Total vegetation cover soil protection Region:LGA Toowoomba_(R) QLD

Date: October 2021

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:

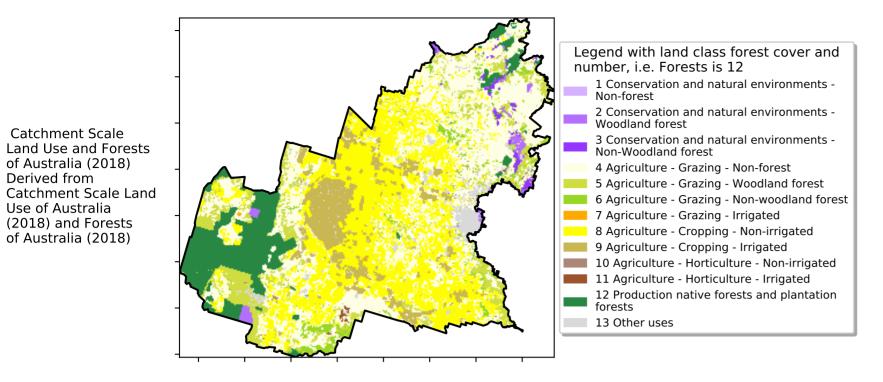
https://doi.org/10.4225/08/5848a3f19a7b3



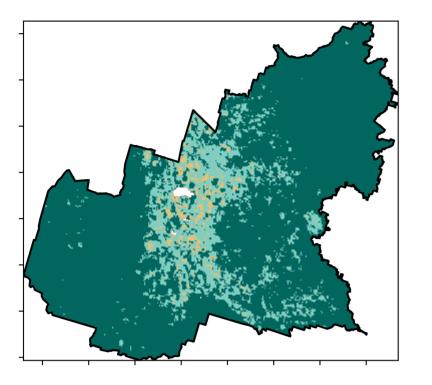
Vegetation Cover Oct 2021

Land use and forest cover

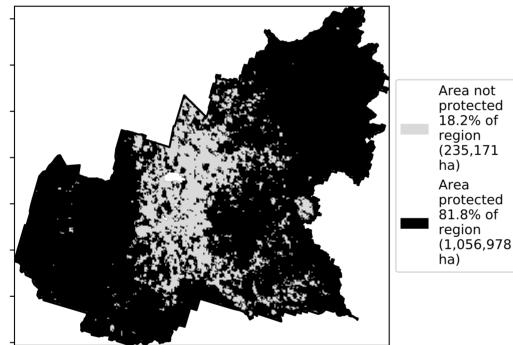
Proportion of each land class in area

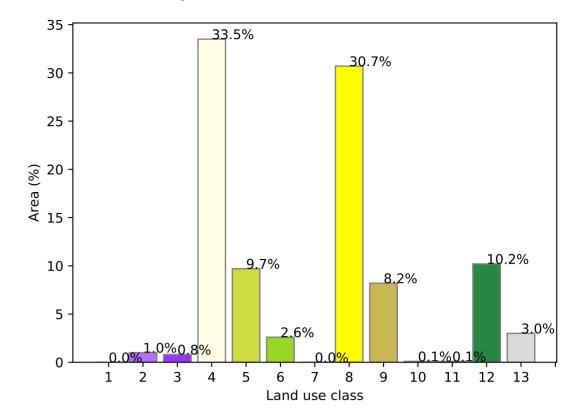


Total Vegetation Cover [%]

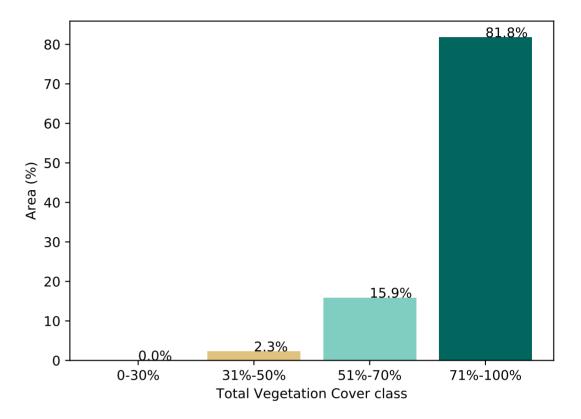


% Area protected from water erosion (>70%)





Proportion of vegetation cover class in area



% Area protected from wind erosion (>50%)



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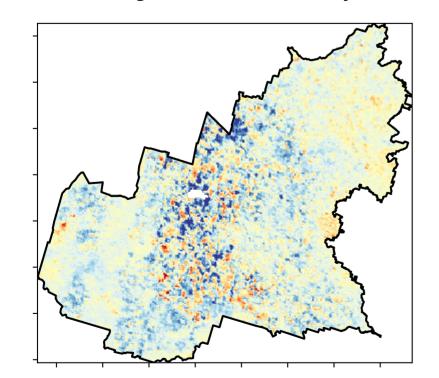
12%200%

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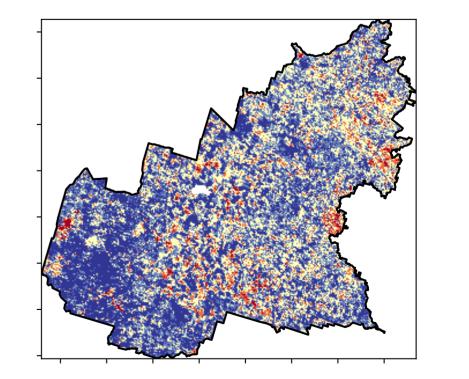


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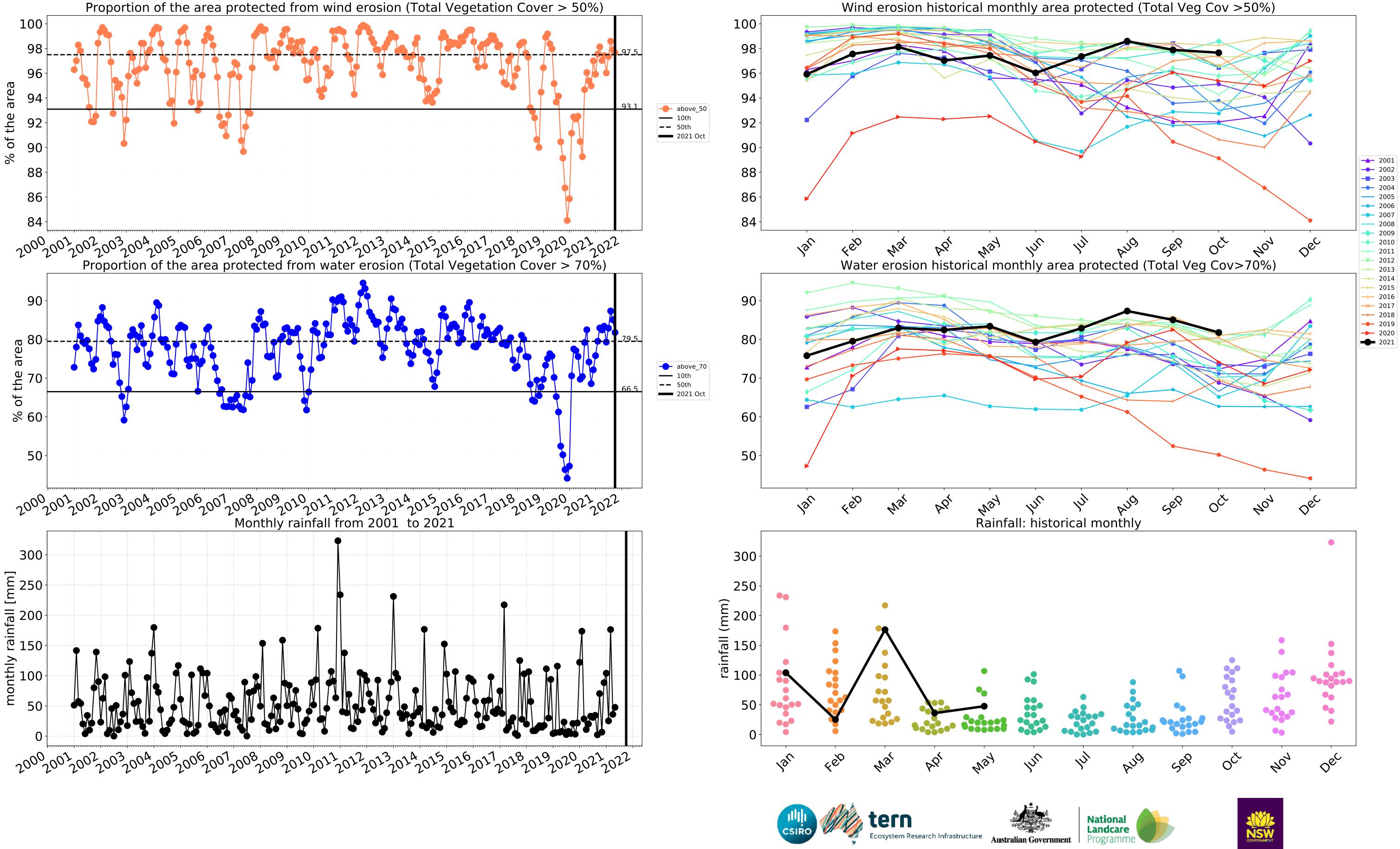
Deciles show where the Deciles show where the pixel value lies in the record, from highest to lowest, for that month. That is, red pixels are in the lowest 10% of records for that month of the map using baseline from 2001 to 2019. Total Vegetation Cover Decile [%]



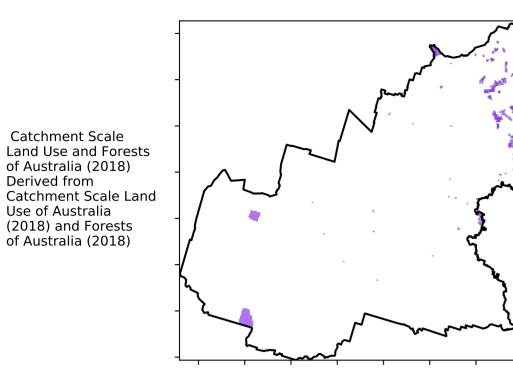


Anomaly show how many percetage points each pixel is from the mean. That is, red pixels are about 20% lower than the mean of that pixel. The mean is only for the month of the map using baseline from 2001 to 2019.

Derived from

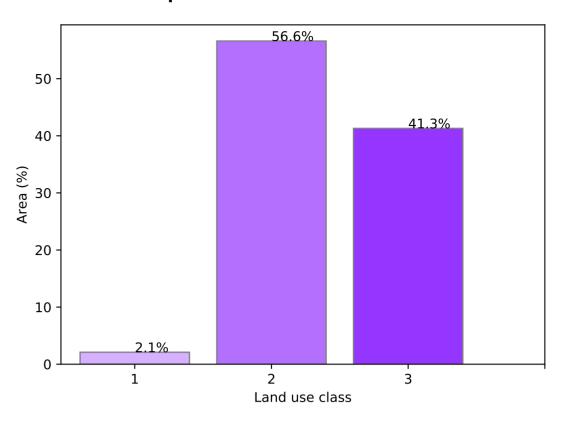


Conservation and natural environments

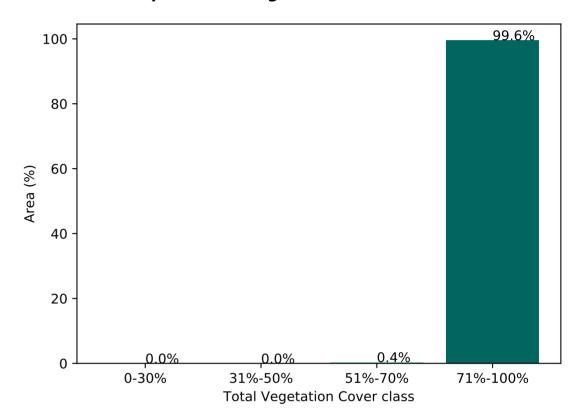


Land use and forest cover

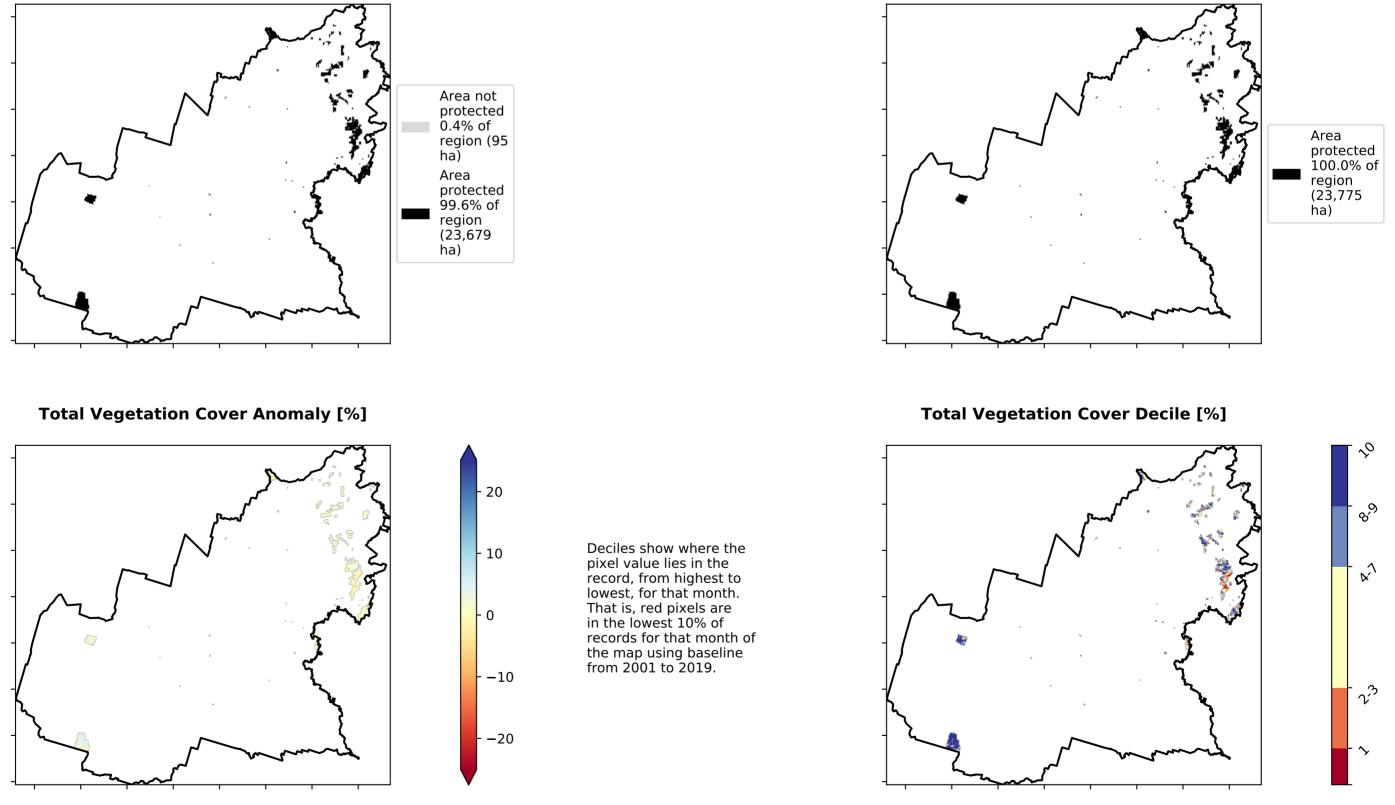
Proportion of each land class in area



Proportion of vegetation cover class in area



% Area protected from wind erosion (>50%)



1 Conservation and natural environments - Non-forest 2 Conservation and natural environments - Woodland forest 3 Conservation and natural environments - Nonwoodland forest

