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National Land & Water Resources Audit

Extract from Rangelands 2008 — Taking the Pulse
4. Focus Bioregions - Sturt Plateau bioregion (NT)

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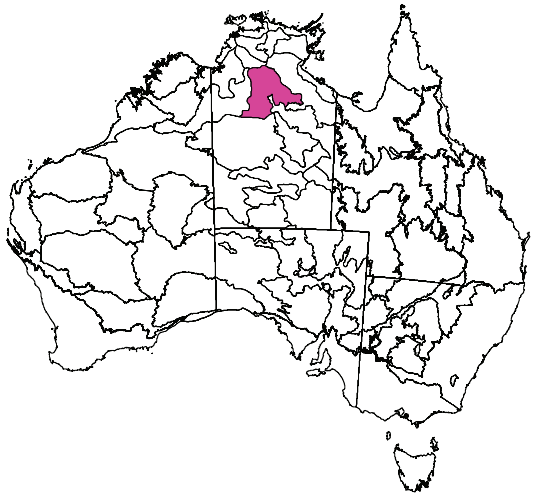
Sturt Plateau bioregion (NT)

The Sturt Plateau bioregion in the northern half of the NT (Figure 4.30) is predominantly eucalypt woodlands or tall shrublands and woodlands of bullwaddy (*Macropleranthea kekwickii*) and lancewood (*Acacia shirleyi*) on flat to gently undulating plains. In more open areas, perennial grasses predominate. Soils are mainly lateritic, but deep sands occur in the south and cracking clays in the southeast. Grazing by cattle is the principal land use (77% of the bioregion area is under pastoral tenure). Aboriginal freehold covers almost 20% of the bioregion, and there is a small area within reserves. Larrimah and Daly Waters are small settlements within the bioregion.

Regional issues

- Historically, pastoral development of the Sturt Plateau bioregion was hindered by water supply problems. There has been considerable development in the past 30 years, mainly through water development and extensive fencing (Figure 4.31).
- Compared with neighbouring productive bioregions, the Sturt Plateau bioregion has a higher proportion of smaller family-owned and operated properties and a lower proportion of larger company-owned stations.
- Increased groundwater information has led to better success rates for drilling bores, and hence to further development.

Figure 4.30 Sturt Plateau bioregion, NT



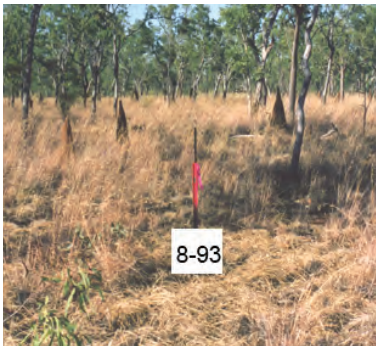
Note: Area = 98 575 km^2.

Figure 4.31 New waterpoint infrastructure on the Sturt Plateau

Photo: NT Department of Natural Resources, Environment and the Arts

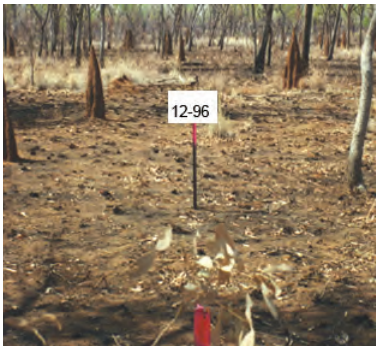
- Infrastructure development has included the strategic location of waterpoints and the use of polypipe and tanks to better distribute and control grazing.
- Landscape condition (Figure 4.32) and management have improved due to increased infrastructure. This has provided better control of cattle grazing and improved access to control wildfires, which are now less frequent and less intense. There is now less patch grazing by feral animals of new pasture growth after fire and less associated land degradation, as there are now fewer burns.
- The region has a very vocal and proactive 'best practice' group. This has assisted intensification and the further development of properties and the region.
- Stock carrying capacities of the region are being reviewed to take into account infrastructure development and better management of the land (Figure 4.33).
- A major concern is the introduction and spread of weeds along the recently completed Alice Springs–Darwin rail corridor. The region has relatively few weed problems, and properties with infestations are very proactive in management and eradication.
- Some Aboriginal leases are being used for pastoral purposes.

