



CHAPTER 2

The Simpson-Strzelecki Dunefields Bioregion

1. Location

At a total area of 29,722,724 ha, the Simpson-Strzelecki Dunefields Bioregion extends from the southeast of the Northern Territory, through the northeast of SA, with small areas in both Qld and NSW. The far northeast corner of NSW is occupied by the bioregion with an area of 2,116,980 ha, which constitutes 7.12% of the entire bioregion and covers 2.65% of the state.

In NSW the bioregion is bordered by the Channel Country Bioregion in the north and by the Broken Hill Complex and Mulga Lands bioregions in the east and south.

There are no townships in the bioregion, although popular tourist spots include Camerons Corner at the junction between SA, Qld and NSW, as well as the nearby Fort Grey (at Lake Pinaroo), where Charles Sturt is reported to have built a defence against local Aborigines (NSW NPWS 1991). Both of these sites fall in Sturt National Park.

The bioregion includes parts of the Lake Frome and Bulloo catchments (Morgan and Terrey 1992).

2. Climate

The Simpson-Strzelecki Dunefields Bioregion is very arid and has unpredictable rainfall, which generally averages from 150-200 mm per year (Morgan and Terrey 1992). It is one of four bioregions, all in the far northwest of the state, that are dominated by a hot, persistently dry desert climate (Stern *et al.* 2000).

3. Topography

The Simpson-Strzelecki Dunefields are part of the Australian continental dunefields, which consist of a huge anti-clockwise whorl of linear dunes in central Australia. Most of the dunefield lies in the Lake Eyre Basin and the edge of the region extends into the NSW corner country. The region is dominated by high linear dunes of red sand.

Mean Annual Temperature	Minimum Average Monthly Temperature	Maximum Average Monthly Temperature	Mean Annual Rainfall	Minimum Average Monthly Rainfall	Maximum Average Monthly Rainfall
19 – 21°C	4.6 – 5.5°C	34.9 – 37.7°C	130 – 249mm	5 – 13mm	19 – 45mm

4. Geology and geomorphology

The dunes and sandplains of this bioregion developed on Tertiary and Quaternary alluvial sediments. Thinner sheets of wind-blown sand that blanket the landscape as sandplains do not have a marked dune structure. In NSW, the dunes are formed by a westerly wind that moves sand from distant lake shores and reworks sand from the alluvial systems. Most dunes are stable, but higher dunes, and those subject to land degradation by grazing, have active crests. Dune spacing varies from 50 to 500m and the intervening swales may expose underlying stony plain, deep alluvial sands and clays, or calcareous sandy soils. The original source of the dune sands is generally considered to be the Great Dividing Range, with the sand being delivered by rivers through the Cooper Creek and Bulloo systems. There are few rock outcrops in the sand dune country other than small flat-topped hills of Cretaceous or Tertiary sediments.

Both the dunefields and the sandplains contain clay pans and ephemeral lake beds. Stream channels from the Tibooburra and Barrier Ranges flow toward Lake Callabonna and Lake Frome in northeastern SA and flood local claypans, but runoff is now insufficient to reach the distant lakes. Sands in the eastern part of the region are derived from the Bulloo overflow where they are associated with larger lake basins that contain well-developed beaches and lunettes. Over the past 30,000 years variable climates have allowed greater dune mobility, more active streams and periods with full lakes. Details of this chronology are not well known for this area.

5. Geodiversity

Arguably, the Simpson-Strzelecki Dunefields Bioregion is the largest example of a linear sand dune environment in the world.

Important features of this bioregion include the following:

- Tertiary vertebrate fossils in river and lake sediments such as the well-known Diprotodon sites at Lake Callabonna (SA), and well-preserved flora in silcretes such as the Miocene eucalypts from Sturt Creek, south of Lake Eyre; no comparable sites have been documented in NSW, although silcretes in the corner country are known to contain Tertiary plant fossils;
- the dune country of Sturt National Park contains stone quarry sites on patches of gibber as well as numerous open campsites in the dunefields and on ephemeral lakes, swamps and streams; even the most extreme climatic zones have been occupied by Aboriginal people who used shallow seepage wells in inter-dune corridors; archaeological dates can place some constraints on ages of dune activity, but few have been obtained from this environment in NSW; and
- the mound springs that occur on the margins of the dunefields in other states and many of the salt lake basins are groundwater windows; little is known of groundwater systems in this part of NSW.

6. Soils

The dunes have only minimal soil profile development as red siliceous sands, although the dune cores contain more clay and soil carbonate. Soils are better developed in the swales, along the creek lines and in the lake beds where fine alluvial sediments accumulate to form cracking brown or grey clays, harsh texture contrast profiles, and sandy red earths.

None of the soils contains high quantities of plant nutrient although the clays are better than the sands. Soil moisture retention is also better in the clays, but some clays contain high levels of soluble minerals such as gypsum and common salt that limit plant growth.