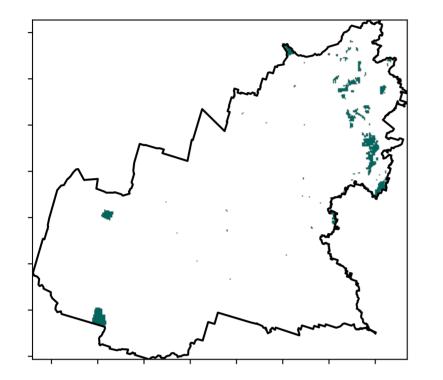
12%200%

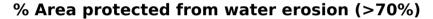
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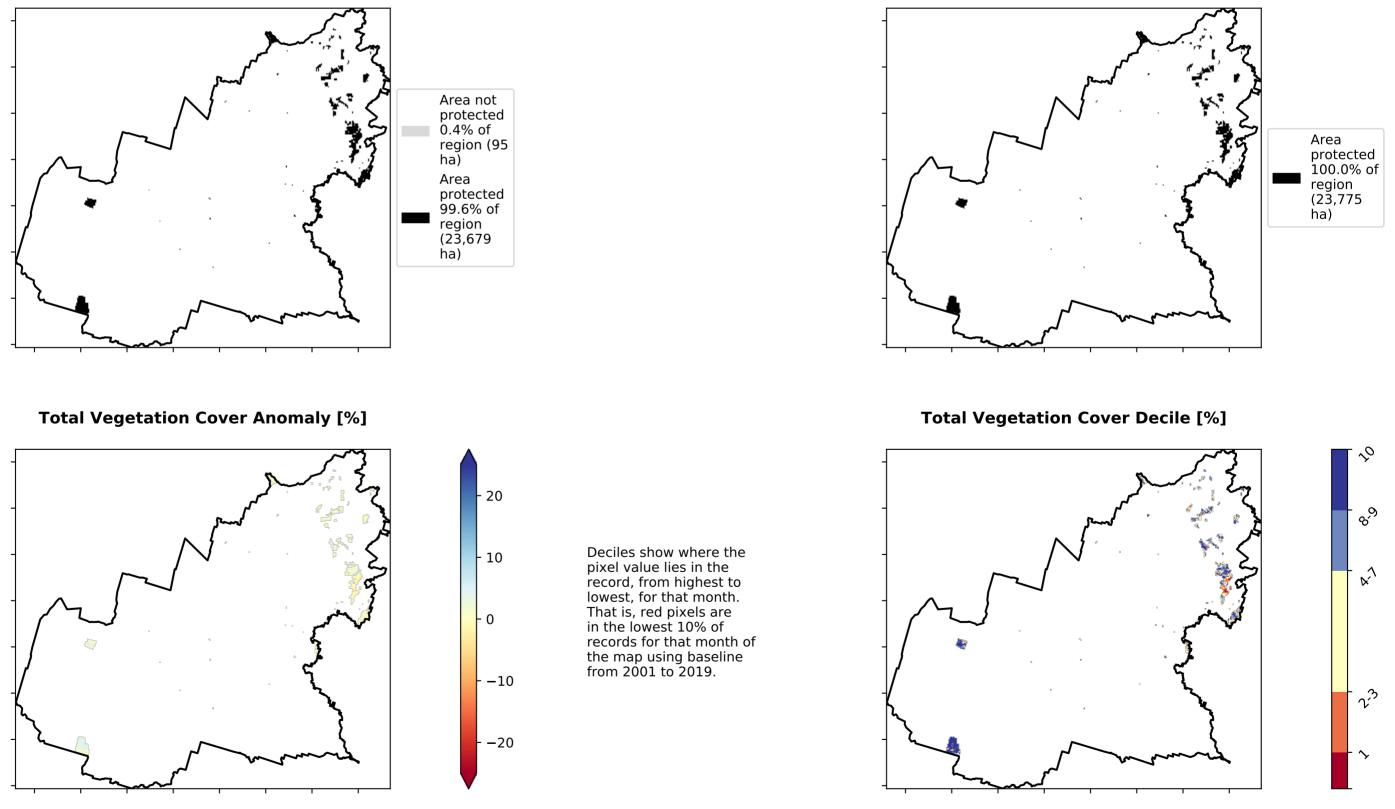
3201050010

0.30%

Total Vegetation Cover [%]

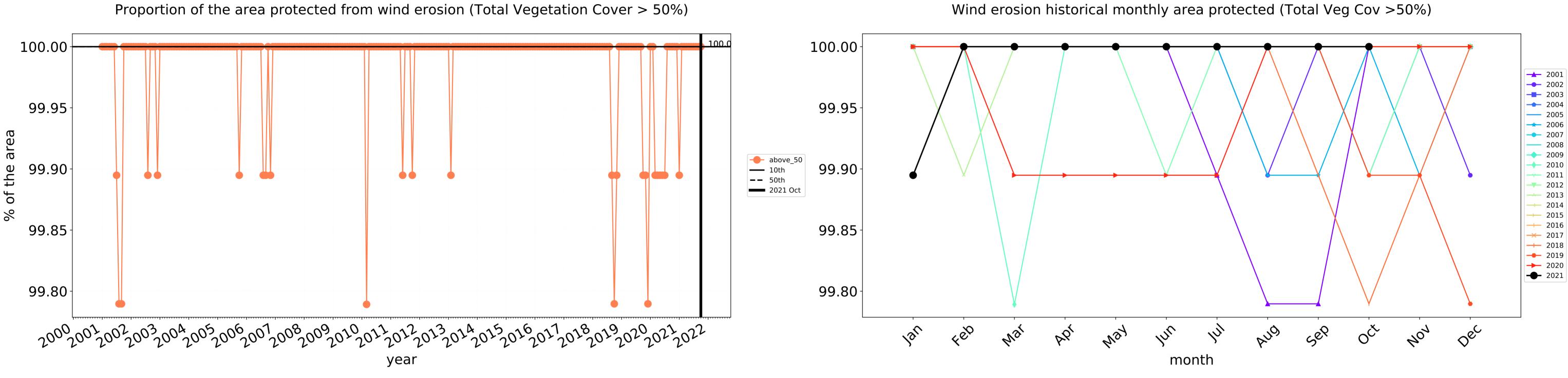




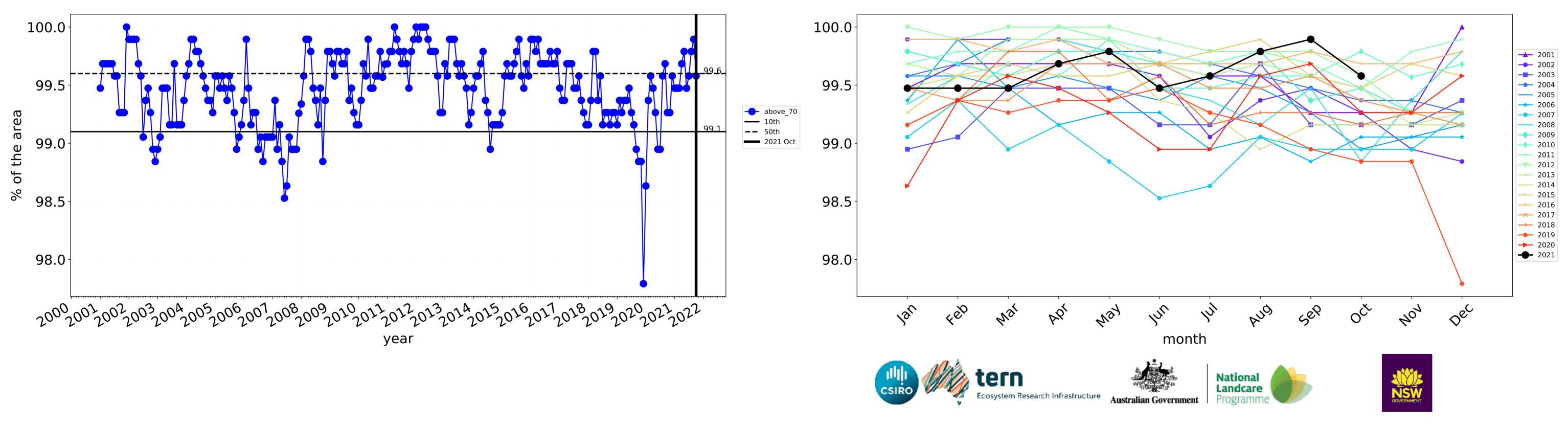


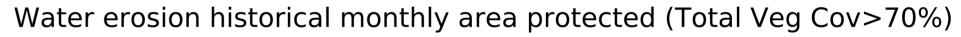


Anomaly show how many percetage points each pixel is from the mean. That is, red pixels are about 20% lower than the mean of that pixel. The mean is only for the month of the map using baseline from 2001 to 2019.





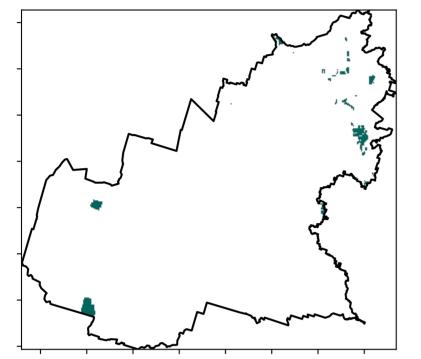


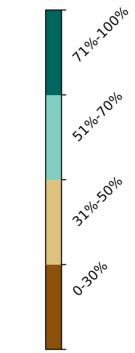


Conservation and natural environments Woodland forest

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

Total Vegetation Cover [%]





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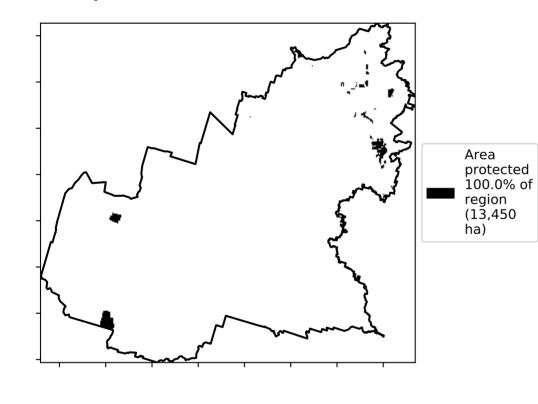
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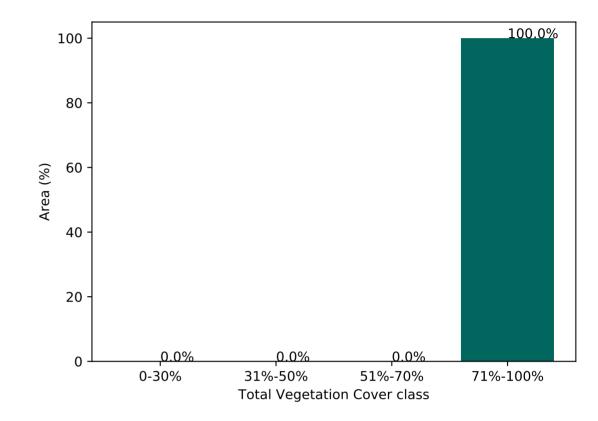
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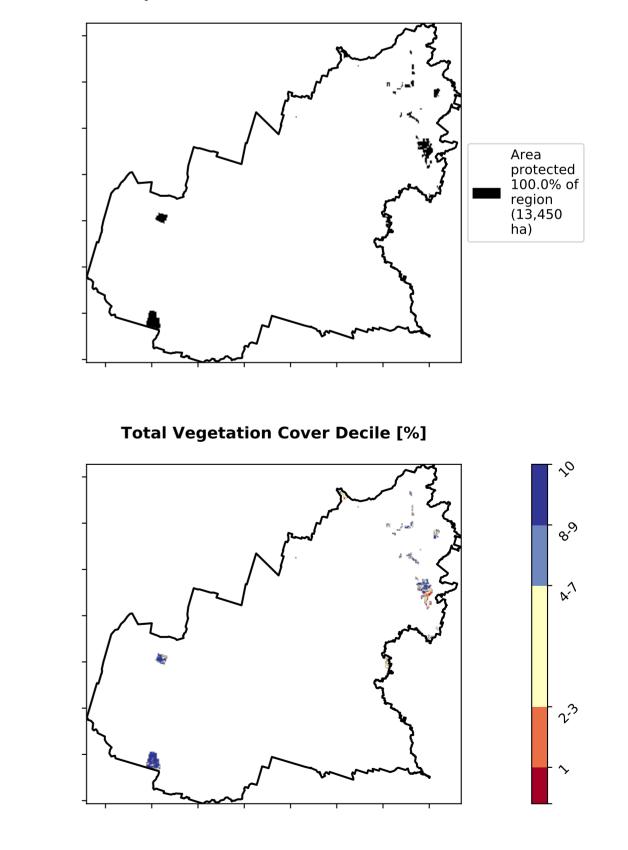
% Area protected from water erosion (>70%)



Proportion of vegetation cover class in area



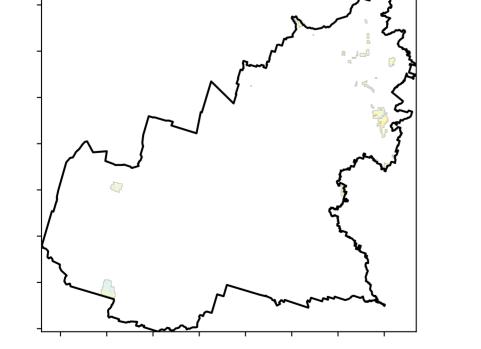
% Area protected from wind erosion (>50%)



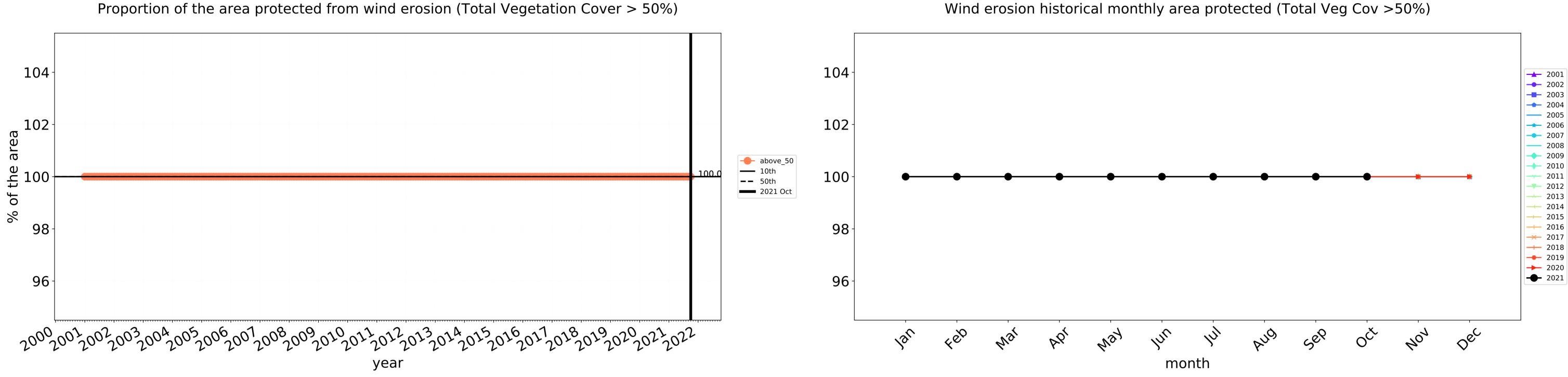


Total Vegetation Cover Anomaly [%]

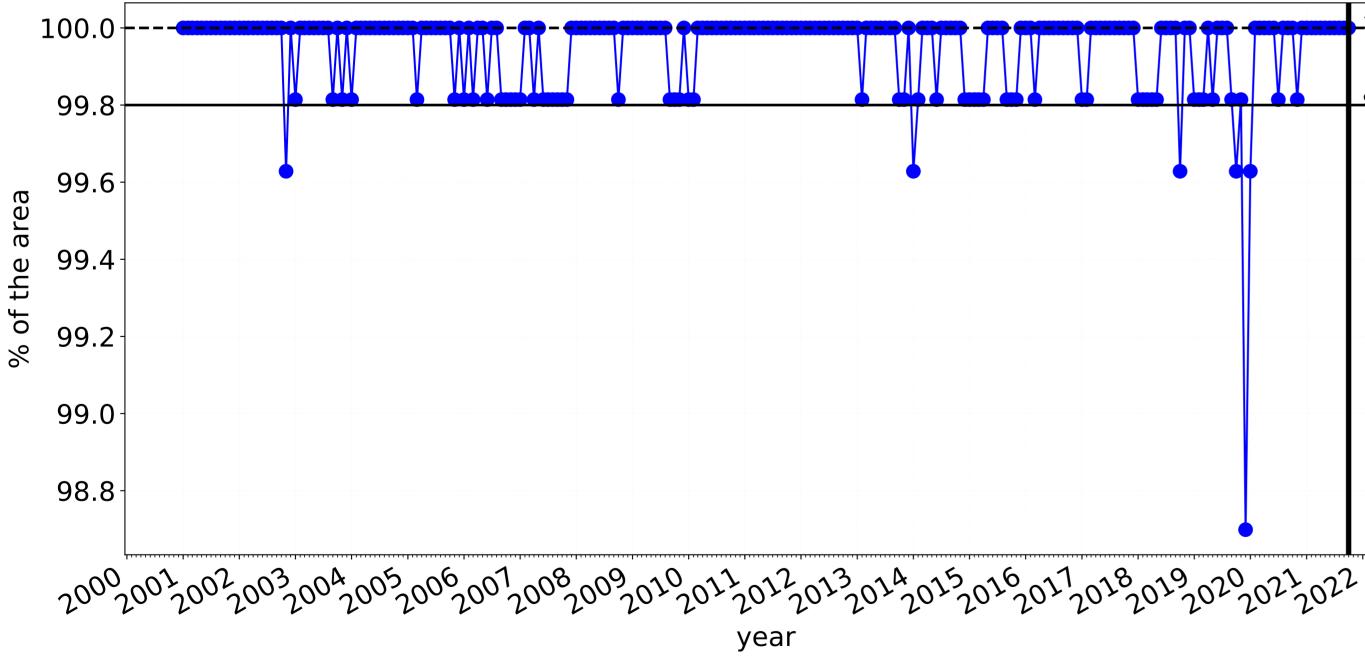
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Deciles show where the pixel value lies in the record, from highest to lowest, for that month. That is, red pixels are in the lowest 10% of records for that month of the map using baseline from 2001 to 2019.

