



# Einaleigh Uplands bioregion

## Description

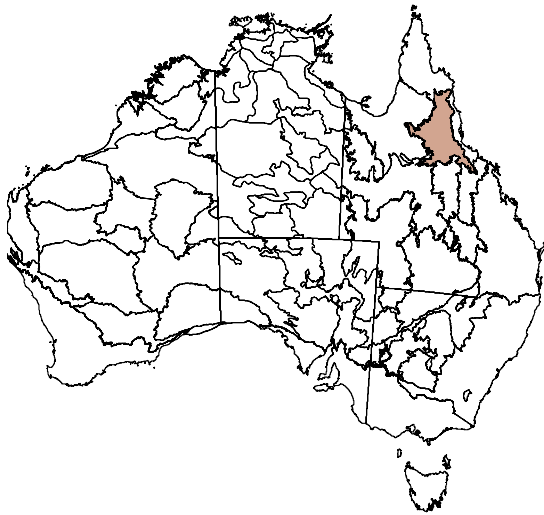
Area: 115 356 km<sup>2</sup>

The Einaleigh Uplands bioregion consists of a series of rugged hills and ranges, dissected plateaus and alluvial and sand plains. The bioregion is dominated by eucalypt woodlands. Land is used extensively for grazing with some mining, cropping and horticulture. There are several nature reserves. Major population centres are Charters Towers, Georgetown and Mareeba.

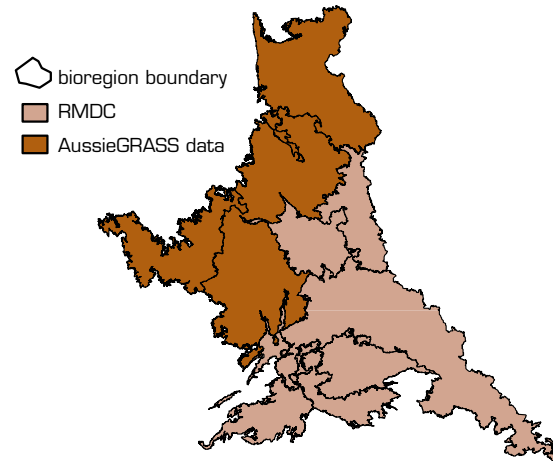
## Location

The Einaleigh Uplands bioregion is located in northeast Queensland (see Figures 1 and 2).

**Figure 1 Location of the Einaleigh Uplands bioregion**



**Figure 2 Monitoring data coverage**



## Data sources available

Data sources include:

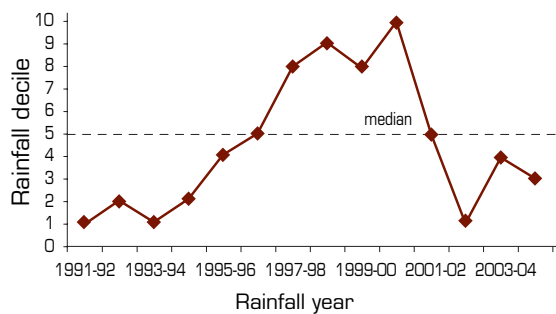
- Rapid Mobile Data Collection (RMDC) supported by AussieGRASS simulation (of pasture growth and utilisation) and remote sensing (**Multiple Regression Bare Ground Index**, version bi1); these data sources provide moderate reliability for reporting change (RMDC — road traverses and visual estimates; AussieGRASS — entire rangelands, simulated results with some ground validation)
- 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
- land values.



## Climate

The Einasleigh Uplands bioregion has a tropical climate with moderate- to high-rainfall summers. Spatially averaged median (1890–2005) rainfall is 707 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* as indicated by decile rainfall increased between 1993–1994 and 2000–2001. It then rapidly declined in the following two years. The years 1991–1992 to 1994–1995 and 2002–2003 were particularly dry years, while 1997–1998 to 2000–2001 was a wetter period.

Note that regional averaging of rainfall conceals spatial variability. Some parts of the Einasleigh Uplands bioregion probably experienced better *seasonal quality* and others worse during the 1992–2005 period.

