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THE AUSTRALIAN NATURAL DISASTER RESILIENCE INDEX

VOLUME II – INDEX DESIGN AND COMPUTATION

Chapter 4 – Statistical outputs: ANDRI, coping capacity and adaptive capacity

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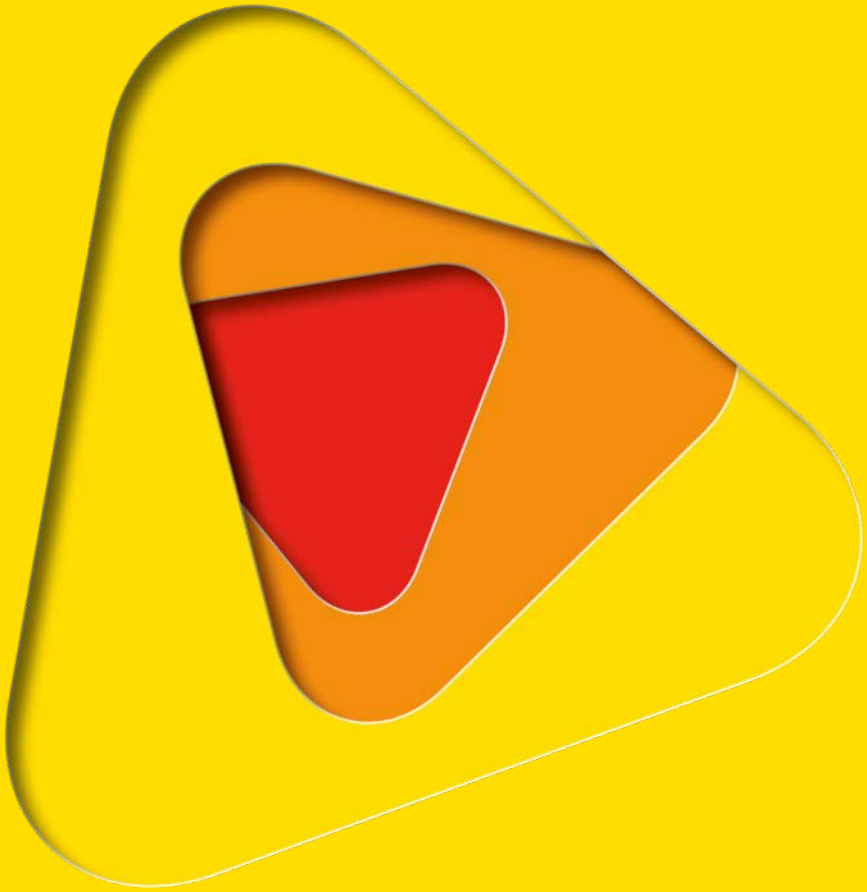
CHAPTER 4 – STATISTICAL OUTPUTS: ANDRI, COPING CAPACITY AND ADAPTIVE CAPACITY

In this chapter

Section 4.1	Presents the statistical outputs and results for the overall Australian Natural Disaster Resilience Index.
Section 4.2	Presents the statistical outputs and results for the coping capacity index.
Section 4.3	Presents the statistical outputs and results for the adaptive capacity index.



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4.1 STATISTICAL RESULTS FOR THE AUSTRALIAN NATURAL DISASTER RESILIENCE INDEX

4.1.1 Transformation

The Australian National Disaster Resilience Index is calculated by aggregating the coping capacity and adaptive capacity sub-indices. These sub-indices were themselves derived from various theme sub-indices and required minor rescaling and transformation before aggregation into the Australian Natural Disaster Resilience Index. Transformation details are shown in Table 4.1and the results of transformation in Table 4.2. Raw and transformed sub-index values are outlined in Appendix 4A.

Table 4.1: Transformation details for sub-indexes used to form the Australian Natural Disaster Resilience Index.

Theme	Transformation details		
	Skewness transform	Exponent	Coefficient for kurtosis transform
Coping Capacity sub-index	Power transform	1.29	0.00
Adaptive Capacity sub-index	Power transform	1.10	0.08

Table 4.2: Transformation results for sub-indexes used to form the Australian Natural Disaster Resilience Index.

Theme	Raw data pre-transform			Post-transform		
	Skewness	Kurtosis	Outliers	Skewness	Kurtosis	Outliers
Coping Capacity sub-index	-0.27	0.17	19	-0.00	-0.21	10
Adaptive Capacity sub-index	-0.11	0.38	57	0.01	0.00	27

4.1.2 Correlation

The correlation between the coping capacity sub-index and the adaptive capacity sub-index is 0.49. This is sufficiently low that some consideration should be given to compensability issues, since there will be some SA2s where low values of one sub-index are being aggregated with high values of the other sub-index and vice versa.

4.1.3 Measurement model

A simple formative model is appropriate, given there are only two sub-indices to be aggregated and the correlation between them is not sufficiently high to suggest the possibility of a latent factor influencing both sub-indices (if so, a reflective model with simple summing or averaging would be appropriate).

4.1.4 Aggregation

With just two sub-indices to aggregate, it is possible to use the discrete Choquet integral for the aggregation process. It can be reasonably assumed that adaptive capacity is more important than coping capacity, since the former has the potential to obviate the need for the latter. A fuzzy measure vector of {} = 0, {Coping Capacity} = 0.4, {Adaptive Capacity} = 0.6, {Coping Capacity, Adaptive Capacity} = 1.0 meets these conditions. This fuzzy measure has an orness of 0.375, which reflects the belief that the constituent sub-indices in the Australian Natural Disaster Resilience Index can substitute for each other in aggregation to a moderate extent.

With only two theme sub-indices being aggregated, there is a greater likelihood that different methods of aggregation will give the same or close values for the Australian Natural Disaster Resilience Index. This occurs for low to moderate coefficients of variation, as shown in the left and centre of Figure 4.1.

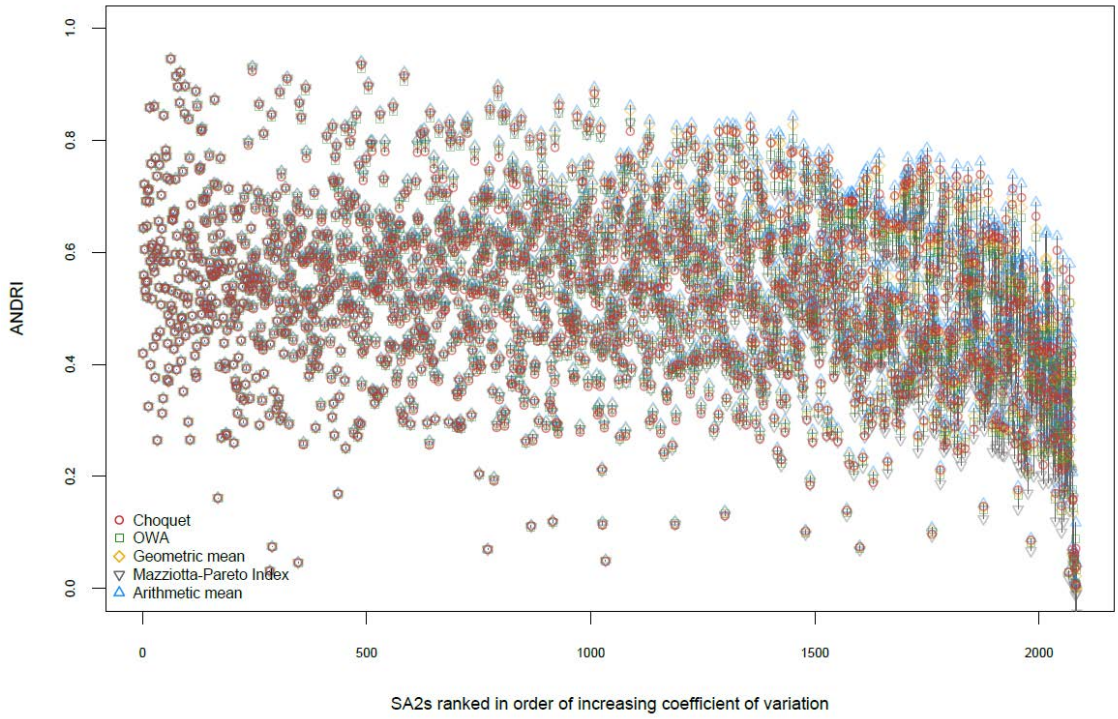


Figure 4.1: Comparison of aggregation methods for the overall Australian Natural Disaster Resilience Index.

Two example SA2s show that, with the aggregation of only two moderately correlated sub-indices, the differences in the values of the Australian Natural Disaster Resilience Index between the discrete Choquet integral and the arithmetic mean are not as great as in some of the other aggregations in the index (Table 4.3).

Table 4.3: Example SA2s showing Australian Natural Disaster Resilience Index (ANDRI) values obtained using different aggregation functions.

Indicator	Rescaled transformed index values	
	High c.v. (East Arnhem)	Low c.v. (Kimba – Cleve – Franklin Harbour)
Coping Capacity sub-index	0.000	0.419
Adaptive Capacity sub-index	0.088	0.419
ANDRI (Choquet)	0.040	0.419
ANDRI (Arithmetic mean)	0.044	0.419
Coefficient of variation (c.v.)	1.414	0.000

4.1.5 Mapped Australian Natural Disaster Resilience Index

The mapped output of the Australian Natural Disaster Resilience Index is shown in Figure 4.2. Maps showing State/Territory and major metropolitan area resolution are provided in Appendix 4B.

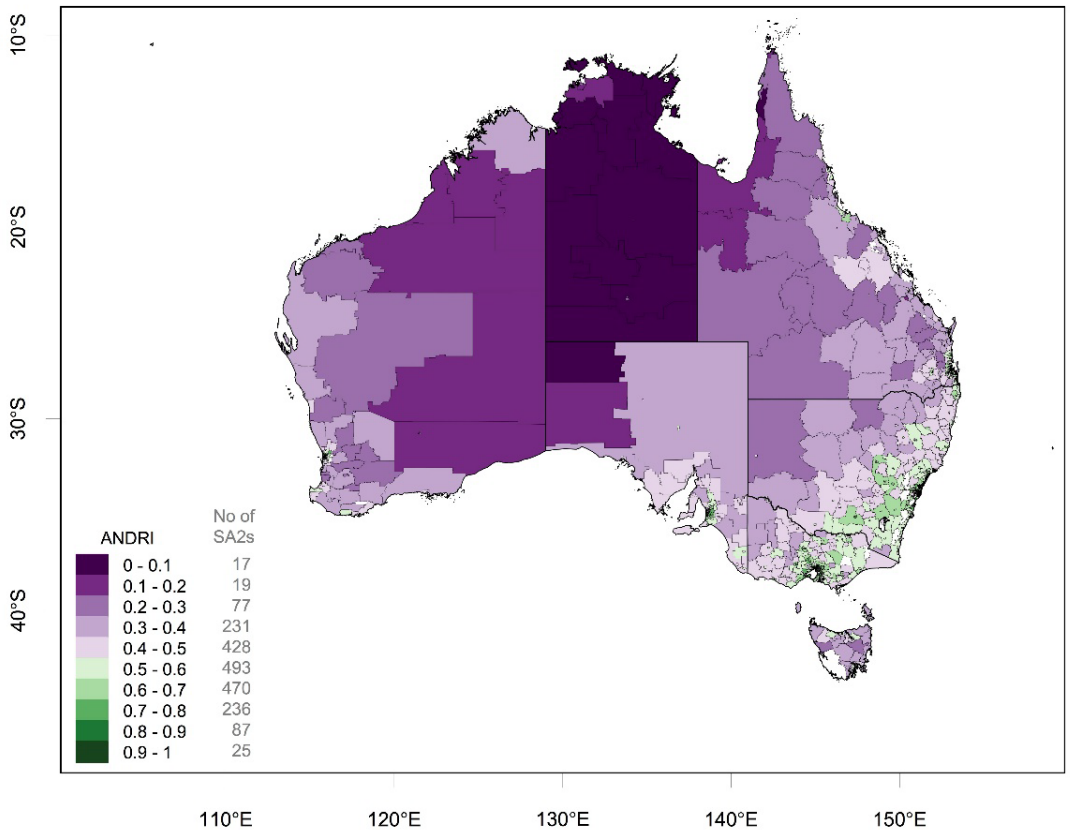


Figure 4.2: Mapped output of the Australian Natural Disaster Resilience Index values at a national level.

4.1.6 Sub-index relationships with composite index

4.1.6.1 National level

The correlations at national level between the coping capacity sub-index, adaptive capacity sub-index and the Australian Natural Disaster Resilience Index are shown in Table 4.4. The magnitude of the correlation gives guidance as to which sub-indexes have the most influence on the value of the Australian Natural Disaster Resilience Index. The corresponding scatter plots and histograms are given in Figure 4.3.

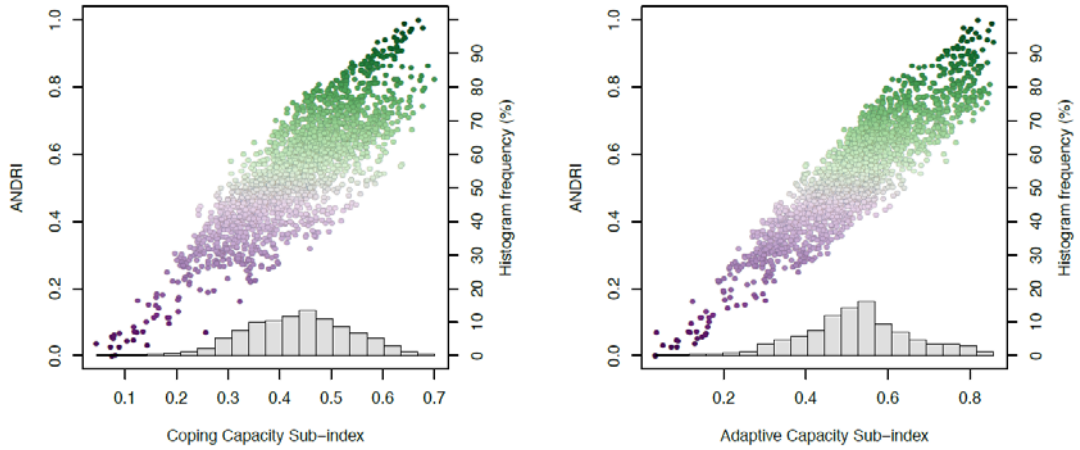


Figure 4.3: Scatterplots showing the relationships between Australian Natural Disaster Resilience Index values and component sub-indices at a national level.

As expected with just two sub-indices being aggregated, both are well correlated with the Australian Natural Disaster Resilience Index (Table 4.4). The higher correlation for adaptive capacity reflects the greater weight accorded this sub-index in the fuzzy measure used in the aggregation by discrete Choquet integral.

Table 4.4: Correlation between coping and adaptive capacity sub-indexes and Australian Natural Disaster Resilience Index values, at a national level.

Sub-index	Correlation with the Australian Natural Disaster Resilience Index
Adaptive Capacity sub-index	0.90
Coping Capacity sub-index	0.83

4.1.6.2 Regional level

Disaggregation of the correlations between the coping capacity and adaptive capacity indexes and the Australian Natural Disaster Resilience Index to SA4 level (larger geographic areas containing around 20 SA2s) shows whether there are any regional differences in the patterns of correlations between sub-indices that result in corresponding differences in the relationships between the theme sub-indices and the Australian Natural Disaster Resilience Index (Figure 4.4). In both plots, the group of points with a remoteness score of 1 or close to 1 are the metropolitan SA4s, including inner city and suburban areas (Figure 4.4). The points with remoteness scores of 2 through to 5 represent the SA4s ranging from inner regional Australia to very remote Australia. The scatter plots suggest that the correlations between coping capacity, adaptive capacity and the Australian Natural Disaster Resilience Index are fairly similar across all regions of Australia.

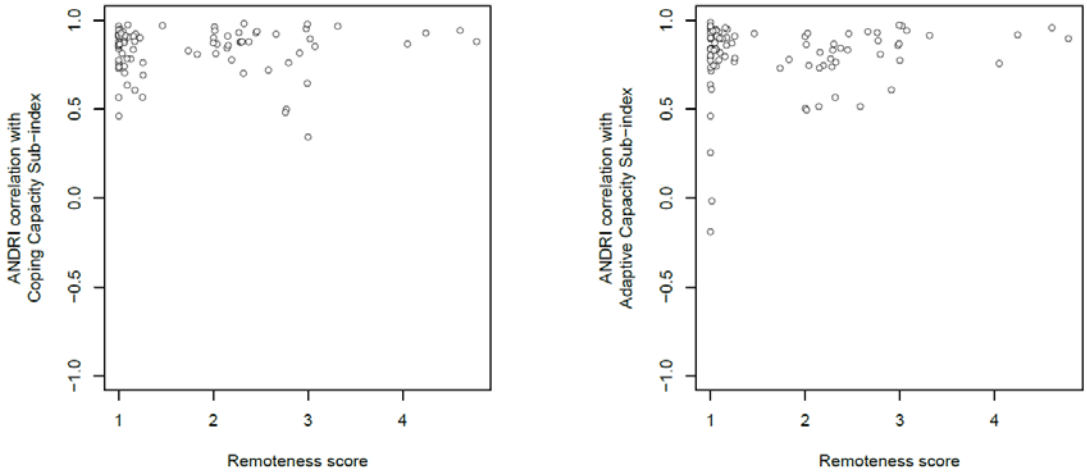


Figure 4.4: Correlation between coping capacity (left) and adaptive capacity (right) sub-indexes and Australian Natural Disaster Resilience Index values, at a regional level. Remoteness of 1 is metropolitan areas through to 5, very remote areas.

4.2 STATISTICAL RESULTS FOR THE COPING CAPACITY SUB-INDEX

4.2.1 Transformation

The coping capacity sub-index is calculated by aggregating the six coping capacity theme sub-indices: social character; economic capital; planning and the built environment; emergency services; community capital and information access. These theme sub-indices were themselves derived from various indicators and so in some instances required rescaling and transformation before aggregation into the coping capacity sub-index. Transformation details are shown in Table 4.5 and the results of transformation in Table 4.6. Raw and transformed sub-index values are outlined in Appendix 4C.

Table 4.5: Transformation details for sub-indexes used to form the coping-capacity index.

Theme	Transformation details		
	Skewness transform	Exponent	Coefficient for kurtosis transform
Social Character	Power transform	2.11	0.00
Economic Capital	Power transform	1.80	0.00
Planning and the Built Environment	No transform	-	-
Emergency Services	Power transform	0.51	0.14
Community Capital	No transform	-	-
Information Access	No transform	-	-

Table 4.6: Transformation results for sub-indexes used to form the coping capacity index.

Theme	Raw data pre-transform			Post-transform		
	Skewness	Kurtosis	Outliers	Skewness	Kurtosis	Outliers
Social Character	-0.91	0.93	65	0.00	-0.23	4
Economic Capital	-0.75	1.97	28	-0.00	-0.08	17
Planning and the Built Environment	0.05	-0.91	0	0.05	-0.91	0
Emergency Services	0.74	0.42	104	0.03	0.00	17
Community Capital	-0.04	-0.43	2	-0.04	-0.43	2
Information Access	-0.21	-1.10	0	-0.21	-1.10	0

4.2.2 Correlation

Two correlations between theme sub-indices are large enough to warrant consideration of the implications for aggregation. The community capital sub-index is correlated with the social character sub-index (Figure 4.5) and this is a consequence of their sharing similar types of indicators. The aspect of resilience encompassed by these themes will be over-emphasised in the coping capacity sub-index, at the expense of other aspects.

The information and engagement sub-index is negatively correlated with the social character sub-index (Figure 4.5), but this is not caused by the two sub-

indices sharing similar indicators. The relevant metropolitan maps suggest the negative correlation is caused by the differences between urban and peri-urban areas in social class and phone and ADSL coverage. The negative correlation means that many individual SA2s will have a high value of one sub-index and a low value of the other, or vice versa, so compensability in aggregation is an issue. Consequently, aggregation by simple addition or averaging is not appropriate.

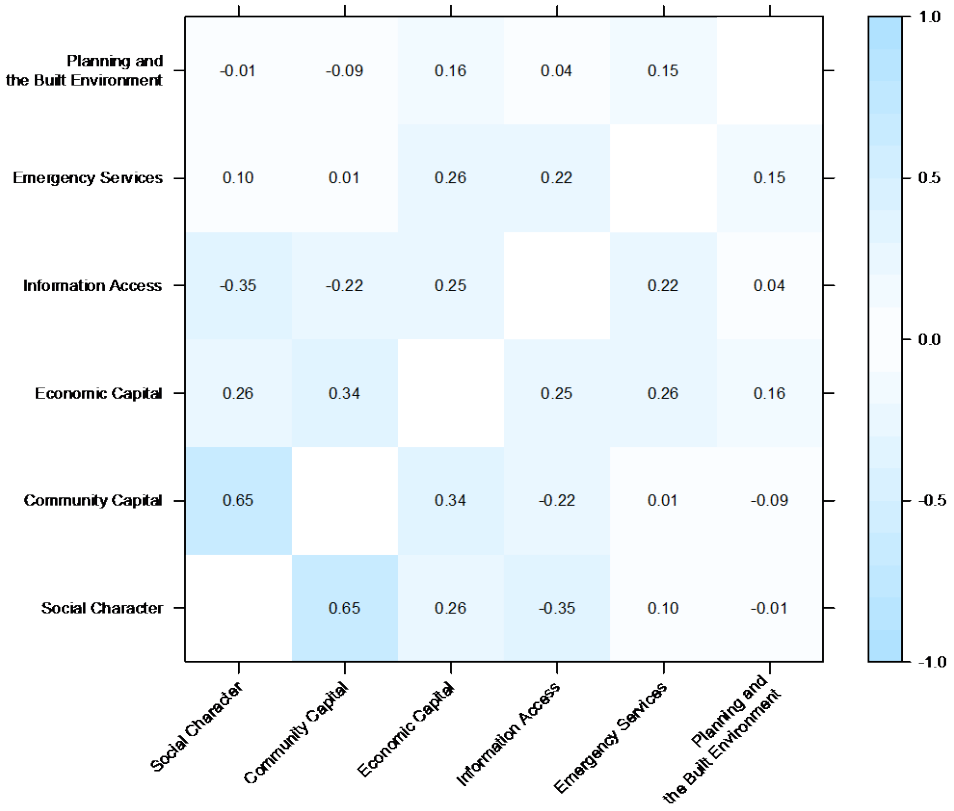


Figure 4.5: Correlations between themes in the coping capacity sub-index.

The correlation plot shows that the remaining sub-indices are only weakly correlated with each other (Figure 4.5). This is confirmed by a Kaiser-Meyer-Olkin measure of sampling adequacy of 0.55, which indicates that PCA is very unlikely to produce well differentiated components. However, an adjustment is needed to prevent the over-representation of the social aspects behind the community capital and social character sub-indices. Consistent with the use of principal components analysis in composite index studies, the two theme sub-indices can simply be averaged and rescaled. Because of the correlation and substantive similarity there are no compensability issues in doing this.

Regressions between each theme sub-index as dependent variable and the remaining theme sub-indices as independent variables confirm the need to reduce the influence of the shared social aspects in the social character and community capital sub-indices (Table 4.7).

Table 4.7: Regression analysis of each theme sub-index value (dependent variable) and remaining sub-index values (independent variable).

Theme sub-index denoted the dependent variable in the regression	R^2
Social Character	0.50
Community Capital	0.48
Economic Capital	0.30
Information Access	0.28
Emergency Services	0.13
Planning and the Built Environment	0.06

4.2.3 Measurement model

With no strong multi-factor or single factor structure, a simple formative model is indicated.

4.2.4 Aggregation

The five theme sub-indices (allowing for the initial combination of the two correlated sub-indices) can then be aggregated using ordered-weighted averaging (OWA) with a suitable orness. The discrete Choquet integral is ruled out because there are too many sub-index interactions to specify. An orness of 0.375 was used with the OWA to reflect the belief that the constituent themes in coping capacity can substitute for each other in aggregation to a moderate extent.

As expected, the coping capacity sub-index obtained by the proposed method of averaging two correlated theme sub-indices and then using OWA, is consistently lower than a simple arithmetic mean of all six theme sub-indices (Figure 4.6). Investigation of SA2s with the largest differences between the coping capacity sub-index value calculated by the proposed method and by the arithmetic mean, shows that this occurs where there are large differences between the theme sub-indices (i.e. a high coefficient of variation). In other words, the differences are caused by the restriction of compensatory effects and not by the initial step of averaging two of the theme sub-indices (the community capital and social character sub-indices).

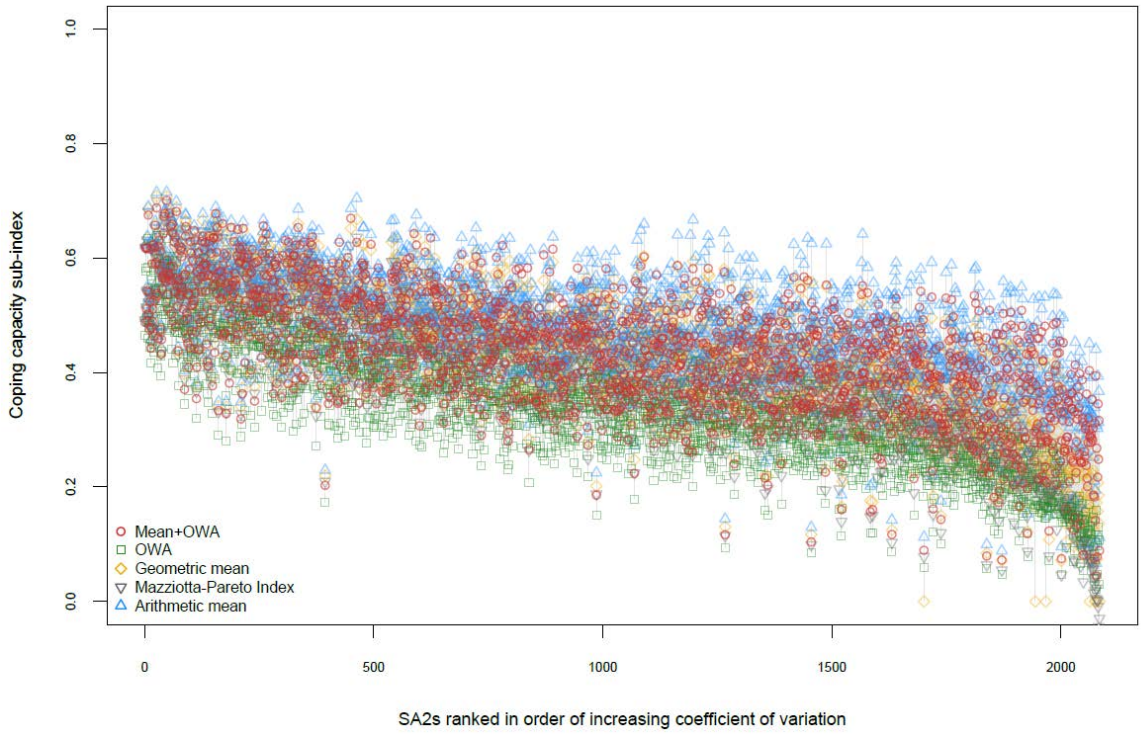


Figure 4.6: Comparison of aggregation methods for the coping capacity index.

The example SA2s in Table 4.8 show that a high coefficient of variation across the five themes results in a larger difference between the coping capacity sub-index calculated with the OWA and that calculated with the simple arithmetic mean of the indicators. This is a consequence of theme OWA restraining the extent to which high values on some themes can compensate for low values on other themes.

Table 4.8: Example SA2s showing coping capacity sub-index values obtained using different aggregation functions.

Theme	Rescaled transformed Indicator values	
	High c.v. (Thamarrurr)	Low c.v. (Anna Bay)
Social Character	0.01	0.45
Economic Capital	0.00	0.51
Planning and the Built Environment	0.08	0.55
Emergency Services	0.23	0.52
Community Capital	0.05	0.49
Information Access	0.31	0.45
Coping Capacity Sub-index (Mean+OWA)	0.09	0.49
Coping Capacity Sub-index (Arithmetic mean)	0.11	0.49
Coefficient of variation	1.12	0.08

4.2.5 Mapped coping capacity index

The mapped output of the coping capacity index is shown in Figure 4.7. Maps showing State/Territory and major metropolitan area resolution are provided in Appendix 4D.

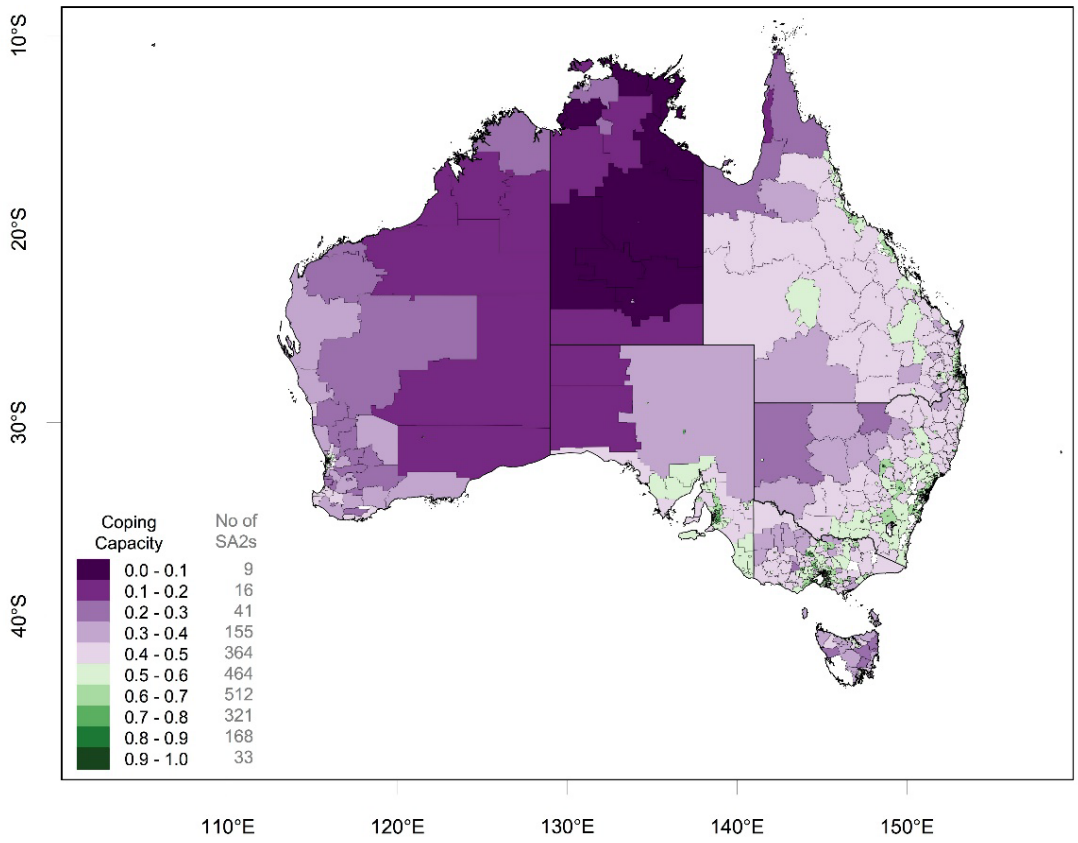


Figure 4.7: Mapped output of the coping capacity index values at a national level.

