# Total vegetation cover soil protection
## Region:NRM Mallee VIC                    Date: August 2019

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

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

The total vegetation cover indicates where soil is likely to be protected from wind and or  water hillslope erosion. Total vegetation cover for this month is shown on a map and chart classified  into 4 classes.
   • 71-100% High cover – protected from wind and usually water erosion (high rainfall, steep
slopes, and erodible soils may need greater than 80, 90, 95 and up to 100% cover)
   • 51-70% Moderate cover – protected from wind erosion
   • 31-50% Low cover – not protected
   • 0-30% Very Low cover – not protected
Erosion protection: Wind erosion 50% total vegetation cover

The vegetation cover threshold required to prevent soil erosion is usually 50% to reduce wind erosion, 70% or 80% to reduce water (hillslope) erosion depending on the steepness and rainfall. Areas protected from erosion for the month:
   • Map: water erosion protection (>70% cover) percentage area and hectares.
   • Map: wind erosion protection (>50% cover) percentage area and hectares.
Comparison with previous years:

   • Map: anomaly comparing this month to the average cover from the same month in previous years.
   • Map: deciles rank of month against the same month in previous years.
Anomalies and deciles until September 2019 are calculated comparing to the same months 2001 to 2019.  Extra monthly data will be used to calculate anomalies and deciles post September 2019 as they become available.
Time series monthly from January 2001 to current:

Erosion protection
   • Wind erosion protection time series: percentage of the area of the region with greater than 50% cover for
      each month (orange lines). Horizontal lines are 10th (cover target) and 50th percentiles.
   • Water erosion protection time series: percentage of the area of the region with greater than 70% cover for
      each month (blue line). Horizontal lines are 10th (cover target) and 50th percentiles.
Rainfall
   • Millimetres rainfall each month (black line).
Each time series is also stacked by year. The black line shows the current year of data.
Water erosion protection for higher rainfall and steeper slopes:

Water erosion protection on higher slopes. As slope increases, more cover is required to control water erosion. The thresholds reported are:
   • the percentage area with pixels greater than 80% total cover.
   • the percentage area with pixels greater than 90% total cover.
   • the percentage area with pixels greater than 95% total cover.
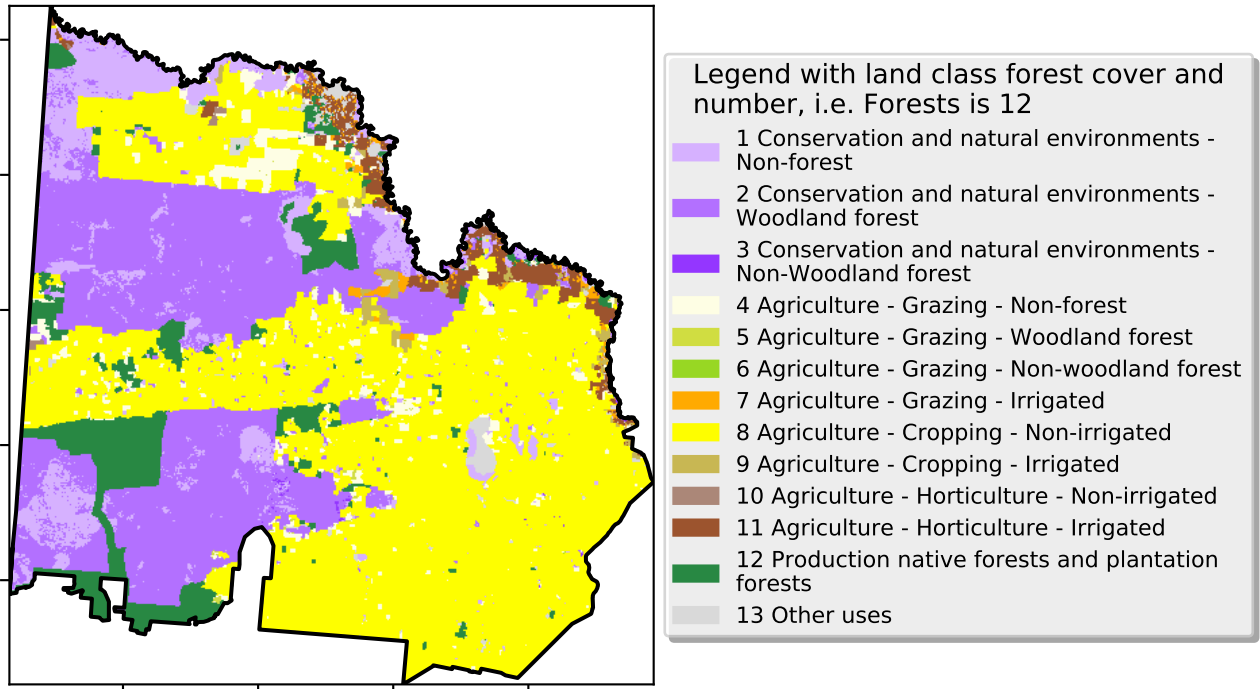
**Acknowledgment of data:**

1. http://www.agriculture.gov.au/abares/aclump/land-use/alum-classification

2. http://www.agriculture.gov.au/abares/forestsaustralia/sofr/sofr-2018

3. https://www.dpi.nsw.gov.au/agriculture/pastures-and-rangelands/establishment-mgmt/production-management2/groundcover
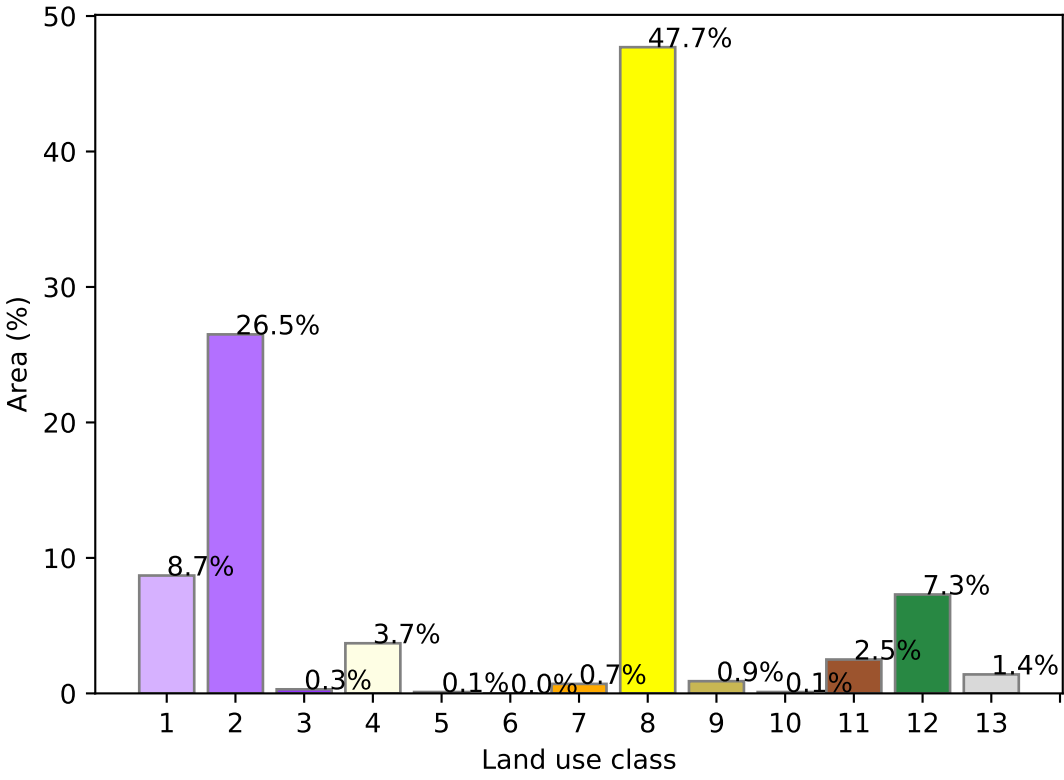
4. MODIS Fractional cover algorithm:

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

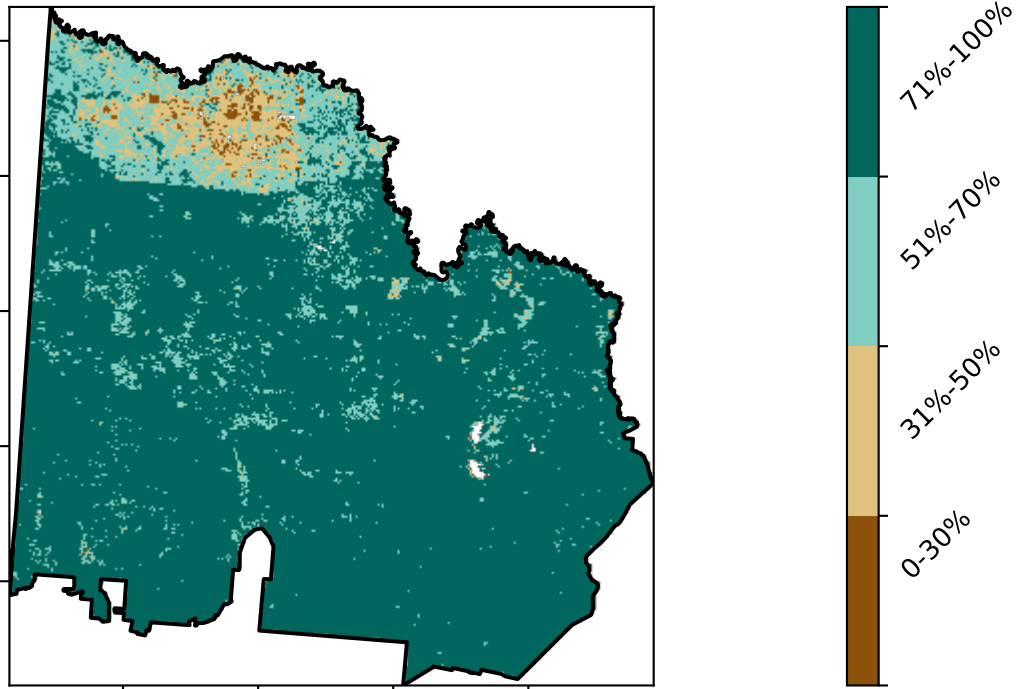# Vegetation Cover Aug 2019

## Land use and forest cover

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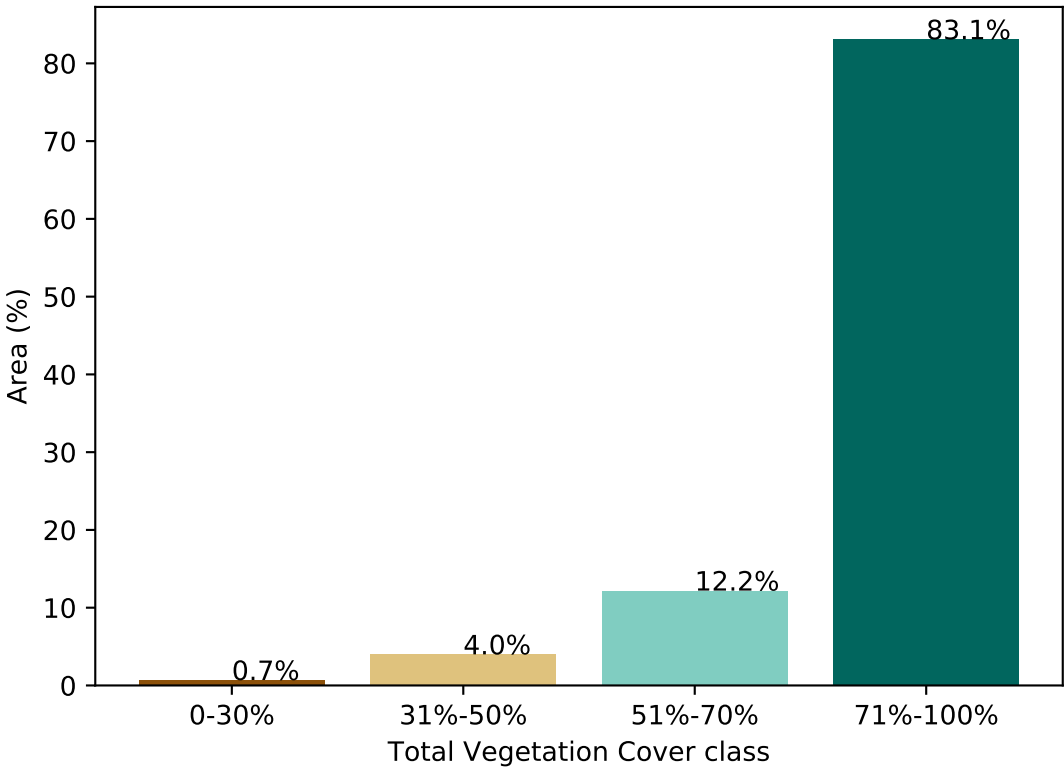(2018) and Forests
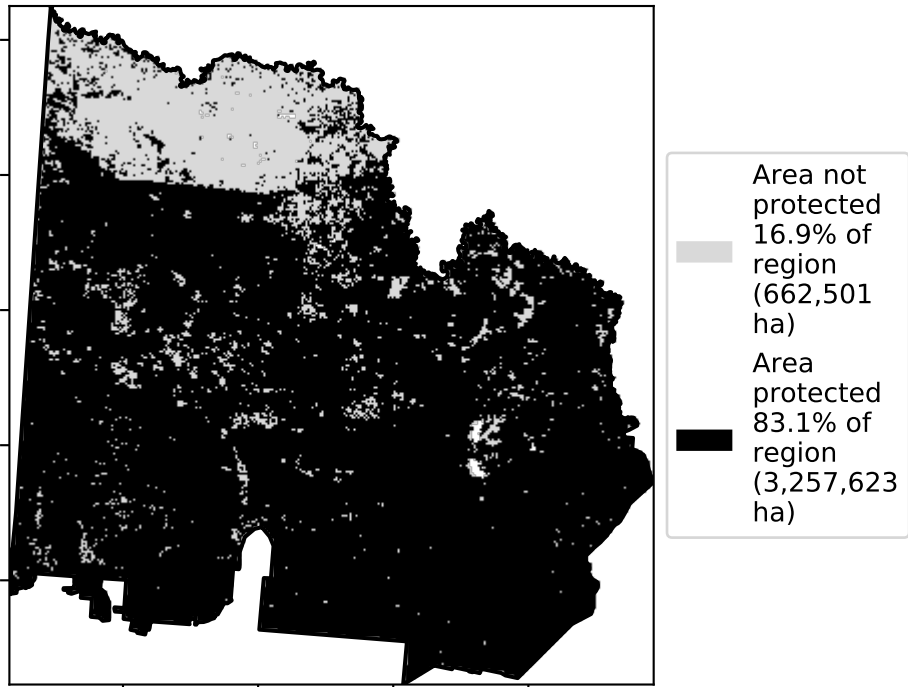of Australia (2018)



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

## Proportion of each land class in area



## Total Vegetation Cover [%]



## Proportion of vegetation cover class in area



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



Area not protected 16.9% of region (662,501 ha)

Area protected 83.1% of region (3,257,623 ha)

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



Area not protected 5.0% of region (196,006 ha)

Area protected 95.0% of region (3,724,118 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.



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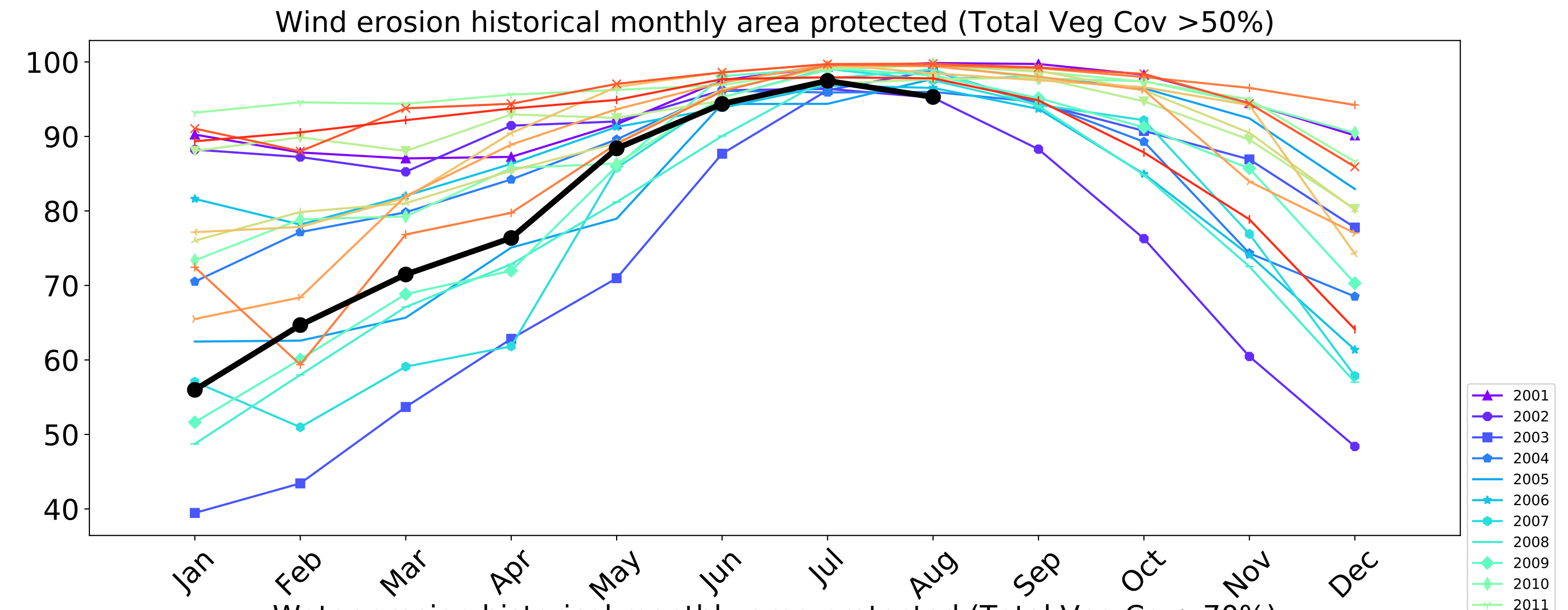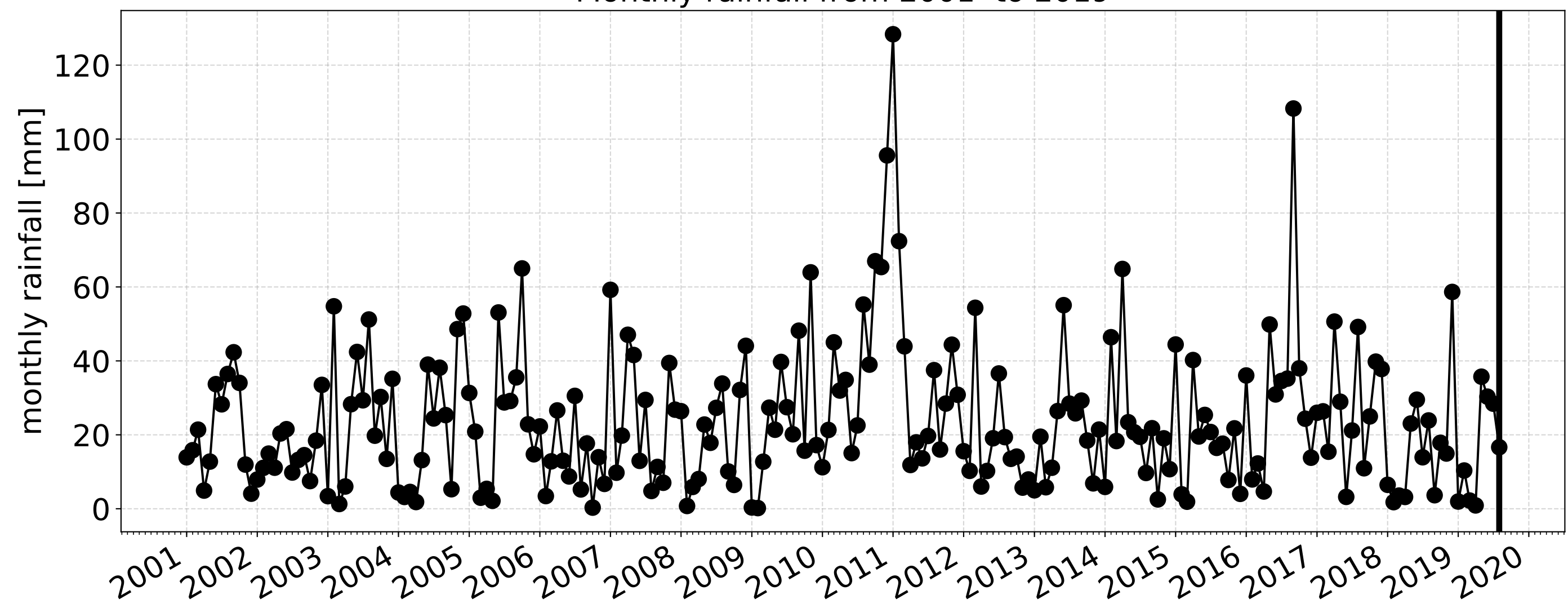
Proportion of the area protected from wind erosion (Total Vegetation Cover > 50%)

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

Monthly rainfall from 2001 to 2019

Wind erosion historical monthly area protected (Total Veg Cov >50%)
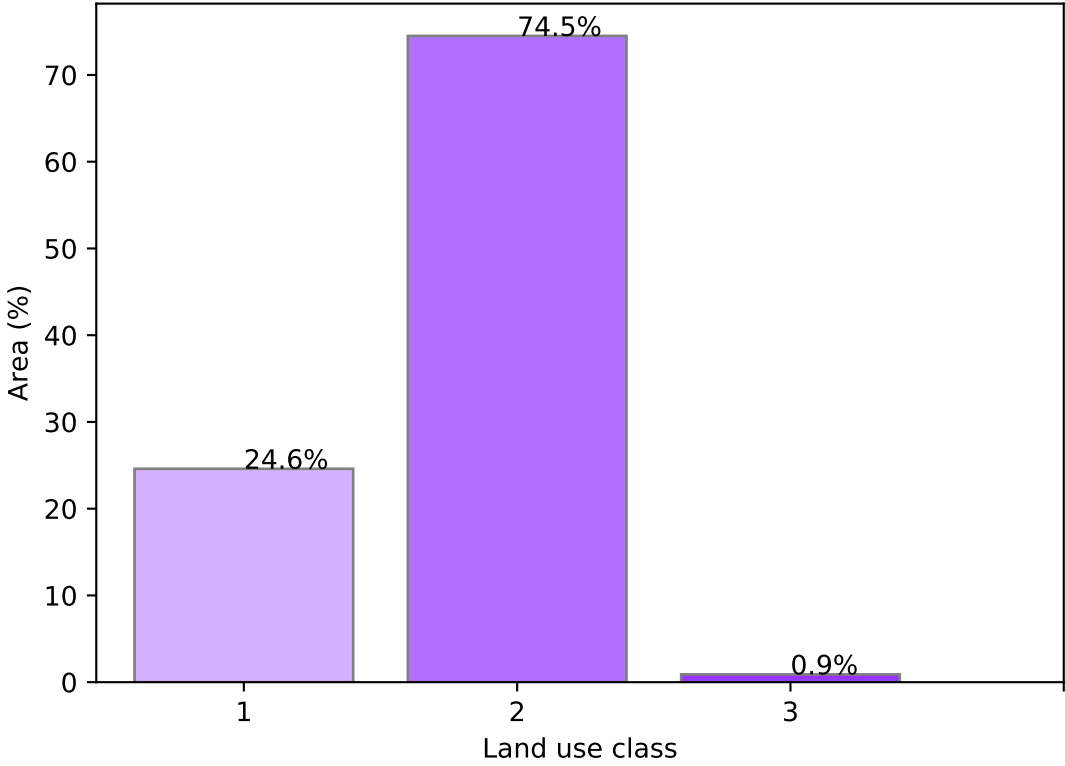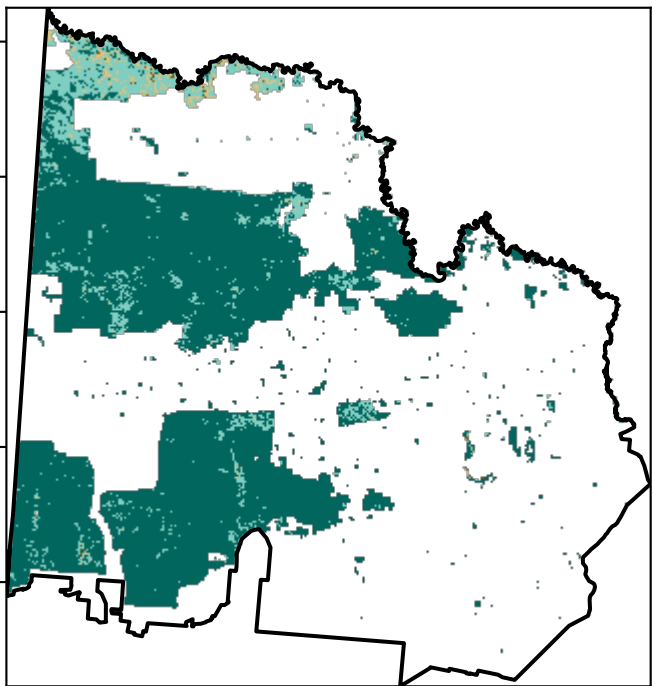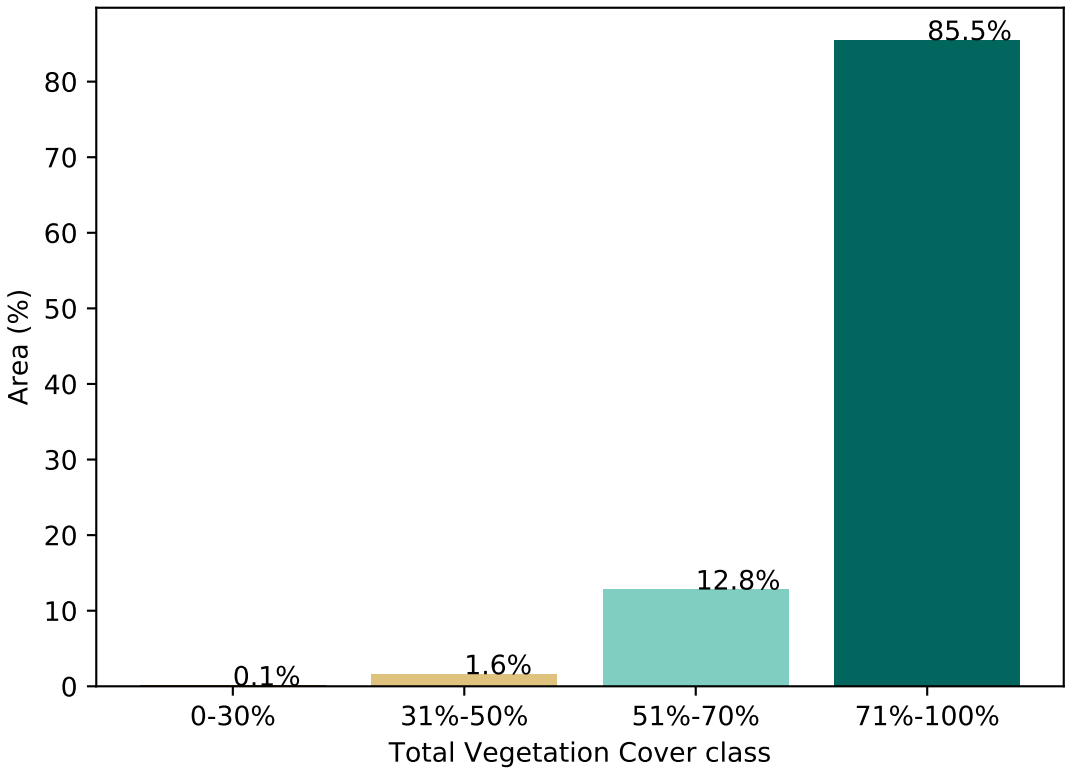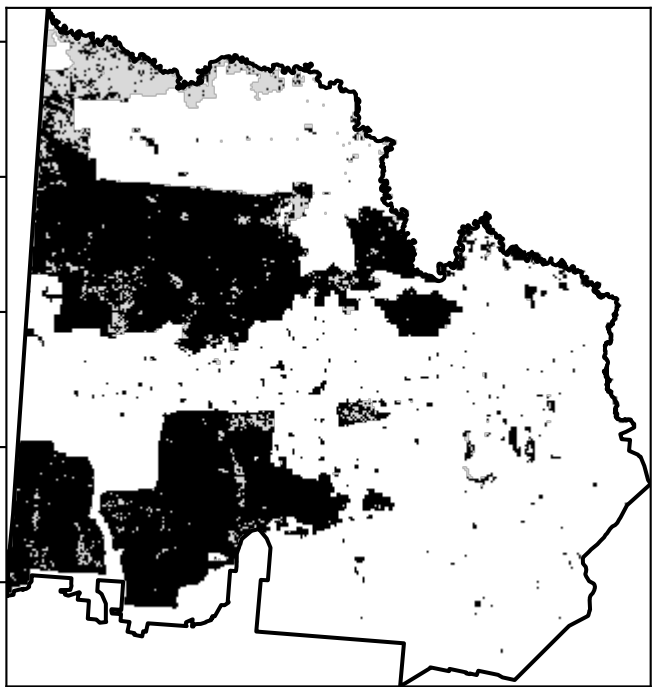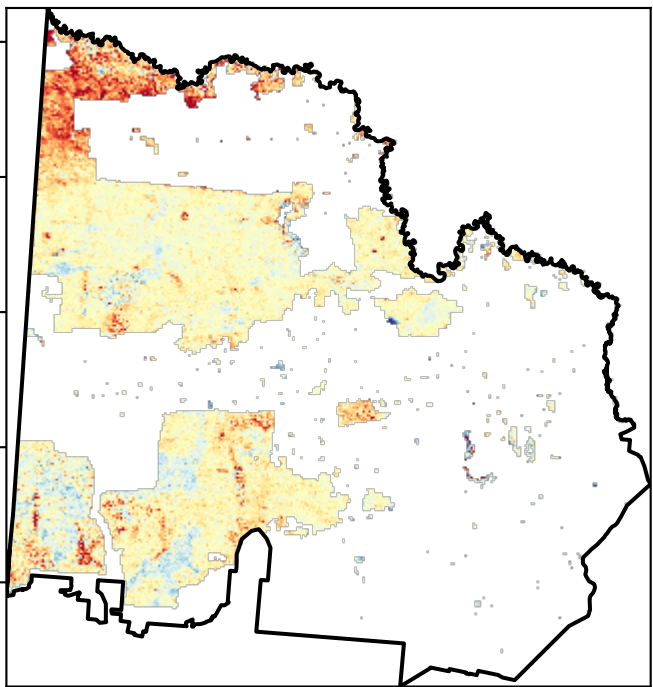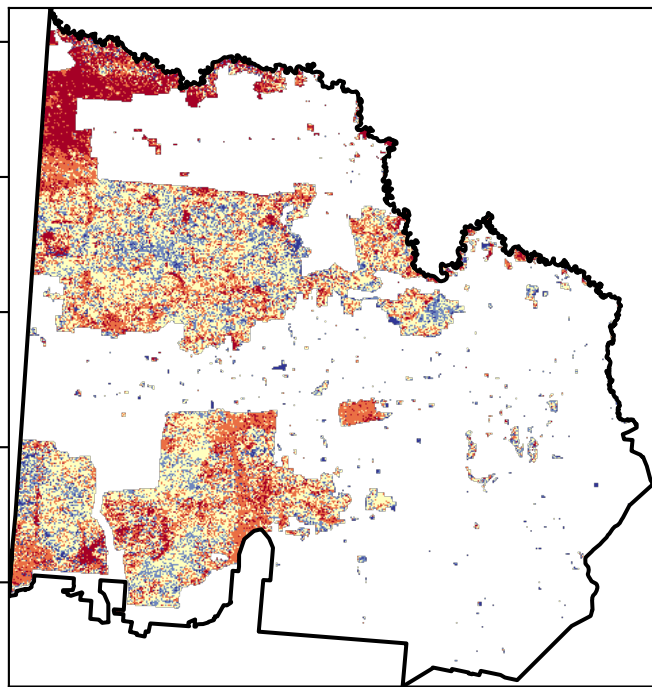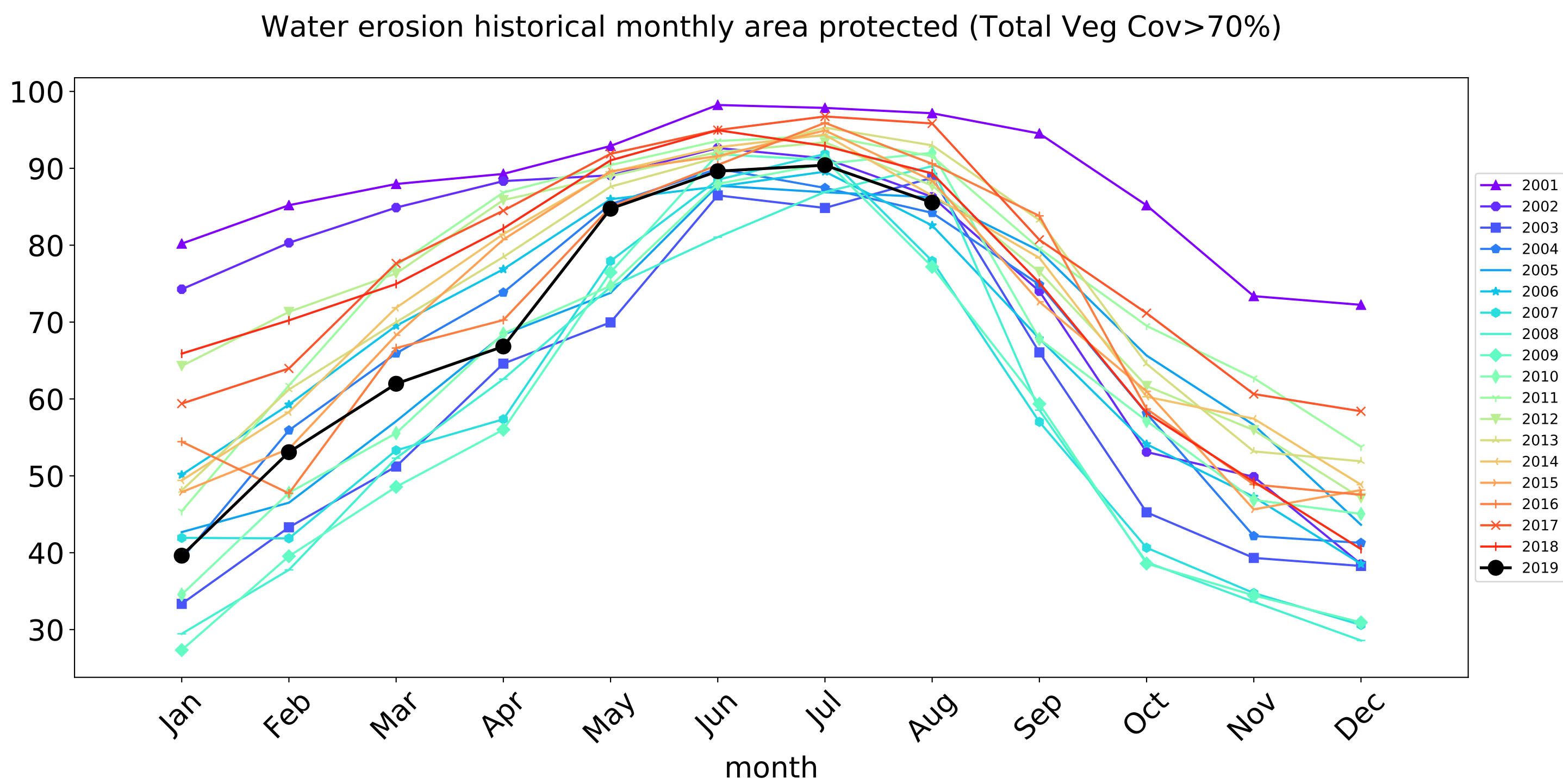
Water erosion historical monthly area protected (Total Veg Cov>70%)

