Simpson–Strzelecki Dunefields bioregion

Description

Area: 272 920 km^2

The Simpson–Strzelecki Dunefields bioregion comprises long parallel sand dunes, fringing dunefields, extensive sand plains, dry watercourses and saltpans. Vegetation is predominantly spinifex hummock grasslands with sparse acacia shrublands and some narrow river red gum and coolibah riverine woodlands. Grassy shrublands predominate in southern areas, especially in New South Wales (NSW). Land use comprises Aboriginal land, conservation reserves and pastoral leases (on the edges of the bioregion). Oil and gas exploration is also important. Santa Teresa is the major population centre, with smaller Aboriginal communities also present.

Location

The Simpson–Strzelecki Dunefields bioregion is located on the Northern Territory (NT), Queensland, South Australia (SA) and NSW borders (SA: 48%, NT: 39%, Queensland: 10% and NSW: 4%). Figures 1 and 2 show the location of the Simpson–Strzelecki Dunefields bioregion, as well as monitoring sites and pastoral tenure.

Figure 1 Location of the Simpson–Strzelecki Dunefields bioregion

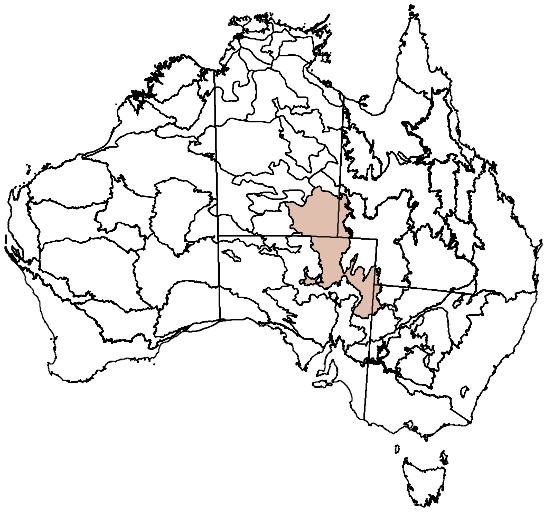
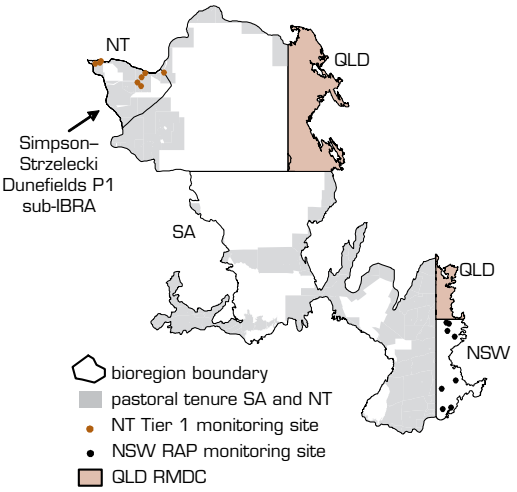


Figure 2 Monitoring sites and pastoral tenure



Data sources available

Data sources include:

- NT Tier 1 (Simpson–Strzelecki Dunefields [SSD] P1 sub-**Interim Biogeographic Regionalisation for Australia — IBRA**), which provides low to moderate reliability for reporting change, with a moderate number of sites but with patchy distribution, estimated (rather than quantitative) data, and a focus on perennial herbage species
- NSW Rangeland Assessment Program (RAP), which provides moderate to high reliability, with a small number of dispersed sites (eight sites) but small area, so there is a relatively high site density, annual assessments, quantitative data, and a focus on perennial herbage species
- SA — no pastoral monitoring sites
- Queensland: Rapid Mobile Data Collection (RMDC) supported by AussieGRASS simulation (of pasture growth and utilisation) and remote sensing (**Multiple Regression Bare Ground Index**, version b1); these data sources provide moderate

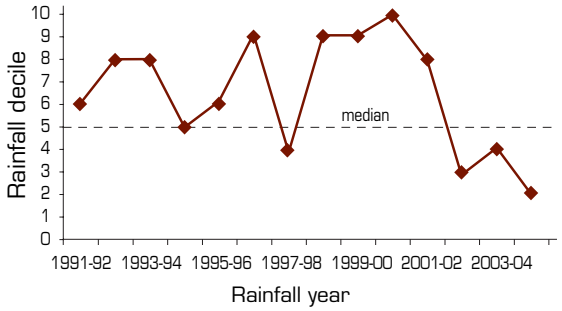
reliability for reporting change (RMDC — road traverses and visual estimates; AussieGRASS — entire rangelands, simulated results with some ground validation)

- 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 Simpson–Strzelecki Dunefields bioregion has an arid, subtropical climate and includes the driest area of Australia. Rainfall is unreliable but usually occurs in summer storms. Spatially averaged median (1890–2005) rainfall is 125 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.

