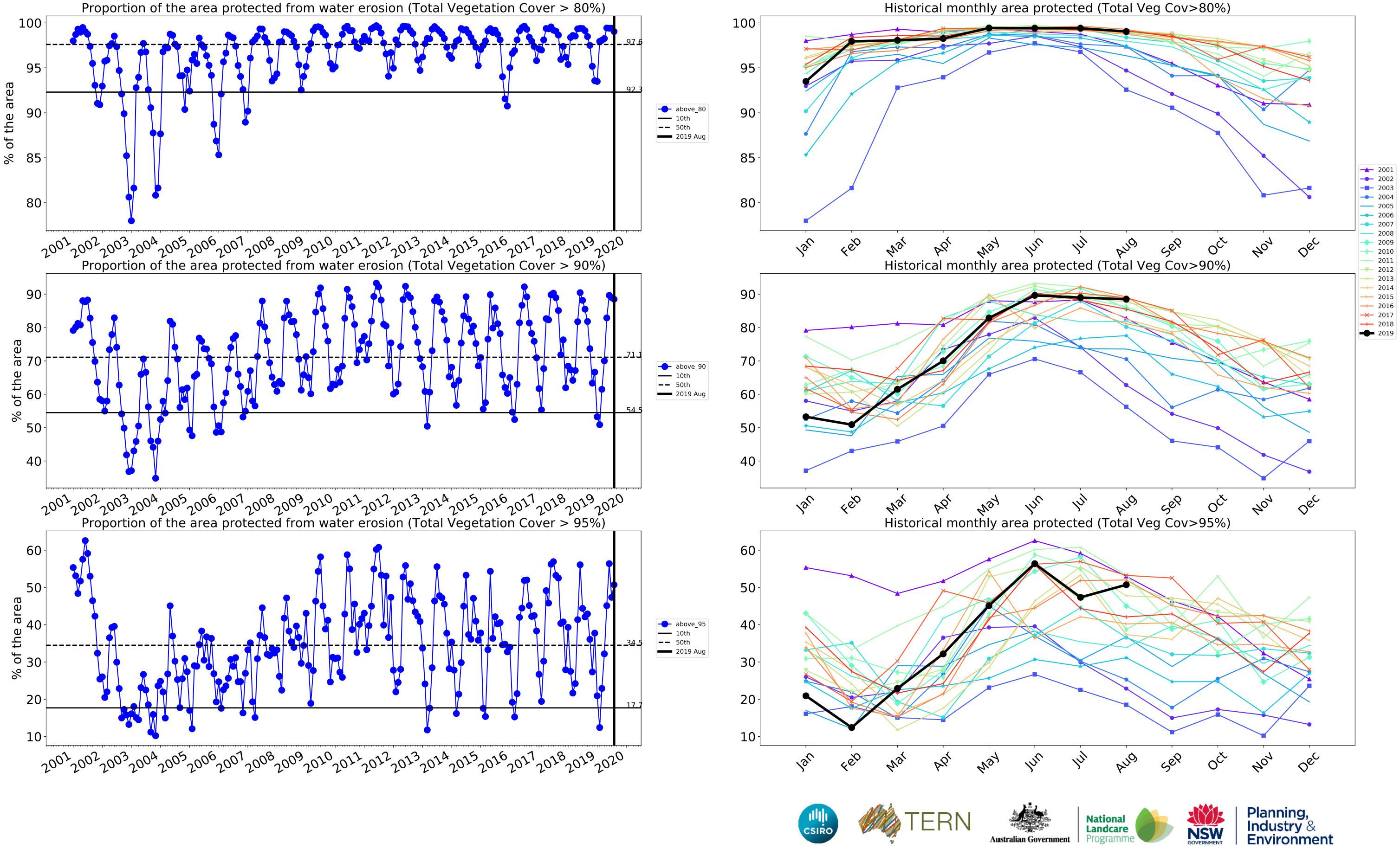
Proportion of the area protected from wind erosion (Total Vegetation Cover > 50%)





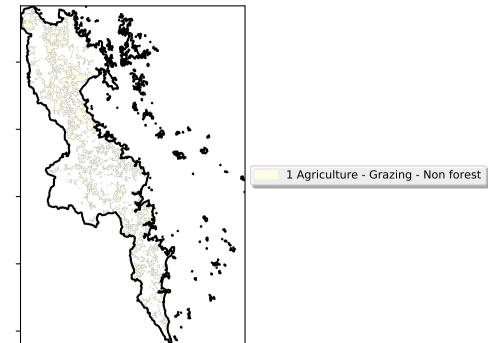
Water erosion historical monthly area protected (Total Veg Cov>70%)



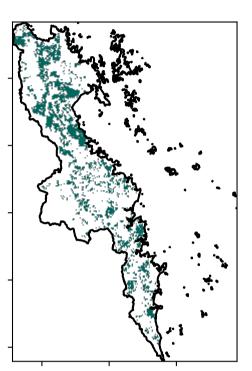


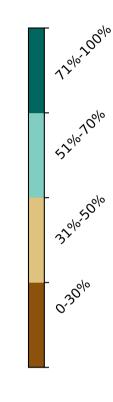
## **Grazing non forest**

Land use and forest cover

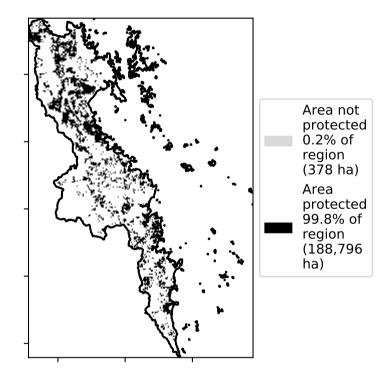


**Total Vegetation Cover [%]** 

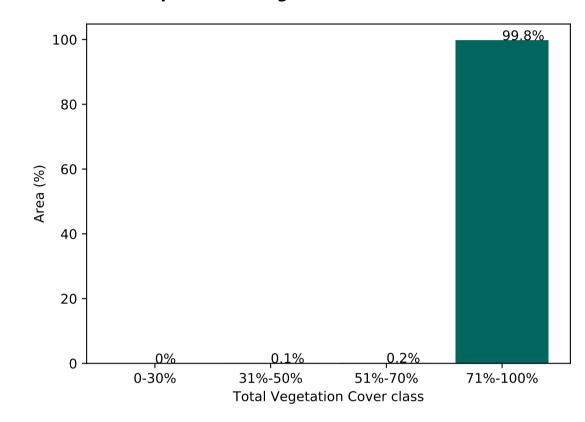




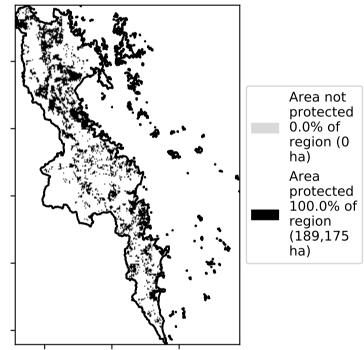
% Area protected from water erosion (>70%)



Proportion of vegetation cover class in area



% Area protected from wind erosion (>50%)

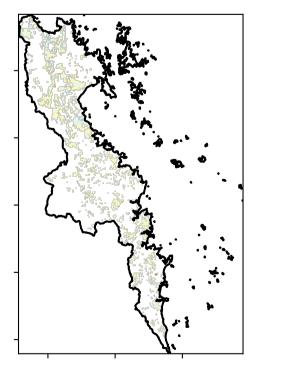


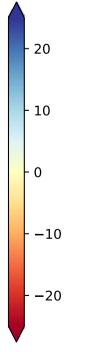


Catchment Scale Land Use and Forests of Australia (2018) Derived from Catchment Scale Land Use of Australia (2018) and Forests of Australia (2018)

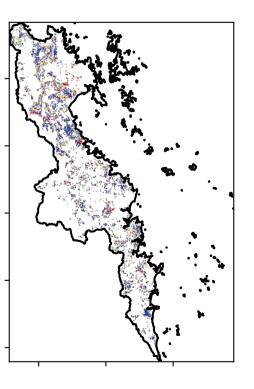
**Total Vegetation Cover Anomaly [%]** 

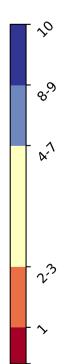
Anomaly show how many percetage points each pixel is from the mean. That is, red pixels are about 20% lower than the mean of that pixel. The mean is only for the month of the map from 2001 to 2019.



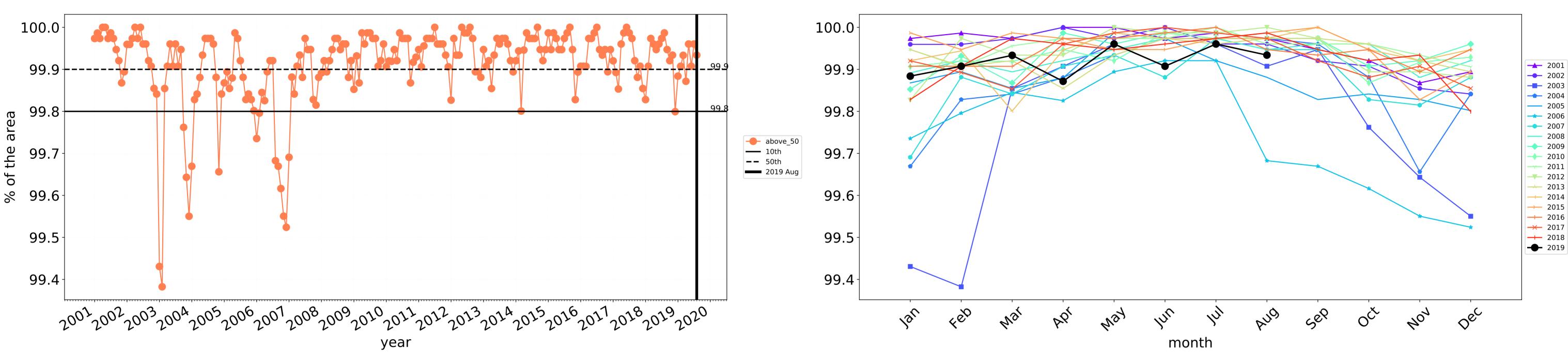


Deciles show where the pixel value lies in the record, from highest to lowest, for that month. That is, red pixels are in the lowest 10% of records for that month of the map using baseline from 2001 to 2019.

