

Dampierland 2 (*DL2 – Pindanland subregion*)

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Subregional description and biodiversity values

Description and area

There are four basic components to the subregion. These comprise;

- Quaternary sandplain overlying Jurassic and Mesozoic sandstones with Pindan. There are hummock grasslands on hills.
- Quaternary marine deposits on coastal plains, with mangal, samphire – *Sporobolus* spp. grasslands, *Melaleuca alsophila* low forests, and *Spinifex* spp. – *Crotalaria* spp. strand communities.
- Quaternary alluvial plains associated with the Permian and Mesozoic sediments of Fitzroy Trough support tree savannahs of ribbon grass (*Chrysopogon* spp.) – bluegrass (*Dichanthium* spp.) grasses with scattered coolibah (*Eucalyptus microtheca*) – *Bauhinia cunninghamii*. There are riparian forests of river red gum (*Eucalyptus camaldulensis*) and Cadjeput (*Melaleuca* spp.) fringe drainages.

The climate is described as dry hot tropical and semi-arid with summer rainfall. The average annual rainfall is between 450 – 700 mm, slightly lower than the Fitzroy Trough subregion. The area of DL2 is 5, 198, 904 ha.

The Pindanland subregion comprises sandplains of the Dampier Peninsular and western part of Dampier Land, including the hinterland of the Eighty Mile Beach. It is a fine-textured sand-sheet with subdued dunes and includes the paleodelta of the Fitzroy River. The vegetation is described primarily as pindan. This is the coastal, semi-arid, north-western margin of the Canning Basin.

Broad scale vegetation mapping of the area describes the following components;

- Mangroves.
- Coastal dune communities.
- Ephemeral herblands and/or grasslands with scattered low trees.
- Mixed species tussock grasslands or sedgeland +/- emergent *Pandanus* spp. (screw palm).
- *Eucalyptus tectifera* (Darwin box), *Corymbia flavescens* woodland with *Acacia tumida* (pindan wattle) open-scrub and *Chrysopogon* spp. (ribbon grass) and *Triodia bitextura* grasses.
- *Eucalyptus tetradonta* (Darwin stringybark), *Eucalyptus miniata* (Darwin woollybutt) +/- *Eucalyptus* spp. +/- *Livistona* spp. (fan palms) woodland with a ground layer of tussock grasses and *Triodia bitextura*.
- *Melaleuca citrolens* (lemon-scented teatree) and *Melaleuca* spp. (paperbark) low woodland with sparse *Chrysopogon fallax* (golden beard grass) tussock grasses.

- *Adansonia gregorii* (boab), *Bauhinia cunninghamii* and *Grevillea striata* (beefwood) grassy low open-woodland.
- *Corymbia dampieri* low open-woodland with *Acacia* spp. Shrubs and *Triodia pungens* (soft spinifex) and *Triodia bitextura* hummock grasses.
- *Eucalyptus brevifolia* (snappy gum) low open-woodland with *Triodia* spp. (spinifex) hummock grasses or sometimes a hummock grassland without trees.
- *Acacia ancistrocarpa* (Fitzroy wattle) and/or *Acacia eriopoda* (Broome pindan wattle) and/or *Acacia monticola* (Gawar) tall shrubland with *Triodia intermedia* (lobed spinifex) and *Triodia pungens* (soft spinifex) hummock grasses.
- *Grevillea refracta* +/- *Hakea lorea* corkwood open-shrubland with *Triodia pungens* (soft spinifex) hummock grasses.
- *Triodia pungens* (soft spinifex) and/or *Triodia schinzii* hummock grassland wooded with low trees and *Acacia* spp. Shrubs.

Dominant land use

(see Appendix B, key b)

- (ix) Grazing – Native pastures
- (xi) UCL and Crown reserves

Continental Stress Class

The Continental Stress Class for DL2 is currently 6, however, given the continuing impacts of landscape scale threatening processes this may need to be reviewed.

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

Rare Features:

- Numerous patches of rainforest found mainly behind the coastal primary dune system with a structure unique to the Dampier Peninsula.
- The extensive mudflats of Roebuck Bay and Eighty Mile Beach resulting from two major paleoriver systems.
- The enormous numbers of migratory birds found at Roebuck Bay and Eighty Mile Beach.
- *Keraudrenia exastia* and *Pandanus spiralis* var. *flammeus* are both declared rare species.
- The vast grasslands of the Roebuck Plains.
- Coastal swamps adjacent to Eighty Mile Beach.
- Claypans support populations the uncommon aquatic plant *Nymphaea indica* (G. Keighery pers. comm.).

