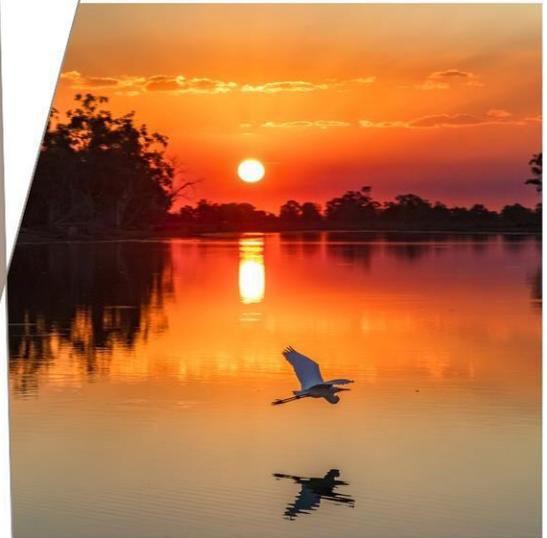


***NOT COUNCIL POLICY –  
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# Natural Environment Study

Final Report

WE19015



Prepared for  
Rockhampton Regional Council

12 September 2019

***NOT COUNCIL POLICY –  
For information purposes only***

## Contact Information

### Cardno (Qld) Pty Ltd

ABN 57 051 074 992

Level 11

515 St Paul's Terrace

Fortitude Valley QLD 4006

Australia

www.cardno.com

Phone +61 7 3369 9822

Fax +61 7 3369 9722

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Author(s):



Mary Timms  
Senior Ecologist

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Approved By:



David Francis  
Senior Principal - Ecology

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## Executive Summary

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The purpose of the Natural Environment Study (the study) is to collate baseline environmental information, highlight matters of environmental significance and identify strategies and recommendations that will help to better protect, maintain and enhance the natural environment of the Rockhampton Region. This report expands and builds upon the previous Natural Environment Report (RPS, 2010), commissioned for the amalgamated regions.

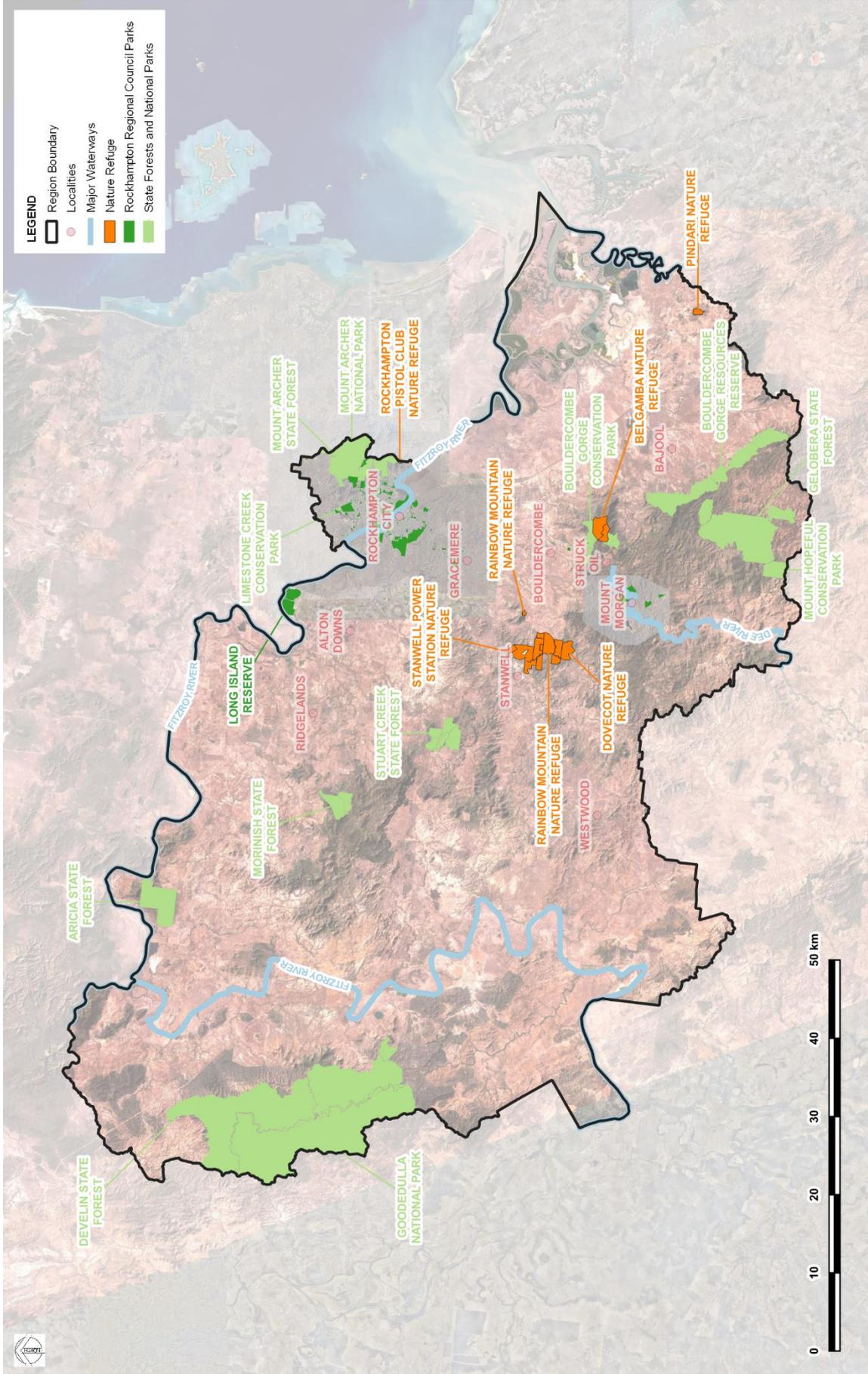
Council's Corporate and Operational Plans recognise the environment as one of five core themes and drive a series of associated actions and targets. Council's *Environmental Sustainability Strategy 2018-2022* further highlights the importance of the natural environment within the Region.

*"Our natural environment includes a range of ecosystems that support our Region. It is the productive lands, waterways and habitats that capture or remove pollutants, regulate weather and atmospheric conditions, and support our diverse flora and fauna. It also provides us with clean air, water, food and a variety of minerals that sustain our industries and lifestyles and deliver economic, social and cultural benefits to our communities."*

The study recognises that the Rockhampton Region contains a diverse and connected natural environment. The Fitzroy River, fed by a vast catchment being the largest draining to the Great Barrier Reef, flows through the Rockhampton Region and is vital to agriculture, water supply and recreational activities such as fishing and boating. Known economic benefits that flow from the natural environment in this region include fishing, agriculture and tourism. The Berserker Ranges are prominent and afford an aesthetic backdrop to Rockhampton City. Broad wooded areas and wetlands including a range of national parks (NP) provide habitat for a diversity of native species (see figure on following page). This region showcases natural environmental values and species that are distinctive to the region, including many elements to be celebrated for their intrinsic value and the contribution they make to Queensland's biodiversity.

There is still much to learn about the natural environment of the Rockhampton Region. However, the study acknowledges that the relatively low extent of remnant vegetation (~30% cover) leaves the natural environment particularly vulnerable to threatening processes. Key threats to the natural environment include land clearing, predation of native wildlife, weed invasion, inappropriate fire regimes and climate change.

To better protect, maintain and enhance the natural environment of the Region, the study identifies a range of opportunities for improvement. Following the figure a summary table is provided of study recommendations that focus on increasing protection for matters of environmental significance via a number of amendments to the Planning Scheme, as well as a range of other statutory and non-statutory recommendations that will help to maintain and enhance our natural environment in the years to come.



State Reserves and Rockhampton Regional Council's Parks

Summary of proposed amendments to be progressed under the Rockhampton Region Planning Scheme

Planning Scheme Priorities	Recommendations
Strategic	<ol style="list-style-type: none"> <li>1. Create a consolidated defined term for ecologically important areas.</li> <li>2. Update strategic framework mapping to include all ecologically important areas as a consolidated area.</li> <li>3. Include a definitive statement in the natural environment and natural hazards element that development should avoid adverse impacts on ecologically important areas to provide clear guidance that this is the preferred outcome.</li> <li>4. To remove doubt and strengthen consideration of ecological protection, stronger and more definitive references to protection of ecologically important areas within the settlement pattern element should be included.</li> <li>5. Although one of the key aims of the Environmental Sustainability Strategy is to ensure that there is 'no net loss' of vegetation, the strategic framework does not include any statements to this effect. It would be useful if this requirement was included as a broad principle within the strategic framework.</li> </ol>
Categories of development and assessment	<ol style="list-style-type: none"> <li>6. It is recommended that the exemption for accepted development and accepted development subject to requirements from assessment against the Biodiversity Overlay be reviewed.</li> </ol>
Biodiversity overlay code and mapping	<ol style="list-style-type: none"> <li>7. Include an additional overall outcome that clearly states the intention that there is 'no net loss' of vegetation or ecologically important areas.</li> <li>8. Re-draft existing overall outcomes to clearly state that the outcome sought is the protection and enhancement of ecologically important areas.</li> <li>9. Review terminology throughout the code to ensure that the individual provisions refer to the defined and mapped overlay elements.</li> <li>10. Include a separate provision that relates to when clearing cannot be avoided.</li> <li>11. Review the provision PO3 relating to MLES (general) and strengthen the ability to regulate development. Further, review the provisions of the Biodiversity Overlay Code and include the requirement of an ecological assessment to be conducted in further instances than currently triggered.</li> <li>12. Draft acceptable outcomes to provide more detailed guidance on how development can achieve compliance.</li> <li>13. Review acceptable outcome provision relating to reconfiguring a lot (PO14) and whether it should apply only to sites that are entirely subject to a mapped value.</li> <li>14. Review biodiversity investigation areas as part of detailed mapping for consideration of a local expert panel for potential inclusion in the Biodiversity Overlay Mapping.</li> </ol>
Biodiversity overlay mapping	<ol style="list-style-type: none"> <li>15. Review overlay mapping for consistency with strategic framework mapping.</li> </ol>
Zones and zone codes	<ol style="list-style-type: none"> <li>16. Consider including additional environmental zones in the planning scheme.</li> <li>17. The Environment Management and Conservation Zone could be amended as required to modify the purpose of the zone, and provide detailed guidance setting out the types of land uses that are envisaged.</li> <li>18. The Environmental Management Zone could contain less significant (through still ecologically important) land.</li> <li>19. It is noted that this is not a recommendation to bring MLES (General) into a new zone, however is provided as an example of the type of consideration process that would be required to identify what land that would be appropriately included in a new zone.</li> <li>20. Utilise the Biodiversity Assessment and Mapping Methodology (BAMM) / Common Nature Conservation Classification System (CNCCS) mapping to inform zoning. .</li> </ol>
Ecological Assessment Planning Scheme Policy (PSP)	<ol style="list-style-type: none"> <li>21. It is recommended that the PSP is updated to be in alignment with best practice restoration framework methodologies.</li> <li>22. It is recommended the Ecological Assessment PSP incorporates the specific sections and tables of the Landscape Design and Street Trees Planning Scheme Policy in order to ensure that locally declared pest species are incorporated into restoration plans for weed management.</li> </ol>
Landscape design and street trees Planning Scheme Policy	<ol style="list-style-type: none"> <li>23. It is recommended that significant trees are added to a local law in order to ensure protection of trees on Council land and privately owned property outside of a</li> </ol>

Planning Scheme Priorities	Recommendations
	development assessment process. Significant trees can be defined as a specific species and size and do not require individual listing within a local law.

Summary of proposed recommendations to better protect, maintain and enhance matters of environmental significance within the Rockhampton Region

Natural Environment Priorities	Recommendations
<b>Short Term</b> 1-3 years	<ol style="list-style-type: none"> <li>1. The Biodiversity Overlay Mapping indicates information gaps including the mapping does not reflect current knowledge including MSES extent and does not reflect on-ground conditions in areas. It is recommended that an update of the Biodiversity Overlay Map is completed using the BAMB / CNCCS. The resulting map can be used for other purposes such as targeting sites for restoration or other forms of protection.</li> <li>2. A key information gap pertains to GIS resources. There are likely to be MLES not captured in available GIS. In particular, adequate corridor mapping is absent and finer detail about ecological features such as location of locally significant wetlands and 'special biodiversity values'. The Planning Scheme provisions also requires refinement to improve its effectiveness.</li> <li>3. Explore options for implementing and expanding community restoration programs and on ground activities.</li> <li>4. Expand restoration projects and programs to include a list of degraded waterways and include restoration of threatened species habitat.</li> <li>5. Include options for implementing and expanding community restoration programs and on ground activities.</li> <li>6. Implement pest management plan as per the pest management priorities detailed in the plan.</li> <li>7. Create a citizen science program linked into existing environmental programs.</li> <li>8. Maintain and expand upon existing educational material to continue to educate the community about the natural values of the region in order to maintain those values. This may even include a volunteer program.</li> <li>9. Introduce local law for tree clearing, to minimise peri-urban clearing of trees providing substantial canopy cover.</li> </ol>
<b>Medium Term</b> 3-5 years	<ol style="list-style-type: none"> <li>10. Develop a priority fauna and flora species list that can be included within future amendments to the Biodiversity Overlay Code as an acceptable outcome for development to plan for the protection and conservation of priority flora and fauna species.</li> <li>11. Update wetland mapping to 'capture' those wetlands presently not mapped. This should be undertaken at a scale of approximately 1:10,000 – 1:25,000.</li> <li>12. Update waterway mapping to ensure the centre line of above ground watercourses are accurately represented in overlay mapping.</li> <li>13. Investigate the Land for Wildlife Program to provide landholders with an alternative to legally binding covenants and to engage in landholder education, access to funding and protection of ecologically important areas on private land.</li> <li>14. Categorise existing open space network to identify the intent of each parcel (e.g. conservation; drainage reserve; active open space) and incorporate into Geocortex. This will allow for targeted conservation efforts within Council's estate.</li> <li>15. Review fire management planning for Council managed protected estates and other land holdings to protect and maintain environmental values.</li> </ol>
<b>Long Term</b> 5+ years	<ol style="list-style-type: none"> <li>16. A preliminary comprehensive, adequate and representative (CAR) assessment has been undertaken for this region. This assessment should be expanded further to take into account lands that are under Council ownership and to identify potential sites for acquisition or a change of management (e.g. Council owned land that is presently used for one purpose that may be better directed to a conservation intent).</li> <li>17. Develop a land acquisition strategy that targets land parcels with high conservation value such as those within or adjoining the Fitzroy River strategic corridor, parcels adjoining protected area estates and/or expanding habitat for threatened species or ecological communities.</li> <li>18. The EPBC Act Protected Matters Search for the region indicates six Commonwealth listed Threatened Ecological Communities which may occur within the region. The location and extent of Threatened Ecological Communities is unknown, therefore Threatened Ecological Communities should be accurately</li> </ol>

Natural Environment Priorities	Recommendations
	<p>mapped and ground-truthed to ensure their protection with other agencies such as Fitzroy Basin Association and State and Federal Government Agencies.</p> <ol style="list-style-type: none"> <li>19. Locally significant Regional Ecosystems should be included in future amendments to the provisions of the Biodiversity Overlay Code.</li> <li>20. Conduct further research and studies into the locations and extents of threatened fauna and flora populations to inform protection measures, conservation outcomes, programs, targeted habitat restoration and threatened flora and fauna species management within the region.</li> </ol>



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# 1 Natural Environmental Values

## 1.1 What is the natural environment?

### 1.1.1 Background

The natural environment helps shape and define the Rockhampton Region. The Fitzroy River, fed by a vast catchment being the largest draining to the Great Barrier Reef, flows through the Rockhampton Region and is vital to agriculture, water supply and recreational activities such as fishing and boating. The Berserker Ranges are prominent and afford an aesthetic backdrop to Rockhampton city. Broad wooded areas and wetlands including the national parks (NP) of Goodedulla NP and Mount Archer NP provide habitat for a diversity of native species. **Figure 1-1** provides an overview of key landmarks in the region.

The residents of the Rockhampton Region benefit from the natural environment including all naturally occurring living and non-living things. The Millennium Ecosystem Assessment (2005) refers “*the benefits people obtain from ecosystems*” as Ecosystem Services. These ecosystem services can be broadly categorised into the functions listed in **Table 1-1** (Maynard, James and Davidson, 2010) which includes some examples within the Rockhampton Region context.

Table 1-1 Examples of ecosystem services

Function	Ecosystem Service	Example
<b>Provisioning Functions</b> - <i>Provision of natural resources</i>	Food	Cattle
	Water for Consumption	Drinking water from the Fitzroy River and tributaries
	Building and Fibre	Timber from the region including the 7 State Forests
	Fuel	
	Genetic Resources	
	Biochemicals, medicines and pharmaceuticals	
	Ornamental Resources	
	Transport Infrastructure	Fitzroy River
<b>Regulating Functions</b> - <i>Maintenance of essential ecological processes and life support systems</i>	Air Quality	Roadside vegetation ‘capturing’ dust
	Habitable Climate	Shade trees and other urban vegetation
	Water Quality	Vegetated riparian strips
	Arable Land	Grazing and Crop Production
	Buffering Against Extremes	Mangroves protecting shorelines in storm events
	Pollination	Native insect pollination of mango trees (crops)
	Reduce Pests and Diseases	Balanced wildlife
	Productive Soils	
	Noise Abatement	Buffers to quarry sites
<b>Cultural Functions</b> - <i>Providing life fulfilment opportunities and cognitive development through exposure to life processes and natural systems</i>	Iconic Species	Some are endemic, bush tucker
	Cultural Diversity	Darumbal
	Spiritual and Religious Values	

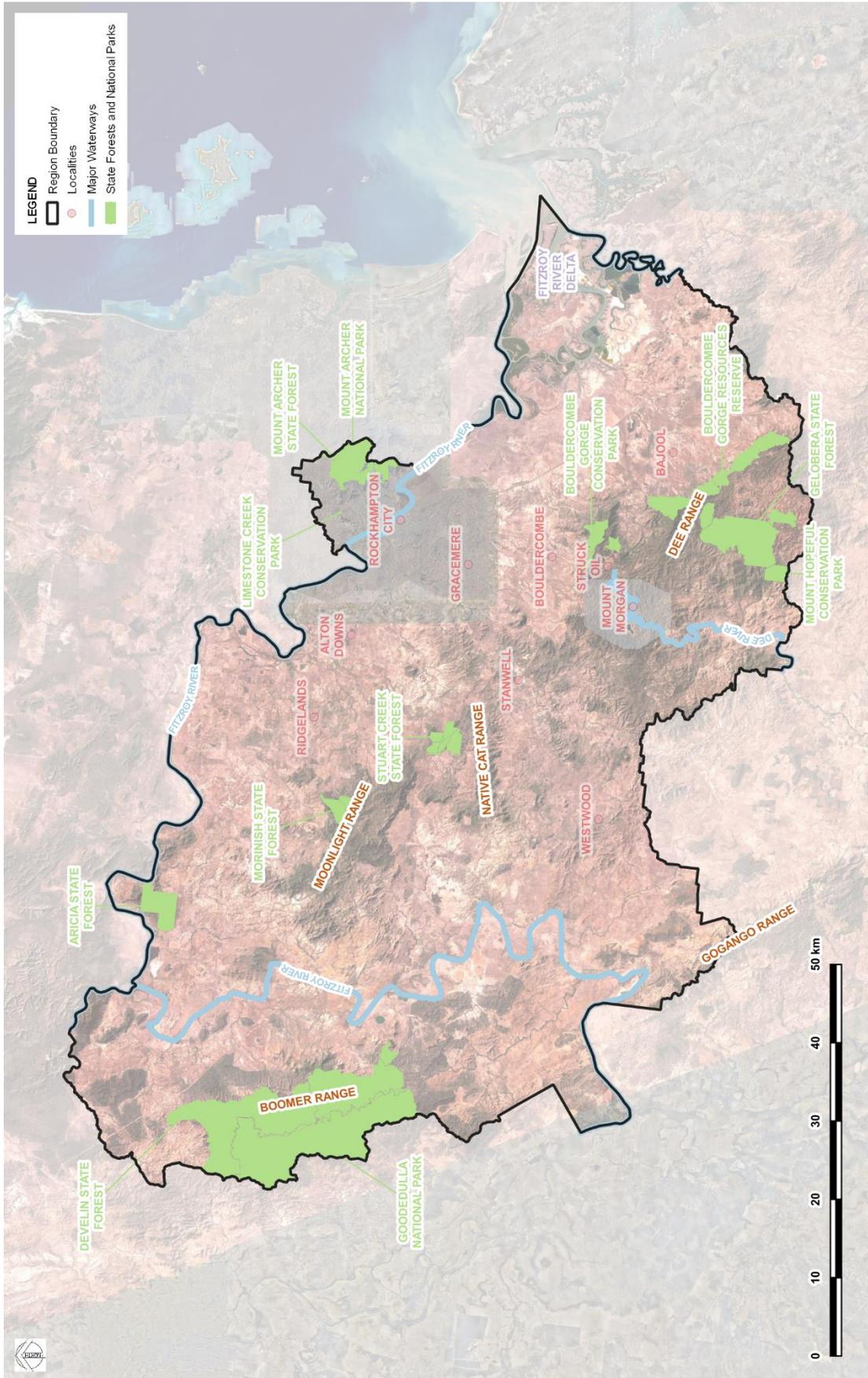


Figure 1-1 Overview of the Rockhampton region's major natural features

The subtropical environment presents particular issues and opportunities for ecosystem services; in particular, the provision of shade in urban areas that not only provide an aesthetic function but also provide cooling and helps make these areas walkable.

The State government also recognises the value of natural environmental values and reflects this in a range of statutory processes. Most notable, the State Planning Policy, 2017 (SPP) expresses the State's interests in land use planning and development and identifies natural environmental values as Matters of Environmental Significance (MES). **Table 1-2** provides a summary of what constitutes MES in the SPP.

Table 1-2 MES as described in the SPP

MES	Definition
Matters of local environmental significance (MLES)	Means natural values and/or areas identified by a local government in a planning instrument as MLES that are not the same, or substantially the same, as matters of national environmental significance or matters of state environmental significance.  <i>Note: A regional plan may identify natural values or areas for investigation and refinement by local government for protection as MLES.</i>
Matters of state environmental significance (MSES)	Means the following natural values and areas: (a) protected areas (including all classes of protected area except coordinated conservation areas) under the <i>Nature Conservation Act 1992</i> (b) 'marine national park', 'conservation park', 'scientific research', 'preservation' or 'buffer' zones under the <i>Marine Parks Act 2004</i> (c) areas within declared fish habitat areas that are management A areas or management B areas under the <i>Fisheries Regulation 2008</i> (d) a designated precinct, in a strategic environmental area under the <i>Regional Planning Interests Regulation 2014</i> , schedule 2, part 5, s15(3) (e) wetlands in a wetland protection area or wetlands of high ecological significance shown on the map of referable wetlands under the <i>Environmental Protection Regulation 2008</i> (f) wetlands and watercourses in high ecological value waters identified in the <i>Environmental Protection (Water) Policy 2009</i> , schedule 1 (g) legally secured offset areas as defined under the <i>Environmental Offsets Act 2014</i> . (h) threatened wildlife under the <i>Nature Conservation Act 1992</i> and special least concern animals under the <i>Nature Conservation (Wildlife) Regulation 2006</i> . (i) marine plants under the <i>Fisheries Act 1994</i> (excluding marine plants in an urban area). (j) waterways that provide for fish passage under the <i>Fisheries Act 1994</i> (excluding waterways providing for fish passage in an urban area). (k) high risk area on the flora survey trigger map as described in the <i>Environmental Offsets Regulation 2014</i> , schedule 2, part 6(1) (l) regulated vegetation under the <i>Vegetation Management Act 1999</i> that is: (i) category B areas on the regulated vegetation management map, that are 'endangered' and 'of concern' regional ecosystems; (ii) category C areas on the regulated vegetation management map that are 'endangered' and 'of concern' regional ecosystems; (iii) category R areas on the regulated vegetation management map; (iv) areas of essential habitat on the essential habitat map for wildlife prescribed as 'endangered wildlife' or 'vulnerable wildlife' under the <i>Nature Conservation Act 1992</i> ; (v) category A, B, C or R areas on the regulated vegetation management map that are located within a defined distance <sup>10</sup> from the defining banks of a relevant watercourse identified on the vegetation management watercourse and drainage feature map (vi) category A, B, C or R areas on the regulated vegetation management map that are located within a wetland or within 100 metres from the defining bank of a wetland identified on the vegetation management wetlands map.  <i>Note: Where possible, MSES is indicatively shown on the SPP IMS</i>
Matters of national environmental significance (MNES)	Means the following matters protected under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> , chapter 2, part 3: <ul style="list-style-type: none"> <li>• world heritage properties</li> <li>• national heritage places</li> <li>• wetlands of international importance</li> <li>• listed threatened species and Communities</li> <li>• listed migratory species</li> <li>• Commonwealth marine areas</li> <li>• the Great Barrier Reef Marine Park.</li> </ul>

MES	Definition
	<p><i>Note: MNES listed above contain natural values, features and areas that are to be considered in applying the biodiversity state interest of the SPP. World heritage properties and natural heritage places may also be listed for cultural heritage significance. In these instances, world heritage properties and national heritage places are also to be considered as part of the cultural heritage state interest.</i></p>

A review of existing documentation, strategies and previous studies was completed and is attached as **Appendix A**. A number of strategies included in the appendix refer to the natural environmental values of the Rockhampton Region.

### 1.1.2 Why is the natural environment important?

The natural environment sustains human populations, providing access to clean water, air, food and shelter. It also underpins the economy, climate and the liveability of the Rockhampton region. It is important to protect, maintain and enhance the natural environment to sustain ecosystems, waterways, wetlands, habitats, productive lands, diversity of flora and fauna, regulate weather and climatic processes and maintain or improve lifestyle and industry within the region.

The region's natural environmental values contribute to ecosystem services and are the "why" of the region's *Environmental Sustainability Strategy 2018-2022* as follows:

*"It is the productive lands, waterways and habitats that capture or remove pollutants, regulate weather and atmospheric conditions and support our diverse flora and fauna. It also provides us with clean air, water, food and a variety of minerals that sustain our industries and lifestyles and deliver economic, social and cultural benefits to our communities." (RRC, 2018a)*

The Commonwealth government's 2015 "Intergenerational report" recognises that protecting the environment can contribute to economic growth and that achieving strong economic growth and strong environmental outcomes are complementary objectives. To improve the quality of Australia's environment for future generations, environmental management is structured in the report under four key pillars being:

- > clean water;
- > clean land;
- > clean air; and
- > heritage protection.

All four of these pillars are relevant to the natural environment of the region, acknowledging that the Great Barrier Reef Marine Park, beyond the Fitzroy River delta, is listed as a World Heritage Area.

In 2018, the Commonwealth published the "*Environmental economic accounting - A common national approach Strategy and Action Plan*". The document opens with the following paragraph that reiterates the significance of ecosystem services to all Australians:

*"Australia's natural environment is fundamental to our economic prosperity and quality of life. Each day it provides us with a range of goods and benefits including clean air, fresh water and a variety of foods and fibres for our consumption. As well as provisioning and regulating services, it supplies a suite of cultural and spiritual values that are fundamental to Australians' way of life."*

The document sets out a strategy to develop a common national approach for coherent, comprehensive and integrated accounts to support decision making by governments, business and the community over the coming years. In the absence of a standard and comprehensive national system, organisations use various approaches to valuing the natural environment. Frequently, organisations adopt Triple Bottom Line reporting as the accepted approach to report on, not only financial capital, but also human and importantly natural capital. This approach requires an organisation to take into account natural capital in its decision making and processes and subsequent reporting. As previously noted, economic and environmental outcomes are complementary. Similarly, society can benefit directly from ecosystem services provided by a healthy natural environment. The Queensland Regional Natural Resource Management Investment Program Progress Report 2017 (DNRME, 2017) acknowledges that in order to manage Queensland's natural resources in a responsible way, to support the economic and social needs of the community, and to maintain healthy and resilient ecosystems that a long-term collaborative approach is required.

A number of studies demonstrate the importance of interrelationship between the economic, social and natural environment in the region including:

> **Fisheries**

- In a study investigating the economic and social impacts of protecting the environmental values of the waters of the Capricorn and Curtis Coasts, Marsden Jacobs Associates (2014) stated that as the condition of the aquatic ecosystem declines, key ecosystem functions and services also decline, affecting key sectors such as tourism, agriculture, fishing and recreation. They go on to state that there is a strong case for maintaining and enhancing waterway health in the region in conjunction with facilitating sustainable regional development.
- The adopted Rockhampton recreational fishing development strategy (RRC, 2016) identifies that there are 639,000 fishers in Queensland, with 350,000 living in southeast Queensland. The contribution to the Queensland economy from individual fishers is approximately \$880m, with \$528m of this attributable to fishers in estuaries (OzCoasts, 2019). Given the number of fisherman residing in Rockhampton, in addition to number travelling to the region (e.g. from southeast Queensland) the economic value of recreation fishing to the region is likely to be significant.

> **Tourism**

- The economic value of nature-based tourism in Australia is high accounting for \$25.13 billion in 2011 (State of Queensland, 2013) by international and domestic visitors. The most popular nature-based activity is visiting national parks and bushwalking. While specific figures for nature-based tourism are unavailable for the local government area, it is known that all tourism annually accounts for \$395 million dollars for the region alone (TRA, 2017) with over 400,000 overnight holiday trips undertaken in the Capricorn Region last year (TRA, 2019).

> **Agriculture**

- Recent research has identified that poor water quality is having negative impacts on the health of the Great Barrier Reef (GBR) (Haynes, Brodie et al., 2007; Brodie, Devlin et al., 2011). The prime determinant for the changes in water quality entering into the GBR has been attributed to the grazing industry, for sediment pollutants, and sugarcane for nutrient pollutants. Grazing is the dominant land use for the Fitzroy River basin and it has been estimated of the ~4.1 million tonnes per annum of sediment runoff from the catchment, 2.9 million is directly attributed to human activity (Queensland Government, 2011). In a report prepared to aid in the understanding the economics of grazing management practices and systems for improving water quality run-off from grazing lands in the Burdekin and Fitzroy Catchments (State of Queensland, 2016) it was found that sediment run-off was lower under moderate, sustainable, stocking rates compared with heavier stocking rates and that management of grazing systems at sustainable stocking rates was generally more profitable than grazing systems operating at heavier stocking rates.

In summary, there is a clear interrelationship between economic outcomes, social well-being and good management of the natural environment. Studies pertaining to the region demonstrate that the natural environment, and its protection, maintenance and enhancement, demonstrate these tangible economic benefits.

## 1.2 What are Rockhampton's natural environmental values?

### 1.2.1 Overview of the region's natural environment

Rockhampton Regional Council Local Government Area, referred to herein as the "region", covers 6,574 square kilometres (km<sup>2</sup>). The Subtropical region is located within the Lower Fitzroy Catchment, which is part of the broader Fitzroy Basin (DES, 2017a). The Fitzroy River flows through the region before outflowing into the Great Barrier Reef. The region has significant environmental values that are distinctive to the region including noteworthy examples such as:

- > Regional ecosystems that occur on serpentine landforms within Aricia State Forest and restricted to a small area within the north-western extent of the region.
- > Threatened flora species such as *Cycas ophiolitica*, *Pimelea leptospermoides* and *Capparis thozetiana*.
- > Threatened fauna species including Koala (*Phascolarctos cinereus*), Yellow Chat (*Epthianura crocea macgregoric*), Fitzroy River Turtle (*Rheodytes leukops*) and White-throated Snapping Turtle (*Elseya albagula*).
- > Iconic species such as Platypus (*Ornithorhynchus anatinus*) and Barramundi (*Lates calcarifer*).
- > Two nationally important wetlands including the Fitzroy River Delta and Fitzroy River Floodplain.
- > The Fitzroy River and numerous waterways and tributaries, which are part of the broader Lower Fitzroy Basin catchment.
- > Murray Lagoon that adjoins the heritage listed botanic gardens and supports habitat for breeding colonies of migratory birds.
- > Ecosystem services, landscape and amenity values including the Mount Archer National Park within the Berserker Ranges.
- > Values of cultural interest such as landforms which are specific to particular bush tucker.

### 1.2.2 Diversity of the region's landscapes

#### 1.2.2.1 The region's landscapes

The Fitzroy River is prominent within and significant to the region. From the region's southwest it tracks northwards between the eastern flank of the Boomer Range and the western foothills of the Moonlight Range. At its junction with Marlborough Creek, in the north of region, the river flows in a south-westerly direction and starts to open to a broad flood plain that is bound by the Berserker and Dee Ranges. The river meets the ocean at the Fitzroy River delta, which is regarded as a wetland of national importance in the Directory of Important Wetlands in Australia.

While the Fitzroy River and its tributaries, associated floodplains and delta support recent alluvial and marine deposits respectively, much of the region's geological diversity can be found in elevated areas. Mount Archer, located on the Berserker Range, represents the highest point in the region at 608m elevation. Other ranges are lower ascending to 590m at Mt Dick on the Dee Range, close to 500m at the Boomer and Moonlight ranges and a little under 400m in the Native Cat Range. Most of the elevated areas within the region are characterised by metasedimentary rocks along with older igneous material such as granodiorite. Minor areas of sedimentary rocks are also present in higher country such as the northern outlier of the Gogango Range in the southwest of the region. Small areas of weathered material and associated duricrusts up to 100m elevation are also present, most notably in the region's northwest. Also present are broad deeper clays associated with "old" alluvium in areas above newer alluvium. Minor areas of recent coastal dune are present at the Fitzroy River delta.

These diverse landforms and geology means that the region supports 11 of the 12 land zones of Queensland present in the region. Such diversity in topography and geology has a strong influence on vegetation types and associated wildlife. There are 69 regional ecosystems recorded from the region. **Table 1-3** lists these regional ecosystems along with the eight national (1:5million) Broad Vegetation Groups (DBVG5M) with which they are associated. **Figure 1-2** illustrates the distribution of these broad vegetation types within the region.

Table 1-3 Relationship between Broad Vegetation Groups and Regional Ecosystems

DBVG5M Code	Description	Associated Regional ecosystems
1	Rainforests, Scrubs	11.2.3, 11.11.18, 11.11.2, 11.11.5, 11.12.4, 11.4.1, 11.3.11 & 11.10.8
2	Wet Eucalypt Open Forests	11.10.2
3	Eastern Eucalypt Woodlands to Open Forests	11.11.3, 11.12.6, 11.12.6a, 11.8.4, 11.10.1d, 11.10.4b, 11.7.4, 11.11.1, 11.11.15, 11.11.15a, 11.11.7, 11.11.7a, 11.11.7x1, 11.12.1, 11.12.3, 11.9.9, 11.11.4, 11.11.3c, 11.11.4c & 11.3.26
4	Eucalypt Open Forests to Woodlands on Floodplains	11.3.25, 11.3.25a, 11.3.25c, 11.3.3, 11.11.3c, 11.3.38, 11.3.4 & 11.3.25f
5	Eucalypt Dry Woodlands on Inland Depositional Plains	11.11.9, 11.3.2, 11.4.2, 11.11.10, 11.12.2 & 11.3.6, 11.5.2, 11.5.9b & 11.5.9c
10	Other Acacia Dominated Open-Forests, Woodlands and Shrublands	11.10.3, 11.7.2, 11.11.14, 11.11.16, 11.12.21, 11.3.1, 11.4.3, 11.4.9, 11.4.9a & 11.9.1
15	Wetlands (Swamps and Lakes)	11.3.27a, 11.1.3, 11.3.27x1b, 11.3.27b & 11.3.27c
16	Mangroves and Tidal Saltmarshes	11.1.4, 11.1.4a, 11.1.4b, 11.1.4c & 11.1.4d, 11.1.1, 11.1.2a & 11.1.2b

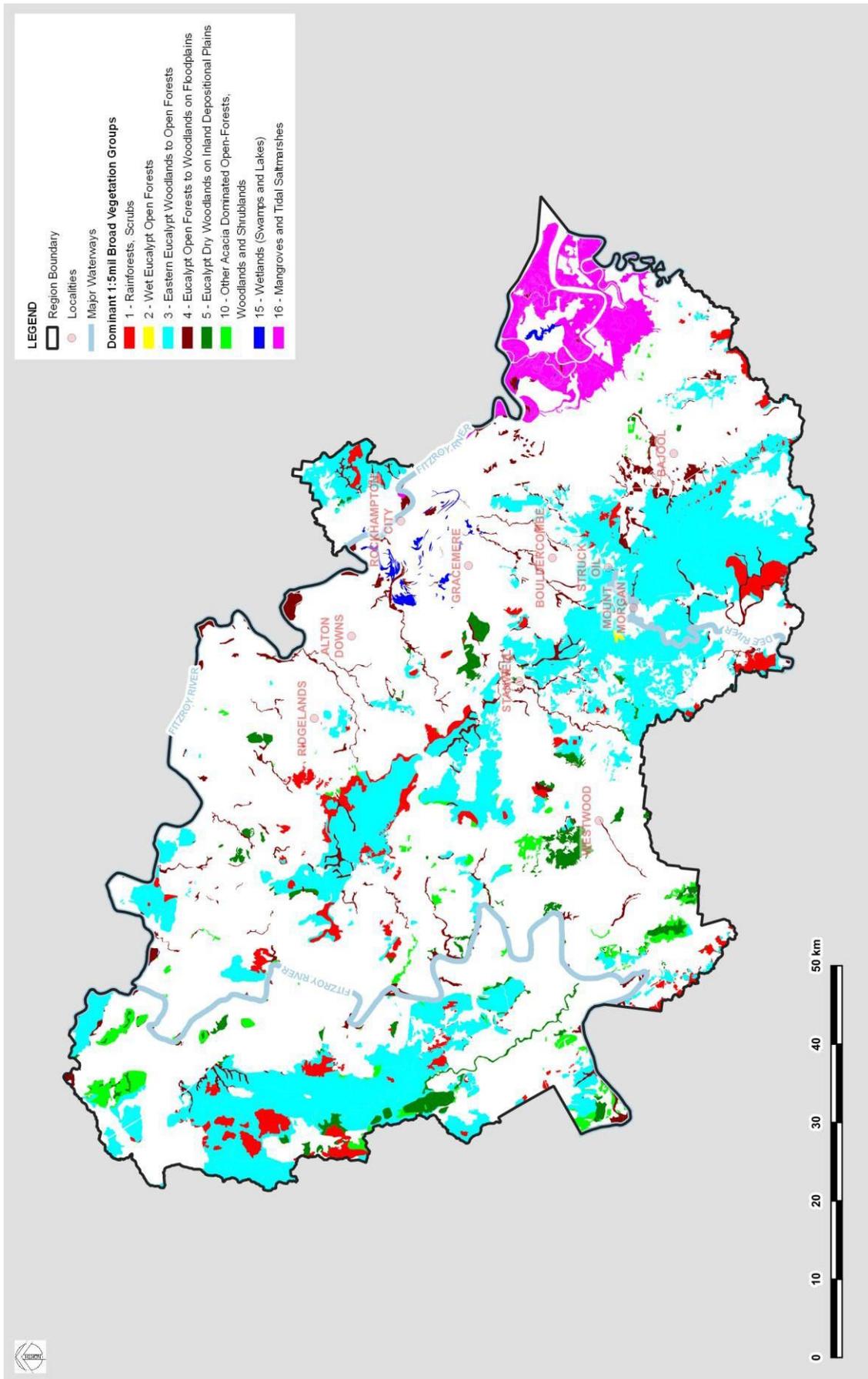


Figure 1-2 Dominant Broad Vegetation Groups in Rockhampton Region

Each of these broad vegetation communities are discussed in the following section. **Appendix B** provides regional ecosystem profiles (DES, 2018f)<sup>1</sup> including dominant species and photos for the individual regional ecosystems identified in **Table 1-3**.

### 1.2.2.2 The region's broad vegetation communities

#### 1.2.2.2.1 Rainforests, Scrubs

A total of 18,633ha of rainforests and 'scrubs' (**Plate 1**) are spread across the region with the largest patches occurring in the Dee, Boomer, Moonlight and Berserker Ranges. As these occur over a number of land zones the scrubs are diverse in terms of their structure and species assemblages. Coastal scrubs are dominated by Burdekin Plum (*Pleiogynium timorense*) with other scrubs characterised by Bottle Trees (*Brachychiton australis*, *B. rupestris*), Hoop pine (*Araucaria cunninghamii*) and Crow's Ash (*Flindersia australis*).



**Plate 1** - Regional ecosystem 11.12.4 forms part of the Rainforest, Scrubs vegetation community

#### 1.2.2.2.2 Wet Eucalypt Open Forests

This is the smallest community in the region, accounting for 120ha immediately to the north of the Mount Morgan Mine and is entirely composed of a single regional ecosystem (11.10.2).



**Plate 2** - View from Sliepner lookout-Mt Archer (Photo by Allan Briggs)

#### 1.2.2.2.3 Eastern Eucalypt Woodlands to Open Forests

Eucalypt woodlands to open forests is the dominant vegetation association within the region accounting for more than 60% (125,477ha) of all remnant vegetation. They occur from the alluvial plains through to the highest ridges and peaks. Most associations are dominated by Iron barks (*Eucalyptus crebra*, *E. fibrosa*) and/or Spotted gum (*Corymbia citriodora*) or bloodwoods (e.g. *C. erythrophloia*). The Berserker Range supports a mesic variant of this community (**Plate 2**) with *E. acmenoides* and *Lophostemon suaveolens* also prominent in the association.

<sup>1</sup> All regional ecosystems for the region have had technical descriptions prepared by DES (2018f) with the exception of 11.1.3, 11.1.4, 11.10.4b, 11.11.3c, 11.2.3, 11.3.11, 11.3.25f, 11.3.25g, 11.3.27x1b and 11.4.1.

1.2.2.2.4 Eucalypt Open Forests to Woodlands on Floodplains

This community is associated with alluvial deposits located along the Fitzroy River and its tributaries. The vegetation association accounts for 20,660ha or a little under 10% of all remnant vegetation in the region. In close proximity to waterways it is often characterised by Coolabah (*Eucalyptus coolabah*), River red gum (*E. camaldulensis*), Forest red gum (*E. tereticornis*), River oak (*Casuarina cunninghamiana*) and tea trees (*Melaleuca bracteata*, *M. viminalis*) with areas located further out on alluvial plains also supporting Poplar box (*E. populnea*). One of the largest patches of this community is associated with the Long Island Environmental Reserve. Some areas are located close to the Rockhampton City centre including the upper sections of the Frenchman’s (Plate 3) and Moores urban Creeks.



Plate 3 - Frenchman's Creek (Photo by Geoff Higgins)

1.2.2.2.5 Eucalypt Dry Woodlands on Inland Depositional Plains

Accounting for a little over 5% of all remnant vegetation (11,308ha), Eucalypt Dry Woodlands on Inland Depositional Plains is located in scattered patches across the region. These sparse woodlands are characterised by species including Poplar box (*Eucalyptus populnea*) (Plate 4), Silver-leafed ironbark (*Eucalyptus melanophloia*) or Narrow-leafed ironbark (*E. crebra*).