## Landscape function

### RMDC, change in visually assessed vegetation and soil attributes contributing to landscape function score

The Broken River sub-**Interim Biogeographic Regionalisation for Australia (IBRA)** showed some loss of function. The Herberton–Wairuna and Undara–Toomba Basalts sub-IBRAs were considered stable. Three other sub-IBRAs (Georgetown–Croyden, Hodgkinson Basin and Kidston) were not assessed adequately to report with RMDC data. **AussieGRASS** simulation suggests that these sub-IBRAs had stable landscape function.

## Sustainable management

### Critical stock forage

#### **AussieGRASS, levels of simulated pasture utilisation and change**

The Broken River sub-IBRA had simulated space- and time-averaged pasture utilisation for the 1991–2005 period close to the safe upper limit. Utilisation levels for other sub-IBRAs were below this threshold. Utilisation increased by approximately 2% (in absolute terms) between 1976–1990 and 1991–2005 in the Broken River sub-IBRA. Remaining sub-IBRAs had relatively unchanged levels of pasture utilisation across the two periods. These results suggest that grazing management based on pasture utilisation was largely sustainable for the Einasleigh Uplands.

### Plant species richness

There are no suitable data for reporting change in plant species richness.

### Change in woody cover

#### **Statewide Landcover and Trees Study (SLATS) reporting**

The Einasleigh Uplands bioregion has substantial woody cover: all sub-IBRAs have more than 75% woody cover; with two having more than 90% (Herberton–Wairuna and Hodgkinson Basin). There was minimal change in woody cover between 1991 and 2003 for all sub-IBRAs (maximum decline of 1.69% in the Broken River sub-IBRA). There is high reliability for reporting change in woody cover.

### Distance from stock water

Based on the locations of stock waterpoints sourced from Geoscience Australia's GEODATA TOPO 250K vector product (Series 3, June 2006), the percentage area within three kilometres of permanent and semi-permanent sources of stock water for each sub-IBRA is:

Georgetown–Croyden (EIU1)	36.7%
Kidston (EIU2)	23.7%
Hodgkinson River (EIU3)	14.4%
Broken River (EIU4)	33.2%
Undara–Toomba Basalts (EIU5)	30.5%
Herberton–Wairuna (EIU13)	16.0%

EIU = Einasleigh Uplands; IBRA = Interim Biogeographic Regionalisation for Australia

Note: complete sub-IBRA area was analysed

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

## Weeds

Weeds known to occur in the Einasleigh Uplands bioregion include:

Common name	Scientific name
Bellyache bush	<i>Jatropha gossypifolia</i>
Blue thunbergia	<i>Thunbergia grandiflora</i>
Cabomba	<i>Cabomba caroliniana</i>
Calotrope	<i>Calotropis procera</i>
Cats claw creeper	<i>Macfadyena unguis-cati</i>
Chinee apple	<i>Zizyphus mauritiana</i>
Creeping lantana	<i>Lantana montevidensis</i>
Giant rats tail grass	<i>Sporobolus natalensis</i> and <i>S. pyramidalis</i>
Hymenachne	<i>Hymenachne amplexicaulis</i>
Lantana	<i>Lantana camara</i>
Laurel clock vine	<i>Thunbergia laurifolia</i>
Mother of millions	<i>Bryophyllum tubiflorum</i> and hybrids
Parkinsonia	<i>Parkinsonia aculeata</i>
Parthenium weed	<i>Parthenium hysterophorus</i>
Pond apple	<i>Annona glabra</i>
Prickly acacia	<i>Acacia nilotica</i> subsp. <i>indica</i>
Rubber vine	<i>Cryptostegia grandiflora</i>
<i>Salvinia molesta</i>	<i>Salvinia molesta</i>
Siam weed	<i>Chromolaena odorata</i>
Water hyacinth	<i>Eichhornia crassipes</i>

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

## Components of total grazing pressure

### Domestic stocking density

Most (93%) of the Einasleigh Uplands bioregion is grazed. Data from the Australian Bureau of Statistics showed that stocking density initially decreased (from 1992 to 1995), then increased (to 2002) and again decreased in the latter part of the reporting period (to 2004, which was the last year of available data). The 1992 density was 9% above the average for the 1983–1991 period and decreased to 11% below this base in 1995. Stocking density then increased to 41% above the base in 2002 and decreased to 27% above the base in 2004. These trends broadly follow the pattern of *seasonal quality*. However, the most recent decrease in stocking density appears to have been less than the decline in *seasonal quality* indicated by decile rainfall above. Note that spatial averaging conceals likely variation in stocking density trends across the bioregion.