Rainfall: historical monthly
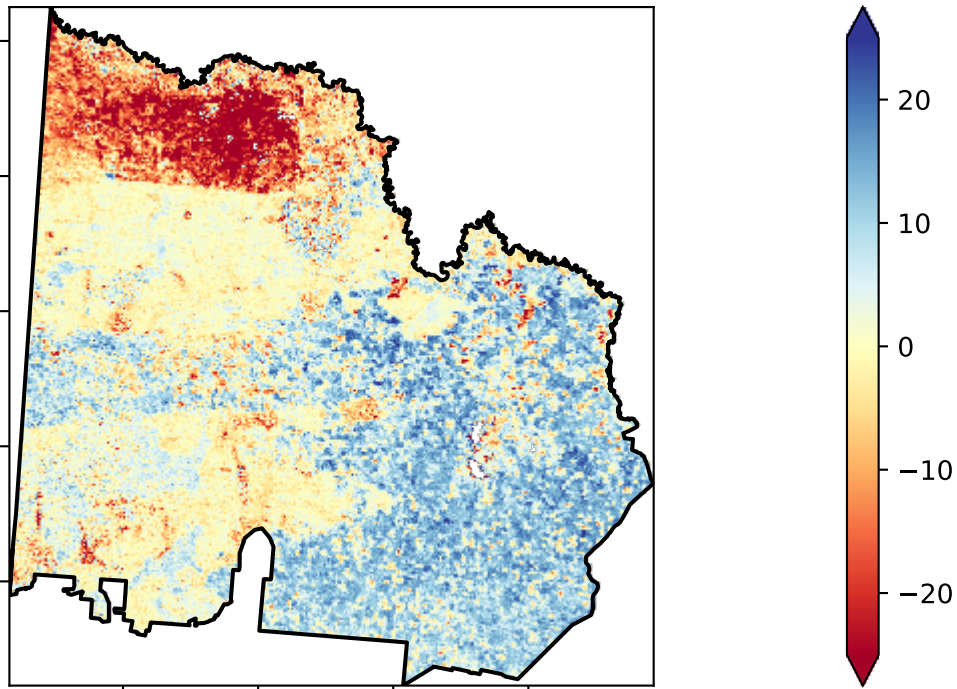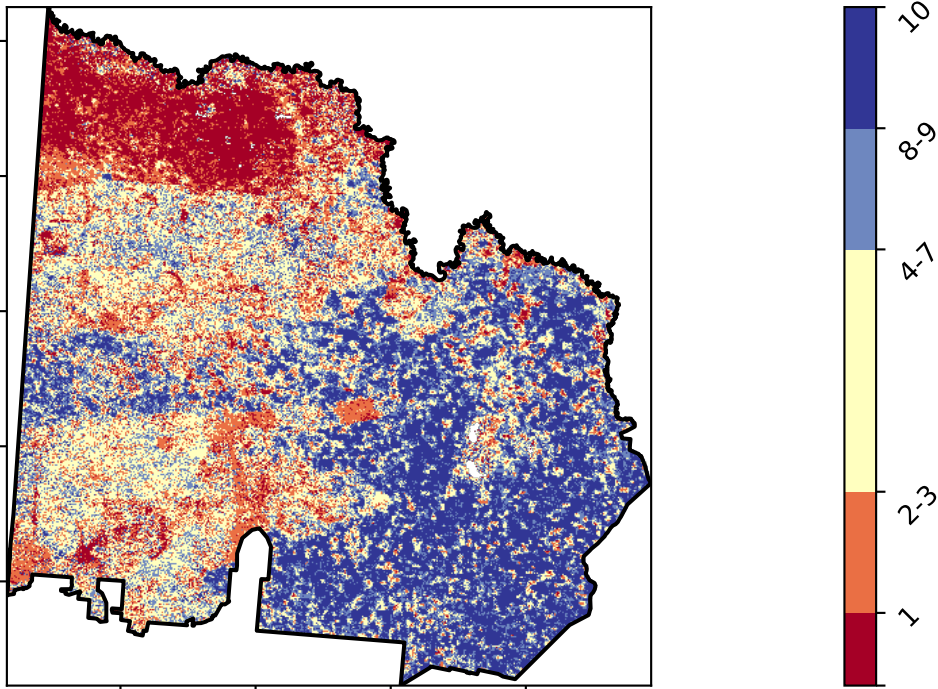
# Conservation and natural environments

## Land use and forest cover



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

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

## Proportion of each land class in area



## Total Vegetation Cover [%]



71%-100%
51%-70%
31%-50%
0-30%

## Proportion of vegetation cover class in area



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



Area not protected 14.5% of region (202,082 ha)

Area protected 85.5% of region (1,191,592 ha)

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



Area not protected 2.0% of region (27,873 ha)

Area protected 98.0% of region (1,365,801 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.

## 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.
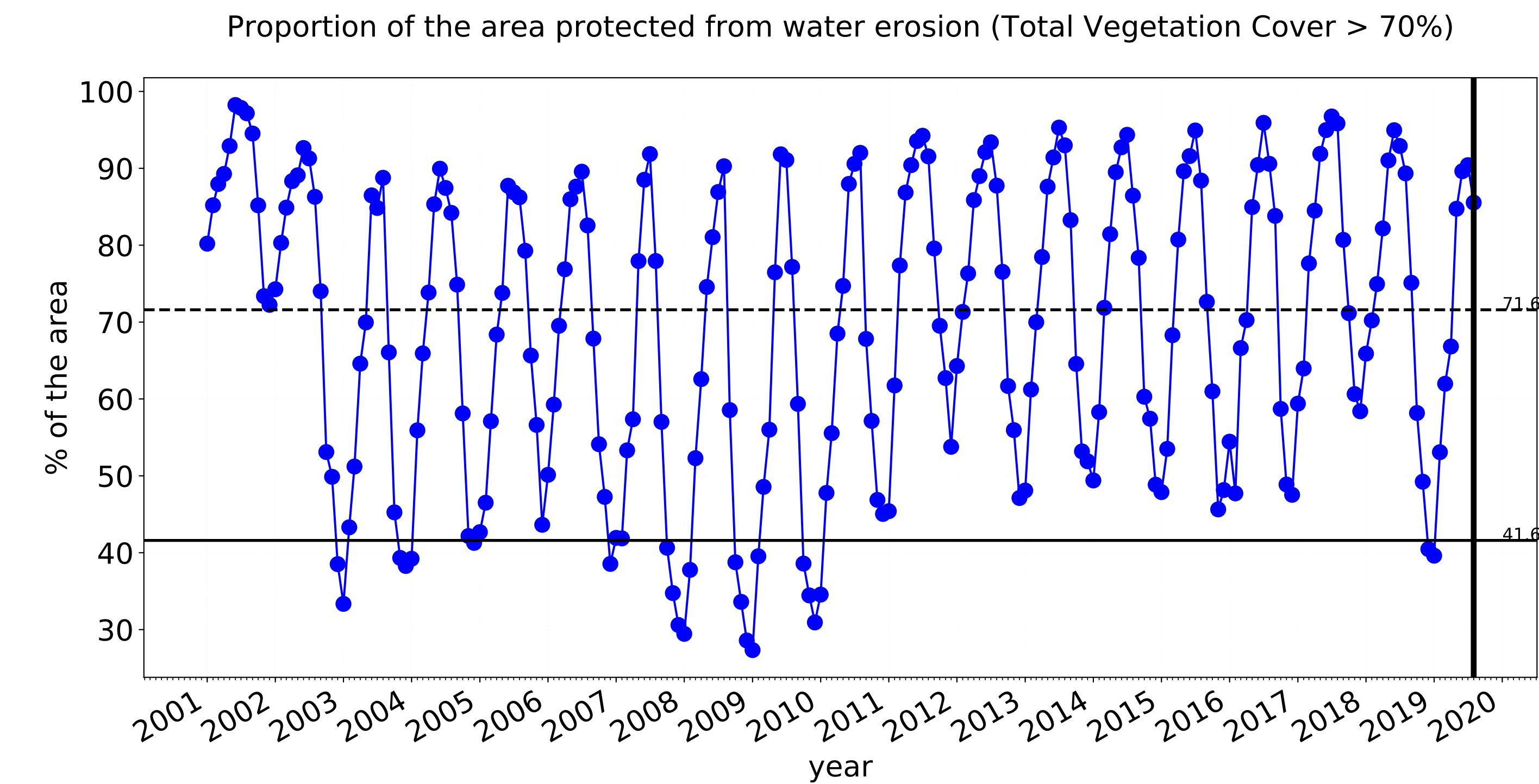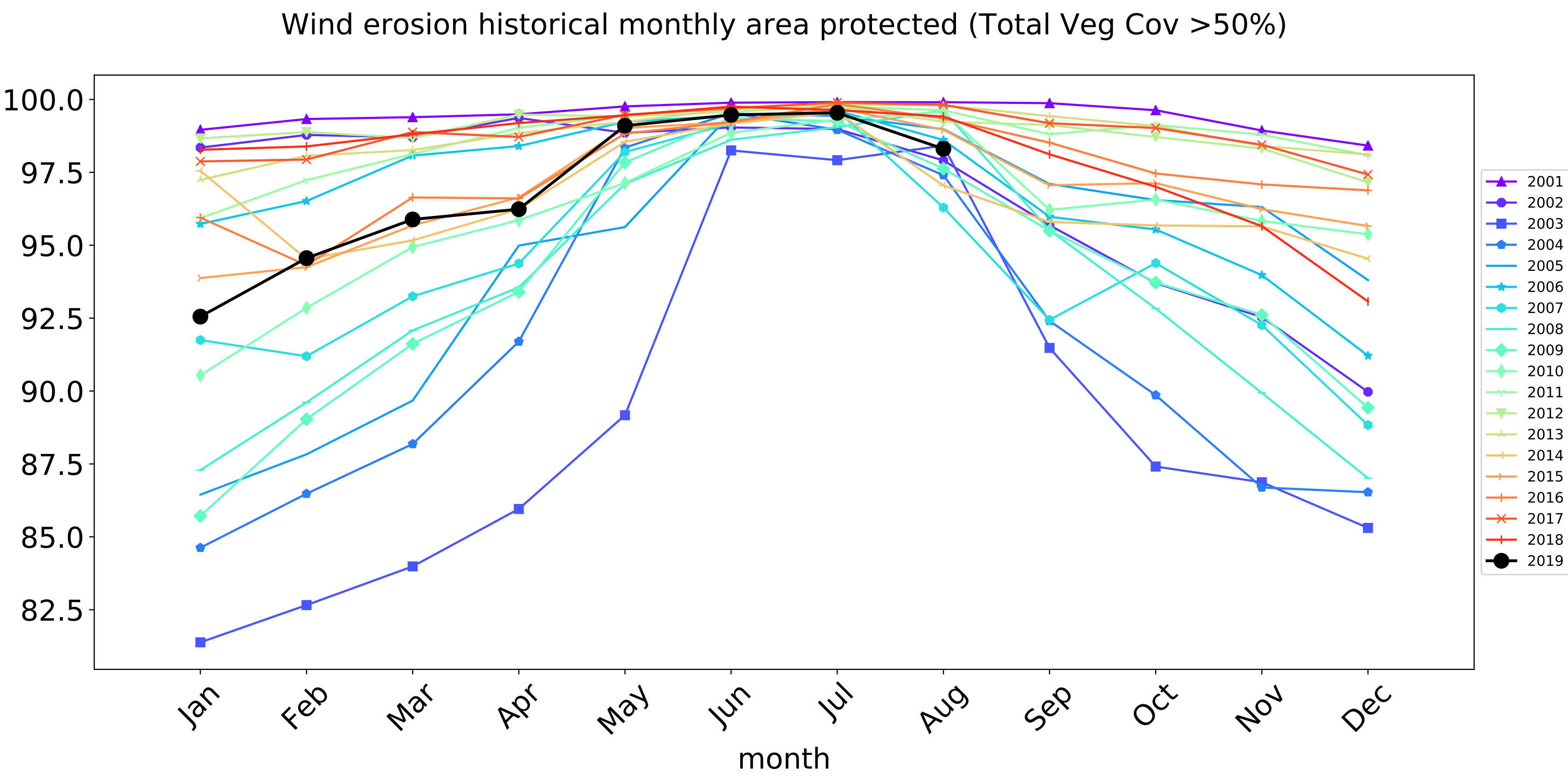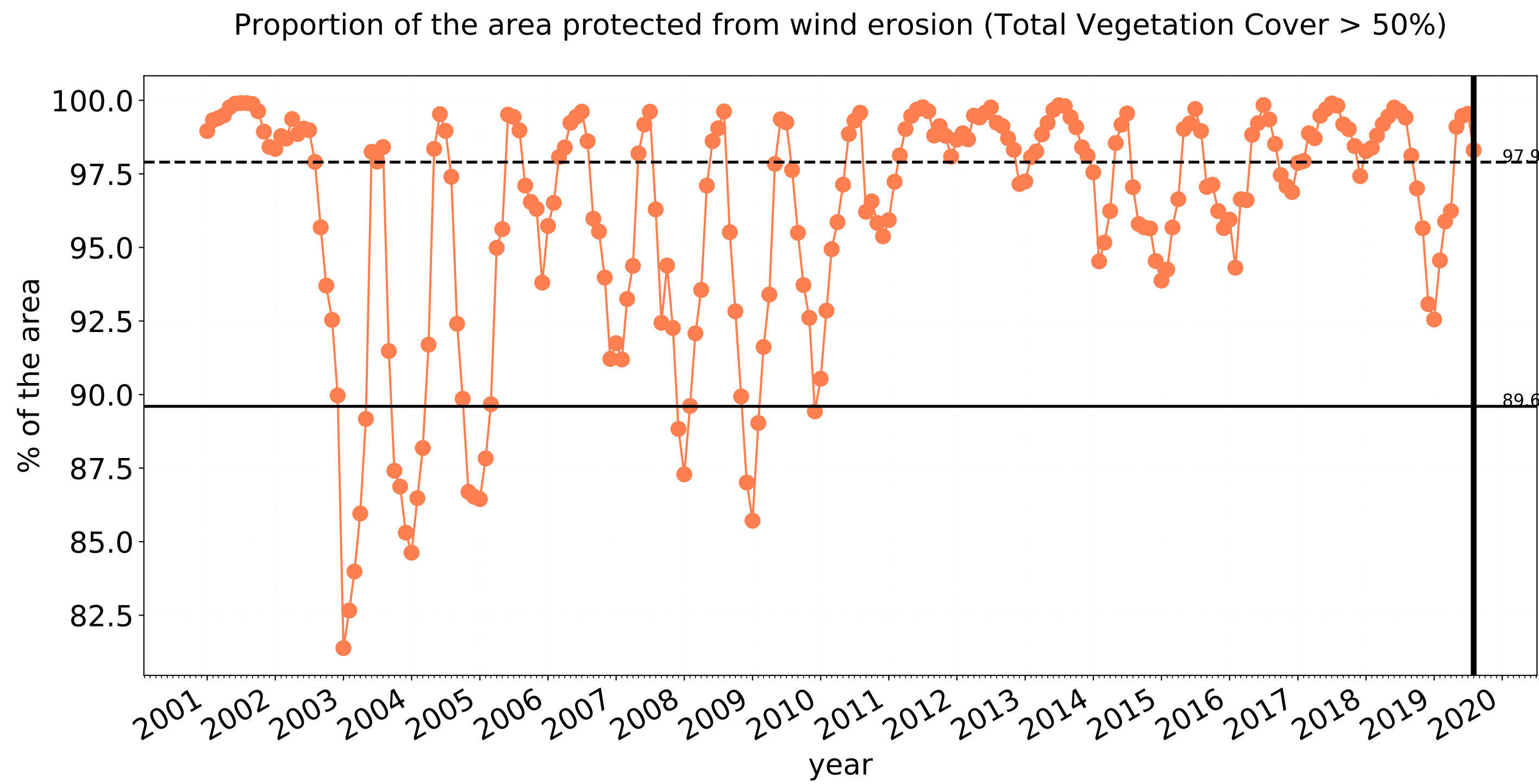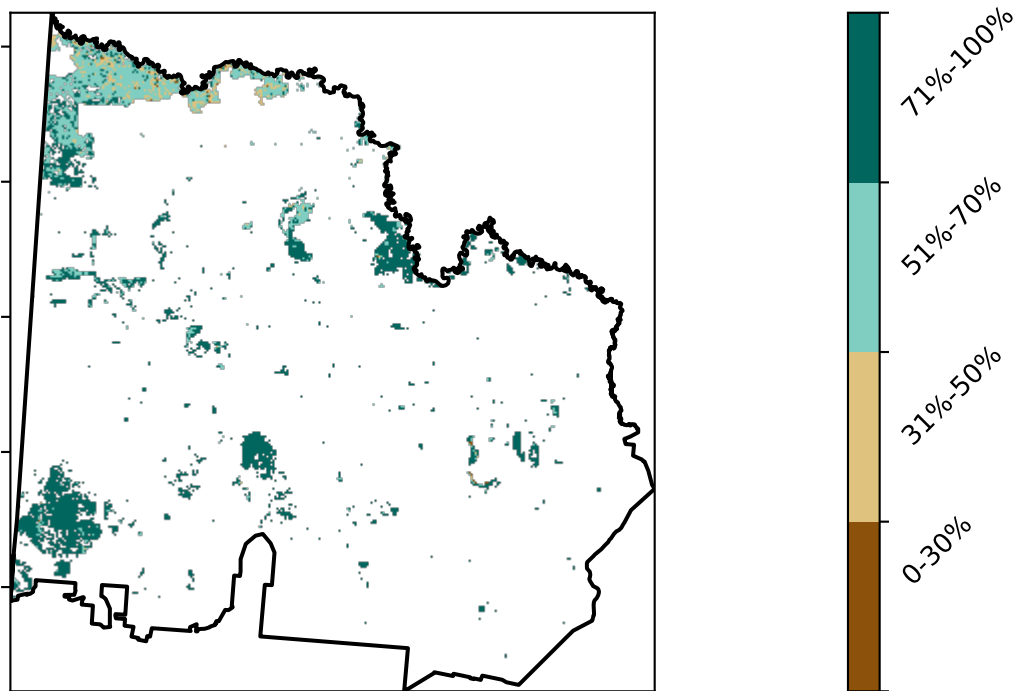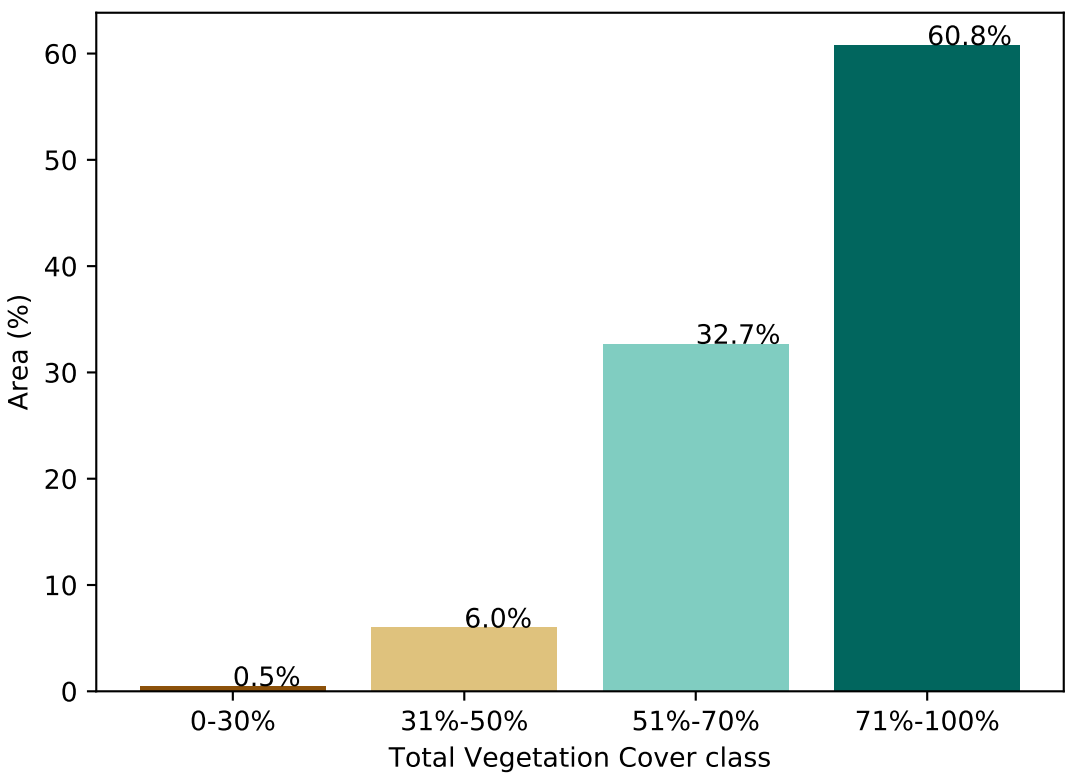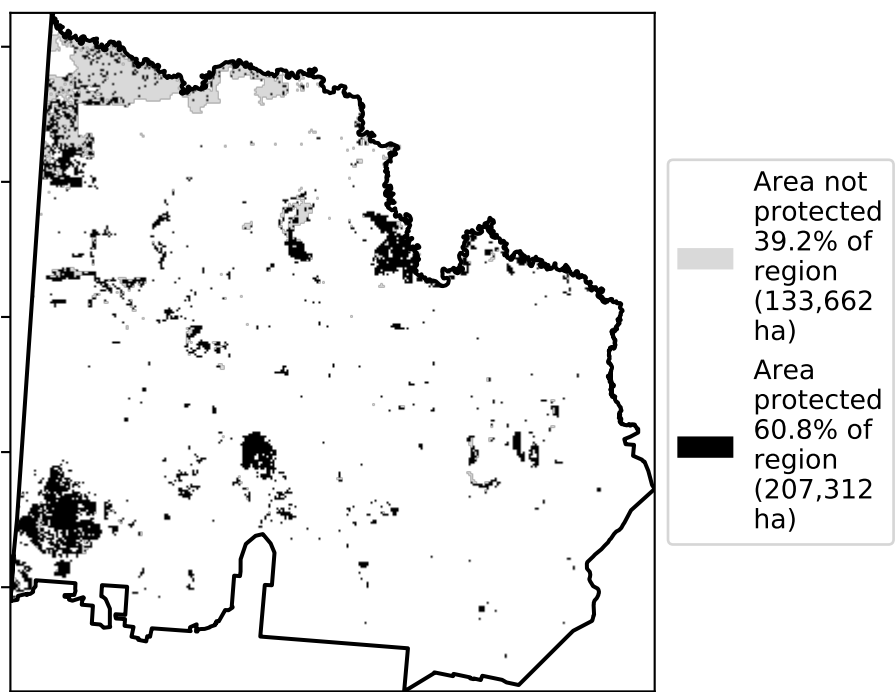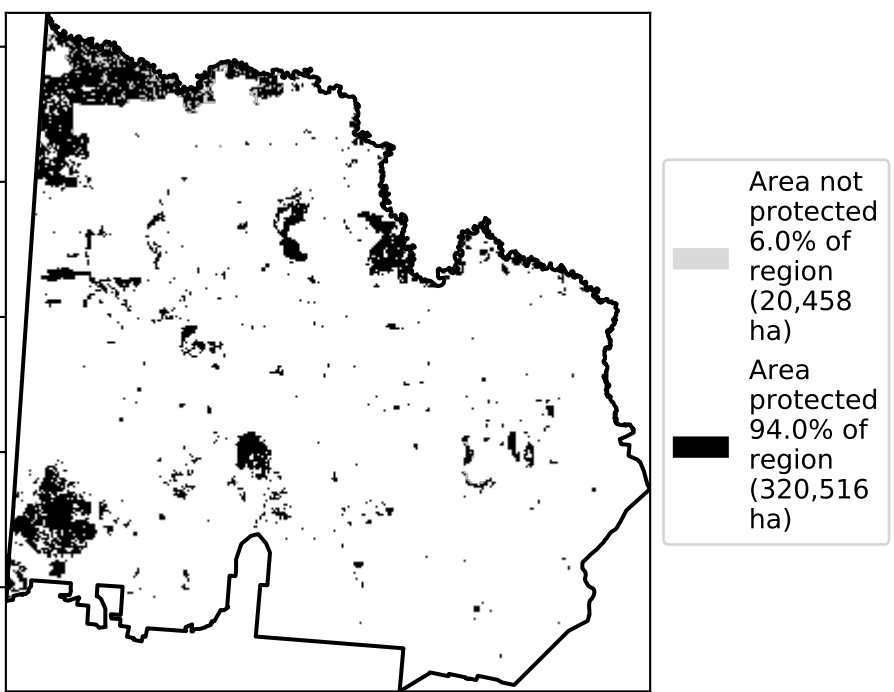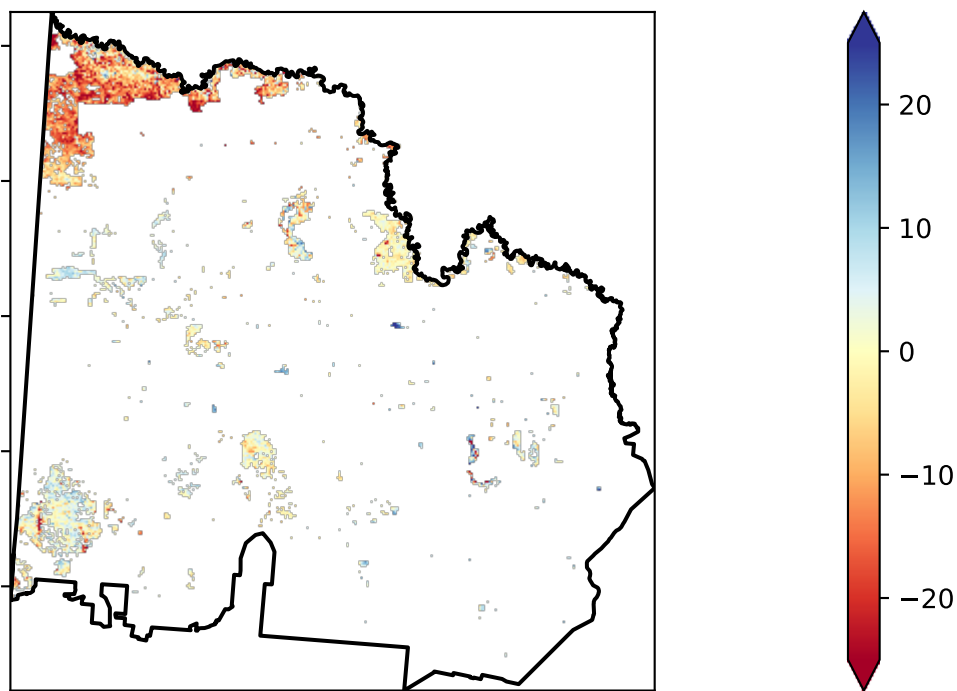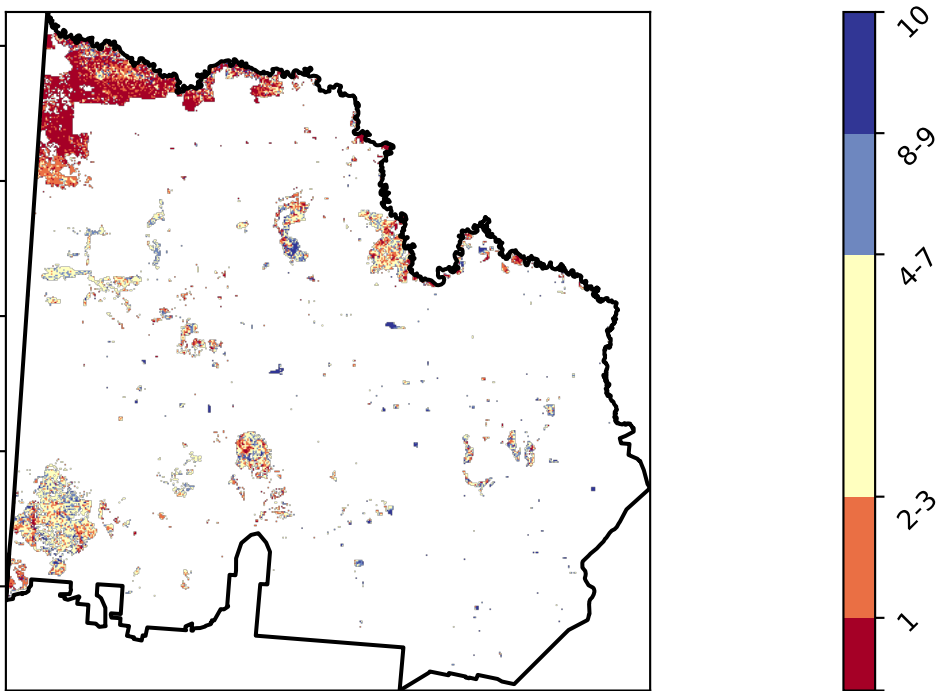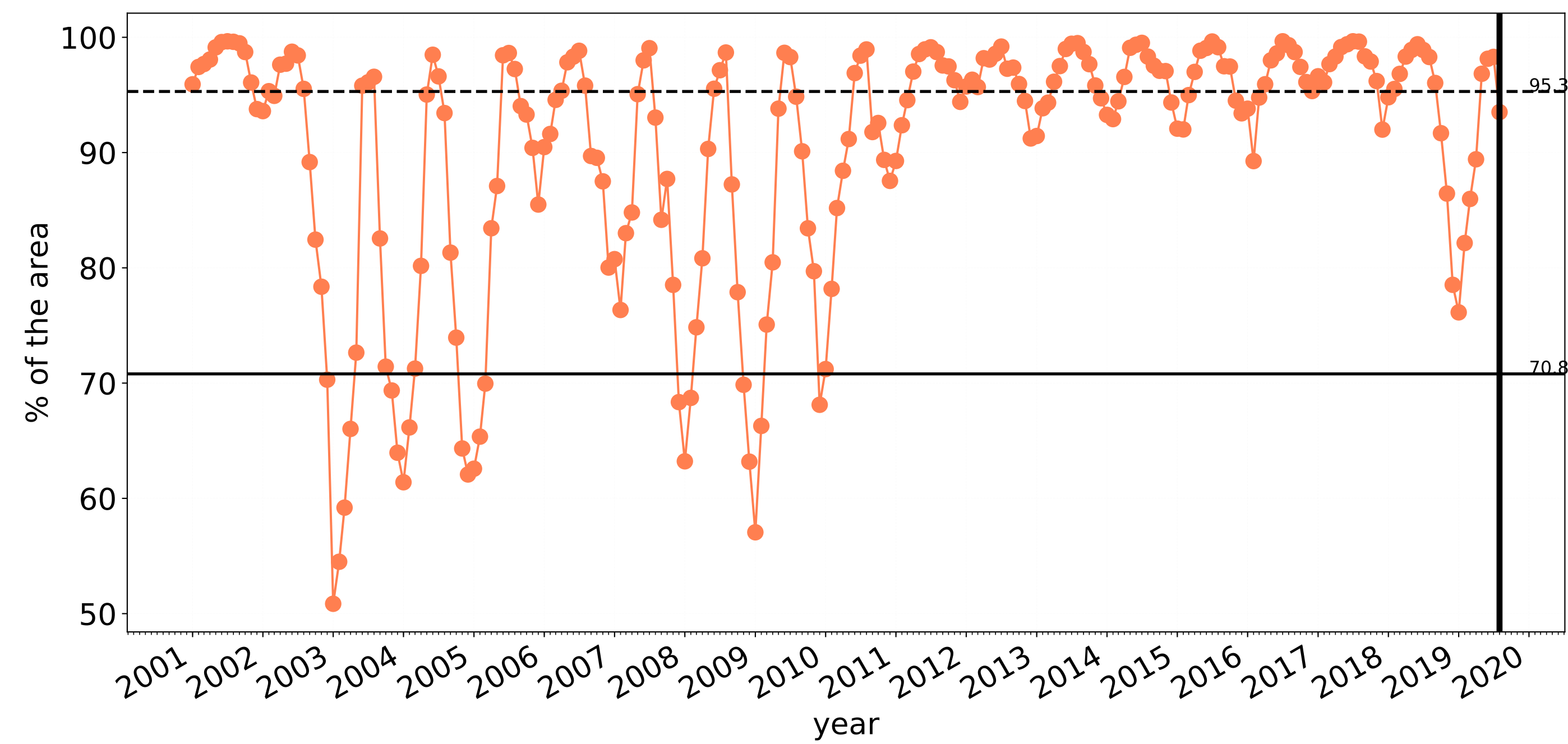
# Conservation and natural environments timeseries

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



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



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



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

# Conservation and natural environments non forest

## Land use and forest cover

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

## Total Vegetation Cover [%]

71%-100%

51%-70%

31%-50%

0-30%

## Proportion of vegetation cover class in area

60.8%

32.7%

6.0%

0.5%

Area (%)

Total Vegetation Cover class

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

Area not protected 39.2% of region (133,662 ha)

Area protected 60.8% of region (207,312 ha)

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

Area not protected 6.0% of region (20,458 ha)

Area protected 94.0% of region (320,516 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.

