Total vegetation cover soil protection Region:LGA Townsville_(C) QLD

Date: June 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:

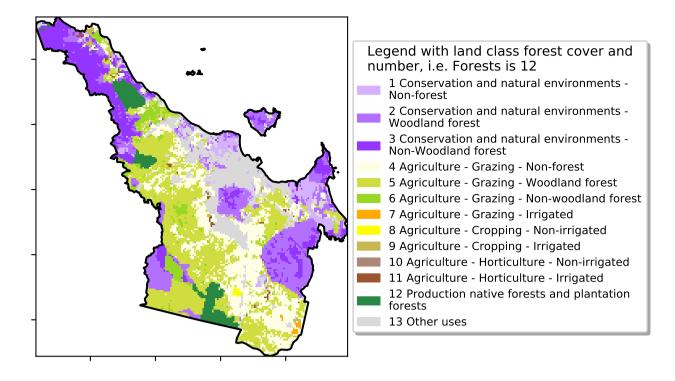
https://doi.org/10.4225/08/5848a3f19a7b3



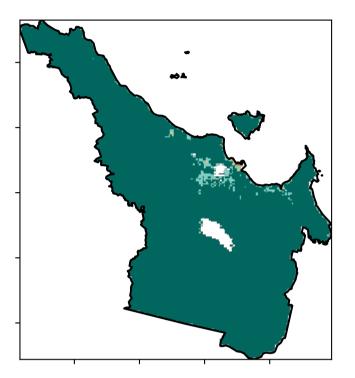
Vegetation Cover Jun 2021

Land use and forest cover

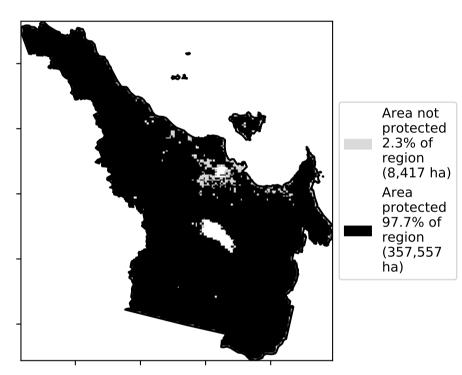
Proportion of each land class in area

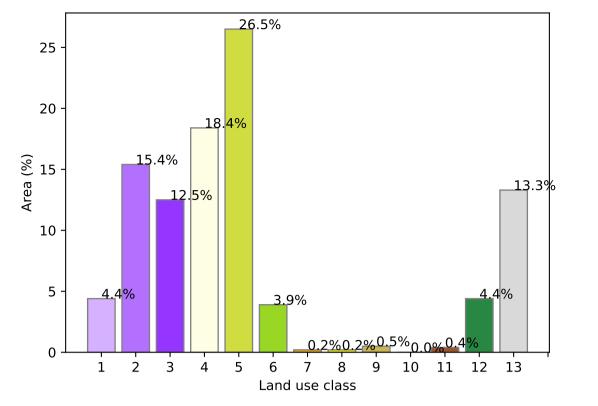


Total Vegetation Cover [%]

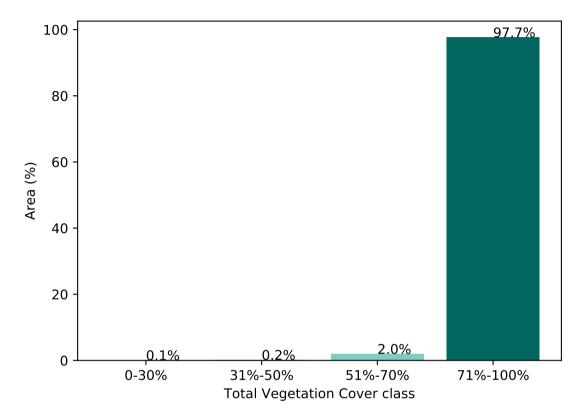


% Area protected from water erosion (>70%)

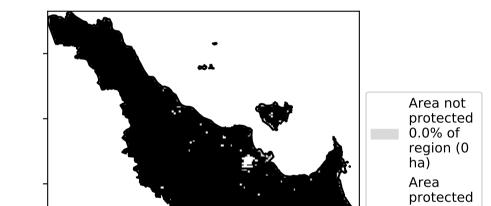




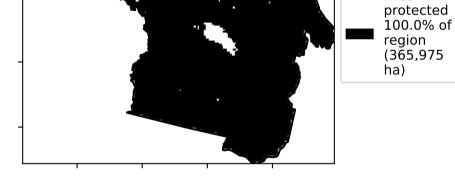
Proportion of vegetation cover class in area



% Area protected from wind erosion (>50%)



Total Vegetation Cover Anomaly [%]



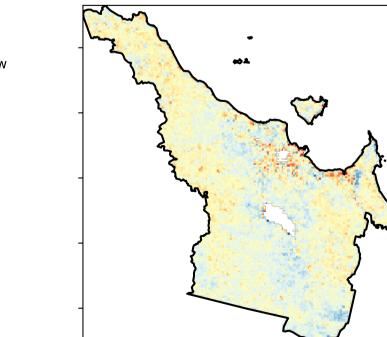
 $\hat{\mathcal{S}}$

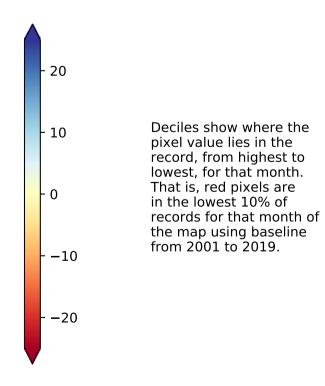
e S

A-1

2?

Total Vegetation Cover Decile [%]



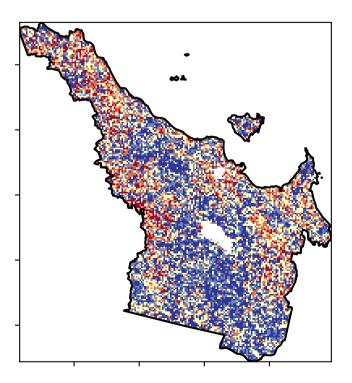


12º10-20010

· 52% 70%

3201050010

0.30%





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

Derived from

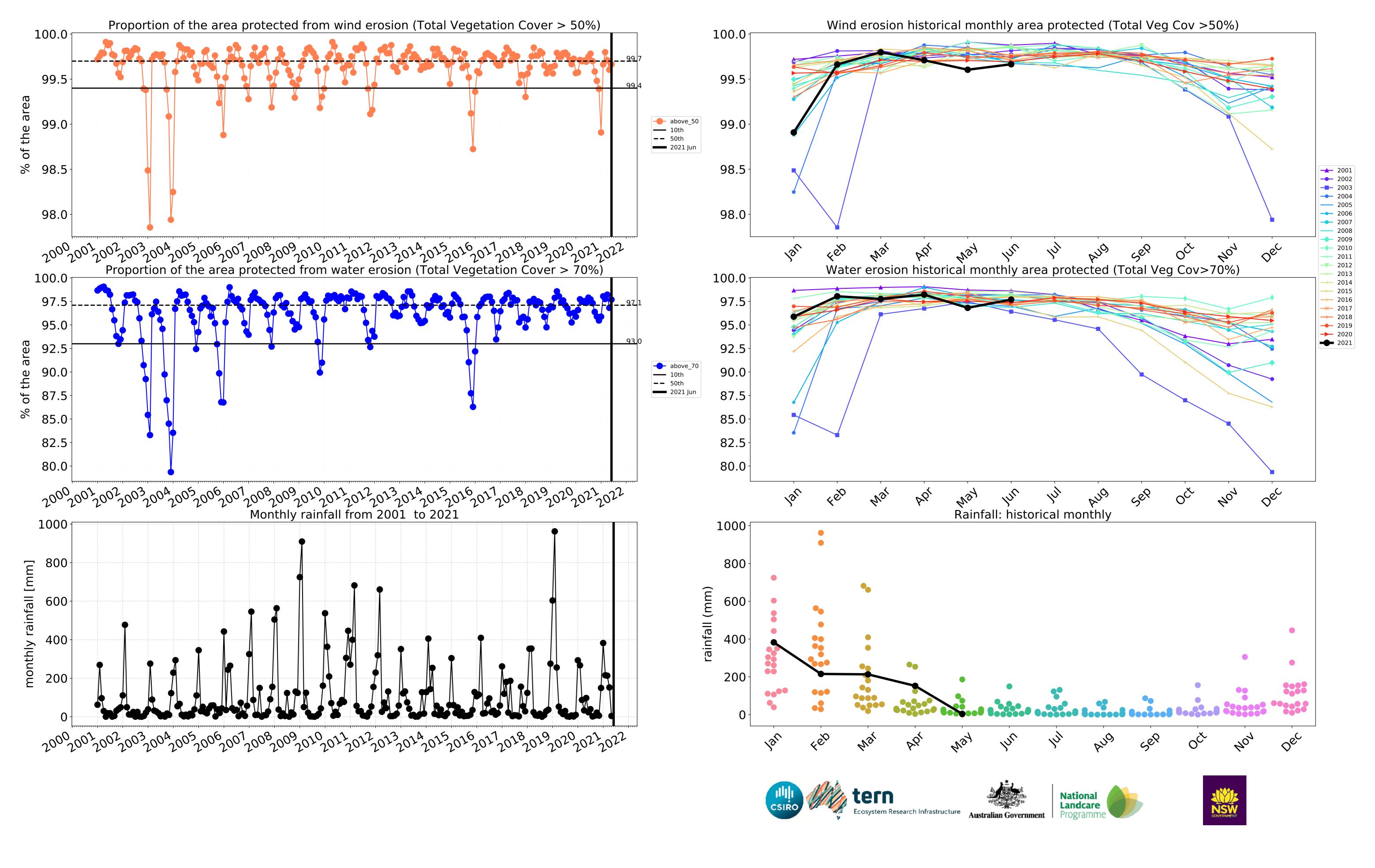
Use of Australia

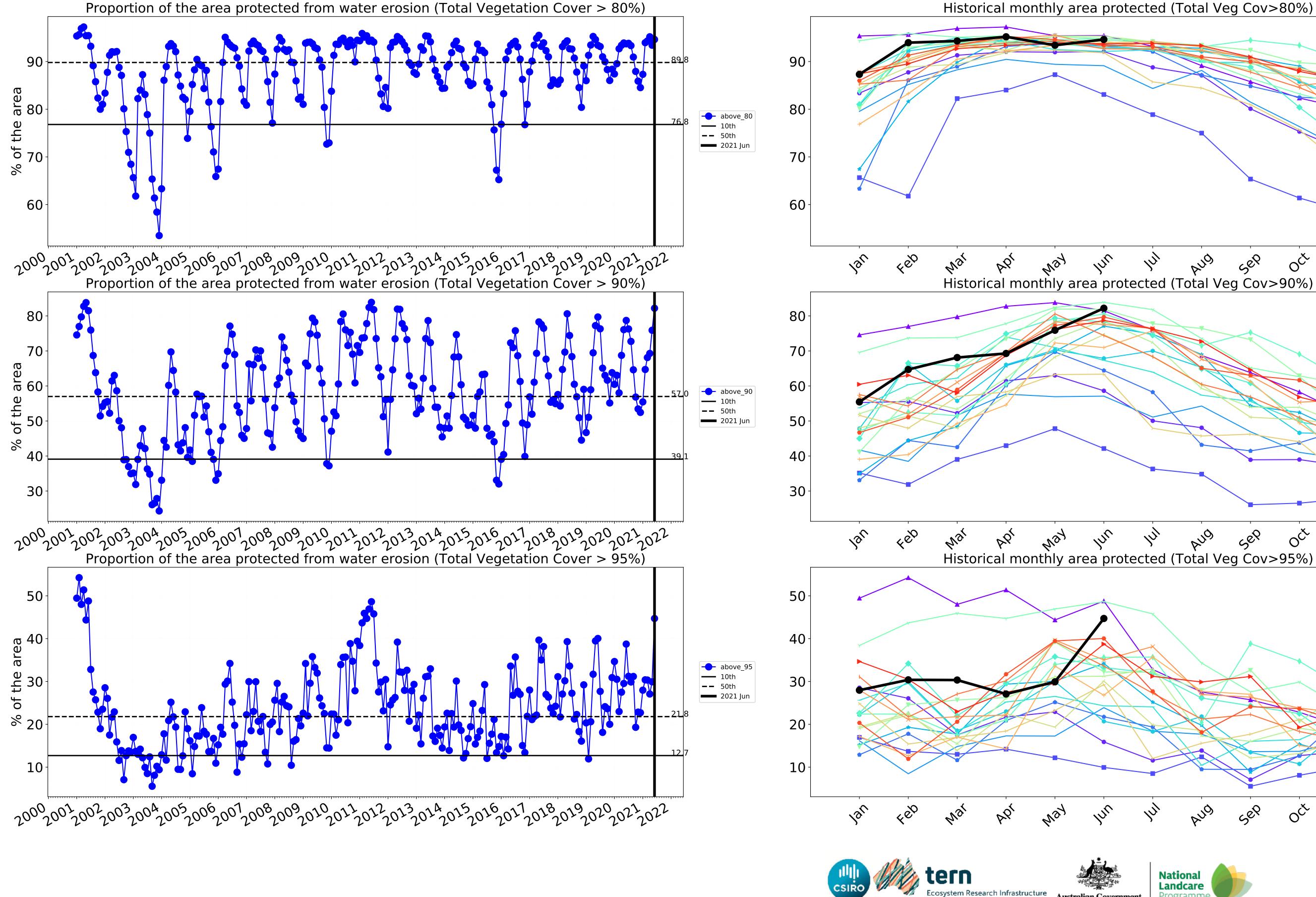
(2018) and Forests

of Australia (2018)

Land Use and Forests of Australia (2018)

Catchment Scale Land





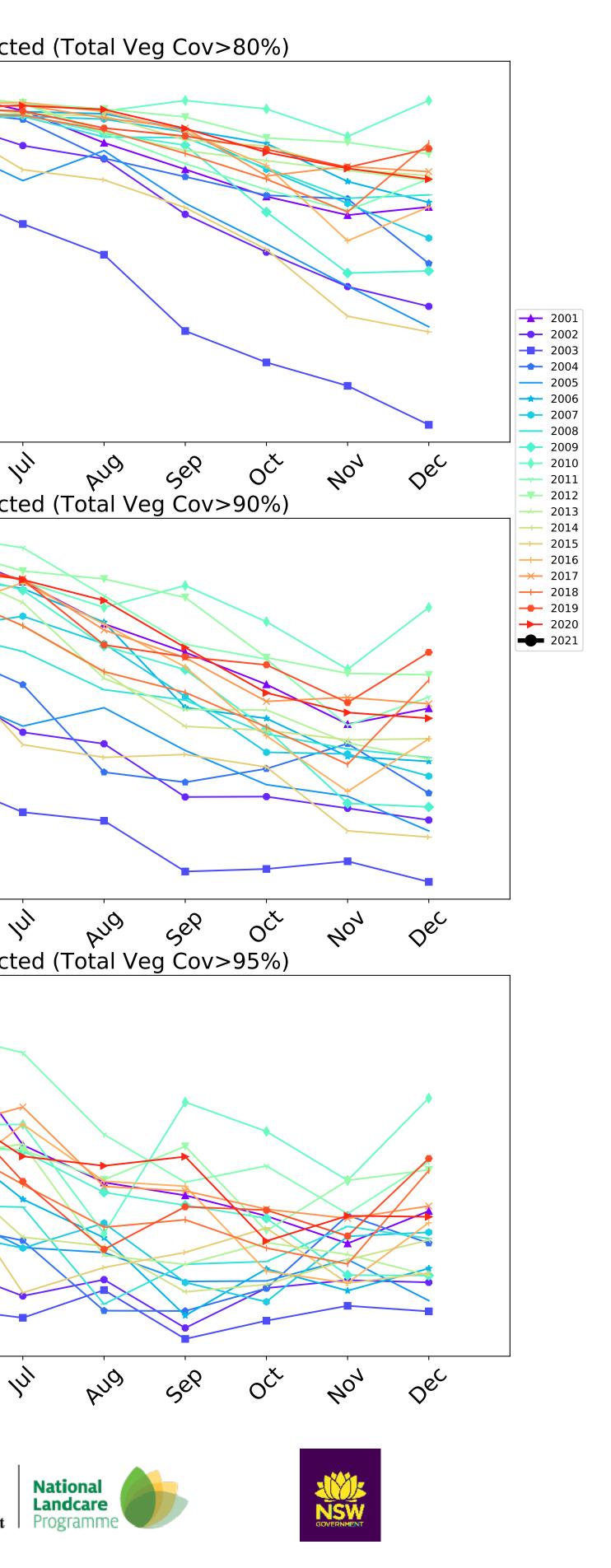
Australian Government

1)

1/2/

4

Ecosystem Research Infrastructure



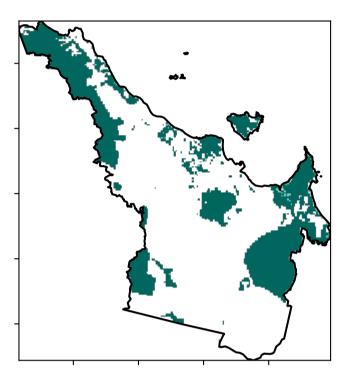
Conservation and natural environments

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

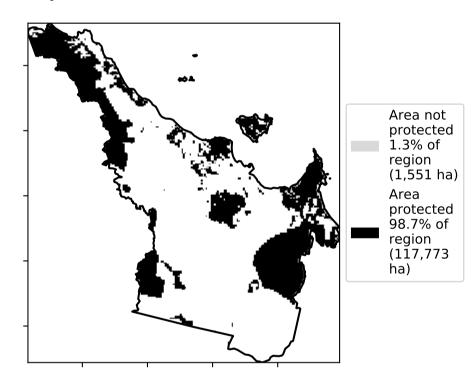
1 Conservation and natural environments - Non-forest 2 Conservation and natural environments – Woodland forest 3 Conservation and natural environments - Non-woodland forest

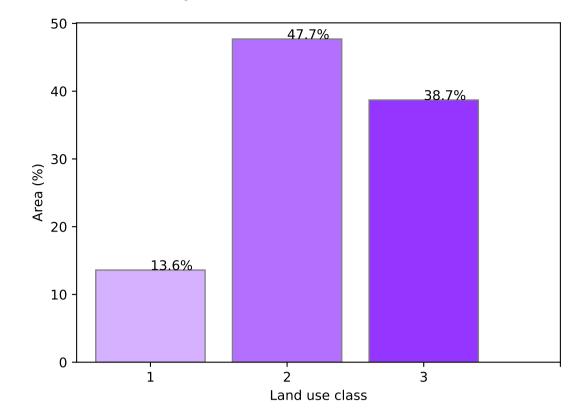
Total Vegetation Cover [%]

Land use and forest cover



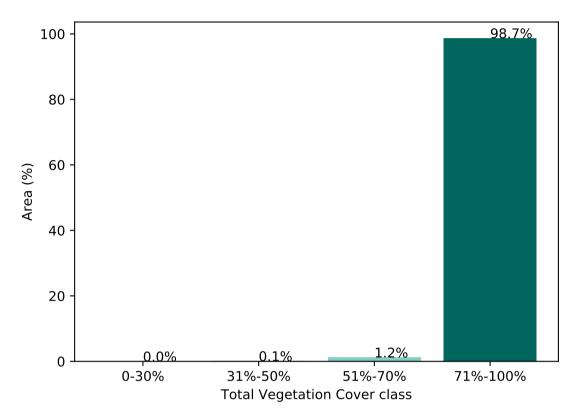
% Area protected from water erosion (>70%)



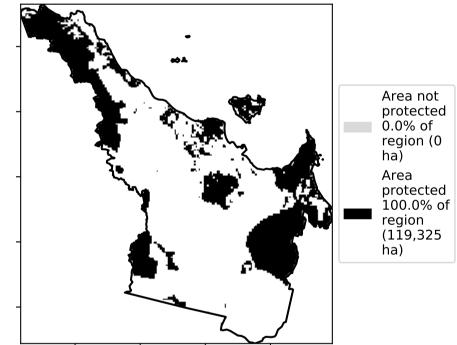


Proportion of each land class in area

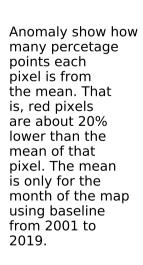
Proportion of vegetation cover class in area

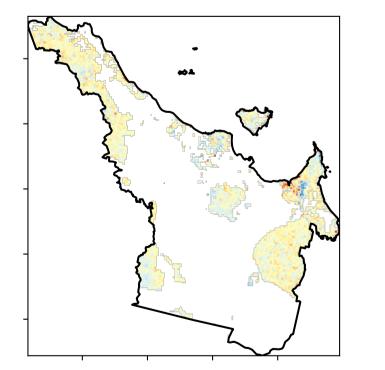


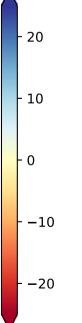
% Area protected from wind erosion (>50%)



Total Vegetation Cover Anomaly [%]





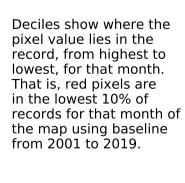


12% 100°1

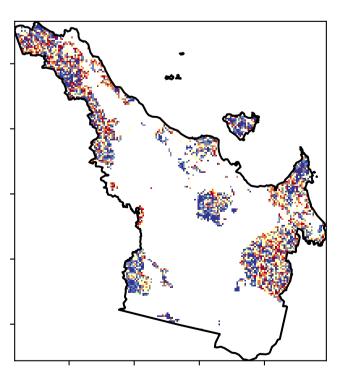
· 52% 70%

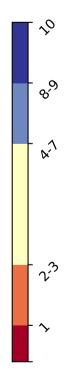
· 3201050010

0.30%

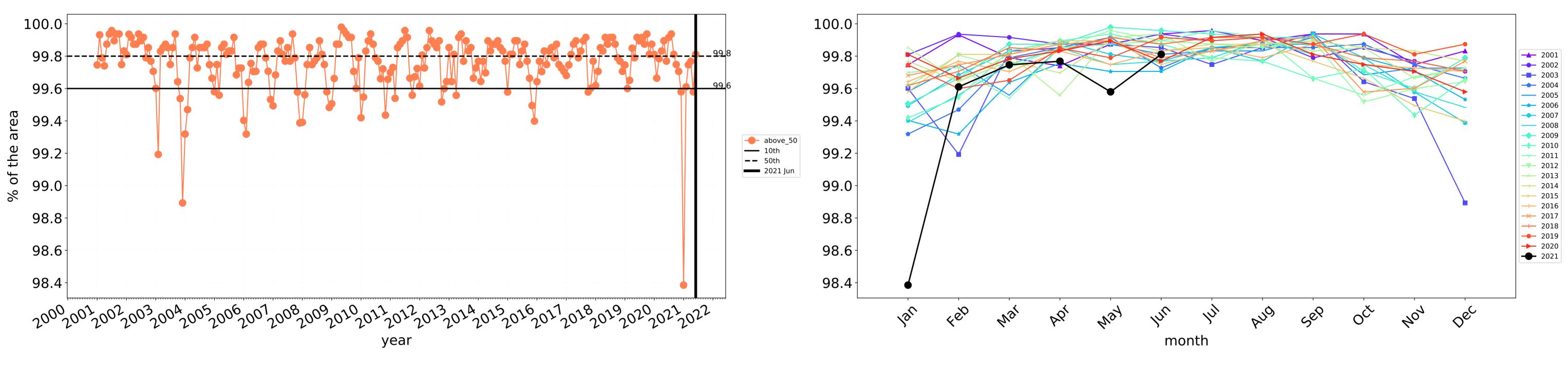


Total Vegetation Cover Decile [%]



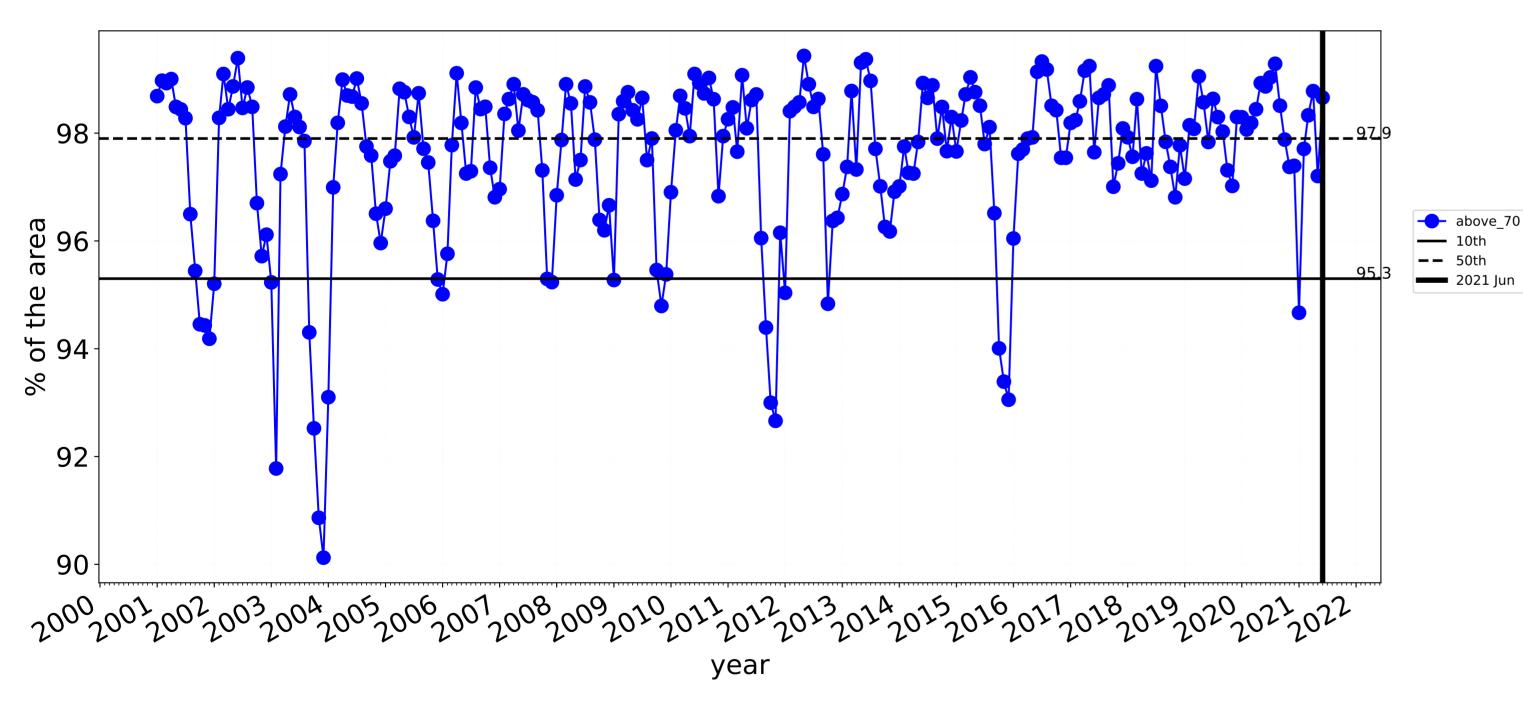




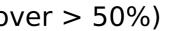


Proportion of the area protected from wind erosion (Total Vegetation Cover > 50%)

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



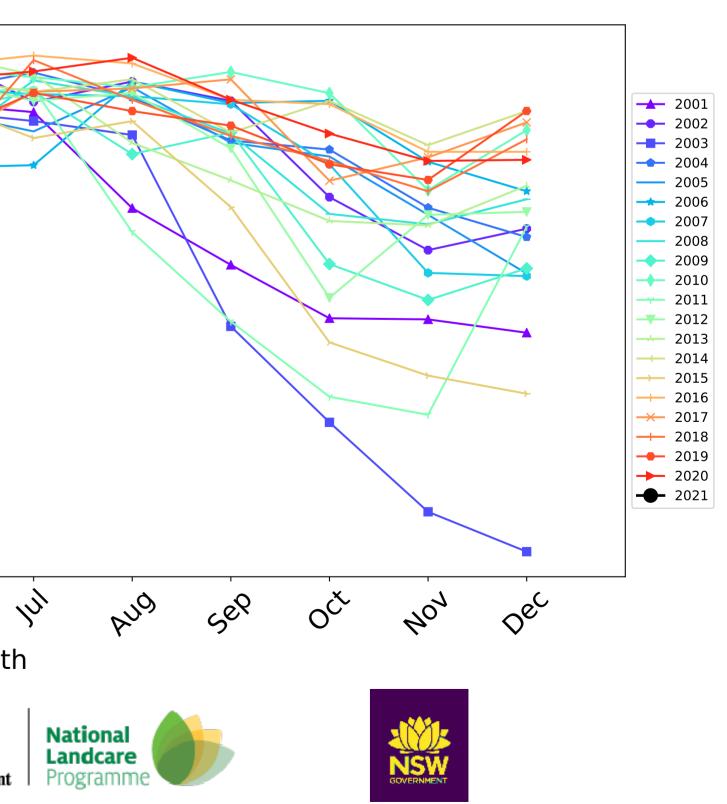
Conservation and natural environments timeseries

