



Australian Government
National Land & Water Resources Audit

Extract from Rangelands 2008 — Taking the Pulse
4. Focus Bioregions - Gawler bioregion (SA)

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ISBN 978 0 642 37146 1

ISBN 978 0 642 37147 8 (CD-ROM of the report)

ISBN 978 0 642 37148 5 (PDF)

Product number: PN21387

Suggested citation

Bastin G and the ACRIS Management Committee, Rangelands 2008 — Taking the Pulse, published on behalf of the ACRIS Management Committee by the National Land & Water Resources Audit, Canberra.

Acknowledgments

Rangelands 2008 — Taking the Pulse is the work of many people who have provided data and information that has been incorporated into this report. It has been possible due to significant in-kind contributions from the State and Territory governments and funding from the Australian Government through the Natural Heritage Trust. Particular thanks are due to staff of the Desert Knowledge Cooperative Research Centre, including Melissa Schliebs, Ange Vincent and Craig James.

Cover photograph

West MacDonnell Ranges (photo Department of the Environment, Water, Heritage and the Arts)

Principal author: Gary Bastin, CSIRO and Desert Knowledge CRC

Technical editor: Dr John Ludwig

Editors: Biotext Pty Ltd

Design: Design ONE

Printed in Australia by Lamb Print

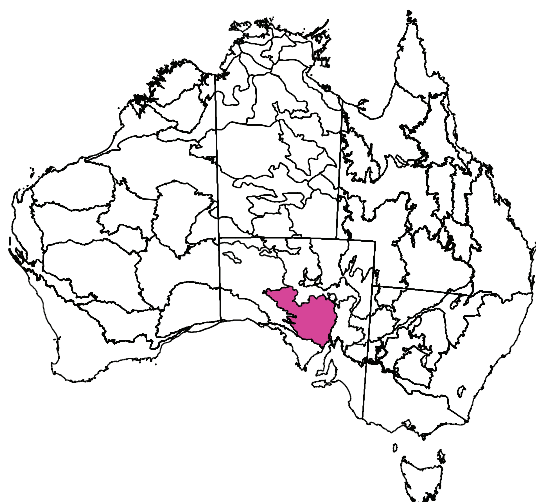
Printed with vegetable-based inks on stock that comprises 80% recycled fibre from postconsumer waste and 20% totally chlorine-free pulp, sourced from sustainable forests.

August 2008

Gawler bioregion (SA)

The Gawler bioregion is in the southern central portion of the SA rangelands (Figure 4.7). Characteristic landscapes are rounded rocky hills, plains and salt-encrusted lake beds (Figures 4.8 and 4.9). Vegetation types include spinifex grasslands, open woodlands and chenopod shrubs. Sheep grazing and some cattle grazing are the most extensive industries (83% of bioregion area is pastoral lease), but mining (particularly copper, uranium and gold at Olympic Dam) provides the main source of revenue. Iron ore is also extracted in the Iron Knob area, opals at Andamooka and copper at Mt Gunson. Conservation reserves make up 12.9% of the bioregion and include Lake Torrens, Gawler Ranges and Lake Gairdner national parks, Lake Gilles Conservation Park, Lake Gilles Conservation Reserve and the sections of Yellabinna Regional Reserve that are in the bioregion. Tourism interest is focused on

Figure 4.7 Gawler bioregion, SA



Note: Area = 123 600 km²

the Gawler Ranges National Park, as well as on Olympic Dam and the Andamooka and Coober Pedy opal fields. Active Australian Defence Force and aerospace facilities are located at Woomera. Major population centres are Whyalla, Port Augusta, Roxby Downs and Woomera.

Figure 4.9 Lake Gairdner, Gawler bioregion



Lake Gairdner is a prominent lake in the Gawler bioregion. This photo is of the southeastern corner, looking west.

Photo: Peter Canty, SA Department for Environment and Heritage

Regional issues

- The Gawler bioregion lacks landscape diversity, being dominated by chenopod shrublands and low woodlands. Sheep are the predominant species of livestock.