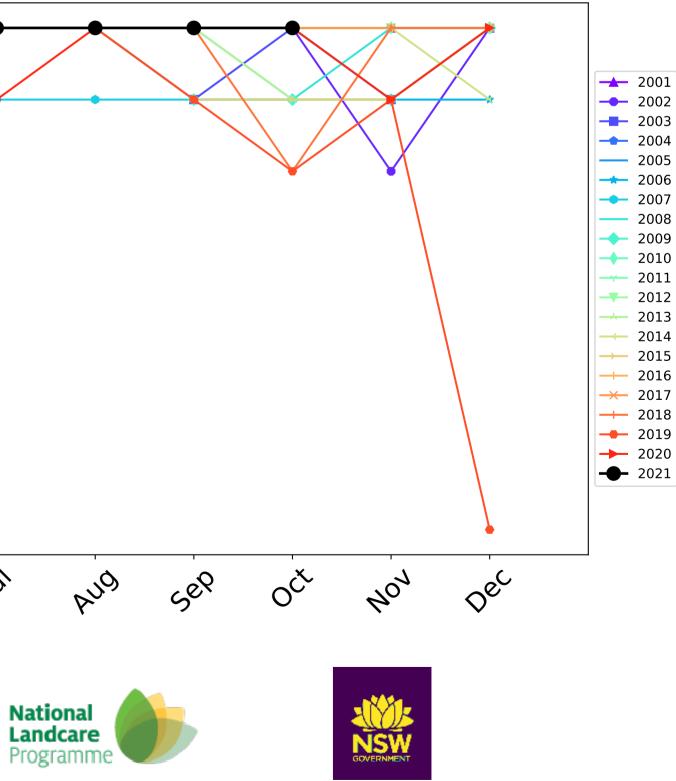


Proportion of the area protected from water erosion (Total Vegetation Cover > 70%)



1<u>00.</u> 100.0-99.8 99.6 ---- above_70 **—** 10th **——** 50th **—** 2021 Oct 99.4 99.2 99.0 98.8 Par 4eb way In 1¹1 PQ War month tern Ecosystem Research Infrastructure Australian Government

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)

pixel is from

is, red pixels

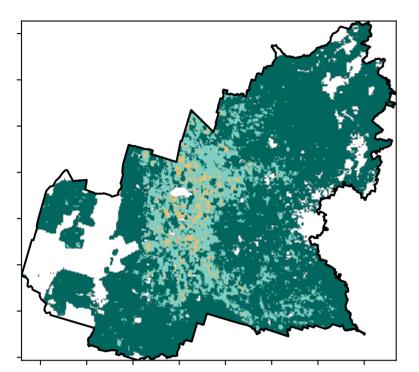
lower than the

mean of that

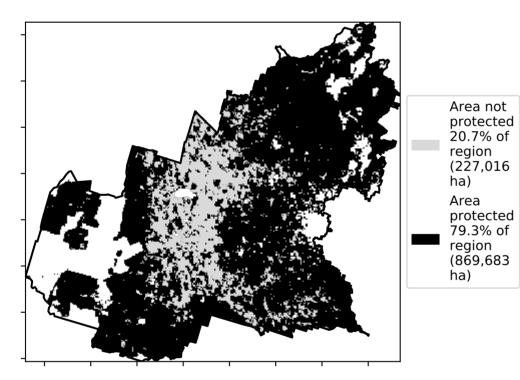
1 Agriculture - Grazing - Non forest 2 Agriculture - Grazing - Woodland forest 3 Agriculture - Grazing - Non-woodland forest 4 Agriculture - Grazing - Irrigated 5 Agriculture - Cropping - Non-irrigated 6 Agriculture - Cropping - Irrigated 7 Agriculture - Horticulture - Non-irrigated 8 Agriculture - Horticulture - Irrigated

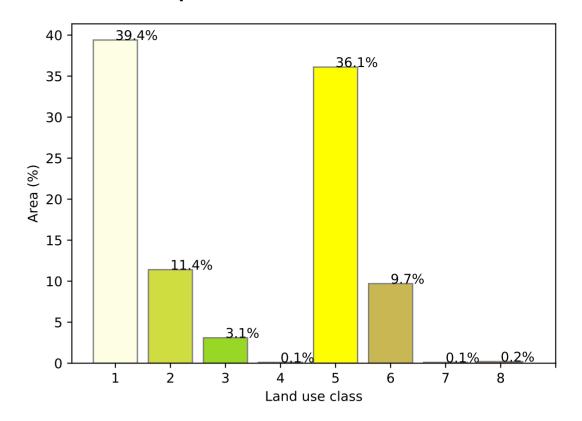
Total Vegetation Cover [%]

Land use and forest cover



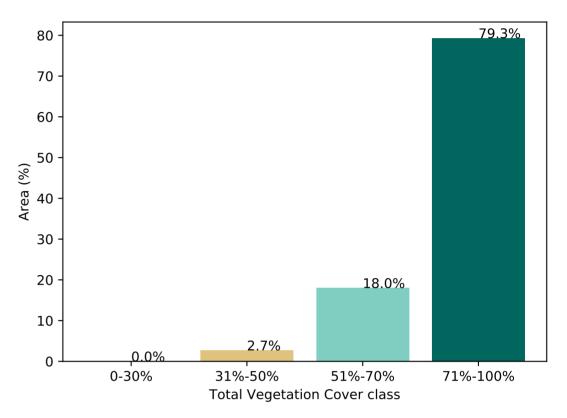
% Area protected from water erosion (>70%)



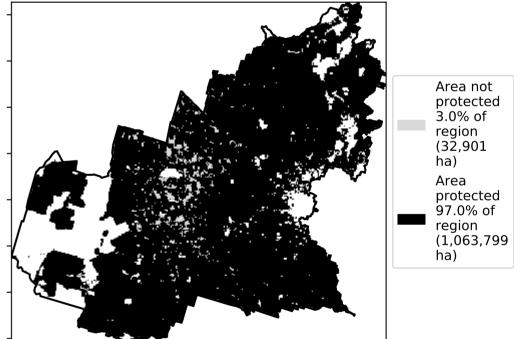


Proportion of each land class in area

Proportion of vegetation cover class in area



% Area protected from wind erosion (>50%)



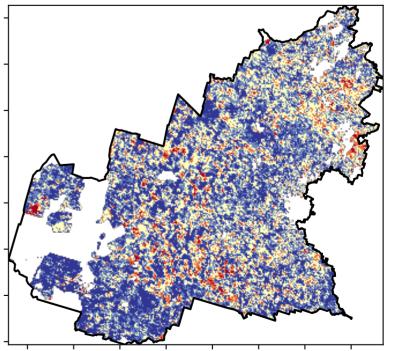
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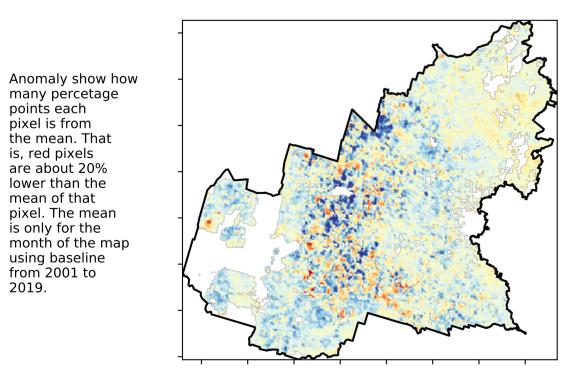
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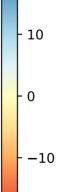
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Total Vegetation Cover Decile [%]



Total Vegetation Cover Anomaly [%]





-20

20

12%200%

52°1010°12

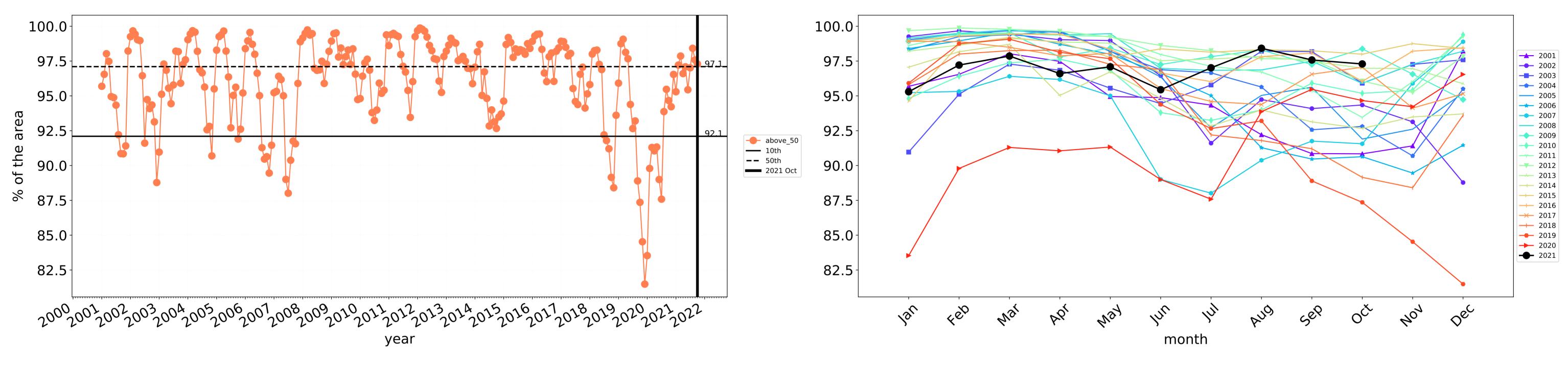
32°10'50°10

0.30%

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

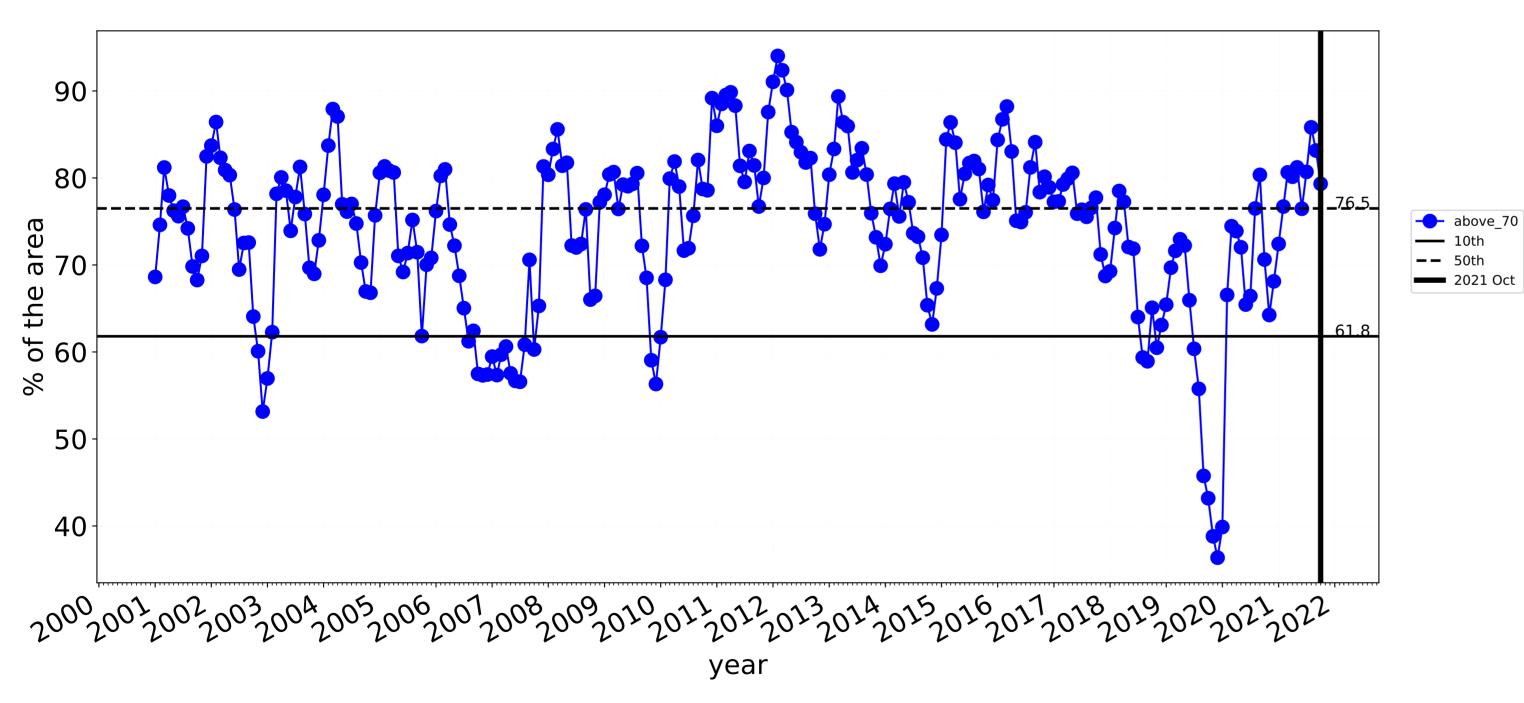




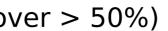


Proportion of the area protected from wind erosion (Total Vegetation Cover > 50%)

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



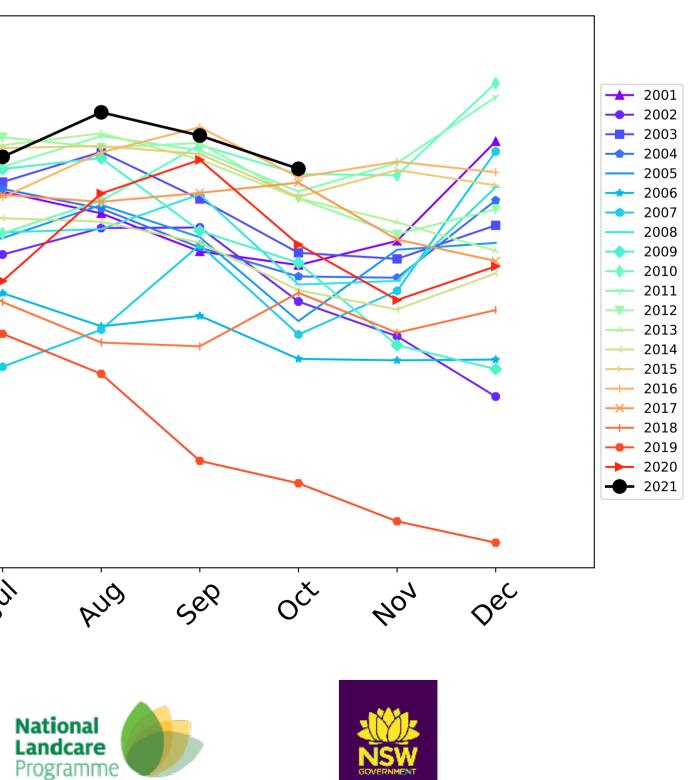
Agriculture timeseries



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

90 80 70 60 50 40 Jan feb Inu way Mai Þ6, month tern Ecosystem Research Infrastructure Australian Government

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



Grazing

1 Agriculture - Grazing - Non forest

12%200%

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0.30%

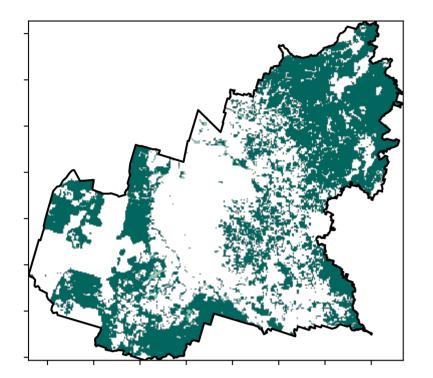
2 Agriculture - Grazing - Woodland forest

3 Agriculture - Grazing - Non-woodland forest

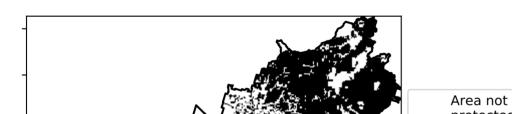
Catchment Scale Land Use and Forests of Australia (2018) Catchment Scale Land Use of Australia (2018) and Forests of Australia (2018)

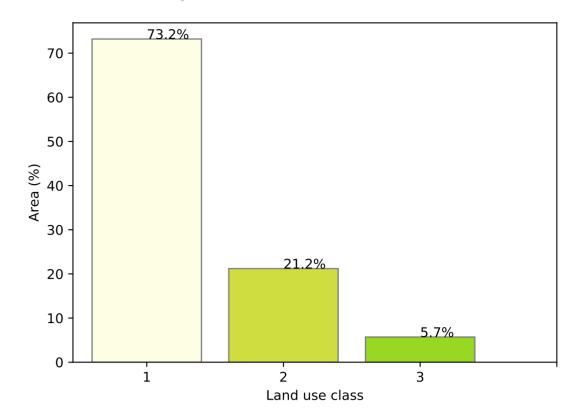
Land use and forest cover

Total Vegetation Cover [%]