## 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.

10

8-9

4-7

2-3

1

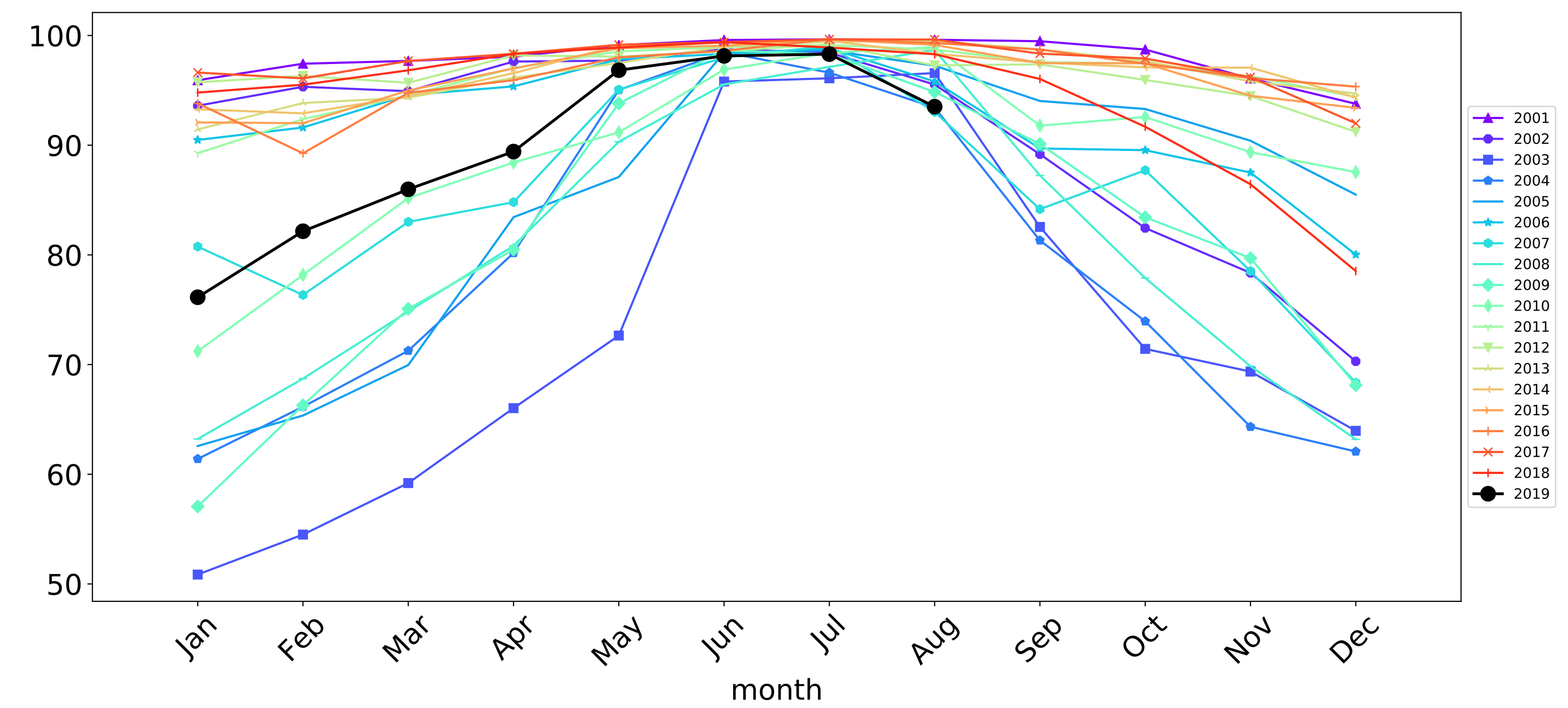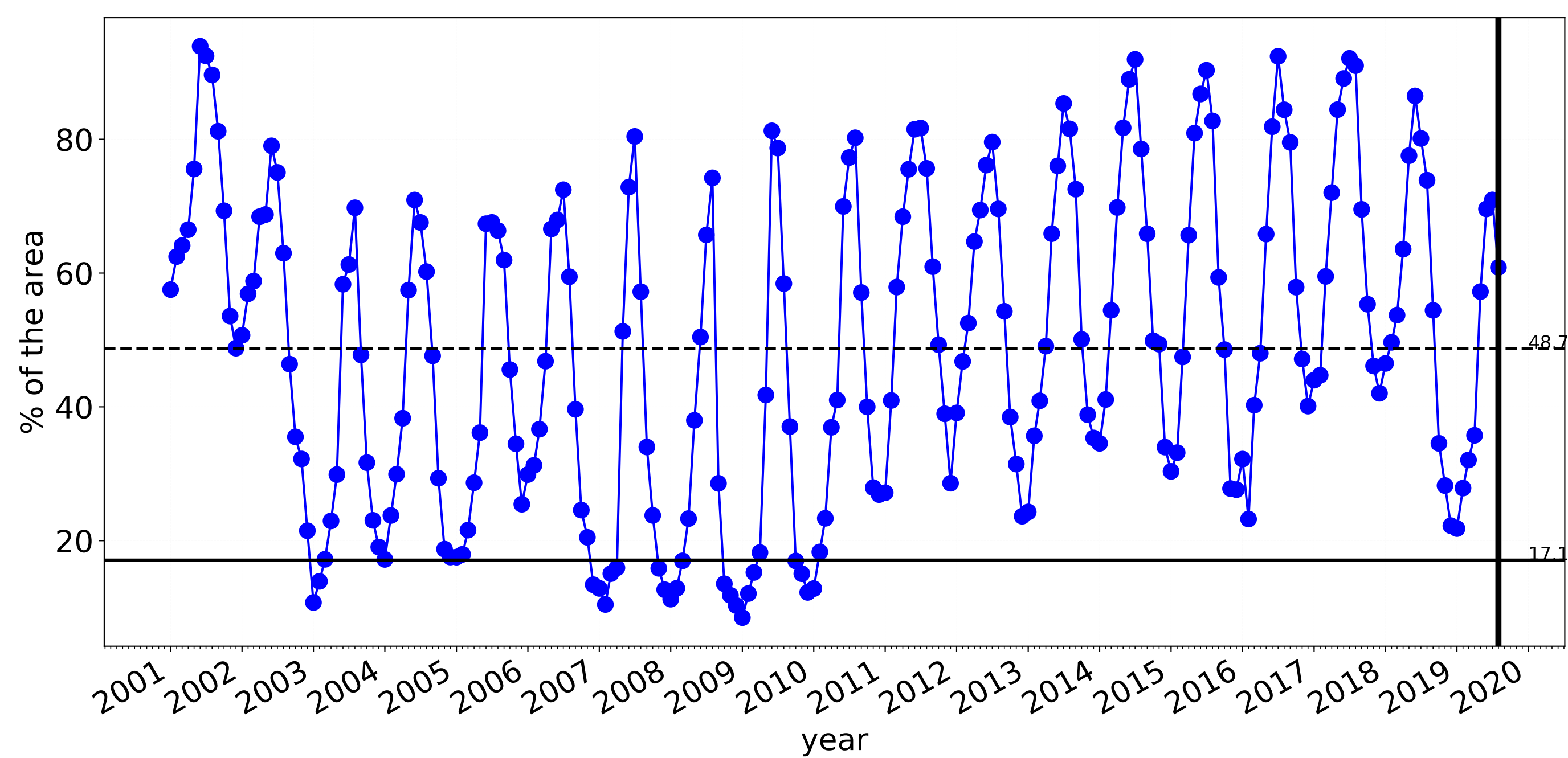CSIRO  TERN  Australian Government  National Landcare Programme  NSW GOVERNMENT | Planning, Industry & Environment

# Conservation and natural environments non forest timeseries



Proportion of the area protected from wind erosion (Total Vegetation Cover > 50%)
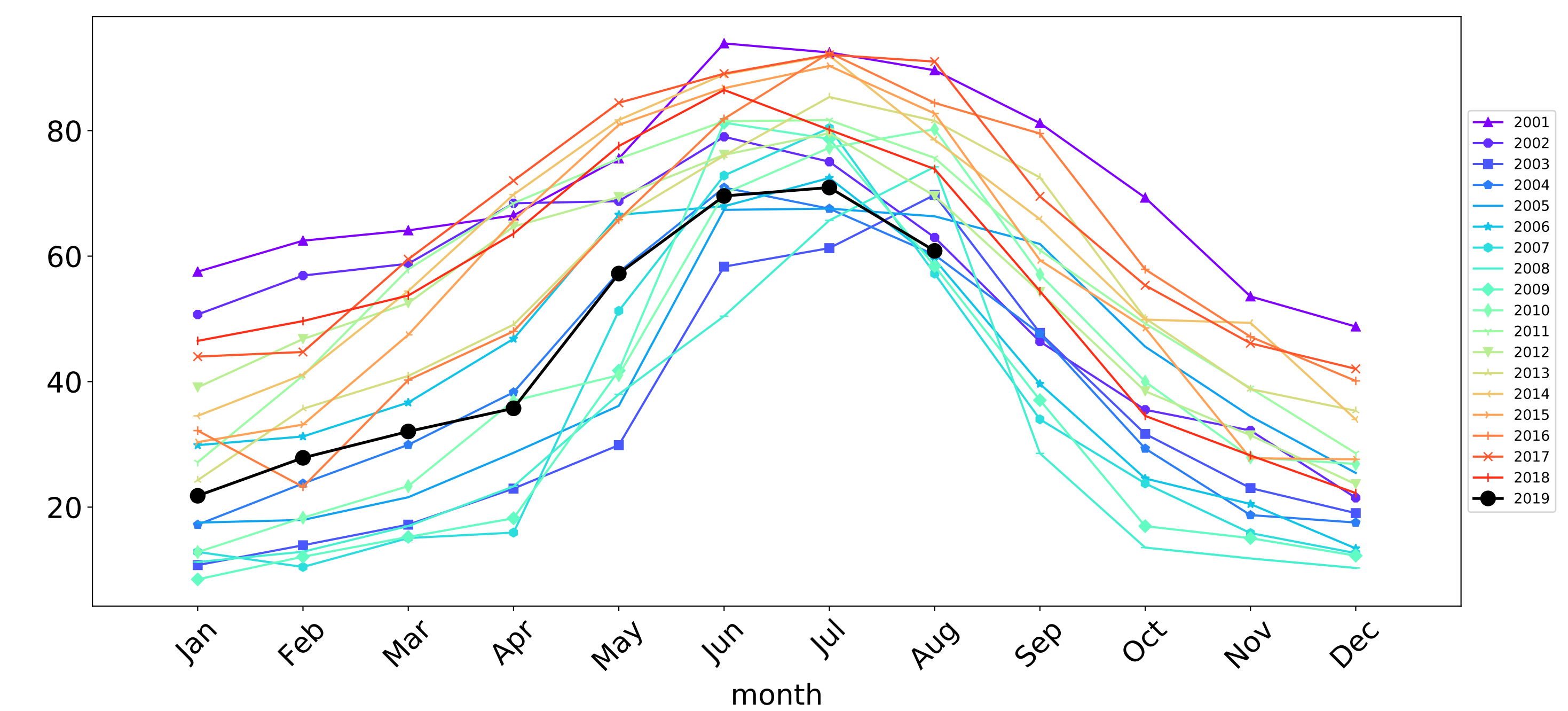
Wind erosion historical monthly area protected (Total Veg Cov >50%)

Proportion of the area protected from water erosion (Total Vegetation Cover > 70%)
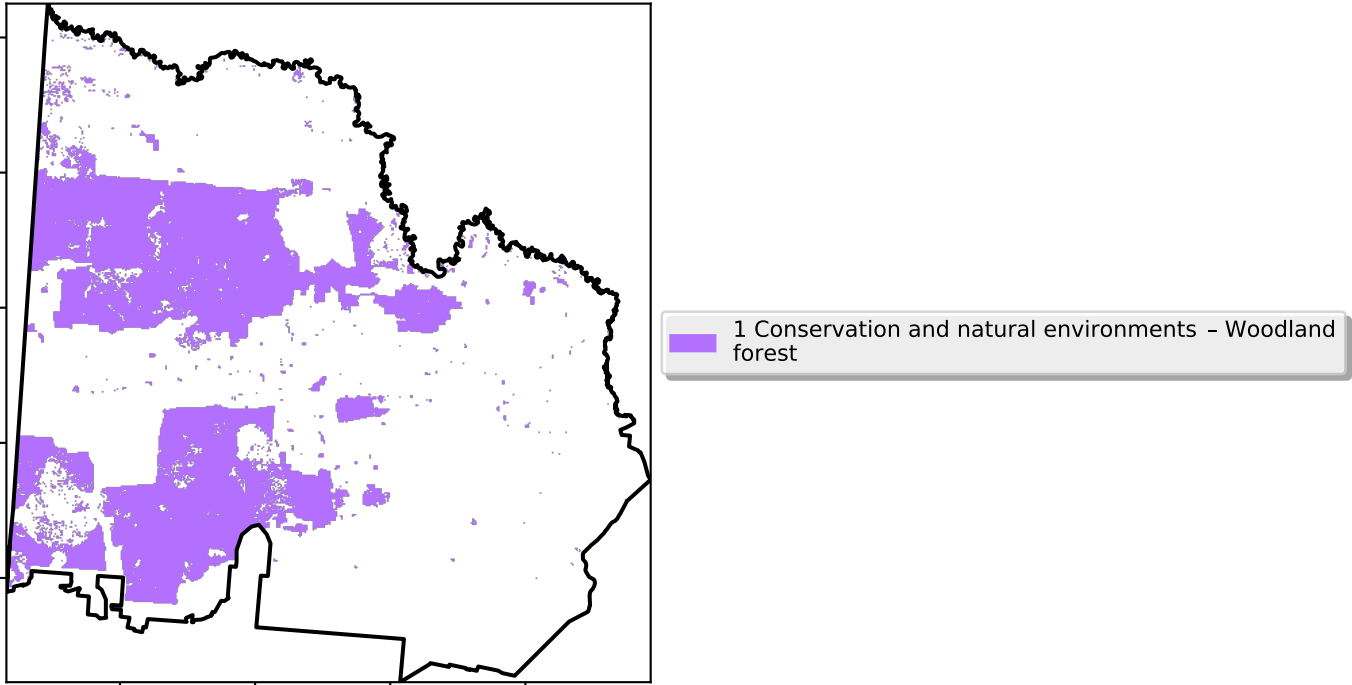
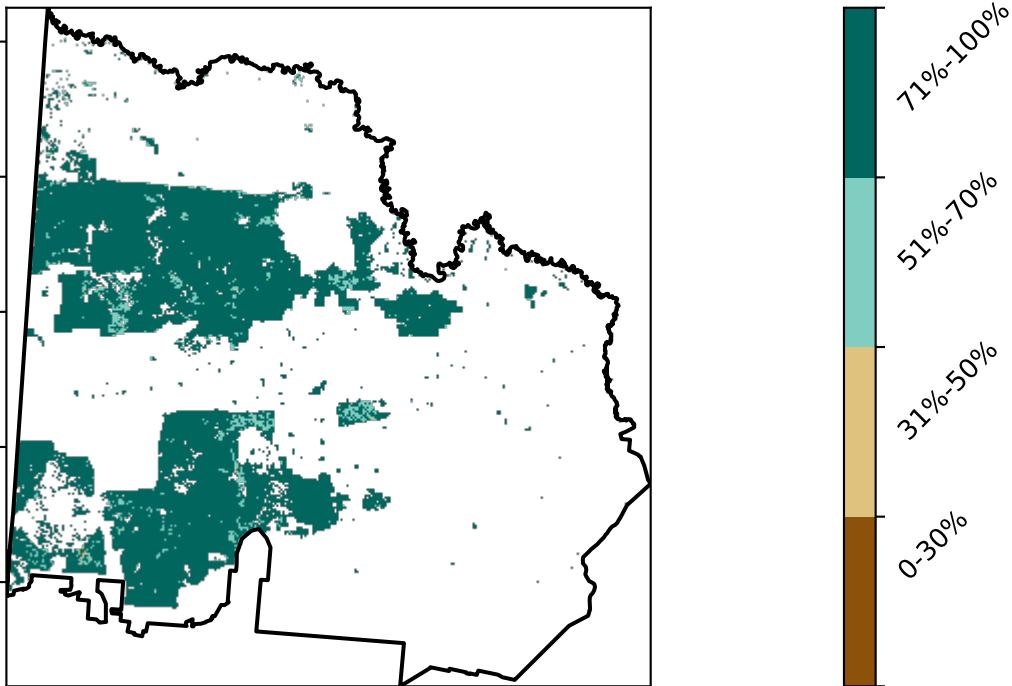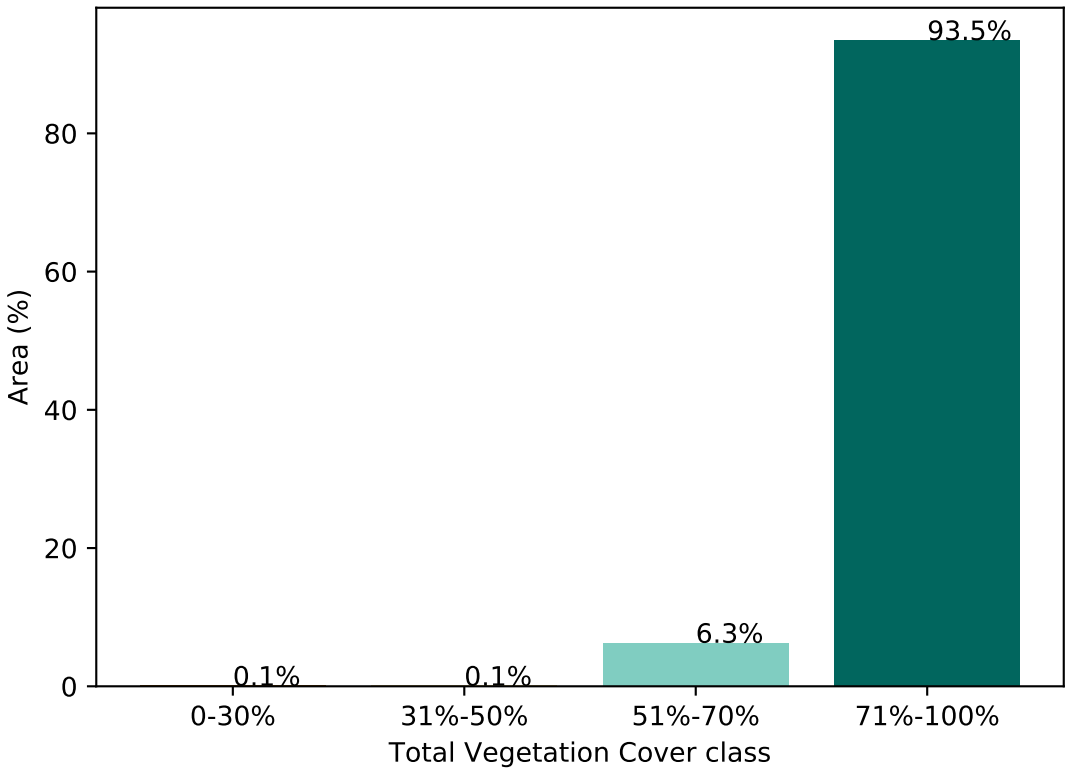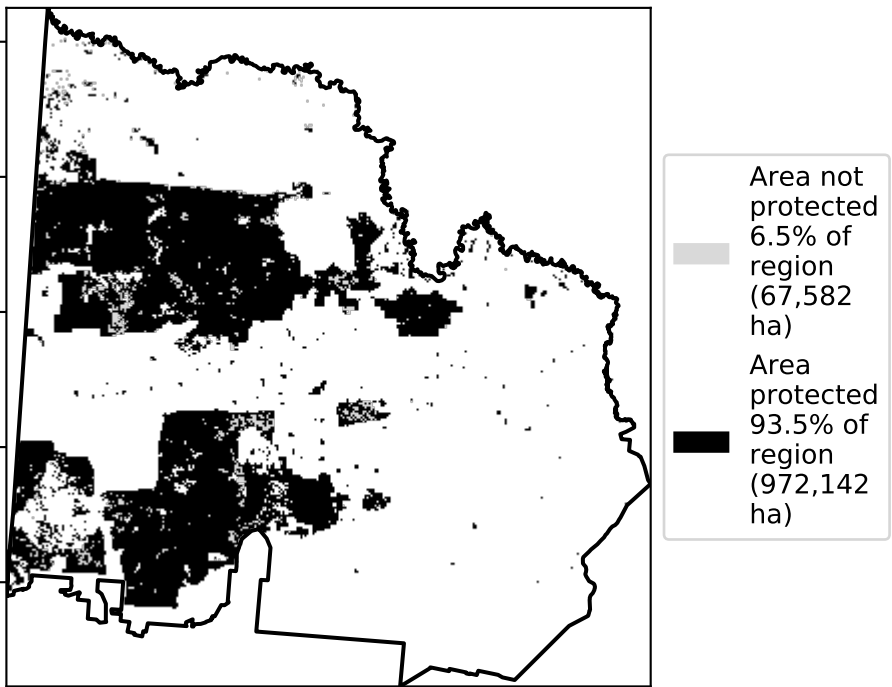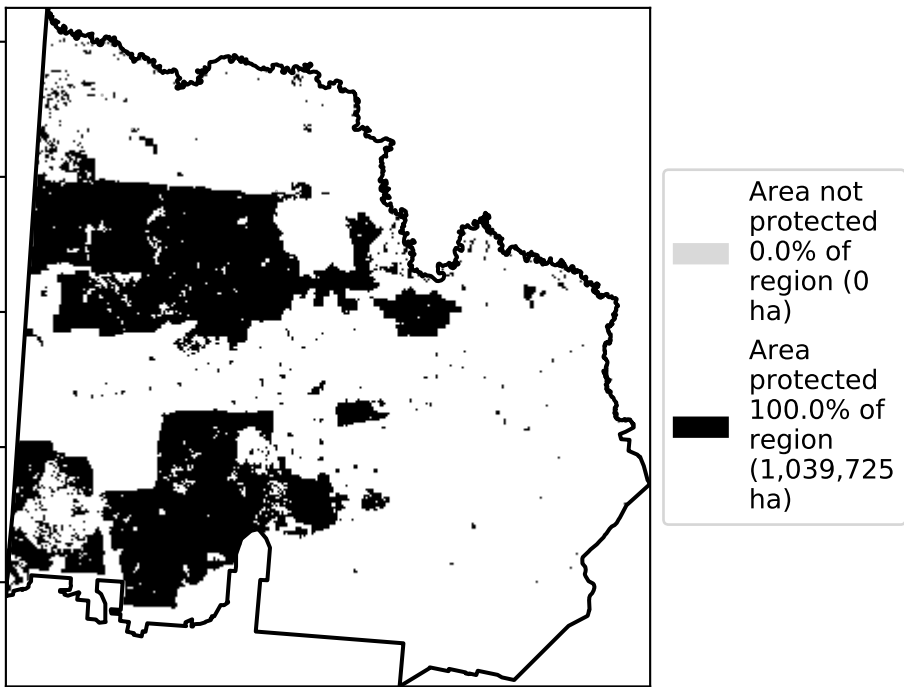Water erosion historical monthly area protected (Total Veg Cov>70%)

# Conservation and natural environments Woodland forest

### Land use and forest cover

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

1 Conservation and natural environments – Woodland
forest

### Total Vegetation Cover [%]

71%-100%

51%-70%

31%-50%

0-30%

### Proportion of vegetation cover class in area

93.5%

6.3%

0.1%          0.1%

0-30%      31%-50%      51%-70%      71%-100%

Total Vegetation Cover class

Area (%)

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

Area not
protected
6.5% of
region
(67,582
ha)

Area
protected
93.5% of
region
(972,142
ha)

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

Area not
protected
0.0% of
region (0
ha)

Area
protected
100.0% of
region
(1,039,725
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.

### 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
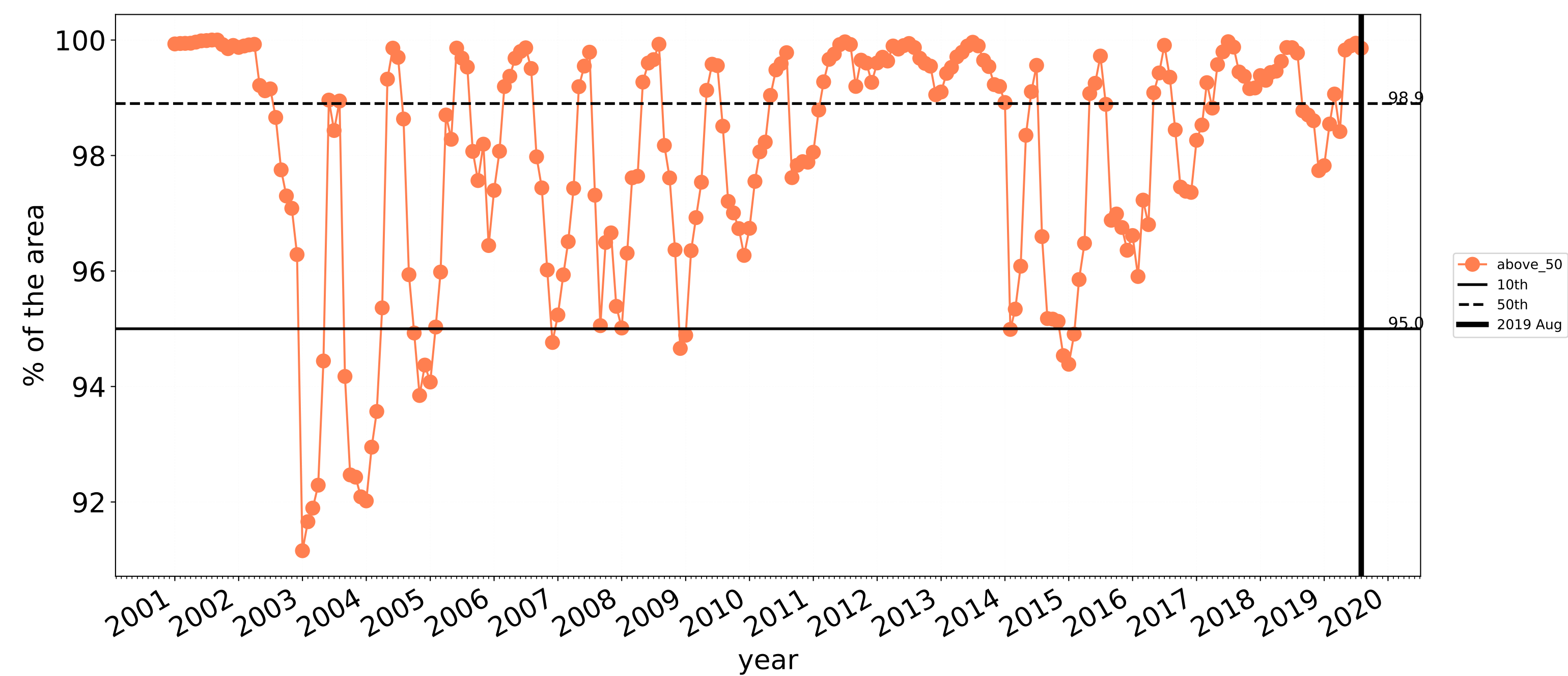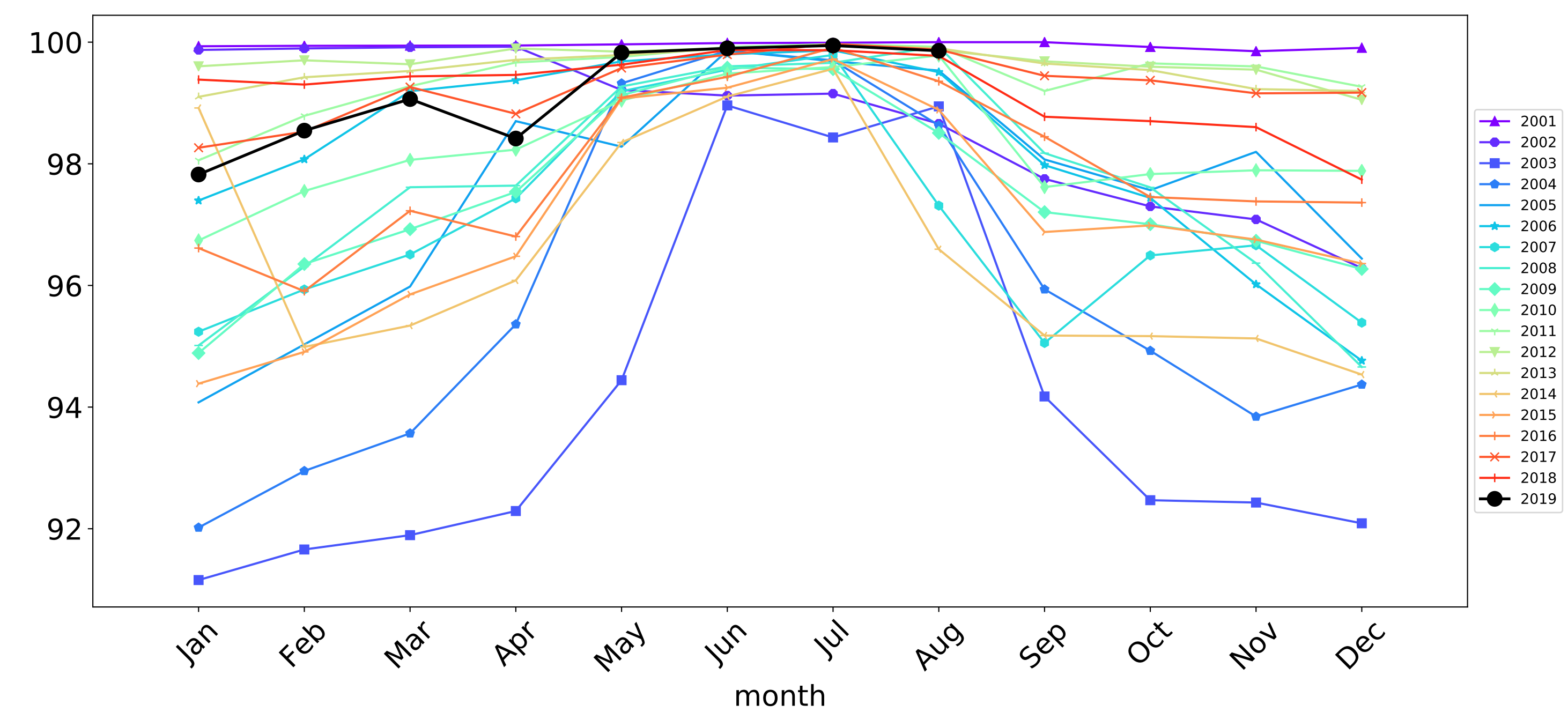the map using baseline
from 2001 to 2019.