Plate 4 – Regional ecosystem 11.3.2 forms part of the Eucalypt Dry Woodlands on Inland Depositional Plains vegetation community



**Plate 5** – Regional ecosystem 11.3.1 forms part of the Other Acacia Dominated Open-Forests, Woodlands and Shrublands vegetation community

1.2.2.2.6 Other Acacia Dominated Open-Forests, Woodlands and Shrublands

Scattered patches of this vegetation community are predominantly located in the west of the region. Accounting for 8,595ha, patches of this community are largely associated with elevated country on metasedimentary deposits and duricrusts. Patches also occur on old clay pans and recent alluvial deposits (**Plate 5**) where Brigalow (*Acacia harpophylla*) often dominates.

1.2.2.2.7 Wetlands (Swamps and Lakes)

While accounting for only <1% of all vegetation associations (1,835ha in total), wetlands (**Plate 6**) are an important community in terms of the habitat and ecological function they provide. Largely associated with the floodplains of the Fitzroy River, most are found in the eastern reaches particularly around Lion Creek. Murray Lagoon to the south of the airport is a prominent example.



**Plate 6** - Lagoon Sunset (Photo by Russell Prothero)

#### 1.2.2.2.8 Mangroves and Tidal Saltmarshes

Covering 20,816ha and accounting for 10% of all remnant vegetation, Mangroves and Tidal Marshes (**Plate 7**) are the second largest vegetation association by area. Nearly all of this community is associated with the Fitzroy River delta. Mangroves that frequently dominate the community include (*Rhizophora stylosa*), Grey Mangrove (*Avicennia marina*) and (*Ceriops australis*). Broad areas devoid of mangroves often support saltmarshes and are dominated by species such as Saltwater couch (*Sporobolus virginicus*), Rusty sedge (*Fimbristylis ferruginea*) and Samphires (*Tecticornia spp.*).



**Plate 7** - Mangroves and tidal marshes

#### 1.2.2.3 The region's habitats

The region's wildlife not only relies on the >200,000ha of remnant vegetation, but also regrowth, scattered trees and habitats that occur in areas that have been historically disturbed. Iconic species are known to utilise non-remnant habitat including the White-throated Snapping Turtle (*Elseya albagula*) that nests in sand bars and koalas that feed on scattered gums in paddocks. This said, most wildlife rely on interconnected habitats for their daily, seasonal and intergenerational requirements. Broad habitat areas, such as those protected in National Parks, State Forests and local conservation reserves are important as core habitat. Other remnant, waterways, regrowth and scattered trees are also important, not only as habitat, but also for connection between core habitats. Waterways in particular offer important existing and potential movement opportunities. The Fitzroy River provides a 'spine' through the region and its tributaries link into core habitats including Goodedulla National Park and adjacent wooded hills of Boomer Range in the west through to Mount Archer National Park in the east. Protection and enhancement of this network of habitat is necessary to maintain and strengthen the region's biological wealth into the future. This need extends not only into the rural parts of the region, but also urban creeks that run through Rockhampton City.

At a finer scale, a diversity of habitat types is necessary to maintain local biodiversity. Different species rely on different niches at different stages of their life cycle. Black-necked storks (*Ephippiorhynchus asiaticus*), for example (**Plate 8**), rely on wetlands to feed, but require tall trees standing in or near water on which to construct their nests. A variety of niches such as wetlands, sandbars, gravel beds, floodplains, salt marshes, rocky outcrops, caves, closed forests, open forests, woody debris, hollow-bearing trees and many others are necessary to maintain biodiversity.

The continued interconnection of all habitats associated with land and water is critical to the key processes that drive ecosystem services.



The Black-necked Stork relies on wetlands (Photo by Judy Milner)



*Ctenopus robustus* relies on wooded and leafy ground layers in open forests and woodlands



The Scarlet Honeyeater relies on forests that are rich in flowering species (Photo by Allan Brigg)

**Plate 8 – Wildlife and habitat**

**1.2.3 Comparison with other regions**

The following sections discuss the specific natural environmental attributes within the Rockhampton region that are of value. Taking a broader view, we can also appreciate how the Rockhampton region compares with other local authorities in terms of specific landscape-scale natural environment indicators. **Figure 1-3** to **Figure 1-6** presents the data for some natural environmental data that can be measured and compared at a local government scale. To aid in benchmarking, data for the region has been presented against two similar local governments being Townsville and Toowoomba, along with the average for all local governments in Queensland.

**Figure 1-3** presents data on the extent of remnant vegetation within the local government area (Queensland Government, 2019). The Rockhampton region only has around 31.73% of remnant vegetation remaining. If we consider the diversity of regional ecosystems, the Rockhampton region is far less diverse than Townsville, but not substantially different to the State average (**Figure 1-4**).

The relative proportion of Endangered and Of Concern regional ecosystems present within the local government area (**Figure 1-5**) is similar to other local governments and the State average.

In terms of biodiversity, a broad metric using the State’s generalised species records (i.e. individual records of flora and fauna species, both native and exotic, plotted on a 10km grid (DES, 2019a)) found that the Rockhampton region supported a moderate diversity of species (**Figure 1-6**). This is likely due to the Rockhampton region being smaller than other local government areas such as Cook Shire Council. Further, the region is not considered a biodiversity hotspot such as the Cassowary Coast Regional Council local government area and the Rockhampton region may be under surveyed in contrast to other areas such as South-east Queensland.

Figure 1-3 Extent of remnant vegetation per LGA

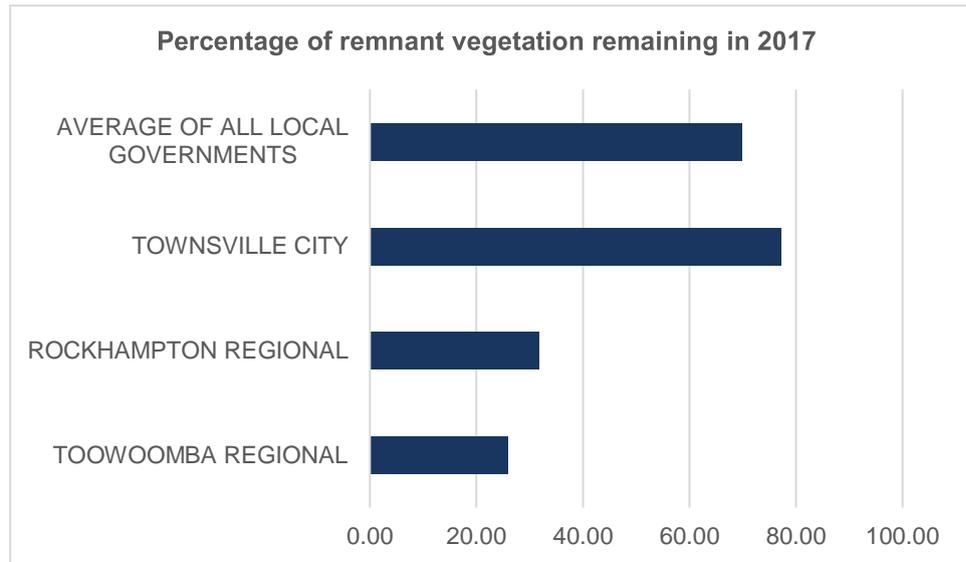


Figure 1-4 Number of regional ecosystems per LGA

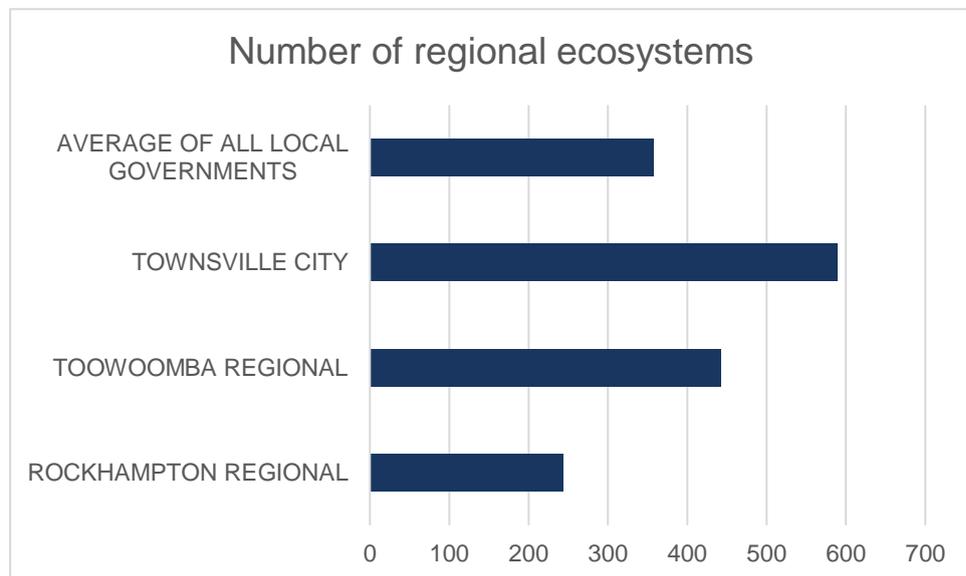


Figure 1-5 Percentage of regional ecosystems that are Endangered or Of Concern per LGA

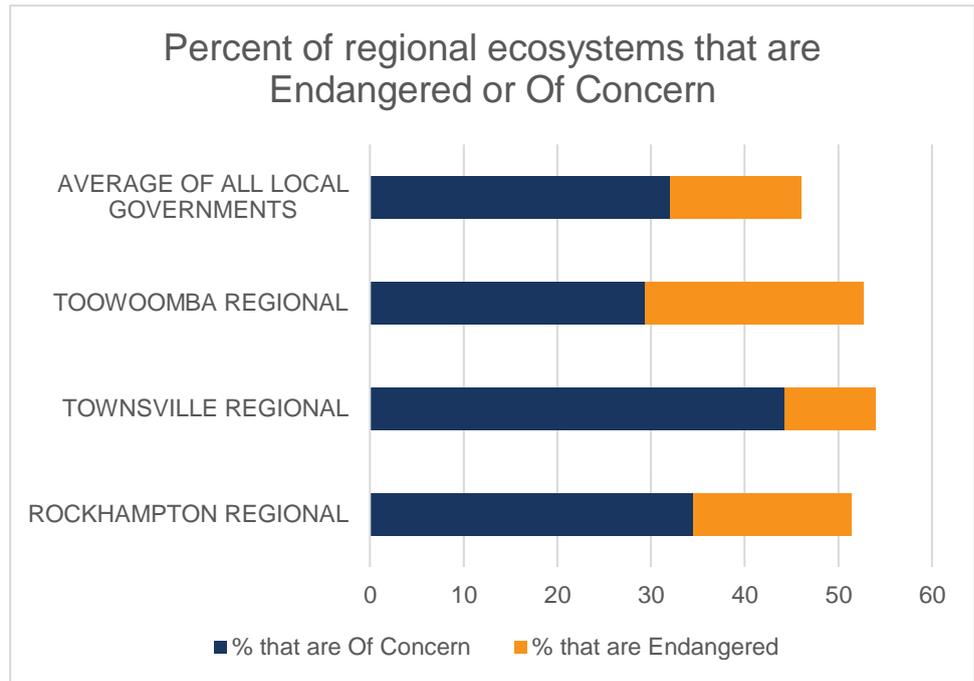
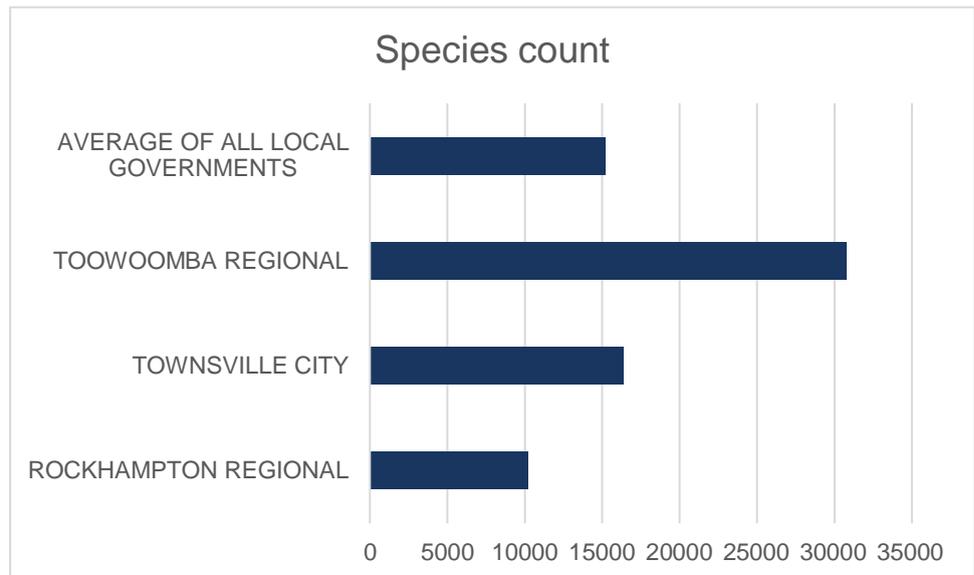


Figure 1-6 Combined flora and fauna species count per LGA



### 1.2.4 Conservation Reserves

Over 47,286ha is protected under State legislation in National Parks, State Forest, Conservation Parks and Nature Refuges across the region (DES, 2019a & DES, 2017d) (Table 1-4).

Table 1-4 Protected Area Estates within the region.

Protected Area	Area (ha)	Total Area (ha)
<b>National Parks</b>		
Goodedulla National Park	25,500	29,750
Mount Archer National Park	4,250	
<b>Conservation Parks and Resource Reserves</b>		
Bouldercombe Gorge Regional Park	390	4,934.2
Bouldercombe Gorge Resource Reserve	3,970	
Limestone Creek Conservation Park	19.8	
Mount Hopeful Conservation Park	554.4	
<b>State Forests</b>		
Mount Archer State Forest	150	9,914.42
Bouldercombe State Forest	4.58	
Stuart Creek State Forest	1,200	
Morinish State Forest	830	
Aricia State Forest	1,780	
Develin State Forest	845.6	
Gelobera State Forest	5,104.24	
<b>Nature Refuges</b>		
Pindari Nature Refuge	83.26	2,687.96
Belgamba Nature Refuge	537	
Rainbow Mountain Nature Refuge	1130	
Dovecot Nature Refuge	291.81	
Stanwell Power Station Nature Refuge	634	
Rockhampton Pistol Club Nature Refuge	11.89	
<b>Total Protected Areas</b>		<b>47,286.58 ha</b>

The Rockhampton region covers an area of 657,400ha of which 47,286ha (~7%) are within the protected area estate. In addition to estate protected under State legislation, Rockhampton Regional Council is responsible for over 2,165ha of land within their parks estate. While a number of these are managed for their natural values, such as Fraser Park at the summit of Mount Archer, there are many more supporting native vegetation and waterways that also provide biodiversity benefits. A targeted mapping project that identifies the specific purpose of each parcel, will aid in both 'protection' of this existing asset and future allocation of funds to 'maintain' and/or 'enhance' the ecological values contained within them. **Figure 1-7** illustrates the location of State reserves and Rockhampton Regional Council's parks estate.

Of the reserves protected under State legislation, there are several that offer recreational opportunities to local residents and tourist in addition to protection of significant biodiversity values. For example, Bouldercombe Gorge Resource Reserve protects 3,970ha, including Crocodile Creek and Bouldercombe Falls (**Plate 10**), which is a popular local swimming hole. The reserve was gazetted in 1992 to enable access

to mineral resources whilst protecting the significant natural values of the area (DNPSR, 2015). The reserve supports eight regional ecosystems and habitat for threatened flora species including *Cycas megacarpa* and *Decaspermum struckoilicum*.

The largest protected area in the region is Goodedella National Park which capturing over 25,500 ha of diverse landscapes. This includes patches of the TEC, Brigalow (*Acacia harpophylla* dominant and co-dominant), the threatened Black ironbark (*Eucalyptus raveretiana*) and Least Concern species at the northern limit of their distribution including Scrub ironbark (*Bridelia exaltata*), Velvet cassia (*Cassia tomentella*) and *Grevillea helmsiae* (DES, 2014b).



**Plate 10** – Bouldercombe Falls (Photo by Kristina Sand)

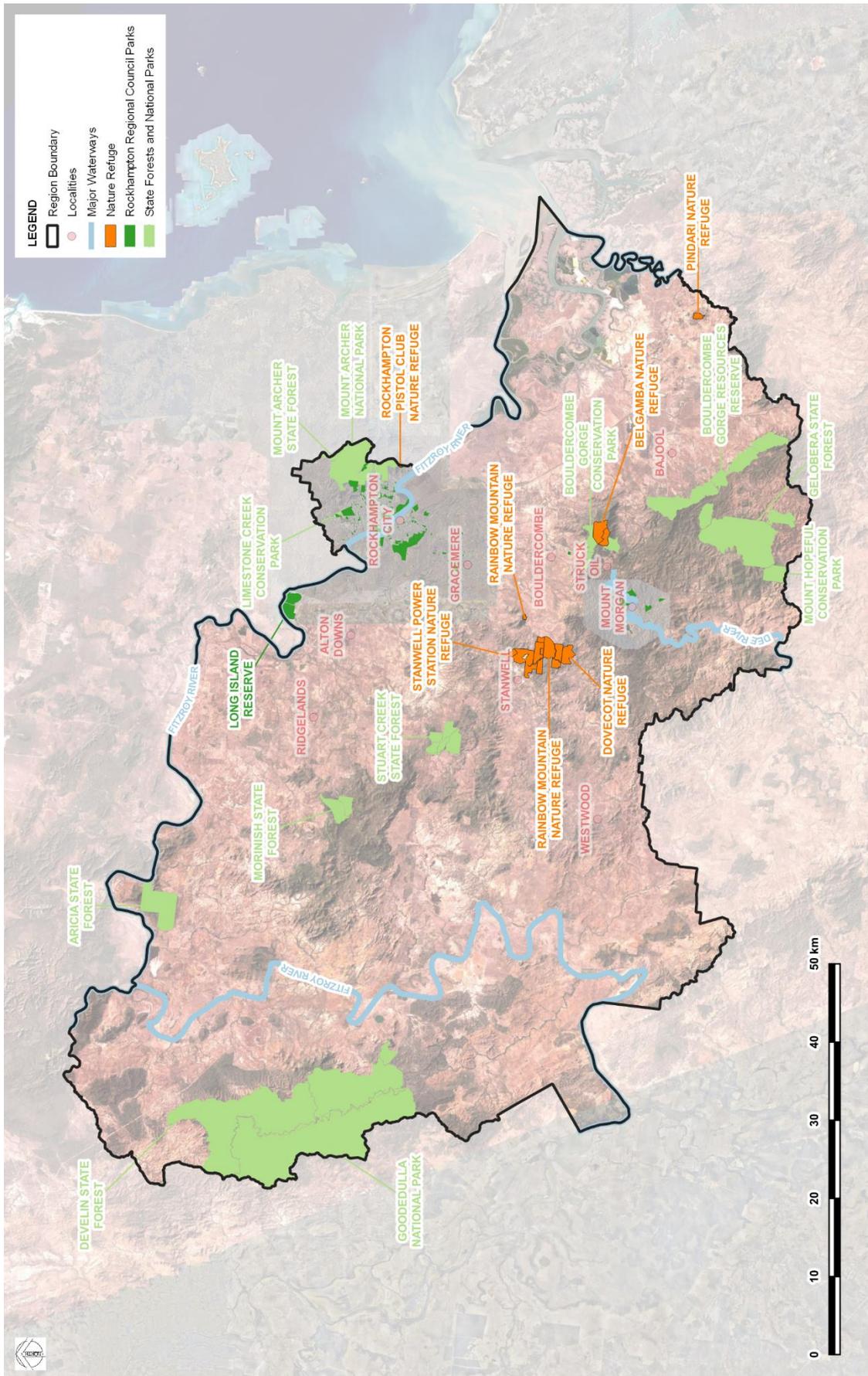


Figure 1-7 State Reserves and Rockhampton Regional Council's Parks

## 1.2.5 Vegetation communities of conservation significance in the Rockhampton region

### 1.2.5.1 Overview

The State maps regional ecosystems for the purposes of the *Vegetation Management Act 1999*. The region contains 69 remnant Regional Ecosystems (DES, 2019c) and has 30% vegetation cover, accounting for approximately 207,000 hectares. The percentage of vegetation cover reflects historical clearing, land use including grazing, production forestry, cropping, horticulture, manufacturing and industry, mining and quarrying. In 1997 the Nationally Agreed Criteria for the Establishment of a Comprehensive, Adequate and Representative Reserve System for Forests in Australia (Commonwealth of Australia, 1997) described a framework for the conservation of ecosystems. The report categorises ecosystems into the status of Rare, Vulnerable and Endangered. A Vulnerable ecosystem includes those where “...a reduction in...extent of 70% within a bioregional context and which remains subject to threatening processes”. They are described as:

*Vulnerable ecosystems include those where threatening processes have caused significant changes in species composition, loss or significant decline in species that play a major role within the ecosystem, or significant alteration to ecosystem processes.*

While this description applies to Vulnerable ecosystems, the same processes apply at a landscape scale and as such landscapes where 70% pre clearing cover has been lost, such as the Rockhampton Regional Council LGA, are likely to have experienced a “significant decline in species that play a major role within the ecosystem, or significant alteration to ecosystem processes”.

Given this, natural environments in the Rockhampton Regional Council LGA are important and efforts are required to protect, maintain and enhance these areas.

The Regional Ecosystem Description Database details the biodiversity status and vegetation management class of each regional ecosystem (DES, 2019e). Biodiversity status is determined based on an assessment of the condition of remnant vegetation and the class of regional ecosystems listed in the *Vegetation Management Act 1999*. The vegetation management class of regional ecosystems is listed in the *Vegetation Management Regulation 2012*. The criteria to determine the biodiversity status and vegetation management class of remnant vegetation is based on the percentage of pre-clearing extent of remaining remnant vegetation within the bioregion or extent of remaining hectares. **Table 1-5** details the biodiversity status and vegetation management class of the 69 regional ecosystems within the Rockhampton region and their distribution is presented in **Figure 1-8**.

Table 1-5 Summary of regional ecosystems

Status	Vegetation Management Act (count)	Biodiversity Status (count)
Endangered	11	12
Of concern	12	24
Least concern / No concern at present	46	33
<b>Total</b>	<b>69</b>	

Regional ecosystems are afforded a conservation status under the *Vegetation Management Act 1999* largely on the basis of how much is remaining in the landscape. Specifically:

- > **Endangered:** A regional ecosystem is listed as ‘endangered’ under the Act if:
  - o remnant vegetation is less than 10% of its pre-clearing extent across the bioregion; or
  - o 10–30% of its pre-clearing extent remains and the remnant vegetation is less than 10,000ha.
- > **Of concern:** A regional ecosystem is listed as ‘of concern’ under the Act if:
  - o remnant vegetation is 10–30% of its pre-clearing extent across the bioregion; or
  - o more than 30% of its pre-clearing extent remains and the remnant extent is less than 10,000ha.
- > **Least Concern:** A regional ecosystem is listed as ‘least concern’ under the Act if:

- remnant vegetation is over 30% of its pre-clearing extent across the bioregion, and the remnant area is greater than 10,000ha.

A similar approach can be used to define status at a local level using the following approach:

- > 'Endangered' if remnant vegetation is less than 10% of its pre-clearing extent across the region.
- > 'Of concern' if remnant vegetation is 10–30% of its pre-clearing extent across the region
- > 'Least Concern' if remnant vegetation is over 30% of its pre-clearing extent across the region.

By utilising version 11 of the 'Biodiversity status of pre-clearing regional ecosystems – Queensland' and 'Biodiversity status of 2017 remnant regional ecosystems - Queensland' GIS resources<sup>2</sup> (DES, 2018e & DES, 2017c) it was possible to identify those regional ecosystems with a local Endangered, Of Concern or Least Concern status of regional ecosystems at a local scale. This exercise also identified a number of regional ecosystems that have been completely cleared from the region, that is, they are regarded as locally 'extinct'.

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<sup>2</sup> The process considered the relative proportion that each regional ecosystem occupied within heterogeneous polygons. For example, a 10ha patch of a heterogeneous polygon of 11.3.3/11.3.25 that had a 70/30% split would constitute 7ha of 11.3.3 and 3ha of 11.3.25.

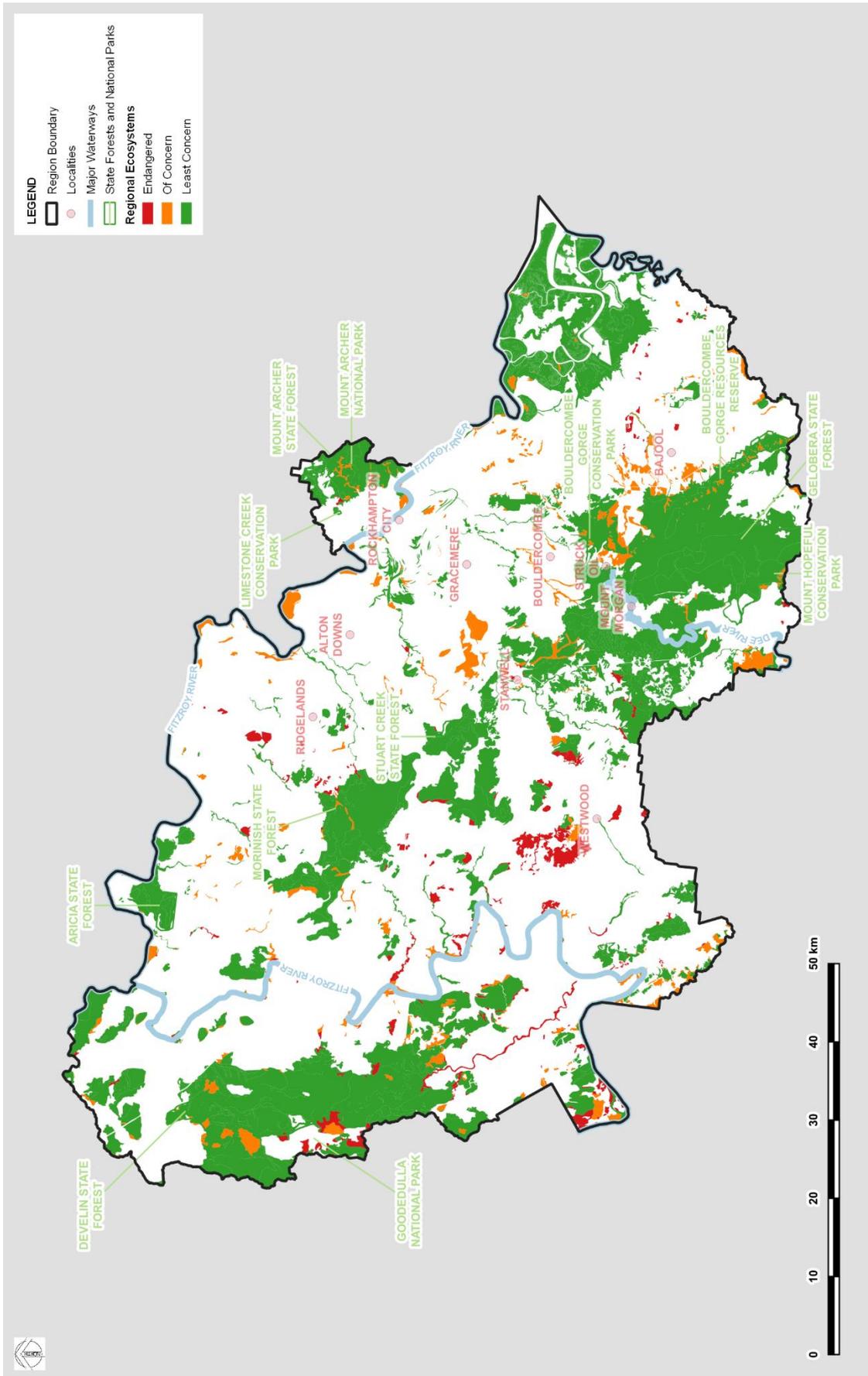


Figure 1-8 Remnant regional ecosystems

Locally significant regional ecosystems include those that have an Endangered or Of Concern vegetation management, biodiversity status or local status ranking. Those regional ecosystems regarded as locally extinct are also considered locally significant<sup>3</sup>. Locally significant regional ecosystems are presented in **Table 1-6** and **Figure 1-9** illustrates where the distribution of locally significant regional ecosystems<sup>4</sup>. **Table 1-6** presents regional ecosystems in order of extent remaining in the region, which aids in illustrating that while some regional ecosystems may not be regarded as locally significant according to the criteria outlined above, they are nonetheless locally significant in the local government area because they have a limited extent. For example, while regional ecosystem 11.5.9c is least concern and 100% of its original extent remains in the region, it is only represented by a single 3.88ha patch in the northwest of the region (i.e. on Develin Creek, which is a tributary of Marlborough Creek).

Table 1-6 Locally Significant Regional ecosystems of the region

Regional Ecosystem	Vegetation Management Act Status	Biodiversity Status	Local Status	Locally Significant?	Extent remaining (ha)
11.11.10a	Of Concern	Of Concern	Extinct	Yes	0.00
11.3.25g	Least Concern	Of Concern	Extinct	Yes	0.00
11.3.27f	Least Concern	Of Concern	Extinct	Yes	0.00
11.3.29a	Least Concern	No concern at present	Extinct	Yes	0.00
11.3.3a	Of Concern	Of Concern	Extinct	Yes	0.00
11.3.9	Least Concern	No concern at present	Extinct	Yes	0.00
11.4.8	Endangered	Endangered	Extinct	Yes	0.00
11.9.5	Endangered	Endangered	Extinct	Yes	0.00
11.5.9c	Least Concern	No concern at present	Least Concern	Not at present	3.88
11.2.3	Of Concern	Of Concern	Least Concern	Yes	6.39
11.4.1	Endangered	Endangered	Endangered	Yes	6.73
11.3.6	Least Concern	Of Concern	Endangered	Yes	7.96
11.4.9	Endangered	Endangered	Endangered	Yes	19.42
11.9.1	Endangered	Endangered	Endangered	Yes	19.71
11.1.4	Least Concern	No concern at present	Least Concern	Not at present	23.85
11.3.11	Endangered	Endangered	Endangered	Yes	32.08
11.3.27x1b	Least Concern	Of Concern	Of Concern	Yes	32.64
11.11.7a	Least Concern	Of Concern	Least Concern	Yes	38.23
11.3.25a	Least Concern	Of Concern	Least Concern	Yes	45.28
11.7.4	Least Concern	No concern at present	Least Concern	Not at present	48.36
11.3.3c	Of Concern	Of Concern	Endangered	Yes	64.43
11.1.2b	Least Concern	No concern at present	Least Concern	Not at present	75.05
11.11.21	Of Concern	Endangered	Least Concern	Yes	82.96
11.8.4	Least Concern	No concern at present	Least Concern	Not at present	96.12
11.1.4a	Least Concern	No concern at present	Least Concern	Not at present	114.06
11.10.8	Of Concern	Of Concern	Least Concern	Yes	116.87
11.10.2	Of Concern	Of Concern	Least Concern	Yes	120.19
11.4.3	Endangered	Endangered	Endangered	Yes	138.74
11.11.16	Of Concern	Of Concern	Endangered	Yes	146.30

<sup>3</sup> Patches of these 'extinct' regional ecosystems may be present as regrowth and/or in patches too small to map or have not been accurately identified in current regional ecosystem mapping.

<sup>4</sup> The figure illustrates the distribution of locally significant regional ecosystems on the basis of the dominant regional ecosystem in each patch.

Regional Ecosystem	Vegetation Management Act Status	Biodiversity Status	Local Status	Locally Significant?	Extent remaining (ha)
11.12.21	Endangered	Endangered	Endangered	Yes	149.61
11.11.4	Least Concern	No concern at present	Of Concern	Not at present	154.13
11.3.38	Endangered	Endangered	Least Concern	Yes	154.54
11.3.25c	Least Concern	Of Concern	Least Concern	Yes	158.42
11.11.9	Least Concern	No concern at present	Of Concern	Not at present	185.31
11.11.18	Endangered	Endangered	Endangered	Yes	241.46
11.1.3	Of Concern	Of Concern	Least Concern	Yes	290.50
11.3.27a	Least Concern	Of Concern	Least Concern	Yes	298.51
11.4.9a	Endangered	Endangered	Endangered	Yes	386.33
11.3.25f	Least Concern	Of Concern	Of Concern	Yes	435.64
11.4.2	Of Concern	Of Concern	Of Concern	Yes	494.93
11.3.27b	Least Concern	Of Concern	Least Concern	Yes	538.00
11.11.15a	Least Concern	No concern at present	Least Concern	Not at present	560.63
11.12.3	Least Concern	Of Concern	Of Concern	Yes	666.37
11.3.27c	Least Concern	Of Concern	Least Concern	Yes	725.56
11.11.14	Endangered	Endangered	Endangered	Yes	783.06
11.1.1	Least Concern	No concern at present	Least Concern	Not at present	888.78
11.10.3	Least Concern	No concern at present	Least Concern	Not at present	948.45
11.9.9	Least Concern	No concern at present	Least Concern	Not at present	1,089.48
11.1.4c	Least Concern	No concern at present	Least Concern	Not at present	1,098.41
11.5.9b	Least Concern	No concern at present	Least Concern	Not at present	1,163.03
11.11.4c	Least Concern	No concern at present	Least Concern	Not at present	1,302.52
11.3.26	Least Concern	No concern at present	Of Concern	Not at present	1,535.94
11.11.7x1	Least Concern	Of Concern	Least Concern	Yes	1,580.61
11.12.6a	Least Concern	No concern at present	Least Concern	Not at present	1,787.71
11.10.4b	Least Concern	No concern at present	Least Concern	Not at present	1,986.08
11.1.4d	Least Concern	No concern at present	Least Concern	Not at present	2,003.33
11.3.1	Endangered	Endangered	Endangered	Yes	2,226.88
11.5.2	Least Concern	No concern at present	Least Concern	Not at present	2,339.83
11.3.2	Of Concern	Of Concern	Endangered	Yes	2,459.00
11.7.2	Least Concern	No concern at present	Least Concern	Not at present	2,488.40
11.1.4b	Least Concern	No concern at present	Least Concern	Not at present	2,507.85
11.10.1d	Least Concern	No concern at present	Least Concern	Not at present	2,531.98
11.11.7	Least Concern	Of Concern	Least Concern	Yes	3,119.02
11.11.10	Of Concern	Of Concern	Of Concern	Yes	3,476.08
11.12.2	Least Concern	No concern at present	Endangered	Yes	3,811.03
11.3.3	Of Concern	Of Concern	Of Concern	Yes	4,256.41
11.11.3c	Least Concern	No concern at present	Least Concern	Not at present	5,783.02
11.11.5	Least Concern	No concern at present	Of Concern	Not at present	6,476.23
11.3.4	Of Concern	Of Concern	Of Concern	Yes	7,456.14
11.3.25	Least Concern	Of Concern	Least Concern	Yes	7,976.56
11.12.4	Least Concern	No concern at present	Least Concern	Not at present	13,312.17

Regional Ecosystem	Vegetation Management Act Status	Biodiversity Status	Local Status	Locally Significant?	Extent remaining (ha)
11.1.2a	Least Concern	No concern at present	Least Concern	Not at present	14,152.90
11.11.15	Least Concern	No concern at present	Least Concern	Not at present	14,425.72
11.11.3	Least Concern	No concern at present	Least Concern	Not at present	18,898.34
11.12.6	Least Concern	No concern at present	Least Concern	Not at present	19,797.07
11.12.1	Least Concern	No concern at present	Least Concern	Not at present	21,640.57
11.11.1	Least Concern	No concern at present	Least Concern	Not at present	25,383.23
<b>TOTAL (ha)</b>					<b>207,365.01</b>



The criteria for listing regional ecosystems as locally significant in **Table 1-6** is based on the rarity of these communities at state and local levels owing to historic clearing. Other ecosystems not otherwise listed may be of significance for the habitat values they provide, other intrinsic qualities or significance at a national scale. For example, the habitat values afforded by Threatened Ecological Communities (TECs) may increase the local significance of specific regional ecosystems. Additionally, regional ecosystems may support valuable ecosystem services which may influence the local significance listing of a regional ecosystem.



**Plate 11** - Brigalow (*Acacia harpophylla*)

Vegetation communities are also described by the Commonwealth as 'Threatened Ecological Communities' (TECs). While the Commonwealth does not provide mapping of TECs, review of the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Database Search (DoEE, 2019a) for the region indicates that five<sup>5</sup> TECs may occur within the region including:

- > Brigalow (*Acacia harpophylla* dominant and co-dominant) (**Plate 11**).
- > Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community.
- > Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions.
- > Natural Grasslands of the Queensland Central Highlands and northern Fitzroy Basin.
- > Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions.

Regional Ecosystems associated within the Threatened Ecological Communities have been included in **Appendix C**. The location and extent of Threatened Ecological Communities within the region is unknown.

<sup>5</sup> The database also identified that Weeping Myall (*Acacia pendula*) may also be present, however given the diagnostic canopy species Weeping Myall is absent from the region, the TEC is also likely to be absent (**Appendix C**.)

1.2.5.2 Noteworthy vegetation communities of significance in Rockhampton

While the Commonwealth and State have identified some vegetation communities of significance because they are rare or threatened, others are of importance because they are biologically diverse and/or support species assemblages that are of scientific interest.

Serpentine landforms and plant ecology

The region contains areas of serpentine landscape supporting soils with specific soil chemical properties derived from igneous rock composed of mafic minerals (Batianoff, *et.al.*, 1999). Hostile serpentine landscapes can create ‘geological islands’ where reduced competition assists in sustaining remnant plants, known as serpentine endemics. Serpentine endemics in the region include a significant proportion of threatened plants including:

- > *Capparis thozetiana* – Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and *Nature Conservation Act 1992* (NC Act);
- > *Hakea trineura* - Vulnerable under the EPBC Act and NC Act;
- > *Pultenaea setulosa* -Vulnerable under the EPBC Act and NC Act;
- > *Stackhousia tryonii* – Near threatened under the NC Act;
- > *Pimelea leptospermoides* - Vulnerable under the EPBC Act and Near Threatened under the NC Act;
- > *Macrozamia serpentina* – Endangered under the NC Act;
- > *Neoroepora buxifolia* - Vulnerable under the EPBC Act and NC Act;
- > *Olearia macdonnellensis* – Vulnerable under the EPBC Act.

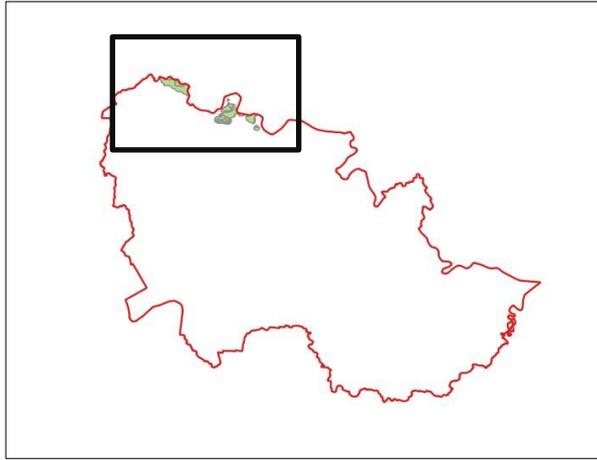
Species of particular scientific interest in these landscapes include nickel hyperaccumulators such as *Pimelea leptospermoides* and *Stackhousia tryonii* (Batianoff *et.al.*, 2001).

The vegetation of the serpentine landform represents scientifically important plant assemblages. In the region these correspond with Regional Ecosystems 11.11.7 and 11.11.21 (DES, 2019e). The Regional Ecosystems of the serpentine landform within the region are described in **Table 1-7** below.

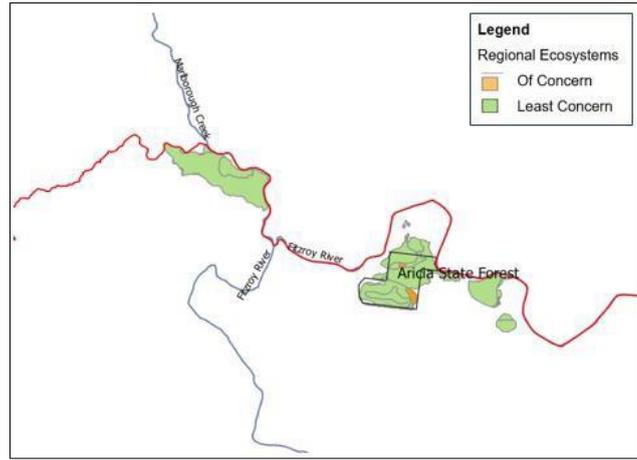
Table 1-7 Regional ecosystems of the serpentine landform (DES, 2019e)

Regional Ecosystem	Vegetation Management Act class	Short Description
11.11.7	Least Concern	<i>Eucalyptus fibrosa subsp. fibrosa</i> , <i>Corymbia xanthope</i> woodland on serpentinite.
11.11.21	Of Concern	<i>Semi-evergreen vine thicket</i> on serpentinite.

The Regional Ecosystems which correspond with serpentine landforms are located within the north-western extent of the region as shown in **Extracts 1** and **2**. A portion of the community is located within Aricia State Forest, which protects 1,780 hectares. Records of the indicator species, *Pimelea leptospermoides* have been recorded and collected by Serpentine landform researcher G.N. Batianoff within Aricia State Forest (ALA, 2019a). DES’s Bukkulla/Marlborough Area Management Statement (DES, 2013) recommends scientific research and monitoring of the vegetation communities growing on the serpentine landform in order to assist the area’s management. The Central Queensland serpentine flora extends northwards to Marlborough and Herbert Creek and is considered a highly diverse flora for ultramafic soils (Batianoff. *et.al.*, 2001).



**Extract 1** - Location of Serpentine landforms within the region.



**Extract 2** - Regional Ecosystems which correspond with Serpentine landforms and ecology

Vine Forests

Vine forests support a high diversity of wildlife and are considered of conservation value on scientific grounds alone (Sattler and Williams, 1999). Known vine forests for the region are illustrated in **Figure 1-10**.

There are some patches of vine forest in the region known to be of particular importance because they are large, support threatened taxa and/or because they represent an uncommon type of community (Forster *et al.* 1991). This includes sites located at (see **Figure 1-10**):

- > Crocodile Creek, Bouldercome Gorge; and
- > Struck Oil.

Furthermore, the endangered Threatened Ecological Community (TEC) ‘Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions’ (SEVT) is present in scattered patches throughout the local government area from coastal areas (**Plate 12**) through to steeper terrain in the west. There is 286ha of mapped regional ecosystems that wholly equate with the SEVT TEC in the Rockhampton region (DES, 2019c). In particular, a concentration of the largest patches in the LGA are located around the foot slopes of the Moonlight Range, particularly around Spear and Oakey Creeks (**Figure 1-10**).



**Plate 12** - Regional ecosystem 11.2.3 equating with the SEVT TEC

SEVT is known to be floristically diverse, support habitat for threatened flora and fauna species such as the Black Breasted Button Quail and even small patches can support habitat for understudied species such as rainforest snails (McDonald, 2010).