Centres of Endemism:

Rainforest patches are particularly important to invertebrates such as Camaenid land snails and annelids. Camaenid land snails have a large number of endemic

species and some endemic genera showing strongly localised patterns of endemism. All the rainforest patches studied to date have endemic earthworm species associated with them.

Refugia:

The nature of this aspect is poorly known. 'Dry' rainforest patches, (as well as swamp rainforests), Mangroves, Riparian zones and Springs (particularly associated with the Edgar Ranges area) provide dry season refuges.

High Species and Ecosystem Diversity:

Rainforests are defined by their vegetation associations and are resource centres for a variety of faunal taxa that are either directly linked to rainforests or are more widely ranging species that are dependent on them. Examples include fruit pigeons and flying foxes.

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

Wetlands

Wetlands of National significance (DIWA listings)

Name and Code	Description ¹	Condition ²	Trend ³	Reliability ⁴	Threatening Process ⁵
Bunda-Bunda Mound Springs WA016	B17	iii	iii	ii	iv, vii
Eighty Mile Beach System WA018	A5	iv	vi	ii	iv, xii (excessive human disturbance, potential for irrigated agriculture using groundwater inland), xi (pollution is a potential threat)
Roebuck Bay WA020	A7	Terrestrial ii, Marine iv	Terrestrial iii, Marine vi	ii	xii (excessive human disturbance, non sustainable hunting of dugong), xi (pollution is a potential threat)
Roebuck Plains System WA021	A7	iii	iii	ii	iv, vii
Willie Creek Wetlands WA022		iii	iii		x (groundwater extraction, causeway construction), v (feral animals), xii (expansion of the town of Broome)

¹Appendix B, key d; ²Appendix C, rank 2; ³Appendix C, rank 3; ⁴Appendix C, rank 1; ⁵Appendix B, key e;

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

No wetlands of subregional significance have been identified in DL2.

Riparian zone vegetation

Name	Condition ¹	Trend ²	Reliability ³	Threatening Processes ⁴
All fringing vegetation of riparian zones	iii	iii	ii	vii, iv, v (feral herbivores), x, vi

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

Ecosystems at risk

Threatened ecological communities (TECs)

Community	Status	NVIS ¹	Condition ²	Trend ³	Reliability ⁴	Threatening Processes ⁵
Monsoon (vine) thickets on coastal sand dunes of the Dampier Peninsula	V	2	ii	iii	iii	iv, vii, ii
Species-rich faunal community of the intertidal mudflats of Roebuck Bay.	V	40	iii	vi	iii	xii (human impact), xi (possible pollution)
Disaster Bay organic mound spring communities.		N/A	ii-iii	vi	iii	iv, xii (soil compaction by cattle; potential changes in sea level due to

The CTRC report in 1974 System 7 formed the basis of the Department's publication "Nature Conservation Reserves in the Kimberley" which has itself been incorporated in a Departmental Draft Regional Management Plan. These reports were focused on non-production lands and those areas not likely to be prospective for minerals. Action statements and strategies in the draft regional management plan do not go to the scale of subregion or even bioregion. Previous rainforest studies are applicable (McKenzie *et al* 1991).

Apart from specific survey work there has been no systematic review of biodiversity but it is apparent that there are on-going changes to the status of fauna (particularly mammals) and plant taxa. There is reasonable evidence about continuing loss of species and changes to assemblages at the landscape level which are affecting vegetation structure (e.g. loss of shrub layer), composition (e.g. perennial vs. annual grasses), vegetation cover, leaf litter, and organics in the upper soil horizon. It is generally recognised that flow-on effects of changes in the physical components of the environment, vegetation structure changes and other factors (e.g. exotic predators) can have significant effects on fauna. Work to date has been of a general nature.

						climate change)
Bunda Bunda organic mound spring communities	V	N/A	ii	iii-iv	iii	iv, vi, xii (soil compaction and erosion)
Assemblages of the organic springs and mound springs of Mandora Marsh area	V	N/A	i-ii	iii	iii	iv (cattle), xii (soil compaction and erosion)

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

Other ecosystems at risk

There are many widespread vegetation types across this subregion that are threatened by changed fire regimes.