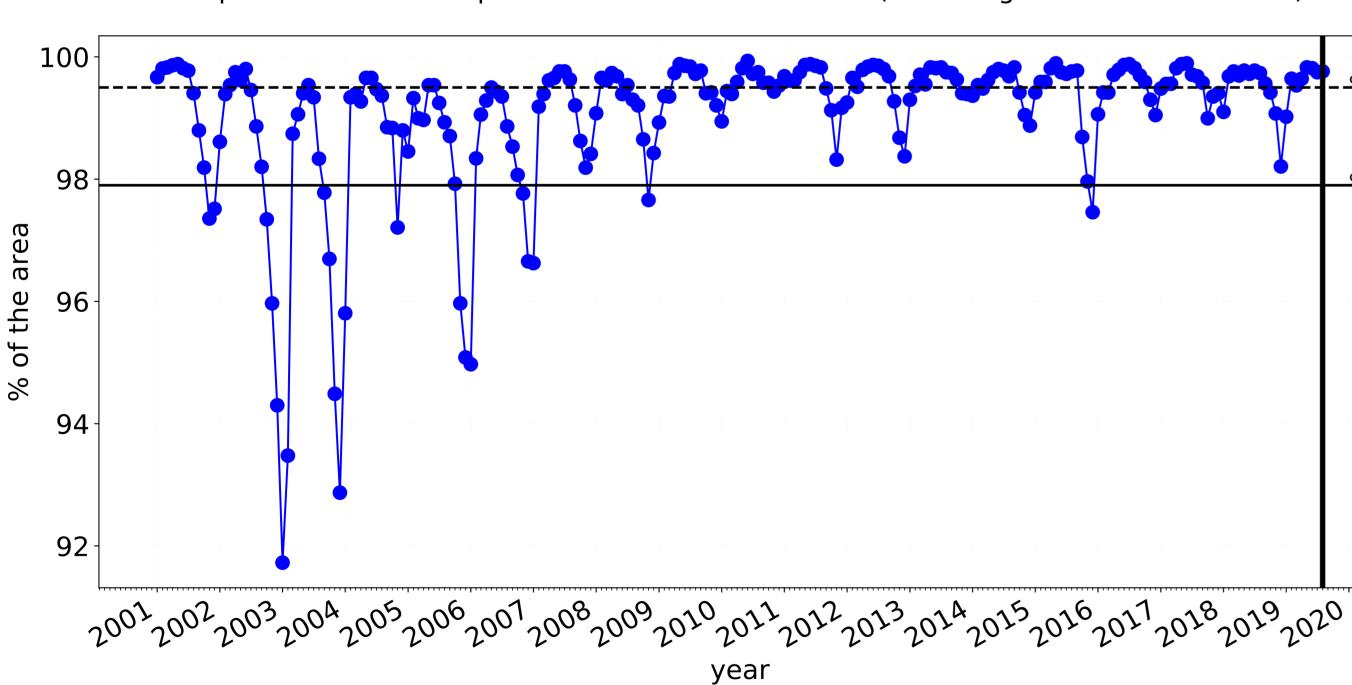








Proportion of the area protected from wind erosion (Total Vegetation Cover > 50%)



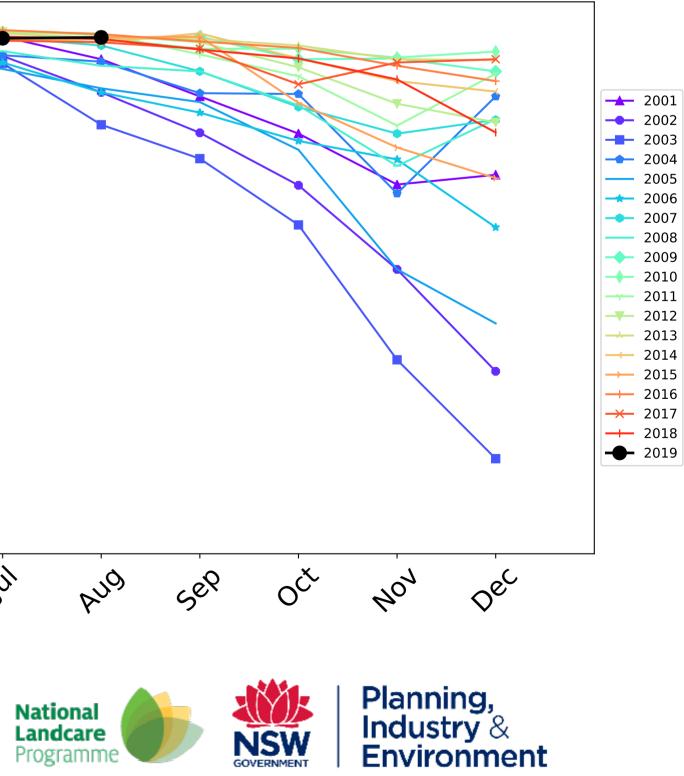
Proportion of the area protected from water erosion (Total Vegetation Cover > 70%)

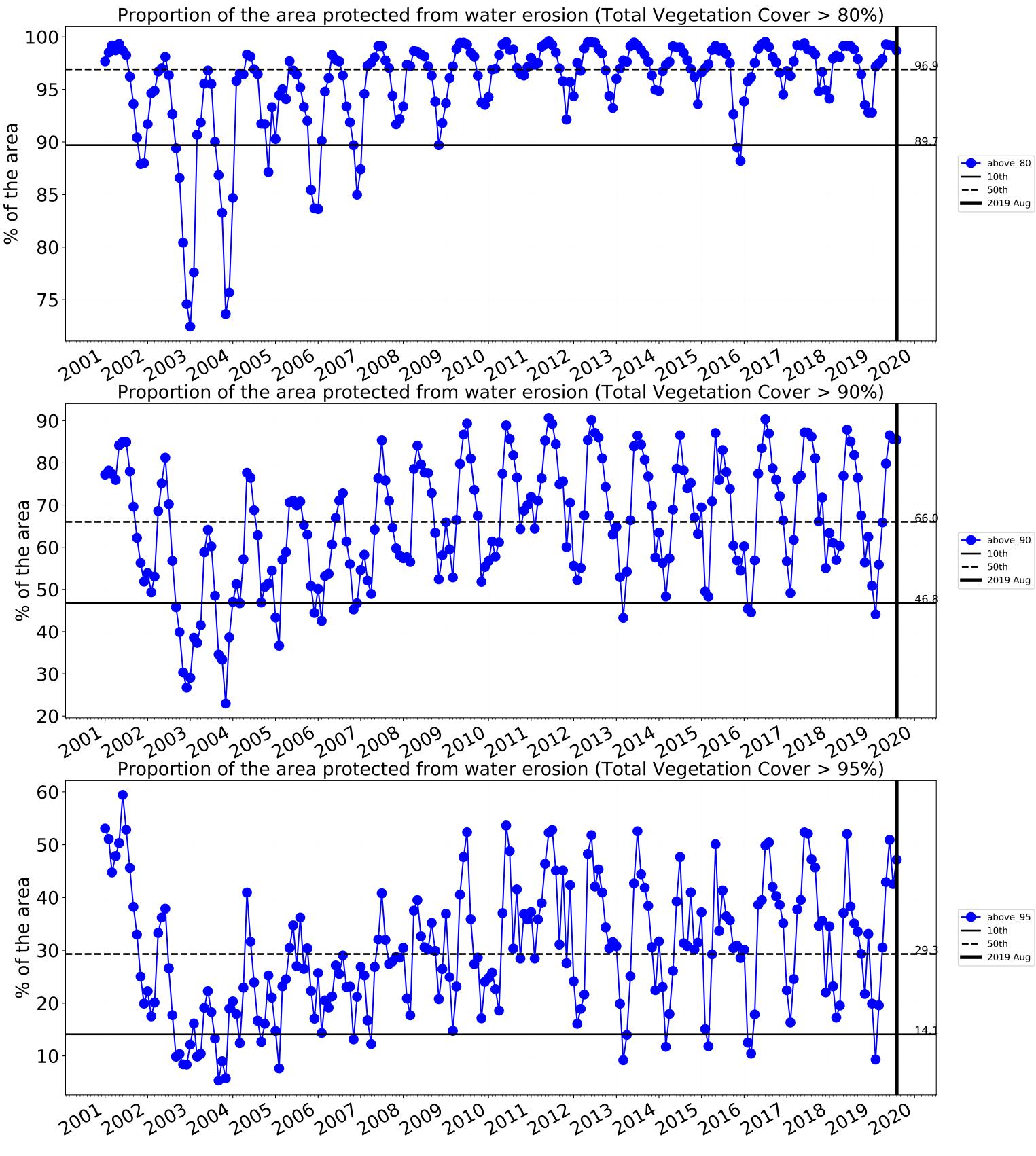
# Grazing non forest timeseries

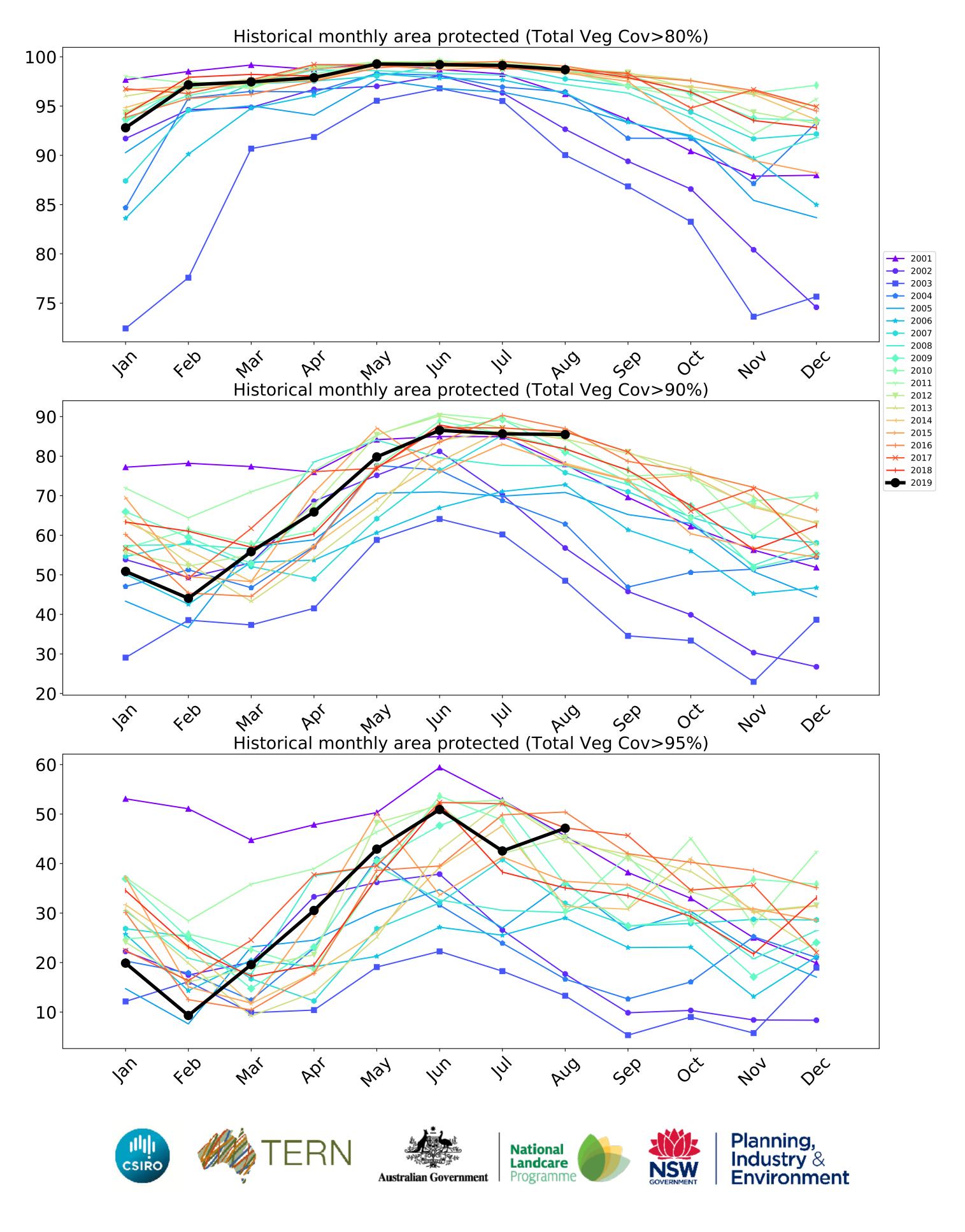
100-98 97 --- above\_70 **—** 10th **——** 50th **—** 2019 Aug 96 94 92 Jan 4eb way In 1st Mai PQ month ERN **HOO** CSIRC Australian Government