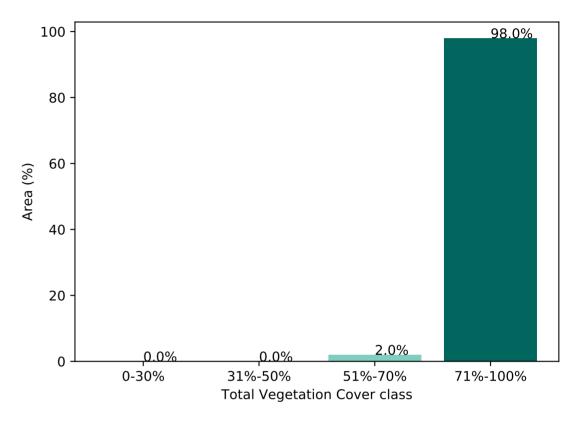




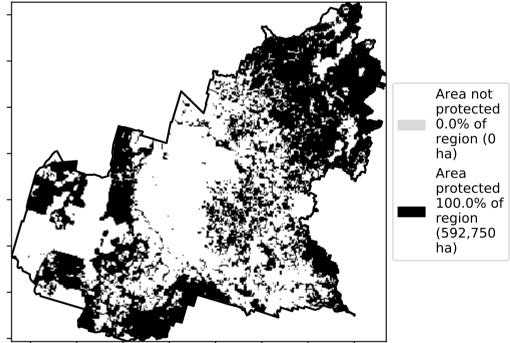


Proportion of each land class in area

Proportion of vegetation cover class in area



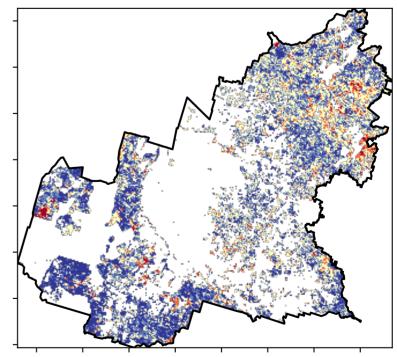
% Area protected from wind erosion (>50%)



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Total Vegetation Cover Decile [%]





Deciles show where the pixel value lies in the

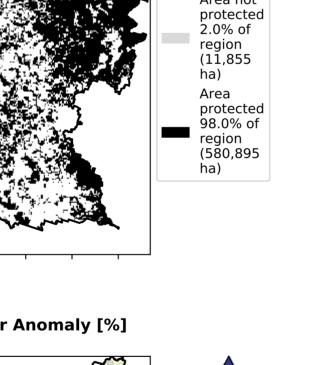
record, from highest to lowest, for that month. That is, red pixels are in the lowest 10% of

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

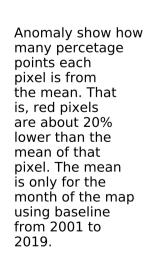
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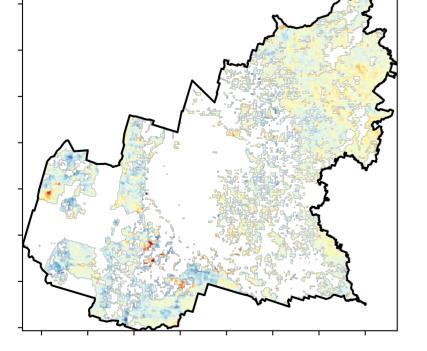
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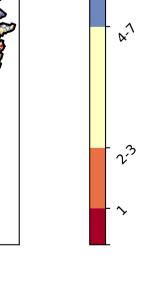
Total Vegetation Cover Anomaly [%]

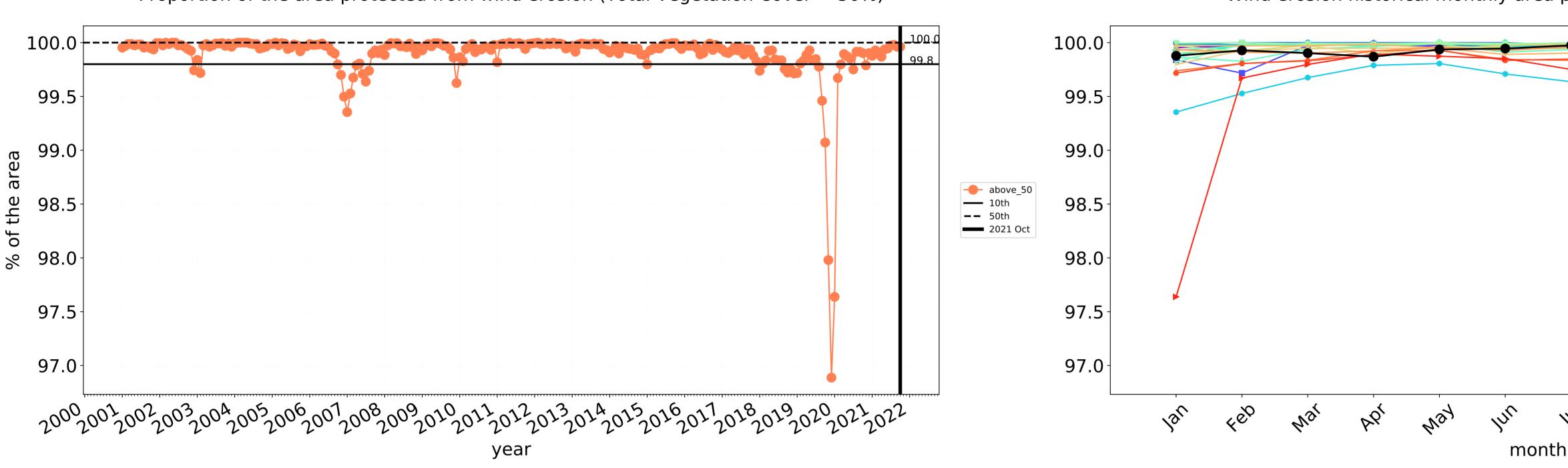


Derived from



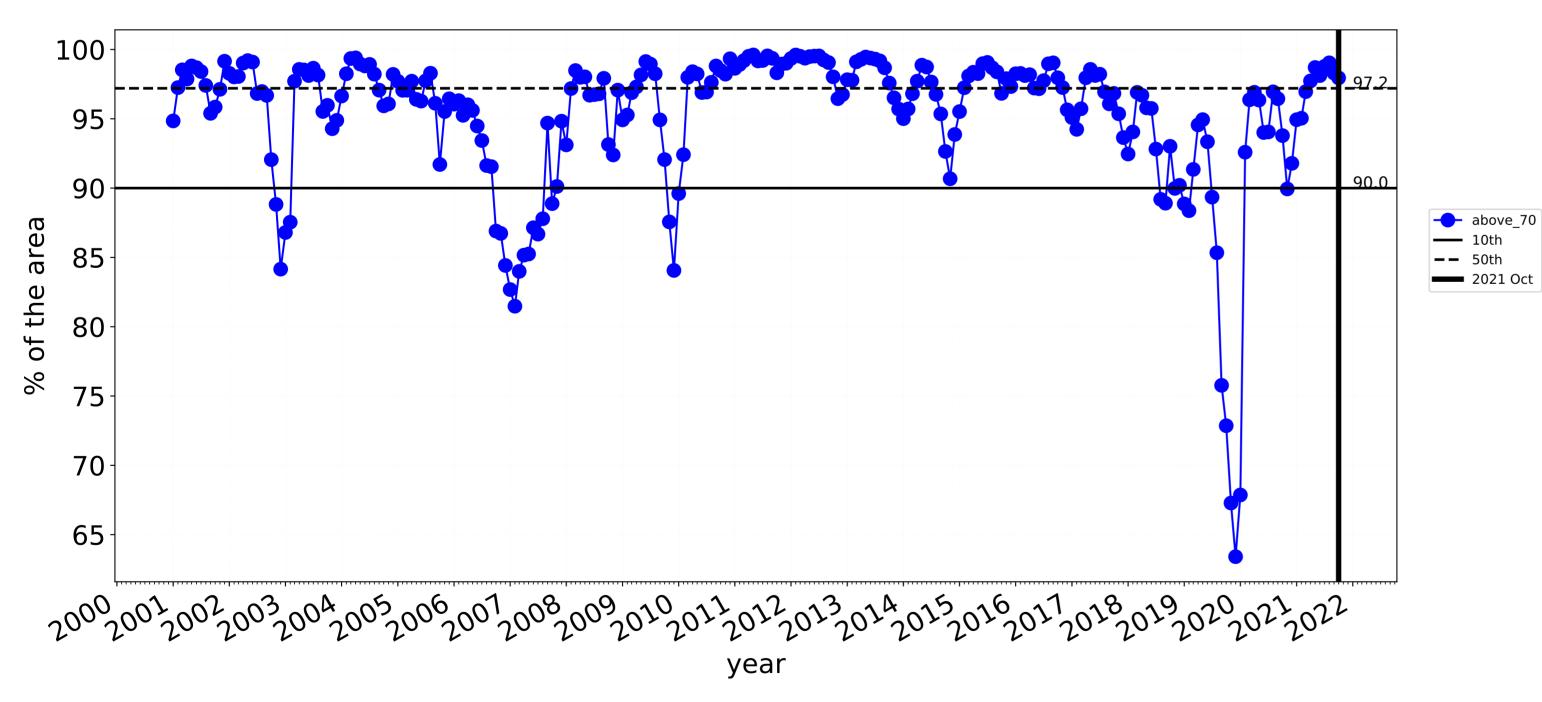






Proportion of the area protected from wind erosion (Total Vegetation Cover > 50%)

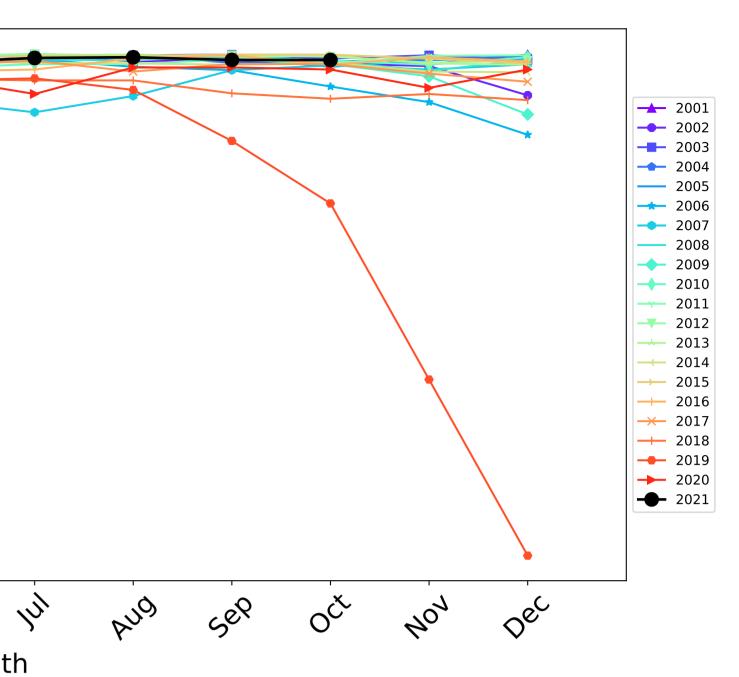
Proportion of the area protected from water erosion (Total Vegetation Cover > 70%)



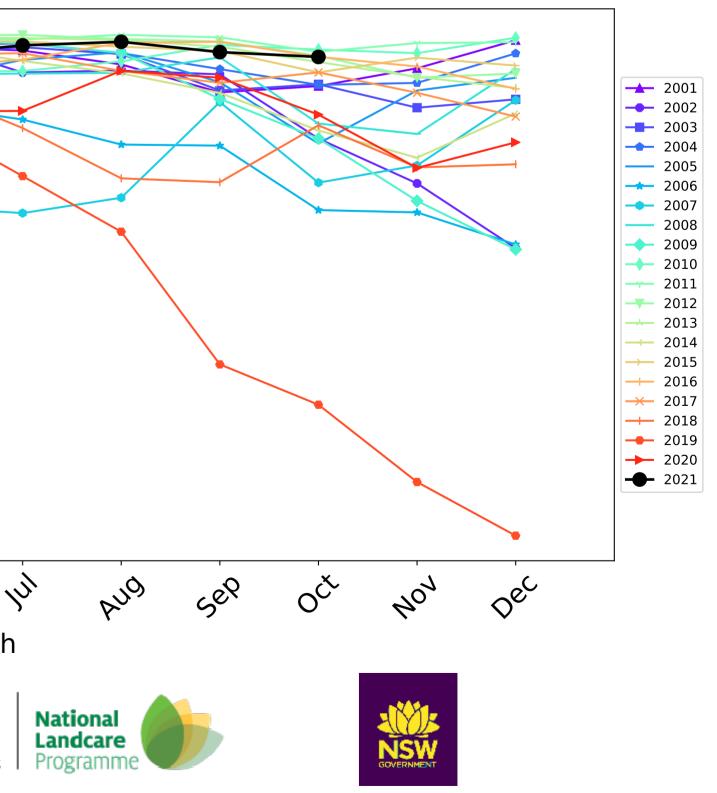
Grazing timeseries

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

100-95 90 85 80 75 70 65 Jan 4eb way In Mai Þ6, month tern Ecosystem Research Infrastructure Australian Government



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



Grazing non forest

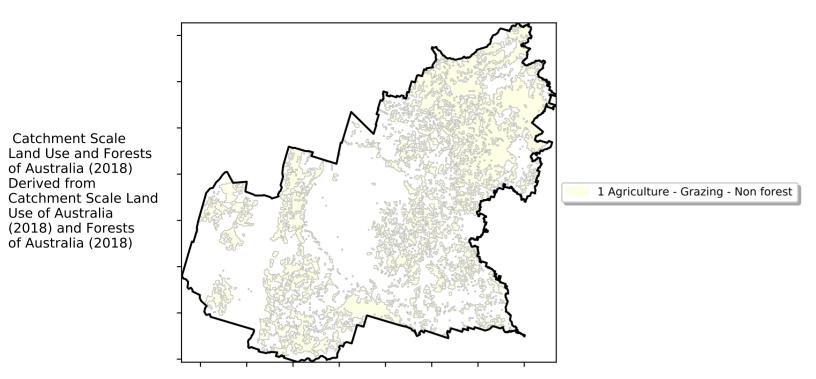
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52% TON

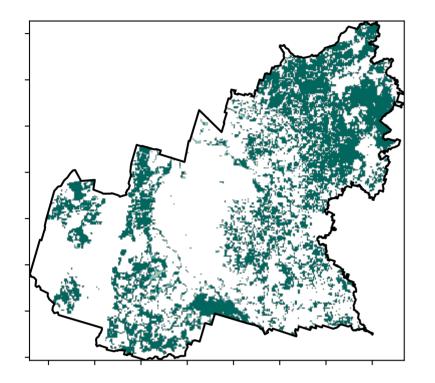
32%50%

0.30%

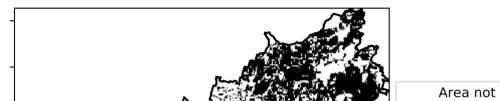
Land use and forest cover



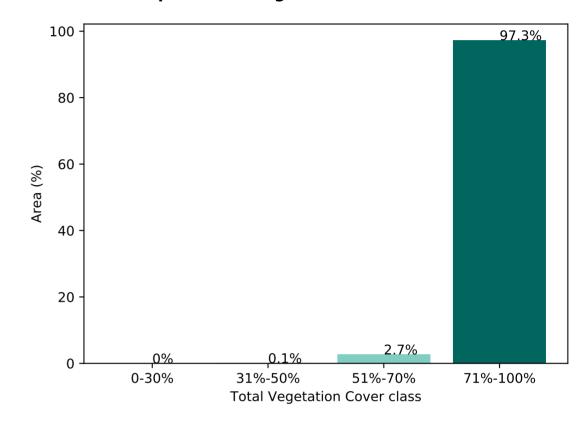
Total Vegetation Cover [%]



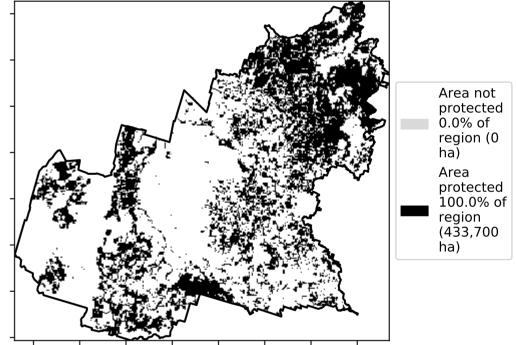




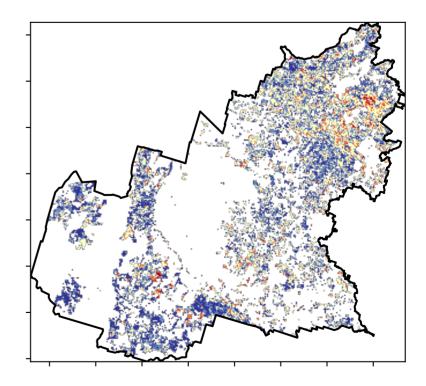
Proportion of vegetation cover class in area



% Area protected from wind erosion (>50%)



Total Vegetation Cover Decile [%]

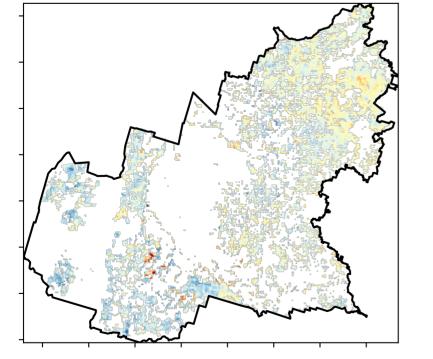




protected 2.7% of region (11,709 ha) Area protected 97.3% of region (421,990 ha)

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.