Ecosystem	Status	NVIS ¹	Condition ²	Trend ³	Reliability ⁴	Threatening Process ⁵
Assemblages of permanent/ephemeral wetlands, damplands, and riparian habitat of the Dampierland region.	V	15, 38, 42	Variable	iii	ii	iv, vii, v
Organic mound spring communities of Lolly Well spring.	P1	N/A	iii	iv	iii	x (ground water abstraction), vii, xii (road construction is affecting salt inflow and fresh water outflows; litter), vi
Nimalaica clay pan community. Inland from Willie Creek.	P4	42	Unknown	iii	iii	x (groundwater extraction, causeway construction), v (feral animals), xii (expansion of the town of Broome)
Saline grasslands on tidal flats above high-water mark (<i>Sporobolus virginicus</i> dominated) on Dampier Peninsula/Broome area.	P1	37	Unknown	vi	ii	vii
Vine thickets on heavily ferruginised Emeriau sandstone on Dampier Peninsula.		2	Unknown	vi	ii	vii, v
Flora and fauna assemblages of spring communities Logues Spring, south-west Kimberley Edgar Range near Dampier Downs.		43	ii	iii	iii	iv
Assemblages of Culla Culla Creek – unusual spring site in Dampierland.			Unknown	vi	ii	Unknown threatening processes
Assemblages of Taylors Lagoon, Lake Champion, and Lake Eda.	V	42	Unknown	vi	iii	Unknown threatening processes

¹Appendix B, key f; ²Appendix C, rank 2; ³Appendix C, rank 3; ⁴Appendix C, rank 1; ⁵Appendix 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)					
<i>Macrotis lagotis</i>	V	Unknown	vi	ii	vii, v (predators)
SCHEDULE 1: RARE/LIKELY TO BECOME EXTINCT, DIV 2 (BIRDS)					
<i>Erythrura gouldiae</i>	E	Unknown	iii	ii	vii
<i>Erythrorchis radiatus</i>	V	Unknown	vi	Unknown	Unknown threatening processes
SCHEDULE 1: RARE/LIKELY TO BECOME EXTINCT, DIV 3 (REPTILES)					
<i>Caretta caretta</i>	E	Unknown	vi	Unknown	Unknown threatening processes
<i>Lepidochelys olivacea</i>	E	Unknown	vi	Unknown	Unknown threatening processes
<i>Chelonia mydas</i>	V	Unknown	vi	Unknown	Unknown threatening processes
<i>Dermochelys coriacea</i>	V	Unknown	vi	Unknown	Unknown threatening processes
<i>Eretmochelys imbricata</i>	V	Unknown	vi	Unknown	Unknown threatening processes
<i>Natator depressus</i>	V	Unknown	vi	Unknown	Unknown threatening processes
SCHEDULE 4: OTHER SPECIALLY PROTECTED FAUNA. DIVISION 3 (REPTILES)					
<i>Crocodylus johnstoni</i>	S4	Unknown	iv	iii	Unknown threatening processes
<i>Crocodylus porosus</i>	S4	Unknown	v	iii	Unknown threatening processes
OTHER SPECIES AT RISK WITHIN THE SUBREGION					
<i>Rhinonictis aurantius</i>	S1	Unknown	vi	Unknown	Unknown threatening processes
<i>Neochmia ruficauda subclarescens</i>	Near threatened	Unknown	iii	iii	vii
<i>Phaps histrionica</i>	Near threatened	Unknown	vi	Unknown	Unknown threatening processes
<i>Heteromunia pectoralis</i>	Near threatened	Unknown	vi	Unknown	Unknown threatening processes
<i>Ardeotis australis</i>	Near threatened	Unknown	vi	Unknown	Unknown threatening processes

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

Declared rare and priority flora

Species Name	Status	Condition ¹	Trend ²	Reliability ³	Threatening Processes ⁴
DECLARED RARE FLORA					
<i>Keraudrenia exastia</i>	CR	Unknown	iv	iii	xii (urban impacts; potential land clearing)
<i>Pandanus spiralis</i> var. <i>flammeus</i>	E	Unknown	v	iii	iv, vi
PRIORITY 1					
<i>Cullen candidum</i>	1	Unknown	vi	Unknown	Unknown threatening processes
<i>Glycine pindanica</i>	1	Unknown	vi	Unknown	Unknown threatening processes
<i>Nicotiana heterantha</i>	1	Unknown	vi	Unknown	Unknown threatening processes
<i>Sauropus salignus</i>	1	Unknown	vi	Unknown	Unknown threatening processes
PRIORITY 2					
<i>Gomphrena pusilla</i>	2	Unknown	vi	Unknown	Unknown threatening processes
<i>Goodenia sepalosa</i>	2	Unknown	vi	Unknown	Unknown threatening processes
<i>Nymphoides beaglensis</i>	2	Unknown	vi	Unknown	Unknown threatening processes
<i>Olax spartea</i>	2	Unknown	vi	Unknown	No known threatening processes

