Nullarbor 2 *(NUL2 – Nullarbor Central Band subregion)*

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Subregional description and biodiversity values

Description and area

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.

Primarily NUL2 is a tertiary limestone plain with subdued arid karst features. Dominated by the Nullarbor Plain, which is wholly contained within the much larger Bunda Plateau. It has shallow calcareous soils, thinly mantling massive limestones. Small scale relief in the patterns of clay-filled depressions that alternate with rises of thin stony soils or bare limestone. Southern end of several paleodrainage lines extend onto the Nullarbor Plain.

The Nullarbor Karst is one of the worlds largest karst systems. Extensive features are the shallow surface depressions (the dongas and ridge and corridor terrain). Other karst features include drip pits, rillenkarren, rundkarren, pavements, solution pans and rockholes. Larger surface karst features such as collapse dolines and blowholes are also present. The Nullarbor Plain is a vast and remarkably flat treeless plain determined by the combination of aridity and the calcareous soils. Bluebush - Saltbush steppe in central areas; low woodlands of *Acacia papyrocarpa* (Western Myall) over *Maireana sedifolia* (bluebush) are present in peripheral areas, including *Myoporum platycarpum* and *E. oleosa* in the east and west. The climate is arid non-seasonal, with an average rainfall of 150 – 200 mm. The subregional area is 10, 169, 146 ha.

Dominant land use
(see Appendix B, key b)

Category	Description	Percentage of Subregion
x	Aboriginal Reserve	0.05%
xiii	Conservation Reserves	4.46%
iii	Cultivation and Plantation	0.00%
ix	Grazing - Freehold	6.76%
ix	Grazing - Leasehold	54.07%
xv	Lakes and Major Watercourses	0.01%
xi	Unallocated Crown Land and Crown Reserves	34.65%

Continental Stress Class

The Continental Stress Class for NUL2 is 6.

Known special values in relation to landscape, ecosystem, species and genetic values

Rare Features:

- The Nullarbor is the worlds largest Karst system and NUL2 contains the majority of cave in this system. Caves of the Nullarbor Plains are considered to be of World importance. Nullarbor Bioregion has been considered for nomination as a World Heritage site, indicating its significance and uniqueness. Therefore, research and prudent management are particularly important in this subregion.
- Sub-fossil deposits in caves are very important in the reconstruction of past fauna composition.
- Stygofauna and troglodites associated with the cave systems is also of importance.
- Wetlands of the Nullarbor region
- The subregion represents the western extent of the range of the Southern Hairy-nosed Wombat (*Lasiorhinus latifrons*) and it is Australia's largest and most secure population (T. Robinson pers. comm..).

Rare Vertebrates Include:
Slender-billed Thornbill (*Acanthiza iredalei iredalei*), Mulgara (*Dasycercus cristicauda*), and Nullarbor Quail-thrush (*Cinclosoma cinnamomeum alisteri*).

Centres of Endemism:

- Stygofauna associated with underground aquifers are generally endemic to individual systems as they have no means of dispersal and have evolved independently.
- Beards Vegetation types 214, 448, 449, 461, 1241 (98%) and 4641 are all endemic to NUL2 (100%).

High Species and Ecosystem Diversity:
Nullarbor bioregion is considered to be relatively species poor ecosystem, however knowledge is incomplete.

Refugia:
Nullarbor Caves are refugia and are considered highly significant as they provide refuge for many evolutionarily relictual species. These include troglobites and

troglophiles of the following groups - Crustaceans, centipedes, cockroaches, ground (carabid) beetles, Orthopterans, Pseudoscorpions and spiders. Two vertebrate species that are also known to use the caves are the bat, *Chalinolobus morio,* and the Nullarbor population of the masked owl, *Tyto novaehollandiae* during good seasons (such as mouse plagues) when it is thought that individuals move in from the South Australian or Western Australian populations.

Existing subregional or bioregional plans and/or systematic reviews of biodiversity and threats

In 1974 the Conservation Through Reserves Committee (CTRC) made recommendations for reserves within the Deserts and Nullarbor Plain (System 12) in the CTRC Green Book. Recommendations for reservation by the CTRC in NUL2 (Great Victoria Desert Nature Reserve) were implemented. Further recommendations for two large Nature reserves on the Nullarbor Plain have not been implemented. The subregion is covered by the Department of CALM's Goldfields Regional Management Plan (1994), and the South Coast Regional Management Plan, which both provide an overview of the region's biota, addresses land and conservation issues. However, the reviews and strategies within these documents (for reserve development or management of weeds, feral animals, fire, mining, ecosystem rehabilitation & disease quarantine) do not address the specific needs of the subregion individually. Goldfields Regional Management Plan recommends the establishment of a CALM Act 5g Reserve around Homestead Cave within the subregion, but this has not been implemented (Department of Conservation and Land Management 1994).

