



Northern Kimberley bioregion

Description

Area: 83 390 km²

The Northern Kimberley bioregion has broad dissected plateaus, spectacular gorges and rugged coastal areas. Vegetation is characterised by tall-grass savanna woodland. The bioregion is mostly Aboriginal land or extensive cattle grazing. Approximately one-sixth of the bioregion is conserved. There is some mining and considerable exploration activity. The tourism industry is large and expanding. The main population centre is Kalumburu.

Location

The Northern Kimberley bioregion is located on the northern coast of Western Australia (WA; see Figures 1 and 2).

Figure 1 Location of the Northern Kimberley bioregion

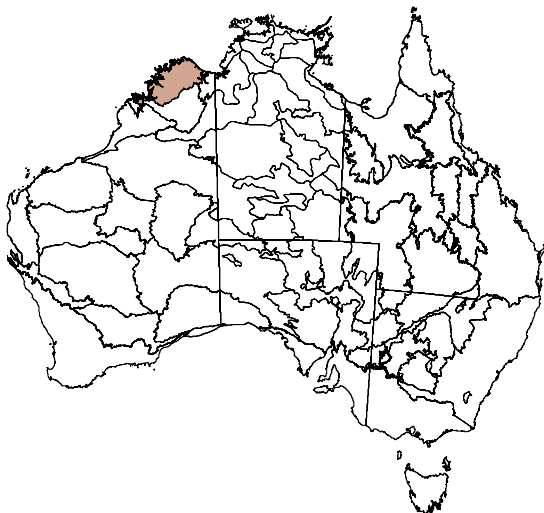
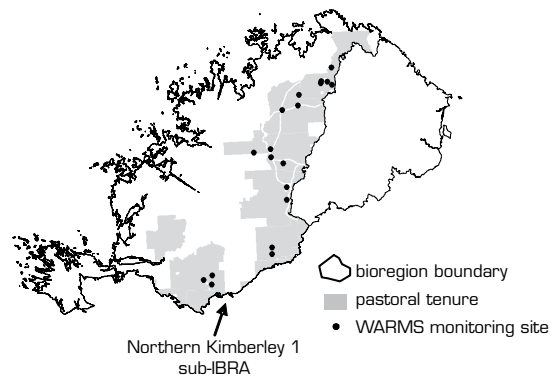


Figure 2 Western Australian Rangeland Monitoring System monitoring sites and pastoral tenure



Data sources available

Data sources include:

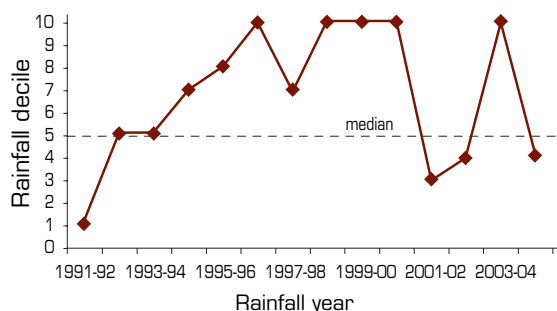
- Western Australian Rangeland Monitoring System (WARMS), which provides moderate reliability for reporting change for the Mitchell (NKI) sub-**Interim Biogeographic Regionalisation for Australia (IBRA)**; there is a moderate number of reasonably well-distributed sites, quantitative data are collected, and there is a focus on perennial 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 Northern Kimberley bioregion has a tropical monsoonal climate with a summer wet season and a winter dry season. Spatially averaged median (1890–2005) rainfall is 939 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 generally above average. It improved from a particularly poor year in 1991–1992 for the bioregion to experience the wettest 10% of years on record in 1996–1997, 1999–2000, 2000–2001 and 2003–2004. Although the period was generally wetter, some years towards the end of the 1992–2005 period had annual rainfall below the long-term median.

Note that regional averaging of rainfall conceals spatial variability. Some parts of the Northern 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 for the Mitchell (NK1) sub-IBRA are based on the frequency of perennial grasses (for consistency with reporting by other jurisdictions). There are insufficient data to report reliably using the resource capture index (fewer than 10 sites were assessed).

Perennial grass frequency — Northern Kimberley 1 sub-IBRA

When *seasonal quality* was above average, 29% of sites showed a decline in perennial grass frequency. 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 $0.90 \leq$ < 1.10	Increase: frequency ≥ 1.10
Above average	17	29%	71%	0%
Average	n/a	n/a	n/a	n/a
Below average	n/a	n/a	n/a	n/a

Sustainable management

Critical stock forage — Northern Kimberley 1 sub-IBRA

There were insufficient data to report change in frequency of decreaser perennial grasses reliably (fewer than 10 sites were assessed for above-average *seasonal quality*).