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

Analysis of appropriate management scenarios

Reservation priorities of ecosystems

The following Dampierland vegetation associations are not reserved within the bioregion:

Beard Veg Assoc.	Description	Area (Ha)
32	Shrublands, pindan: <i>Acacia</i> shrubland with scattered low trees over <i>Plectrachne</i> spp. and <i>Triodia</i> spp.	35,672
37	Shrublands; teatree (<i>Melaleuca</i> spp.) thicket.	14,505
41	Shrublands; teatree (<i>Melaleuca</i> spp.) scrub.	11,680
60	Grasslands, tall bunch grass savannah woodland, Darwin box (<i>Eucalyptus tectifica</i>) and cabbage gum (<i>Eucalyptus grandifolia</i>) over ribbon grass (<i>Chrysopogon</i> spp.).	36,558
61	Grasslands, tall bunch grass savannah woodland, coolibah over ribbon grass (<i>Chrysopogon</i> spp.).	81,828
64	Grasslands, tall bunch grass savannah low tree; boab (<i>Adansonia gregorii</i>), bauhinia (<i>Bauhinia cunninghamii</i>) and beefwood (<i>Grevillea striata</i>) over ribbon grass (<i>Chrysopogon</i> spp.).	460,411
67	Grasslands, tall bunch grass savannah, sparse low tree; ribbon grass (<i>Chrysopogon</i> spp.) paperbarks (<i>Melaleuca</i> spp.).	28779
73	Grasslands, short bunch grass savannah, grass: salt watermarine couch (<i>Sporobolus virginicus</i>).	242,046
93	Hummock grasslands, shrub steppe; Ranji bush (<i>Acacia pyrifolia</i>) over soft spinifex (<i>Triodia pungens</i>).	1,030
101	Hummock grasslands, shrub steppe; <i>Acacia</i> spp. over soft spinifex (<i>Triodia pungens</i>).	13
104	Hummock grasslands, shrub steppe; silverleaf grevillea (<i>Grevillea refracta</i>) and <i>Hakea</i> spp. over soft spinifex (<i>Triodia pungens</i>).	90,204
117	Hummock grasslands, grass steppe; soft spinifex (<i>Triodia pungens</i>).	27,410
125	Bare areas; salt lakes.	2,285
126	Bare areas; freshwater lakes.	259
175	Short bunch grassland - savannah/grass plain.	18,549
676	Succulent steppe; samphire.	207
699	Shrublands, pindan: <i>Acacia eriopoda</i> shrubland with scattered low bloodwood (<i>Eucalyptus</i> spp.) and <i>Eucalyptus setosa</i> over soft (<i>Triodia pungens</i>) and <i>Triodia bitextura</i> on sandplain.	1,885,682
700	Shrublands, pindan: <i>Acacia eriopoda</i> shrubland with scattered low bloodwood (<i>Eucalyptus</i> spp.) and <i>Eucalyptus setosa</i> over soft (<i>Triodia pungens</i>) and <i>Triodia bitextura</i> between dunes.	1,046,019
701	Hummock grasslands, shrub steppe; <i>Acacia</i> spp. and <i>Grevillea</i> spp. over soft spinifex (<i>Triodia pungens</i>) and winged lobed spinifex (<i>Triodia intermedia</i>) on sandy plateau.	115,505
702	Hummock grasslands, grass steppe; winged lobed spinifex (<i>Triodia intermedia</i>).	25,551
704	Grasslands, short bunch grass savannah low tree and sparse shrubs; bauhinia (<i>Bauhinia cunninghamii</i>), Broome pindan wattle (<i>Acacia eriopoda</i>) and <i>Acacia</i> spp. over <i>Aristida</i> spp. short grasses on river flats.	65,444
705	Hummock grasslands, sparse tree steppe; snappy gum (<i>Eucalyptus brevifolia</i>) and bloodwood (<i>Eucalyptus</i> spp.) and roughleaf bloodwood (<i>Eucalyptus setosa</i>) over lobed spinifex (<i>Triodia intermedia</i>).	19,218
707	Grasslands, tall bunch grass savannah sparse low tree; bauhinia (<i>Bauhinia cunninghamii</i>) and coolibah over ribbon/blue grass (<i>Chrysopogon</i> spp./ <i>Bothriochloa</i> spp.) on black soil.	215,223
710	Mosaic: Grasslands, tall bunch grass savannah low tree; boab (<i>Adansonia gregorii</i>), bauhinia (<i>Bauhinia cunninghamii</i>) and beefwood (<i>Grevillea striata</i>) over ribbon grass (<i>Chrysopogon</i> spp.)/hummock grasslands, grass steppe soft spinifex (<i>Triodia pungens</i>) and <i>Triodia bitextura</i> .	27,073
712	Mosaic: Shrublands, pindan: <i>Acacia eriopoda</i> shrubland with scattered low bloodwood (<i>Eucalyptus</i> spp.) and <i>Eucalyptus setosa</i> over soft (<i>Triodia pungens</i>) and <i>Triodia bitextura</i> /Grasslands, tall bunch grass savannah low tree; boab (<i>Adansonia gregorii</i>), <i>Bauhinia cunninghamii</i> and beefwood (<i>Grevillea striata</i>) over ribbon grass (<i>Chrysopogon</i> spp.).	258,457
716	Mosaic: Grasslands, tall bunch grass savannah low tree; boab (<i>Adansonia gregorii</i>), bauhinia (<i>Bauhinia cunninghamii</i>) and beefwood (<i>Grevillea striata</i>) over ribbon grass (<i>Chrysopogon</i> spp.)/Hummock grasslands, open low tree-steppe; snappy gum (<i>Eucalyptus brevifolia</i>) over soft spinifex (<i>Triodia pungens</i>) and lobed spinifex (<i>Triodia intermedia</i>).	12,276
721	Hummock grasslands, sparse tree steppe; eucalypt and bauhinia (<i>Bauhinia cunninghamii</i>) over lobed spinifex (<i>Triodia intermedia</i>).	55,049
722	Shrublands, pindan: <i>Acacia</i> spp. and <i>Acacia eriopoda</i> shrubland with sparse low <i>Bauhinia cunninghamii</i> and bloodwood (<i>Eucalyptus</i> spp.) over ribbon (<i>Chrysopogon</i> spp.) and <i>Triodia bitextura</i> .	14,652
724	Hummock grasslands, shrub steppe; <i>Acacia</i> spp. over winged lobed spinifex (<i>Triodia intermedia</i>).	154
737	Shrublands, pindan: pindan wattle (<i>Acacia tumida</i>) shrubland with scattered low bloodwood (<i>Eucalyptus</i> spp.) and roughleaf bloodwood (<i>Eucalyptus setosa</i>) over <i>Triodia bitextura</i> .	38,160
742	Medium woodland; river red gum (<i>Eucalyptus camaldulensis</i>) and <i>Terminalia</i> spp.	11