### Kangaroos

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

### Invasive animals

Invasive animal species known to occur in the Einasleigh Uplands bioregion include:

Common name	Scientific name
Feral pig	<i>Sus scrofa</i>
Deer	<i>Cervidae</i> family
Fox	<i>Vulpes vulpes</i>
Rabbit	<i>Drycolagus cuniculus</i>
Wild dog	<i>Canis</i> spp.
Feral cat	<i>Felis catus</i>
Cane toad	<i>Bufo marinus</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

For the available record (1997–2005), fire was moderately extensive in 1997 and 2001. This was at the start and end of a wetter period. Late dry-season (August to December) fires were predominant in all years. These fires are presumed to be more intense than fires earlier in the dry season. As such, these fires would be more effective in scorching thickening undergrowth.

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005
% area burnt	12.7	6.3	6.9	5.4	13.2	5.9	5.1	4.2	4.9

The frequency of fire between 1997 and 2005 was moderate, with a mean frequency ( $\log_{10}$  transformed) of 0.19.

### Dust

The mean Dust Storm Index value (1992–2005) was the equal lowest of all rangeland bioregions, at 0.47. Dust levels were low in the far southwest corner and negligible elsewhere.

### Biodiversity

In Queensland, regional ecosystems are defined by Sattler and Williams (1999) as vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil. Descriptions of regional ecosystems can be sourced from the Regional Ecosystem Description Database.<sup>1</sup>

There are 142 regional ecosystems described for the Einasleigh Uplands bioregion. Under the *Vegetation Management Act 1999*, 36 of these are listed as 'of concern'. Nine of the 'of concern' regional ecosystems are currently represented in the reserve system (Accad et al 2006) (Biodiversity Working Group indicator: Threatened communities; see **Section 7 of Chapter 3** of *Rangelands 2008 — Taking the Pulse*).

<sup>1</sup> See [http://www.epa.qld.gov.au/nature\\_conservation/biodiversity/regional\\_ecosystems/how\\_to\\_download\\_REDD/](http://www.epa.qld.gov.au/nature_conservation/biodiversity/regional_ecosystems/how_to_download_REDD/)

In this bioregion, there are (Biodiversity Working Group indicator: Threatened species):

- 27 threatened plant species
- 7 threatened mammal species (includes one extinct species, the eastern bettong)
- 9 threatened bird species
- 3 threatened reptile species
- 2 threatened amphibian species
- no threatened fish species.

More than 20% of the bioregion has been cleared (Biodiversity Working Group indicator: Habitat loss).

There have been relatively many fauna surveys (Biodiversity Working Group indicator: Fauna surveys).

The bioregion has areas of dense rubber vine (a transformer species, Biodiversity Working Group indicator: Transformers). A case study (see **Buffel grass, Transformer Weeds in Chapter 3**) exists on how buffel grass is transforming habitats.

A further case study (see **Habitat condition affects biodiversity in Chapter 3**) examines how habitat condition affects biodiversity (Biodiversity Working Group indicator: Habitat condition).

## Socioeconomic characteristics

### Land use and value

Most (93%) of the Einasleigh Uplands bioregion is grazed. This area has not changed appreciably over the 1992–2005 reporting period.

Unimproved land values as at June 2006 were, on average, the second highest of any Queensland rangeland bioregion: \$26 712 ± \$2534/km<sup>2</sup> (values expressed in 2005 dollars). There was a large range in average unimproved value across sub-IBRAs (\$6282 to \$52 058/km<sup>2</sup>). It is not possible to report change in land values for the 1992–2005 period.

## Key management issues and features

Key features and issues of the Einasleigh Uplands bioregion are:

- high pasture utilisation in some parts of the landscape in dry seasons
- increase in weeds of national significance, particularly woody species
- woodland thickening
- low fire frequency
- understorey species change (from native perennial grasses to annual and exotic species, eg Indian couch, *Bothriochloa pertusa*)
- soil erosion in some areas, particularly where ground cover is reduced through excessive pasture utilisation.