The first 10 years of the reporting period had variable rainfall with annual totals generally above the long-term median. The period 1998–1999 to 2000–2001 was a wetter period. The last three years of the reporting period (2002–2003 to 2004–2005) were consistently dry.

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

Landscape function

Northern Territory

Tier 1, index based on composition (by biomass) and cover of perennial herbage species

Insufficient sites were assessed following above- and below-average *seasonal quality* to report change reliably.

South Australia

There are no suitable data for reporting change.

New South Wales

RAP, index based on the frequency and cover of perennial herbage species

When *seasonal quality* was above average, 20% of site–time assessments showed a decline in the index of landscape function, while 25% of site–time assessments showed an increase when *seasonal quality* was below average.

Seasonal quality	Number of site-by-year combinations	Percentage of reassessed sites showing:		
		Decline: > 4 decrease in index	No change	Increase: > 4 increase in index
Above average	40	20%	55%	25%
Average	48	4%	77%	19%
Below average	32	31%	44%	25%

Queensland

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

There was some loss of function for the Strzelecki Desert, Western Dunefields sub-IBRA. The Dieri and Simpson Desert sub-IBRAs were considered stable.

Sustainable management

Critical stock forage

Northern Territory

Tier 1, composition (by biomass) of palatable perennial (2P) herbage species

Insufficient sites were assessed following above- and below-average *seasonal quality* to report change reliably.

Seasonal quality	Number of sites	Percentage of reassessed sites showing:		
		Decline: > 20% decrease in 2P grasses	No change	Increase: > 20% increase in 2P grasses
Above average	8	n/a	n/a	n/a
Average	18	6%	67%	28%
Below average	2	n/a	n/a	n/a

South Australia

There are no suitable data for reporting change.

New South Wales

RAP, frequency of the palatable and perennial grass, *Eragrostis eriopoda*

When *seasonal quality* was above average, 9% of site–time assessments showed a decline in the frequency of *Eragrostis eripoda*, while 17% of site–time assessments showed an increase when *seasonal quality* was below average.

Seasonal quality	Number of site-by-year combi-nations	Percentage of reassessed sites showing:		
		Decline: > 3 decrease in frequency	No change	Increase: > 2 increase in frequency
Above average	32	9%	78%	13%
Average	48	23%	67%	10%
Below average	24	8%	75%	17%

Sites selected for reporting change were restricted to those where the 2P grass *Eragrostis eriopoda* was present at the start of the period. Frequency data from these same sites at subsequent reassessments were then used to report change.

Queensland

AussieGRASS, levels of simulated pasture utilisation and change

For the period 1976–1990 compared with 1991–2005, the Simpson Desert and Dieri sub-IBRAs had low levels of utilisation (less than 5%). This reflects the large areas of conservation reserve in these sub-IBRA regions (these reserves were not separated from the pastoral estate before analysis). Contrasting with conservative utilisation for these two sub-IBRAs, the Strzelecki Desert, Western Dunefields sub-IBRA had about 25% utilisation, suggesting that very high levels of utilisation were likely in the interdune corridors. Utilisation increased by approximately 1% (in absolute terms) between 1976–1990 and 1991–2005 in the Strzelecki Desert, Western Dunefields; decreased by approximately 1% in Dieri; and remained unchanged in the Simpson Desert sub-IBRA.

Plant species richness

NSW RAP, count of native perennial and annual herbage species

Approximately 20% of site–time assessments had decreased plant species richness following above-average *seasonal quality* and 12% of site–time assessments had increased plant species richness following below-average *seasonal quality*.

Seasonal quality	Number of site-by-year combi-nations	Percentage of reassessed sites showing:		
		Decline: > 18 decrease in no. species	No change	Increase: > 18 increase in no. species
Above average	40	20%	57%	23%
Average	48	4%	85%	11%
Below average	32	13%	75%	12%

There are no suitable data for NT, SA and Queensland to report change in plant species richness.

Change in woody cover

Queensland — Statewide Landcover and Trees Study reporting

At sub-IBRA resolution, there was no change in Statewide Landcover and Trees Study (SLATS) derived levels of woody cover between 1991 and 2003. Woody cover varied between 0.29% in the Dieri sub-IBRA and 3.05% in the Simpson Desert sub-IBRA (2003 data).

