



# Gascoyne bioregion

## Description

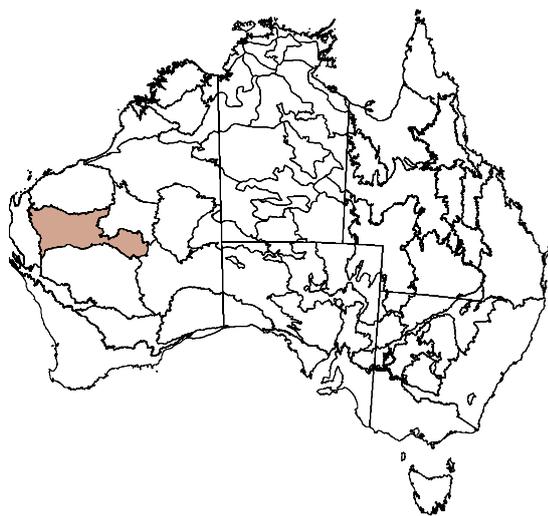
Area: 180 750 km<sup>2</sup>

The Gascoyne bioregion has low, rugged ranges and broad, flat valleys. The vegetation is dominated by open mulga low woodlands. Extensive sheep and cattle grazing is the main land use on pastoral leasehold in the bioregion. Mining is important for the bioregion's economy. There are no major population centres in the bioregion. Aboriginal communities include Jigalong and Burringurrah.

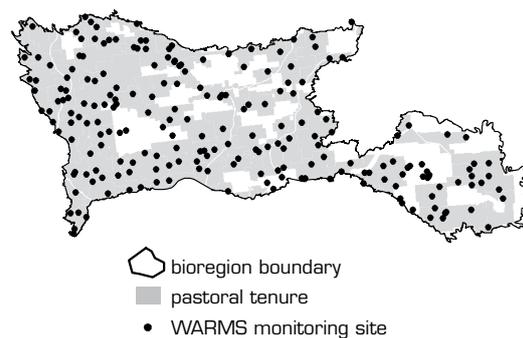
## Location

The Gascoyne bioregion is located in the central west rangelands of Western Australia (WA; see Figures 1 and 2).

**Figure 1 Location of the Gascoyne bioregion**



**Figure 2 Monitoring sites and pastoral tenure**



## Data sources available

Data sources include:

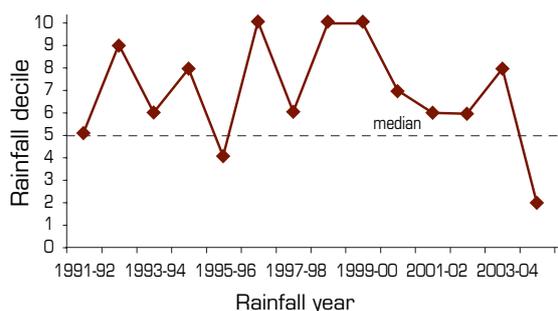
- Western Australian Rangeland Monitoring System (WARMS), which provides high reliability for reporting change, with a large number of well-distributed sites, quantitative data, and a focus on longer-lived plant species (which helps to filter short-term seasonal variability)
- domestic stocking density, 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
- conservation estate
- land values.



## Climate

The Gascoyne bioregion has an arid climate with predominantly winter rainfall in the west, and summer rainfall in the east. Spatially averaged median (1890–2005) rainfall is 202 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.

*Seasonal quality* based on decile rainfall was variable but generally above average for most of the reporting period. The year 2004–2005 was the driest in the period when rainfall was well below the long-term median (decile 2). As an overall sequence, the period between 1992 and 2005 had the most rainfall on record.

Note that regional averaging of rainfall across this very large bioregion conceals spatial variability. Some parts of the bioregion may have experienced better *seasonal quality* and others worse during the 1992–2005 period.

## Landscape function

Change in landscape function can be reported in a number of ways using WARMS data. The following sections are based on data from the resource capture index and population growth rate (for consistency with reporting by other jurisdictions).