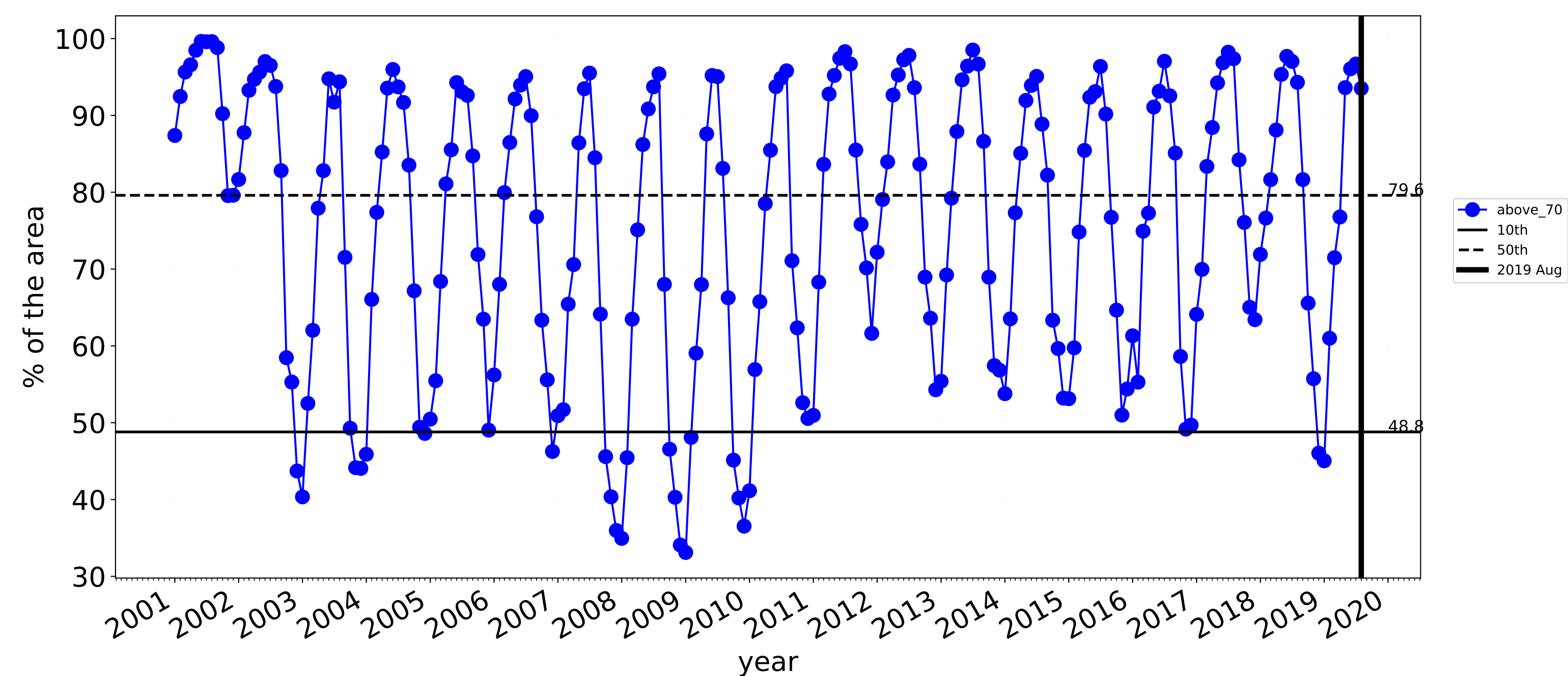# Conservation and natural environments Woodland forest timeseries

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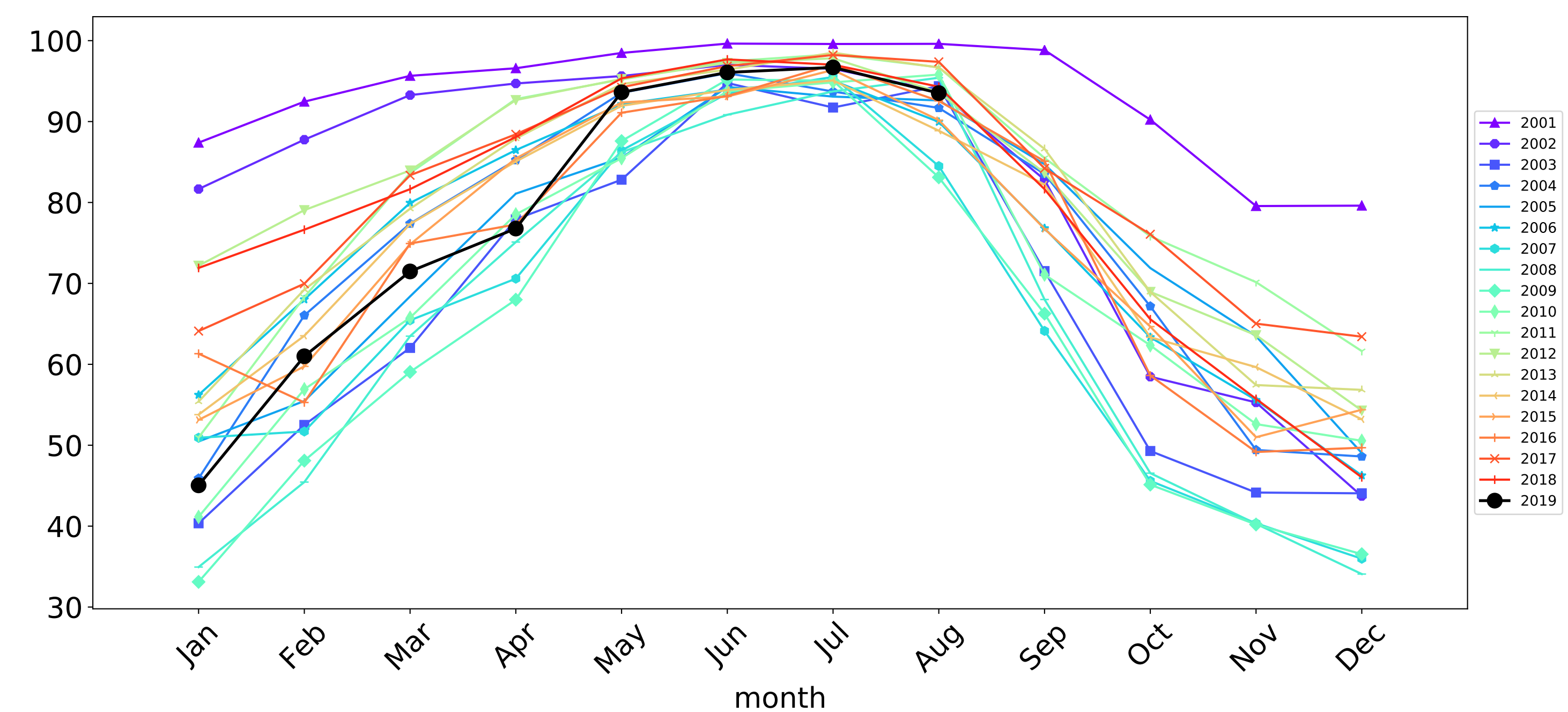


### Wind erosion historical monthly area protected (Total Veg Cov >50%)



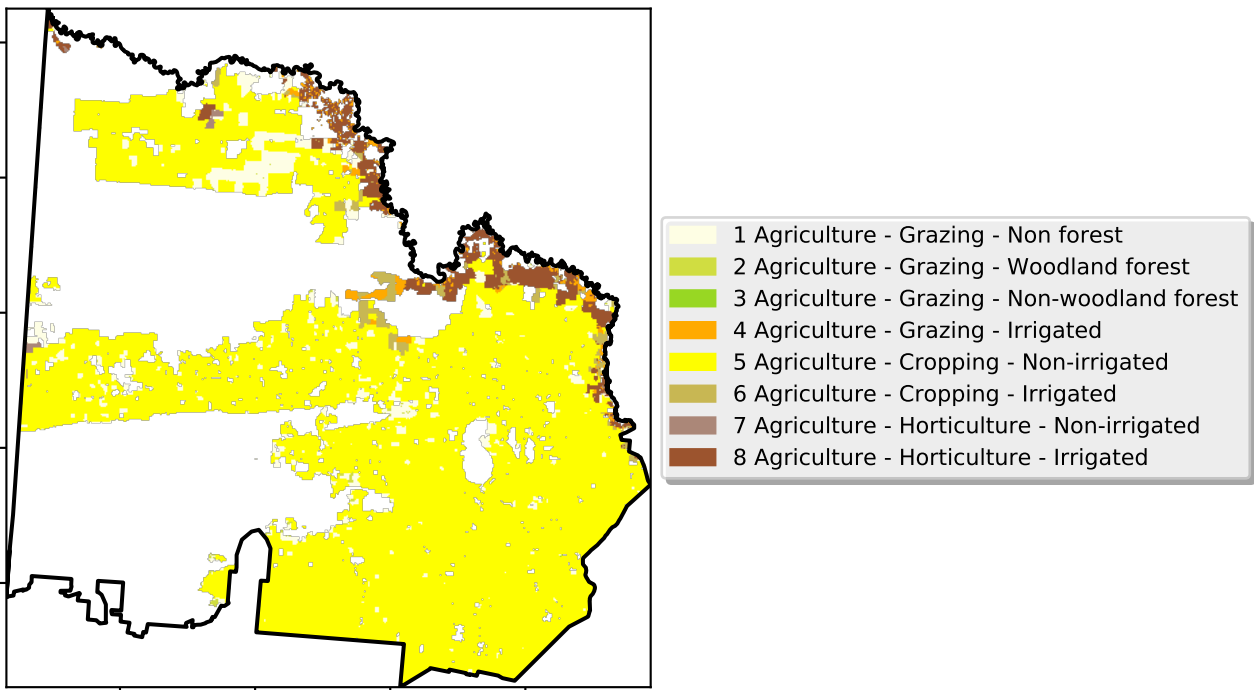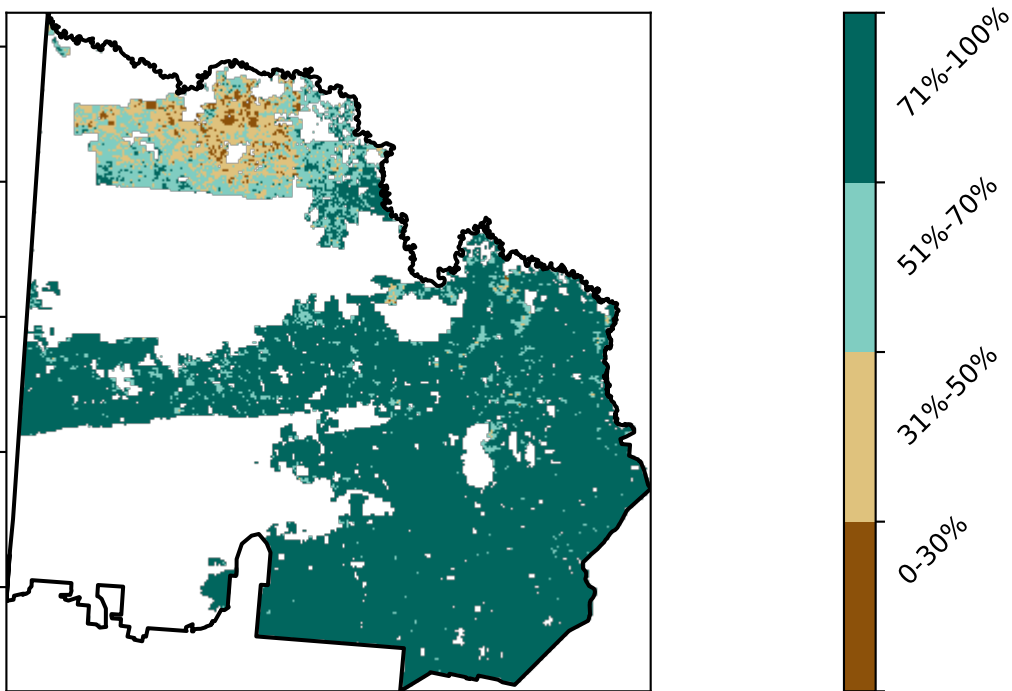### Proportion of the area protected from water erosion (Total Vegetation Cover > 70%)



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

# Agriculture

## Land use and forest cover

Catchment Scale Land Use and Forests of Australia (2018) Derived from Catchment Scale Land Use of Australia (2018) and Forests of Australia (2018)
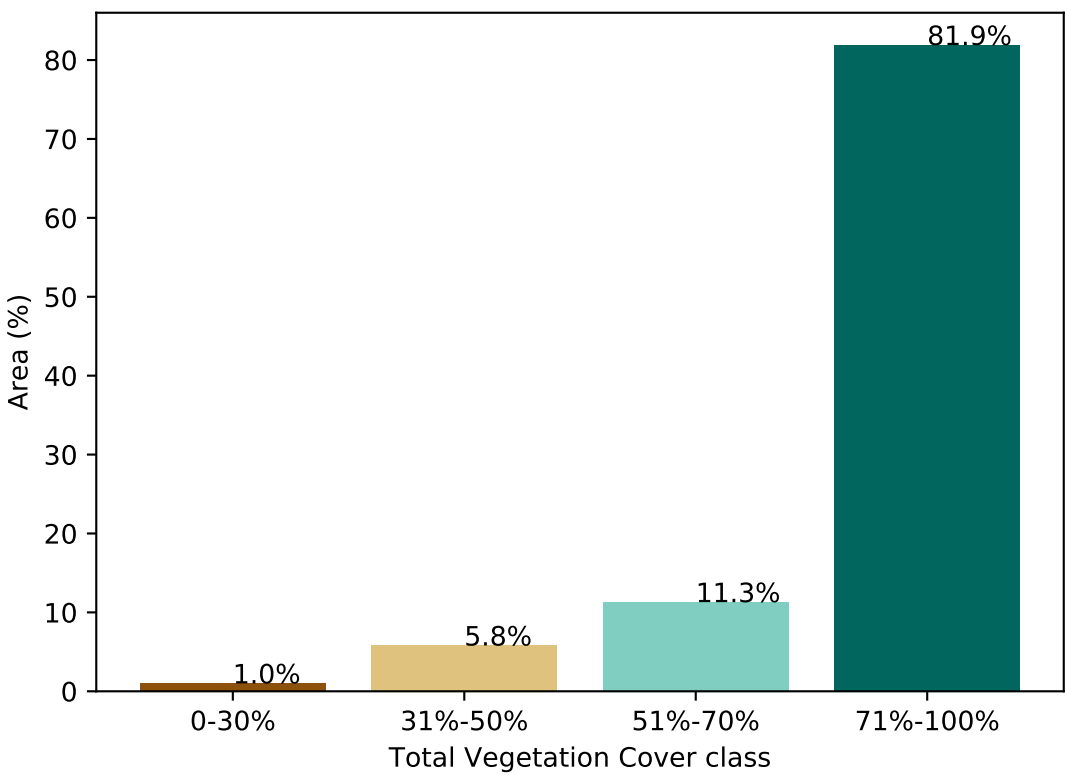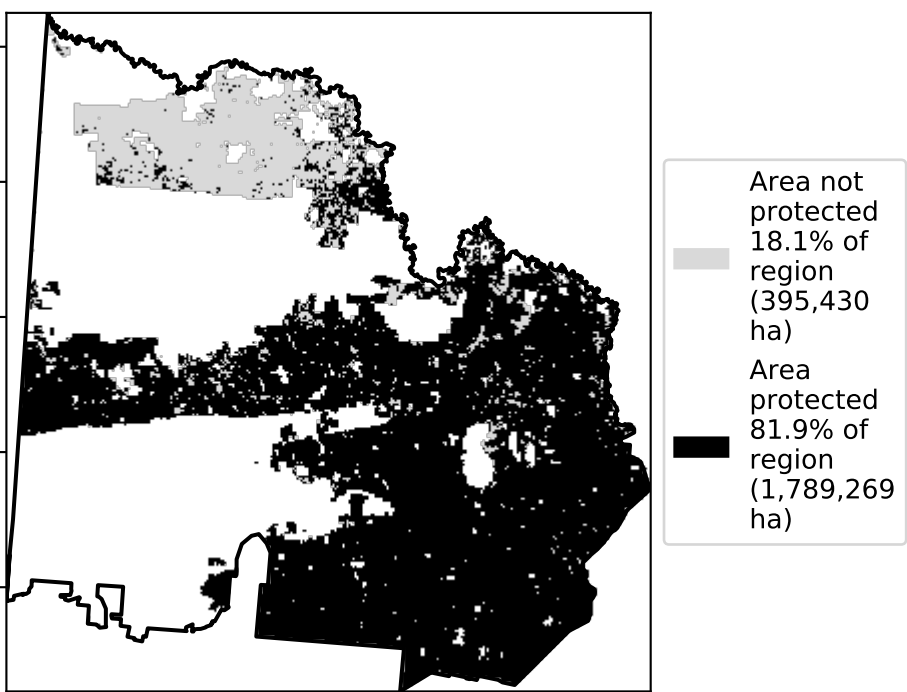
1 Agriculture - Grazing - Non forest
2 Agriculture - Grazing - Woodland forest
3 Agriculture - Grazing - Non-woodland forest
4 Agriculture - Grazing - Irrigated
5 Agriculture - Cropping - Non-irrigated
6 Agriculture - Cropping - Irrigated
7 Agriculture - Horticulture - Non-irrigated
8 Agriculture - Horticulture - Irrigated

## Proportion of each land class in area

## Total Vegetation Cover [%]

71%-100%
51%-70%
31%-50%
0-30%

## Proportion of vegetation cover class in area

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

Area not protected 18.1% of region (395,430 ha)

Area protected 81.9% of region (1,789,269 ha)

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

Area not protected 7.0% of region (152,929 ha)
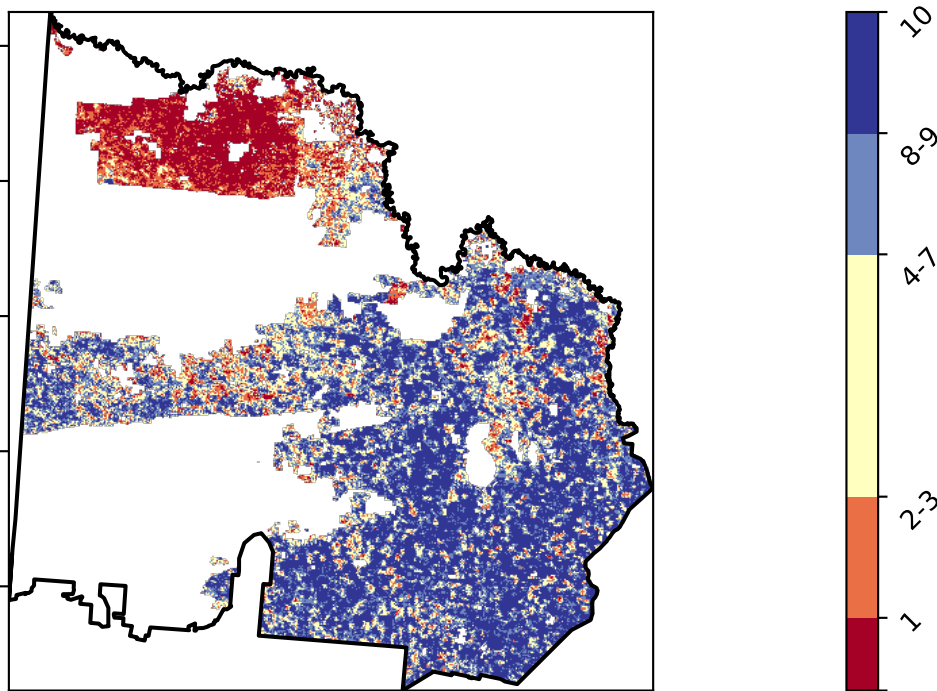
Area protected 93.0% of region (2,031,771 ha)

## 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.

## 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.

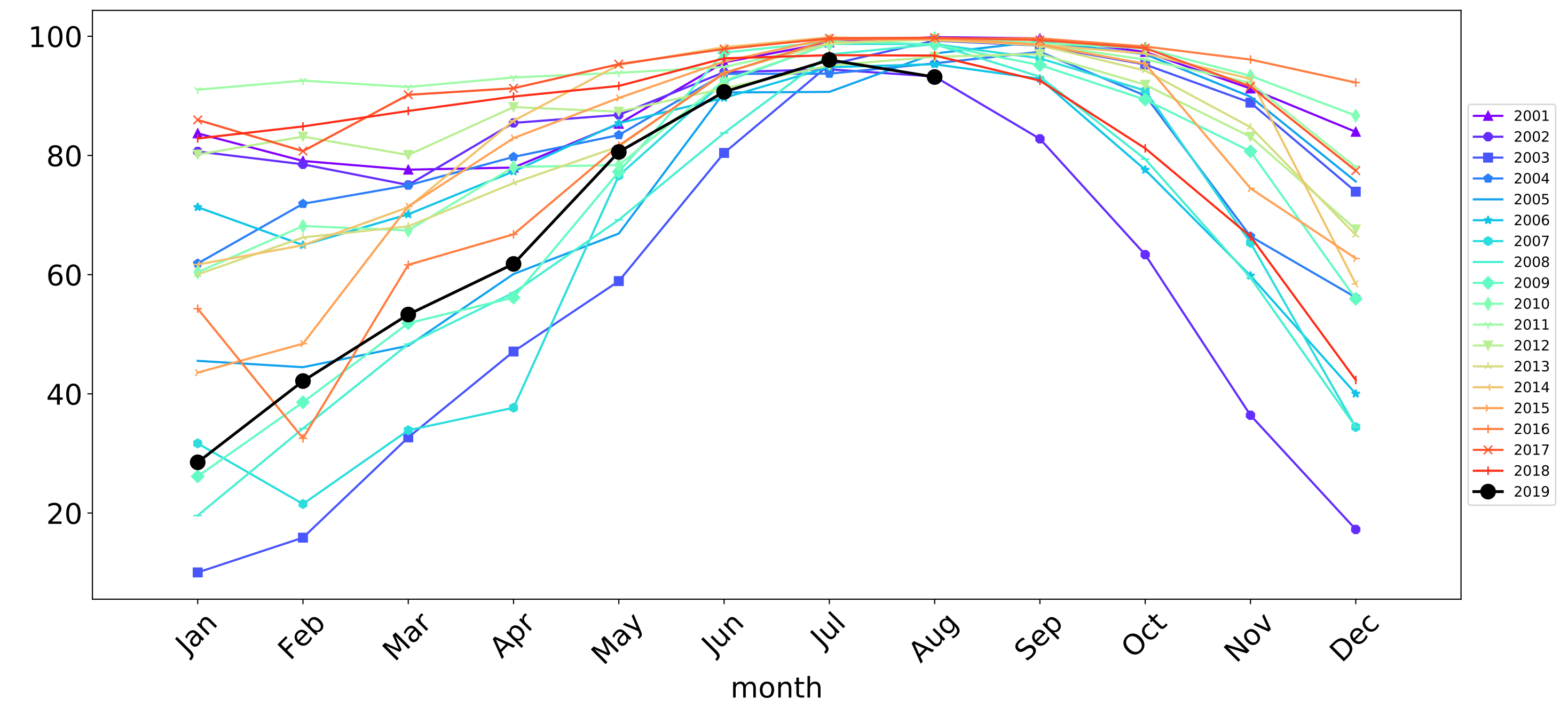CSIRO    TERN    Australian Government    National Landcare Programme    NSW GOVERNMENT    Planning, Industry & Environment
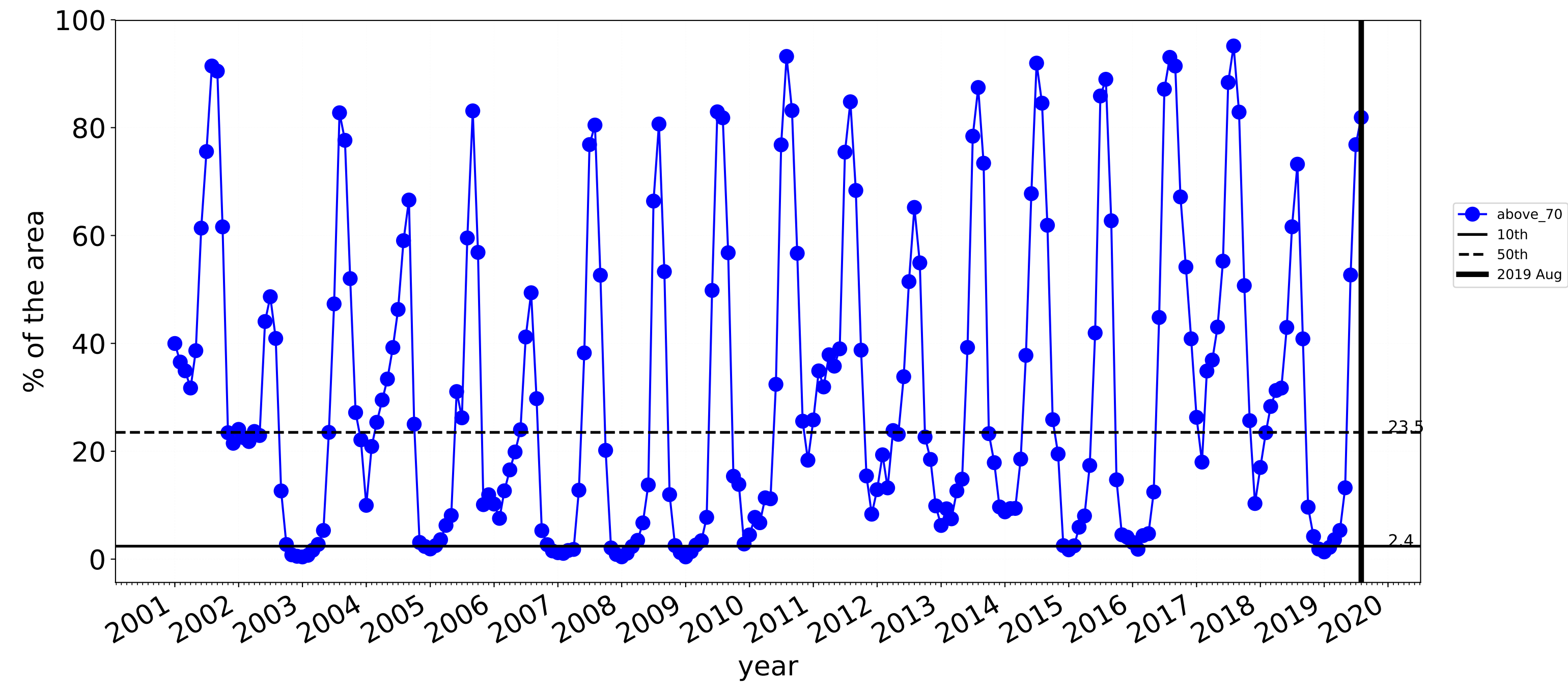
10

# Agriculture timeseries

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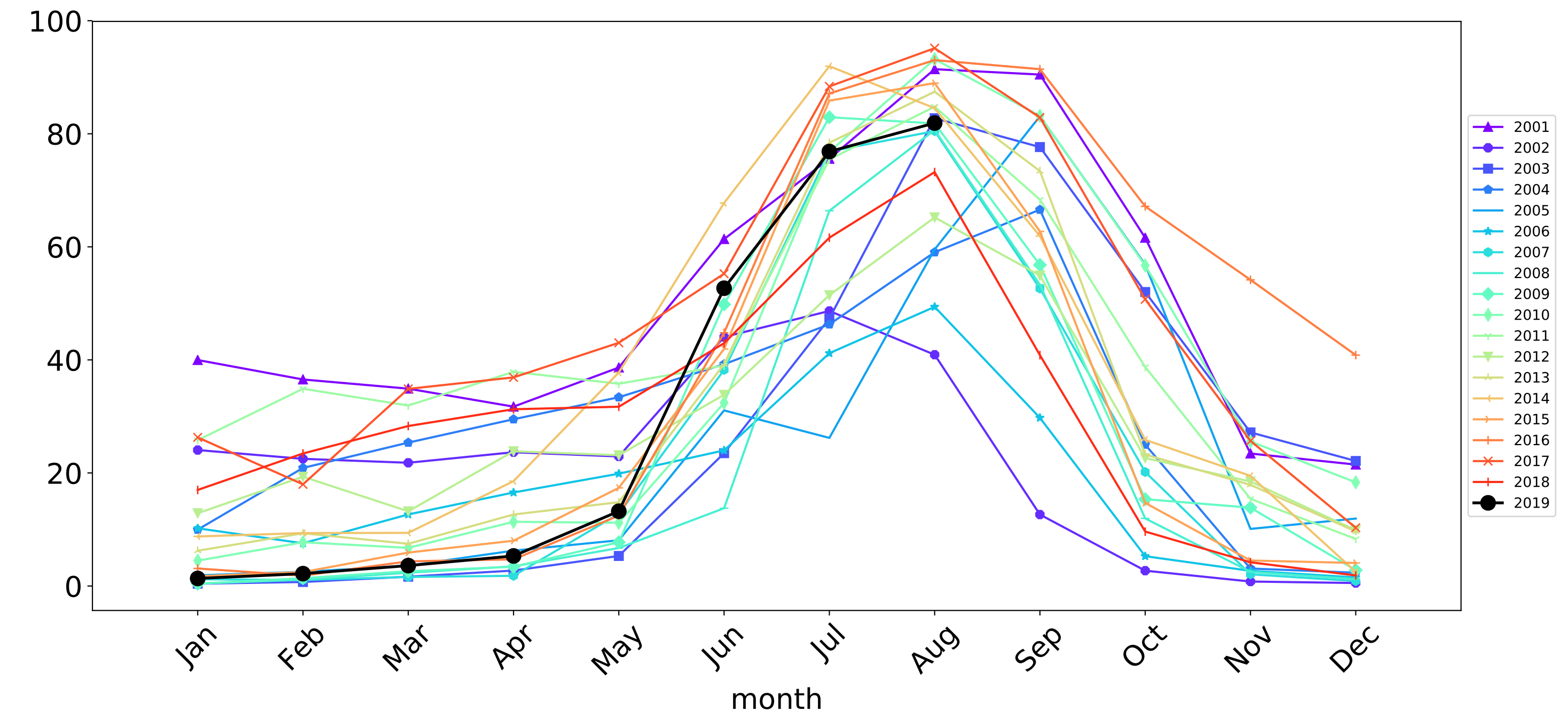


### Wind erosion historical monthly area protected (Total Veg Cov >50%)



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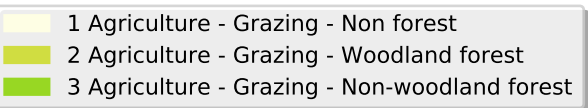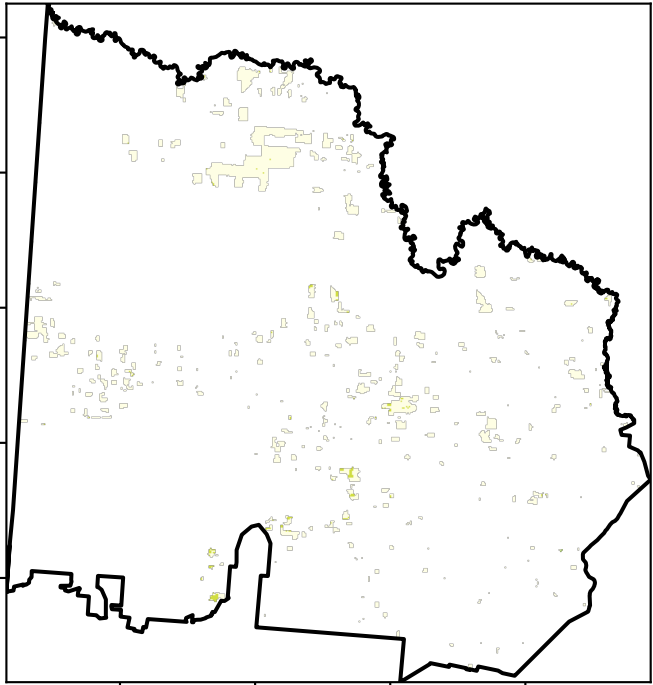


