Riverina bioregion

Description

Area: 56 910 km^2

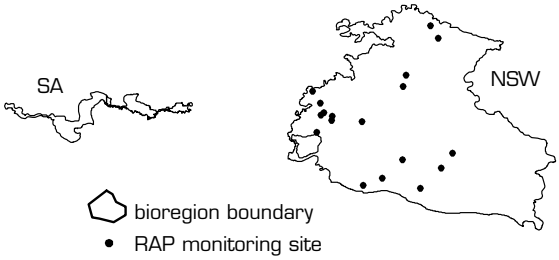
The Riverina bioregion is characterised by extensive riverine floodplains with low relief, associated with the Murray, Murrumbidgee and Lachlan Rivers. Chenopod shrublands and associated grasslands predominate. Other vegetation types include box woodlands, mallee woodlands, native grasslands and wetlands. Land tenure is mostly freehold. Within the rangelands, sheep and cattle grazing is the most extensive land use. There are also areas of horticulture (wine grapes, vegetables and citrus) and grain crops. Major population centres are Hay, Hillston, Loxton and Renmark.

Location

The Riverina bioregion is located in southern New South Wales (NSW) with a small portion (3%) in South Australia (SA; see Figures 1 and 2).

Figure 1 Location of the Riverina bioregion

Figure 2 Rangeland Assessment Program monitoring sites in NSW



Data sources available

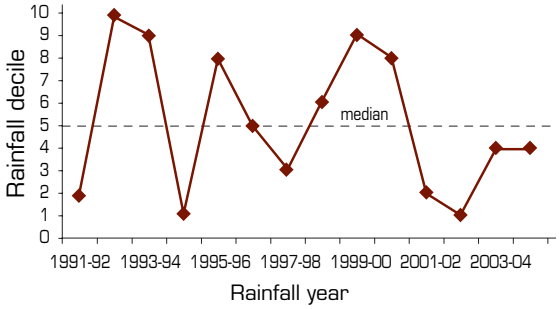
Data sources include:

- NSW Rangeland Assessment Program (RAP), which provides moderate reliability for reporting change, with a moderate number of sites but relatively low density for the bioregion, fairly uniform distribution, annual assessments, quantitative data, and a focus on perennial species
- SA — no pastoral monitoring data are available
- domestic stocking density, which provides moderate reliability
- fire extent, intensity and frequency, which provides high reliability
- dust
- distance from water
- distribution and relative abundance of invasive animals and weeds
- land use
- land values.

Climate

The Riverina bioregion has a semiarid climate with low, winter-dominant rainfall, hot summers and cool winters. Spatially averaged median (1890–2005) rainfall is 272 mm (April to March rainfall year; see Figure 3).

Figure 3 Decile rainfall for the period 1991–1992 to 2004–2005



Annual rainfall is for the 12-month period 1 April to 31 March.

Decile rainfall was highly variable throughout the reporting period. The years 1991–1992, 1994–1995, 2001–2002 and 2002–2003 were very dry. Years of above-average ***seasonal quality*** (based on decile rainfall) included 1992–1993, 1993–1994 and 1999–2000.

Note that regional averaging of rainfall conceals spatial variability. Some parts of the Riverina bioregion probably experienced better *seasonal quality* and others worse during the 1992–2005 period.

Landscape function

New South Wales

RAP, index based on the frequency and cover of perennial herbage species

When *seasonal quality* was above average, 7% of site–time assessments showed a decline in the index of landscape function. When *seasonal quality* was below average, 6% of site–time assessments showed an increase.

Seasonal quality	Number of site-by-year combi-nations	Percentage of reassessed sites showing:		
		Decline: >4 decrease in index	No change	Increase: >4 increase in index
Above average	57	7%	89%	4%
Average	72	6%	86%	8%
Below average	54	5%	89%	6%

South Australia

There are no suitable data for reporting change.

Sustainable management

Critical stock forage

New South Wales

RAP, frequency of the palatable and perennial grass, (2P) *Austodanthonia caespitosa*

When *seasonal quality* was above average, 13% of site–time assessments showed a decline in the frequency of *Austodanthonia caespitosa*. No sites assessed following below-average *seasonal quality* showed an increase in the frequency of *A. caespitosa*.

Seasonal quality	Number of site-by-year combi-nations	Percentage of reassessed sites showing:		
		Decline: > 18 decrease in frequency	No change	Increase: > 13 increase in frequency
Above average	68	13%	72%	15%
Average	102	13%	66%	21%
Below average	51	22%	78%	0%

Sites selected for reporting change were restricted to those where the 2P grass *A. caespitosa* was present at the start of the period. Frequency data from these same sites at subsequent reassessments were then used to report change.