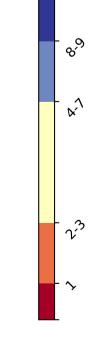
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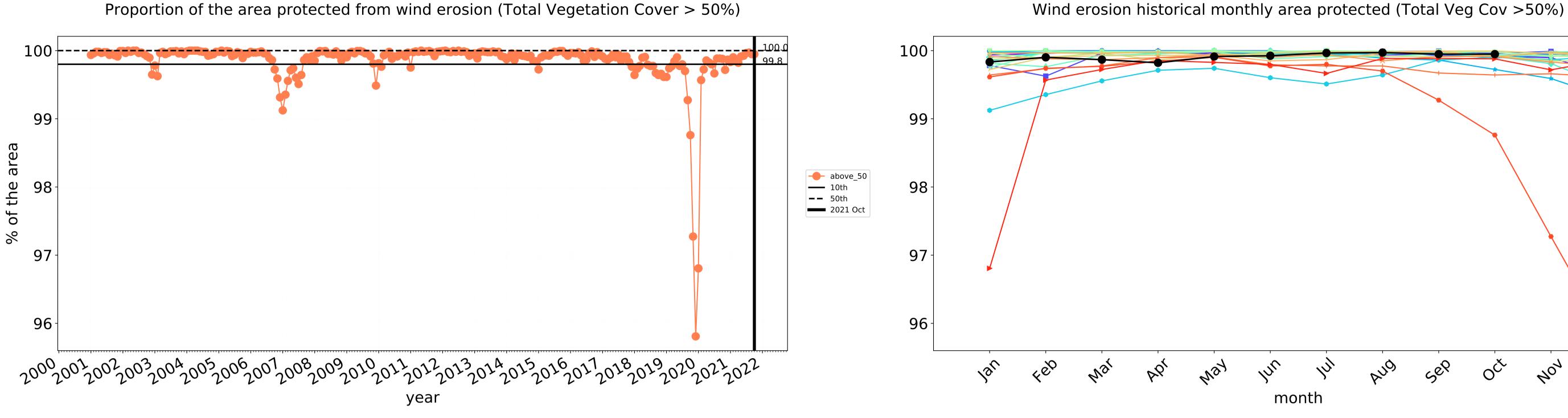
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Deciles show where the pixel value lies in the record, from highest to lowest, for that month. That is, red pixels are in the lowest 10% of records for that month of the man using baseline the map using baseline from 2001 to 2019.



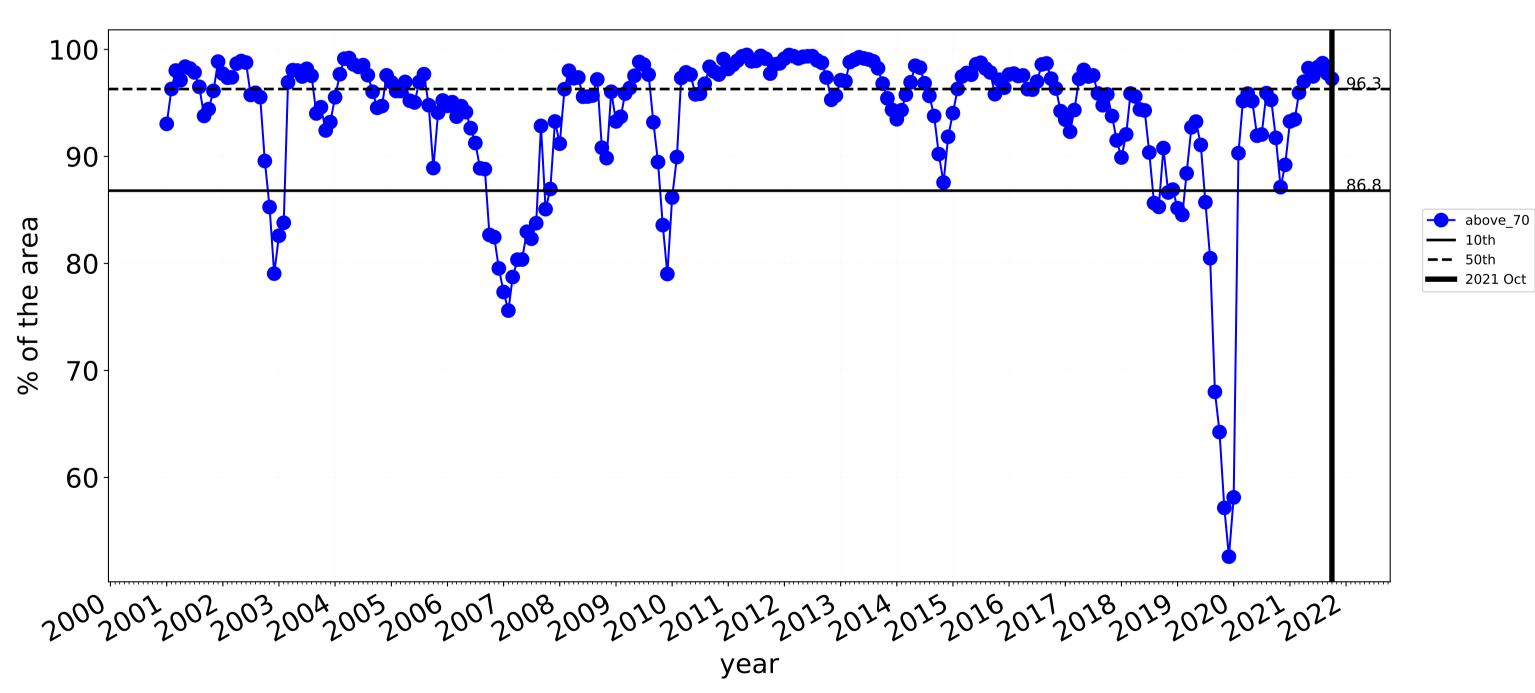


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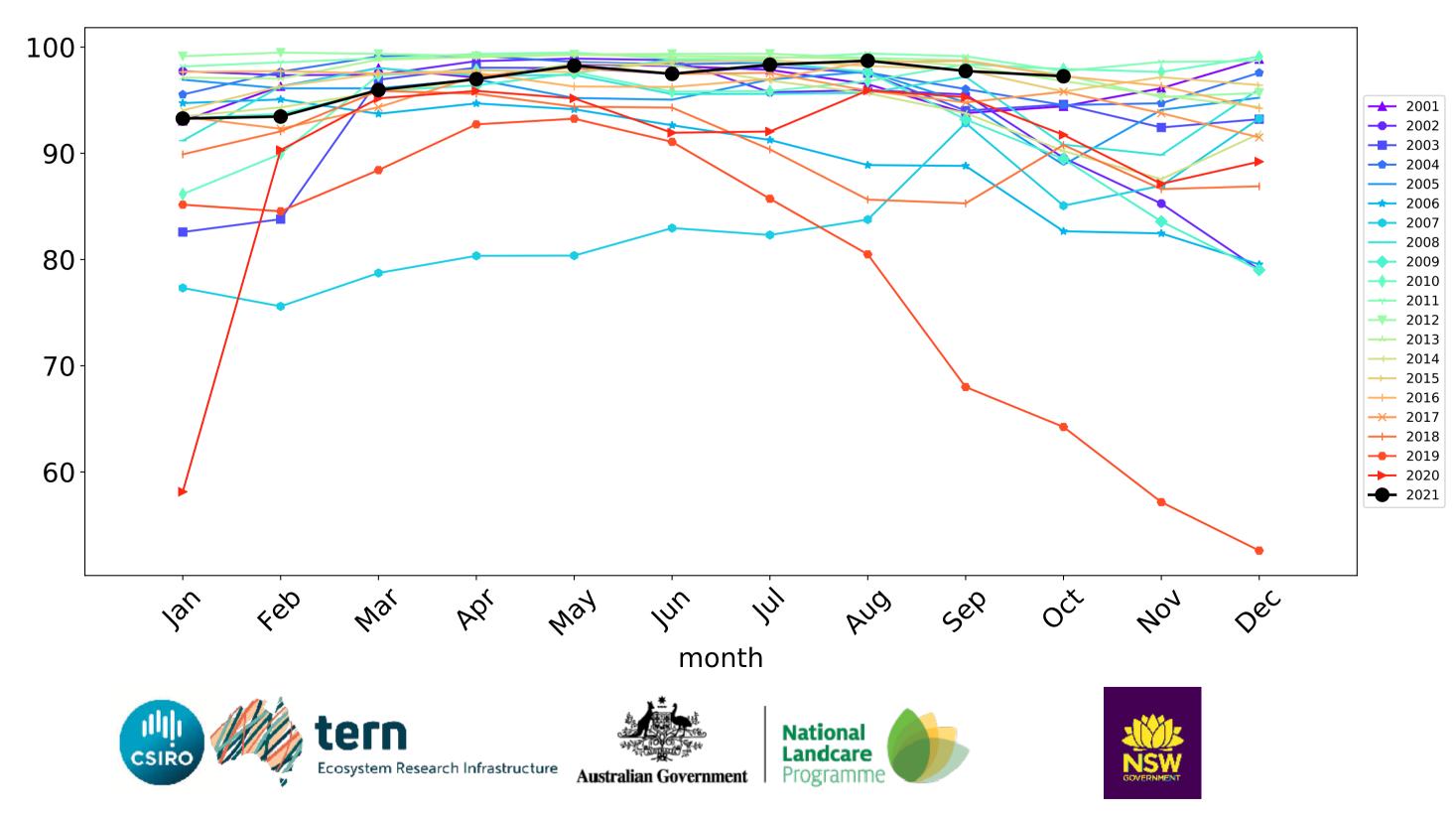
Proportion of the area protected from wind erosion (Total Vegetation Cover > 50%)

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



Grazing non forest timeseries

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



___ 2001 --- 2002 **___** 2003 **---** 2004 ____ 2005 **___** 2006 --- 2007 2008 ---- 2009 --- 2011 --- 2013 **→** 2014 <mark>→</mark> 2015 --- 2016 <u>→</u> 2017 **→** 2018 ---- 2019 → 2020 ---- 2021 404 AUG Sel Dec OC

Grazing Woodland forest

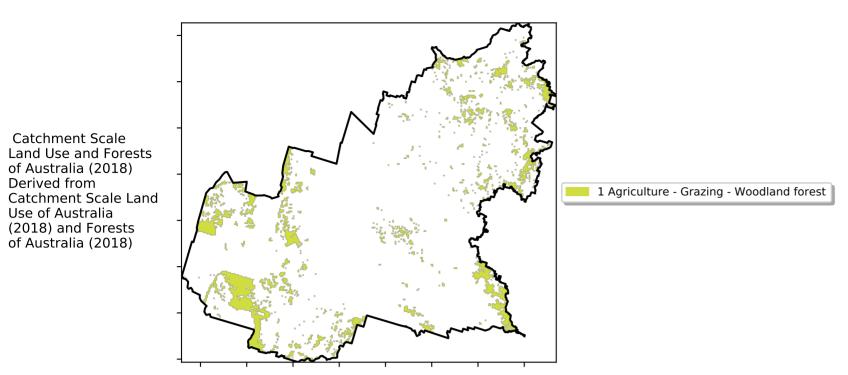
1200-200%

52°10°10°10

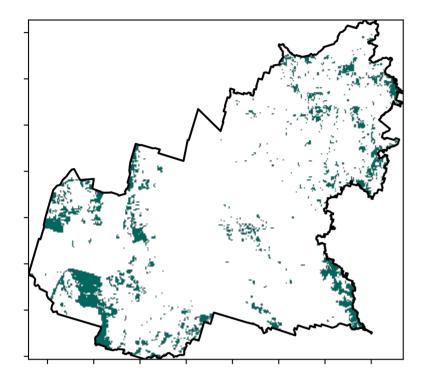
3201050010

0.30%

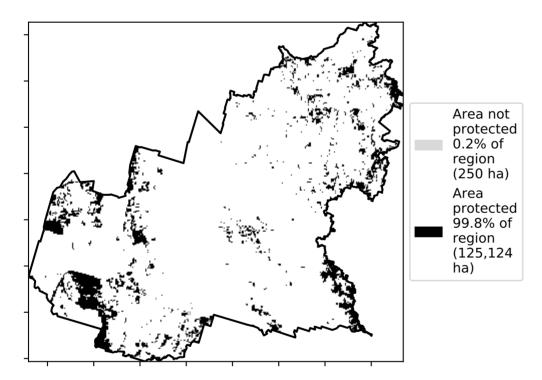
Land use and forest cover



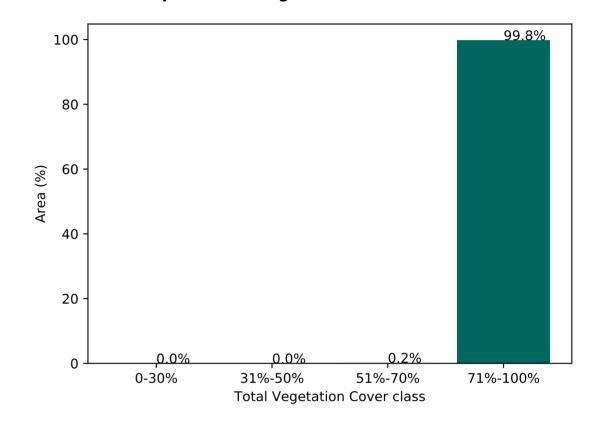
Total Vegetation Cover [%]



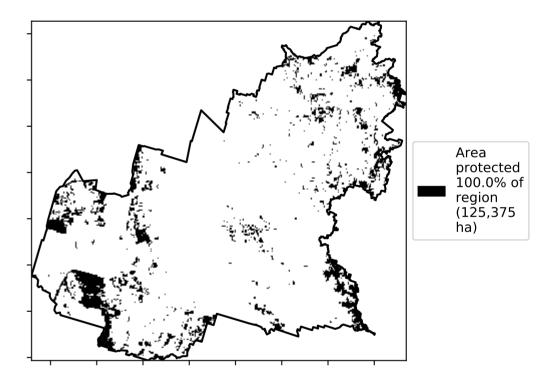




Proportion of vegetation cover class in area



% Area protected from wind erosion (>50%)



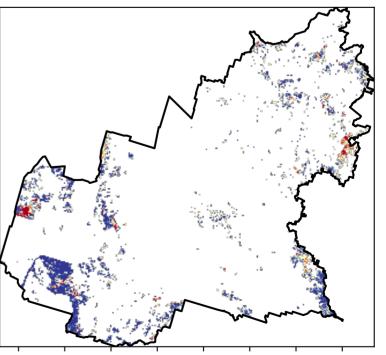
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Total Vegetation Cover Decile [%]

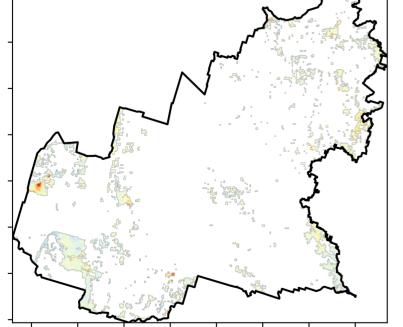




Total Vegetation Cover Anomaly [%]

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

Derived from



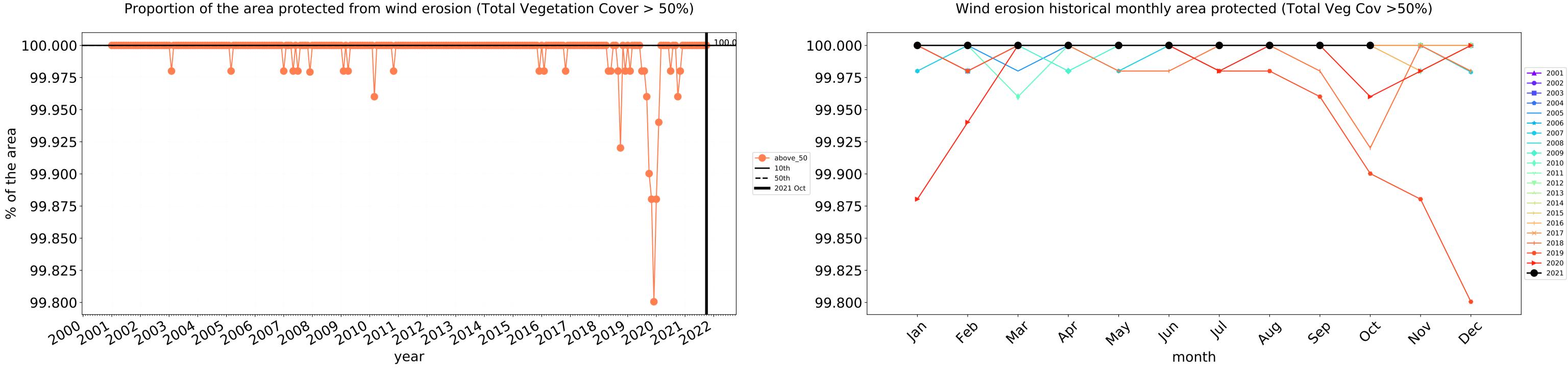
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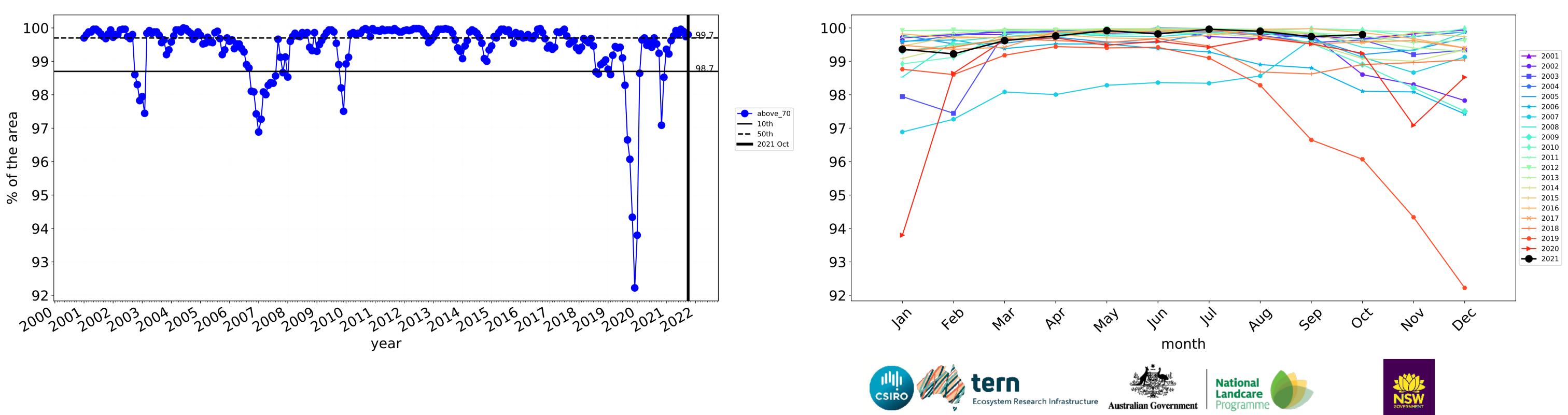
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Deciles show where the pixel value lies in the record, from highest to lowest, for that month. That is, red pixels are in the lowest 10% of records for that month of the man using baseline the map using baseline from 2001 to 2019.



