Mulga Lands bioregion

Description

Area: 251 640 km^2

The Mulga Lands bioregion is characterised by flat to undulating plains with strips of low hills. The dominant vegetation types are mulga and eucalypt woodlands. The alluvial floodplains of the Warrego River run through the middle in a widening north-to-south wedge. Tenure is a mix of leasehold and freehold land grazed by sheep and cattle. Major population centres are Charleville, Cunnamulla, Quilpie and Thargomindah in Queensland and White Cliffs in New South Wales (NSW).

Location

The Mulga Lands bioregion is located in the northern part of the Murray-Darling Basin in NSW and southwest Queensland (74% of bioregion in Queensland, 26% in NSW; see Figures 1 and 2).

Figure 1 Location of the Mulga Lands bioregion

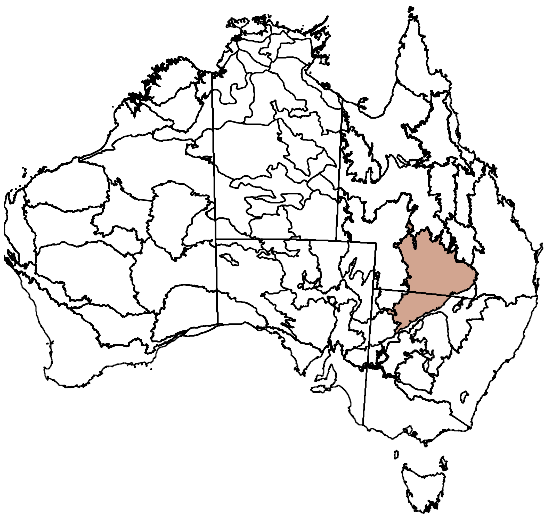
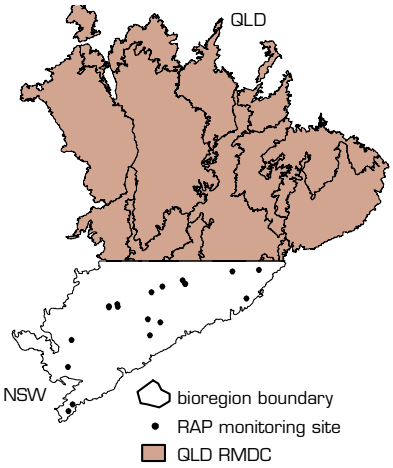


Figure 2 Rangeland Assessment Program monitoring sites (NSW) and data from Rapid Mobile Data Collection (Queensland)



Data sources available

Data sources include:

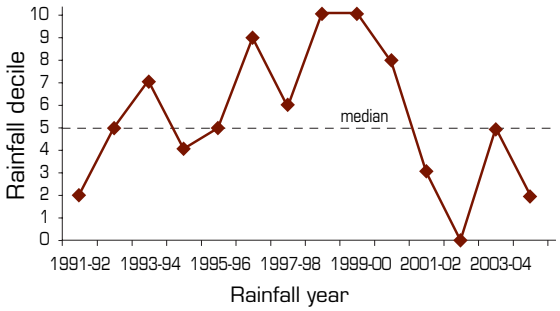
- NSW Rangeland Assessment Program (RAP) — moderate reliability for reporting change; a moderate number of sites, but a low sampling density for the bioregion, reasonably uniform distribution, annual assessments, quantitative data, and a focus on perennial species
- Queensland: **Rapid Mobile Data Collection** (RMDC) supported by **AussieGRASS** simulation (of pasture growth and utilisation) and remote sensing (**Multiple Regression Bare Ground Index**, version bi1); these data sources provide moderate reliability for reporting change (RMDC — road traverses and visual estimates; AussieGRASS — entire rangelands, simulated results with some ground validation)

- 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 Mulga Lands bioregion has a semiarid climate with highly variable, summer-dominant rainfall. Spatially averaged median (1890–2005) rainfall is 305 mm (April to March rainfall year) but ranges from 500 mm to 250 mm (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 generally increased in the first half of the reporting period and then declined dramatically in the early years of this decade. The years 1998–1999 and 1999–2000 were very wet and 2002–2003 was extremely dry.

Note that regional averaging of rainfall conceals spatial variability. Some parts of the Mulga Lands 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, 3% of site–time assessments showed a decline in the index of landscape function, while 5% of site–time assessments showed an increase when *seasonal quality* was below average.

Seasonal quality	Number of site-by-year combinations	Percentage of reassessed sites showing:		
		Decline: > 4 decrease in index	No change	Increase: > 4 increase in index
Above average	59	3%	65%	32%
Average	114	11%	81%	8%
Below average	76	12%	83%	5%

Queensland

RMDC, change in visually assessed vegetation and soil attributes contributing to landscape function score

All sub-**Interim Biogeographic Regionalisation for Australia (IBRA)** regions showed either significant or some loss of function, due to both woody plant thickening and loss of perennial grass cover.