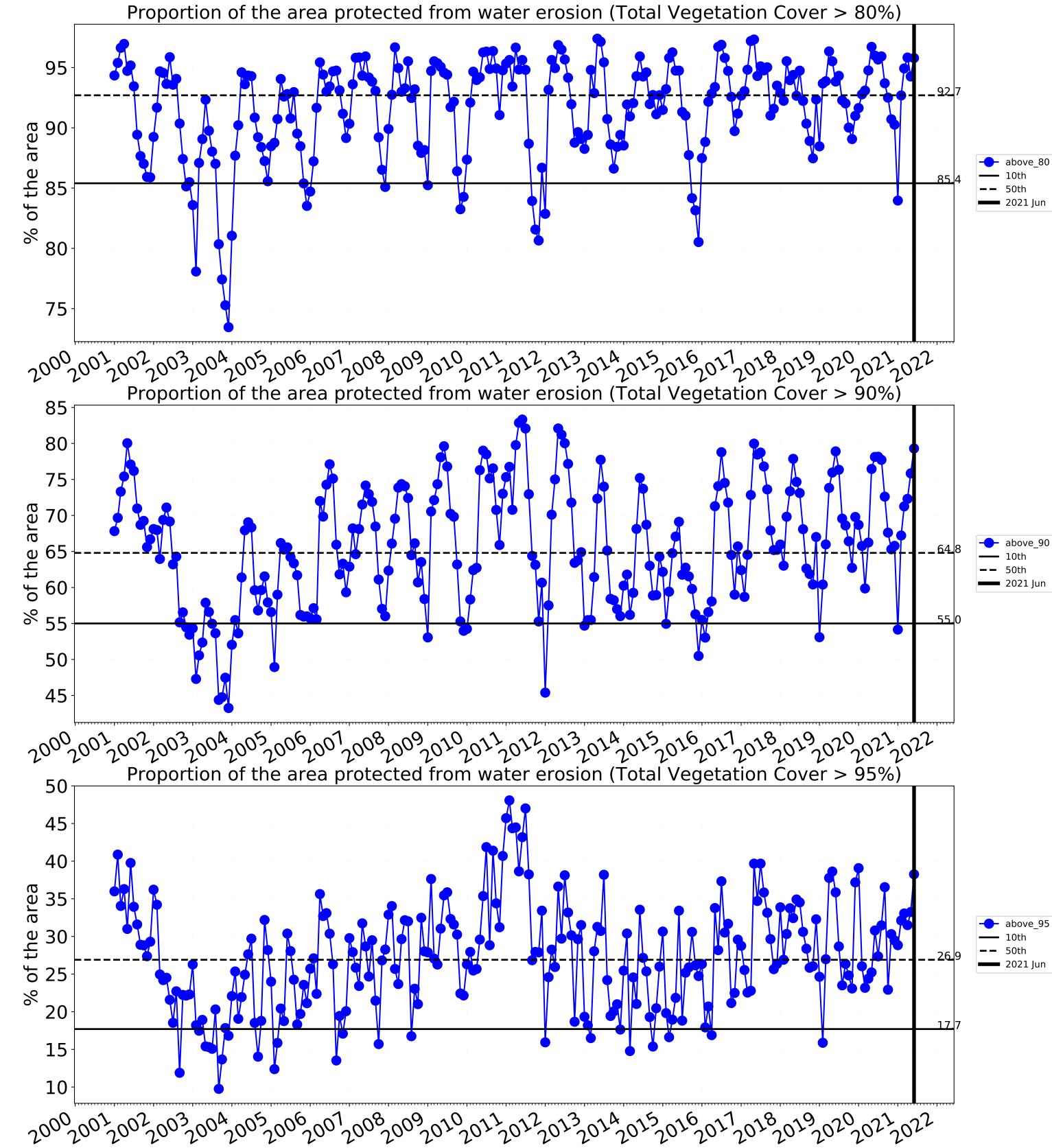


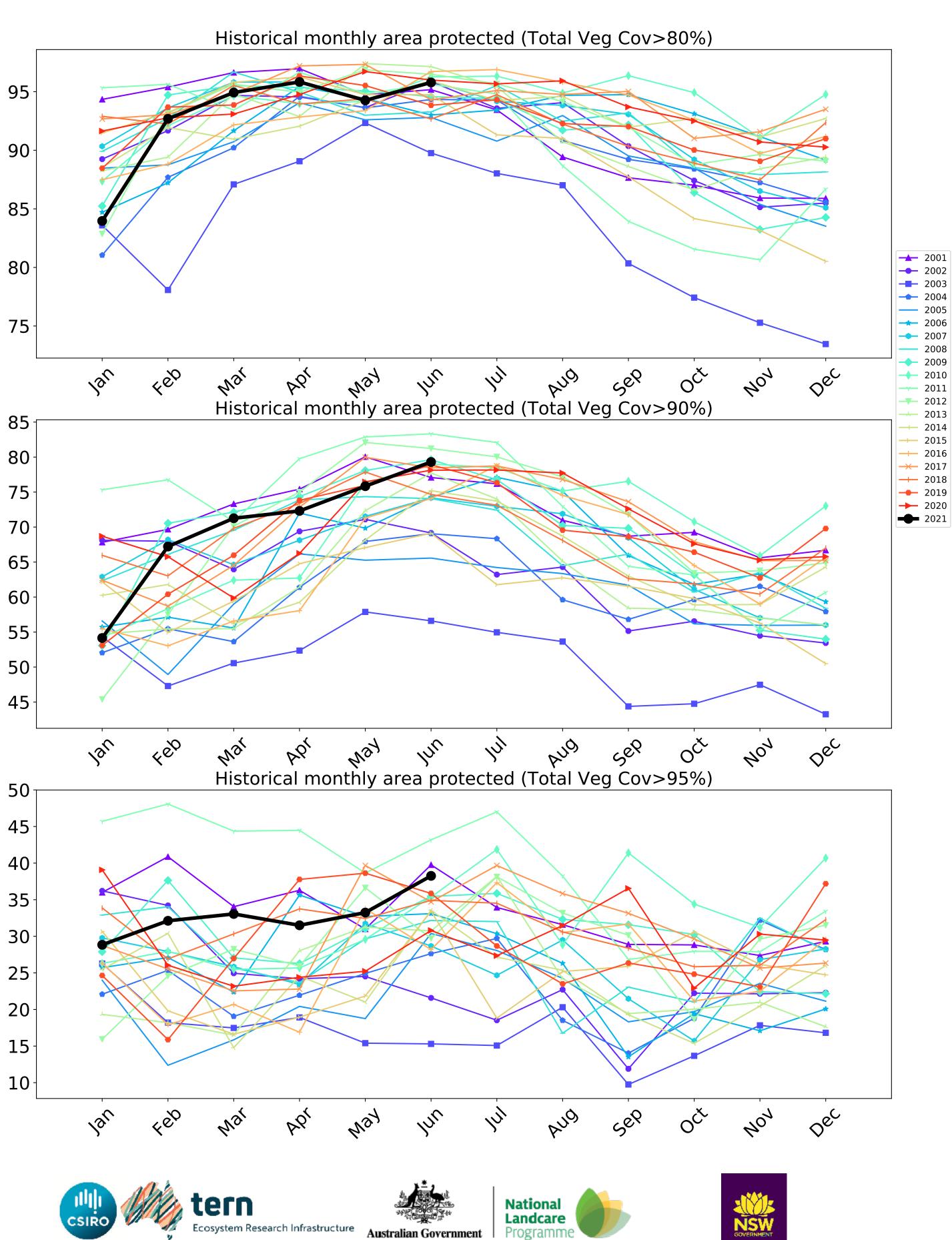
Wind erosion historical monthly area protected (Total Veg Cov >50%)

98 96 94 92 90 Jan 4eb In May Mai PG1 month 100 tern Ecosystem Research Infrastructure Australian Government

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



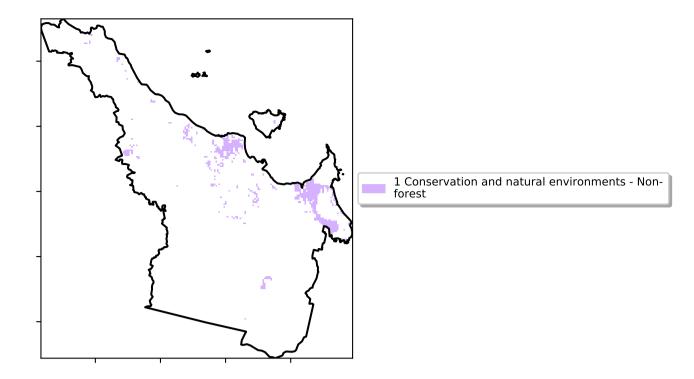




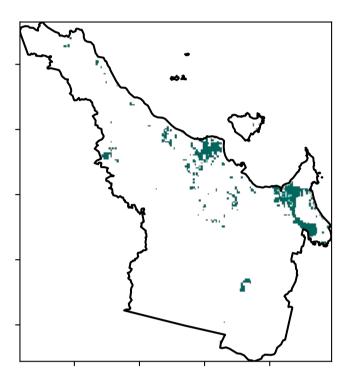


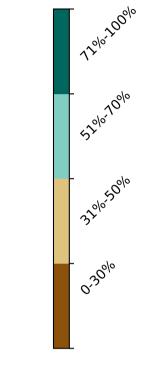
Conservation and natural environments non forest

Land use and forest cover

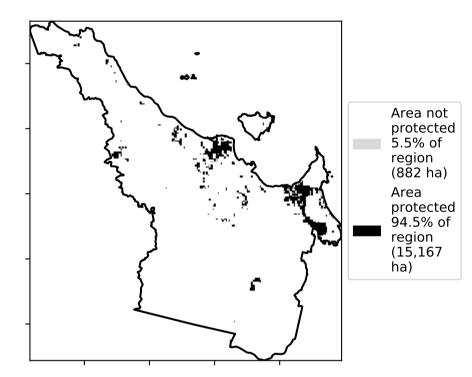


Total Vegetation Cover [%]

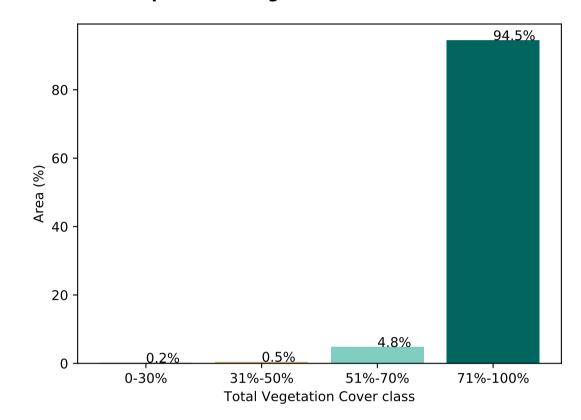




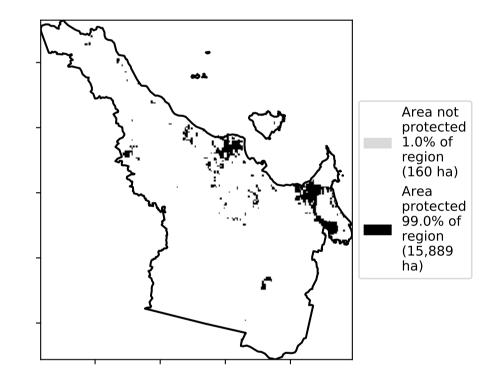
% Area protected from water erosion (>70%)



Proportion of vegetation cover class in area

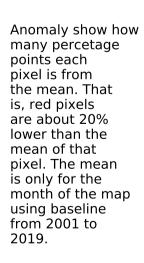


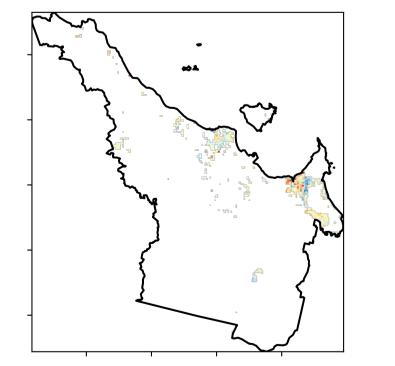
% Area protected from wind erosion (>50%)

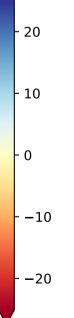


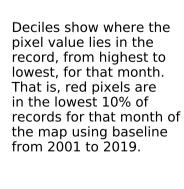
Catchment Scale Land Use and Forests of Australia (2018) Derived from Catchment Scale Land Use of Australia (2018) and Forests of Australia (2018)

Total Vegetation Cover Anomaly [%]









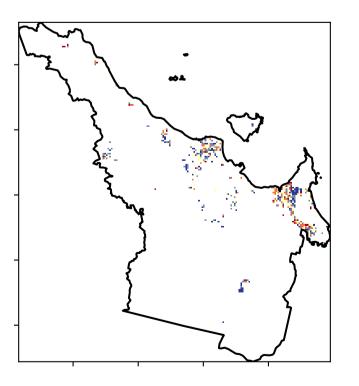
Total Vegetation Cover Decile [%]

\$

ଚ୍ଚ

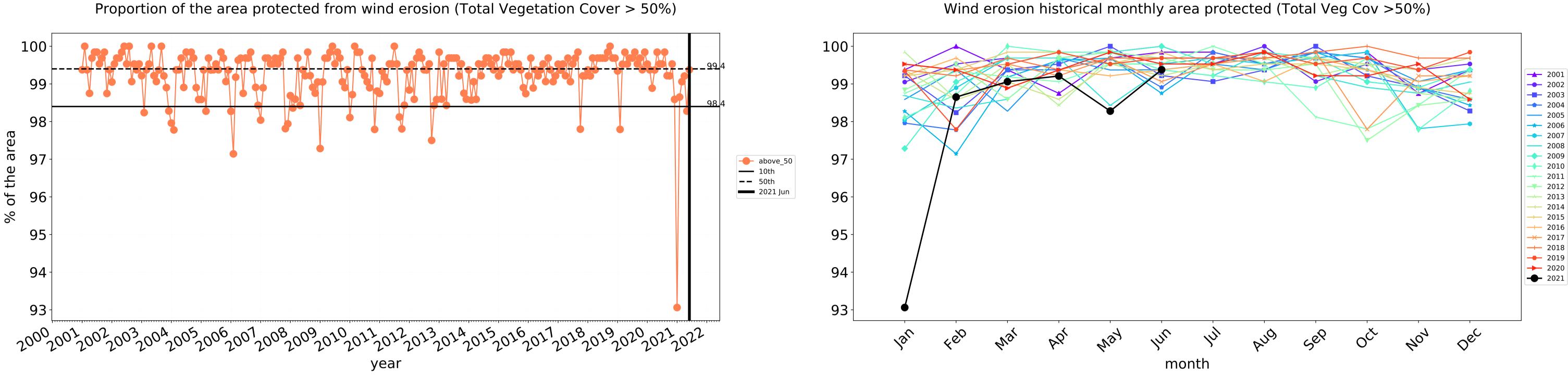
A-1

2?3



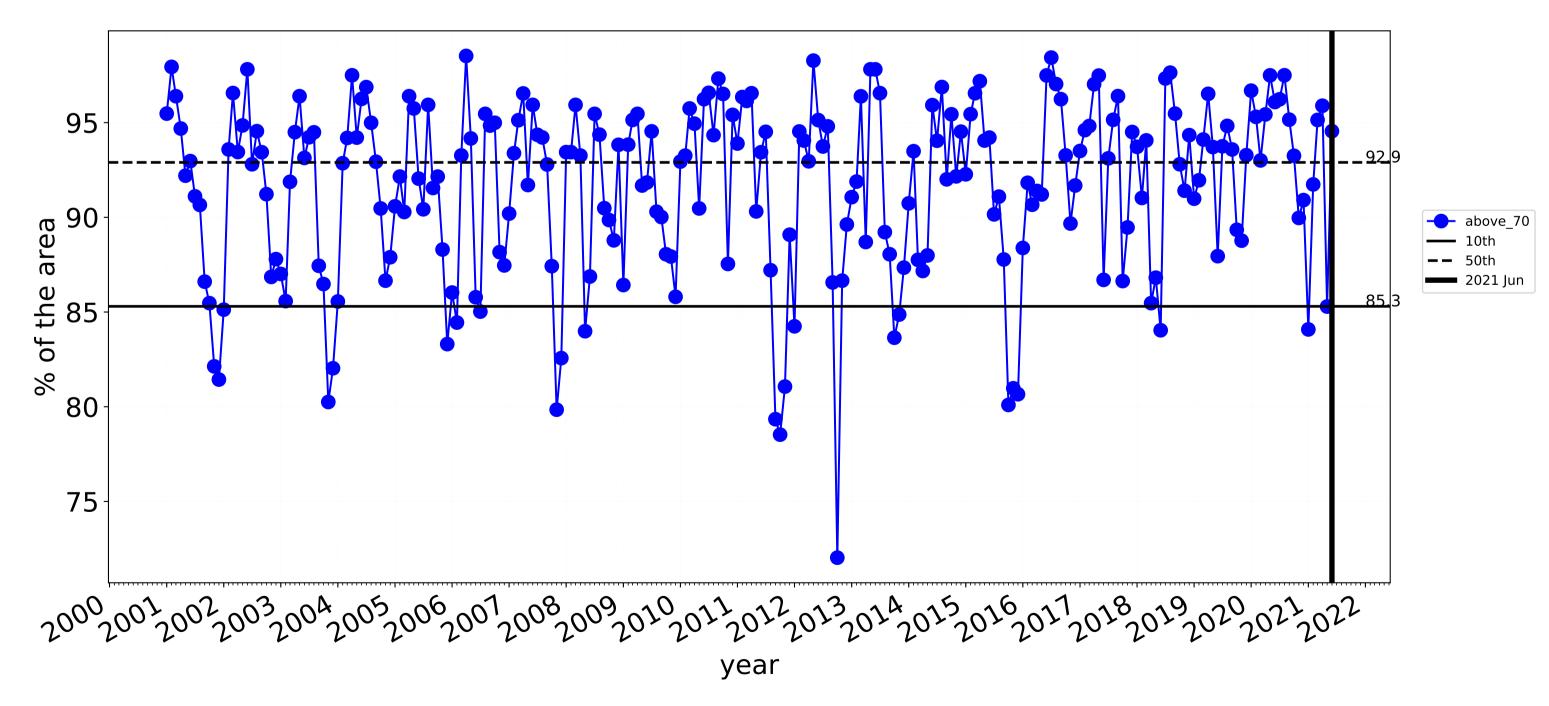


8

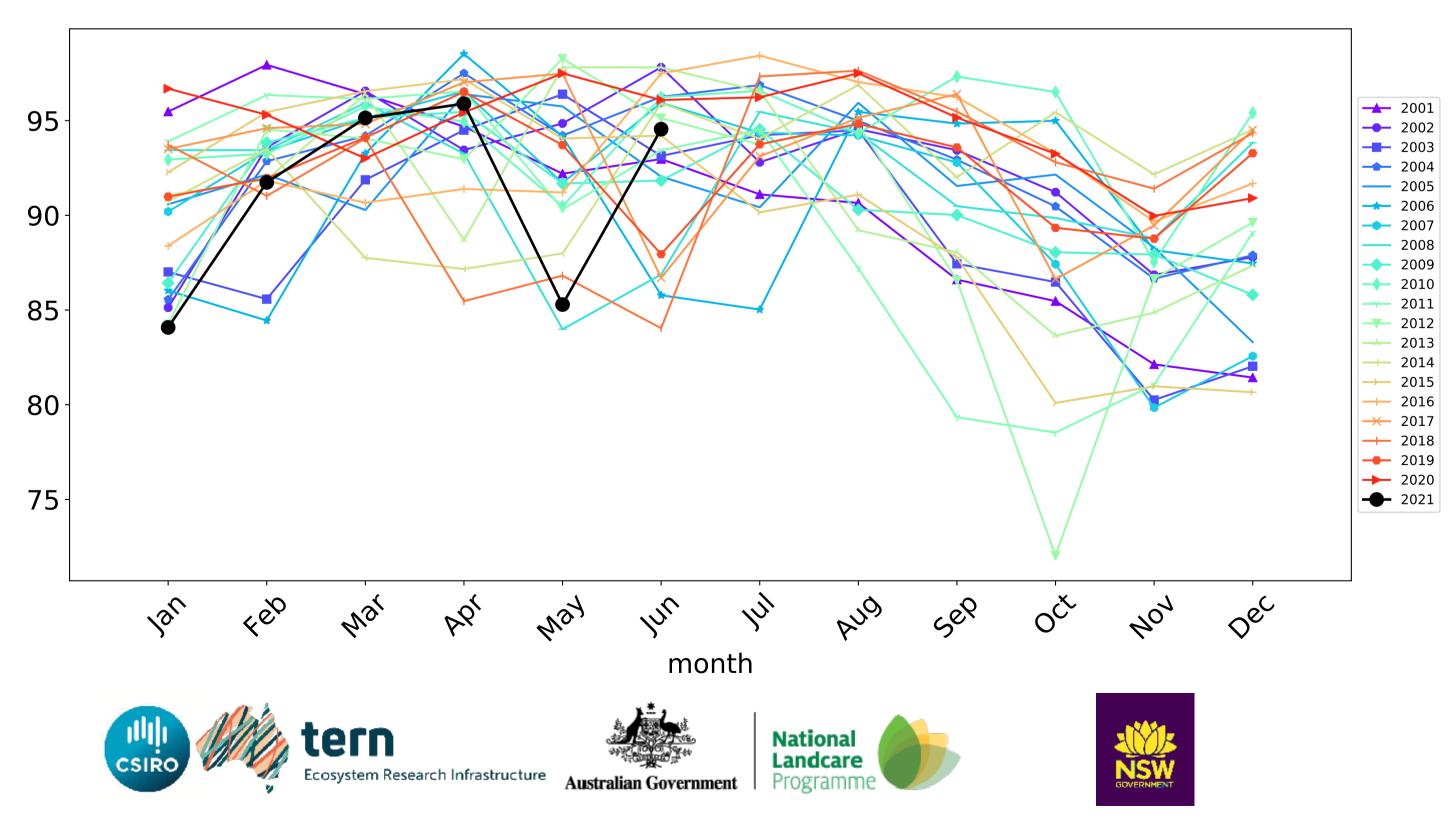


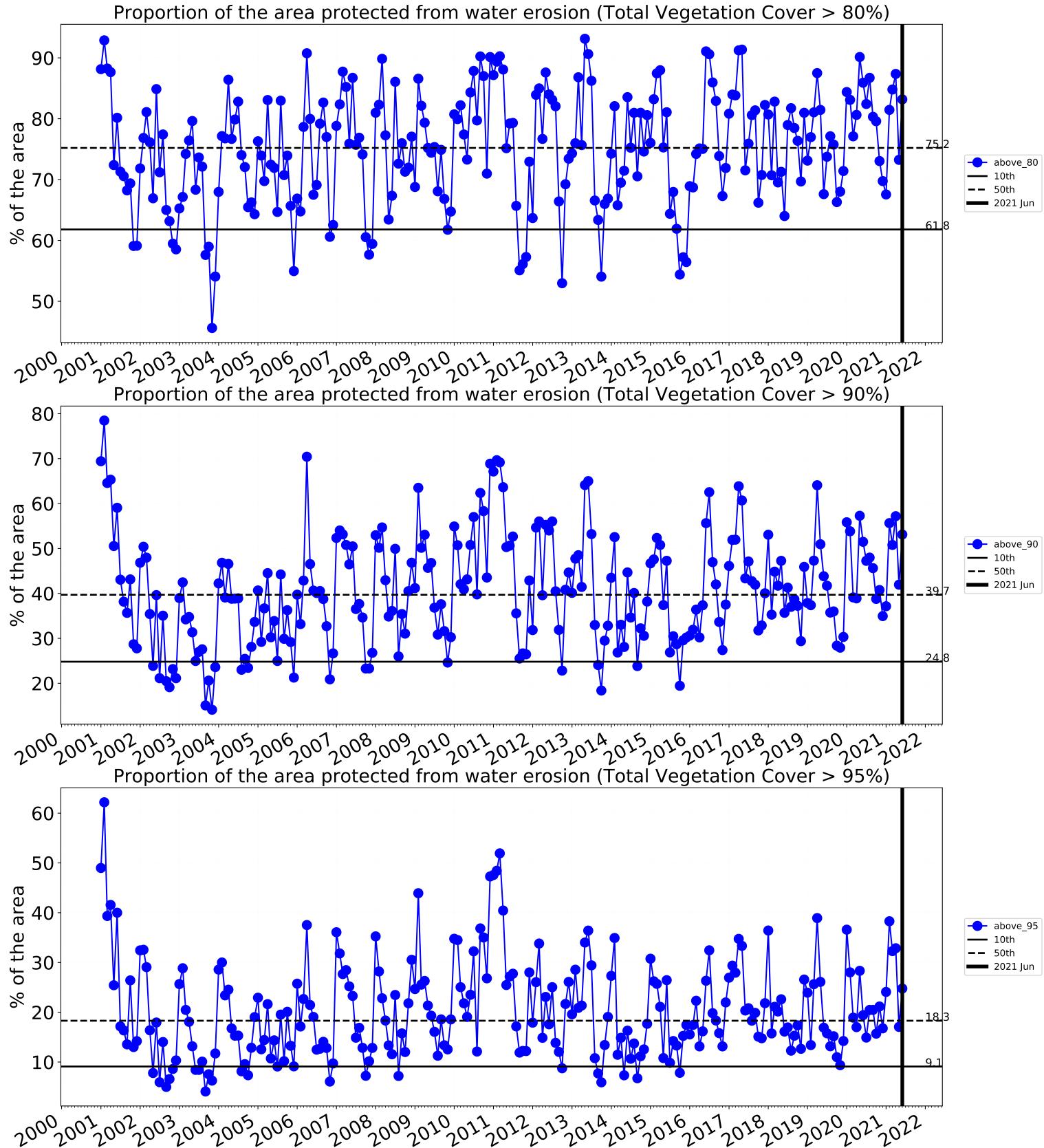
Proportion of the area protected from wind erosion (Total Vegetation Cover > 50%)

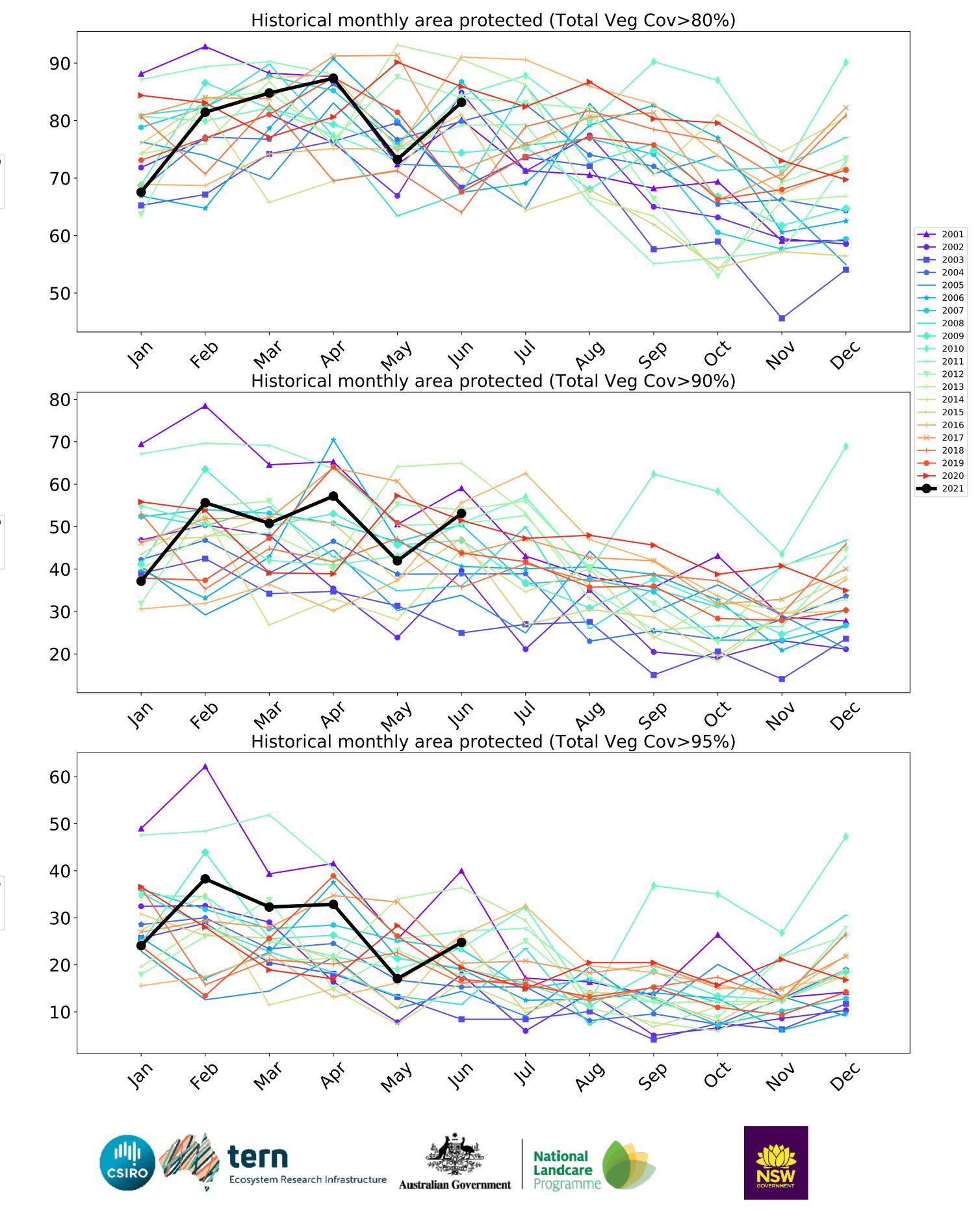




Water erosion historical monthly area protected (Total Veg Cov>70%)

