Technical information supporting the 2023 Terrestrial protected areas: landscapes adequately protected environmental trend and condition report card

Government
of South Australia

Department for
Environment and Water

Acknowledgement of Country

We acknowledge and respect the Traditional Custodians whose ancestral lands we live and work upon and we pay our respects to their Elders past and present. We acknowledge and respect their deep spiritual connection and the relationship that Aboriginal and Torres Strait Islanders people have to Country. We also pay our respects to the cultural authority of Aboriginal and Torres Strait Islander people and their nations in South Australia, as well as those across Australia.

Acknowledgements

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Summary

The 2023 release of South Australia's environmental trend and condition report cards summarises our understanding of the current condition of the South Australian environment, and how it is changing over time.

This document describes the indicators, information sources, analysis methods and results used to develop this report and the associated 2023 Terrestrial protected areas: landscapes adequately protected report card. The reliability of information sources used in the report card is also described.

The Terrestrial protected areas: landscapes adequately protected report card sits within the report card Biodiversity theme and Terrestrial sub-theme. Report cards are published by the Department for Environment and Water and can be accessed at www.environment.sa.gov.au.

1 Introduction

1.1 Environmental trend and condition reporting in SA

The Minister for Climate, Environment and Water under the *Landscape South Australia Act 2019* is required to 'monitor, evaluate and audit the state and condition of the State's natural resources, coasts and seas; and to report on the state and condition of the State's natural resources, coasts and seas' (9(1(a-b)). Environmental trend and condition report cards are produced as the primary means for the Minister to undertake this reporting. Trend and condition report cards are also a key input into the State of the Environment Report for South Australia, which must be prepared under the *Environment Protection Act 1993*. This Act states that the State of the Environment Report must:

- include an assessment of the condition of the major environmental resources of South Australia (112(3(a))), and

- include a specific assessment of the state of the River Murray, especially taking into account the Objectives for a Healthy River Murray under the *River Murray Act 2003* (112(3(ab))), and

- identify significant trends in environmental quality based on an analysis of indicators of environmental quality (112(3(b))).

1.2 Purpose and benefits of SA's environmental trend and condition report cards

South Australia's environmental trend and condition report cards focus on the state's priority environmental assets and the pressures that impact on these assets. The report cards present information on trend, condition, and information reliability in a succinct visual summary.

The full suite of report cards captures patterns in trend and condition, generally at a state scale, and gives insight to changes in a particular asset over time. They also highlight gaps in our knowledge on priority assets that prevent us from assessing trend and condition and might impede our ability to make evidence-based decisions.

Although both trend and condition are considered important, the report cards give particular emphasis to trend. Trend shows how the environment has responded to past drivers, decisions, and actions, and is what we seek to influence through future decisions and actions.

The benefits of trend and condition report cards include to:

- provide insight into our environment by tracking its change over time

- interpret complex information in a simple and accessible format

- provide a transparent and open evidence base for decision-making

- provide consistent messages on the trend and condition of the environment in South Australia

- highlight critical knowledge gaps in our understanding of South Australia's environment

- support alignment of environmental reporting, ensuring we 'do once, use many times'.

Environmental trend and condition report cards are designed to align with and inform state of the environment reporting at both the South Australian and national level. The format, design and accessibly of the report cards has been reviewed and improved with each release.

1.3   Protected areas

The original intent of protected areas was to conserve iconic landscapes and wildlife. More recently protected areas are increasingly expected to supply a diverse range of conservation, social and economic outcomes to people and communities worldwide (Watson *et al.* 2014). Protected areas are a tried and tested approach that has been applied for centuries to conserve nature and associated cultural resources by local communities, indigenous peoples, governments and other organisations (World Parks Congress).

While the protected area system has increased substantially in recent decades this has not been matched by increasing support for management of protected areas. Financial support for protected areas worldwide is dwarfed by the benefits that they provide, but these returns depend on effective management (Watson *et al.* 2014). Increased recognition, funding, planning and enforcement will be required to enable protected areas to fulfill their potential (Watson *et al.* 2014). This potential extends the vital role of protected areas in conserving nature to their role in assisting human response to some of today's most pressing challenges, including food and water security, human health and well-being, disaster risk reduction and climate change (World Parks Congress).

The IUCN (Dudley 2008) defines protected areas as 'a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long term conservation of nature with associated ecosystem services and cultural values'. This definition includes both public and private lands. In South Australia areas of land are protected under a variety of mechanisms including:

- Indigenous Protected Areas
- *National Parks and Wildlife Act 1972*
    - National Parks including co-managed parks
    - Conservation Parks including co-managed parks
    - Game Reserves
    - Recreation Parks
    - Regional Reserves
- *Wilderness Protection Act 1992*
    - Wilderness Protection Areas and Zones including co-managed areas
- *Native Vegetation Act 1991*
    - Heritage Agreements
- *Forestry Act 1950*
    - Native Forest Reserves
- *Crown Lands Management Act 2009*
    - Crown Land Reserve (Conservation Reserve)
- *Arkaroola Protection Act 2012*
    - Arkaroola Protection Area
- *Marine Parks Act 2007*. In some instances Marine Park boundaries extend above the high tide mark, for example in the Onkaparinga River
    - general managed use zone
    - habitat protection zone
    - sanctuary zone
    - restricted access zone.

Management objectives for South Australian protected areas are that the state's terrestrial and marine biodiversity, environments and cultural heritage are healthy, productive and conserved and that in turn South Australian's lives are enriched by the state's biodiversity and cultural heritage. Protected areas aim to conserve the full range of ecosystems and build the capacity of natural systems to adapt to climate change. They also aim to protect places of special meaning for people and create opportunities for indigenous co-management.

A survey in 2017 found 99% of South Australians valued National Parks, Conservation Parks and Recreational Parks for either recreation and use or biodiversity and cultural heritage while only 1% of South Australians said those parks were not important to them (DEWNR 2017).

Recent additions to the protected area system include: Aldinga Washpool addition to Aldinga Scrub Conservation Park, Hindmarsh Valley National Park, Nilpena Ediacara National Park and a new section added to Scott Creek Conservation Park.

2 Methods

2.1 Indicator

The indicator used for this terrestrial protected areas report card is landscapes adequately protected.

The comprehensive, adequate, representative (CAR) concept is used to guide the protected area system in Australia (Commonwealth of Australia 1995). The use of landscapes adequately protected here is to reflect that CAR concept. The following definitions are provided (Commonwealth of Australia 1995; Commonwealth of Australia 1997):

- comprehensive means to include the full range of vegetation communities recognised by an agreed scientific classification at appropriate hierarchical levels
- adequate means the maintenance of ecological viability and integrity of populations, species and communities
- representative means those areas chosen for inclusion in reserves should reasonably reflect the biotic diversity of the communities.

While the threshold used here to define adequate protection is 10% (DSEWPC 2009; DENR 2012), this threshold is somewhat arbitrary, and other criteria are sometimes used to guide the proclamation of protected areas (Commonwealth of Australia 1997). For example, sites of high biodiversity, complementarity or rarity may influence regional priorities, not just the achievement of a percentage target. Further, the Commonwealth of Australia (1997) considered 15% of pre-European distribution as a desirable objective. However, 'flexibility is both acceptable and desirable. For instance, where socio-economic impacts are not acceptable, or where biodiversity conservation objectives can be demonstrably achieved, such as for forest ecosystems which are extensive, a lower level of reservation, (e.g., 10%) may prove adequate (Commonwealth of Australia 1997)'.

While protected areas are a key component of any strategy to maintain the natural values of an area, the areas outside of reserves also make vital contributions to the maintenance of natural values (McIntyre and Hobbs 1999; McIntyre and Hobbs 2000).

2.2 Data sources

2.2.1 Landscapes

Landscapes for the purposes of this assessment are equivalent to Interim Bioregionalisation of Australia (IBRA) Associations 6.1 (DEW 2023a). IBRA Associations are derived from the Environments of South Australia Handbook (Laut *et al.* 1977), work developed by CSIRO as a test case for using satellite data to define environmentally similar areas based on Landsat imagery. While it represents the finest scale of mapping in the IBRA hierarchy for South Australia it should still be considered a landscape scale, i.e. a single IBRA Association (landscape) usually contains more than one type of ecosystem.

IBRA Associations 6.1 (DEW 2023a) contain 382 unique associations.