7. Biodiversity

7.1 Plant communities

The sand dunes of the western half of Sturt National Park in the bioregion support a perennial woodland community dominated by *Acacia ligulata*, mulga, needlewood (*Hakea leucoptera*), whitewood (*Atalaya hemiglauca*) and beefwood (*Grevillea striata*). The woodland understorey is a shrubland consisting of species of *Cassia*, *Eremophila* and *Dodonaea*. Mitchell Grass also occurs on the dunes while temporary canegrass (*Glyceria ramigera*) – lignum (*Muehlenbeckia cunninghamia*) swamp communities occur between them.



Photo: C. Robertson

The sand dunes and sandplains support sandhill wattle (*Acacia ligulata*), turpentine (*Eremophila sturtii*), scattered mulga (*Acacia anuera*), rosewood (*Heterodendrum oleifolium*), whitewood (*Atalaya hemiglauca*), canegrass (*Eragrostis australasica*), the occasional white pine (*Callitris glaucophylla*) and various cassia and eremophila species.

Lignum (*Muehlenbeckia cunninghamia*), black box (*Eucalyptus largiflorens*) and river red gum (*Eucalyptus camaldulensis*) grow along the creeks and on the margins of freshwater claypans. Many of the same species are found in the more saline clays of the Cobham land system along with prickly wattle (*Acacia victoriae*) and chenopods. Bladder saltbush (*Atriplex vesicaria*), black bluebush (*Maireana pyramidata*), Mitchell grass (*Astrelba* sp.) and scattered mulga (*Acacia anuera*) are found on the tablelands and stony downs. Bimble box (*Eucalyptus populnea*), western bloodwood (*Eucalyptus terminalis*) and ironwood (*Acacia excelsa*) are present with denser mulga on the sands of the Bulloo Dunefield.

7.2 Significant flora

Seven species found in the bioregion are listed in the TSC Act 1995. Of these, five are listed as endangered and two are listed as vulnerable. A further three species, *Glinus orygioides*, *Osteocarpum pentapterum* and *Senecio georgianus*, which previously occurred in Sturt National Park, are now considered extinct in NSW (NSW NPWS 2001).

7.3 Significant fauna

Forty-one fauna species found in the bioregion are listed in the schedules of the TSC Act. Of these, 12 are listed as endangered and 27 are listed as vulnerable. Two species, the pig-footed bandicoot (*Chaeropus ecaudatus*) and the burrowing bettong (*Bettongia lesueur*), are presumed extinct in the bioregion.

Although sand dunes are not generally home to a high diversity or number of birds, the bioregion supports a few distinct species. These include Eyrean grasswrens (*Amytornis goyderi*) which occur in cane grass on dunes (Australian Terrestrial Biodiversity Assessment 2002), as well as species characteristic of chenopod shrublands, many of which are threatened in other bioregions (Morton *et al.* 1995). In contrast to others, this bioregion shows little evidence of environmental change and supports few exotic bird species (Australian Terrestrial Biodiversity Assessment 2002).

Some waterbirds, such as the vulnerable painted snipe (*Rostratula benghalensis*), have been recorded here (Australian Terrestrial Biodiversity Assessment 2002), indicating a higher than average rainfall in this arid bioregion. During wet periods, many itinerant waterbirds breed on the ephemeral inter-dune swamps, although declines have been recorded in numbers of freshwater species and migratory waders (Australian Terrestrial Biodiversity Assessment 2002).

Feral animals threaten the biodiversity of the bioregion, with rabbits being particularly problematic.

7.4 Significant wetlands

Sturt National Park wetlands are a good example of canegrass claypans in dunefields and occur at the western end of Sturt National Park with mainly sparse vegetation dominated by canegrass (*Eragrostis australasica*), lignum (*Muehlenbeckia spp.*) and chenopods (*Chenopodium spp.*). Fort Grey basin and overflow swamps occur in this area and support large numbers of waterbirds

(ANCA 1996). The wetlands are considered to be in good condition and are improving despite the presence of feral animals and weeds (Australian Terrestrial Biodiversity Assessment 2002).

The Salt Lake is a terminal salina, which is occasionally inundated for long periods. The water is saline, becoming more concentrated as evaporation occurs, and provides a representative example of a hypersaline lake. When full, more than 70,000 waterbirds have been recorded on the lake (Kingsford *et al.* 1994; cited in ANCA 1996) although the lake is usually dry and supports little vegetation. Submerged algae and sea tassel (*Ruppia* sp.) can be found when it is flooded (ANCA 1996).

Paldramata Lake is another significant wetland in the bioregion. In December 1989, the lake supported 4,200 waterbirds and in March 1993 over 2,000 waterbirds were recorded (Australian Terrestrial Biodiversity Assessment 2002). The most abundant species included Eurasian coot (*Fulica atra*), pink-eared duck (*Malacorhynchus membranaceus*) and hardhead (*Aythya australis*). Waterbirds recorded at the lake include the vulnerable freckled duck (*Stictonetta naevosa*) (Kingsford *et al.* 1994).