Beard Veg Assoc.	Description	Area (Ha)
743	Grasslands, tall bunch grass savannah sparse low tree; <i>Acacia suberosa</i> and bauhinia (<i>Bauhinia cunninghamii</i>) over ribbon/blue grass (<i>Chrysopogon</i> spp./ <i>Bothriochloa</i> spp.) on black soil.	4108
745	Shrublands, pindan: <i>Acacia</i> spp. shrubland with scattered low trees over spinifex.	246
751	Shrublands, pindan: <i>Acacia eriopoda</i> and pindan wattle (<i>Acacia tumida</i>) shrubland with scattered low <i>Eucalyptus confertiflora</i> over <i>Triodia bitextura</i> .	13,411
752	Hummock grasslands, shrub steppe; pindan wattle (<i>Acacia tumida</i>) over winged lobed spinifex (<i>Triodia intermedia</i>).	7,129
754	Shrublands, pindan: pindan wattle (<i>Acacia tumida</i>) shrubland with Northern woollybutt (<i>Eucalyptus miniata</i>) and cabbage gum (<i>Eucalyptus grandifolia</i>) medium woodland over ribbon grass (<i>Chrysopogon</i> spp.) and <i>Triodia bitextura</i> .	195,258
755	Shrublands, pindan: pindan wattle (<i>Acacia tumida</i>) and <i>Acacia</i> spp. shrubland with scattered low bloodwood (<i>Eucalyptus</i> spp.) and roughleaf bloodwood (<i>Eucalyptus setosa</i>) over ribbon grass (<i>Chrysopogon</i> spp.) and <i>Triodia bitextura</i> .	19,881
756	Medium woodland; river red gum (<i>Eucalyptus camaldulensis</i>) and <i>Terminalia</i> spp. mixed with coolibah and ghost gum (<i>Eucalyptus bella</i>).	2,838
757	Shrublands, pindan: pindan wattle (<i>Acacia tumida</i>) and <i>Acacia</i> spp. shrubland with scattered low bloodwood (<i>Eucalyptus</i> spp.) and roughleaf bloodwood (<i>Eucalyptus setosa</i>) over ribbon grass (<i>Chrysopogon</i> spp.) and <i>Triodia bitextura</i> .	16,926
759	Grasslands, tall bunch grass savannah woodland, coolibah over ribbon/blue grass (<i>Chrysopogon</i> spp./ <i>Bothriochloa</i> spp.).	55,395