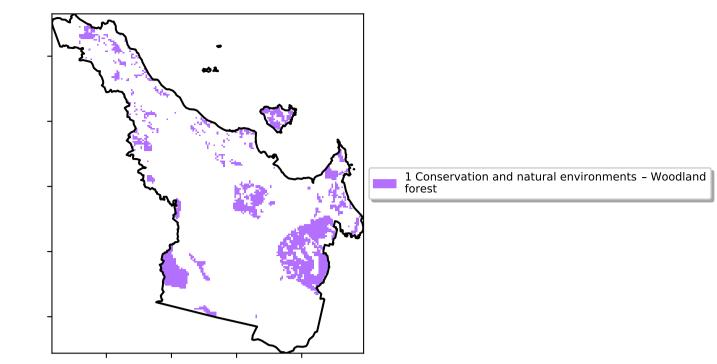




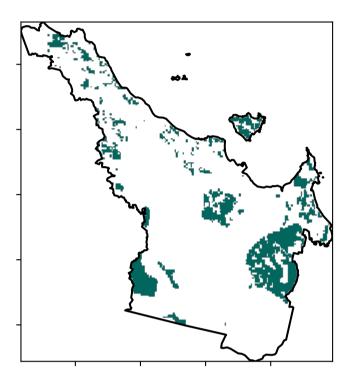


Conservation and natural environments Woodland forest

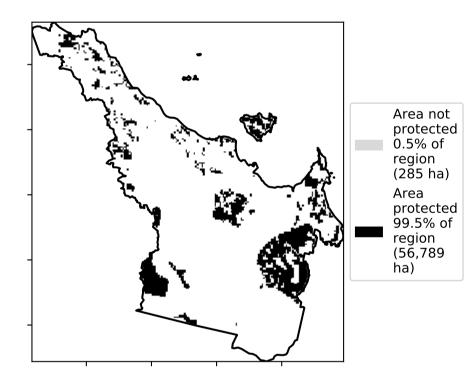
Land use and forest cover



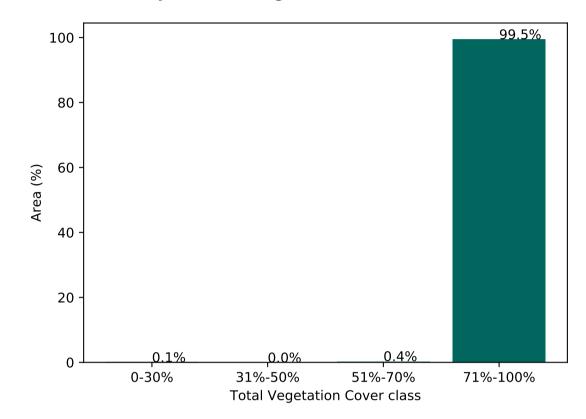
Total Vegetation Cover [%]









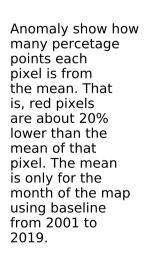


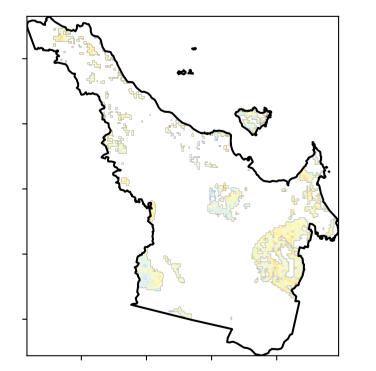
% Area protected from wind erosion (>50%)

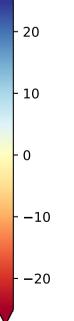


Catchment Scale Land Use and Forests of Australia (2018) Derived from Catchment Scale Land Use of Australia (2018) and Forests of Australia (2018)

Total Vegetation Cover Anomaly [%]





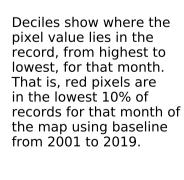


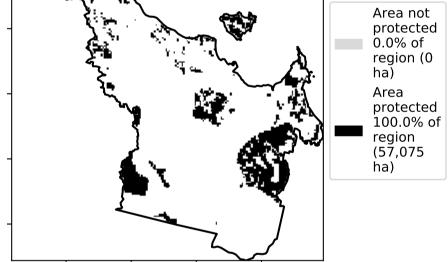
12%200%

· 52°1070°10

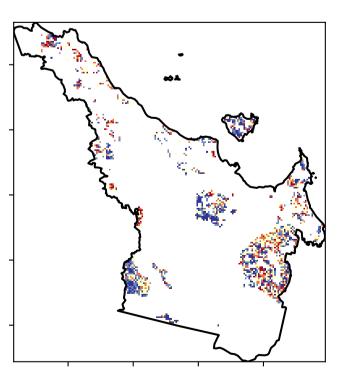
3201050010

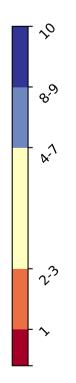
0.30%



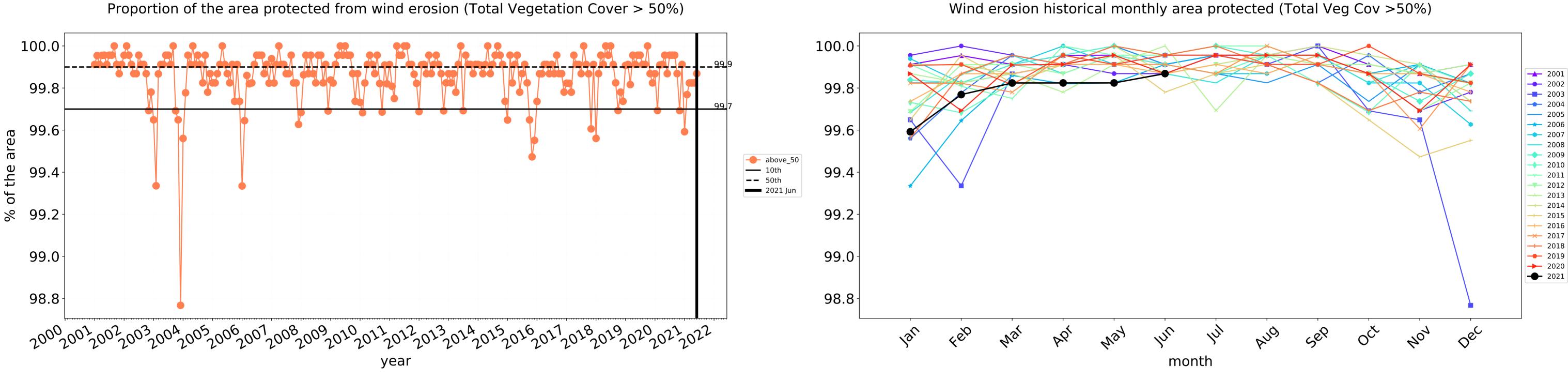


Total Vegetation Cover Decile [%]



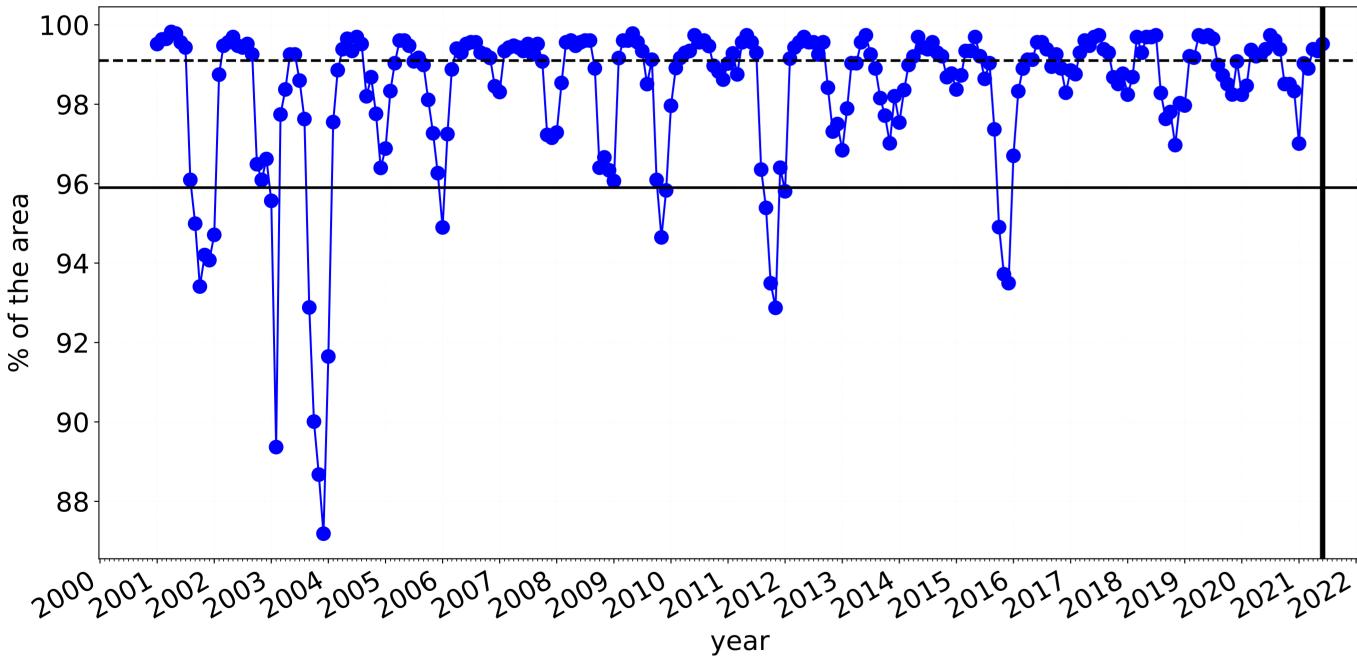






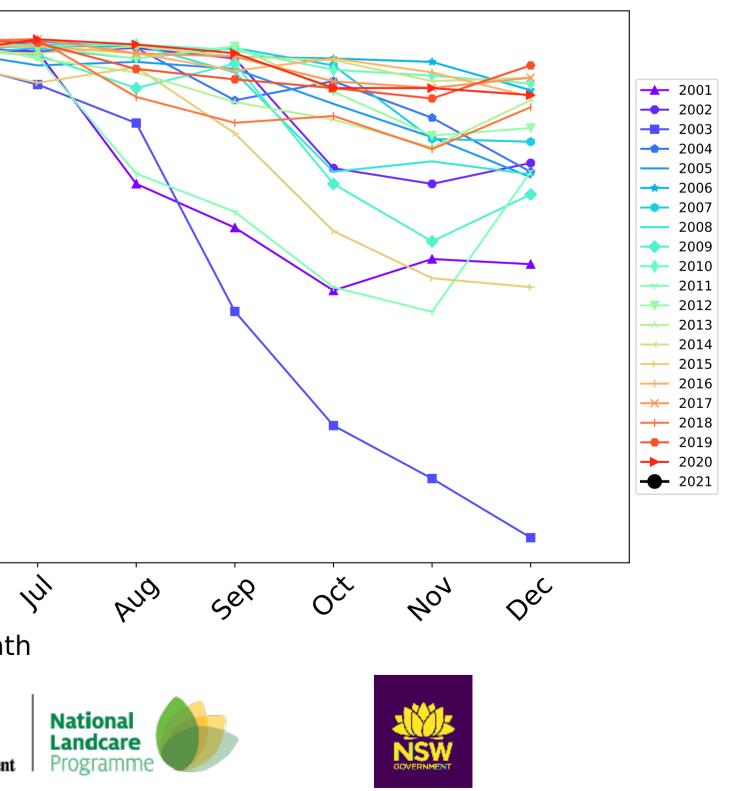
Proportion of the area protected from wind erosion (Total Vegetation Cover > 50%)

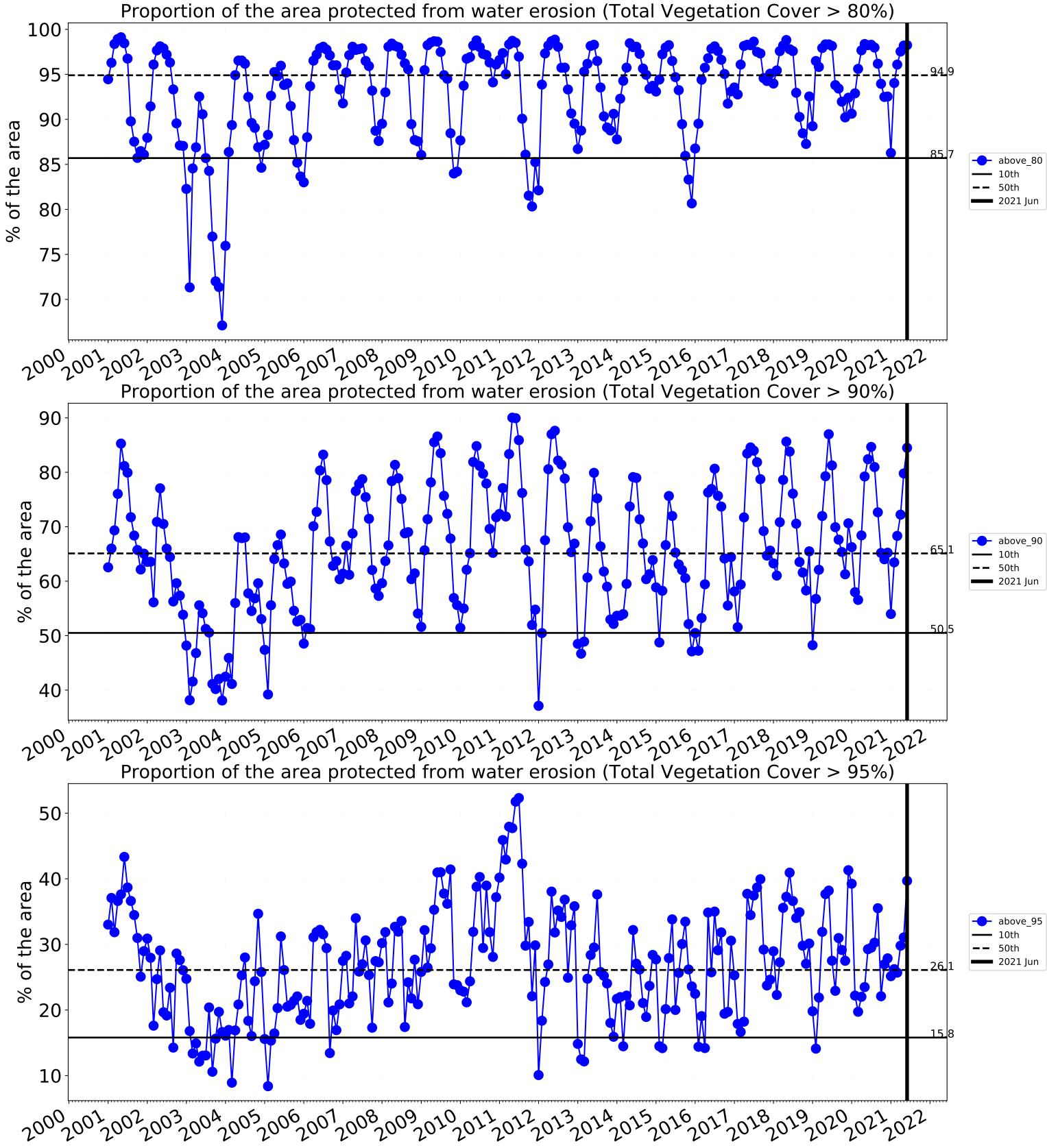




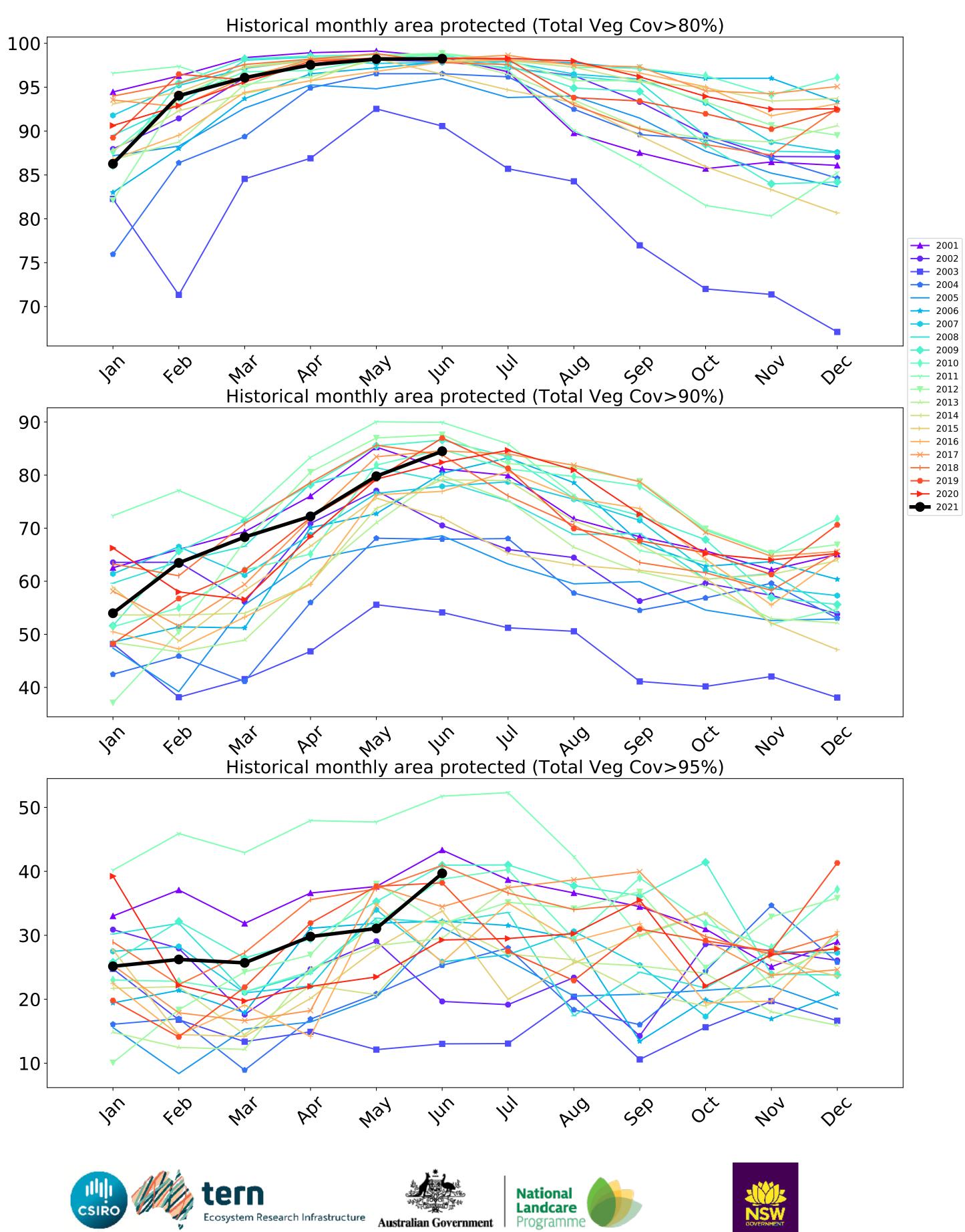
100 98 96 95 ---- above_70 **—** 10th **——** 50th **——** 2021 Jun 94 92 90 88 Jan 4eb way PQ In Mai month tern Ecosystem Research Infrastructure Australian Government

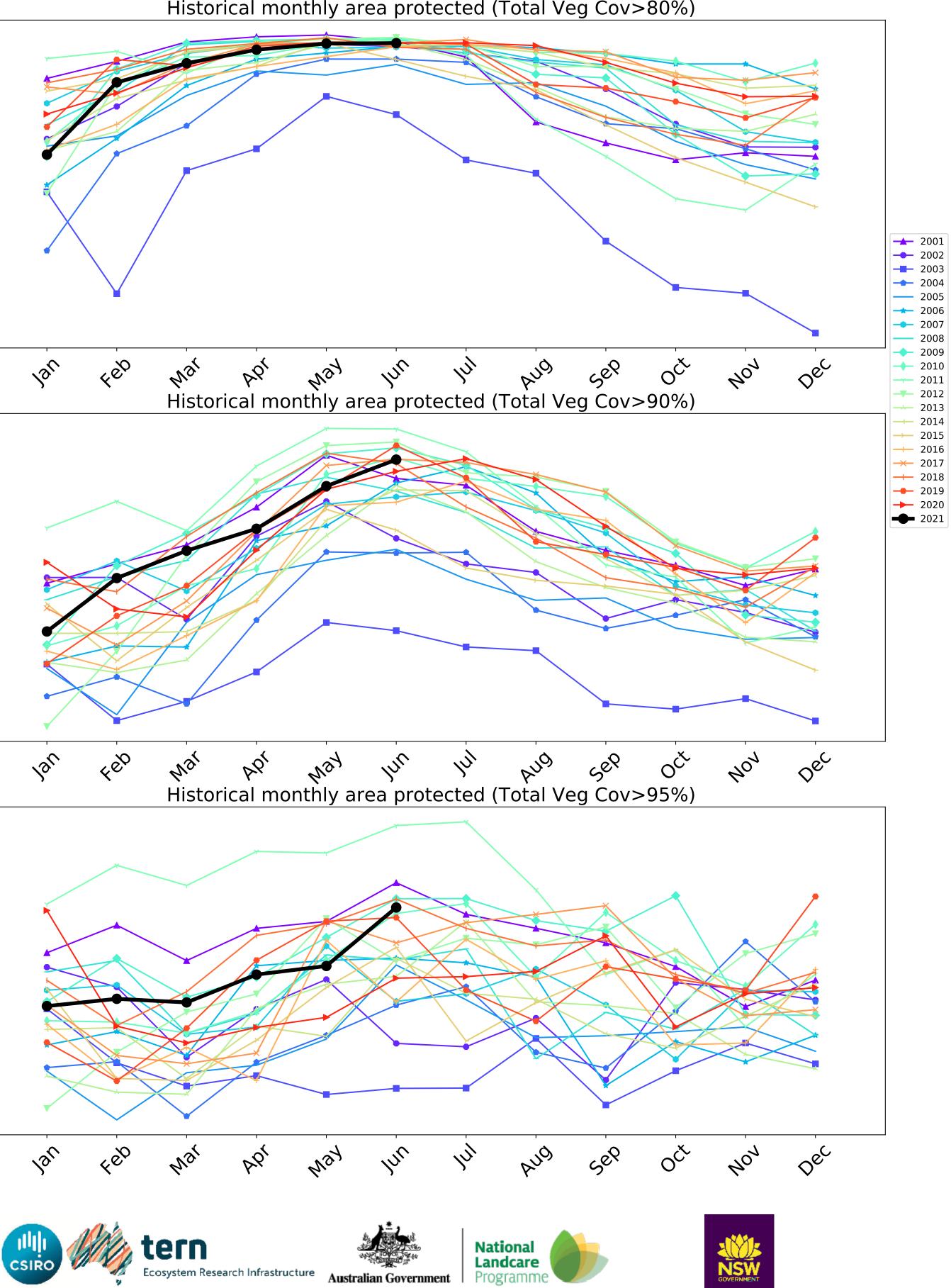
Water erosion historical monthly area protected (Total Veg Cov>70%)





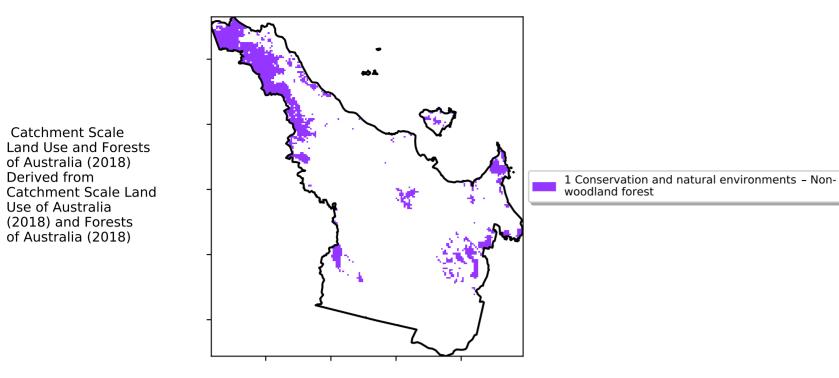




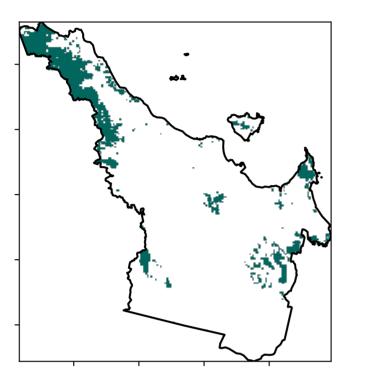


Conservation and natural environments Forest (non woodland)

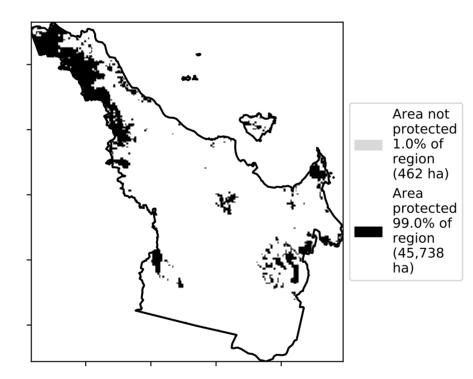
Land use and forest cover



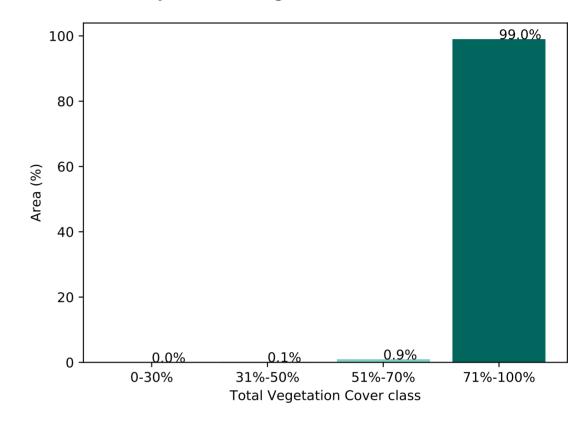
Total Vegetation Cover [%]



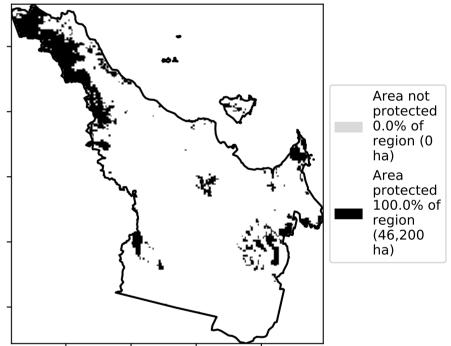
% Area protected from water erosion (>70%)

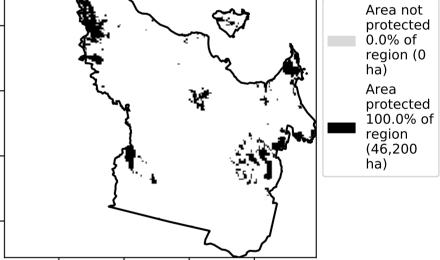


Proportion of vegetation cover class in area



% Area protected from wind erosion (>50%)





 $\hat{\mathcal{O}}$

_ଚି

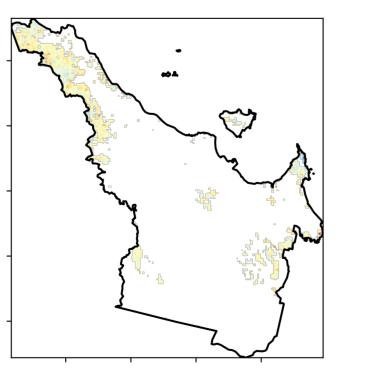
A.1

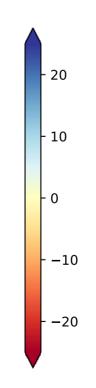
2?3

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



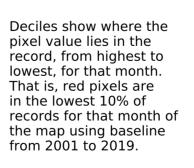


120010000

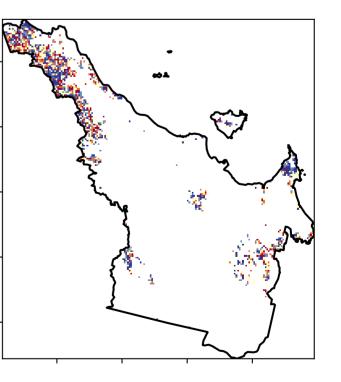
· 52% 70%

320050010

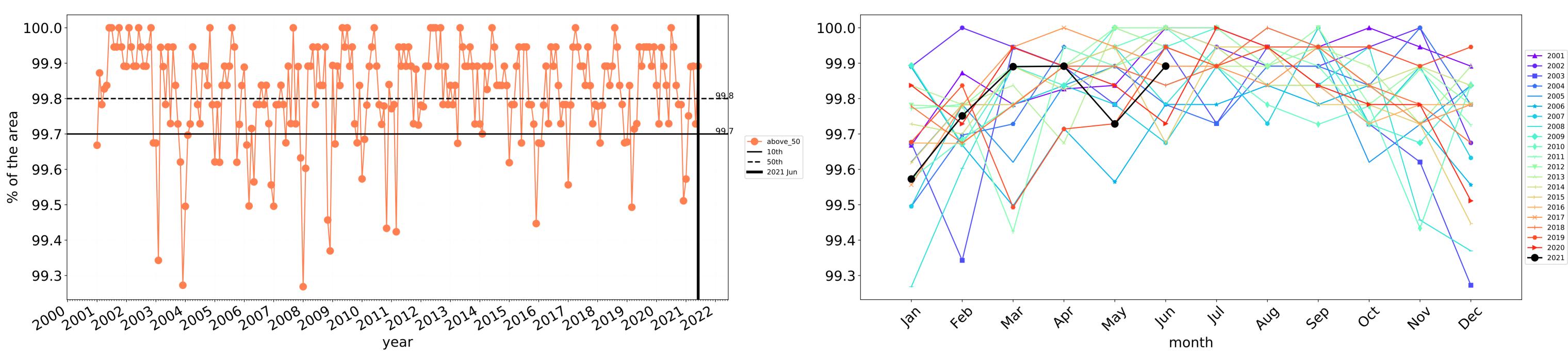
0.30%



Total Vegetation Cover Decile [%]

