



Central Kimberley bioregion

Description

Area: 76 760 km²

The Central Kimberley bioregion comprises hilly to mountainous country and low plains. Vegetation is predominantly curly spinifex savanna woodland with areas of semidesert spinifex steppe. Land use includes pastoral leasehold, Aboriginal-held land and nature reserves. Extensive cattle grazing and tourism contribute to the bioregion's economy. The major population centre is Halls Creek.

Location

The Central Kimberley bioregion is located in northern Western Australia (see Figures 1 and 2).

Figure 1 Location of the Central Kimberley bioregion

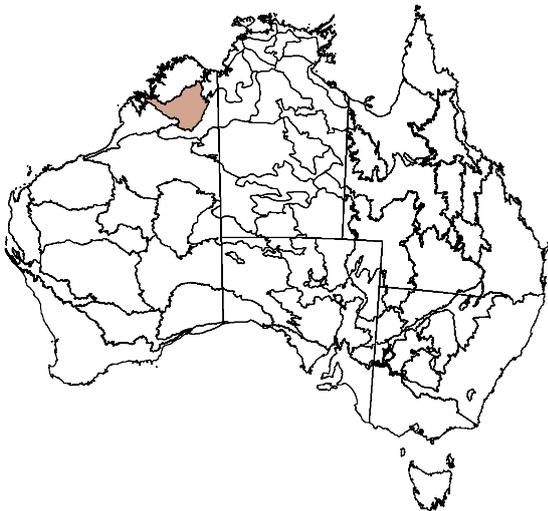
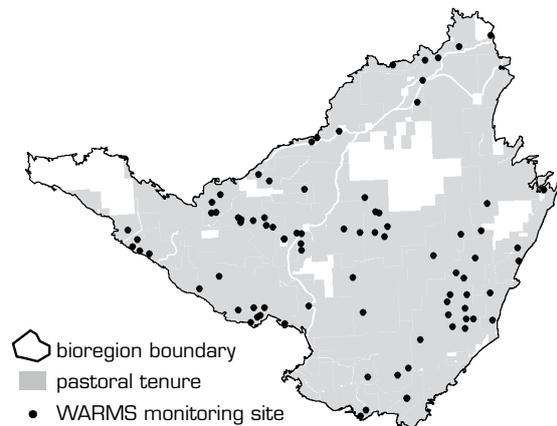


Figure 2 Western Australian Rangeland Monitoring System monitoring sites and pastoral tenure



Data sources available

Data sources include:

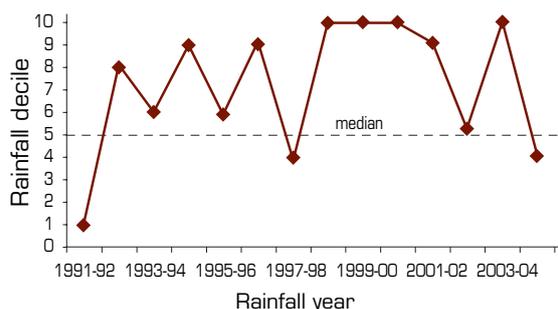
- Western Australian Rangeland Monitoring System (WARMS), which has moderate to high reliability for reporting change, based on a moderate number of reasonably well-distributed sites, quantitative data, and a focus on perennial plant species, which helps to filter short-term seasonal variability
- domestic stocking density, which has moderate reliability
- fire extent, intensity and frequency, which has 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 Central Kimberley bioregion is tropical monsoonal with a warm, dry season and a wet season. Spatially averaged median (1890–2005) rainfall is 627 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 of the reporting period had above-average *seasonal quality* based on decile rainfall. The year 1991–1992 was a particularly dry year, while 1997–1998 and 2004–2005 received rainfall slightly below the long-term median. All other years were above median, with a very wet sequence from 1998–1999 to 2001–2002.

Note that regional averaging of rainfall conceals spatial variability. Some parts of the Central Kimberley 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 report the resource capture index and frequency of perennial grasses (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. 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	25	60%	16%	24%
Average	35	49%	29%	23%
Below average	8	n/a	n/a	n/a

RCI = resource capture index

Perennial grass frequency

Approximately 8% of sites showed a decline in perennial grass frequency when *seasonal quality* was above average. It is not possible to report change following below-average *seasonal quality*.

<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	147	8%	61%	30%
Average	35	14%	57%	29%
Below average	n/a	n/a	n/a	n/a

Sustainable management

Critical stock forage

Decreaser perennial grasses declined in frequency at 19% of sites following above-average *seasonal quality*. It is not possible to report change following below-average *seasonal quality*.

Seasonal quality	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	147	19%	52%	29%
	Intermediate	114	19%	24%	57%
	Increaser	104	38%	16%	46%
Average	Decreaser	35	14%	46%	40%
	Intermediate	30	33%	13%	53%
	Increaser	23	39%	13%	48%
Below average	Decreaser	n/a	n/a	n/a	n/a
	Intermediate	n/a	n/a	n/a	n/a
	Increaser	n/a	n/a	n/a	n/a

Plant species richness

Within the bioregion, 16% of sites showed a decline in plant species richness of native perennial plants when *seasonal quality* was above average. It is not possible to report change when *seasonal quality* was below average.