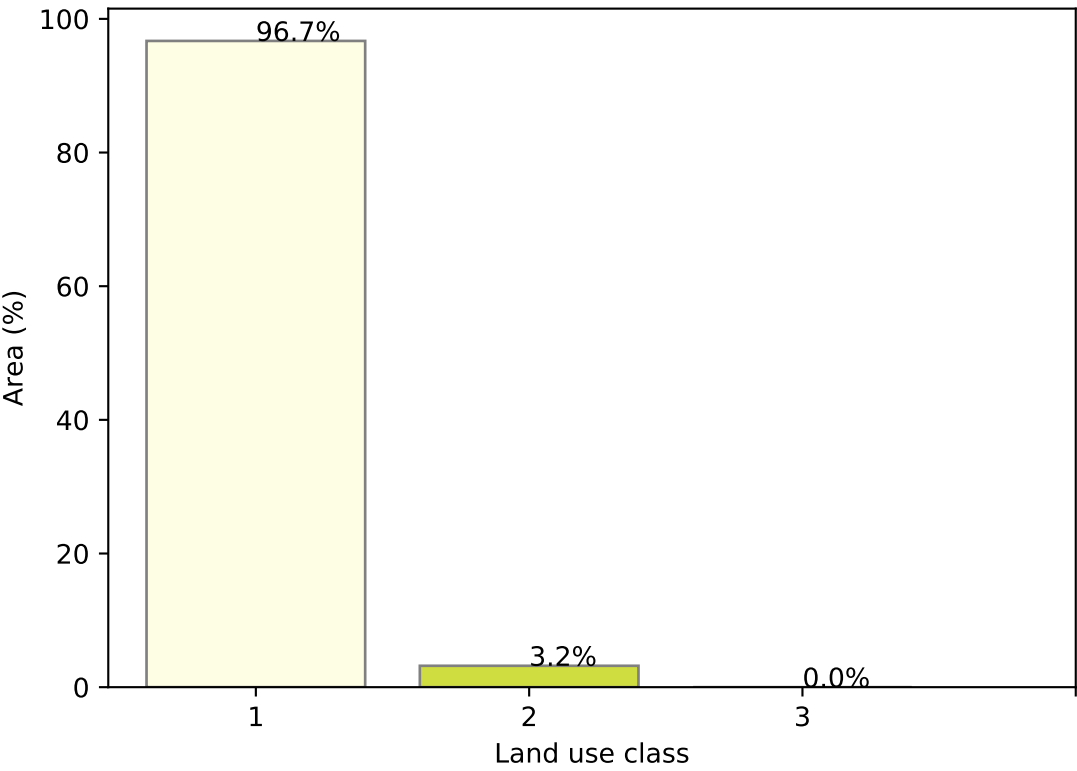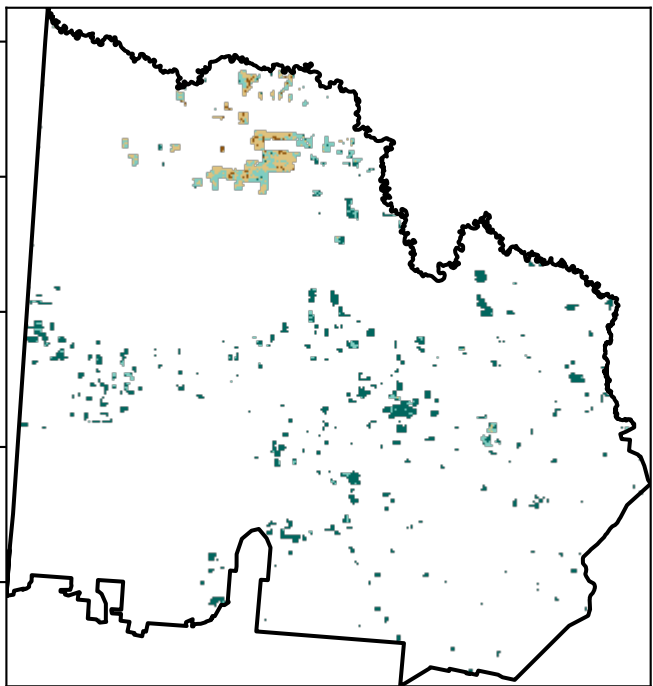### Water erosion historical monthly area protected (Total Veg Cov>70%)

# Grazing

## Land use and forest cover

1 Agriculture - Grazing - Non forest
2 Agriculture - Grazing - Woodland forest
3 Agriculture - Grazing - Non-woodland forest

## Proportion of each land class in area

96.7%
3.2%
0.0%

## Total Vegetation Cover [%]

71%-100%
51%-70%
31%-50%
0-30%

## Proportion of vegetation cover class in area

56.7%
23.5%
17.5%
2.3%

0-30%  31%-50%  51%-70%  71%-100%
Total Vegetation Cover class

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

Area not protected 43.3% of region (65,177 ha)

Area protected 56.7% of region (85,347 ha)

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

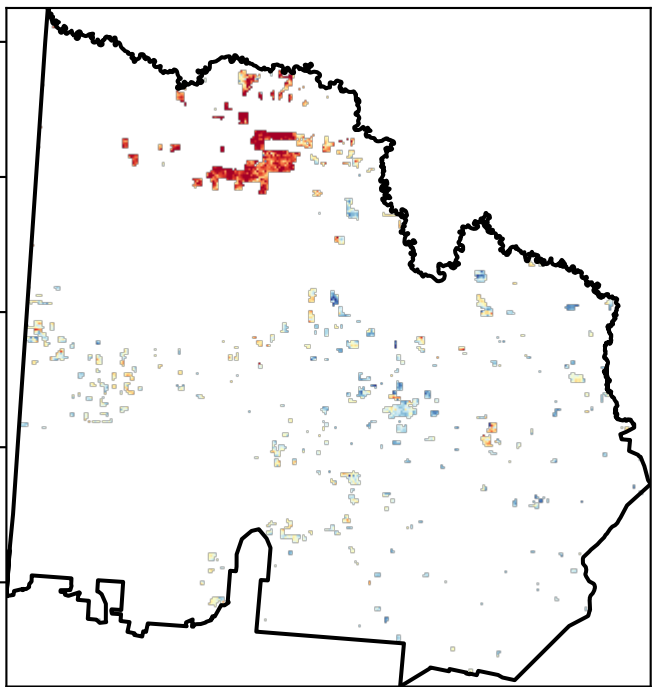Area not protected 20.0% of region (30,105 ha)
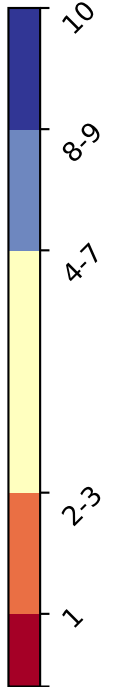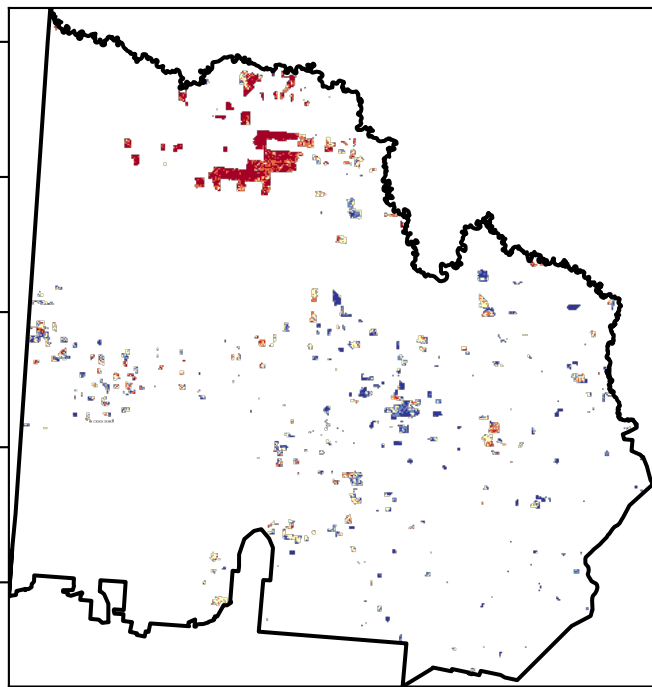
Area protected 80.0% of region (120,420 ha)

## 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.

## 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.
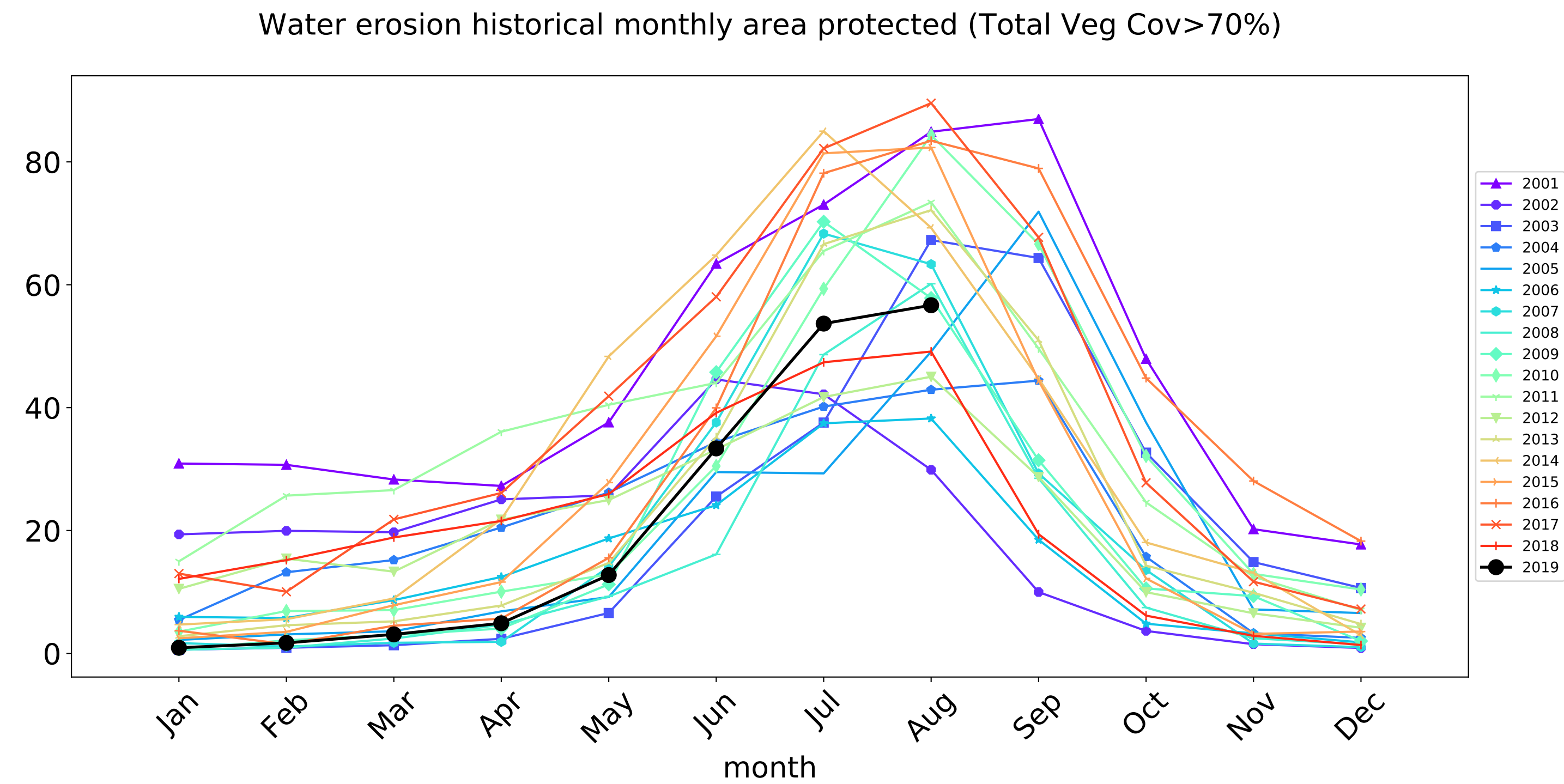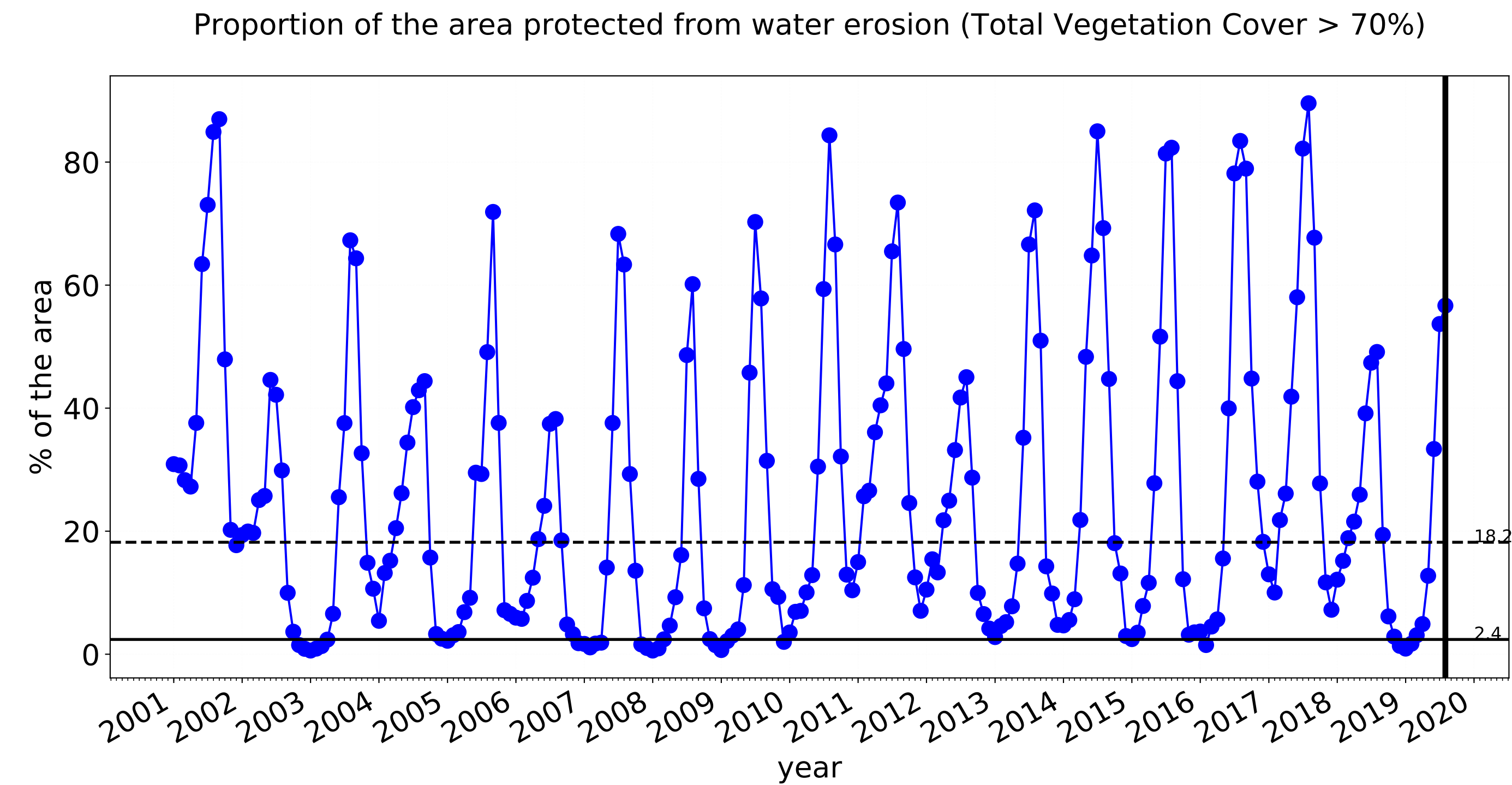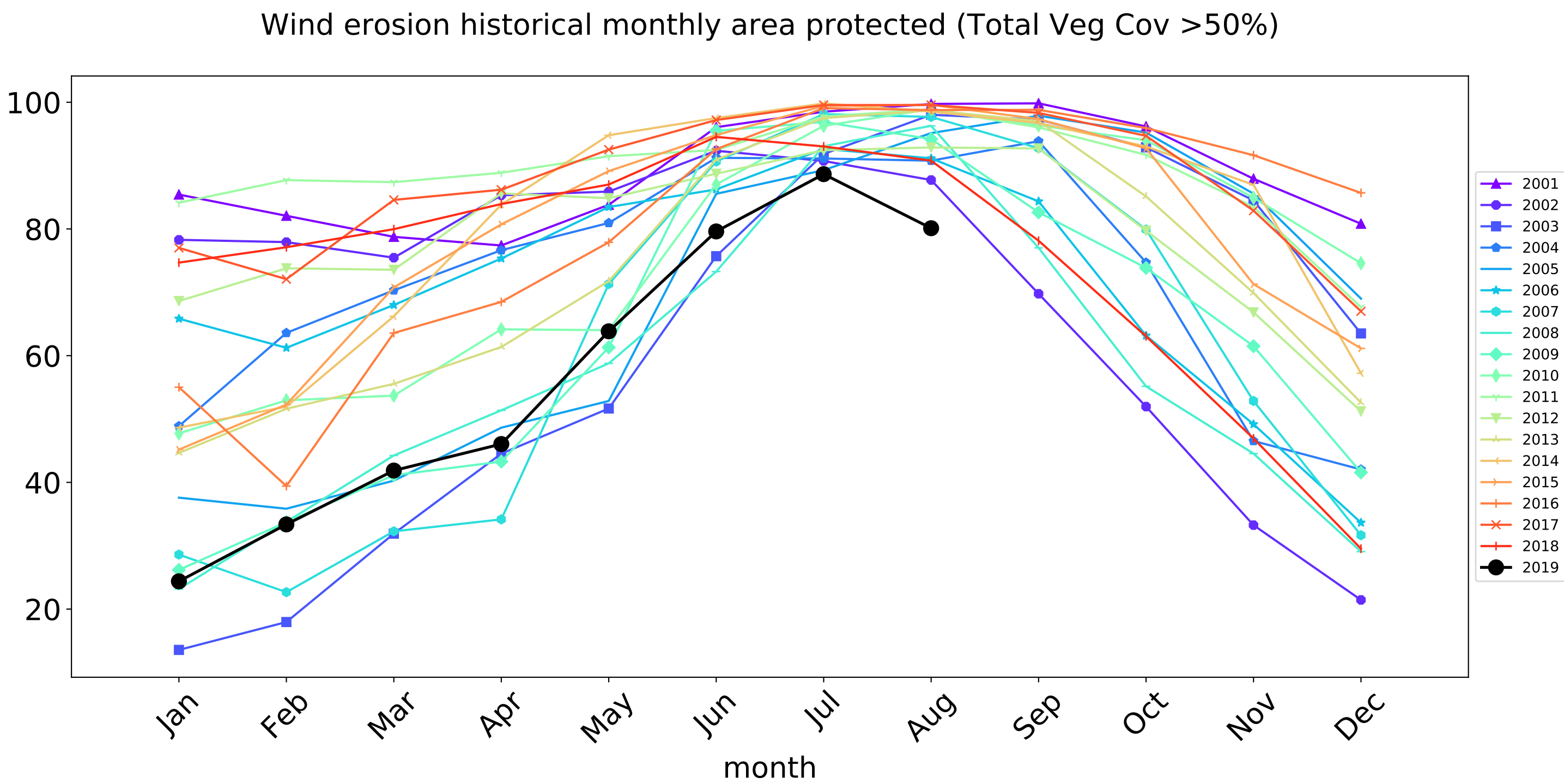
10
8-9
4-7
2-3
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# Grazing timeseries

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



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



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



### Water erosion historical monthly area protected (Total Veg Cov>70%)
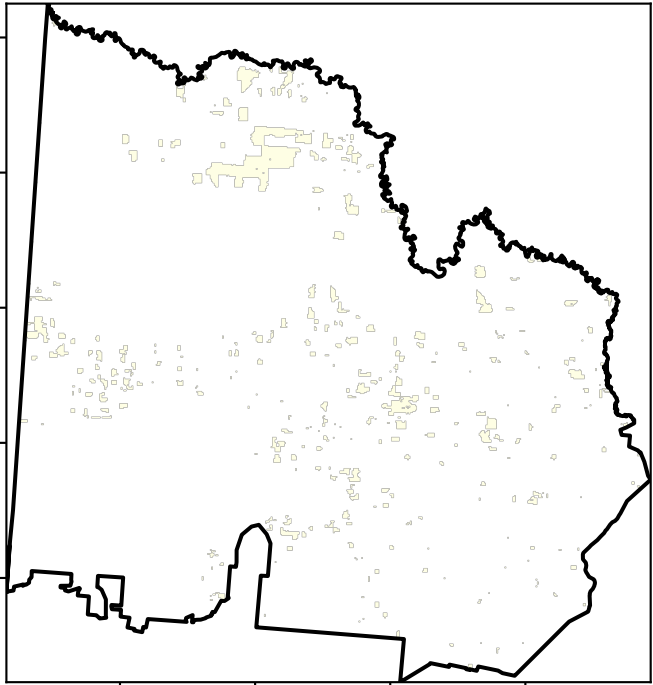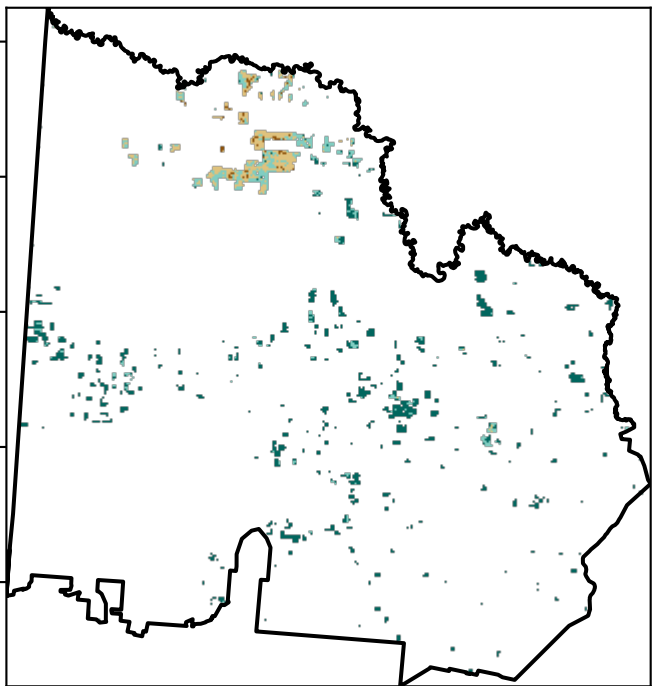
# Grazing non forest

## Land use and forest cover

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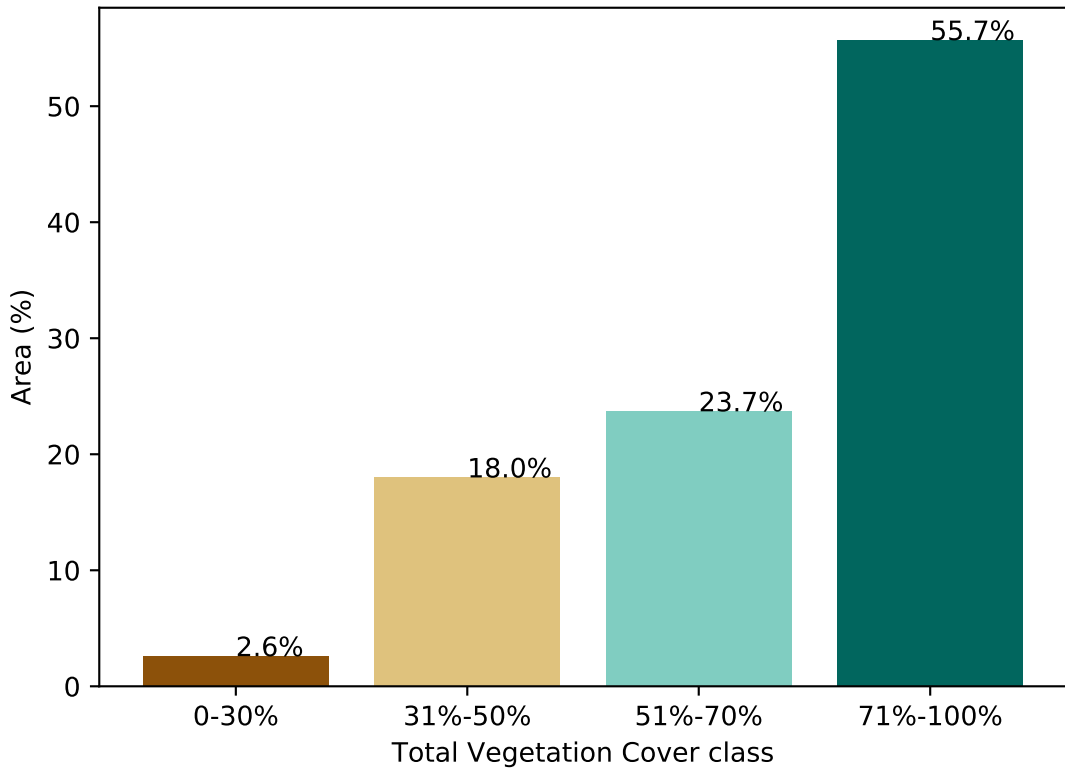Use of Australia
(2018) and Forests
of Australia (2018)

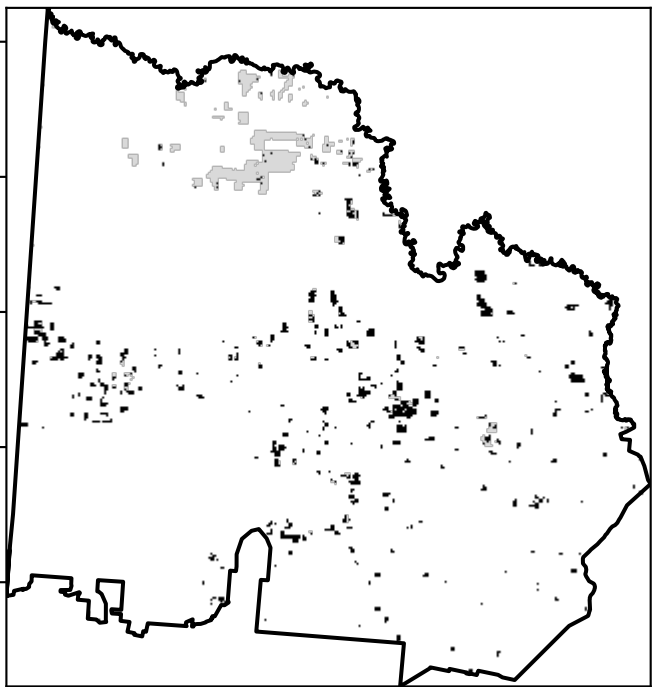1 Agriculture - Grazing - Non forest

## Total Vegetation Cover [%]

71%-100%

51%-70%

31%-50%

0-30%

## Proportion of vegetation cover class in area

55.7%

23.7%

18.0%

2.6%

Area (%)

0-30%    31%-50%    51%-70%    71%-100%
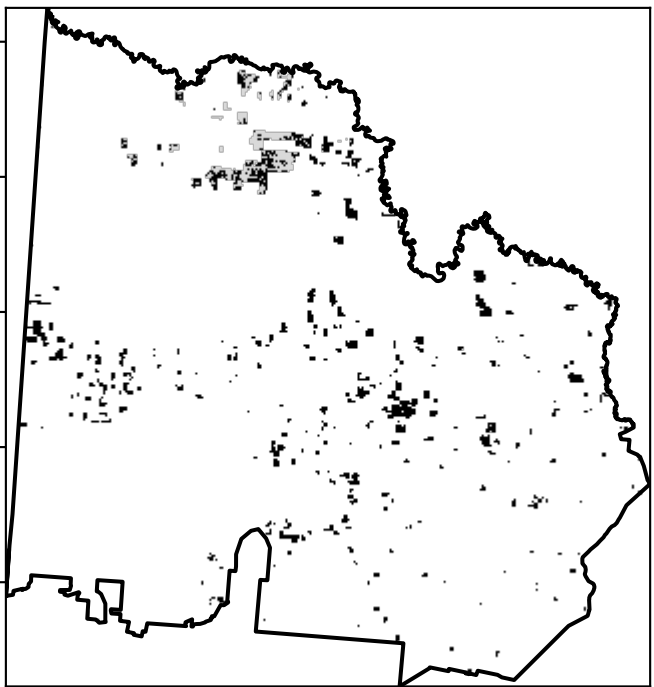Total Vegetation Cover class

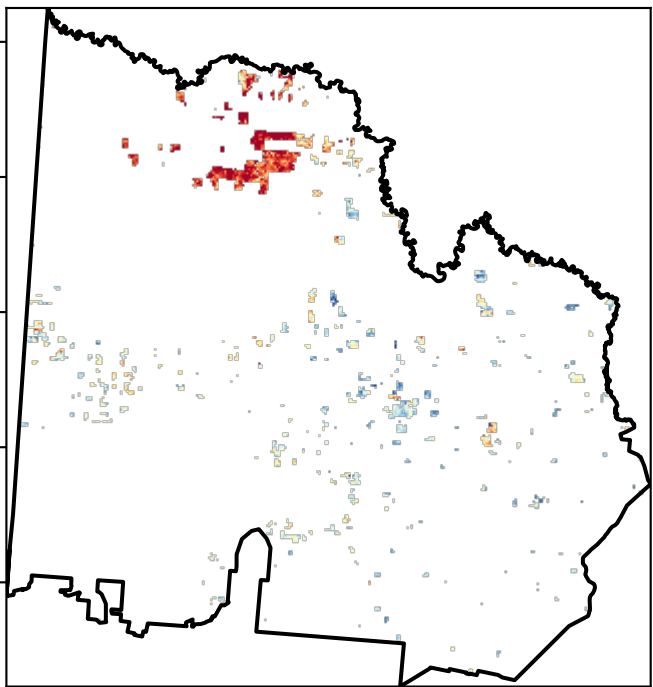## % Area protected from water erosion (>70%)

Area not
protected
44.3% of
region
(64,500
ha)

Area
protected
55.7% of
region
(81,099
ha)

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

Area not
protected
21.0% of
region
(30,576
ha)

Area
protected
79.0% of
region
(115,024
ha)

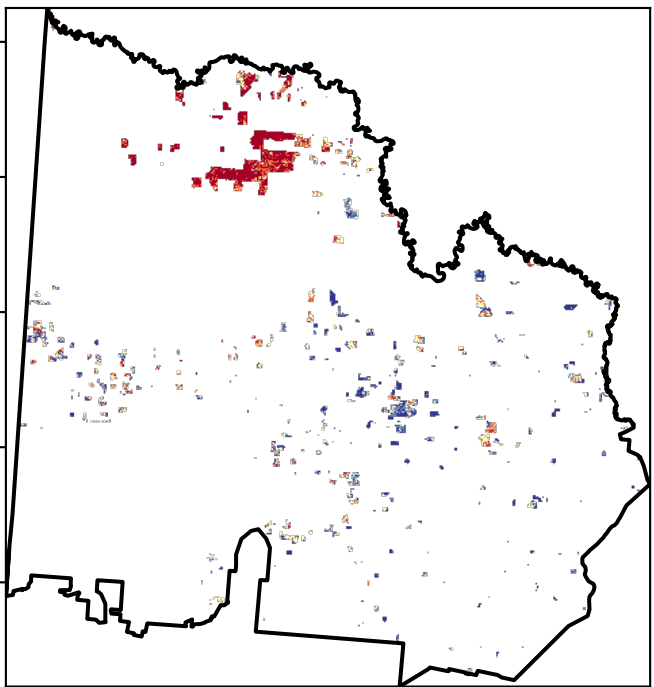## Total Vegetation Cover Anomaly [%]

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.

