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National Land & Water Resources Audit

Extract from Rangelands 2008 — Taking the Pulse
4. Focus Bioregions - Mitchell Grass Downs bioregion (QLD and the NT)

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Disclaimer

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Mitchell Grass Downs bioregion (Queensland and the NT)

The Mitchell Grass Downs bioregion extends across central Queensland into the NT (Figure 4.15). Reporting here is confined to the Queensland portion except where otherwise stated. The bioregion encompasses rolling, largely treeless, plains with cracking clay ('black') soils. The predominant vegetation is Mitchell grass tussock grassland with some low-tree overstorey of gidgee (Acacia cambagei) and other species (Figure 4.16). Most of the bioregion is under either leasehold or freehold tenure and is grazed by cattle and sheep. There has been a gradual movement out of woolgrowing in recent years. Major population centres are Longreach, Blackall and Hughenden.

Figure 4.15 Mitchell Grass Downs bioregion

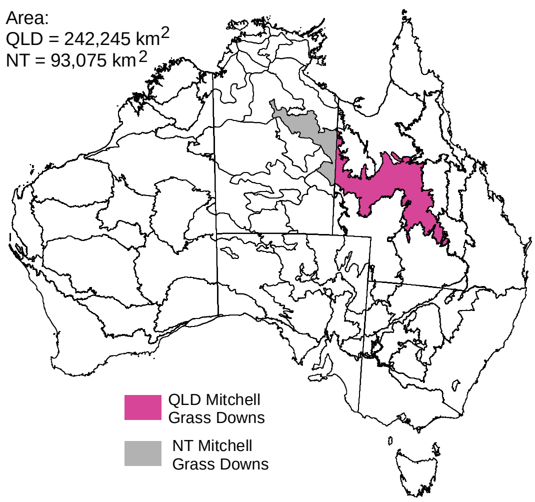

Figure 4.16 Landscapes of the Mitchell Grass Downs bioregion, Queensland.

Central western Queensland Mitchell Grass Downs in a good season. The shrub is mimosa bush (*Acacia farnesiana*), which provides winter protein and shade.

And when it rains!

Photos: Queensland Department of Primary Industries and Fisheries

Regional issues

Regional issues in the Mitchell Grass Downs bioregion include:

- high levels of pasture utilisation (in two sub-IBRAs and in individual years), which have implications for persistence and recovery of palatable and productive perennial grasses
- Mitchell grass death, with areas of non-recovery to date
- pasture composition changes to more *Aristida* species
- increasing woody Weeds of National Significance (WoNS), particularly prickly acacia (*Acacia nilotica*)
- increasing cover of trees and shrubs in former grassland areas (eg mimosa and gundabluey).

Seasonal quality — 1992–2005

Annual rainfall, as an indicator of *seasonal quality*, was quite variable throughout the reporting period (Figure 4.17, left). The period from April 1998 to March 2001 was wetter (deciles 9 and 10 in terms of the 1890–2005 record). Rainfall was quite variable at other times. Several years in the 1990s and at the end of the reporting period had below-median rainfall. Despite these drier years, the 1992–2005 reporting period as a whole had a significantly positive cumulative rainfall deviation from the long-term median, and *seasonal quality* for the whole period was considerably better than for some other blocks of 14-year periods in the past (ie 1918 to 1940 and 1955 to 1973 were much drier periods than in the recent past).

Spatial averaging of rainfall conceals spatial variation in *seasonal quality* for the Queensland portion of the bioregion. The variability shown for 1997 (as an example) was based on simulated pasture biomass produced by AussieGRASS and 'season quality' derived from the NDVI[44] (Figure 4.17, right panels).

Change in landscape function

Landscape function declined across most of the bioregion between 1994 and 2005 (Figure 4.18), and significantly so in the Georgina Limestone sub-IBRA. The underlying data to support this assessment were extracted from the Rapid Mobile Data Collection database (Hassett et al 2006). These data were collected along repeat road traverses.

