Nullarbor

Low bluebush shrubland with samphire on the Nullarbor Plain Bioregion. Photo: Peter Canty

Description

Bioregional description and biodiversity values

The Nullarbor bioregion extends over most of the onshore part of the Eucla Basin - an epeirogenic basin of Cretaceous and Tertiary sediments on an irregular basement predominantly of Precambrian granite and metamorphic rocks. It has an arid, non-seasonal climate with average rainfall of between 150 and 200mm.

There are two subregions within the bioregion – a northern band known as Carlisle and the central band known as the Nullarbor Plain.

Carlisle is dominated by the Carlisle Plain, the northern periphery of the Bunda Plateau. Soil profiles are well developed, with a high proportion of red quartz-rich sand mixed with loams and calcareous clays which is partly calcreted over calcareous sandstone. Sandplains with extensive seif dunes supporting a tree steppe of *Eucalyptus gongylocarpa*, mulga and *E. youngiana* over hummock grassland occupy northern parts of the subregion, but occasional breakaways and quartzite hills provide minor relief. Salt lakes supporting samphire communities and major valley floors with lake derived dunes are also present, part of an inactive paleodrainage system that flows into the Nullarbor karst. Low woodlands of *Acacia papyrocarpa* (western myall) over *Maireana sedifolia* (bluebush) dominate its central and southern parts.

The Nullarbor Plain is a tertiary limestone plain with subdued, arid karst features. It is a vast and remarkably flat treeless plain wholly contained within the much larger Bunda Plateau and has shallow calcareous soils, thinly mantling massive limestone. It supports a bluebush-saltbush steppe, although low woodlands of western myall over bluebush are present in peripheral areas, including *Myoporum platycarpum* and *E. oleosa* in the east and west.

The Nullarbor is the world's largest karst system. Significant features include the shallow surface depressions (the donga, ridge and corridor terrain), collapse dolines, blowholes, drip pits, rillenkarren, rundkarren, pavements, solution pans and rockholes.

Endemic reptiles, birds, plants and vegetation associations are also present, including *Cinclosoma cinnamomeum* and *Pogona nullarbor.* The Nullarbor caves provide refuge for many evolutionarily relictual invertebrates and two vertebrates. Caves often contain sub-fossil remains that have been very useful in reconstructing lists of the original vertebrate fauna assemblages.

Dominant land uses include unallocated Crown land, grazing leases and conservation reserves. The current continental stress class is six for both the Carlisle and Nullarbor Plain subregions but the Nullarbor is clearly in poor condition warranting a higher stress class of three or even two.

A high proportion of the Nullarbor's original mammal fauna is extinct, vegetation cover has been stripped from large areas and replaced with the invasive weed *Carrichtera annua* (Ward's weed), foxes and cats are ubiquitous, and until recently rabbits were so common that a rabbit skin and meat industry flourished in the region.

Overall condition and trend

Overall condition is only fair because weeds, fire and feral predators and herbivores have substantially modified habitats over extensive areas of the Carlisle and Nullarbor Plain subregions and caused numerous extinctions in indigenous mammals. The trend is declining as weeds continue to spread, displacing indigenous vegetation. The reserve system is strongly biased, with a third of vegetation associations not represented, and large areas of existing reserves severely degraded.

Conservation priorities

Weed and feral animal control present the greatest problems. Priorities are the re-establishment of healthy succulent communities, the completion of the reserve system and the reconstruction of original fauna. Protection of cave faunas and fire control are also important.

Nationally important wetlands

There are no wetlands of national significance in the Nullarbor Bioregion.

Wetlands of regional significance

Nine wetlands of regional significance are recognised. One, Plumridge Lakes, is a seasonally intermittent saline lake in good condition with a static trend. Another (Hampton Scarp Rockholes) comprises freshwater pools, degraded in condition and static in trend.

Three others are intermittent freshwater lakes and floodplains in degraded condition and declining (Lake Boonderoo, Duck Pond in Arubiddy Station and paleodrainage channel on Gunnadorah Station). The

other four are inland subterranean Karst wetlands in good condition with unknown trends (Cocklebiddy, Murra El Elevyn, Tommy Graham's and Mullamullang).

Threatening process for the surface wetlands includes feral herbivores, stock and feral predators; for subterranean wetlands they are public visitation, earth works and feral predators.

Riparian zone

There are no true riparian zones or riparian zone vegetation in the biobregion.

Ecosystems at risk

No threatened ecological communities have been declared in the Nullarbor region under WA State legislation. However, wetlands of the Nullarbor region are considered to be at risk, as specified above.