Figure 4.32 Changes at a Tier 1 monitoring site, Sturt Plateau bioregion, 1993 to 2004

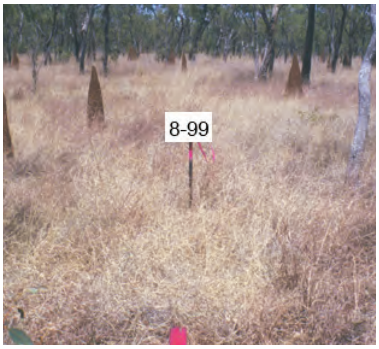


August 1993

June 1995

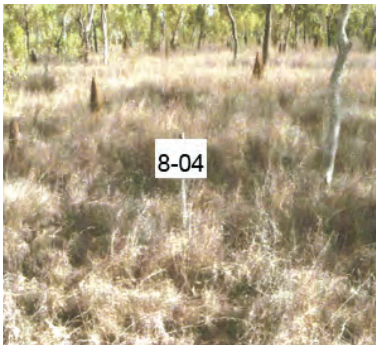


December 1996



August 1999

August 2000



August 2004

The site has been able to recover from fire and increased grazing pressures to record similar cover levels to those present 10 years earlier.

Photos: NT Department of Natural Resources, Environment and the Arts

Figure 4.33 Infrastructure developments in the Sturt Plateau bioregion

Trap yards and other infrastructure developments, including increased water supply, paddocking and increased track access for fire control, have improved land management in the Sturt Plateau bioregion.

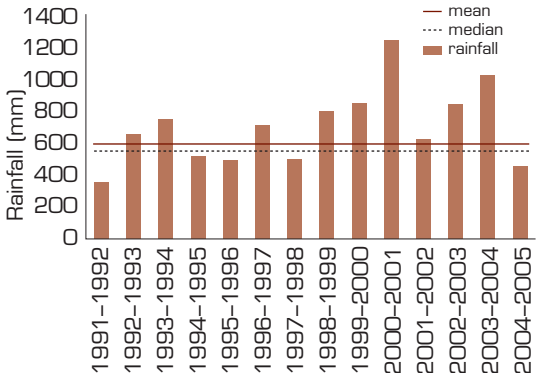
Photo: NT Department of Natural Resources, Environment and the Arts

Seasonal quality — 1992–2005

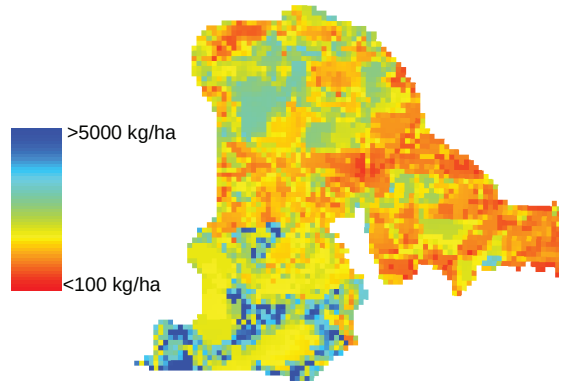
Rainfall was generally above the long-term (1890–2005) median throughout the 1992–2005 period, indicating above-average *seasonal quality*, and the 14-year period as a whole was better than most other 14-year periods since 1890 (Figure 4.34, left). The past 45 years have been generally wetter, apart from a return to more average *seasonal quality* in some years in the 1980s (bottom left panel, Figure 4.34). As in most bioregions, *seasonal quality* has varied spatially across the Sturt Plateau in some years. This assessment of variability is based on simulated pasture biomass produced by AussieGRASS and 'season quality' derived from NDVI[50] (Figure 4.34, right panels).