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%)

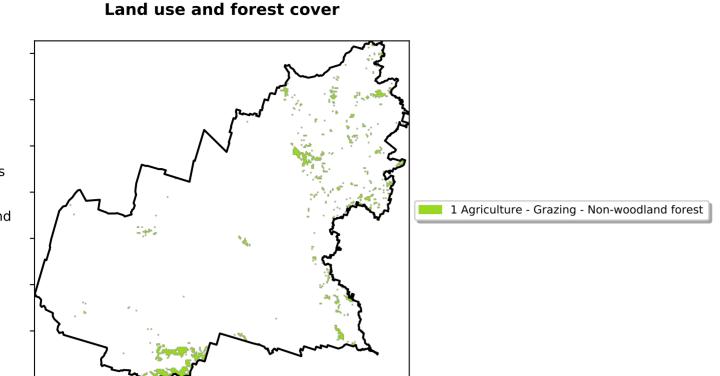
Grazing - Forest (non woodland)

12º0010000

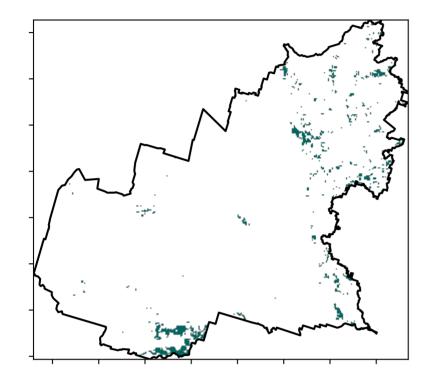
· 52°10'70°10

3201050010

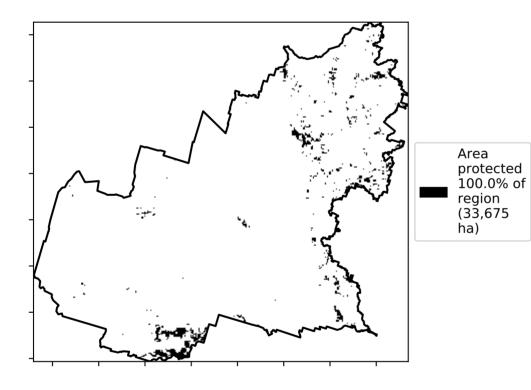
0.30%



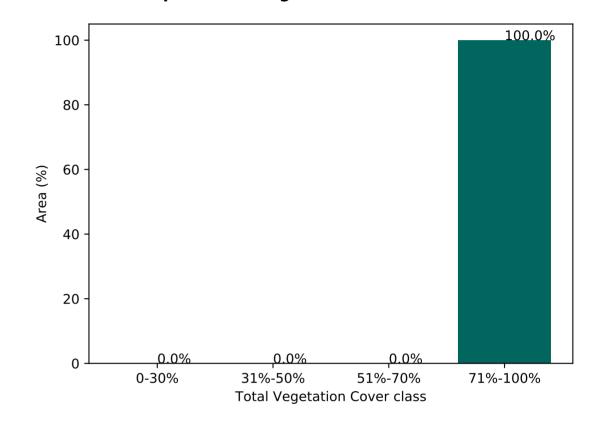
Total Vegetation Cover [%]



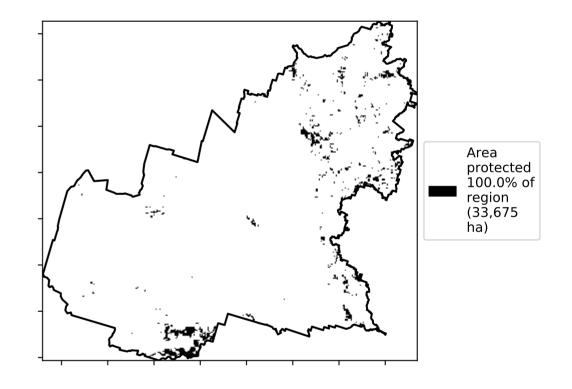




Proportion of vegetation cover class in area



% Area protected from wind erosion (>50%)



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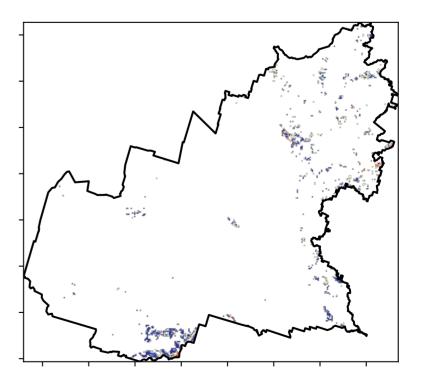
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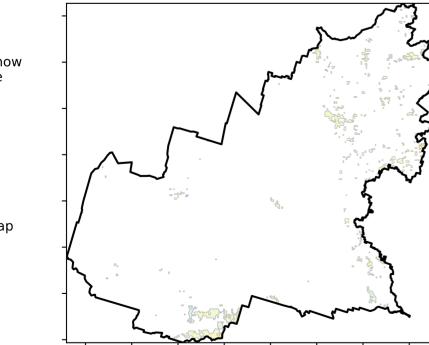
Catchment Scale Land Use and Forests of Australia (2018) Derived from Catchment Scale Land Use of Australia (2018) and Forests of Australia (2018)

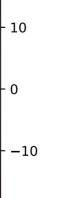
Total Vegetation Cover Decile [%]





Total Vegetation Cover Anomaly [%]





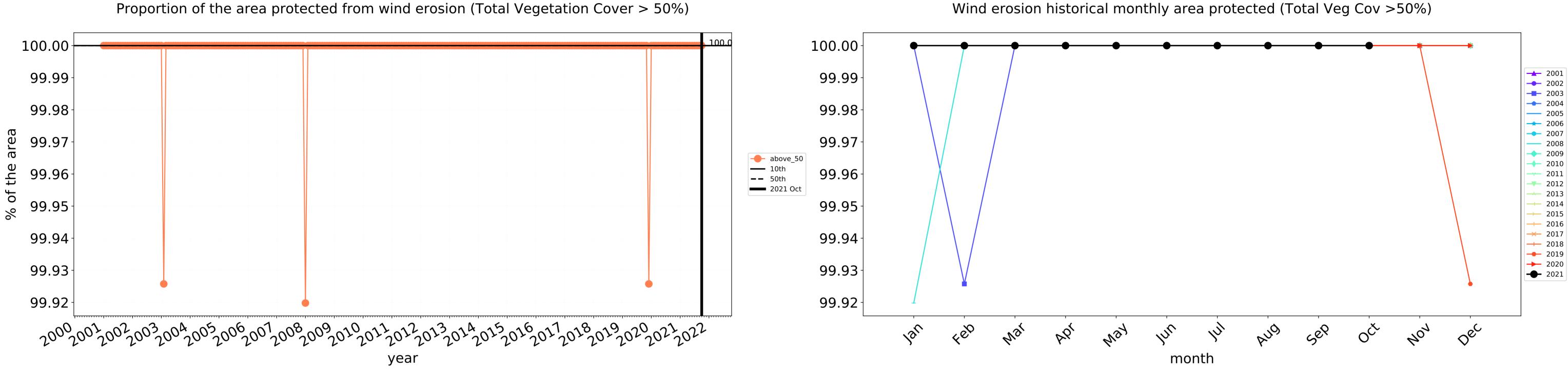
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Deciles show where the pixel value lies in the record, from highest to lowest, for that month. That is, red pixels are in the lowest 10% of records for that month of the map using baseline from 2001 to 2019.

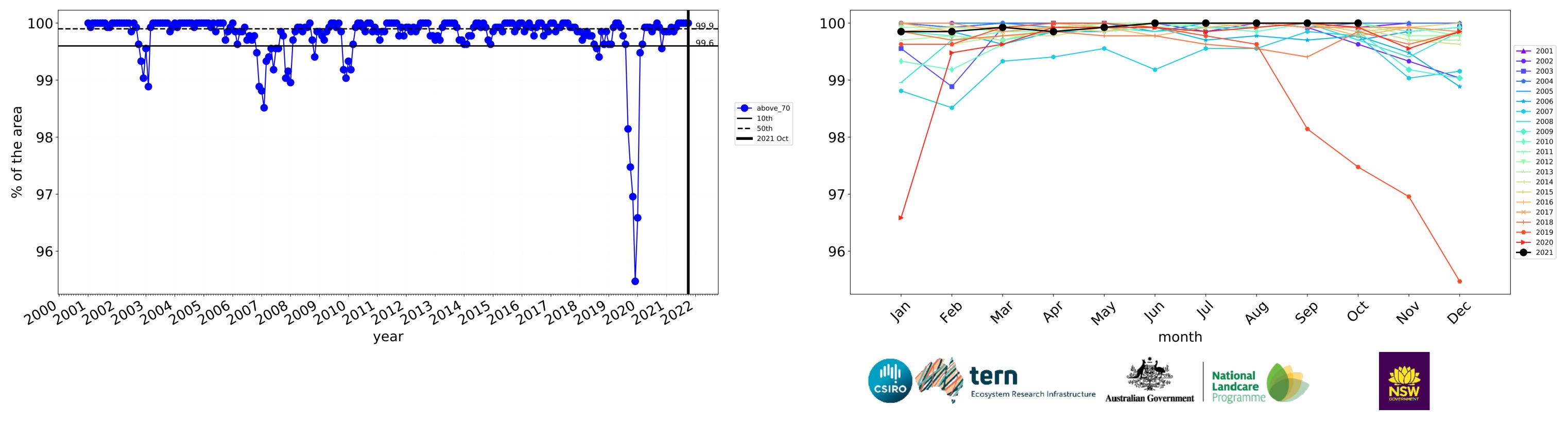


Anomaly show how many percetage points each pixel is from the mean. That is, red pixels are about 20% lower than the mean of that pixel. The mean pixel. The mean is only for the month of the map using baseline from 2001 to 2019.



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

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



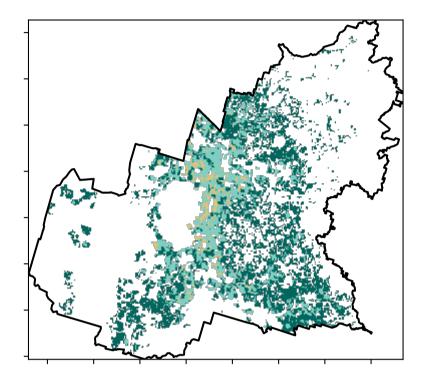
Water erosion historical monthly area protected (Total Veg Cov>70%)

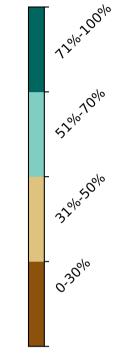
Cropping

1 Agriculture - Cropping - Non-irrigated

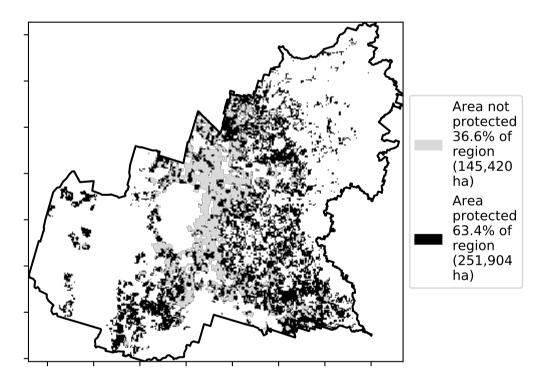
Total Vegetation Cover [%]

Land use and forest cover

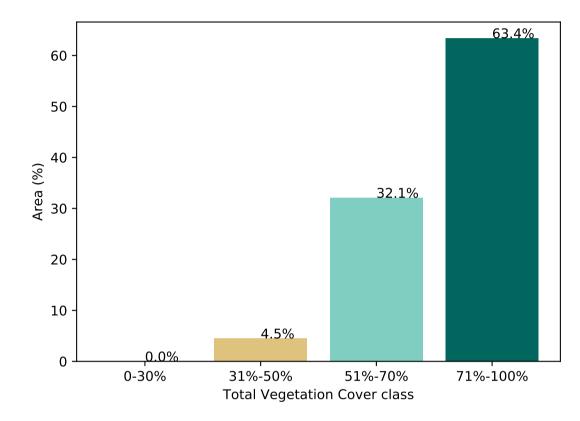




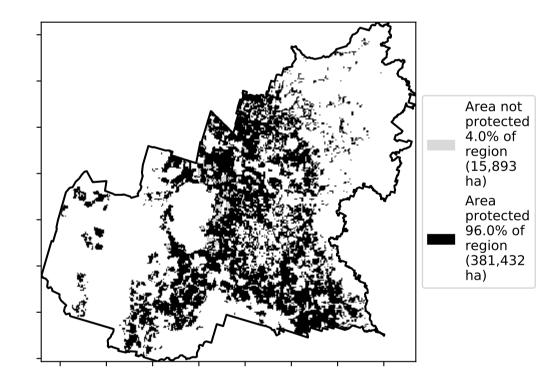
% Area protected from water erosion (>70%)



Proportion of vegetation cover class in area

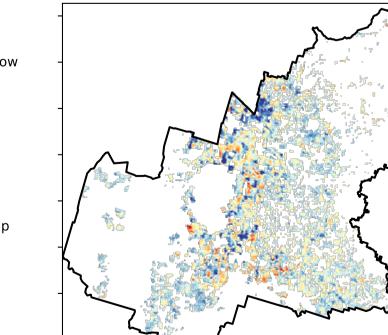


% Area protected from wind erosion (>50%)



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

Total Vegetation Cover Anomaly [%]



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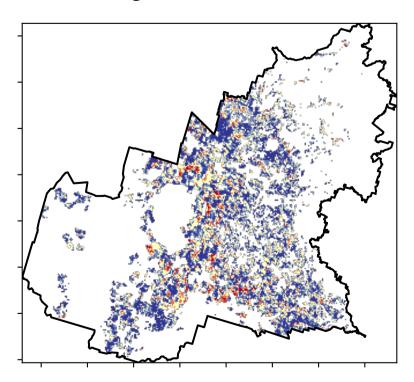
Total Vegetation Cover Decile [%]

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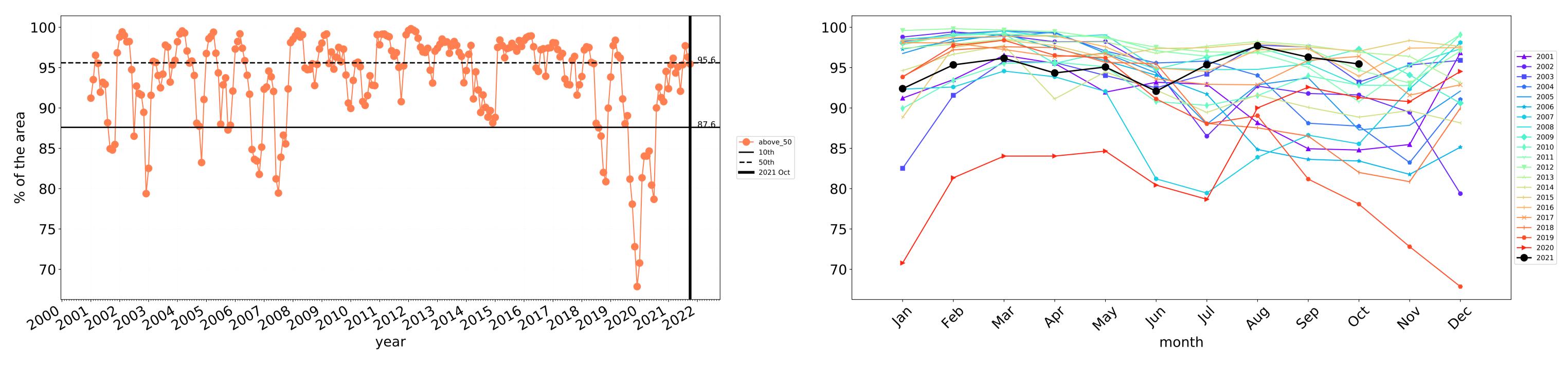


Deciles show where the pixel value lies in the record, from highest to lowest, for that month. That is, red pixels are in the lowest 10% of records for that month of the man using baseline

the map using baseline from 2001 to 2019.