761	Hummock grasslands, shrub steppe: <i>Acacia eriopoda</i> and pindan wattle (<i>Acacia tumida</i>) over <i>Triodia</i> spp. and spinifex (<i>Triodia intermedia</i>) sandplain	27,575
762	Hummock grasslands, shrub steppe: <i>Acacia eriopoda</i> over soft spinifex (<i>Triodia pungens</i>).	7,939
764	Shrublands, pindan: <i>Acacia eriopoda</i> and pindan wattle (<i>Acacia tumida</i>) shrubland with scattered low bloodwood (<i>Eucalyptus</i> spp.) and <i>Eucalyptus setosa</i> over ribbon grass (<i>Chrysopogon</i> spp.) and <i>Triodia bitextura</i> .	581,958
765	Shrublands, pindan.	185,199
767	Hummock grasslands, shrub steppe: silverleaf grevillea (<i>Grevillea refracta</i>) over soft spinifex (<i>Triodia pungens</i>).	599
770	Shrublands; Wattle thicket near Broome.	878
771	Shrublands, pindan; pindan wattle (<i>Acacia tumida</i>) shrubland with ghost gum (<i>Eucalyptus bella</i>) and roughleaf bloodwood (<i>Eucalyptus setosa</i>) medium woodland over <i>Triodia bitextura</i> .	36,173
840	Grasslands, tall bunch grass savannah, ribbon/blue grass (<i>Chrysopogon</i> spp./ <i>Bothriochloa</i> spp.).	36,663
854	Grasslands, tall bunch grass savannah low tree; boab (<i>Adansonia gregorii</i>), bauhinia (<i>Bauhinia cunninghamii</i>) and beefwood (<i>Grevillea striata</i>) over ribbon grass (<i>Chrysopogon</i> spp.) and blue grass (<i>Bothriochloa</i> spp.).	5,975
864	Grasslands, tall bunch grass savannah low tree; bloodwood (<i>Eucalyptus</i> spp.) over ribbon grass (<i>Chrysopogon</i> spp.).	2,424
866	Grasslands, tall bunch grass savannah sparse low tree; bauhinia (<i>Bauhinia cunninghamii</i>) and coolibah over ribbon grass (<i>Chrysopogon</i> spp.) on black soil.	7,152
867	Grasslands, high grass savannah low woodland: Darwin box (<i>Eucalyptus tectifica</i>) and cabbage gum (<i>Eucalyptus grandifolia</i>) over white grass (<i>Sehima nervosum</i>) and/or upland tall grass.	5,239
1271	Bare areas; claypans.	1,745
2041	Succulent steppe with scrub; teatree (<i>Melaleuca</i> spp.) over saltflats.	153
7001	Shrublands, pindan: <i>Acacia eriopoda</i> and pindan wattle (<i>Acacia tumida</i>) shrubland with scattered low <i>Eucalyptus grandifolia</i> and <i>Eucalyptus setosa</i> over ribbon (<i>Chrysopogon</i> spp.) and <i>Triodia bitextura</i> .	110,505
8003	Grasslands, curly spinifex (<i>Triodia bitextura</i>).	123,265

Poorly represented ecosystems subject to threat:

Assemblages of permanent/ephemeral wetlands, damplands, and riparian habitat of the Dampierland region.
Species-rich faunal community of the intertidal mudflats of Roebuck Bay.
Monsoon (vine) thickets on coastal sand dunes of the Dampier Peninsula.
Disaster Bay organic mound spring communities.
Organic mound spring communities of Lolly Well spring.
Nimalaica clay pan community. Inland from Willie Creek.
Saline grasslands on tidal flats above high-water mark (<i>Sporobolus virginicus</i> dominated) on Dampier Peninsula/Broome area.
Roebuck Bay freshwater seepage (sponges) community.
Vine thickets on heavily ferruginised Emeriau sandstone on Dampier Peninsula.
Flora and fauna assemblages of spring communities Logues Spring, south-west Kimberley Edgar Range near Dampier Downs.
Assemblages of Culla Culla Creek – unusual spring site in Dampierland.
Assemblages of Taylors Lagoon, Lake Champion, and Lake Eda.
Assemblages of the ephemeral Claypan at Cape Borda

Note: the lack of study in some areas precludes statements about the level of reservation required.