Figure 4.8 Rocky hills and shrubby plains of the Gawler bioregion



Photo: Pastoral Land Management Group, SA Department of Water; Land and Biodiversity Conservation

Figure 4.10 Change at a photopoint in the Gawler bioregion, 1955 to 1992



In 1955, the area had a reduced density of bluebush (*Maireana sedifolia*) as a result of high grazing pressure.



By 1992 there had been significant colonisation by valuable saltbushes (*Atriplex stipitata* and *A. vesicaria*).

Photos: Pastoral Land Management Group, SA Department of Water, Land and Biodiversity Conservation

- Some increases in woody cover are evident, possibly due to the effects of continual grazing pressure.
- There have been historically high levels of stocking.
- Available water supplies are fully exploited. Groundwater is limited in extent and is generally of poor to marginal quality.
- Rabbit numbers are recovering following the spread of rabbit haemorrhagic disease (calicivirus) in the 1990s.
- Feral goats persist in the more inaccessible areas.
- This region has the most extensive rangeland monitoring program in SA (Figure 4.10). The second round of condition assessments on pastoral leases is under way.

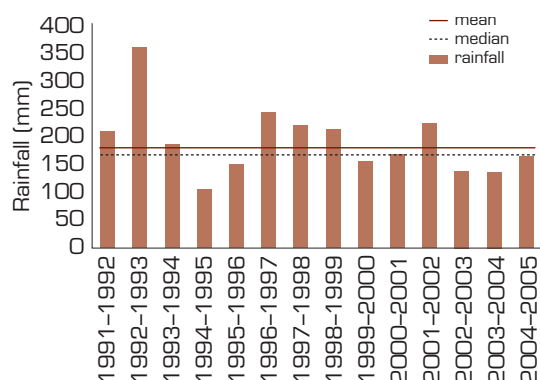
Further information relevant to recent changes within the Gawler bioregion is available in Della Torre (2005).

Seasonal quality — 1992–2005

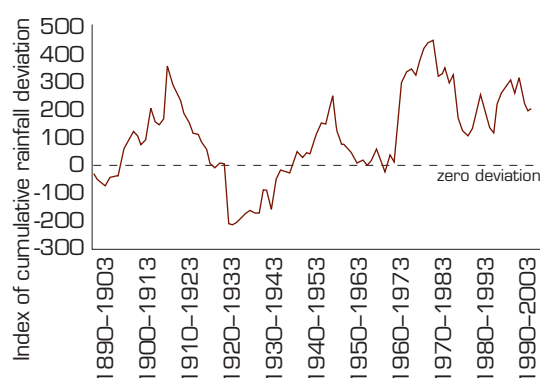
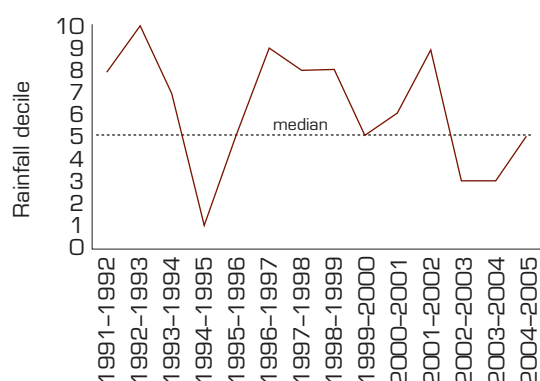
Rainfall was above the long-term (1890–2005) median for 8 of the 14 years between 1992 and 2005, and the period as a whole was better than many other 14-year periods since 1890 (Figure 4.11, left). The past 45 years have been generally wetter, apart from a return to more average *seasonal quality* in some years in the 1980s (Figure 4.11, left). For the 1992–2005 period, several years had better than the median rainfall, while 1994–95 was very dry. As in most bioregions, *seasonal quality* varied spatially across the Gawler bioregion in some years. This assessment of variability is based on simulated pasture biomass produced by AussieGRASS and 'season quality' derived from the NDVI⁴⁰ (Figure 4.11, right panels). Note that much of the south to north decrease in total standing dry matter is due to changing vegetation structure and composition with increasing aridity.

⁴⁰ See <http://www.environment.gov.au/erin/ndvi.html>.