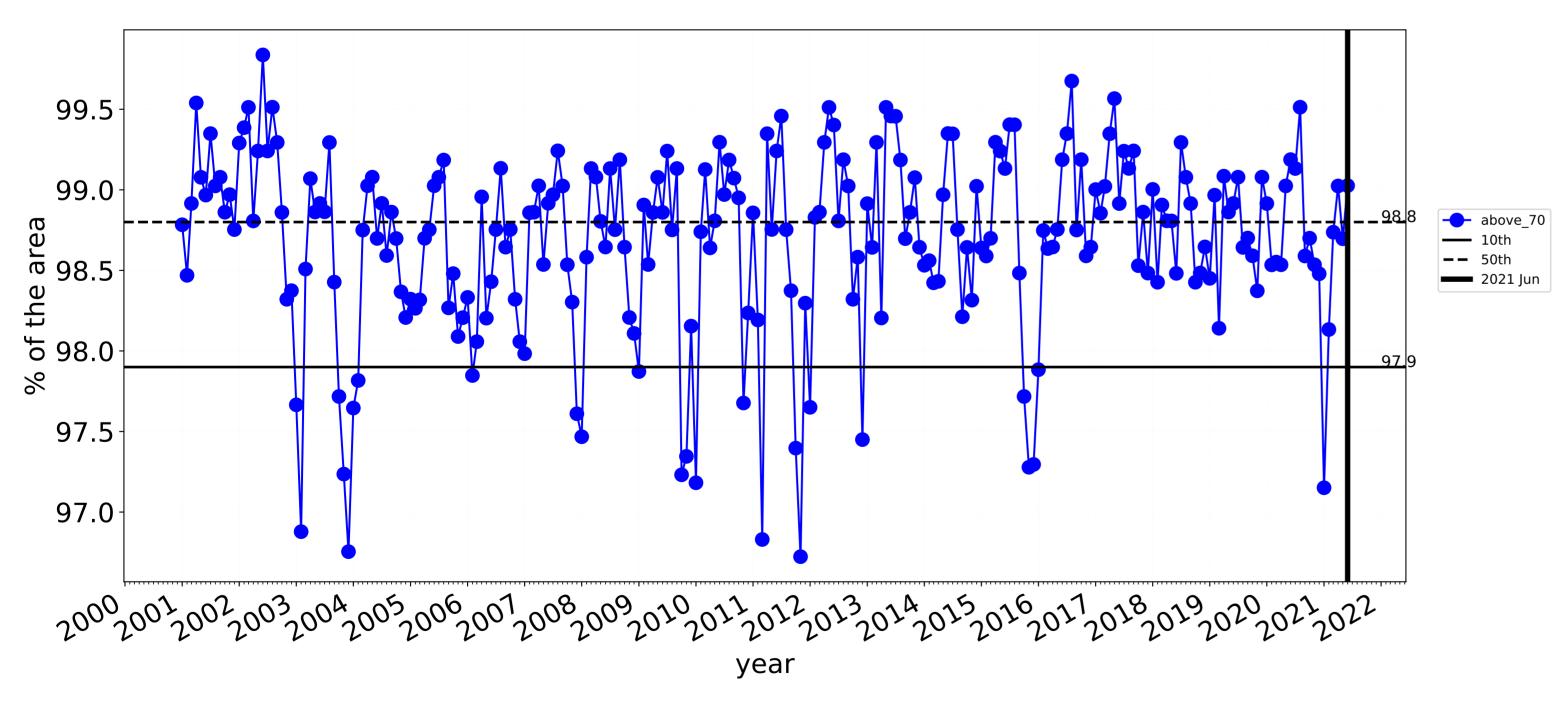


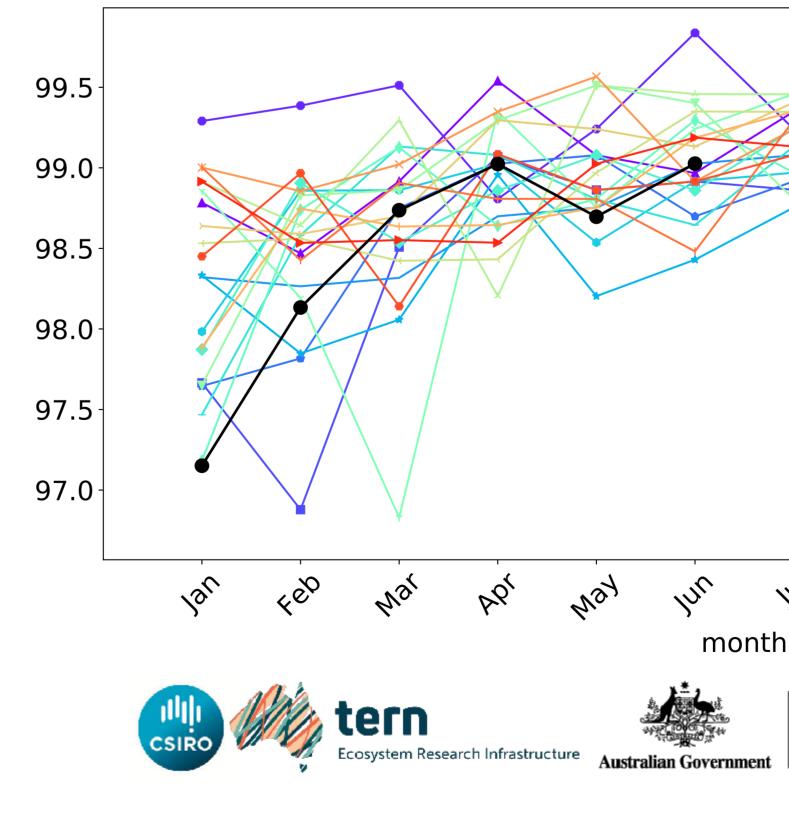




Proportion of the area protected from wind erosion (Total Vegetation Cover > 50%)

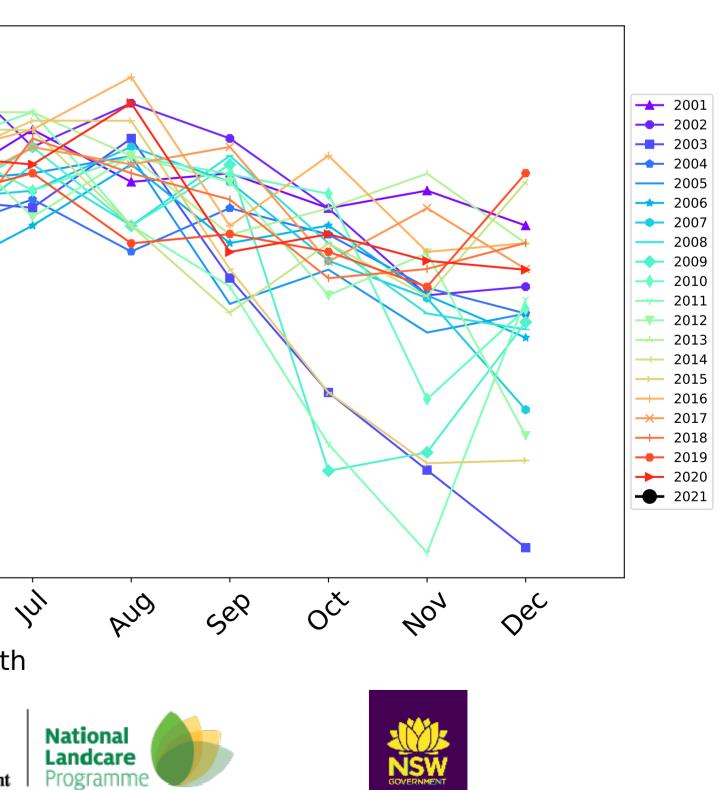
Proportion of the area protected from water erosion (Total Vegetation Cover > 70%)

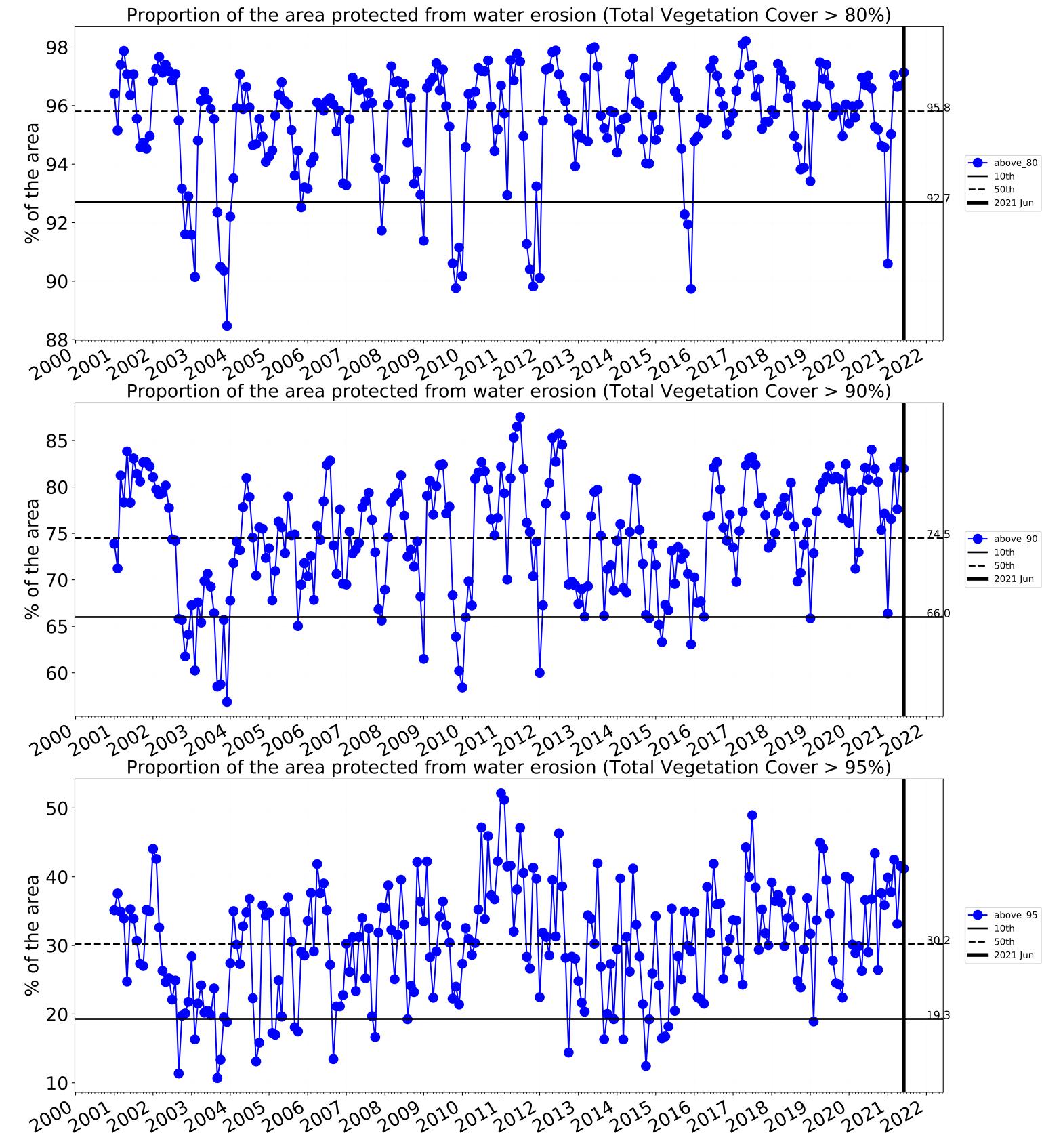


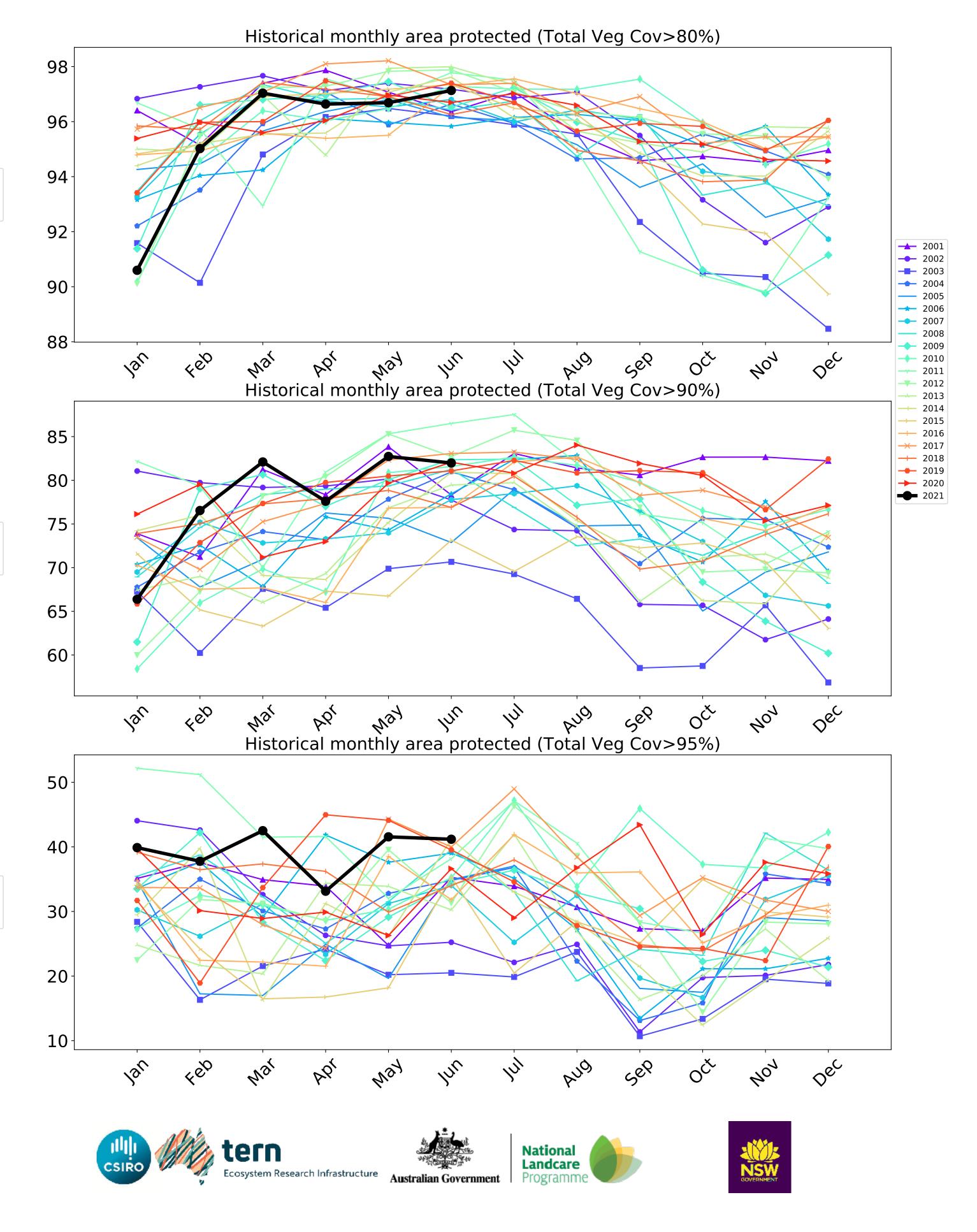


Wind erosion historical monthly area protected (Total Veg Cov >50%)

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



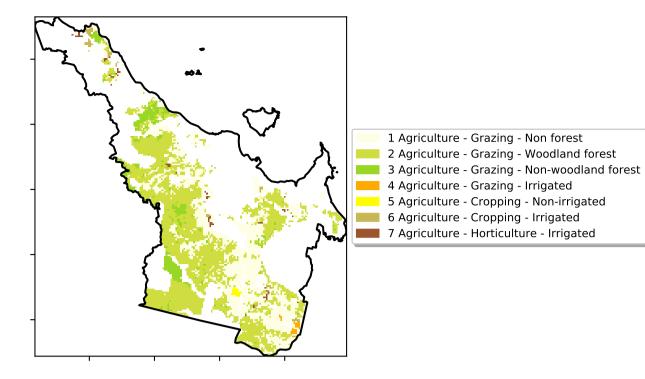




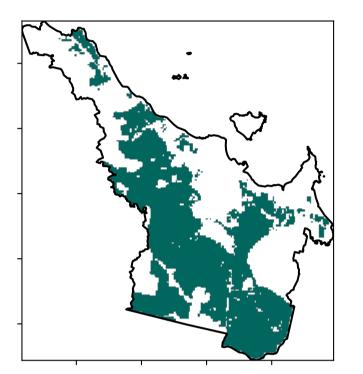
Agriculture

Land use and forest cover

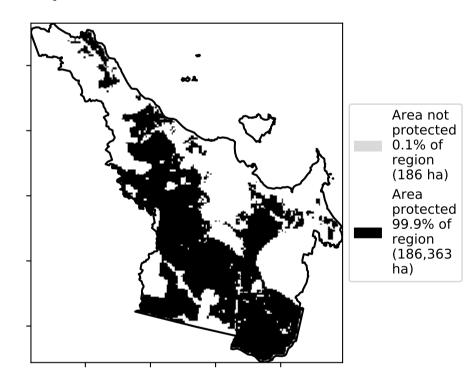


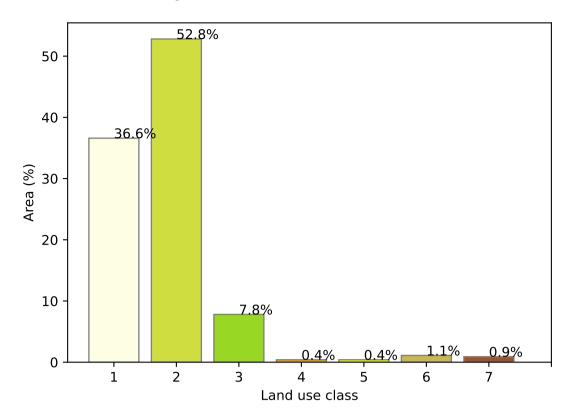


Total Vegetation Cover [%]

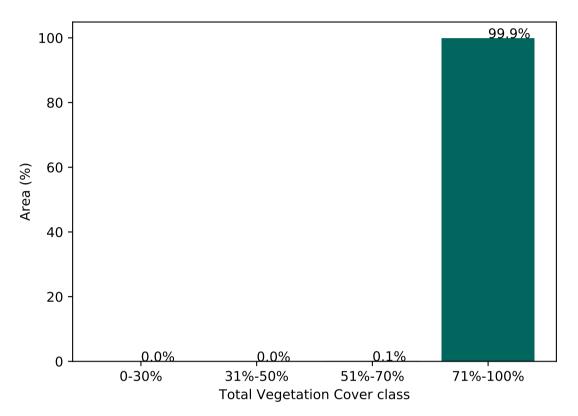


% Area protected from water erosion (>70%)

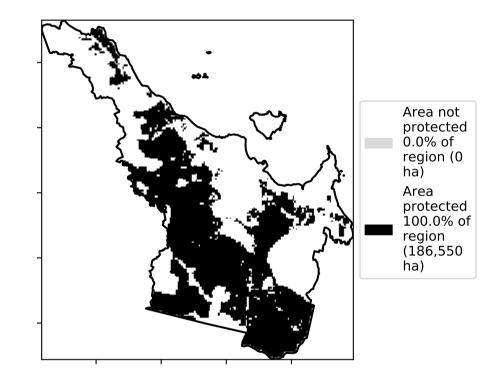




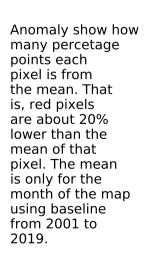
Proportion of vegetation cover class in area



% Area protected from wind erosion (>50%)



Total Vegetation Cover Anomaly [%]



Catchment Scale

of Australia (2018)

Derived from

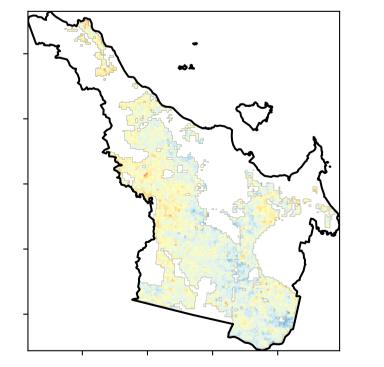
Use of Australia

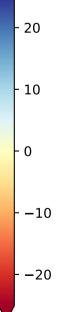
(2018) and Forests

of Australia (2018)

Land Use and Forests

Catchment Scale Land



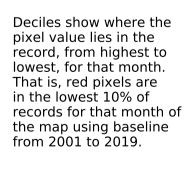


12º10-20010

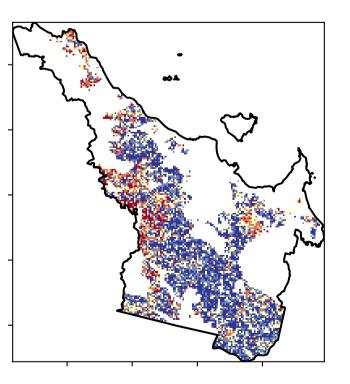
· 52°10'10°10

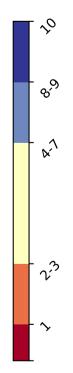
320050010

0.30%



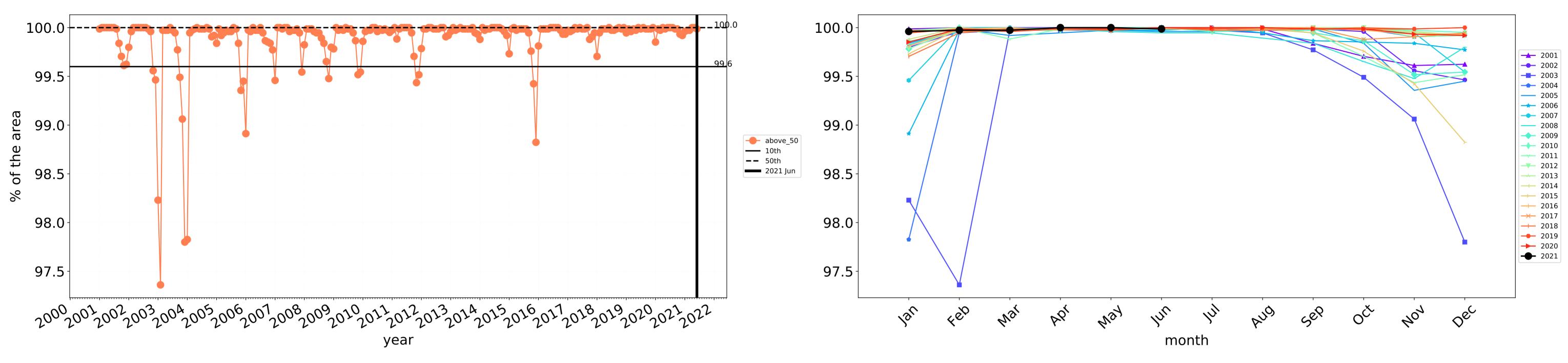
Total Vegetation Cover Decile [%]