Subregional constraints in order of priority

(see Appendix B, key g)

Competing Land Uses: Pastoral production and mining.

Economic Constraints: Land prices for pastoral leases.

Bioregional and subregional priority for reserve consolidation

The Dampierland has a ranking priority under the preliminary bioregional NRS priorities of 1 (see Appendix D, and Appendix C, rank 4). However this may need to be increased because of the creation of several conservation parks within the Fitzroy Trough subregion. There continue to be problems with the continued impact of inappropriate fire regimes and uncontrolled stock grazing. The fire issue is becoming particularly relevant for the Pindanland subregion. It can also be argued that there is a bias in the reserve system because some ecosystems not reserved are those that are being grazed and have been grazed the longest and are often burnt the most often (or the most frequency x intensity).

Other: Our knowledge of biodiversity patterns across the subregion's landscape does not have enough resolution to accurately define all acquisition priorities on the ground.

In terms of priority the Pindanland subregion would have a higher priority than the Fitzroy Trough subregion.

Reserve management standard

The bioregion is ranked at poor (i) to fair (ii) (see Appendix C, rank 5). Apart from the donkey control program undertaken by the Department of Agriculture (WA) there are no concerted feral animal control programs in place. There is limited strategic aerial prescribed burning along with some opportunistic hand burns with the latter being confined to very small areas of the Fitzroy Trough subregion. Extent of other threatening processes, for example weeds, yet to be determined. Due to uncontrolled stock access, changes are occurring within parks particularly in valley systems.

Estate	Rank ¹	Issues
National Parks		
Windjana Gorge	ii	Ranger presence during the tourist season. Full extent of threatening processes (Fire, weeds, feral animals) need to be documented.
Geikie Gorge	ii	Full time ranger presence. Full extent of threatening processes (Fire, weeds, feral animals) need to be

		documented.
Conservation Parks		
Brooking Gorge	i	Full extent of threatening processes (Fire, weeds, feral animals) need to be documented.
Devonian Reef	i	Full extent of threatening processes (Fire, weeds, feral animals) need to be documented.
Nature Reserves		
Point Coulomb	i	Full extent of threatening processes (Fire, weeds, feral animals) need to be documented.

¹Appendix C, rank 5

Off reserve conservation

Priority species or groups

- Threatening processes operate from the species to landscape level.
- Little is known of the status of critical weight range mammals in Pindanland subregion.
- Action is required to identify appropriate fire regimes.
- The effect of fire and cattle on critical weight range mammals, granivorous birds and savannah composition and structure is of concern.
- Changed grassland structures are of concern.
- There is evidence that changes have, and continue, to occur for the balance between annual and perennial grasses.
- Landscape level threatening processes also bring about changes to the organic profile layer in soils, water infiltration rates and surface flow velocity after rain.
- Impacts on rainforest patches of inappropriate fire regimes and specifically rainforest fire/cattle interaction is of concern.
- There have been changes to riparian zones due to the impact of changed fire regimes, grazing and the indirect effects from changed hydrology.
- Action is required to identify what is at risk and components of the biota at most risk then recommend and research appropriate management.
- Little is known of the distribution, status and impact of weed species.

Existing species recovery plans

The Action Plan for Australian Bats
 The Action Plan for Australian Birds 2000
 Action Plan for Australian Marsupials and Monotremes
 Gouldian Finch Recovery Plan.
 Draft Kimberley Region Management Plan (various strategies).

Appropriate recovery actions

Fire Management: Move to biodiversity driven approaches to fire management strategies. Avoid frequent, broad scale, hot, late dry-season burning in savannah.

Industry Codes of Practice: Need to define weeds priorities both in an agricultural resource sense and an environmental sense. Resources required for already identified State and regional weed strategies.

Capacity Building: Need organisational responsibility for coordinating management efforts across tenure and management responsibilities. Local adoption of

strategies. Capacity building in pastoral industry and Aboriginal groups to optimise biodiversity and savannah productivity. Minimise loss of the mineral A horizon and protection of organic layers.

Environmental Management Systems: Removal of feral stock from conservation estate and management of stock on other lands e.g. close order husbandry of cattle herds to prevent overgrazing. Eradication of feral animals especially cattle, donkeys and pigs.