2**3** 

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

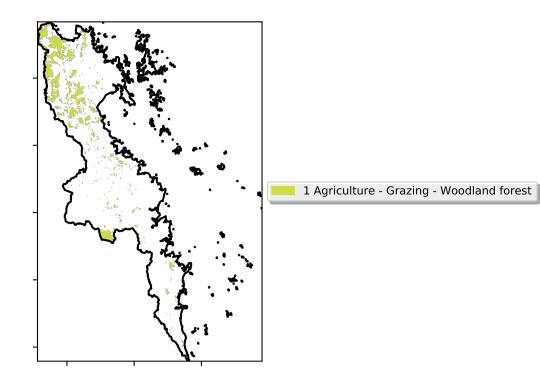




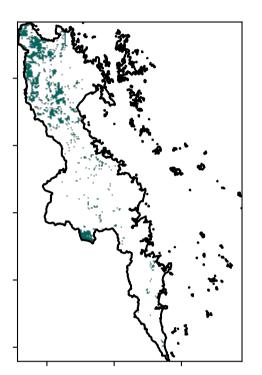


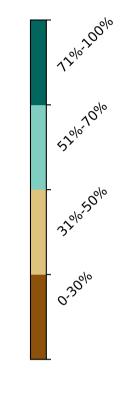
## **Grazing Woodland forest**

Land use and forest cover

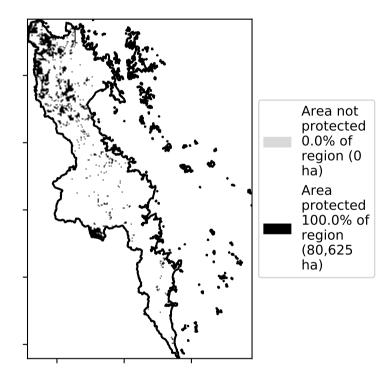


**Total Vegetation Cover [%]** 

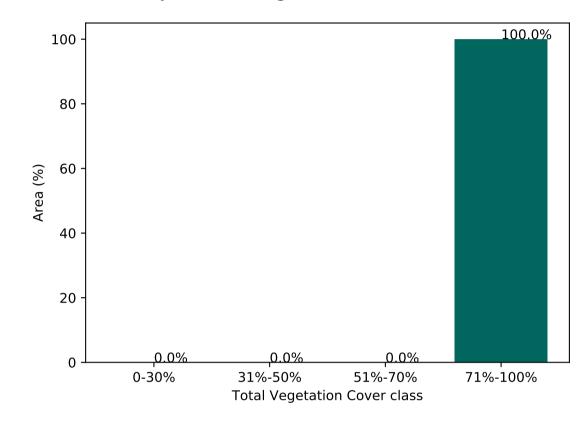




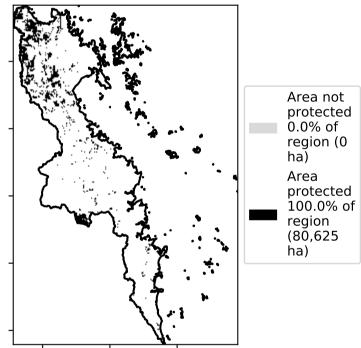
% Area protected from water erosion (>70%)

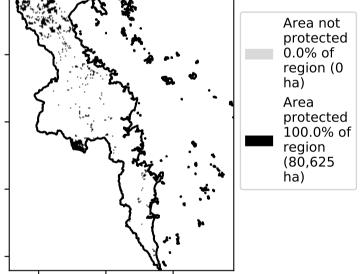


Proportion of vegetation cover class in area



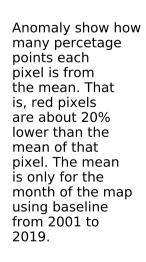
% Area protected from wind erosion (>50%)

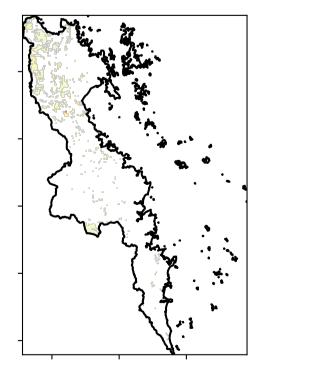


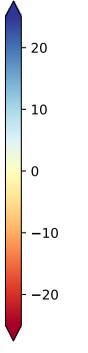


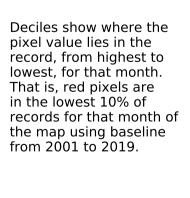
Catchment Scale Land Use and Forests of Australia (2018) Derived from Catchment Scale Land Use of Australia (2018) and Forests of Australia (2018)

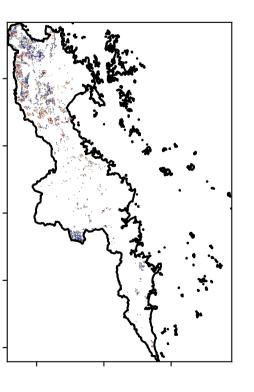
**Total Vegetation Cover Anomaly [%]** 

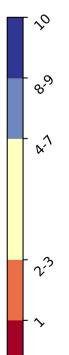




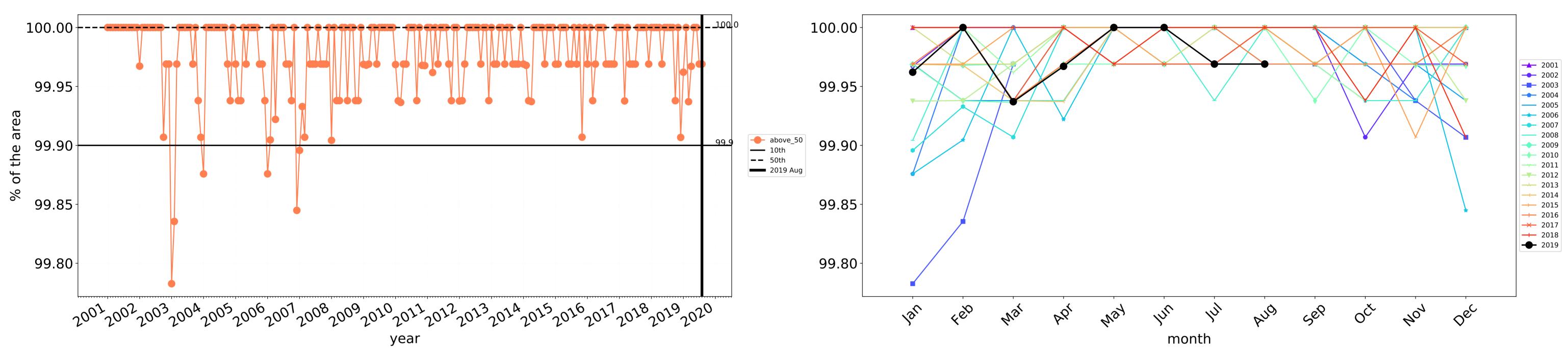






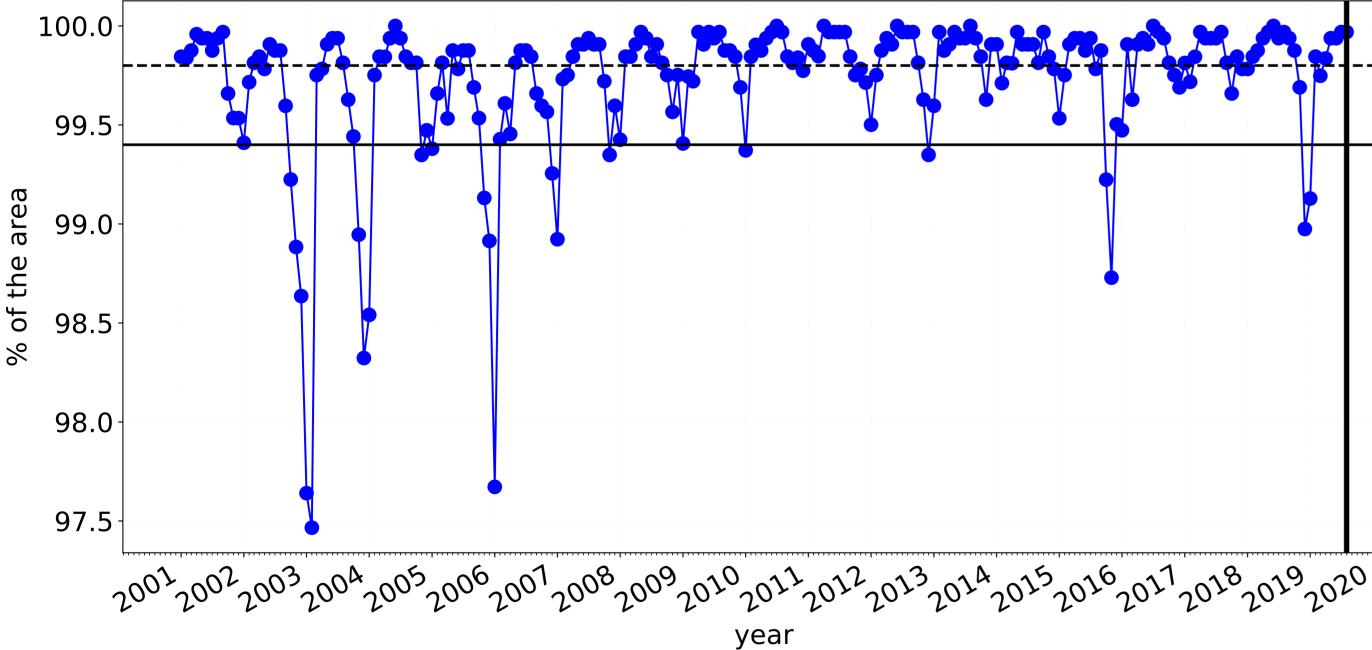




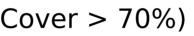


Proportion of the area protected from wind erosion (Total Vegetation Cover > 50%)