4.2.6 Sub-index relationships with composite index

4.2.6.1 National level

The correlations at national level between individual theme sub-indices and the coping capacity sub-index are shown in Table 4.9. The magnitude of the correlation gives guidance as to which themes have the most influence on the value of the coping capacity sub-index. The corresponding scatter plots and histograms are given in Figure 4.8.

Economic capital has the strongest influence on the coping capacity sub-index (Table 4.9). This is consistent with the economic capital theme having somewhat higher correlations with the other themes.

Table 4.9: Correlation between theme sub-index values and coping capacity index values, at a national level.

Theme sub-index	Correlation with Coping Capacity Sub-index
Economic Capital	0.70
Planning and the Built Environment	0.56
Information Access	0.56
Emergency Services	0.49
Community Capital	0.27
Social Character	0.26

4.2.6.2 Regional level

Disaggregation of the correlations between the theme sub-indices and the coping capacity sub-index to SA4 level (larger geographic areas containing around 20 SA2s) shows whether there are any regional differences in the patterns of correlations between sub-indices that result in corresponding differences in the relationships between the theme sub-indices and the coping capacity sub-index (Figure 4.9). The scatter plots suggest that, for most of the themes, the influences of the theme sub-indices on the coping capacity sub-index are much the same in metropolitan areas as they are in regional and remote Australia (Figure 4.9). The exception is the information access theme, where in metropolitan areas there is a range of correlations from positive through to negative, while in regional and remote areas the information access theme sub-index is generally positively correlated with the coping capacity sub-index. This implies that, in regional and remote areas, the coping capacity is influenced more by information access than it is in metropolitan areas.

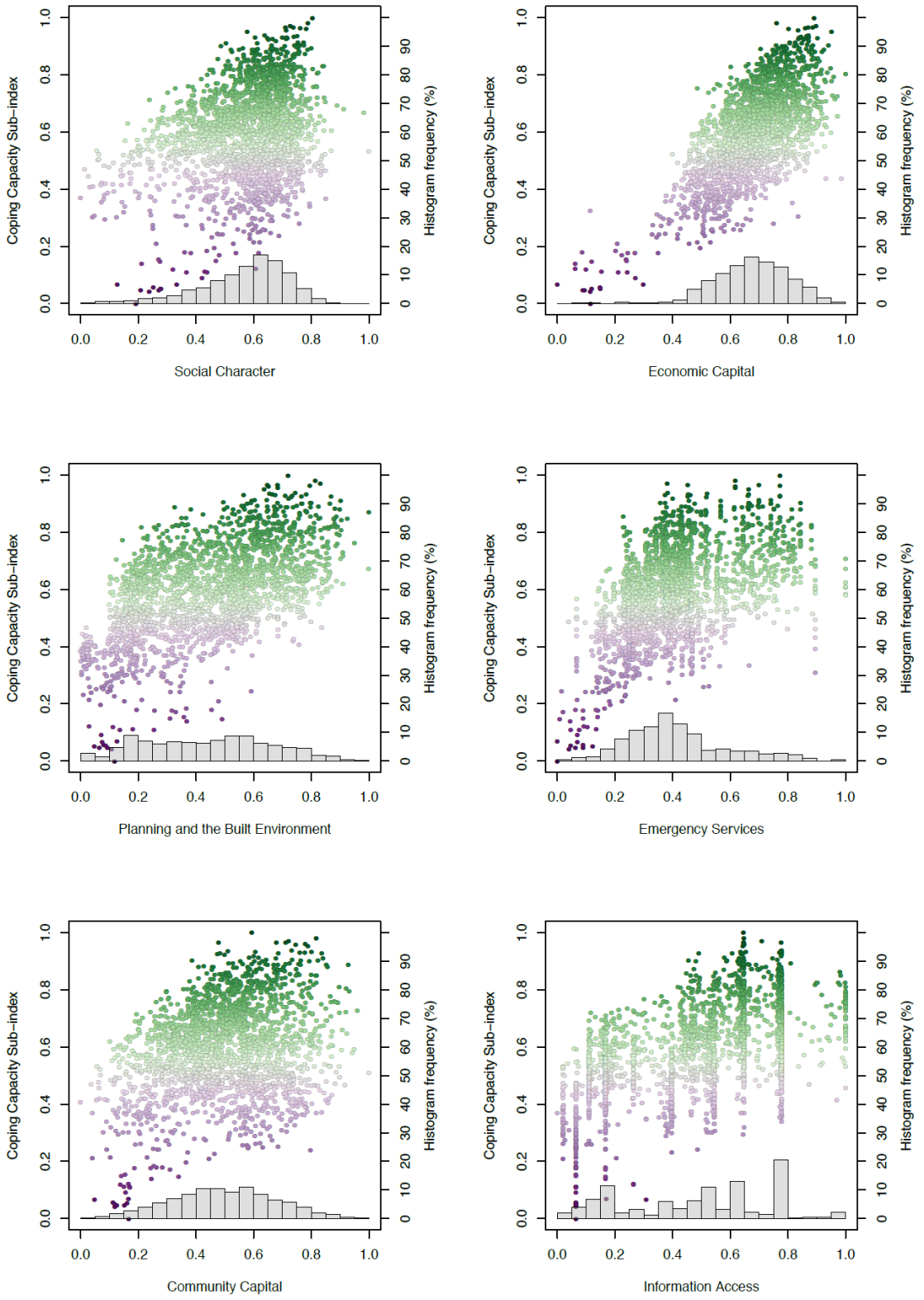


Figure 4.8: Scatterplots showing the relationships between coping capacity sub-index values and component sub-indices at a national level.

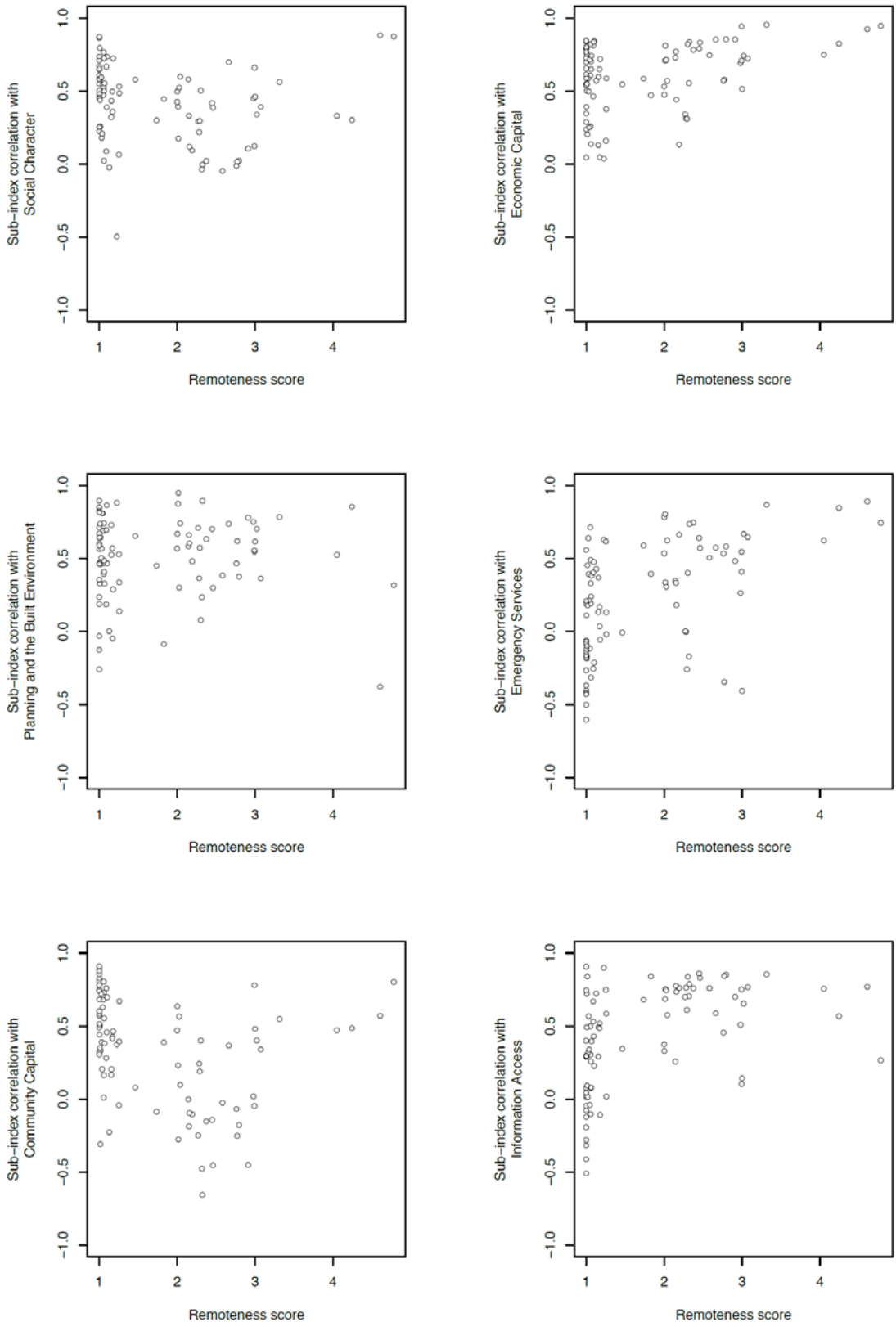


Figure 4.9: Correlation between theme sub-indexes and coping capacity sub-index values, at a regional level. Remoteness of 1 is metropolitan areas through to 5, very remote areas.

4.3 STATISTICAL RESULTS FOR THE ADAPTIVE CAPACITY SUB-INDEX

4.3.1 Transformation

The adaptive capacity sub-index is calculated by aggregating the following theme sub-indices: social and community engagement; and, governance and leadership. These theme sub-indices were themselves derived from various indicators and so in some instances required rescaling and transformation before aggregation into the adaptive capacity sub-index. Transformation details are shown in Table 4.10 and the results of transformation in Table 4.11. Raw and transformed sub-index values are outlined in Appendix 4E.

Table 4.10: Transformation details for sub-indexes used to form the adaptive capacity index.

Theme	Transformation details		
	Skewness transform	Exponent	Coefficient for kurtosis transform
Governance and Leadership	Power transform	0.52	0.00
Social and Community Engagement	Power transform	1.63	0.00

Table 4.11: Transformation results for sub-indexes used to form the adaptive capacity index.

Theme	Raw data pre-transform			Post-transform		
	Skewness	Kurtosis	Outliers	Skewness	Kurtosis	Outliers
Governance and Leadership	0.55	-0.50	0	0.00	-0.46	5
Social and Community Engagement	-0.61	0.87	38	-0.00	-0.26	1

4.3.2 Correlation

The correlation between the governance and leadership theme sub-index and the social and community engagement theme sub-index is 0.22. With a correlation this low, compensability issues need to be considered, since there will be a substantial number of SA2s where low values of one sub-index are being aggregated with high values of the other sub-index and vice versa.

4.3.3 Measurement model

A simple formative model is appropriate, given there are only two sub-indices to be aggregated. The low correlation between them also rules out the possibility of a latent causal factor (in which situation, a reflective model would be appropriate).

4.3.4 Aggregation

With just two sub-indices to aggregate, it is possible to use the discrete Choquet integral for the aggregation process. It can be reasonably assumed that governance and leadership is more important than social and community engagement, since the latter is unlikely to be able to fully make up for a lack of the former. A fuzzy measure vector of {} = 0, {Governance and Leadership} = 0.6, {Social and Community Engagement} = 0.4, {Governance and Leadership, Social and Community Engagement} = 1.0 meets these conditions. This fuzzy measure has an orness of 0.375, which reflects the belief that the constituent sub-indices in adaptive capacity can substitute for each other in aggregation to a moderate extent.

With only two theme sub-indices being aggregated, there is a greater likelihood that different methods of aggregation will give the same or close values for the adaptive capacity sub-index (Figure 4.10). This can be seen at the low coefficient of variation side of Figure 4.10. The rows of points in the centre and right side of Figure 4.10 are artefacts caused by the original disaggregation of indicators from State and large regions to SA2 level.

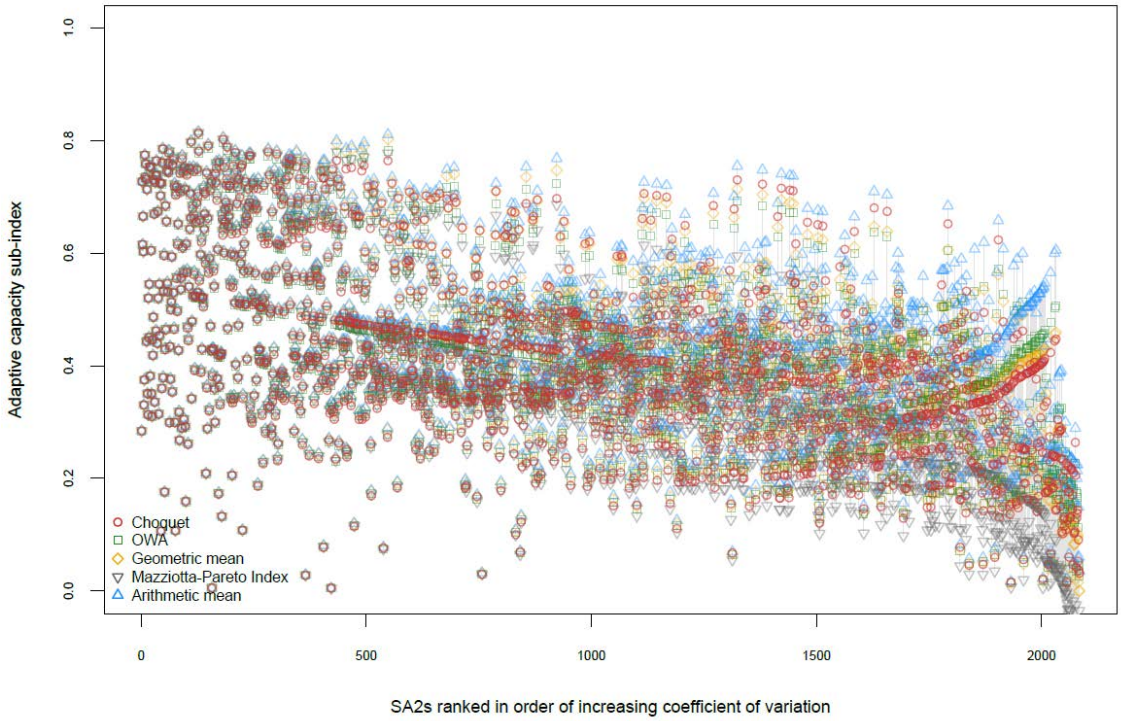


Figure 4.10: Comparison of aggregation methods for the adaptive capacity index.

The example SA2s in Table 4.12 show that with the aggregation of only two theme sub-indices, the differences in the values of adaptive capacity sub-index between the discrete Choquet integral and the arithmetic mean are not as great as in some of the other aggregations in the Australian Natural Disaster Resilience Index.

Table 4.12: Example SA2s showing adaptive capacity sub-index values obtained using different aggregation functions.

Theme	Rescaled transformed Indicator values	
	High c.v. (Yarrabah)	Low c.v. (Walgett - Lightning Ridge)
Governance and Leadership	0.00	0.28
Social and Community Engagement	0.12	0.28
Adaptive Capacity Sub-index (Choquet)	0.04	0.28
Adaptive Capacity Sub-index (Arithmetic mean)	0.06	0.28
Coefficient of variation	1.41	0.00

4.3.5 Mapped adaptive capacity index

The mapped output of the adaptive capacity index is shown in Figure 4.11. Maps showing State/Territory and major metropolitan area resolution are provided in Appendix 4F.

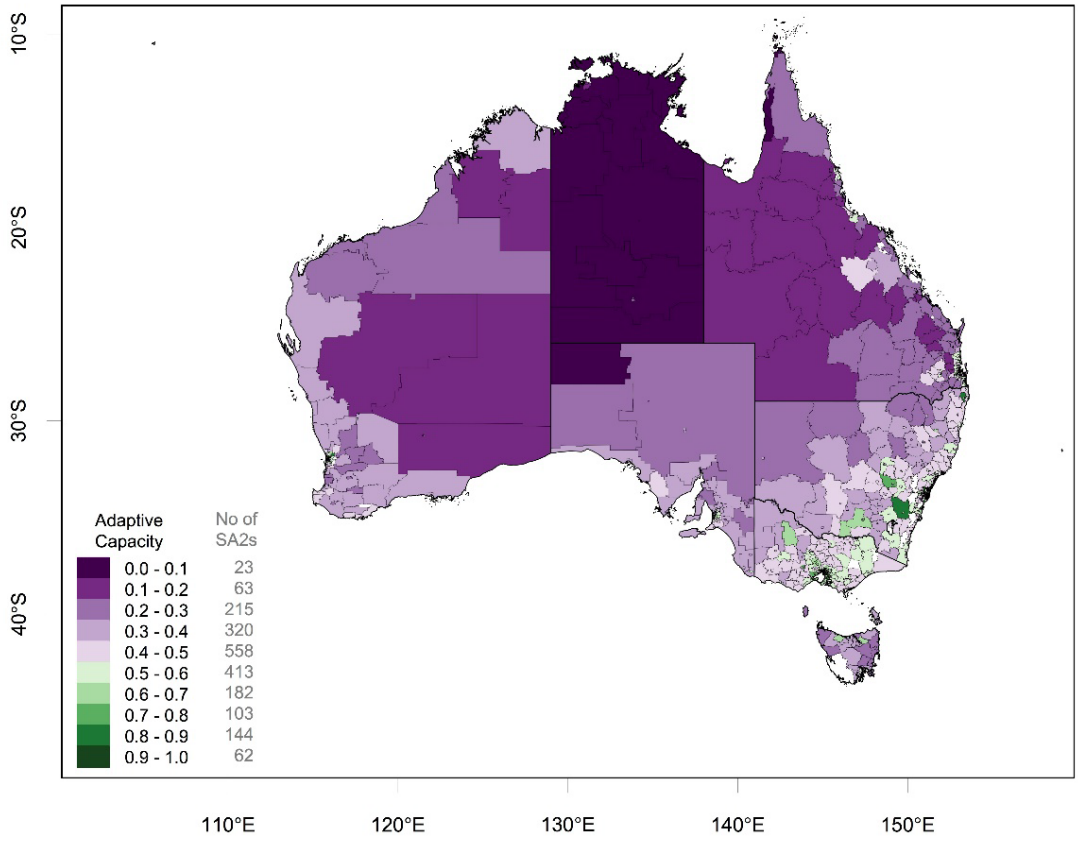


Figure 4.11: Mapped output of the adaptive capacity sub-index values at a national level.

4.3.6 Sub-index relationships with composite index

4.3.6.1 National level

The correlations at national level between individual theme sub-indices and the adaptive capacity sub-index are shown in Table 4.13. The magnitude of the correlation gives guidance as to which themes have the most influence on the value of the adaptive capacity sub-index. The corresponding scatter plots and histograms are given in Figure 4.12.

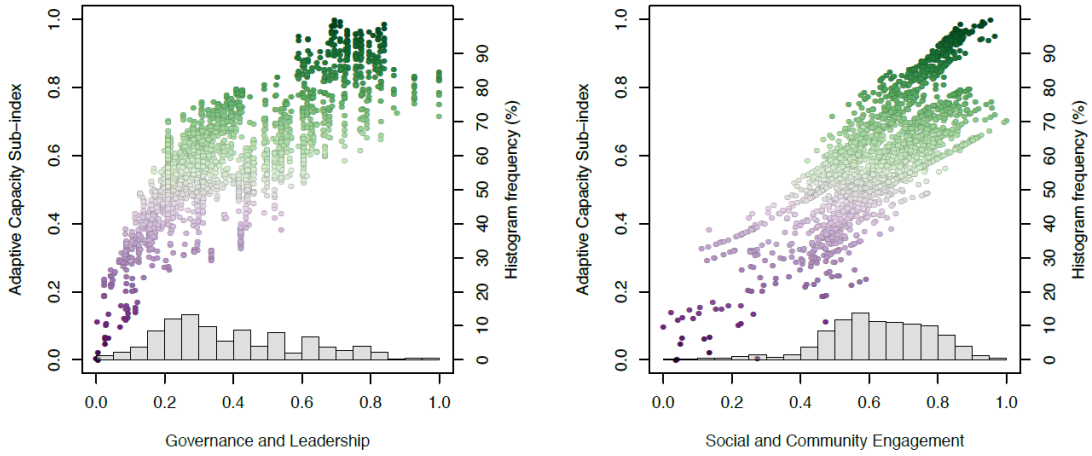


Figure 4.12: Scatterplots showing the relationships between adaptive capacity index values and component sub-indices at a national level.

As expected with just two theme sub-indices being aggregated, both sub-indices are well correlated with the adaptive capacity sub-index. The higher correlation for governance and leadership reflects the greater weight accorded this theme in the fuzzy measure used in the aggregation by discrete Choquet integral.

Table 4.13: Correlation between theme sub-index values and adaptive capacity sub-index values, at a national level.

Theme Sub-index	Correlation with Adaptive Capacity Sub-index
Governance and Leadership	0.89
Social and Community Engagement	0.62

4.3.6.2 Regional level

Disaggregation of the correlations between the theme sub-indices and the Adaptive Capacity sub-index to SA4 level (larger geographic areas containing around 20 SA2s) shows whether there are any regional differences in the patterns of correlations between sub-indices that result in corresponding differences in the relationships between the theme sub-indices and the adaptive capacity sub-index (Figure 4.13). The scatter plots suggest that, while there are some metropolitan and regional areas where there is little correlation or negative correlation between the theme sub-indices and the adaptive capacity sub-index, in remote areas the correlation is consistently positive (Figure 4.13).

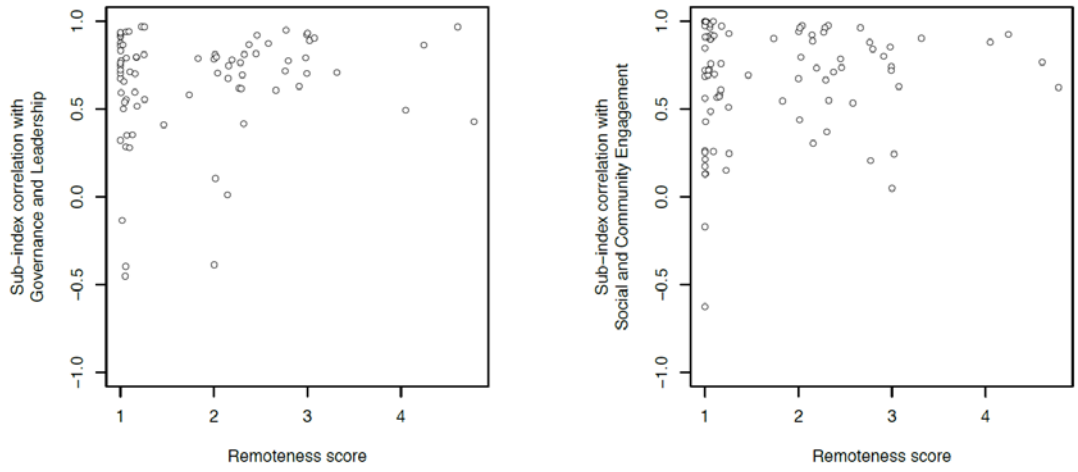
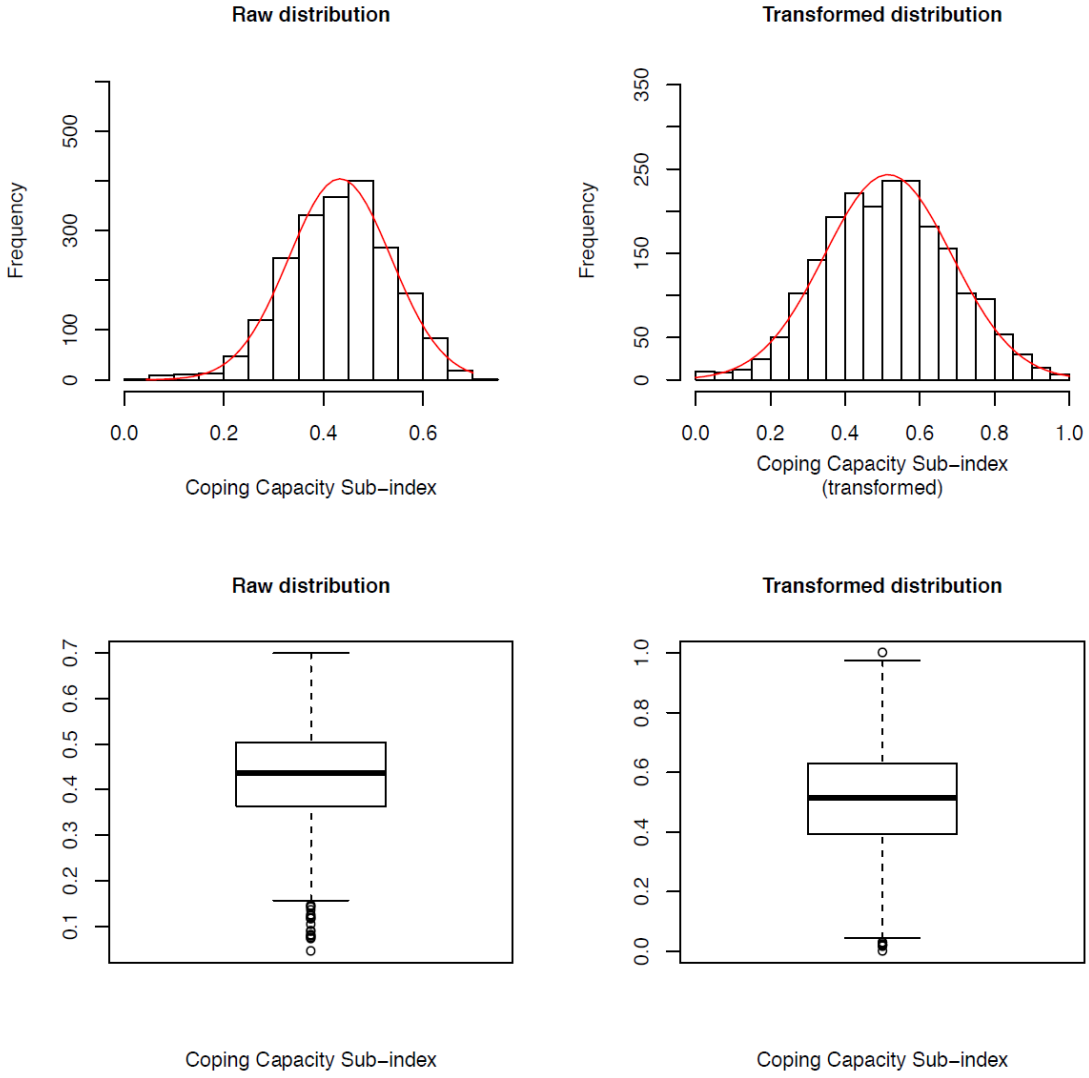


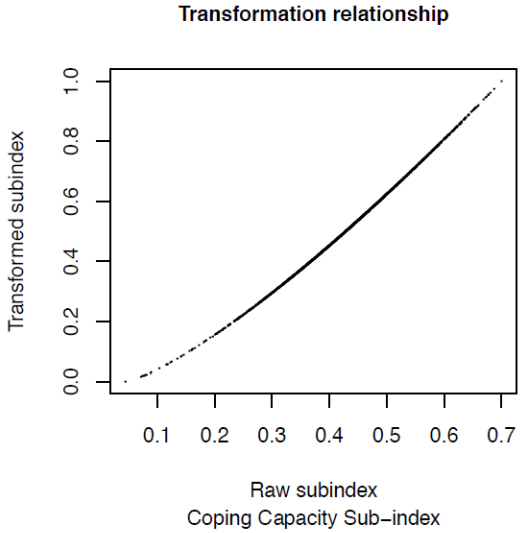
Figure 4.13: Correlation between theme sub-indexes and adaptive capacity sub-index values, at a regional level. Remoteness of 1 is metropolitan areas through to 5, very remote areas.

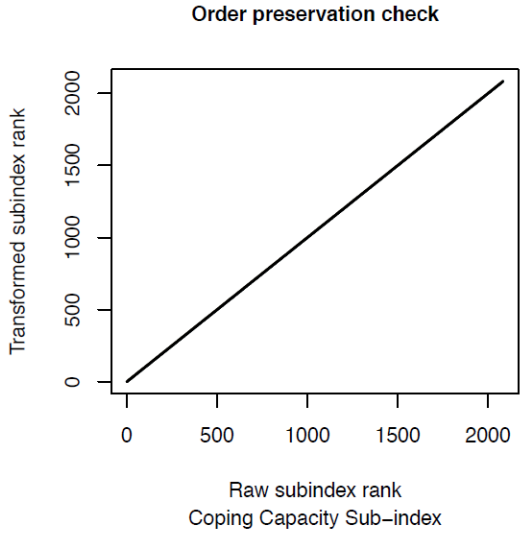
APPENDIX 4A – AUSTRALIAN NATURAL DISASTER RESILIENCE INDEX TRANSFORMATION DETAILS

Appendix 4A shows the raw and transformed sub-indexes used to compute the Australian Natural Disaster Resilience Index.