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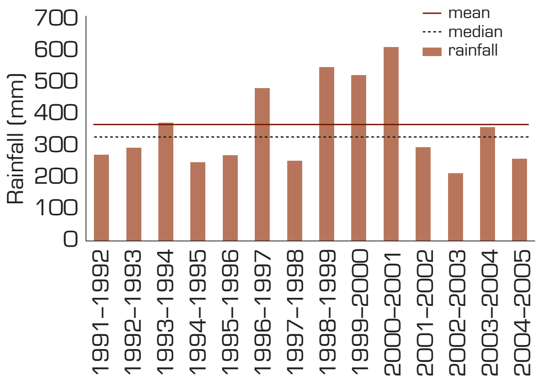
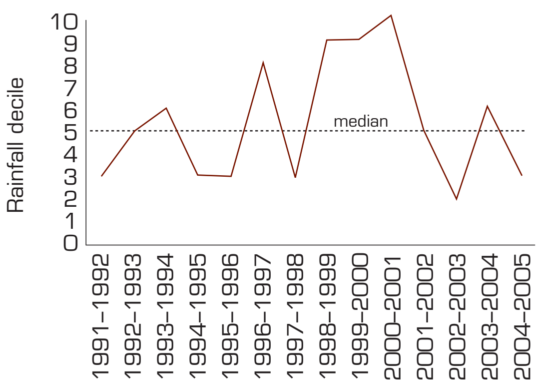
44 See http://www.environment.gov.au/erin/ndvi.html.

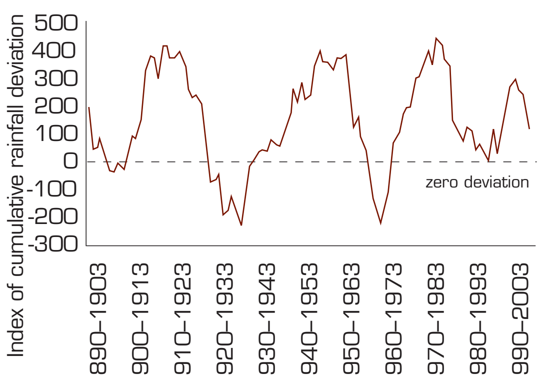
Figure 4.17 Indicators of *seasonal quality*, Mitchell Grass Downs bioregion



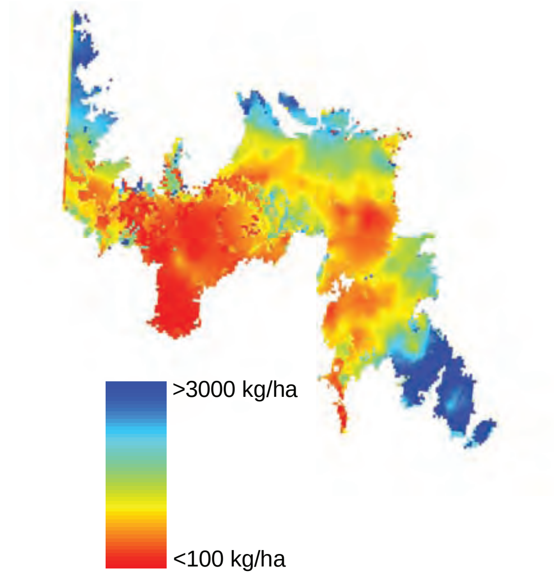
Annual rainfall. Long-term (1890–2005) mean and median



