

Great Sandy Desert 1 (*GSD1 – McLarty subregion*)

GORDON GRAHAM
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Subregional description and biodiversity values

Description and area

This is mainly tree steppe grading to shrub steppe in south; comprising open hummock grassland of *Triodia pungens* and *Triodia schinzii* with scattered trees of *Owenia reticulata* and Bloodwoods, and shrubs of *Acacia* spp, *Grevillea wickhamii* and *G. refracta*, on Quaternary red longitudinal sand dune fields overlying Jurassic and Cretaceous sandstones of the Canning and Armadus Basins. *Casuarina decasneana* (Desert Oak) occurs in the far east of the region. Gently undulating lateritised uplands support shrub steppe such as *Acacia pachycarpa* shrublands over *Triodia pungens* hummock grass. Calcrete and evaporite surfaces are associated with occluded palaeo-drainage systems that traverse the desert; these include extensive salt lake chains with samphire low shrublands, and *Melaleuca glomerata* - *M. lasiandra* shrublands. It includes the Mandora Paleoriver System. Red-brown dunefields with finer texture than further south. Includes gravely surfaces of Anketell Ridge along its northern margin.

The subregion is arid tropical with summer rain and is influenced by monsoonal activity. Morning fogs are recorded during the dry season. Subregional area is 13, 173, 266 ha.

Dominant land use

The only land use in GSD1 is (xi) UCL and Crown reserves (see Appendix B, key b)

Continental Stress Class

The Continental Stress Class on GSD1 is 5.

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

Special Features:

- The very complex and diverse wetland system associated with the Mandora Marsh area.
- Most inland distribution of mangroves (*Avicennia marina*) in Australia. This species has been recorded 60 kms inland along the Mandora Marsh area and is separated from the coast.
- Salt Creek within the Mandora Marsh area is quite unique particularly with respect to its relationship with other wetlands within the area. This relationship is not understood.

Wetlands

Wetlands of National significance (DIWA listings)

- The mound springs within the Mandora Marsh area and in particular springs such as Eil Eil with its distinctive tall *Melaleuca leucadendra* closed forest.
- Dragon Tree Soak with its particular vegetation association.
- The series of interdunal ephemeral wetlands which are dominated by Coolibah (*Eucalyptus victrix*).

Refugia:

Several permanent soaks (e.g. Dragon Tree Soak) are of particular importance in the desert environment. Likewise the vast array of less permanent soaks and wetlands perform significant refuge functions. Mound springs such as Eil Eil, supporting tall *Melaleuca leucadendra* forest, are identified as being important bird nesting sites.

High Species and Ecosystem Diversity:

All freshwater mound spring and soak systems clearly exhibiting an array of vegetation assemblages and are gradually being studied to determine the level of faunal complexity.

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

The Conservation Through Reserves Committee report in 1974 System 7 (Environmental Protection Authority 1974) formed the basis of the Department's publication Nature Conservation Reserves in the Kimberley (Burbidge *et al.* 1991), which has itself been incorporated in a Departmental Draft Regional Management Plan (Portlock *et al.* 2001). 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. An overall biological survey of the Great Sandy Desert was undertaken in the early 1980's. A land management assessment is also in preparation for publication that covers the Mandora Marsh area.

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 and 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.

Name and Code	Description ¹	Condition ²	Trend ³	Reliability ⁴	Threatening Processes ⁵
Dragon Tree Soak WA040	B17	ii	iii	ii	v (camels are causing significant damage to the spring), vii (the potential for too frequent burning of the soak).
Mandora Salt Marsh WA042	B11	Currently iii (good), but some components are being degraded	vi	ii	iv, v (cattle and camels)
Rock Pools of the Breaden Hills WA043	B17	Unknown	Unknown	Unknown	Unknown threatening processes.

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 GSD1.