Appendix 4A (cont.)





TRANSFORMATION DETAILS

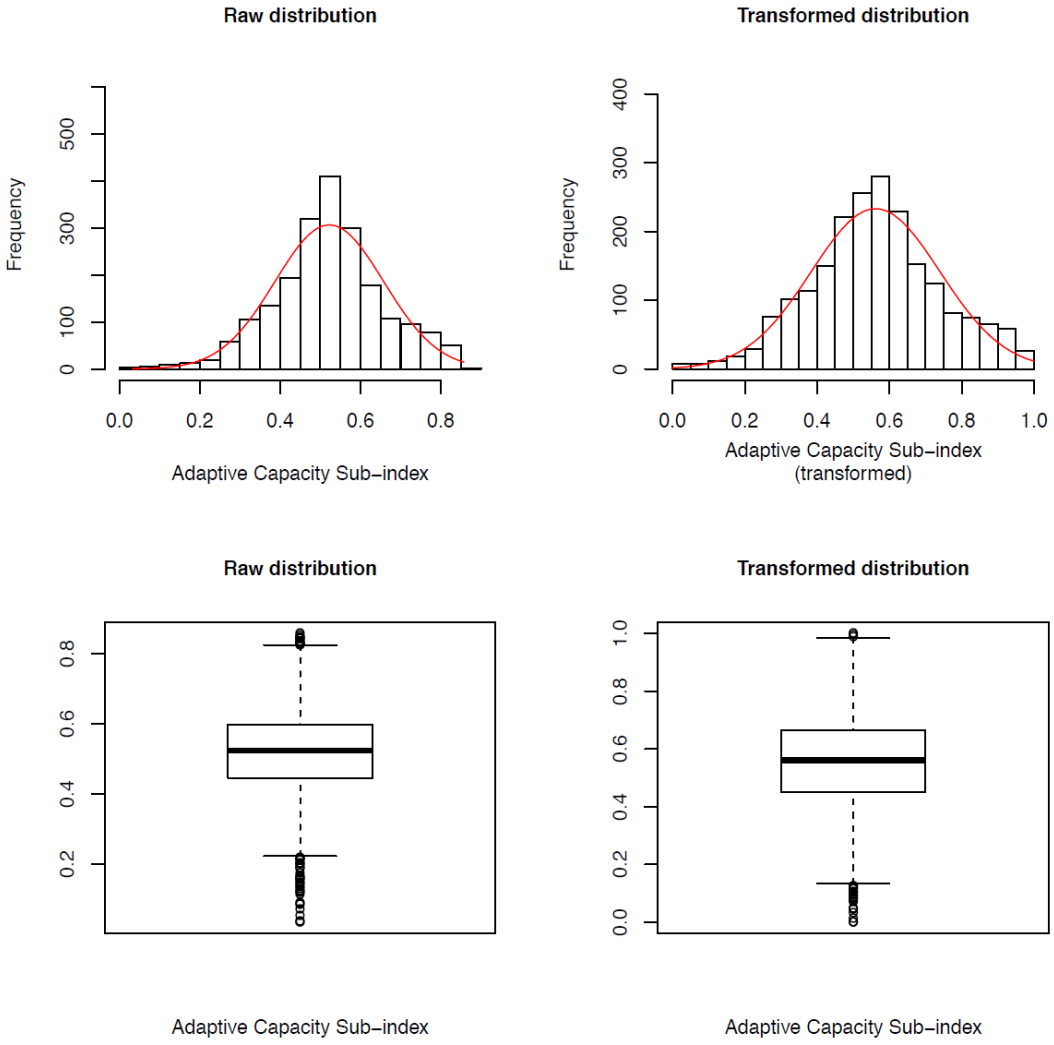
Unreversed

Skewness:
Power transform, exponent: 1.29
Pre–transform skewness: –0.3
Post–transform skewness: –0.0

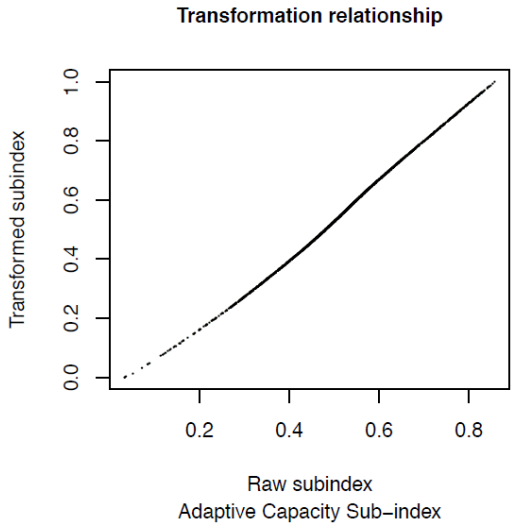
Kurtosis:
Coefficient: 0.00
Pre–transform kurtosis: 0.2
Post–transform kurtosis: –0.2

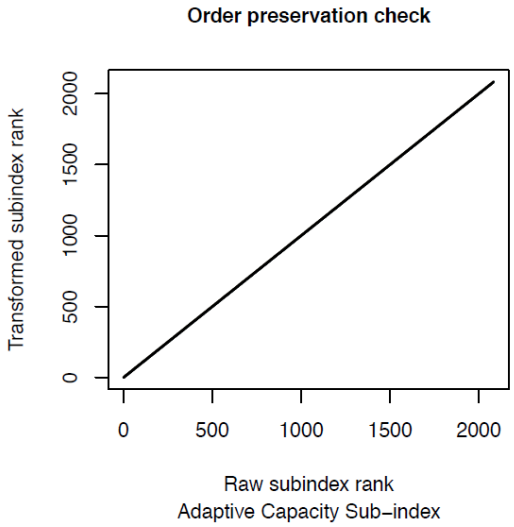
Outliers:
Pre–transform outlier count: 9
Post–transform outlier count: 0

Appendix 4A (cont.)



Appendix 4A (cont.)





TRANSFORMATION DETAILS

Unreversed

Skewness:
Power transform, exponent: 1.10
Pre–transform skewness: –0.1
Post–transform skewness: 0.0

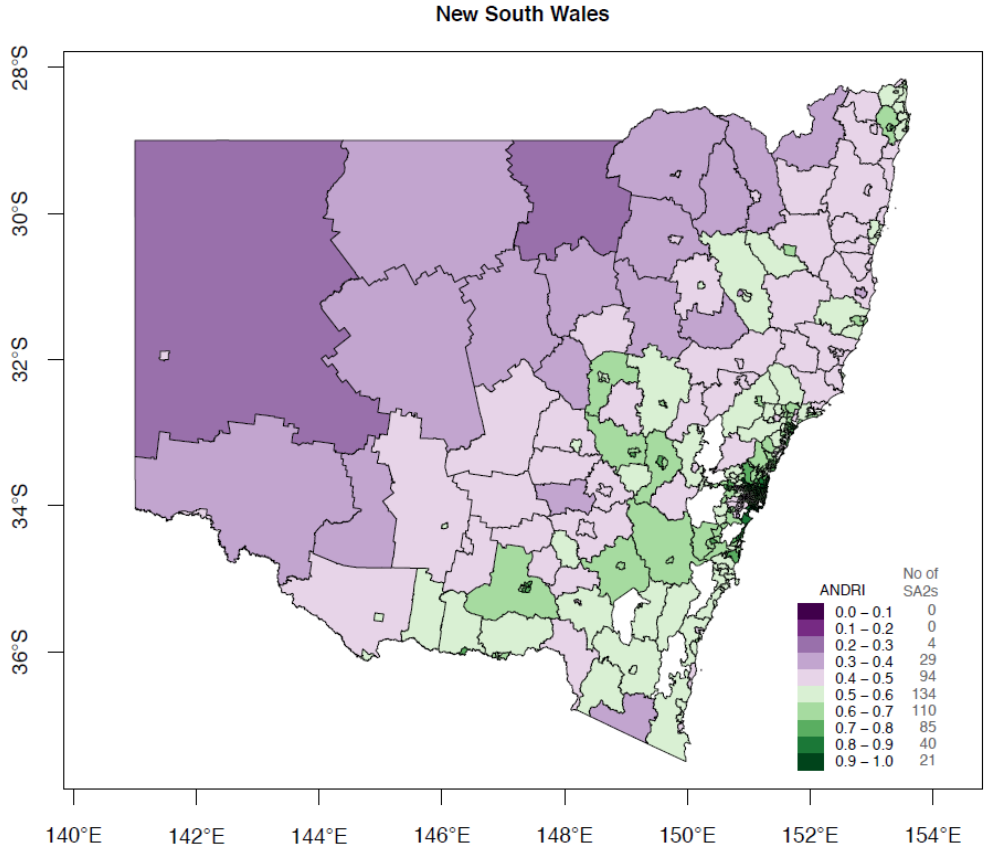
Kurtosis:
Coefficient: 0.08
Pre–transform kurtosis: 0.4
Post–transform kurtosis: 0.0

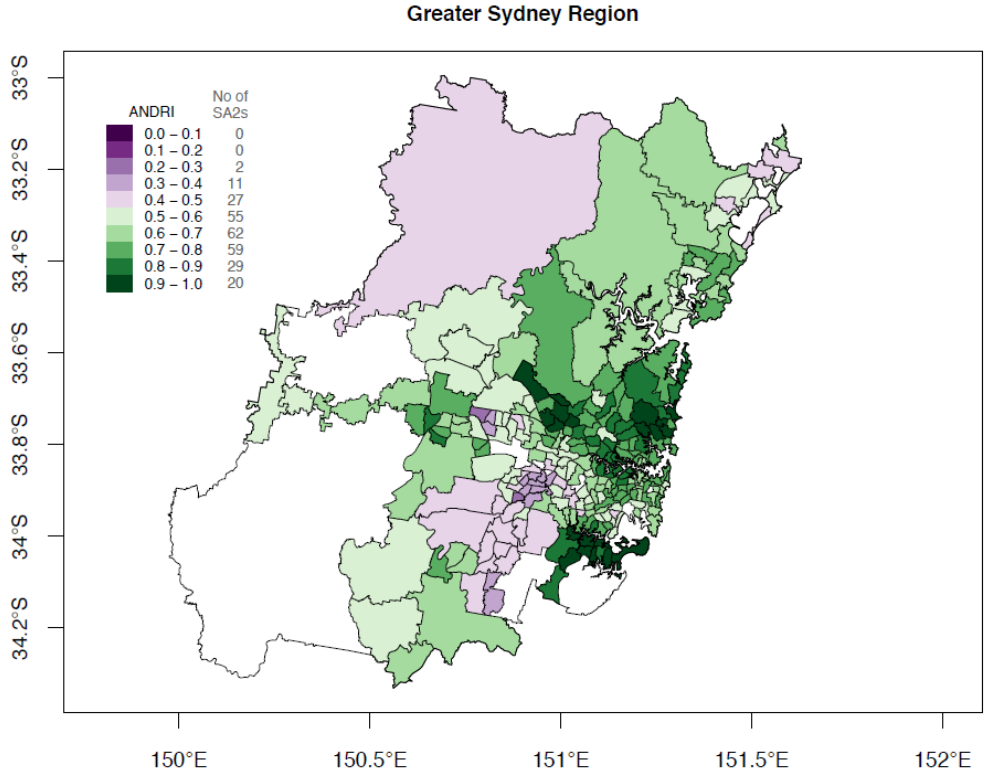
Outliers:
Pre–transform outlier count: 5
Post–transform outlier count: 0

APPENDIX 4B – MAPS: AUSTRALIAN NATURAL DISASTER RESILIENCE INDEX VALUES BY STATE/TERRITORY AND METROPOLITAN AREAS

Appendix 4B maps the Australian Natural Disaster Resilience Index at the resolution of individual States and Territories, and major metropolitan areas.

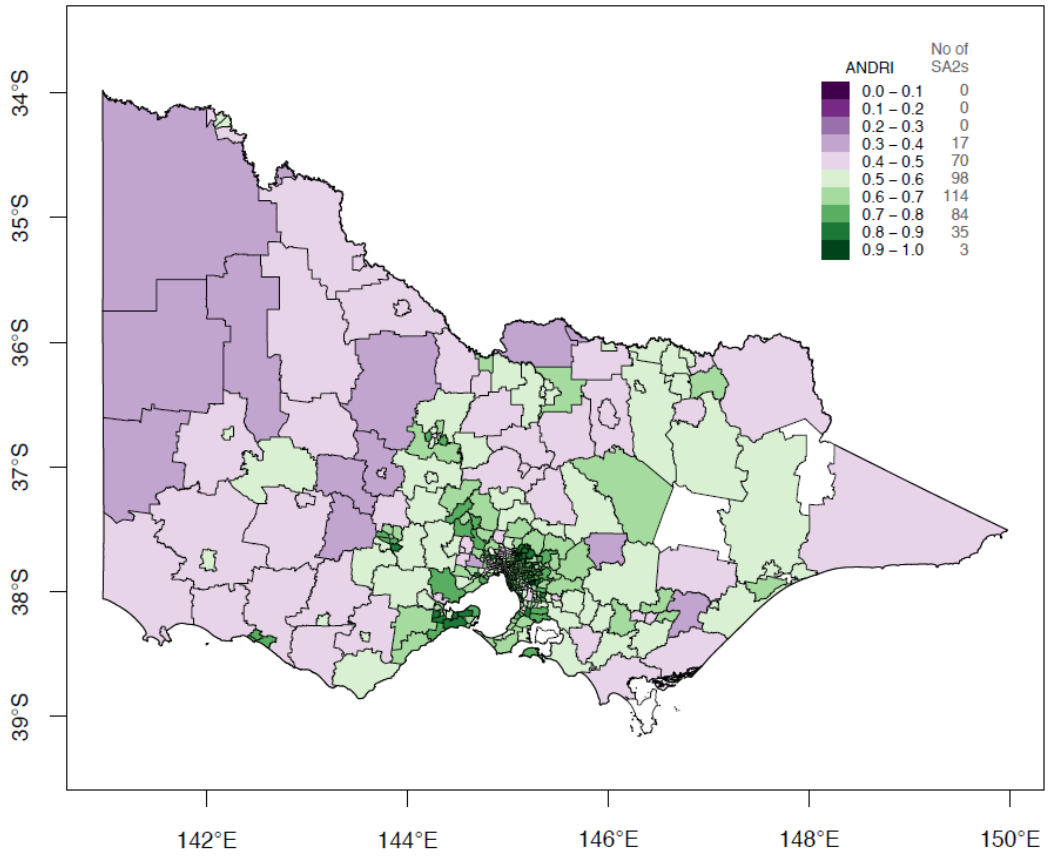
Appendix 4B


New South Wales
28°S
30°S
32°S
34°S
36°S
140°E
142°E
144°E
146°E
148°E
150°E
152°E
154°E
ANDRI
No of SA2s
0.0 – 0.1 0
0.1 – 0.2 0
0.2 – 0.3 4
0.3 – 0.4 29
0.4 – 0.5 94
0.5 – 0.6 134
0.6 – 0.7 110
0.7 – 0.8 85
0.8 – 0.9 40
0.9 – 1.0 21

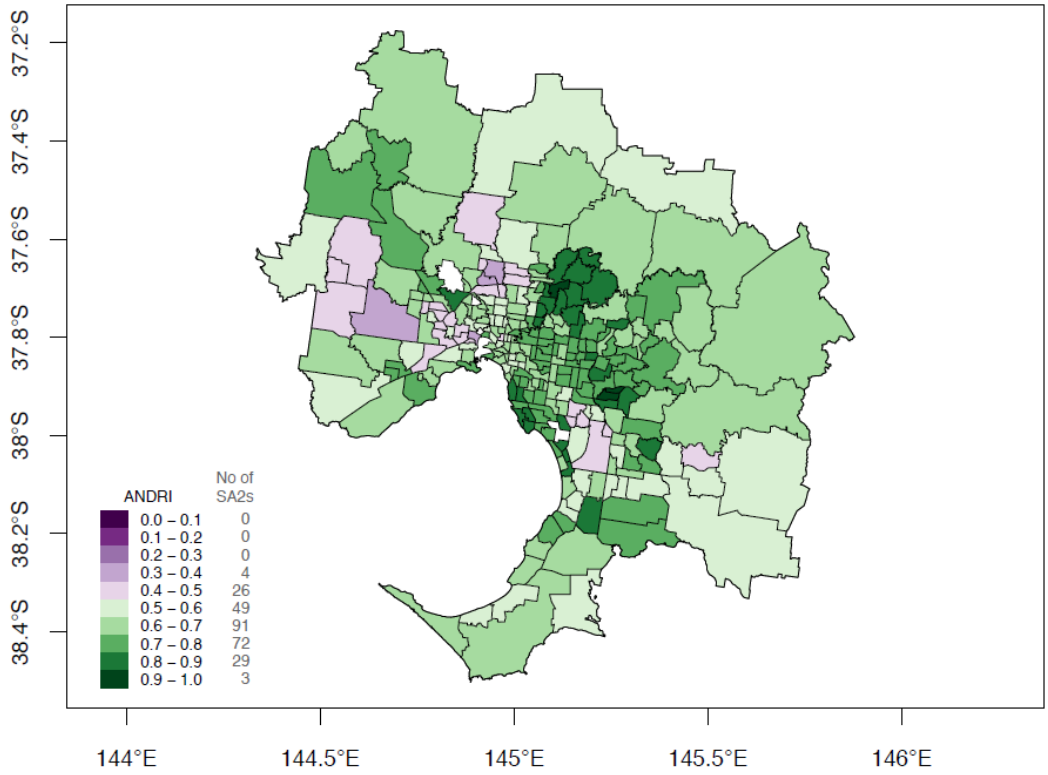

Greater Sydney Region
33°S
33.2°S
33.4°S
33.6°S
33.8°S
34°S
34.2°S
150°E
150.5°E
151°E
151.5°E
152°E
ANDRI
No of SA2s
0.0 – 0.1 0
0.1 – 0.2 0
0.2 – 0.3 2
0.3 – 0.4 11
0.4 – 0.5 27
0.5 – 0.6 55
0.6 – 0.7 62
0.7 – 0.8 59
0.8 – 0.9 29
0.9 – 1.0 20

Appendix 4B (cont.)

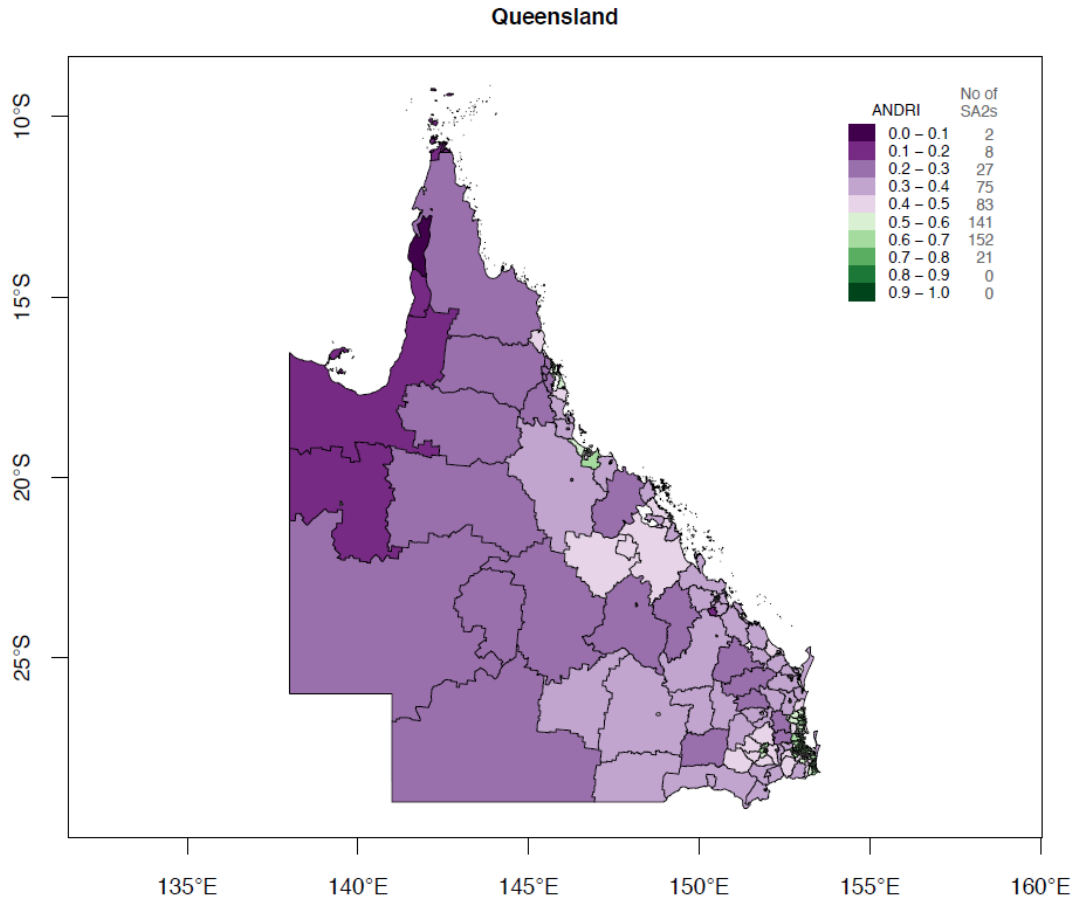
Victoria

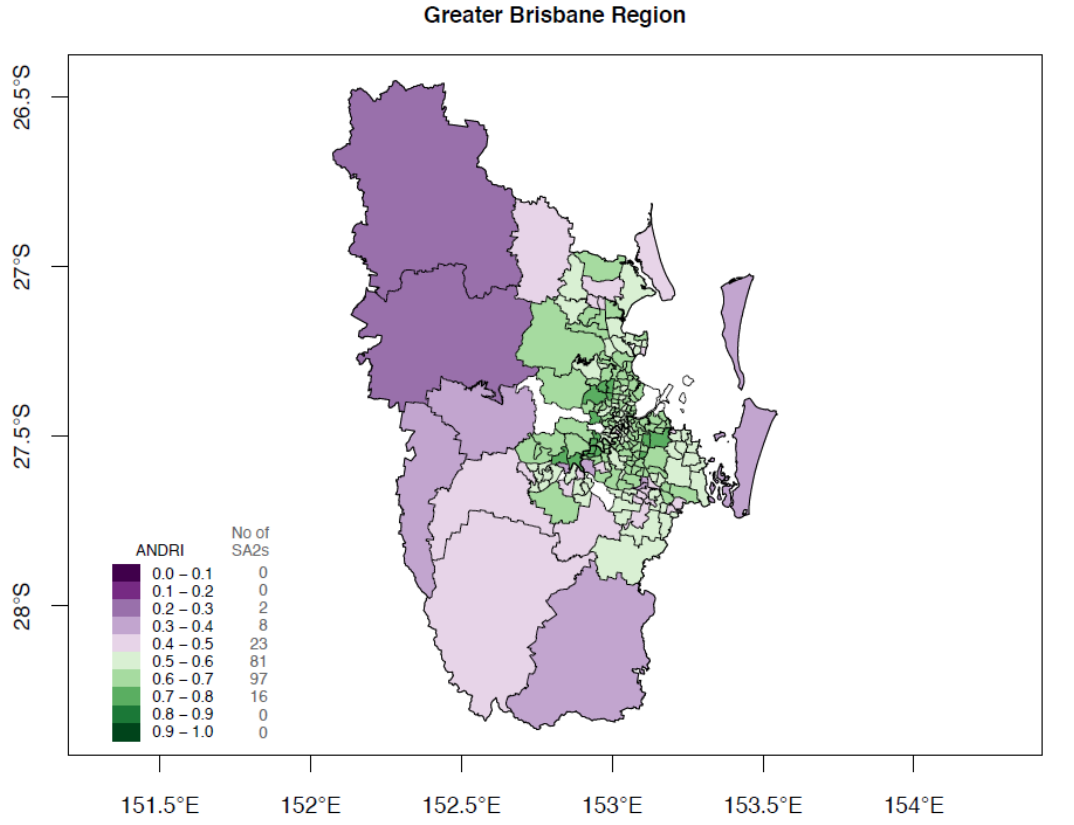


Greater Melbourne Region



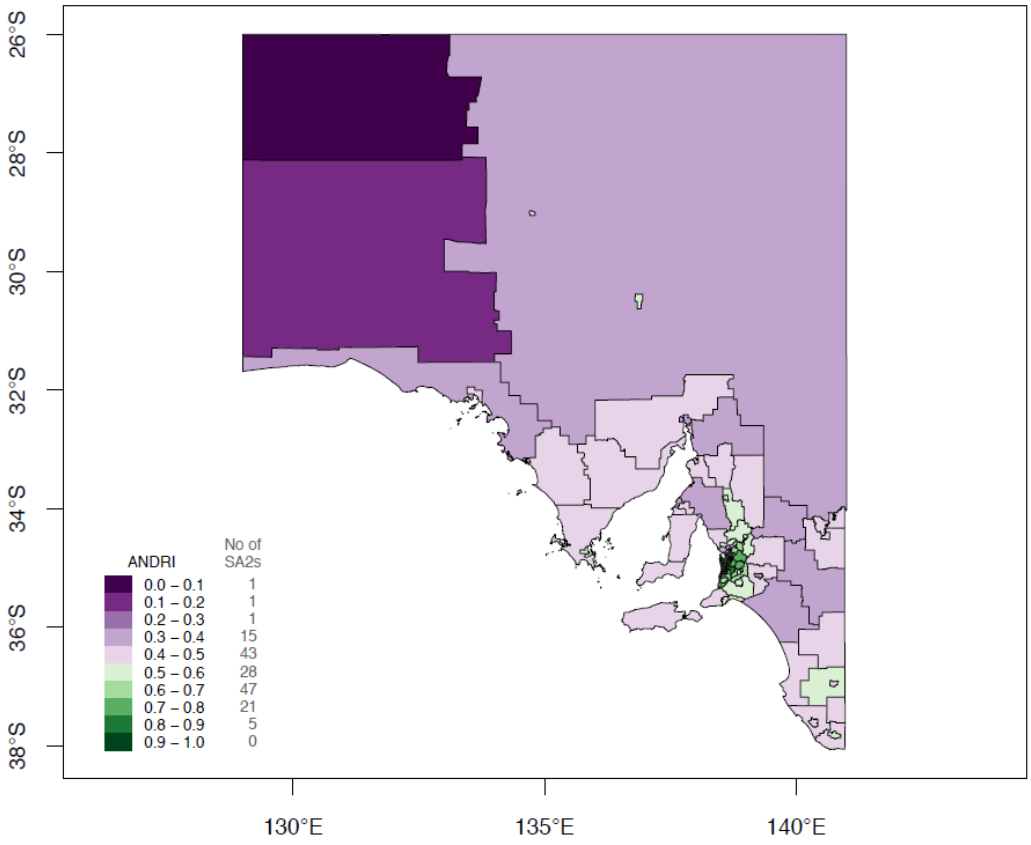
Appendix 4B (cont.)



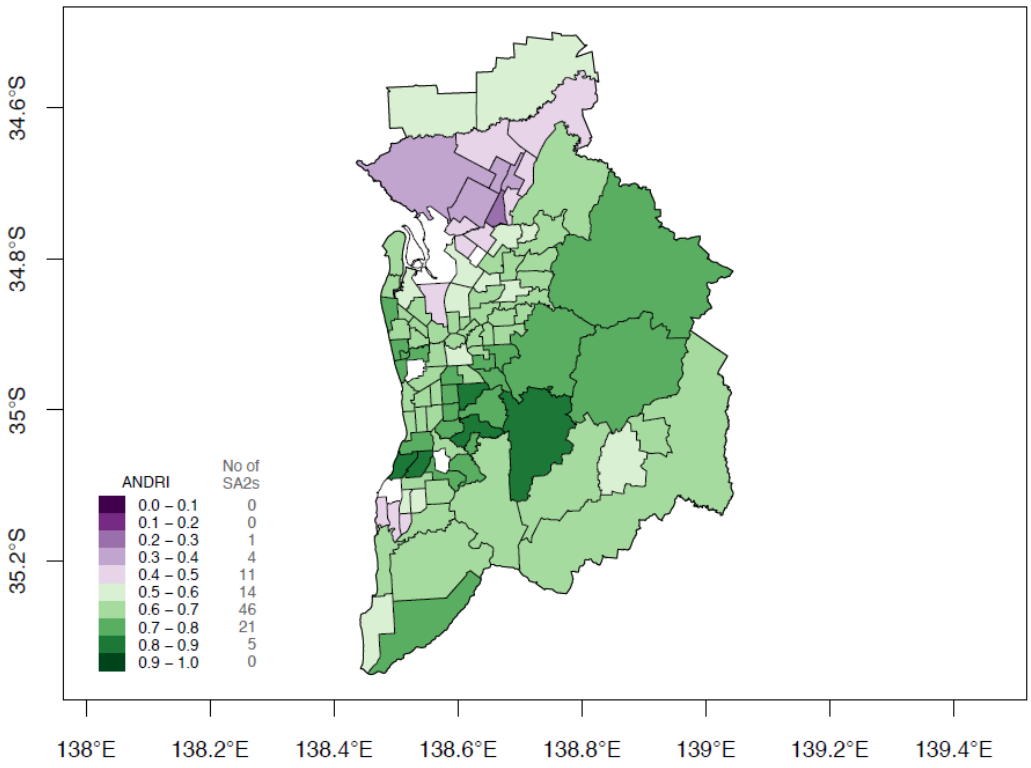


Appendix 4B (cont.)