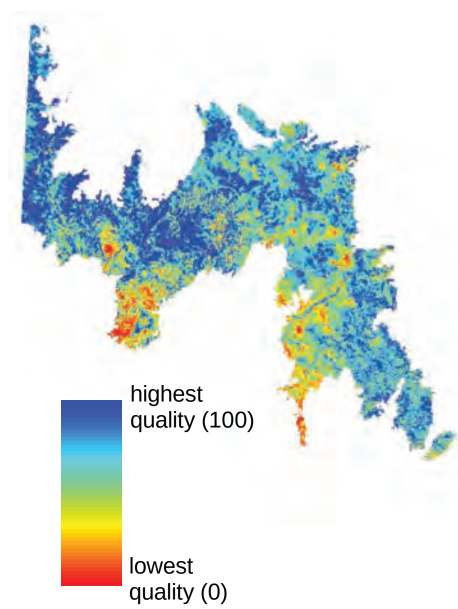
Annual rainfall as deciles of the long-term (1890–2005) rainfall



Cumulative percentage deviations of annual (April–March) rainfall from the long-term (1890–2005) median for all 14-year periods between 1890–1903 and 1992–2005



Aussie-GRASS simulated total standing dry matter - 1997



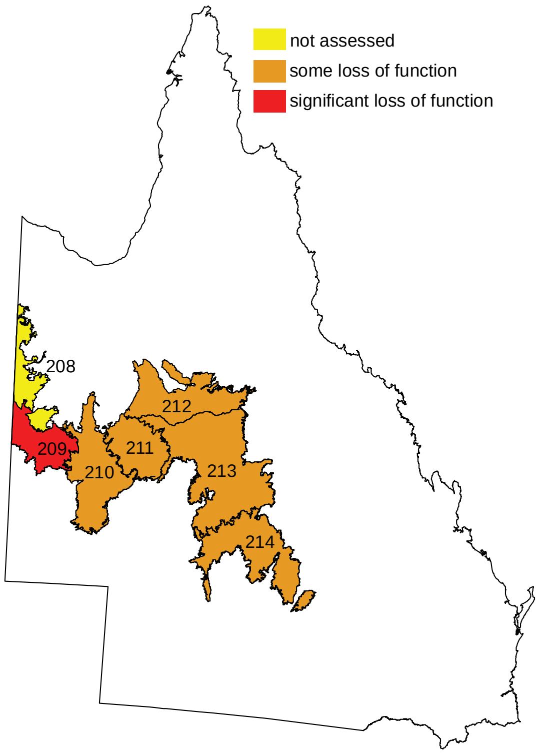
NDVI-based image of 'season quality' for 1997. Each pixel has a relative value according to the greeness of vegetation (ie photosynthetic activity)

Left: Rainfall

Right: Simulated pasture biomass and vegetation greenness (NDVI)

Note: Indicators are based on spatially averaged annual rainfall (April–March) between 1991–92 and 2004–05. For cumulative percentage deviations, periods below the dashed zero line indicate 14-year sequences with generally less rainfall (poorer *seasonal quality*) and periods above the line indicate sequences of increased rainfall (better *seasonal quality*). All data are for the Queensland part of the bioregion.

Figure 4.18 Change in landscape function, Queensland sub-IBRAs of the Mitchell Grass Downs bioregion



Sub IBRA #	Name
208	Barkly Tableland
209	Georgina Limestone
210	Southwestern Downs
211	Kynuna Plateau
212	Northern Downs
213	Central Downs
214	Southern Wooded Downs

Note: Based on rapid mobile data collection

Source: Queensland Department of Natural Resources and Water.

This summarised reporting of change in landscape function is moderately reliable. Sub-IBRAs where change is reported were surveyed moderately intensively at various times between 1994 and 2005 by the same highly competent observer. Reliability is constrained because assessments were confined to paddock edges fringing roads, and because the index compiled from the available data has not yet been thoroughly tested for its robustness in indicating actual change in landscape function.

Sustainable management

Change in critical stock forage

Three sub-IBRAs (Georgina Limestone, Northern Downs and Barkly Tableland; Figure 4.19a, brightest green) had levels of AussieGRASS simulated annual pasture utilisation between 1991 and 2005 that were less than the specified safe threshold. The utilisation level for the Barkly Tableland sub-IBRA was considerably less than the threshold, implying relatively conservative (and sustainable) grazing management. The Kynuna Plateau and Southern Wooded Downs sub-IBRAs had the highest utilisation levels during the same period (27% and 26%, respectively, darkest green, Figure 4.19a). Those utilisations are at a level that causes loss of palatable perennial grasses and are of considerable concern. Average utilisation elsewhere (Southwestern Downs and Central Downs) was close to the safe threshold.