Sub-IBRAs showing significant loss of landscape function included Cuttaburra–Paroo, Langlo Plains, North Eastern Plains, Urisino Sandplains, Warrego Plains, West Bulloo and West Warrego.

Sub-IBRAs with some loss of function were: Eastern Mulga Plains, Nebine Plains — Block Range, Northern Uplands and West Balonne Plains.

Sustainable management

Critical stock forage

New South Wales

RAP, frequency of the palatable and perennial (2P) grass, *Thyridolepis mitchelliana*

No sites assessed following above-average *seasonal quality* showed a decline in the frequency of *Thyridolepis mitchelliana*. Approximately 23% of site–time assessments showed an increase when *seasonal quality* was below average.

Seasonal quality	Number of site-by-year combi-nations	Percentage of reassessed sites showing:		
		Decline: > 6 decrease in frequency	No change	Increase: > 4 increase in frequency
Above average	42	0%	100%	0%
Average	84	11%	76%	13%
Below average	84	27%	50%	23%

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

Queensland

AussieGRASS, levels of simulated pasture utilisation and change

All sub-IBRAs had simulated space- and time-averaged levels of pasture utilisation for the 1991–2005 period well above the specified safe level. Some utilisation levels were very high (Urisino Sandplains, 48%; Nebine Plains — Block Range, 42%; Cuttaburra–Paroo and West Warrego, 38%). Also of concern, simulated utilisation increased by between 4% and 6% (in absolute terms) for the West Bulloo and Urisino Sandplains sub-IBRAs between 1976–1990 and 1991–2005. The Warrego Plains, West Balonne Plains and Eastern Mulga Plains showed small declines of between 2 and 5% (absolute) in utilisation off a high base (the 1991–2005 utilisation was more than 10% above the safe level).

Low rainfall and pasture growth for much of the 1991–2005 period contributed to high utilisation, as did high macropod numbers. Significant amounts of fodder clearing have been carried out to maintain domestic livestock numbers.

Plant species richness

New South Wales

RAP, count of native perennial and annual herbage species

Approximately 11% of site–time assessments had decreased plant species richness following above-average *seasonal quality* and 23% of site–time assessments had increased plant species richness following below-average *seasonal quality*.

Seasonal quality	Number of site-by-year combi-nations	Percentage of reassessed sites showing:		
		Decline: > 12 decrease in no. species	No change	Increase: > 15 increase in no. species
Above average	102	11%	77%	12%
Average	68	24%	75%	1%
Below average	102	11%	66%	23%

Queensland

There are no suitable data for reporting change in plant species richness.

Change in woody cover

Queensland

Statewide Landcover and Trees Study (SLATS) reporting

There were relatively large reductions in woody cover in the North Eastern Plains, Eastern Mulga Plains and West Balonne Plains sub-IBRAs between 1991 and 2003, largely due to clearing. In comparison, there were moderate declines in the Nebine Plains — Block Range and Langlo Plains sub-IBRAs. Actual reduction in woody cover between 1991 and 2003 in all regions was less than the sum of clearing because of appreciable regrowth in some cleared areas. There is high reliability for reporting change in woody cover based on SLATS analysis.

Sub-IBRA	SLATS woody cover		Change 1991–2003
	1991	2003	
North Eastern Plains	70.92%	50.11%	–20.81%
Eastern Mulga Plains	68.40%	54.40%	–14.00%
West Balonne Plains	48.58%	36.18%	–12.40%
Nebine Plains — Block Range	66.76%	60.46%	–6.30%
Langlo Plains	73.86%	66.08%	–7.78%
Urisino Sandplains	35.55%	34.94%	–0.61%
Warrego Plains	60.95%	59.65%	–1.30%
West Warrego	55.75%	54.85%	–0.89%
Cuttaburra–Paroo	72.60%	71.75%	–0.86%
Northern Uplands	67.53%	67.03%	–0.50%
West Bulloo	24.89%	24.86%	–0.03%

IBRA = Interim Biogeographic Regionalisation for Australia;
SLATS = Statewide Landcover and Trees Study

New South Wales

SLATS-type reporting

The annualised rate of woody vegetation change between 2004 and 2006 was 865 ha based on analysis of satellite data using Queensland 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 (DNR 2007). 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.