Each IBRA Association was assigned to one Landscape SA (LSA) region. If an IBRA Association crossed LSA region boundaries it was assigned to the LSA region in which it had the largest area. Table 2.1 defines LSA regions and Figure 2.1 shows their location.

Table 2.1: South Australian LSA regions

LSARegion	LSA
Hills and Fleurieu	HF
Alinytjara Wilurara	AW
Eyre Peninsula	EP
Kangaroo Island	KI
Northern and Yorke	NY
South Australian Arid Lands	SAAL
Murraylands and Riverland	MR
Limestone Coast	LC
Green Adelaide	GA
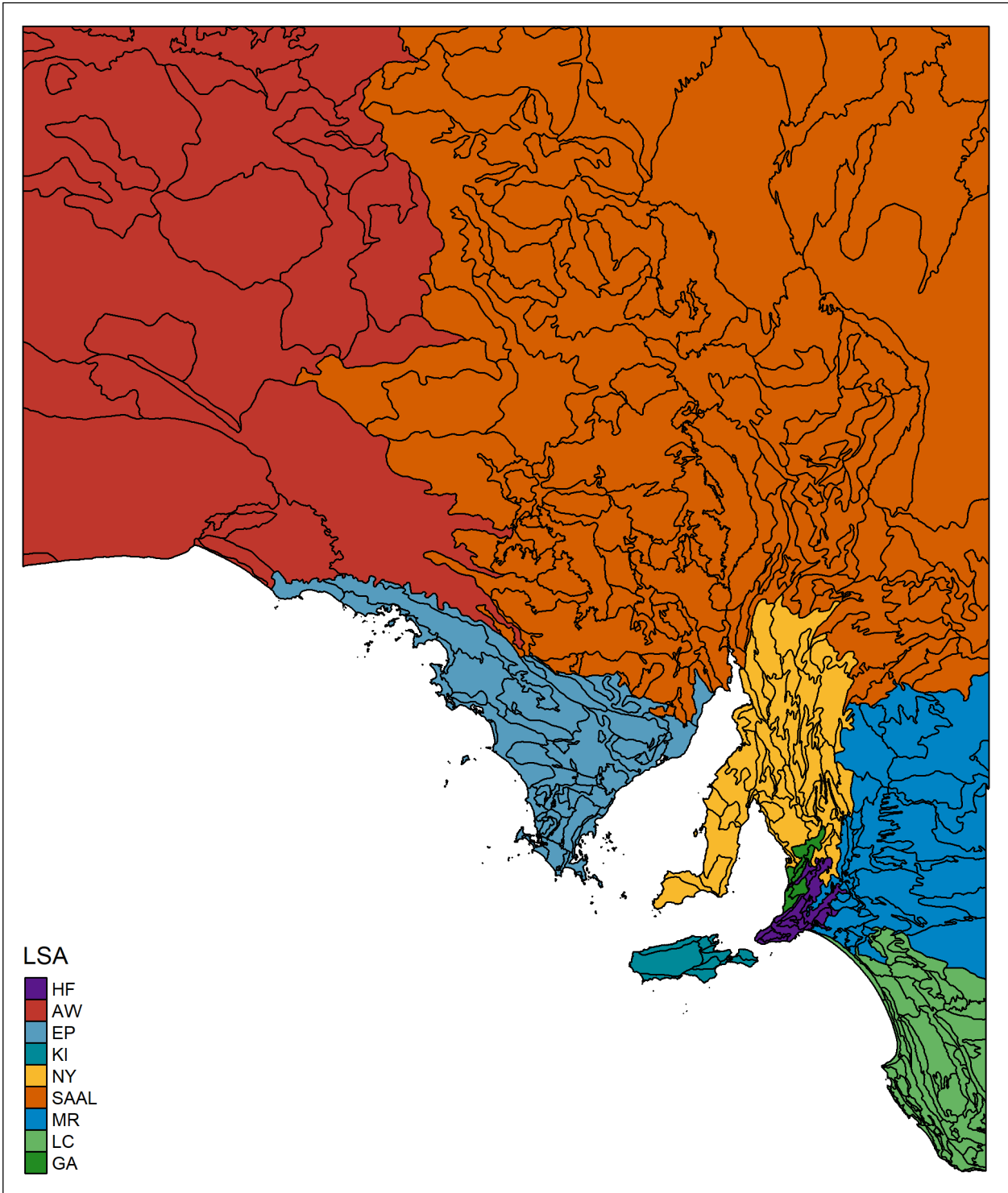
Figure 2.1: Relationship of IBRA Associations 6.1 to the LSA regions

2.2.2   Protected areas

For the purposes of this report card, protected areas are considered to be areas protected under legislation and indigenous protected areas. The data sources used for each protected area, and the types of protected areas included are given in Table 2.2.

The gazettal year was obtained from the data sources listed in Table 2.2. In some cases where a protected area, or part thereof, has been reclassified, the gazettal date obtained from the data sources specified will represent the reclassification date, not the original date of protection. In these cases the date of original gazettal was re-instated from other data sources.

Table 2.2: Data source for each type of protected area

Legislation	Data source	Types included
Indigenous Protected Areas	Commonwealth of Australia (2017)	All
National Parks and Wildlife Act 1972	DEW (2023b)	National Parks, Conservation Parks, Game Reserves, Recreation Parks and Regional Reserves
Wilderness Protection Act 1992	DEW (2023b)	All
Native Vegetation Act 1991	DEW (2023c)	All except for Monarto aesthetic heritage agreements
Forestry Act 1950	DEW (2023d)	Native Forest Reserves
Crown Lands Management Act 2009	DEW (2023b)	Conservation Reserve
Arkaroola Protection Act 2012	DEW (2023e)	Arkaroola Protection Area
Marine Parks Act 2007	DEW (2023f)	general managed use, habitat protection, sanctuary and restricted access zones

2.3   Trend and condition

The area of land in the protected area system in each IBRA Association was calculated by summing the area of the protection categories (listed above in data sources) and dividing by the total area of each IBRA Association. The terrestrial boundary of the state was assumed to be the same as the IBRA Association boundaries, with any protected area beyond this boundary being ignored in this analysis.

Data were summarised at the following spatial scales: statewide and LSA regions. At each level of the two spatial scales (statewide and LSA Region [8 levels]):

- Trend was classified as stable, getting better or getting worse based on the number of IBRA Associations that were classified as being adequately protected (more than 10% protected area) over the previous six year period (see Table 2.3)
- Condition was classified from the percentage of IBRA Associations adequately protected in 2022 (see Table 2.4 for classification thresholds).

For trend and condition, public and private protected areas were combined. The time since proclamation was defined by the time between the gazettal year (not date) and 2022.

Generic definitions for trend and condition are provided in Table 2.3 and Table 2.4 respectively, including the specific values used here as thresholds to define the classes.

Table 2.3: Definition of trend classes used

Trend	Description	Threshold
Getting better	Over a scale relevant to tracking change in the indicator it is improving in status with good confidence	Increase in the number of IBRA associations (Laut *et al.* 1977; DEW 2023a) adequately protected (more than 10% protected area) over the 6 years to 2022
Stable	Over a scale relevant to tracking change in the indicator it is neither improving or declining in status	No increase in the number of IBRA associations (Laut *et al.* 1977; DEW 2023a) adequately protected (more than 10% protected area) over the 6 years to 2022
Getting worse	Over a scale relevant to tracking change in the indicator it is declining in status with good confidence	Decrease in the number of IBRA associations (Laut *et al.* 1977; DEW 2023a) adequately protected (more than 10% protected area) over the 6 years to 2022
Unknown	Data are not available, or are not available at relevant temporal scales, to determine any trend in the status of this resource	-
Not applicable	This indicator of the natural resource does not lend itself to being classified into one of the above trend classes	-

Table 2.4: Definition of condition classes

Condition	Description	Threshold
Very good	The natural resource is in a state that meets all environmental, economic and social expectations, based on this indicator. Thus, desirable function can be expected for all processes/services expected of this resource, now and into the future, even during times of stress (e.g. prolonged drought)	>= 75% IBRA Associations classified as adequately protected
Good	The natural resource is in a state that meets most environmental, economic and social expectations, based on this indicator. Thus, desirable function cannot be expected for all processes/services expected of this resource, now and into the future, even during times of stress (e.g. prolonged drought)	>= 50% and < 75% IBRA Associations classified as adequately protected
Fair	The natural resource is in a state that does not meet some environmental, economic and social expectations, based on this indicator. Thus, desirable function cannot be expected from many processes/services expected of this resource, now and into the future, particularly during times of stress (e.g. prolonged drought)	>= 25% and < 50% IBRA Associations classified as adequately protected
Poor	The natural resource is in a state that does not meet most environmental, economic and social expectations, based on this indicator. Thus, desirable function cannot be expected from most processes/services expected of this resource, now and into the future, particularly during times of stress (e.g. prolonged drought)	< 25% IBRA Associations classified as adequately protected
Unknown	Data are not available to determine the state of this natural resource, based on this indicator	-
Not applicable	This indicator of the natural resource does not lend itself to being classified into one of the above condition classes	-

2.4   Reliability

Information is scored for reliability based on subjective scores (1 [worst] to 5 [best]) given for information currency, applicability and level of spatial representation. Where there is information available regarding accuracy, this is included as well. Definitions guiding the application of these scores are provided in Table 2.5 for currency, Table 2.6 for applicability and Table 2.7 for spatial representation.