South Australia

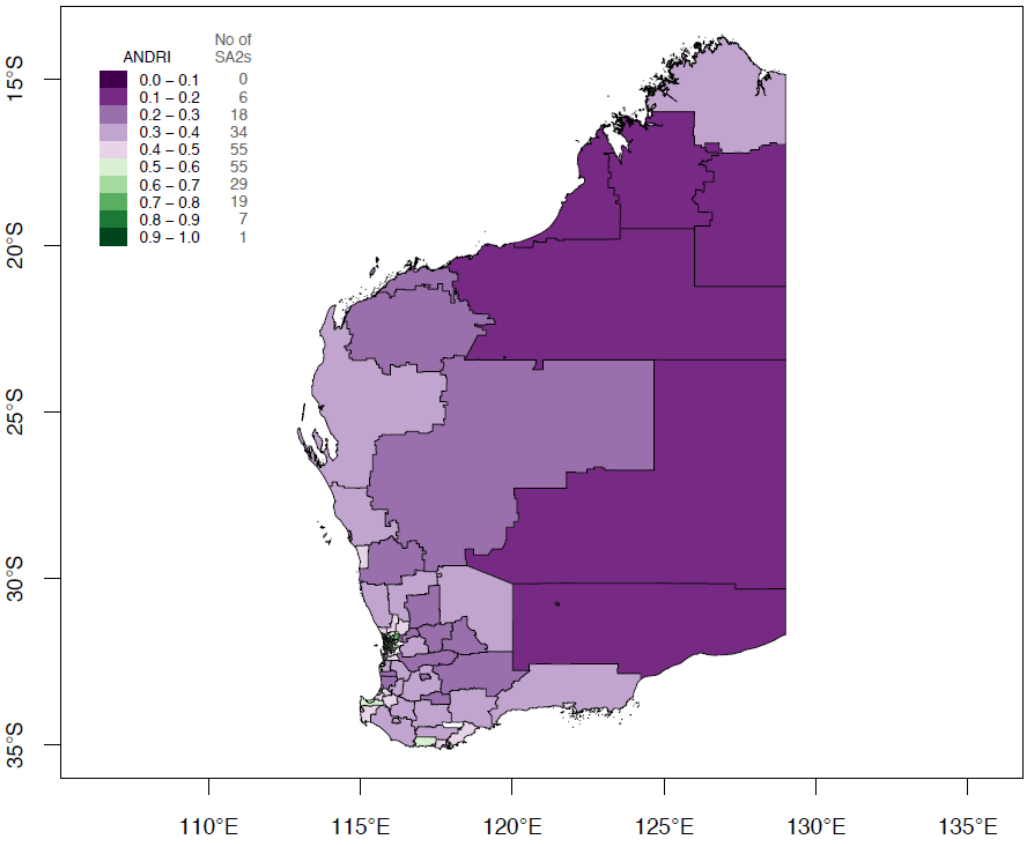


Greater Adelaide Region

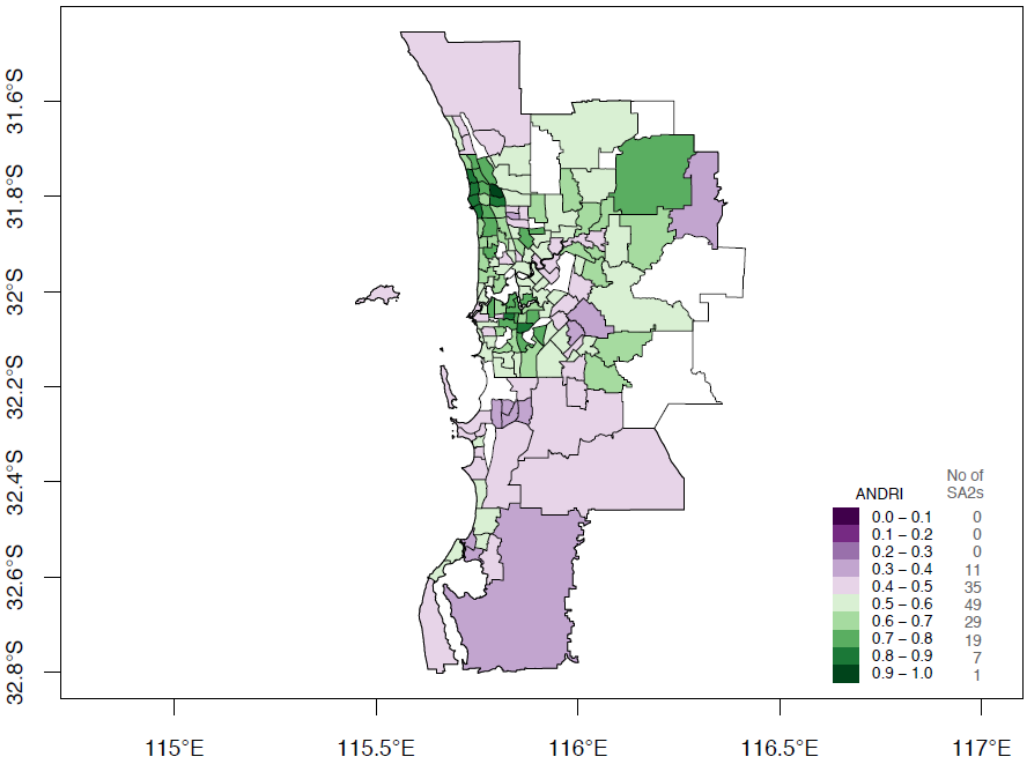


Appendix 4B (cont.)

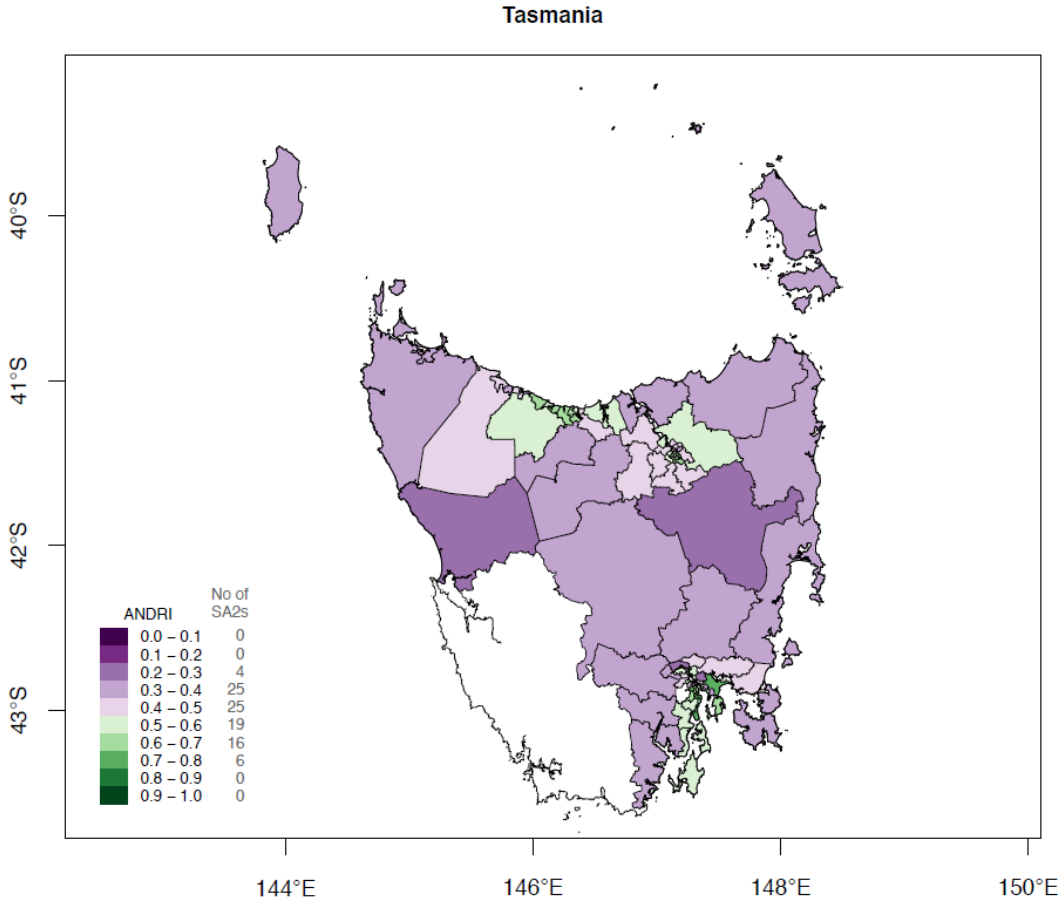
Western Australia

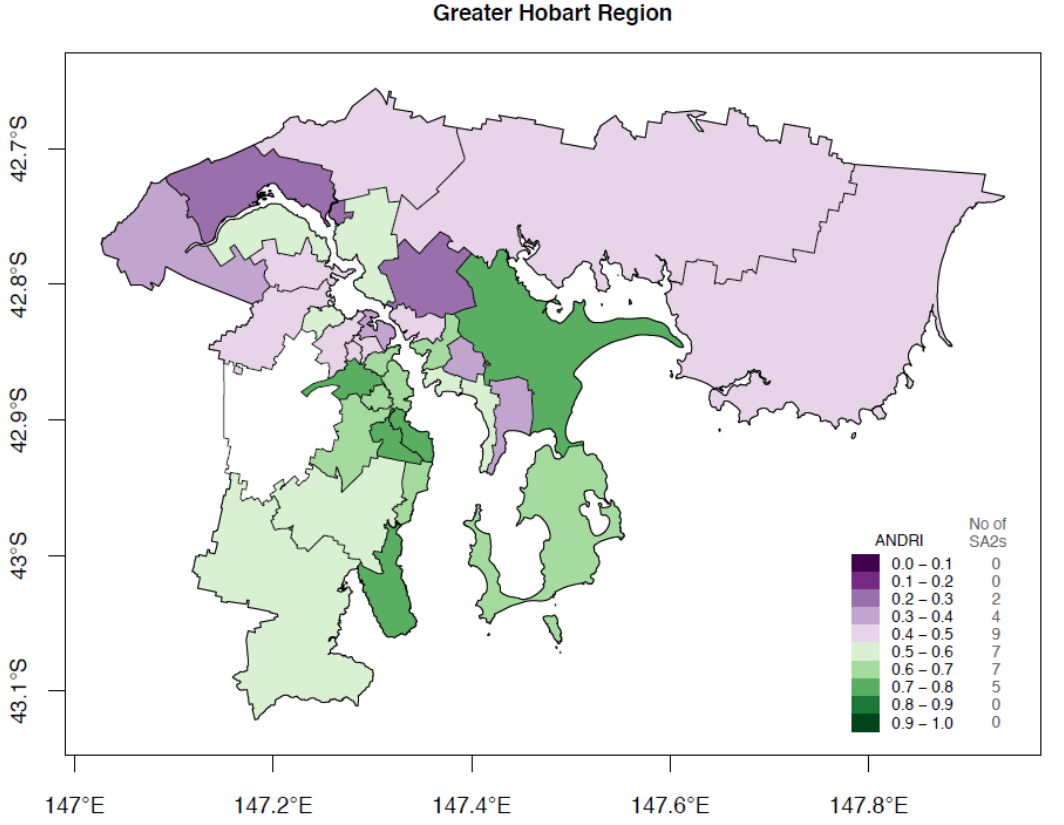


Greater Perth Region

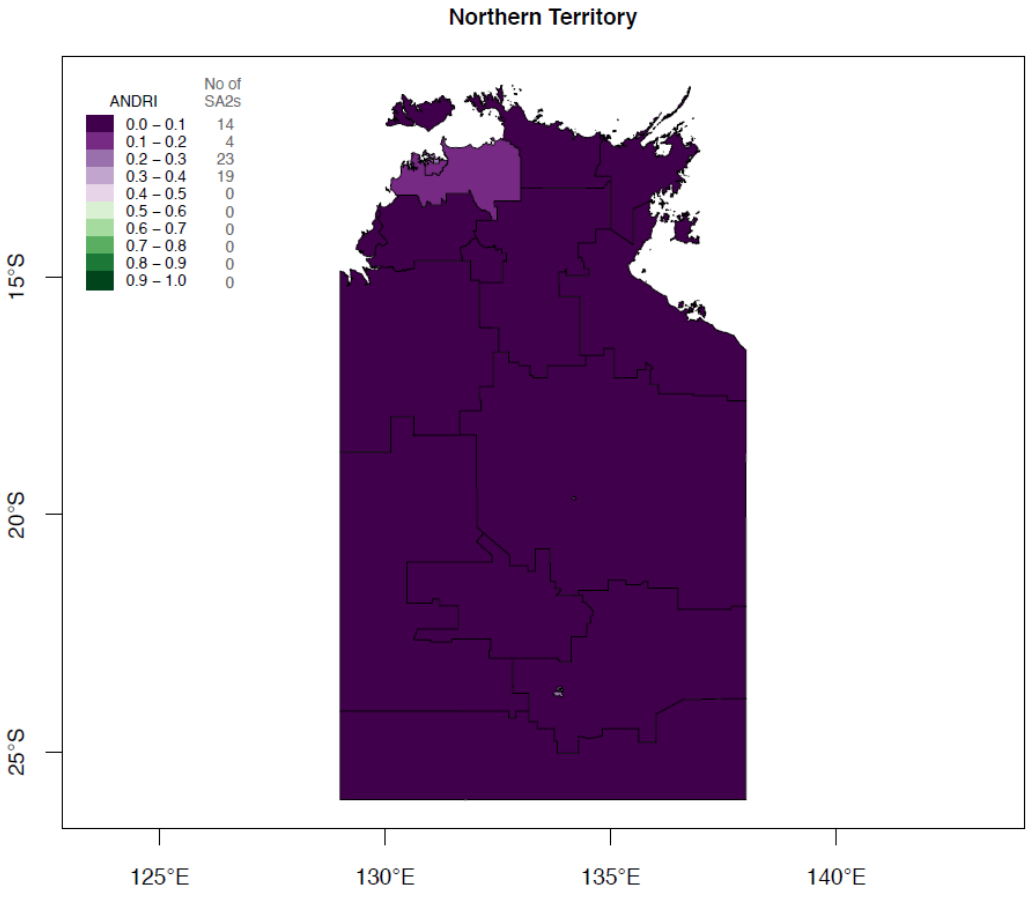


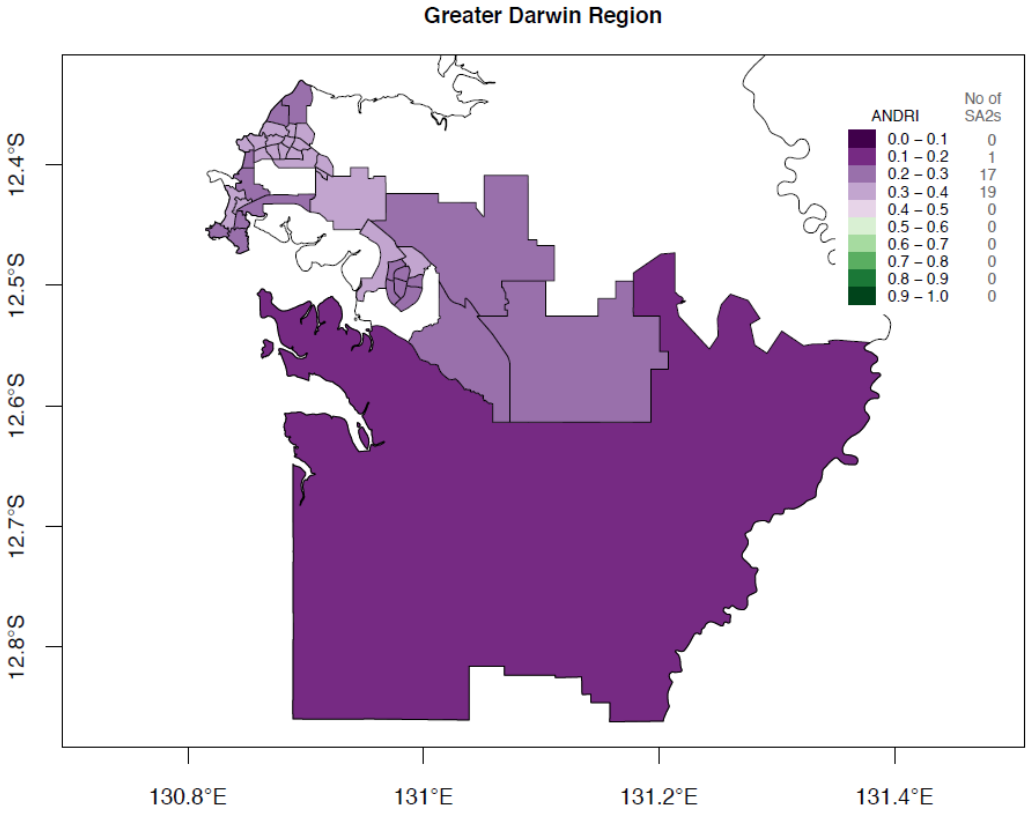
Appendix 4B (cont.)



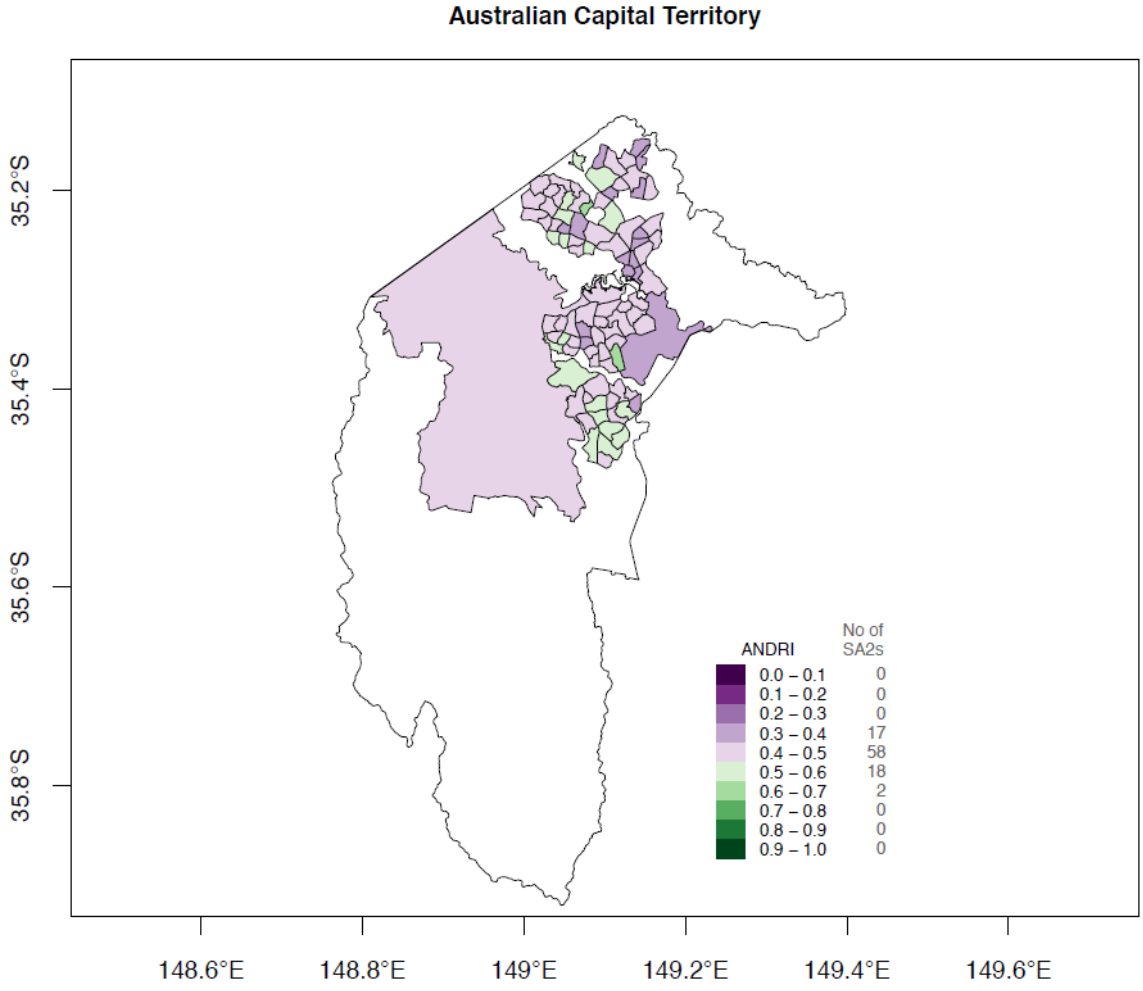


Appendix 4B (cont.)





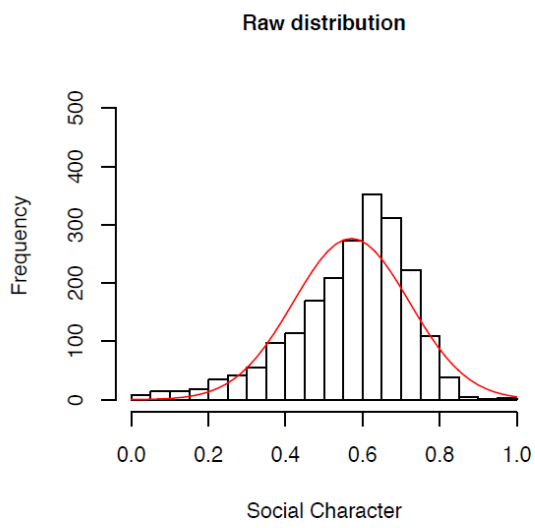
Appendix 4B (cont.)

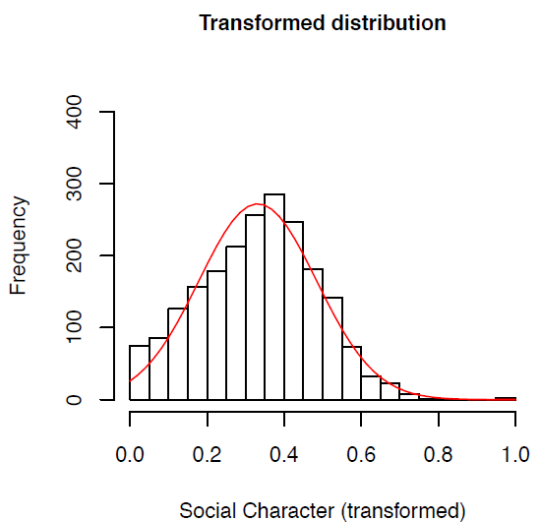


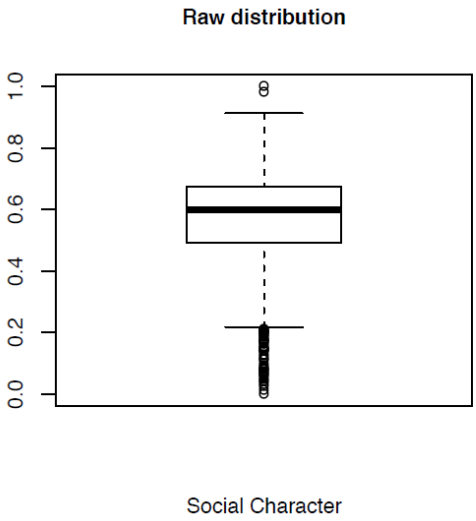
APPENDIX 4C – COPING CAPACITY SUB-INDEX TRANSFORMATION DETAILS

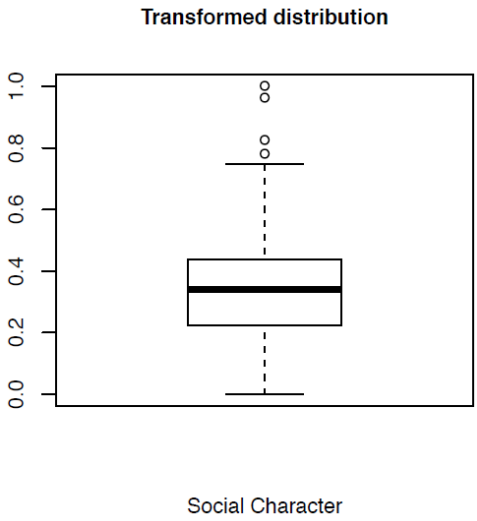
Appendix 4C shows the raw and transformed sub-indexes (social character, economic capital, planning and the built environment, emergency services, community capital and information access) used to compute the coping capacity sub-index.

Appendix 4C

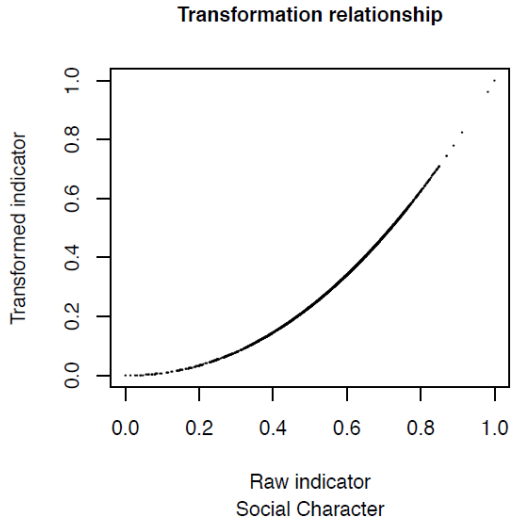

Raw distribution
Frequency
0
100
200
300
400
500
0.0
0.2
0.4
0.6
0.8
1.0
Social Character

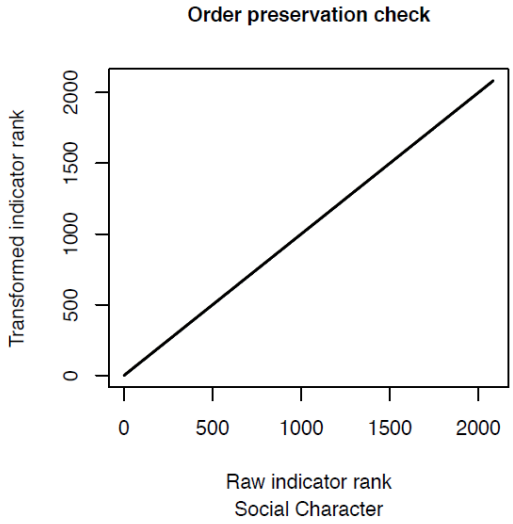

Transformed distribution
Frequency
0
100
200
300
400
0.0
0.2
0.4
0.6
0.8
1.0
Social Character (transformed)


Raw distribution
0.0
0.2
0.4
0.6
0.8
1.0
Social Character


Transformed distribution
0.0
0.2
0.4
0.6
0.8
1.0
Social Character

Appendix 4C (cont.)





TRANSFORMATION DETAILS

Unreversed

Skewness:
Power transform, exponent: 2.11
Pre–transform skewness: –0.9
Post–transform skewness: 0.0

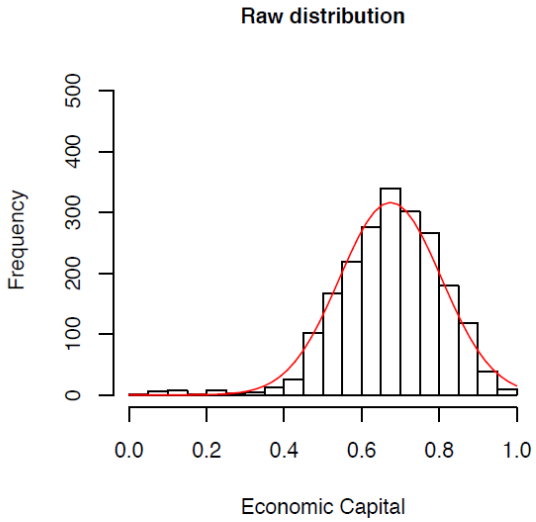
Kurtosis:
Coefficient: 0.00
Pre–transform kurtosis: 0.9
Post–transform kurtosis: –0.2

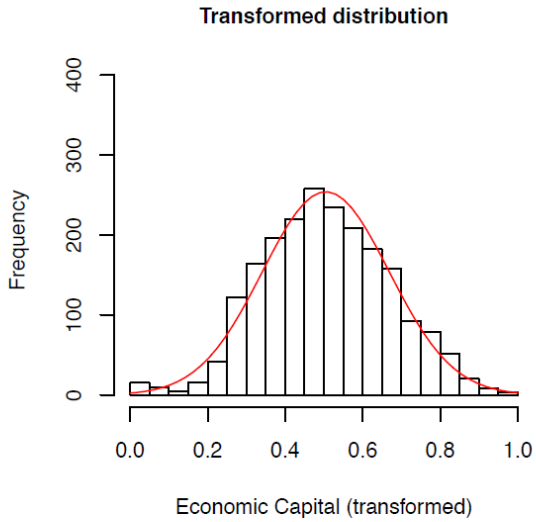
Outliers:
Pre–transform outlier count: 14
Post–transform outlier count: 2

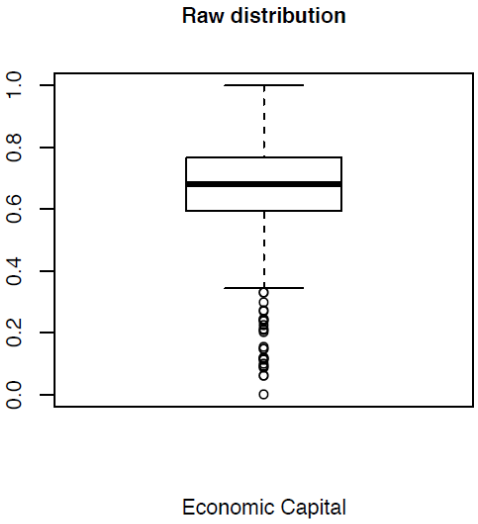
OUTLIER DETAILS

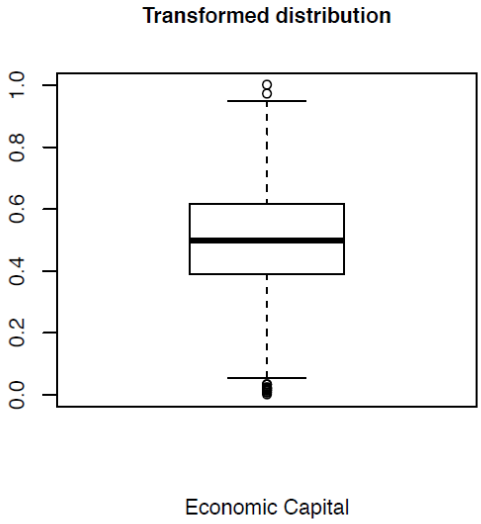
SA2	Value
Mackay Harbour	0.98
Hall	1.00

Appendix 4C (cont.)