NSW — SLATS-type reporting

Based on analysis of satellite data using Queensland SLATS methods, there was no detected change in woody vegetation between 2004 and 2006. Woody vegetation is defined as woody communities with 20% crown cover or more (eg woodlands, open forests and closed forests) and taller than about two metres (DNR 2007). At this stage, it is not possible to report change for earlier years of the 1992–2005 period using this method.

Northern Territory and South Australia

There are no suitable data for reporting change in woody cover.

Distance from stock water

The percentage of sub-IBRA area within three kilometres of permanent and semipermanent sources of stock water is summarised in the following table. Note that for SA and the NT, the locations of stock waterpoints were sourced from the lease infrastructure mapping of each jurisdiction. Queensland and NSW data were obtained from Geoscience Australia's GEODATA TOPO 250K vector product (Series 3, June 2006). The bracketed figures in the SA and NT columns report the percentage area of each sub-IBRA analysed in that jurisdiction (total sub-IBRA area was analysed for NSW and Queensland). Note that mapping differences between the jurisdictional data (SA and NT) and the Geoscience Australia product mean that the percentage watered areas reported by each data type are not directly comparable.

Sub-IBRA	% sub-IBRA area within 3 km of water			
	SA	NSW	Qld	NT
Simpson–Strzelecki Dunefields P1 (SSD1)				40.0 (57.3)
Simpson Desert (SSD2)	10.2 (10.6)		2.0	20.4 (29.2)
Dieri (SSD3)	14.2 (28.3)		1.3	
Warriner (SSD4)	25.6 (97.0)			
Strzelecki Desert, Western Dunefields (SSD5)	15.4 (81.5)	16.5		

IBRA = Interim Biogeographic Regionalisation for Australia; NSW = New South Wales; NT = Northern Territory; Qld = Queensland; SA = South Australia; SSD = Simpson–Strzelecki Dunefields

Note that this analysis for NSW, Queensland and the NT does not include the locations of natural waters (these water supplies are included for SA). Although rare in this bioregion, natural waters can provide temporary additional sources of water for stock. It is not possible to report change in watered area for any jurisdiction for the 1992–2005 period.

Weeds

Weeds known to occur in the Simpson–Strzelecki Dunefields bioregion include:

Common name	Scientific name
African boxthorn	*Lycium ferocissimum*
Athel pine	*Tamarix aphylla*
Bathurst burr	*Xanthium spinosum*
Noogoora burr	*Xanthium occidentale*
Parkinsonia	*Parkinsonia aculeata*
Prickly acacia	*Acacia nilotica* subsp. *indica*
Silver leaf nightshade	*Solanum elaeagnifolium*

See www.anra.gov.au for distribution maps

Components of total grazing pressure

Domestic stocking density

Domestic stocking density data are reported for the whole bioregion. Approximately 49% of the Simpson–Strzelecki Dunefields bioregion is grazed. Data from the Australian Bureau of Statistics showed that domestic stocking density fluctuated around the 1983–1991 average (±5%) between 1992 and 1997. Stocking density then increased to 16% above the 1983–1991 base by 2001 and declined abruptly to 15% below the base in 2003. Stocking density recovered to 96% of the 1983–1991 base in 2004 (the last year of available data). These stocking levels generally tracked *seasonal quality* as indicated by decile rainfall above. Note that spatial averaging conceals likely variation in stocking density trends across the bioregion.

Kangaroos

New South Wales

The combined density of the three species (red, eastern and western greys, on a dry sheep equivalent basis) decreased from equalling the 1984–1991 average in 1992 to 78% of the base value in 1996. Kangaroo density then increased sharply in 1997 to 28% above the base and remained similar in 1998. The density then fell to approximately 75% of the base in 1999 and 2000, increased to 7% above the base in 2001 and declined considerably over the next two years (to 33% of the 1984–1991 average in 2003). The higher densities in 1997, 1998 and 2001 reflect better seasonal conditions at that time while the sharp decline towards the end of the reporting period has occurred during times of below-average *seasonal quality*.

There are no suitable data to report change for the Queensland, SA and NT parts of the bioregion.

Invasive animals

Invasive animal species known to occur in the Simpson–Strzelecki Dunefields bioregion include:

Common name	Scientific name
Feral pig	*Sus scrofa*
Feral goat	*Capri hircus*
Fox	*Vulpes vulpes*
Rabbit	*Oryctolagus cuniculus*
Wild dog	*Canis* spp.
Feral cat	*Felis cattus*
Starling	*Sturnus vulgaris*
Camel	*Camelus dromedaries*
Donkey	*Equus asinus*
Horse	*Equus caballus*

See www.anra.gov.au for distribution maps

Products that support reporting of landscape function and sustainable management

Fire

Fire data apply to the whole bioregion. Fire extent was very low for most of the period with data (1997–2005). The most extensive fires were in 2001 when 5.4% of the Simpson–Strzelecki Dunefields bioregion burnt.