The reliability score given on a report card is the minimum of any of those scores. Minimum is used as the average can mask a very low reliability for one of the scores (say, currency if the information is quite old) if other scores are not as low.

Table 2.5: Guides for applying information currency

Currency score	Criteria
1	Most recent information >10 years old
2	Most recent information up to 10 years old
3	Most recent information up to 7 years old
4	Most recent information up to 5 years old
5	Most recent information up to 3 years old

Table 2.6: Guides for applying information applicability

Applicability score	Criteria
1	Data are based on expert opinion of the measure
2	All data based on indirect indicators of the measure
3	Most data based on indirect indicators of the measure
4	Most data based on direct indicators of the measure
5	All data based on direct indicators of the measure

Table 2.7: Guides for applying spatial representation of information (sampling design)

Spatial score	Criteria
1	From an area that represents less than 5% the spatial distribution of the asset within the region/state or spatial representation unknown
2	From an area that represents less than 25% the spatial distribution of the asset within the region/state
3	From an area that represents less than half the spatial distribution of the asset within the region/state
4	From across the whole region/state (or whole distribution of asset within the region/state) using a sampling design that is not stratified
5	From across the whole region/state (or whole distribution of asset within the region/state) using a stratified sampling design

2.5   Workflow

The data import, cleaning, analysis and report writing were done in a scripted workflow using the programs `R` and 'R-studio Desktop'. R (R Core Team 2020) is an open source software environment for statistical computing and graphics. Base R can be extended via a range of open source packages to enable specific tasks or analyses. The packages used to produce this report are listed in Table 2.8.

R-studio Desktop is a set of open source tools built to facilitate interaction with `R`.

A workflow diagram (managing environmental knowledge chart) is provided in Figure 2.2.

Table 2.8: R (R Core Team 2020) packages used in the production of this report

package	citation	loadedversion	date	source
base	R Core Team (2020)	4.0.2	2020-06-22	local
knitr	Xie (2021a)	1.33	2021-04-24	CRAN (R 4.0.5)
bookdown	Xie (2021b)	0.24	2021-09-02	CRAN (R 4.0.5)
devtools	Wickham and Hester *et al.* (2021)	2.4.2	2021-06-07	CRAN (R 4.0.5)
dplyr	Wickham *et al.* (2022)	1.0.8	2022-02-08	CRAN (R 4.0.5)
tidyr	Wickham and Girlich (2022)	1.2.0	2022-02-01	CRAN (R 4.0.5)
purrr	Henry and Wickham (2020)	0.3.4	2020-04-17	CRAN (R 4.0.5)
tibble	Müller and Wickham (2021)	3.1.6	2021-11-07	CRAN (R 4.0.5)
readr	Wickham and Hester (2021)	2.0.1	2021-08-10	CRAN (R 4.0.5)
forcats	Wickham (2021)	0.5.1	2021-01-27	CRAN (R 4.0.5)
stringr	Wickham (2019)	1.4.0	2019-02-10	CRAN (R 4.0.5)
lubridate	Spinu *et al.* (2021)	1.7.10	2021-02-26	CRAN (R 4.0.5)
ggplot2	Wickham and Chang *et al.* (2021)	3.3.5	2021-06-25	CRAN (R 4.0.5)
readxl	Wickham and Bryan (2019)	1.3.1	2019-03-13	CRAN (R 4.0.5)
fs	Hester *et al.* (2021)	1.5.2	2021-12-08	CRAN (R 4.0.5)
rio	Chan and Leeper (2021)	0.5.27	2021-06-21	CRAN (R 4.0.5)
sf	Pebesma (2021)	1.0-4	2021-11-14	CRAN (R 4.0.5)
tmap	Tennekes (2021)	3.3-2	2021-06-16	CRAN (R 4.0.5)
envFunc	Willoughby (2023a)	0.0.0.9000	2023-05-31	Github (acanthiza/envFunc@bbeb4c1)
envReport	Willoughby (2023b)	0.0.0.9000	2023-05-31	Github (acanthiza/envReport@bd9b258)

Report Card 114 – TER Terrestrial protected areas: landscapes adequately protected

Inputs

Main input datasets used in analysis

Final output data set

Dataset(s) from which stats, graphs and maps are derived

Report card and technical info

Final pdfs

114.1a-e NPWS properties, State marine park zoning, Vegetation heritage agreements, Arkaroola protection area, Landscape SA regions
Authorised by: DEW
Access via: https://data.sa.gov.au/data/dataset/conservation-reserve-parcel,
https://data.sa.gov.au/data/dataset/marine-park-zoning,
https://data.sa.gov.au/data/dataset/vegetation-heritage-agreements,
https://data.sa.gov.au/data/dataset/arkaroola-protection-area,
https://data.sa.gov.au/data/dataset/landscapes-sa-boundaries
114.2 Indigenous protected areas
Authorised by: Other Public
Access via: https://data.gov.au/dataset/ds-dga-1f60de3d-b0e6-41e0-b877-238b2bfb258e/details?q=indigenous%20protected%20areas

114.3 PAIS park additions and reclassifications
Owner: DEW
114.4 Native forest reserves proclamation dates
Owner: SA Gov

114.5 Forestry SA land
Owner: SA Gov
114.6 Interim Biogeographic Regionalisation for Australia (IBRA) Associations (v6.1)
Owner: Other Public

114.7 Protected area stats ArcGIS Pro toolbox
Owner: DEW

114.8 R-scripts
Owner: DEW

Process/Analysis

Scripts source and aggregate datasets, run analysis to calculate indicator, and generate all content for the report card and technical document.

114.9 Percentage of landscapes that are adequately protected
Owner: DEW

114.10 Trend in landscapes that are adequately protected
Owner: DEW

RC Method

DEW Bespoke method for Trend & Condition Report Cards. Associated Technical Report written by Report Card author(s).

114.11 Report Card – Terrestrial protected areas: landscapes adequately protected
Authorised by: DEW
Access via: https://data.environment.sa.gov.au/Trend-and-condition-reports

114.12 Technical information supporting the 2023 Terrestrial protected areas: landscapes adequately protected environmental trend and condition report card
Authorised by: DEW
Access via: https://data.environment.sa.gov.au/Trend-and-condition-reports

DOCUMENT   TABLE   SPATIAL   CHART

MAP   MODEL   DATABASE   IMAGE

Figure 2.2: Workflow diagram for landscapes adequately protected

3 Results

3.1 Statewide

Figure 3.1 shows how the protected area system has changed through time. Based on these data, in 2022 28,277,000 hectares are protected in South Australia or about 28.8% of the state.

Table 3.1 shows changes in landscapes adequately protected over six year periods. Figure 3.2 shows how the percentage of landscapes adequately protected has changed through time.

Across the state there are 75 IBRA Associations with no protected areas.