Seasonal quality	Number of site-by-year combinations	Decline: richness index < 0.80	No change: 0.80 ≤ richness index < 1.20	Increase: richness index ≥ 1.20
Above average	147	16%	57%	27%
Average	35	9%	57%	34%
Below average	n/a	n/a	n/a	n/a

Change in woody cover

Crown cover of woody species increased by 18% on average, and remained the same or increased on 70% of sites. On only 2% 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:

Pentecost (CK1)	5.5% (83.1% of sub-IBRA analysed)
Hart (CK2)	19.9% (94.4% of sub-IBRA analysed)
Mount Eliza (CK3)	12.5% (68.5% of sub-IBRA analysed)

CK = Central Kimberley; IBRA = Interim Biogeographic Regionalisation for Australia

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

Weeds

Weeds known to occur in the Central Kimberley bioregion include:

Common name	Scientific name
Calotrope	<i>Calotropis procera</i>
Hyptis	<i>Hyptis suaveolens</i>
Parkinsonia	<i>Parkinsonia aculeata</i>
Prickly acacia	<i>Acacia nilotica</i> subsp. <i>indica</i>

See www.anra.gov.au for distribution maps

Components of total grazing pressure

Domestic stocking density

Approximately 84% of the Central Kimberley bioregion was grazed in 1992, reducing to 80% in 2001. Based on data from the Australian Bureau of Statistics, and taking account of this small reduction in grazed area, domestic stocking density was below the 1983–1991 average from 1993 to 2004, and declined quite appreciably from 2000 onwards (95% of the baseline in 2000, decreasing to 46% in 2003 and increasing slightly to 53% in 2004). This declining trend appeared to be largely independent of *seasonal quality* as indicated by decile rainfall (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, given that locally collected data suggest that stocking density remained relatively stable from 2000 onwards.

Kangaroos

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

Invasive animals

Invasive animal species known to occur in the Central Kimberley bioregion include:

Common name	Scientific name
Feral pig	<i>Sus scrofa</i>
Fox	<i>Vulpes vulpes</i>
Wild dog	<i>Canis</i> spp.
Feral cat	<i>Felis catus</i>
Donkey	<i>Equus asinus</i>
Horse	<i>Equus caballus</i>

See www.anra.gov.au for distribution maps

Products that support reporting of landscape function and sustainable management

Fire

Fires were extensive throughout the bioregion for much of the 1997–2005 period, apart from 1998, 2003 and 2005.

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005
% area burnt	35.6	18.3	38.4	31.2	28.2	26.2	16.1	40.8	15.7

The largest areas were burnt between August and December and were likely hotter or more intense fires.

The frequency of fire between 1997 and 2005 was high relative to other rangeland bioregions, with a mean frequency (\log_{10} transformed) of 0.56.

Dust

The mean Dust Storm Index value (1992–2005) was 1.39, which is considered low. The spatial distribution map shows negligible dust observed in the far south of the bioregion and low values elsewhere.

Biodiversity

There is 1 known threatened plant species, 1 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

In 1992, 84% of the Central Kimberley bioregion was grazed; this reduced to 80% in 2001.

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

Key management issues and features

Key features and issues of the Central Kimberley bioregion include the following:

- Perennial grass frequency on WARMS sites remained stable (2003 to 2005) after a period of increase from the mid-1990s.
- The cover of woody species on WARMS sites increased slightly during the 2003 to 2005 period. The threat of woody thickening will continue to be monitored.
- Grazing-sensitive perennial grasses on WARMS sites were not adversely affected during the 2003 to 2005 period.
- Native perennial species richness on WARMS sites was stable during the 2003 to 2005 period.
- About 40% of the pastoral leases are under Indigenous ownership, and many are either destocked or running low numbers of livestock.
- There is a trend for a number of leases to be operated as a single management unit, with consequent declines in staffing levels and permanent habitation.

- Market demand for live cattle at specified weights has encouraged managers to turn off young cattle and better match animal numbers to feed supply. Combined with good seasons, pastoralists have an excellent operating environment in which to show improved land management.
- Most commercial enterprises (of viable size) are profitable.
- A number of noxious weed species have established populations but have not yet become widespread. They are the subject of ongoing surveillance.
- A donkey eradication program is in place for the bioregion. In southern areas, eradication is nearly complete.
- Fire management is being seen as increasingly important. Late dry-season fires tend to homogenise the vegetation structure, with mid-storey vegetation particularly at risk. They also contribute significantly to greenhouse gas emissions.
- About 4.4% of the bioregion is within the conservation estate.
- A long run of generally good to very good rainfall years has produced probably the best sequence of rainfall on record, better even than the mid-1970s and the period leading up to the 1920s.