



# Pilbara bioregion

## Description

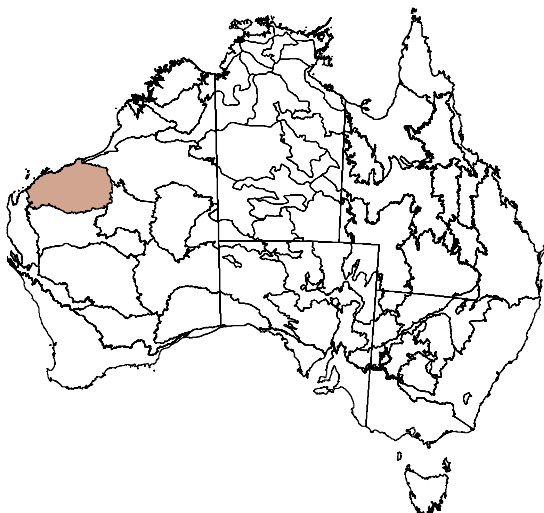
Area: 178 060 km<sup>2</sup>

The Pilbara bioregion is characterised by vast coastal plains and inland mountain ranges with cliffs and deep gorges. Vegetation is predominantly mulga low woodlands or snappy gum over bunch and hummock grasses. Tenure comprises Aboriginal land, leasehold (for grazing cattle) and conservation reserves. The bioregion provides the majority of Western Australia's (WA) exports in petroleum, natural gas and iron ore. Major population centres are Karratha, Port Hedland, Newman and Tom Price.

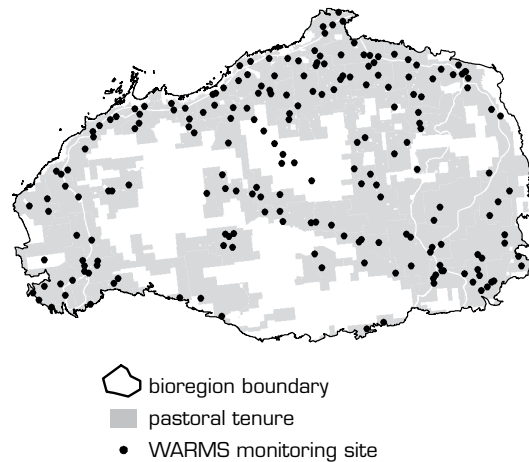
## Location

The Pilbara bioregion is located in the central west of WA (see Figures 1 and 2).

**Figure 1 Location of the Pilbara 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 perennial 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

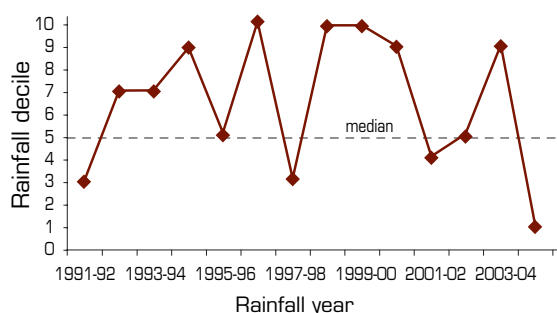


- distribution and relative abundance of invasive animals and weeds
- land use
- conservation estate
- land values.

## Climate

The climate of the Pilbara bioregion is arid to tropical. Spatially averaged median (1890–2005) rainfall is 298 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 highly variable but generally above the long-term median during the 1992–2005 reporting period. Ten of the 14 years had median or above rainfall. *Seasonal quality*, based on decile rainfall, declined sharply in the last year of reporting (2004–2005).

Note that regional averaging of rainfall conceals spatial variability. Some parts of the Pilbara 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 data in the following sections are based on the resource capture index and frequency of perennial grasses (for consistency with reporting by other jurisdictions).

## Resource capture index

No measurements to report the resource capture index were made at sites following above-average *seasonal quality*. When *seasonal quality* was below average, 32% of sites showed an increase in the resource capture index.

<i>Seasonal quality</i>	Number of sites	Decline: RCI < 0.90	No change: 0.90 ≤ RCI < 1.10	Increase: RCI ≥ 1.10
Above average	0	n/a	n/a	n/a
Average	38	34%	16%	50%
Below average	37	57%	11%	32%

## Perennial grass frequency

When *seasonal quality* was above average, 7% of sites showed a decline in the frequency of perennial grasses, while 16% of sites showed an increase when *seasonal quality* was below average.

<i>Seasonal quality</i>	Number of site-by-year combinations	Decline: frequency < 0.90	No change: frequency < 1.10	Increase: frequency ≥ 1.10
Above average	79	7%	51%	43%
Average	72	17%	60%	23%
Below average	58	42%	43%	16%

## Sustainable management

### Critical stock forage

Decreaser perennial grasses declined in frequency at 8% of sites following above-average *seasonal quality*. They increased at 18% of sites following below-average *seasonal quality*.