Species at risk

Under State legislation:

- three cave-dwelling spiders are listed as vulnerable, each being restricted to only one cave system, and
- three mammals and three birds are listed as vulnerable.

Twenty five species of indigenous mammal and one bird have become extinct in the region, although many persist elsewhere in WA.

The invertebrates are threatened by human use of the caves, but their population trends are unknown. The vertebrates are thought to have been affected by habitat changes caused by introduced herbivores and changed fire regimes in combination with introduced predators. No Declared Rare Flora species are found in the Carlisle or Nullarbor Plain subregions.

Management responses

Reserve system

The conservation estate comprises parts of three large nature reserves and, in South Australia, a large national park and part of a large conservation park.

Fourteen of the 27 vegetation associations recognised from the WA part of the region are not represented in reserves, including four that are considered of high priority. All vegetation associations that are under particular threat and are therefore high priority to reserve are succulent steppe communities involving saltbush, bluebush and/or grassland, although some have salmon gum, gimlet, myall or myoporum upper strata. Overall, 16 per cent of the Nullarbor bioregion is reserved in IUCN I-IV reserves (including 36 per cent of the Carlisle subregion and 4.7 per cent of the Nullarbor Plain). The bioregion has an IBRA Reservation Class of five. The reserve system is incomplete and biased in terms of CAR criteria. The Nullarbor Plain region is considered to be of higher priority (Class three) because significant threatening processes such as grazing, feral animals and changed fire regimes exist.

Constraints are primarily resource related in terms of management and research, although competition for grazing land in the western and eastern ends of the region is a factor. The Aboriginal Land Agreement (Spinifex) is likely to work in favor of biodiversity conservation.

Reserve management is fair to good across all reserves because biodiversity values and or management issues are often poorly identified. Weeds are widespread, considerable degradation has occurred in vegetation and components of the fauna (especially in the Great Victoria Desert Nature Reserve), resource degradation is occurring elsewhere (though retrievable), wildfire management is non-existent, and the ongoing impact of feral herbivores is unknown.

Off reserve conservation for species and ecosystem recovery

- Control mechanisms for Ward's weed need to be developed and implemented.
- Cave faunas on privately managed lands especially require habitat protection and further research into species' ecological requirements.
- Critical weight range mammals and regionally extinct bird populations need to be reintroduced, protected from feral predators and their habitats managed for fire and introduced herbivores.
- Wetland communities need to be protected by reservation and feral mammal control.
- Main recovery actions include habitat retention through reserves, implementation of management plan recommendations, capacity building with landholders and industry concerning pastoral operations, and fire management to reduce the impact of large intense, summer wildfires on habitat and fauna populations.
- Further research is required to determine species status, distribution and gain increased knowledge of region's biodiversity, and cost-efficient methods for feral animal and weed control to allow reintroductions and extant populations of critical weight range species to recover.

The main constraint is lack of resources to implement management activities and the remoteness from population centres. Weed, feral and fire control are region-wide priorities and significant conservation effort is required in both subregions, cave fauna management is a priority in the Nullarbor Plain region.

Integrated natural resource management (NRM)

Existing natural resource management actions include industry codes of practice particularly in relation to pastoral lease management, and integration environmental management systems with property management planning and Landcare. Declaration of reserves has been the most effective natural resource management activity so far.

Opportunities for natural resource management include legislation for duty-of-care covering leasehold and other lands (threat abatement planning for vegetation, threatened species, pests and fire). Capacity building in community, landholders, industry and institutions will be required to implement these actions, and programs to increase the awareness of conservation values through education of local industries and communities are needed.

Major constraints include the need to modify the Land Administration Act, to complete negotiations related to the Spinifex Land Agreement and to overcome limited financial resources.

Major data gaps and research priorities

Before the bioregional survey in 1984, no comprehensive biological study of the Eucla Basin had ever been undertaken. Other Nullarbor work had been largely opportunistic or focused on individual species or taxonomic groups.

The main gaps are:

- there is no vegetation and regolith mapping at better than a 1:250,000 scale,
- a regional survey of flora and vertebrate fauna is based on very sparse sampling (83 sites across the entire region),
- there is little data on the habitat requirements of virtually all invertebrate species, most ephemeral plants, persisting critical weight range mammals and uncommon vertebrate and plant species,
- there is no data to provide a regional context on life history (including population trend) for any species apart from rabbits,
- there is no quantitative data on the effect of exotic predators, weed colonization and fire, and
- there is only limited data on the impact of grazing on vegetation systems of pastoral leases.