In 1992, the Commonwealth Government commissioned a report on the suitability of the Nullarbor Region for World Heritage Listing. The report was submitted but not supported by the Western Australian Government and the recommendation did not progress.

Wetlands

Wetlands of National significance (DIWA listings)

No Wetlands of National Significance have been identified in NUL2.

Wetlands of subregional significance (in addition to the DIWA listed wetlands

Name and Code	Location	Description[1]	Special Values[2]	Condition[3]	Trend[4]	Reliability[5]	Threatening Processes[6]
Lake Boonderoo	Eastings 629 000 Northings 6654 000, Zone 52	B6 - Lake gradually turns saline as water level drops.	ii, iii, iv, v	i	iii	iii	iv (grazing & trampling pressure from stock and feral animals), v (rabbits, camels, foxes and cats)
Hampton Scarp Rockholes	Between Burnabbie and Madura Stations, along the escarpment separating Hampton and Nullarbor Bioregions. Eastings 280 000 Northings 6455 000, Zone 52	B17	ii	i	vi	i	iv (stock and feral animals), v (rabbits, foxes and cats)
Duck Pond – Arubiddy station	Eastings 778 000 Northings 6477 000, Zone 52	B6	ii	i	ii	i	iv (stock and feral animals), v (rabbits, foxes and cats)
Paleodrainage channel, Gunnadorah Station	Eastings 220 000 Northings 6624 000, Zone 52	B6	ii	i	ii	i	iv (grazing by stock and feral animals), v (rabbits, foxes and cats)
Name and Code	Location	Description[1]	Special Values[2]	Condition[3]	Trend[4]	Reliability[5]	Threatening Processes[6]
Cocklebiddy Cave – Nuytsland Nature Reserve	125 549 E, 31 580 S	B19	ii	iii	vi	i	iv (grazing by stock and feral animals), xii (compaction via public visitation), v (rabbits, foxes and cats)
Murra El Elevyn Cave – Nuytsland Nature Reserve	126 023 E, 32 025 S	B19	ii	iii	vi	i	xii (compaction via public visitation; man made earth bund surrounding cave entrance), v (rabbits, foxes and cats)
Tommy Grahams Cave – Nuytsland Nature Reserve	126 117 E, 32 057 S	B19	ii	iii	vi	i	xii (compaction via public visitation), v (rabbits, foxes and cats)
Mullamullang Cave	31 432' S 127 14' E	B19	ii	iv	vi	i	iv, xii (uncontrolled recreational use)

[1]Appendix B, key d; [2]Appendix B, key c; [3]Appendix C, rank 2; [4]Appendix C, rank 3; [5]Appendix C, rank 1; [6]Appendix B, key e

Riparian zone vegetation

There is no true riparian vegetation within NUL2.

Ecosystems at risk

Threatened ecological communities (TECs)

There are no Threatened Ecological Communities in NUL2.

Other ecosystems at risk

Ecosystem	Status	NVIS[1]	Condition[2]	Trend[3]	Reliability[4]	Threatening Processes[5]
Wetlands of the Nullarbor region	V	41,42	i-ii	iii - iv (in some instances)	ii	iv, v (rabbits camels)

[1]Appendix B, key f; [2]Appendix C, rank 2; [3]Appendix C, rank 3; [4]Appendix C, rank 1; [5]Appendix B, key e

Species at risk

Fauna

Species	Status	Condition[1]	Trend[2]	Reliability[3]	Threatening Processes[4]
SCHEDULE 1; RARE/LIKELY TO BECOME EXTINCT, DIV 1 (MAMMALS)					
Dasycercus cristicauda	V	ii	vi	ii	v (cats, foxes), vii iv
SCHEDULE 1; RARE/LIKELY TO BECOME EXTINCT, DIV 2 (BIRDS)					
Acanthiza iredalei iredalei	V	ii	vi	ii	iv (rabbits), vii
Cinclosoma cinnamomeum alisteri	V	Unknown	vi	ii	iv (rabbits), vii
SCHEDULE 1; RARE/LIKELY TO BECOME EXTINCT, DIV 7 (ARACHNIDS)					
Tartarus mullamullangensis	V	Unknown	vi	ii	xii (habitat disturbance due to recreation)
Tartarus murdochensis	V	Unknown	vi	ii	xii (habitat disturbance due to recreation)
Troglodiplura lowryi	V	Unknown	vi	ii	xii (habitat disturbance due to recreation)

[1]Appendix C, rank 2; [2]Appendix C, rank 3; [3]Appendix C, rank 1; [4]Appendix B, key e

