



# Coolgardie bioregion

## Description

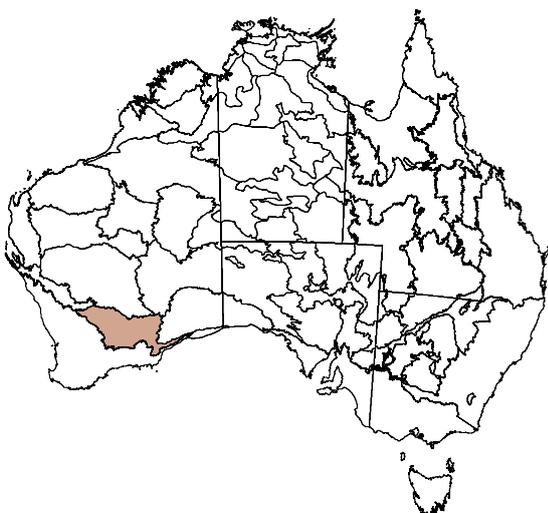
Area: 129 117 km<sup>2</sup>

Landforms of the Coolgardie bioregion include granite rocky outcrops, low greenstone hills, laterite uplands and broad plains. Numerous salt lakes also occur through the bioregion. The Coolgardie bioregion covers the interzone between mulga and spinifex country, and eucalypt environments. Land tenure includes pastoral lease, Aboriginal land and several national parks and reserves. Gold and nickel mining are very important to the bioregion's economy. Regional income is supplemented by pastoral activity and tourism. Major population centres are Kalgoorlie, Coolgardie and Norseman.

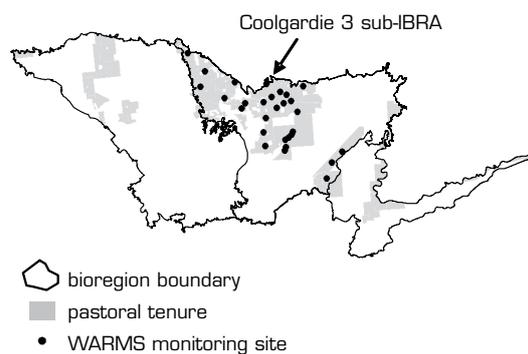
## Location

The Coolgardie bioregion is located in the southern rangelands of Western Australia (see Figures 1 and 2).

**Figure 1 Location of the Coolgardie bioregion**



**Figure 2 Western Australian Rangeland Monitoring System monitoring sites and pastoral tenure**



## Data sources available

Data sources include:

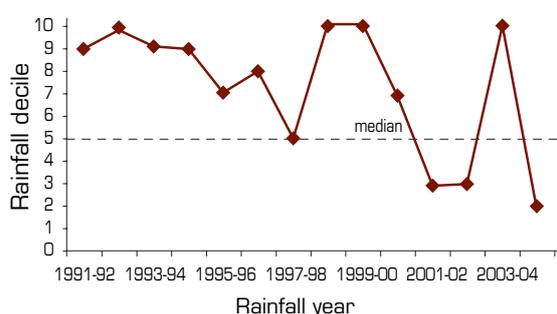
- Western Australian Rangeland Monitoring System (WARMS), which provides moderate reliability for reporting change, through a moderate number of sites in the Eastern Goldfields (COO3) sub-Interim Biogeographic Regionalisation for Australia (IBRA), quantitative data, and a focus on longer-lived plant 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 climate of the Coolgardie bioregion is semiarid. Spatially averaged median (1890–2005) rainfall is 248 mm (April to March rainfall year). This median rainfall and the decile values shown in Figure 3, below, are for the whole area of the bioregion (WARMS monitoring data reported later are for the Coolgardie 3 sub-IBRA).

**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.**

For the majority of the reporting period, *seasonal quality* based on decile rainfall was variable but generally above average. It declined substantially between 1992–1993 and 1997–1998 and again between 1999–2000 and 2001–2002. The rainfall for 2004–2005 was considerably below the median; however, all but three years were above median and the overall sequence of years was the best on record.

Note that regional averaging of rainfall conceals spatial variability. Some parts of the bioregion 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). Reporting is for the Coolgardie 3 (COO3) sub-IBRA only, based on the distribution of WARMS sites.

## Coolgardie 3 sub-IBRA

### Resource capture index

When *seasonal quality* was above average, 59% of sites showed a decline in the resource capture index. It is not possible to report change following below-average *seasonal quality* because only one site was assessed at this time.