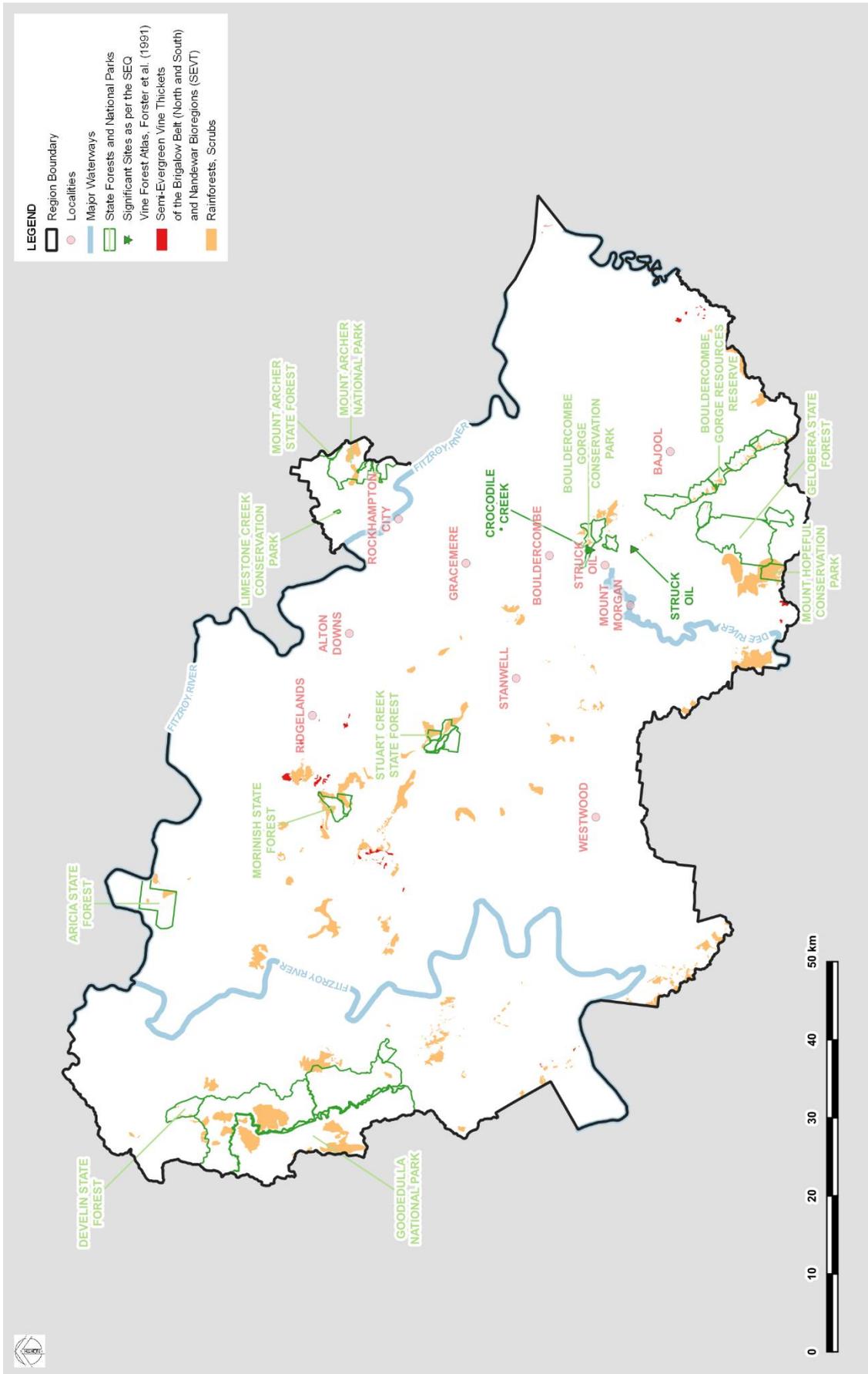


Figure 1-10 Vine Forests

### Coolabah woodland on alluvial floodplains

The alluvial floodplains of the Fitzroy River hosts Coolabah woodlands which correspond with the Of Concern Regional Ecosystem 11.3.3 and the Endangered TEC, 'Coolibah – Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions' (DES, 2011).

The community is found on the clays of periodically waterlogged floodplains, swamp, ephemeral wetlands and stream banks. The canopy is dominated by Coolabah (*Eucalyptus coolabah*) with a mid-layer which is often absent, however scattered tree and shrubs may be present including Poplar box (*Eucalyptus populnea*), Black tea-tree (*Melaleuca bracteata*), River coomba (*Acacia stenophylla*), Western rosewood (*Alectryon oleifolius*) and Gidgee (*Acacia cambagei*). The community is particularly important for birds and colonial breeding waterbirds where present on flood plains (DES, 2011). The community is represented within Mount Archer National Park along Frenchmans and Thozets Creeks.

#### 1.2.5.3 Information gaps

The regional ecosystem mapping represents the best product available to delineate areas of vegetation. This vegetation is based solely on remnant mapping and has been prepared at a limited scale of 1:100,000. Given this, there are several limitations with the existing mapping and information gaps including:

- > The most detailed seamless vegetation coverage for the region is the State's Regional Ecosystem mapping. This mapping has been prepared at a scale of 1:100,000. This means that many areas of significance are unlikely to have been adequately captured in the coverage because the mapping is too coarse to identify their presence (e.g. vine forests in gullies); they are too small to be mapped (e.g. the minimum regional ecosystem mapped patch is 1ha whereas the Brigalow TEC includes areas down to 0.5ha in area and the mapping only includes remnant (i.e. regrowth is not always included), this is relevant for some TECs such as Brigalow TEC because it includes areas as young as 15 years old.
- > Locally significant Regional Ecosystems were previously unknown, **Table 1-6** provides a list of locally significant Regional Ecosystems. It is recommended that the list of locally significant Regional Ecosystems be updated to include other ecosystems of importance (e.g. Serpentine landforms) and included within future amendments to the provisions of the Biodiversity Overlay Code.

## 1.2.6 Flora species of the Rockhampton Region

### 1.2.6.1 Overview

The region supports a diversity of flora species including 1,217 native plant species (QG, 2017). **Appendix D** lists all species returns for the local government, including those that are regarded of conservation significance under the Commonwealth's EPBC Act or the State's NC Act (ALA, 2019a). The list includes those made since commencement of data collection and those that have imprecise locational accuracy. Therefore, the list is likely to include species that are no longer present in the local government area or, owing to the precision of the record, may actually occur in neighbouring local government areas. Significantly, several of the records have been afford low precision because they represent species that are targeted by illegal collection activities. For example, this includes the locally iconic and ancient species Marlborough Blue (*Cycas ophiolitica*) (see **Plate 13**). Considering this, the database reveals that there are 47 species that are listed as threatened or near threatened accounting for around 4% of all species recorded in the Rockhampton Region.

Locationally precise threatened flora species (i.e.  $\leq 2,000m$  precision)<sup>6</sup> and recent records (i.e. since 1950) are presented in **Table 1-8** accounting for a total of 17 flora species within the region.

Table 1-8 High precision threatened flora species within the region

Scientific Name	Common Name	Status	
		NC Act	EPBC Act
<i>Cadellia pentastylis</i>	Ooline ( <b>Plate 14</b> )	Vulnerable	Vulnerable
<i>Capparis thozetiana</i>		Vulnerable	Vulnerable
<i>Comesperma oblongatum</i>	Byfield Matchstick	Vulnerable	Vulnerable

<sup>6</sup> Older records typically have relatively imprecise spatial data. There are some species for which their spatial data is deliberately 'denatured' to protect their precise location; hence, some species may not be included in the list despite recent collections.

Scientific Name	Common Name	Status	
		NC Act	EPBC Act
<i>Corymbia xanthope</i>	Glen Geddes Bloodwood	Vulnerable	Vulnerable
<i>Cossinia australiana</i>	Cossinia	Endangered	Endangered
<i>Cycas megacarpa</i>		Endangered	Endangered
<i>Decaspermum struckoiligum</i>		Endangered	Endangered
<i>Eucalyptus raveretiana</i>	Black Ironbox	-	Vulnerable
<i>Graptophyllum ilicifolium</i>	Holly-leaved Graptophyllum	Vulnerable	Vulnerable
<i>Hakea trineura</i>	Three-veined Hakea	Vulnerable	Vulnerable
<i>Marsdenia brevifolia</i>		Vulnerable	Vulnerable
<i>Neoroepora buxifolia</i>		Vulnerable	Vulnerable
<i>Olearia macdonnellensis</i>		Endangered	Vulnerable
<i>Parsonsia larcomensis</i>	Mt Larson Silk Pod	Vulnerable	Vulnerable
<i>Pimelea leptospermoides</i>		Near threatened	Vulnerable
<i>Pultenaea setulosa</i>		Vulnerable	Vulnerable
<i>Samadera bidwillii</i>	Quassia	Vulnerable	Vulnerable



Plate 13 – Marlborough Blue (*Cycas ophiolitica*)



Plate 14 - Ooline (*Cadellia pentastylis*)

The diverse ecosystems within the region provide suitable habitat for a myriad of flora species including those with unique habitat requirements. Distinctive landscapes and vegetation communities support habitat for threatened flora species such as the *Capparis thozetiana*, *Cycas ophiolitica*, *Pimelea leptospermoides* and *Decaspermum struckoiligum* (DoEE, 2008a).

All known scheduled flora species from the region are presented in **Appendix D** and locations of high precision records are shown on **Figure 1-11**.

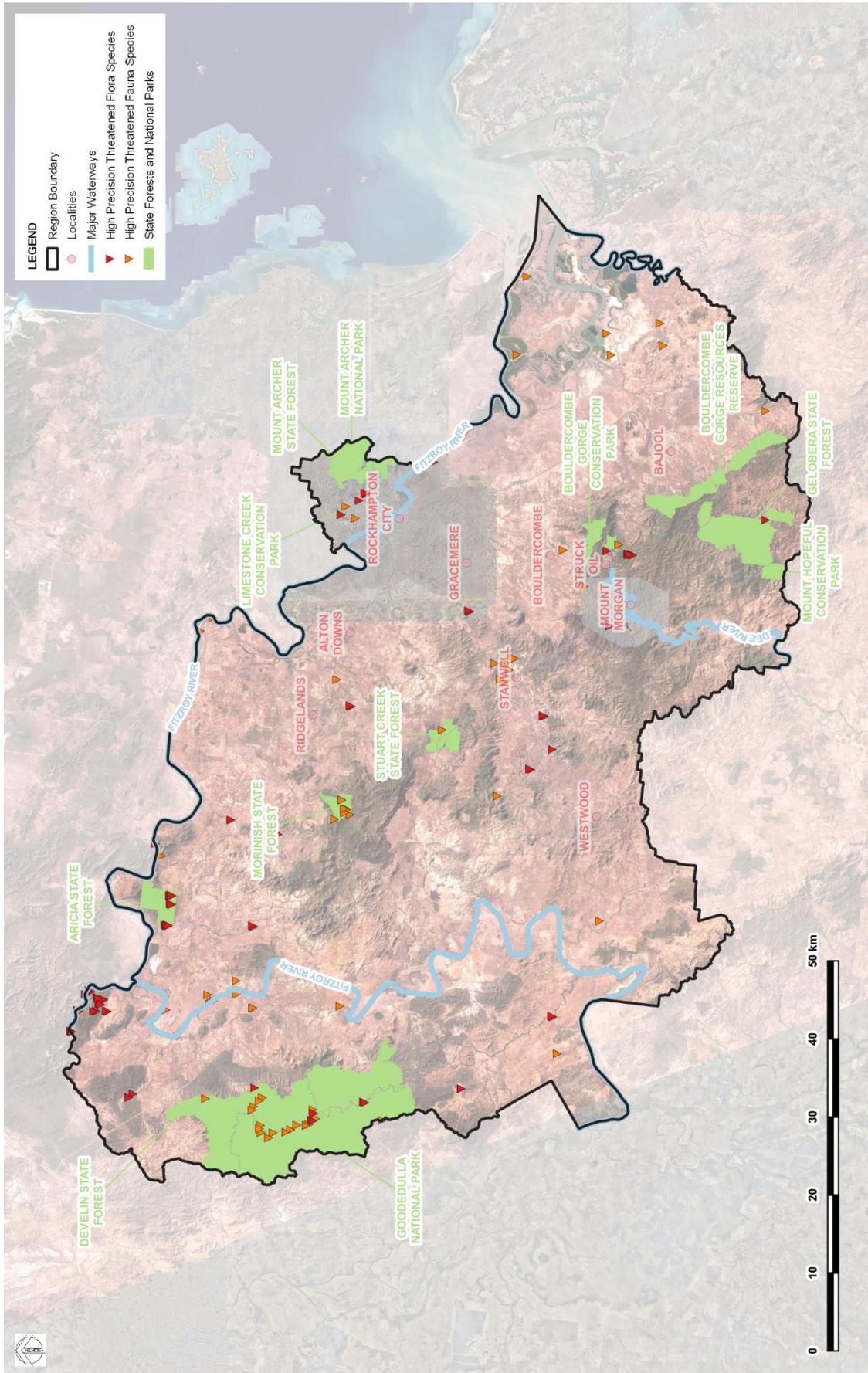


Figure 1-11 Distribution of high precision records for threatened and near threatened flora and fauna species

### 1.2.6.2 Noteworthy flora species of Rockhampton

The scheduling of flora under legislation is but one measure of significance of flora species. Other species can be regarded of significance for a range of reasons including:

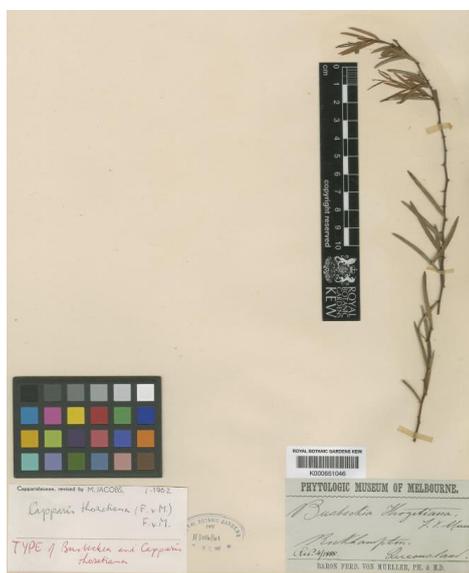
- > poor representation in the Rockhampton region;
- > they are considered to be in decline;
- > restricted or disjunct distribution;
- > species at the edge of their range;
- > poorly known;
- > unusual forms of a species not present elsewhere;
- > or the species plays as important ecological role.

While there has been some historical work to describe some noteworthy species (Batianoff and Dillewaard, 1988) there has been no comprehensive and contemporary assessment of locally significant flora.

#### > Capparis thozetiana

*Capparis thozetiana* (**Plate 15**) is endemic to the region and populations are limited to serpentine landforms and adjacent slopes. While the species is scheduled under both State and Commonwealth legislation it is also regarded of significance owing to its species epithet. Anthelme Thozet was an avid plant collector in the region in the 1860s and experimented with native plants of potential commercial use in his north Rockhampton garden. The species *Capparis thozetiana* is named in honour of Thozet who made a significant contribution to our knowledge of flora of the Rockhampton Region and of Queensland.

The distribution of the species overlaps with the EPBC Act listed Threatened Ecological Community, Brigalow (*Acacia harpophylla* dominant and co-dominant) (DoEE, 2013).



**Plate 15** – Ferdinand von Muller's specimen of *Capparis thozetiana* held at Kew Gardens

#### > Cleistanthus dallachyanus

The species has a restricted distribution recorded from Fantome Island east of Ingham in the north, to Rockhampton in the south. The Rockhampton population does not only represent the southern most limit of its range, but also a disjunct population that is approximately 250 km from the nearest onshore population. Of interest is that a number of records made in the Rockhampton area were by Thozet.

> *Lysiphyllum hookeri*

In 1935, the curator of the Rockhampton Botanic Garden, George Henry Simmons suggested a floral emblem for the city. A ballot was held and citizens voted from six flowering trees. Native bauhinia (*Lysiphyllum hookeri* syn. *Bauhinia hookeri*) won the vote and is the floral emblem of the region (McDonald, 1981) (**Plate 16**).

*L. hookeri* is usually a small multi-stemmed tree and is a Least Concern species found within the Brigalow Belt bioregion grasslands, semi-evergreen-vine thicket and native woodland Regional Ecosystems. Records of the species have been recorded near inlets of the Fitzroy River, Marlborough Creek and the Berserker Range (ALA, 2019c). The species was also planted as a street tree in a scheme from 1937 in cooperation between Council and the Girl Guides (McDonald, 1981).



**Plate 16** – The floral emblem of the region - Native bauhinia

#### 1.2.6.3 Information gaps

The known number and location of scheduled flora species is based on the extent of existing surveys. Within the broad region these surveys have been relatively limited and concentrated close to development (i.e. population centres and road verges) and conservation estates. Further survey work is required to expand the knowledge of their extent. Additional information gaps requiring further effort include the following.

> Little is known about locally significant flora and there is no comprehensive list of these species. It is recommended that a list considers:

- the species is endemic to the Rockhampton region;
- the species is poorly represented in the Rockhampton region;
- the species is considered to be in decline;
- the species has a restricted distribution or disjunct distribution;
- the species is at the edge of their distributional range;
- the species is a poorly known or insufficiently known species;
- there are unusual forms of a species not represented elsewhere; or
- the species plays an important ecological role.

> The priority flora species list can be included within future amendments to the Biodiversity Overlay Code as an acceptable outcome for development to plan for the conservation of priority flora species.

### 1.2.7 Fauna species of the Rockhampton region

#### 1.2.7.1 Overview

The region supports a diversity of fauna species including 111 reptile species, 22 frog species, 35 fish species, 359 bird species and 93 mammal species (QG, 2017). Of these 39 are known to be threatened or near threatened. Similar to flora records, a number of fauna records have been 'denatured' and do not support locationally precise records for the local government areas including the Critically Endangered Yellow chat *Epthianura crocea macgregori*. There are 11 species with locationally precise records (**Table 1-9**) and shown in **Figure 1-11**.

Table 1-9 High precision threatened fauna species within the region

Scientific Name	Common Name	Status	
		NC Act	EPBC Act
<b>Amphibians</b>			
<i>Adelotus brevis</i>	Tusked Frog	Vulnerable	-
<b>Reptiles</b>			
<i>Eelseya albagula</i>	White-throated Snapping Turtle	Endangered	Critically Endangered
<i>Rheodytes leukops</i>	Fitzroy River Turtle	Vulnerable	Vulnerable
<b>Birds</b>			
<i>Geophaps scripta scripta</i>	Squatter Pigeon	Vulnerable	Vulnerable
<i>Numenius madagascariensis</i>	Eastern Curlew	Endangered	Critically Endangered
<i>Ninox strenua</i>	Powerful Owl	Vulnerable	-
<b>Mammals</b>			
<i>Dasyurus hallucatus</i>	Northern Quoll	-	Endangered
<i>Phascolarctos cinereus</i>	Koala	Vulnerable	Vulnerable
<i>Petauroides volans</i>	Greater Glider	Vulnerable	Vulnerable
<i>Macroderma gigas</i>	Ghost Bat	Endangered	Vulnerable
<b>Fish</b>			
<i>Bidyanus bidyanus</i>	Silver Perch	-	Critically Endangered

The diverse ecosystems within the region provide suitable habitat for a myriad of fauna species including those with unique habitat requirements. Distinctive landscapes and vegetation communities support habitat for protected fauna such as the Fitzroy River Turtle (*Rheodytes leukops*) and White-throated Snapping Turtle (*Eelseya albagula*) both found in the Fitzroy River and tributaries (DoEE, 2008d).

The State has identified areas of essential habitat for *Nature Conservation Act 1992* wildlife for the purposes of the *Vegetation Management Act 1999* by using species habitat models and buffered species records. A review of the essential habitat map and essential habitat factor database for high precision fauna species records indicates that several regional ecosystems regarded as essential habitat for these species are present within the Rockhampton region (**Table 1-10**).

Table 1-10 High precision species which correspond with essential habitat within the region

Species <sup>7</sup>	Common Name	NC Act Status	Vegetation Community	Regional Ecosystems
<i>Adelotus brevis</i>	Tusked Frog	V	In cavities, under debris (logs, stones) in subtropical vine forest, tall open moist forest, heaths, Melaleuca swamp and pasturelands near puddles and streams.	11.1.4, 11.2.3, 11.3.1, 11.3.2, 11.3.3, 11.3.4, 11.3.11, 11.3.25, 11.3.27, 11.3.29, 11.3.38, 11.4.2, 11.4.9, 11.5.2, 11.5.9, 11.7.2, 11.8.4, 11.9.9, 11.10.1, 11.10.2, 11.10.4, 11.10.8, 11.12.1, 11.12.2, 11.12.3, 11.12.4, 11.12.21
<i>Geophaps scripta scripta</i>	Squatter Pigeon (southern subsp.)	V	Dry eucalypt woodland (including poplar box, spotted gum, yellow box, acacia and callitris), with sparse short grass, often on sandy areas near to permanent water; grassy eucalypt woodlands. Nest on ground near or under grass tussock, log or low bush.	11.2.3, 11.3.1, 11.3.1, 11.3.2, 11.3.3, 11.3.4, 11.3.25, 11.3.27, 11.3.29, 11.4.2, 11.4.9, 11.5.2, 11.7.2, 11.8.4, 11.9.9, 11.10.1, 11.10.4, 11.11.1, 11.11.3, 11.11.7, 11.11.10, 11.11.15,

<sup>7</sup> Data for the Koala and turtle species was unavailable

Species <sup>7</sup>	Common Name	NC Act Status	Vegetation Community	Regional Ecosystems
				11.11.16, 11.12.1, 11.12.2, 11.12.3, 11.12.6.
<i>Numenius madagascariensis</i>	Eastern Curlew	E	Foraging on soft, intertidal mudflat, with a preference for broad flats, often in sheltered areas near mangroves and estuaries/creeks, also on sandflats and occasionally ocean beaches, rock platforms and coral reefs. Roost on saltflat, saltmarsh, mangroves, reef flat, sandy spits and grassland near water.	11.1.1, 11.1.2, 11.1.3, 11.1.4.
<i>Ninox strenua</i>	Powerful Owl	V	Wet and dry tall open eucalypt forest ( <i>Eucalyptus pilularis</i> , <i>E. acmenoides</i> , <i>E. tereticornis</i> , <i>E. camaldulensis</i> , <i>E. crebra</i> , <i>E. melliodora</i> , <i>Corymbia citriodora</i> & <i>C. intermedia</i> ), including mountain forest gullies/gorges; forests aged 60+ years (large & old) on fertile soils with suitable hollows; roosting in dense foliage of closed forest (occasionally caves) and foraging in open forest and woodland including areas adjacent to urban/rural development. Nest in large hollows (45-75cm diameter, 50-180cm deep) 6-45m above ground, in large (>100cm dbh) old eucalypts on the side or at the head of heavily wooded gully.	11.2.3, 11.3.1, 11.3.11, 11.3.25, 11.3.26, 11.4.9, 11.10.1, 11.10.2, 11.10.8, 11.11.3, 11.11.5, 11.11.14, 11.11.18, 11.12.4, 11.12.21
<i>Petauroides volans</i>	Greater Glider	V	Tall mature open wet and dry eucalypt forest ( <i>Eucalyptus</i> &/or <i>Corymbia</i> spp.) to low open eucalypt woodland; presence of hollow-bearing trees.	11.3.1, 11.3.2, 11.3.3, 11.3.4, 11.3.25,6, 11.3.27, 11.3.29, 11.3.28, 11.4.2, 11.5.2, 11.5.9, 11.8.4, 11.9.9, 11.10.1, 11.10.2, 11.10.4, 11.11.1, 11.11.3, 11.11.7, 11.11.10, 1.11.15, 11.11.16, 11.12.1, 11.12.2, 11.12.6.
<i>Macroderma gigas</i>	Ghost Bat	E	Open forest, woodland, arid scrubs, spinifex hillsides, blacksoil grassland and rainforest (semi-deciduous mesophyll vine forest, dry gallery rainforest) with suitable cave roost sites with specific microclimate (> 25o C & > 60-70% relative humidity). Roosts by day in complete darkness of large caves, rock shelters, deep rock fissures and disused mines; maternity roosts often deep caves/mines in sedimentary remnants or granite rockpiles, transient roosts include shallow caves and rock crevices.	11.2.3, 11.3.1, 11.3.2, 11.3.3, 11.3.4, 11.3.11, 11.3.25, 11.3.26, 11.3.27, 11.3.29, 11.3.38, 11.4.2, 11.4.9, 11.5.2, 11.7.2, 11.8.4, 11.9.9, 11.10.1, 11.10.2, 11.10.3, 11.10.4, 11.10.8, 11.11.1, 11.11.3, 11.11.7, 11.11.14, 11.11.15, 11.11.16, 11.11.18, 11.11.21.

Note: E = endangered & V = vulnerable as prescribed under the NC Act.

The extent of regional ecosystems listed in **Table 1-10** are illustrated in **Figure 1-12**.

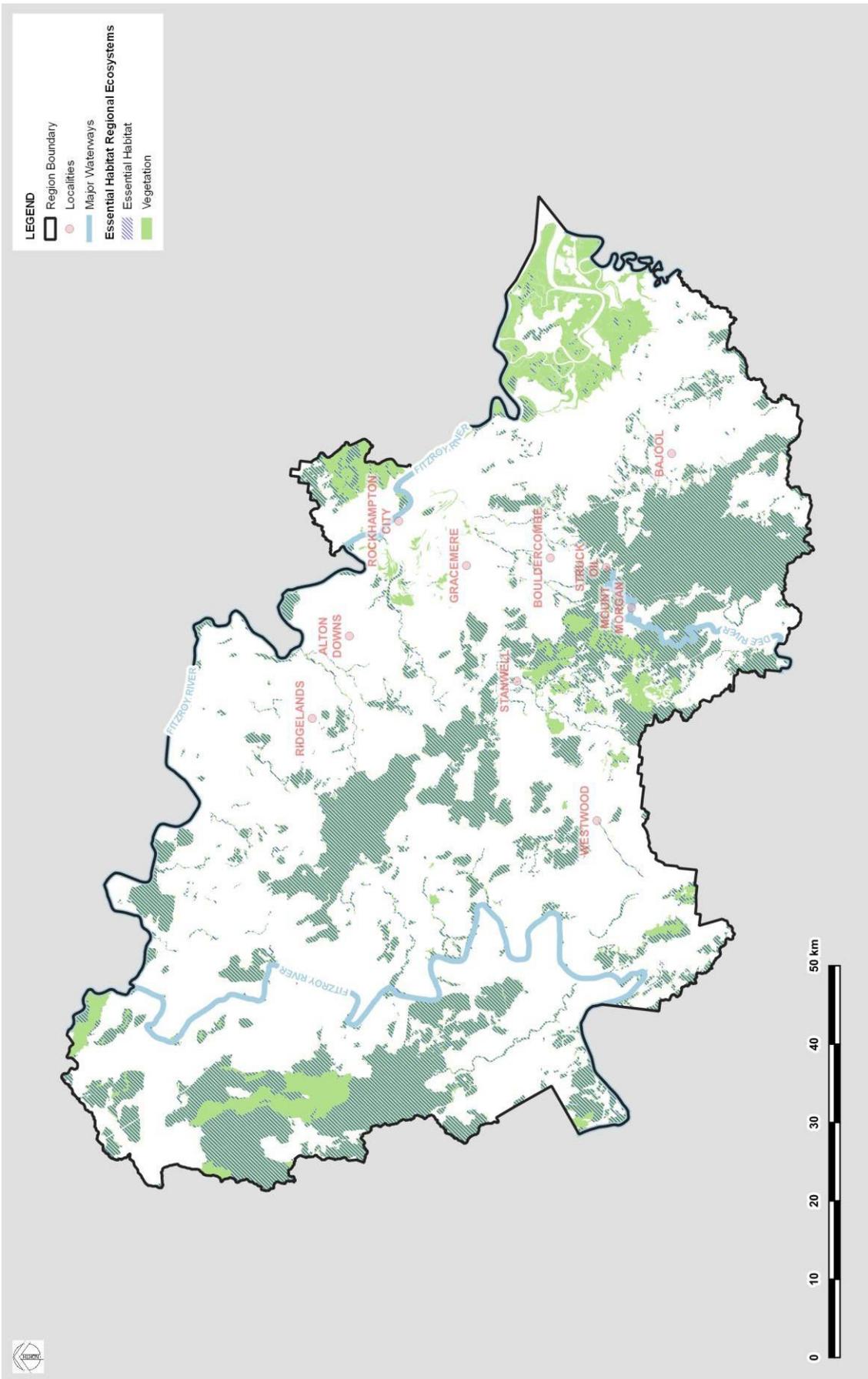


Figure 1-12 Remnant regional ecosystems and associated Essential Habitat

1.2.7.2 *Notable fauna species of Rockhampton*

The listing of fauna under legislation as threatened or near threatened is one measure of significance. Species can be regarded as notable or significant for a range of reasons including occurring poor representation in the Rockhampton region, species is considered to be in decline, restricted or disjunct distribution, species at the edge of their range, poorly known, unusual forms of a species not present elsewhere or the species plays as important ecological role.

Some of the notable species from the region, including threatened species and those that are otherwise significant, are discussed below.

Koala (*Phascolarctos cinereus*)



**Plate 17** - Koala

The biological range of the Koala (**Plate 17**) extends from north-eastern Queensland to the south-east corner of South Australia. Koalas are known to inhabit the Rockhampton region, however there are limited recorded sightings. The distribution of the Koala and its habitat are influenced by altitude (generally limited to <800 m above sea level), temperature and, at the western and northern ends of the range, leaf moisture. Koala populations are generally greater closer to the coast. Koalas are subject to a number of threats, the greatest being;

- > habitat loss and fragmentation;
- > mortality due to dog attacks and vehicle strikes;
- > disease; and
- > climate change and drought (DoE, 2019).

A review of databases indicated the following:

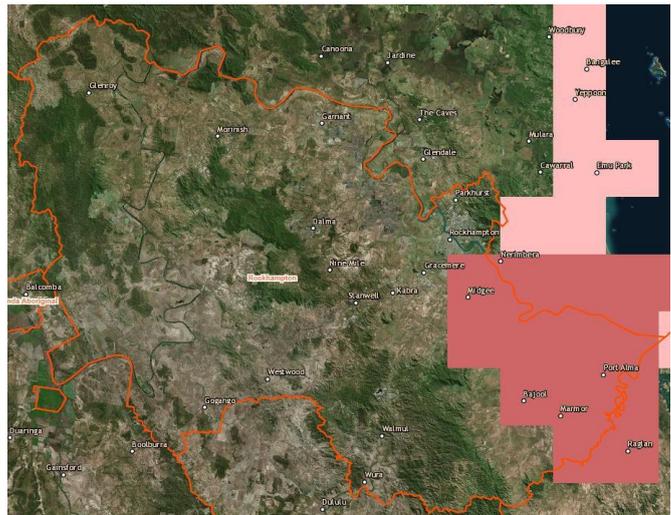
- > Two records of koalas were found within the region from the Atlas of Living database (ALA, 2019a);
- > Wildlife online database for the region revealed 25 records (DSITIA, 2019);
- > Koala Tracker indicated no records (Koala Tracker, 2019); and

The two records of koalas in the region include one made in 2011 in an urban area proximate to Elsie Marsh Park (located along Limestone Creek in the suburb of Kawana) and a second record was made in 1998 in a highly modified agricultural landscape within the southwestern extent of the region.

Work is currently underway by Central Queensland University researching the reintroduction of koalas in Central Queensland. The reintroduction project explores the potential to recover koala populations in previous known koala habitat in eastern Central Queensland. The project aims to test the reintroduction of koalas, and develop the methodology for the naturalisation, release and monitoring of the koalas. It is understood that the project will also review the needs of rural landholders to accommodate koalas into property planning (CQ University, 2019).

### Yellow Chat (*Epthianura crocea macgregori*)

The Yellow Chat is restricted to coastal areas of central Queensland. It is known to occur in breeding populations on the Fitzroy River Delta and Torilla Plain. A breeding population was recorded on Curtis Island in 2002, however an extensive 2007 study failed to detect any birds at this location, meaning the mainland population is of particular importance. The Yellow Chat inhabits marine plain wetlands that are subject to extensive seasonal inundation and varying degrees of both fresh and saltwater influence (**Plate 7**). The Yellow Chat utilises different areas of the wetland for different purposes. It breeds, shelters and forages in grasslands and dense beds of rush and sedge, but it also forages in more open habitat nearby, especially sparse grasslands and Samphire vegetation (DoE, 2019).



**Extract 3 - Yellow Chat habitat model (pink areas represent modelled habitat)**

Due to declining population and limited geographic distribution, the status of the Yellow Chat was amended to Critically endangered under the EPBC Act (Threatened Species Scientific Committee, 2002). Records of Yellow Chat were found within the south-eastern area of the region, however due to the lack of precision, records of the species are removed from the vetted list in **Appendix D**. Illustrated (**Extract 3**) is the Yellow Chat habitat model available from <https://www.fba.org.au>.

### Fitzroy River Turtle (*Rheodytes leukops*)

The Fitzroy River Turtle is endemic to the Fitzroy basin and is estimated to occur in a total area of less than 1,000 km<sup>2</sup>. The greatest threats to the Fitzroy River Turtle include egg predation and habitat degradation. Egg predation is largely caused by pigs, foxes, goannas and water rats. Habitat degradation in the form of increased turbidity and sedimentation may affect food resources and cloacal respiration, and has been observed to coincide with population decline. Nesting sites may also be threatened by unseasonal flooding, weed incursion and trampling by livestock (DoEE, 2008d). Records of the Fitzroy River Turtle appear to have been denatured, however within the Rockhampton region sightings are scattered along the length of the Fitzroy River.

### White-throated Snapping Turtle (*Elseya albagula*)

The White-throated Snapping Turtle is restricted to three catchments, one of which is the Fitzroy River. The species was first described in 2006 and is distinguished by markings on the throat and sides of the face.

Acknowledged as a habitat specialist, the White-throated Snapping Turtle has a preference for clear, flowing and well-oxygenated water, suitable shelters and refuges (e.g. fallen trees) and sandy banks for nesting. The habitat preference for well-oxygenated water is considered to be due to their physical adaption as a 'bottom-breather' or cloacal respirator. The key threats to the species include loss of hatchlings through predation by native and feral animals (e.g. goannas and foxes) as well as the trampling of nests by cattle (DoEE, 2008b). The construction of dams and weirs is also a threat to the species due to:

- > fragmentation of habitats;
- > obstructing migration;
- > mortality during over-topping or water releases;
- > modified hydrology leading to changes to flow which may reduce oxygenation of water and impact the ability of the species to breathe;
- > flooding of nesting sites; and
- > loss of riparian vegetation resulting in a reduction in food for adult turtles.

Similar to the extent of the Fitzroy River Turtle, the White-throated Snapping Turtle records are scattered along the length of the Fitzroy River as well as a record located along Limestone Creek at Alton Downs.

The Fitzroy Basin Association's report on the recovery of the White-throated Snapping Turtle (FBA, 2017)

described the assessment of nine survey sites within a 198 km stretch of the Fitzroy River. Four of the nine sites were confirmed nesting sites for the White-throated snapping turtle. Nesting sites were identified on sand banks in close proximity to riffle zones. A second report completed by the Fitzroy Basin Association details the recovery actions for the White-throated Snapping Turtle Project (FBA, 2018a). The project included identification of fox activity in and adjacent to nesting sites and the deployment and monitoring of fox traps. The study assessed the efficiency of the use of detection dogs to detect fox activity and installation of predator exclusion devices. The project identified 28 nesting sites within the Lower Fitzroy River catchment and predator exclusion devices were installed at 11 nest sites. The project resulted in 143 hatchlings successfully joining the location population. The use of detection dogs was considered critical to confirming the presence or absence of fox activity. Further, the project included the training of four field staff in correct turtle trapping, nest identification and protection methodologies which resulted in local providers trained to contribute to the future recovery actions for the species.

**Microbats**

A colony of Ghost Bat is located within the Mount Etna Caves National Park immediately to the north of the region, however The Atlas of Living Australia includes two records of Ghost Bat (*Macroderma gigas*) within the region dated 1977 and 1979 (ALA, 2019a) and a WildNet online search identified eight records of Ghost Bat for the region. The habitat for the species includes caves, abandoned mine tunnels and crevices in rocky outcrops which are present in the region. Because there are no recent records of the species, further research will be required to determine whether the species persists within the Rockhampton region.

In addition to the Ghost Bat, there are 20 other microbats species. Microbats play an important ecological role by eating vast quantities of insects including mosquitos and farm pests. In Central Queensland 300,000 Little Bentwing-bat (*Miniopterus australis*) eat half their body weight each night<sup>8</sup>. Within the region there are several records of this species including within Morinish State Forest, Stanwell Power Station Nature Refuge and within the eastern and western suburbs of Rockhampton (ALA, 2019b). Little Bentwing-bats roost in caves, mine tunnels and tree hollows. Hundreds of Little Bentwing-bats roost together in a colony and often share roosting sites within Common Bentwing-bats (*Miniopterus schreibersii*).

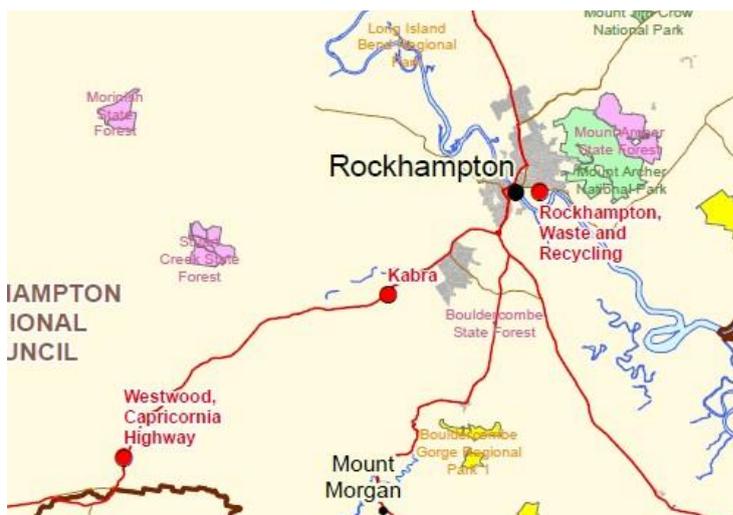
**Megabats**

Megabats, better known as Flying-foxes, also play an important ecological role and are crucial to keeping native forests healthy by dispersing seeds and pollinating flowering plants (DES, 2012). The Black Flying-fox (*Pteropus alecto*) (**Plate 17**) has been recorded within the Rockhampton region (ALA, 2019b) and DES has documented three Flying fox camps (DES, 2016a) (**Extract 4**) at the following locations:

- > Lakes Creek Road Landfill or ‘The Common’;
- > Kabra; and
- > Westwood, Capricornia Highway.



**Plate 17** - Black Flying-fox (*Pteropus alecto*)



**Extract 4** - Flying fox camps (Source: DES, 2016a)

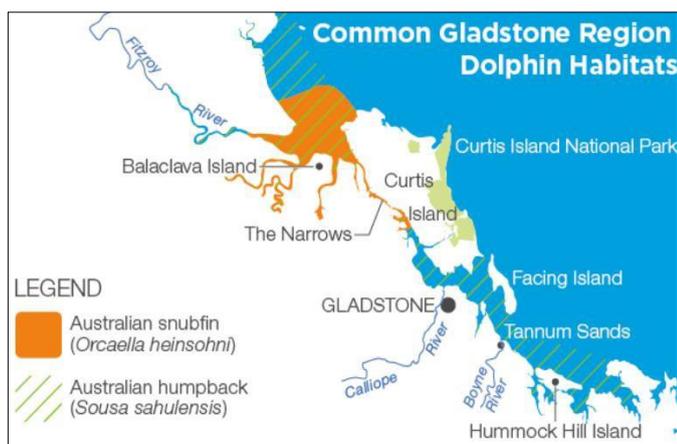
<sup>8</sup> Source <http://capricorncaves.com.au/pdfs/>

### Australian Snubfin dolphin (*Orcaella heinsohni*)

The most southerly extent of the Vulnerable Australian Snubfin Dolphin (*Orcaella heinsohni*) is Port Alma at the Fitzroy River delta. Not only is the species listed under the Nature Conservation Act 1992, it is also ranked as 'critical priority' under the DES's Back on Track species prioritisation framework (DES, 2018a).

The species has a distinctive rounded forehead and small dorsal fin and inhabits riverine, estuarine and coastal waters. Australian Snubfin Dolphins are threatened by:

- > Habitat loss and degradation.
- > Noise pollution (i.e. boating activities).
- > Degraded water quality.
- > Incidental capture by fisheries and the Shark Control Program.
- > Entanglement and ingestion of recreational fishing hooks and marine debris.
- > Pollution which may be amplified up the food chain and lead to increased susceptibility to disease.



Habitat for the Australian Snubfin Dolphin occurs in Keppel Bay, the mouth of the Fitzroy River, Casuarina, Raglan, Conner and Deception Creeks (**Plate 9**). The Fitzroy Basin Association funded research has identified that the pod of approximately 80 Australian Snubfin Dolphins that inhabit the mouth of the Fitzroy River are genetically isolated from other populations (FBA, 2019).

**Extract 5** – Dolphin Habitats (Source: Gladstone Ports Corporation)

### Estuarine Crocodile (*Crocodylus porosus*)

The Estuarine Crocodile is listed as Vulnerable under the *Nature Conservation Act 1992*, marine under the *Environment Protection and Biodiversity Conservation Act 1999* and migratory under the Convention on Migratory Species (Bonn Convention).

Estuarine Crocodiles inhabit reef, coastal waters, estuaries, lakes and inland swamps and are known to persist in both saltwater and freshwater bodies. In Queensland, habitat for Estuarine Crocodiles is generally limited to coastal waterways and floodplain wetlands, however Read and colleagues (2004) note populations may be found hundreds of kilometres upstream in the Fitzroy River. A ten-year survey on the distribution and abundance of Estuarine Crocodile recorded 19 non-hatchling crocodiles within 159 km surveyed in the Fitzroy River Catchment (Read *et al.*, 2004). The population trend indicates an increasing population as evidenced by an increase in individuals living in marginal habitats and expanding distribution in upstream habitats. Threats to the species include mortality due to fishing nets, habitat destruction and illegal harvesting. Anecdotal evidence suggests that Estuarine Crocodiles are affected by exotic aquatic pest plants which can reduce the availability of nesting habitat (DotEE, 2012).

### Migratory birds

The wetlands, coastal areas, rivers and floodplains provide habitat for migratory birds. Two nationally significant wetlands are located within the region, the Fitzroy River Delta and Fitzroy River Floodplain that are both considered important habitat for migratory birds.

The Protected Matters Search Tool indicates nine migratory marine birds potentially occur within the region (DoEE, 2019a) including:

- > Common Noddy (*Anous stolidus*) (**Plate 18**);
- > Fork-tailed Swift (*Apus pacificus*);
- > Flesh-footed Shearwater (*Ardenna carneipes*);
- > Streaked Shearwater (*Calonectris leucomelas*);
- > Lesser Frigatebird (*Fregata ariel*);
- > Great Frigatebird (*F. minor*);
- > Southern Giant-petrel (*Macronectes giganteus*);
- > Little Tern (*Sternula albifrons*); and
- > Campbell Albatross (*Thalassarche impavida*).



**Plate 18** - Common Noddy (*Anous stolidus*)

#### 1.2.7.3 Information gaps

Similar to flora records, fauna records may be subject to bias and gaps in information. To overcome this limitation the following is recommended:

- > Databases utilised for obtaining threatened fauna species records for the region including the EPBC Act Protected Matters, Wildlife Online database searches and the Atlas of Living Australia all have various limitations, degrees of error and are not exhaustive lists. It is recommended that further research and studies into the locations and extents of threatened fauna are completed to inform conservation outcomes and programs, targeted habitat restoration, and threatened flora species management within the region.
- > Develop a priority fauna species for the LGA or species of local significance based on the same criteria identified for flora.