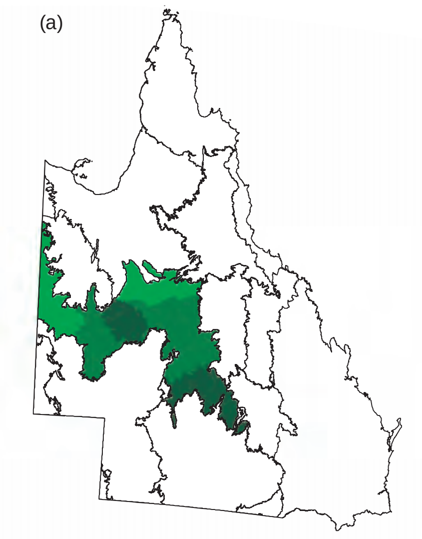
Time-averaged utilisation levels declined between 1976–90 and 1991–2005 in the Barkly Tableland, Northern Downs, Central Downs and Southern Wooded Downs sub-IBRAs (bright red in Figure 4.19b). The Georgina Limestone, Southwestern Downs and Kynuna Plateau sub-IBRAs had lesser decreases in average utilisation between the two periods and were assigned a neutral trend.

Combining the two maps shows that the Barkly Tableland and Northern Downs sub-IBRAs had lower (more conservative) levels of pasture utilisation in the 1991–2005 period and a decrease in mean utilisation between the 1976–90 and 1991–2005 periods (yellow in Figure 4.19c). This suggests that those two regions have the most sustainable management in terms of stock forage.

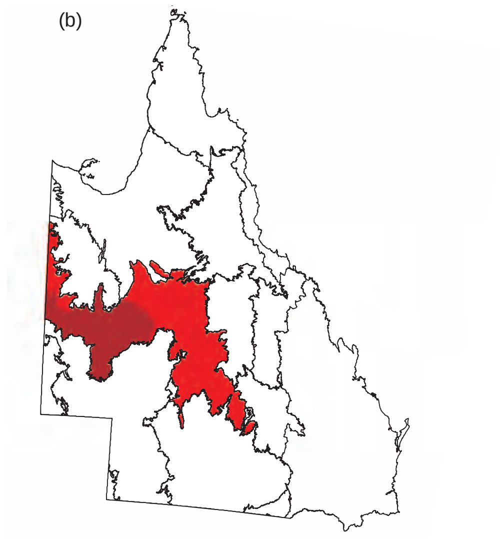
Change in woody cover

The SLATS data show that the Southern Wooded Downs sub-IBRA has relatively high woody cover compared to other regions (Table 4.7). This sub-IBRA also experienced the greatest area of clearing during the 1991–2003 period. By comparison, the Kynuna Plateau and Georgina Limestone sub-IBRAs have moderate levels of woody cover and have undergone little change. Remaining sub-IBRAs have low levels of woody cover that has changed little, apart from some clearing in the Central Downs sub-IBRA.

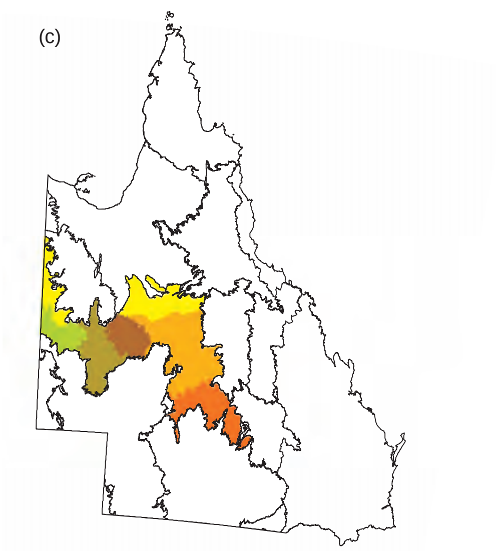
Figure 4.19 Change in stock forage, sub-IBRAs of the Mitchell Grass Downs bioregion