The lakes in the bioregion are considered to be in good condition (Australian Terrestrial Biodiversity Assessment 2002). Threats are present, however, and include impacts from grazing pressure, feral animals and exotic weeds.

8. Regional history

For information on the regional history of the Simpson-Strzelecki Dunefields Bioregion refer to Chapter 1 under the heading “Regional history”.

9. Bioregional-scale conservation

Only a few of the possible conservation tenures are deployed in this bioregion. Those that are occupy 253,211 ha or 11.96% of the bioregion. The parts of Sturt National Park and Pindera Downs Aboriginal Area that are located within the Simpson-Strzelecki Dunefields are the only reserves managed under the NPW Act 1974 in the bioregion. They occupy 122,030 ha or 5.76% and 2,403 ha or 0.11% of the bioregion respectively. These are not managed additionally for wilderness values, as there are no declared wilderness areas in the bioregion.

Some landholders in the bioregion have entered into private land conservation under the provisions of the NPW Act 1974. There are four wildlife refuges on properties occupying about 128,779 ha or 6.08% of the bioregion but there are no voluntary conservation agreements. Nor are there any property agreements under the NVC Act 1997 in the bioregion.

No land, in the form of either State forest or flora reserve, is managed for conservation or for forestry under the Forestry Act 1916.

10. Subregions of the Simpson-Strzelecki Dunefields Bioregion

(Morgan and Terrey 1992)

Subregion	Geology	Characteristic landforms	Typical soils	Vegetation
Western Dunefields Parts of 9 land systems.	Quaternary aeolian sand, minor alluvial sediments, and small areas of Cretaceous or Tertiary bedrock.	High parallel, linear dunes with streams and lakes extending from the ranges through the inter-dune depressions. Most lakes are freshwater. Small areas of stony plain.	Deep red quartz sands on dunes, heavy clays along stream lines.	Sandhill wattle, mulga, turpentine, hopbush, rosewood, and canegrass occur on dunes and swales. Prickly wattle, canegrass, black box, and river red gum on creeks and lakes. Bladder saltbush, black bluebush, Mitchell grass, mulga, whitewood, turpentine and hopbush are present on stony plains.
Central Depression Parts of 12 land systems.	Complex of Quaternary aeolian sands, alluvial and lake beds with well-developed beaches and lunettes.	Low sand dunes of variable orientation and shape, extensive sandplains. Large lake basins with fringing lunettes, some saline lakes possibly linked to groundwater.	Deep quartz sands on dunes, sand and clay lunettes, heavy clays along stream lines.	Mulga, whitewood with canegrass on dunes and black bluebush in swales. Mulga, whitewood, prickly wattle, black box, canegrass and river red gum along creeks. Canegrass, lignum, prickly wattle, black box, old man saltbush and thorny saltbush occur on lakes. Lunettes support open mulga, turpentine and pearl bluebush.
Bulloo Dunefields Parts of 11 land systems.	Quaternary aeolian sands from local sources, alluvial and lake sediments, with outcrops of Cretaceous or Tertiary bedrock.	Sandplains and low dunes, marginal to extensive areas of floodout country. Tablelands and stony downs on bedrock.	Deep red to yellow quartz sand, heavy clays in alluvial areas. Stony loams on downs.	Mulga, whitewood, ironwood, bimble box, and canegrass are present on sandplains. Mulga, bimble box, grasses and forbs occur on floodouts. Mulga, dead finish, desert poplar, silver cassia, punty bush, turkey bush, bluebush and grasses occur on tablelands and downs.

11. References

Australian Nature Conservation Agency. 1996. *A Directory of Important Wetlands in Australia*. Second Edition. ANCA, Canberra.

Australian Terrestrial Biodiversity Assessment 2002. National Land and Water Resources Audit, Canberra.

Kingsford, R. Bedward, M. and Porter, J. 1994. *Wetlands and waterbirds in north-western NSW*. NSW National Parks and Wildlife Service, Hurstville.

Morgan, G. and Terrey, J. 1992. *Nature conservation in western New South Wales*. National Parks Association, Sydney.

Morton, S.R., Short, J. and Barker, R.D. with an Appendix by Griffin, G.F. and Pearce, G. 1995. *Refugia for biological diversity in Arid and Semi-arid Australia*. A report to the Biodiversity Unit of the Department of Environment, Sport and Territories. CSIRO Australia, Canberra.

NSW NPWS 1991. *An Outdoor Museum: Historic places in the NSW National Parks and Wildlife Service estate*. NSW National Parks and Wildlife Service, Hurstville.

NSW NPWS 2001. *Atlas of New South Wales wildlife*. NSW National Parks and Wildlife Service, Hurstville.

Stern H., de Hoedt G. & Ernst J. 2000. *Objective Classification of Australian Climates*. Bureau of Meteorology, Melbourne.