### 1.2.8 Wetlands of the Rockhampton region

#### 1.2.8.1 Overview

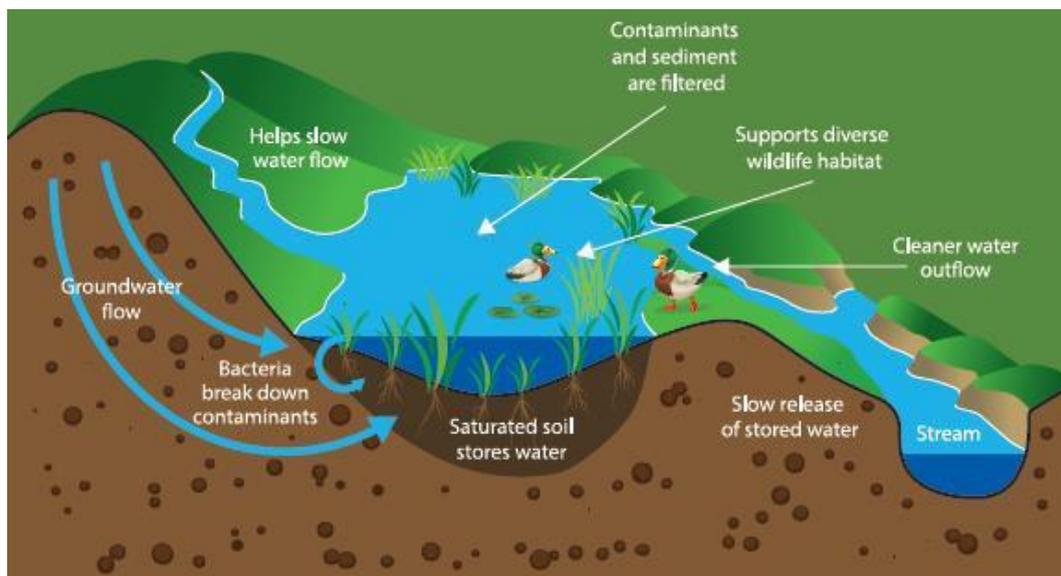
Covering 6.2% of the Rockhampton region, wetlands include natural riverine, lacustrine, palustrine and estuarine systems, but also artificial and highly modified systems. The Fitzroy River Floodplain spans 198 km<sup>2</sup> from Yaamba to Gracemere and the Fitzroy River Delta covers an area of 702.1 km<sup>2</sup> from the centre of Rockhampton to Port Alma (**Figure 1-13**). Both wetlands are listed on the Directory of Important Wetlands in Australia (DIWA) (Wetland Info, 2019).

Smaller lagoons and reserves are key natural assets within the region and include:

- > Springers Lagoon;
- > Murray Lagoon;
- > Yeppen Lagoon;
- > Toonda Lagoon;
- > Long Island Environmental Reserve;
- > Woolwash Lagoon;
- > The Common (Waste facility); and
- > Duckpond Environmental Reserve.

The lagoons attract significant birdlife and opportunities for recreation, tourism and community education. Springers Lagoon is a wetland within the Fitzroy floodplain located along Gavial Creek. The lagoon provides habitat for a diversity of wildlife including turtles, eels, birds and provides breeding habitat for freshwater fish species. During high rainfall periods the lagoon connects with the broader catchment and allows for

freshwater systems to connect with saltwater which is important for maintaining a healthy ecosystem. **Extract 6** presents the conceptual model for Springers Lagoon which illustrates how wetlands function and filter nutrients, sediments and pesticides from water runoff.



Extract 6 - Springers Lagoon interpretive signage (RRC, 2017a)

Wetland systems provide rich natural resources and ecosystem services that are invaluable to human health and wellbeing (Ramsar, 2011) including those identified in **Table 1-11**.

Table 1-11 Ecosystem Services of wetlands in the region

Service	Description
Flood control	<ul style="list-style-type: none"> <li>&gt; Wetlands act like sponges and absorb rainfall allowing water to slowly move through soil and reducing the speed and volume of water entering the Fitzroy River system following rainfall events. This results in a slower water level rise and decreases impacts to human livelihood, safety and reduces the risk of flash flooding;</li> <li>&gt; Coastal wetlands including mangroves, salt marsh communities, deltas and estuaries protect coastal communities from the potentially devastating effects of storm surge by acting as a physical barrier and reducing the speed and height of water; and</li> <li>&gt; The Fitzroy River Floodplain is a natural water storage system and allows water to spread over a wide area. Historical land clearing and development within the floodplain has created a narrower corridor which means that floodwaters travel faster and deeper during peakflows.</li> </ul>
Groundwater replenishment	<ul style="list-style-type: none"> <li>&gt; Wetlands can be directly connected to groundwater and play an important role in the quality and quantity of water entering the water table. Groundwater is an important source of drinking water and used for irrigation of agricultural land.</li> </ul>
Shoreline stabilisation and storm protection	<ul style="list-style-type: none"> <li>&gt; Risks of flooding and weather events has increased from climate change;</li> <li>&gt; Wetlands provide a physical protection or barrier to coastal communities by reducing water speed and height;</li> <li>&gt; Mangroves and saltmarsh communities stabilise the shore; and</li> <li>&gt; 'Managed coastal realignment' is a cost effective option for shoreline protection by re-instating natural wetland systems rather than maintaining and upgrading existing engineered shoreline stabilisation protection measures.</li> </ul>
Sediment and nutrient retention and export	<ul style="list-style-type: none"> <li>&gt; Wetlands capture sediments and nutrients from stormwater runoff, streams and the Fitzroy River. Dissolved nutrients from fertilisers and sewage are stored in wetland plants and result in improved water quality; and</li> <li>&gt; The Fitzroy River, delta, saltmarshes, mudflats and mangroves support fish habitat, fisheries and provide habitat for migratory shorebirds. These habitats require regular sediment deposits to maintain their condition. Upstream dams and weirs can limit the transport of sediment and result in erosion and impact the ecosystem services that the wetland provides.</li> </ul>

Service	Description
Water purification	<ul style="list-style-type: none"> <li>&gt; Wetlands play a significant role in filtering pollutants from water. Artificial wetlands have been used to treat wastewater from industry, mining and sewage; and</li> <li>&gt; Fast-growing wetland species including the native Common Reed (<i>Phragmites australis</i>) and the exotic Broad-leaved cumbungi (<i>Typha orientalis</i>) have been effectively used to treat water polluted with nutrients and heavy metals (Ramsar, 2011).</li> </ul>
Biodiversity hotspots	<ul style="list-style-type: none"> <li>&gt; The wetlands within the Rockhampton region are areas of species richness. Species diversity encourages genetic variation which ensures sustainable populations for the future. Fish, shorebirds and invertebrates can often occur in abundance in wetlands; and</li> <li>&gt; Coastal wetlands and marine plains within the region provide extensive breeding habitat for water birds as well as habitat for threatened species including the critically endangered Yellow Chat (<i>Epthianura crocea macgregori</i>).</li> </ul>
Wetland products	<ul style="list-style-type: none"> <li>&gt; Two-thirds of fish consumed globally are dependent on coastal wetland systems for spawning, fish nursery and feeding.</li> </ul>
Cultural values	<ul style="list-style-type: none"> <li>&gt; The local indigenous people, the Darumbal, identify the Fitzroy River as a place of cultural significance; and</li> <li>&gt; The valuable wetland landscape of the Fitzroy River and associated plants and animals are a relationship between people and nature which continues from historical linkages.</li> </ul>
Recreation and tourism	<ul style="list-style-type: none"> <li>&gt; Queensland-wide, the Great Barrier Reef Marine Park, generates over \$1 billion annually from an estimated 1.6 million tourists; and</li> <li>&gt; The Fitzroy River wetlands support recreational fishing, boating, kayaking and canoeing activities which generate economic benefits from tourism.</li> </ul>
Climate change mitigation and adaptation	<ul style="list-style-type: none"> <li>&gt; Wetlands and the ecosystem services they provide are threatened by climate change;</li> <li>&gt; Wetlands assist in the reduction of greenhouse gas emissions, store carbon and limit the adverse impacts of climate change; and</li> <li>&gt; Climate change is anticipated to result in sea-level rise, increased rainfall and severe weather events. The Fitzroy River floodplain wetland limits flood damage by reducing the speed and depth of floodwaters.</li> </ul>

The Department of Environment and Science's Queensland Wetland Program, *Walking the Landscape*, is a framework which includes existing data with expert knowledge through workshops. The data includes all available knowledge of wetland landscapes including groundwater dependent ecosystems, lacustrine wetlands and processes which are presented in interactive maps, available via WetlandInfo (DoEE, 2013). *Walking the Landscape – Lower Fitzroy Catchment Map Journal* is an interactive map and story of the Lower Fitzroy catchment (DES, 2017a) which highlights the values of the catchment within the region and surrounding local government areas including the environmental values associated with wetlands.

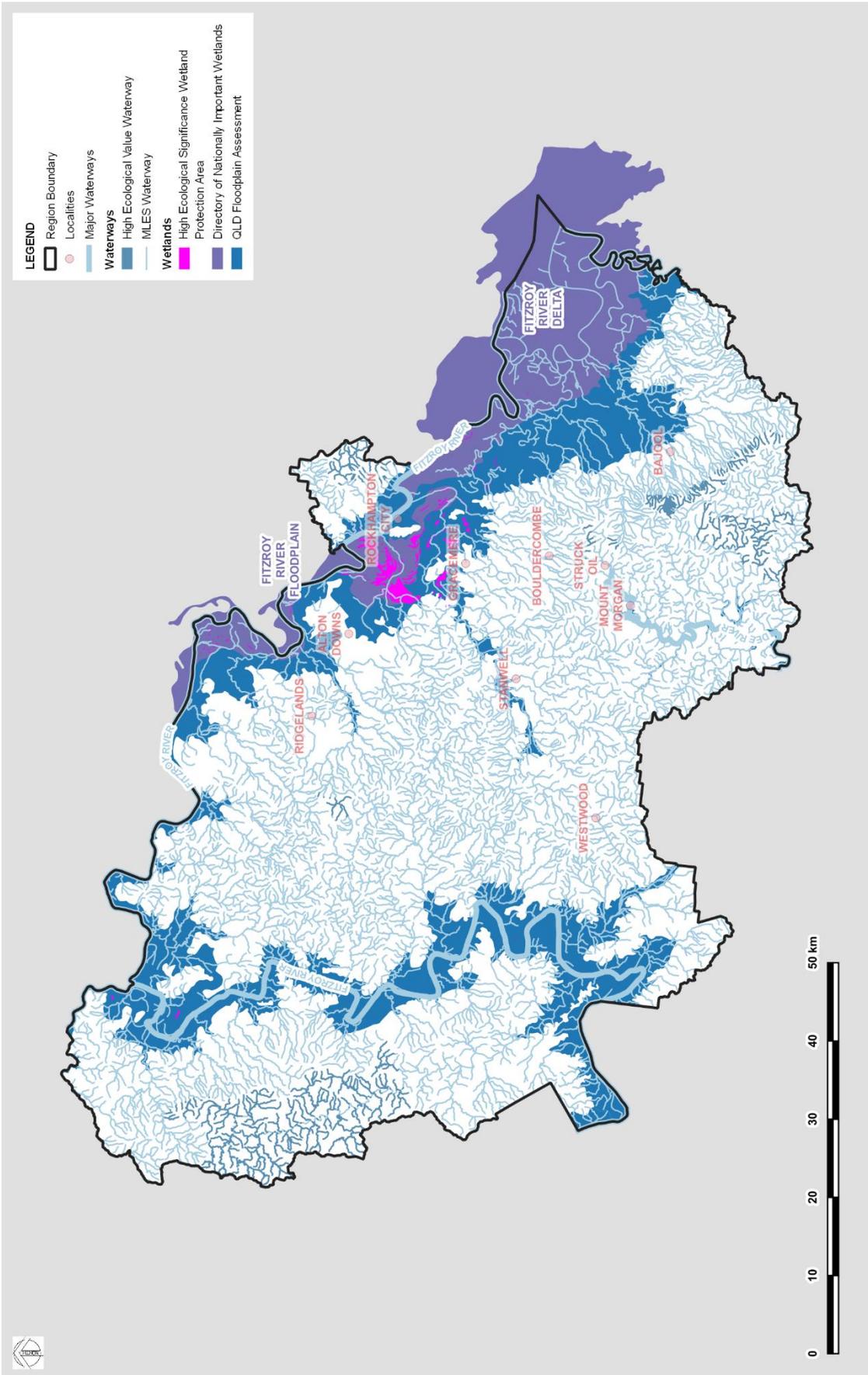


Figure 1-13 Wetlands and waterways

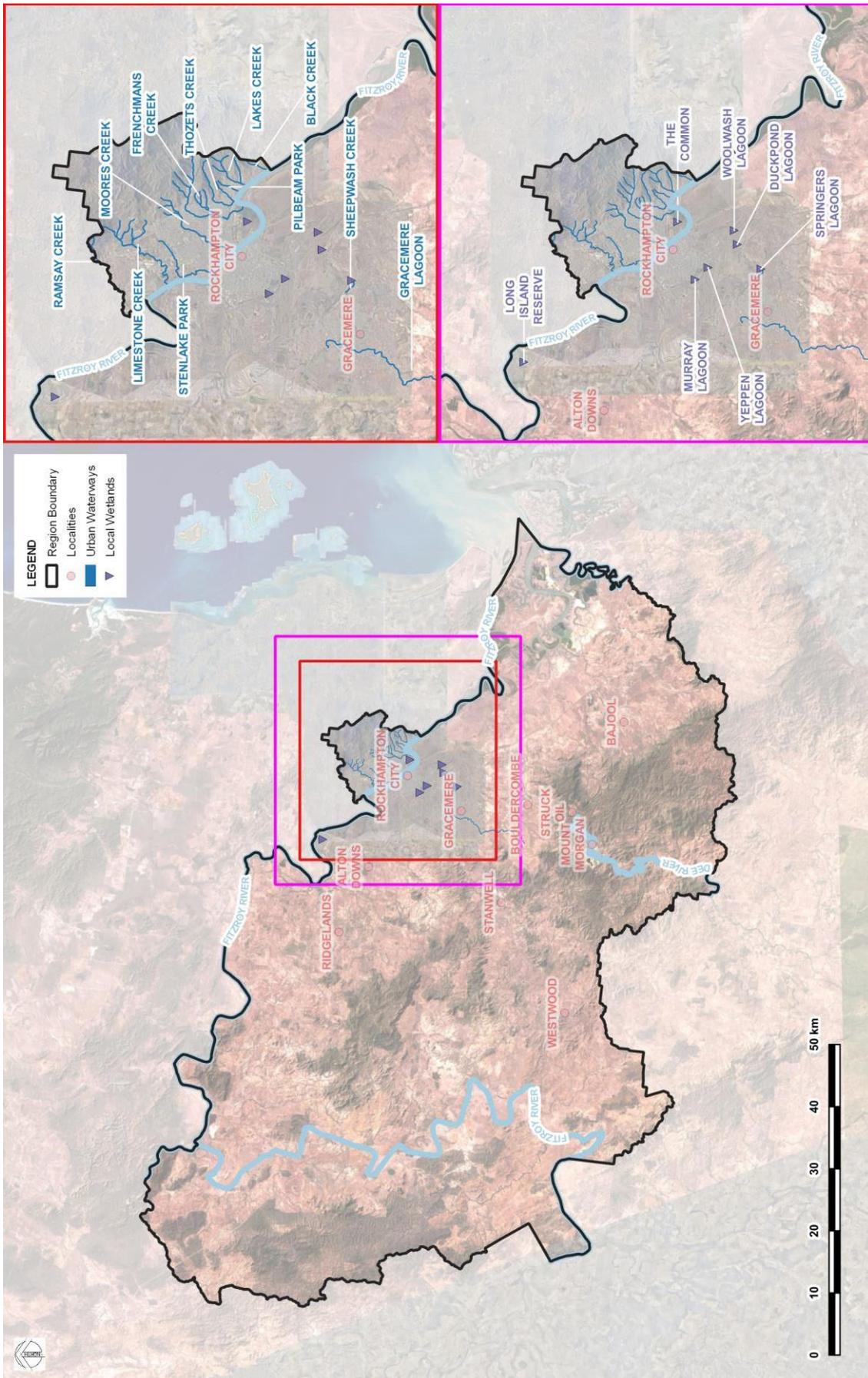


Figure 1-14 Notable wetlands and waterways

The region is mapped as containing 212.15 km<sup>2</sup> of referable wetlands under the *Environmental Protection Regulation 2008*, which contain Wetland Protection Areas within the Great Barrier Reef catchment (DNRME, 2016). Referable wetlands identify wetlands of high ecological significance (HES) and general ecological significance (GES) within the region. HES wetlands are considered a MSES and are regulated under the *Planning Act 2016*.

#### 1.2.8.2 Noteworthy wetlands

**Figure 1-14** illustrates some of the noteworthy wetlands of the region. These are discussed as follows.

##### Palustrine and lacustrine wetland within the Fitzroy River Floodplain

Located within the broad floodplain of the Fitzroy River are riverine wetlands palustrine and lacustrine wetlands (DES,2019). Palustrine wetlands are vegetated, non-riverine or non-channel systems and include billabongs, swamps, bogs, springs, soaks etc. Palustrine wetlands are an important part of the landscape and provide habitat and breeding areas for a wide variety of species. Lacustrine wetlands are lake characterised by open water. Most of the lacustrine wetlands are open water with fringing vegetation located on the banks. Two noteworthy wetlands of the floodplain include

##### > Murray Lagoon

Murray Lagoon forms an important part of the Rockhampton Botanic Gardens and provides habitat to a wide range of birds, fish, turtles and eels (**Plate 19**). The Botanic Gardens area listed on the Queensland Heritage Register and Murray Lagoon is located adjoining the heritage listed gardens (refer to **Extract 7**). Breeding colonies of listed marine and migratory birds including Cattle egret (*Ardea ibis*) and Intermediate Great egret (*Ardea intermedia*) have been observed on the edge of the Lagoon (Birdlife, 2013). Over 100 species of birds have been recorded within the botanic gardens including species listed in the “Birds of Murray Lagoon” brochure including, Royal Spoonbill (*Platalea regia*), Whiskered Tern (*Chlidonias hyrida*), Sharp-tailed Sandpiper (*Calidris acuminata*) and the Australian Glebe (*Tachybaptus novaehollandiae*) (RRC). Murray Lagoon was declared a Fauna Sanctuary in 1902.



**Extract 7** - Location of Murray Lagoon in relation to Botanic Gardens



Plate 19- Murray Lagoon, Photograph by Jan Wilson

> Duckpond Environmental Reserve

A key natural asset within the region is Duckpond Environmental Reserve, located at the southern limit of the Fitzroy River Floodplain and accessed via the Old Bruce Highway South (**Extract 8**). The reserve is managed as a joint trusteeship between Council, the Department of Natural Resources, Mines and Energy and the Capricorn Branch of Wildlife Queensland. The reserve includes a small portion of Scrubby Creek and is a day-use recreation area containing walking tracks. The Duckpond Environmental Reserve visitor information flyer (RRC) indicates that the reserve and freshwater lagoon provides suitable habitat for amphibian, reptile, mammal and bird species including Koalas (*Phascolarctos cinereus*), Little Red Flying Foxes (*Pteropus scapulatus*), Black Flying Fox (*Pteropus alecto*), Cotton Pygmy-goose (*Nettapus coromandelianus*) as well as unidentified microbat species'. The reserve contains scattered mature Coolabah (*Eucalyptus coolabah*) and Red gum (*Eucalyptus camaldulensis*). The mature vegetation within the reserve support hollow-bearing limbs that provide suitable habitat for hollow-dependent fauna. Evidence of indigenous presence has been found within the reserve, and the lagoon and surrounds would have provided resources for the Darumbal people. A Draft Management Plan details reserve management measures including fuel reduction, controlled grazing, weed control and restoration to enhance wildlife values.



Extract 8 - Location of Duckpond Environmental Reserve (Source: RRC)

1.2.8.3 Information gaps

The current planning scheme overlays include MSES wetlands only. This mapping, that reflects the contemporary wetland mapping prepared by the State that is illustrated in **Figure 1-13**. While many of the locally important wetlands are 'captured' by this mapping, including Murray Lagoon near The Range and Springers Lagoon in Gracemere, there are numerous smaller unmapped wetlands evident in aerial imagery within the Fitzroy River floodplain and further upstream adjacent to the river and its tributaries. This includes wetland complexes on the southern banks of the Fitzroy River. An example of such an unmapped complex is shown in **Extract 9**. Given the need to protect, maintain and enhance wetlands within the 'tail end' of the largest catchment draining to the Great Barrier Reef, there is a need to identify the location of unmapped wetlands at a LGA scale.

The Queensland Government updates the state wetlands mapping every four years based on DES's Wetland Mapping and Classification Methodology (2005). The mapping methodology uses existing information including water body mapping derived from Landsat satellite imagery, regional ecosystem mapping, topographic data and a springs database. Further data including higher resolution imagery, other vegetation and wetland mapping, geology, soil and land system mapping is also used in assessing the Queensland Wetlands Program mapping products. It is recommended that local wetland mapping is prepared and is submitted to the Queensland Government for consideration for the State's wetland mapping.



**Extract 9** - Example of an unmapped wetland complex

*(Note Blue area is a MSES wetland already addressed in Council's overlay mapping; and the area in red is the unmapped wetland complex).*

**1.2.9 Waterways of the Rockhampton region**

1.2.9.1 Overview

Waterways have inherent ecological values and provide ecosystem services resulting from a waterway's vegetation, fauna, hydrology, landforms and micro-organisms. Waterways provide habitat for terrestrial and aquatic species and freshwater systems provide water for industries such as grazing as well as providing scenic, recreational, social and cultural values.

As evident in **Figure 1-13** waterways including rivers, creeks and estuaries are prominent in the region. The

Fitzroy River is the lifeblood of the Rockhampton region and snakes through the landscape before outflowing into the Great Barrier Reef Marine Park.

The Lower Fitzroy catchment (Fitzroy River Drainage Sub-Basin) begins at the confluence of the Mackenzie and Dawson Rivers. The Lower Fitzroy Catchment is part of the broader Fitzroy Basin. The Fitzroy River flows east through Rockhampton and outflows into the Great Barrier Reef Marine Park near Curtis Island. The Lower Fitzroy catchment spans 9,700 km<sup>2</sup>. The catchment includes 13,650 km of stream network and 163 km of estuarine systems (WetlandInfo, 2019a). Three large weirs including the Eden Bann Weir, Fitzroy River Barrage and Bajool Weir currently interrupt the Lower Fitzroy catchment.

Waterways and wetlands are also significant for the wildlife they support, in particular fish. The region contains 59.37 km<sup>2</sup> of declared fish habitat areas within the eastern extent of the Fitzroy River Floodplain (DSDMIP, 2019). Declared fish habitat areas protect coastal and marine fish habitat from disturbance. Fish passage in waterways is critical to the survival of native fish. Barriers to fish passage include, infrastructure located within the stream channel including culvert crossings, weirs, dams and barrages etc. The Fitzroy Basin Association have carried out a review and prioritisation of fish barrier removal as part of the Fish Barrier Prioritisation Project (DPI, 2008). It is understood that several fish barrier removal projects have been completed to date including the removal of barriers within Moores Creek and Raglan Creek and the construction of the Fitzroy River Barrage fish ladder.

The Lower Fitzroy River Infrastructure Project was prompted by the Central Queensland Regional Water Supply Strategy (DNRME, 2006) which identified the need for further infrastructure to provide a long-term reliable water supply. The Project includes the raising of the Eden Bann Weir, proposed Rockwood Weir and improved fish and turtle passage to the dams (Lower Fitzroy Infrastructure Project, 2017). Infrastructure upgrades to the existing Eden Bann Weir include, upgrade of the existing fish lock on the northern bank, a new fish lock on the southern bank and a turtle ramp on the northern bank. In addition to the proposed Rockwood Weir, the project also includes the construction of fish lock and a turtle ramp on the eastern bank. Fish locks are an alternative to fish ladders and allow fish passage upstream of the weir.

The Queensland Floodplain Assessment represents drainage sub-basins within floodplain areas (**Figure 1-13**). The assessments were developed for use by local governments as potential flood hazard areas. The mapping was developed by analysis of data including 10 metre contours, historical flood records, vegetation, soils mapping and satellite imagery. The Floodplain Assessment for the region incorporates drainage sub-basins of the Dawson River, Fitzroy River and Mackenzie River sub-basins. While the mapping was derived for identifying flood hazard it also illustrates areas of ecological significance in that these areas often support wetlands and are important to aquatic wildlife during flood events.

#### 1.2.9.2 Noteworthy waterways of Rockhampton

**Figure 1-14** illustrates some of the noteworthy waterways of the region. These are discussed as follows.

##### Fitzroy River

The Fitzroy River aids in purifying water through filtration, dilution, sedimentation and chemical and biological processes, thereby improving water for human consumption, stock, irrigation, industrial uses. The river also provides significant recreational, social and cultural values to the community.

More than 4,800 gigalitres of water flow from the Fitzroy River and into the Great Barrier Reef each year (FBA, 2019). The Fitzroy River is part of the broader Fitzroy Basin which covers 156,762 km<sup>2</sup>. The Fitzroy River is fed by the Dawson Comet, Nogea, Isaac and Mackenzie Rivers. The Mackenzie and Dawson Rivers converge near Duaringa and the Fitzroy River flows north then south-east before flowing into the ocean. Seasonal irregularity is a defining feature of the broader basin, with periods of drought often followed by wet season high rainfall which can result in flooding (Fitzroy Partnership for River Health, 2018). The Fitzroy River Barrage and Eden Bann Weir supply water for the Rockhampton region.

The ecological values of the Fitzroy River include providing habitat for a number of threatened and near threatened flora and fauna species including:

- > Fitzroy River Turtle (*Rheodytes leukops*) which is only found in the Fitzroy River catchment and associated tributaries;
- > White-throated Snapping Turtle (*Elseya albagula*) which has known nesting sites along the Fitzroy River; and
- > Snubfin Dolphin (*Orcaella heinsohni*) which are known to inhabit the mouth of the Fitzroy River.

Water quality within the river is impacted by various land uses within the catchment. The Fitzroy catchment is dominated by grazing and the basin transports sediments and nutrients to the reef. Dryland cropping, urban

areas and mining can also generate large amounts of sediments. Agricultural fertilisers are linked to the levels of dissolved nutrients found in the river which in excess can result in algal blooms. The Fitzroy Partnership for River Health develops report card assessments for the water quality, biological and ecological health for the waterways in the Fitzroy Basin. The report card for the period between 2017-2018 graded the Fitzroy catchment as a 'B' grade overall, which indicates an improved condition from previous report cards (FPRH, 2018). While this represents an improvement, more work is required to ensure the ecological, social and economic benefits of the river can continue to be enjoyed into the future. Such a program is Council's Reef Guardian Action Plan that integrates water quality improvement measures to improve the quality of water entering the reef from wastewater and stormwater sources through urban water cycle initiatives and a proposed urban waterways management plan (**Appendix A**).

### Urban Waterways

Urban waterways provide flood management, public recreation and amenity, green corridors, urban cooling, health and wellbeing and cultural values to the community. Aquatic and riparian vegetation is important for maintaining healthy waterways by:

- > Absorbing nutrients from water entering waterways, over land surfaces and through groundwater;
- > Slowing the flow of water which allows sediment and pollution to deposit and reduce sedimentation and pollution of waterways;
- > Stabilising of the bank and bed of waterways which reduces erosion;
- > Oxygenation of waterways through the process of photosynthesis which is essential for supporting fish and other aquatic fauna;
- > Providing habitat for aquatic and terrestrial fauna and ecological corridors for movement opportunities between habitats; and
- > Providing shade for waterways which regulates water temperature and reduces the growth of phytoplankton which reduces algal blooms.

Increased urbanisation and encroachment into waterway corridors has resulted in degraded urban waterways in some parts of the Rockhampton region.

The prominent urban waterways of the region include:

- > Ramsay Creek;
- > Moores Creek;
- > Limestone Creek;
- > Stenlake Creek;
- > Lakes Creek;
- > Frenchmans Creek;
- > Thozets Creek;
- > Black Creek; and
- > Sheepwash Creek.

Urban waterways play an important role by providing; terrestrial and aquatic habitat values, fauna movement opportunities, contribute to urban cooling, recreation and amenity values and reduce sediment and nutrient loads to downstream receiving waters including the Great Barrier Reef estuary. At the confluence of the Fitzroy River are intertidal zones which are characterised by intact mangrove forest. Mangroves systems are important habitats for a wide range of species, providing nursery, feeding and refuge areas and supporting coastal food webs that support commercial and non-commercial species. A floodplain wetland is connected to tidal zone of Frenchmans Creek. Frenchmans and Thozets Creeks are a noteworthy example of valuable aquatic and terrestrial habitat that persist in an urban environment under threat from erosion (including bank migration and retreat), weed invasion, residential crowding and surrounding land uses.

Frenchman and Thozets Creeks have their headwaters within the Berserker Ranges and flow south-west through an urban area before entering the Fitzroy River. In 2018, Council commissioned a riparian corridor

management study of the Frenchmans and Thozets Creeks (Alluvium, 2018). The riparian corridors of Frenchmans and Thozets Creeks provide important fauna movement opportunities for native fauna species between the Berserker Range and the Fitzroy River. Whilst the study indicated that the corridors have been degraded and are narrow in sections, native species including Koalas and platypus can persist in highly modified urban environments. The outcomes of the study included a recommended program of works involving revegetation, structural works and stormwater treatments. Further, the study outlined waterway management guidelines including waterway buffers and widths, post flood management, erosion management, culvert maintenance, instream crossing and flood conveyance.

### 1.2.9.3 Information gaps

A review of the current waterway overlay mapping indicates that in some areas the mapping does not align with on-ground conditions (refer to extract of Biodiversity Overlay (indicating waterways sourced from MSES - Regulated vegetation (intersecting a watercourse)) in **Extract 10**). Addressing this gap would improve the protection of waterways and the maintenance of the ecosystem services they provide. It is therefore recommended that ground-truthing of mapped waterways occurs in order to accurately reflect conditions and requirements within the Biodiversity Overlay.



**Extract 10** - Example of Waterway mapping inconsistent with on-ground conditions

(Located at Anna Meares Avenue, Gracemere (Source: Google Earth Pro. Imagery dated: 13/5/2019).

## 1.2.10 Ecological Processes

### 1.2.10.1 Driving forces

The natural environment is affected by daily, seasonal and episodic events. The daily tidal cycle maintains mangrove and saltmarsh communities and changes in riverine flows during the wet season can result in floods that replenish floodplains and their associated ecology. Conversely, the dry season and in extreme events, drought, can affect the way wildlife move through and use the landscape. Hot fires occurring during heat waves and extreme drought can have a devastating effect on flora and fauna, particularly in a fragmented landscape. Some of these events are exacerbated by the El Nino and La Nina weather cycles.

Maintenance of a well-connected natural environment is necessary to ensure ecological processes are resilient to ongoing and episodic events. For example, maintenance of tidal connection and unencumbered waterway passage is required to maintain a productive commercial and recreational fishery. Retention of habitat areas, corridors and stepping stone habitat ensures flora and fauna can move through the landscape and continue to provide ecosystem services such as pollination and pest control. Buffers to important areas such as waterways, wetlands and habitat also aid in the resilience of these systems.

### 1.2.10.2 Habitat and corridors

In fragmented landscapes, such as the Rockhampton region where 70% of its vegetation cover has been lost, it is important to protect, maintain and enhance the remaining core habitat areas, critical corridors and habitat stepping stones to facilitate ecological processes.

Core habitat areas are largely associated with the protected estate, but also includes considerable tracts of land that are not under conservation tenure such as large parts of the Moonlight, Boomer, Native Cat and Dee Ranges. These areas play an important role for both meta-populations and species that have wide home ranges such as the Powerful Owl.

Stepping stone habitat is any patch of vegetation, including regrowth, remaining in the landscape. Even small patches can play an important role for species such as raptors as they move through the landscape.

Corridors play an important role in linking areas of Core bushland areas. Council's Biodiversity Corridor Overlay map does not presently reflect current knowledge of the region's corridors as identified in the Biodiversity Planning Assessment for the Brigalow Belt (State). Council's corridors also do not capture vital local waterway corridors that are particularly important in built up areas. The Alluvium (2018) study of Frenchmans and Thozets Creeks highlighted the instream and riparian values within the creeks, including the overall aquatic habitat conditions and overall aquatic habitat values. The study proposed restoration objectives to protect the values of the creeks.

Ecological corridors connect habitats for the daily, seasonal and intergenerational movement of wildlife. Creeks and rivers often provide vegetated corridors, which are vital habitat links for fauna movement.

The Biodiversity Planning Assessment for the Brigalow Belt Region (BPA) (DES, 2018b) details the method for defining and mapping landscape corridors at a State-wide level as shown in **Figure 1-15**. The landscape level terrestrial corridors reflected in the BPA link broad habitat areas associated with the protected area estate network including Bouldercombe George Resource and Conservation Park, Gelobera State Forest, Stuart Creek State Forest, Morinish State Forest, Goodedulla National Park and Mount Archer National Park.

Local waterway corridors have been mapped as part of the current study to delineate vital links through modified landscapes with the broader State corridor network. The region's corridor network is shown in **Figure 1-15**. The local waterway corridors have been defined by buffering local waterways by 25 m either side of the waterway centreline (delineating a 50m wide corridor) as per Council's Biodiversity Overlay Code (PO6) for waterways with stream orders 1 and 2.

**Figure 1-15** provides a sound basis for the planning scheme map and to identify where offset receiving sites are appropriate and add value to strategic corridors.

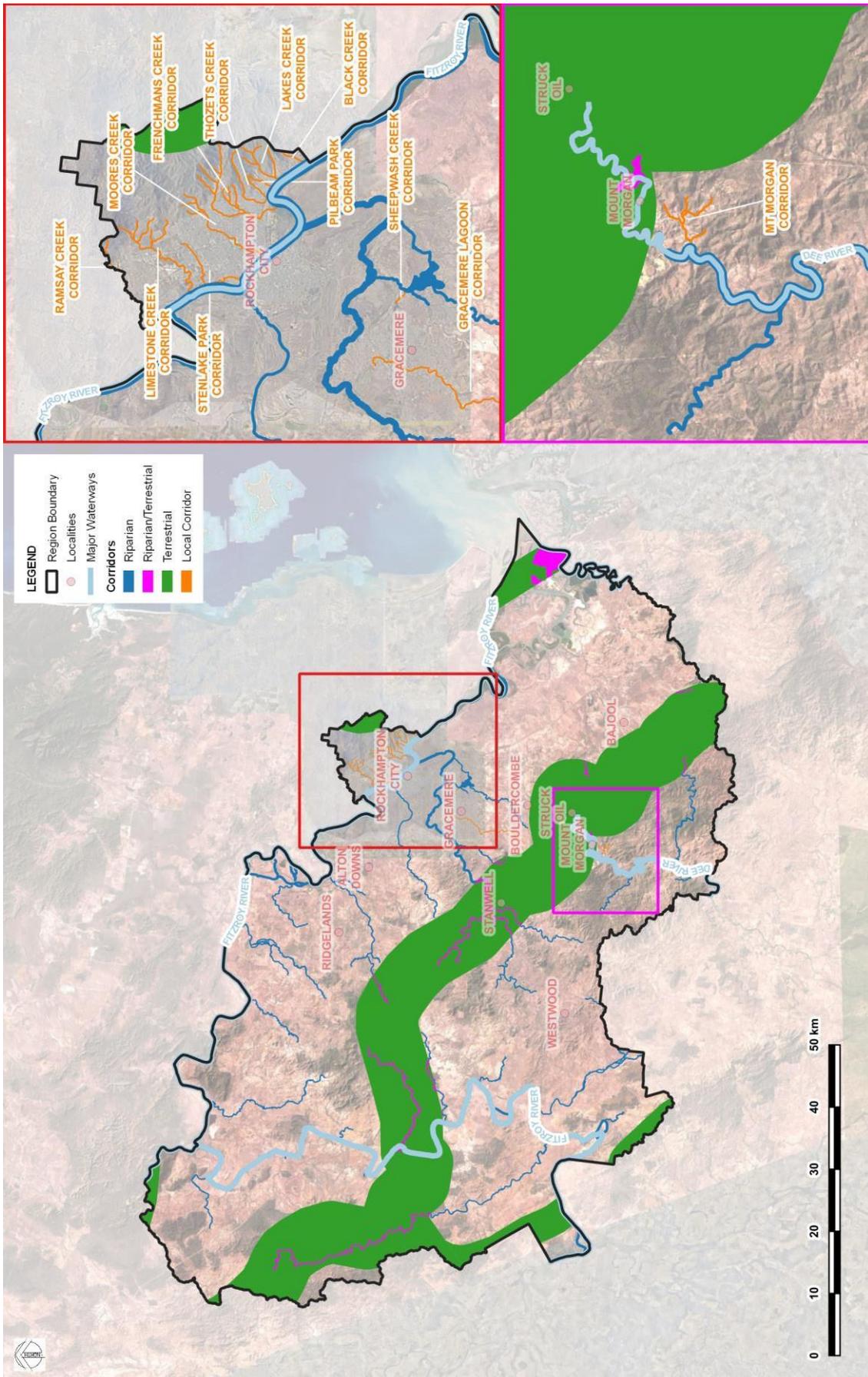


Figure 1-15 State Terrestrial and Riparian Corridors and Local Corridors

### 1.3 Identifying significance of the natural environment

The existing Planning Scheme includes a Biodiversity Overlay (**Figure 1-16**) that aims to capture areas of High and Low Matters of Local Environmental Significance. This mapping is based on a methodology developed close to 10 years ago as discussed in **Appendix E**.

While the mapping requires updating, as discussed in **Appendix E**, it broadly captures parts of the natural environment that are regarded as of significance. Specifically, the mapping is broadly adequate for most areas in which development is foreseen. This is because the mapping is based on a structured methodology applied to remnant and regrowth mapping that is broadly consistent with current vegetation mapping.

Any future mapping reviews will also need to consider current Matters of State Environmental Significance mapping (**Figure 1-17**). The State Planning Policy (SPP) is a key component of the State planning system. The SPP expresses the State’s interests in land use planning, and either:

- > affects an economic or environmental interest of the state or a part of the state
- > affects the interest of ensuring that the purpose of the Act is achieved.

In preparing a planning scheme, a local government must reflect the SPP and provide land use and development guidance that facilitates the achievement of the State interest.

The current Biodiversity Planning Assessment (DES, 2018b) resulted in significance mapping for the region as presented in **Figure 1-18**. This mapping has identified a number of areas of State or Regional Significance that are not presently identified within overlay mapping as MSES or MLES, such as some areas adjacent to Yeppoon Road.

While there are multiple areas within the region that require further review, there are a select number that require particular focus owing to the presence of known ecological values that are presently not recognised in overlay mapping and/or they are subject to development pressure. For example, broad areas within the Raglan and Casuarina Creeks Aquaculture Development Areas support multiple wetlands that are presently unmapped. **Figure 1-19** illustrates the general location of Biodiversity Investigation Areas where additional focus and **Table 1-12** provides an overview of these areas and recommended actions insofar as future mapping efforts are concerned.

Table 1-12 Biodiversity Investigation Areas

Investigation area	Background	Recommended action
A	Broad stands of vegetation of the Berserker Range and its foothills/slopes. Area B is a broad outlier that is likely to act as ‘stepping stone’ habitat. The area provides a connectivity role and supports remnant and regrowth vegetation some of which is regarded as of Regional significance in the BPA mapping. Areas in the vicinity of Springfield Drive are regarded of ‘State’ Significance on the basis of threatened species records.	Review as part of detailed mapping. Local expert panel to consider corridor values and the relevance of the BPA mapping at a minimum. Any areas of significance identified to be considered in revised overlay mapping.  Consideration should also be given to rezoning lower sloped of the Berserker Range given the presence of State and Regionally significant vegetation.
B		
C	Includes areas of locally significant regional ecosystems, State significant vegetation (as per BPA mapping) and areas of regrowth vegetation. Some parts are regarded of ‘State’ Significance on the basis of threatened species records.	Review as part of detailed mapping. Local expert panel to consider importance of State significant vegetation (as per BPA mapping) and regrowth at a minimum. Any areas of significance identified to be considered in revised overlay mapping. Area E presently includes areas of General Local Environmental Significance in overlay mapping – this may require review and elevation to High.  Consideration should also be given to rezoning lower sloped of the Berserker Range given the presence of State and Regionally significant vegetation.
D		
E		
F	Includes the Fitzroy River Delta, multiple areas of unmapped wetlands, areas of locally significant regional ecosystems, State and Regionally significant vegetation (as per BPA mapping) and areas of regrowth vegetation.	Review as part of detailed mapping. Local expert panel to consider importance of State and Regionally significant vegetation (as per BPA mapping) and unmapped wetlands at a minimum. Any areas of significance identified to be considered in revised overlay mapping.

Investigation area	Background	Recommended action
G	Includes areas of locally significant regional ecosystems, State significant vegetation (as per BPA mapping), areas of regrowth vegetation and falls, in part, within a bioregional corridor.	Review as part of detailed mapping. Local expert panel to consider importance of State significant vegetation (as per BPA mapping) and regrowth at a minimum. Any areas of significance identified to be considered in revised overlay mapping.  Consider rezoning to protect corridor values.
I-O	Large areas of remnant vegetation presently not captured in overlay mapping. This includes broad areas of State significant vegetation (as per BPA mapping) in addition to vine forests, locally significant regional ecosystems and areas of regrowth vegetation	Review as part of detailed mapping. Local expert panel to consider importance of State significant vegetation (as per BPA mapping) and regrowth at a minimum. Any areas of significance identified to be considered in revised overlay mapping.

Further, the mapping is also limited by scale and the attributes it can capture. For example, it relies on vegetation mapping which, owing to the scale at which it is prepared, can only illustrate certain types of vegetation in patches of a set minimum size. Hence, patches that are smaller than this or features that cannot be mapped (e.g. individual trees; sand banks of importance to turtle nesting or non-remnant vegetation that still provides a habitat function) will not be expressed in the overlay map.

The proposed revised mapping methodology will allow for capturing additional areas by way of expert panel input. This may include small patches, isolated features and significant areas to ecosystem processes (e.g. floodplains).

A new Biodiversity Overlay Mapping layer can be developed using the Biodiversity Assessment and Mapping Methodology (BAMM) and the Common Nature Conservation Classification System (CNCCS) (Chenoweth, 2001). The CNCCS takes into account local environmental values that are omitted in the BAMM. The method provides a consistent and defensible approach to assessing natural environmental values at a region or landscape scale. One advantage of the method is that information pertaining to the significance of individual mapped patches is retained in the GIS output. The criteria used in applying the BAMM are presented in **Table 1-13**.