Table 3.1: Statewide trend and condition in six-year periods of landscapes adequately protected

Year	Adequately protected	Percentage	Trend	Condition
2022	116	30.4	Getting better	Fair
2016	93	24.3	Getting better	Poor
2010	57	14.9	Getting better	Poor
2004	32	8.4	Getting better	Poor
1998	20	5.2	Getting better	Poor
1992	16	4.2	Getting better	Poor
1986	6	1.6	Getting better	Poor
1980	1	0.3	Stable	Poor
1974	1	0.3	Getting better	Poor
1968	0	0.0	Stable	Poor
1962	0	0.0	Stable	Poor
1956	0	0.0	Stable	Poor
1950	0	0.0	-	Poor
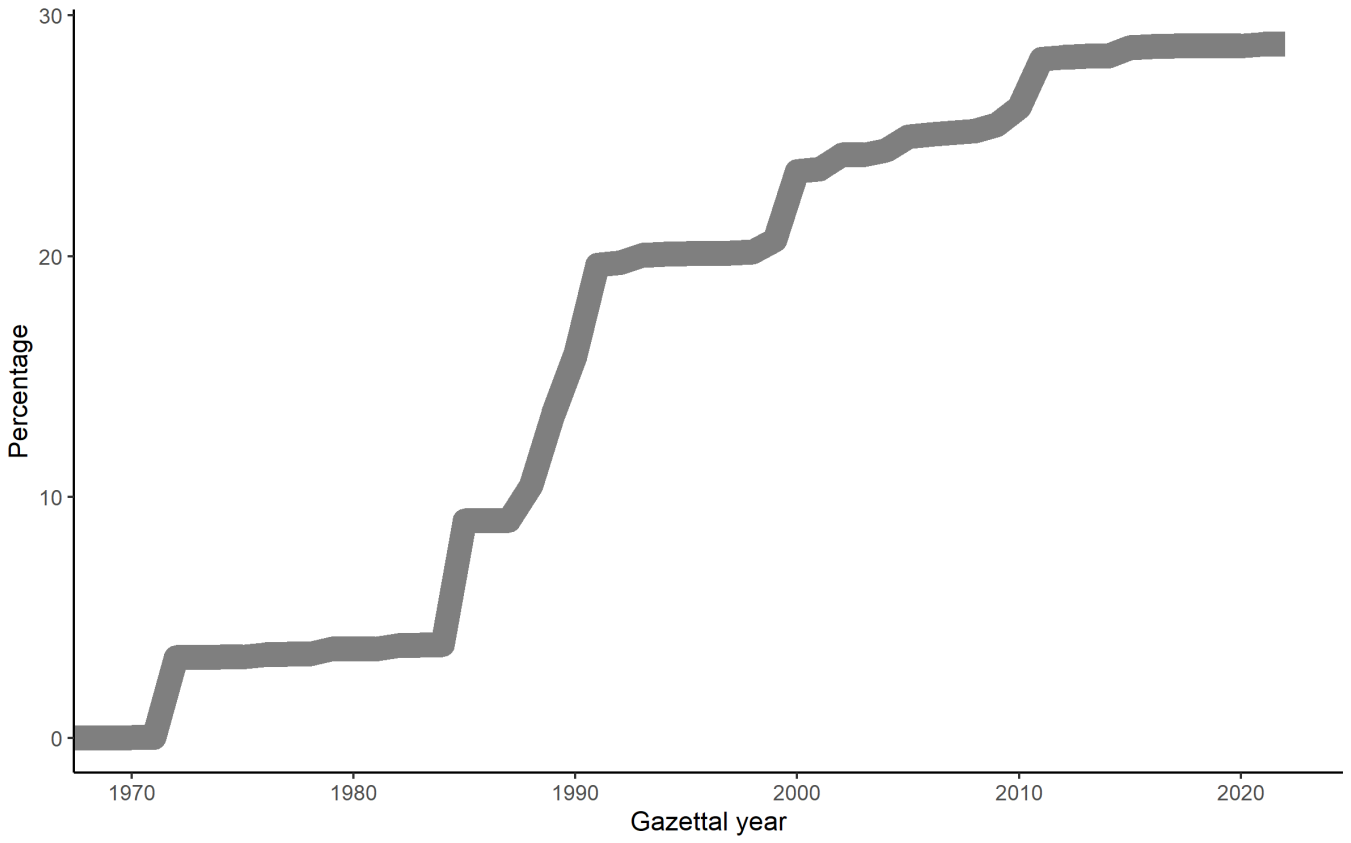
Figure 3.1: Percentage of South Australia protected
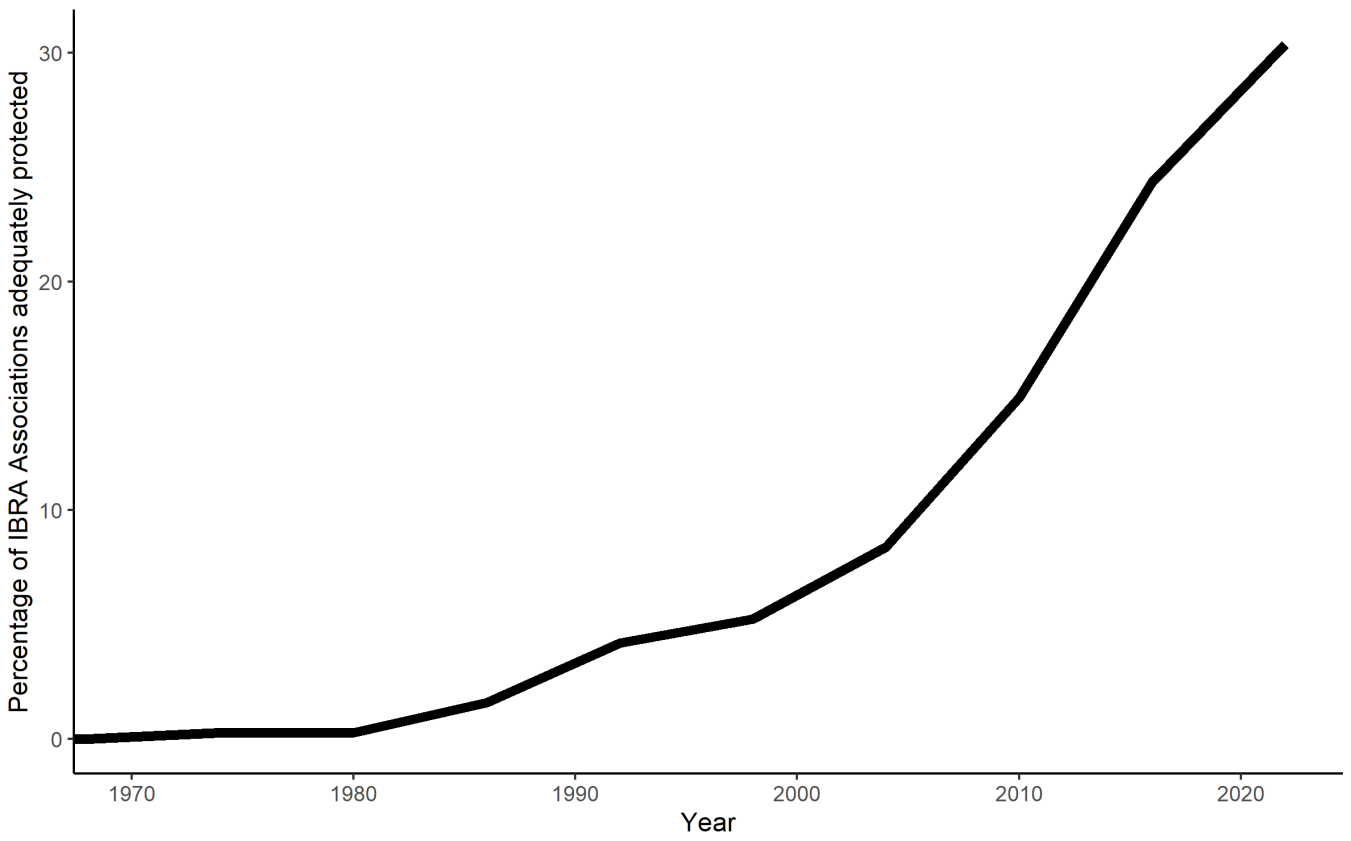
Figure 3.2: Percentage of IBRA Associations that are adequately protected

3.2   LSA regions

Table 3.2 and Figure 3.3 shows how the indicator landscapes adequately protected has changed through time in each LSA Region. This trend is also shown in Figure 3.4. Current estimates of percentage of landscapes adequately protected in each region are shown in Figure 3.5.

The number of IBRA Associations with no protected areas in each LSA Region is given in Table 3.3.

Details on the IBRA Associations assigned to each LSA region, including the area, year of last gazettal, percentage protected and adequacy of protection, are shown in the Appendices (Tables 5.1 to 5.9.