Plant species richness — Northern Kimberley 1 sub-IBRA

When *seasonal quality* was above average, 24% of sites showed a decline in species richness of native perennial plants. It is not possible to report change when *seasonal quality* was below average.

<i>Seasonal quality</i>	Number of site-by-year combinations	Decline: richness index < 0.80	No change: richness index $0.80 \leq$ < 1.20	Increase: richness index ≥ 1.20
Above average	17	24%	53%	24%
Average	n/a	n/a	n/a	n/a
Below average	n/a	n/a	n/a	n/a

Change in woody cover

Insufficient sites were assessed to report change based on WARMS crown cover data.

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:

Mitchell (NK1)	3.5% (27.7% of sub-IBRA analysed)
Berkeley (NK2)	1.0% (23.9% of sub-IBRA analysed)

IBRA = Interim Biogeographic Regionalisation for Australia;
NK = Northern Kimberley

This analysis does not include the locations of natural waters, which in this bioregion provide many 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 Northern Kimberley bioregion include:

Common name	Scientific name
Calotrope	<i>Calotropis procera</i>
Golden dodder	<i>Cuscuta campestris</i>
Grader grass	<i>Themeda quadrivalvis</i>
Hyptis	<i>Hyptis suaveolens</i>
Sicklepod	<i>Senna obtusifolia</i> and <i>S. tora</i>

See www.anra.gov.au for distribution maps

Components of total grazing pressure

Domestic stocking density

This section reports for the grazed area of the whole bioregion. Approximately 34% of the bioregion is pastoral leasehold, predominantly the Northern Kimberley (NK1) sub-IBRA. Data from the Australian Bureau of Statistics showed that domestic stocking density was generally above or close to the average of the 1983–1991 baseline period between 1992

and 2002. Stocking density peaked in 1995 when it was 35% above the baseline. Stocking density decreased substantially between 2001 and 2003 (when it was 72% of the baseline). These changes are not closely linked with *seasonal quality* as indicated by decile rainfall (see Figure 3, above). Note that spatial averaging conceals likely variation in stocking density trends across the bioregion, given that sample size is very low. Locally collected data suggest that stocking density increased slightly from the mid-1990s.

Kangaroos

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

Invasive animals

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

Common name	Scientific name
Feral pig	<i>Sus scrofa</i>
Wild dog	<i>Canis spp.</i>
Feral cat	<i>Felis cattus</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

Data on fire apply for the whole Northern Kimberley bioregion, of which large areas were burnt in all years between 1997 and 2005, with a maximum of 53% of the bioregion burnt in 2005.

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005
% area burnt	31.9	34.4	39.4	41.6	43.0	24.8	49.0	37.5	53.5

Hotter fires (between August and December) were more common. Fire frequency between 1997 and 2005 was the highest of all rangeland bioregions, with a mean frequency (\log_{10} transformed) of 0.71.

Dust

For the whole bioregion, the mean Dust Storm Index value (1992–2005) was 0.82, which is among the lowest values for rangeland bioregions. Dust levels were negligible in the far south of the bioregion and low elsewhere.

Biodiversity

One plant species is listed as threatened in the Northern Kimberley bioregion. There are also 5 mammal species, 4 bird species and 2 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 34% of the Northern Kimberley bioregion is pastoral land. This area has not changed appreciably over the 1992–2005 reporting period.

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 Northern Kimberley bioregion include the following:

- The threat of woody thickening will continue to be monitored.

- About 30% of the pastoral leases are under Indigenous ownership.
- Several leases are being operated as a single management unit, with consequent declines in staffing levels and permanent habitation.
- Basic management is still largely 'cattle harvesting' with minimal fences and mostly natural waters.
- Income from tourism provides a substantial proportion of pastoralists' livelihood.
- The Northern Kimberley is probably the most weed-free area of the Kimberley; however, the potential for weed introductions is high, especially with increased access by tourists and others.
- Donkey control programs are at an early stage, although numbers are not high. Feral cattle exert uncontrolled grazing pressure.
- 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 14.9% of the bioregion is within the conservation estate. For the Northern Kimberley I (NK1) sub-IBRA, it is 14.2%.
- 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.