Table 1-13 BAMM Criteria

Diagnostic Criteria	Expert Panel Criteria
A: Habitat for EVNT taxa	H: Habitat for priority taxa
B: Ecosystem value at two scales: B1: State B2: Regional	I: Special biodiversity values
C: Tract Size	J: Corridors
D: Relative size of regional system	K: Threatening processes
E: Condition	
F: Ecosystem diversity	
G: Context and connection	

In addition to mapped biodiversity values there is still a need to recognise that other areas may be significant for the ecosystem service they provide (refer to **Table 1-1**) and/or cultural reasons. Some areas of significance are difficult to map owing to scale or they are difficult to quantify (e.g. cultural values). Given this, Council's programs that aim to protect, maintain and enhance the natural environment must not rely on mapping alone. Non-statutory recommendations which highlight initiatives and recommended implementation are detailed in **Section 2** of this report.

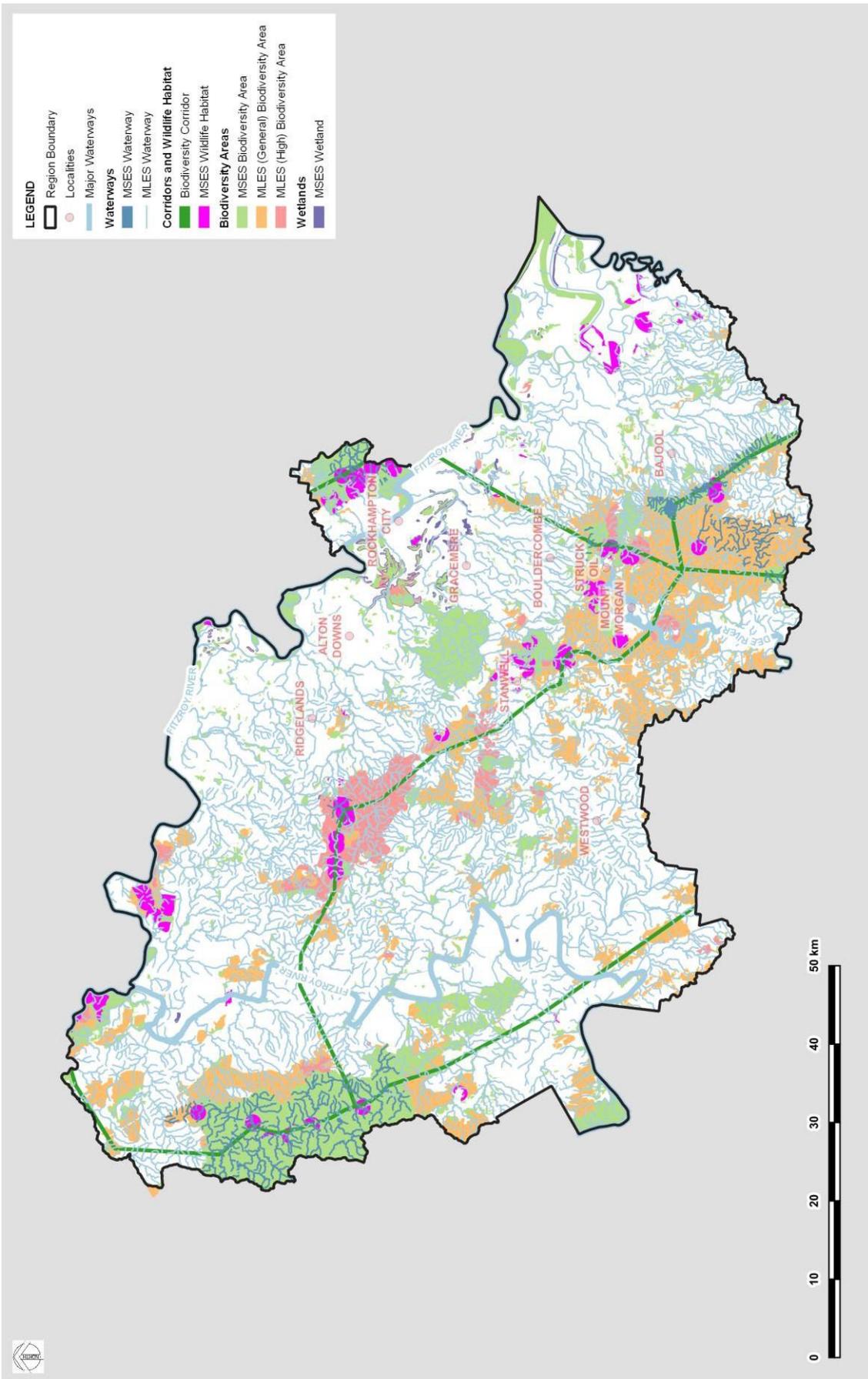


Figure 1-16 Existing Overlay mapping

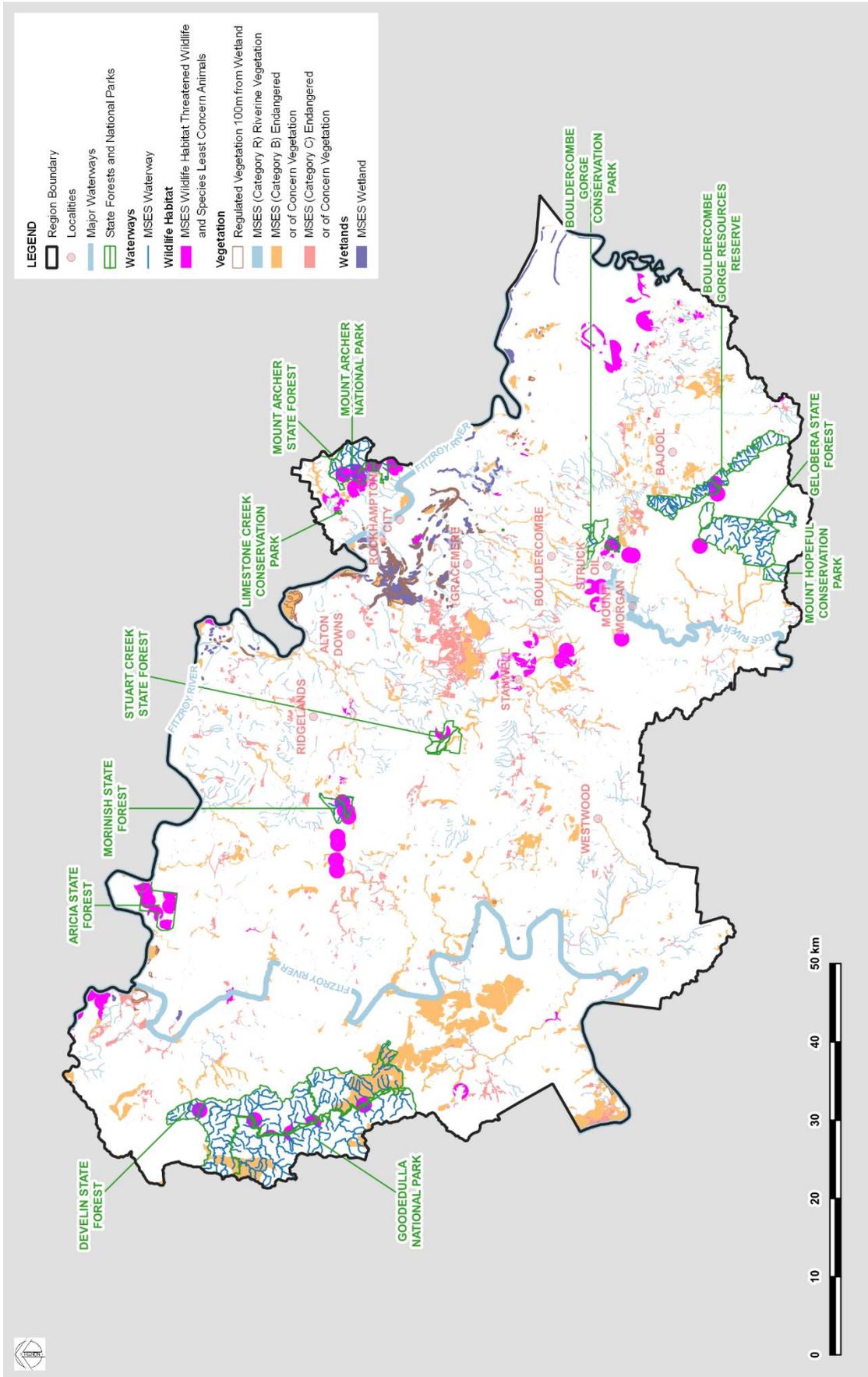


Figure 1-17 Matters of State Environmental Significance

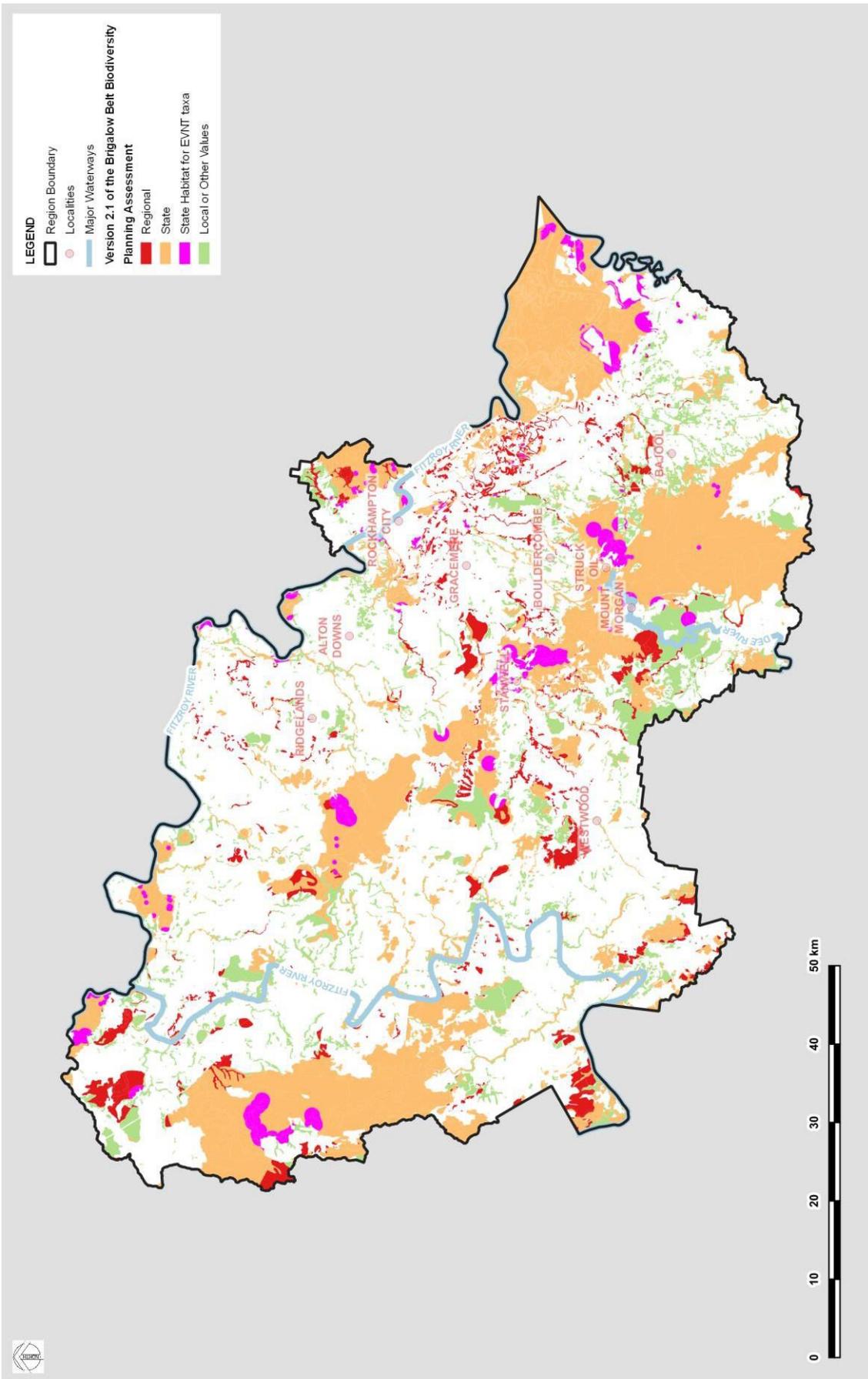


Figure 1-18 Version 2.1 of the Biodiversity Planning Assessment

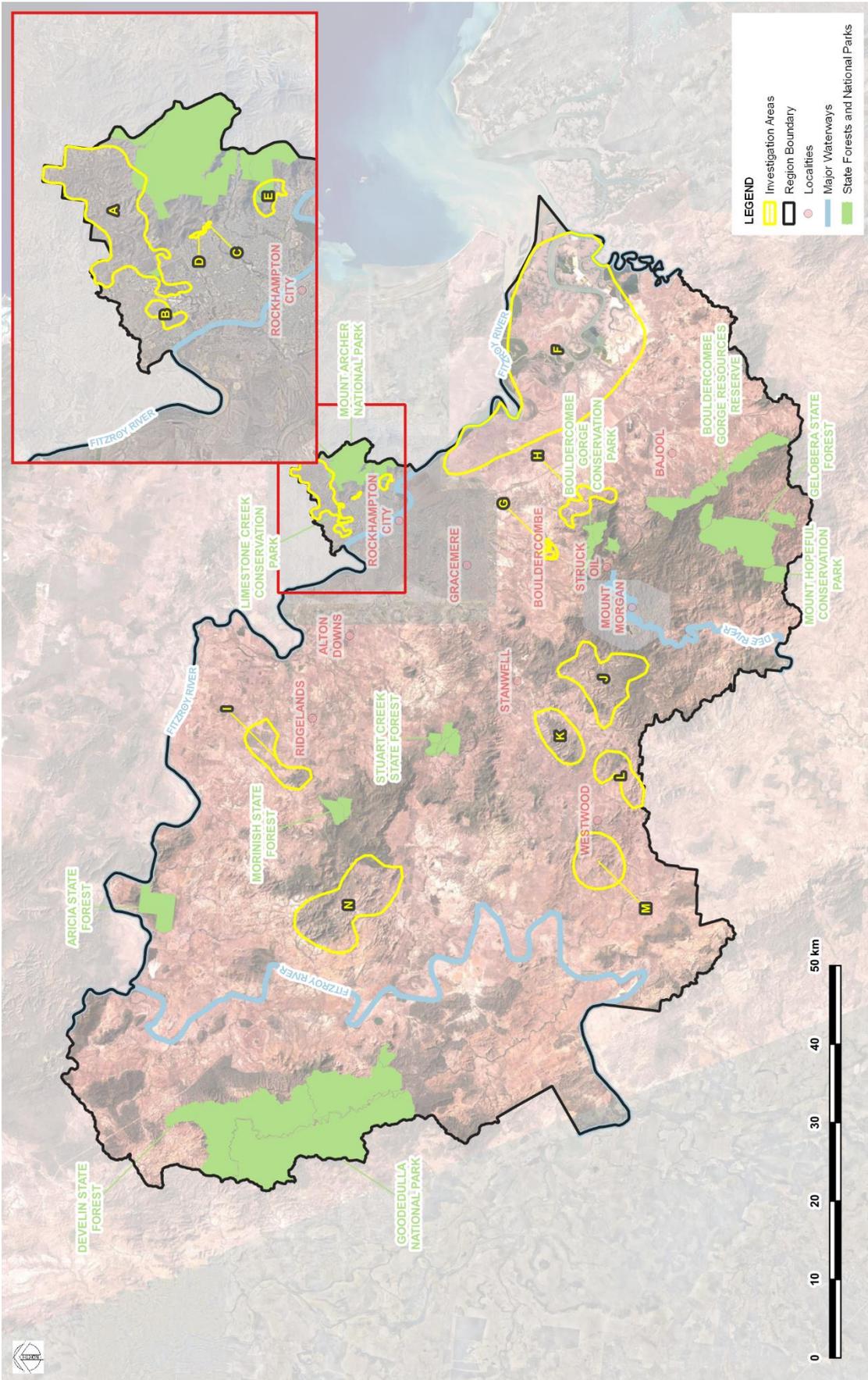


Figure 1-19 Biodiversity Investigation Areas

## 1.4 What are the threats to the natural environment?

### 1.4.1 Overview

Key threats to the natural environment within the Rockhampton region include:

- > land clearing;
- > pest animals;
- > weeds;
- > inappropriate fire regimes; and
- > climate change.

Each of these are discussed in the following sections.

### 1.4.2 Land clearing

In terms of rate of clearing of remnant vegetation, the Rockhampton region rates as one of the lowest in the State (**Figure 1-20**). While there is ~30% of remnant vegetation remaining in the region nearly all of this clearing is attributable to historic agricultural development.

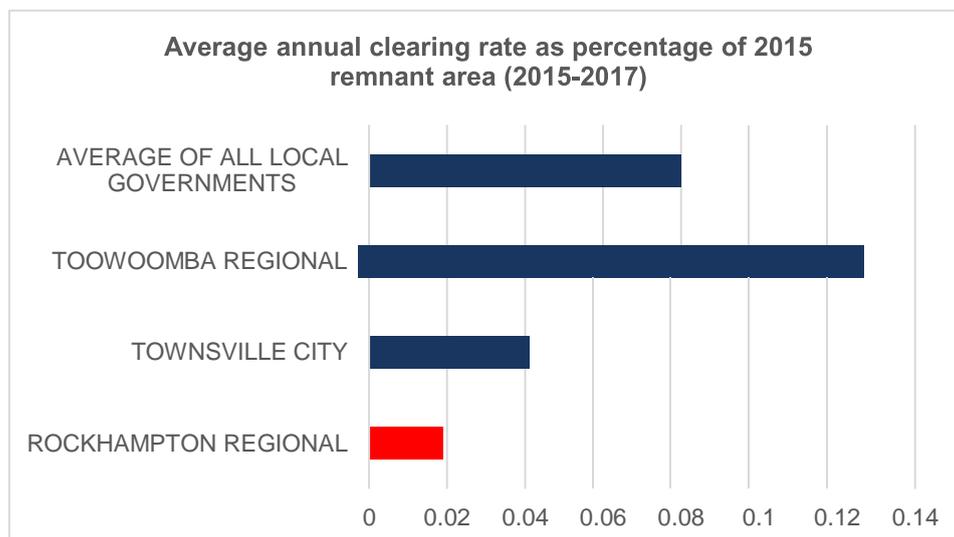


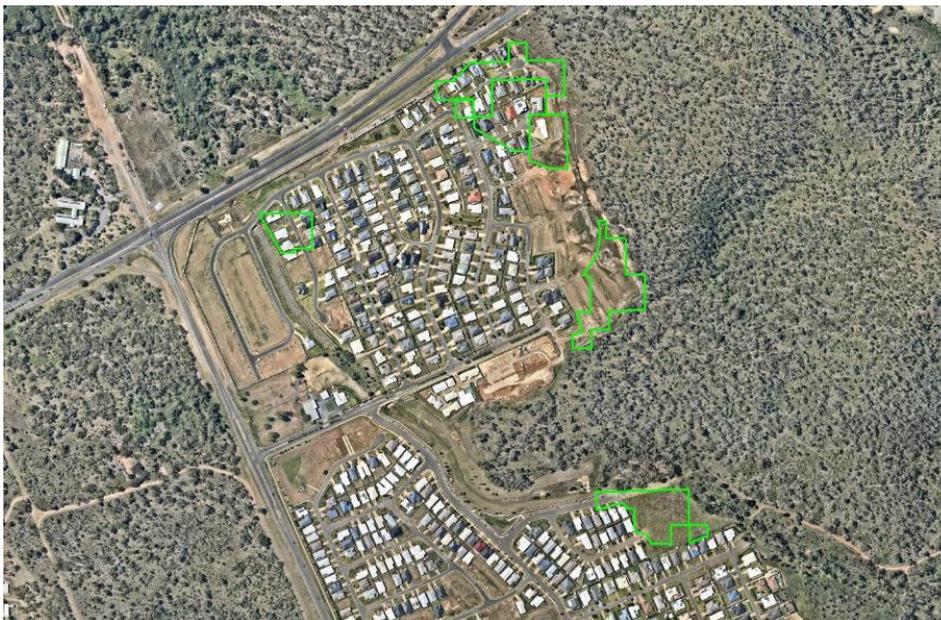
Figure 1-20 Rate of clearing of remnant vegetation per LGA  
(Rockhampton shown in red)

The State also measures the rate of all clearing for all vegetation irrespective of whether it is remnant, regrowth or scattered trees through the Statewide Landcover and Trees Study (SLATS). A review of clearing recorded in SLATS was undertaken for the Environmental Management and Conservation Zone, Biodiversity Areas of the Biodiversity Overlay and Waterway Corridors of the Biodiversity Overlay of the planning scheme (**Table 1-14**). The SLATS review of vegetation indicated clearing associated with a small clustering of development located at the foothills of the Berserker Range at the corner of Yeppoon and Norman Roads (**Extract 11**).

Table 1-14 Review of SLATs clearing

Replacement land cover <sup>9</sup>	2014-2015	2015-2016	2017-2017	2017-2018	TOTAL (ha)
Pasture	315.9	119.6	119.6	101.6	656.7
Crops	0	0	0	0	0
Forestry	0	0	0	0	0
Mining	0	0	0	0.3	0.3
Infrastructure	2.7	0.6	9.2	0	12.5
Natural disaster damage	2.2	0	0	0	2.2
Missed clearing in previous era	0	3.2	2.7	0	5.9
Thinning	0	6.1	27.6	0	33.7
Timber Plantation	0	0	0	3.3	3.3
Settlement	1	2.5	1.6	0	5.1
TOTAL (ha)	321.8	132	160.7	105.2	719.7

The review found that a relatively small area of clearing is associated with settlement and that most clearing was associated with conversion of land to pasture.



**Extract 11** - Clearing (in green) associated with settlement proximate to the corner of Yeppoon and Norman Roads

The assessment is however limited in that:

- > The SLATS mapping is coarse and will not necessarily accurately delineate all clearing associated with assessable development. The SLATS metadata does not recommend its application at scales more detailed than 1:100,000.
- > It assumes settlement clearing occurred as a result of development that was approved under the current planning scheme (i.e. clearing was not approved under a superseded planning scheme or was not for an as of right use).
- > While clearing may have occurred within areas mapped on the biodiversity overlay, these may have been adequately assessed as part of a development application.

<sup>9</sup> Annual assessments prepared by the Department of Environment and Science (DES) track conversion of woody vegetation to an alternative 'replacement land cover' including (DES, 2018)

- > The absence of clearing in 'environmental' areas mapped in the planning scheme does not necessarily imply success of the Scheme and may simply indicate that no applications have been lodged within the area.

Despite the relatively low levels of clearing, any clearing of vegetation will result in habitat loss, changes in soil structure and increase heating of the landscape through removal of shade. While clearing levels of remnant are likely to remain low, clearing of unmapped regrowth and isolated residual trees in urban and rural environments is likely to continue given this vegetation has little to no statutory protection.

#### 1.4.3 Pest animals

The Rockhampton Regional Council Biosecurity Plan for Pest Management 2017-2021 identifies that invasive biosecurity matters have the potential to adversely alter ecosystem function, reduce primary industry productivity and profitability and threaten human and animal health and social amenity. The Rockhampton region has records for 26 exotic and/or naturalised animal species.

An example of the threat posed by exotic animals on the natural environment is the predation of the White-throated Snapping Turtle by foxes (FBA, 2018a). A study included the identification of fox activity in the habitat for the White-throated Snapping Turtle, monitoring of fox traps, an assessment of the effectiveness of the use of detection dogs to enable effective fox control measures and nest survey and protection of located nests with predator exclusion devices.

#### 1.4.4 Weeds

Pest plants or weeds also adversely alter ecosystems, reduce the productivity and profitability of primary industries, threatened human and animal health and social amenity.

There are 331 documented exotic species recorded in the Rockhampton region accounting for ~16% of all flora records. Council's Biosecurity Plan for Pest Management 2017-2021 details the key issues, legislative framework, principles of pest management and the strategy for implementation (RRC, 2017b).

The Biosecurity Act 2014 provides a regulatory framework for the prevention, minimisation and management of restricted matters (including restricted invasive plants) in Queensland. Council is responsible for the administration and enforcement of the *Biosecurity Act 2014* and local laws which relate to pest plants. The Fitzroy Basin Association lists problematic pests within the broader natural resource management area including several listed as 'restricted' under the *Biosecurity Act 2014*:

- > Cat's Claw Creeper (*Dolichandra unguis-cati*);
- > Giant Rat's Tail Grasses (*Sporobolus pyramidalis* and *S. natalensis*);
- > Lantana (*Lantana camara*);
- > Parkinsonia (*Parkinsonia aculeata*);
- > Prickly Acacia (*Vachellia nilotica*); and
- > Rubber Vines (*Cryptostegia madagascariensis* and *C. grandiflora*).



**Plate 20** – Thicket of Prickly Acacia (*Vachellia nilotica*)

Council's Biosecurity Plan for Pest Management 2017-2021 lists locally declared weeds within the Rockhampton region including:

- > Castor-oil Plant (*Ricinus communis*);
- > Devil's Apple (*Solanum aculeatissimum*);
- > Devil's Fig (*Solanum torvum*);
- > Elephant Grass (*Penisetum purpureum*);
- > Feral Leucaena (*Leucaena leucocephala*);
- > Lion Tail (*Leonotis nepetifloia*);
- > Maltese Cockspur (*Centaurea melitensis*);

- > Sisal (*Agave vivipara* (var. *vivipara* and cv. Marginate (sisal), *A. sisalana* (sisal/sisal hemp)); and
- > Wild Sisal (*Furcraea selloa*).

Terrestrial weeds can alter ecosystems, dominate large areas and prevent native plant recruitment. Weed management measures include environmental management (fire, moisture and nutrient control and over-planting), chemical, mechanical, manual and biological control. Council is responsible for controlling weeds on Council land and weed infestations are managed in accordance with Parks management plans. Landholders are responsible for weed control on their own property.

Restricted aquatic weeds which occur within the Fitzroy River include Water Hyacinth (*Eichhornia crassipes*), Salvinia (*Salvinia molesta*) and Water Lettuce (*Pistia stratiotes*). During suitable conditions invasive aquatic weeds can cover waterways causing significant environmental, infrastructure and community impacts. During flood events weeds are transported into the Fitzroy River Floodplain wetlands and impact ecosystem health. Council have successfully trialed a biocontrol program using weevils to control restricted aquatic weeds. The program provides a tool for aquatic weed management in the Rockhampton region.

A key threat to the recovery of the Critically endangered Yellow Chat habitat is weed invasion of its habitat. A study completed by CQ University assessed the effectiveness of biocontrol in the management of Moonlight cactus (*Harrisia martinii*, *H. tortuosa* and/or *H. pomanensis*) (CQ University, 2016). Over 1,200 clumps of Moonlight cactus were inoculated with mealy bugs at sites located at Cheetham and part of the Yellow Chat's core habitat at Twelve Mile Creek. The results of the study indicate a decline in health of Moonlight Cactus infested with Mealy bugs over a one-year period (between 2015 – 2016).

#### 1.4.5 Inappropriate fire regimes

As urban areas expand toward bushland areas the risks associated with bushfire increase. Mount Archer has been the area of focus for fire management following bushfires in 2007 and 2009. Council's Bushfire Management Strategy details a coordinated bushfire management approach to integrate existing bushfire management activities into multi-agency approaches. Bushfire mitigation activities include bushfire priority area risk assessments, maintaining fire trails and fuel reduction burns. Fuel reduction burns are one of the key components in determining bushfire hazard due to the amount of fuel available. Site assessments are completed annually to determine the timing and location of fuel reduction burns. Landholders located within bushfire hazard zones are encouraged to complete regular site assessments and strategic fuel reduction burns. Fuel reduction burns have the potential to threaten the natural environment and create a difficult balance between fire hazard reduction versus the specific bushfire management requirements of various ecosystems. Fuel reduction burns that are too frequent can cause fire-driven extinction of flora and fauna species. Fire must be excluded from some ecosystems all together including vine forests and mangrove communities all together. Conversely fire is also needed for recruitment in some ecosystems, weed management and to benefit some fauna. Some bird species from the region are known to benefit from appropriate fire regimes including a wide range of seed-eating birds, typically including Red-tailed Black-Cockatoos, Galahs and the threatened Squatter Pigeon. Specifically, cool fires of the early dry season can remove the barrier of dense grass, but typically do not greatly reduce the density of seeds lying dormant on the soil surface (Olsen and Weston, 2005).

The Queensland Herbarium's fire management guidelines for individual regional ecosystems identify appropriate burn season, intensity, intervals and strategy (Queensland Herbarium, 2018). The Queensland Herbarium guidelines should be used in conjunction with the coordinated approach as detailed in Council's Bushfire Management Strategy with consideration of wildfire suppression, hazard reduction, timber production management and pest plant control. Additionally, local conditions including safety of people and animals, weather, landforms and infrastructure must be considered.

#### 1.4.6 Climate change

Climate change presents a threat to biodiversity through reducing the bioclimatic range within which species or ecological communities exist. Climate change resulting in changes in temperature, rainfall patterns, El Nino Southern Oscillation, and sea level rise has ramifications for marine, aquatic and terrestrial flora, fauna and ecological communities (TSSC, 2001). Such changes have wide-ranging effects across all flora and fauna groups, and disproportionately affect species and communities with restricted ranges or which occupy small bioclimatic habitats. The following impacts of climate change are anticipated in the region:

- > Landward migration of mangrove communities are anticipated in Rockhampton (Low, 2011).
- > Species with small distributional ranges, such as the endangered *Decaspermum struckoiligum* which is confined to dry rainforest at a single location in Struck Oil, are vulnerable to climate change.

- > Death of Brigalow, a diagnostic species of a national TEC, have already been attributable to drought in the Rockhampton region (Low, 2011) and such events can be expected to increase with the effects of climate change.
- > Potential consequences including prolonged drought, accelerated sea level rise, increased storm surge or reduced average regional rainfall will affect the communities, infrastructure as well as significant flora and fauna species. (DoEE, 2002).
- > Warming seas and increased storm tide inundation can potentially impact coastal ecosystems, which have important recreation and biodiversity values (DEHP, 2016).
- > There is high confidence that fire behaviour will be more extreme given higher levels of fuel dryness and increased hot, dry, windy conditions (DEHP, 2016). This will have flow on impacts to ecosystems and people alike.
- > Ecosystem services and the livability of the region could potentially be affected by the anticipated increase in weather extremes which can cause flood, storm damage, drought and bushfire hazard.

## 1.5 Land uses compatible with natural environmental values

Land uses compatible with natural environmental values include low intensity, small-scale development consistent with the values within the area. For example, the environmental management and conservation zone provides for conservation values of the land to be maintained and enhanced and may be appropriate for small scale rural or eco-tourism uses where they are compatible with the environmental values of the locality. Other examples of low intensity land use compatible with natural environmental values, and in some instances have positive social and economic benefits, include:

- > some ecotourism ventures;
- > walking and bike trails;
- > cottage industries;
- > trail rides;
- > ziplines; and
- > developments which incorporate the principles of ecologically sustainable development.

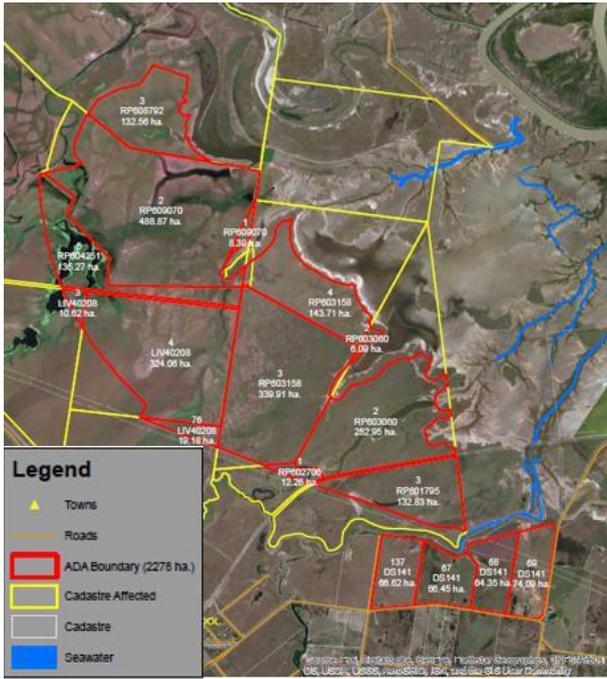
Some uses are unlikely to require development approval and can be conducted as an as of right. This may include:

- > on existing agricultural lands adoption of Grazing Best Management Practices (see <https://www.bmpgrazing.com.au/>);
- > carbon farming;
- > sustainable forestry; and
- > sustainable fishing.

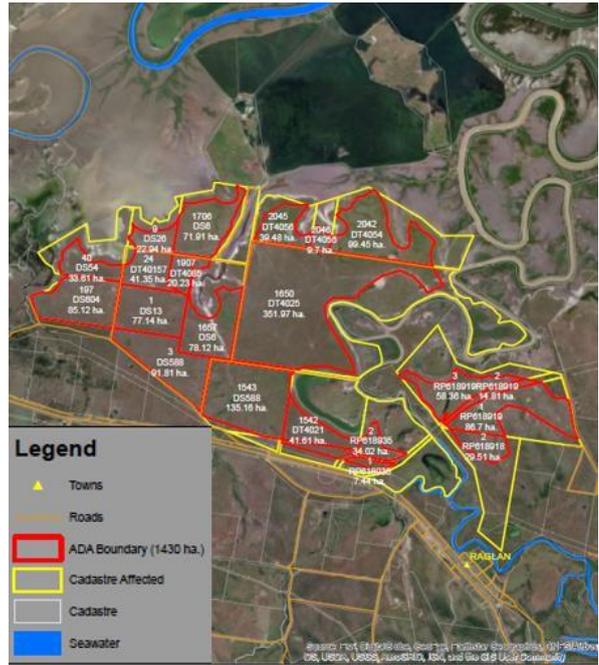
Areas supporting environmental values which are of less critical importance can be developed with higher impact uses provided appropriate environmental impact assessment and environmental management measures are undertaken.

Intense development can coexist with the natural environment provided they are adequately planned and designed to avoid offsite impacts (e.g. edge effects and runoff).

The Queensland Government identified the region suitable for aquaculture development, with approximately 3,700 hectares of land at Raglan Creek and Casuarina Creek within the Aquaculture Development Area (**Extracts 12 and 13**). The Queensland Government provides potential aquaculture development investors with a guide to environmental factors that influence site selection (QG, 2016). It is critical that high impact land use, such as aquaculture developments are compatible with the environmental values and undergo stringent environmental impact assessment and environmental management.



Extract 12 - Extract of Casuarina Creek Aquaculture Development Area Map (DAF, 2018)



Extract 13 - Extract of Raglan Creek Aquaculture Development Area Map (DAF, 2018)

## 2 Valuing the Natural Environment

### 2.1 What does protect, maintain and enhance mean?

The *Environmental Sustainability Strategy 2018-2022* (RRC, 2018a) highlights the vision and approach for pathways to a sustainable future.

The vision of the strategy is,  
*“We want the Rockhampton Region to be a great place to live, work, play, learn and invest - both now and in the future.”*

Council’s approach to achieve this vision is broadly to work together collaboratively, learn from experiences and refine approaches. The strategy identifies four interconnected pathways to a sustainable future including Natural Environment, Empowering Community, Industry and Infrastructure and Council Operations. The objective for the Natural Environment pathway is *“Let’s work together to protect, maintain and enhance our natural environment”*. This objective includes key actions that are fundamental to realising the overall vision of the Strategy. Understanding the intent of each of these actions is therefore important in pursuing the vision and informing the current study. For the purpose of this study the actions of protecting, maintaining and enhancing are defined below.



**What does it mean to protect?**

Protect means to retain and conserve natural environmental values and processes. As an example by preventing inappropriate development, land use and land clearing.



**What does it mean to maintain?**

Maintain means to sustain and support natural environmental values and processes by ensuring environmental areas and values are managed appropriately.



**What does it mean to enhance?**

Enhance means to improve natural environmental values and processes. As an example, this may be done through ecological restoration works.

The strategy lists three targets for the natural environment pathway as follows:

- > Programs in place to maintain and enhance our natural assets, waterways and green corridors;
- > Programs in place to protect remnant vegetation and support local biodiversity in urban areas; and
- > Long-term trending improvement in net waterway health

The natural environment pathway lists five strategic actions including those details in **Table 2-1**.

Table 2-1 Strategic actions of the natural environment pathway

Strategic Actions	
1.1	Take steps to better understand our local natural environment and its inherent biodiversity values in order to inform and prioritise management actions.
1.2	Foster strong partnerships to protect, maintain and enhance our local natural environment.
1.3	Implement actions to improve waterway health and better manage the condition of key natural assets, green corridors and urban waterways.
1.4	Develop tools to better protect our natural environment, local biodiversity and remnant vegetation from development and other pressures.
1.5	Celebrate our natural assets, and their contribution to the liveability of our region, through a targeted long-term communications campaign.

Council's role as one of the land managers in the Region, will be to champion the natural environment to ensure the protection, maintenance and enhancement of the significant natural environmental values of the region through statutory and non-statutory means.

Protection, maintenance and enhancement of the natural environment can only be achieved through a combination of statutory and non-statutory approaches (i.e. applying one approach alone would not be successful). Each approach can be improved, in part, by building on our knowledge of the natural environment of the Rockhampton region. Given there are several information gaps pertaining to the natural environment, the sequence in which information is collected and subsequent statutory and non-statutory responses are developed is important. For example:

- i. a locally significant fauna species list has been identified as an information gap;
- ii. once established, it will be important to identify the specific habitat needs of significant species;
- iii. species and habitats can then be prioritised for funding and on ground works; and
- iv. on ground works can be implemented to maintain and enhance priority species and habitats.

Given this, the actions identified herein aim to improve base knowledge of the natural environment and improve management of the values that are currently known. Some actions will not be evident until these actions are undertaken.

The following sections individually address protection, maintenance and enhancement according to the following.

1. Some of the information gaps that require further investigation. While information gaps are presented in the introductory part of each section, addressing these is not always a prerequisite to proceeding with the development of statutory and non-statutory programs. Each information gap is ranked according to the priorities outlined in **Table 2-2**. The table also provides some guidance for prioritisation of non-statutory measures.

Table 2-2 Prioritisation of information gap actions

Priority	Description
<b>Short term</b>	Filing this information gap will aid in improving the effectiveness of the Planning Scheme in particular with the aim of protecting the natural environment. Delivering non-statutory actions will also assist in protection of the natural environment.
<b>Medium term</b>	Will aid with future statutory and non-statutory measures to protect, maintain and enhance the natural environment.

Priority	Description
<b>Long term / On going</b>	This information will aid in improved knowledge of the natural environment of Rockhampton region and will aid with future maintenance and enhancement of the natural environment.

2. Statutory measures that can be used to improve the protection of the natural environment. Discussion is provided around the suitability of existing resources to inform statutory measures and the steps required to realise the recommended measure.
3. Non-statutory measures. These are often based on best practices adopted by other local authorities in Queensland.

The Rockhampton Region Planning Scheme (planning scheme) is a significant focus of the statutory measures identified to protect the natural environment. While some measures outlined in the Planning Scheme, such as restoration triggered under some code requirements, results in 'enhancement', the primary approach of the Planning Scheme insofar as the natural environment is concerned is protection.



## 2.2 Protect

### 2.2.1 Strategies

#### 2.2.1.1 Addressing information gaps to protect that natural environment

**Section 1** of this study highlights the natural environmental values of the region and details information gaps in the protection and maintenance of natural environmental values. A summary of information gaps is provided below (**Table 2-3**) to aid in developing actions to protect the natural environment.

Table 2-3 Information gaps that affect the protection of the natural environment

Priority	Information gap / action
Short term	1. The Biodiversity Overlay Mapping indicates information gaps including the mapping does not reflect current knowledge including MSES extents and does not reflect on-ground conditions in areas. Updating the Biodiversity Overlay Map to reflect current knowledge will strengthen the case for amending the zone of parcels located within the Biodiversity Overlay Mapping. It is recommended that an update of the Biodiversity Overlay Map is completed using the BAMB / CNCCS. The resulting map can be used for other purposes such as targeting sites for restoration or other forms of protection.
	2. A key information gap pertains to GIS resources. Contemporary information regarding waterways, wetlands, vegetation communities (including remnant and regrowth) and threatened species is available to inform MSES. However, there are likely to be MLES not captured in available GIS. In particular, adequate corridor mapping is absent and finer detail about ecological features such as location of locally significant wetlands and 'special biodiversity values'. The planning scheme provisions also requires refinement to improve its effectiveness.
Medium term	3. The region does not currently have a priority fauna and flora species list. The priority flora and fauna species lists can be included within future amendments to the Biodiversity Overlay Code as an acceptable outcome for development to plan for the protection and conservation of priority flora and fauna species.
	4. Update wetland mapping to 'capture' those wetlands presently not mapped. This should be undertaken at a scale of approximately 1:10,000 – 1:25,000.
	5. Update waterway mapping to ensure the centre line of above ground watercourses are accurately represented in overlay mapping.
Long term / On going	6. Categorise Rockhampton Regional Council's existing open space network to identify the intent of each parcel (e.g. conservation; drainage reserve; active open space) and incorporate into Geocortex. This will allow for targeted conservation efforts within Council's estate.
	7. The EPBC Act Protected Matters Search for the region indicates six Commonwealth listed Threatened Ecological Communities which may occur within the region. The location and extent of Threatened Ecological Communities is unknown, therefore it is recommended that Threatened Ecological Communities are accurately mapped and ground-truthed to ensure their protection with other agencies such as Fitzroy Basin Association and State and Federal Government Agencies.
	8. Locally significant Regional Ecosystems were previously unknown, <b>Table 1-6</b> above provides a list of locally significant Regional Ecosystems. It is recommended that the list of locally significant Regional Ecosystems is included within future amendments to the provisions of the Biodiversity Overlay Code.
	9. Databases used for obtaining threatened fauna and flora species records for the region including the EPBC Act Protected Matters, Wildlife Online database searches and the Atlas of Living Australia all have various limitations, degrees of error and are not exhaustive lists. It is recommended that further research and studies into the locations and extents of threatened fauna and flora populations be completed to inform protection measures, conservation outcomes, programs, targeted habitat restoration and threatened flora and fauna species management within the region. At a minimum this should include requiring ecological assessments to be conducted in more instances than currently triggered by the Planning Scheme.
	10. Multiple areas within the region require further biodiversity investigation and several areas require particular focus owing to the presence of known ecological values that are presently not recognised in overlay mapping and/or they are subject to development pressure. It is recommended that the highlighted biodiversity investigation areas are reviewed as part of detailed mapping and assessed by a local expert panel for consideration and potentially inclusion in the Biodiversity Overlay Mapping.

2.2.1.2 Statutory measures

2.2.1.2.1 Planning Scheme

The primary statutory tool that Rockhampton Regional Council can use to protect the natural environment is the Planning Scheme. A review of the Planning Scheme and how it relates to protection and management of the natural environment was completed (**Appendix F**). The review focused predominantly on the elements of the planning scheme that have a direct role in terms of providing a regulatory framework for planning and development decisions and the impacts on natural features and environmental values. The review focused on key elements of the scheme and provide an analysis of:

- > the effectiveness of the provisions in protecting and managing the natural environment;
- > the operation of the scheme in terms of delivering the intended outcomes; and
- > any improvements that may be considered that will facilitate the scheme in ensuring ‘no net loss’ of environmental values.

The Town Planning Assessment (**Appendix F**) resulted in a number of recommendations pertaining to improving the Planning Scheme that are presented in **Table 2-4**.