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

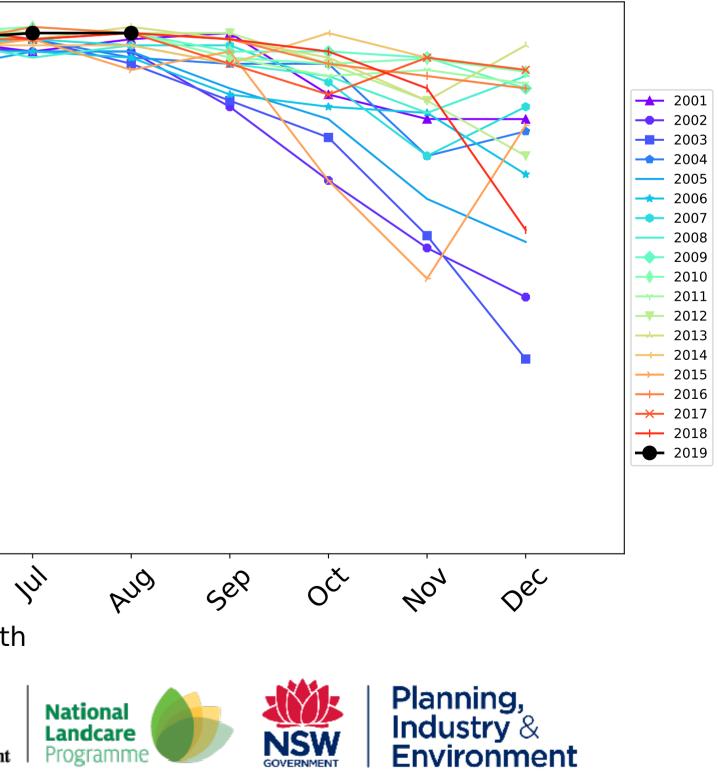


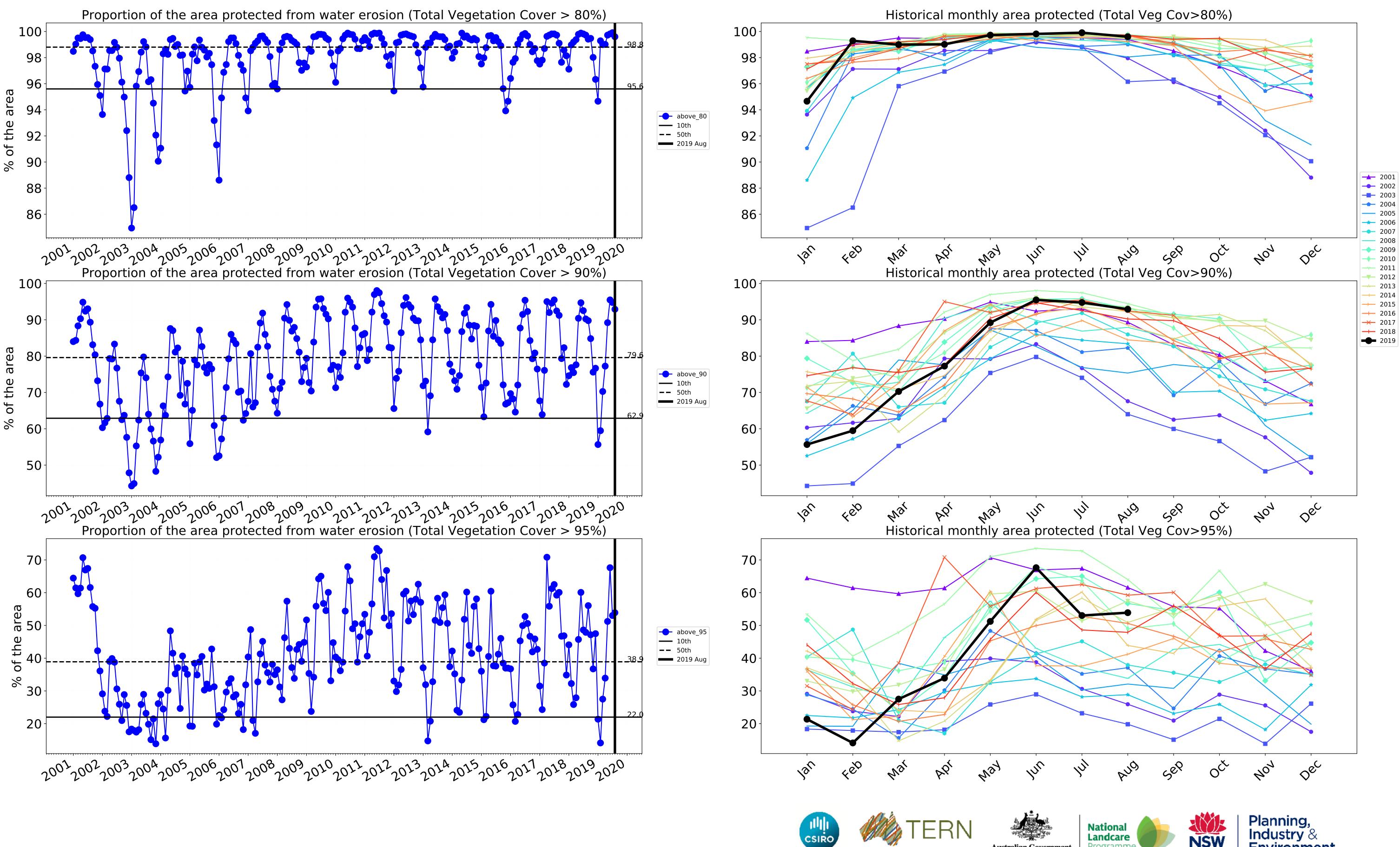
Wind erosion historical monthly area protected (Total Veg Cov >50%)



100.0-99.5 ---- above\_70 **—** 10th 99.0 **--** 50th 98.5 98.0 97.5 feb Jan May In Wai PQ month ERN csiro Australian Government

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



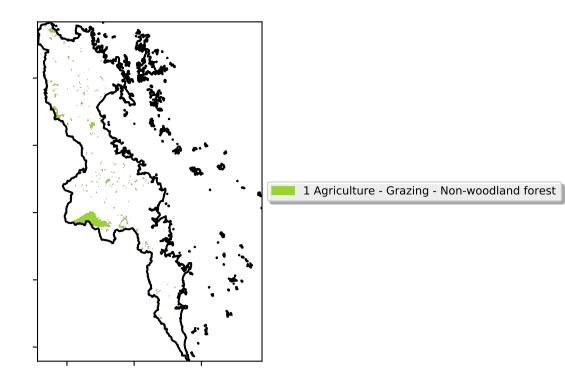


Australian Government

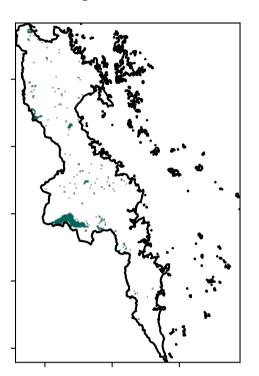


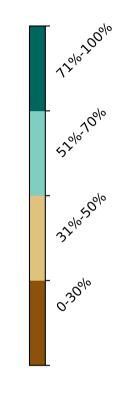
## **Grazing - Forest (non woodland)**

Land use and forest cover

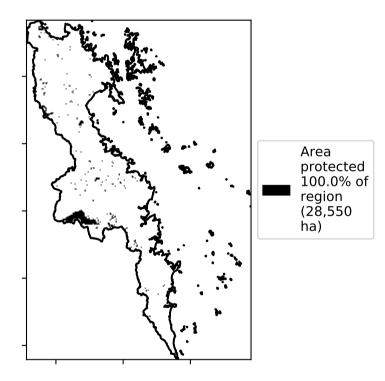


Total Vegetation Cover [%]

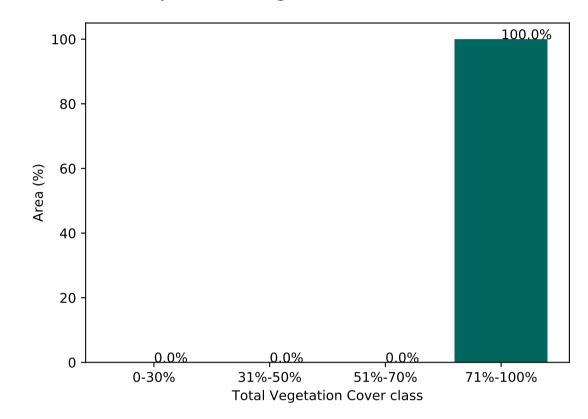




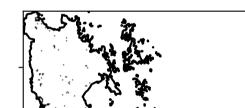
% Area protected from water erosion (>70%)





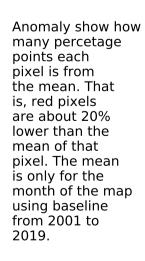


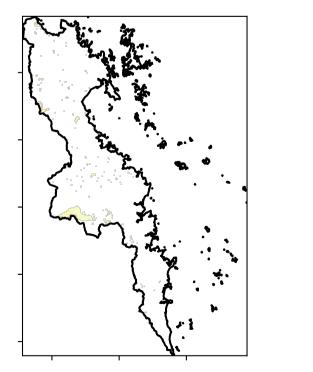
% Area protected from wind erosion (>50%)

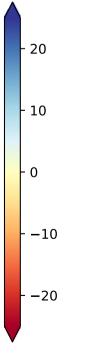


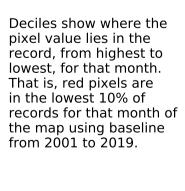
Catchment Scale Land Use and Forests of Australia (2018) Derived from Catchment Scale Land Use of Australia (2018) and Forests of Australia (2018)