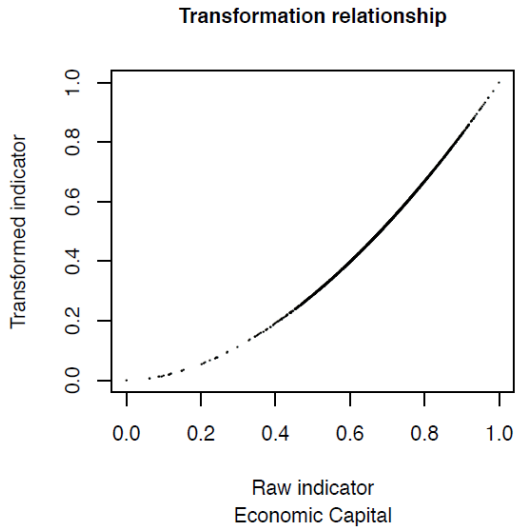


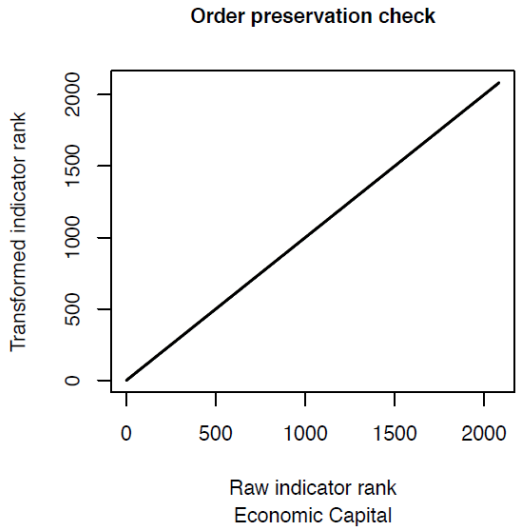






Appendix 4C (cont.)





TRANSFORMATION DETAILS

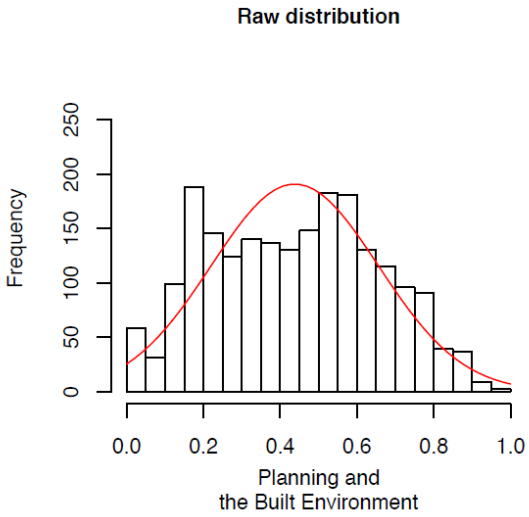
Unreversed

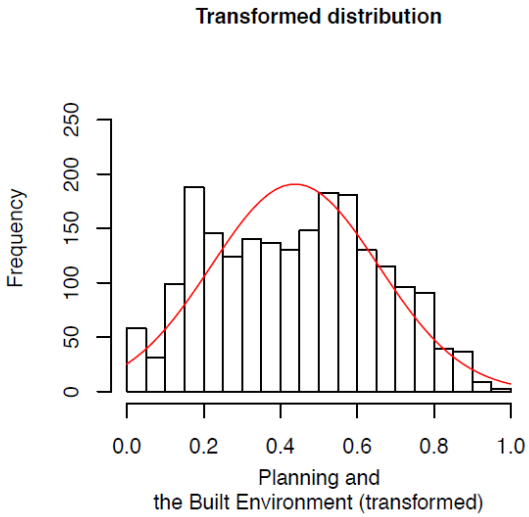
Skewness:
Power transform, exponent: 1.80
Pre–transform skewness: –0.8
Post–transform skewness: –0.0

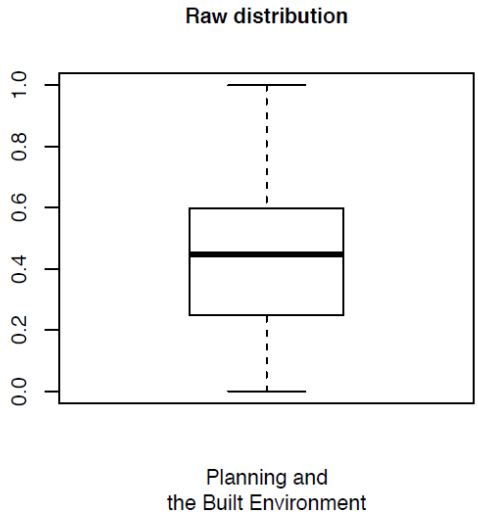
Kurtosis:
Coefficient: 0.00
Pre–transform kurtosis: 2.0
Post–transform kurtosis: –0.1

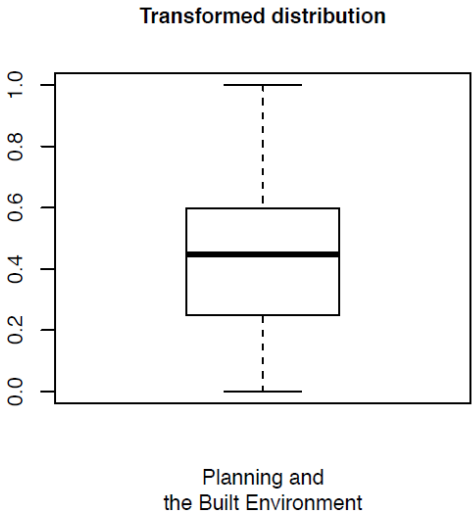
Outliers:
Pre–transform outlier count: 21
Post–transform outlier count: 0

Appendix 4C (cont.)

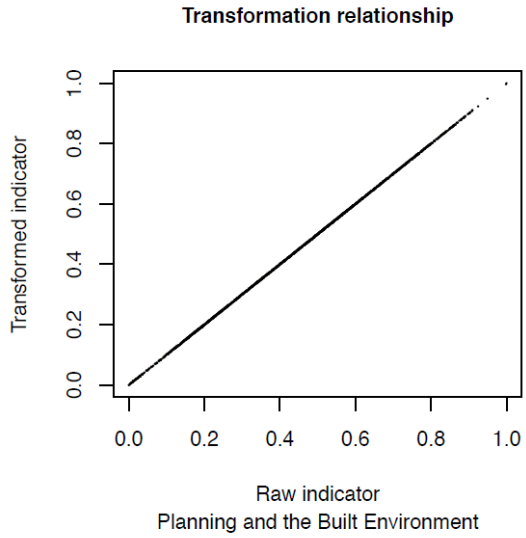


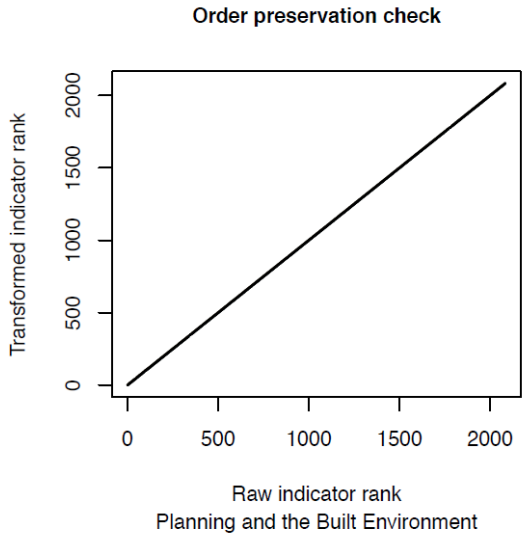






Appendix 4C (cont.)





TRANSFORMATION DETAILS

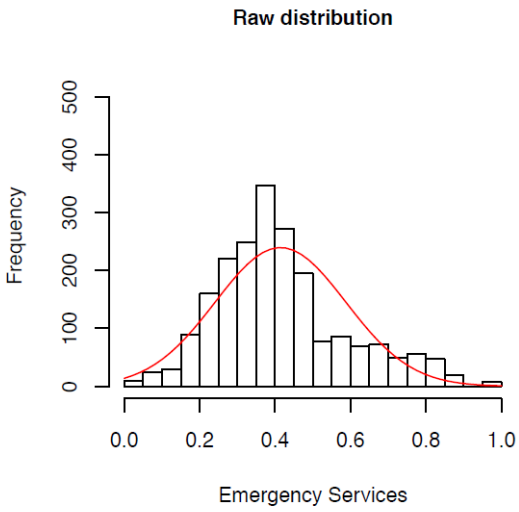
Unreversed

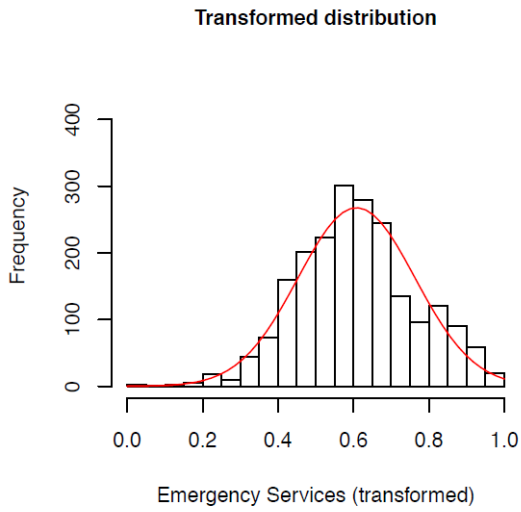
Skewness:
No transform
Pre–transform skewness: 0.1
Post–transform skewness: 0.1

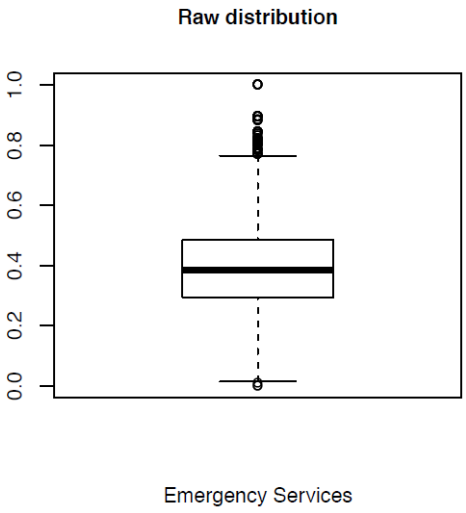
Kurtosis:
No transform
Pre–transform kurtosis: –0.9
Post–transform kurtosis: –0.9

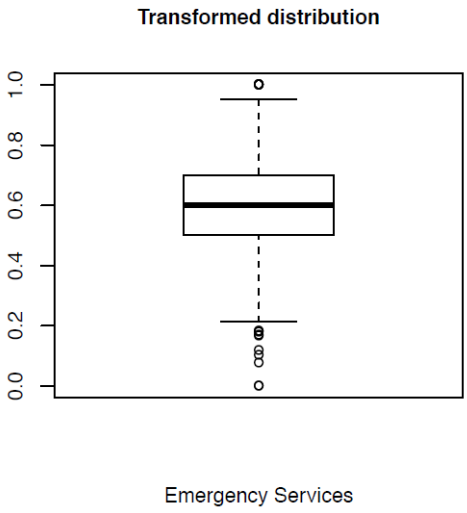
Outliers:
Pre–transform outlier count: 0
Post–transform outlier count: 0

Appendix 4C (cont.)

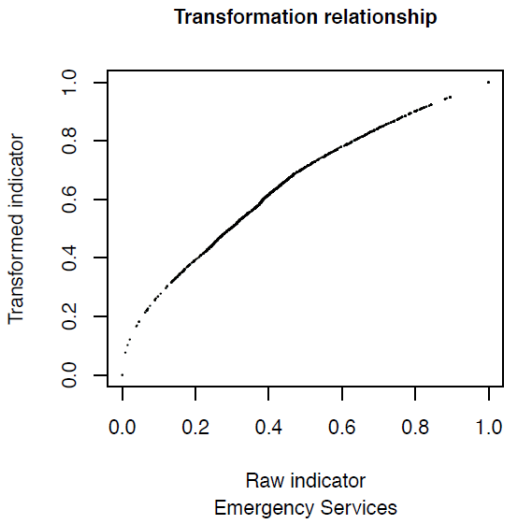


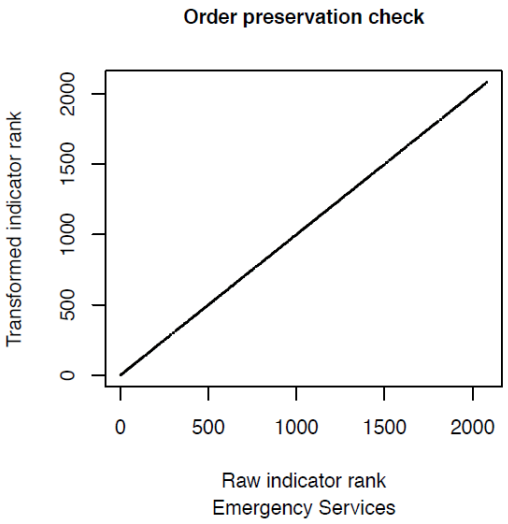






Appendix 4C (cont.)





TRANSFORMATION DETAILS

Unreversed

Skewness:
Power transform, exponent: 0.51
Pre–transform skewness: 0.7
Post–transform skewness: 0.0

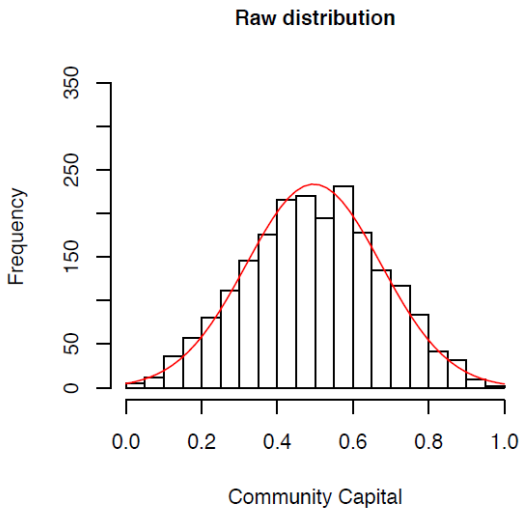
Kurtosis:
Coefficient: 0.14
Pre–transform kurtosis: 0.4
Post–transform kurtosis: 0.0

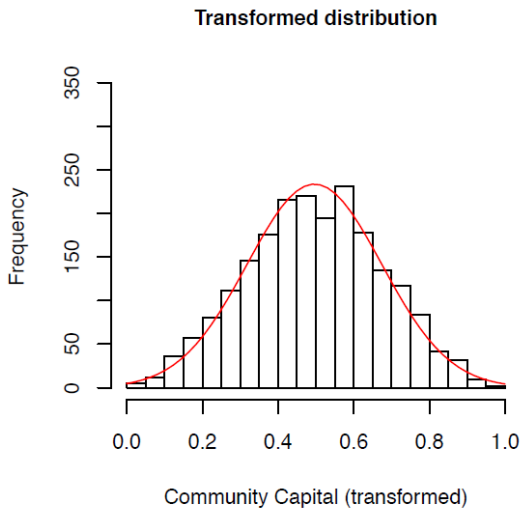
Outliers:
Pre–transform outlier count: 7
Post–transform outlier count: 3

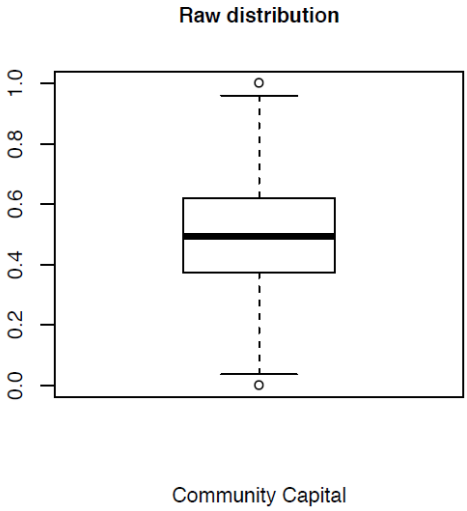
OUTLIER DETAILS

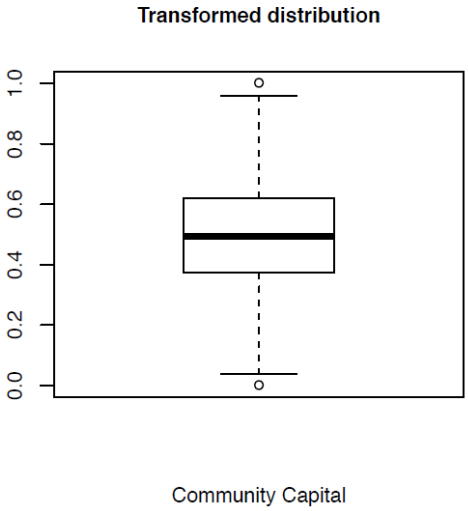
SA2	Value
Anindilyakwa	0.00
East Arnhem	0.00
Torres Strait Islands	0.01

Appendix 4C (cont.)

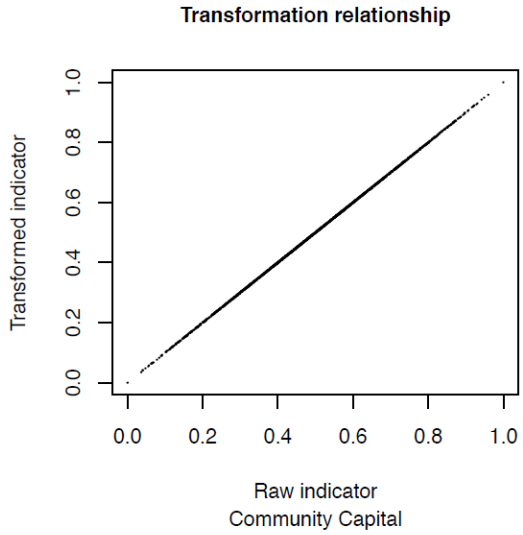


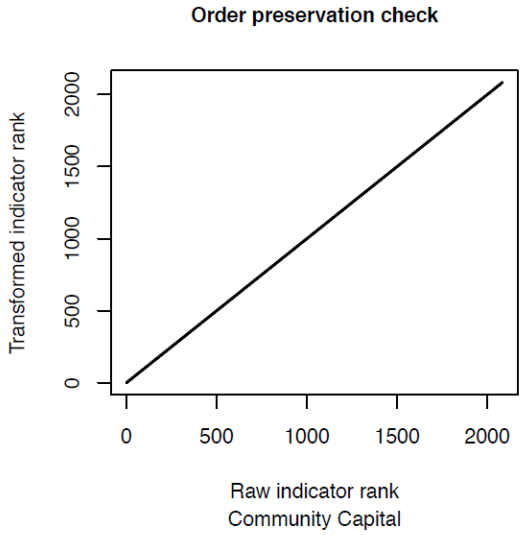






Appendix 4C (cont.)





TRANSFORMATION DETAILS

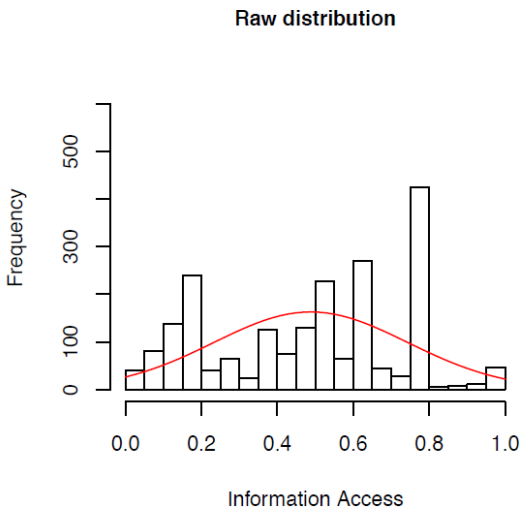
Unreversed

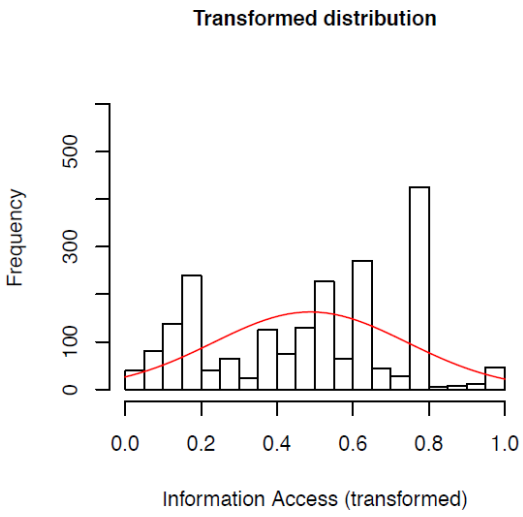
Skewness:
No transform
Pre–transform skewness: –0.0
Post–transform skewness: –0.0

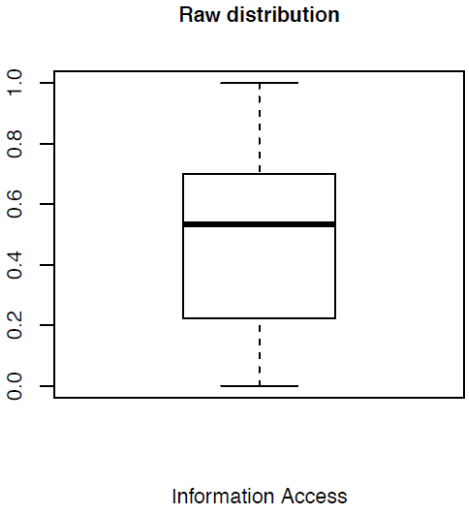
Kurtosis:
No transform
Pre–transform kurtosis: –0.4
Post–transform kurtosis: –0.4

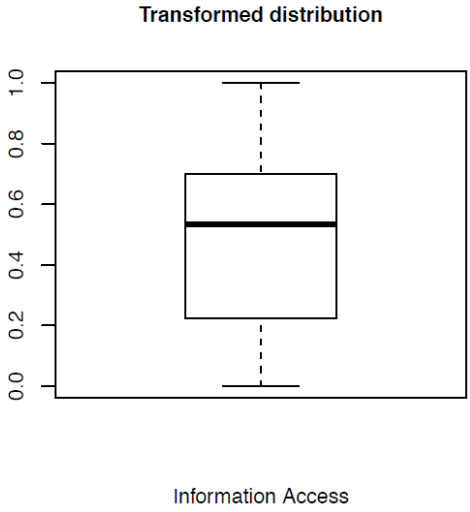
Outliers:
Pre–transform outlier count: 0
Post–transform outlier count: 0

Appendix 4C (cont.)

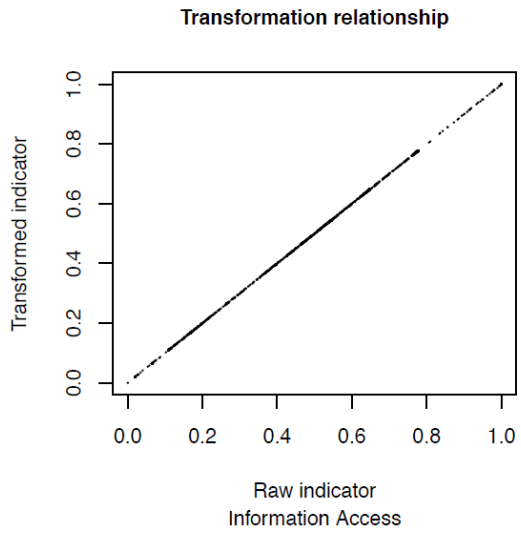


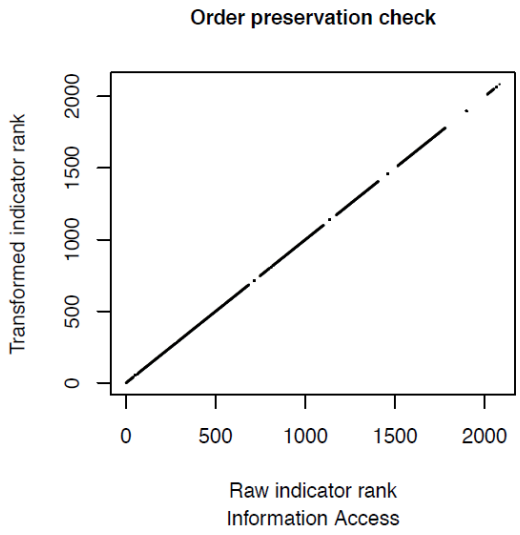






Appendix 4C (cont.)





TRANSFORMATION DETAILS

Unreversed

Skewness:
No transform
Pre–transform skewness: –0.2
Post–transform skewness: –0.2

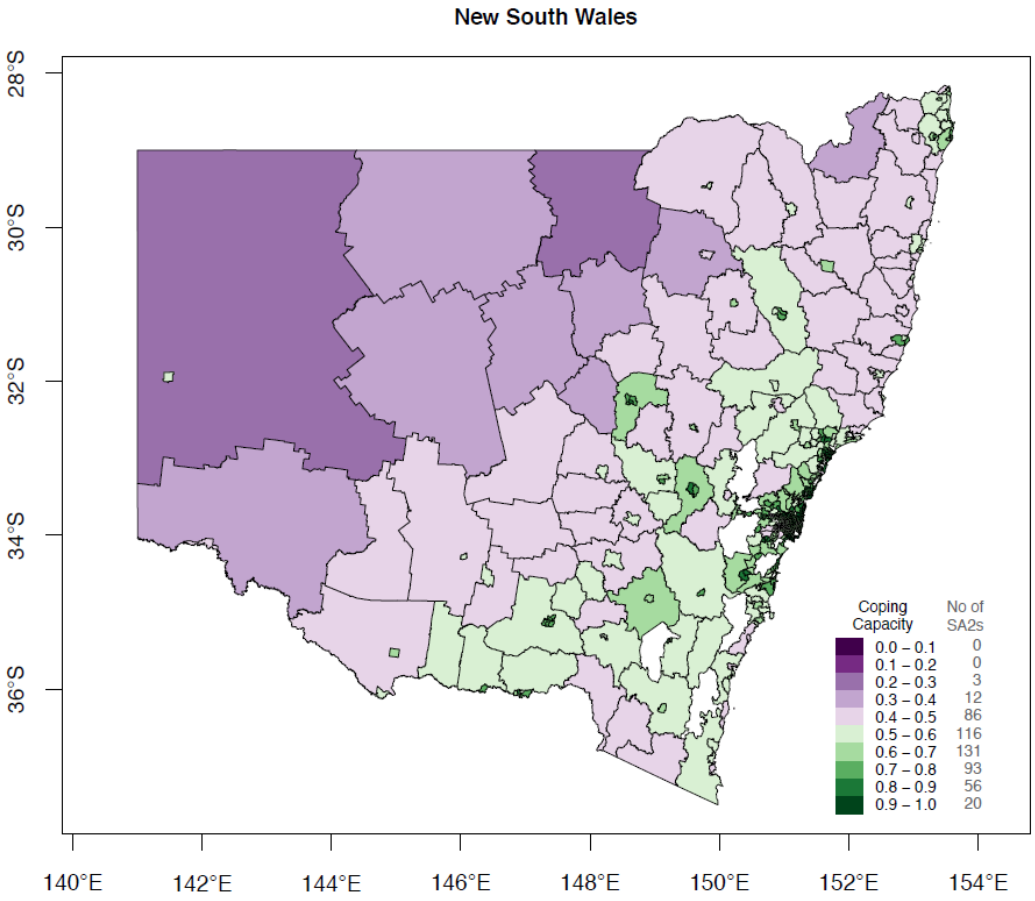
Kurtosis:
No transform
Pre–transform kurtosis: –1.1
Post–transform kurtosis: –1.1

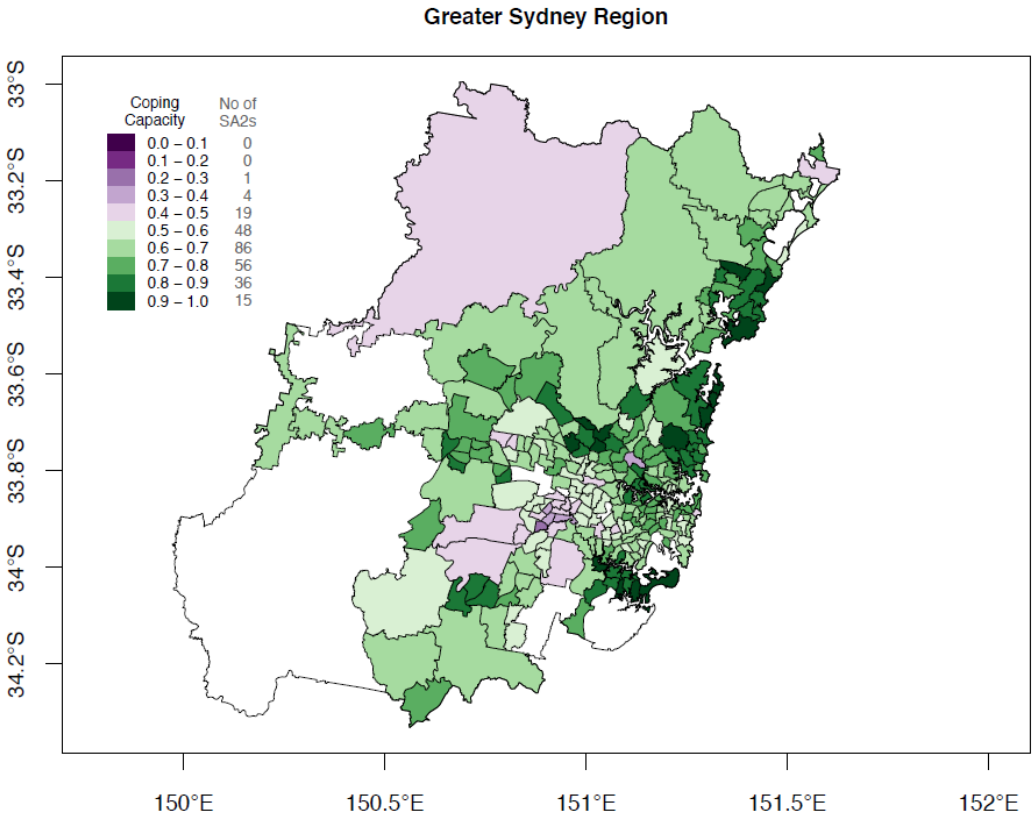
Outliers:
Pre–transform outlier count: 0
Post–transform outlier count: 0

APPENDIX 4D – MAPS: COPING CAPACITY SUB-INDEX VALUES BY STATE/TERRITORY AND METROPOLITAN AREAS

Appendix 4D maps the coping capacity sub-index at the resolution of individual States and Territories, and major metropolitan areas.