## 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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8-9

4-7

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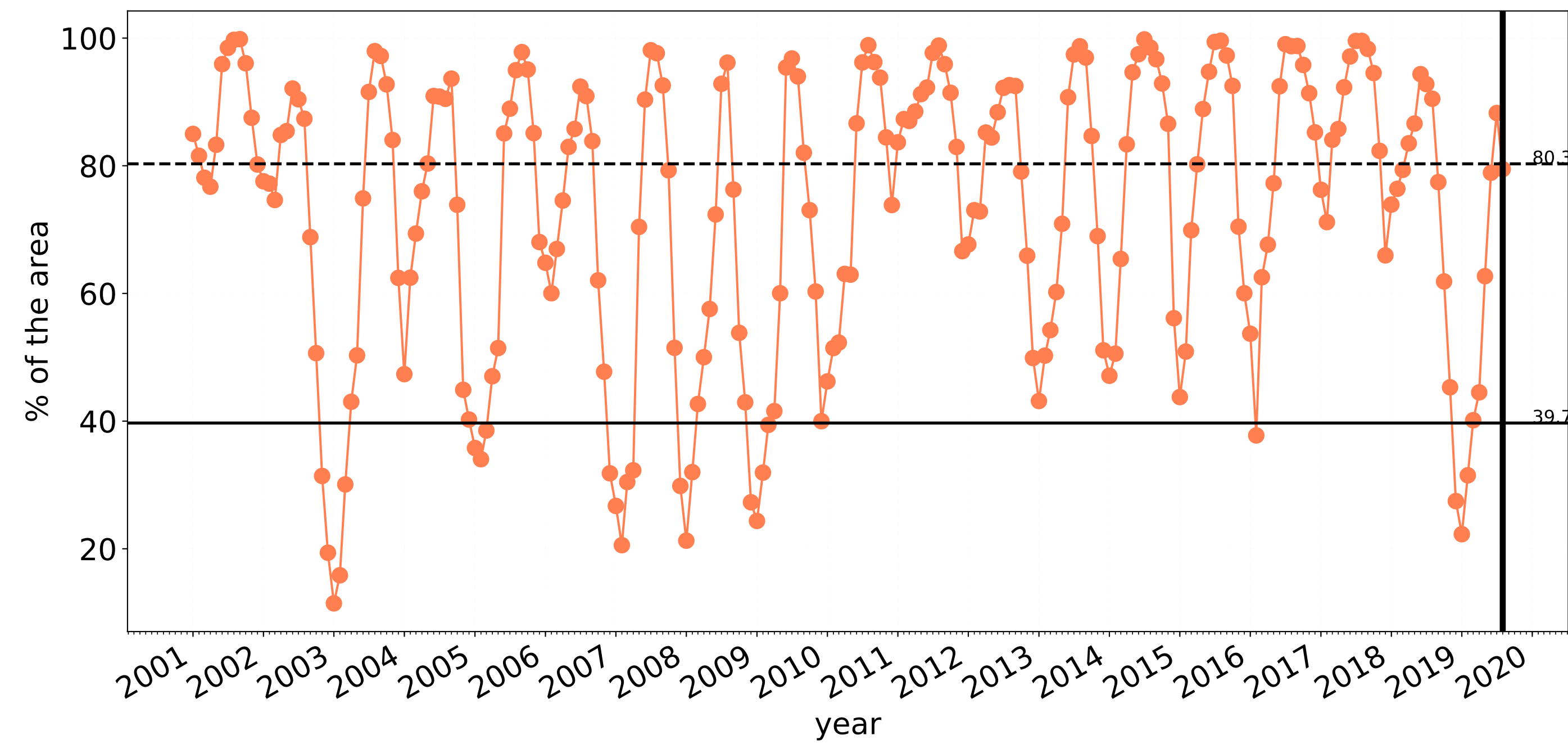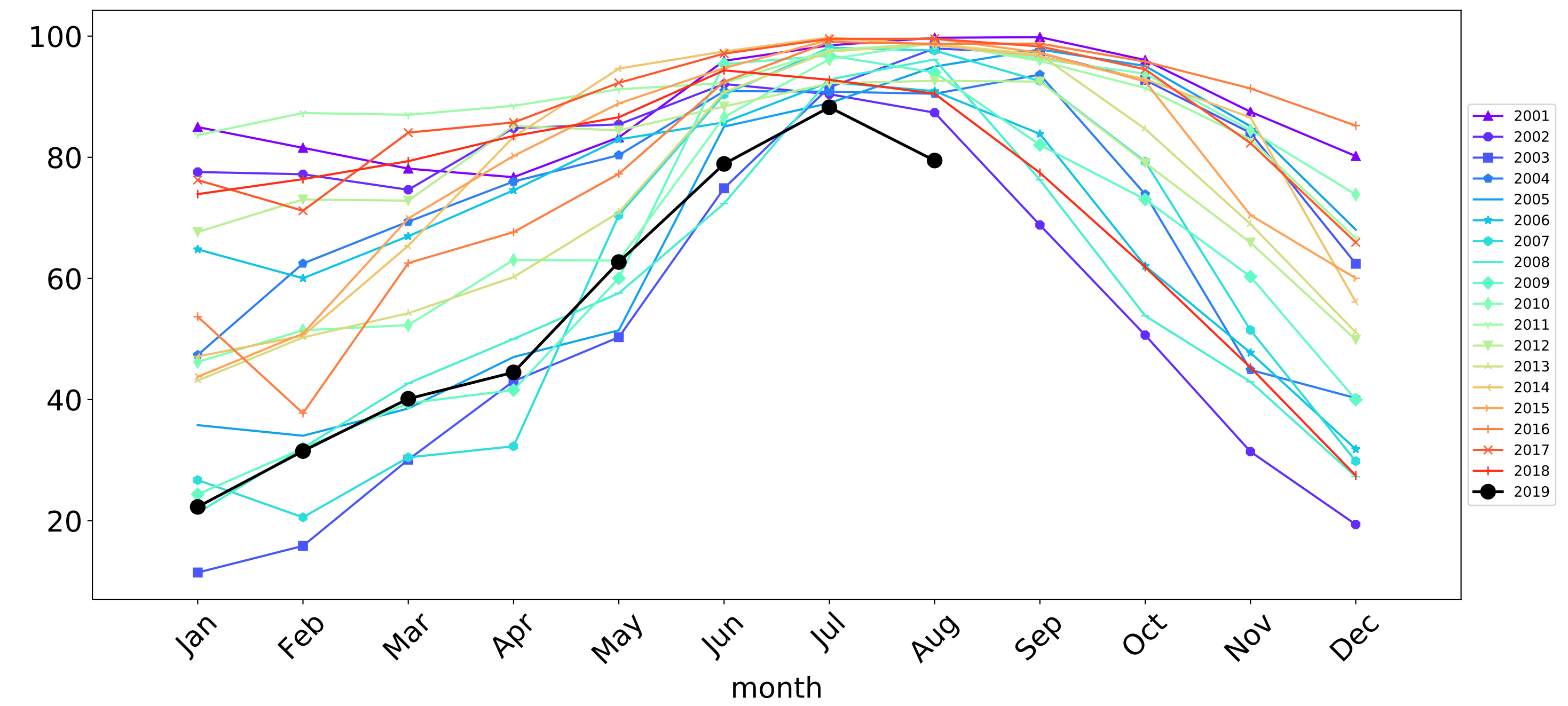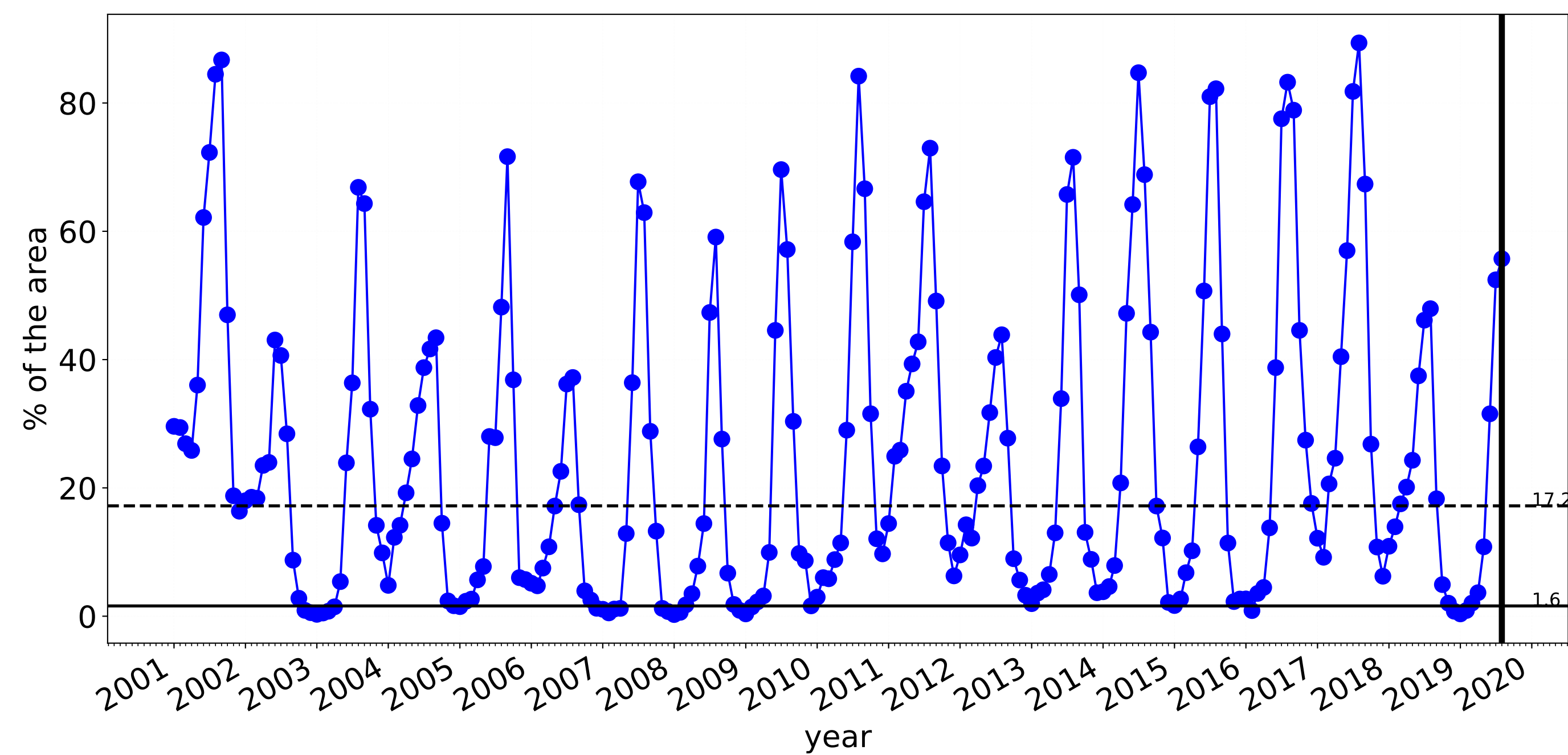
# Grazing non forest timeseries

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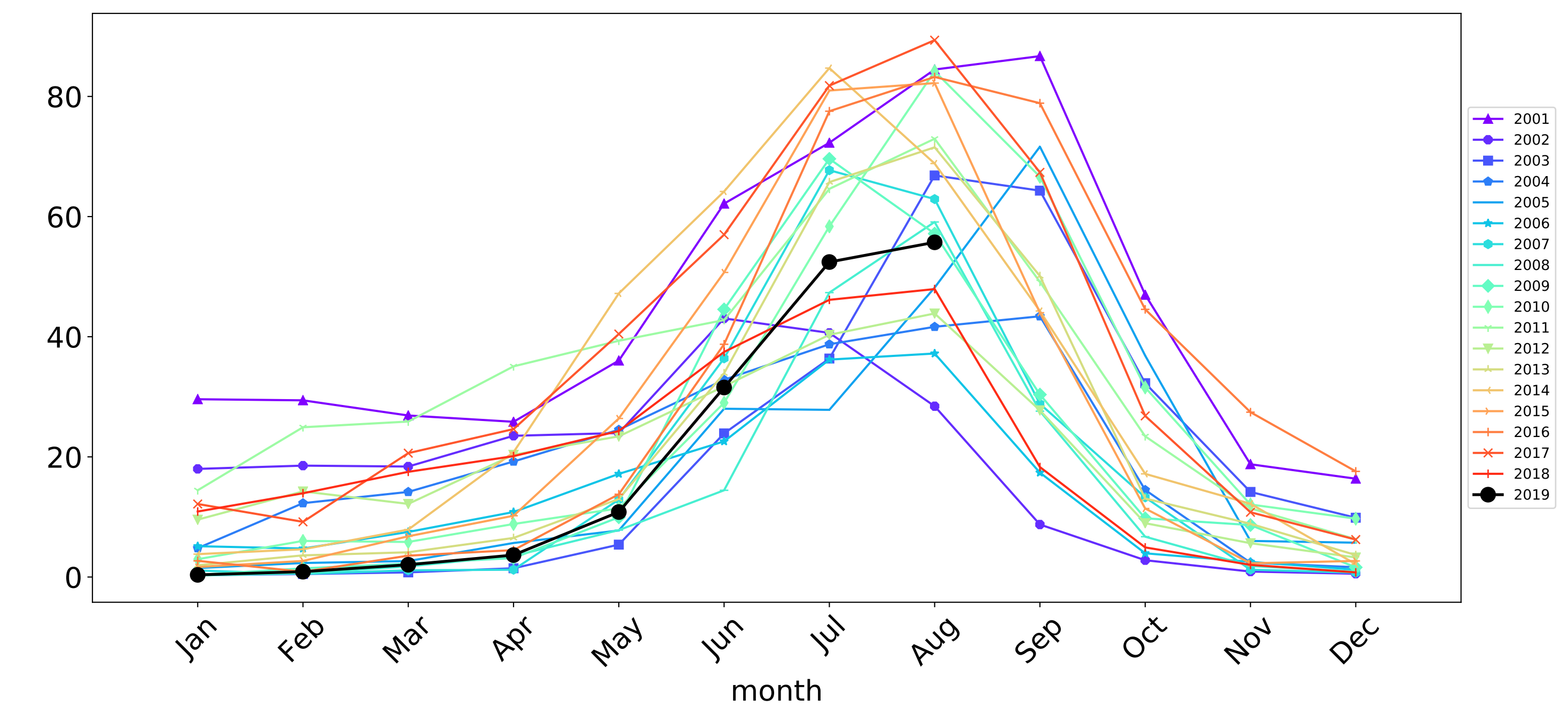


## Wind erosion historical monthly area protected (Total Veg Cov >50%)



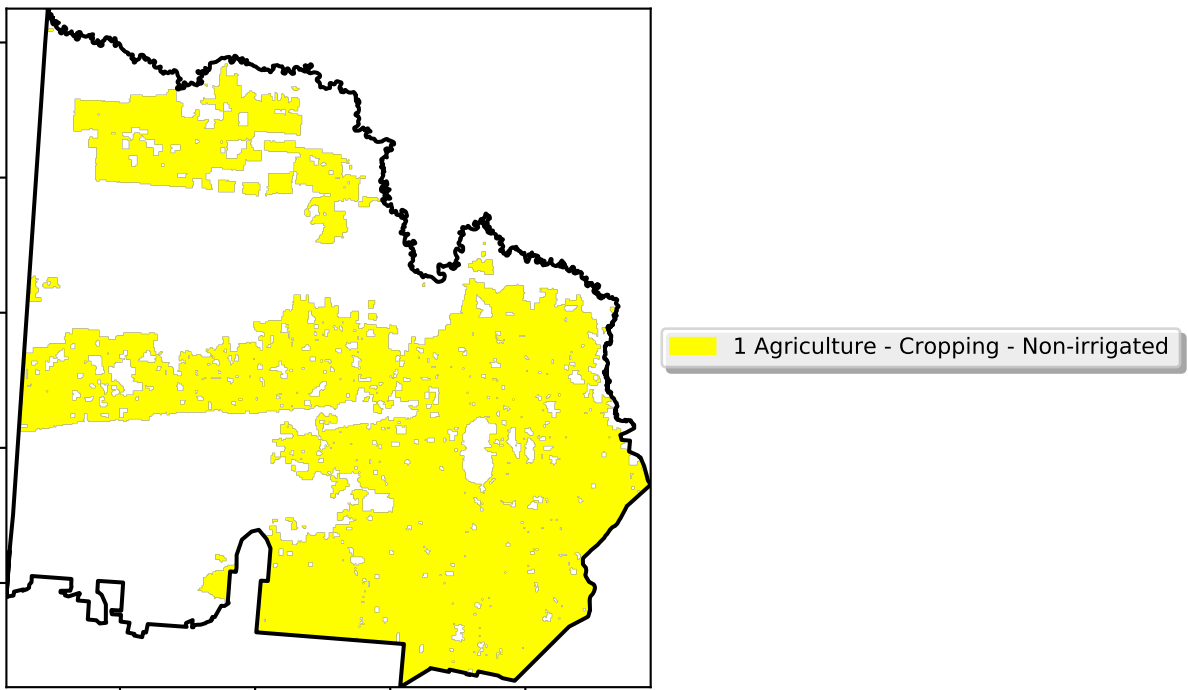## Proportion of the area protected from water erosion (Total Vegetation Cover > 70%)



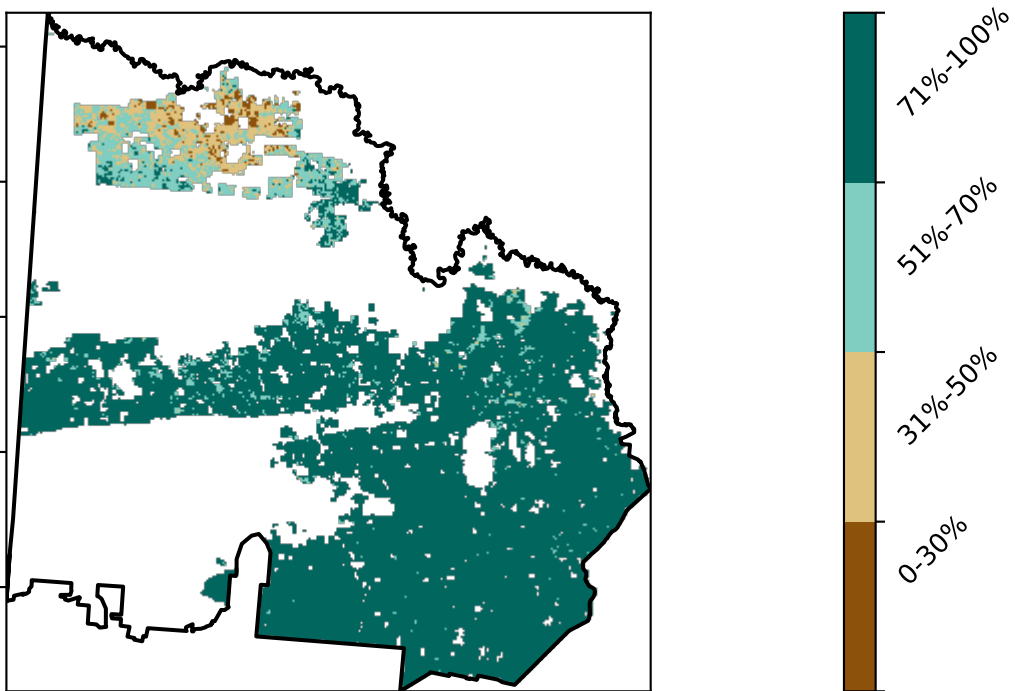## Water erosion historical monthly area protected (Total Veg Cov>70%)
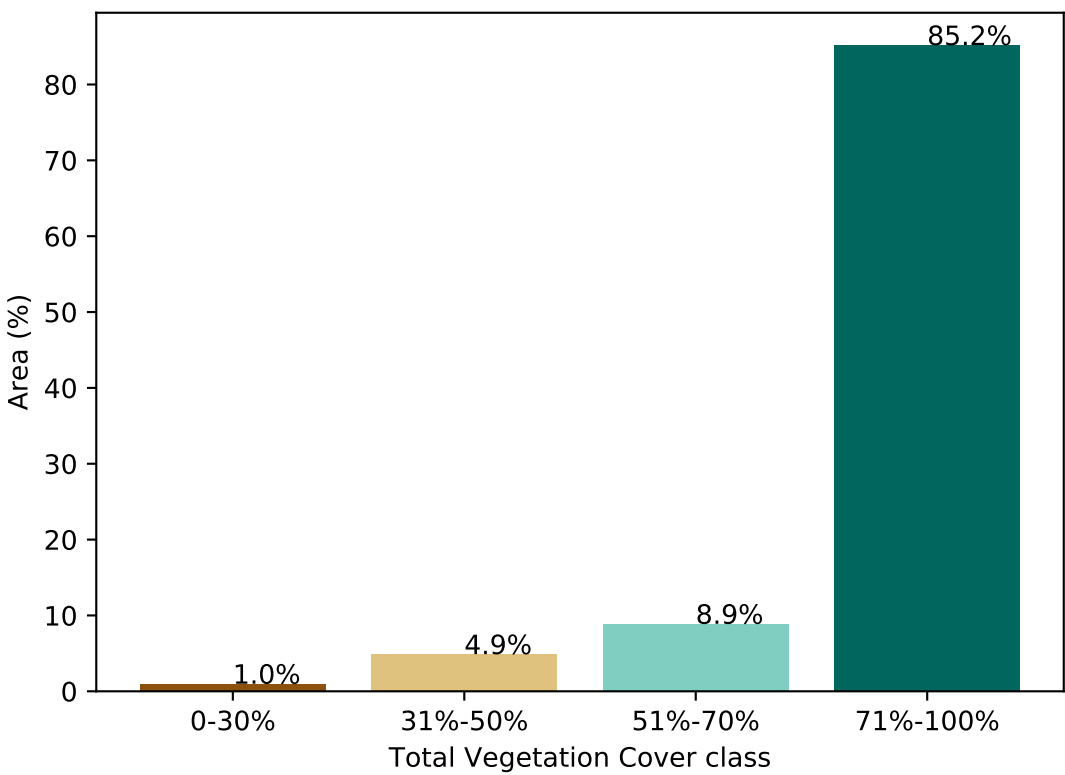
# Cropping

## Land use and forest cover

Catchment Scale Land Use and Forests of Australia (2018) Derived from Catchment Scale Land Use of Australia (2018) and Forests of Australia (2018)
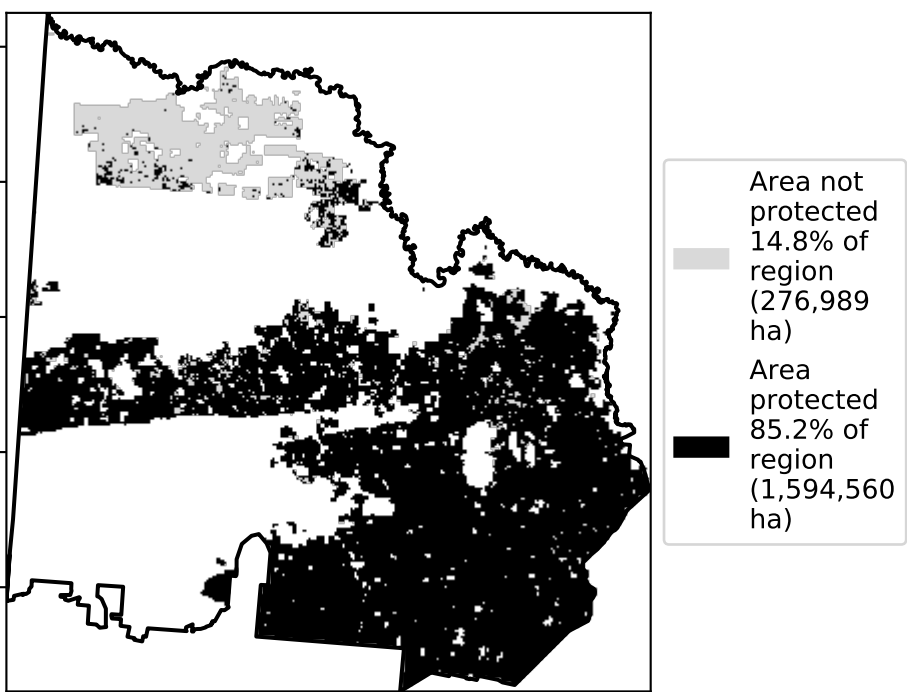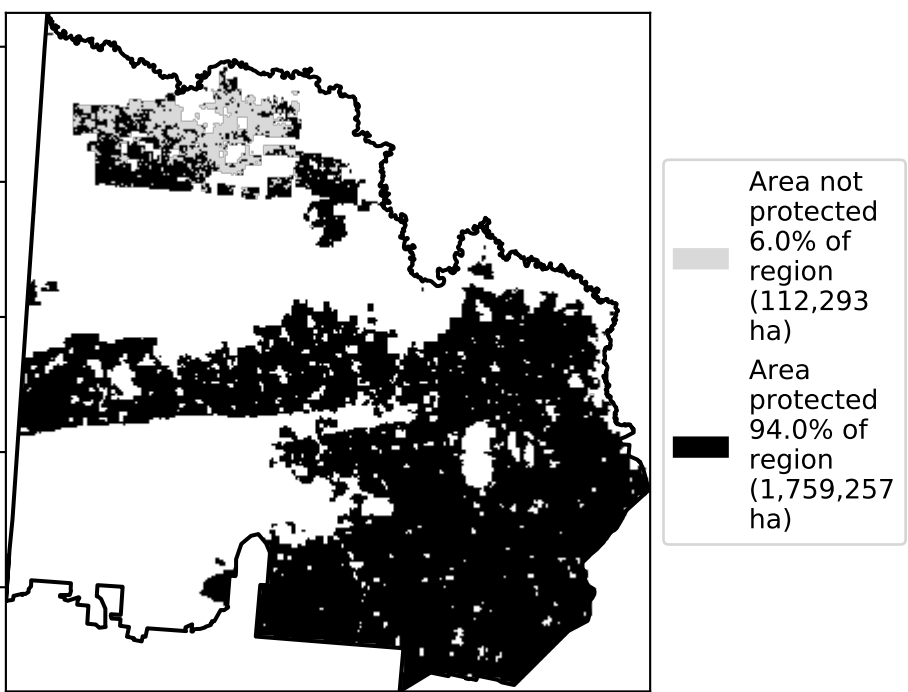
1 Agriculture - Cropping - Non-irrigated

## Total Vegetation Cover [%]

71%-100%
51%-70%
31%-50%
0-30%

## Proportion of vegetation cover class in area

85.2%
1.0%
4.9%
8.9%

Area (%)

0-30%   31%-50%   51%-70%   71%-100%
Total Vegetation Cover class

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

Area not protected 14.8% of region (276,989 ha)

Area protected 85.2% of region (1,594,560 ha)

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

Area not protected 6.0% of region (112,293 ha)
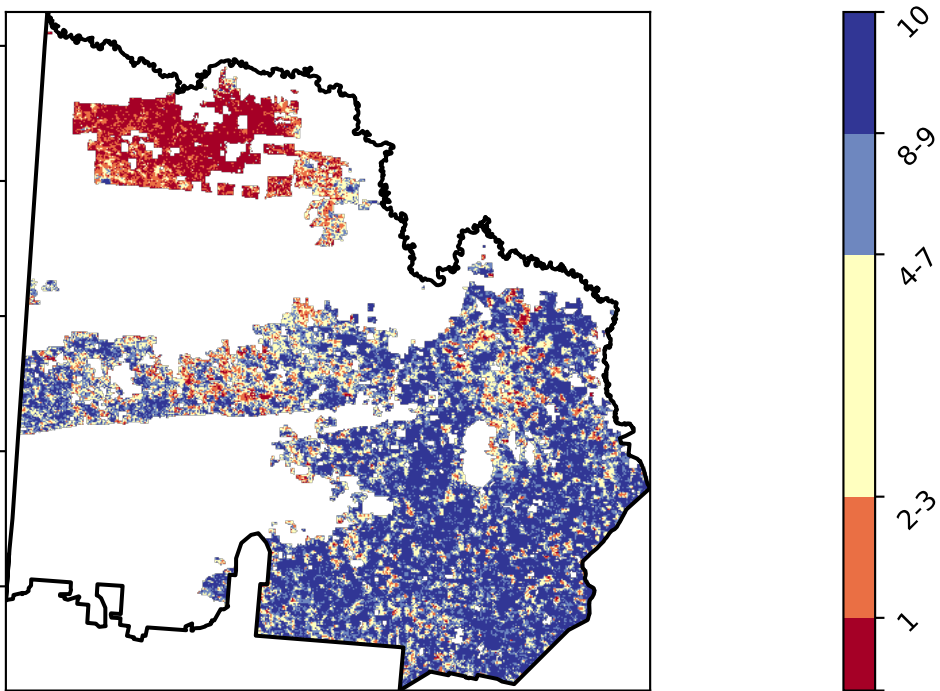
Area protected 94.0% of region (1,759,257 ha)

## 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.

## 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.
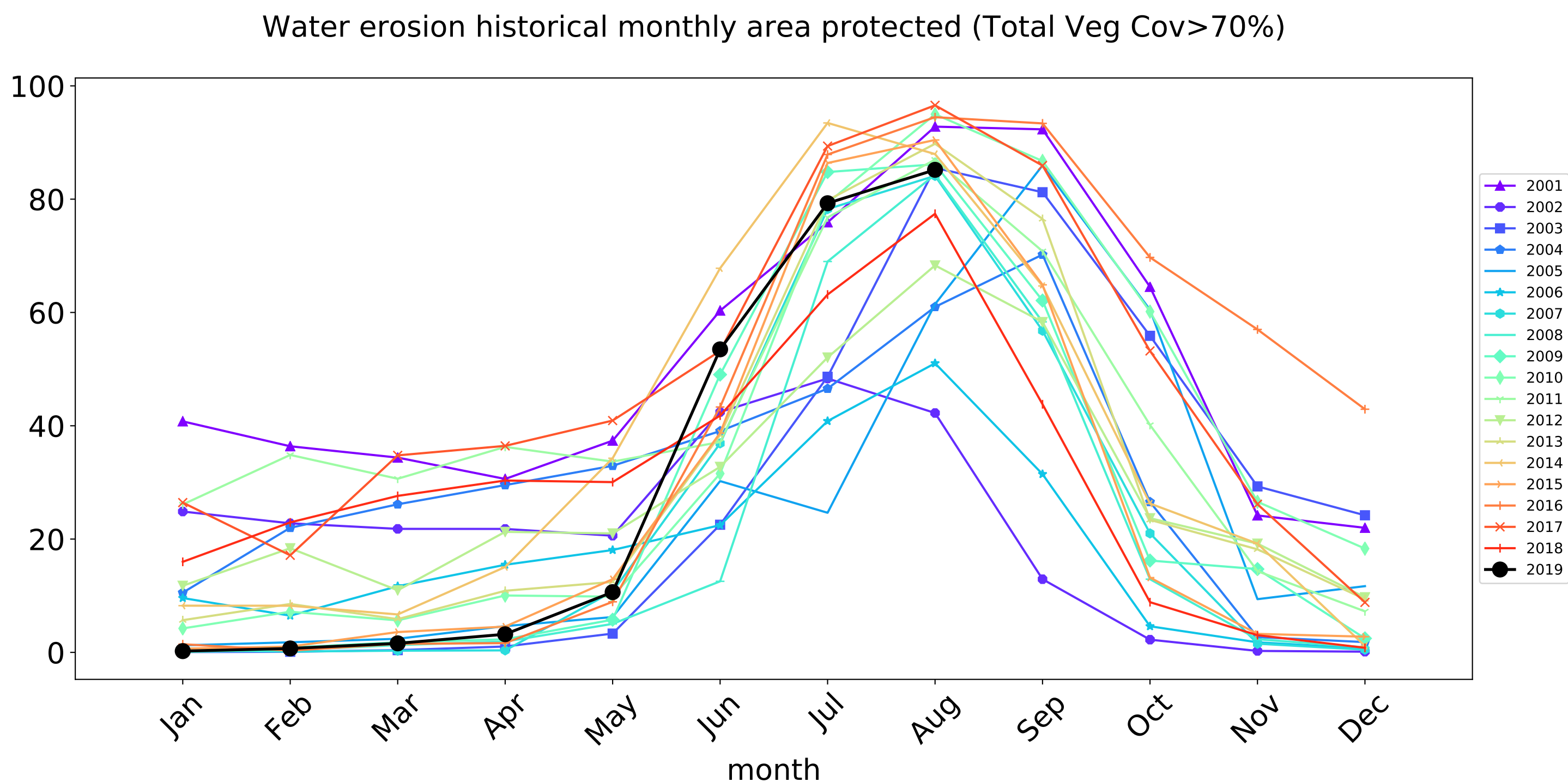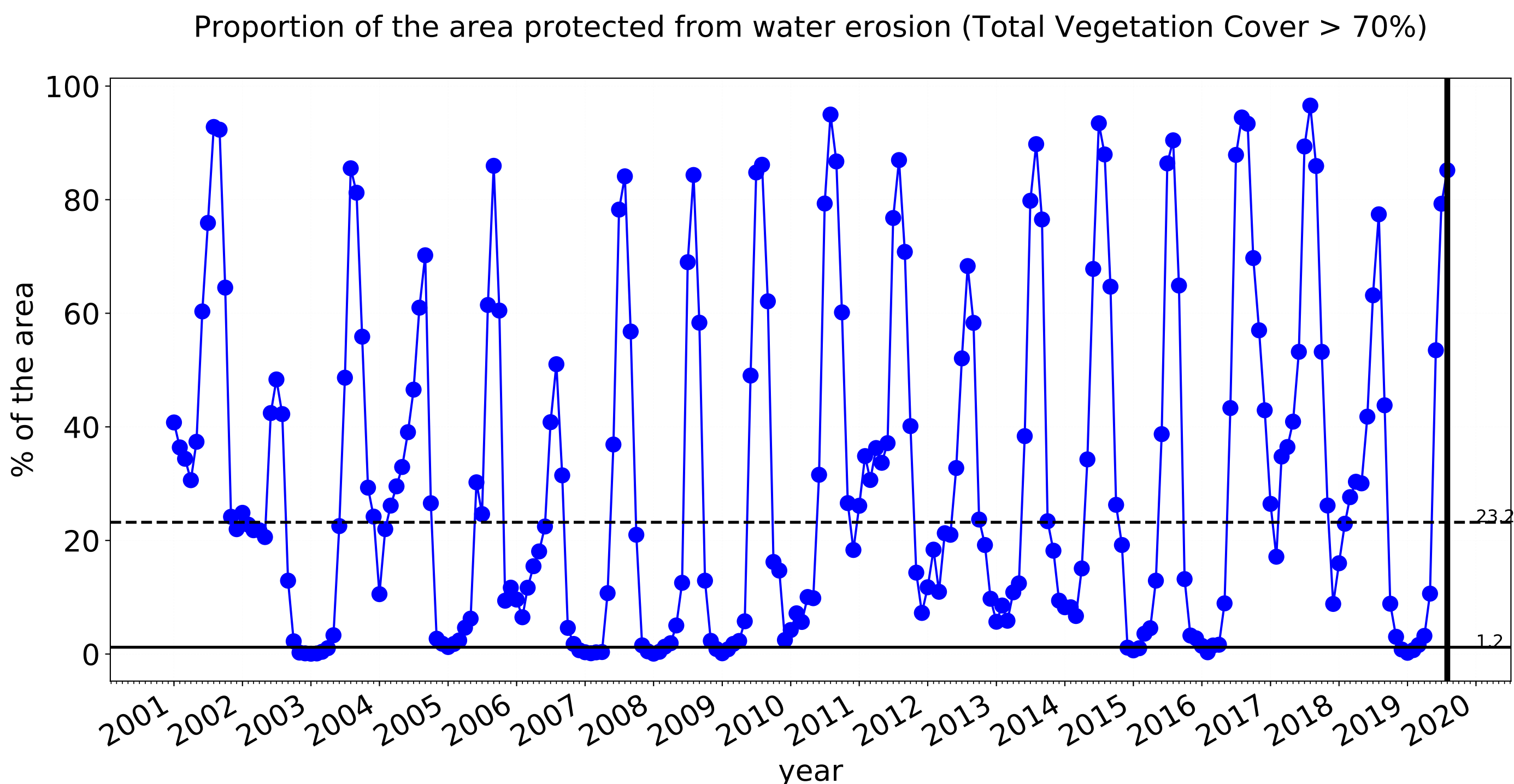
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8-9
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2-3
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# Cropping timeseries



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

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

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

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

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# Irrigation

## Land use and forest cover

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



Legend:
- 1 Agriculture - Grazing - Irrigated
- 2 Agriculture - Cropping - Irrigated
- 3 Agriculture - Horticulture - Irrigated

## Proportion of each land class in area



- 1: 17.8%
- 2: 21.3%
- 3: 60.9%

X-axis: Land use class
Y-axis: Area (%)

## Total Vegetation Cover [%]



Legend:
- 71%-100%
- 51%-70%
- 31%-50%
- 0-30%

## Proportion of vegetation cover class in area



- 0-30%: 0.5%
- 31%-50%: 4.0%
- 51%-70%: 27.3%
- 71%-100%: 68.2%

X-axis: Total Vegetation Cover class
Y-axis: Area (%)

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



Area not protected 31.8% of region (50,323 ha)

Area protected 68.2% of region (107,926 ha)

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



Area not protected 4.0% of region (6,330 ha)

Area protected 96.0% of region (151,920 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.