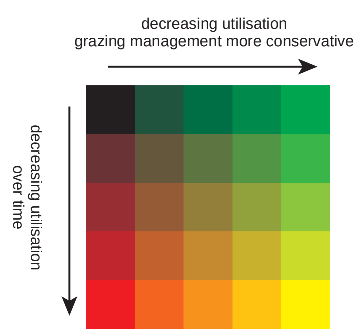
Sustainability of pasture utilisation based on Aussie-GRASS simulation for the 1991–2005 period. Increasing brightness of green means decreased utilisation relative to the safe threshold. Grazing is more conservative (ie sustainable).



Trend: ie change in mean level of pasture utilisation based on Aussie-GRASS simulation between1976–90and 1991–2005. Increased brightness of red means reduced average utilisation in the latter period.



Pasture sustainability and trend combined. Darker colours indicate high utilisation (relative to the safe threshold) and increased utilisation over time. Yellow indicates conservative grazing and decreased utilisation over time.



Colour scheme for interpreting sustainability of pasture utilisation and trend in sustainability

a: Sustainability of stock forage based on levels of pasture utilisation for the 1991–2005 period (increasing sustainability shown by increased brightness of green)

b: Degree of sustainability (ie change in utilisation) between the 1976–90 and 1991–2005 periods (decreasing utilisation shown by increased brightness of blue)

c: Combined sustainability and trend information. Darker coloured sub-IBRAs represent a low level of sustainability and increased utilisation; green indicates sustainable utilisation but a trend towards reduced sustainability (increased utilisation); red shows low sustainability and improving trend (decreased utilisation); yellow depicts sub-IBRAs with both sustainable and decreasing utilisation (ie improving trend).

Note: Based on AussieGRASS simulation of pasture utilisation. Utilisation levels were space- and time-averaged for the two periods: 1976–1990 and 1991–2005.

Table 4.7 Percentage change in woody cover for Queensland sub-IBRAs of the Mitchell Grass Downs bioregion

Sub-IBRA	SLATS woody cover 1991	SLATS woody cover 2003	Change 1991–2003	Cumulative clearing, 1991–2003
Southern Wooded Downs	29.96	26.15	–3.81	4.61
Kynuna Plateau	17.28	17.08	–0.20	0.25
Georgina Limestone	14.89	14.89	0.00	0.00
Central Downs	8.31	7.42	–0.89	1.03
Northern Downs	6.20	5.92	–0.28	0.31
Southwestern Downs	3.85	3.84	–0.01	0.01
Barkly Tableland	3.65	3.64	–0.01	0.00

Source: SLATS data

Table 4.8 Percentage of sub-IBRA area within 3 km and beyond 8 km of permanent and semipermanent sources of stock water, Mitchell Grass Downs bioregion

Sub IBRA	% of sub IBRA area: <3 km from water	% of sub IBRA area: >8 km from water
Southern Wooded Downs	85.9	0.0
Central Downs	82.5	0.0
Northern Downs	67.0	0.5
Kynuna Plateau	34.5	11.3
Barkly Tableland	31.6	4.6
Southwestern Downs	29.2	14.1
Mitchell Grass Downs P1	25.8	7.2
Georgina Limestone	16.9	30.9

Distance from stock water

Table 4. 8 shows the percentage of sub-IBRA area within 3 km and beyond 8 km of permanent and semipermanent sources of stock water. Waterpoint data (bores and dams) were obtained from Geoscience Australia's Geodata Topo 250K vector product (Series 3, June 2006).