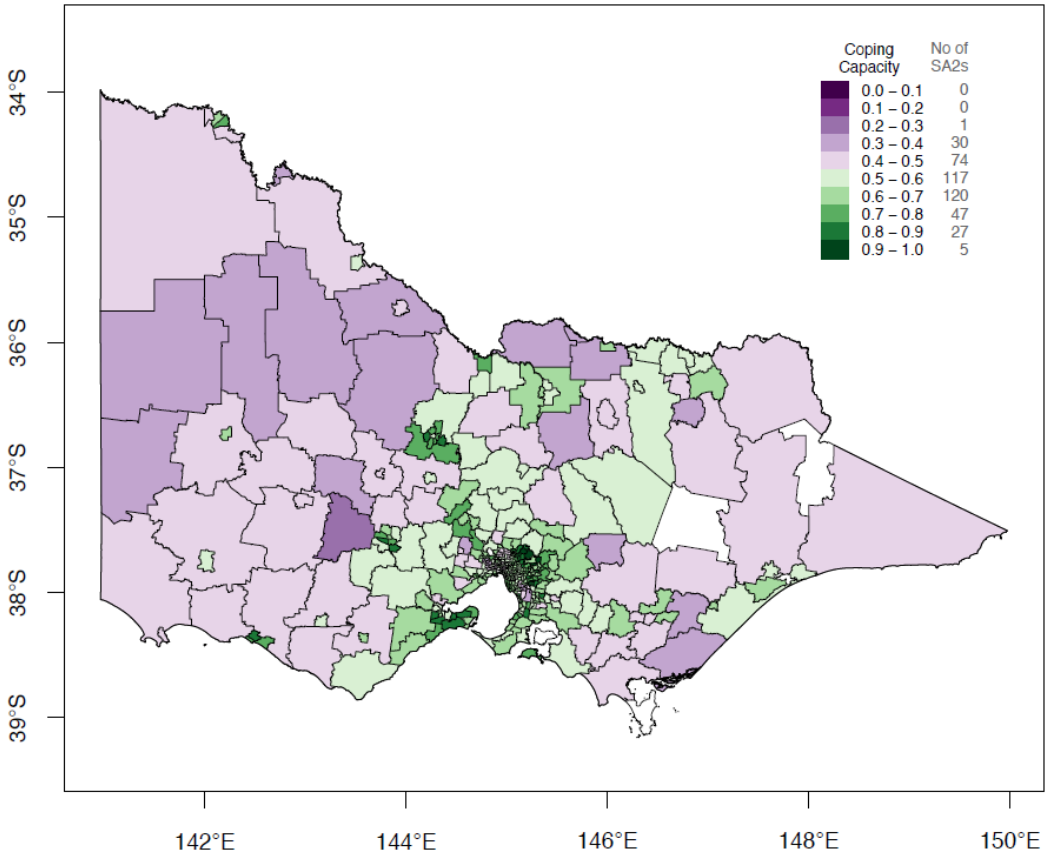
Appendix 4D (cont.)



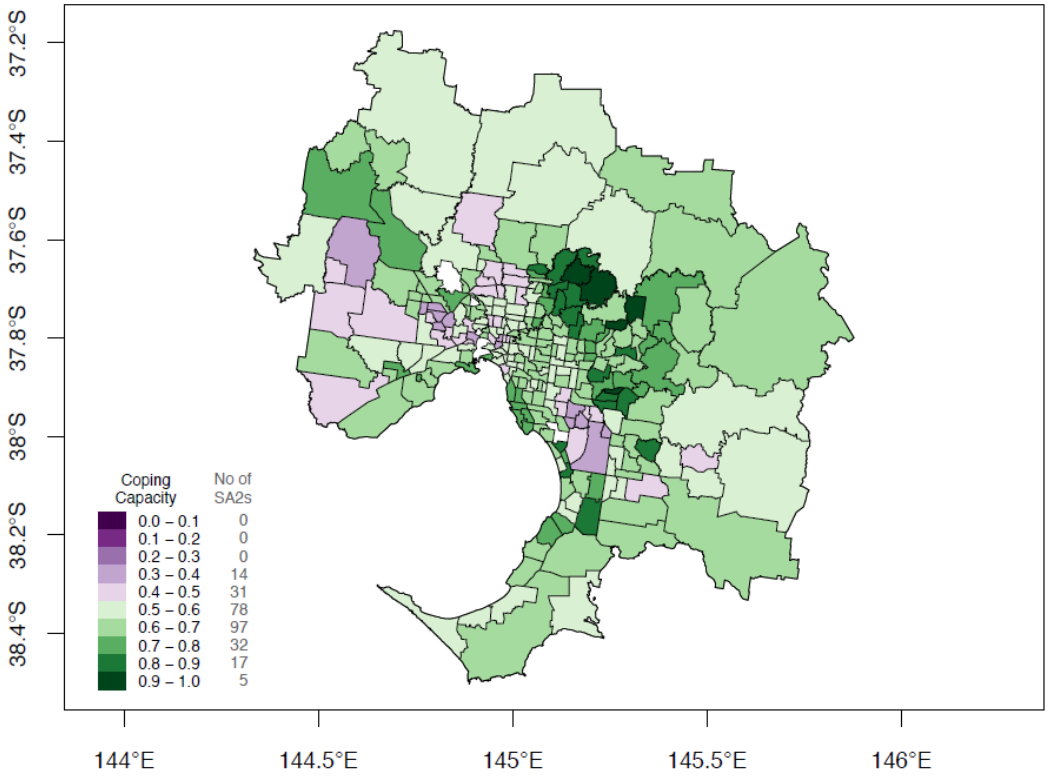


Appendix 4D (cont.)

Victoria

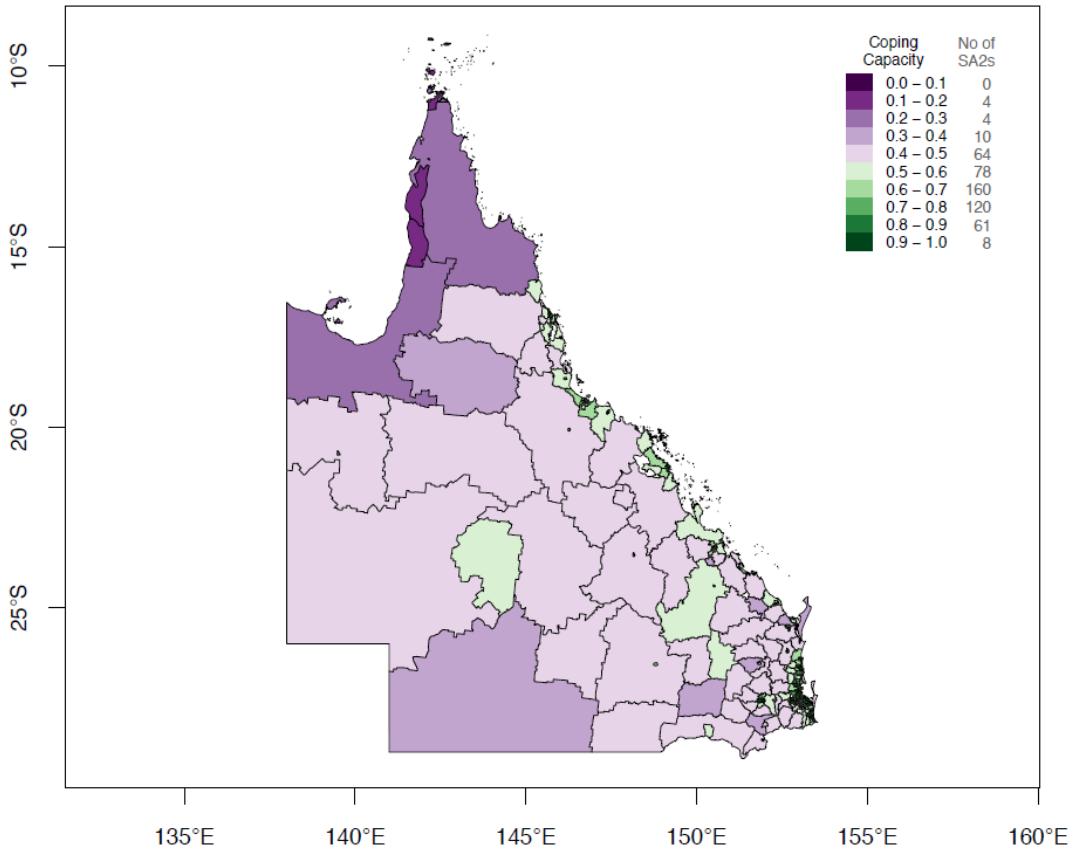


Greater Melbourne Region

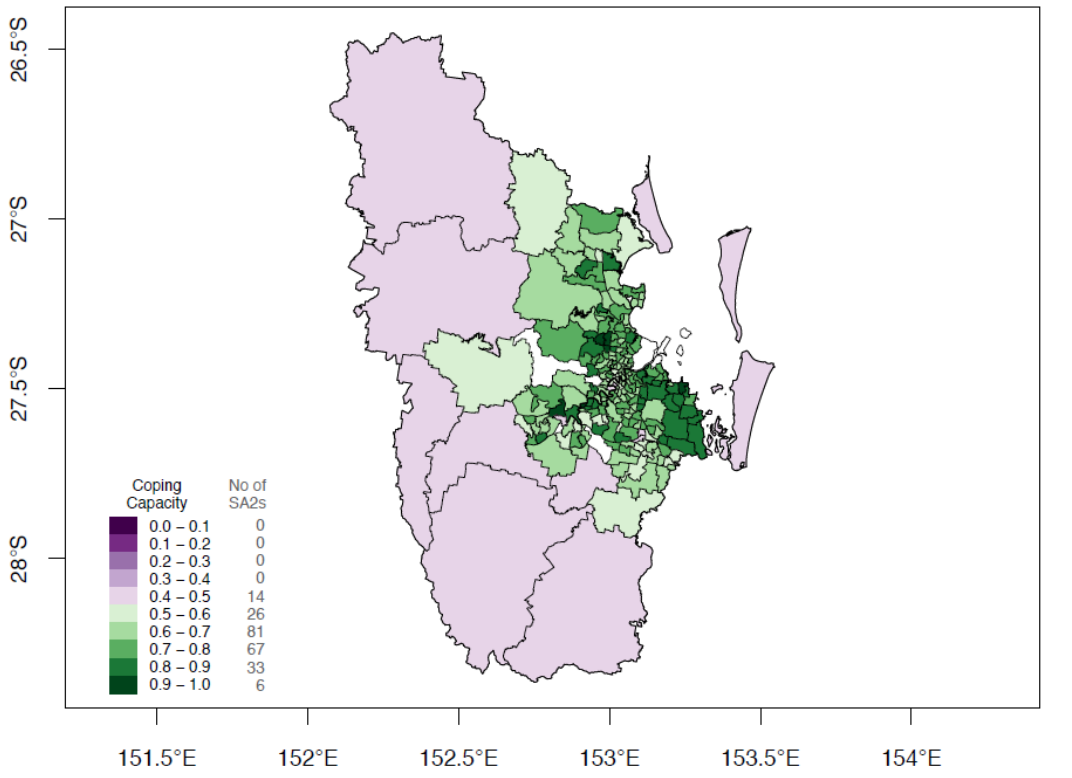


Appendix 4D (cont.)

Queensland

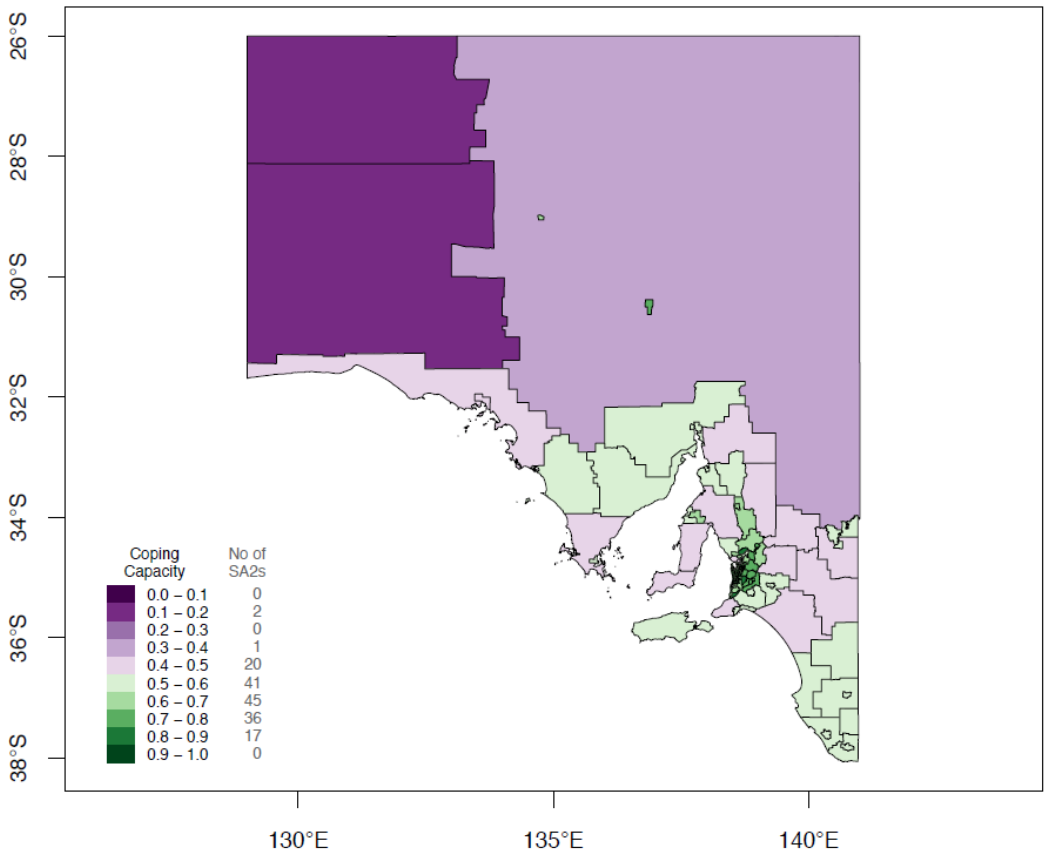


Greater Brisbane Region

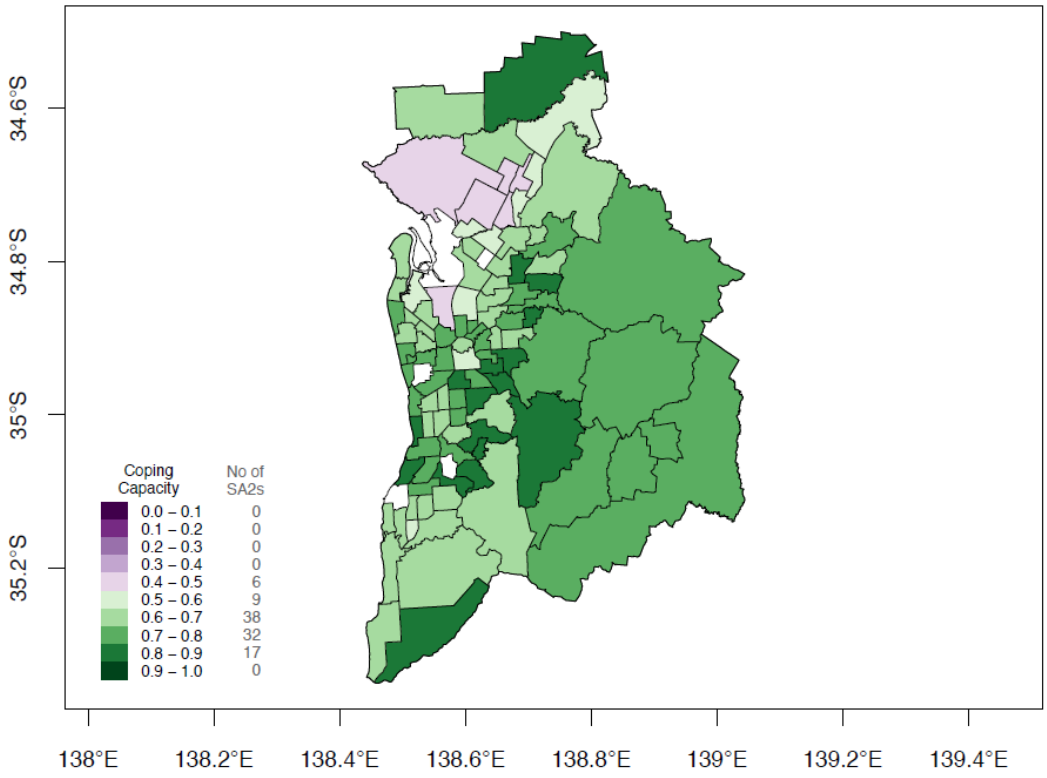


Appendix 4D (cont.)

South Australia

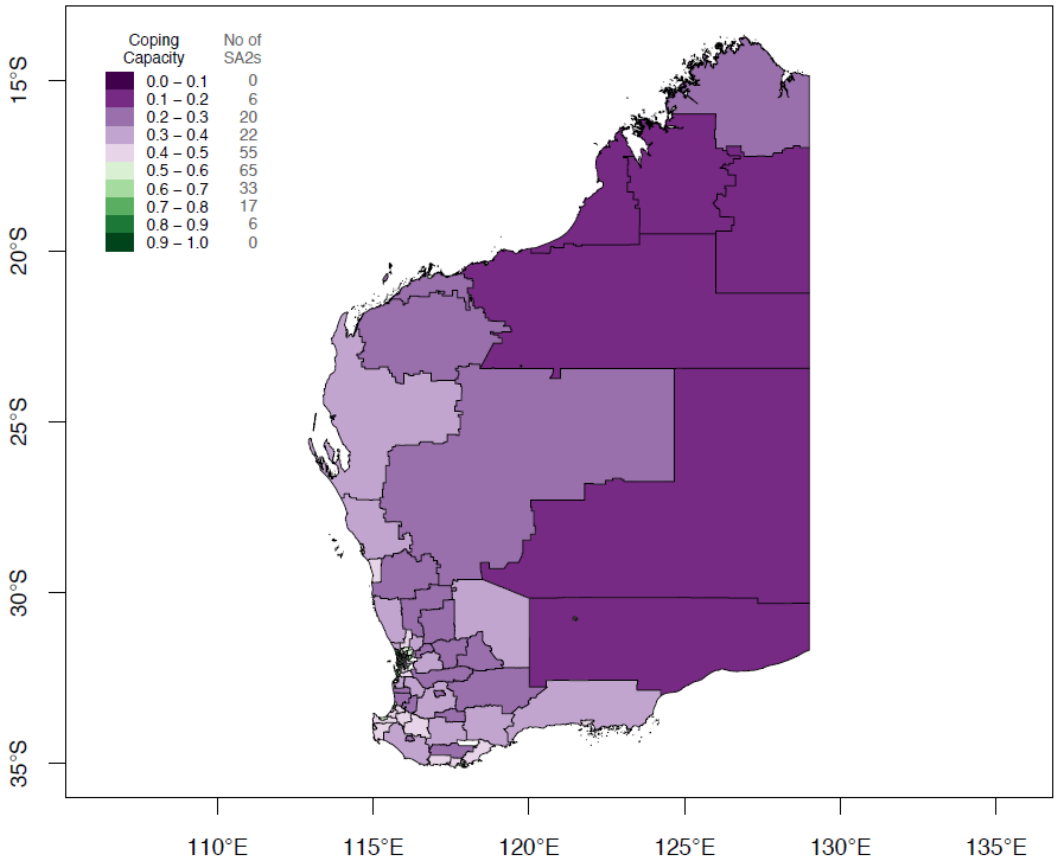


Greater Adelaide Region

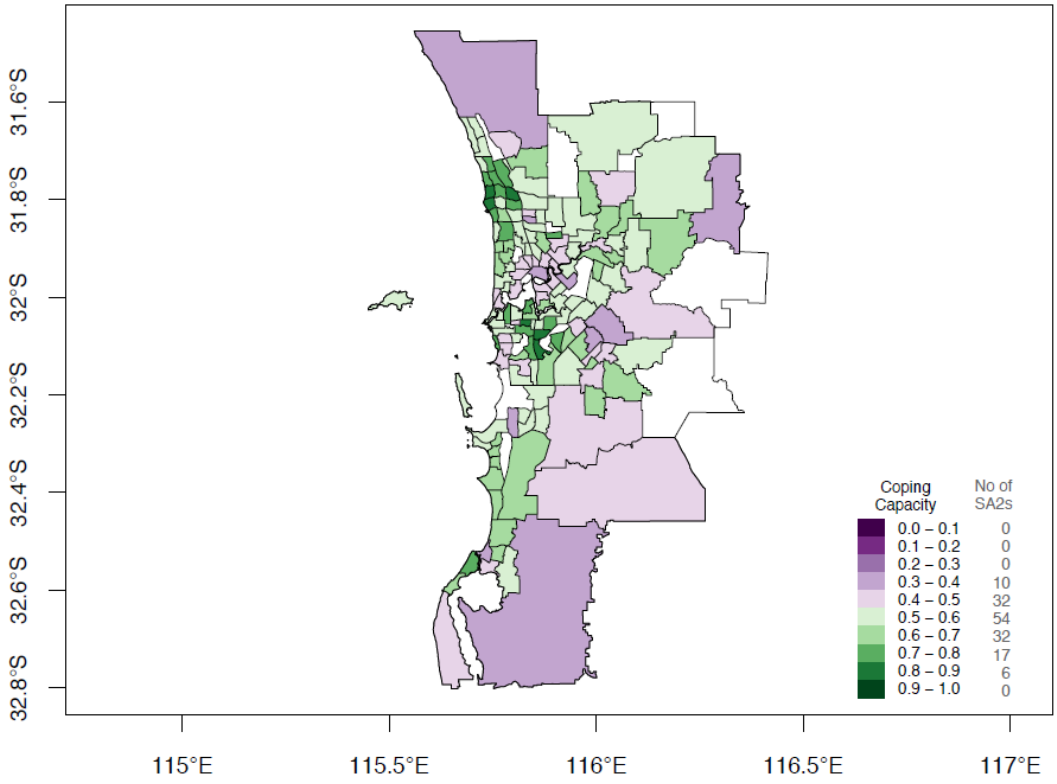


Appendix 4D (cont.)