Declared rare and priority flora

Species Name	Status	Condition[1]	Trend[2]	Reliability[3]	Threatening Processes[4]
PRIORITY 1					
Grevillea phillipsiana	1	Unknown	vi	ii	iv, v (rabbits), vii
Lepidium fasciculatum	1	Unknown	vi	ii	iv, v (rabbits), vii
Thysanotus baueri	1	Unknown	vi	ii	iv, v (rabbits), vii
PRIORITY 2					
Phlegmatospermum eremaeum	2	Unknown	vi	ii	iv, v (rabbits), vii, vi (Ward's weed)

Analysis of appropriate management scenarios

Reservation priorities of ecosystems

Beard Veg Assoc	Ecosystem Description	IUCN I-IV	Non IUCN Reserve	CALM purchased lease	Priority
122	Succulent steppe with open low woodland; *Acacia papyrocarpa* over saltbush & bluebush,	X			L
214	Mosaic: Medium woodland; goldfield eucalypts/Succulent steppe with open low woodland; myoporum over saltbush				H
441	Succulent steppe with open low woodland; mulga & sheoak over bluebush				L
448	Succulent steppe; bluebush (in dongas)	X			H
449	Succulent steppe; bluebush with grassy depressions				H
461	Succulent steppe with open low woodland; *Acacia papyrocarpa* over bluebush				H
482	Medium woodland; merrit & red mallee				L
515	Shrublands; mallee scrub, blue mallee (*Eucalyptus socialis*)				L
676	Succulent steppe; samphire				L
936	Medium woodland; salmon gum				L
1241	Succulent steppe; bluebush	X	X		M
4623	Succulent steppe with low woodland; *Acacia papyrocarpa* over bluebush	X			H
4641	Succulent steppe with open woodland; salmon gum & gimlet over bluebush				H

Subregional constraints in order of priority

(see Appendix B, key g)

Competing Landuses: Particularly pastoral leases and associated activities.

Other Subregional Constraints: These are primarily resource related in terms of management and research.

Bioregional and subregional priority for reserve consolidation

(see Appendix D, and Appendix C, rank 4)

Overall 16% of Nullarbor bioregion is reserved in IUCN I-IV reserves and the bioregion is reservation Class 5 (see Appendix D, and Appendix C, rank 4). At the subregional scale NUL1 has 36% of its area in IUCN I-IV reserves while NUL2 has 4.7%. NUL2 is considered a higher primary classification, therefore should be upgraded to Class 3 as significant threatening processes exist (grazing, feral animals and changed fire regimes) and the reserve system is biased in terms of CAR.

Reserve management standard

(see Appendix C, rank 5)

Rating for NUL2 is (ii) fair, indicating that biodiversity values and management issues poorly identified and some resource degradation is occurring, although it is thought to be retrievable. Wildfire management is non-existent; mining exploration activities are supervised; impact of feral herbivores is unknown. Some grazing from domestic stock is occurring in reserves.

Class	Purpose	Name	Category	Reserve Management Rank
A	Conservation of Flora and Fauna	Great Victoria Desert Nature reserve	Nature Reserve	ii - iii
A	Primitive Area for the Preservation and Study of Flora Fauna, Geological and Anthropological Features	Nuytsland Nature Reserve	Nature Reserve	ii - iii

Off reserve conservation

Priority species or groups

Species	Specific Recovery Plan	General Recovery Plan
Acanthiza iredalei iredalei	No	Action Plan for Australian Birds
Dasycercus cristicauda	Yes - Species monitored by the National Threatened Species Recovery team	Action Plan for Australian Marsupials and Monotremes
Cinclosoma cinnamomeum	No	Action Plan for Australian Birds

Appropriate species recovery actions

The general recovery actions applicable to all species in NUL2 might include: (i) habitat retention through reserves (implementation of management plan recommendation; (xiii) capacity building with community, landholders, and industry (concerning pastoral operations); fire management (ix) to reduce the impact of large intense, summer wildfires on habitat and fauna populations; further research (xii) is required to determine species status, distribution and gain increased knowledge of subregion; feral animal control (vii) would assist with extant CWR species recovery. Insufficient resources to implement management activities is a major constraint.

Species	Recovery Actions[1]	Recovery Descriptions
Acanthiza iredalei iredalei	vii, ix, xii	Feral predator control important, further research into species ecology and habitat requirements is needed. Fire management may be necessary
Dasycercus cristicauda	iii, vii, ix, xii	Habitat protection on other state lands, further research into the species ecology. Feral predator control and fire management are important.
Cinclosoma cinnamomeum	vii, ix, xii	Feral animal control (herbivores and predators), Fire management may be necessary

[1]Appendix B, key h

Ecosystems and existing recovery plans

Ecosystem	Specific Recovery Plan	General Recovery Plan
Wetlands of the Nullarbor region	No local or regional action plan	No
Stygofauna	No local or regional action plan	No

Appropriate ecosystem recovery actions

Ecosystem	Recovery Actions[1]	Recovery Descriptions
Stygofauna	xii, i, ii	Further research into species ecology, and habitat retention and protection on other lands.
Wetlands of the Nullarbor region	i, iii, vii, xii	Habitat retention through reservation and protection on other state lands, further research and feral animal control.