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

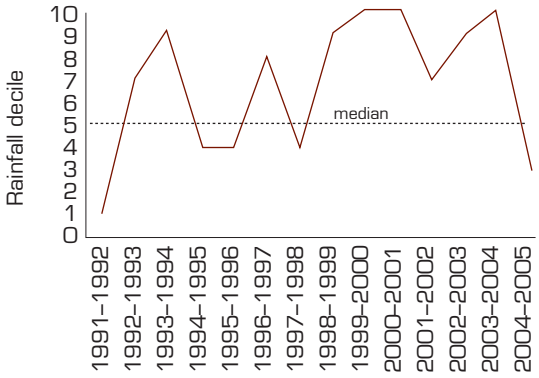
Figure 4.34 Indicators of *seasonal quality*, Sturt Plateau bioregion



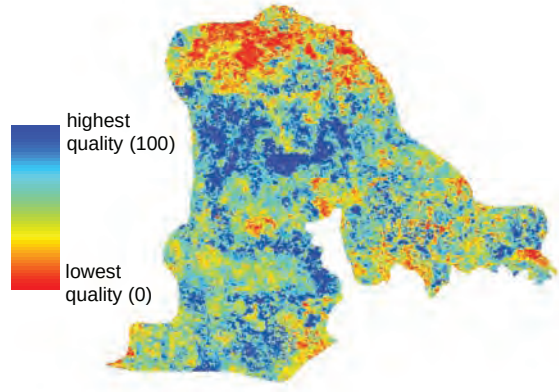
Annual rainfall. Long-term (1890–2005) mean and median



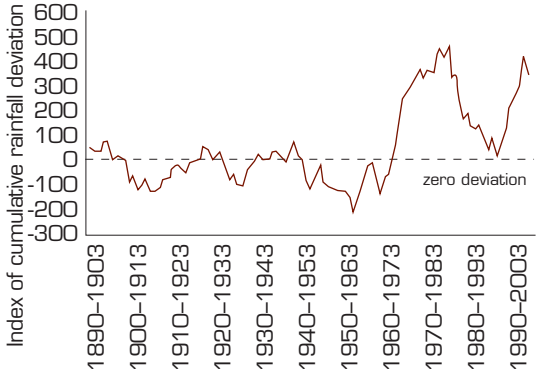
Aussie-GRASS simulated total standing dry matter — 2002



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



NDVI-based image of 'season quality' for 2002. Each pixel has a relative value according to the greeness of vegetation (ie photosynthetic activity)



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

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*).

Change in landscape function

Using the percentage of groundcover and composition (by biomass) of perennial herbage species (mainly grasses) estimated at Tier 1 monitoring sites as an index, landscape function initially declined (between 1993 and 1996) and then increased to a moderately stable and relatively high value over most of the remainder of the reporting period (Figure 4.35). Taking account of seasonal conditions, 6% of 167 sites assessed following above-average rainfall showed reduced landscape function (ie improved landscape function would have been expected at this time). Decline in landscape function at some sites in the early years of the current decade was due to extensive wildfire following the extended period of above-average rainfall. Perennial grasses were temporarily replaced by annual sorghum on burnt areas. This decline appeared to be temporary — landscape function, on average, was largely restored at those sites assessed in 2004. No sites were assessed following any periods of below-average *seasonal quality* between 1992 and 2005.

There is a moderate degree of confidence in these data. There is a reasonably high density of Tier 1 sites, but their distribution is clumped to some degree, and the index is based on observer estimates, rather than quantitative measured data. The derived index has not yet been tested to determine its ability to indicate landscape function reliably, compared to the established method of formal ground-based landscape function analysis used in the WARMS monitoring system.

Sustainable management

Change in critical stock forage

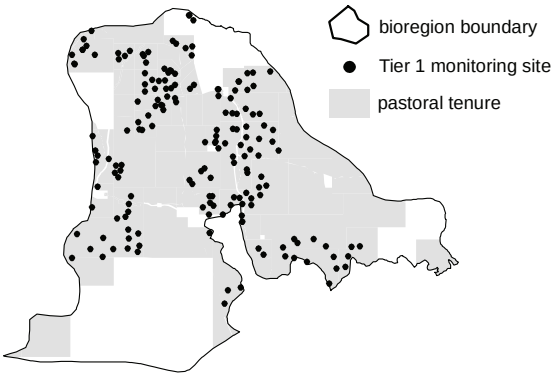
Changes in estimated composition, by biomass, of palatable perennial (2P) grasses were mainly in accord with seasonal expectations (Table 4.14). Across both average and above-average seasonal conditions, 93% of the 183 sites providing suitable data for reporting change showed no change or an improvement in the composition of 2P grasses. Composition is adjusted for utilisation (ie it is adjusted to the composition estimated to be present at the end of the growing season).