## 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.
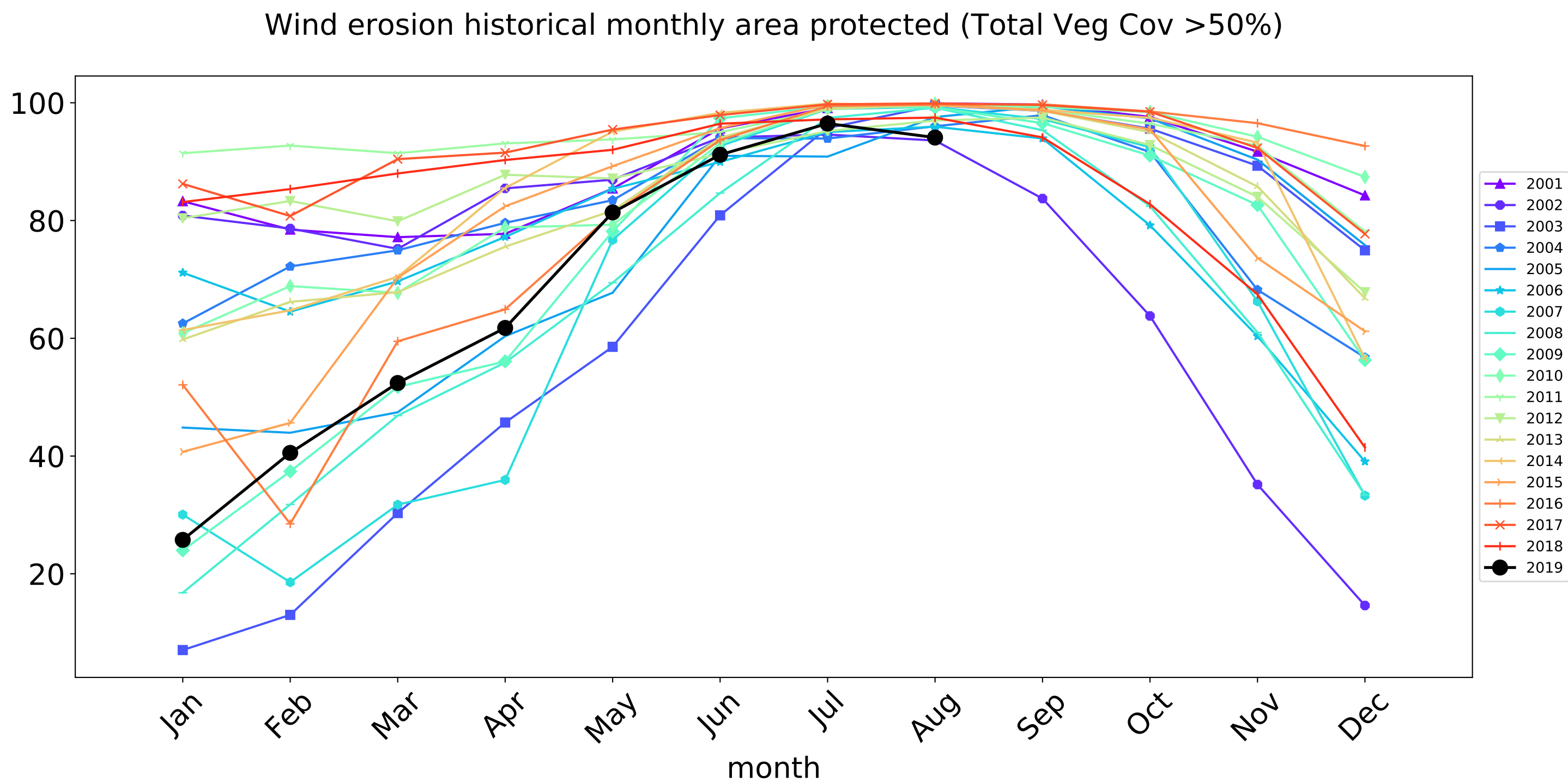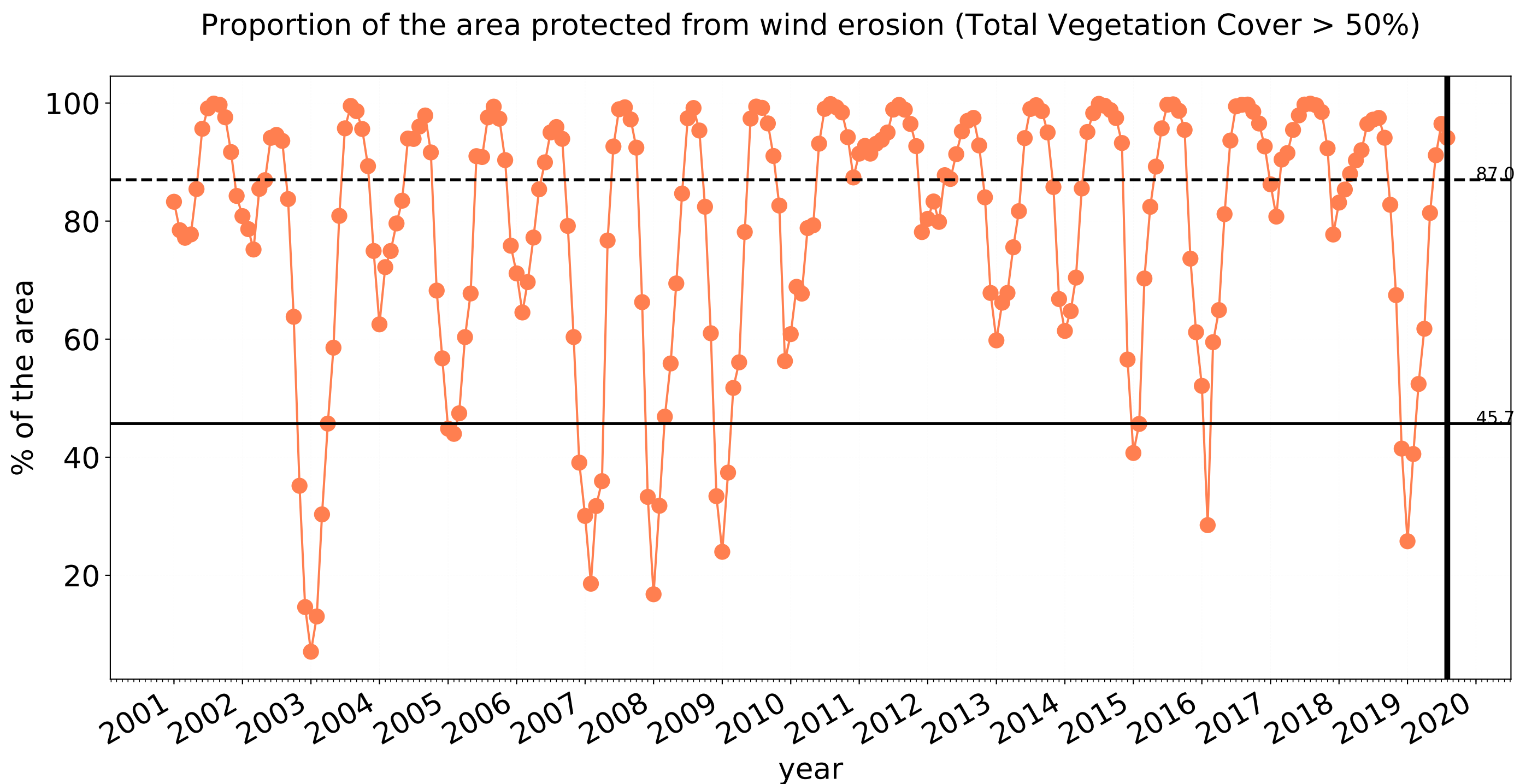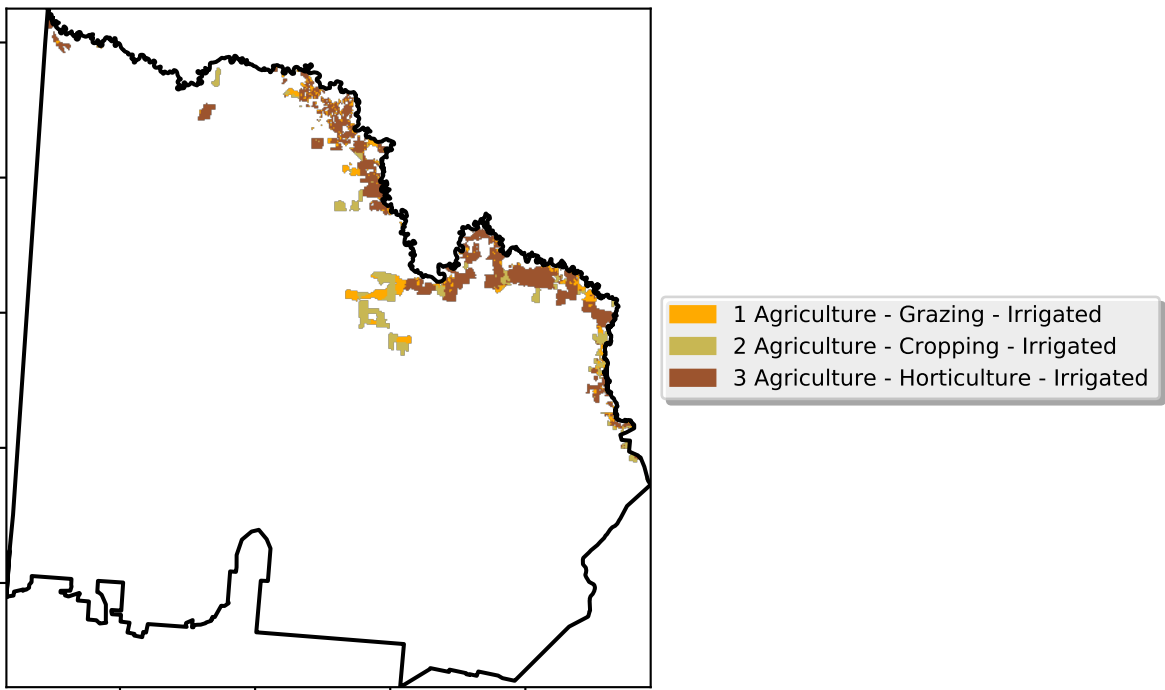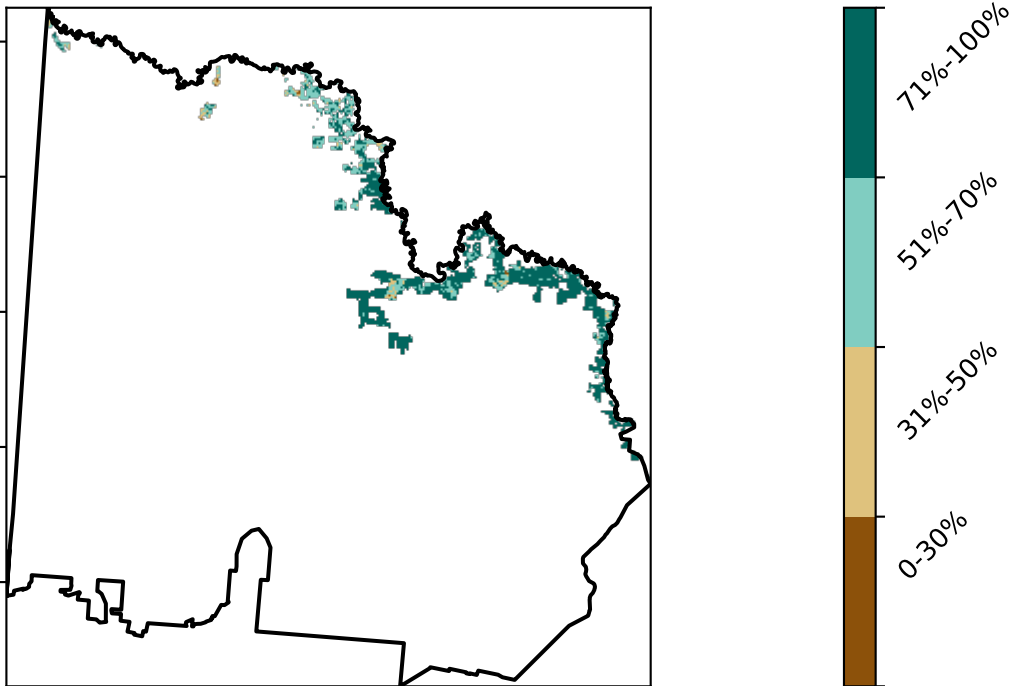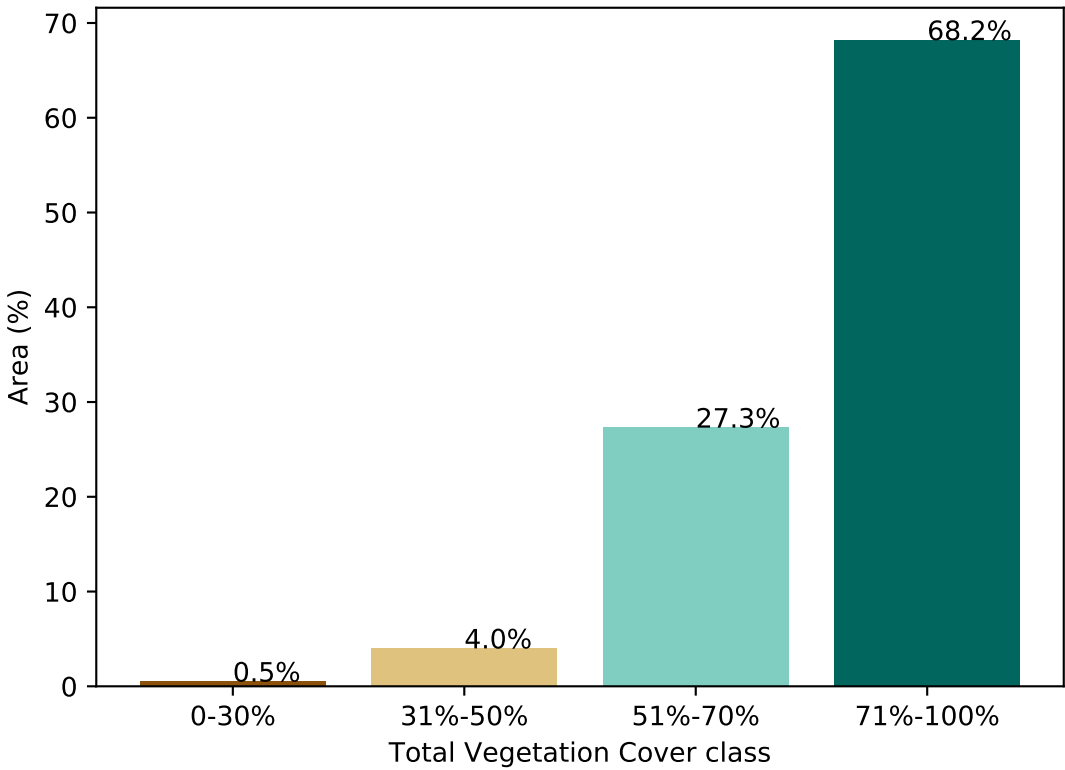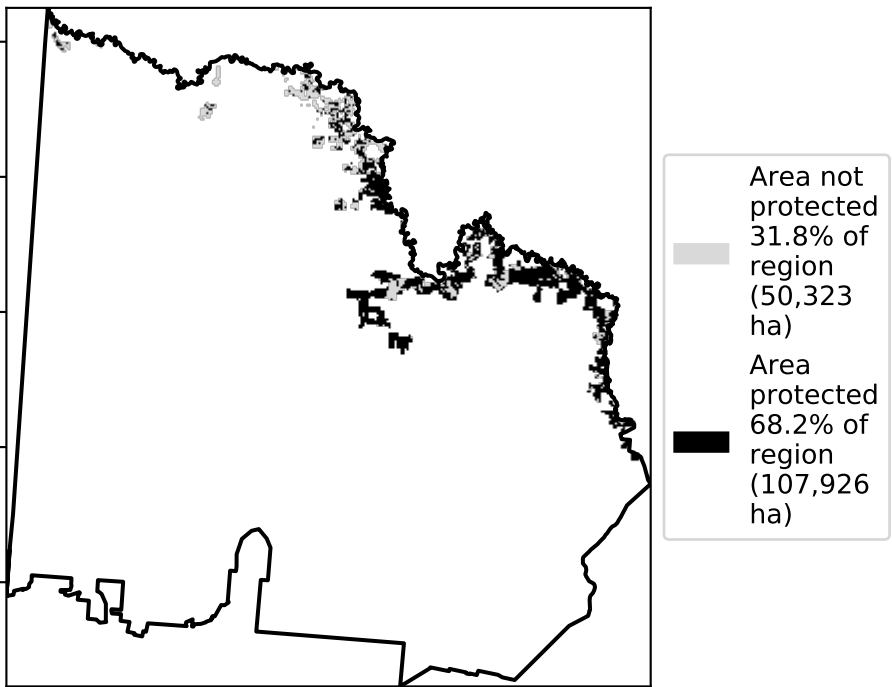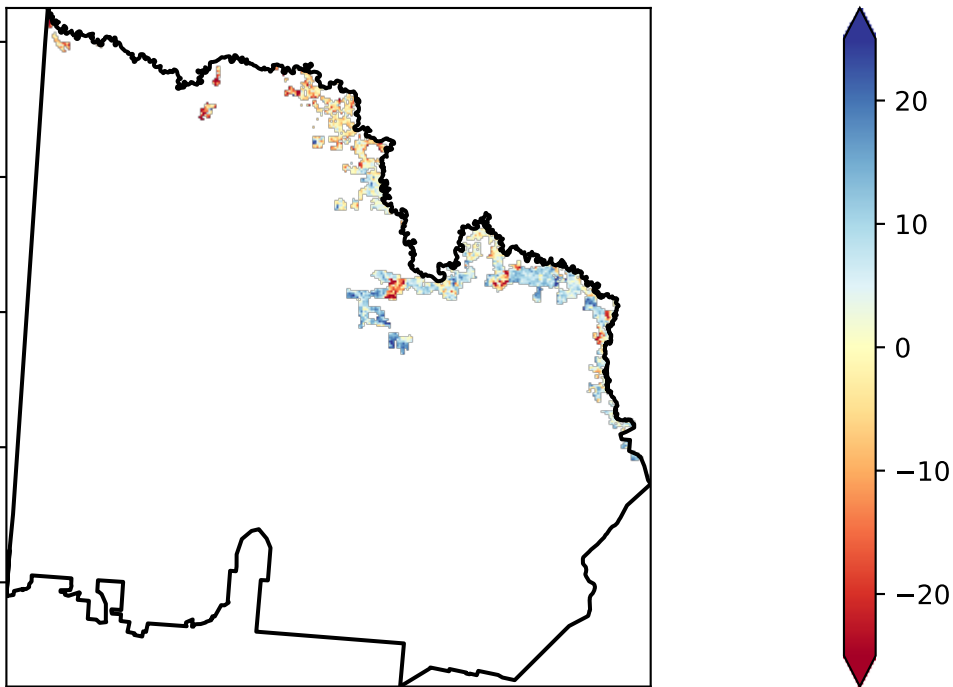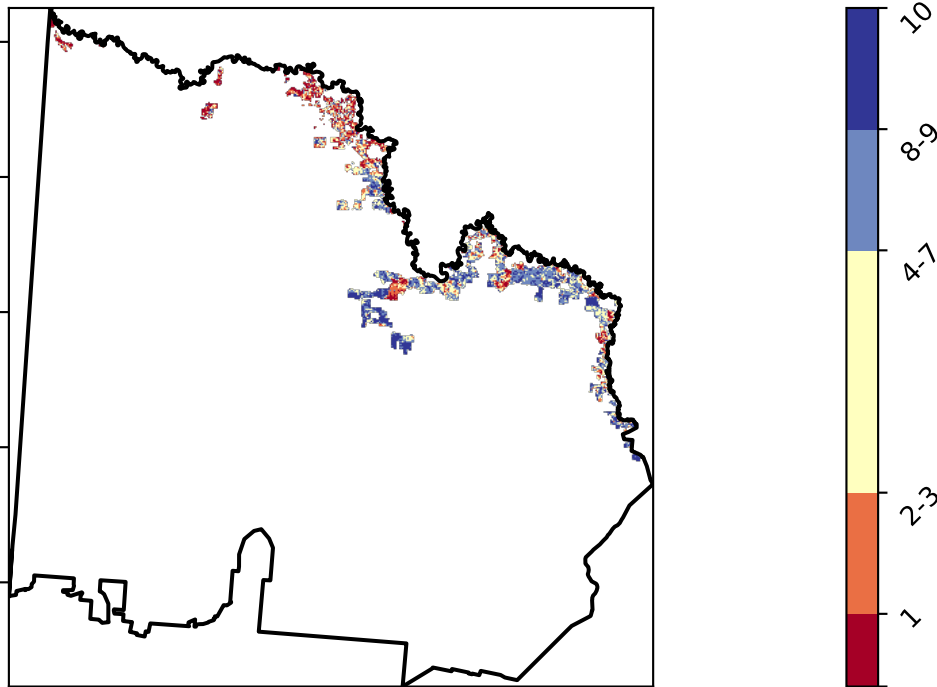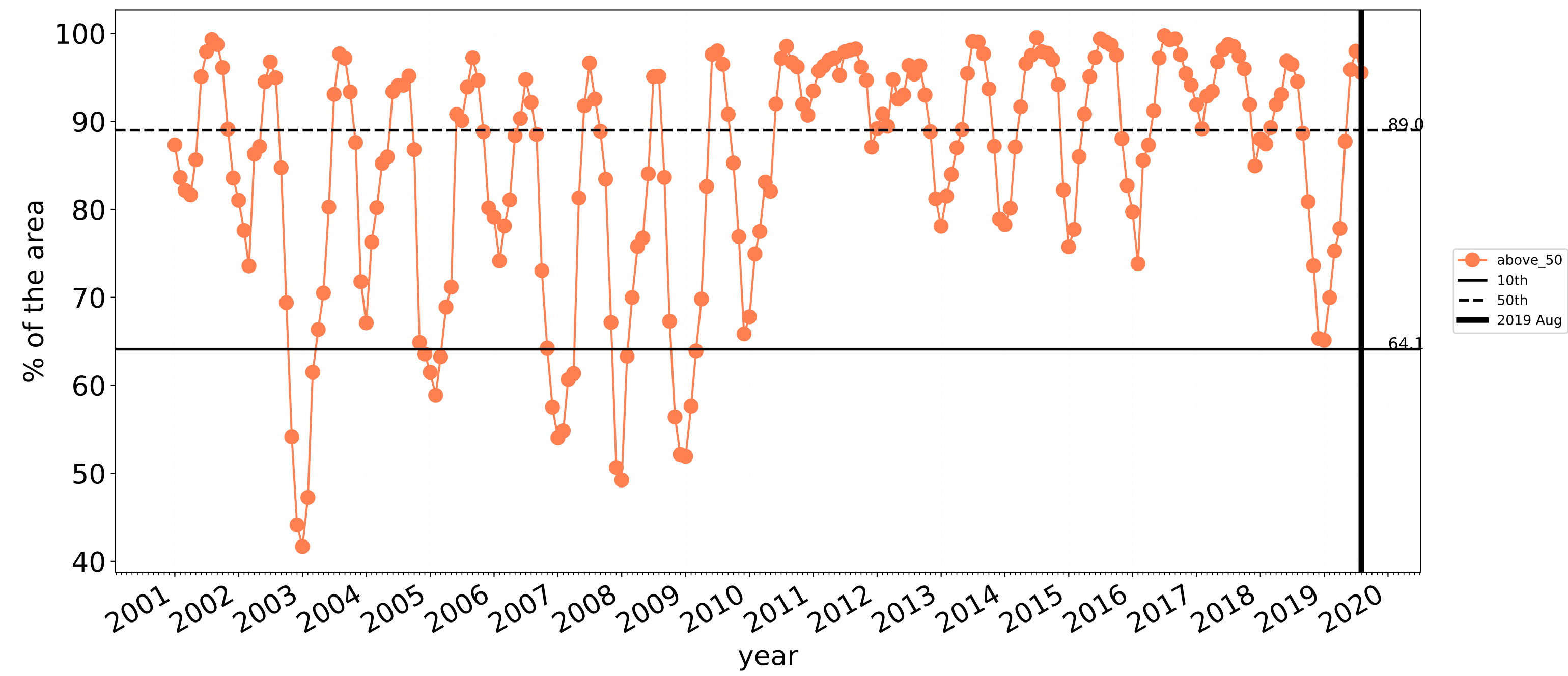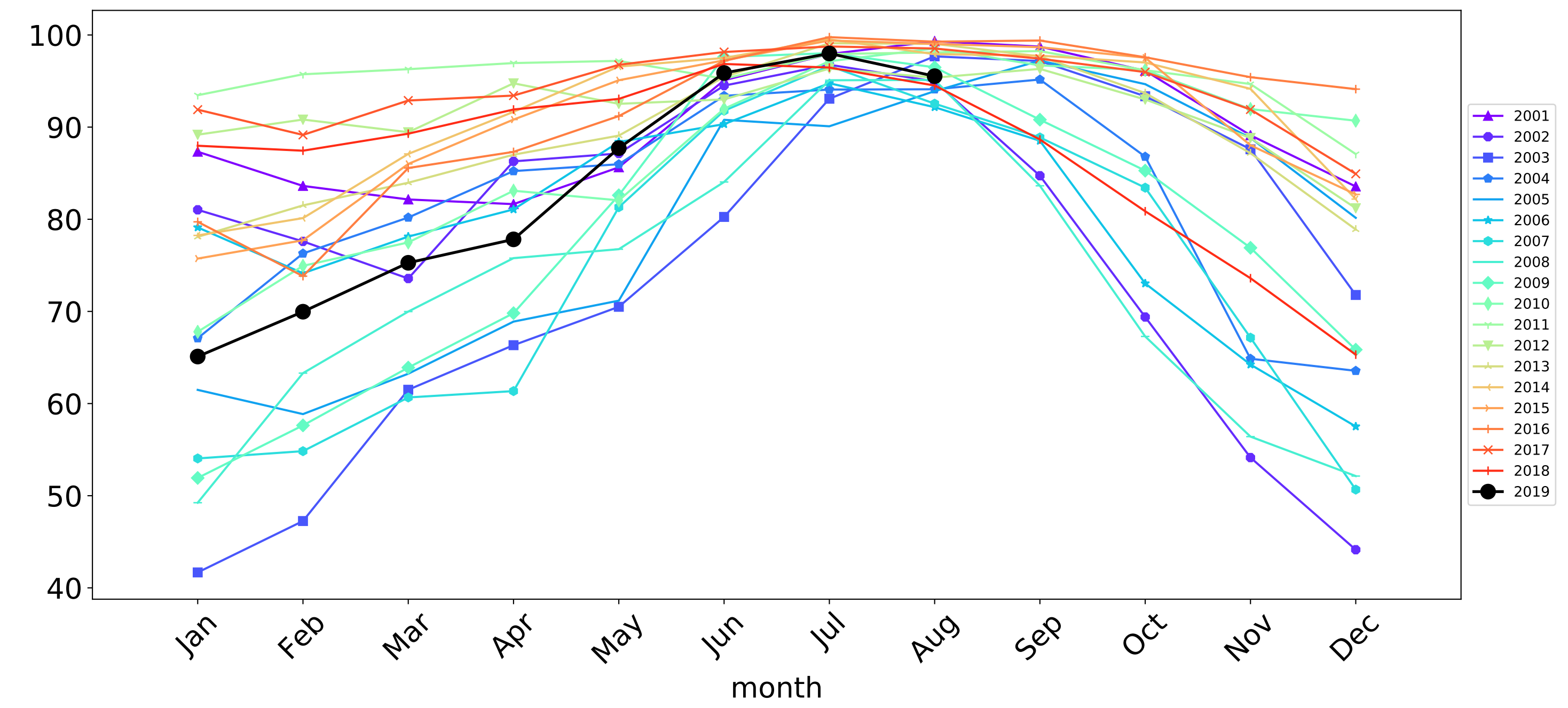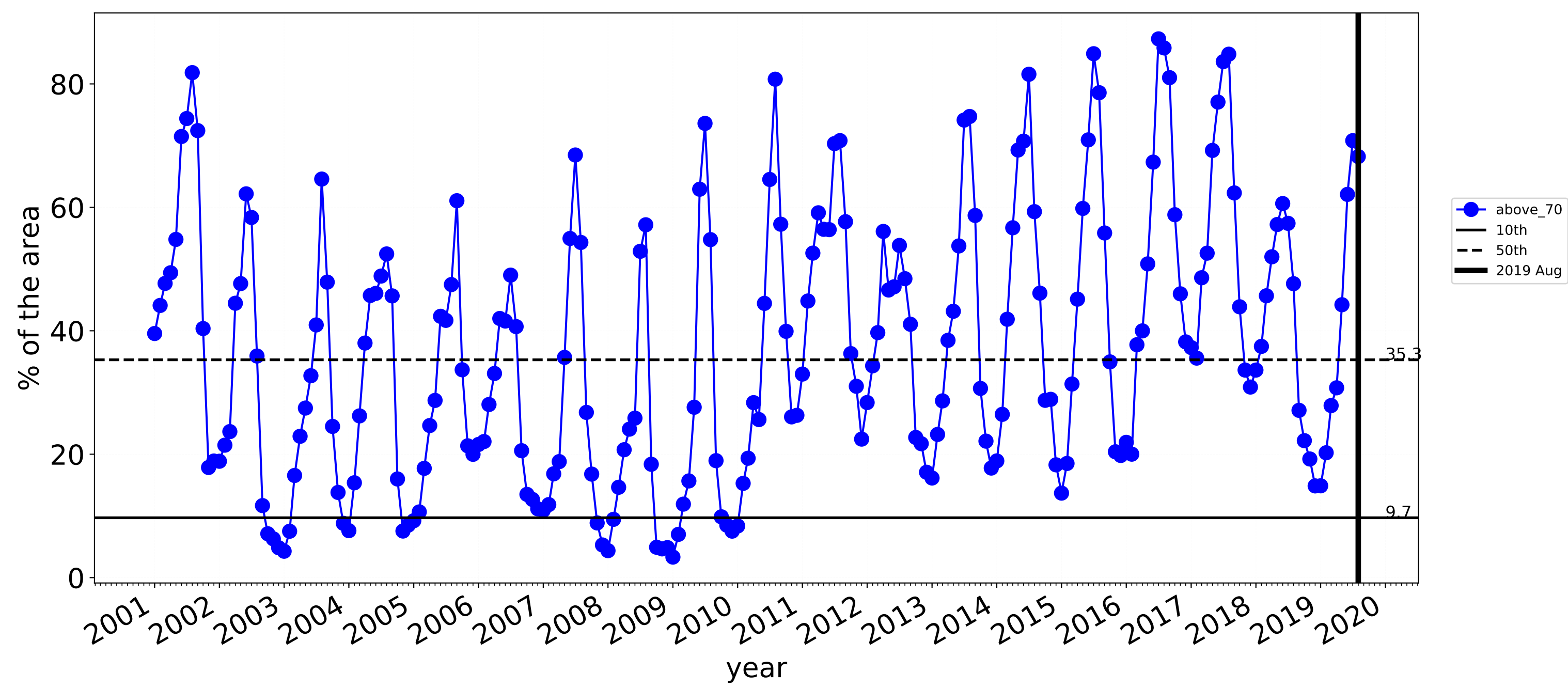
# Irrigation timeseries