Table 2-4 Recommended amendments to the Planning Scheme

Planning scheme section	Amendment recommendation
Strategic Framework	<ol style="list-style-type: none"> <li>1. Create a consolidated defined term for ecologically important areas<sup>10</sup>. This could be included as an administrative definition and may include all or some of the range of individual elements (including Federal, State, and local elements as required) identified in Section 3.4.2.1(2) of the scheme;</li> <li>2. Update strategic framework mapping to include all ecologically important areas as a consolidated area. This will ensure that where the text refers to protection/enhancement/rehabilitation of specified areas there is a clear linkage with the location and extent of these areas.</li> <li>3. Include a definitive statement in the Natural environment and natural hazards element that development should avoid adverse impacts on ecologically important areas to provide clear guidance that this is the preferred outcome. Other minimisation and mitigation actions are to be pursued only where avoidance is not practicable.</li> <li>4. The current construction of the strategic framework has sought to focus tightly on the individual elements, with very little crossover or overlap. In this regard, while the Natural environment and natural hazards element has some stronger statements regarding protection of ecologically important areas, the settlement pattern element only has contingent references to this principle. To remove doubt and strengthen consideration of ecological protection, stronger and more definitive references to protection of ecologically important areas within the settlement pattern element should be included. While this will result in some repetition and duplication, it is considered appropriate to demonstrate the clear intent of the scheme in making this an important consideration. To have greatest effect, these statements should be included across all place typologies (i.e. urban, rural, urban infill, future urban etc), as well as a standalone statement in the strategic outcomes.</li> <li>5. Although one of the key aims of the Environmental Sustainability Strategy is to ensure that there is ‘no net loss’ of vegetation, the strategic framework does not include any statements to this effect. It would be useful if this requirement was included as a broad principle within the strategic framework, which would strengthen lower order scheme provisions (such as zone codes and overlays) and provide a clear vertical integration across the planning scheme.</li> </ol>
Categories of development and assessment	<ol style="list-style-type: none"> <li>1. It is recommended that the exemption for accepted development and accepted development subject to requirements from assessment against the Biodiversity overlay be reviewed. This could also potentially extend to building applications for dwelling houses. The underlying level of assessment need not change, however assessment against the relevant provisions of the (amended) Biodiversity overlay code would provide a mechanism to better regulate and manage potential environmental impacts of all development. While it is good practice to allow low risk development to proceed with minimal intervention, this needs to be balanced against the potential incremental loss of vegetation/ecologically important areas that could be inadvertently allowed. The instances where such development would be captured are likely to be limited, and for accepted development such as a dwelling house the assessment need not be onerous and could simply include provisions that limit the area able to be cleared. This will allow typical and low risk development to proceed, but provide an opportunity for Council to scrutinise potentially damaging development.</li> </ol>

<sup>10</sup> A recommended definition for ecologically important areas is “an area known to support a matter of environmental significance”.

Planning scheme section	Amendment recommendation
Biodiversity overlay code and mapping	<ol style="list-style-type: none"> <li>1. Include an additional overall outcome that clearly states the intention that there is 'no net loss' of vegetation or ecologically important areas. This will provide vertical integration and linkage with similar statements in the strategic framework.</li> <li>2. Re-draft existing overall outcomes (a) and (b) to clearly state that the outcome sought is the protection and enhancement of ecologically important areas. The aspects of these provisions that relate to principles of minimisation and offsetting can be repositioned and included in the performance outcomes and acceptable outcomes.</li> <li>3. Review terminology throughout the code to ensure that the individual provisions refer to the defined and mapped overlay elements. It may be beneficial to consider a broader review and consolidation of an umbrella terminology to be prepared for the planning scheme, with this term included as a separate administrative definition to facilitate a consistent terminology and simplify the code.</li> <li>4. Include a separate provision that relates to when clearing cannot be avoided. This will provide a more focused approach that can more clearly link any clearing with mitigation and offset options as well as the overall outcome of 'no net loss'.</li> <li>5. Review the provision PO3 relating to MLES (general) and strengthen the ability to regulate development. As currently drafted this provision is not sufficiently robust to protect environmental values, and a specific reference to the Ecological assessment planning scheme policy may assist in an applicant demonstrating the range of considerations, options, and mitigations that have informed the development concept. Further, review the provisions of the Biodiversity Overlay Code and include the requirement of an ecological assessment to be conducted in further instances than currently triggered.</li> <li>6. Draft acceptable outcomes to provide more detailed guidance on how development can achieve compliance. As an example it would be relatively simple to include acceptable outcome provisions requiring that development is not located in specified areas, or specifies maximum area of clearing for certain development (such as dwelling houses). Where not meeting the provision a performance based response could be pursued. This approach would allow simple development that met basic outcomes to proceed without an onerous procedural requirement, and would also allow for accepted development subject to requirements such as dwelling houses to be subject to the overlay code.</li> <li>7. Review acceptable outcome provision relating to reconfiguring a lot (PO14) and whether it should apply only to sites that are entirely subject to a mapped value. It may be more effective for there to be no new lots in areas subject to high ecological values on any part of a site. This would allow for some development while clearly indicating that no intensification of development in environmentally significant areas is envisaged.</li> <li>8. Review overlay mapping for consistency with strategic framework mapping. Where this is not possible, include reference in the overlay code to corridors mapped in strategic framework mapping to ensure that development is responsive to constraints and opportunities in these areas.</li> <li>9. Revise overlay mapping. In particular the Biodiversity Areas and corridor mapping require a significant review. <b>Appendix E</b> provides detailed discussion in this regard. Waterway and wetland mapping are presently fit for purpose, but would benefit from future refinement to capture all wetlands and the correct drainage path of some waterways.</li> </ol>

Planning scheme section	Amendment recommendation
Zones and zone codes	<ol style="list-style-type: none"> <li>1. Consider including additional environmental zones in the planning scheme. The regulated requirements provide for a suite of environmental zones that can be used in the planning scheme. By including additional environmental zones, the planning scheme can take a finer grained approach to protecting, maintaining, and enhancing environmental values. Very high environmental value land can be retained in the Environmental management and conservation zone, however other land with lower values but that still warrants some protection can be included in other zones such as an Environmental management zone.</li> <li>2. The Environment management and conservation zone could be amended as required to modify the purpose of the zone, and provide detailed guidance setting out the types of land uses that are envisaged. This zone would remain the highest order environmental zone and offer the greatest level of protection to critically important areas such as National Parks, State Forests, and other key environmental features.</li> <li>3. The Environmental management zone could contain less significant (through still ecologically important) land. The actual type and nature of which land is included in the zone is a matter for Council, and this will require a significant review effort to quantify what land/values/locations are suitable for inclusion. As an example, land currently identified as being MLES (General) in the Biodiversity overlay could potentially be included in a new Environmental management zone. This approach would allow for some form of development to occur, however the use of an environmental zone would provide a clear indication that the land has ecological value and any development would need to sensitively respond to these values.</li> <li>4. It is noted that this is not a recommendation to bring MLES (General) into a new zone, however is provided as an example of the type of consideration process that would be required to identify what land that would be appropriately included a new zone. There are a number of implications that may arise from including a new zone into the scheme, including issues of injurious affection and potential compensation requirements. In this regard, any decision to include a new zone should be based on a clear rationale supported by relevant studies and analysis. It is likely that a significant audit and review of regional environmental values and mapping would be required to form the basis of such an approach.</li> <li>5. The recommended BAMB / CNCCS mapping could aid in informing rezoning. For example, if the mapping output results in a combination of specific environmental values (e.g. threatened species habitat, location within a corridor, significant ecosystem etc.) this may provide justification for a change in zoning. It is anticipated that areas on the lower slopes of the Beserker Range would be triggered through this mapping because they form part of a significant area of habitat known to support threatened plant and animal species.</li> </ol>
Planning Scheme Policy	<ol style="list-style-type: none"> <li>1. If the intention for the scheme is to protect, maintain and enhance environmental values, it is considered prudent that the policy be applied more broadly. This could be achieved through explicit reference to the policy in the Biodiversity overlay code through Notes or Editor's Notes in all sub-sections.</li> <li>2. Revise the planning scheme policy to simplify requirements for ecological assessments (e.g. projects in particular locations may require a 'basic' assessment, while others a 'detailed' assessment).</li> <li>3. Include a requirement for tree surveys and tree protection plans.</li> <li>4. Include greater guidance regarding biodiversity offsets. This may eventually include a full biodiversity offsets policy. <b>Appendix G</b> provides greater discussion regarding offsets.</li> </ol>

#### 2.2.1.2.2 Future reiterations and planning scheme updates

The *Planning Act 2016* details the requirements and timeframes for reviewing a planning scheme (QG, 2018b). Under the *Planning Act 2016*, the Minister's Guidelines and Rules (DILGP, 2017) outlines the rules and process for amending a planning scheme including major amendments, such as changes to zones and minor amendments, for example small administrative changes. Future reiterations or updates to the planning scheme mapping will be required for major and minor amendments. Further, updates to the Biodiversity Overlay Mapping can occur on an as needed basis when new information becomes available.

#### 2.2.1.2.3 Local Laws

Protection of vegetation outside of assessable development including vegetation located on Council land, street trees and vegetation located on privately owned land is not currently captured within the requirements of the planning scheme or a local law. Council identified an issue with loss of canopy cover within peri-urban areas. It is noted that the *Landscape design and street trees planning policy* applies to assessable development only and is a landscape specification document (i.e. it does not apply to naturally occurring trees). It is recommended that vegetation is protected outside of assessable development via the

establishment of a local law. An example of a Council which protects vegetation under a local law is Brisbane City Council's *Natural Assets Local Law 2003* (BCC, 2003). The law is made under the *City of Brisbane Act 2010* and has been in effect since 1991. The local law protects vegetation located on Council land (including street trees) and properties mapped as protected vegetation under the law. The law lists exempt clearing works, directs permitting and compliance requirements and applies to vegetation outside of the development application process and also forms part of the conditions of development.

Rather than a blanket application, this law could focus on specific groups of trees (e.g. vegetation protection orders) or trees in particular locations (e.g. fringing waterways). The law does not necessarily prevent clearing, but controls clearing in a manner that ensures the protection of vegetation that has ecological, historic and/or aesthetic values. The individual trees identified in Table SC6.12.12.1 of SC6.12 Landscape design and street trees planning scheme policy could form the basis of a protection order.

### 2.2.1.3 Non-statutory measures

Measures to protect the natural environment include non-statutory approaches, examples of initiatives which promote the protection of the natural environment and their potential application or development and recommendations are listed in **Table 2-5**.

Table 2-5 Non-statutory initiatives, examples and potential application to protect the natural environment

Initiative	Example	Implementation	Priority
Environmental levy and land acquisitions program	Noosa Council has an environmental levy and uses levy funds to acquire land for environmental conservation purposes. As at May 2018, the Environment Levy has been used to purchase 33 land parcels comprising a total of 1,555 ha set aside for environmental conservation.	It is recommended that the region develop a land acquisition strategy that targets land parcels with high conservation value such as those within or adjoining the Fitzroy River strategic corridor, parcels adjoining Protected area estates and/or expanding habitat/corridors for threatened species or ecological communities.	Long term / On going
Conservation gap assessment	Gold Coast City Council has a program of regularly assessing the representation of vegetation communities within their reserve network to ensure they are comprehensive and representative (CAR).	It is noted that the State has already conducted a preliminary CAR assessment for Council. This assessment should be expanded further to take into account lands that are under Council ownership and to identify potential sites for acquisition or a change of management (e.g. Council owned land that is presently used for one purpose may be better directed to a conservation intent).	Long term / On going
Wildlife Conservation Partnership Programs	<p>Brisbane City Council (BCC) runs a Wildlife Conservation Partnership Program which offers landholders advice about revegetation, local flora and fauna species and how to conserve and restore wildlife habitat on their land. The program offers five agreements including:</p> <ul style="list-style-type: none"> <li>▪ Working Towards Land for Wildlife</li> <li>▪ Land for Wildlife</li> <li>▪ General Voluntary Conservation Agreement</li> <li>▪ Higher Voluntary Conservation Agreement</li> <li>▪ Voluntary Conservation Covenant.</li> </ul> <p>Eligible landholders may apply for funding to assist bushland restoration on private land. Land for wildlife is a non-binding agreement and has a successful history of assisting landholders protect, maintain and enhance privately owned land.</p>	It is recommended the region incorporates the Land for Wildlife Program to provide landholders with an alternative to legally binding covenants and to engage in landholder education, access to funding and protection of ecologically important areas on private land.	Medium-term

Initiative	Example	Implementation	Priority
<p>Flora and Fauna Database Website</p>	<p>Gold Coast City Council hosts a website called, '<i>The City of Gold Coast's flora and fauna</i>' (see: <a href="http://www.goldcoastflorafauna.com.au/">http://www.goldcoastflorafauna.com.au/</a>) (GCCC, 2017). The initiative is part of the Gold Coast City Council's ongoing commitment to conserve the city's biodiversity and natural assets, and is a key initiative of Council's <i>Nature Conservation Strategy 2009-2019</i>.</p> <p>The City of Gold Coast received a national commendation from the Planning Institute of Australia for the Flora &amp; Fauna Database in the '<i>Improving Planning Processes and Practices</i>' category at the National Awards for Planning Excellence in May 2017.</p>	<p>Knowledge of the location of protected wildlife will aid in its protection.</p> <p>It is recommended that a region specific flora and fauna database website is developed to assist in the protection of flora and fauna including threatened species.</p> <p>An alternative approach is to encourage residents to use an existing platform such as ALA, so that data is captured and accessible.</p>	<p><b>Medium-term</b></p>



## 2.3 Maintain

### 2.3.1.1 Addressing information gaps

**Table 2-6** identifies information gaps that relate to the maintenance of the natural environment within the Rockhampton region.

Table 2-6 Information gaps that affect the maintenance of the natural environment

Priority	Information gap / action
Medium term	1. Knowledge of flora and fauna species distribution in the region is currently limited. It is recommended that Council environmental programs incorporate and promote citizen science.

### 2.3.1.2 Statutory measures

Statutory measures to maintain the natural environment are captured in the measures identified for protection outlined in **Section 2.2.1.2**.

### 2.3.1.3 Non-statutory measures

Measures to maintain the natural environment include non-statutory measures. Examples of initiatives which promote the maintenance of the natural environment and their potential application or development and recommendations are listed in **Table 2-5** below.

Table 2-7 Non-statutory example and potential application to maintain the natural environment

Initiative	Example	Implementation	Priority
Biosecurity Plan for Pest Management	Council has an existing Biosecurity Plan for Pest Management 2017-2021.	It is recommended that the pest management plan is implemented as per the pest management priorities detailed in the plan.	Short-term
Citizen Science Programs	Citizen science involves the collection of data by members of the community as part of collaborative projects with professional scientists. An example of an association which hosts citizen science is the Australian Citizen Science Association. The association is a member-based community that informs and supports science through citizen science. There are many platforms for citizen science including Council lead NatureBlitz's which are point in time records of species, Council hosted websites and existing platforms such as the Atlas of Living Australia.	It is recommended that Council incorporate a citizen science program into their existing Environmental programs. This may extend to: <ul style="list-style-type: none"> <li>• A volunteer program.</li> <li>• Flora and fauna surveys.</li> <li>• Monitoring e.g. water quality, mangroves, fauna nest box use.</li> </ul>	Short-term
Community education	Council has existing natural area visitor information flyers, website resources, school field trip environmental information resources and maps on local wetlands and lagoons.	It is recommended that existing educational material be maintained and expanded upon to continue to educate the community about the natural values of the region in order to maintain those values.	Short-term
Fire management planning	The SEQ Fire and Biodiversity Consortium is a network of land managers and stakeholders providing	It is recommended that Council review fire management planning	Medium-term

Initiative	Example	Implementation	Priority
	<p>a coordinated response to best-practice fire management, fire ecology and the conservation of biodiversity in South-east Queensland. The consortium provide resources including recommended fire regimes, fire and ecology and fire management manuals.</p>	<p>for Council managed protected estates and other land holdings.</p>	



## 2.4 Enhance

### 2.4.1 Strategies

#### 2.4.1.1 Addressing information gaps

**Table 2-8** below highlights identified information gaps and recommendations for addressing gaps to ensure the enhancement of the natural environment within the region.

Table 2-8 Identified information gap and recommendation to enhance the natural environment

Priority	Information gap / action
Short term	1. Where should restoration efforts be focused – where are weeds and pest animals affecting significant species such as the Yellow Chat or White Throated Snapping Turtle.

#### 2.4.1.2 Statutory measures

Statutory measures to enhance the natural environment are captured in the measures identified for protection outlined in **Section 2.2.1.2**.

#### 2.4.1.3 Non-statutory measures

It is recommended that Council continue existing programs such as the Reef Guardian Project (**Appendix A**).

Non-statutory examples to promote the enhancement of the natural environment are listed in **Table 2-9** below and detail potential development and recommendations of the existing program.

Table 2-9 Non-statutory example and potential program development to enhance the natural environment

Initiative	Example	Implementation	Priority
Community Engagement Programs	<p>The region has an existing sustainability program, <i>'Bringing nature back'</i>. The program includes a range of local events and activities that connect the community with nature and support strategic social, economic and environmental goals. Events and activities include:</p> <ul style="list-style-type: none"> <li>▪ Native plant program - residents and landholders receive a free native plant at local events;</li> <li>▪ Workshops and activities</li> <li>▪ Community projects including Fraser Park bushland restoration partnerships and fish hotels installed in Yeppen Lagoon.</li> </ul>	<p>Continue to build on the programs that encourage the community to become involved. The native plant program and ongoing workshops / activities are provided with ongoing support.</p> <p>It is recommended that restoration projects and programs be expanded to include a triaged list of degraded waterways and include restoration of</p>	Short-term
On ground works	<p>It is understood that there is an existing landcare group. There are numerous examples of local government leading community plantings and coordinating bushcare groups, including Brisbane City Council's Habitat Brisbane Program. The Habitat Brisbane group undertakes a diverse range of actions including weed and rubbish removal, planting native plants, reporting species sighting and creating a sense of community.</p>	<p>It is recommended that Council explore options for implementing and expanding community restoration programs and on ground activities.</p>	Short-term

## 2.5 What are the Key Opportunities and Challenges?

Opportunities to protect, maintain and enhance the natural environmental values of the region are within statutory and non-statutory mechanisms. Information gaps have been identified and recommendations for implementation have been prioritised. Key opportunities to protect, maintain and enhance the natural environment within the region have been detailed in **Table 2-10** below.

Table 2-10 Key opportunities and challenges of protecting, maintaining and enhancing the natural environment

Opportunities	Challenges
<b>Protect</b>	
<p><b>Addressing information gaps</b></p> <ul style="list-style-type: none"> <li>&gt; Map biodiversity values through application of the BAMB / CNCCS.</li> <li>&gt; Map waterways and wetlands at a LGA scale.</li> <li>&gt; Priority flora and fauna list.</li> <li>&gt; Map EPBC Act TECs.</li> <li>&gt; Prioritise regional ecosystems.</li> <li>&gt; Further survey effort for threatened species.</li> </ul> <p><b>Statutory approaches</b></p> <ul style="list-style-type: none"> <li>&gt; Revise Planning Scheme. This will include consideration of various actions as outlined in <b>Appendix D</b> and Section 2.2.1.2.1, but will importantly require updating of the biodiversity overlay.</li> <li>&gt; Introduce local law for tree clearing.</li> </ul> <p><b>Non-statutory approaches</b></p> <ul style="list-style-type: none"> <li>&gt; Environmental levy and land acquisitions program.</li> <li>&gt; Conservation gap assessment.</li> <li>&gt; Wildlife Conservation Partnership Programs.</li> <li>&gt; Flora and Fauna Database Website.</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Budget and resource limitations.</li> <li>&gt; Balancing conflicting economic, social, political and environmental drivers.</li> <li>&gt; In developing the biodiversity overlay mapping, sufficient lead time and engagement is required to ensure an expert panel is convened that adequately 'capture' presently unmapped natural values of the region. Similarly, sufficient resources will be needed to allow for converting expert panel recommendations into mappable products.</li> <li>&gt; Attaining necessary datasets from the State to prepare biodiversity overlay mapping (e.g. spatially accurate threatened species records).</li> <li>&gt; Community support.</li> <li>&gt; The approval process for amending planning schemes can sometimes be a long process.</li> <li>&gt; Prioritising implementation of protection, measures for the region's natural environment.</li> </ul>
<b>Maintain</b>	
<p><b>Addressing information gaps</b></p> <ul style="list-style-type: none"> <li>&gt; Incorporate citizen science into Council's environmental programs to expand knowledge of species distribution and abundance.</li> </ul> <p><b>Statutory approaches</b></p> <ul style="list-style-type: none"> <li>&gt; Refer to '<b>Protect</b>'.</li> </ul> <p><b>Non-statutory approaches</b></p> <ul style="list-style-type: none"> <li>&gt; Implement existing biosecurity plan.</li> <li>&gt; Citizen Science Programs.</li> <li>&gt; Fire management planning.</li> <li>&gt; Community education.</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Budget and resource limitations.</li> <li>&gt; Community engagement.</li> <li>&gt; Prioritising implementation of maintenance, measures for the region's natural environment.</li> </ul>
<b>Enhance</b>	
<p><b>Addressing information gaps</b></p> <ul style="list-style-type: none"> <li>&gt; Identify priority restoration areas.</li> </ul> <p><b>Statutory approaches</b></p> <ul style="list-style-type: none"> <li>&gt; Refer to '<b>Protect</b>'.</li> </ul> <p><b>Non-statutory approaches</b></p> <ul style="list-style-type: none"> <li>&gt; Community Engagement Programs/ Volunteer Program</li> <li>&gt; On ground works.</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Budget and resource limitations.</li> <li>&gt; Landholder engagement, support and recognition.</li> <li>&gt; Prioritising implementation of enhancement, measures for the region's natural environment.</li> </ul> <p>Restoration of degraded areas and waterway located outside of a development application process requires landholder engagement and support.</p>

### 3 Conclusion

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The purpose of the Natural Environment Study is to identify the natural environmental values, significance, threats, compatible land uses and provide pathways to better protect, maintain and enhance the natural environment in the region.

Council's *Environmental Sustainability Strategy 2018-2022* highlights the vision and approach for pathways to a sustainable future. The strategy identifies four interconnected pathways to a sustainable future including Natural Environment, Empowering Community, Industry and Infrastructure and Council Operations. The key actions that are fundamental to realising the vision of the strategy are the protection, maintenance and enhancement of the natural environment.

The natural environment provides access to clean water, air, food and shelter. It also underpins the economy, climate and the liveability of our region. It is important to protect, maintain and enhance the natural environment to sustain ecosystems, waterways, wetlands, habitats, productive lands, diversity of flora and fauna, regulate weather and climatic processes and maintain or improve lifestyle and industry within the region.

The region showcases natural environmental values that are distinctive to the region including many elements to be celebrated for their intrinsic value and contribution they make to Queensland's biodiversity.

These values are however under threat from land clearing, predation of wildlife, weed invasion, inappropriate fire regimes and climate change.

Land use compatible with natural environmental values include low intensity, small-scale development consistent with the natural environmental values of the locality. The planning scheme zones provide protection and maintenance of conservation values and guide the scale and intensity of development to ensure the land use is compatible with the environmental values. Environmental values which are of less critical importance can support higher impact uses with appropriate environmental impact assessment and environmental management. It is critical that high impact land use are compatible with the environmental values and undergo stringent environmental impact assessment and environmental management.

This study provides strategies and recommendations for protecting, maintaining and enhancing the Natural Environment including addressing information, statutory measures and non-statutory measures. Recommendations have been prioritised in terms of deliverability and need. **Table 3-1** presents a summary of key recommendations pertaining to the Planning Scheme and **Table 3-2** provides a summary of recommendations pertaining to measures outside of the planning scheme.

An important recommendation of the review was that there is a need to revise current mapping of natural environment features in the LGA given existing mapping is based on information that is a decade old. Mapping also needs to be transparent, robust and defensible. The use of the BAMM / CNCCS methodology will provide a high level of rigour using contemporary information. It will be able to integrate data sources that are not readily available. The mapping will not only provide a useful aid in informing zoning and overlay mapping of the Planning Scheme, but can also be used to inform locations where offsets can be directed and where non-statutory conservation efforts such as Land for Wildlife Programs can be focused.

Table 3-1 Summary of proposed amendments to be progressed under the Rockhampton Region Planning Scheme

Planning Scheme Priorities	Recommendations
Strategic	<ol style="list-style-type: none"> <li>1. Create a consolidated defined term for ecologically important areas.</li> <li>2. Update strategic framework mapping to include all ecologically important areas as a consolidated area.</li> <li>3. Include a definitive statement in the natural environment and natural hazards element that development should avoid adverse impacts on ecologically important areas to provide clear guidance that this is the preferred outcome.</li> <li>4. To remove doubt and strengthen consideration of ecological protection, stronger and more definitive references to protection of ecologically important areas within the settlement pattern element should be included.</li> <li>5. Although one of the key aims of the Environmental Sustainability Strategy is to ensure that there is 'no net loss' of vegetation, the strategic framework does not include any statements to this effect. It would be useful if this requirement was included as a broad principle within the strategic framework.</li> </ol>
Categories of development and assessment	<ol style="list-style-type: none"> <li>6. It is recommended that the exemption for accepted development and accepted development subject to requirements from assessment against the Biodiversity Overlay be reviewed.</li> </ol>
Biodiversity overlay code and mapping	<ol style="list-style-type: none"> <li>7. Include an additional overall outcome that clearly states the intention that there is 'no net loss' of vegetation or ecologically important areas.</li> <li>8. Re-draft existing overall outcomes to clearly state that the outcome sought is the protection and enhancement of ecologically important areas.</li> <li>9. Review terminology throughout the code to ensure that the individual provisions refer to the defined and mapped overlay elements.</li> <li>10. Include a separate provision that relates to when clearing cannot be avoided.</li> <li>11. Review the provision PO3 relating to MLES (general) and strengthen the ability to regulate development. Further, review the provisions of the Biodiversity Overlay Code and include the requirement of an ecological assessment to be conducted in further instances than currently triggered.</li> <li>12. Draft acceptable outcomes to provide more detailed guidance on how development can achieve compliance.</li> <li>13. Review acceptable outcome provision relating to reconfiguring a lot (PO14) and whether it should apply only to sites that are entirely subject to a mapped value.</li> <li>14. Review biodiversity investigation areas as part of detailed mapping for consideration of a local expert panel for potential inclusion in the Biodiversity Overlay Mapping.</li> </ol>
Biodiversity overlay mapping	<ol style="list-style-type: none"> <li>15. Review overlay mapping for consistency with strategic framework mapping.</li> </ol>
Zones and zone codes	<ol style="list-style-type: none"> <li>16. Consider including additional environmental zones in the planning scheme.</li> <li>17. The Environment Management and Conservation Zone could be amended as required to modify the purpose of the zone, and provide detailed guidance setting out the types of land uses that are envisaged.</li> <li>18. The Environmental Management Zone could contain less significant (through still ecologically important) land.</li> <li>19. It is noted that this is not a recommendation to bring MLES (General) into a new zone, however is provided as an example of the type of consideration process that would be required to identify what land that would be appropriately included in a new zone. .</li> <li>20. Utilise the Biodiversity Assessment and Mapping Methodology (BAMM) / Common Nature Conservation Classification System (CNCCS) mapping to inform zoning. .</li> </ol>
Ecological Assessment Planning Scheme Policy (PSP)	<ol style="list-style-type: none"> <li>21. It is recommended that the PSP is updated to be in alignment with best practice restoration framework methodologies.</li> <li>22. It is recommended the Ecological Assessment PSP incorporates the specific sections and tables of the Landscape Design and Street Trees Planning Scheme Policy in order to ensure that locally declared pest species are incorporated into restoration plans for weed management.</li> </ol>

Planning Scheme Priorities	Recommendations
Landscape design and street trees Planning Scheme Policy	23. It is recommended that significant trees are added to a local law in order to ensure protection of trees on Council land and privately owned property outside of a development assessment process. Significant trees can be defined as a specific species and size and do not require individual listing within a local law.

Table 3-2 Summary of proposed recommendations to better protect, maintain and enhance matters of environmental significance within the Rockhampton Region

Natural Environment Priorities	Recommendations
Short Term 1-3 years	<ol style="list-style-type: none"> <li>1. The Biodiversity Overlay Mapping indicates information gaps including the mapping does not reflect current knowledge including MSES extent and does not reflect on-ground conditions in areas. It is recommended that an update of the Biodiversity Overlay Map is completed using the BAMB / CNCCS. The resulting map can be used for other purposes such as targeting sites for restoration or other forms of protection.</li> <li>2. A key information gap pertains to GIS resources. There are likely to be MLES not captured in available GIS. In particular, adequate corridor mapping is absent and finer detail about ecological features such as location of locally significant wetlands and 'special biodiversity values' . The Planning Scheme provisions also requires refinement to improve its effectiveness.</li> <li>3. Explore options for implementing and expanding community restoration programs and on ground activities.</li> <li>4. Expand restoration projects and programs to include a list of degraded waterways and include restoration of threatened species habitat.</li> <li>5. Include options for implementing and expanding community restoration programs and on ground activities.</li> <li>6. Implement pest management plan as per the pest management priorities detailed in the plan.</li> <li>7. Create a citizen science program linked into existing environmental programs.</li> <li>8. Maintain and expand upon existing educational material to continue to educate the community about the natural values of the region in order to maintain those values. This may even include a volunteer program.</li> <li>9. Introduce local law for tree clearing, to minimise peri-urban clearing of trees providing substantial canopy cover.</li> </ol>
Medium Term 3-5 years	<ol style="list-style-type: none"> <li>10. Develop a priority fauna and flora species list that can be included within future amendments to the Biodiversity Overlay Code as an acceptable outcome for development to plan for the protection and conservation of priority flora and fauna species.</li> <li>11. Update wetland mapping to 'capture' those wetlands presently not mapped. This should be undertaken at a scale of approximately 1:10,000 – 1:25,000.</li> <li>12. Update waterway mapping to ensure the centre line of above ground watercourses are accurately represented in overlay mapping.</li> <li>13. Investigate the Land for Wildlife Program to provide landholders with an alternative to legally binding covenants and to engage in landholder education, access to funding and protection of ecologically important areas on private land.</li> <li>14. Categorise existing open space network to identify the intent of each parcel (e.g. conservation; drainage reserve; active open space) and incorporate into Geocortex. This will allow for targeted conservation efforts within Council's estate.</li> <li>15. Review fire management planning for Council managed protected estates and other land holdings to protect and maintain environmental values.</li> </ol>
Long Term 5+ years	<ol style="list-style-type: none"> <li>16. A preliminary comprehensive, adequate and representative (CAR) assessment has been undertaken for this region. This assessment should be expanded further to take into account lands that are under Council ownership and to identify potential sites for acquisition or a change of management (e.g. Council owned land that is presently used for one purpose that may be better directed to a conservation intent).</li> <li>17. Develop a land acquisition strategy that targets land parcels with high conservation value such as those within or adjoining the Fitzroy River strategic corridor, parcels adjoining protected area estates and/or expanding habitat for threatened species or ecological communities.</li> <li>18. The EPBC Act Protected Matters Search for the region indicates six Commonwealth listed Threatened Ecological Communities which may occur within</li> </ol>

Natural Environment Priorities	Recommendations
	<p>the region. The location and extent of Threatened Ecological Communities is unknown, therefore Threatened Ecological Communities should be accurately mapped and ground-truthed to ensure their protection with other agencies such as Fitzroy Basin Association and State and Federal Government Agencies.</p> <ol style="list-style-type: none"> <li>19. Locally significant Regional Ecosystems should be included in future amendments to the provisions of the Biodiversity Overlay Code.</li> <li>20. Conduct further research and studies into the locations and extents of threatened fauna and flora populations to inform protection measures, conservation outcomes, programs, targeted habitat restoration and threatened flora and fauna species management within the region.</li> </ol>

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APPENDIX

A

LITERATURE REVIEW

# 1 Literature Review

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## 1.1 Council documentation

### 1.1.1 Introduction

A review of existing documentation provided by Council on the 27 February 2019 was completed as part of this desktop assessment including a review of the following documentation:

- > Strategy documents
  - Central Queensland Regional Plan;
  - Environmental Sustainability Strategy 2018-2022; and
  - Central Queensland Sustainability Strategy 2030.
- > Other Council Reports
  - RPS Natural Environment Study 2010;
  - Riparian Management Study for Frenchman's and Thozets Creeks (Alluvium, 2018); and
  - Basic i-Tree canopy assessment for the Rockhampton and Gracemere priority development areas (urban footprint), dated 2015 and 2018.
- > Other Studies
  - Biodiversity planning assessment for the Brigalow Belt;
  - RRC Regional Ecosystem CAR Analysis; and

### 1.1.2 Document Review

#### 1.1.2.1 *Central Queensland Regional Plan*

The Central Queensland Regional Plan (DSDIP, 2013) is limited to providing policy responses to resolve the region's most important issues affecting its economy and the liveability of its towns. The plan specifically provides direction to resolve competing state interests relating to the agricultural and resources sectors, and to enable the growth potential of the region's towns. The plan therefore does not include any specific policy relating to the natural environment. While the plan includes reference to the environmental assets of the region it unambiguously states that achieving this state interest is not reliant on a strategic direction, which can be facilitated through a statutory regional plan.

#### 1.1.2.2 *Rockhampton Environmental Sustainability Strategy 2018-2022*

Rockhampton Regional Council's Environmental Sustainability Strategy 2018-2022 (RRC, 2018a) provides a high-level review of the local context of Council's move towards environmental sustainability and the key drivers and influences.

This document provides an overview of the community, native wildlife, climate and challenges. In relation to the challenges faced by the region, the strategy references the *Central Queensland Sustainability Strategy 2030* including:

- > Population growth, land use intensification and climate change.
- > Impacts to water quality and from vegetation disturbance and soil erosion.
- > Water quantity.
- > Species strongholds, local extinction and remnant vegetation being vulnerable to clearing.
- > Impacts to marine ecosystems including the Great Barrier Reef from climate change, agricultural land use (water run-off) and coastal development.
- > Maintaining the extent and connectivity of natural ecosystem including vegetation corridor and waterway flows.
- > Impacts from climate change to industry and communities that rely on natural assets.

Environmental values of the region highlighted in the document include:

- > 30% of pre-clearing remnant vegetation has been retained which contain 70 Regional Ecosystems and 1,217 plant species;
- > Fauna diversity includes:
  - 111 species of reptiles;
  - 22 species of frogs;
  - 35 species of fish;
  - 359 species of birds; and
  - 93 species of mammal.
- > The Fitzroy River is the largest river system flowing into the Great Barrier Reef and the second largest seaward draining catchment in Australia;
- > Extensive wetland habitat, creeks and river systems cover approximately 6% of the land area.

The strategy identifies four interconnected pathways for a sustainable present and future including:

1. Natural Environment.
2. Empowering community.
3. Industry and infrastructure.
4. Council Operations.

The objective for the Natural Environment pathway is “*Let’s work together to protect, maintain and enhance our natural environment*”. This objective includes key actions that are fundamental to realising the overall vision of the Strategy. The Natural Environment pathway has key targets, strategic actions and key focus areas indicated in **Table A1** below.

Table A1 - Objective, Key Targets, Strategic Actions and Key Focus Areas of the Natural Environment Pathway

Objective: “ <i>Let’s work together to protect, maintain and enhance our natural environment</i> ”		
Key Targets	Strategic Actions	Key Focus Areas
<ul style="list-style-type: none"> <li>▪ Programs in place to maintain and enhance our natural assets, waterways and green corridors.</li> <li>▪ Programs in place to protect remnant vegetation and support local biodiversity in urban areas.</li> <li>▪ Long-term trending improvement in net waterway health.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Take steps to better understand our local natural environment and its inherent biodiversity values in order to inform and prioritise management actions.</li> <li>▪ Foster strong partnerships to protect, maintain and enhance our local natural environment.</li> <li>▪ Implement actions to improve waterway health and better manage the condition of key natural assets, green corridors and urban waterways.</li> <li>▪ Develop tools to better protect our natural environment, local biodiversity and remnant vegetation from development and other pressures.</li> <li>▪ Celebrate our natural assets, and their contribution to the liveability of our region, through a targeted long term communications campaign.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Collaborative arrangements with our local and regional natural resource management groups, community groups and indigenous groups.</li> <li>▪ Ensure continued engagement with the Fitzroy Partnership for River Health and the Reef Guardian Council’s program.</li> <li>▪ Development of a natural environment plan to guide management actions.</li> <li>▪ On-ground environmental management works.</li> <li>▪ Implementation of the Biosecurity Plan including weed and pest management activities.</li> <li>▪ Parks maintenance and improvement activities.</li> <li>▪ Investigate potential opportunities to support biodiversity protection in conjunction with the State Government’s Nature Refuge Program and other local projects.</li> </ul>

### 1.1.2.3 Central Queensland Sustainability Strategy 2030

The Central Queensland Sustainability Strategy 2030 (CQSS:2030) (FBA, 2014) provides a framework for managing and protecting natural assets within Fitzroy Basin Association’s natural resource management (NRM) region. The strategy is divided into three key focus areas, ‘Protect our assets’ is one of the focus areas and the sub-headings most relevant to protecting biodiversity values within the region include:

- > Protect our terrestrial ecosystems;

- > Protect our freshwater rivers and wetlands;
- > Protect our climate and air; and
- > Protect our coastal and marine ecosystems.

While not a statutory document, the strategy includes a number of aspirations and targets relevant to the current study. **Table A2** details some of the key targets for protecting biodiversity values within CQSS:2030.

Table A2 - Catchment health indicators of CQSS:2030

Measure	Standard (target)	Monitoring and reporting
<b>Protect our terrestrial Regional Ecosystems</b>		
Regional Ecosystems (vegetation cover)	Maintain vegetation cover of endangered and of concern Regional Ecosystems	State-wide landcover and trees monitoring and annual report (DSITIA)
Corridors and refugia (vegetation cover)	Improve cover and connectivity in regional wildlife corridors and refugia.	State-wide landcover and trees monitoring (requires analysis and reporting (DSITIA))
<b>Protect our freshwater rivers and wetlands</b>		
Aquatic ecosystems	Maintain the extent and condition of aquatic ecosystems	Not indicated
Riparian ecosystems	Maintain the extent and condition of riparian ecosystems	Not indicated
Wetland ecosystems	Maintain the extent and condition of wetland ecosystems	Not indicated
Flows	Manage flows	Not indicated
Water quality	Manage water quality	Not indicated
<b>Protect our climate and air</b>		
Greenhouse gas emissions	Reduce greenhouse gas emissions	National Greenhouse Accounts (DEH)
Climate	Long-term records of climate variables	Bureau of Meteorology website
Ocean	Long-term variables of climate-affected ocean variables	GBRMPA Outlook Report
<b>Protect our coastal and marine ecosystems</b>		
Marine health	Overall A or B score, coral, seagrass health and water quality measures	AIMS monitoring and GBR/FPRH report card
Fitzroy estuary health	Overall A or B score, water quality and ecological measures	DSITIA & Info Fish monitoring program, FPRH reporting
Coastal wetland extent	Maintain vegetation cover in wetland ecosystems	GBR wetland extent monitoring (DSITIA) and GBR reporting.

It is noted that whilst the Protect our freshwater rivers and wetlands indicates current initiatives including:

- > The Fitzroy Partnership for River;
- > The Reef Water Quality Protection Plan is supported by an extensive monitoring program and reports annually on the uptake of improved agricultural practices, wetland extent, water quality and marine health across Reef catchments;
- > Local water quality guidelines have been developed for the Fitzroy Basin;
- > The Queensland Government has conducted aquatic conservation assessments (ACAs) to determine the conservation values of rivers and wetlands across Great Barrier Reef catchments (including the Fitzroy) using AquaBAMM methods;

- > Water storage and extraction is managed under the region's statutory Water Resource Plan and Resource Operations Plan;
- > An assessment of in-stream barriers to fish passage has been undertaken and priority barriers identified for removal or modification (QDPI);
- > A regional Water Quality Improvement Plan has been developed to guide incentives for the adoption of improved agricultural practices (FBA);
- > Agricultural industry Best Management Practice programs, including Grazing BMP, Grains BMP, Growcom's Farm Management System and BMP Cotton promote the adoption of good land and water management practices;
- > Reef Programme grants to support the adoption of improved agricultural practices with water quality benefits (Australian Government, FBA);
- > Rural Water Use Efficiency Irrigation Futures Program supports improved water management practices in agricultural industries (DNRM); and
- > The DNRM is managing issues of acid mine drainage at the Mount Morgan mine.

### 1.1.3 Other Council Reports

#### 1.1.3.1 RPS Natural Environment Study 2010

RPS prepared the Rockhampton Regional Council Natural Environment Study in 2010 (RPS, 2010). The purpose of the study was to inform the planning scheme review and identify potential constraints and issues with Council's Priority Infrastructure Plan.

The study was undertaken before the 2014 de-amalgamation and therefore included assessment of areas now included in the Shire of Livingstone.

An important component of the study was preparation of mapping that delineated natural areas of importance based on a 'biophysical rating'. This was achieved through the application of indicators specifically designed for the project as summarised in **Table A3** for individual mapped polygons of mapped remnant (Regional Ecosystem version 6) and regrowth vegetation (version 2).

Table A3 - Summary of RPS (2010) biophysical indicators

Indicator	Rating (Score)				
	Very High (5)	High (4)	Moderate (3)	Low (2)	Very Low (1)
Condition	Remnant	Remnant: disturbed	Non-remnant: Regrowth	Non-remnant: Plantation	Non-remnant: Cleared
Connectivity	Habitat Node (Tracts >40,000ha)	Cleared distance to habitat node <50m	Cleared distance to habitat node 50 – 100m	Cleared distance to habitat node 10 – 400m	Cleared distance to habitat node >400m
Tract Size	Tracts >100,000ha	Tracts 50,000 – 100,000ha	Tracts 500 – 50,000ha	Tracts 10 – 500ha	Tracts <10ha
Ecosystem Diversity	Simpsons Index >75%	Simpsons Index 50% - 75%	Simpsons Index 25% - 50%	Simpsons Index <25%	Cleared or non-remnant
Threatened Species Habitat	An area within a remnant unit that has precise records or core habitat for one or more endangered or two or more vulnerable or rare taxa. Consistent with BPA  Criteria "A" Very High	An area within a remnant unit that has records for core habitat for one vulnerable or one rare taxon.  Consistent with BPA Criteria "A" High	A buffer area within a remnant unit that has records for one or more EVR taxa, or an area within a remnant unit that fall outside of a buffer area for EVR taxa, or an area within a remnant unit that represents Essential Habitat.  Consistent with BPA	All other remnant vegetation, consistent with BPA Criteria "A" Low. All other regrowth vegetation	Cleared

Indicator	Rating (Score)				
	Very High (5)	High (4)	Moderate (3)	Low (2)	Very Low (1)
			Criteria "A" Medium		

Each polygon was afforded with an overall biophysical rating of Very High, High, Moderate, Low or Very Low based on cumulative scores of >20, 16-20, 11-15, 6-10 of <6 respectively. The study recommends that this mapping forms the basis of overlay mapping for the planning scheme and that overlays also incorporate wildlife corridors and waterway networks.

Biophysical mapping was further prioritised based on the current level of protection as Low, Medium or High for each mapped polygon. For example, an area with Very High biophysical value is only regarded as having a Medium priority where they occur in a highly protective location such as a National Park, whereas a High biophysical location is regarded as having a High priority where little protection is afforded.