Change in woody cover

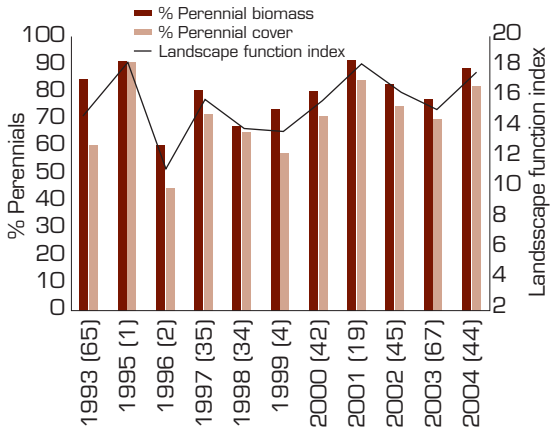
Based on the Australian Greenhouse Office's definition and mapping, forest extent is negligible in the Sturt Plateau bioregion.[51] Forest covered 0.04% of the bioregion area in 1991, and that proportion remained relatively unchanged at 0.05% in 2004. Reporting is based on analysis of Landsat data and is highly reliable because almost complete coverage of satellite imagery was available (more than 90% of the bioregion area).

[51] http://www.greenhouse.gov.au/ncas/reports/tech09.html

Figure 4.35 Changes in an index of landscape function, Sturt Plateau bioregion



Tier 1 monitoring sites used to report changes in landscape function



Change in landscape function is based on the combined estimated percentage cover and composition (by biomass) of perennial herbage species (mainly grasses). Biomass composition is adjusted for grazing to remove any short-term utilisation effects. Figures in parentheses along the horizontal axis show the number of sites assessed each year.

Table 4.14 Percentage of Tier 1 sites assessed following variable *seasonal quality* where there was a change in the estimated composition of palatable perennial (2P) grasses, Sturt Plateau bioregion

Seasonal quality	Number of sites	Percentage of reassessed sites showing		
		Decline >20% decrease in 2P grasses	No change	Improvement >20% increase in 2P grasses
Above average	171	8	67	25
Average	12	0	92	8
Below average	n.a.	n.a.	n.a.	n.a.

n.a. = not applicable

Note: The light grey cell indicates a likely adverse effect related to grazing management, in that no change or an improvement in the composition of 2P grasses would be expected following above-average seasonal conditions.

Table 4.15 Percentages of sub-IBRA area within 3 km and beyond 8 km of permanent and semipermanent sources of stock water, Sturt Plateau bioregion

Sub IBRA	% of sub IBRA area	
	<3 km from water	>8 km from water
Sturt Plateau P1	0.7	96.9
Sturt Plateau P2	7.0	66.7
Sturt Plateau P3	6.4	69.3

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), Table 4.15 lists the percentages of sub-IBRA areas within 3 km and further than 8 km of permanent and semipermanent sources of stock water. This analysis does not include the locations of natural waters, which can provide additional sources of water for stock, particularly in the early dry season. Available waterpoint data are probably out of date, as they do not reflect recent infrastructure development in the bioregion.

It is not possible to report change in watered area.

Weeds

Weeds known to occur in the bioregion include bellyache bush (*Jatropha gossypifolia*), Chinee apple (*Ziziyphus mauritiana*), grader grass (*Themeda quadrivalvis*), hyptis (*Hyptis suaveolens*), mission grass (*Pennisetum polystachion*), Noogoora burr (*Xanthium occidentale*), parkinsonia (*Parkinsonia aculeata*), prickly acacia (*Acacia nilotica* subsp. *indica*) and sicklepod (*Senna obtusifolia tora*).[52]