Figure 4.11 Indicators of *seasonal quality* for the Gawler bioregion



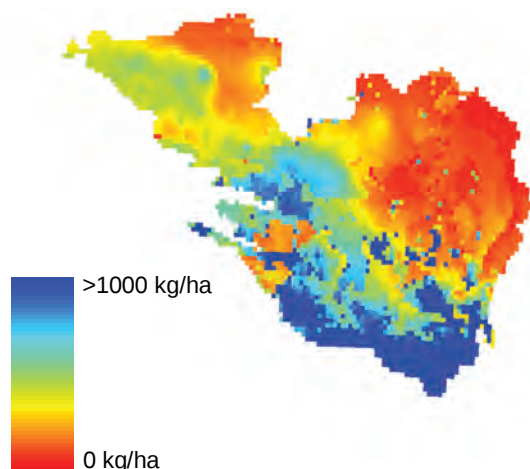
Annual rainfall. Long-term (1890–2005) mean and median



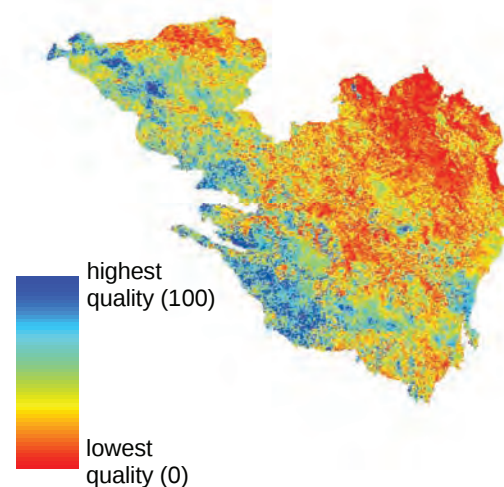
Cumulative percentage deviations of annual (April–March) rainfall from the long-term (1890–2005) median for all 14-year periods between 1890–1903 and 1992–2005

Left: Rainfall

Right: Simulated pasture biomass and vegetation greenness (NDVI)



Aussie-GRASS simulated total standing dry matter — 1998



NDVI-based image of 'season quality' for 1998. Each pixel has a relative value according to the greenness of vegetation (ie photosynthetic activity)

Note: Indicators are based on spatially averaged annual rainfall (April–March) between 1991–92 and 2004–05. For cumulative percentage deviations, periods below the dashed zero line indicate 14-year sequences with generally less rainfall (poorer *seasonal quality*). Periods above the dashed zero line indicate sequences of increased rainfall (better *seasonal quality*).

Figure 4.12 Pastoral monitoring sites and changes in landscape function, Gawler bioregion