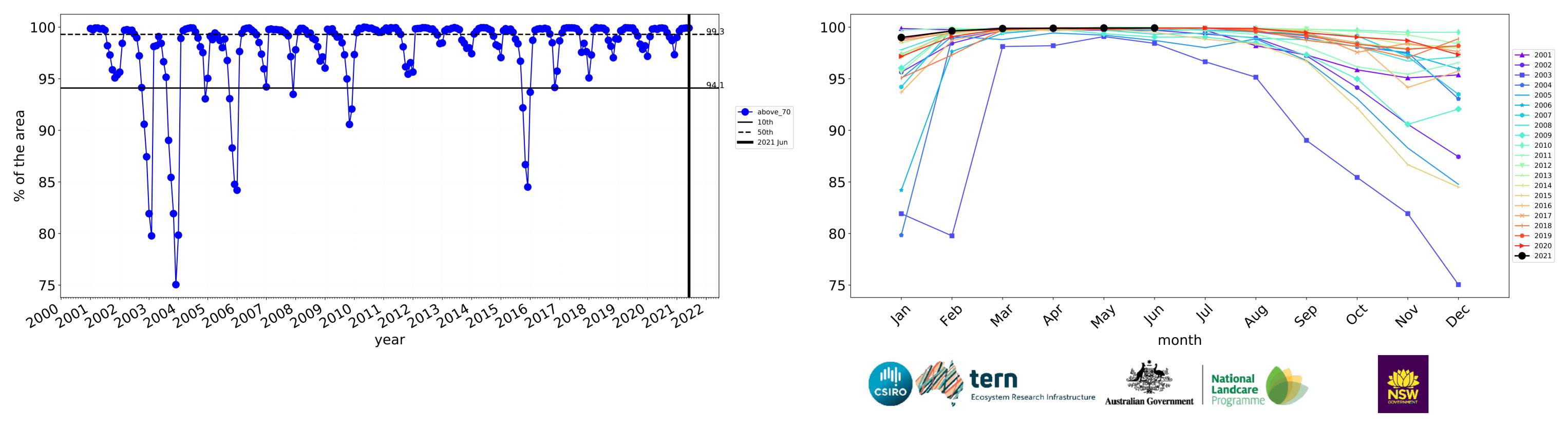


12



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

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

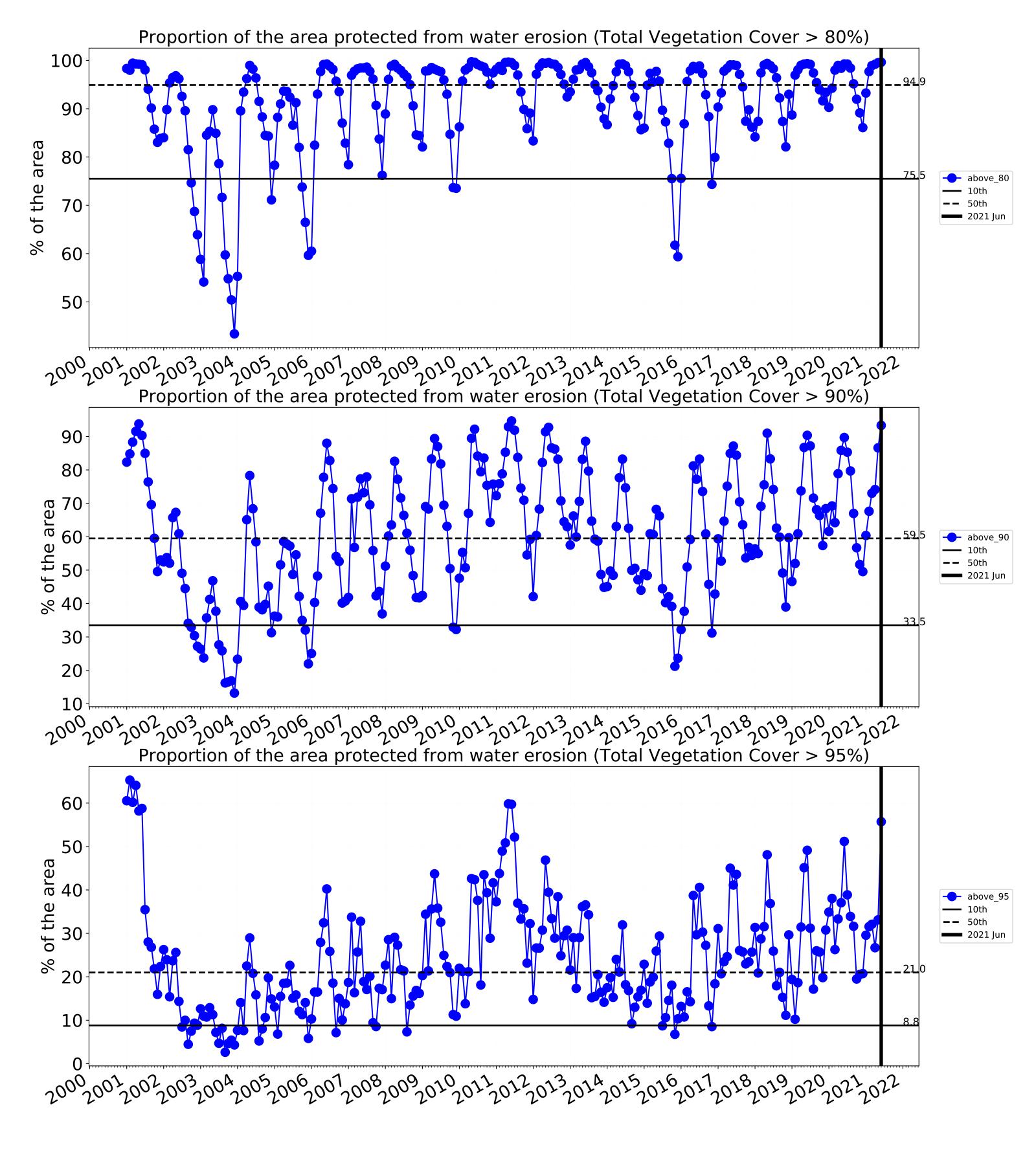


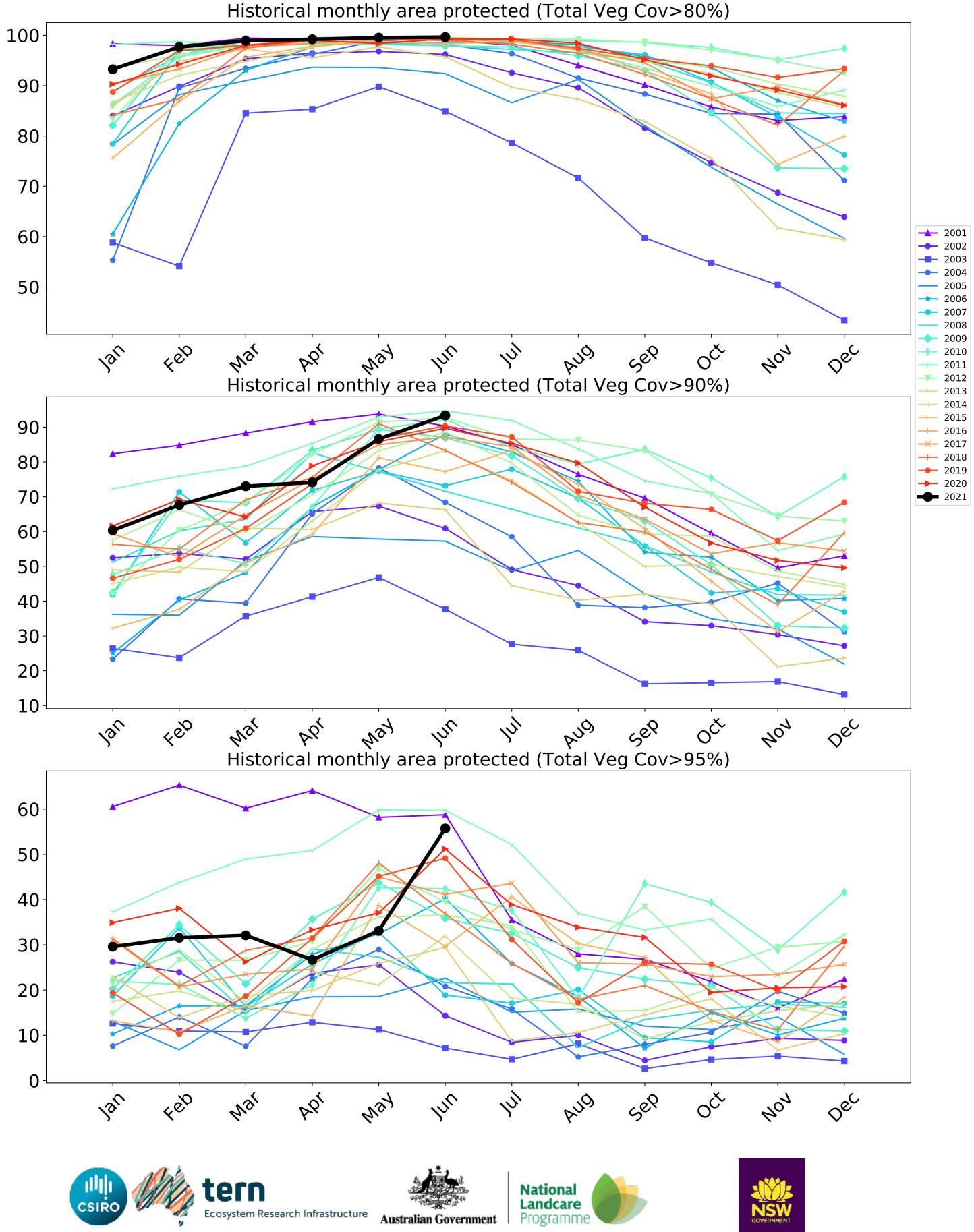
Agriculture timeseries



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

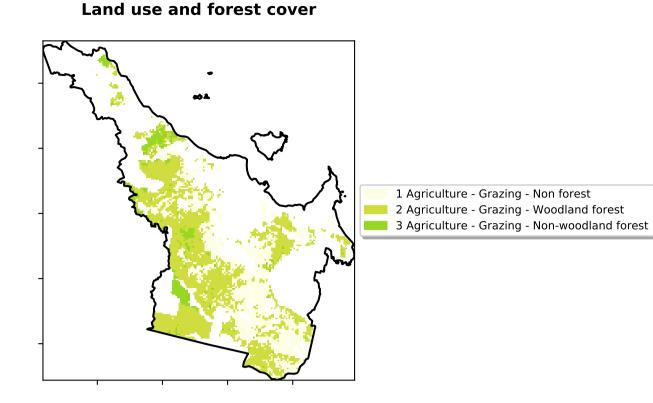
Water erosion historical monthly area protected (Total Veg Cov>70%)



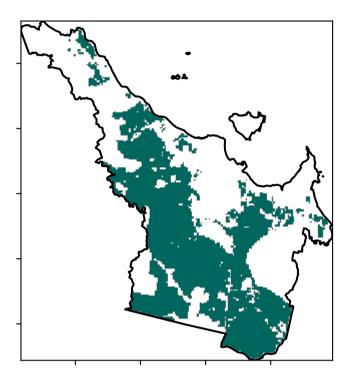


Grazing

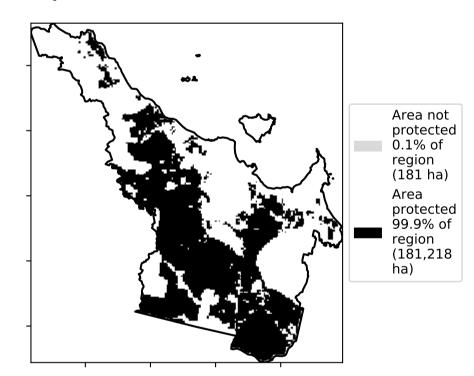
Catchment Scale Land Use and Forests of Australia (2018) Derived from Catchment Scale Land Use of Australia (2018) and Forests of Australia (2018)

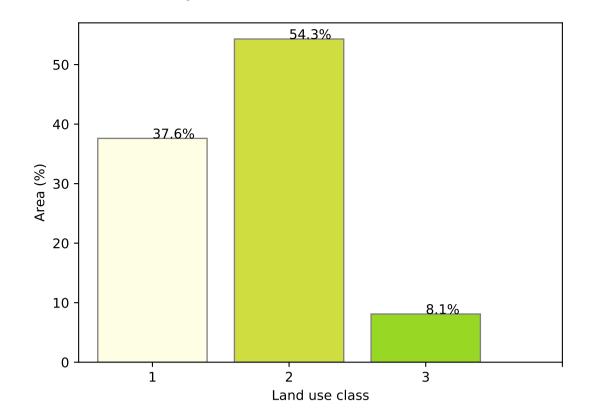


Total Vegetation Cover [%]



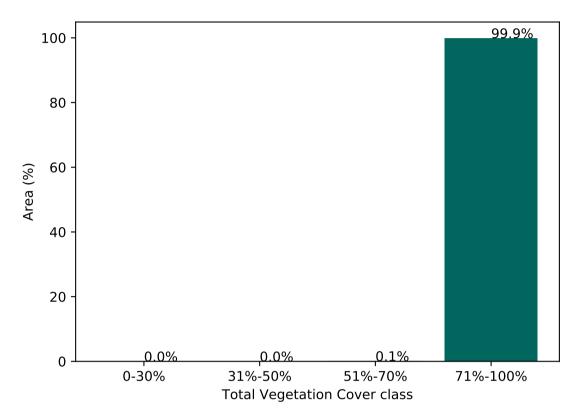
% Area protected from water erosion (>70%)



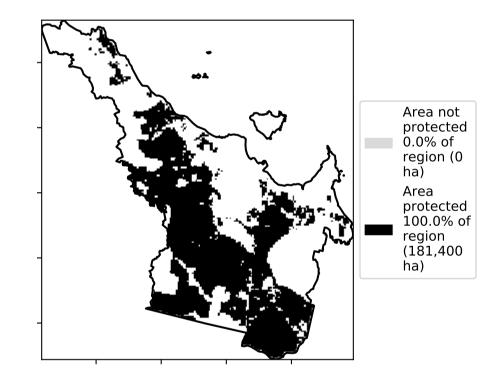


Proportion of each land class in area

Proportion of vegetation cover class in area

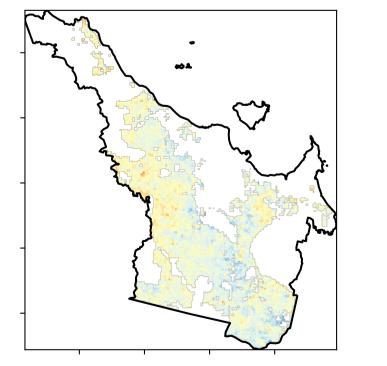


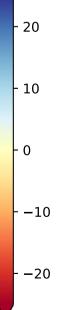
% Area protected from wind erosion (>50%)



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.





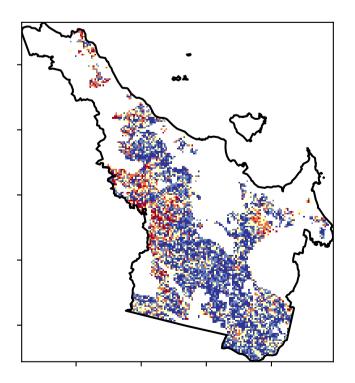
12%200%

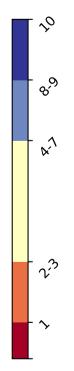
· 52% 70%

32005000

0.30%

Total Vegetation Cover Decile [%]





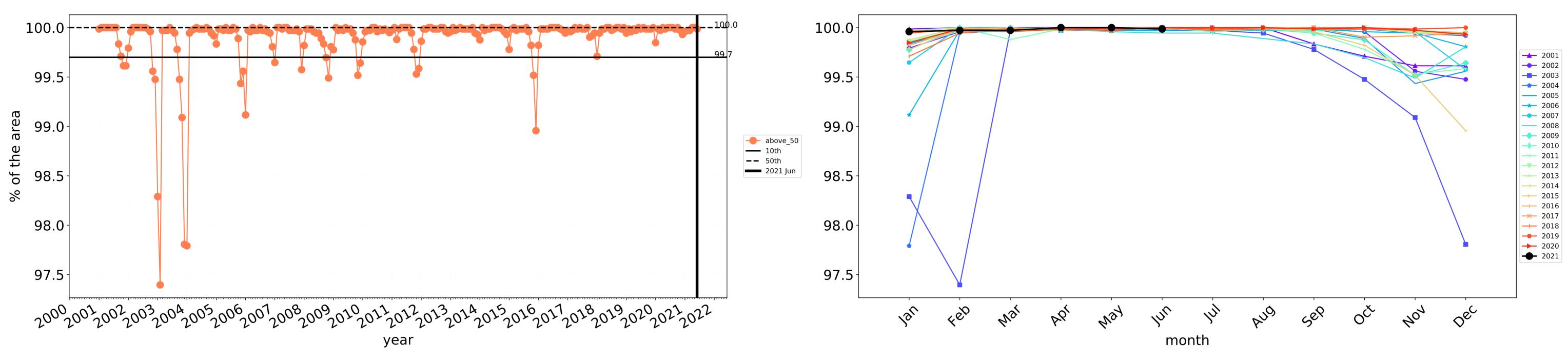


Deciles show where the pixel value lies in the

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

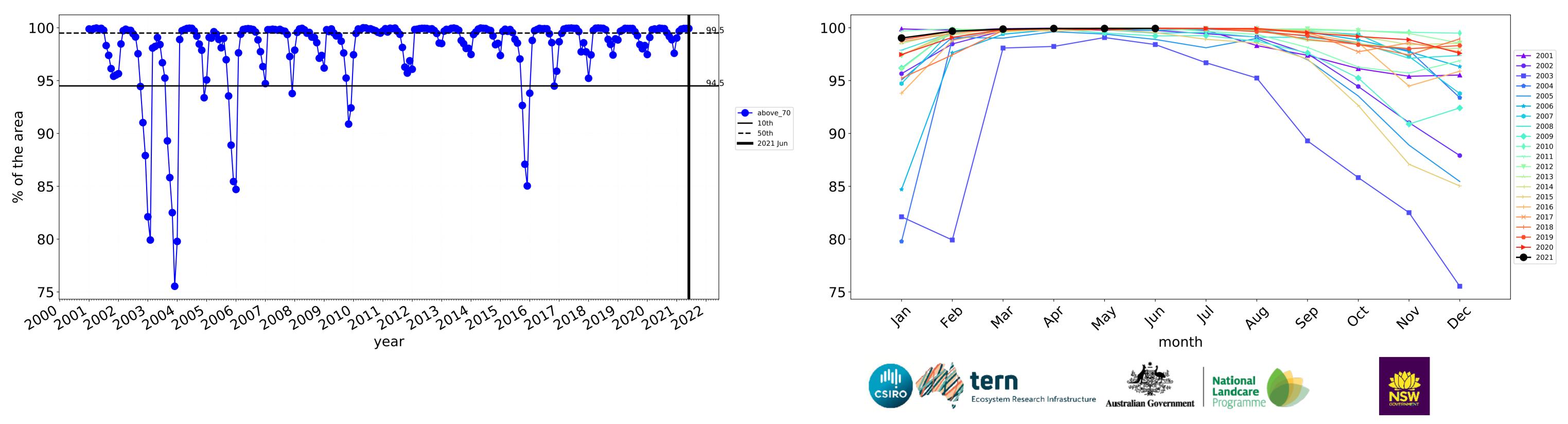
records for that month of

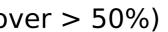
the map using baseline from 2001 to 2019.



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

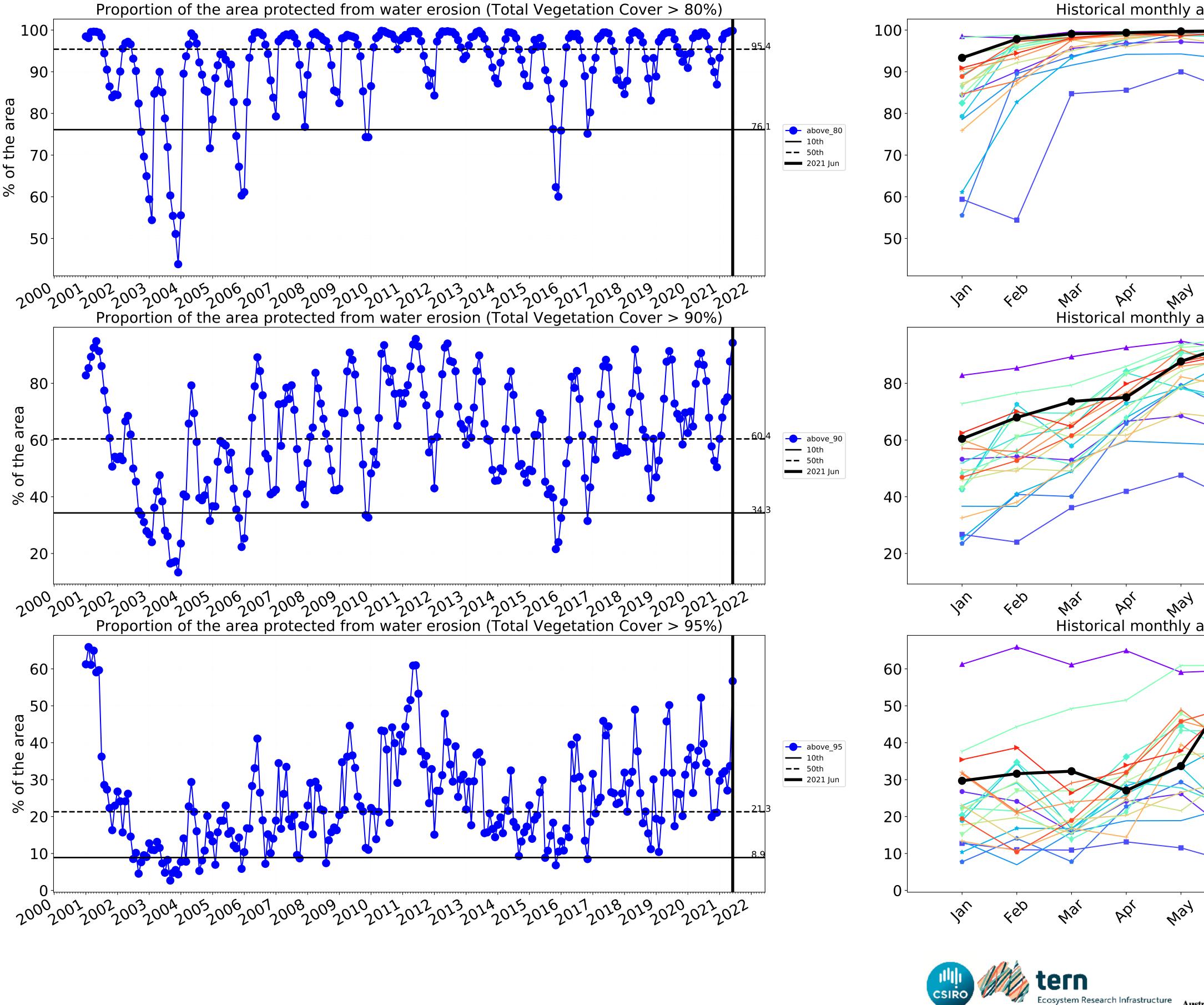
Proportion of the area protected from water erosion (Total Vegetation Cover > 70%)





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

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

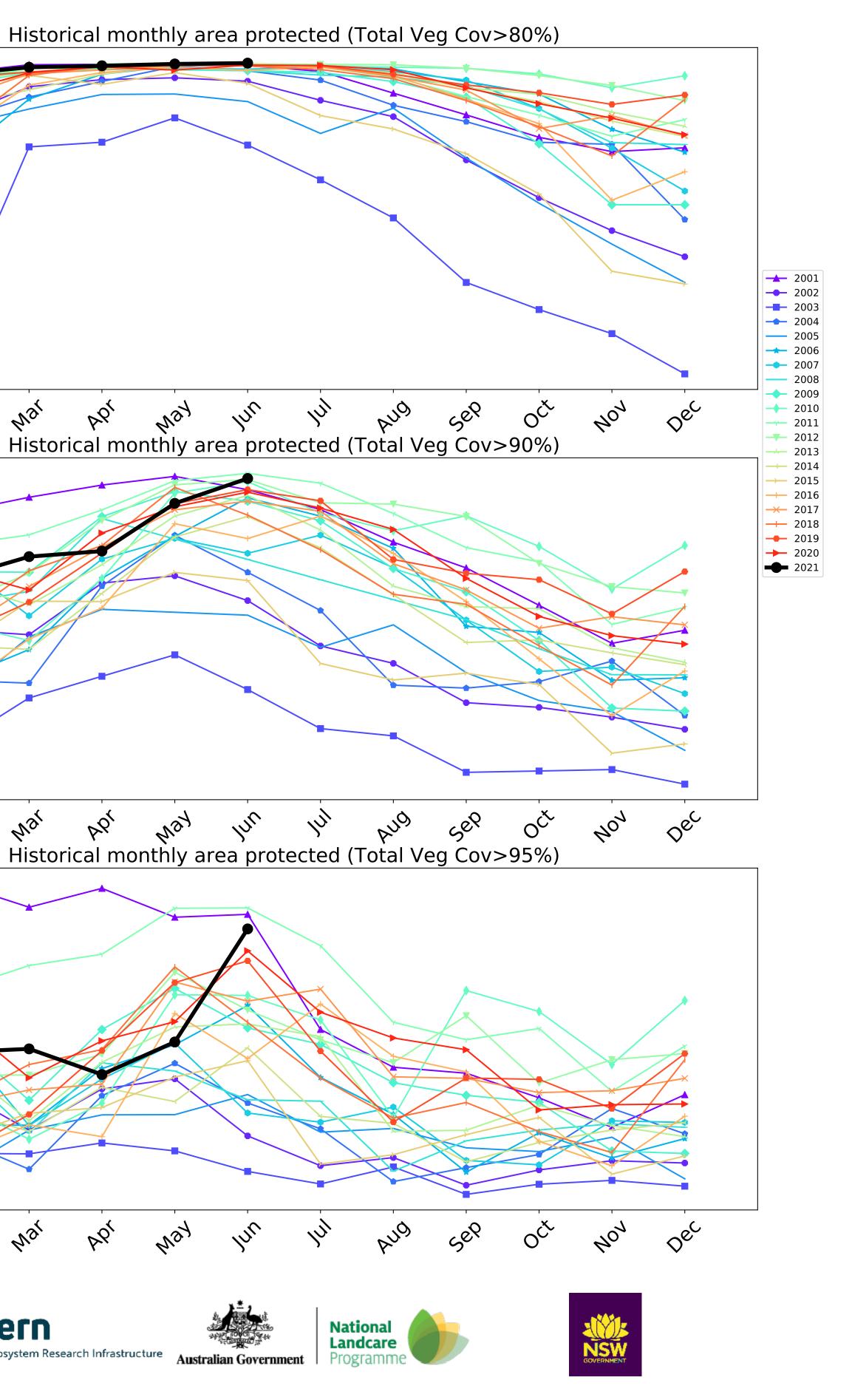




JUJ

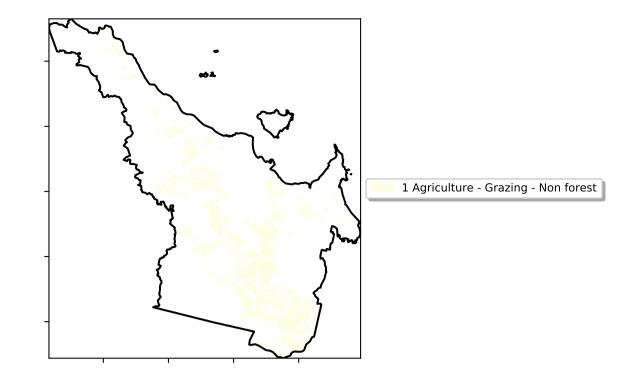
In

Jul

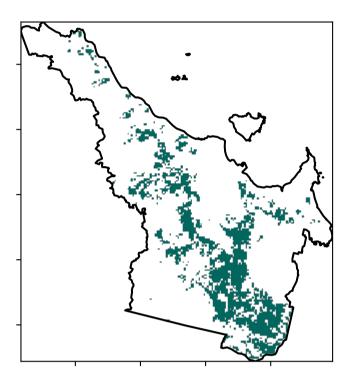


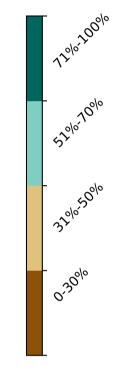
Grazing non forest

Land use and forest cover

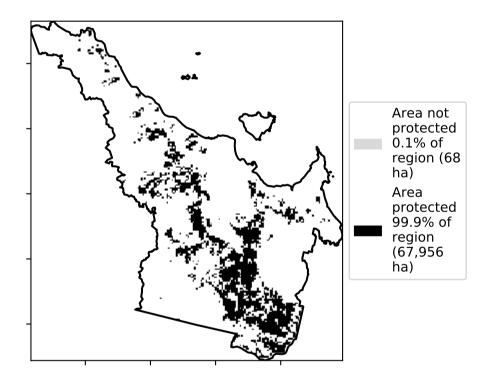


Total Vegetation Cover [%]

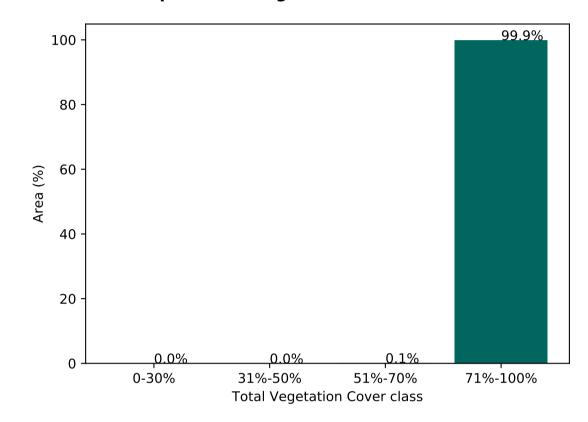




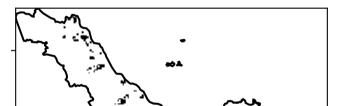
% Area protected from water erosion (>70%)



Proportion of vegetation cover class in area

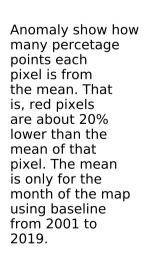


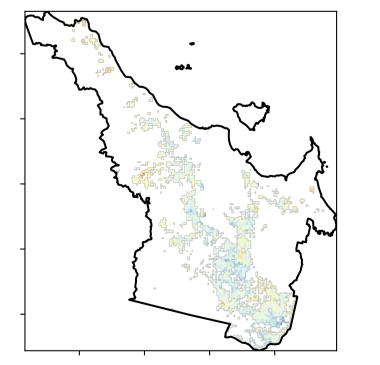
% Area protected from wind erosion (>50%)

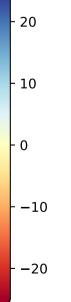


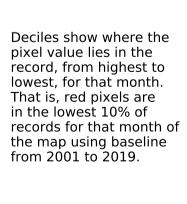
Catchment Scale Land Use and Forests of Australia (2018) Derived from Catchment Scale Land Use of Australia (2018) and Forests of Australia (2018)

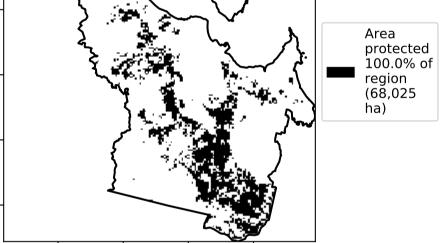
Total Vegetation Cover Anomaly [%]











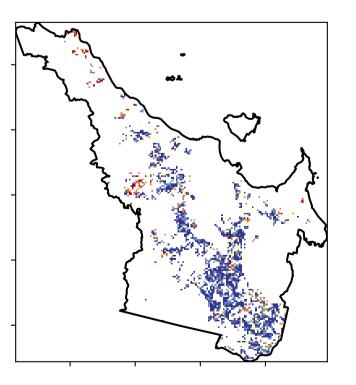
~

ଚ୍ଚ

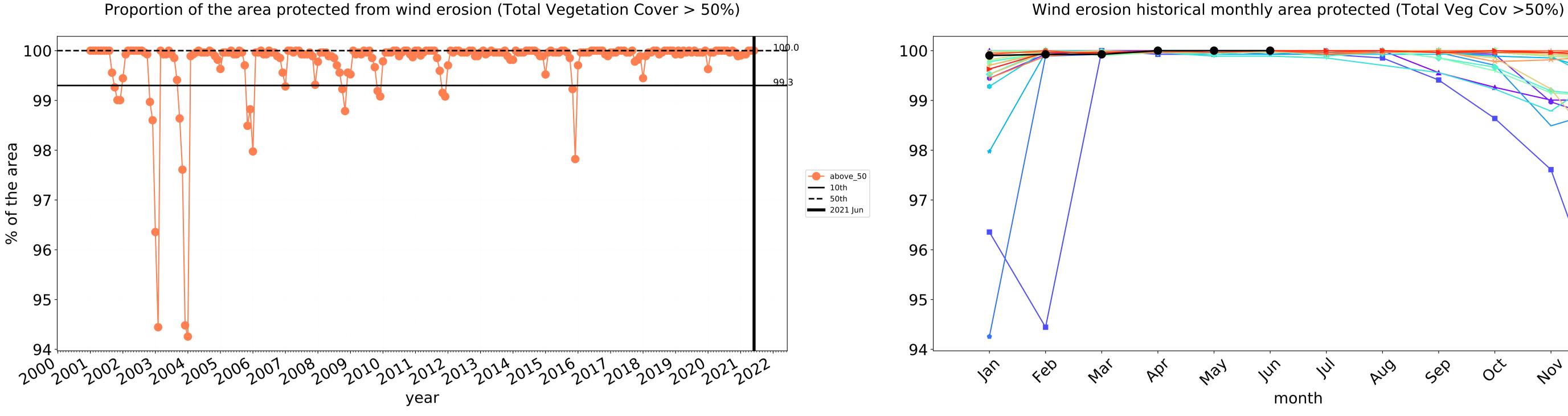
A.1

2??

