



Murchison bioregion

Description

Area: 281 200 km²

The Murchison bioregion has low hills and mesas separated by flat colluvium and alluvial plains. Vegetation is predominantly low mulga woodlands. The bioregion is one of the main pastoral (sheep and cattle) areas in Western Australia (WA), although mining (gold, iron and nickel) is more important to the region's economy. Major population centres are Leinster, Leonora, Meekatharra, Mount Magnet, Laverton, Cue and Wiluna.

Location

The Murchison bioregion is located in the southern rangelands of WA (see Figures 1 and 2).

Figure 1 Location of the Murchison bioregion

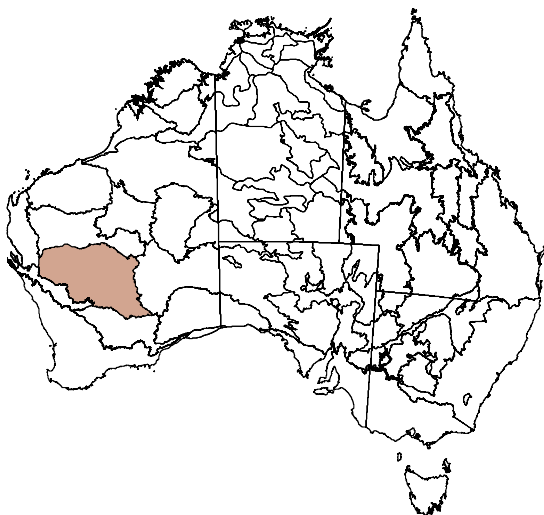
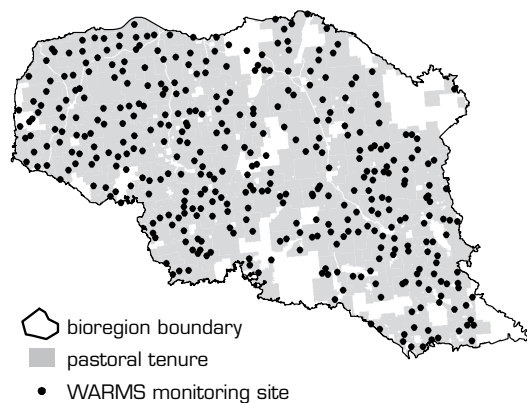


Figure 2 Western Australian Rangeland Monitoring System monitoring sites and pastoral tenure



Data sources available

Data sources include:

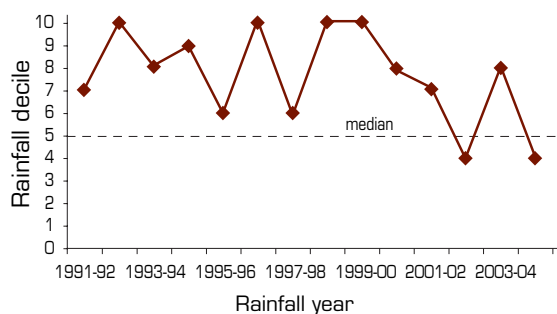
- Western Australian Rangeland Monitoring System (WARMS), which provides high reliability for reporting change, with a large number of well-distributed sites, quantitative data, and a focus on longer-lived plant species, which helps to filter short-term seasonal variability
- domestic stocking density, 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 Murchison bioregion has an arid climate with predominantly winter rainfall. Spatially averaged median (1890–2005) rainfall is 201 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.

Most years had better than the median rainfall, indicating above-average *seasonal quality* during the reporting period. Only two years were below median and the sequence of wet years in the 1990s was the best on record.

Despite this apparent optimistic summary provided by spatially averaged rainfall, there was considerable spatial variability in rainfall in some years. Much of the western and southern Murchison experienced severe drought from mid-2001, and some of the bioregion remained declared in 2006 for exceptional circumstances (drought).

Landscape function

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

Resource capture index

When *seasonal quality* was above average, 60% of sites showed a decline in the resource capture index, while 21% of sites showed an increase when *seasonal quality* was below average.

<i>Seasonal quality</i>	Number of sites	Decline: RCI < 0.90	No change: RCI < 1.10	Increase: RCI ≥ 1.10
Above average	94	60%	9%	32%
Average	141	55%	15%	30%
Below average	62	68%	11%	21%

RCI = resource capture index

Population growth rate

When *seasonal quality* was above average, 14% of sites showed a decline in the density of longer-lived perennial vegetation, while 21% of sites showed an increase when *seasonal quality* was below average.

<i>Seasonal quality</i>	Number of sites	Decline: density < 95%	No change: density between 95% and 105%	Increase: density ≥ 105%
Above average	157	14%	15%	71%
Average	167	30%	23%	47%
Below average	62	60%	19%	21%

Sustainable management

Critical stock forage

Decreaser shrubs declined in density at 17% of sites following above-average *seasonal quality*. They increased at 23% of sites following below-average *seasonal quality*.