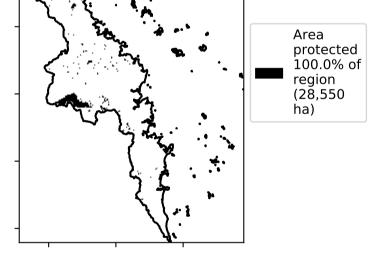
**Total Vegetation Cover Anomaly [%]** 

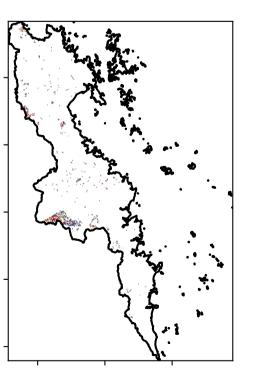


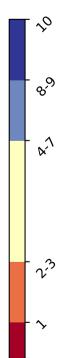




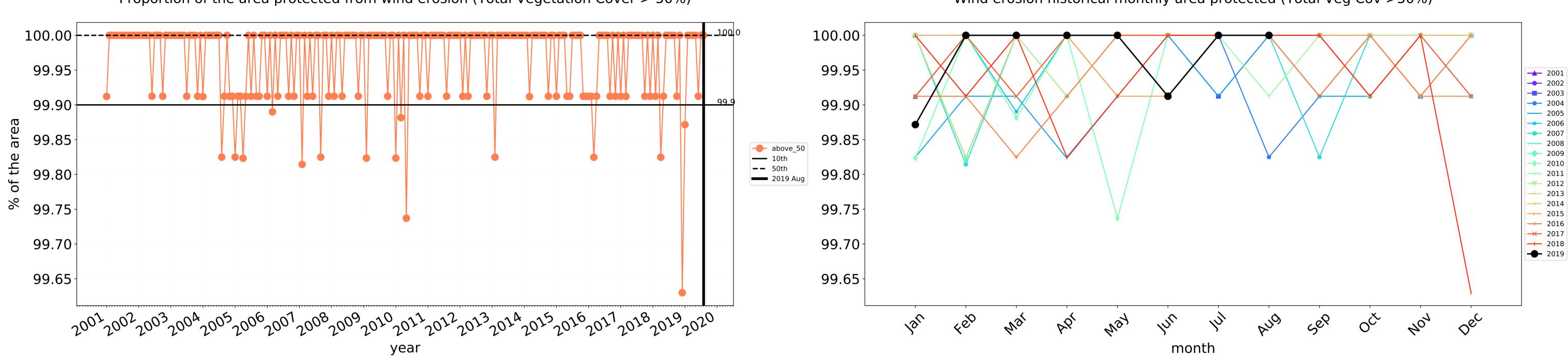






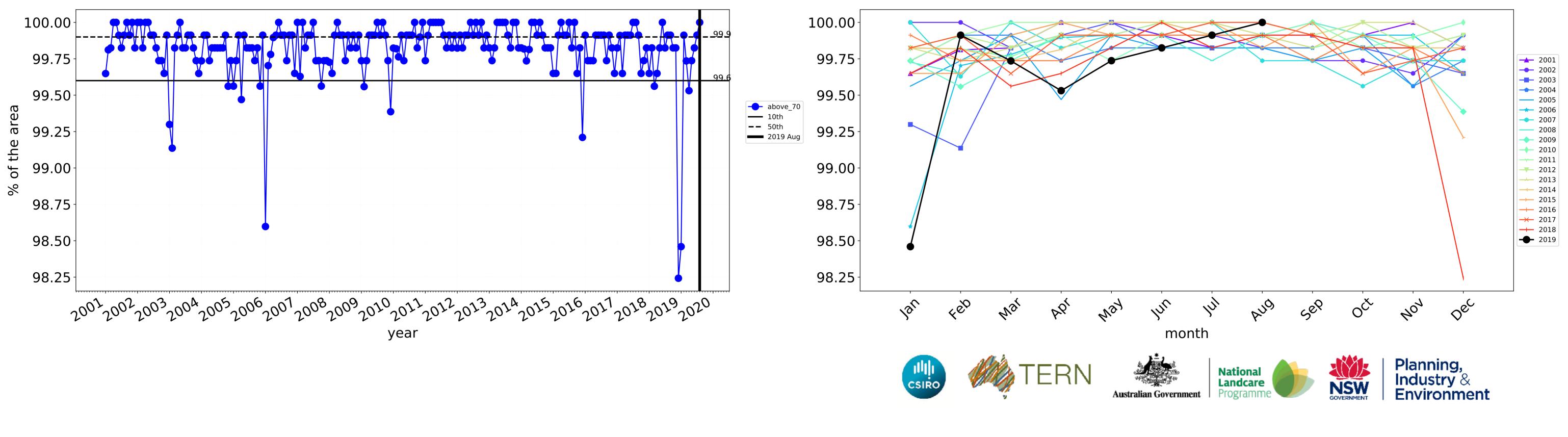


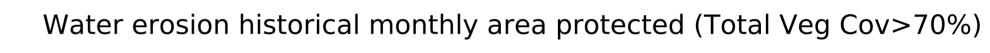




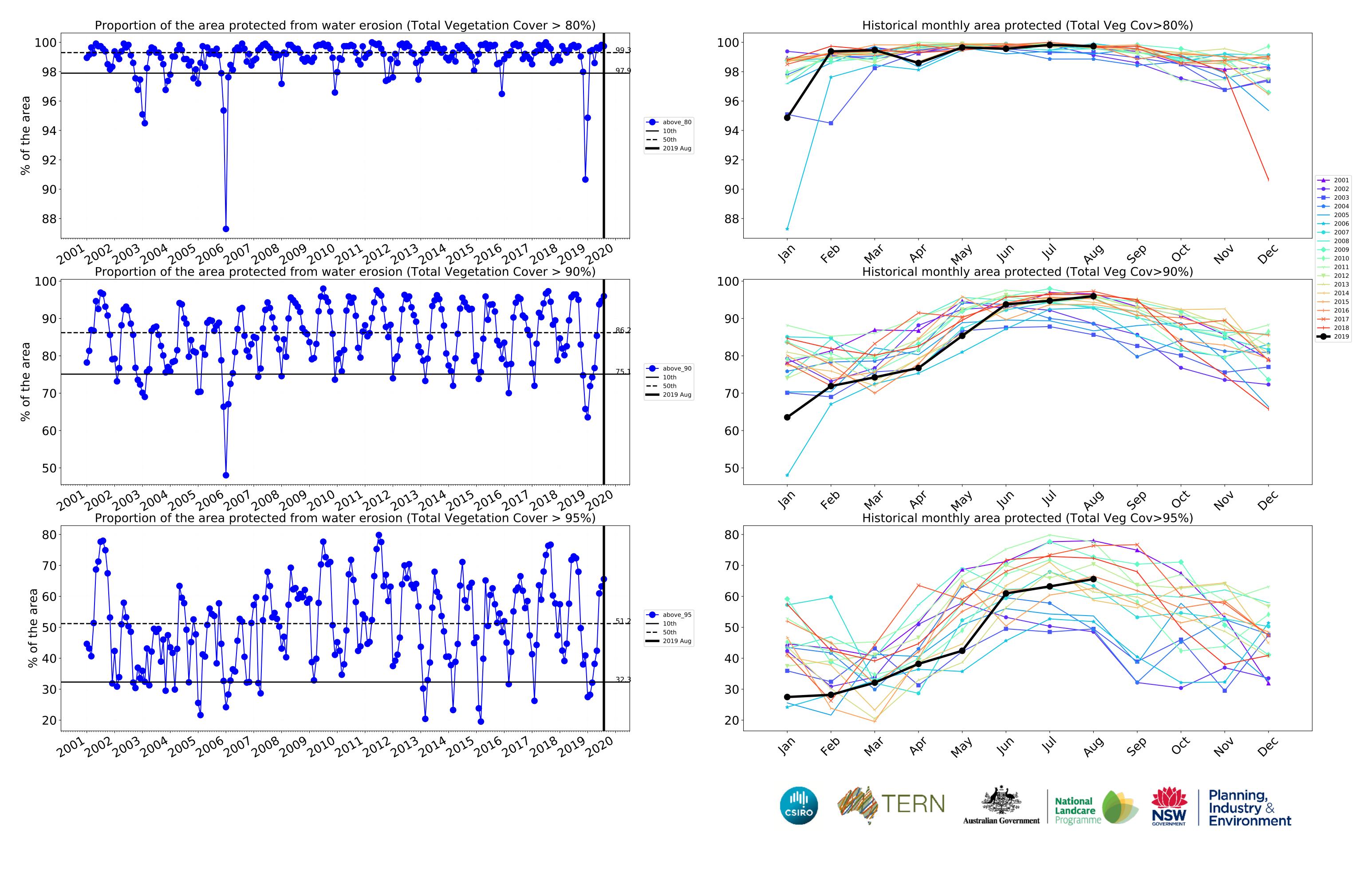
Proportion of the area protected from wind erosion (Total Vegetation Cover > 50%)

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





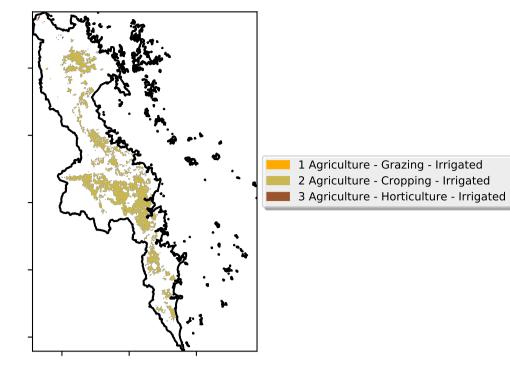
Wind erosion historical monthly area protected (Total Veg Cov >50%)