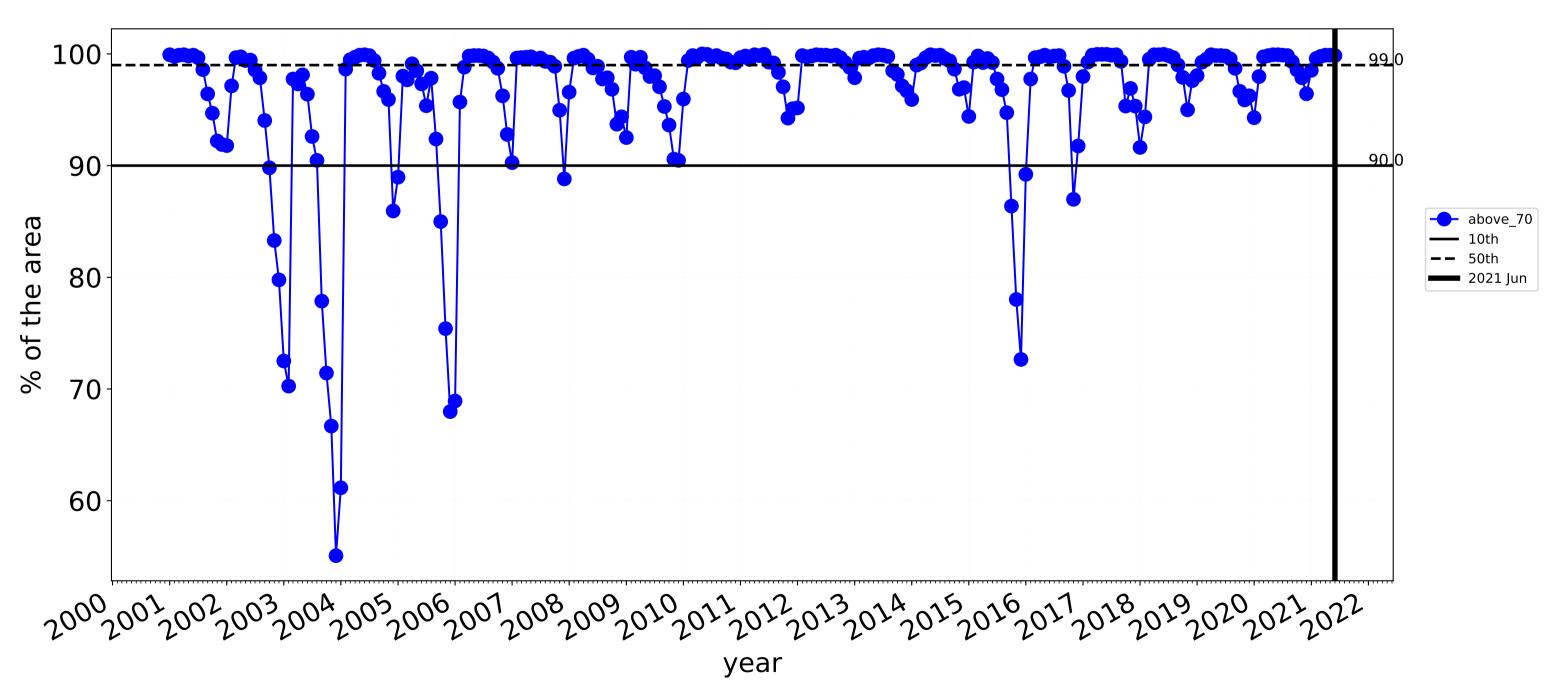
Total Vegetation Cover Decile [%]





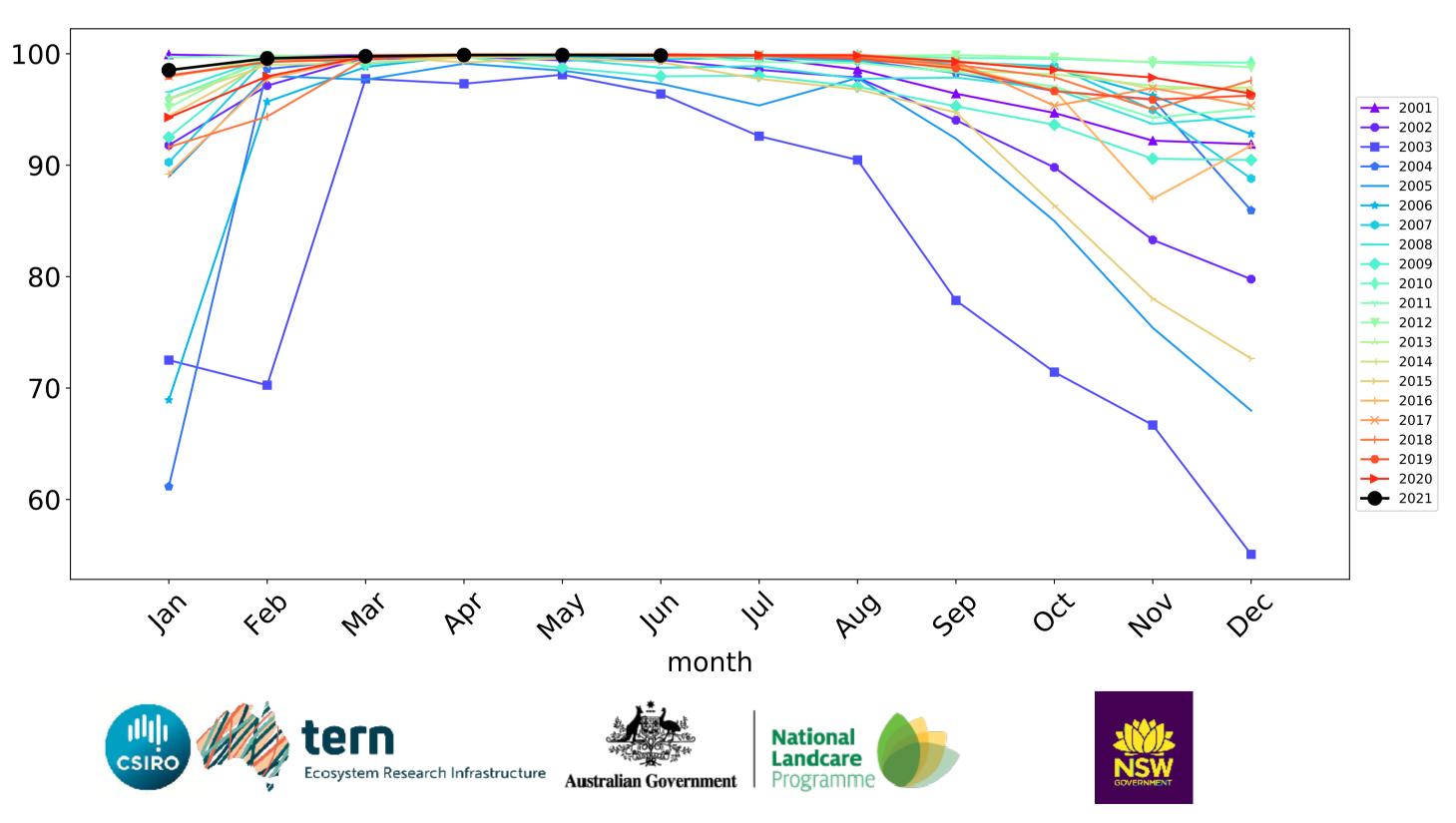


Proportion of the area protected from water erosion (Total Vegetation Cover > 70%)

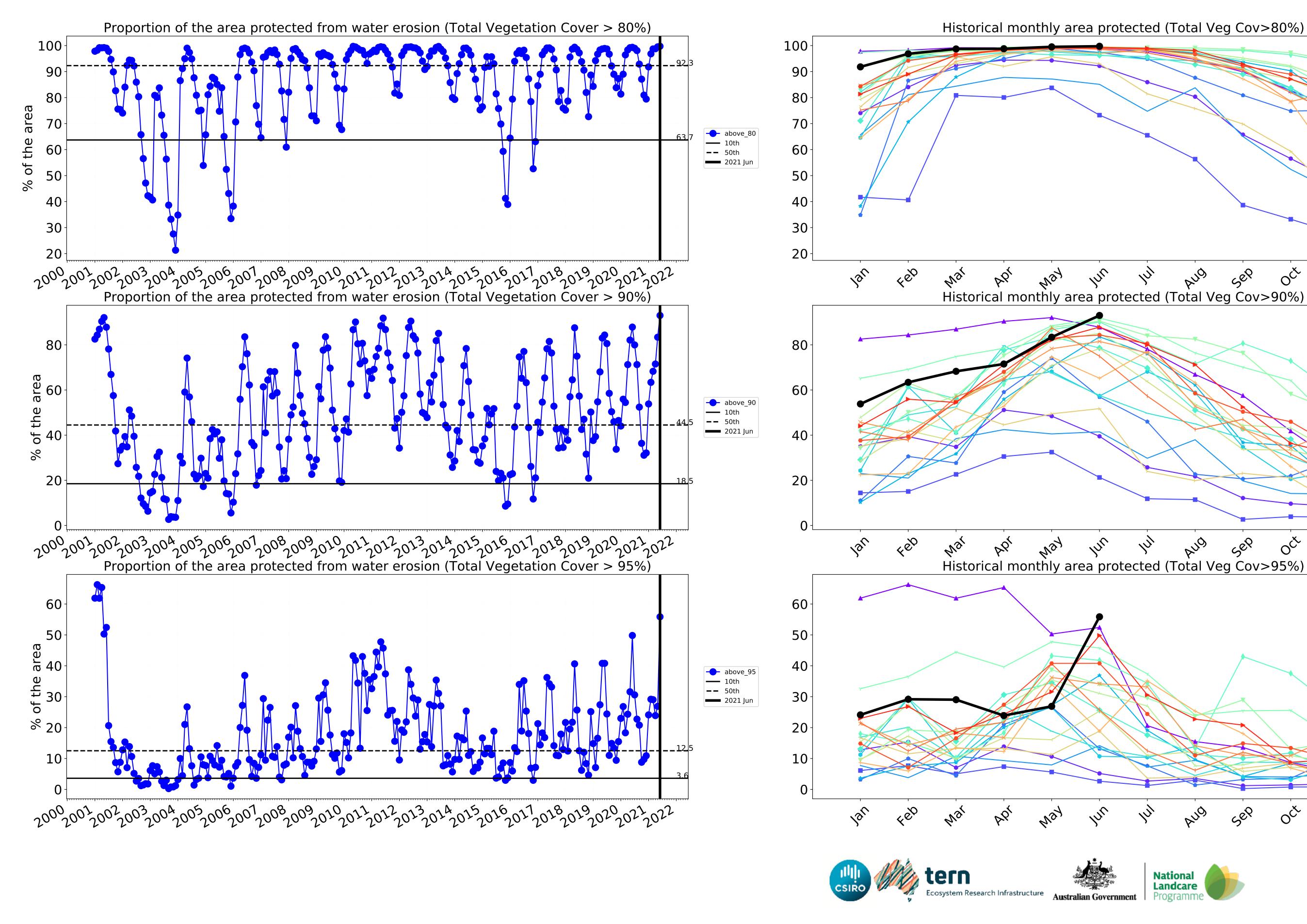


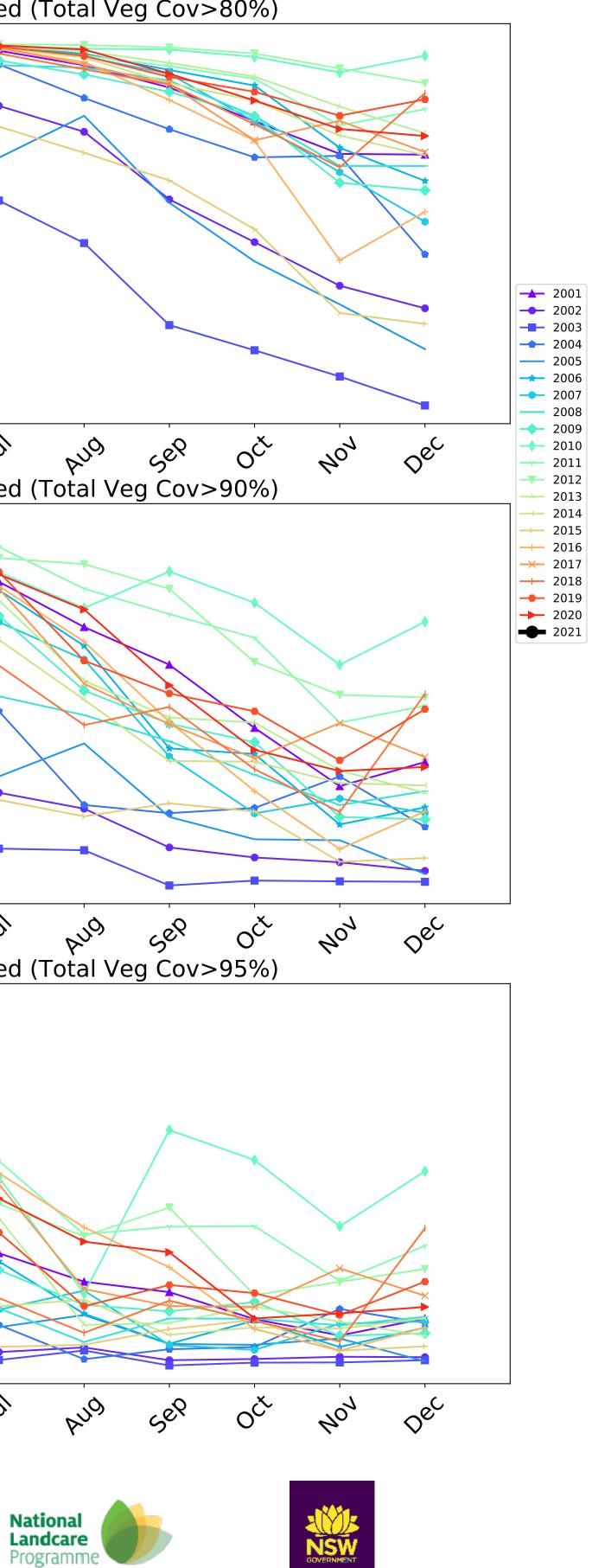
Grazing non forest timeseries

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



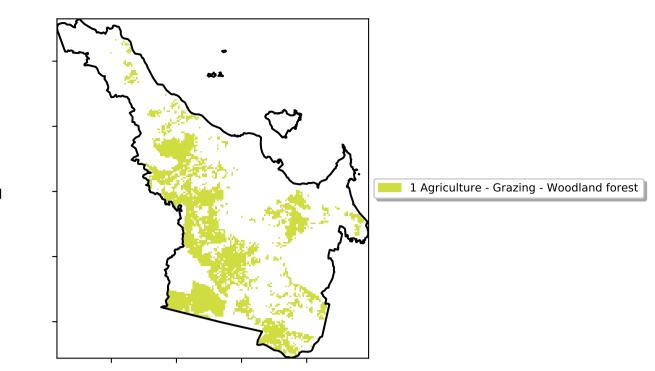
___ 2001 --- 2002 **___** 2003 **---** 2004 ____ 2005 **___** 2006 **---** 2007 2008 **---** 2009 **—** 2010 --- 2011 --- 2013 **→** 2014 <mark>→</mark> 2015 --- 2016 <u>→</u> 2017 **→** 2018 ---- 2019 → 2020 ---- 2021 AUD Sel 404 Dec OC



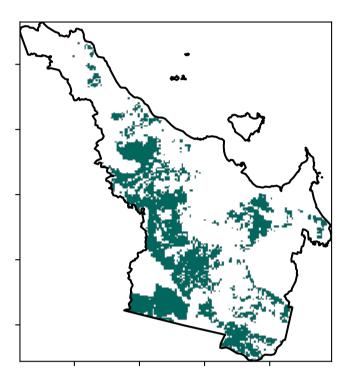


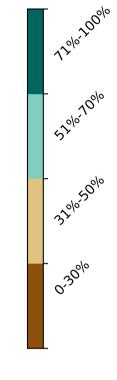
Grazing Woodland forest

Land use and forest cover

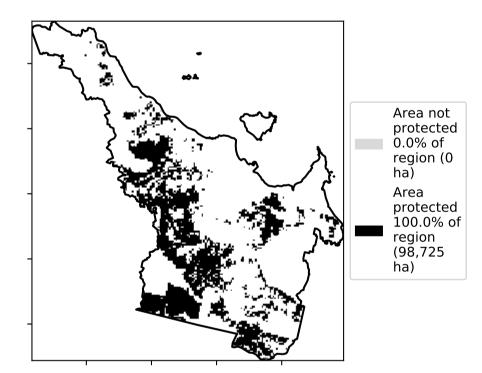


Total Vegetation Cover [%]

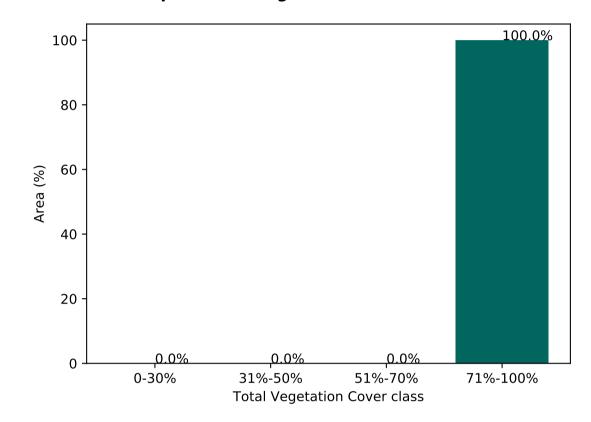




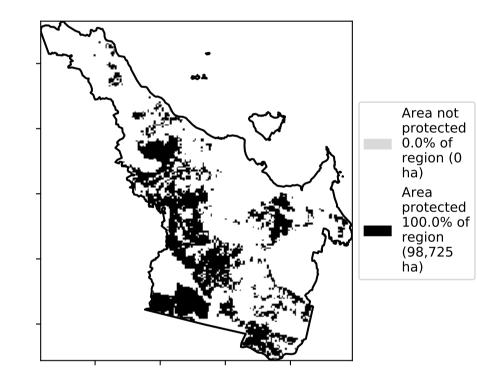
% Area protected from water erosion (>70%)



Proportion of vegetation cover class in area

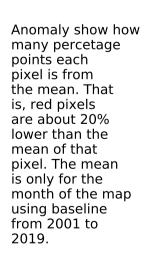


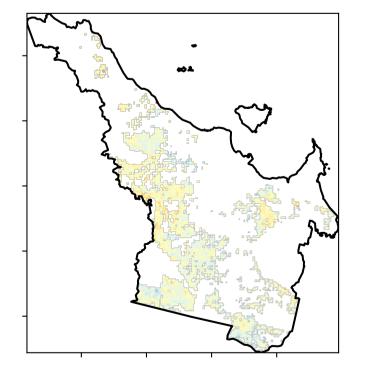
% Area protected from wind erosion (>50%)

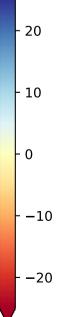


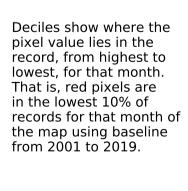
Catchment Scale Land Use and Forests of Australia (2018) Derived from Catchment Scale Land Use of Australia (2018) and Forests of Australia (2018)

Total Vegetation Cover Anomaly [%]

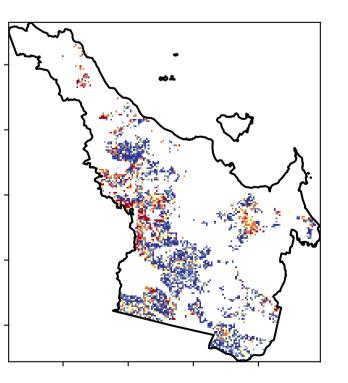


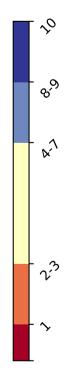






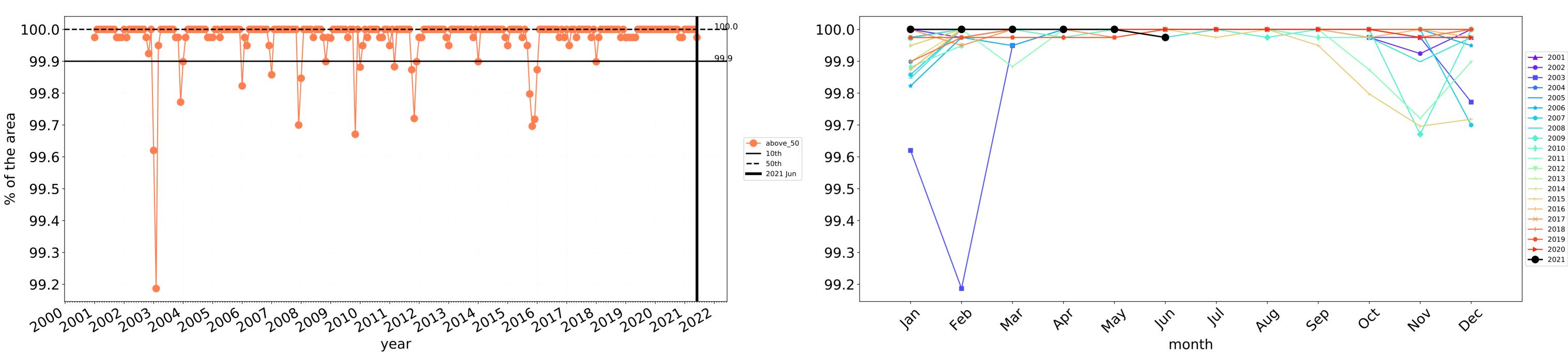
Total Vegetation Cover Decile [%]





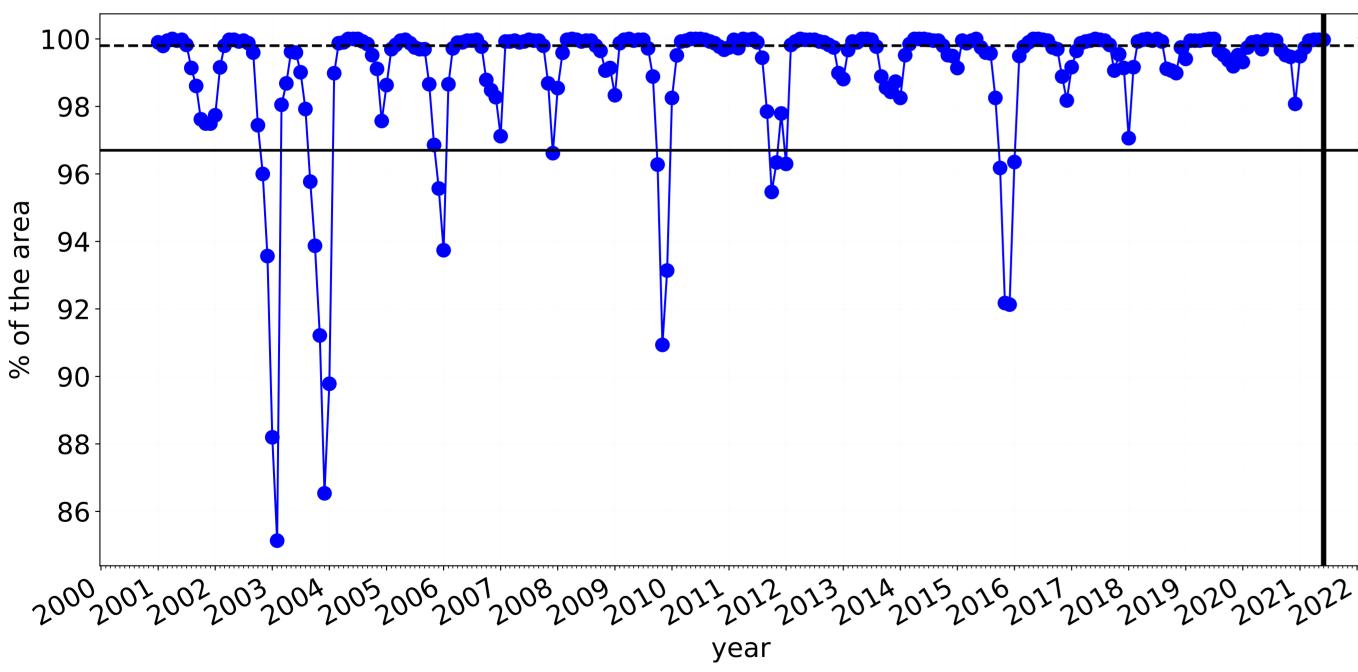


Grazing Woodland forest timeseries



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

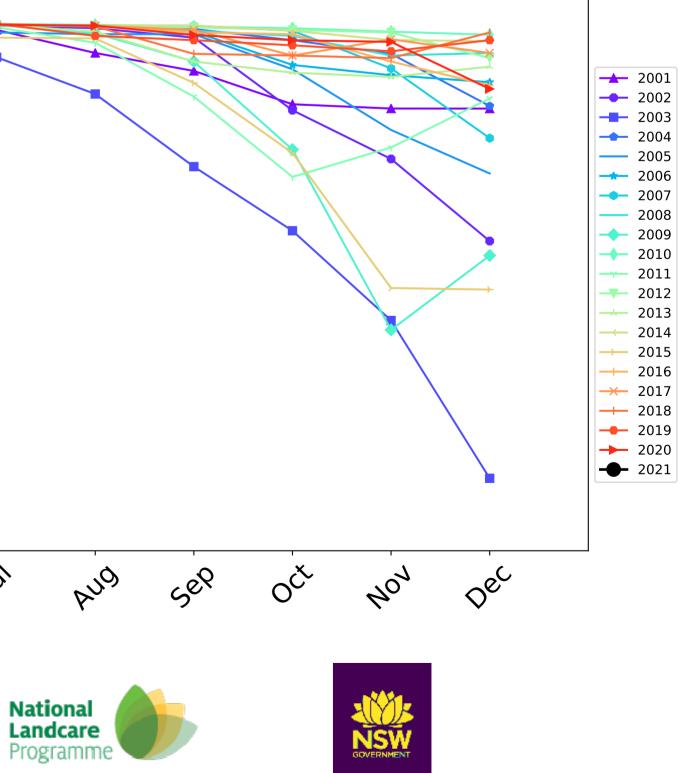
Proportion of the area protected from water erosion (Total Vegetation Cover > 70%)