<i>Seasonal quality</i>	Species group	Number of site-by-year combinations	Decline: frequency < 0.90	No change: 0.90 ≤ frequency < 1.10	Increase: frequency ≥ 1.10
Above average	Decreaser	77	8%	46%	47%
	Intermediate	18	22%	17%	61%
	Increaser	n/a	n/a	n/a	n/a
Average	Decreaser	68%	18%	60%	22%
	Intermediate	24%	33%	29%	41%
	Increaser	n/a	n/a	n/a	n/a
Below average	Decreaser	56%	45%	38%	18%
	Intermediate	n/a	n/a	n/a	n/a
	Increaser	n/a	n/a	n/a	n/a

### Plant species richness

When *seasonal quality* was above average, 12% of WARMS sites showed a decline in species richness of native perennial plants, while 28% of sites showed an increase when *seasonal quality* was below average.

<i>Seasonal quality</i>	Number of sites	Decline: richness index < 0.80	No change: 0.80 ≤ richness index < 1.20	Increase: richness index ≥ 1.20
Above average	78	12%	46%	42%
Average	71	16%	55%	30%
Below average	57	23%	49%	28%

## Change in woody cover

Crown cover of woody species increased by 15% on average, and remained the same or increased on 66% of WARMS sites. Cover dropped below 50% of the initially recorded value at 10% of sites.

### 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:

Chichester (PIL1)	32.0% (67.1% of sub-IBRA analysed)
Fortescue (PIL2)	31.9% (84.7% of sub-IBRA analysed)
Hamersley (PIL3)	25.0% (47.2% of sub-IBRA analysed)
Roebourne (PIL4)	59.2% (75.3% of sub-IBRA analysed)

IBRA = Interim Biogeographic Regionalisation for Australia;  
PIL = Pilbara

Note that this analysis does not include the locations of natural waters, which can provide additional sources of water for stock, particularly in the more rugged parts of the Chichester and Hamersley subregions. It is not possible to report change in watered area between 1992 and 2005.

## Weeds

Weeds known to occur in the Pilbara bioregion include:

Common name	Scientific name
Mesquite	<i>Prosopis</i> spp.
Mexican Poppy	<i>Argemone ochroleuca</i>
Parkinsonia	<i>Parkinsonia aculeata</i>

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

## Components of total grazing pressure

### Domestic stocking density

Approximately 65% of the Pilbara bioregion is grazed. Data from the Australian Bureau of Statistics showed that domestic stocking density increased continually throughout the 1992–2004 period, apart from a small decrease in 2003. The stocking density was 83% of the 1983–1991 average in 1992 and increased to be 44% above this baseline value in 2002. It dropped to 24% above the 1983–1991 average in 2003 but then increased to 57% above the baseline in 2004. This consistent increase was probably facilitated by generally above-average *seasonal quality* throughout the period (see Figure 3, above), but the continued increase does not reflect distinctly poorer *seasonal quality* at the end of the reporting period (2004). That is, stocking densities do not appear to have declined in response to drier conditions towards the end of the reporting period. 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 density.

### Invasive animals

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

Common name	Scientific name
Feral pig	<i>Sus scrofa</i>
Feral goat	<i>Capri hircus</i>
Rabbit	<i>Dryctolagus cuniculus</i>
Fox	<i>Vulpes vulpes</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

The extent of fires in the Pilbara bioregion varied considerably between 1997 and 2005, with relatively large areas burnt in 1997 and 2000.

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005
% area burnt	20.1	2.5	9.7	25.8	9.4	11.8	3.1	3.1	1.1

The majority of fires occurred during the period August to December and were presumed to produce hotter, more intense burns than fires in other months.

The frequency of fire between 1997 and 2005 was moderate, with a mean frequency ( $\log_{10}$  transformed) of 0.16.

### Dust

The mean Dust Storm Index value (1992–2005) was 1.25, which is considered low. Dust levels were negligible in the western part of the bioregion and low in the eastern half.

## Biodiversity

Two plant species are listed as threatened in the Pilbara bioregion. Seven mammal species, 1 bird species and 1 species of reptile are also 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 65% of the Pilbara bioregion is commercially grazed. This area has not changed appreciably over the 1992–2005 reporting period.

Average 'lease and improvement' values for pastoral leases in the Pilbara increased more than five-fold between 1992 and 2005.

## Key management issues and features

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

- Perennial grass frequency on WARMS sites declined between 2003 and 2005, following increases in the mid- to late 1990s.
- The cover of woody species on WARMS sites increased slightly during the 2003 to 2005 period.
- Grazing-sensitive perennial grasses on WARMS sites declined slightly during the 2003 to 2005 period.
- Native perennial species richness on WARMS sites was stable during the 2003 to 2005 period.
- About 15% of the pastoral leases are under Indigenous ownership and another 15% are under mining company ownership.
- Most commercial enterprises (of viable size) are profitable.
- Infrastructure development has made more pastoral land accessible to livestock and raised the potential for increased livestock numbers.
- Stocking rates have increased considerably since the early 1990s.
- Wild dog numbers and their impacts have increased markedly in recent years.
- Camel populations continue to encroach from desert areas in the east of the bioregion.
- Mesquite remains a problem weed in the western part of the bioregion. Despite significant resources going into management, the problem remains out of control.
- About 8.3% of the bioregion is within the conservation estate.
- The Roebourne subregion received a generally good run of years through the 1990s but the early 2000s were dry and much of the subregion was declared for exceptional circumstances (drought) in 2003.
- The other three subregions had a generally good to very good sequence of rainfall years in the 1990s. This was probably the best sequence ever, better even than the mid-1970s.