## Irrigation

### Land use and forest cover

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

2 Agriculture - Cropping - Irrigated

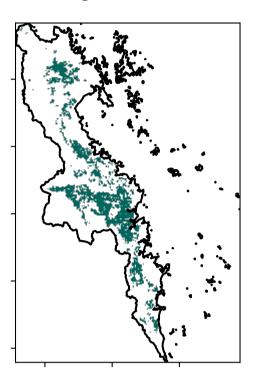
12%200%

· 52°10'TOON

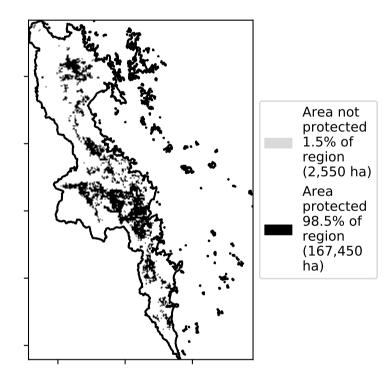
320050010

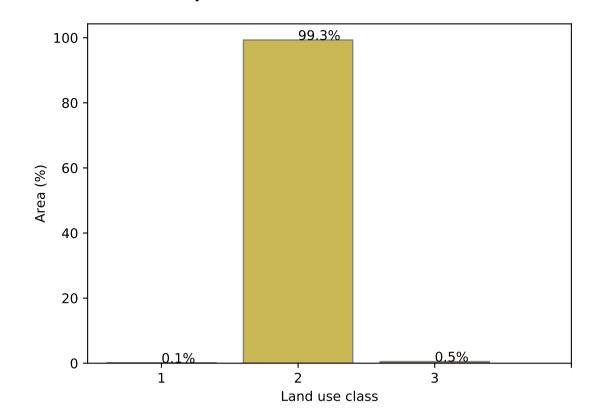
0.30%

**Total Vegetation Cover [%]** 



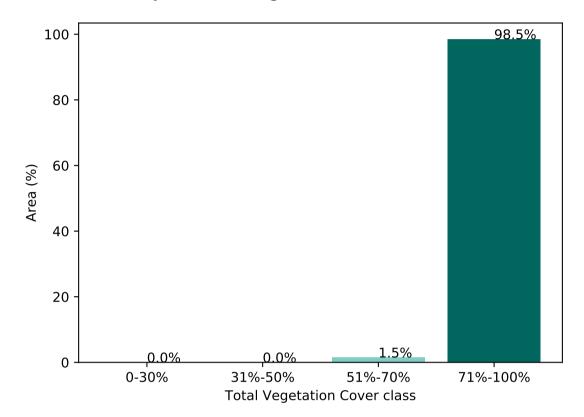
% Area protected from water erosion (>70%)



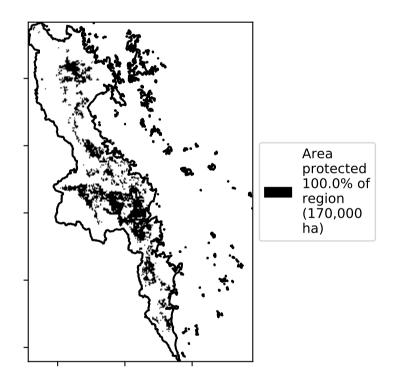


### Proportion of each land class in area

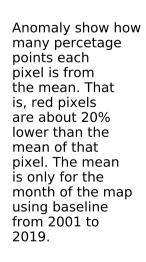
### Proportion of vegetation cover class in area

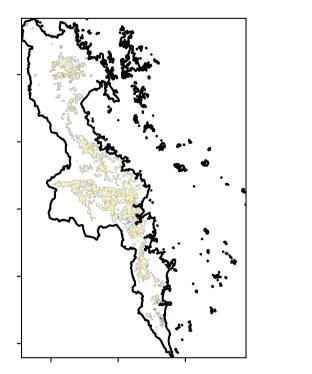


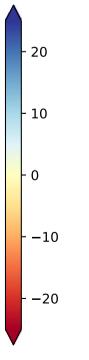
% Area protected from wind erosion (>50%)



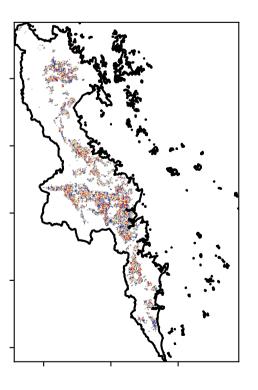
**Total Vegetation Cover Anomaly [%]** 

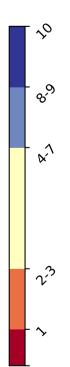






**Total Vegetation Cover Decile [%]** 





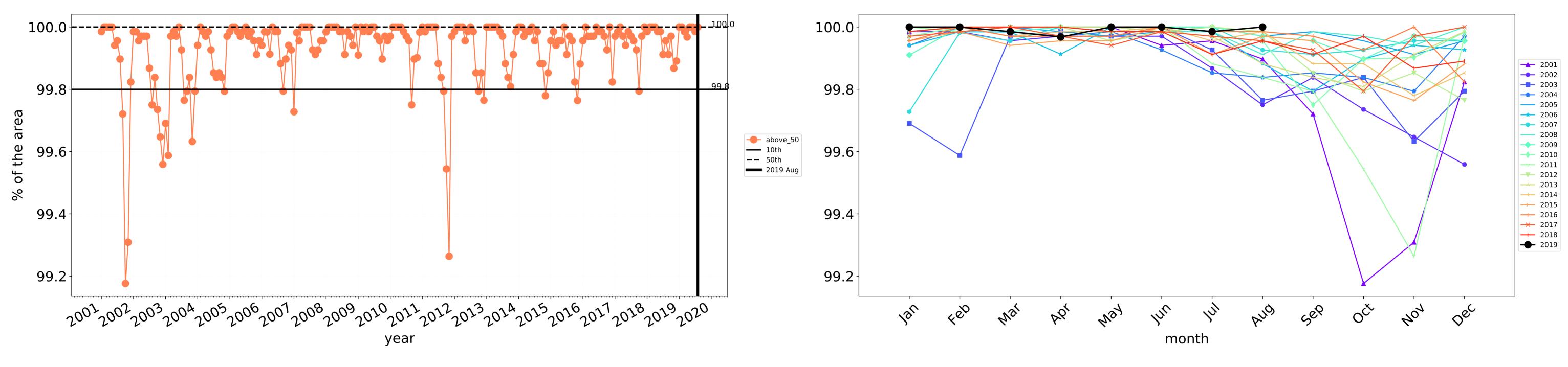


Deciles show where the pixel value lies in the

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

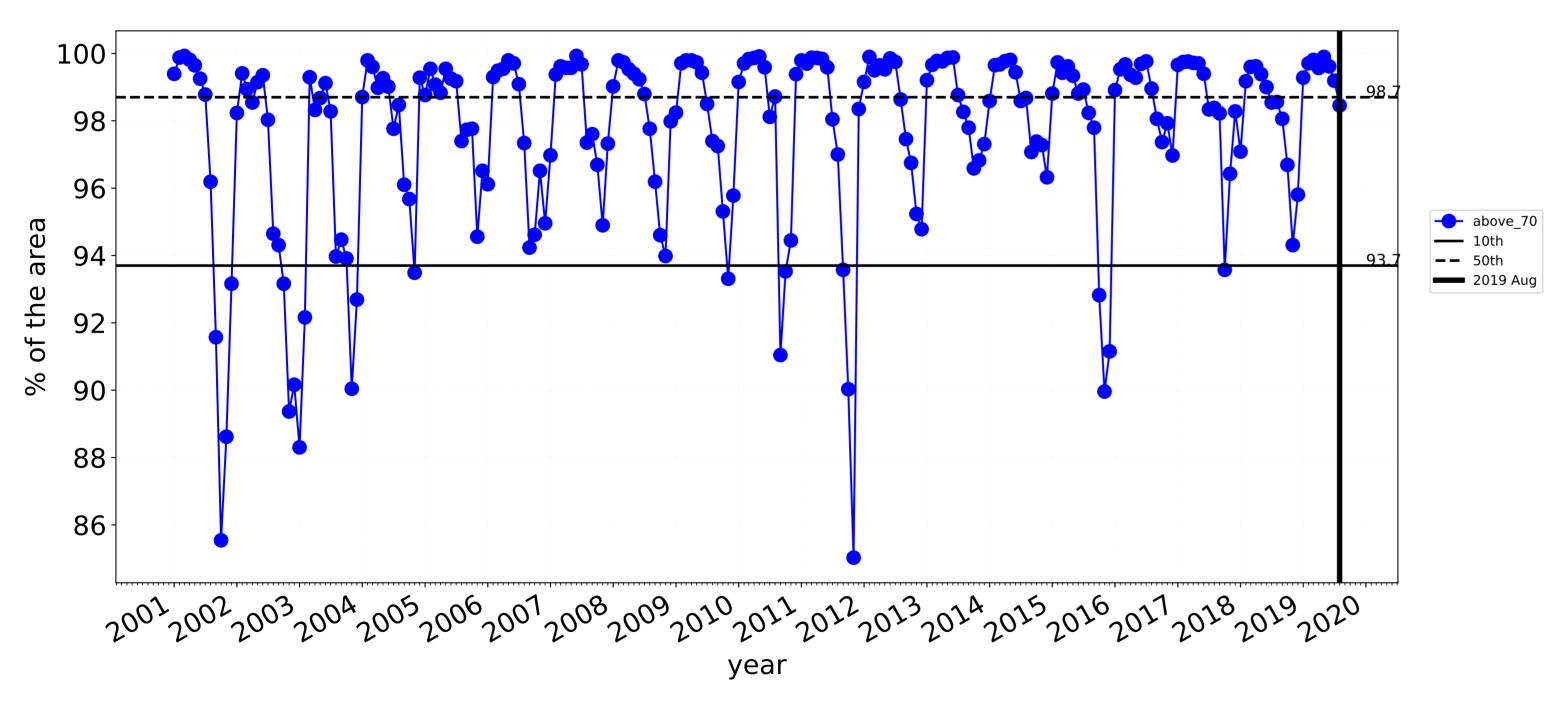
records for that month of

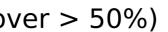
the map using baseline from 2001 to 2019.