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

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
Organic mound spring community of Dragon Tree Soak, Great Sandy Desert.	E	43	ii	iii	iii	v (camels are causing significant damage to the spring), vii (the potential for too frequent burning of the soak)

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

Other ecosystems at risk

Community	Status	NVIS ¹	Condition ²	Trend ³	Reliability ⁴	Threatening Processes ⁵
Assemblages of permanent/ephemeral wetlands, damplands, and riparian habitat of the southern Kimberley region.	V	15, 38, 42	Unknown	iii	ii	iv, vii
Widespread vegetation types and widespread threats such as changed fire regimes.	V	11	Unknown	vi	ii	Unknown threatening process
Organic mound spring communities of Anna Plains Station ('Mandora Marsh' area), Dampierland/Great Sandy Desert.	P1	43	Unknown	iii	iii	iv
Inland Mangrove (<i>Avicennia marina</i>) community of Salt Creek, Anna Plains Station.		40	Unknown	iii	iii	iv (cattle), xii (trampling of vegetation)
Microbiolite community of Salt Creek, Anna Plains Station.		43	Unknown	iii	iii	xii (trampling of vegetation)
Microbiolite community of McDonaldson Spring, Great Sandy Desert.		43	Unknown	vi	ii	Unknown threatening process

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 (feral predators)
OTHER SPECIES AT RISK WITHIN THE SUBREGION					
<i>Falco hypoleucos</i>	Near threatened	Unknown	vi	Unknown	Unknown threatening processes
<i>Heteromunia pectoralis</i>	Near threatened	Unknown	vi	Unknown	Unknown threatening processes
<i>Neochmia ruficauda</i>	Near threatened	Unknown	vi	Unknown	Unknown threatening processes
<i>Phaps histrionica</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
PRIORITY 2					
<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 Great Sandy Desert vegetation associations are not reserved within the bioregion:

Beard Veg Assoc	Description	Area (Ha.)
39	Shrublands; mulga scrub.	20,188
41	Shrublands; teatree (<i>Melaleuca spp.</i>) scrub.	92,819
78	Hummock grasslands, low tree steppe; eucalypts over soft spinifex (<i>Triodia pungens</i>).	338,740
80	Hummock grasslands, low tree steppe; desert walnut (<i>Owenia reticulata</i>) over soft spinifex (<i>Triodia pungens</i>) between sandridges.	172,057
81	Hummock grasslands, low tree steppe; snappy gum (<i>Eucalyptus brevifolia</i>) over soft spinifex (<i>Triodia pungens</i>).	28,307
91	Hummock grasslands, sparse tree steppe; snappy gum (<i>Eucalyptus brevifolia</i>) over soft spinifex (<i>Triodia pungens</i>).	183
93	Hummock grasslands, shrub steppe; Ranji bush (<i>Acacia pyrifolia</i>) over soft spinifex (<i>Triodia pungens</i>).	46,395
100	Hummock grasslands, shrub steppe; <i>Acacia delibrata</i> over soft spinifex (<i>Triodia pungens</i>).	2,274
101	Hummock grasslands, shrub steppe; <i>Acacia pachycarpa</i> over soft spinifex (<i>Triodia pungens</i>).	701,564
102	Hummock grasslands, shrub steppe; <i>Acacia pachycarpa</i> over lobed spinifex (<i>Triodia basedowii</i>).	78,640
104	Hummock grasslands, shrub steppe; silverleaf grevillea (<i>Grevillea refracta</i>) and <i>Hakea spp.</i> over soft spinifex (<i>Triodia pungens</i>).	5,686
106	Hummock grasslands, shrub steppe; <i>Hakea spp.</i> over soft spinifex (<i>Triodia pungens</i>).	451,606
136	Hummock grasslands, shrub steppe; mixed shrubs over spinifex between sandhills.	3,068
137	Hummock grasslands, low tree steppe; desert walnut (<i>Owenia reticulata</i>) over soft spinifex (<i>Triodia pungens</i>)/ <i>Plectrachne spp.</i> on sandplain.	217,620
138	Mosaic: Hummock grasslands, low tree steppe; eucalypts over feathertop spinifex (<i>Plectrachne schinzii</i>) between dunes / Hummock grasslands, patchy shrub steppe; <i>Acacia pachycarpa</i> over soft spinifex (<i>Triodia pungens</i>) on lateritic rises.	1,084,977
151	Sedgeland; sedges with open low trees; coolibah over various sedges.	2,835
152	Hummock grasslands, grass steppe; soft (<i>Triodia pungens</i>) and winged spinifex (<i>Triodia intermedia</i>).	377
155	Hummock grasslands, low tree steppe; eucalypts over soft (<i>Triodia pungens</i>) and feathertop spinifex (<i>Plectrachne schinzii</i>) between sandhills.	6,316,789
157	Hummock grasslands, grass steppe; winged spinifex (<i>Triodia intermedia</i>), <i>Triodia wiseana</i> .	34,232
173	Hummock grasslands, shrub steppe; Ranji bush (<i>Acacia pyrifolia</i>) over soft spinifex (<i>Triodia pungens</i>) and <i>Triodia wiseana</i> on basalt.	1
Beard Veg Assoc	Description	Area (Ha.)
174	Hummock grasslands, shrub steppe; mixed shrubs over soft spinifex (<i>Triodia pungens</i>).	1,103,747
178	Hummock grasslands, grass steppe; winged spinifex (<i>Triodia intermedia</i>), lobed spinifex (<i>Triodia basedowii</i>).	4,882
217	Hummock grasslands, steppe woodland; desert oak (<i>Allocasuarina decaisneana</i>) and soft spinifex (<i>Triodia pungens</i>).	13,041
218	Hummock grasslands, shrub steppe; corkwood (<i>Hakea suberea</i>) and <i>Acacia spp.</i> over soft spinifex (<i>Triodia pungens</i>).	18,291
219	Hummock grasslands, grass steppe; soft (<i>Triodia pungens</i>), winged spinifex (<i>Triodia intermedia</i>) and lobed spinifex (<i>Triodia basedowii</i>).	39,744
676	Succulent steppe; samphire.	4,292
699	Shrublands, pindan; <i>Acacia eriopoda</i> shrubland with scattered low bloodwood (<i>Eucalyptus spp.</i>) and roughleaf bloodwood (<i>Eucalyptus setosa</i>) over soft spinifex (<i>Triodia pungens</i>) and curly spinifex (<i>Triodia bitextura</i>) on sandplain.	286,746
701	Hummock grasslands, shrub steppe; <i>Acacia pachycarpa</i> and <i>Grevillea spp.</i> over soft spinifex (<i>Triodia pungens</i>) and winged spinifex (<i>Triodia intermedia</i>) on sandy plateau.	1
703	Hummock grasslands, low tree steppe; snappy gum (<i>Eucalyptus brevifolia</i>) over winged spinifex (<i>Triodia intermedia</i>).	1,546
712	Mosaic: Shrublands, pindan; <i>Acacia eriopoda</i> shrubland with scattered low bloodwood (<i>Eucalyptus spp.</i>) and roughleaf bloodwood (<i>Eucalyptus setosa</i>) over soft (<i>Triodia pungens</i>) and curly spinifex (<i>Triodia bitextura</i>) / Grasslands, tall bunch grass savannah low tree; boab (<i>Adansonia gregorii</i>), baubinia (<i>Bauhinia cunninghamii</i>) and beefwood (<i>Grevillea striata</i>) over ribbon grass (<i>Chrysopogon spp.</i>).	289
849	Hummock grasslands, low tree steppe; snappy gum (<i>Eucalyptus brevifolia</i>) and bloodwood (<i>Eucalyptus spp.</i>) over soft spinifex (<i>Triodia pungens</i>).	23,225
922	Hummock grasslands, low tree steppe; eucalypts over soft (<i>Triodia pungens</i>) and feathertop spinifex (<i>Plectrachne schinzii</i>) between sandhills	8
923	Hummock grasslands, grass steppe; spinifex <i>Triodia inutillis</i> .	24,281
1121	Mixed short grass and spinifex with scattered coolibah.	3,595
1271	Bare areas; claypans.	29,361
2041	Succulent steppe with scrub; teatree (<i>Melaleuca spp.</i>) over saltflats.	30,908

2175	Grass savannah on clay plains (Tanami).	10,770
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Poorly represented ecosystems subject to threat:

Organic mound spring communities of Anna Plains Station ('Mandora Marsh' area), Dampierland/Great Sandy Desert.
Inland Mangrove (<i>Avicennia marina</i>) community of Salt Creek, Anna Plains Station.
Microbiolite community of Salt Creek, Anna Plains Station.
Microbiolite community of McDonaldson Spring, Great Sandy Desert.
Assemblages of permanent/ephemeral wetlands, damplands, and riparian habitat of the southern Kimberley region.