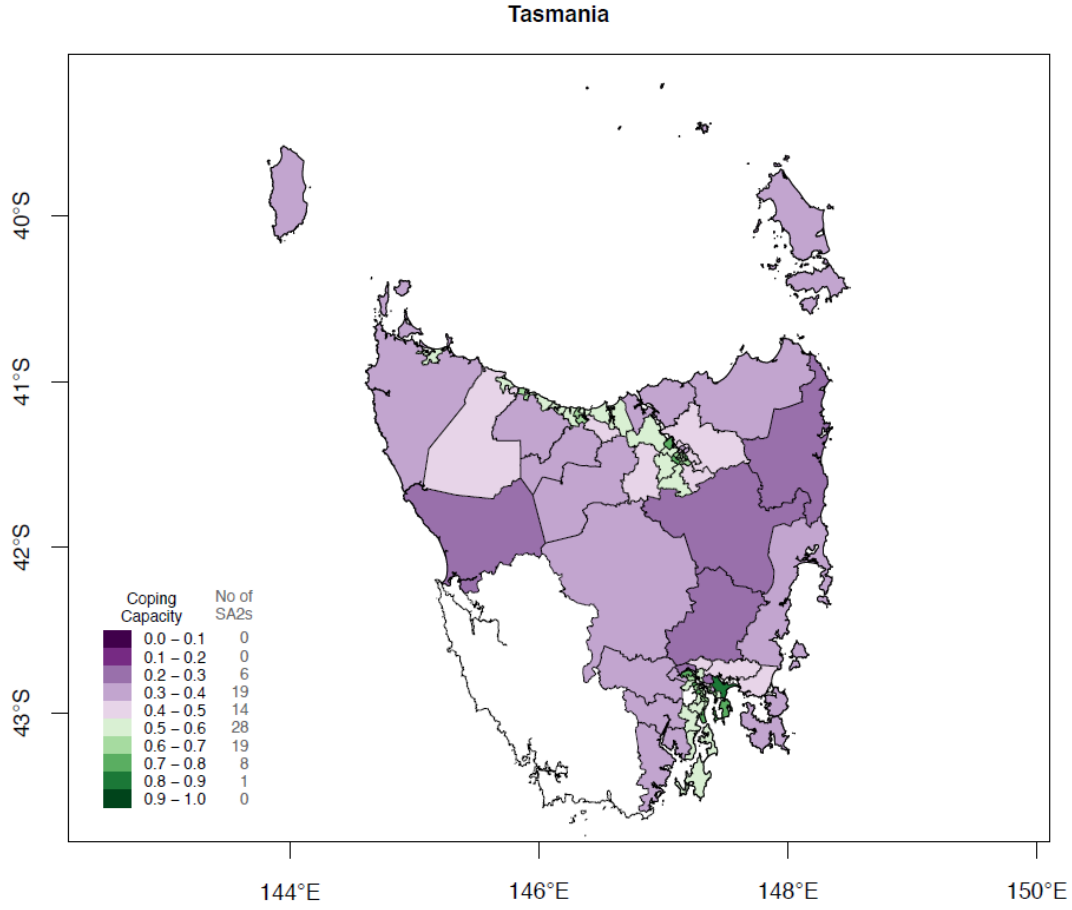
Western Australia

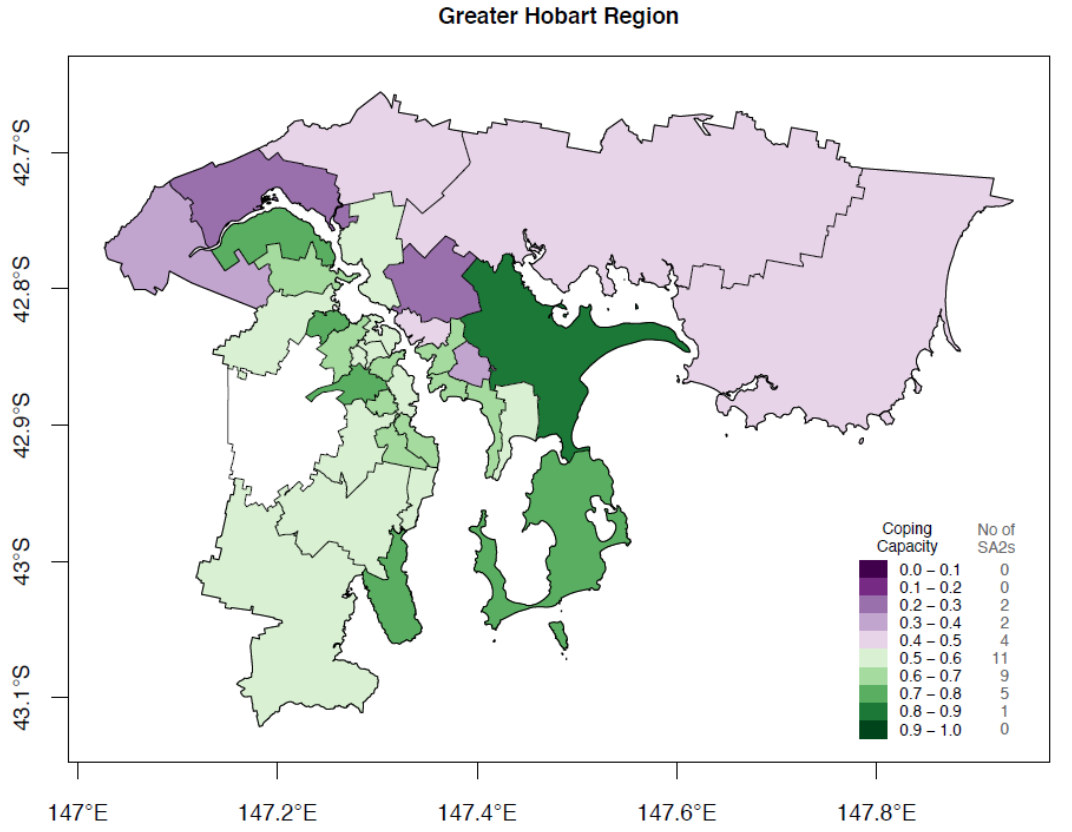


Greater Perth Region

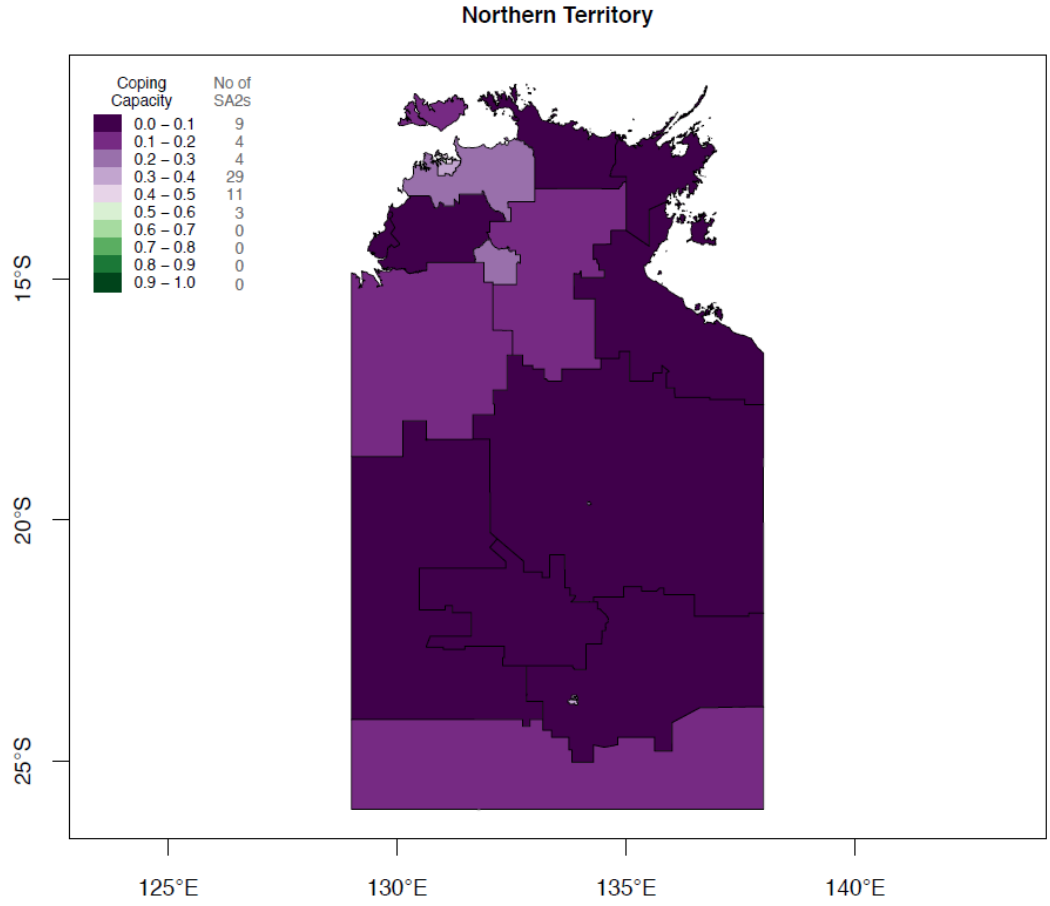


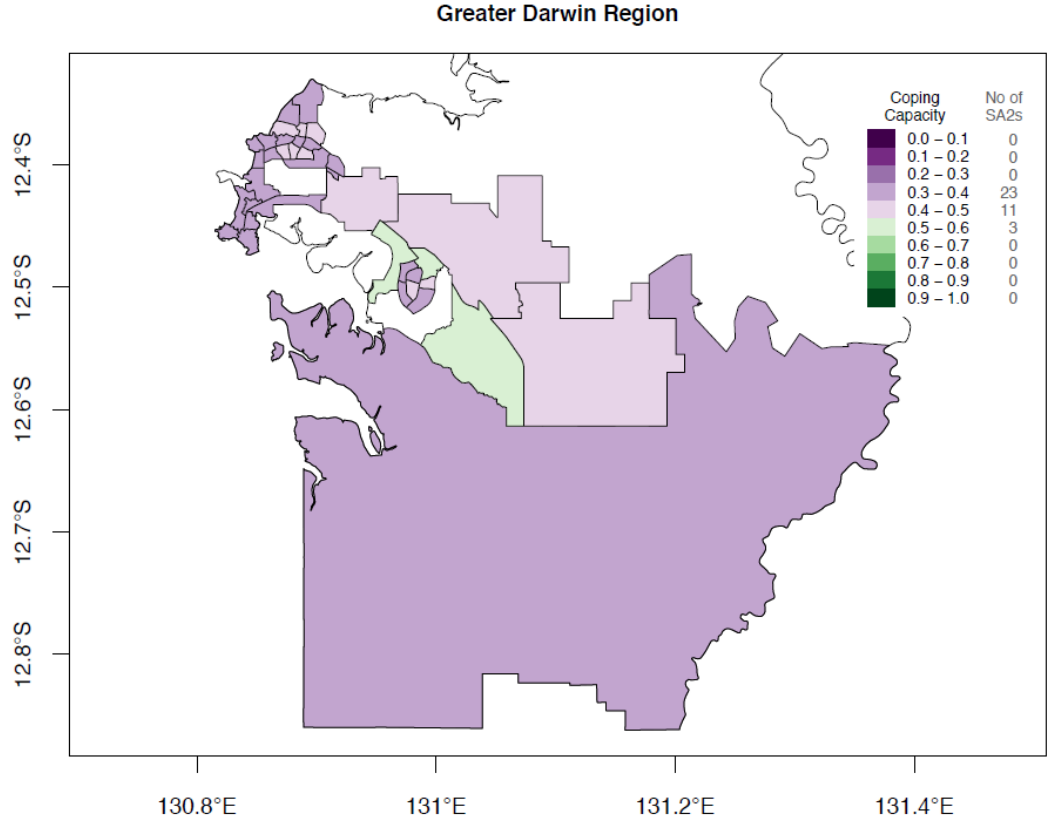
Appendix 4D (cont.)



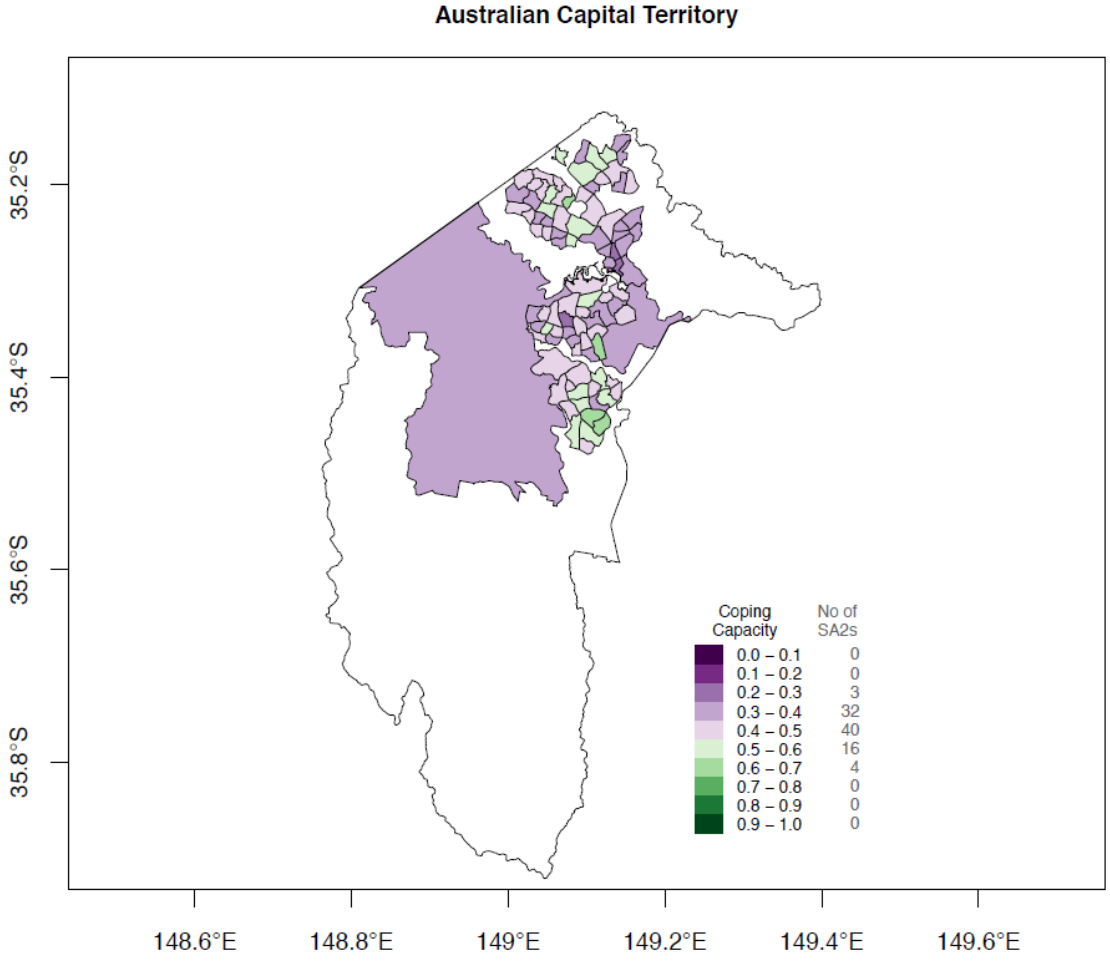


Appendix 4D (cont.)





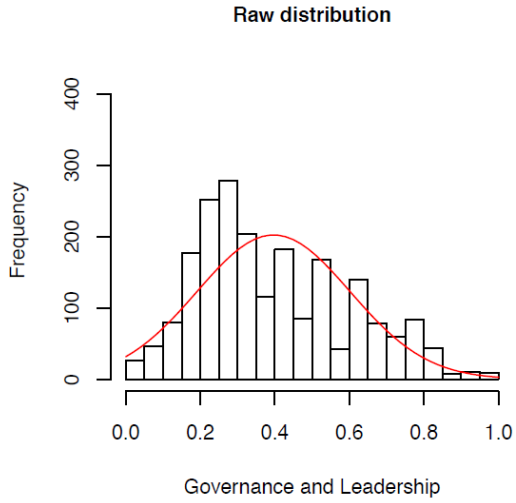
Appendix 4D (cont.)

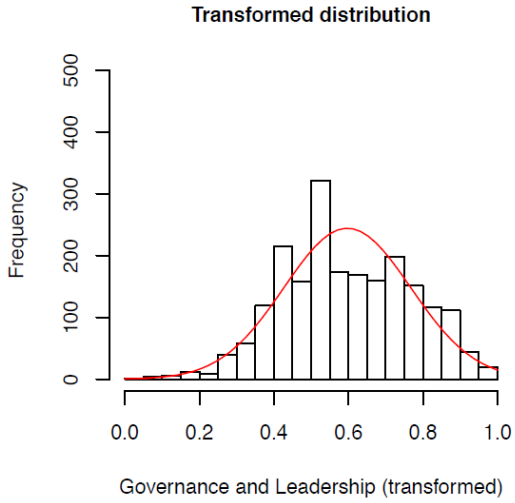


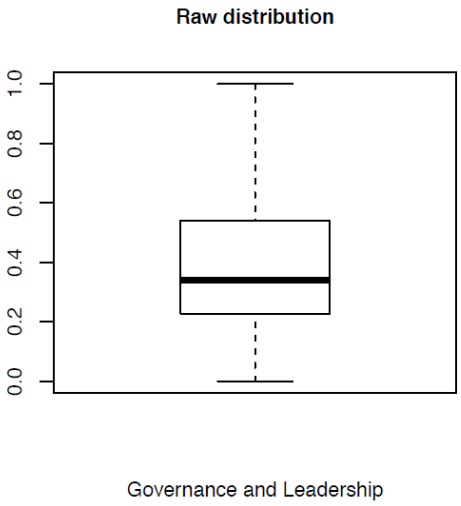
APPENDIX 4E – ADAPTIVE CAPACITY SUB-INDEX TRANSFORMATION DETAILS

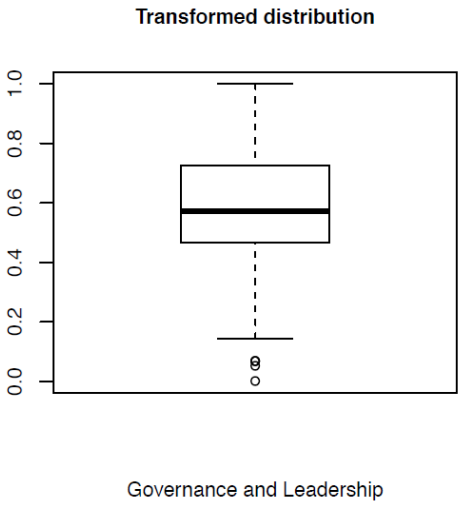
Appendix 4E shows the raw and transformed sub-indexes (social and community engagement and governance and leadership) used to compute the adaptive capacity sub-index.

Appendix 4E

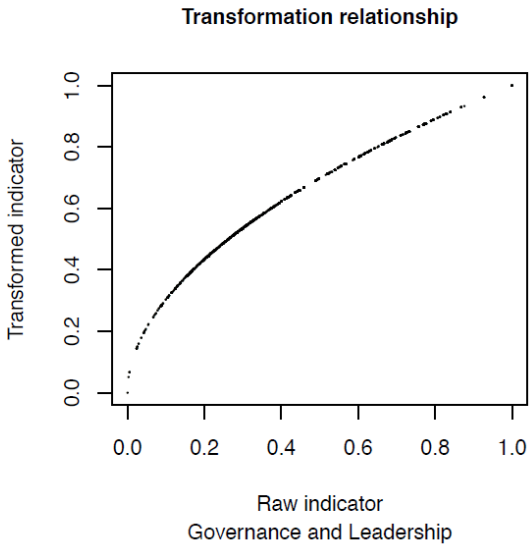

Raw distribution
Frequency
0
100
200
300
400
0.0
0.2
0.4
0.6
0.8
1.0
Governance and Leadership

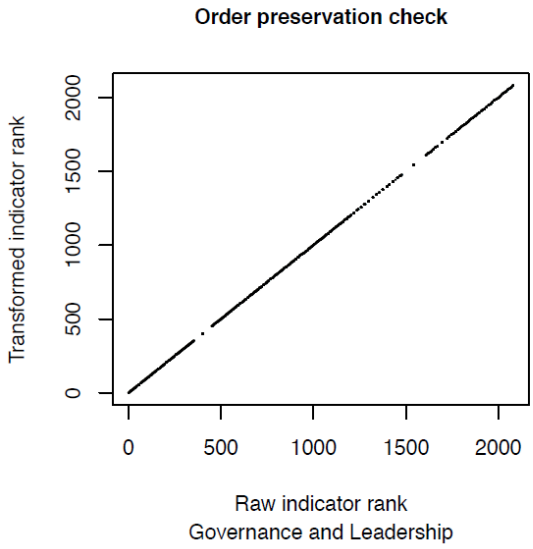

Transformed distribution
Frequency
0
100
200
300
400
500
0.0
0.2
0.4
0.6
0.8
1.0
Governance and Leadership (transformed)


Raw distribution
0.0
0.2
0.4
0.6
0.8
1.0
Governance and Leadership


Transformed distribution
0.0
0.2
0.4
0.6
0.8
1.0
Governance and Leadership

Appendix 4E (cont.)





TRANSFORMATION DETAILS

Unreversed

Skewness:
Power transform, exponent: 0.52
Pre–transform skewness: 0.6
Post–transform skewness: 0.0

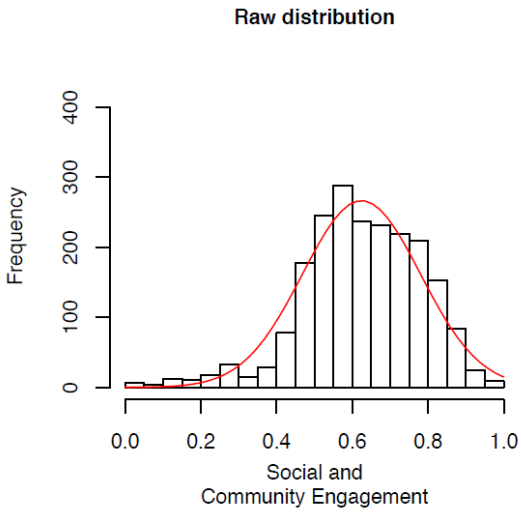
Kurtosis:
Coefficient: 0.00
Pre–transform kurtosis: –0.5
Post–transform kurtosis: –0.5

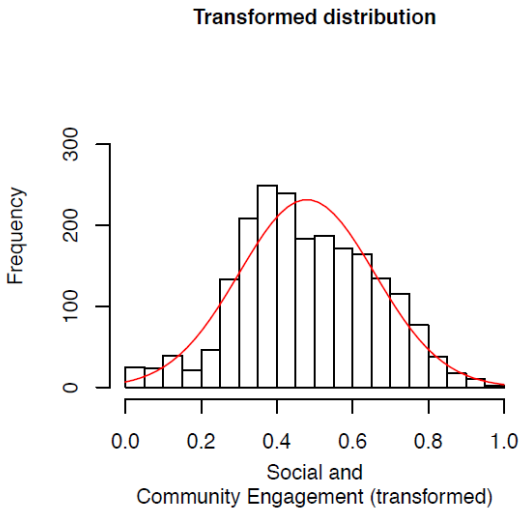
Outliers:
Pre–transform outlier count: 0
Post–transform outlier count: 1

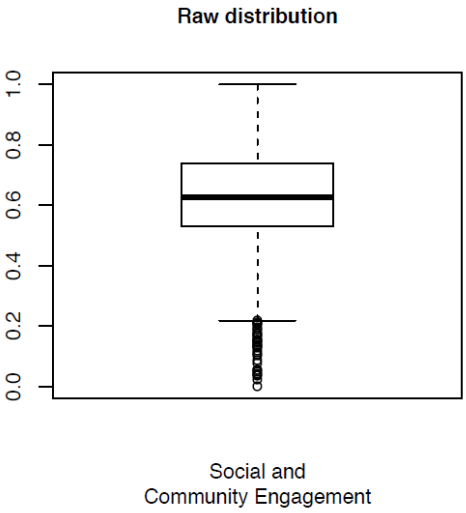
OUTLIER DETAILS

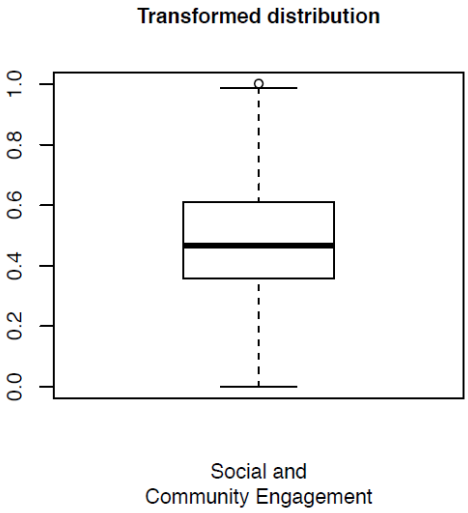
SA2	Value
Yarrabah	0.00

Appendix 4E (cont.)

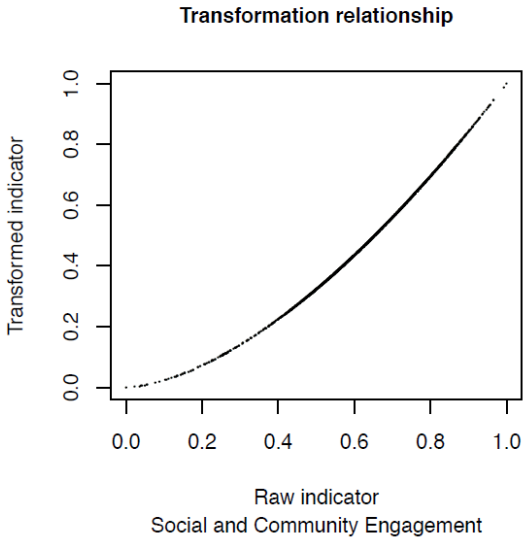


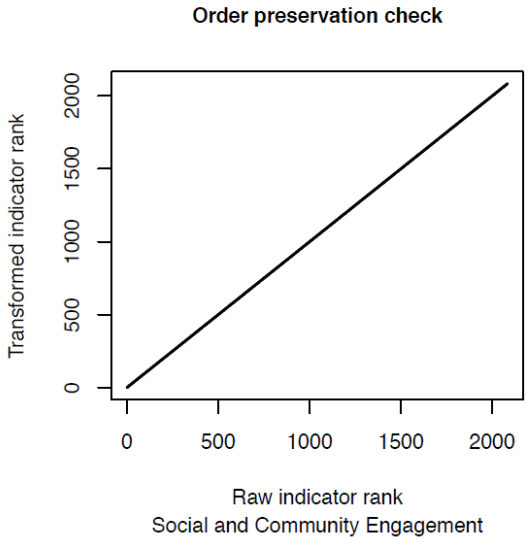






Appendix 4E (cont.)





TRANSFORMATION DETAILS

Unreversed

Skewness:
Power transform, exponent: 1.63
Pre–transform skewness: –0.6
Post–transform skewness: –0.0

Kurtosis:
Coefficient: 0.00
Pre–transform kurtosis: 0.9
Post–transform kurtosis: –0.3

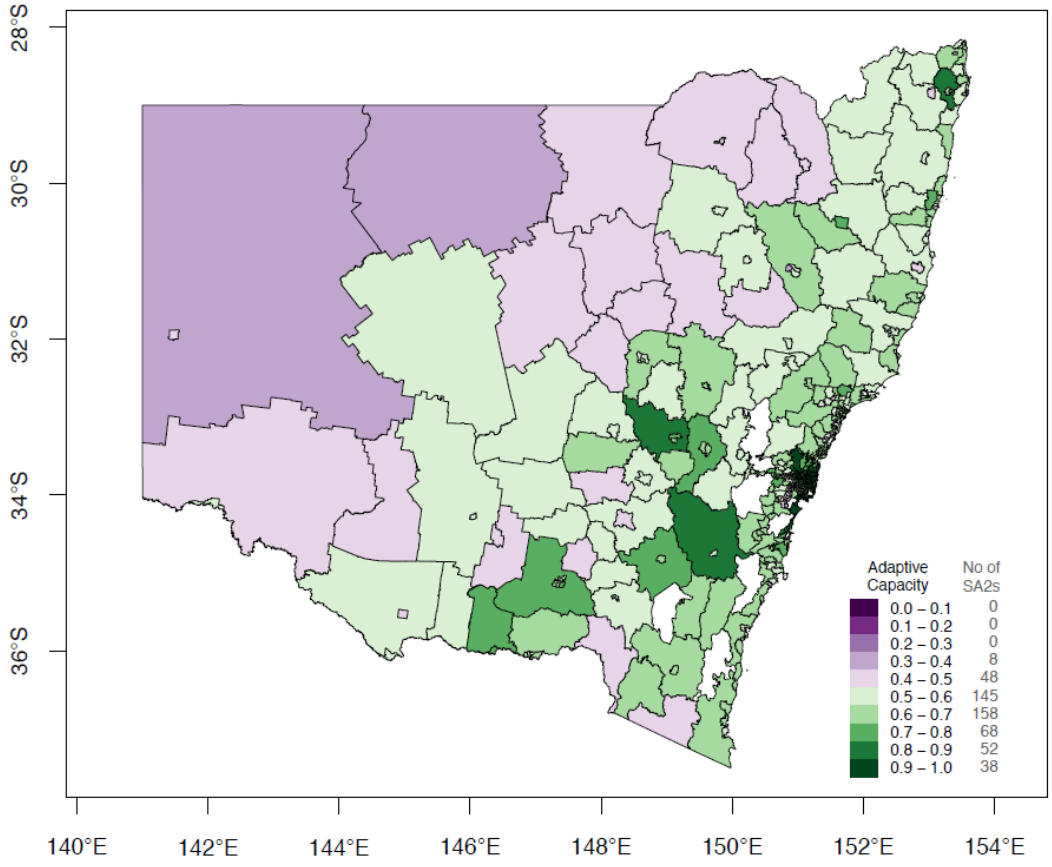
Outliers:
Pre–transform outlier count: 12
Post–transform outlier count: 0

APPENDIX 4F – MAPS: ADAPTIVE CAPACITY SUB-INDEX VALUES BY STATE/TERRITORY AND METROPOLITAN AREAS

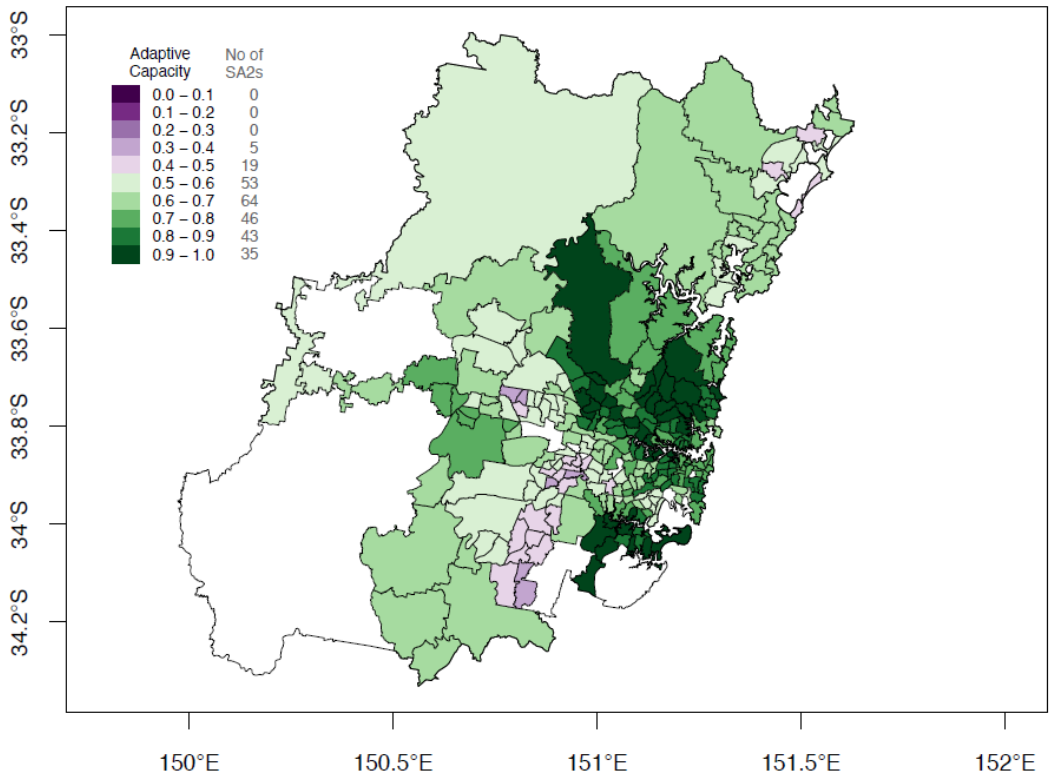
Appendix 4F maps the adaptive capacity sub-index at the resolution of individual States and Territories, and major metropolitan areas.

Appendix 4F (cont.)

New South Wales

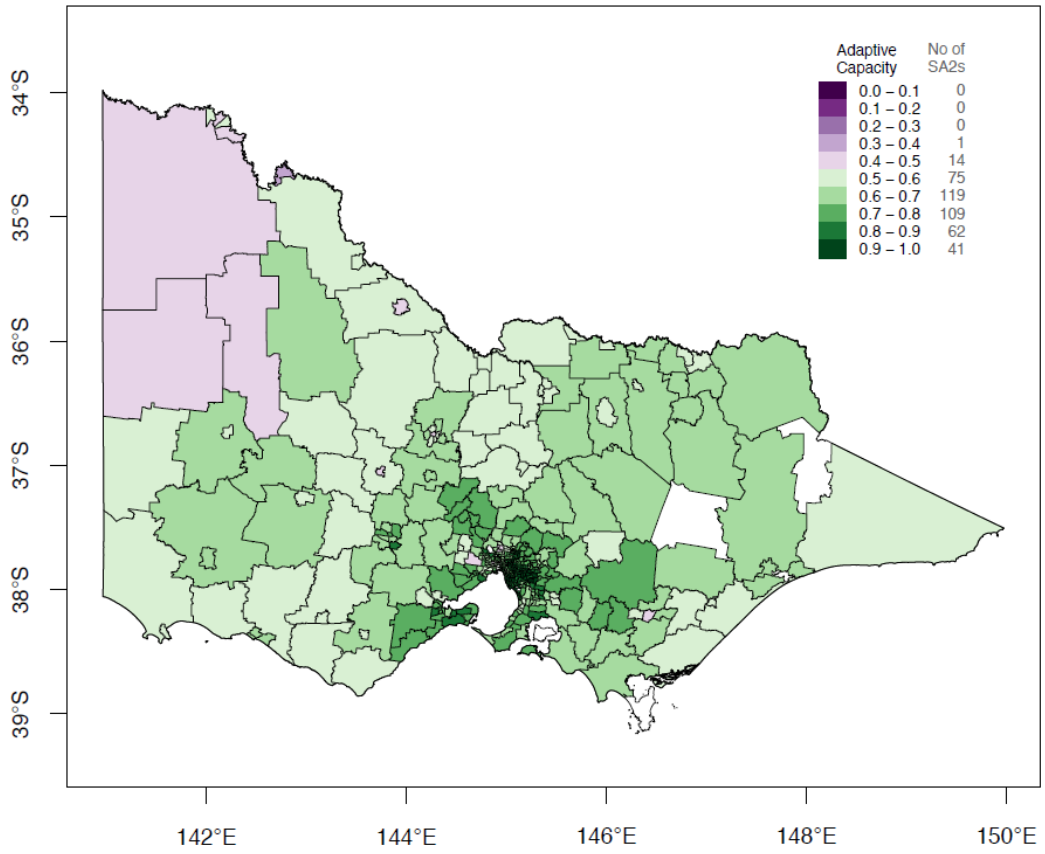


Greater Sydney Region

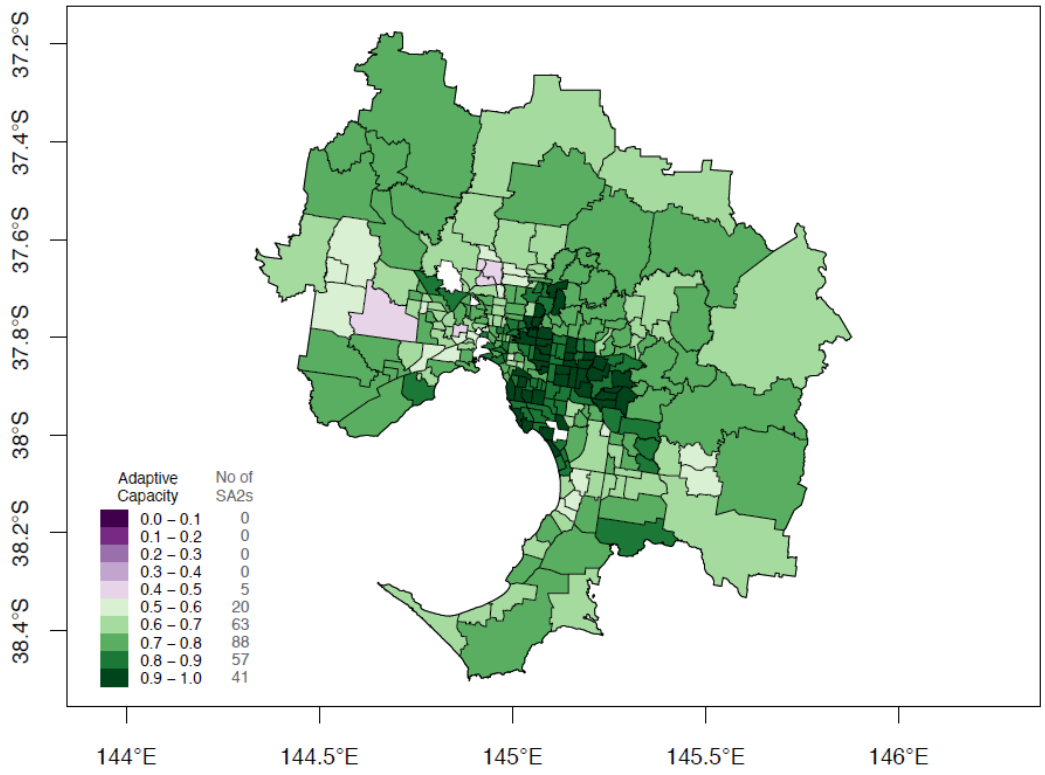


Appendix 4F (cont.)