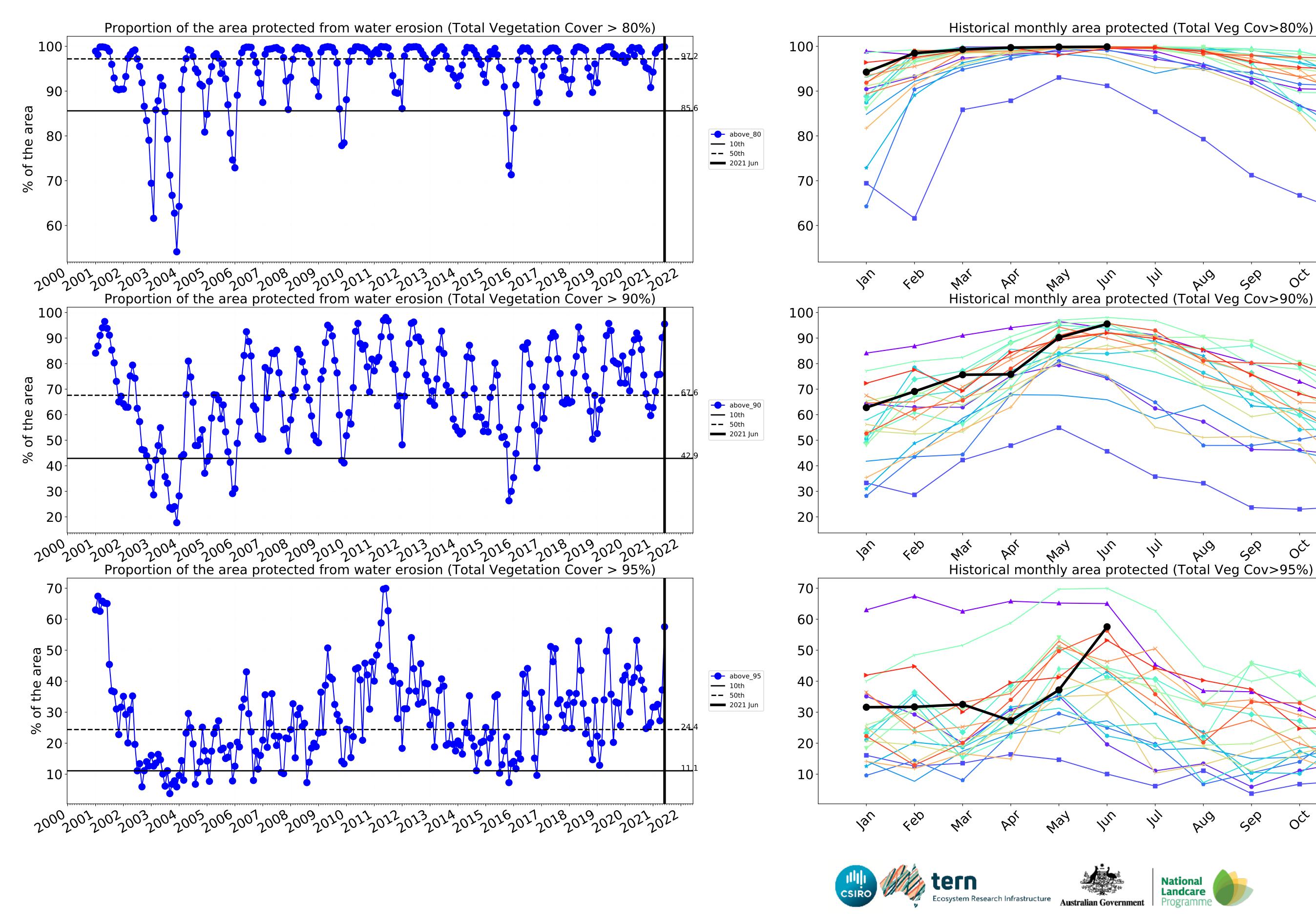


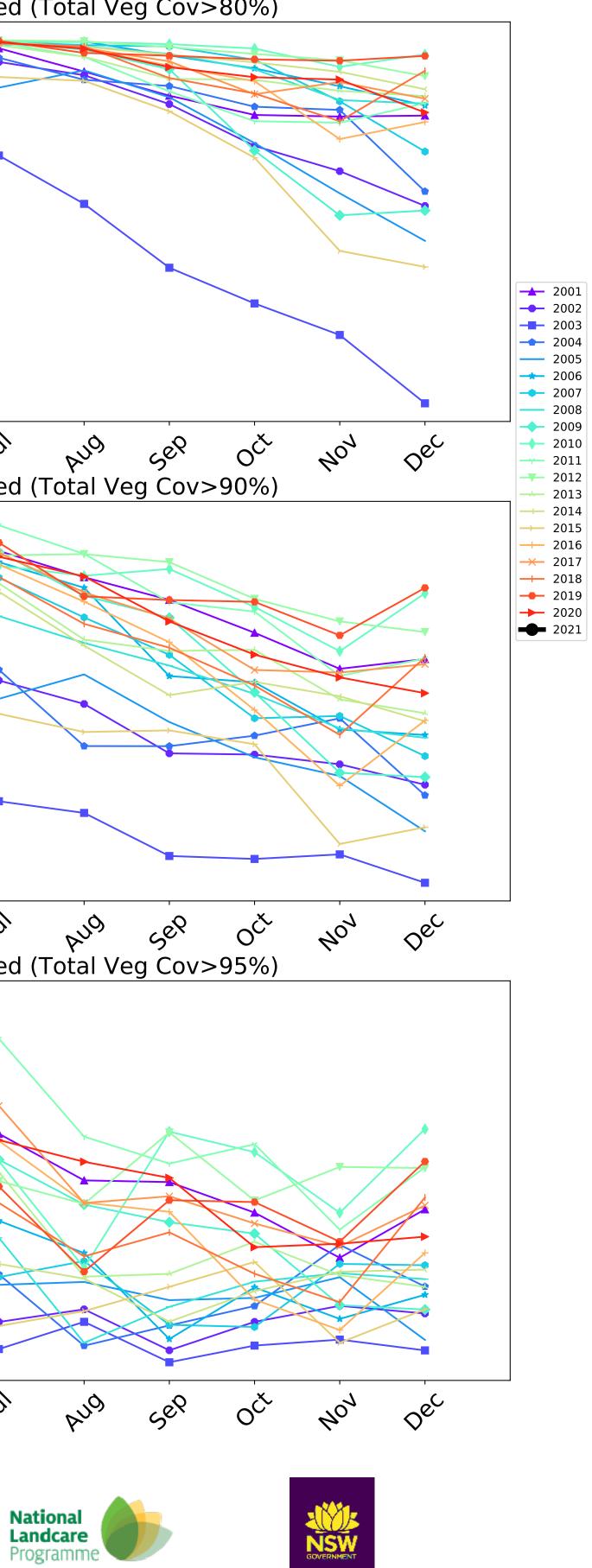
100 98 96 ---- above_70 **—** 10th 94 **——** 50th **——** 2021 Jun 92 90 88 86 4e0 Par In way 1st Mar P.Q month tern Ecosystem Research Infrastructure Australian Government

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

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

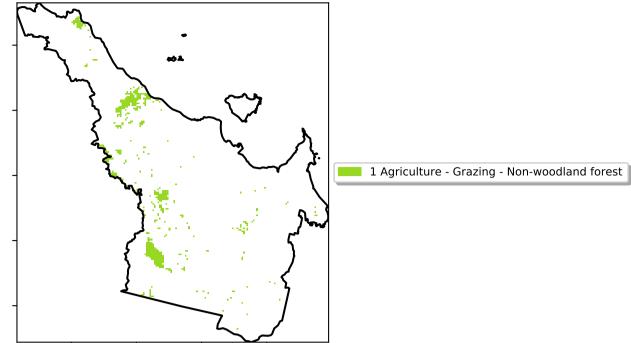




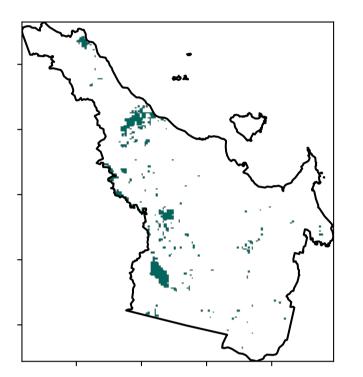


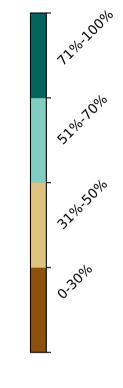
Grazing - Forest (non woodland)

Land use and forest cover

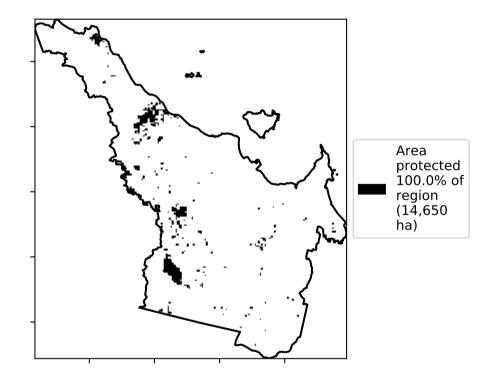


Total Vegetation Cover [%]

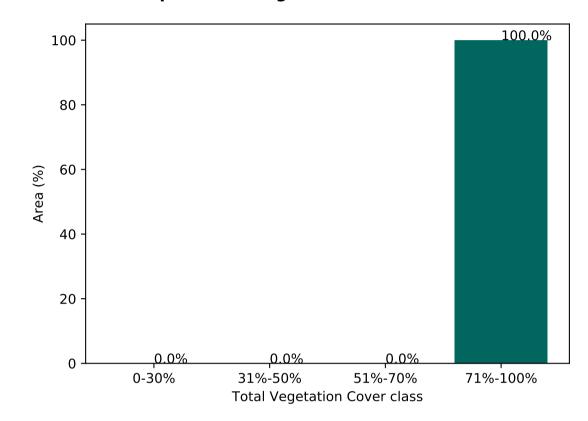




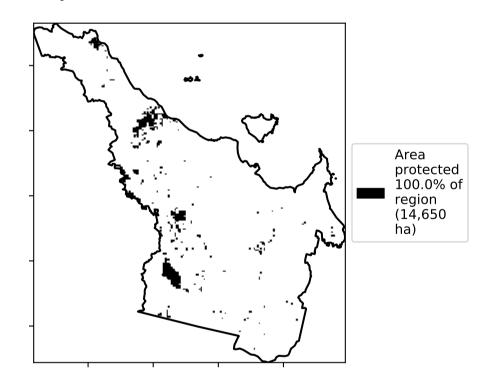
% Area protected from water erosion (>70%)

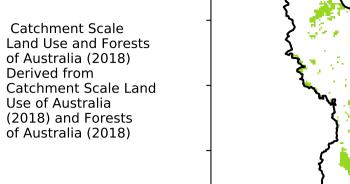


Proportion of vegetation cover class in area

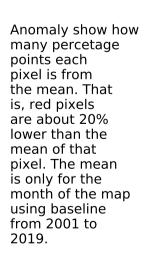


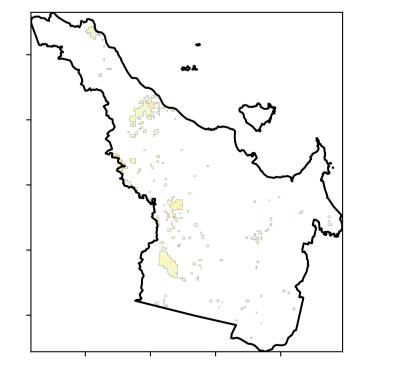
% Area protected from wind erosion (>50%)

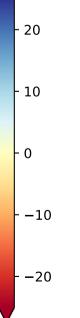




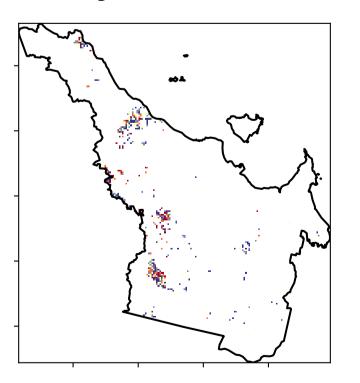
Total Vegetation Cover Anomaly [%]

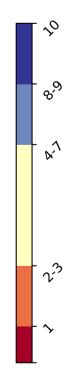






Total Vegetation Cover Decile [%]





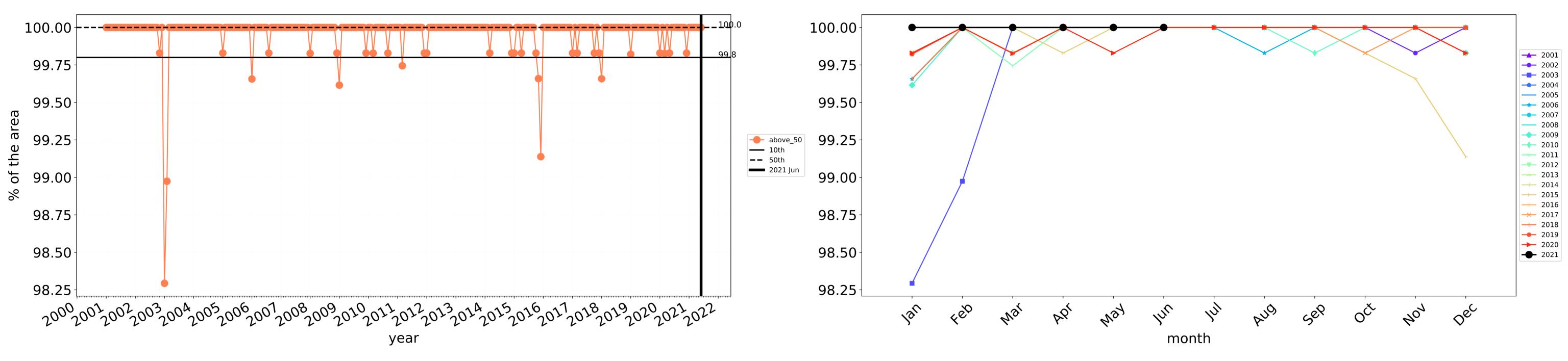


Deciles show where the pixel value lies in the

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

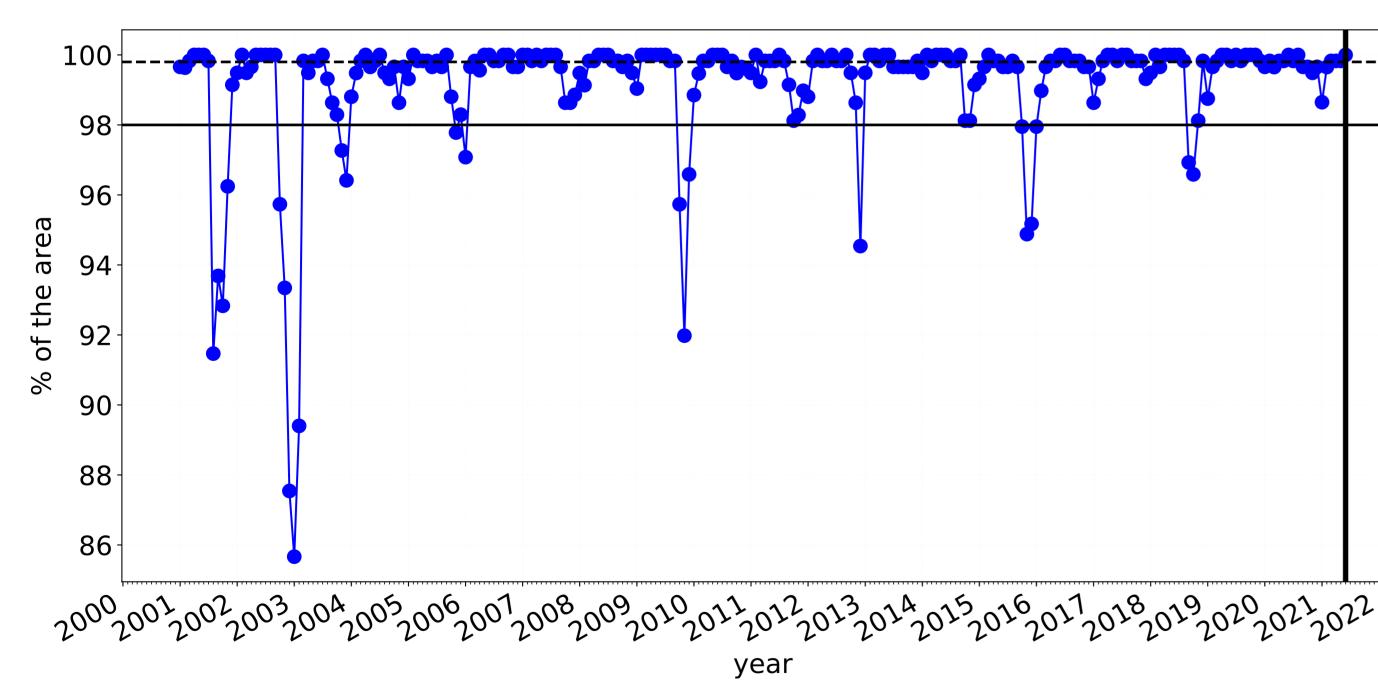
records for that month of

the map using baseline from 2001 to 2019.



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

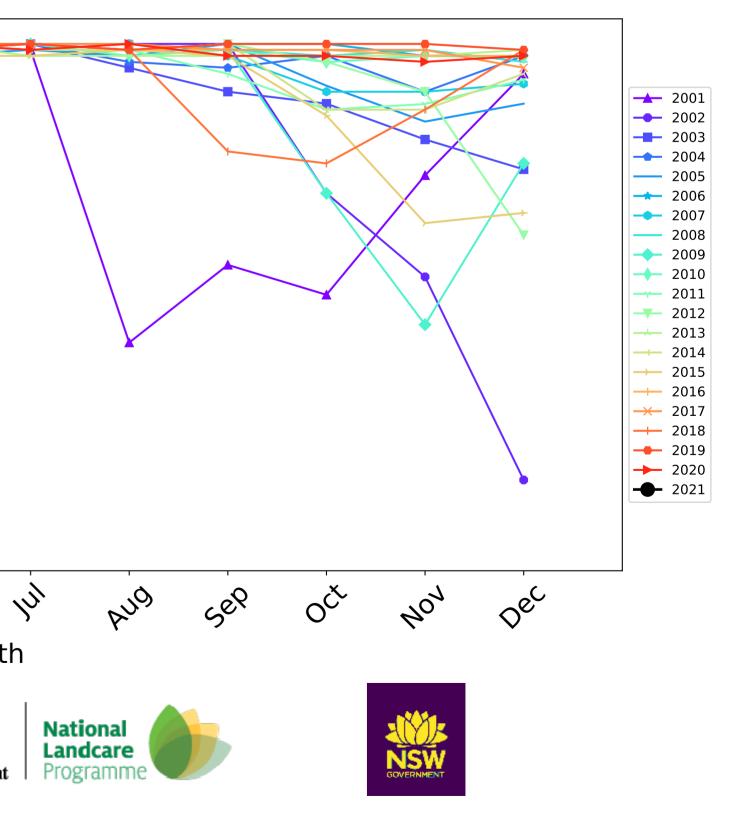
Proportion of the area protected from water erosion (Total Vegetation Cover > 70%)

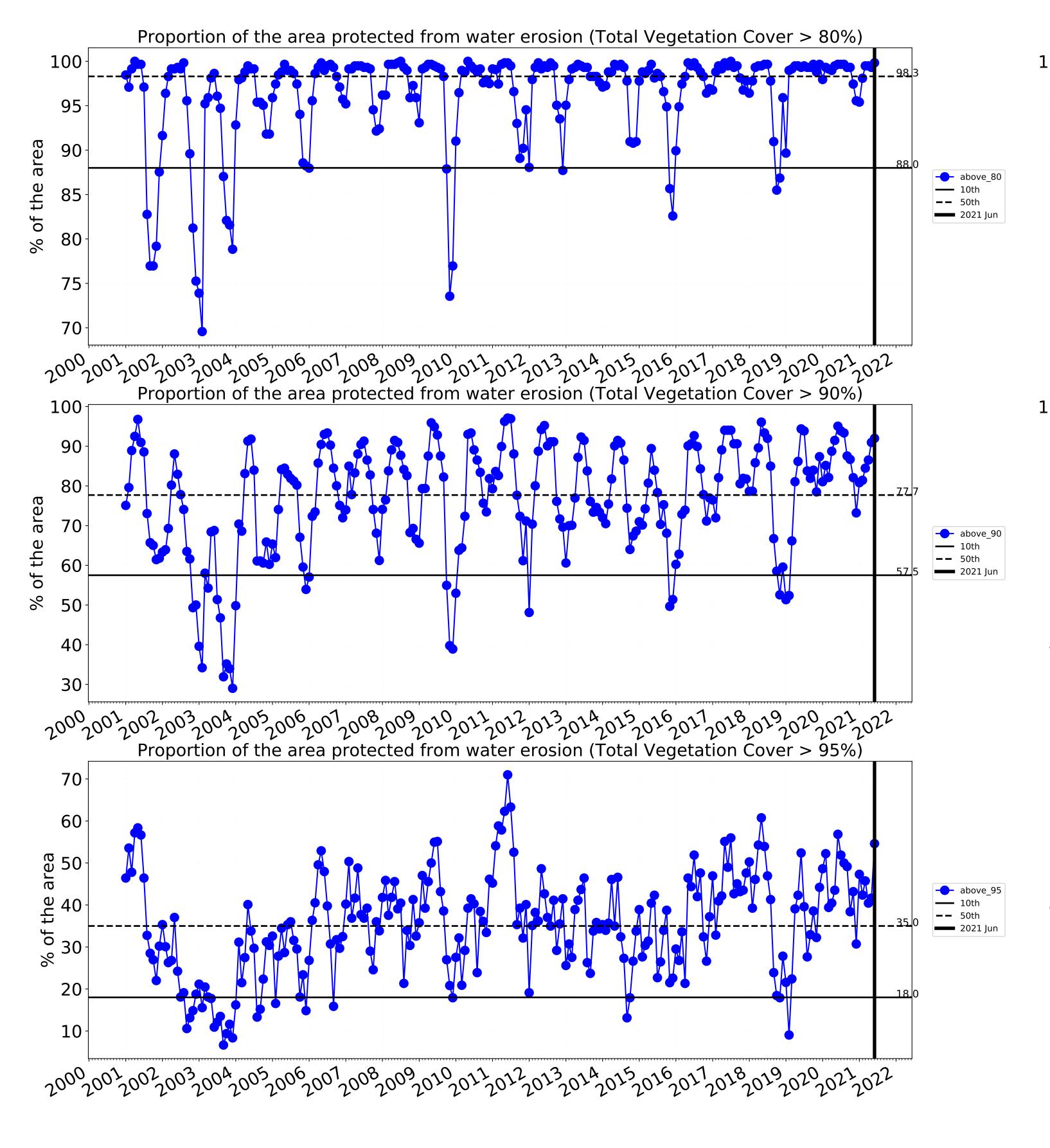


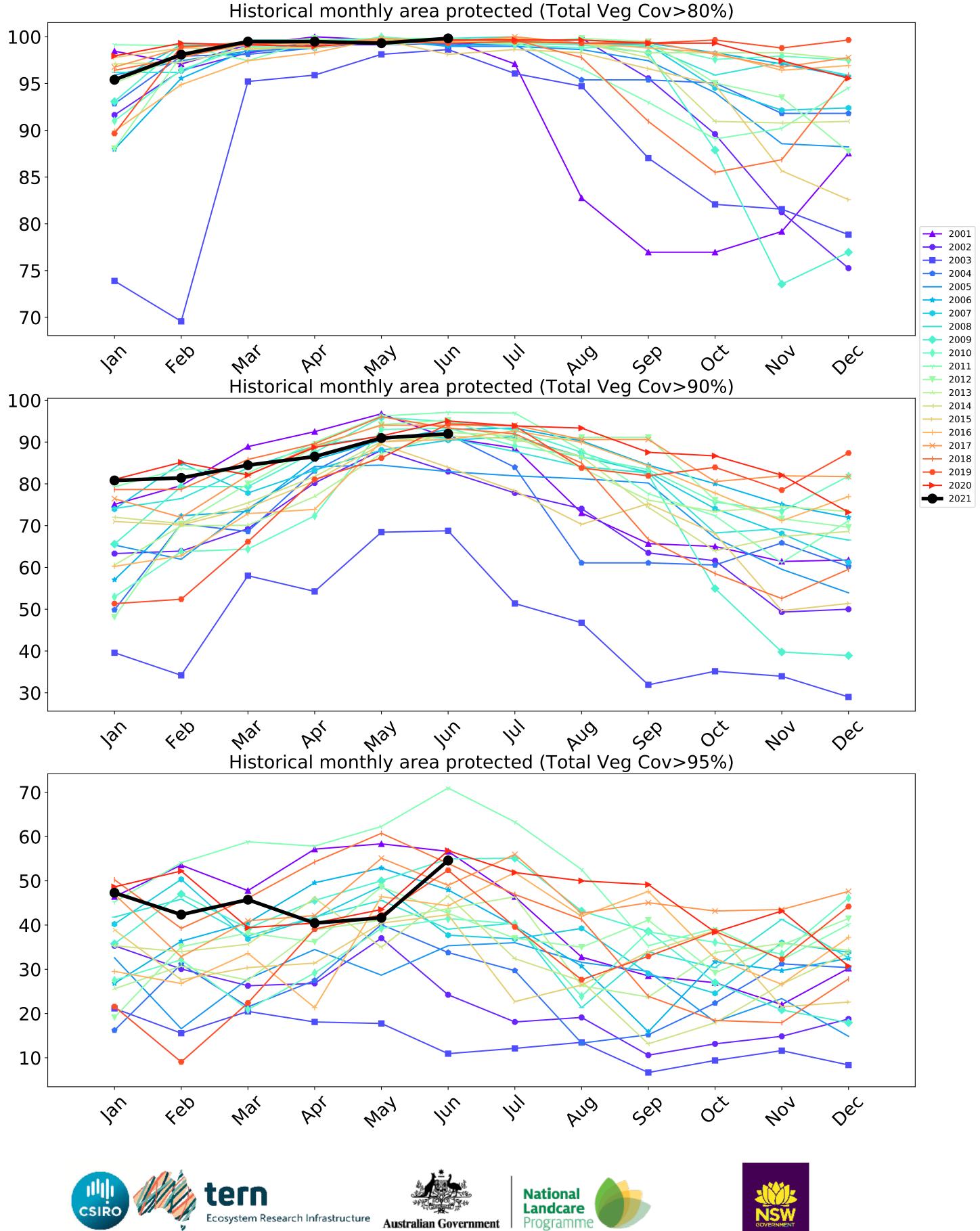
Wind erosion historical monthly area protected (Total Veg Cov >50%)

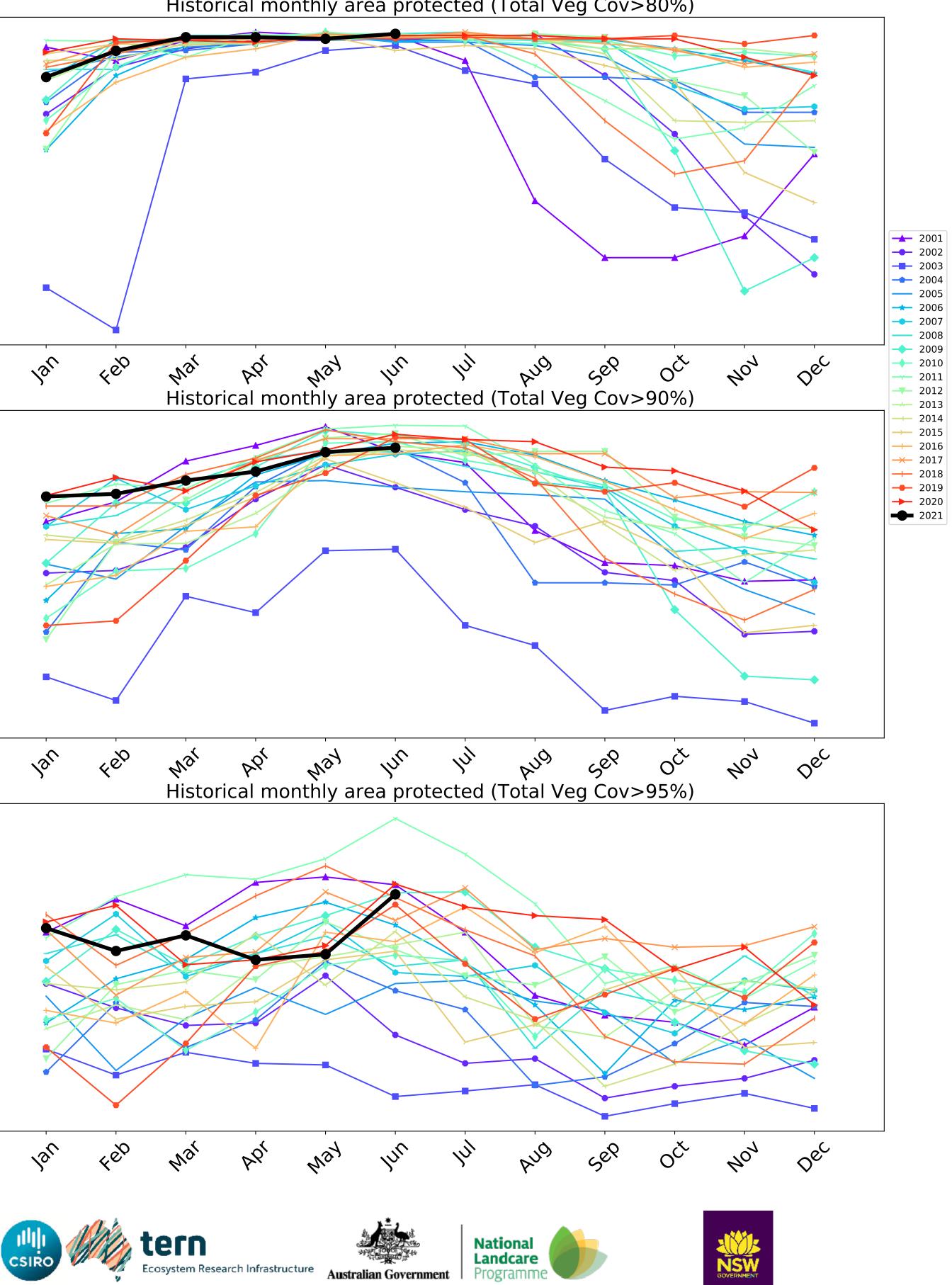
100 98 96 ---- above_70 **—** 10th **--** 50th 94 **——** 2021 Jun 92 90 88 86 feb Jan In way War PQ' month tern Ecosystem Research Infrastructure Australian Government

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







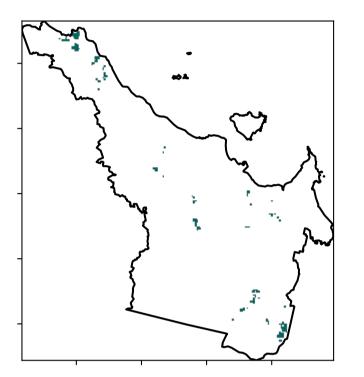


Irrigation

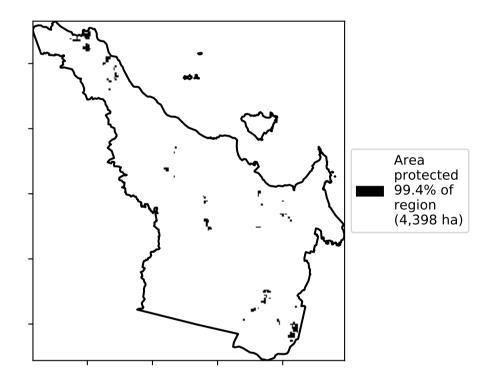
40 A Catchment Scale Land Use and Forests of Australia (2018) 1 Agriculture - Grazing - Irrigated 2 Agriculture - Cropping - Irrigated Catchment Scale Land 3 Agriculture - Horticulture - Irrigated

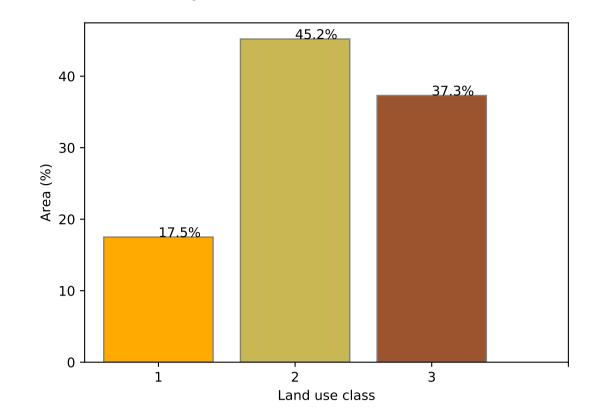
Total Vegetation Cover [%]