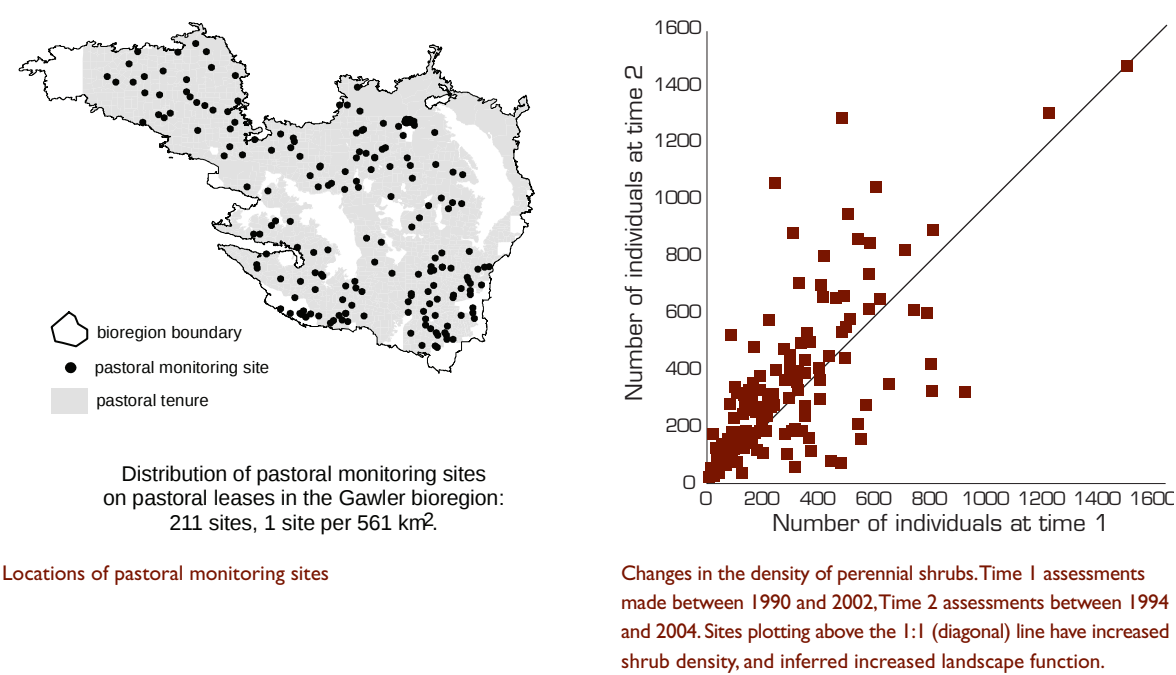


Table 4.5 Percentage of pastoral monitoring sites assessed following variable *seasonal quality* where there was a change in the density of decreaser perennial shrubs

Seasonal quality	Number of sites	Decline. Density <90%	No change. Density between 90% and 110%	Increase. Density ≥110%
Above average	107	16%	25%	59%
Average	56	21%	25%	54%
Below average	2	n.a.	n.a.	n.a.

n.a. = not applicable
Note: The light grey cell indicates a likely adverse effect related to grazing management.

Change in landscape function

Based on the density of longer-lived shrubs measured in fixed (Jessup) transects, ~60% of sites showed an increase in plant density (Figure 4.12), which is assumed to be an increase in landscape function. Taking account of seasonal conditions, 18% of 123 sites assessed following above-average rainfall showed reduced landscape function (ie improved landscape function would have been expected). Insufficient sites were assessed following below-average seasonal quality to report change.

There is a high degree of confidence in reporting change in landscape function for the Gawler bioregion:

there is a good density of sites that are well distributed (Figure 4.12, left panel), shrub density reliably indicates landscape function in this environment, and quantitative recording methods ensure good repeatability among observers measuring sites.

Sustainable management

Change in critical stock forage

The density of perennial decreaser shrubs declined at 16% of sites following above-average seasonal quality (Table 4.5). Insufficient sites were assessed following below-average seasonal quality to report change at this time.

Table 4.6 Percentage of the pastoral lease area of each sub-IBRA within 3 km or beyond 8 km of stock water, Gawler bioregion

Sub IBRA	% sub IBRA area included	% area ≤3 km from stock water	% area >8 km from stock water
Myall Plains (GAW1)	77.7	69.4	2.4
Gawler Volcanics (GAW2)	87.3	52.5	8.2
Gawler Lakes (GAW3)	55.1	44.6	12.6
Arcoona Plateau (GAW4)	90.6	45.6	6.5
Kingoonya (GAW5)	89.3	30.2	15.2

Change in woody cover

Based on the Australian Greenhouse Office definition and mapping of forest extent⁴¹, there is a very small area of forest in the Gawler bioregion and there was very little change in that area between 1991 and 2004. Forest cover increased from 1.90% of the bioregion area in 1991 to 2.09% in 2004, an increase of 0.19%. Reporting is based on analysis of Landsat data; there is high reliability in reporting results because complete coverage of satellite imagery was available.

Distance from stock water

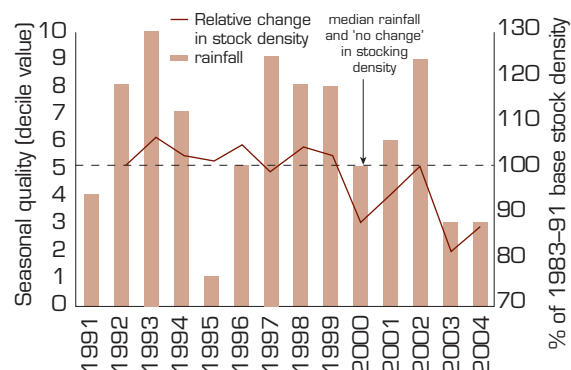
Eighty-three per cent of the Gawler bioregion is occupied as pastoral lease, and most of that area is within grazing distance of stock water (Table 4.6). The non-pastoral area in the Gawler bioregion consists mostly of salt lakes.