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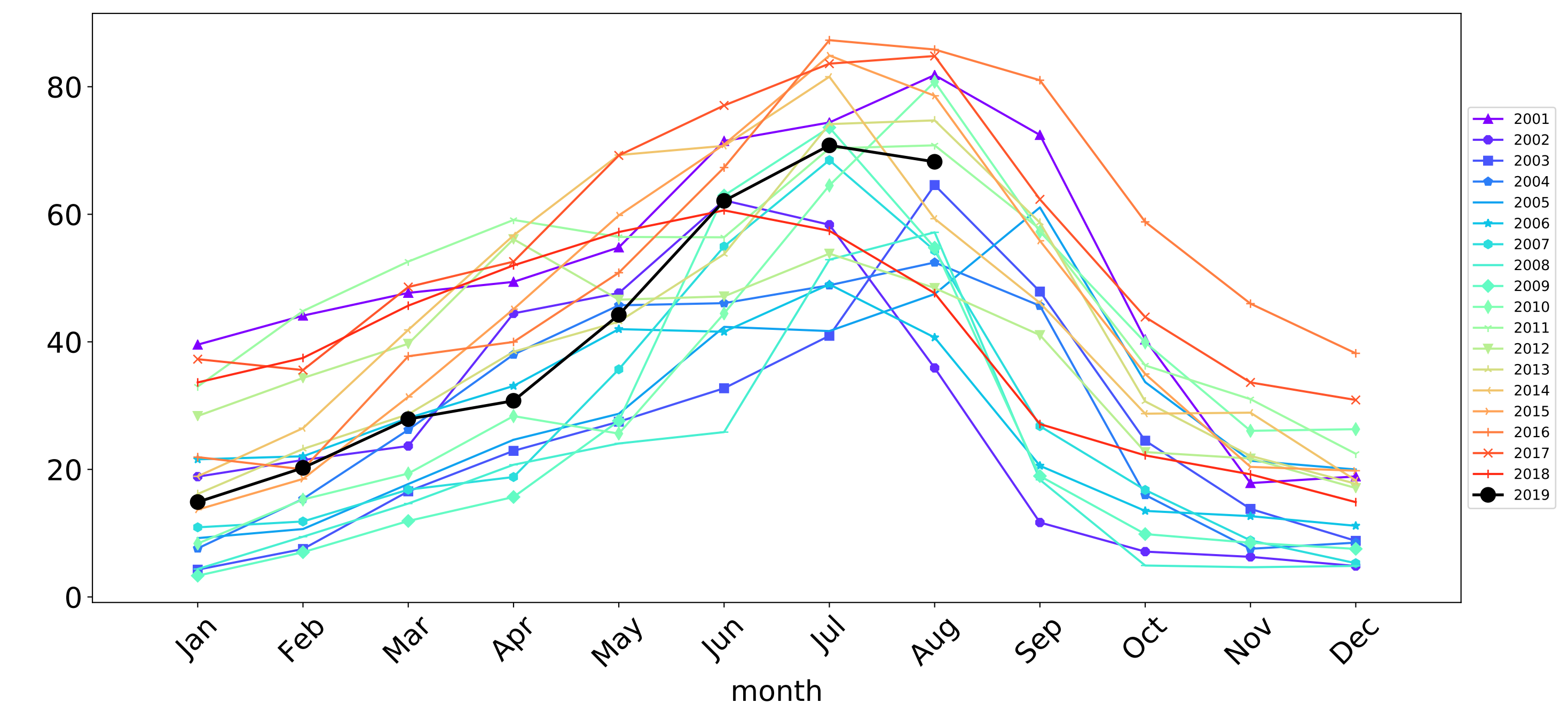


### Wind erosion historical monthly area protected (Total Veg Cov >50%)



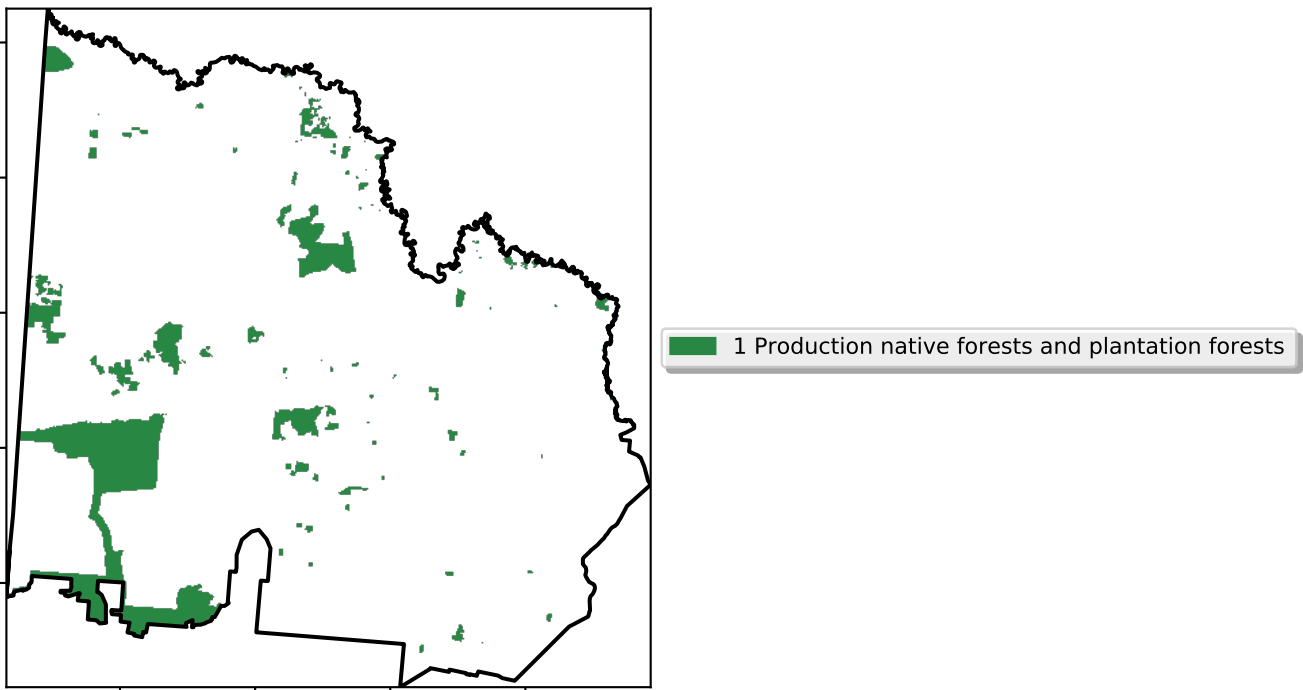### Proportion of the area protected from water erosion (Total Vegetation Cover > 70%)



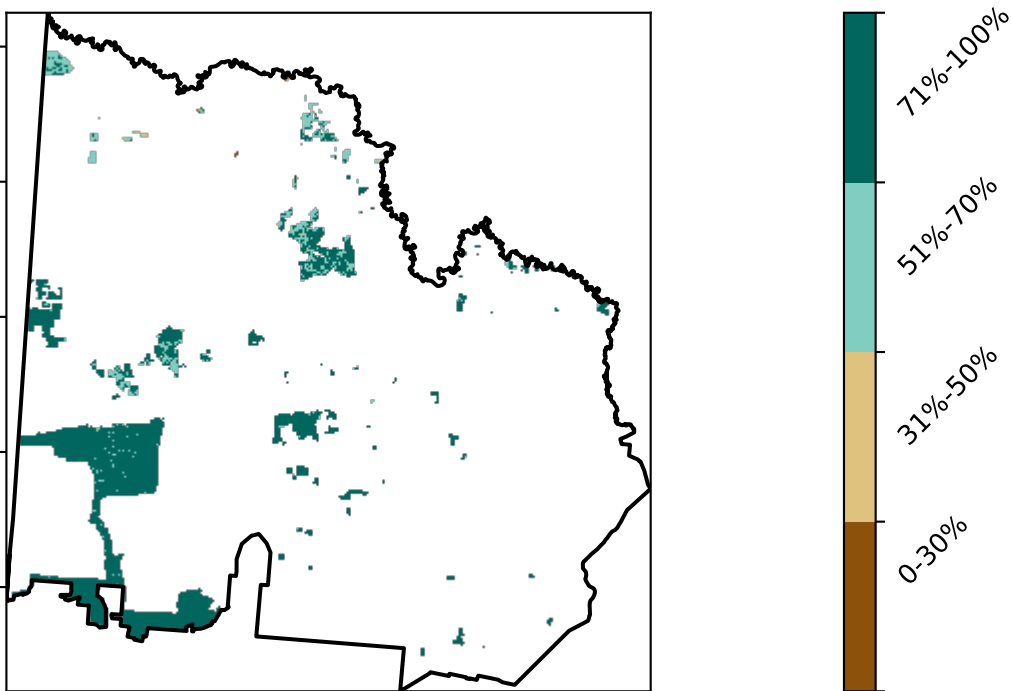### Water erosion historical monthly area protected (Total Veg Cov>70%)

# Production native forests and plantation forests

## Land use and forest cover
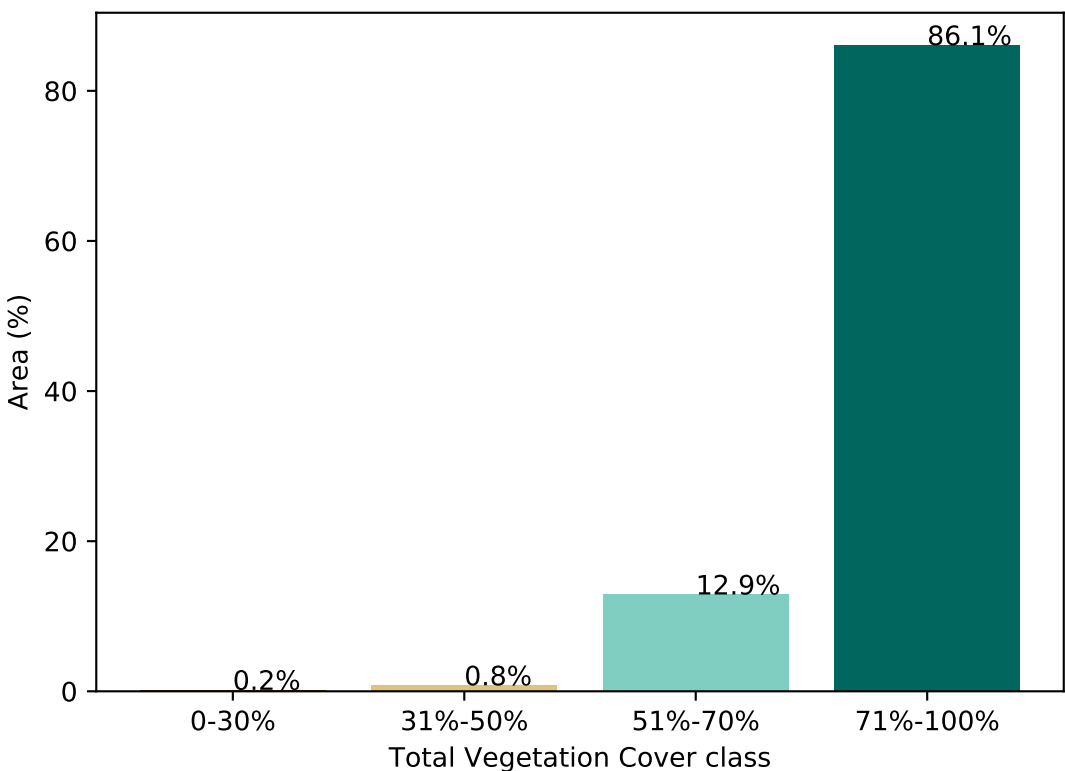
Catchment Scale Land Use and Forests of Australia (2018) Derived from Catchment Scale Land Use of Australia (2018) and Forests of Australia (2018)
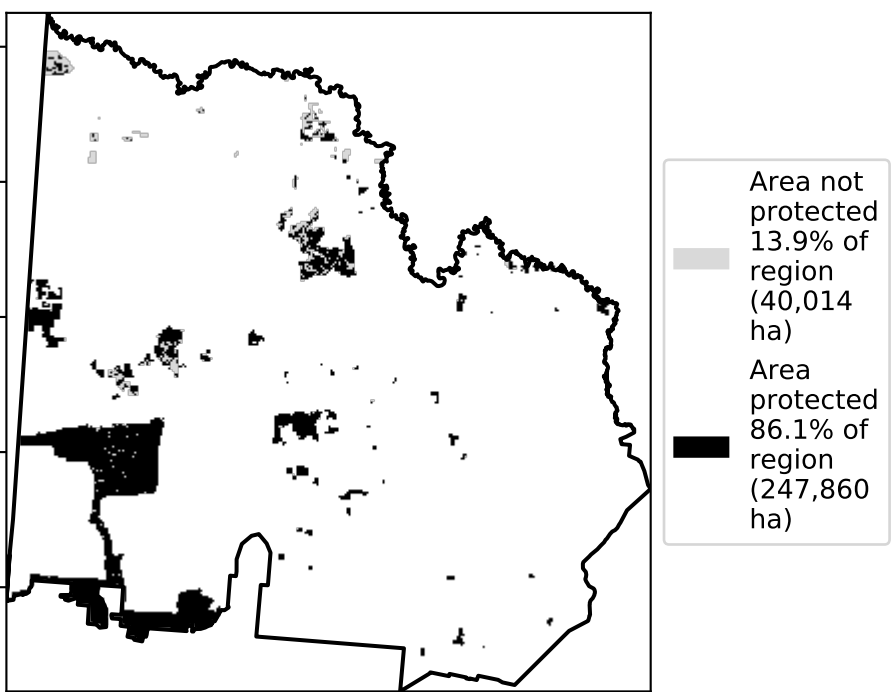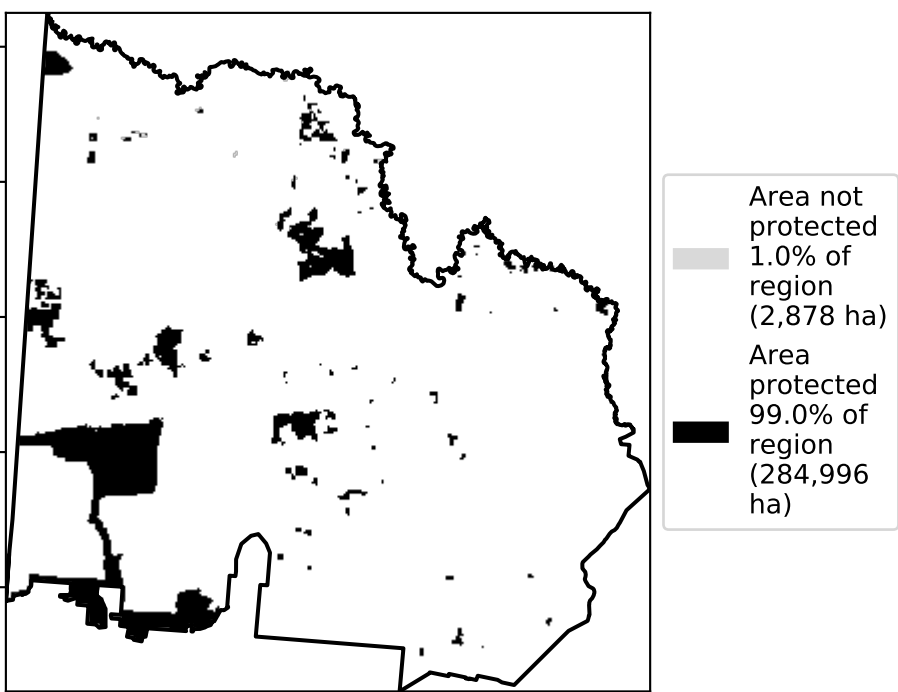
1 Production native forests and plantation forests

## Total Vegetation Cover [%]

71%-100%
51%-70%
31%-50%
0-30%

## Proportion of vegetation cover class in area

86.1%
12.9%
0.2%    0.8%

Area (%)
Total Vegetation Cover class
0-30    31%-50%    51%-70%    71%-100%

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

Area not protected 13.9% of region (40,014 ha)

Area protected 86.1% of region (247,860 ha)

## % Area protected from wind erosion (>50%)
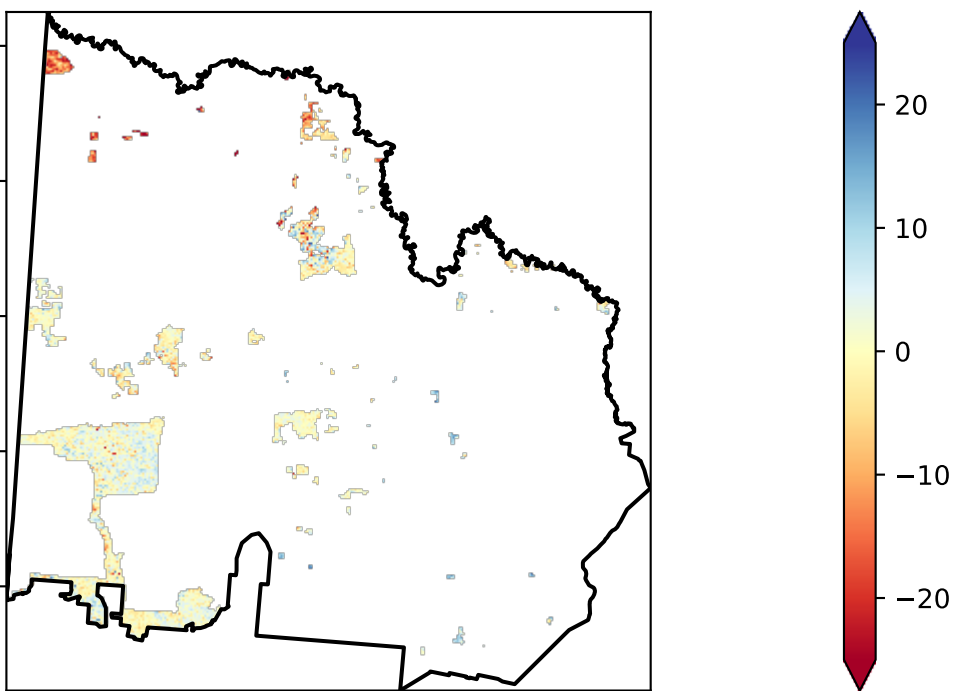
Area not protected 1.0% of region (2,878 ha)

Area protected 99.0% of region (284,996 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.

## 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.

10
8-9
4-7
2-3
1

# Production native forests and plantation forests timeseries

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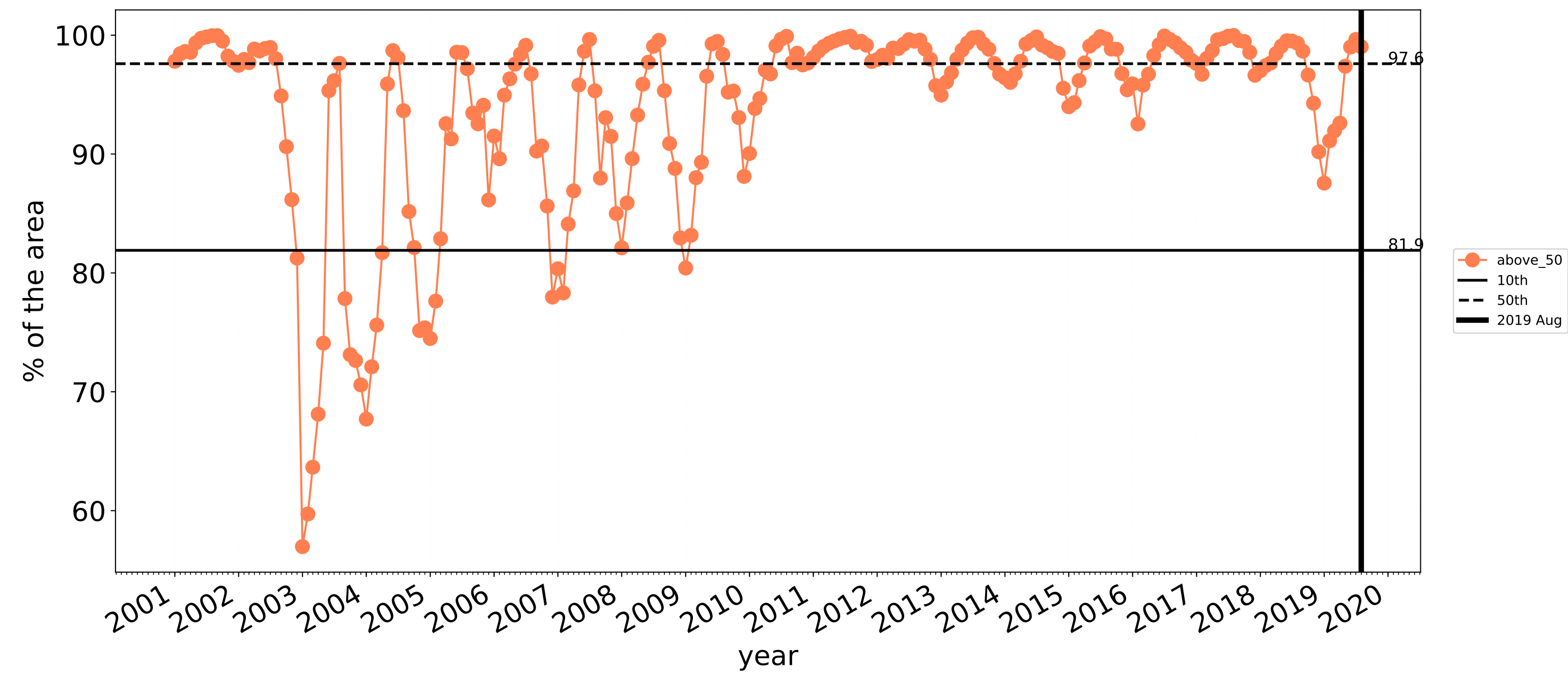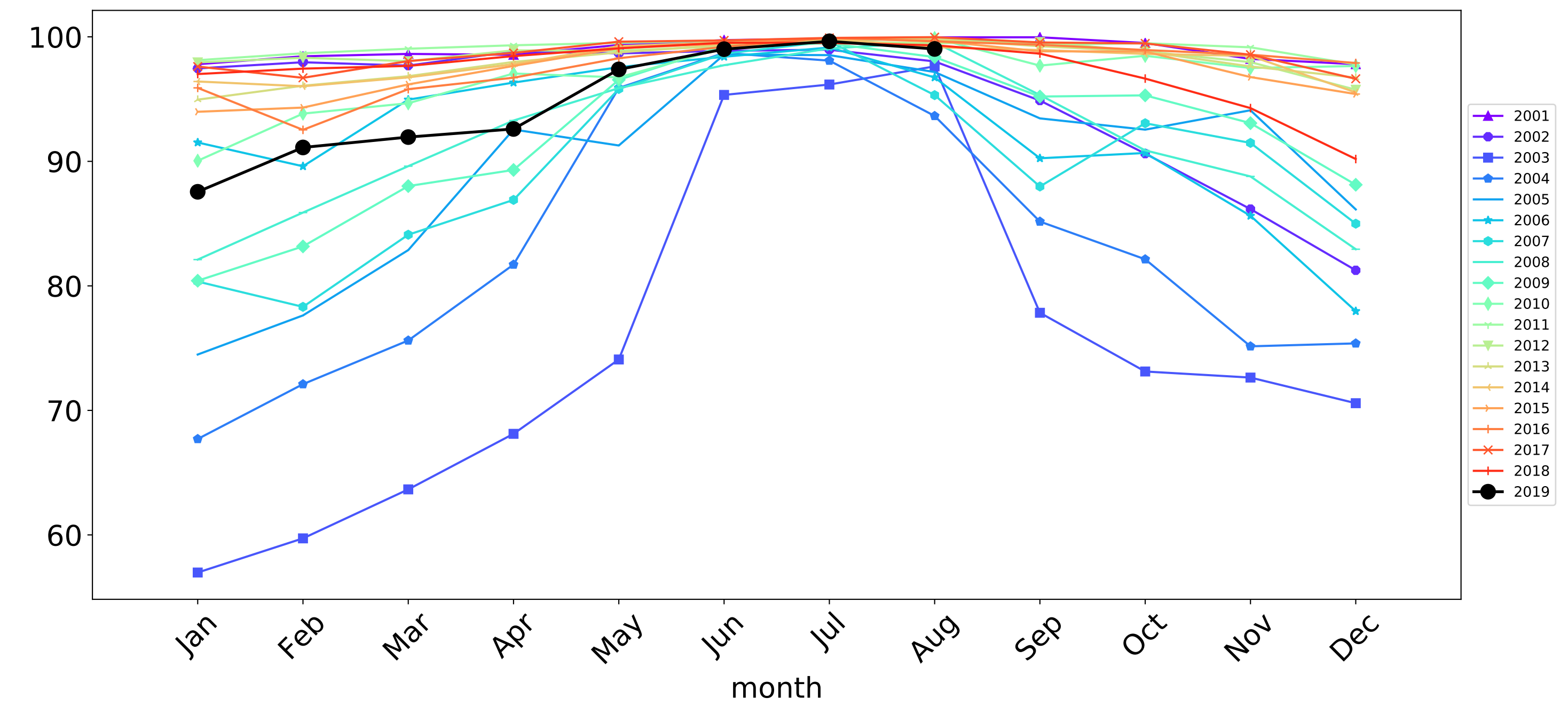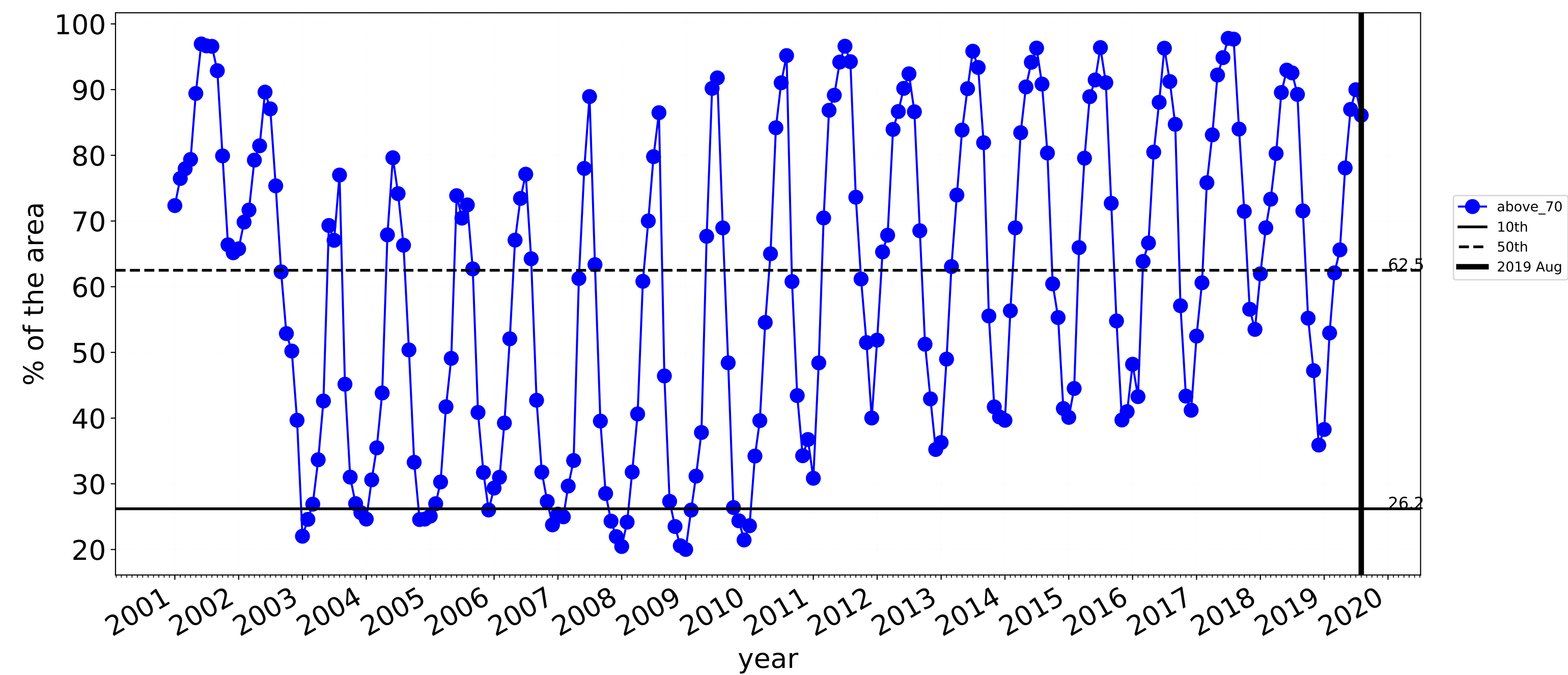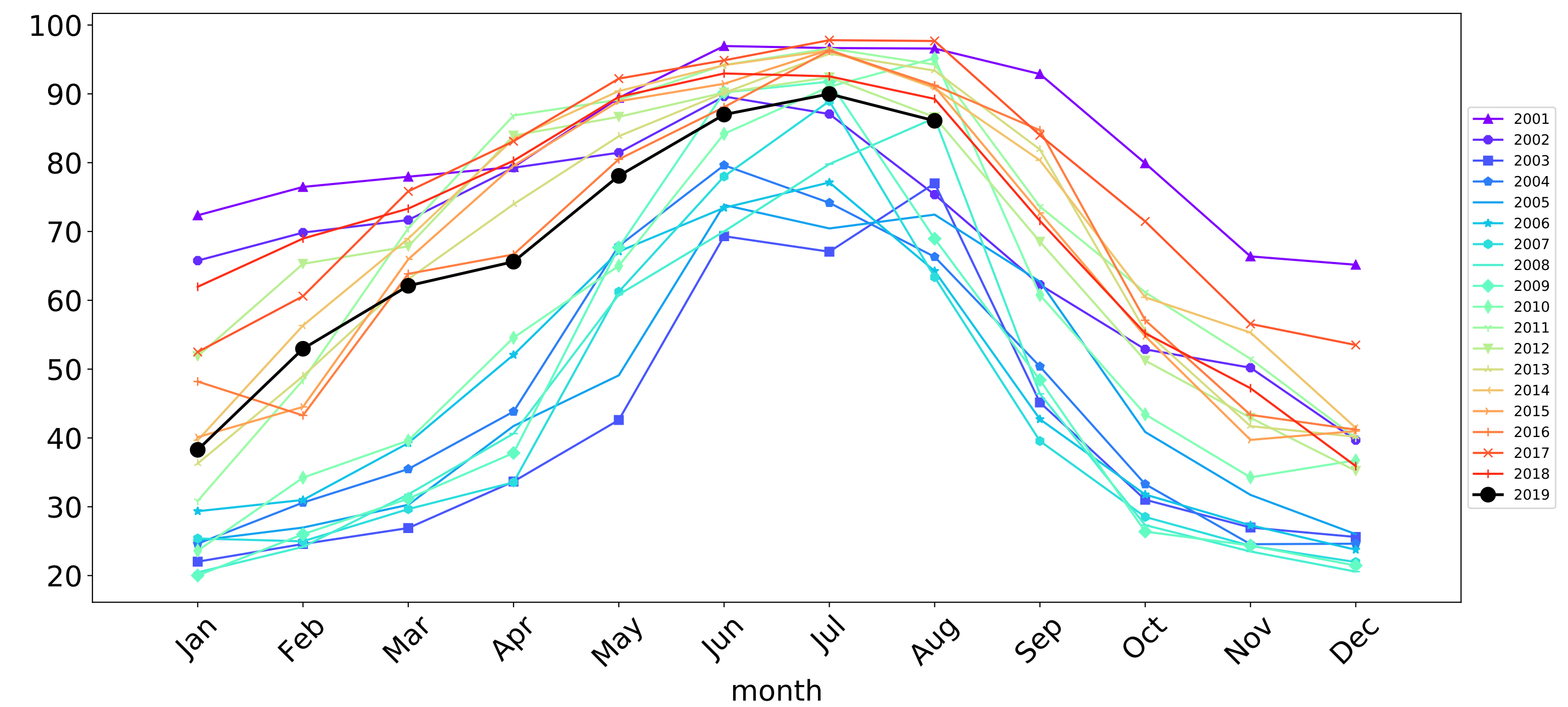


### Wind erosion historical monthly area protected (Total Veg Cov >50%)



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



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

## Mallee (3,920,125 ha and no data 7,667 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 | 3,920,125 | 99.3%<br>3,893,575 | 95.3%<br>3,735,650 | 83.1%<br>3,258,275 | 54.2%<br>2,123,575 | 20.3%<br>794,025 | 9.9%<br>387,675 |
| Conservation and natural environments | 1,393,675 | 99.9%<br>1,391,750 | 98.3%<br>1,370,075 | 85.5%<br>1,192,175 | 39.8%<br>554,075 | 2.0%<br>27,425 | 0.6%<br>8,375 |
| Conservation and natural environments non forest | 340,975 | 99.5%<br>339,175 | 93.5%<br>318,850 | 60.8%<br>207,450 | 29.4%<br>100,150 | 5.0%<br>17,050 | 1.7%<br>5,800 |
| Conservation and natural environments Woodland forest | 1,039,725 | 100.0%<br>1,039,600 | 99.9%<br>1,038,250 | 93.5%<br>972,300 | 42.9%<br>446,200 | 0.9%<br>9,225 | 0.2%<br>2,400 |
| Agriculture | 2,184,700 | 98.9%<br>2,161,550 | 93.2%<br>2,035,300 | 81.9%<br>1,789,225 | 65.1%<br>1,421,575 | 34.4%<br>752,600 | 17.1%<br>374,175 |
| Grazing | 150,525 | 97.6%<br>146,900 | 80.1%<br>120,600 | 56.7%<br>85,300 | 32.2%<br>48,500 | 8.5%<br>12,775 | 3.2%<br>4,775 |
| Grazing non forest | 145,600 | 97.5%<br>141,975 | 79.5%<br>115,700 | 55.7%<br>81,125 | 31.8%<br>46,350 | 8.7%<br>12,675 | 3.2%<br>4,725 |
| Cropping | 1,871,550 | 99.0%<br>1,853,125 | 94.1%<br>1,761,000 | 85.2%<br>1,594,175 | 71.0%<br>1,328,425 | 39.0%<br>730,300 | 19.6%<br>366,050 |
| Irrigation | 158,250 | 99.5%<br>157,500 | 95.5%<br>151,175 | 68.2%<br>107,975 | 27.8%<br>43,950 | 6.0%<br>9,525 | 2.1%<br>3,350 |
| Production native forests and plantation forests | 287,875 | 99.8%<br>287,425 | 99.0%<br>285,075 | 86.1%<br>247,825 | 45.6%<br>131,225 | 2.7%<br>7,900 | 0.9%<br>2,475 |