Areas more than 8 km from stock water are less likely to be grazed by cattle and are beyond the normal grazing range of sheep. This analysis does not include the locations of natural waters or bore drains, the latter being a very significant source of stock water across much of the bioregion. Thus, the percentage area within 3 km of stock water for some sub-IBRAs is probably significantly understated and the proportion beyond 8 km may be overstated.

It is not possible to report change in watered area. This is a significant issue in parts of Queensland where numerous formerly free-flowing bores (and their associated bore drains) now have controlled flows and water is now reticulated by polythene pipe, tanks and troughs.

Weeds

Weeds known to occur in the Queensland part of the bioregion include Athel pine (*Tamarix aphylla*), mesquite (*Prosopis* spp.), parkinsonia (*Parkinsonia aculeata*), prickly acacia (*Acacia nilotica*) and rubber vine (*Cryptostegia grandiflora*).[45]

Components of total grazing pressure

Change in domestic stocking density

Based on ABS-sourced data, relative stocking density in the Queensland part of the Mitchell Grass Downs bioregion was initially (until 1997) in line with generally

45 See http://www.anra.gov.au

deteriorating *seasonal quality* (Figure 4.20). Stock numbers then increased appreciably between 1999 and 2001 during wetter years and then declined markedly with drier years in 2002 and 2003. Spatial averaging conceals likely variation in stocking density trends across the bioregion.

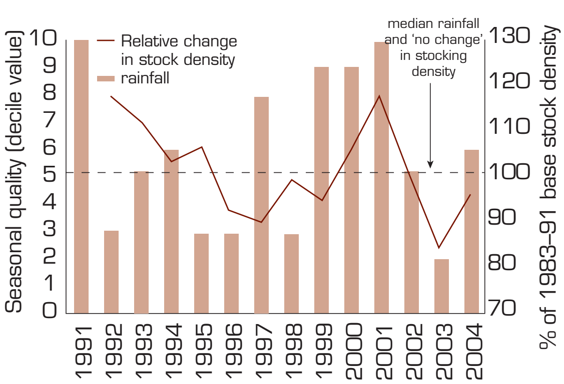
Kangaroo density

Kangaroo density data are available for all or most of the Southern Wooded Downs, Central Downs, Northern Downs and Kynuna Plateau sub-IBRAs. The relative density of red and eastern grey kangaroos (combined and expressed in DSEs) decreased, in a fluctuating manner, between 1993 and 1997 (Figure 4.21). It then increased rapidly and markedly to 2000 (>1.5 times the 1984–91 average) before decreasing in the early years of this decade, particularly due to poorer *seasonal quality* in 2002 and 2003 (see Figure 4.17).

Invasive animals

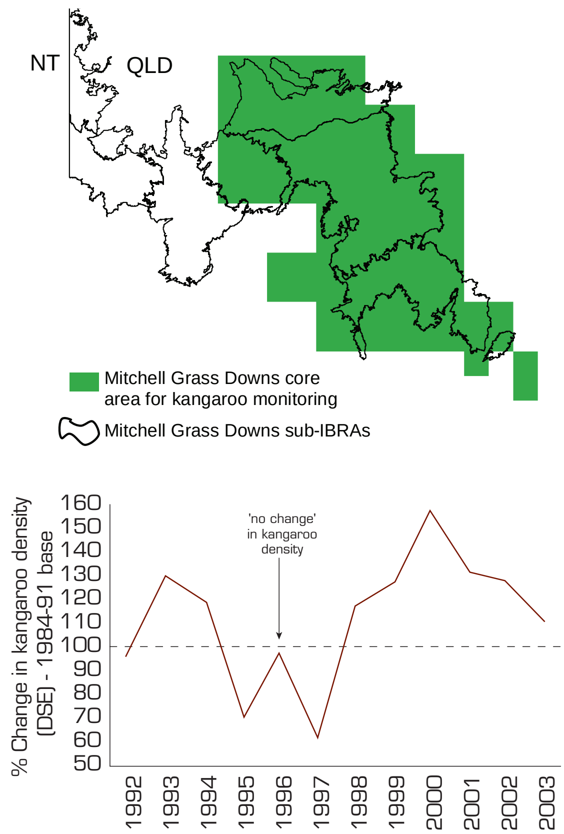
Invasive animal species known to occur in the Queensland part of the Mitchell Grass Downs bioregion include pig (*Sus scrofa*), goat (*Capra hircus*), deer (*Cervidae* spp.), fox (*Vulpes vulpes*), rabbit (*Oryctolagus cuniculus*), wild dog (*Canis lupus familiaris*), feral cat (*Felis catus*), starling (*Sturnus vulgaris*) and cane toad (*Bufo marinus*).[46]