## Resource capture index

Across the Gascoyne bioregion, 59% of sites showed a decline in the resource capture index when *seasonal quality* was above average. It is not possible to report change following below-average *seasonal quality* because of low reliability associated with the very small number of sites (eight sites) assessed at this time.

<i>Seasonal quality</i>	Number of sites	Decline: RCI < 0.90	No change: 0.90 ≤ RCI < 1.10	Increase: RCI ≥ 1.10
Above average	39	59%	15%	26%
Average	15	53%	26%	20%
Below average	8	n/a	n/a	n/a

RCI = resource capture index

## Population growth rate

When *seasonal quality* was above average, 8% of sites showed a decline in population growth rate. Again, it is not possible to report change following below-average *seasonal quality* because only eight sites were assessed at this time.

<i>Seasonal quality</i>	Number of sites	Decline: density < 95%	No change: density between 95% and 105%	Increase: density ≥ 105%
Above average	167	8%	10%	82%
Average	20	40%	15%	45%
Below average	8	n/a	n/a	n/a

## Sustainable management

### Critical stock forage

Decreaser shrubs declined in density at 14% of sites following above-average *seasonal quality*. It is not possible to report change following below-average *seasonal quality*.

Seasonal quality	Number of sites	Species group	Decline: density < 0.95	No change: 0.95 ≤ density ≤ 1.05	Increase: density ≥ 1.05
Above average	161	Decreaser	14%	12%	73%
	162	Intermediate	16%	8%	76%
	141	Increaser	9%	10%	82%
Average	18	Decreaser	50%	28%	22%
	20	Intermediate	40%	10%	50%
	17	Increaser	18%	18%	65%
Below average	8	Decreaser	n/a	n/a	n/a
	8	Intermediate	n/a	n/a	n/a
	8	Increaser	n/a	n/a	n/a

## Plant species richness

Across the Gascoyne bioregion, 4% of WARMS sites had decreased species richness of native perennial plants following above-average *seasonal quality*. It is not possible to report change following below-average *seasonal quality*.

Seasonal quality	Number of sites	Decline: richness index < 0.80	No change: 0.80 ≤ richness index < 1.20	Increase: richness index ≥ 1.20
Above average	167	4%	62%	35%
Average	20	5%	75%	20%
Below average	8	n/a	n/a	n/a

## Change in woody cover

Based on WARMS data, cover of woody species increased on average by 23%. Almost all sites (94%) recorded an increase. On only 1% of sites did cover drop below 50% of the initially recorded value.

## Distance from stock water

The percentage area of pastoral lease country within three kilometres of permanent and semipermanent sources of stock water for each sub-**Interim Biogeographic Regionalisation for Australia (IBRA)** is:

Ashburton (GAS1)	26.3% (81.8% of sub-IBRA analysed)
Carnegie (GAS2)	12.8% (57.5% of sub-IBRA analysed)
Augustus (GAS3)	32.5% (76.4% of sub-IBRA analysed)

GAS = Gascoyne; IBRA = Interim Biogeographic Regionalisation for Australia

Note that this analysis does not include the locations of natural waters. These can provide significant additional sources of water for stock, particularly after substantial rainfall. It is not possible to report change in watered area for the 1992–2005 period.

## Weeds

Weeds known to occur in the Gascoyne bioregion include:

Common name	Scientific name
Mexican poppy	<i>Argemone ochroleuca</i>

See [www.anra.gov.au](http://www.anra.gov.au) for distribution maps

## Components of total grazing pressure

### Domestic stocking density

Approximately 80% of the Gascoyne bioregion was grazed in the period 1992 to 2001. This area reduced to approximately 71% of the bioregion in 2005. Based on data from the Australian Bureau of Statistics and taking account of the reduced area grazed, domestic stocking density increased almost continuously between 1993 and 2001 (from 90% of the 1983–1991 average in 1993 to 44% above this baseline in 2001). Stocking density then decreased over the next three years to be 27% above the 1983–1991 average in 2004. The build up in the earlier years of the 1992–2005 reporting period was facilitated by some wetter years but was not driven solely by better *seasonal quality*. Decreasing stocking density between 2001 and 2004 probably largely resulted from declining *seasonal quality* (see Figure 3, above). It is probable that there was spatial variation in stocking density across the bioregion that is concealed by the spatially averaged data presented here.