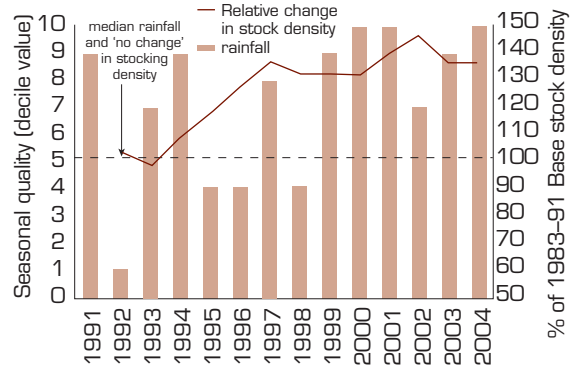
[52] See http://www.anra.gov.au

Components of total grazing pressure

Change in domestic stocking density

Approximately 77% of the Sturt Plateau bioregion is pastoral land. Based on ABS-sourced data, domestic stocking density increased between 1993 and 1997 (Figure 4.36).

Figure 4.36 Change in domestic stocking density (beef cattle), Sturt Plateau bioregion, 1991 to 2004



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

Table 4.16 Percentage area of Sturt Plateau bioregion burned, 1997 to 2005

1997	1998	1999	2000	2001	2002	2003	2004	2005
7.9	13.2	41.4	20.2	61.1	27.0	18.2	63.7	2.1

Source: WA Landgate data based on fire-scar mapping from National Oceanic and Atmospheric Administration AVHRR satellite images

This approximate density was maintained until 2000 and then increased to 2002. In both 2003 and 2004, stocking density was 37% above the 1983–91 base. This large increase in stocking density was probably helped by some better seasons but also continued through some seasons of average *seasonal quality*. Apart from the better seasons, the increase was also driven by land use intensification in the region. Spatial averaging conceals likely variation in stocking density trends across the bioregion.

Invasive animals

Invasive animal species known to occur in the Sturt Plateau bioregion include pig (*Sus scrofa*), wild dog (*Canis lupus familiaris*), feral cat (*Felis catus*), cane toad (*Bufo marinus*) and water buffalo (*Bubalus bubalis*).[53]

Fire and dust

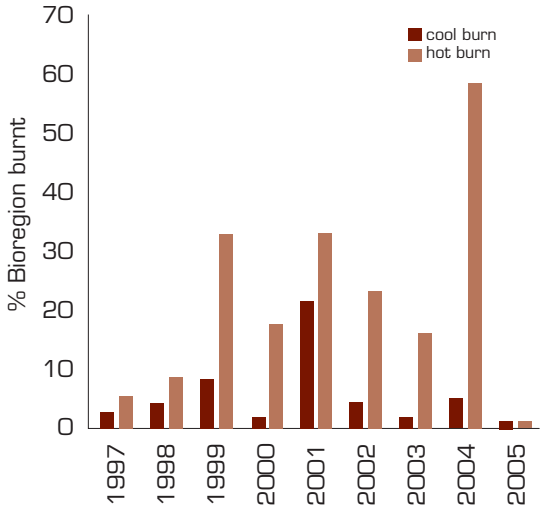
Fire

Large areas of the bioregion were burned in 1999, 2001 and 2004 (Table 4.16). During the most fire-active years (1999 to 2004), hot late dry-season (August–December) fires were predominant (Figure 4.37). Fire frequency was moderate compared with the rangelands as a whole (mean frequency (log_{10} transformed) = 0.435).

Dust

Atmospheric dust levels based on the DSI were among the lowest levels of all rangeland bioregions (mean DSI_3 of 0.47 for the 1992–2005 period, when the maximum value for all bioregions was 8.44).

Figure 4.37 Area of Sturt Plateau bioregion burned in 'cool' (January–July) and 'hot' (August–December) fires, 1997 to 2005 (%)



Change in biodiversity

Five mammal species and five bird species are listed as threatened for the Sturt Plateau bioregion (Biodiversity Working Group indicator: Threatened species).

Change in land use and land values

Based on available data, there was no change between 1992 and 2005 in the proportion of the bioregion under pastoral land use (77%). Ninety-five per cent of the area contained in pastoral leases was grazed.

The unimproved value of pastoral land increased by 45% between 1991 and 2003. This was the largest increase of all pastorally significant bioregions in the NT. Increased land values were partly driven by intensification resulting from infrastructure development and increased availability of groundwater.

[53] See http://www.anra.gov.au