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

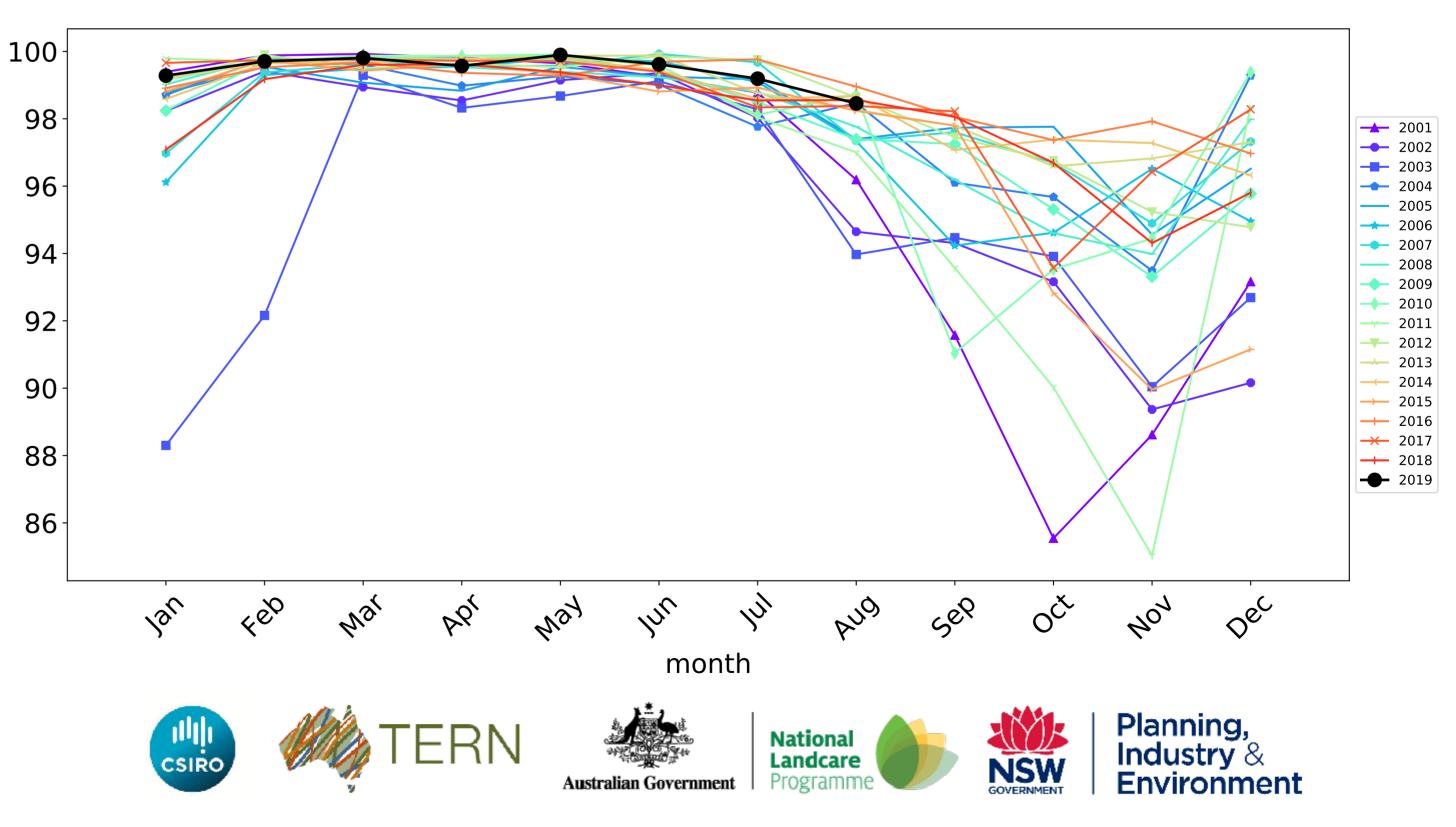


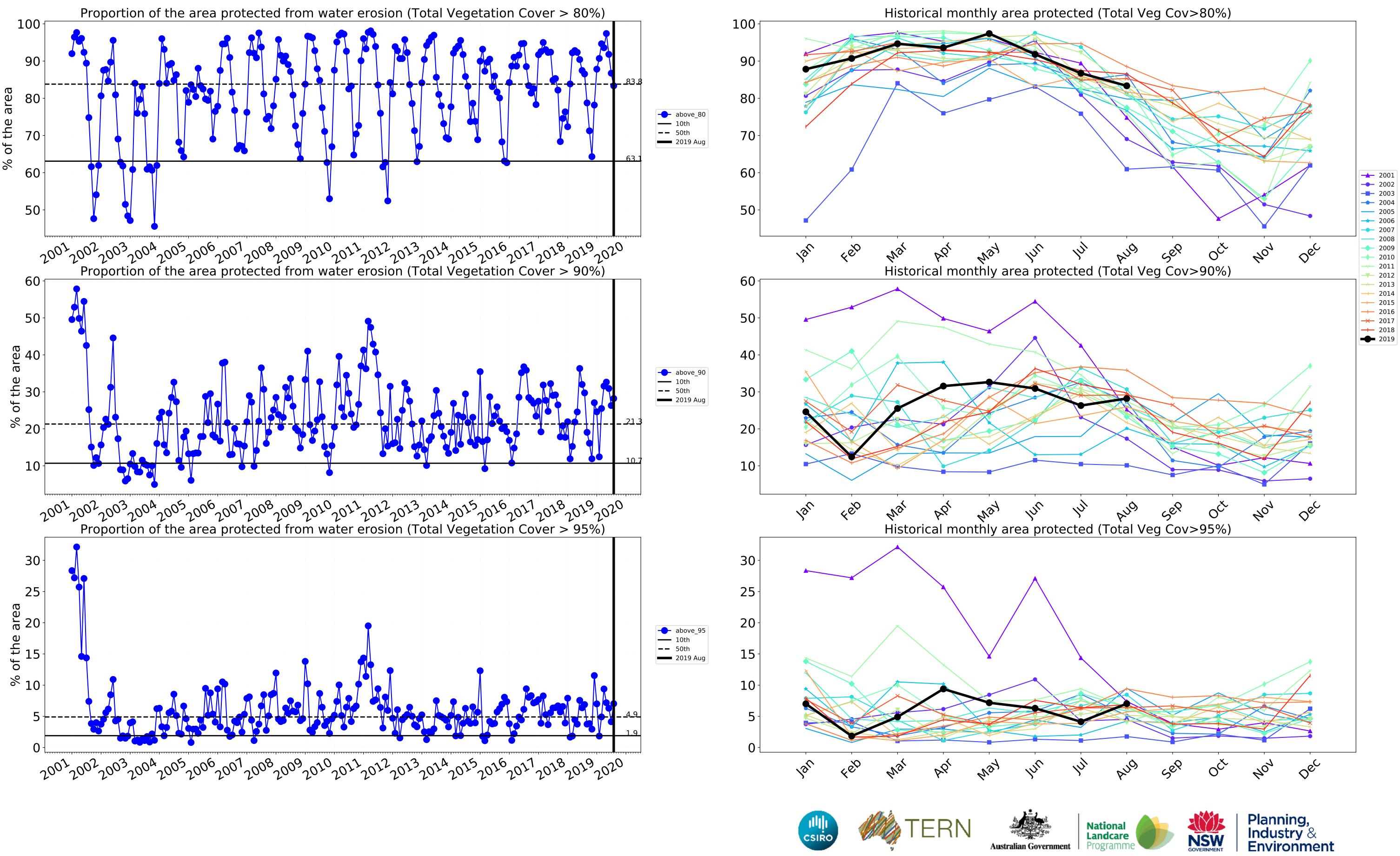




Wind erosion historical monthly area protected (Total Veg Cov >50%)

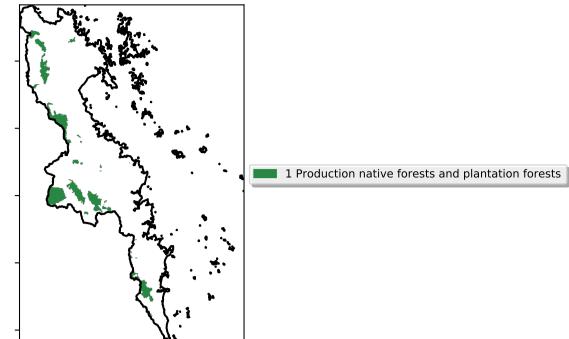
Water erosion historical monthly area protected (Total Veg Cov>70%)



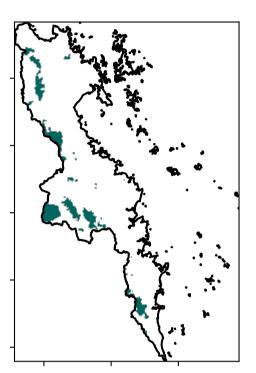


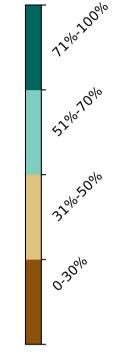
## **Production native forests and plantation forests**

Land use and forest cover

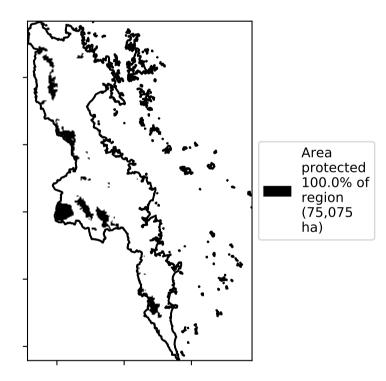


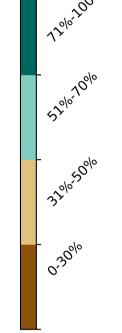
**Total Vegetation Cover [%]** 





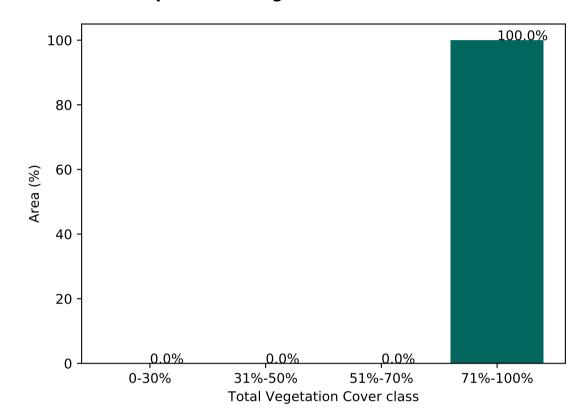
% Area protected from water erosion (>70%)



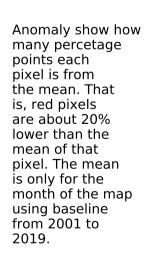


% Area protected from wind erosion (>50%)

### Proportion of vegetation cover class in area

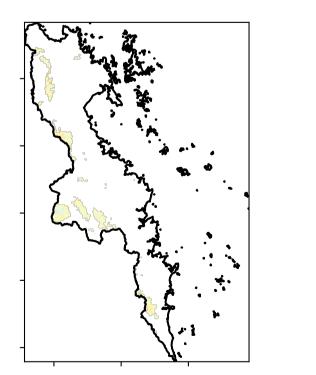


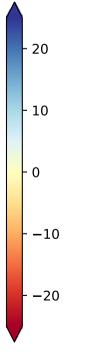
**Total Vegetation Cover Anomaly [%]** 

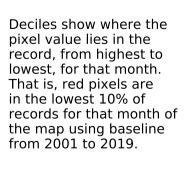


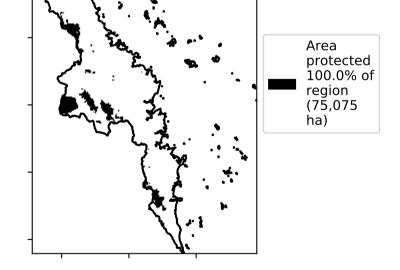
Catchment Scale Land Use and Forests of Australia (2018) Derived from