Table 3.2: Trend and condition in each LSA Region of landscapes adequately protected

LSA	IBRA Associations with adequate protection	Total IBRA Associations	Percentage with adequate protection	Year of last gazettal that reached 10%	Trend	Condition
HF	4	16	25	2010	Stable	Fair
AW	25	31	81	2011	Stable	Very good
EP	23	56	41	2006	Stable	Fair
KI	4	8	50	1992	Stable	Good
NY	6	48	12	2016	Getting better	Poor
SAAL	33	132	25	2021	Getting better	Fair
MR	8	36	22	2015	Stable	Poor
LC	12	49	24	2010	Stable	Poor
GA	1	6	17	1993	Stable	Poor

Table 3.3: Number of IBRA Associations in each LSA Region with no protected areas

LSA	IBRA Associations with no protection	Number of IBRA Associations	Percentage with no protection
HF	0	16	0.0
AW	4	31	12.9
EP	5	56	8.9
KI	0	8	0.0
NY	9	48	18.8
SAAL	49	132	37.1
MR	2	36	5.6
LC	6	49	12.2
GA	0	6	0.0
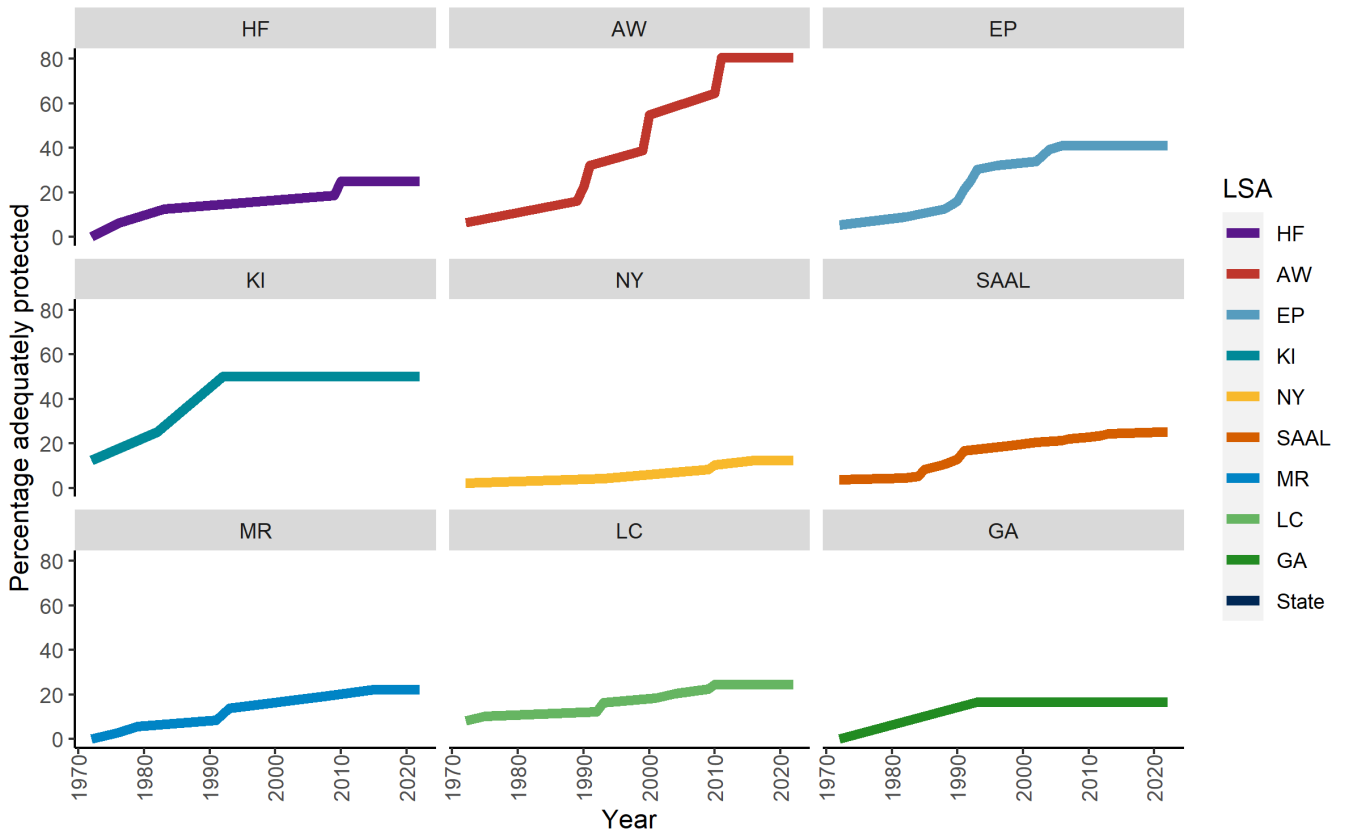
Figure 3.3: Percentage of IBRA Associations in each LSA region that are adequately protected
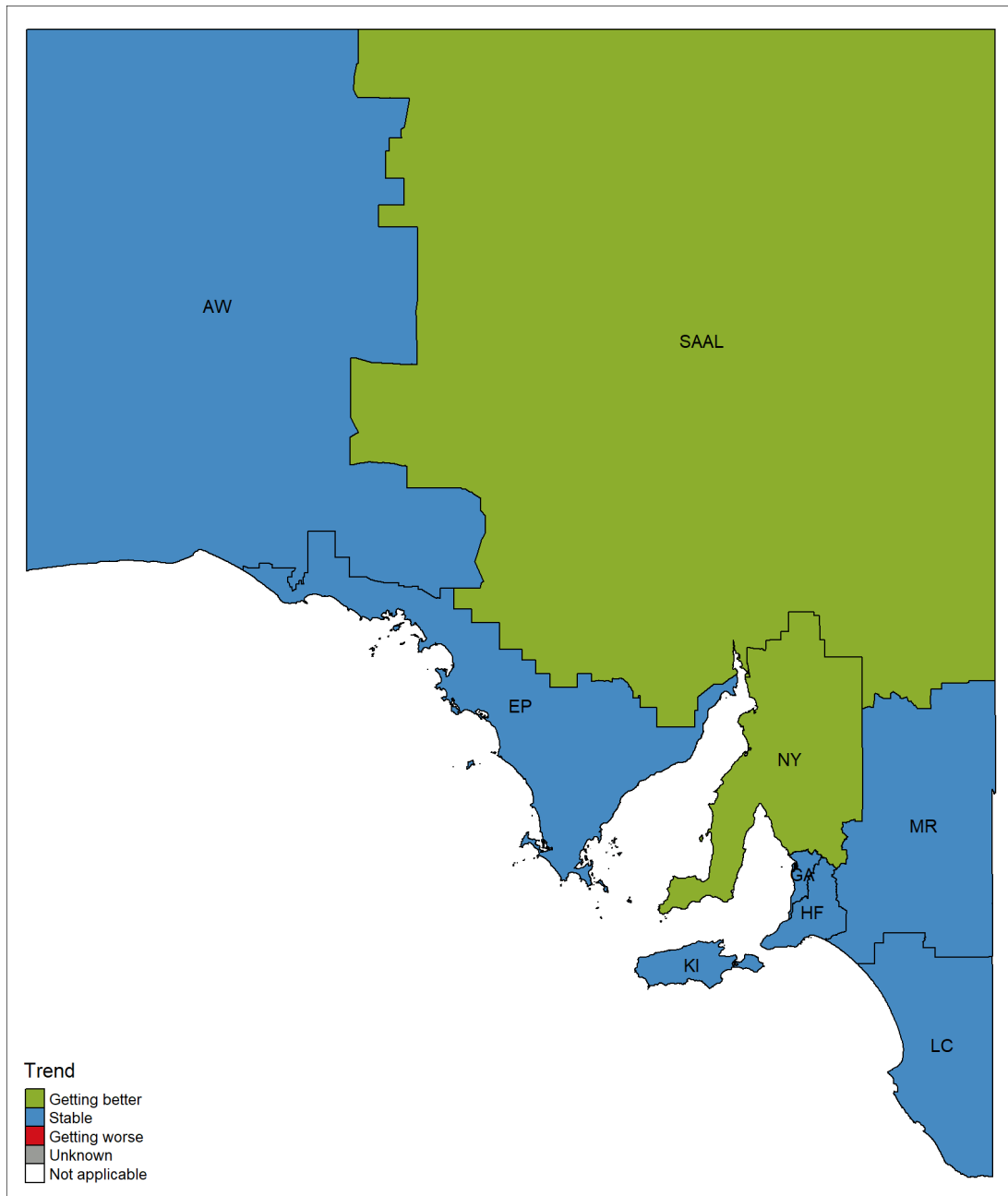
Figure 3.4: Regional trends in percentage of adequately protected IBRA Associations by LSA region
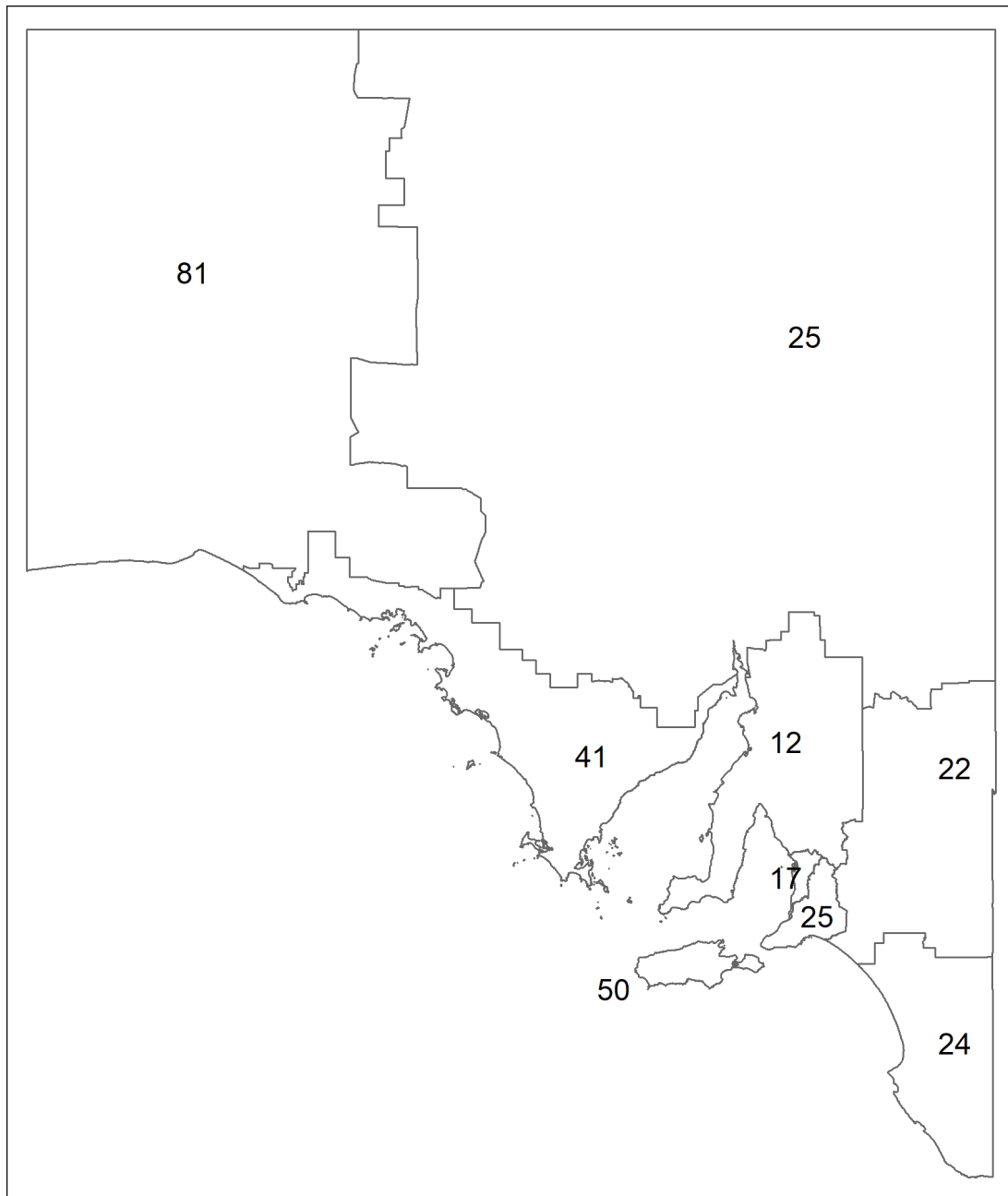
Figure 3.5: Percentage of adequately protected IBRA Associations by LSA region