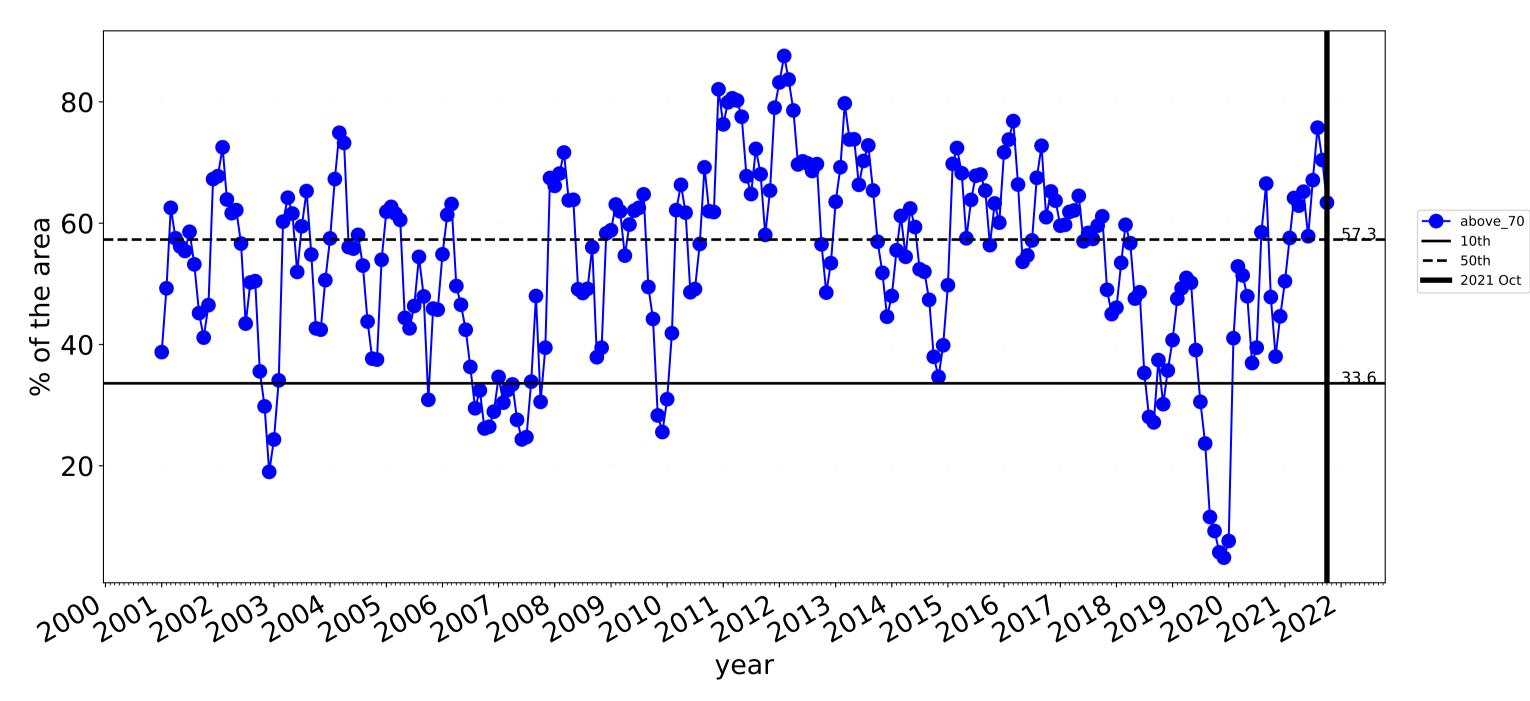
Anomaly show how many percetage points each pixel is from the mean. That is, red pixels are about 20% lower than the mean of that pixel. The mean is only for the month of the map using baseline from 2001 to 2019.





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

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



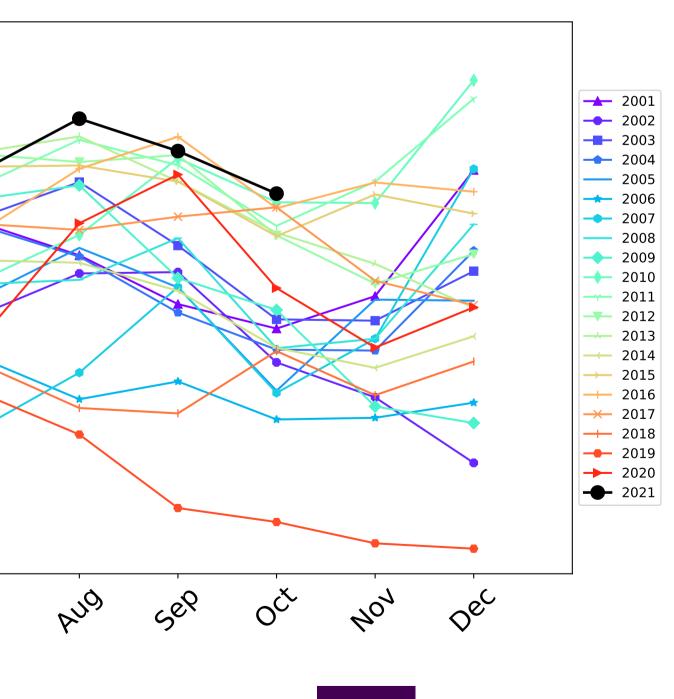
Cropping timeseries



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

80-60-40 20lar 4er way Jun 12 Wa1 291 month Ecosystem Research Infrastructure Australian Government

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







Irrigation

12%100%

· 52°1070010

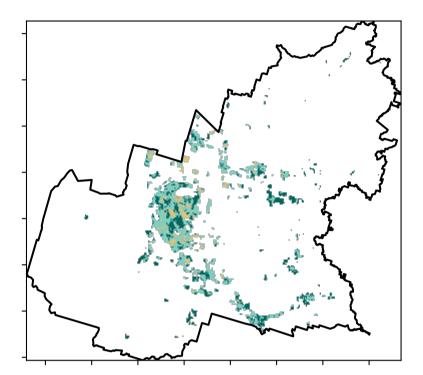
32°1050°10

0.30%

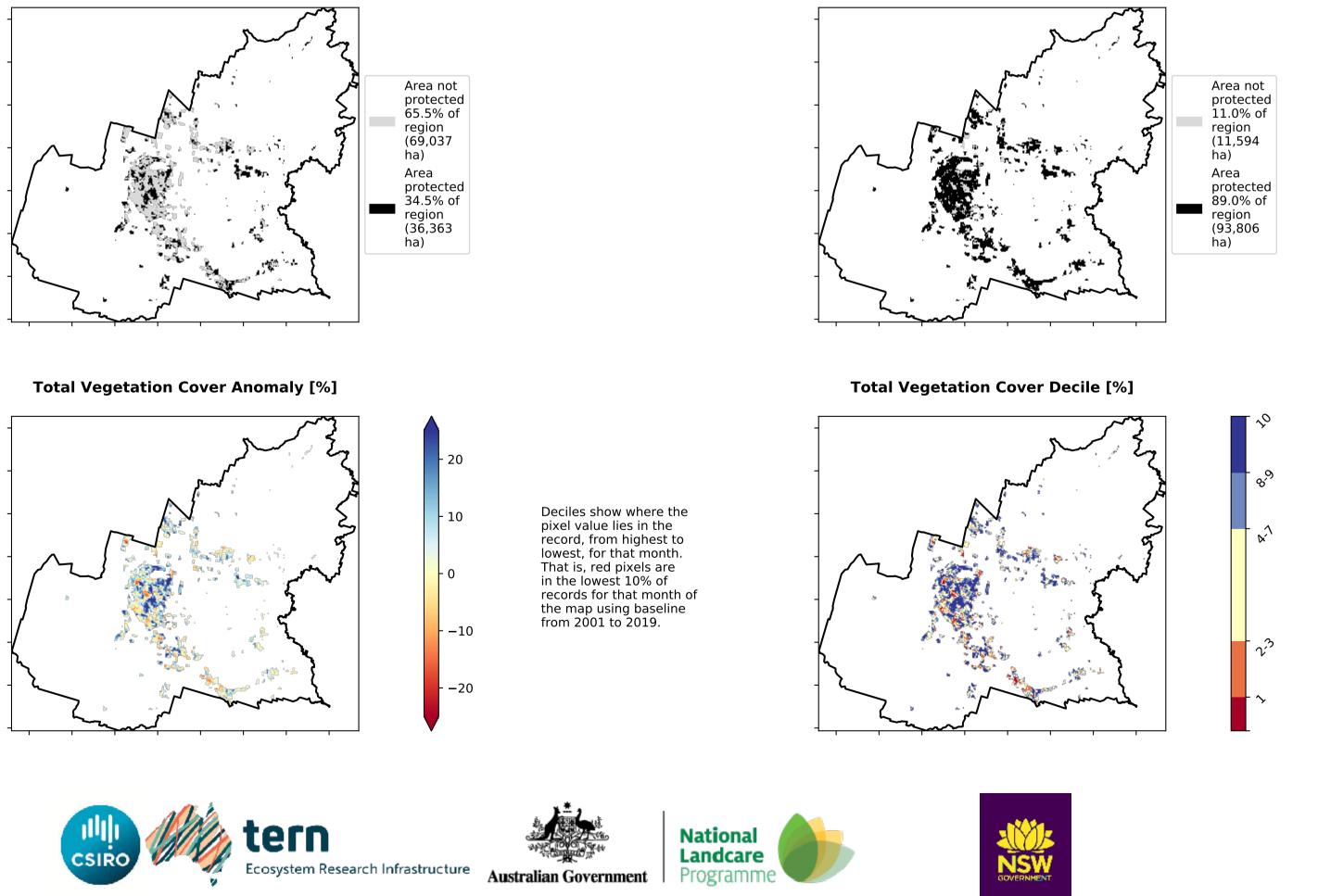
Catchment Scale Land Use and Forests of Australia (2018) Derived from Catchment Scale Land Use of Australia (2018) and Forests of Australia (2018)

Land use and forest cover 1 Agriculture - Grazing - Irrigated 2 Agriculture - Cropping - Irrigated 3 Agriculture - Horticulture - Irrigated

Total Vegetation Cover [%]



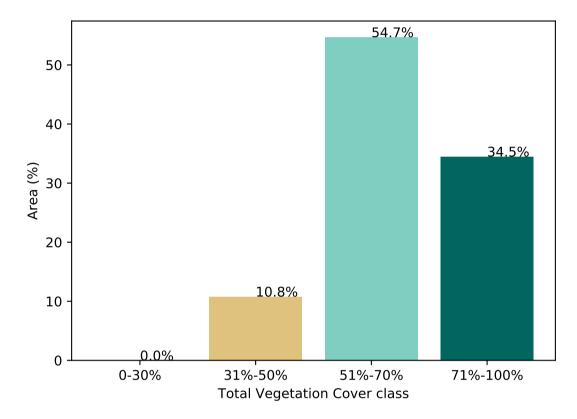




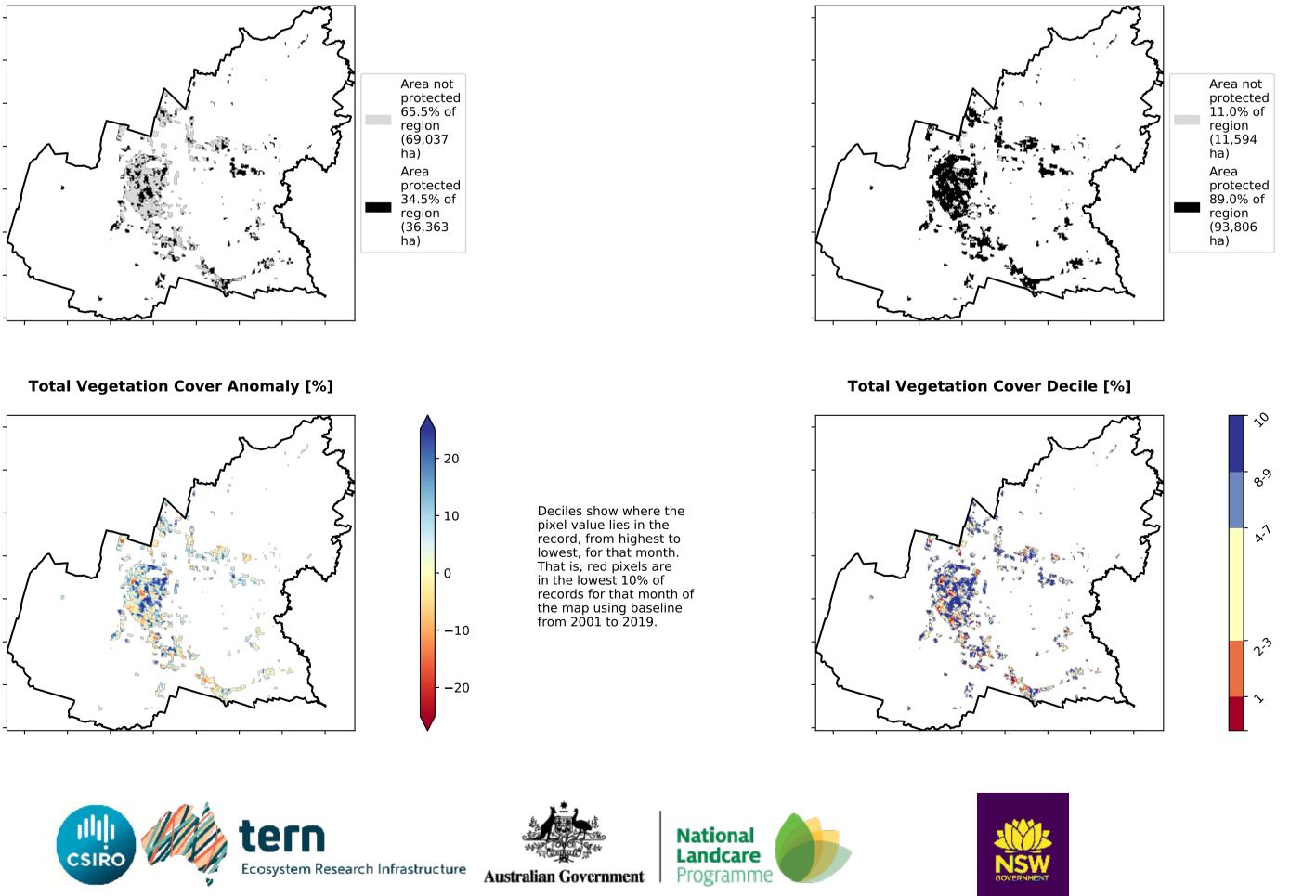
100 97.8% 80 60 Area (%) 40 20 1.7% 0.5% 0 2 1 3 Land use class

Proportion of each land class in area

Proportion of vegetation cover class in area

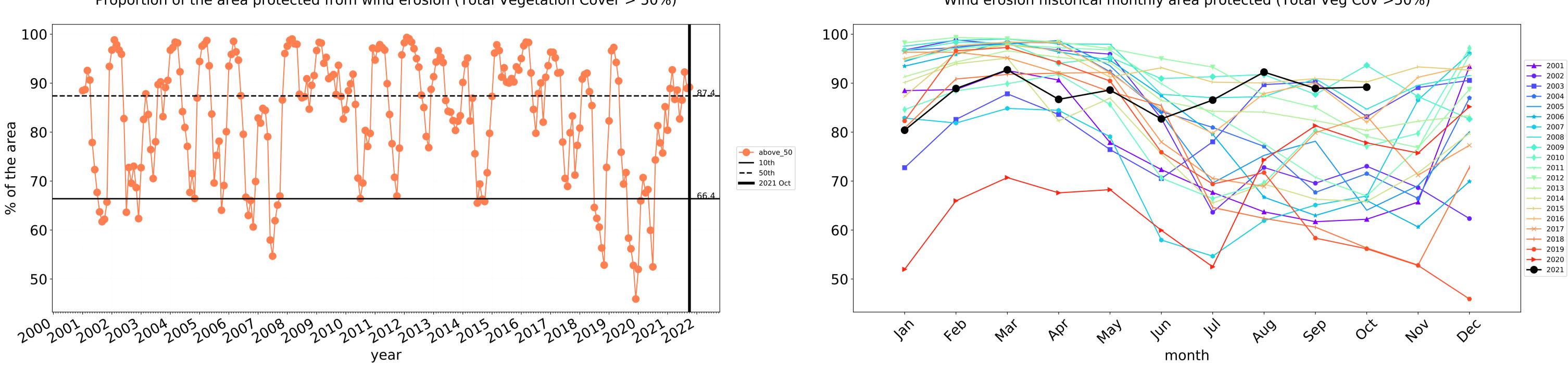


% Area protected from wind erosion (>50%)