Distance from stock water

Based on the locations of stock waterpoints sourced from Geoscience Australia's GEODATA TOPO 250K vector product (Series 3, June 2006), the percentage area within three kilometres of permanent and semi-permanent sources of stock water for each sub-IBRA is:

West Balonne Plains (ML1)	79.7%
Eastern Mulga Plains (ML2)	77.8%
Nebine Plains, Block Range (ML3)	74.5%
North Eastern Plains (ML4)	81.1%
Warrego Plains (ML5)	74.6%
Langlo Plains (ML6)	79.3%
Cuttaburra–Paroo (ML7)	61.8%
West Warrego (ML8)	56.2%
Northern Uplands (ML9)	30.5%
West Bulloo (ML10)	47.7%
Urisino Sandplains (ML11)	56.9%
Warrego Sands (ML12)	74.25%
Kerribree Basin (ML13)	78.9%
White Cliffs Plateau (ML14)	75.7%
Paroo Overflow (ML15)	78.8%
Paroo–Darling Sands (ML8)	73.9%

ML = Mulga Lands
Note: complete sub-IBRA area is analysed

Note that this analysis does not include the locations of natural waters, which may provide additional sources of water for stock, particularly following good rains. It is not possible to report change in watered area for the 1992–2005 period for either NSW or Queensland.

Weeds

Weeds known to occur in the Mulga Lands bioregion include:

Common name	Scientific name
African boxthorn	*Lycium ferocissimum*
Athel pine	*Tamarix aphylla*
Mesquite	*Prosopis* spp.
Mother of millions	*Bryophyllum tubiflorum* and hybrids
Parkinsonia	*Parkinsonia aculeata*
Parthenium weed	*Parthenium hysterophorus*
Prickly acacia	*Acacia nilotica* subsp. *indica*
Rubber vine	*Cryptostegia grandiflora*
Silver leaf nightshade	*Solanum elaeagnifolium*

See www.anra.gov.au for distribution maps

Components of total grazing pressure

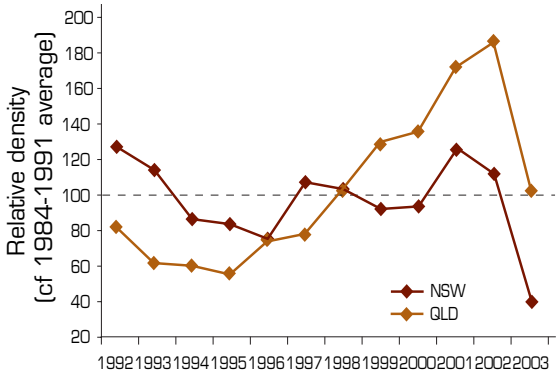
Domestic stocking density

Domestic stocking density data report for the whole bioregion. Most (94%) of the Mulga Lands bioregion is grazed. Data from the Australian Bureau of Statistics showed that stocking density decreased from near the 1983–1991 average in 1992 to 88% of this base in 1993. Stocking density then gradually increased until 2000 when it was 6% above the base. It then decreased consistently to 75% of the base in 2003 before increasing slightly in 2004 (to 80% of the base). These trends reflect *seasonal quality* indicated by decile rainfall above. Note that spatial averaging conceals likely variation in stocking density trends across the bioregion. Note also that feral goats add appreciably to total grazing pressure in this bioregion but the Australian Collaborative Rangelands Information System lacks suitable data to report changes in their density over time.

Kangaroos

The combined density of kangaroos (on a dry sheep equivalent basis) across the whole bioregion initially declined then increased to 2001–2002 before reducing sharply in 2003 (the last year of available data; see Figure 4). Changes in the Queensland population were more volatile than for NSW. The density for Queensland was appreciably lower until 1995 and then much higher from 1999 onwards. Contributing species to kangaroo density are reds, western and eastern greys in NSW and reds and eastern greys in Queensland.

Figure 4 Kangaroo density in the NSW and QLD parts of the Mulga Lands bioregion



Changing kangaroo densities broadly reflect *seasonal quality* shown by decile rainfall (Figure 3, above). The increase between 1995–1996 and 2001–2002 lagged increasing decile rainfall, and the substantial decrease post-2002 resulted from substantially lower rainfall from 2001–2002 onwards.

Invasive animals

Invasive animal species known to occur in the Mulga Lands bioregion include:

Common name	Scientific name
Feral pig	*Sus scrofa*
Feral goat	*Capri hircus*
Fox	*Vulpes vulpes*
Rabbit	*Oryctolagus cuniculus*
Wild dog	*Canis* spp.
Feral cat	*Felis cattus*
Starling	*Sturnus vulgaris*
Carp	*Cyprinus carpio*
Camel	*Camelus dromedaries*
Horse	*Equus caballus*

See www.anra.gov.au for distribution maps

Products that support reporting of landscape function and sustainable management

Fire

Fire data report for the whole bioregion. Fire was insignificant throughout the 1997–2005 period. There were no mapped fires in most years and a peak of 0.2% of the bioregion area burnt in 1999.