South Australia

There are no suitable data for reporting change.

Plant species richness

New South Wales

RAP, count of native perennial and annual herbage species

Approximately 18% of site–time assessments had decreased plant species richness following above-average *seasonal quality* and 9% of site–time assessments had increased plant species richness following below-average *seasonal quality*.

Seasonal quality	Number of site-by-year combinations	Percentage of reassessed sites showing: Decline: > 11 decrease in no. species	No change	Increase: > 9 increase in no. species
Above average	60	18%	72%	10%
Average	75	8%	73%	19%
Below average	45	9%	82%	9%

South Australia

There are no suitable data for reporting change.

Change in woody cover

New South Wales

Statewide Landcover and Trees Study-type reporting

The annualised rate of woody vegetation change between 2004 and 2006 was 108 ha based on analysis of satellite data using Queensland **Statewide Landcover and Trees Study (SLATS)** methods. Woody vegetation is defined as woody communities with 20% crown cover or more (eg woodlands, open forests and closed forests) and taller than about two metres. The annualised rate of clearing represents the annual rate of woody vegetation change, which is largely due to cropping, pasture and thinning (DNR 2007).

At this stage, it is not possible to report change for earlier years of the 1992–2005 period using this method.

South Australia

Based on the Australian Greenhouse Office definition and mapping of forest extent[1], there is a small amount of forest cover in the SA part of the bioregion: 11.82% in 1991 increasing by 0.40% to 12.22% in 2004. There is complete coverage of Landsat imagery for reporting this result.

Distance from stock water

The percentage of sub-**Interim Biogeographic Regionalisation for Australia (IBRA)** area within three kilometres of permanent and semipermanent sources of stock water is summarised in the following table. The locations of stock waterpoints in SA were sourced from state mapping of lease infrastructure, and watered area is reported as the percentage of pastoral tenure within the one sub-IBRA. NSW data were obtained from Geoscience Australia's GEODATA TOPO 250K vector product (Series 3, June 2006), and watered area is the percentage of sub-IBRA area. Note that mapping differences between the SA data and the Geoscience Australia product (NSW) mean that the percentage watered areas reported by each data type are not directly comparable.

Sub-IBRA	South Australia: % sub-IBRA within 3 km of water	South Australia: % sub-IBRA area analysed	New South Wales: % sub-IBRA within 3 km of water	New South Wales: % sub-IBRA area analysed
Lachlan (RIV1)			69.4	100
Murrumbidgee (RIV2)			38.6	100
Murray Scroll Belt (RIV6)	83.0	18.9	4.6	100

IBRA = Interim Biogeographic Regionalisation for Australia; RIV = Riverina

Note that this analysis does not include the locations of natural waters (eg the rivers), which provide many additional sources of water for stock. It is not possible to report change in watered area for the 1992–2005 period for either jurisdiction.

[1] See http://www.greenhouse.gov.au/ncas/reports/tech09.html

Weeds

Weeds known to occur in the Riverina bioregion include:

Common name	Scientific name
Alligator weed	*Alternanthera philoxeroides*
Athel pine	*Tamarix aphylla*
Blackberry	*Rubus fruticosus* aggregate
Bridal creeper	*Asparagus asparagoides*
Mesquite	*Prosopis* spp.
Privet (broad leaf or tree privet)	*Ligustrum lucidum*
Privet (small leaf or Chinese privet)	*Ligustrum sinense*
Silver leaf nightshade	*Solanum elaeagnifolium*
St John's wort	*Hypericum perforatum*

See www.anra.gov.au for distribution maps

Components of total grazing pressure

Domestic stocking density

Data relating to domestic stocking density are reported for the whole bioregion. In 1992, 86% of the rangelands component of the Riverina bioregion was grazed. This area reduced to 81% in 2001. Based on data from the Australian Bureau of Statistics and taking account of this reduced area, stocking density declined more-or-less continuously between 1993 and 2003. Stocking density in 1992–1993 was about 15% above the average for 1983–1991. By 2003, it was 74% of this base value and increased slightly in 2004 (the last year of available data) to be 80% of the 1983–1991 base. The consistent decline was partly attributable to poorer *seasonal quality*, particularly from 2001 onwards. However, it is also likely that movement out of less-profitable wool growing into dryland and irrigated agriculture contributed to the decline in stocking density. Note that spatial averaging conceals likely variation in stocking density trends across the bioregion.