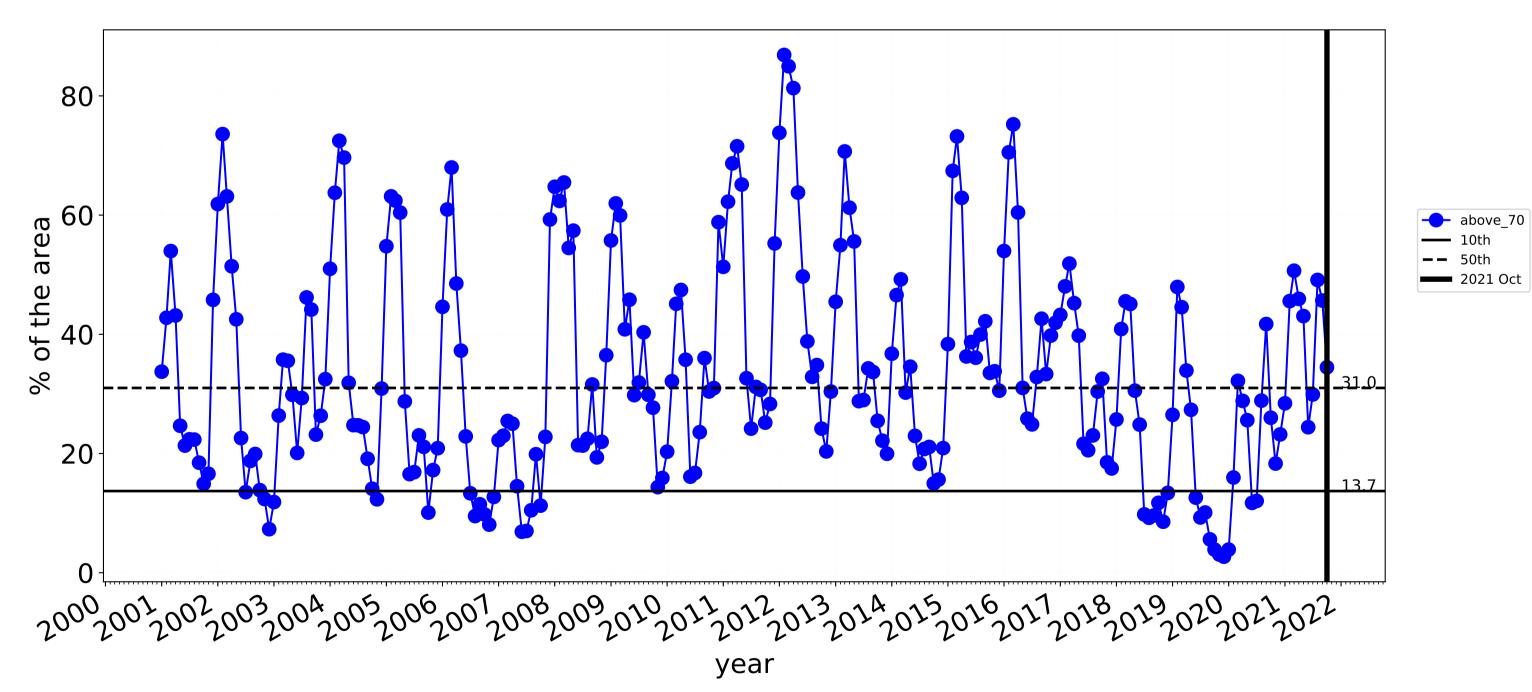
Anomaly show how many percetage points each pixel is from the mean. That is, red pixels are about 20% lower than the mean of that pixel. The mean is only for the month of the map from 2001 to 2019.

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



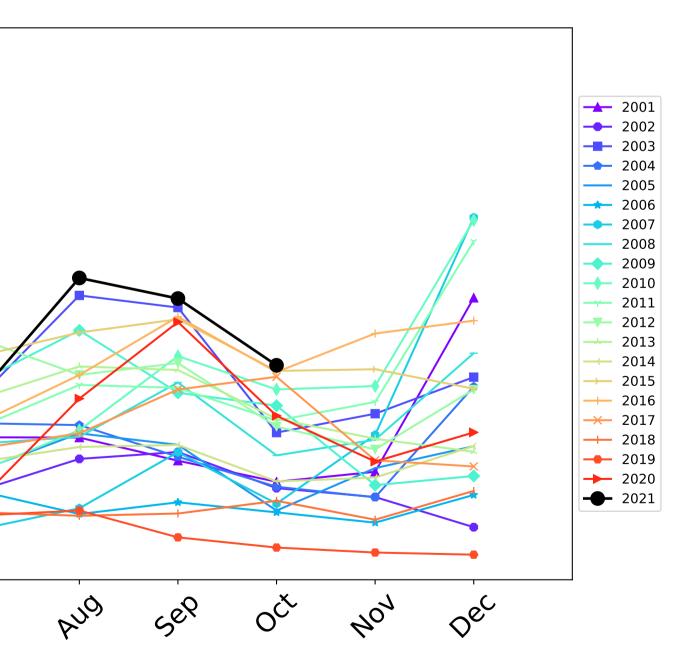


Irrigation timeseries

80-60-40-20-0 feb way In Jan War PQ 12 month Ecosystem Research Infrastructure Australian Government

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

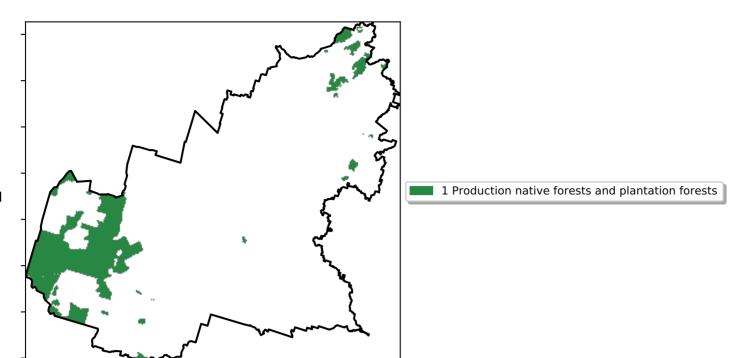
Water erosion historical monthly area protected (Total Veg Cov>70%)







Production native forests and plantation forests



12%100%

, 52°1001001c

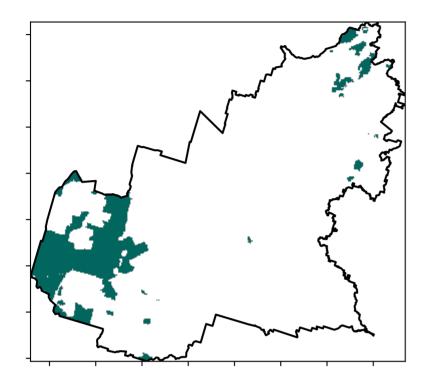
32%50%

0.30%

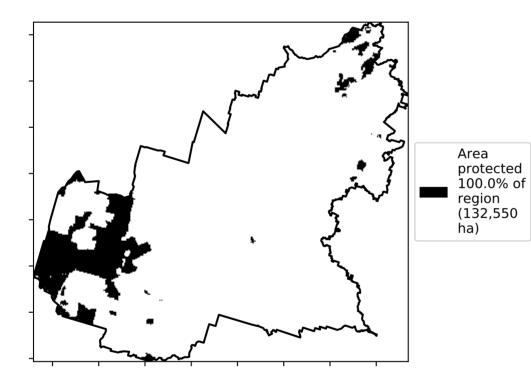
Catchment Scale Land Use and Forests of Australia (2018) Derived from Catchment Scale Land Use of Australia (2018) and Forests of Australia (2018)

Total Vegetation Cover [%]

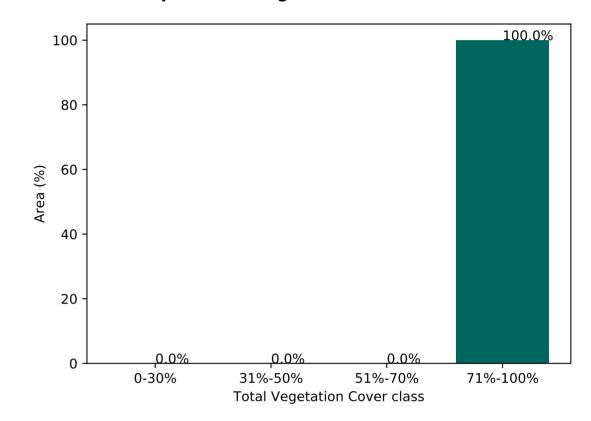
Land use and forest cover



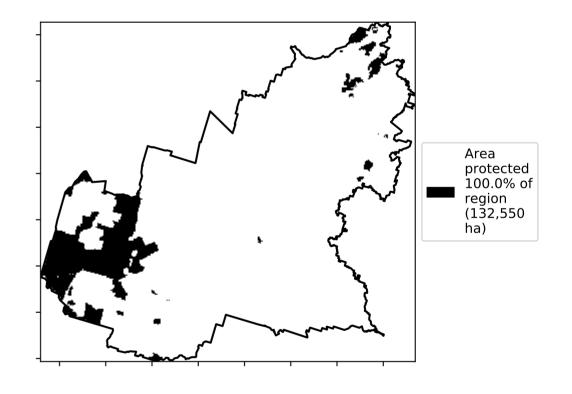




Proportion of vegetation cover class in area



% Area protected from wind erosion (>50%)



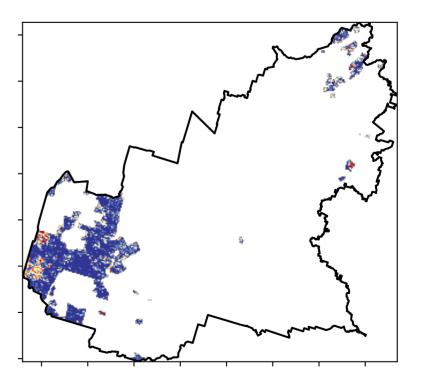
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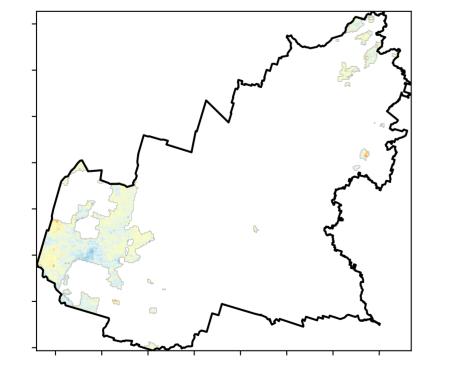
Total Vegetation Cover Decile [%]





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.

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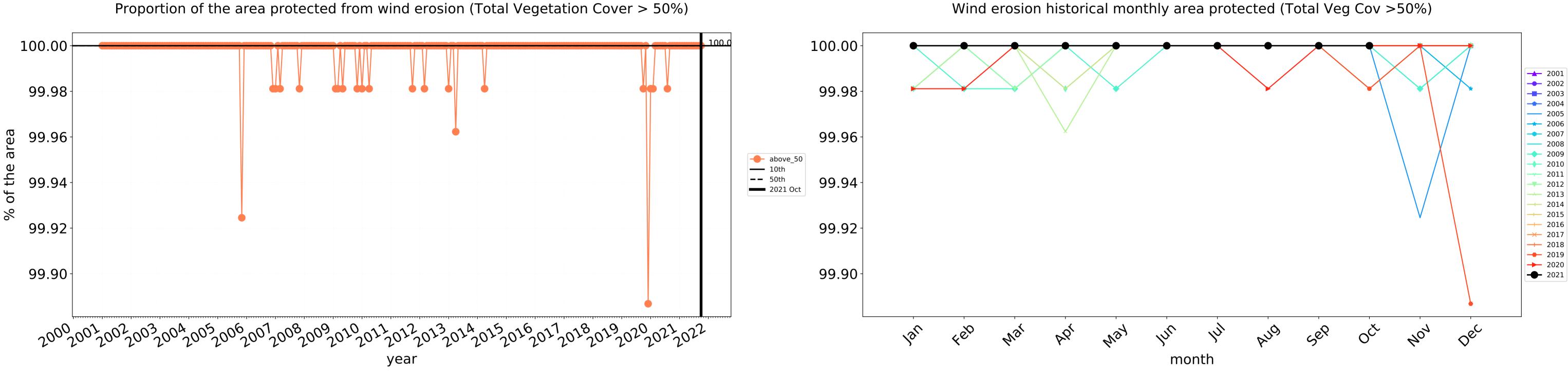
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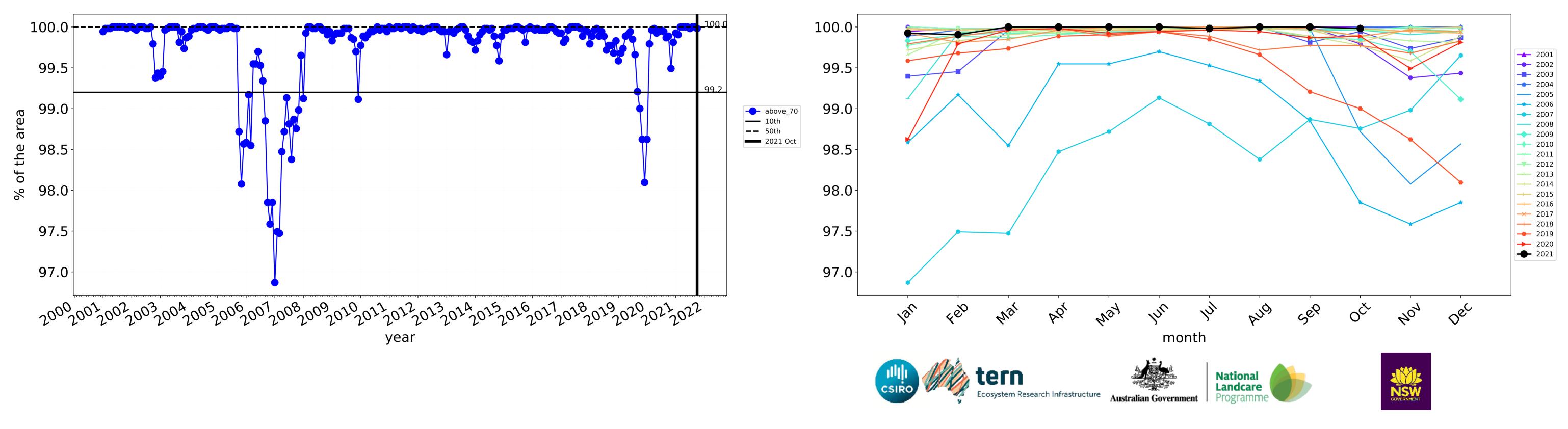
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Proportion of the area protected from water erosion (Total Vegetation Cover > 70%)





Toowoomba_(R) (1,292,150 ha and no data 3,604 ha) Percentage area and hectares protected with TVC threshold 30,50,70,80,90 and 95%

Land use and forest cover Class	area(ha)	above_30	above_50	above_70	above_80	above_90	above_95
Entire region	1,292,150	100.0% 1,292,050	97.7% 1,261,925	81.8% 1,056,725	63.6% 821,950	33.0% 426,125	7.8% 101,150
Conservation and natural environments	23,775	100.0% 23,775	100.0% 23,775	99.6% 23,675	98.9% 23,525	92.0% 21,875	51.1% 12,150
Conservation and natural environments Woodland forest	13,450	100.0% 13,450	100.0% 13,450	100.0% 13,450	99.6% 13,400	92.2% 12,400	47.2% 6,350
Agriculture	1,096,700	100.0% 1,096,600	97.3% 1,067,000	79.3% 870,000	58.9% 645,625	25.7% 282,100	5.2% 56,750
Grazing	592,750	100.0% 592,750	100.0% 592,525	98.0% 580,600	87.9% 520,875	44.7% 265,200	9.1% 53,850
Grazing non forest	433,700	100.0% 433,700	99.9% 433,475	97.3% 421,800	84.2% 365,200	34.9% 151,275	5.9% 25,475
Grazing Woodland forest	125,375	100.0% 125,375	100.0% 125,375	99.8% 125,125	97.5% 122,250	70.1% 87,900	16.3% 20,475
Grazing - Forest (non woodland)	33,675	100.0% 33,675	100.0% 33,675	100.0% 33,675	99.3% 33,425	77.3% 26,025	23.5% 7,900
Cropping	397,325	100.0% 397,275	95.5% 379,250	63.4% 251,875	28.1% 111,500	3.6% 14,375	0.6% 2,300
Irrigation	105,400	100.0% 105,350	89.2% 94,000	34.5% 36,325	11.6% 12,175	2.0% 2,075	0.5% 525
Production native forests and plantation forests	132,550	100.0% 132,550	100.0% 132,550	100.0% 132,525	99.6% 132,075	87.3% 115,675	23.5% 31,100