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)

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.

Bioregional and subregional priority for reserve consolidation

The Great Sandy Desert bioregion has a ranking priority under the preliminary bioregional NRS priorities of 2 (see Appendix D, and Appendix C, rank 4). There is a

lack of adequate data on the condition of the McLarty subregion to compare this to the Mackay subregion in terms of prioritising between the two however the Dragon Tree Soak Nature Reserve is found within the McLarty subregion.

Reserve management standard

The bioregion is ranked at poor (i) (see Appendix C, rank 5). No feral animal control programmes in place and no prescribed burning is undertaken. The extent of other threatening processes (for example weeds) is yet to be determined. Due to uncontrolled stock access, changes are occurring within parks.

Estate	Reserve Management Rank ¹	Issues
Nature Reserves		
Dragon Tree Soak	i	Full extent of threatening processes (fire, weeds, feral animals) need to be documented. Camel impact occurring threatening the know feature of the soak.

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 the McLarty subregion.
- Action is required to identify appropriate fire regimes.
- The effect of fire and cattle on critical weight range mammals, granivorous birds and vegetation composition and structure is of concern.
- 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.

Weed Control: Need to define weeds priorities. 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. Minimise loss of the mineral A horizon and protection of organic layers.

Feral Animal Control: Removal of feral stock from conservation estate, specifically camels.

Ecosystems and appropriate recovery actions

This is a general savannah issue and fire is the main driver in addressing this. The next most important may well be predation of fauna by cats and occasionally foxes. Actions that are required are linked to management research and better-coordinated efforts between Government agencies, Traditional owners and the broader community.

Existing species recovery plans

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

Appropriate recovery actions

Fire Management: Move to biodiversity driven approaches to fire management strategies. Further fire research is required.

Subregion priority for off reserve conservation

For much of the subregion the off park conservation priority is (ii) (see Appendix C, rank 6), indicating that a large off park effort is needed, resource constraints and limited community capacity. However for some focused areas (Mandora Marsh) the off park priority is (iv),

indicating that limited off park measures will result in significant conservation gains.

Conservation actions as an integral part of NRM

Existing NRM actions

Capacity Building: La Grange groundwater management committee established. This may prove to be an important capacity building resource.

Feasible opportunities for NRM

Threat Abatement Planning: Research is needed on the mechanism and impacts of threatening processes. Outputs of this should assess potential cost/effective solutions.

Legislation: Improved implementation of existing legislation.

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

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
(see Appendix C, rank 7)

Given the current possibility of a large irrigated agriculture industry being proposed (La Grange) there is an immediate need to gain a better understanding of possible impacts on groundwater resources along with impact on the existing wetlands that may be linked to the 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/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. As an initial step a review of the Beard vegetation mapping database is warranted.

Systematic Fauna Survey: No systematic quadrat based fauna and flora sampling programme across the subregion to provide a basis for modeling species distribution and status.

Floristic Data: Data is sparse. An efficient methodology to undertake mapping needs to be designed.

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, camels and pigs), fire and weeds.
- Specifically for this environment research to gain an improved understanding of the vast array of wetlands within the subregion is warranted.

Source

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
272	Environmental Protection Authority	(1974).	Conservation Reserves in Western Australia - Report of the Conservation through Reserves Committee to the Environmental Protection Authority.	Environmental Protection Authority, Perth	R
132	Burbidge, A.A., McKenzie, N.L. and Kenneally, K.F.	(1991).	Nature Conservation Reserves in the Kimberley Western Australia.	Department of Conservation and Land Management.	R
556	Portlock, C., Graham, G., Done, C., Gilmour, J. and Williamson, J.	(2001).	Kimberley Region Draft Regional Management Plan. (Unpubl)	Department of Conservation and Land Management.	R
258	Duncan, A., Barry Baker, G. and Montgomery, N.	(1999).	The Action Plan for Australian Bats.	Environment Australia.	R

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

Other relevant publications

See reference numbers 094, 100, 118, 120, 132, 173, 258, 268, 272, 298, 317, 437, 483, 551, 556, 626, 634, 635, 636, 637, 648, 674, 692 and 693 in Appendix A.