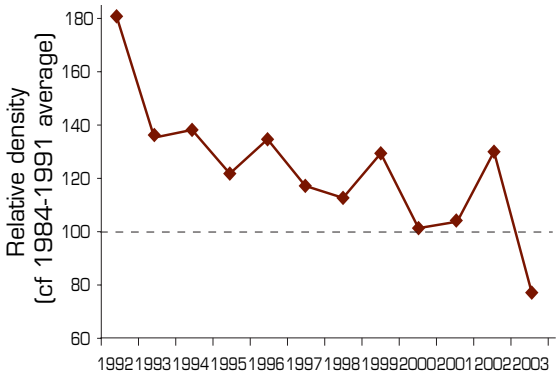
Kangaroos

New South Wales

The density of kangaroos (on a dry sheep equivalent basis) generally declined across the reporting period, although there were years in which the density temporarily increased from the previous year (1996, 1999 and 2002). Declines were most pronounced in the 1992–1993 and 2002–2003 periods.

The density of kangaroos was greater than the 1984–1991 average between 1992 and 1999. Figure 4 shows kangaroo density in the NSW Riverina bioregion. Contributing kangaroo species are reds, and western and eastern greys.

Figure 4 Kangaroo density in the NSW Riverina bioregion



It is probable that drier seasonal conditions at various times in the 1992–2003 period contributed to the decrease in kangaroo density but there is no clear relationship with *seasonal quality*, as indicated by Figure 3 (showing decile rainfall), above.

Invasive animals

Invasive animal species known to occur in the Riverina bioregion include:

Common name	Scientific name
Feral pig	*Sus scrofa*
Fox	*Vulpes vulpes*
Rabbit	*Oryctolagus cuniculus*
Feral cat	*Felis cattus*
Starling	*Sturnus vulgaris*
Carp	*Cyprinus carpio*

See www.anra.gov.au for distribution maps

Products that support reporting of landscape function and sustainable management

Fire

Fire data apply to the whole bioregion. Fire was insignificant for the 1997–2005 reporting period, with a maximum of 0.3% of the bioregion burnt in 1998.

Dust

Dust data apply to the whole bioregion. The mean Dust Storm Index value (1992–2005) was 4.13, which is a moderate value and fourth highest among all rangeland bioregions. Dust levels were highest in the centre of the NSW part of the bioregion.

Biodiversity

The NSW Riverina contains Ramsar-listed wetlands and there is case study information (see **Monitoring wetlands and waterbirds in Chapter 3**) on wetland waterbirds (both Biodiversity Working Group indicator: Wetlands; see **Section 7 of Chapter 3** of *Rangelands 2008 — Taking the Pulse*).

Socioeconomic characteristics

Land use and value

In 1992, 86% of the rangelands component of the Riverina bioregion was grazed. This area reduced to 81% in 2001.

In NSW, the market value of a typical property in the Hay area increased spectacularly (by approximately 140%) between 1996 and 2005 (values expressed in 2005 dollars). Market value has risen by approximately 18% over the same period in the Balranald area. Average property size is 548 ha (maximum size of 13 925 ha) for all land parcels bigger than 10 ha.

Key management issues and features

Key features and issues of the Riverina bioregion include the following:

- NSW:
  - This bioregion is the most productive of the NSW rangelands. It experiences lower seasonal climatic variability and higher, winter-dominant rainfall. However it has a long history of grazing use. The presence and vigour of the chenopod shrublands provide a ready guide to historic grazing intensity.
  - Woody thickening is generally insignificant within the bioregion.
  - Unlike other NSW bioregions, feral goats are generally in very low numbers in this landscape. Rabbits are also of lower significance than elsewhere, largely due to the heavy textured soils.
  - Fire is of very limited occurrence within the bioregion. It generally has a destructive impact on chenopod shrublands.
  - Bladder saltbush (*Atriplex vesicaria*) is dominant over a large portion of the bioregion. Shrub populations are dynamic. A saltbush dieback event occurred between 1992 and 1997, largely attributed to caterpillar attack. Interestingly, those properties that were conservatively stocked at the time of saltbush dieback were hit the hardest and suffered the worst recovery rates. This was related to available leaf area for moth eggs to be laid and hence density of caterpillars.
  - During the reporting period, there has been a significant conversion of rangeland to irrigated agriculture. This is evident in the Hay area where irrigated cotton is a significant industry.