Victoria

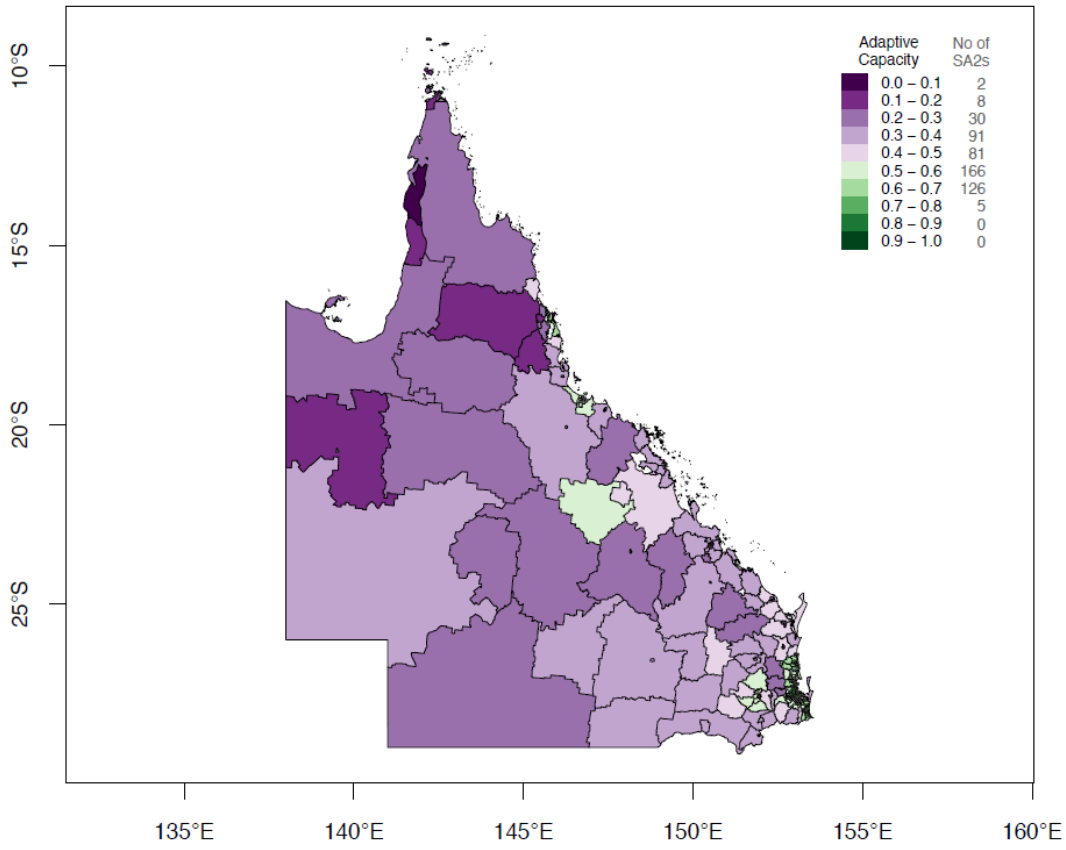


Greater Melbourne Region

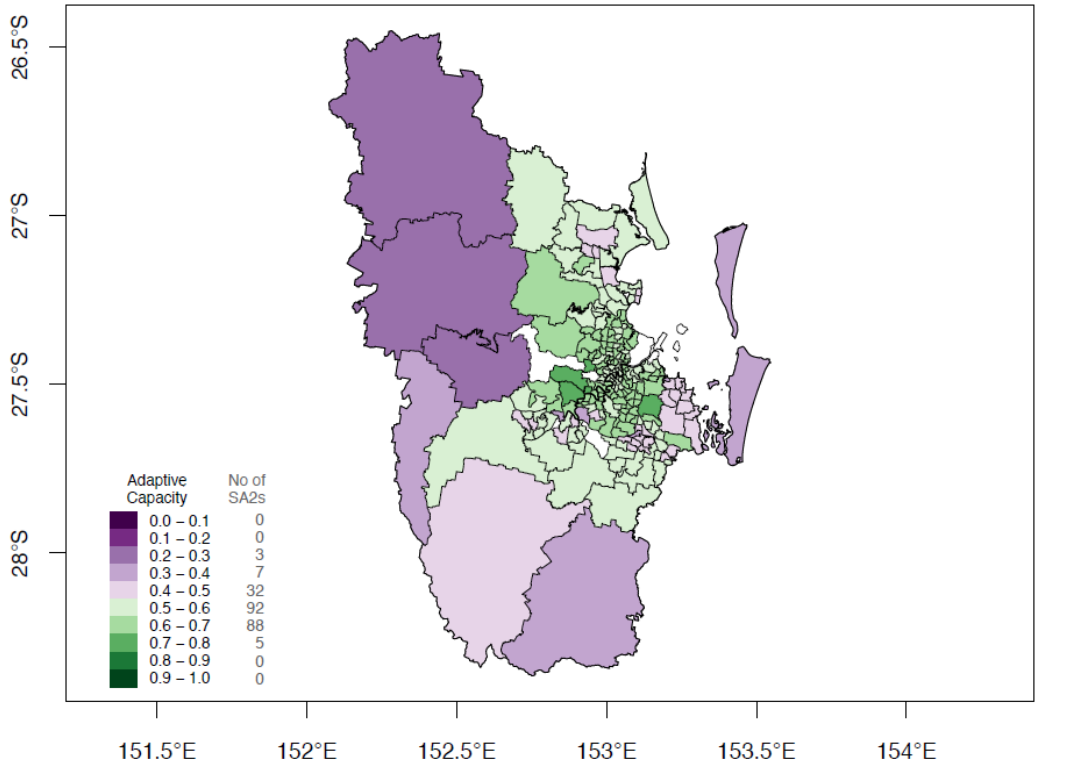


Appendix 4F (cont.)

Queensland

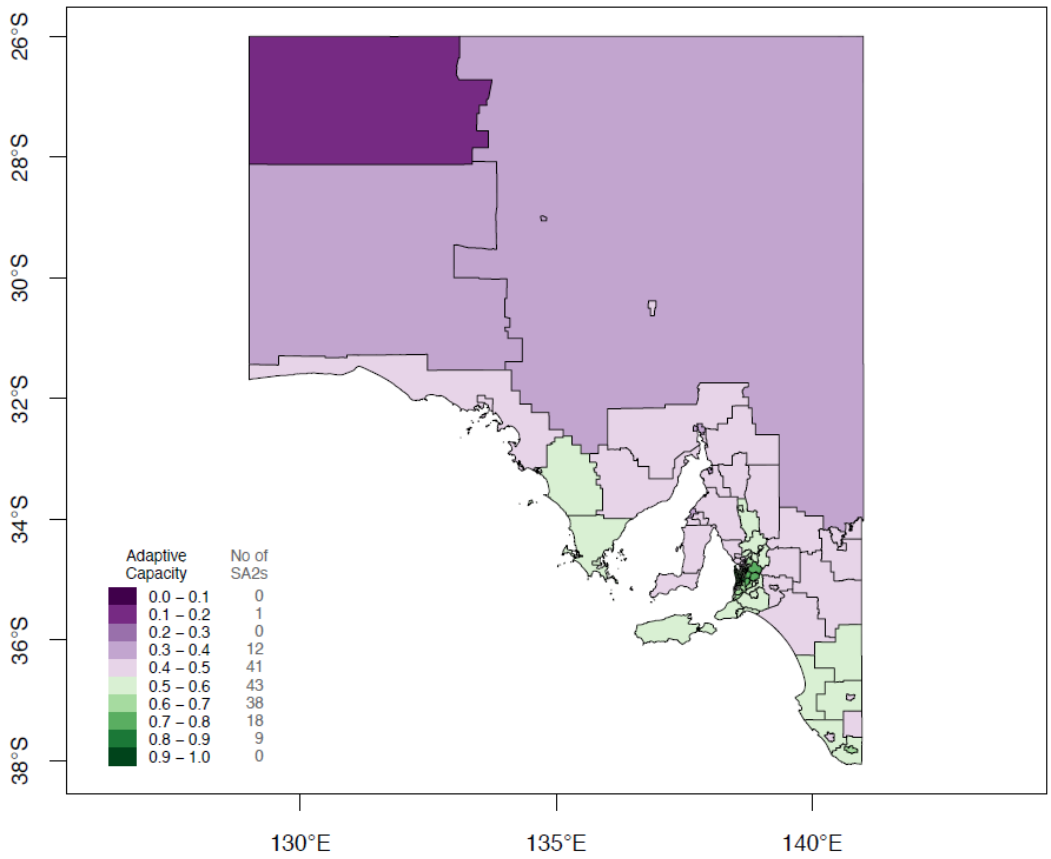


Greater Brisbane Region

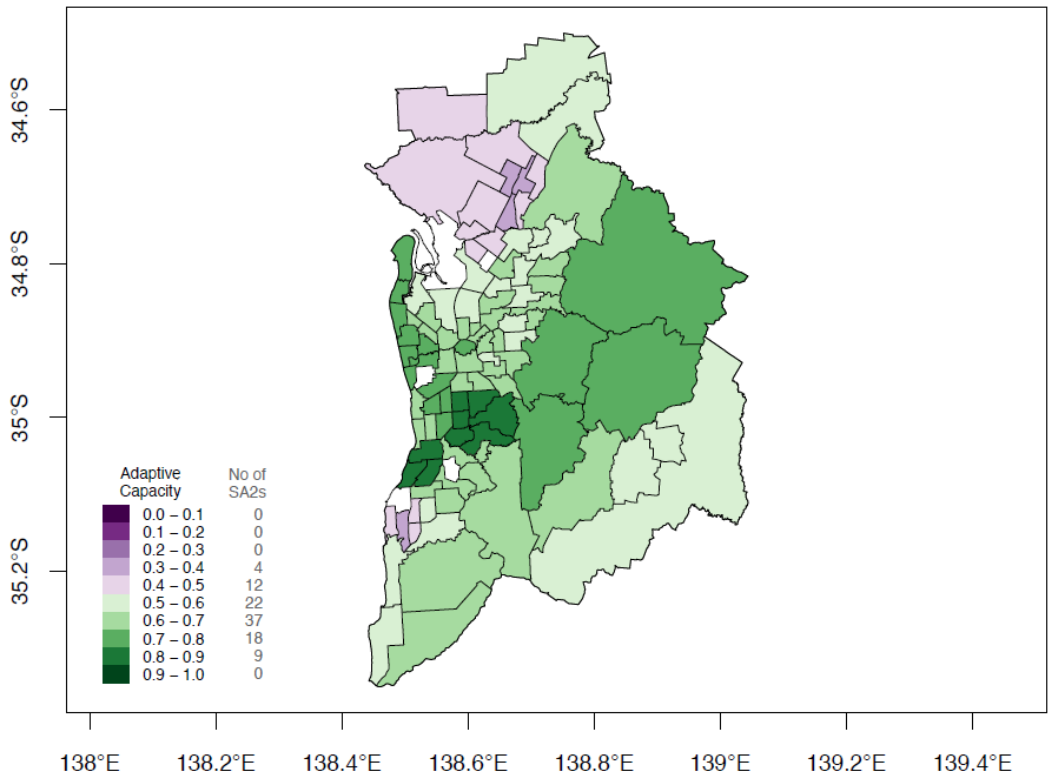


Appendix 4F (cont.)

South Australia

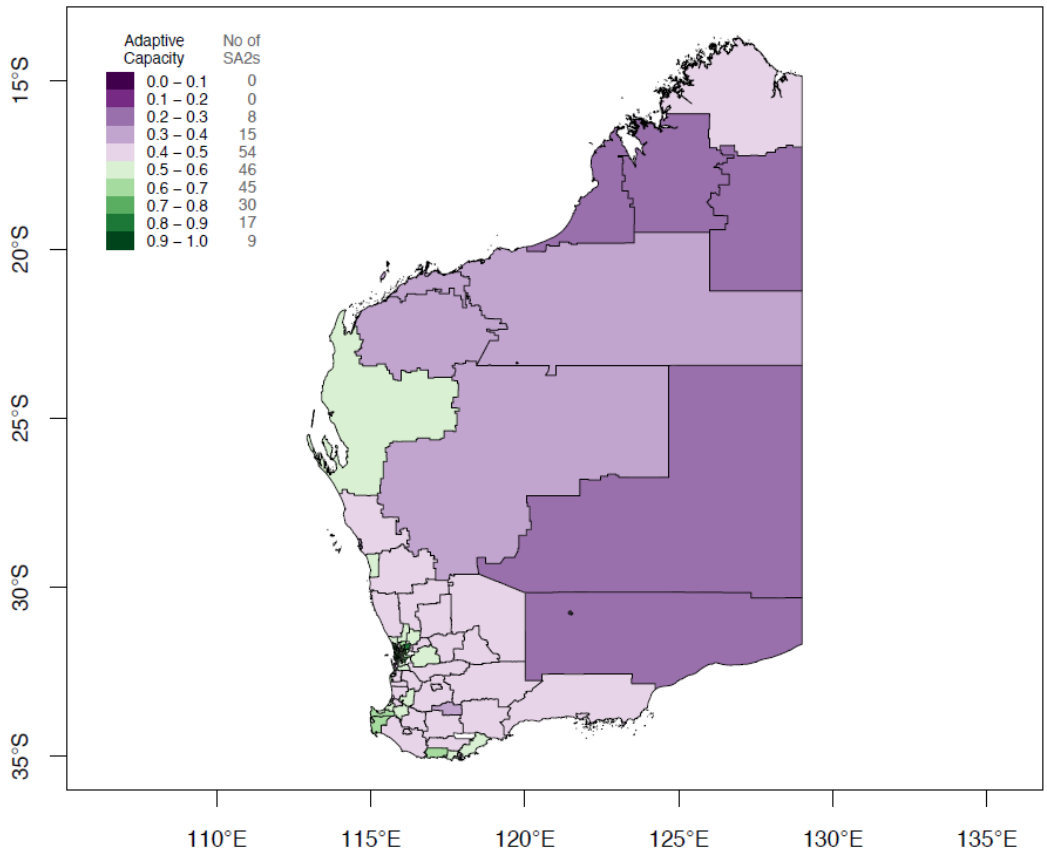


Greater Adelaide Region

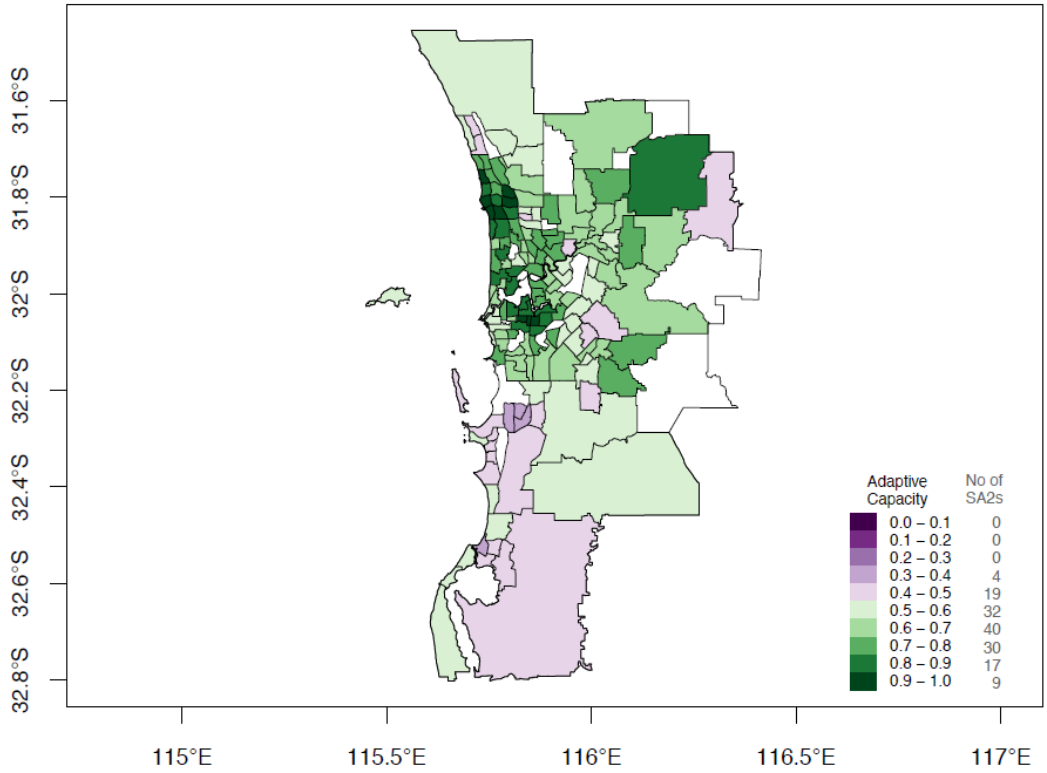


Appendix 4F (cont.)

Western Australia

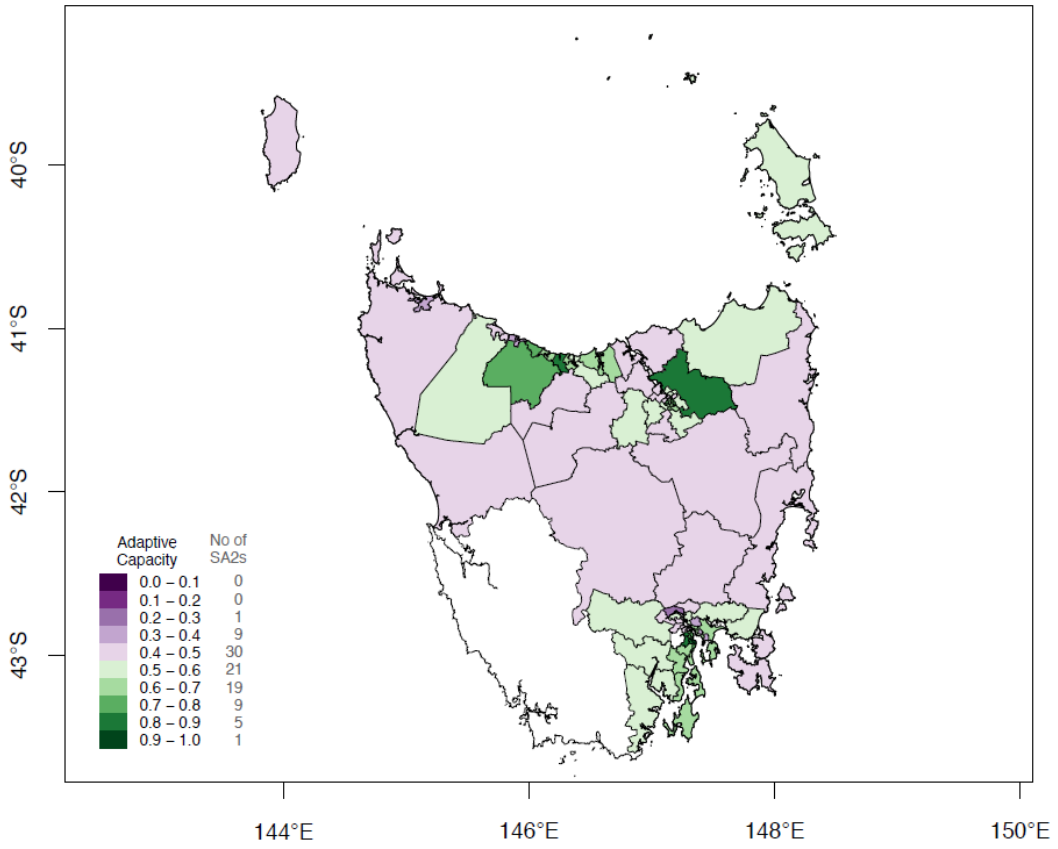


Greater Perth Region

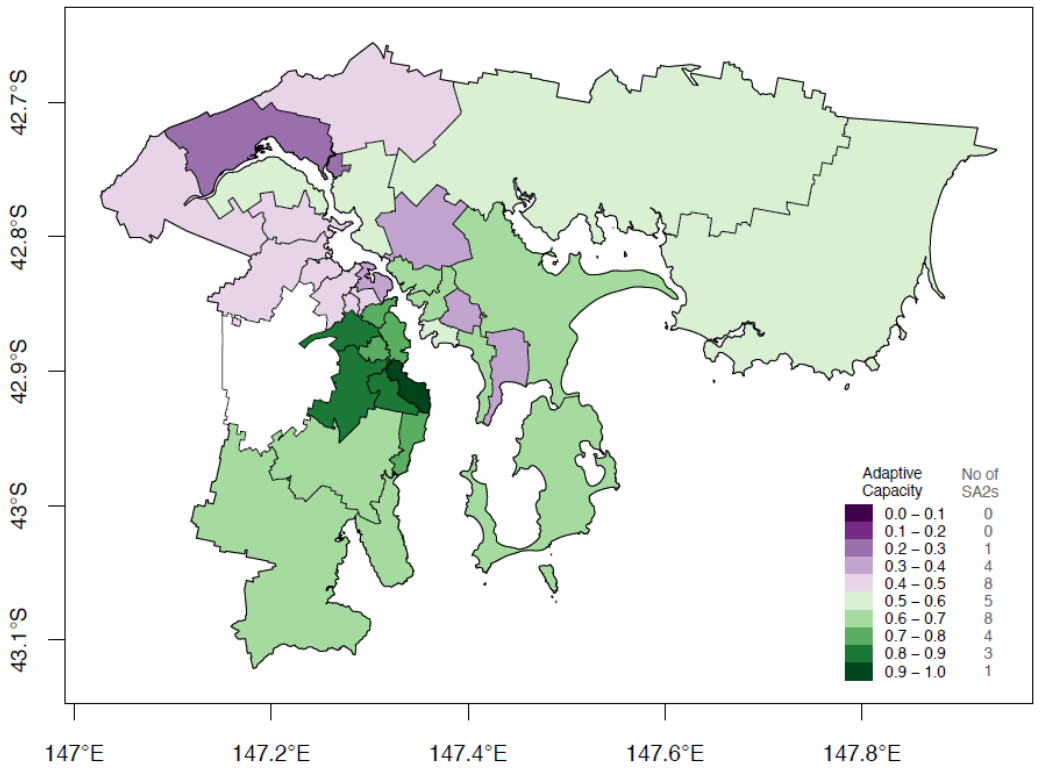


Appendix 4F (cont.)

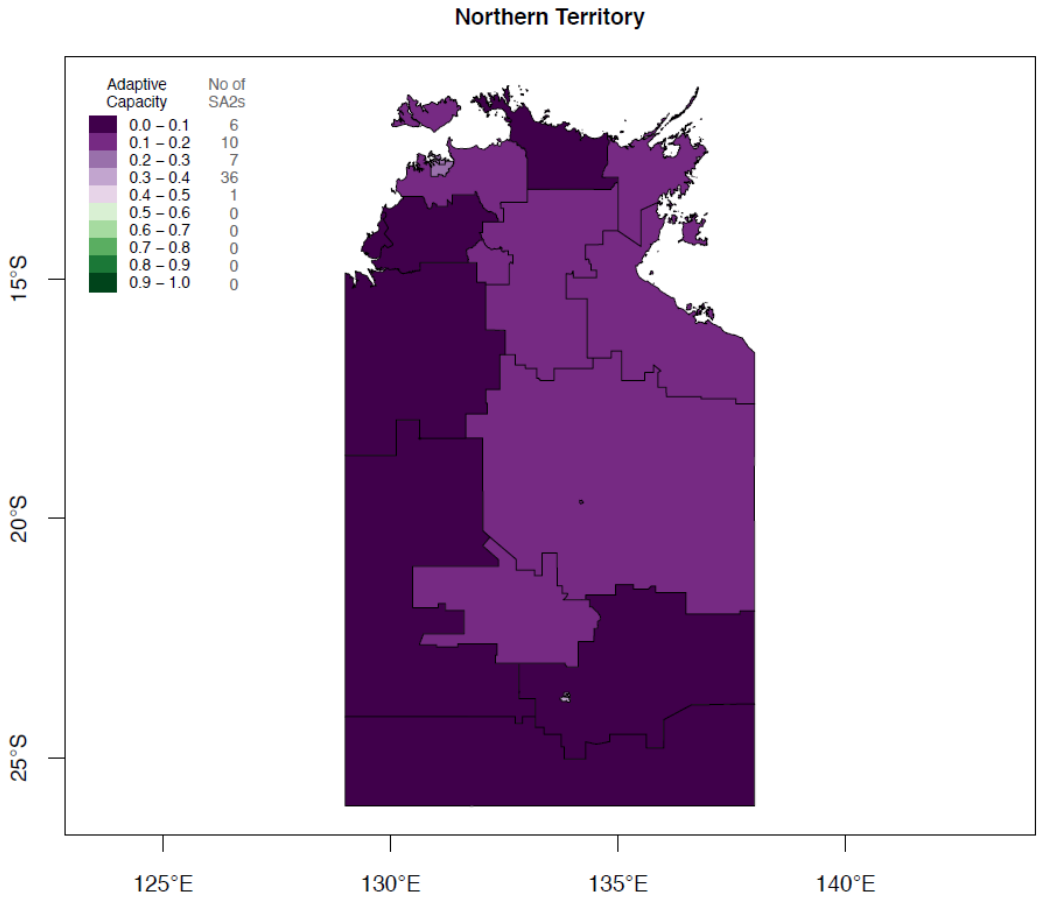
Tasmania

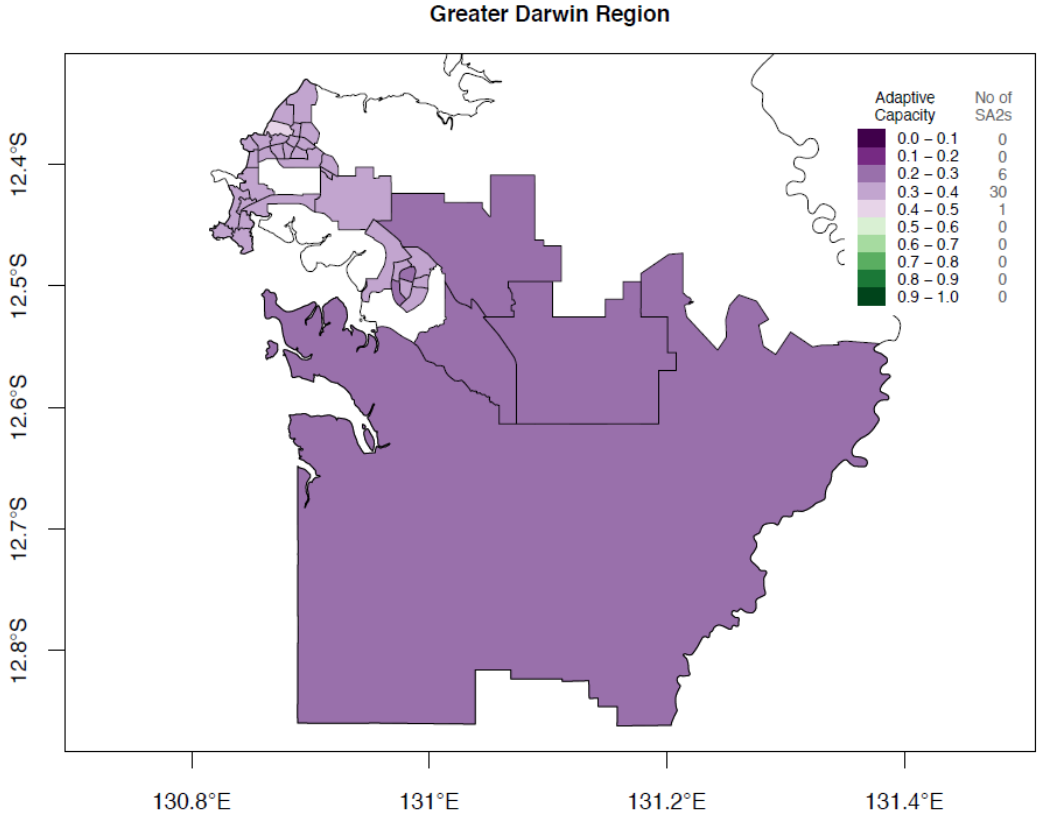


Greater Hobart Region



Appendix 4F (cont.)





Appendix 4F (cont.)