[1]Appendix B, key h

Subregion priority for off reserve conservation

The subregional priority for off park conservation is (ii) (see Appendix C, rank 6) which indicates that significant off park effort is required. There are significant conflicting land uses as much of NUL2 (60%) is utilised for grazing (pastoral leases).

Conservation actions as an integral part of NRM

Existing NRM actions

Industry Codes of Practice: Particularly in relation to pastoral lease management and activities.
Environmental Management Systems and Ecological Sustainable Product Marketing.

Integration with Property Management Planning, Catchment Planning and Landcare.

Feasible opportunities for NRM

Legislation: Including duty of care for leasehold and other lands

Institutional Reform: Expansion of reform in pastoral and mining industries.

Threat Abatement Planning as Part of NRM: Vegetation and threatened species management plans, pest management and fire management plans.

Capacity Building Required With Community, Landholders, Industry and Institutions.

Impediments or constraints to opportunities

A number of impediments exist, including the Land Administration Act and operations of the Pastoral Lands Board. Conservation Through Reserves (CTR) is limited through mining leases and tenements. There is a need to increase awareness of conservation values through education of various industries (mining, pastoral) and the public in general. Limited financial resources are also a major constraint.

Subregions where specific NRM actions are a priority to pursue

(see Appendix C, rank 7)

The NRM rank for NUL2 has a rank of (iv), indicating that there are some constraints to integrate conservation into NRM. Some NRM instruments in place with some achieved biodiversity outcomes.

Data gaps

Gaps in data needed for the identification of biodiversity values and management responses

Prior to the Bioregional survey in 1984 no complete study of the Eucla Basin had ever been undertaken. Other Nullarbor studies had been largely opportunistic or focused on individual species or taxonomic groups.

Vegetation and Regional Ecosystem Mapping: Regolith mapping is available (Hamilton, Victoria) for Nullarbor bioregion. Regional survey of flora and vertebrate fauna for bioregion has been published, but is based on very sparse sampling.

Systematic Fauna Survey: Data is confined to vertebrates and is sparse. Bioregion survey had 80 quadrats across bioregion (SA and WA) with 20 in NUL2. Quadrats only positioned on discrete vegetation units and surface types with more widespread land units replicated. All quadrats were sampled twice, Spring and Autumn 1984 (4 days and nights each sampling).

Floristic Data: Data is general and knowledge is incomplete. Bioregion survey had 80 quadrats across bioregion (SA and WA) with 20 in NUL2. Quadrats only positioned on discrete vegetation units and surface types with more widespread land units replicated.

Ecological and Life History Data: There is little data on habitat requirements of virtually all invertebrate species, most ephemeral plants, persisting CWR mammals and uncommon vertebrate and plant species. There is no data to provide regional context on life history (including population trend) of any species apart from rabbits. Gilfillan (1999) provides some insight into rabbit population trend, albeit from two survey sites.

Other Priority Data Gaps Include:
Quantitative data on the affect of exotic predators, weed colonisation, fire.
No quantitative data for feral herbivores other than rabbits. There is some quantitative data on the impact of grazing on vegetation systems on pastoral leases.

Sources

References cited

No.	Author	Date	Title	Publication Details	Pub. Type
298	Garnett, S.T. and Crowley, G.M.	(2000).	The Action Plan for Australian Birds.	Environment Australia, Canberra.	R
483	Maxwell, S., Burbidge, A.A. and Morris, K. (eds).	(1996).	The 1996 Action Plan for Australian Marsupials and Monotremes. Wildlife Australia Endangered Species Program Project Number 50.	Environment Australia, Canberra.	R
231	Department of Conservation and Land Management	(1994b).	Goldfields Region Management Plan 1994-2004. Management Plan No. 27.	Department of Conservation and Land Management.	R
306	Gilfillan, S.	(1999).	Monitoring the impacts of changed rabbit numbers due to Rabbit Calicivirus Disease on native fauna and vegetation in the Stirling Range, Western Australia.	Department of Conservation and Land Management. National Rabbit Calicivirus Monitoring and Surveillance Program.	R

R = Report; J = Journal article; O = Other.

Other relevant publications

See reference numbers 040, 081, 098, 101, 133, 166, 181, 206, 207, 208, 209, 241, 268, 278, 417, 489, 490, 507, 508, 602 and 673 in Appendix A.