Dust

For the whole bioregion, the mean Dust Storm Index value (1992–2005) was very high at 8.25 (second only to the Channel Country bioregion). The spatial spread of this dust was relatively even across the bioregion, with lower values in the far north (NT) and far south (adjoining the Flinders Ranges bioregion).

Biodiversity

Features of the Simpson–Strzelecki Dunefields bioregion include:

- More than 15% of the bioregion area is protected within reserves (Collaborative Australian Protected Areas Database, Biodiversity Working Group indicator: Protected areas; see Section 7 of Chapter 3 of *Rangelands 2008 — Taking the Pulse*).
- For the SA component, there are more than 300 fauna survey sites (Biodiversity Working Group indicator: Fauna surveys) and more than 400 flora survey sites (16 000 records of about 830 taxa, Biodiversity Working Group indicator: Flora surveys).
- The NSW portion has Ramsar-listed wetlands (Biodiversity Working Group indicator: Wetlands).

For the whole bioregion, there are (Biodiversity Working Group indicator: Threatened species):

- 5 threatened plant species
- 14 threatened mammal species, including 5 extinct species (the pig-footed bandicoot, lesser stick-nest rat, lesser bilby, short-tailed hopping mouse and desert bandicoot) and the western quoll, which is listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), but is extinct from this bioregion
- 3 threatened bird species
- no threatened reptile, amphibian or fish species.

Socioeconomic characteristics

Land use and value

About half (49%) of the Simpson–Strzelecki Dunefields bioregion is grazed. This area has not changed appreciably over the 1992–2005 reporting period.

In Queensland, the unimproved rangeland values as at June 2006 were, on average, \$43 ± \$8/km^2 (values expressed in 2005 dollars). These are the lowest of all Queensland bioregions. There was a narrow range in average unimproved value across sub-IBRAs (\$39 to \$49/km^2). It is not possible to report change in land values for the 1992–2005 period.

In SA, the unimproved value of pastoral land has increased, on average, by approximately 60% between 1998 and 2004 (values expressed in 2005 dollars).

In NSW, average property size is 21 180 ha (maximum size of 70 690 ha) for all land parcels bigger than 10 ha.

Key management issues and features

Key features and issues of the Simpson–Strzelecki Dunefields bioregion include the following:

- Queensland:
  - There is high pasture utilisation of interdune and drainage areas.
  - Tree and shrub death has occurred under protracted drought conditions, especially for browse species.
  - There are extensive areas of low cover and wind erosion throughout the majority of the area.
  - Rabbit numbers are increasing.
  - Perennial grass species abundance has been reduced.
- NT:
  - Feral camel numbers have increased significantly in the area and they are affecting land condition within the bioregion.
  - Programs are being developed for camel control. These programs are, however, slow to be implemented.
- NSW:
  - Properties in this bioregion are relatively large compared with other NSW leases. Family groups often run several properties.
  - The merino wool industry is in decline. During the mid-1990s, export prices for meat increased relative to the wool value of sheep. Goats also became financially viable to run. This had a big negative impact on the condition of the country. Presently, many properties are switching to meat sheep, goats and increasingly cattle as their primary enterprises.

- Thickening of woody shrubs has occurred, particularly in conditions of average winter rainfall followed by the wet summers of 1973–1974, 1983–1984 and perhaps 1999–2000. The most common species to have thickened is hopbush (*Dodonea* spp.).
- Lack of control of total grazing pressure due to the mobility of kangaroos and goats is the greatest challenge to land management. Landholders are widely adopting improved fencing strategies to better manage grazing. This commonly includes control over access to water.

- SA:
  - This bioregion includes the lowest rainfall zone in Australia.
  - Most of the bioregion is within parks and reserves (Strzelecki Regional Reserve, Simpson Desert Regional Reserve and Simpson Desert National Park).
  - Where grazing occurs, interdune corridors and drainage areas experience the highest levels of pasture utilisation.
  - The number of feral camels is increasing. Camels are highly mobile and cause damage to the sparse shrub and tree cover. They are also causing damage to adjacent pastoral infrastructure.
  - Rabbit numbers are recovering from rabbit haemorrhagic disease (calicivirus).
  - Invasion of buffel grass is evident.