Land use and forest cover



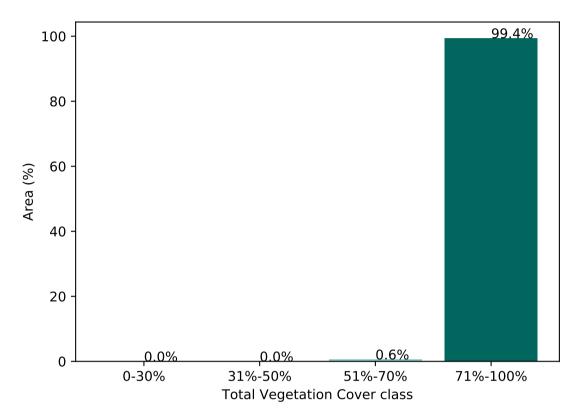




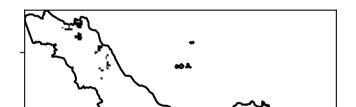


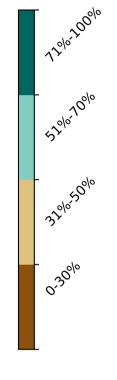
Proportion of each land class in area

Proportion of vegetation cover class in area

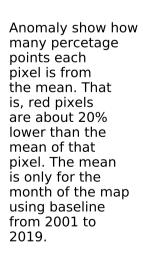


% Area protected from wind erosion (>50%)



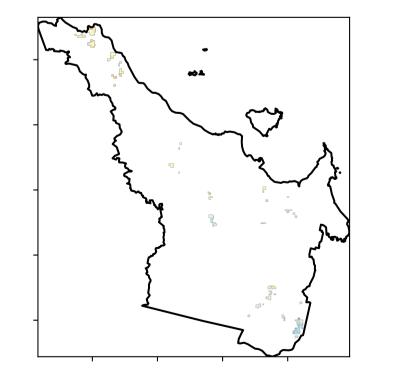


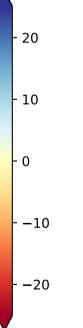
Total Vegetation Cover Anomaly [%]

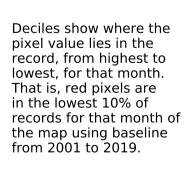


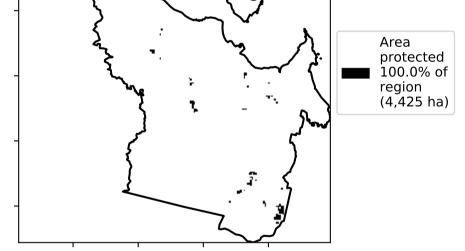
Derived from

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









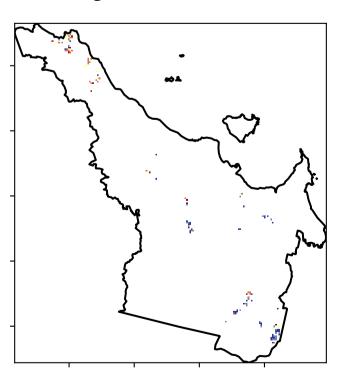
\$

ଚ୍ଚ

A-1

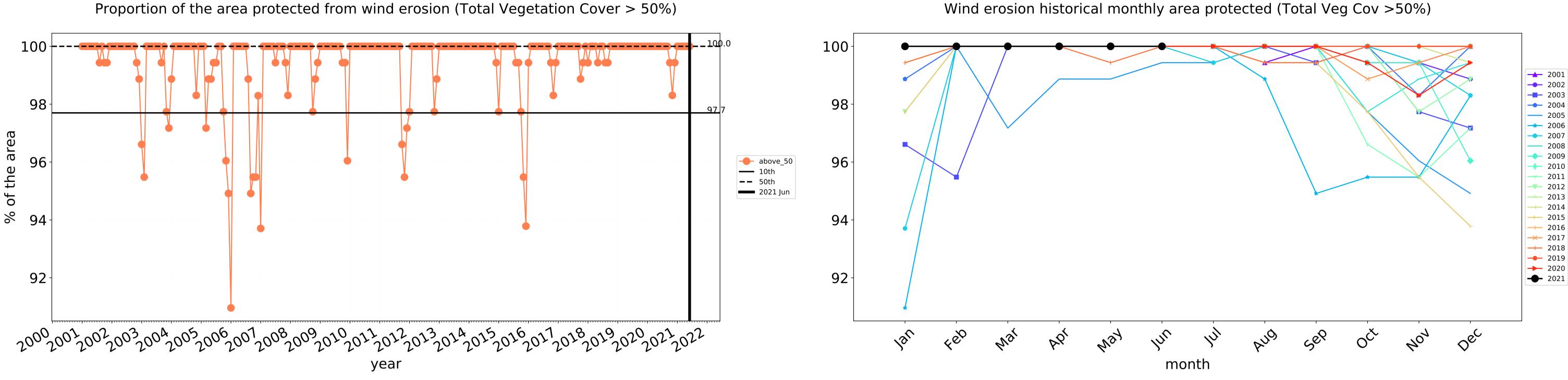
2??

Total Vegetation Cover Decile [%]





32



100

90

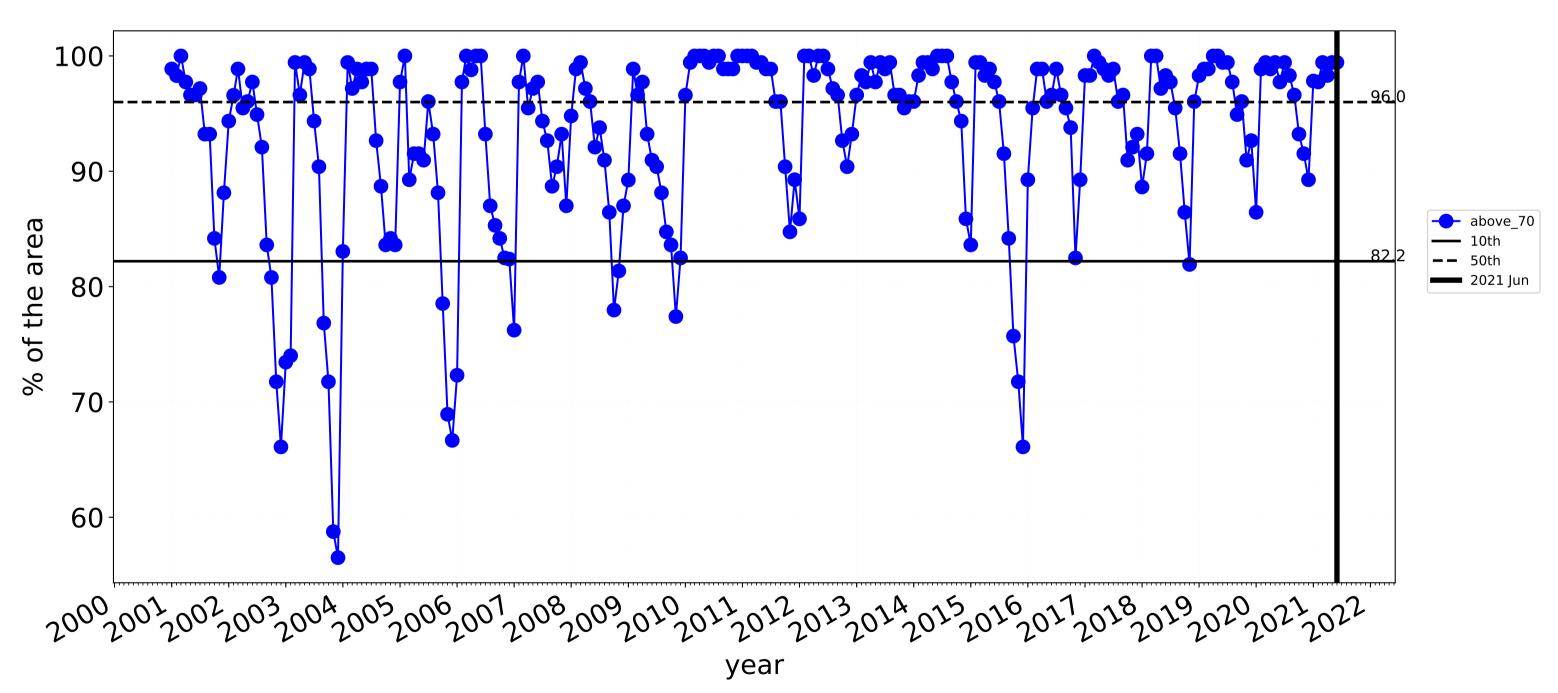
80

70-

60-

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

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



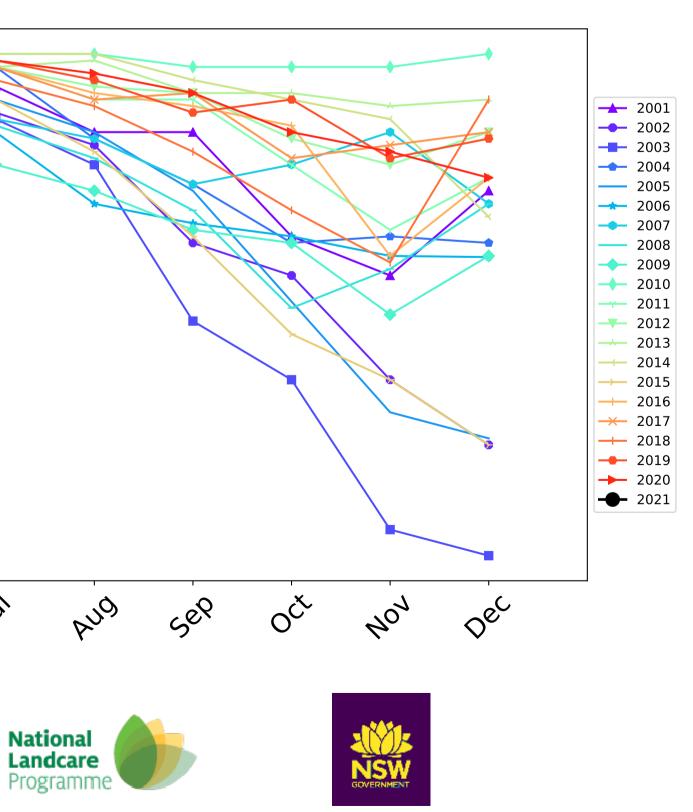
Irrigation timeseries

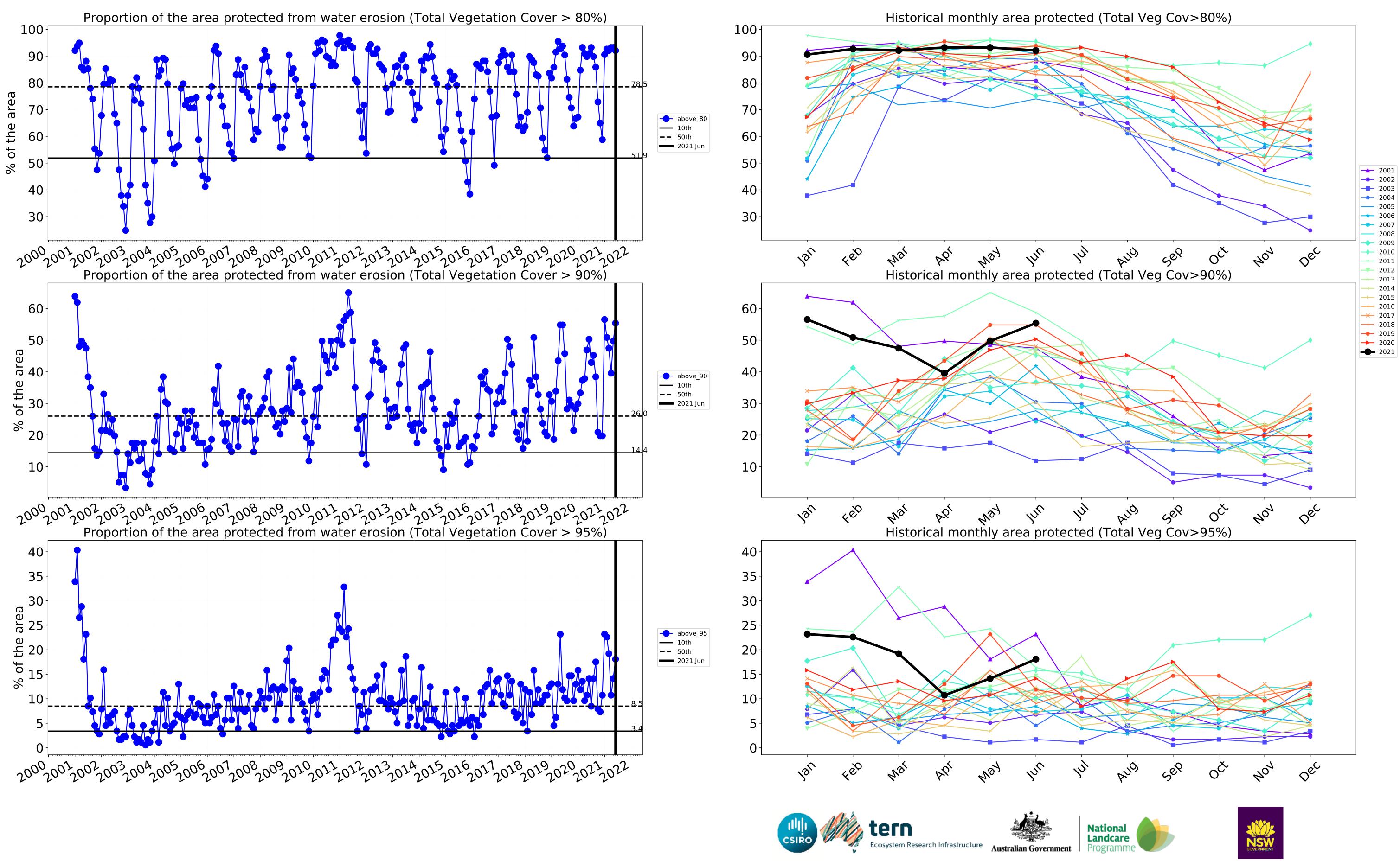
4eb may In War Jan PQ 1's month

CSIRO CONTRACTOR CONTR Australian Government

33

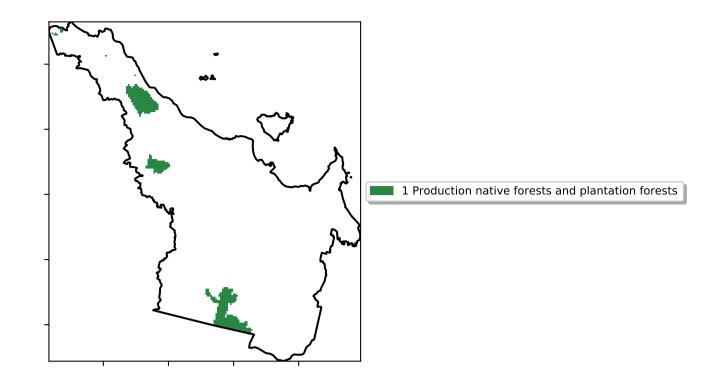
Water erosion historical monthly area protected (Total Veg Cov>70%)



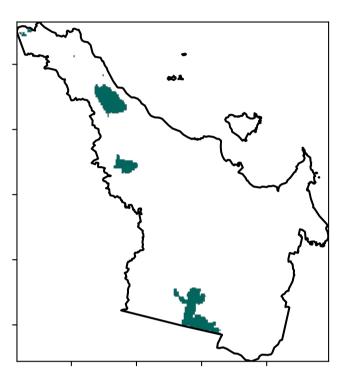


Production native forests and plantation forests

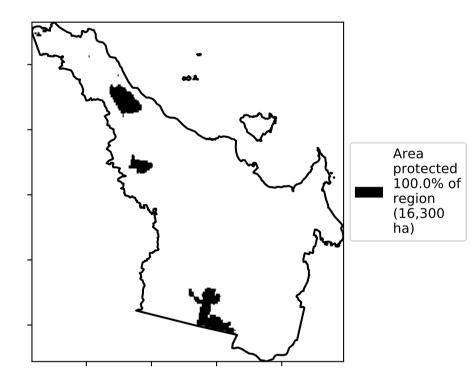
Land use and forest cover



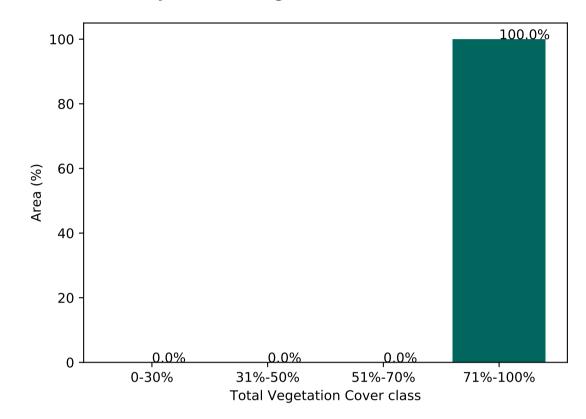
Total Vegetation Cover [%]



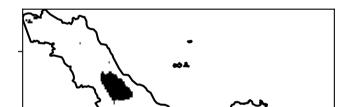




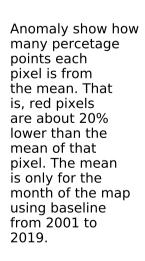




% Area protected from wind erosion (>50%)

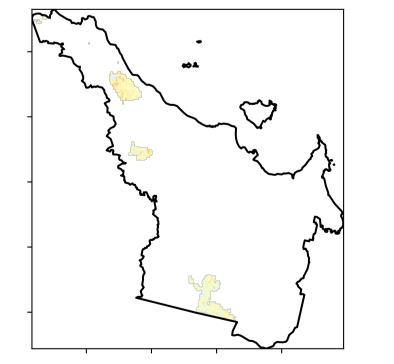


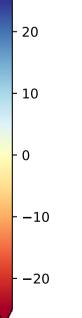
Total Vegetation Cover Anomaly [%]



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

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



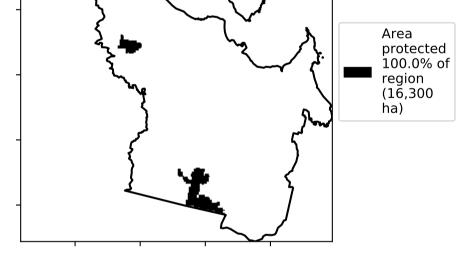


12º100010

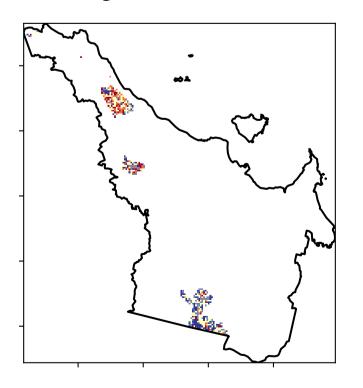
· 52% 70%

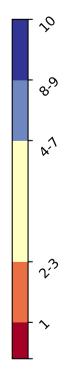
3201050010

0.30%



Total Vegetation Cover Decile [%]





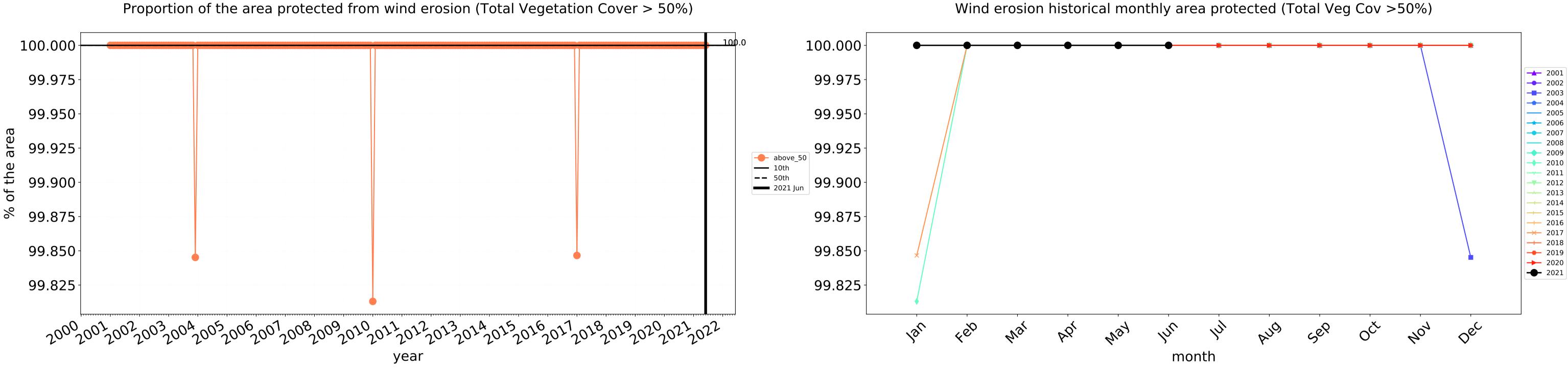


Deciles show where the pixel value lies in the

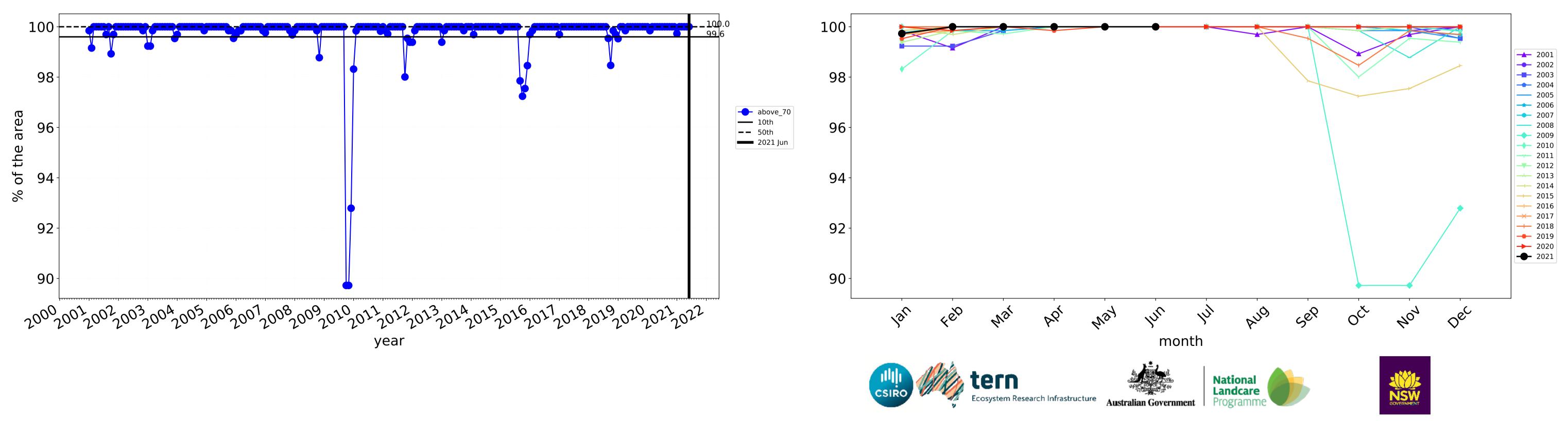
record, from highest to lowest, for that month. That is, red pixels are in the lowest 10% of

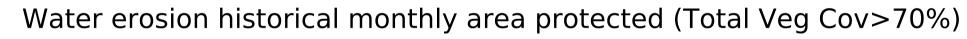
records for that month of

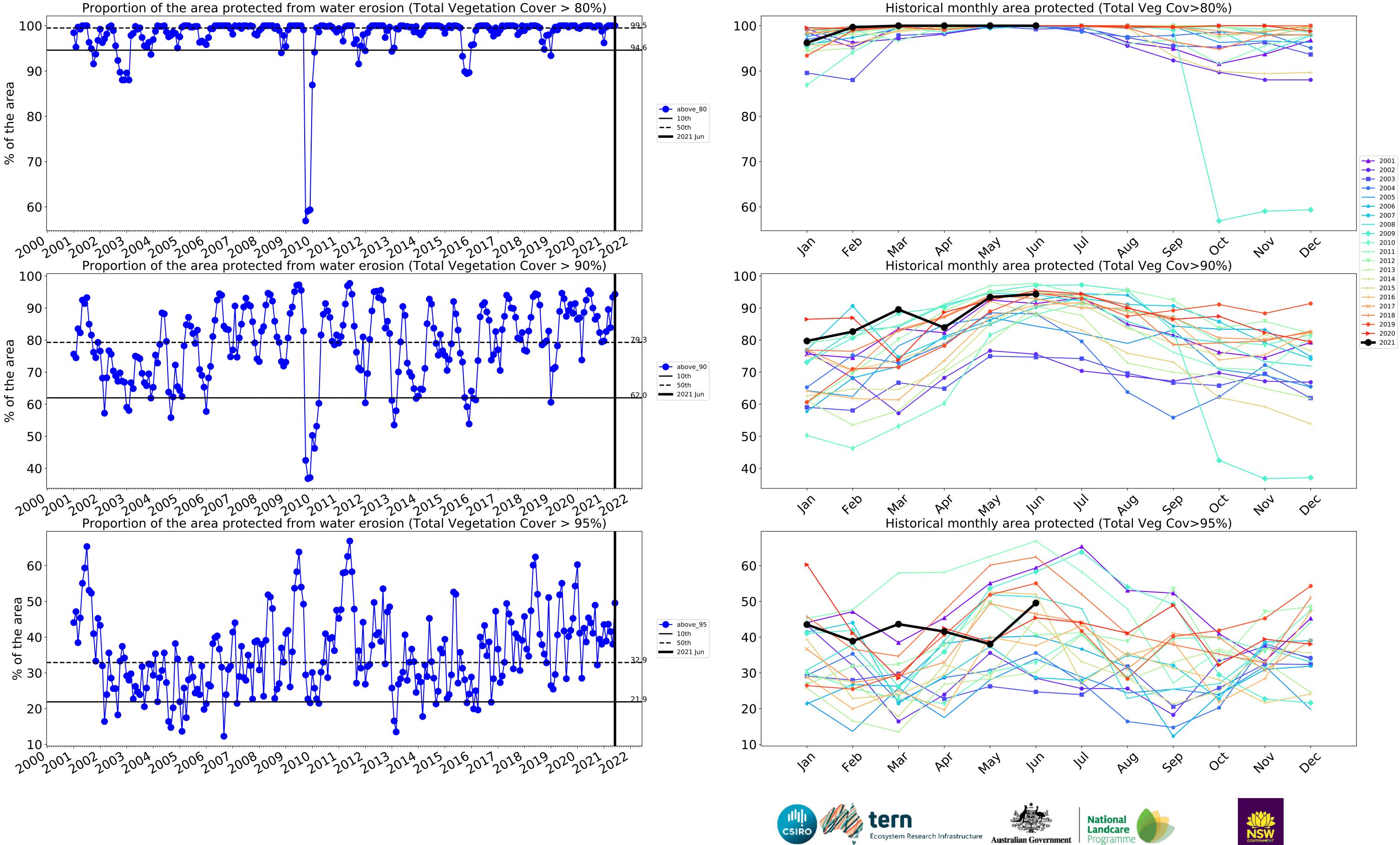
the map using baseline from 2001 to 2019.



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







Townsville_(C) (365,975 ha and no data 7,210 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	365,975	99.9% 365,550	99.7% 364,750	97.7% 357,550	94.6% 346,325	82.2% 300,825	44.7% 163,650
Conservation and natural environments	119,325	99.9% 119,250	99.8% 119,100	98.7% 117,725	95.8% 114,300	79.3% 94,625	38.3% 45,650
Conservation and natural environments non forest	16,050	99.8% 16,025	99.4% 15,950	94.5% 15,175	83.2% 13,350	53.1% 8,525	24.8% 3,975
Conservation and natural environments Woodland forest	57,075	99.9% 57,025	99.9% 57,000	99.5% 56,800	98.2% 56,075	84.5% 48,225	39.7% 22,650
Conservation and natural environments Forest (non woodland)	46,200	100.0% 46,200	99.9% 46,150	99.0% 45,750	97.1% 44,875	82.0% 37,875	41.2% 19,025
Agriculture	186,550	100.0% 186,550	100.0% 186,525	99.9% 186,400	99.6% 185,875	93.3% 174,125	55.7% 103,925
Grazing	181,400	100.0% 181,400	100.0% 181,375	99.9% 181,275	99.8% 181,100	94.3% 171,050	56.7% 102,825
Grazing non forest	68,025	100.0% 68,025	100.0% 68,025	99.9% 67,925	99.7% 67,850	93.0% 63,275	55.9% 38,000
Grazing Woodland forest	98,725	100.0% 98,725	100.0% 98,700	100.0% 98,700	99.9% 98,625	95.5% 94,300	57.6% 56,825
Grazing - Forest (non woodland)	14,650	100.0% 14,650	100.0% 14,650	100.0% 14,650	99.8% 14,625	92.0% 13,475	54.6% 8,000
Irrigation	4,425	100.0% 4,425	100.0% 4,425	99.4% 4,400	92.1% 4,075	55.4% 2,450	18.1% 800
Production native forests and plantation forests	16,300	100.0% 16,300	100.0% 16,300	100.0% 16,300	100.0% 16,300	94.3% 15,375	49.5% 8,075