Dust

Dusts data report for the whole bioregion. The mean Dust Storm Index value (1992–2005) was 3.15, which was a moderate to high value (the fifth highest for all rangeland bioregions). Dust Storm Index values were quite patterned across the bioregion, being much higher in the west (adjacent to the Channel Country bioregion) and reducing to the east.

Biodiversity

In Queensland, more than 20% of the Mulga Lands bioregion has been cleared (Biodiversity Working Group indicator: Habitat loss; see **Section 7 of Chapter 3** of *Rangelands 2008 — Taking the Pulse*). Of the 65 regional ecosystems described for the Queensland part of the bioregion, three are listed as endangered and five are listed as 'of concern' under the *Queensland Vegetation Management Act 1999*. Seven of the listed regional ecosystems are represented in the reserve system, but at less than 4% of their pre-clear extent (Accad et al 2006) (Biodiversity Working Group indicator: Threatened communities).[1]

In the Queensland portion of this bioregion, there are (Biodiversity Working Group indicator: Threatened species):

- 9 threatened plant species
- 5 threatened mammal species (including the western quoll, which is listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), but is extinct from this bioregion)
- 7 threatened bird species
- 2 threatened reptile species
- no threatened amphibian or fish species.

The Queensland portion also has Ramsar-listed wetlands (Biodiversity Working Group indicator: Wetlands).

Socioeconomic characteristics

Land use and value

Most (94%) of the Mulga Lands bioregion is grazed. This area has not changed appreciably over the 1992–2005 reporting period.

In NSW, the market value of a typical property in the Wilcannia area has increased by approximately 75% between 1996 and 2005 (values expressed in 2005 dollars). Average property size is 3725 ha (maximum size of 41 960 ha) for all land parcels bigger than 10 ha.

In Queensland, the unimproved rangeland values as at June 2006 were, on average, \$2262 ± \$234/km^2 (values expressed in 2005 dollars). There was a large range in average unimproved value across Queensland sub-IBRAs (\$220 to \$4582/km^2). It is not possible to report change in land values for the 1992–2005 period.

Key management issues and features

Major features and issues for the Mulga Lands bioregion include the following:

- NSW:
  - Wool prices increased through the 1980s and wool growers generally kept high stock numbers. Removal of the floor price at the end of the 1980s and drought conditions in 1992 had an adverse impact on land condition because sheep were difficult to offload. The merino wool industry continued to decline during the 1990s.
  - During the mid-1990s, export prices for meat increased relative to wool. Goats also became financially more viable to run. Presently, many properties are switching to meat sheep, goats and increasingly cattle as their primary enterprises.
  - Extensive woody thickening has occurred. Seedling recruitment was especially evident following conditions of average winter rainfall followed by the wet summers of 1973–1974, 1983–1984 and perhaps 1999–2000. Woody species that are becoming thicker are hopbush (*Dodonea* spp.), turpentine (*Eremophila sturtii*) and mulga (*Acacia aneura*).
  - Fire is of very low incidence in this landscape. Fuel loads are generally low due to high total grazing pressure, so prescribed burning is seldom considered to be a land management option.

[1] Descriptions of regional ecosystems are available at http://www.epa.qld.gov.au/nature_conservation/biodiversity/regional_ecosystems/how_to_download_REDD/

- Lack of control of total grazing pressure due to the mobility of kangaroos and goats is the greatest challenge to land management. Landholders are widely adopting improved fencing strategies to better manage grazing. This commonly includes controlled access to water.
- The population density and vigour of mulga is low in some parts of the bioregion, primarily where there have been (or are) significant rabbit populations. Individual trees are commonly senescent and recruitment of young stock is very limited in extent.
- Palatable perennial grasses are generally of low abundance in this bioregion and their occurrence provides key feedback on grazing pressures during summer-rainfall seasons. Locally significant species include mulga Mitchell grass (*Thyridolepis mitchelliana*), bandicoot grass (*Monocather paradoxa*) and woollybutt (*Eragrostis eriopoda*).

- Queensland:
  - There is high pasture utilisation including consumption of leaf litter. There is also little chance of recovery from historic degradation.
  - Many regions have woodland thickening; there are extensive areas of tree and shrub death in others.
  - Stream bank erosion, scalding and wind erosion are increasing.
  - There is also increasing patchiness of the overall system.
  - Large numbers of macropods and feral and semicommercial goats are contributing to high utilisation, loss of palatable perennials and degradation.
  - High utilisation is leading to economic necessity of recurrent and extensive fodder harvesting (a form of clearing).
  - There is little chance of development of adequate fuel loads for fire management of woody species.