It is not possible to report change in distance from stock water for the 1992–2005 period.

Weeds

Weeds known to occur in the bioregion include African boxthorn (*Lycium ferocissimum*), African love grass (*Eragrostis curvula*), Athel pine (*Tamarix aphylla*), Bathurst burr (*Xanthium spinosum*), bridal creeper (*Asparagus asparagoides*), kochia (*Bassia scoparia*), mesquite (*Prosopis* spp.), Noogoora burr (*Xanthium occidentale*), pampas grass (*Cortaderia* spp.), parkinsonia (*Parkinsonia aculeata*), Patersons curse (*Echium plantagineum*), silver leaf nightshade (*Solanum elaeagnifolium*) and wild mignonette (*Reseda luteola*).⁴²

Figure 4.13 Change in domestic stocking density (sheep and beef cattle), Gawler bioregion, 1991 to 2004



Note: Seasonal quality as deciles of rainfall is also shown.

Components of total grazing pressure

Change in domestic stocking density

Fluctuations in stocking density, based on ABS-sourced data, are shown in Figure 4.13. The decline in the latter half of the reporting period was probably largely driven by declining seasonal quality (indicated here by rainfall deciles). It is probable that spatial variation in stocking density across the bioregion is concealed by the spatially averaged data presented here.

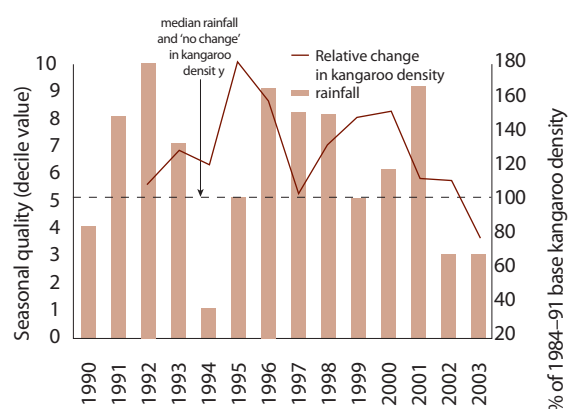
Change in kangaroo density

The combined density of red and western grey kangaroos (expressed as DSEs) fluctuated considerably throughout the 1992–2003 period (Figure 4.14). The initial increase and later decrease were related to seasonal quality and broadly correspond with the changes in domestic stocking density reported above.

⁴¹ See <http://www.greenhouse.gov.au/ncas/reports/tech09.html>.

⁴² See <http://www.anra.gov.au>

Figure 4.14 Change in kangaroo density, Gawler bioregion, 1990 to 2003



The bioregion has 8 plant, 3 mammal and 7 bird species and 1 species of reptile, amphibian or fish listed as threatened (Biodiversity Working Group indicator: Threatened species).

Change in land use and land values

According to available NLWRA data, there was no change between 1992 and 2005 in the percentage area of the bioregion under pastoral land use (83%).

The unimproved value of pastoral land has increased, on average, by ~65% between 1998 and 2004 (values expressed in 2005 dollars).

Invasive animals

Invasive animal species known to occur in the bioregion include goat (*Capra hircus*), fox (*Vulpes vulpes*), rabbit (*Oryctolagus cuniculus*), wild dog (*Canis lupus familiaris*), feral cat (*Felis catus*), starling (*Sturnus vulgaris*) and camel (*Camelus dromedarius*).⁴³

Fire and dust

Fire

No fires were recorded in the bioregion for any year during the 1997–2005 period.

Dust

Atmospheric dust levels based on the Dust Storm Index (DSI) were low to moderate compared with all rangeland bioregions (mean DSI₃ of 1.75 for 1992–2005, where the maximum value among all bioregions was 8.44). Dust levels were higher in the northeast part of the bioregion and negligible in the vicinity of Kingoonya.

Change in biodiversity

By 2005, there were over 200 bird records (Biodiversity Working Group indicator: Fauna surveys), over 200 flora survey sites and more than 200 flora records (Biodiversity Working Group Indicator: flora surveys) for the bioregion.

⁴³ See <http://www.anra.gov.au>