## Kangaroos

There are no suitable data for reporting change in kangaroo populations.

## Invasive animals

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

Common name	Scientific name
Feral goat	<i>Capri hircus</i>
Fox	<i>Vulpes vulpes</i>
Rabbit	<i>Dryctolagus cuniculus</i>
Wild dog	<i>Canis spp.</i>
Feral cat	<i>Felis cattus</i>
Camel	<i>Camelus dromedaries</i>
Donkey	<i>Equus asinus</i>
Horse	<i>Equus caballus</i>

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## Products that support reporting of landscape function and sustainable management

### Fire

Fire was insignificant during the 1997–2005 period, with a maximum of 4.4% of the Gascoyne bioregion area burnt in 2000.

The fires that were recorded were a mixture of both hot burns (during the hotter summer months) and cool burns (during the cooler months of the year).

The frequency of fire between 1997 and 2005 was minimal, with a mean frequency ( $\log_{10}$  transformed) of 0.04.

### Dust

The mean Dust Storm Index value (1992–2005) was 1.06, which is considered low. The spatial distribution map shows negligible dust observed in the western half of the bioregion and low values in both the eastern and far-western portions (ie adjacent to the Carnarvon bioregion).

## Biodiversity

The Gascoyne bioregion has 2 plant species, 5 mammals, 2 birds and 1 species of reptile listed as threatened (Biodiversity Working Group indicator: Threatened species; see **Section 7 of Chapter 3** of *Rangelands 2008 — Taking the Pulse*).

## Socioeconomic characteristics

### Land use and value

Approximately 80% of the Gascoyne bioregion was grazed in the period 1992 to 2001. This area reduced to approximately 71% of the bioregion in 2005.

The average 'lease and improvement' value of pastoral land in the Carnarvon–Gascoyne–Murchison region increased by 230% over the period 1992 to 2005.

## Key management issues and features

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

- While the early 1990s were very dry, the mid- to late 1990s represented an exceptional sequence of above-average rainfall years, particularly in terms of summer rainfall. For some of the bioregion, the period since mid-2001 has been dry.
- The western part of the bioregion was declared for exceptional circumstances (drought) in 2003.
- About 9% of the pastoral leases are under Indigenous ownership and another 5% are under mining company ownership.
- There was a strong trend in enterprise type away from merino sheep to cattle, meat sheep and rangeland goats. This was due to low wool prices, high meat prices, difficulty in finding labour for wool enterprises and wild-dog predation on sheep. Infrastructure on many stations, especially fencing, is not being maintained. This is partly the result of the move away from merino sheep.

- Over approximately the past decade, the cover and density of shrubs and trees on WARMS sites increased.
- Grazing-sensitive species were not adversely affected on WARMS sites over approximately the past decade.
- Native shrub species richness on WARMS sites increased slightly over approximately the past decade.
- Particularly in the north of the Gascoyne bioregion, the spread of introduced buffel grass has stabilised many degraded areas. This has allowed stocking rates to increase in these areas.
- Unmanaged goats are a large component of total grazing pressure and their contribution to station income can be high. A large number of trap yards have been built in the past 10 years, as a way of lowering the cost of mustering and for better controlling total grazing pressure.
- Wild dog numbers and their impacts have increased markedly in recent years.
- About 10.3% of the bioregion is within the conservation estate. This area has increased appreciably since 2001 with the purchase of former pastoral leases for conservation purposes.