3.3   Reliability

The overall reliability score for this report card was good, based on Table 3.4.

The overall reliability score was the minimum of: currency, which was excellent (most recent information up to 3 years old); applicability, which was good (most data based on indirect indicators of the measure); and spatial, which was excellent (from across the whole region/state (or whole distribution of asset within the region/state) using a stratified sampling design).

Table 3.4: Information reliability scores for terrestrial protected areas landscapes adequately protected

Indicator	Currency score	Applicability score	Spatial score	Reliability
IBRA Associations with greater than 10% protected area	5	3	5	3

4 Discussion

Statewide landscapes adequately protected was getting better between 2016 and 2022. The 2022 condition of landscapes adequately protected was fair.

While landscapes adequately protected is a useful indicator for the trend and condition of the statewide reserve system, the use of the 10% threshold should not be seen as the only guide for the proclamation of protected areas (Commonwealth of Australia 1997). For example, sites of high biodiversity, complementarity or rarity may influence regional priorities, as will the amount of native vegetation remaining, and therefore available, for protection.

5   Appendices

5.1   LSA regions assigned to each IBRA Association

5.1.1   HF LSA region

Table 5.1 shows the IBRA Associations assigned to the HF LSA region.

Table 5.1: IBRA Associations assigned to HF region

IBRA Association	Area (hectares)	Last Gazettal	Protected %	Adequate
Angas Plains	22529	2017	0.53	No
Bleasdale	6402	1984	0.42	No
Bob Teirs	15734	2022	13.99	Yes
Bull Knob	9214	2017	5.97	No
Deep Creek	12919	2021	25.37	Yes
Fleurieu	20356	2022	10.93	Yes
Goolwa	11706	2017	0.68	No
Hahndorf	61551	2022	0.63	No
Inman Valley	37095	2022	4.00	No
Kerby Hill	10417	2021	0.13	No
Mt Compass	31607	2022	4.34	No
Mt Rapid	12720	2022	1.20	No
Mt Terrible	19383	2022	22.51	Yes
Mt Wilson	15230	2009	0.30	No
Sandergrove	53681	2022	3.81	No
Uraidla	14376	2022	6.05	No

5.1.2   AW LSA region

Table 5.2 shows the IBRA Associations assigned to the AW LSA region.

Table 5.2: IBRA Associations assigned to AW region

IBRA Association	Area (hectares)	Last Gazettal	Protected %	Adequate
Ammaroodinna	406872	1991	4.66	No
Bight	34691	2011	99.95	Yes
Bunda	44607	1991	99.16	Yes
Byilcaoora	65023	2011	15.79	Yes
Cave Hill	77174	2011	18.54	Yes
Chintumba	160568	2011	88.32	Yes
Corkscrew	470258	1991	57.97	Yes
Dingo	1282833	1991	21.36	Yes
Giles	1137483	2002	77.97	Yes
Illbillee	454781	2011	47.31	Yes
Kroonilla	817202	2006	71.41	Yes
Lake Wright	251832	2000	87.73	Yes
Mann Range	76363	2010	7.27	No
Maralinga	-	-	-	-
Mt Davies	60055	2010	100.00	Yes
Mt Sir Thomas	424119	2000	73.84	Yes
Muckera	720716	1972	47.34	Yes
Musgrave	539869	2011	16.99	Yes
Nullarbor	4094976	2009	67.73	Yes
Nurrari	-	-	-	-
Officer	-	-	-	-
Okaralnga	2649696	2011	62.49	Yes
Oolarinna	349168	2011	40.26	Yes
Purananja	91010	2010	100.00	Yes
Purndu	1992901	2011	44.00	Yes
Sundown	-	-	-	-
Victoria Desert	4502785	2000	39.18	Yes
Walalkaranya	1638856	2011	65.78	Yes
Walatajarnja	947814	2011	47.36	Yes
Yalata	130792	1999	99.89	Yes
Yellabina	4442806	2006	56.45	Yes

5.1.3 EP LSA region

Table 5.3 shows the IBRA Associations assigned to the EP LSA region.