Figure 4.20 Change in domestic stocking density (sheep and beef cattle), Queensland part of the Mitchell Grass Downs bioregion, 1991 to 2004



Note: *Seasonal quality* as deciles of rainfall is also shown.

Figure 4.21 Change in kangaroo density, Mitchell Grass Downs bioregion, 1992 to 2003, relative to the average density for 1984–91 (DSE basis)



Note: Density data (bottom) are for the Mitchell Grass Downs core monitoring area (shown in green above).

Fire and dust

Fire

Fire was generally insignificant: less than 1% of the whole bioregion area burned each year between 1998–2000 and 2002–05. Fire was a feature in 2001, when 5.5% of the entire bioregion burned following three wetter years (Figure 4.17). However, extensive wildfires appear to have been confined to sub-IBRAs predominantly in the NT. Apart from 3.1% of the Central Downs sub-IBRA burning in 1997, other Mitchell Grass Downs sub-IBRAs exclusively in Queensland had less than 0.5% of their area burned in any year between 1997 and 2005.

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46 See http://www.anra.gov.au

Figure 4.22 Pitfall and funnel trapping — part of a fauna survey in the Mitchell Grass Downs bioregion, Queensland

Photo: Teresa Eyre, Queensland Environmental Protection Agency

Dust

The mean DSI_3 value (1992–2005, entire bioregion) was 1.69, a low to moderate value among all rangeland bioregions (maximum value, 8.44). Dust levels were higher in the central portion of the bioregion (Barkly Tableland sub-IBRA in the vicinity of the NT–Queensland border, Georgina Limestone and Southwestern Downs sub-IBRAs). Dust levels were negligible further into the NT and were low in the far east of the bioregion (Central Downs and Southern Wooded Downs sub-IBRAs).

Change in biodiversity

Fauna and flora surveys have been conducted across much of the bioregion (Figure 4.22). Under the Biodiversity Working Group indicator: Threatened species (for the entire bioregion), there are:

- 12 threatened plant species
- 8 threatened mammal species (which includes two extinct species, the desert rat-kangaroo and the lesser stick-nest rat); also included in the list is the western quoll, which is listed as vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999*, but is extinct in this bioregion
- 9 threatened bird species
- no threatened reptile or amphibian species
- 2 threatened fish species.

Fifty-four regional ecosystems have been described for Queensland sub-IBRAs of the Mitchell Grass Downs bioregion. Under the *Vegetation Management Act 1999* (Qld), four of them are listed as 'of concern' and one is listed as endangered. For two of these regional ecosystems, less than 10% of their pre-clearing distributions are currently represented in reserves (Accad et al 2006) (Biodiversity Working Group indicator: Threatened communities). Descriptions of regional ecosystems are available at the Queensland Environmental Protection Agency website.[47]

47 http://www.epa.qld.gov.au/nature_conservation/biodiversity/regional_ecosystems/how_to_download_REDD/

Change in land use and land values

Ninety-six per cent of the entire bioregion area is under pastoral land use.There was no significant change in this area over the 1992–2005 reporting period.

rangeland values at June 2006 were, on average, \$4792 ± \$261/km^2 (2005 dollars).There was a large

(\$333/km^2 to \$6668/km^2). It is not possible to report change in land values.