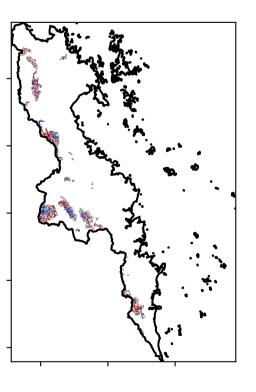
Catchment Scale Land Use of Australia (2018) and Forests of Australia (2018)

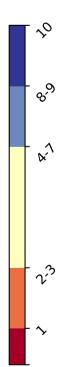




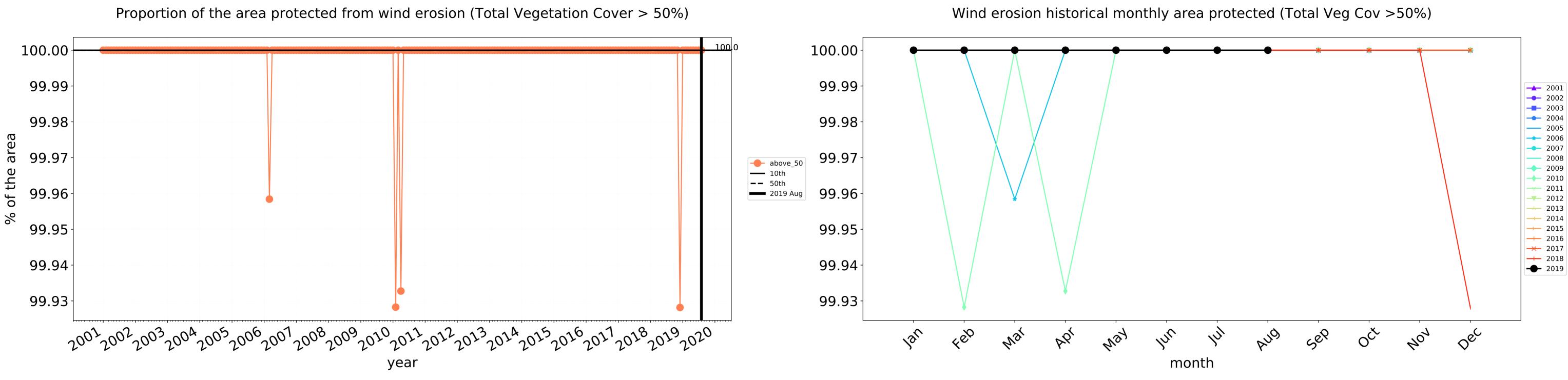




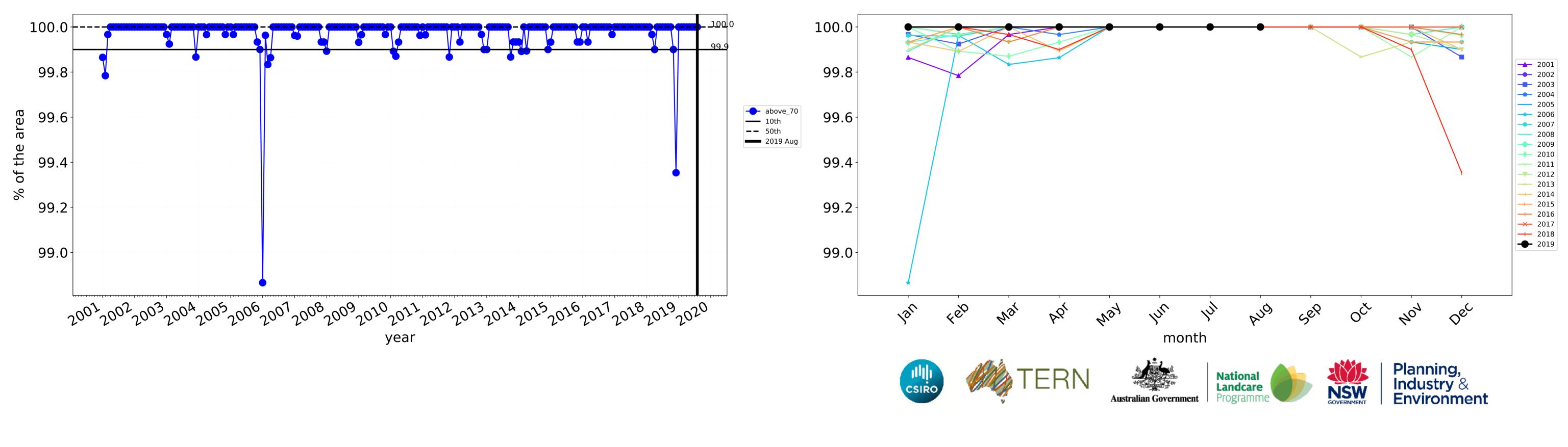




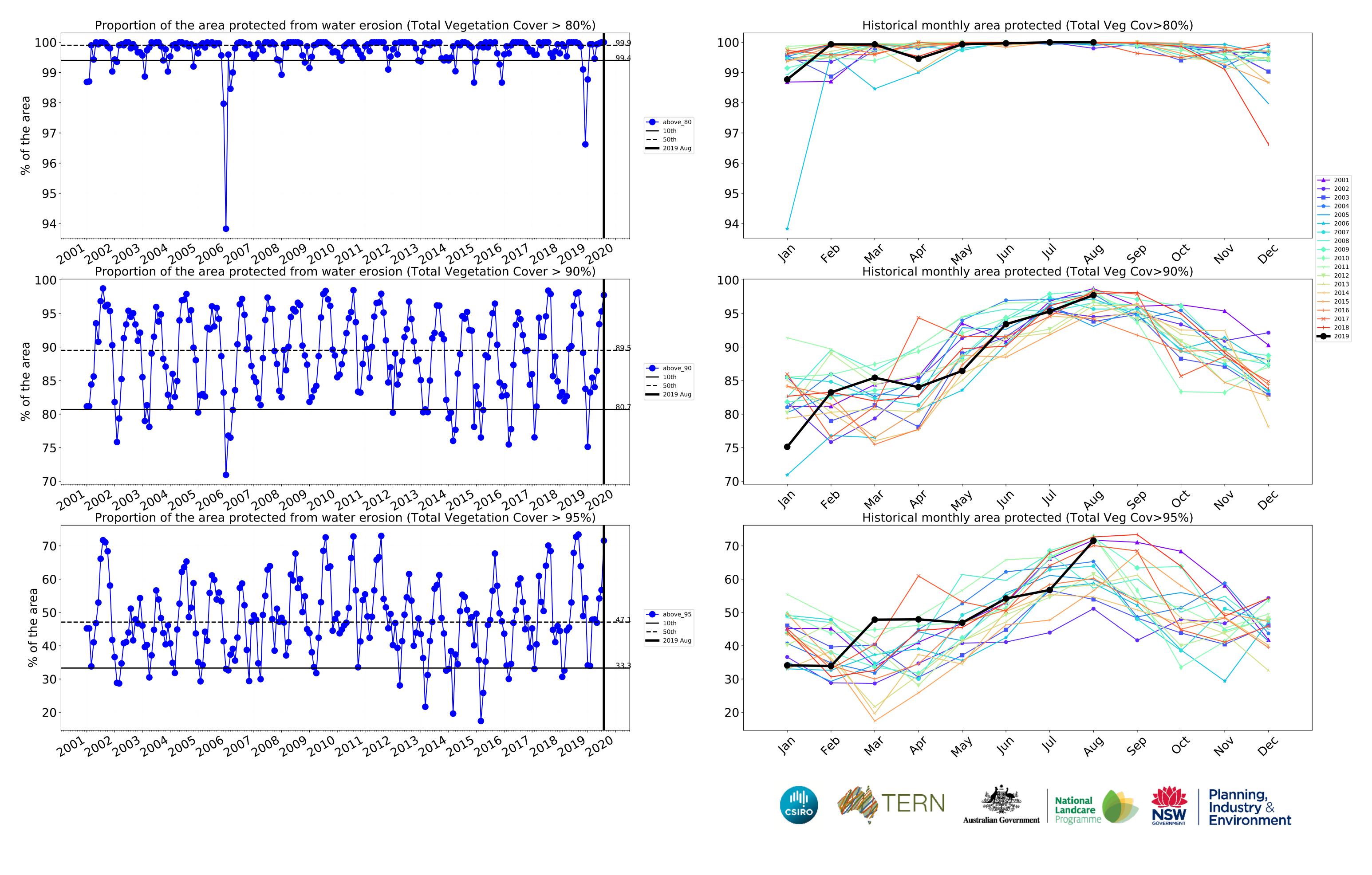




Proportion of the area protected from water erosion (Total Vegetation Cover > 70%)



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



# Mackay Whitsunday (909,025 ha and no data 24,035 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	909,025	100.0% 908,750	99.8% 907,275	98.6% 896,100	93.2% 847,325	72.6% 659,775	41.0% 372,475
Conservation and natural environments	276,550	99.9% 276,400	99.8% 275,875	98.9% 273,375	97.0% 268,300	87.4% 241,675	52.9% 146,275
Conservation and natural environments non forest	7,325	99.7% 7,300	98.6% 7,225	95.6% 7,000	82.6% 6,050	50.2% 3,675	22.2% 1,625
Conservation and natural environments Woodland forest	75,050	99.9% 75,000	99.7% 74,825	99.1% 74,400	97.9% 73,475	89.6% 67,250	54.5% 40,900
Conservation and natural environments Forest (non woodland)	194,175	100.0% 194,100	99.8% 193,825	98.9% 191,975	97.2% 188,775	87.9% 170,750	53.4% 103,750
Agriculture	468,400	100.0% 468,375	100.0% 468,250	99.3% 465,300	93.3% 437,225	66.6% 311,975	34.9% 163,300
Grazing	298,350	100.0% 298,325	99.9% 298,200	99.8% 297,875	99.0% 295,475	88.5% 264,000	50.7% 151,350
Grazing non forest	189,175	100.0% 189,175	99.9% 189,050	99.8% 188,725	98.7% 186,700	85.5% 161,700	47.1% 89,175
Grazing Woodland forest	80,625	100.0% 80,600	100.0% 80,600	100.0% 80,600	99.6% 80,300	92.9% 74,900	53.9% 43,450
Grazing - Forest (non woodland)	28,550	100.0% 28,550	100.0% 28,550	100.0% 28,550	99.7% 28,475	96.0% 27,400	65.6% 18,725
Irrigation	170,000	100.0% 170,000	100.0% 170,000	98.5% 167,375	83.4% 141,700	28.2% 47,950	7.0% 11,950
Production native forests and plantation forests	75,075	100.0% 75,075	100.0% 75,075	100.0% 75,075	100.0% 75,075	97.7% 73,375	71.6% 53,725