Table 5.3: IBRA Associations assigned to EP region

IBRA Association	Area (hectares)	Last Gazettal	Protected %	Adequate
Avoid Bay	20543	2022	89.71	Yes
Blue Range	6508	2004	32.32	Yes
Bookabie	135008	2022	34.56	Yes
Brimpton	15958	1988	0.08	No
Butler	77284	2016	0.07	No
Ceduna	132955	2011	13.44	Yes
Cleve	97201	2009	3.25	No
Cobbler Hill	11267	2009	11.44	Yes
Coffin Bay	11042	2009	100.00	Yes
Corrabinnie	132637	2016	88.52	Yes
Cummins	-	-	-	-
Darke Peake	7715	2010	8.99	No
Douglas	2463	2009	0.03	No
Drummond	46155	2012	9.67	No
Edillie	36705	2017	2.24	No
Greenly	6882	1999	3.82	No
Hambidge	353423	2010	20.87	Yes
Hincks	28948	2004	75.48	Yes
Inkster	320199	2021	20.01	Yes
Isabella	29596	2013	1.65	No
Jussieu	2572	2009	100.00	Yes
Kappawanta	179770	2010	32.40	Yes
Kimba	109366	2007	5.35	No
Kiona	14513	2012	0.53	No
Koongawa	538677	2012	18.05	Yes
Kyancutta	73543	2012	1.29	No
Lincoln	40587	2009	70.91	Yes
Lock	18737	1994	1.28	No
Malata	19957	2012	1.15	No
Marble Range	15222	1992	16.86	Yes
McLochlan	103956	2009	42.16	Yes
Messenger	189591	2012	18.09	Yes
Midgee	120723	2012	33.24	Yes
Mt Cooper	40466	2007	1.47	No
Mt Dampier	6399	1991	5.36	No

IBRA Association	Area (hectares)	Last Gazettal	Protected %	Adequate
Mt Desperate	87594	1999	6.32	No
Mt Gawler	19336	2011	0.23	No
Mungerowie	65106	2013	22.83	Yes
Newland	11159	1999	77.69	Yes
Numulta	14432	1993	1.81	No
Peake Bay	32880	2016	1.58	No
Pinkawillinie	161263	2016	24.43	Yes
Polda	288442	2011	9.20	No
Salt Creek	-	-	-	-
Scrubby Peak	24524	2016	62.85	Yes
Streaky Bay	75473	2016	8.12	No
Tooligie	-	-	-	-
Triple Hill	-	-	-	-
Waretta	11239	2009	0.12	No
Wharminda	70245	1985	0.23	No
Whyalla	72828	2016	4.07	No
Wirrula	500498	2006	2.47	No
Woolawae	17335	2010	0.05	No
Yalarna	23627	2012	58.76	Yes
Yalunda	105744	2009	1.97	No
Yeelanna	-	-	-	-

5.1.4 KI LSA region

Table 5.4 shows the IBRA Associations assigned to the KI LSA region.

Table 5.4: IBRA Associations assigned to KI region

IBRA Association	Area (hectares)	Last Gazettal	Protected %	Adequate
Amberley	47070	2014	1.87	No
Coranda	18856	2014	7.12	No
Cygnet	8991	2015	1.63	No
Gantheaume	77567	2022	72.64	Yes
MacGillivray	23658	2017	17.23	Yes
Mt Marsden	5791	2009	0.82	No
Parndana	214414	2019	36.30	Yes
Stokes Bay	42439	2009	25.41	Yes

5.1.5 NY LSA region

Table 5.5 shows the IBRA Associations assigned to the NY LSA region.

Table 5.5: IBRA Associations assigned to NY region

IBRA Association	Area (hectares)	Last Gazettal	Protected %	Adequate
Alma	12755	2001	0.19	No
Apoinga	-	-	-	-
Appila	135353	2011	0.01	No
Arthurton	48647	2009	0.03	No
Bald Hill	14794	2019	0.03	No
Barossa	13919	2010	0.67	No
Barung	86034	2001	0.00	No
Boor Plain	154113	2009	0.18	No
Boowillia	-	-	-	-
Bumbunga	-	-	-	-
Bundara	111399	1979	0.19	No
Burra Hill	72811	2016	4.86	No
Clare	154548	2022	0.36	No
Corny	47546	2017	1.38	No
Crystal Brook	91124	1988	0.04	No
Eden Valley	68708	2021	0.54	No
Freeling	-	-	-	-
Glendella	45854	2021	5.58	No
Hansen	142924	2005	0.03	No
Innes	104195	2017	29.85	Yes
Kallora	39140	2016	0.07	No
Kybunga	-	-	-	-
Mallala	182197	2020	0.12	No
Mongalata	22988	2014	11.26	Yes
Moochra	251891	2022	0.03	No
Mopami	77335	2010	0.14	No
Mt Remarkable	118008	2019	22.77	Yes
Neales Flat	42300	2012	0.86	No
Nurom	-	-	-	-
Para	34766	2022	12.86	Yes
Parham	37548	2016	17.63	Yes
Port Pirie	43735	2009	15.68	Yes
Rufus	17418	2019	0.05	No
Shearers Hill	6339	1994	0.94	No
Stockport	-	-	-	-

IBRA Association	Area (hectares)	Last Gazettal	Protected %	Adequate
Sutherlands	68891	2015	1.32	No
Tarcowie	79308	2008	0.29	No
Tarlee	49046	2016	0.58	No
Terowie	328886	2016	1.68	No
Urania	209817	2015	2.25	No
Walloway	-	-	-	-
Weetulta	49598	2009	0.19	No
Willochra	202958	2013	0.04	No
Wirrabara	31587	2016	0.23	No
Wokurna	134328	1976	0.59	No
Yacka	54644	1984	0.03	No
Yongala	-	-	-	-
Yorketown	75382	2009	0.55	No

5.1.6 SAAL LSA region

Table 5.6 shows the IBRA Associations assigned to the SAAL LSA region.

Table 5.6: IBRA Associations assigned to SAAL region

IBRA Association	Area (hectares)	Last Gazettal	Protected %	Adequate
Acraman	297711	1991	21.38	Yes
Anabama	-	-	-	-
Andamooka	501038	1991	1.58	No
Arden	87753	2009	3.65	No
Arkaba	39905	2013	4.03	No
Bagot	1197270	1985	44.34	Yes
Balcanoona	198087	2012	10.31	Yes
Bamboo Swamp	101966	2016	3.25	No
Barilla	-	-	-	-
Barrata	-	-	-	-
Benagerie	-	-	-	-
Benda Range	233029	2010	2.83	No
Bimbowrie	271655	2010	19.15	Yes
Birthday Dam	-	-	-	-
Brachina	166362	2021	3.12	No
Breakaway	2932711	2013	7.27	No
Buckalowie	-	-	-	-
Buckaringa	81283	2000	4.82	No
Buckleboo	497662	2012	12.63	Yes

IBRA Association	Area (hectares)	Last Gazettal	Protected %	Adequate
Chitaminga	25263	1991	0.85	No
Cockburn	-	-	-	-
Cooper Creek	2099843	2005	42.28	Yes
Cooryanna	-	-	-	-
Cradock	-	-	-	-
Curnamona	-	-	-	-
Davenport	-	-	-	-
Ediacara	111373	2021	10.01	Yes
Erragoona	34757	1998	91.04	Yes
Evelyn Creek	138415	2002	7.88	No
Everard	111177	1991	91.27	Yes
Finke	499252	1985	33.71	Yes
Fyne	163329	2005	36.48	Yes
Gairdner	440339	2007	97.23	Yes
Gairloch Dam	249175	2009	0.76	No
Gammon	39900	1982	89.51	Yes
Gawler	921462	2016	8.97	No
Giddi Giddinna	-	-	-	-
Glendamboo	-	-	-	-
Harper	164616	1991	0.91	No
Hesso	431791	1991	0.10	No
Hopeless	-	-	-	-
Ilkina	54967	2006	14.41	Yes
Inakoo Hill	-	-	-	-
Iron Knob	-	-	-	-
Ironstone Hill	26799	2012	90.27	Yes
Irrapatana	138713	1985	0.59	No
Jarret	-	-	-	-
Jungle Dam	-	-	-	-
Kadlongaroo	1071572	2013	0.47	No
Kallakoopah	3688677	1985	62.38	Yes
Koolcutta	-	-	-	-
Koonamore	-	-	-	-
Kooree	-	-	-	-
Labyrinth	224071	1991	0.16	No
Lake Eyre	990770	2016	93.71	Yes
Lake Frome	695536	1991	50.63	Yes
Lake Gilles	61726	2010	70.24	Yes
Lake Phillipson	936457	1991	0.35	No
Mabel Creek	480105	2002	4.14	No