Ecosystems and appropriate recovery actions

This is a general savannah issue and fire is the main driver in addressing this. The next most important, and linked, issue is grazing. Actions that are required are linked to management research and better-coordinated efforts between Government agencies, the pastoral grazing industry, traditional owners and the broader community. For example with mound springs the recovery actions would be (ix) fire management, (vii) feral animal control, (vi) weed control.

Existing ecosystem recovery plans

There are no existing Recovery Plans that are relevant to any of the ecosystems at risk listed in DL2.

Subregion priority for off reserve conservation

For much of the subregion the off park conservation priority is (ii) (see Appendix C, rank 6), where a large off park effort needed, resource constraints and a limited community capacity exist. However for some focused areas (iv), limited off park measures will result in significant conservation gains.

Conservation actions as an integral part of NRM

Existing NRM actions

Legislation: Pastoral lease inspections are undertaken by the Department of Agriculture and leaseholders notified of any problems via the Pastoral Lands Board. Final scenario is that the Commissioner for Soil Conservation can institute formal proceedings if issues are not being addressed. The last is rarely undertaken.

Threat Abatement Planning as Part of NRM: Concerted and coordinated effort by the Department of Agriculture in the control of donkeys.

Capacity Building: Land Conservation District Committees established and provide a venue for discussion on conservation matters.

Integration With Property Management Planning, Catchment Planning and Landcare: Land Conservation District Committees provide an opportunity for integration of land management activities.

Feasible opportunities for NRM

Environmental Management Systems: Research is needed on the mechanism and impacts of threatening processes. Outputs of this should assess potential cost/effective solutions. There has been some development in the co-ordination of multiple research initiatives and communication of this; Environmental planning across tenure (weeds, fire and feral animals) coordinated through Land Conservation District Committees.

Legislation: Improved implementation of existing legislation.

Capacity Building: Improved communication required between all stakeholders and an acknowledgement of differing land management objectives.

Other Planning Opportunities: Shire plan incorporating biodiversity objectives incorporating an acknowledgement of the worth of the natural environment e.g. tourism including the cost of management, for example in making national parks accessible.

Integration With Property Management Planning, Catchment Planning and Landcare: Development of catchment and regional plans involving all stakeholders.

Impediments or constraints to opportunities

A limited financial resource is a major constraint. The number of people available to implement strategies is a constraint. There is a need to increase awareness of conservation values throughout the community.

Subregions where specific NRM actions are a priority to pursue

A more coordinated approach to land management would be necessary for both subregions however due to the continuing and growing impacts within the Pindanland subregion this may have higher priority than the Fitzroy Trough. The rank for both subregions is (ii) (see Appendix C, rank 7), indicating that there are significant constraints to integrate conservation as part of production or development system.

Data gaps

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

Vegetation and Regional Ecosystem Mapping: Much finer scale (at 100,000:1 or better) vegetation and regional ecosystem mapping required for most of the widespread surfaces. This needs to align with soil maps and environmental geology maps and these do not yet exist at better than 1:250 000 scale.

Systematic Fauna Survey: No systematic quadrat based fauna and/or flora sampling programme across the

subregion to provide a basis for modeling species distribution and status.

Floristic Data: Data is sparse. Some potential for adapting WARMS monitoring methodology.

Ecological and Life History Data: Data is lacking on the habitat requirements of fauna species.

Other Priority Data Gaps: Further research is required on the conservation status of many fauna and flora taxa as well as the effects of threatening processes such exotic predators (cats), stock (cattle, donkeys and pigs), fire and weeds.

Sources

References cited

No.	Author	Date	Title	Publication Details	Pub. Type
714	Dostine, Peter	(1998).	Gouldian finch recovery plan, <i>Erythrura gouldiae</i>	Parks & Wildlife Commission of the Northern Territory, Darwin	R
258	Duncan, A., Barry Baker, G. and Montgomery, N.	(1999).	The Action Plan for Australian Bats.	Environment Australia.	R
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
495	McKenzie, N.L., Johnston, R.B. and Kendrick, P.G. (Eds.)	(1991).	Kimberley Rainforests of Australia.	Surrey Beatty and Sons.	B

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

Other relevant publications

See reference numbers 018, 094, 100, 118, 120, 132, 173, 258, 268, 298, 418, 437, 483, 487, 488, 492, 495,

551, 556, 595, 626, 634, 635, 636, 637, 648, 674, 692, 693 and 714 in Appendix A.