The study provides a brief summary of appropriate corridor widths, but does not provide corridor mapping other than broad 4km wide indicative regional corridors. Appropriate widths identified include:

- > Regional corridors minimum width of 500m.
- > Sub regional corridors minimum width of 300m.
- > Local corridors minimum width of 50m.

Further, the report recommends a nominal buffer width of 50m to waterways,

A 'toolbox' approach to natural area protection and prioritisation is promoted in the study. **Table A4** provides a summary of the how the toolbox was applied to the priority areas along with categorisation of the prescribed protection tools into planning scheme measures and other non-regulatory approaches.

Table A4 - Summary of RPS (2010) management toolbox

Priority	Toolbox	Recommendations (after RPS, 2010)	Protection tool (planning scheme)	Protection tool (Other mechanisms)
High	<b>A</b>	<ul style="list-style-type: none"> <li>&gt; Permanent protection measures should be the first priority for these areas to ensure their long-term protection.</li> <li>&gt; Consider changing zoning to conservation purposes.</li> <li>&gt; Planning scheme maps should be developed to identify these areas conservation areas.</li> <li>&gt; Dedication as public open space should be sought.</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Conservation Zoning</li> <li>&gt; No intensification of current land use</li> <li>&gt; Dedication through the Development Assessment Process</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Land Acquisition</li> <li>&gt; Voluntary Conservation Agreements</li> <li>&gt; Vegetation Protection Order</li> </ul>
Medium	<b>B</b>	<ul style="list-style-type: none"> <li>&gt; Investigate potential for some areas to be rezoned as conservation zones.</li> <li>&gt; Identify opportunities for implementation of Voluntary Conservation Agreements and Land for Wildlife Programs</li> <li>&gt; Planning scheme maps should identify areas that are within regional corridors.</li> <li>&gt; Vegetation Protection Orders should be considered.</li> <li>&gt; For properties subject to development applications, dedication as public open space should be sought.</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Conservation zoning</li> <li>&gt; No intensification of current land use</li> <li>&gt; Identify and target areas within key regional corridors</li> <li>&gt; Dedication through the Development Assessment Process</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Voluntary Conservation Agreements</li> <li>&gt; Identify and target areas within key regional corridors</li> <li>&gt; Vegetation Protection Order</li> <li>&gt; Land for Wildlife</li> </ul>
Low	<b>C</b>	<ul style="list-style-type: none"> <li>&gt; Planning scheme maps should identify areas within regional corridors.</li> <li>&gt; Vegetation Protection Orders should be instated on vegetated areas</li> </ul>	<ul style="list-style-type: none"> <li>&gt; No intensification of current zone within regional corridors</li> <li>&gt; Dedication and rehabilitation of areas within regional corridors</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Target areas within regional corridors for acquisition and rehabilitation</li> <li>&gt; Vegetation Protection Order where intact</li> </ul>

Priority	Toolbox	Recommendations (after RPS, 2010)	Protection tool (planning scheme)	Protection tool (Other mechanisms)
			through the Development Assessment Process	remnant vegetation occurs

#### 1.1.4 Riparian Management Study for Frenchman’s and Thozets Creeks

The Riparian Management Study for Frenchman’s and Thozets Creeks (Alluvium, 2018) study provides a detailed riparian restoration plan and management plan for Frenchman’s and Thozets Creeks. The two catchment have been subject to:

- > Major changes to the primary inputs that can impact on channel morphology;
- > Clearing of catchment vegetation and urbanisation have resulted in increased runoff;
- > Increased runoff has led to increased flows within the channel and increased incidences of water overtopping the banks;
- > Channelisation and removal of vegetation has increased stream power and decreased the strength of waterway boundaries resulting in significant lateral adjustment of the waterway.

The objectives of the study included:

- > Determine existing instream and riparian values within the study area.
- > Establish the level of channel and floodplain stability within the study area.
- > Identify major threats to instream and riparian ecology and channel and floodplain stability.
- > Develop options for management, which improve the ecological value and stability of the study reaches within the constraints of their urban landscape.
- > Provide a set of principles and guidelines to assist in the future management of the study reaches floodplain and riparian zone.

Desktop assessments and field investigations were used to inform the study and develop a series of management options. Management measures identified with the study reaches include:

1. Revegetation.
2. Structural works.
3. Stormwater Treatment.

The study includes a waterway management guideline which was developed to guide:

- > Riparian buffer management.
- > Post-flood management.
- > Culvert maintenance.
- > Options for managing active erosion.

The resultant restoration strategy indicates reaches and management measures.

#### 1.1.5 Basic i-Tree canopy assessment

i-Tree is a freely available online tool that can assist land managers track changes in tree cover over time. A Basic i-Tree canopy assessment was undertaken for the Rockhampton and Gracemere priority development areas (urban footprint) by Council officers to track changes between 2015 and 2018 (RRC, 2018a). The intervening period saw two cyclones affect the area being Marcia and Debbie. While the method is relatively unsophisticated, it nonetheless revealed interesting results reporting a 0.8% change in cover in Rockhampton City and a 0.9% change in Gracemere. While the percentages are similar, it is important to note that Gracemere commenced with only 15.8% cover while Rockhampton City had 27%. The loss of any vegetation in a setting that has a low cover, such as Gracemere, has a notable change on available ecological resources and amenity values.

## 1.2 Other studies

### 1.2.1 Biodiversity planning assessment for the Brigalow Belt documentation

The Biodiversity Planning Assessment for the Brigalow Belt (DES, 2018) is a report, which describes the scientific methodology that supports Biodiversity Planning Assessments (BPA). The Biodiversity Assessment and Mapping Methodology (BAMM) (DES, 2014a) details a consistent approach for assessing terrestrial biodiversity values in Queensland. The BAMM involves two stages:

1. Assessment of existing data to review ecological condition (i.e. species diversity, fragmentation, habitat condition, threats and ecosystem processes) across the bioregion; and
2. Expert opinion to refine the first stage and identify features including ecological corridors and areas of biodiversity values (e.g. centres of endism).

Local governments can utilise information from BPAs and associated GIS platforms to:

- > Identify significant ecological values when assessing tenure dealings;
- > Identify significant ecological values when assessing possible additions to the protected area estate;
- > Identify significant ecological values when assessing development applications;
- > Core species habitat identification as part of the *Vegetation Management Act 1999* Essential Habitat and Essential Regrowth Habitat;
- > Local government planning schemes;
- > Development of regional plans;
- > Development of Natural Resource Management Plans; and
- > Community-based organisations' work to identify and prioritise areas of importance.

BAMM Assessment Criteria are presented in **Table A5**.

Table A5 - BAMM Criteria

Diagnostic Criteria	Expert Panel Criteria
A: Habitat for EVNT taxa	H: Habitat for priority taxa
B: Ecosystem value at two scales: B1: State B2: Regional	I: Special biodiversity values
C: Tract Size	J: Corridors
D: Relative size of regional system	K: Threatening processes
E: Condition	
F: Ecosystem diversity	
G: Context and connection	

The report provides a summary of the BPA for the Brigalow Belt as follows:

- > Approximately 92% of remnant vegetation was as being of state or regional significance as the region is highly fragmented and the remaining vegetation is significant for biodiversity.
- > Ecosystems within the region are recognised for their significance at a nation scale.
- > The results of the BPA can be incorporated into regional planning instruments.

- > The Brigalow Belt bioregion is threatened by clearing and fragmentation of native vegetation (remnant and regrowth habitat) due to clearing for agriculture or as part of resource development associated with coal, gas and water exploitation.
- > Threats to the bioregion may be exacerbated by climate change.
- > Maintaining landscape connectivity through topographic variation will be a priority to mitigate the effects of climate change in the future.

The BPA for the Brigalow Belt Bioregion can be used for the purposes of the management priorities for the development of management actions can be undertaken as part of future regional planning. A key take-away of the Brigalow Belt BPA is in relation to maintaining ecosystem resilience through landscape connectivity across topographic variations in order to mitigate the effects of climate change in the future.

### 1.2.2 RRC Regional Ecosystem CAR Analysis

The Department of Environment and Science's Regional Ecosystem (REs) Comprehensive Adequate and Representative (CAR) analysis provides a system of classification of land parcels within Queensland for their potential to contribute areas towards the protection of REs.

The analysis reviews the representation of REs within the protected area network within the region and assesses the properties against the following thresholds:

- > 30% of large REs (more than 33,000 ha);
- > At least 10,000 ha of medium REs (larger than 10,000 but less than 33,000ha); and
- > All of small REs (under 10,000 ha).

The resultant GIS output is a subset of the cadastre and contains threshold areas of RE on a lot, irreplaceable components of the above and urgency. The fields are then presented in a seven-point scale (one being the highest category and seven being the lowest category).

The analysis of RRC indicates that 48 REs are found in the area and details their assessment threshold and order of priority.

The analysis provides a classification and prioritisation system of land parcels within RRC and the potential to contribute to the protection of REs. The system priorities REs for protection, for example RE 11.1.3 described as, '*Sedgeland on marine clay plains*' is considered the highest potential contribution to the region.

## 1.3 Suitability of reviewed information to inform protection of the natural environment

### 1.3.1 Applicability of reviewed information

**Table A6** provides an assessment of the suitability of the material reviewed to aid in improving the effectiveness of the relevant planning scheme provisions and mapping in protecting and managing the natural environment.

Table A6 - Applicability of available material in informing the planning scheme

Type of Resource	Resource	Relevance to informing planning scheme provisions	Relevance to informing planning scheme mapping
Document	Central Queensland Regional Plan	> Not applicable	> Not applicable
	Environmental Sustainability Strategy 2018-2022	> Supports the implementation of actions to protect and manage waterways, vegetation and corridors by way of strategic actions.	> Not applicable
	RPS Natural Environment Study 2010	> Not applicable	> The methodology provided in the report is adequate for the delineation of areas of Matters of Local Environmental Significance.

Type of Resource	Resource	Relevance to informing planning scheme provisions	Relevance to informing planning scheme mapping
			<ul style="list-style-type: none"> <li>&gt; The mapping is generally adequate, but will require updating to consider changes in regional ecosystem mapping, regrowth mapping, known threatened species locations and minor adjustments to vegetation boundaries as defined by Council in major update edits.</li> <li>&gt; Corridor mapping contained in the report is inadequate for the delineation of local corridors.</li> </ul>
	Riparian Management Study for Frenchman's and Thozets Creeks (Alluvium, 2018)	<ul style="list-style-type: none"> <li>&gt; While not directly applicable, the report adds weight to the need to identify appropriate mechanisms within the planning scheme to prevent intrusions and associated / facilitated environmental impacts.</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Not applicable</li> </ul>
	Basic i-Tree canopy assessment for the Rockhampton and Gracemere priority development areas	<ul style="list-style-type: none"> <li>&gt; While not directly applicable, the report adds weight to the need to identify appropriate mechanisms within the planning scheme to protect trees.</li> <li>&gt; If tree protection cannot be afforded through the planning scheme, Council might consider the establishment of a Local Law that addresses vegetation protection.</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Not applicable</li> </ul>
	Biodiversity planning assessment for the Brigalow Belt	<ul style="list-style-type: none"> <li>&gt; Not applicable</li> </ul>	<ul style="list-style-type: none"> <li>&gt; May be useful in delineating important corridors and areas of biodiversity significance.</li> </ul>
	RRC Regional Ecosystem CAR Analysis	<ul style="list-style-type: none"> <li>&gt; Not applicable</li> </ul>	<ul style="list-style-type: none"> <li>&gt; May be useful for identifying ecosystems that may be poorly conserved locally and therefore require additional protection in the local government area.</li> </ul>
GIS	Various resources	<ul style="list-style-type: none"> <li>&gt; Not applicable</li> </ul>	<ul style="list-style-type: none"> <li>&gt; See 0 and 0</li> </ul>
Database	PMST	<ul style="list-style-type: none"> <li>&gt; Not applicable</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Potential resource for identifying some regional ecosystems to be elevated in significance in mapping outputs</li> </ul>
	ALA	<ul style="list-style-type: none"> <li>&gt; May form the basis for identifying locally important species for inclusion in a planning scheme policy.</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Can aid in identifying areas of significance to protected wildlife.</li> </ul>

**Table A7** provides a summary of MES and the extent they occupy within the LGA based on existing data sources.

Table A7 - Matters of Environmental Significance

Category	Resource	Protected Matter	Identified within the region
Matter of National Environmental Significance	PMST (Also see <b>Appendix C</b> )	National heritage places	The Great Barrier Reef National Heritage Place
		Listed threatened species and ecological communities	65 Threatened Species and six threatened ecological communities.

Category	Resource	Protected Matter	Identified within the region
		Migratory species protected under international agreements	46 migratory species
Matters of State Environmental Significance	Derived from State Government resources (Also see <b>Appendix A</b> ).	Protected areas (estate)	332.01 km <sup>2</sup>
		Protected areas (nature refuge)	22.22 km <sup>2</sup>
		Declared fish habitat area	59.26 km <sup>2</sup>
		Wildlife habitat	144.04 km <sup>2</sup>
		Regulated vegetation (category B)	419.03 km <sup>2</sup>
		Regulated vegetation (category C)	373.8 km <sup>2</sup>
		Regulated vegetation (category R)	161.7 km <sup>2</sup>
		Regulated vegetation (essential habitat)	22.4 km <sup>2</sup>
		Regulated vegetation (wetland)	59.37 km <sup>2</sup>
		Regulated vegetation (intersecting a watercourse)	143.8 km <sup>2</sup>
		High ecological significance wetlands	3,671.35 km <sup>2</sup>
		High ecological value waters (wetland)	373.8 km <sup>2</sup>
		MSES - High ecological value waters (watercourse)	161.7 km <sup>2</sup>
Matters of Local Environmental Significance	Current Rockhampton Regional Council datasets used to inform existing Biodiversity overlay mapping of the Planning Scheme (Also see <b>Appendix A</b> ).	MLES – High	1,123.75 km <sup>2</sup>
		MLES - General	135.47 km <sup>2</sup>
		Biodiversity Corridors	1470.15 km <sup>2</sup>
		MSES Wildlife Habitat	144.04 km <sup>2</sup>
		MSES Waterways	123.97 km <sup>2</sup>
		Waterways	866,9779.48 km
		MSES Wetlands	76.36 km <sup>2</sup>

## 1.4 Council's existing environmental programs

A review of Council's non-statutory measures to protect and maintain the natural environment through non-statutory mechanisms is evident in Council's first Environmental Sustainability Strategy 2018-2022 and existing sustainability programs including:

- > Bringing Nature Back program;
- > Reef Guardian Council; and
- > Sustainable Rockhampton Investment Fund.

A review of Council's existing programs and effectiveness in enhancing the natural environmental values of the region has been details below.

### Bringing Nature Back program

The 'Bringing Nature Back' program is a key target of the *Environmental Sustainability Strategy 2018-2022*, which lists as a key target, "Programs in place to maintain and enhance our natural assets, waterways and green corridors". The 'Bringing Nature Back' programs includes a range of initiatives, events and activities in order to build sustainability awareness and capability within the region. The program includes a free native plant initiative for residents and landholders, where free native plants are available at local events (RRC, 2019). Other component of the program are sustainability workshops and activities and the program also encompasses community projects including:

- > Fraser Park bushland restoration partnerships; and
- > Yeppen Lagoon fish hotels.

#### Reef Guardian Council

The Reef Guardian Program and an initiative of the Great Barrier Reef Marine Park Authority Initiative and is a stewardship program that encourages Councils, industry and school to be actively involved in protecting the Great Barrier Reef. Rockhampton Regional Council is a Reef Guardian Council. Council's Reef Guardian Council Action Plan 2017-2018 (RRC, 2017) details what Councils can do including:

- > Help communities to mitigate and adapt to the impacts of a changing climate;
- > Help to restore catchments;
- > Continuously improve the quality of water entering the reef from wastewater and stormwater sources through urban water cycle initiatives;
- > Minimise waste entering the Reef from land-based sources; and
- > Celebrate community connections to the Reef and encourage stewardship.

Projects relevant to this study are listed in Council's Reef Guardian Action Plan (DoEE, 2018) and detailed in **Table A8**. The action plan is a measurable indicator of Council performance. It is evident that Council has achieved key actions including completion and commencement of the following:

- > *Environmental Sustainability Strategy 2018-2022* (RRC, 2018a);
- > Riparian vegetation study (Alluvium, 2018);
- > Bringing Nature Back (RRC, 2019); and

Other achievements are ongoing key actions including:

- > Management of the Fitzroy River floodplain;
- > Fitzroy Partnership for River Health;
- > Aquatic weed control.

It is further noted that the planning scheme amendment is an key action under the climate change and land management categories and recent conversations with Council indicate that the planning scheme amendment will be implemented as a package and updated on an as need basis.

Table A8 - Relevant natural environment projects listed in Council's Reef Guardian Action Plan

Project name	Description	Financial /resource commitment	Partnerships	Responsible department	Project Status	Reef 2050 action
Planning Scheme amendments	Review state mapping changes to protect and enhance places of value as part of the major amendment to the Planning Scheme.	Council in-kind staff resources	-	Strategic Planning	In progress	EHA28
Biosecurity Plan	Develop a new Biosecurity Plan to manage weeds and pests and reduce pressures on our agricultural land, natural areas and riparian zones.	Council in-kind staff resources	Regional stakeholders	Community Services (Environment and Health)	In progress	EHA28

Project name	Description	Financial /resource commitment	Partnerships	Responsible department	Project Status	Reef 2050 action
Management of the Fitzroy River floodplain	Continuing weed and pest management activities.	Operational budget	-	-	On-going	WQA8
Biodiversity management Plan	Develop and implement a plan for the long-term management of the region's biodiversity including core bushland areas, critical corridors and habitat stepping stones.	Pending scope	-	-	Pending scope (can be informed by the outcomes of this study)	BA16
Riparian vegetation study	Identify critical areas for waterway stability and revegetation works.	Operational budget + Council in-kind staff resources	University	Regional Services (Infrastructure)	Completed in 2018 (Alluvium, 2018)	WQA13
Fitzroy Partnership for River Health	As a founding partner, Fitzroy River Water (on behalf of Council) continues to work towards collaborative initiatives as part of the Fitzroy Partnership for River Health. FRW also provide water quality data for the annual report card.	Fitzroy River Water – Operating budget + Council in-kind staff resources	-	-	Ongoing	WQA8 WQA12 WQA13
Aquatic weed control	Continue to undertake targeted aquatic weed control activities within the Fitzroy River and broader catchment.	Community Services (Health and Environment)	-	-	Ongoing	WQA8
Urban waterways management plan	Develop and implement a plan for the long-term management of the region's urban waterways including pest and weed management, stabilisation and revegetation, erosion and sediment control and protection from contamination.	Pending scope	-	-	Future project wish list	WQA12 WQA13
Environmental Sustainability Strategy	Develop a Strategy which defines Council's guiding principles, key focus areas and priority actions.	Council staff in-kind resources	Internal and external stakeholders	Corporate Services (NRM)	Completed 2018 (RRC, 2018a)	EHA28 CBA11
Bringing Nature Back	Nature-based community engagement program, designed to bring nature back into the community's hearts, minds and everyday lives through a variety of local events and activities.	Council and Program Partners – with combined in-kind support valued at around \$195,000	-	-	Commenced 2018	CBA12 EHA28

# 1 GIS Resource Assessment

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## 1.1 Review of GIS Resources

A review of existing data provided by Council on the 1st March 2019 was completed as part of this desktop assessment including the following GIS layers:

- > Matters of Local Environmental Significance (MLES)
  - MSES
  - MLES General
  - MLES High
  - Biodiversity Corridors
  - MSES Wildlife Habitat
  - MSES Waterways
  - MLES – Waterways
  - Waterways
- > Matters of State Environmental Significance (MSES)
  - MSES – Protected areas
  - MSES – Regulated Vegetation
  - MSES – Regulated Vegetation intersecting a watercourse
  - MSES – Regulated Vegetation (Wetlands)
  - MSES – Regulated Vegetation (essential habitat)
  - MSES – Wildlife Habitat
  - MSES – Fish Habitat Area
  - MSES – Wetlands
- > Matters of National Environmental Significance (MNES)
  - MNES – National heritage places
  - MNES - Listed threatened species

## 2 GIS Resources

### 2.1 State government resources

State government GIS resources, effective dates description and applicability to the Natural Environment Study have been detailed in **Table A9**.

Table A9 - State government GIS resources

Resource	Date	Description	Applicability
Local Government Areas	05/03/2019	Local government areas of Queensland including the extent of the Rockhampton Regional Council area.	The Rockhampton Regional Council area defines the extent of the study area.
Vegetation management regional ecosystem map - version 10.1	30/11/2018	Extent of regulated remnant vegetation across the State  See <b>Figure 1</b> .	Regulated vegetation areas are mapped within Rockhampton Regional Council in accordance with the <i>Vegetation Management Act 1999</i> . This mapping is the state's vegetation management legislation and provides a framework for vegetation protection and clearing requirements.
Regulated vegetation – category C	14/05/2018	This layer shows Regulated Vegetation that are matters of state environmental significance (MSES).	As above.
Regulated vegetation – intersecting a watercourse	30/06/2017	This layer shows Regulated Vegetation (defined watercourse) that are matters of state environmental significance (MSES).	As above.
Regulated vegetation - essential habitat - Queensland	14/05/2018	This layer shows Regulated Vegetation (essential habitat) that are matters of state environmental significance (MSES).	As above.
Regional ecosystem map version 6.0	-	Information incorporated in the RPS 2010 study.	Not applicable insofar as contemporary mapping is concerned.
High value regrowth mapping version 2.0	-	Information incorporated in the RPS 2010 study.	Not applicable insofar as contemporary mapping is concerned.
Brigalow Belt Biodiversity Planning Assessment version 2.1	26/02/2018	The Brigalow Belt Biodiversity Planning Assessment (BPA) identifies terrestrial ecological values in the Brigalow Belt bioregion, according to their biodiversity significance.	May assist in identifying corridors of State Significance in addition to other sites of biodiversity significance.

### 2.2 Rockhampton Regional Council resources

Rockhampton Regional Council GIS resources, effective dates description and applicability to the Natural Environment Study have been detailed in **Table A10**.

Table A10 - Rockhampton Regional Council GIS resources

Resource	Layer Name	Date	Description	Applicability
Major Amendment Biodiversity Overlays	Biodiversity Areas Overlay MLES General	Nov 2018	Biodiversity Areas Overlays includes land mapped as MLES (General and High) within the region. Biodiversity Areas Overlay derived from the findings of the RRC Natural Environment Study (2010) and therefore are not current.	Identifies MLES and MSES areas capturing areas that have been cleared since the previous iteration of the mapping. Some minor areas have also been added to the mapping.
	Biodiversity Areas Overlay MLES High	Nov 2018		

Resource	Layer Name	Date	Description	Applicability
	Biodiversity MSES	Nov 2018	Includes Regulated Vegetation that are MSES.	
	Biodiversity MSES Wetland Buffer	June 2017	Includes high ecological value waters – wetlands (50 m) buffer that are MSES.	
	Wildlife habitat MSES	June 2017	Wildlife habitat threatened and special least concern animals that are MSES.	
	RRPS Biodiversity Corridors	Nov 2017	Statewide corridors version 1.4 identified in the Rockhampton Regional planning scheme.	
MSES Layers	Regulated vegetation – category B Endangered or Of Concern	14/5/2018	This layer shows Regulated Vegetation (endangered or of concern in RVM Category B) that are MSES.	Identifies State Government interests.
	Regulated vegetation – category C Endangered or Of Concern	14/05/2018	This layer shows Regulated Vegetation (endangered or of concern in RVM Category C) that are MSES.	
	Regulated vegetation – category R GBR riverine	May 2018	This layer shows Regulated Vegetation (RVM category R GBR riverine) that are MSES.	
	Regulated vegetation – intersecting a watercourse	July 2017	This layer shows Regulated Vegetation (intersecting a watercourse) that are MSES.	
	Regulated vegetation – essential habitat	14/05/2017	This layer shows Regulated Vegetation (endangered or of concern in RVM Category B) that are MSES.	
	Regulated vegetation – 100 m from a wetland area	May 2018	This layer shows Regulated Vegetation (Category A, B, C, R) areas that are located within 100 meters from the defining bank of a wetland identified on the vegetation management wetlands map, that are MSES.	
	Fish habitat area (A and B)	28/6/2017	This layer shows Fish Habitat Areas (A and B areas) that are MSES.	
	Protected area estate	28/08/2017	This layer shows Protected Area (estates) that are MSES.	
	Protected area nature refuges	28/08/2017	This layer shows Protected Area (nature refuges) that are MSES.	
HEV Layers	High ecological values wetland	30/06/2017	This layer contains wetland areas (polygon features) that intersect with selected areas scheduled under the Environmental Protection Policy for Water (EPP Water) as High Environmental Value (HEV).	

Resource	Layer Name	Date	Description	Applicability
	High ecological value waters	30/06/2017	This layer contains waterway areas (polygon features) that intersect with selected areas scheduled under the Environmental Protection Policy for Water (EPP Water) as High Environmental Value (HEV).	
2015 planning scheme Biodiversity Overlays	Overlay Layers Biodiversity Corridors	RRC Natural Environment Study 2010	This Overlay includes land mapped as contain biodiversity corridors within the region. Biodiversity Corridors have been mapped based on a minimum width of 500 m.	In combination with 'Major Amendment Biodiversity Overlays' forms the basis of any revised mapping layers for the planning scheme.
	Overlay Layers Matters of State Environmental Significance	2015	This Overlay includes land mapped as containing matters of state environmental significance. Matters of National Environmental Significance (MNES) are also included in this Overlay.	
	Overlay layers MSES Wildlife habitat	2015	This Overlay includes land mapped as wildlife habitat that is a matter of state environmental significance. MNES are also included in this overlay.	
	Overlay Layers MSES Wetlands Merged Buffered Dissolved	2015	This Overlay includes land mapped as containing wetlands that are matters of state environmental significance. MNES are also included in this Overlay.	
	Overlay Layers SDE planning SDEGIS RRC MLES General_Strategic_Env_2014	2014	Matters of Local Environmental Significance (General) within the RRC.	
	Overlay Layers SDE planning SDEGIS RRC MLES High Strategic Env 2014	2014	Matters of Local Environmental Significance (High) within the RRC.	
	RRC MSES HEV Waters Buffered Dec 2014	Dec 2014	High ecological value waters (wetlands) that are MSES.	
Regional Ecosystems	Pre-clear regional ecosystem 2015 v11 RRC	14/12/2018	Biodiversity status of pre-clearing regional ecosystems (Version 11) for the RRC.	Can inform any revised mapping layers for the planning scheme.
	Pre-clear regional ecosystems 2015 v11 qld	14/12/2018	Biodiversity status of pre-clearing regional ecosystems (Version 11) for Queensland.	
	Remnant regional ecosystems 2015 v10p1 qld	01/03/2018	Biodiversity status of remnant regional ecosystems (Version 11) for Queensland.	
	Remnant regional ecosystems 2015 v10p1 RRC clip	01/03/2018	Biodiversity status of remnant regional ecosystems (Version 11) for the RRC.	

Resource	Layer Name	Date	Description	Applicability
RRC Regional Ecosystem CAR Assessment	RRC preclear regional ecosystem 2015 v10	10/12/2016	Biodiversity status of pre-clearing regional ecosystems (Version 11).	Can potentially inform any revised mapping layers for the planning scheme.
	RRC Property Lyr regional ecosystem assessment	Mar 2019	Property boundaries within the RRC that intersect with areas identified in the Department of Environment and Science (DES) comprehensive adequate representation (CAR) assessment.	
	RRC Regional Ecosystem 2015 v10	10/12/2016	Biodiversity status of remnant regional ecosystems for the RRC.	
Statewide Corridors QLD	Statewide corridor buffers v1.4	13/03/2018	Queensland corridors derived predominately from Biodiversity Planning Assessment of QLD and statewide conservation riparian and terrestrial corridors.  The mapping shows the 10km corridor buffer prescribed in the BPA.	Can potentially inform any revised mapping layers for the planning scheme.
	Statewide corridor riparian centerlines v1.4			
	Statewide corridor terrestrial centerlines v1.4			

## 2.3 Applicability of GIS resources to planning scheme mapping

**Table A11** provides an assessment of the suitability of the material reviewed to aid in improving the effectiveness of the relevant planning scheme provisions and mapping in protecting and managing the natural environment.

Table A11 - Applicability of available material in informing the planning scheme mapping

Type of Resource	Resource	Relevance to informing planning scheme provisions	Relevance to informing planning scheme mapping
Document	Central Queensland Regional Plan	> Not applicable	> Not applicable
	Environmental Sustainability Strategy 2018-2022	> Supports the implementation of actions to protect and manage waterways, vegetation and corridors by way of strategic actions.	> Not applicable
	RPS Natural Environment Study 2010	> Not applicable	<ul style="list-style-type: none"> <li>&gt; The methodology provided in the report is generally adequate for the delineation of areas of Matters of Local Environmental Significance.</li> <li>&gt; The mapping is generally adequate, but will require updating to consider changes in regional ecosystem mapping, regrowth mapping, known threatened species locations and minor adjustments to vegetation boundaries as defined by Council in major update edits. (See <b>Appendix E</b>).</li> <li>&gt; Corridor mapping contained in the report is inadequate for the delineation of local corridors.</li> </ul>
	Riparian Management Study for Frenchman's and Thozets Creeks (Alluvium, 2018)	> While not directly applicable, the report adds weight to the need to identify appropriate mechanisms within the planning scheme to	> Not applicable

Type of Resource	Resource	Relevance to informing planning scheme provisions	Relevance to informing planning scheme mapping
		prevent intrusions and associated / facilitated environmental impacts.	
	Basic i-Tree canopy assessment for the Rockhampton and Gracemere priority development areas	<ul style="list-style-type: none"> <li>&gt; While not directly applicable, the report adds weight to the need to identify appropriate mechanisms within the planning scheme to protect trees.</li> <li>&gt; If tree protection cannot be afforded through the planning scheme, Council might consider the establishment of a Local Law that addresses vegetation protection.</li> </ul>	> Not applicable
	Biodiversity planning assessment for the Brigalow Belt	> Not applicable	> May be useful in delineating important corridors and areas of biodiversity significance.
	RRC Regional Ecosystem CAR Analysis	> Not applicable	> May be useful for identifying ecosystems that may be poorly conserved locally and therefore require additional protection in the local government area.
GIS	Various resources	> Not applicable	> See 0 and 0
Database	PMST	> Not applicable	> Potential resource for identifying some regional ecosystems to be elevated in significance in mapping outputs
	ALA	> May form the basis for identifying locally important species for inclusion in a planning scheme policy.	> Can aid in identifying areas of significance to protected wildlife.

APPENDIX

# B

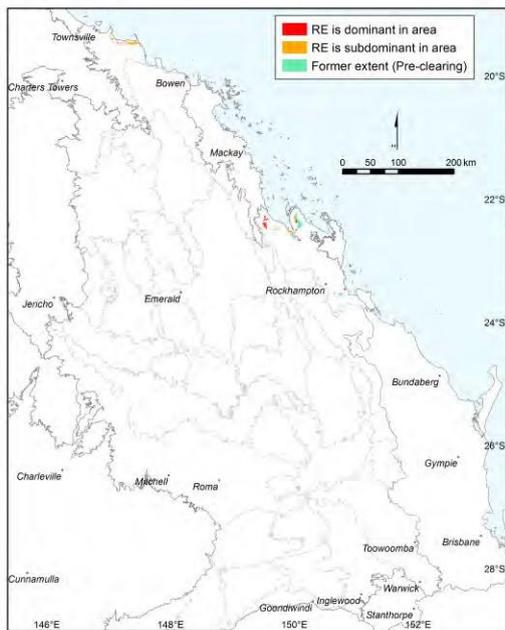
REGIONAL ECOSYSTEM PROFILES

The following regional ecosystem profiles have been taken from the Regional Ecosystem Technical Descriptions for the Brigalow Belt (available from <https://publications.qld.gov.au/dataset/re-technical-descriptions>) DES (2018f).

All regional ecosystems for the region have had technical descriptions with the exception of 11.1.3, 11.1.4, 11.10.4b, 11.11.3c, 11.2.3, 11.3.11, 11.3.25f, 11.3.25g, 11.3.27x1b and 11.4.1.

Further information regarding the region's regional ecosystems can be found within the regional ecosystem biocondition benchmarks (<https://www.qld.gov.au/environment/plants-animals/biodiversity/benchmarks>) or the Regional Ecosystem Description Database (<https://apps.des.qld.gov.au/regional-ecosystems/>).

**Sporobolus virginicus grassland on marine clay plains**



David Halford

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 35,003 17,575 50%

Species\_recorded: Total: 60; woody: 6; ground: 54; Avg. spp./site: 13.0; std dev.: 3.7, 6 site(s)

Basal area: 0

Structural formation: Open-tussock grassland: 50%; closed-tussock grassland: 33%; tussock grassland: 17%, 6 site(s)

Representative\_sites 17581, 19066, 26405, 36845, 40713, 53134.

**Stratum: Shrub 1**

Height avg. = 1.7m, range 1-2.5m, 3 sites

Crown cover avg. = 3.7%, range 2.0-5.0%, 3 sites

Frequent species (cover, frequency): *Aegiceras corniculatum* (1, 17%), *Avicennia marina* (4, 17%), *Ceriops australis* (1, 17%), *Lumnitzera racemosa* (17%), *Myoporum acuminatum* (1, 17%), *Neptunia major* (4, 17%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Technical Description****Regional ecosystem: 11.1.1****Ground  
Stratum:****Height avg. = 0.3m, range 0.1-0.7m, 6 sites****PFC avg. = 61.0%, range 33-99%, 6 sites**

*Dominant species (relative cover, frequency): Sporobolus virginicus (65, 83%), Cyperus scariosus (21, 33%), Cynodon dactylon\* (13, 33%), Tecticornia indica (12, 50%), Fimbristylis polytrichoides (11, 50%)*

*Frequent species (cover, frequency): GRAMINOIDS: Sporobolus virginicus (38, 83%), Fimbristylis polytrichoides (5, 50%), Chloris inflata\* (1, 33%), Cynodon dactylon\* (8, 33%), Cyperus scariosus (21, 33%), Eriochloa crebra (33%), Chrysopogon fallax (1, 17%), Cyperus polystachyos (17%), Cyperus subulatus (17%), Cyperus victoriensis (17%), Dichanthium fecundum (5, 17%), Digitaria brownii (17%), Digitaria indet. (10, 17%), Diplachne fusca\* (17%), Diplachne fusca var. fusca (17%), Echinochloa colona\* (17%), Eriochloa pseudoacrotricha (25, 17%), Eulalia aurea (5, 17%), Fimbristylis ferruginea (17%), Panicum decompositum var. tenuius (17%), Poaceae indet. (17%), Urochloa pubigera (17%)*

*FORBS: Sphaeromorphaea indet. (50%), Suaeda australis (2, 50%), Tecticornia indica (7, 50%), Eclipta prostrata\* (1, 33%), Limonium solanderi (1, 33%), Aeschynomene indica (17%), Alternanthera denticulata (17%), Alternanthera denticulata var. micrantha (17%), Amaranthus interruptus (2, 17%), Camptacra barbata (17%), Cyanthillium cinereum (17%), Emilia sonchifolia\* (17%), Enchylaena tomentosa (17%), Euphorbia indet. (1, 17%), Gomphrena celosioides\* (17%), Macroptilium lathyroides\* (17%), Maireana microphylla (17%), Neptunia gracilis (17%), Opuntia stricta\* (1, 17%), Portulaca bicolor (17%), Portulaca filifolia (17%), Portulaca indet. (2, 17%), Pterocaulon redolens (17%), Sarcocornia quinqueflora subsp. quinqueflora (8, 17%), Sclerolaena muricata (1, 17%), Sesbania cannabina (17%), Sesbania cannabina var. cannabina (17%), Sesuvium portulacastrum (1, 17%), Sida indet. (17%), Sida rhombifolia\* (1, 17%), Stachytarpheta jamaicensis\* (17%), Zornia indet. (17%)*

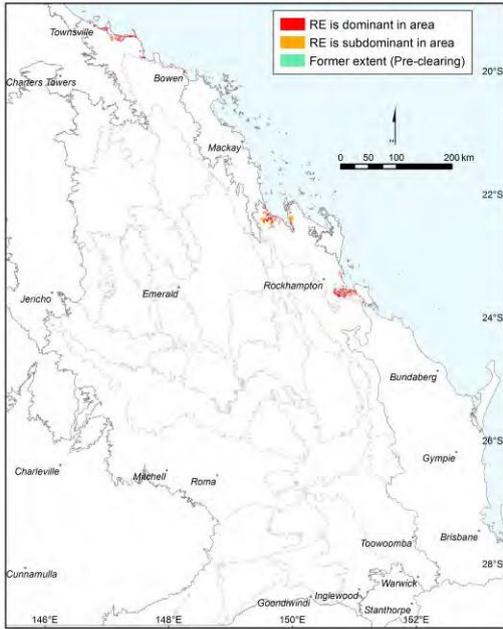
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**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Bare mud flats on marine clayplains



Annie Kelly

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 81,063 76,158 94%

Species\_recorded: Total: 5; woody: 0; ground: 5; Avg. spp./site: 3.0; std dev.: 0.0, 1 site(s)

Basal area: 0

Structural formation: Open succulent shrubland: 100%, 2 site(s)

Representative\_sites 44882, 58374.

Stratum: Ground

Height avg. = 0.1m, 1 site

PFC avg. = 4.0%, 1 site

Dominant species (relative cover, frequency): *Tecticornia indica* (96, 100%), *Sesuvium portulacastrum* (2, 100%), *Limonium solanderi* (2, 100%)

Frequent species (cover, frequency): GRAMINOIDS:

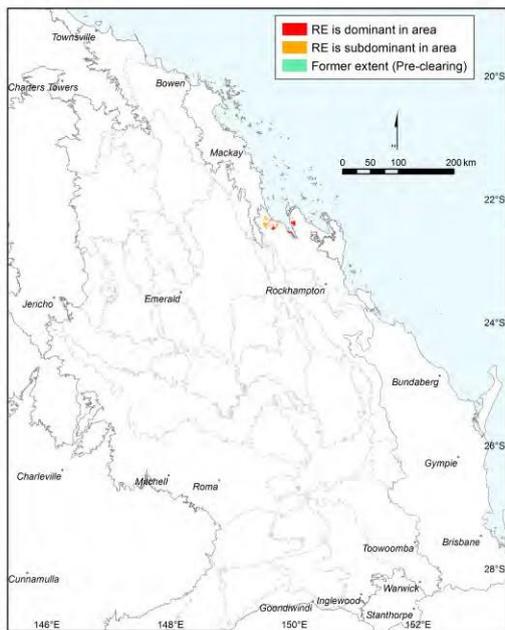
FORBS: *Limonium solanderi* (100%), *Sesuvium portulacastrum* (100%), *Tecticornia indica* (5, 100%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Samphire forbland on marine clay plains



Andrew Franks

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 18,906 15,768 83%

Species\_recorded: Total: 25; woody: 4; ground: 21; Avg. spp./site: 7.3; std dev.: 3.9, 6 site(s)

Basal area: 0

Structural formation: Succulent shrubland: 67%; open succulent shrubland: 33%, 6 site(s)

Representative\_sites 14827, 17591, 26404, 36844, 40750, 52294.

Stratum: Tree 1

Height avg. = 5.0m, 1 site

Crown cover avg. = 2.0%, 1 site

Frequent species (cover, frequency): *Avicennia marina subsp. australasica* (17%), *Melaleuca viridiflora* (2, 17%)

Stratum: Shrub 1

Height avg. = 1.5m, 1 site

Crown cover avg. = 0.0%, range 0.0-0.0%, 2 sites

Frequent species (cover, frequency): *Avicennia marina subsp. australasica* (17%), *Lumnitzera racemosa* (17%), *Melaleuca viridiflora* (17%), *Thespesia populnea* (17%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Ground  
Stratum:

Height avg. = 0.2m, range 0.05-0.3m, 5 sites

PFC avg. = 39.8%, range 9-80%, 6 sites

Dominant species (relative cover, frequency): *Tecticornia pergranulata* subsp. *queenslandica* (50, 83%), *Tecticornia indica* (23, 83%), *Sporobolus virginicus* (16, 50%), *Fimbristylis polytrichoides* (13, 67%), *Suaeda australis* (4, 83%)

Frequent species (cover, frequency): GRAMINOIDS: *Fimbristylis polytrichoides* (5, 67%), *Sporobolus virginicus* (8, 50%), *Chloris divaricata* (17%), *Cyperus indet.* (17%), *Eriochloa procera* (17%), *Fimbristylis ferruginea* (17%), *Sporobolus australasicus* (17%)

FORBS: *Suaeda australis* (3, 83%), *Tecticornia indica* (7, 83%), *Tecticornia pergranulata* subsp. *queenslandica* (12, 83%), *Limonium solanderi* (1, 33%), *Aeschynomene indica* (17%), *Atriplex muelleri* (5, 17%), *Eclipta prostrata*\* (17%), *Enchylaena tomentosa* (17%), *Macroptilium atropurpureum*\* (17%), *Sesbania cannabina* (1, 17%), *Sesuvium portulacastrum* (5, 17%), *Tecticornia halocnemoides* (51, 17%), *Tecticornia indica* subsp. *julacea* (15, 17%), *Tecticornia indica* subsp. *leiostachya* (17%)

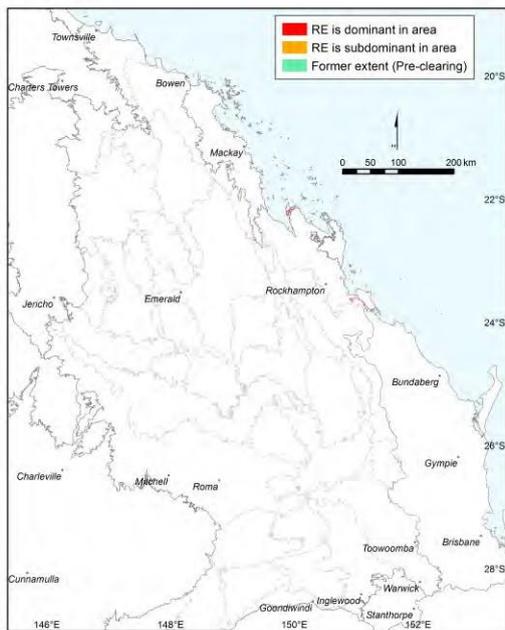
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Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Rhizophora spp. open forest on marine clay plains



Rhonda Meizer

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 12,140 12,101 100%

Species\_recorded: Total: 4; woody: 3; ground: 2; Avg. spp./site: 4.0; std dev.: 0.0, 1 site(s)

Basal area: Avg./site: 4.0 m<sup>2</sup>/ha, range: 2.0 - 6 m<sup>2</sup>/ha, std. deviation: 2 m<sup>2</sup>/ha, 2 site(s)

Structural formation: Low woodland: 50%; low closed-forest: 50%, 2 site(s)

Representative\_sites 17580, 37166.