<i>Seasonal quality</i>	Number of sites	Decline: RCI < 0.90	No change: RCI < 1.10	Increase: RCI ≥ 1.10
Above average	22	59%	18%	23%
Average	5	n/a	n/a	n/a
Below average	1	n/a	n/a	n/a

RCI = resource capture index

### Population growth rate

When *seasonal quality* was above average, 9% of sites showed a decline in the density of longer-lived perennial vegetation. It is not possible to report change following below-average *seasonal quality* due to insufficient sites 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	23	9%	48%	43%
Average	5	n/a	n/a	n/a
Below average	1	n/a	n/a	n/a

## Sustainable management

### Critical stock forage

Decreaser shrubs declined in density at 23% of sites in the Eastern Goldfields (COO3) sub-IBRA following above-average *seasonal quality*. Insufficient sites were assessed following below-average *seasonal quality* to report change in density of decreaser shrubs at that time.

Seasonal quality	Species group	Number of sites	Decline: density < 0.95	No change: 0.95 ≤ density < 1.05	Increase: density ≥ 1.05
Above average	Decreaser	22	23%	27%	50%
	Intermediate	21	0%	67%	33%
	Increaser	4	n/a	n/a	n/a

## Plant species richness

No WARMS sites had decreased species richness of native perennial plants following above-average seasonal quality. It is not possible to report change in species richness 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	23	0%	52%	48%
Average	5	n/a	n/a	n/a
Below average	1	n/a	n/a	n/a

## Change in woody cover

Based on WARMS data, cover of woody species increased on average by 28%. Most sites (93%) recorded an increase in cover. On no 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-IBRA is:

Mardabilla (CO01)	12.9% (10.5% of sub-IBRA analysed)
Southern Cross (CO02)	11.3% (9.4% of sub-IBRA analysed)
Eastern Goldfields (CO03)	37.0% (38.0% of sub-IBRA analysed)

COO = Coolgardie; IBRA = Interim Biogeographic Regionalisation for Australia

Note that this analysis does not include the locations of natural waters. These may provide 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 Coolgardie bioregion include:

Common name	Scientific name
Patersons curse	<i>Echium plantagineum</i>
Bathurst burr	<i>Xanthium spinosum</i>
African boxthorn	<i>Lycium ferocissimum</i>
Mexican poppy	<i>Argemone achroleuca</i>

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

## Components of total grazing pressure

Domestic stocking density was reported for the pastoral lease area within the bioregion, mainly in the Eastern Goldfields (CO03) sub-IBRA.

Data from the Australian Bureau of Statistics showed that domestic stocking density decreased from 1994 to 1999 and was below the 1983–1991 average between 1996 and 2000. Stocking density increased sharply between 1999 and 2002 (when it was 35% above the 1983–1991 average) and then decreased substantially in 2003 (to 4% above the 1983–1991 baseline). These changes show some similarity with seasonal quality indicated by decile rainfall (see Figure 3, above). Note that spatial averaging conceals likely variation in stocking density trends across the bioregion, and locally collected data suggest that stocking densities have declined overall since the early 1990s.

## Kangaroos

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

## Invasive animals

Invasive animal species known to occur in the Coolgardie 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>
Carp	<i>Cyprinus carpio</i>
Camel	<i>Camelus dromedaries</i>
Donkey	<i>Equus asinus</i>
Horse	<i>Equus caballus</i>
Feral sheep	<i>Ovis spp.</i>

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

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

### Fire

Fire data report for all the Coolgardie bioregion area within the rangelands. Fire was insignificant during the 1997–2005 period. A maximum of 5.3% of the bioregion area was burnt in 2001. Where fires did occur, they were generally during summer and were likely hotter or more intense than fires in other months of the year.

### Dust

Dust data apply to the bioregion area within the rangelands. The mean Dust Storm Index value (1992–2005) was 1.78, which is considered low. The spatial distribution map shows that more dust was observed in the western half of the bioregion compared with the eastern half.

## Biodiversity

The Coolgardie bioregion has 24 threatened plant species, 8 threatened mammal species and 3 threatened bird species (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 27% of the Coolgardie bioregion is grazed. This area has not changed appreciably over the 1992–2005 reporting period.

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

## Key management issues and features

Key features and issues (particularly for the Eastern Goldfields, COO3 sub-IBRA) include the following:

- All years from 1991–1992 to 2000–2001 received above-average rainfall. The early 2000s were dry and the bioregion was declared for exceptional circumstances (drought) in 2003. For much of the bioregion, this was extended in 2006.
- About 25% of the pastoral leases are under mining company ownership.
- There has been 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 grazing merino sheep.
- Unmanaged goats contribute a large proportion of the total grazing pressure, and their contribution to station income can be high.
- 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.
- About 13.3% of the whole bioregion is within the conservation estate. For the Eastern Goldfields (COO3) sub-IBRA, it is 3.8%.