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	153	17%	11%	73%
	Intermediate	151	16%	19%	65%
	Increaser	74	7%	36%	57%
Average	Decreaser	165	33%	20%	47%
	Intermediate	166	25%	31%	44%
	Increaser	108	12%	34%	54%
Below average	Decreaser	61	67%	10%	23%
	Intermediate	58	45%	34%	21%
	Increaser	43	28%	33%	40%

Plant species richness

Only a small proportion (3%) of WARMS sites had decreased species richness of native perennial plants following above-average seasonal quality and 15% of sites had increased 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	157	3%	67%	31%
Average	167	3%	83%	14%
Below average	62	5%	81%	15%

Change in woody cover

Cover of woody species at WARMS sites increased on average by 28% and remained the same or increased on most sites (68%). On only 3% 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:

Eastern Murchison (MUR1)	38.4% (78.3% of sub-IBRA analysed)
Western Murchison (MUR2)	48.6% (90.9% of sub-IBRA analysed)

IBRA = Interim Biogeographic Regionalisation for Australia; MUR = Murchison

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 Murchison bioregion include:

Common name	Scientific name
African boxthorn	<i>Lycium ferocissimum</i>
Patersons curse	<i>Echium plantagineum</i>
Bathurst burr	<i>Xanthium spinosum</i>
Mesquite	<i>Prosopis</i> spp.
Mexican poppy	<i>Argemone ochroleuca</i>

See www.anra.gov.au for distribution maps

Components of total grazing pressure

Domestic stocking density

This section reports for the pastorally occupied portion of the bioregion.

Most (88%) of the Murchison bioregion was pastoral land in the period 1992 to 2001. This area reduced to approximately 83% 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 was slightly above the 1983–1991 average (by 4%) between 1996 and 1998 but decreased sharply in 1999 (to 91% of the average) and then decreased further by 2003 and 2004 (to 82% of the 1983–1991 average). This decrease reflects destocking of leases in the western part of the bioregion from 1999–2000 onwards as drought set in. Most of the

bioregion was drought declared in 2003 and this declaration was extended in 2006. Spatial averaging of stocking density across the large extent of this bioregion conceals variation in actual stocking density within parts of the bioregion, similar to the situation where a statement about average *seasonal quality* risks under- or over-stating the actual conditions in some parts.

Kangaroos

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

Invasive animals

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

Common name	Scientific name
Feral goat	<i>Capri hircus</i>
Fox	<i>Vulpes vulpes</i>
Rabbit	<i>Oryctolagus 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>
Feral sheep	<i>Ovis spp.</i>

See www.anra.gov.au for distribution maps

Products that support reporting of landscape function and sustainable management

Fire

Fire was insignificant during the 1997–2005 period, with a maximum of 1.9% of the bioregion area burnt in both 2000 and 2001.

The fires between 1997 and 2005 were both hot and cool fires (based on month of burn), with both kinds of fire occurring each year to varying extents.

The frequency of fire between 1997 and 2005 was very low, with a mean frequency (\log_{10} transformed) of 0.03.

Dust

The mean Dust Storm Index value (1992–2005) was 1.43, which is considered low. The spatial distribution map shows that most dust was observed in the southeastern and eastern parts of the bioregion. Some of these dust sources are probably associated with mining activity (eg surrounding Kalgoorlie). (Kalgoorlie is just south of the bioregion boundary in the Coolgardie bioregion.)

Biodiversity

Two plant species are listed as threatened in the Murchison bioregion. Seven mammal species, 2 birds and 3 species of reptile are also listed as threatened (Biodiversity Working Group indicator: Threatened species).

The area set aside for conservation purposes increased from about 0.5% of the bioregion in 1998 to 6.7% in 2004, due to the purchase of pastoral leases by the WA Government.

Socioeconomic characteristics

Land use and value

A substantial portion (88%) of the Murchison bioregion was pastoral land in the period 1992 to 2001. This area reduced to approximately 83% 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 Murchison bioregion include the following:

- 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 and southern part of the bioregion was declared for exceptional circumstances (drought) in 2003 and some areas had this declaration extended in 2006.
- About 6% of the pastoral leases are under Indigenous ownership and another 22% 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 change 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.
- An increasing percentage of pastoralists expect to earn significant off-station income, principally from supporting the mining industry. Many leases are unviable as pastoral enterprises on their own.
- Unmanaged goats contribute a large proportion of the 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.
- Over approximately the past decade, the cover and density of shrubs and trees on WARMS sites increased.
- In general, grazing-sensitive species were not adversely affected on WARMS sites over approximately the past decade. However, on sites where overall decline was observed, the decline was greatest for grazing-sensitive species.
- Native shrub species richness on WARMS sites increased slightly over approximately the past decade.
- About 6.7% of the bioregion is within the conservation estate.