IBRA Association	Area (hectares)	Last Gazettal	Protected %	Adequate
Macfarlane	147234	2016	0.37	No
Magnacowie	-	-	-	-
Mahanewo	151528	2016	5.61	No
Manarrina	1012494	1985	0.08	No
Marree	1029103	2016	2.39	No
Merna Mora	37089	2013	12.51	Yes
Merninie	192193	1988	100.00	Yes
Middleback Range	35540	2010	6.40	No
Moolooloo	-	-	-	-
Moondiepitchnie	1309363	1991	0.06	No
Mt Margaret	-	-	-	-
Mt. Gunson	-	-	-	-
Mulgarie	666361	2021	8.10	No
Muloorina	211266	1991	1.30	No
Mundawatana	-	-	-	-
Narina	-	-	-	-
Oakden	-	-	-	-
Old Telechie	256928	2010	7.58	No
Orama	-	-	-	-
Oraparinna	243636	2020	18.07	Yes
Outouie	62278	1998	12.65	Yes
Palthrubie	184319	1991	1.98	No
Parlue	-	-	-	-
Patchawara	70080	1988	93.09	Yes
Peake Creek	-	-	-	-
Peaked Hill	-	-	-	-
Pernatty	-	-	-	-
Petermorra	371387	1991	0.26	No
Pine Lodge	49264	2016	55.93	Yes
Piniewirie	525768	1988	0.14	No
Pootkamaunta	285603	1991	3.96	No
Quorn	92154	2013	3.77	No
Red Rock	45271	2016	4.93	No
Sarah	-	-	-	-
Simmens	155527	2009	0.01	No
Simpson Desert	2190214	1985	84.08	Yes
Stony Desert	1601183	1988	0.19	No
Strzelecki Desert	4467166	1991	21.08	Yes
Stuart Creek	-	-	-	-
Tarracalena	-	-	-	-

IBRA Association	Area (hectares)	Last Gazettal	Protected %	Adequate
Thurlga	-	-	-	-
Tiverton	118898	2010	1.08	No
Torrens	565315	2021	98.28	Yes
Tregolana	50375	2009	1.61	No
Uno Range	-	-	-	-
Uro	60822	1991	0.96	No
Walgidya	-	-	-	-
Wallabyng	101265	1991	0.08	No
Wandery Hill	365075	2014	1.25	No
Warburton	853861	1985	0.07	No
Warraweena	188267	2001	26.28	Yes
Warrida	-	-	-	-
Waulalumbo	113487	1991	1.06	No
White Elephant	262336	2016	3.17	No
Wiawera Creek	-	-	-	-
William Creek	949689	1991	2.31	No
Willouran	-	-	-	-
Wilpena	110364	2017	38.58	Yes
Wilyunpa	-	-	-	-
Wipipipee	89331	1991	0.31	No
Wirrangula	-	-	-	-
Wirrealpa	307815	2001	0.22	No
Woomera	-	-	-	-
Worumba	-	-	-	-
Wychinga	-	-	-	-
Yarra Wurta	46323	1991	0.09	No
Yarramba	151864	2010	0.31	No
Yeltana	12357	1987	0.52	No
Yerda	1072249	2005	13.29	Yes
Yerelina	439949	2012	12.39	Yes
Yudnamutana	93455	2012	56.82	Yes
Yudnapinna	-	-	-	-
Yunta	-	-	-	-

5.1.7 MR LSA region

Table 5.7 shows the IBRA Associations assigned to the MR LSA region.

Table 5.7: IBRA Associations assigned to MR region

IBRA Association	Area (hectares)	Last Gazettal	Protected %	Adequate
Bandon	22071	2005	1.47	No
Billiatt	301925	2011	34.66	Yes
Blanchetown	231988	2016	15.82	Yes
Canopus	746370	2015	72.85	Yes
Coorangie	56469	2004	5.75	No
Faraway Hill	-	-	-	-
Florieton	351287	2002	0.20	No
Fords Lagoon	-	-	-	-
Holder	399928	2019	7.07	No
Hypurna	39447	1993	100.00	Yes
Karoonda	420339	2013	1.93	No
Kunlara	90509	2013	4.59	No
Lake Alexandrina	133799	2017	1.68	No
Lower Murray	20547	1976	0.03	No
Loydella	12886	2016	5.64	No
Moorlands	144639	2003	1.73	No
Mt Mary	100465	1995	1.01	No
Mt Misery	22959	2022	2.07	No
Murtho	12431	2007	1.53	No
Narrung	29172	1991	2.47	No
Pallamana	8918	2017	0.53	No
Parcoola	234704	2021	55.07	Yes
Pata	204422	1992	0.63	No
Pine Valley	296931	2009	2.16	No
Pinnaroo	130939	1994	0.26	No
Punthari	69076	2022	2.97	No
Renmark	173760	2021	31.63	Yes
Sandleton	2493	1992	6.71	No
Scotts Hill	97419	2022	0.82	No
Sedan	14535	2016	11.40	Yes
Seymour	9372	2005	1.91	No
Stonefield	23520	2013	0.90	No
The Big Desert	399338	2017	66.51	Yes
Towitta	39503	2011	0.48	No
Wellington	6015	2016	0.34	No

IBRA Association	Area (hectares)	Last Gazettal	Protected %	Adequate
Wood Hill	46041	2016	2.21	No

5.1.8 LC LSA region

Table 5.8 shows the IBRA Associations assigned to the LC LSA region.

Table 5.8: IBRA Associations assigned to LC region

IBRA Association	Area (hectares)	Last Gazettal	Protected %	Adequate
Allendale	46178	2021	0.73	No
Angle Rock	49260	2004	0.86	No
Avenue	96326	2003	1.84	No
Bangham	141496	2016	7.88	No
Beachport	27757	2021	46.73	Yes
Bool Lagoon	66855	1993	5.57	No
Bordertown	55211	2016	0.40	No
Callendale	116818	2010	3.08	No
Cannawigara	126243	2005	4.16	No
Carcuma	83326	2004	38.00	Yes
Caroline	25301	2001	7.10	No
Catana	69445	2008	9.95	No
Coolatoo	27417	2014	32.68	Yes
Coonalpyn	17248	2008	4.59	No
Coonawarra	-	-	-	-
Coorong	51172	2020	77.73	Yes
Cortina	35182	2005	7.40	No
Culburra	-	-	-	-
Dismal Swamp	77420	2005	4.34	No
Duck Island	60650	2002	17.38	Yes
Glencoe	4793	2001	0.16	No
Glenroy	-	-	-	-
Jacks Hill	26878	1994	24.45	Yes
Keith	37822	2010	1.28	No
Konetta	104450	2011	0.69	No
Kybybolite	75938	2016	0.61	No
Lake George	46951	2019	5.55	No
Lake Hawdon	21674	2016	14.66	Yes
Lake Leake	-	-	-	-
Lucindale	298625	2020	5.53	No
Messent	105689	2005	24.23	Yes

IBRA Association	Area (hectares)	Last Gazettal	Protected %	Adequate
Morambro	-	-	-	-
Mt Burr	21008	2001	11.79	Yes
Mt Gambier	-	-	-	-
Nangwarry	35742	2001	8.57	No
Naracoorte	58213	2016	9.83	No
Naranga	49354	1994	1.16	No
Nene Valley	2712	2007	15.73	Yes
Noolook	40069	2004	3.32	No
Pendleton	51622	2017	0.95	No
Penola Station	12087	2001	0.08	No
Pongal	26774	1989	0.29	No
Port Macdonnell	4564	2010	15.04	Yes
Ruthven	3432	1998	3.08	No
Tartwaup	36620	2001	0.17	No
Tilley Swamp	35626	2010	20.72	Yes
Tintinara	64323	1972	0.02	No
Wirreanda	43726	2014	0.70	No
Woakwine	53718	2019	1.83	No

5.1.9 GA LSA region

Table 5.9 shows the IBRA Associations assigned to the GA LSA region.

Table 5.9: IBRA Associations assigned to GA region

IBRA Association	Area (hectares)	Last Gazettal	Protected %	Adequate
Adelaide Foothills	16031	2014	0.83	No
Aldinga	25967	2020	5.22	No
Bare Hill	13091	2015	8.49	No
Claredon	27985	2022	14.17	Yes
Reedbeds	12734	2014	0.11	No
Rosedale	57308	2022	0.91	No

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