**Stratum: Tree 1**

Height avg. = 7.5m, range 6-9m, 2 sites

Crown cover avg. = 50.0%, range 10.0-90.0%, 2 sites

Dominant species (relative cover, frequency): *Rhizophora stylosa* (100, 50%), *Avicennia marina subsp. australasica* (100, 50%)

Frequent species (cover, frequency): *Avicennia marina subsp. australasica* (10, 50%), *Rhizophora stylosa* (90, 50%)

**Stratum: Tree 2**

Height avg. = 5.0m, 1 site

Crown cover avg. = 15.0%, 1 site

Dominant species (relative cover, frequency): *Rhizophora stylosa* (100, 50%)

Frequent species (cover, frequency): *Rhizophora stylosa* (15, 50%)

**Stratum: Shrub 1**

Height avg. = 1.2m, range 0.7-1.6m, 2 sites

Crown cover avg. = 27.5%, range 5.0-50.0%, 2 sites

Dominant species (relative cover, frequency): *Aegiceras corniculatum* (90, 50%), *Rhizophora stylosa* (53, 100%), *Avicennia marina subsp. australasica* (4, 50%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.1.4a

*Frequent species (cover, frequency): Rhizophora stylosa (4, 100%), Aegiceras corniculatum (45, 50%), Avicennia marina subsp. australasica (2, 50%)*

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Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

1/03/2018

## Technical Description

Regional ecosystem: 11.1.4a

Stratum: Ground

Height avg. = 0.1m, 1 site

PFC avg. = 30.0%, 1 site

Dominant species (relative cover, frequency): *Suaeda australis* (83, 100%), *Rhizophora stylosa* (17, 100%)

Frequent species (cover, frequency): GRAMINOIDS:

FORBS: *Rhizophora stylosa* (5, 100%), *Suaeda australis* (25, 100%)

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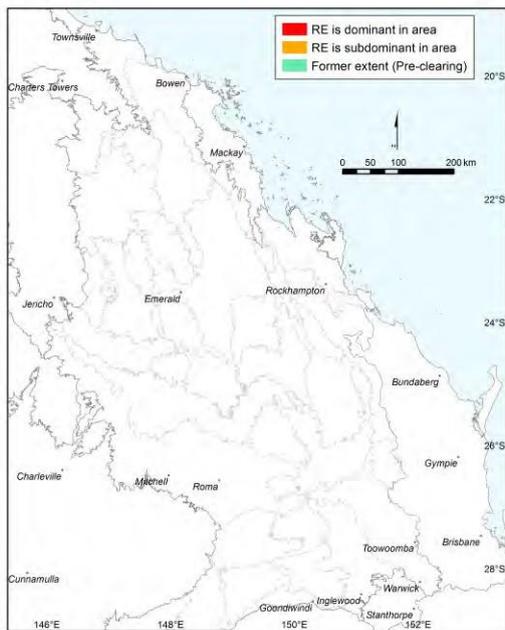
Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

1/03/2018

Avicennia marina low open shrubland to closed forest on marine clay plains



Rhonda Meizer

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 8,023 7,664 96%

Species\_recorded: Total: 16; woody: 10; ground: 6; Avg. spp./site: 10.0; std dev.: 0.0, 1 site(s)

Basal area: Avg./site: 1.7 m<sup>2</sup>/ha, range: 1.0 - 2 m<sup>2</sup>/ha, std. deviation: 0 m<sup>2</sup>/ha, 3 site(s)

Structural formation: Tall shrubland: 25%; shrubland: 25%; low open-woodland: 25%; low open-forest: 25%, 4 site(s)

Representative\_sites 17086, 17510, 17529, 26565.

Stratum: Tree 1

Height avg. = 5.8m, range 4-8m, 4 sites

Crown cover avg. = 8.8%, range 5.0-15.0%, 4 sites

Dominant species (relative cover, frequency): *Avicennia marina* (93, 100%), *Excoecaria agallocha* (29, 25%)

Frequent species (cover, frequency): *Avicennia marina* (9, 100%), *Excoecaria agallocha* (2, 25%)

Stratum: Tree 2

Height avg. = 2.0m, range 2-2m, 2 sites

Crown cover avg. = 33.0%, range 6.0-60.0%, 2 sites

Dominant species (relative cover, frequency): *Lumnitzera littorea* (33, 25%), *Bruguiera gymnorhiza* (33, 25%), *Rhizophora stylosa* (33, 50%), *Avicennia marina* (33, 25%), *Osbornia octodonta* (17, 25%)

Frequent species (cover, frequency): *Rhizophora stylosa* (11, 50%), *Aegiceras corniculatum* (10, 25%), *Amyema mackayensis* (25%), *Avicennia marina* (20, 25%), *Bruguiera gymnorhiza* (2, 25%), *Lumnitzera littorea* (2, 25%), *Osbornia octodonta* (10, 25%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.1.4b

### Stratum: Shrub 1

Height avg. = 1.8m, range 0.5-4m, 4 sites

Crown cover avg. = 15.0%, range 2.0-35.0%, 4 sites

Dominant species (relative cover, frequency): *Clerodendrum inerme* (100, 25%), *Rhizophora stylosa* (75, 25%), *Avicennia marina* (64, 75%), *Ceriops tagal* (33, 25%)

Frequent species (cover, frequency): *Avicennia marina* (16, 75%), *Ceriops tagal* (5, 25%), *Clerodendrum inerme* (2, 25%), *Rhizophora stylosa* (6, 25%)

### Stratum: Shrub 2

Height avg. = 0.6m, 1 site

Crown cover avg. = 7.0%, 1 site

Dominant species (relative cover, frequency): *Rhizophora stylosa* (71, 25%), *Avicennia marina* (14, 25%), *Aegiceras corniculatum* (14, 25%)

Frequent species (cover, frequency): *Aegiceras corniculatum* (1, 25%), *Avicennia marina* (1, 25%), *Rhizophora stylosa* (5, 25%)

### Stratum: Ground

Height avg. = 0.3m, 1 site

PFC avg. = 14.0%, 1 site

Dominant species (relative cover, frequency): *Tecticornia pergranulata* subsp. *queenslandica* (36, 100%), *Sporobolus virginicus* (36, 100%), *Tecticornia indica* (14, 100%), *Suaeda australis* (14, 100%)

Frequent species (cover, frequency): GRAMINOIDS: *Sporobolus virginicus* (5, 100%)

FORBS: *Suaeda australis* (2, 100%), *Tecticornia indica* (2, 100%), *Tecticornia pergranulata* subsp. *queenslandica* (5, 100%)

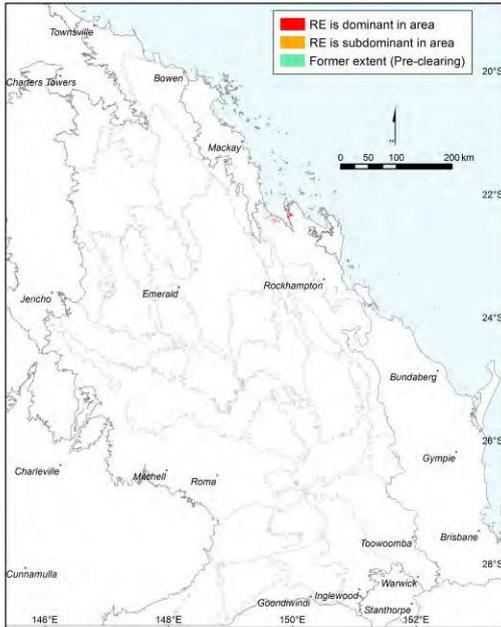
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Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Ceriops australis, +/- Avicennia marina open forest on marine clay plains**



Pre-clearing area (ha), remnant area (ha) and per cent remaining: 15,487 15,466 100%

Species\_recorded: Total: 9; woody: 8; ground: 3; Avg. spp./site: 9.0; std dev.: 0.0, 1 site(s)

Basal area: Avg./site: 13.0 m<sup>2</sup>/ha, range: 13.0 - 13 m<sup>2</sup>/ha, std. deviation: 0 m<sup>2</sup>/ha, 1 site(s)

Structural formation: Low closed-forest: 100%, 1 site(s)

Representative\_sites 26410.

**Stratum: Tree 1**

Height avg. = 7.0m, 1 site

Crown cover avg. = 90.0%, 1 site

Dominant species (relative cover, frequency): *Ceriops tagal* (89, 100%), *Lumnitzera racemosa* (6, 100%), *Bruguiera exaristata* (4, 100%), *Avicennia marina* (1, 100%)

Frequent species (cover, frequency): *Avicennia marina* (1, 100%), *Bruguiera exaristata* (4, 100%), *Ceriops tagal* (80, 100%), *Clerodendrum inerme* (100%), *Excoecaria agallocha* (100%), *Lumnitzera racemosa* (5, 100%), *Rhizophora stylosa* (100%)

**Stratum: Shrub 1**

Height avg. = 3.0m, 1 site

Crown cover avg. = 4.0%, 1 site

Dominant species (relative cover, frequency): *Aegialitis annulata* (100, 100%)

Frequent species (cover, frequency): *Aegialitis annulata* (4, 100%)

**Stratum: Ground**

Height avg. = 0.3m, 1 site

PFC avg. = 1.0%, 1 site

Dominant species (relative cover, frequency): *Avicennia marina* (77, 100%), *Ceriops tagal* (15, 100%), *Xylocarpus moluccensis* (8, 100%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.1.4c

*Frequent species (cover, frequency): GRAMINOIDS:*

*FORBS: Avicennia marina (1, 100%), Ceriops tagal (100%), Xylocarpus moluccensis (100%)*

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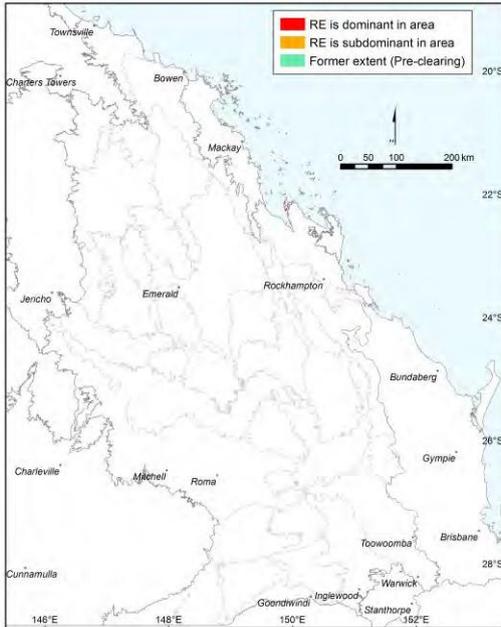
Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

1/03/2018

Mixed (mangrove) species low closed forest on marine clay plains



Pre-clearing area (ha), remnant area (ha) and per cent remaining: 8,264 8,239 100%

Species\_recorded: Total: 7; woody: 5; ground: 3; Avg. spp./site: 5.0; std dev.: 1.0, 2 site(s)

Basal area: Avg./site: 3.0 m<sup>2</sup>/ha, range: 3.0 - 3 m<sup>2</sup>/ha, std. deviation: 0 m<sup>2</sup>/ha, 1 site(s)

Structural formation: Shrubland: 100%, 2 site(s)

Representative\_sites 17582, 17590.

**Stratum: Shrub 1**

Height avg. = 2.3m, range 1.5-3m, 2 sites

Crown cover avg. = 17.5%, range 10.0-25.0%, 2 sites

Dominant species (relative cover, frequency): *Aegiceras corniculatum* (80, 50%), *Rhizophora stylosa* (40, 50%), *Avicennia marina subsp. australasica* (40, 100%)

Frequent species (cover, frequency): *Avicennia marina subsp. australasica* (6, 100%), *Aegiceras corniculatum* (20, 50%), *Rhizophora stylosa* (4, 50%)

**Stratum: Shrub 2**

Height avg. = 1.1m, range 0.7-1.5m, 2 sites

Crown cover avg. = 47.5%, range 15.0-80.0%, 2 sites

Dominant species (relative cover, frequency): *Ceriops australis* (63, 50%), *Aegiceras corniculatum* (53, 100%), *Avicennia marina subsp. australasica* (19, 50%), *Osbornia octodonta* (13, 50%)

Frequent species (cover, frequency): *Aegiceras corniculatum* (10, 100%), *Avicennia marina subsp. australasica* (15, 50%), *Ceriops australis* (50, 50%), *Osbornia octodonta* (10, 50%)

**Stratum: Ground**

Height avg. = 0.2m, range 0.1-0.3m, 2 sites

PFC avg. = 3.0%, range 2-4%, 2 sites

Dominant species (relative cover, frequency): *Aegiceras corniculatum* (75, 50%), *Suaeda australis* (60, 100%), *Sporobolus virginicus* (5, 50%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.1.4d

*Frequent species (cover, frequency): GRAMINOIDS: Sporobolus virginicus (50%)  
FORBS: Suaeda australis (2, 100%), Aegiceras corniculatum (3, 50%)*

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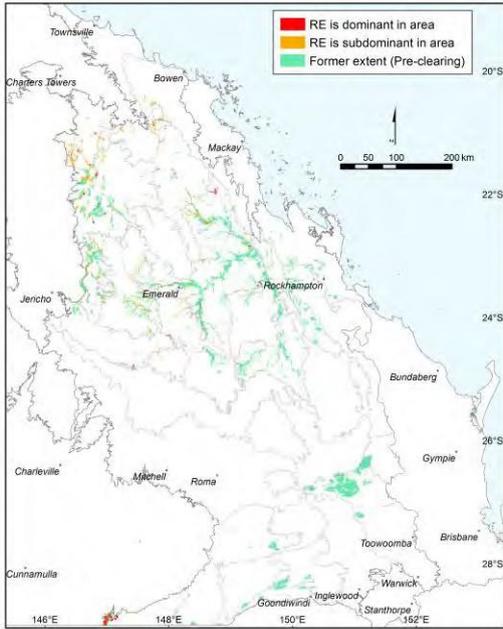
Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

1/03/2018

Acacia harpophylla and/or Casuarina cristata open forest on alluvial plains



Don Butler

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 778,179 79,646 10%

Species\_recorded: Total: 139; woody: 41; ground: 109; Avg. spp./site: 21.6; std dev.: 5.2, 7 site(s)

Basal area: Avg./site: 13.3 m<sup>2</sup>/ha, range: 8.0 - 22 m<sup>2</sup>/ha, std. deviation: 4 m<sup>2</sup>/ha, 13 site(s)

Structural formation: Open-forest: 46%; woodland: 31%; open-woodland: 23%, 13 site(s)

Representative\_sites 16837, 16912, 17083, 17181, 17227, 17235, 17244, 17304, 17593, 19242, 19245, 19252, 58114.

Stratum: Emergent

Height avg. = 15.0m, 1 site

Crown cover avg. = 10.0%, 1 site

Frequent species (cover, frequency): *Eucalyptus coolabah* (10, 8%)

Stratum: Tree 1

Height avg. = 15.1m, range 10-22m, 13 sites

Crown cover avg. = 32.7%, range 7.0-65.0%, 13 sites

Dominant species (relative cover, frequency): *Acacia harpophylla* (75, 85%), *Eucalyptus coolabah* (37, 23%), *Casuarina cristata* (30, 38%), *Terminalia oblongata subsp. oblongata* (18, 23%)

Frequent species (cover, frequency): *Acacia harpophylla* (26, 85%), *Casuarina cristata* (11, 38%), *Eucalyptus coolabah* (10, 23%), *Terminalia oblongata subsp. oblongata* (2, 23%), *Eucalyptus cambageana* (20, 15%), *Brachychiton rupestris* (1, 8%), *Eucalyptus populnea* (8%), *Lysiphyllum carronii* (5, 8%), *Lysiphyllum hookeri* (8%), *Melaleuca bracteata* (2, 8%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.3.1

### Stratum: Tree 2

Height avg. = 7.8m, range 4-12m, 8 sites

Crown cover avg. = 18.3%, range 5.0-30.0%, 8 sites

Dominant species (relative cover, frequency): *Acacia harpophylla* (80, 23%), *Lysiphyllum carronii* (48, 23%)

Frequent species (cover, frequency): *Acacia harpophylla* (14, 23%), *Lysiphyllum carronii* (4, 23%), *Casuarina cristata* (3, 15%), *Geijera parviflora* (13, 15%), *Lysiphyllum hookeri* (6, 15%), *Acacia salicina* (5, 8%), *Alectryon diversifolius* (1, 8%), *Alectryon oleifolius* subsp. *elongatus* (8%), *Brachychiton rupestris* (1, 8%), *Bridelia leichhardtii* (1, 8%), *Capparis lasiantha* (1, 8%), *Denhamia oleaster* (8%), *Diospyros humilis* (8%), *Elattostachys xylocarpa* (1, 8%), *Eremophila mitchellii* (5, 8%), *Melaleuca bracteata* (5, 8%), *Notelaea microcarpa* (5, 8%), *Opuntia tomentosa*\* (8%), *Planchonella cotinifolia* var. *pubescens* (1, 8%), *Psyrax odorata* (8%), *Psyrax odorata* forma *buxifolia* (8%), *Santalum lanceolatum* (8%), *Terminalia oblongata* subsp. *oblongata* (10, 8%)

### Stratum: Tree 3

Height avg. = 4.0m, range 3-5m, 2 sites

Crown cover avg. = 6.5%, range 1.0-12.0%, 2 sites

Frequent species (cover, frequency): *Acacia harpophylla* (3, 8%), *Alectryon diversifolius* (2, 8%), *Capparis lasiantha* (8%), *Diospyros humilis* (2, 8%), *Elattostachys xylocarpa* (8%), *Eremophila mitchellii* (21, 8%), *Exocarpos latifolius* (1, 8%), *Pittosporum spinescens* (3, 8%)

### Stratum: Shrub 1

Height avg. = 1.9m, range 1-6m, 11 sites

Crown cover avg. = 13.3%, range 1.0-40.0%, 12 sites

Dominant species (relative cover, frequency): *Geijera parviflora* (67, 23%), *Acacia harpophylla* (31, 46%), *Carissa ovata* (28, 46%), *Alectryon diversifolius* (22, 62%), *Lysiphyllum hookeri* (18, 23%)

Frequent species (cover, frequency): *Alectryon diversifolius* (2, 62%), *Acacia harpophylla* (2, 46%), *Carissa ovata* (8, 46%), *Terminalia oblongata* subsp. *oblongata* (1, 31%), *Geijera parviflora* (14, 23%), *Lysiphyllum hookeri* (1, 23%), *Apophyllum anomalum* (1, 15%), *Casuarina cristata* (1, 15%), *Diospyros humilis* (4, 15%), *Eremophila deserti* (3, 15%), *Eremophila mitchellii* (4, 15%), *Lysiphyllum carronii* (1, 15%), *Acacia salicina* (1, 8%), *Alectryon oleifolius* subsp. *elongatus* (1, 8%), *Alphitonia excelsa* (1, 8%), *Atalaya hemiglaucula* (8%), *Brachychiton rupestris* (1, 8%), *Breynia oblongifolia* (1, 8%), *Capparis lasiantha* (1, 8%), *Citrus glauca* (8%), *Clematicissus opaca* (8%), *Ehretia membranifolia* (8%), *Eremophila bignoniiflora* (8%), *Eremophila maculata* (1, 8%), *Geijera salicifolia* (1, 8%), *Opuntia tomentosa*\* (8%), *Pittosporum spinescens* (8%), *Psyrax odorata* (1, 8%), *Sida cordifolia*\* (20, 8%)

### Stratum: Shrub 2

Height avg. = 1.5m, 1 site

Crown cover avg. = 5.0%, 1 site

Frequent species (cover, frequency): *Lysiphyllum hookeri* (1, 8%)

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Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Ground  
Stratum:

Height avg. = 0.4m, range 0.2-0.6m, 7 sites

PFC avg. = 25.4%, range 3-60%, 7 sites

*Dominant species (relative cover, frequency): Paspalidium caespitosum (36, 43%), Sclerolaena tetracuspis (23, 43%), Carissa ovata (20, 43%), Alectryon diversifolius (19, 43%), Parthenium hysterophorus\* (10, 43%)*

*Frequent species (cover, frequency): GRAMINOIDS: Cyperus indet. (57%), Paspalidium caespitosum (13, 43%), Sporobolus caroli (1, 43%), Echinochloa colona\* (29%), Enteropogon acicularis (29%), Paspalidium jubiflorum (1, 29%), Ancistrachne uncinulata (14%), Aristida gracilipes (15, 14%), Cenchrus ciliaris\* (14%), Dinebra decipiens (14%), Dinebra decipiens var. decipiens (10, 14%), Eleocharis pallens (1, 14%), Enneapogon indet. (14%), Enteropogon ramosus (2, 14%), Eragrostis leptostachya (14%), Eriochloa procera (2, 14%), Eriochloa pseudoacrotricha (14%), Heteropogon contortus (14%), Iseilema vaginiflorum (1, 14%), Megathyrsus maximus\* (14%), Panicum indet. (14%), Panicum queenslandicum (14%), Paspalidium globoideum (14%), Paspalidium indet. (14%), Sporobolus creber (2, 14%), Sporobolus disjunctus (1, 14%), Sporobolus elongatus (14%)*

*FORBS: Capparis lasiantha (57%), Abutilon oxycarpum (43%), Alectryon diversifolius (4, 43%), Carissa ovata (1, 43%), Parthenium hysterophorus\* (1, 43%), Sclerolaena tetracuspis (7, 43%), Abutilon oxycarpum var. oxycarpum (29%), Brunoniella australis (29%), Salsola australis (2, 29%), Abutilon guineense\* (14%), Acacia harpophylla (1, 14%), Alternanthera denticulata (14%), Alternanthera nodiflora (14%), Amaranthus macrocarpus (14%), Asteraceae indet. (1, 14%), Boerhavia burbridgeana (14%), Boerhavia indet. (14%), Bryophyllum delagoense\* (14%), Cayratia indet. (1, 14%), Clematicissus opaca (14%), Commelina ensifolia (14%), Commelina lanceolata (14%), Cynanchum viminalis (3, 14%), Duma florulenta (1, 14%), Einadia nutans subsp. linifolia (14%), Einadia nutans subsp. nutans (14%), Enchylaena tomentosa var. tomentosa (14%), Geijera parviflora (14%), Goodenia indet. (14%), Heliotropium indicum\* (14%), Heliotropium ovalifolium (14%), Jasminum didymum subsp. racemosum (14%), Lysiphyllum carronii (14%), Malvaceae indet. (14%), Melhania oblongifolia (14%), Oxalis indet. (14%), Parsonsia indet. (14%), Pittosporum spinescens (14%), Plectranthus graveolens (14%), Portulaca oleracea\* (14%), Rhagodia spinescens (14%), Rorippa eustylis (14%), Rostellularia adscendens (14%), Sclerolaena muricata var. muricata (14%), Senecio tuberculatus (14%), Sesbania cannabina (14%), Sida indet. (14%), Sida spinosa\* (14%), Solanum stelligerum (14%), Terminalia oblongata subsp. oblongata (14%), Verbena litoralis\* (14%)*

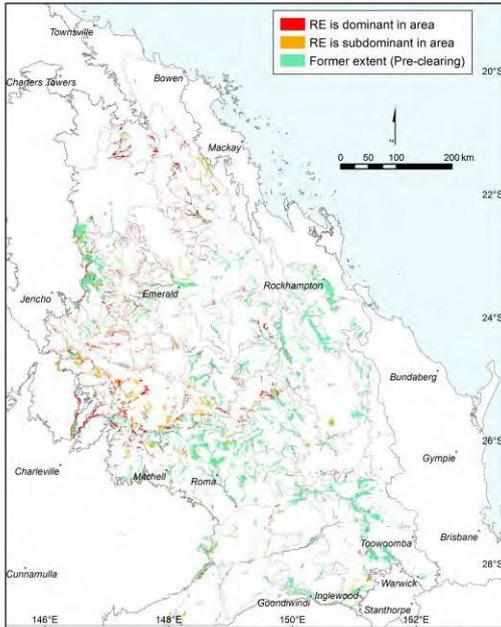
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Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Eucalyptus populnea woodland on alluvial plains**



Teresa Eyré

**Pre-clearing area (ha), remnant area (ha) and per cent remaining:** 1,934,590 513,456 27%

**Species recorded:** Total: 345; woody: 54; ground: 315; Avg. spp./site: 34.9; std dev.: 8.7, 22 site(s)

**Basal area:** Avg./site: 11.6 m<sup>2</sup>/ha, range: 3.5 - 23 m<sup>2</sup>/ha, std. deviation: 5 m<sup>2</sup>/ha, 28 site(s)

**Structural formation:** Woodland: 68%; open-forest: 18%; open-woodland: 14%, 28 site(s)

**Representative sites** 14236, 14631, 16561, 16567, 16602, 16609, 16613, 16743, 16765, 16776, 16841, 16882, 16884, 16887, 16941, 17278, 17399, 17517, 17545, 17575, 17607, 17636, 17678, 19027, 19148, 19197, 42266, 58155.

**Stratum: Tree 1**

**Height avg. = 17.4m, range 11-26m, 28 sites**

**Crown cover avg. = 33.4%, range 8.0-72.0%, 28 sites**

*Dominant species (relative cover, frequency): Eucalyptus populnea (96, 100%)*

*Frequent species (cover, frequency): Eucalyptus populnea (32, 100%), Eucalyptus camaldulensis (5, 7%), Eucalyptus crebra (1, 7%), Acacia harpophylla (4%), Amyema indet. (4%), Amyema pendula subsp. longifolia (4%), Brachychiton populneus (4%), Casuarina cristata (5, 4%), Corymbia clarksoniana (2, 4%), Cymbidium canaliculatum (4%), Eremophila mitchellii (4%), Eucalyptus melanophloia (15, 4%), Eucalyptus tereticornis (4, 4%)*

**Stratum: Tree 2**

**Height avg. = 9.9m, range 5-16m, 17 sites**

**Crown cover avg. = 5.6%, range 0.0-15.0%, 17 sites**

*Dominant species (relative cover, frequency): Eucalyptus populnea (79, 54%)*

*Frequent species (cover, frequency): Eucalyptus populnea (5, 54%), Eremophila mitchellii (2, 14%), Geijera parviflora (2, 7%), Acacia conferta (2, 4%), Acacia excelsa (4%), Acacia harpophylla (4, 4%), Casuarina cristata (2, 4%), Eucalyptustereticornis (2, 4%), Grevillea striata (2, 4%), Lysiphyllum carronii (4%), Opuntia tomentosa\* (1, 4%), Ventilago viminalis (4%)*

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.3.2

### Stratum: Tree 3

Height avg. = 3.5m, range 2.5-5m, 5 sites

Crown cover avg. = 4.8%, range 1.0-15.0%, 6 sites

*Frequent species (cover, frequency): Eucalyptus populnea (1, 14%), Eremophila mitchellii (3, 7%), Acacia fasciculifera (1, 4%), Acacia salicina (4, 4%), Atalaya hemiglauca (1, 4%), Callitris glaucophylla (1, 4%), Cassia brewsteri (1, 4%), Casuarina cristata (3, 4%), Citrus glauca (1, 4%), Geijera parviflora (6, 4%), Grevillea striata (4, 4%), Psydrax oleifolia (4%), Vachellia farnesiana\* (2, 4%)*

### Stratum: Shrub 1

Height avg. = 2.6m, range 0.5-6m, 21 sites

Crown cover avg. = 5.6%, range 0.0-30.0%, 21 sites

*Dominant species (relative cover, frequency): Eremophila mitchellii (58, 46%), Eucalyptus populnea (36, 25%)*

*Frequent species (cover, frequency): Eremophila mitchellii (6, 46%), Eucalyptus populnea (1, 25%), Geijera parviflora (2, 18%), Acacia salicina (1, 14%), Atalaya hemiglauca (1, 14%), Eremophila deserti (14%), Erythroxylum australe (11%), Acacia crassa (7%), Acacia excelsa (2, 7%), Alectryon diversifolius (7%), Alectryon oleifolius (7%), Capparis lasiantha (7%), Dodonaea viscosa (3, 7%), Grevillea striata (1, 7%), Psydrax oleifolia (7%), Acacia conferta (2, 4%), Acacia decora (1, 4%), Acacia harpophylla (2, 4%), Acacia oswaldii (3, 4%), Corymbia clarksoniana (4%), Eremophila glabra subsp. glabra (4%), Ficus opposita (4%), Grewia retusifolia (4%), Hakea chordophylla (4%), Indigofera indet. (4%), Lysiphylum carronii (4%), Opuntia indet. (4%), Opuntia stricta\* (4%), Opuntia tomentosa\* (1, 4%), Owenia acidula (4%), Owenia venosa (1, 4%), Pimelea neoanglica (4%), Salsola australis (4%), Sida hackettiana (1, 4%), Tephrosia indet. (4%), Terminalia oblongata subsp. oblongata (4%), Ventilago viminalis (4%), Zieria smithii (4%)*

### Stratum: Shrub 2

Height avg. = 1.4m, range 0.8-2.2m, 4 sites

Crown cover avg. = 15.3%, range 0.0-60.0%, 4 sites

*Frequent species (cover, frequency): Eremophila mitchellii (5, 11%), Alectryon diversifolius (4%), Citrus glauca (4%), Dodonaea viscosa (4%), Maireana microphylla (4%), Psydrax oleifolia (4%)*

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**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Ground  
Stratum:

Height avg. = 0.4m, range 0.05-1m, 22 sites

PFC avg. = 46.1%, range 10-90%, 22 sites

Dominant species (relative cover, frequency): *Chloris ventricosa* (23, 23%), *Aristida calycina* var. *calycina* (23, 23%), *Chloris divaricata* (19, 23%), *Cenchrus ciliaris*\* (18, 55%), *Dichanthium sericeum* (18, 23%)

Frequent species (cover, frequency): GRAMINOIDS: *Cyperus gracilis* (3, 64%), *Cenchrus ciliaris*\* (9, 55%), *Chrysopogon fallax* (1, 50%), *Cymbopogon refractus* (1, 45%), *Enteropogon acicularis* (1, 41%), *Heteropogon contortus* (9, 41%), *Bothriochloa decipiens* (4, 32%), *Panicum effusum* (1, 32%), *Themeda triandra* (4, 32%), *Eragrostis lacunaria* (1, 27%), *Sporobolus caroli* (1, 27%), *Aristida calycina* var. *calycina* (4, 23%), *Aristida personata* (2, 23%), *Chloris divaricata* (9, 23%), *Chloris ventricosa* (11, 23%), *Dichanthium sericeum* (10, 23%), *Enneapogon intermedius* (1, 23%), *Eragrostis sororia* (23%), *Melinis repens*\* (23%), *Sporobolus creber* (23%), *Bothriochloa decipiens* var. *decipiens* (3, 18%), *Chloris truncata* (5, 18%), *Enteropogon ramosus* (8, 18%), *Eriochloa pseudoacrotricha* (1, 18%), *Paspalidium caespitosum* (5, 18%), *Tragus australianus* (1, 18%), *Aristida calycina* (2, 14%), *Aristida* indet. (4, 14%), *Aristida ramosa* (9, 14%), *Austrostipa verticillata* (14%), *Digitaria hystrichoides* (1, 14%), *Eremochloa bimaculata* (2, 14%), *Eulalia aurea* (14%), *Fimbristylis dichotoma* (14%), *Panicum decompositum* (1, 14%), *Panicum simile* (14%), *Paspalidium gracile* (14%), *Urochloa foliosa* (2, 14%), *Bothriochloa bladhii* (1, 9%), *Bothriochloa bladhii* subsp. *bladhii* (1, 9%), *Cyperus fulvus* (9%), *Dichanthium sericeum* subsp. *sericeum* (1, 9%), *Digitaria brownii* (1, 9%), *Dinebra decipiens* (1, 9%), *Enneapogon gracilis* (9%), *Enneapogon* indet. (2, 9%), *Enneapogon lindleyanus* (3, 9%), *Enneapogon polyphyllus* (1, 9%), *Enneapogon virens* (9%), *Eragrostis brownii* (9%), *Eragrostis cilianensis*\* (9%), *Eragrostis elongata* (1, 9%), *Eragrostis leptostachya* (16, 9%), *Eriochloa crebra* (9%), *Leptochloa digitata* (9%), *Megathyrsus maximus*\* (9%), *Sporobolus elongatus* (1, 9%)

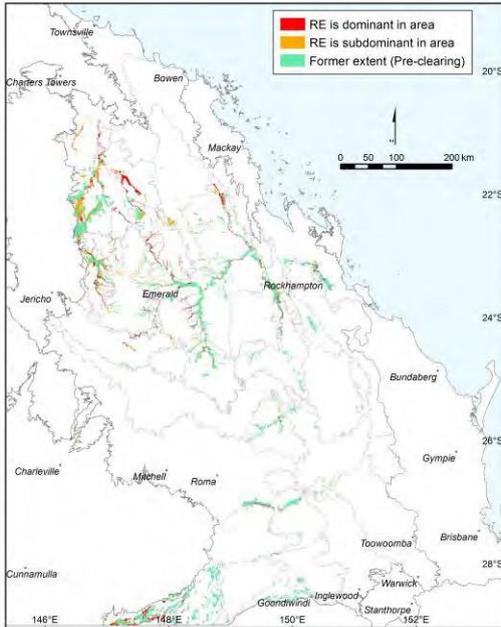
FORBS: *Eremophila debilis* (64%), *Sida hackettiana* (2, 55%), *Brunoniella australis* (41%), *Opuntia stricta*\* (41%), *Euphorbia drummondii* (36%), *Evolvulus alsinoides* (36%), *Boerhavia dominii* (32%), *Cyanthillium cinereum* (32%), *Malvastrum americanum* var. *americanum*\* (1, 32%), *Phyllanthus virgatus* (27%), *Achyranthes aspera* (1, 23%), *Neptunia gracilis* (23%), *Rhynchosia minima* (23%), *Sida rhombifolia*\* (1, 23%), *Alternanthera nana* (18%), *Carissa ovata* (1, 18%), *Einadia nutans* subsp. *linifolia* (5, 18%), *Euphorbia dallachyana* (18%), *Gomphrena celosioides*\* (18%), *Maireana microphylla* (18%), *Nyssanthes erecta* (18%), *Parthenium hysterophorus*\* (3, 18%), *Portulaca oleracea*\* (18%), *Pseuderanthemum variabile* (18%), *Salsola australis* (18%), *Sclerolaena birchii* (1, 18%), *Vittadinia sulcata* (18%), *Abutilon oxycarpum* (14%), *Brennia oblongifolia* (14%), *Capparis lasiantha* (1, 14%), *Chrysocephalum apiculatum* (14%), *Desmodium varians* (14%), *Einadia hastata* (1, 14%), *Enchylaena tomentosa* (14%), *Glandularia aristigera*\* (1, 14%), *Glycine tabacina* (14%), *Hibiscus sturtii* (14%), *Jasminum didymum* (14%), *Melhania oblongifolia* (14%), *Murdannia graminea* (14%), *Nyssanthes diffusa* (1, 14%), *Opuntia tomentosa*\* (14%), *Peripleura hispidula* (1, 14%), *Pterocaulon redolens* (14%), *Sida* indet. (14%), *Stackhousia muricata* (14%), *Vittadinia pustulata* (14%), *Wahlenbergia gracilis* (14%), *Bidens pilosa*\* (9%), *Calotis cuneata* (2, 9%), *Calotis lappulacea* (9%), *Clematicissus opaca* (9%), *Desmodium rhytidophyllum* (9%), *Erigeron bonariensis*\* (9%), *Galactia tenuiflora* (9%), *Glossocardia bidens* (9%), *Grewia latifolia* (9%), *Indigofera* indet. (1, 9%), *Lepidium africanum*\* (9%), *Marsdenia viridiflora* (9%), *Parsonia lanceolata* (9%), *Portulaca pilosa*\* (9%), *Psydrax oleifolia* (9%), *Rhagodia spinescens* (9%), *Rostellularia adscendens* (9%), *Sclerolaena muricata* (9%), *Sida cordifolia*\* (9%), *Sida pleiantha* (9%), *Sida rohlenae* (9%), *Sida* sp. (Musselbrook M.B.Thomas+ MRS437) (9%), *Sida spinosa*\* (9%), *Sida trichopoda* (9%), *Sonchus oleraceus*\* (9%), *Tribulus terrestris* (9%), *Tricoryne elatior* (9%), *Verbena* indet. (9%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Eucalyptus coolabah woodland on alluvial plains**



John Neldner

**Pre-clearing area (ha), remnant area (ha) and per cent remaining: 894,392 257,697 29%**

**Species recorded: Total: 341; woody: 68; ground: 299; Avg. spp./site: 28.4; std dev.: 9.7, 21 site(s)**

**Basal area: Avg./site: 13.8 m<sup>2</sup>/ha, range: 2.5 - 50 m<sup>2</sup>/ha, std. deviation: 9 m<sup>2</sup>/ha, 33 site(s)**

**Structural formation: Woodland: 53%; open-woodland: 26%; open-forest: 18%; unrecorded: 3%, 34 site(s)**

**Representative sites 2360, 16569, 16625, 16674, 16678, 16679, 16779, 16823, 16842, 16860, 16968, 17055, 17112, 17142, 17143, 17287, 17294, 17305, 17368, 17446, 17503, 17557, 17569, 17608, 17629, 17647, 17683, 19024, 19151, 19243, 28783, 28868, 28880, 36830.**

**Stratum: Tree 1**

**Height avg. = 18.0m, range 10-26m, 34 sites**

**Crown cover avg. = 33.1%, range 3.0-74.0%, 34 sites**

*Dominant species (relative cover, frequency): Eucalyptus coolabah (94, 100%)*

*Frequent species (cover, frequency): Eucalyptus coolabah (31, 100%), Acacia harpophylla (3, 12%), Eucalyptus tereticornis (2, 12%), Eucalyptus populnea (5, 9%), Casuarina cristata (1, 6%), Corymbia tessellaris (1, 6%), Eucalyptus camaldulensis (3, 6%), Acacia cambagei (3%), Amyema congener (3%), Amyema quandang (3%), Eucalyptus melanophloia (1, 3%), Owenia acidula (3%), Terminalia oblongata subsp. oblongata (2, 3%)*

**Stratum: Tree 2**

**Height avg. = 9.0m, range 3.5-16m, 22 sites**

**Crown cover avg. = 8.4%, range 0.0-25.0%, 22 sites**

*Dominant species (relative cover, frequency): Eucalyptus coolabah (75, 32%)*

*Frequent species (cover, frequency): Eucalyptus coolabah (6, 32%), Acacia salicina (3, 18%), Terminalia oblongata subsp. oblongata (3, 15%), Eremophila mitchellii (5, 9%), Alectryon oleifolius subsp. elongatus (2, 6%), Cymbidium canaliculatum (6%), Geijera parviflora (6, 6%), Melaleuca bracteata (3, 6%), Acacia cambagei (10, 3%), Acacia harpophylla (10, 3%), Acacia pendula (10, 3%), Alectryon oleifolius (2, 3%), Apophyllum anomalum (3%), Casuarina cristata (5, 3%), Casuarina cunninghamiana (5, 3%), Dodonaea viscosa (2, 3%), Eucalyptus tereticornis (3, 3%), Exocarpos aphyllus (3%), Lysiphillum hookeri (10, 3%), Myoporum acuminatum (1, 3%), Psydrax oleifolia (1, 3%), Ventilago viminalis (3%)*

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.3.3

### Stratum: Tree 3

Height avg. = 4.5m, range 3-7m, 4 sites

Crown cover avg. = 3.5%, range 2.0-6.0%, 4 sites

*Frequent species (cover, frequency): Eucalyptus coolabah (2, 9%), Acacia salicina (3, 6%), Acacia pendula (2, 3%), Alectryon oleifolius subsp. elongatus (3%), Cassia brewsteri (1, 3%), Casuarina cristata (1, 3%)*

### Stratum: Shrub 1

Height avg. = 2.5m, range 0.4-6m, 24 sites

Crown cover avg. = 7.5%, range 0.0-90.8%, 24 sites

*Dominant species (relative cover, frequency): Acacia salicina (41, 38%), Eucalyptus coolabah (25, 29%)*

*Frequent species (cover, frequency): Acacia salicina (1, 38%), Eucalyptus coolabah (29%), Lysiphyllum carronii (15%), Vachellia farnesiana\* (15%), Acacia oswaldii (12%), Atalaya hemiglaucula (12%), Cassia brewsteri (1, 9%), Geijera parviflora (3, 9%), Senna barclayana (9%), Casuarina cristata (12, 6%), Eremophila mitchellii (1, 6%), Lysiphyllum hookeri (6%), Melaleuca bracteata (3, 6%), Myoporum acuminatum (2, 6%), Opuntia stricta\* (6%), Psydrax oleifolia (6%), Santalum lanceolatum (3, 6%), Terminalia oblongata subsp. oblongata (6%), Acacia excelsa (3%), Acacia harpophylla (1, 3%), Acacia pendula (1, 3%), Acacia stenophylla (3, 3%), Alectryon diversifolius (3%), Alectryon oleifolius (3%), Alectryon oleifolius subsp. elongatus (3%), Avicennia marina (84, 3%), Bidens pilosa\* (1, 3%), Bursaria spinosa subsp. spinosa (3%), Capparis lasiantha (1, 3%), Citrus glauca (1, 3%), Clematicissus opaca (1, 3%), Denhamia indet. (3%), Diospyros humilis (1, 3%), Dodonaea lanceolata (5, 3%), Duma florulenta (3%), Ehretia membranifolia (1, 3%), Eremophila bignoniiflora (2, 3%), Eremophila deserti (2, 3%), Eucalyptus tereticornis (3%), Excoecaria agallocha (16, 3%), Ficus opposita (3%), Grewia latifolia (2, 3%), Malvastrum americanum var. americanum\* (2, 3%), Notelaea microcarpa (1, 3%), Opuntia tomentosa\* (3%), Parkinsonia aculeata\* (3%), Parthenium hysterophorus\* (1, 3%), Pittosporum angustifolium (1, 3%), Psydrax forsteri (2, 3%), Psydrax johnsonii (2, 3%), Sesbania cannabina (3%), Sesbania cannabina var. cannabina (1, 3%), Ventilago viminalis (3%)*

### Stratum: Shrub 2

Height avg. = 0.9m, range 0.75-1m, 2 sites

Crown cover avg. = 2.5%, range 0.0-5.0%, 2 sites

*Frequent species (cover, frequency): Capparis lasiantha (1, 3%), Carissa ovata (3, 3%), Enchylaena tomentosa (2, 3%)*

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Technical Description****Regional ecosystem: 11.3.3****Ground  
Stratum:****Height avg. = 0.5m, range 0.15-1.2m, 19 sites****PFC avg. = 44.8%, range 6-94%, 21 sites**

*Dominant species (relative cover, frequency):* *Cenchrus ciliaris*\* (22, 29%), *Paspalidium caespitosum* (18, 29%), *Dinebra decipiens* (9, 24%), *Enteropogon acicularis* (8, 33%), *Cyperus gracilis* (6, 29%)

*Frequent species (cover, frequency):* GRAMINOIDS: *Enteropogon acicularis* (3, 33%), *Heteropogon contortus* (1, 33%), *Cenchrus ciliaris*\* (13, 29%), *Cyperus gracilis* (3, 29%), *Paspalidium caespitosum* (4, 29%), *Dinebra decipiens* (2, 24%), *Leptochloa digitata* (3, 24%), *Panicum decompositum* (2, 24%), *Sporobolus caroli* (24%), *Cyperus exaltatus* (1, 19%), *Enteropogon ramosus* (2, 19%), *Eriochloa pseudoacrotricha* (5, 19%), *Eulalia aurea* (4, 19%), *Paspalidium jubiflorum* (3, 19%), *Bothriochloa bladhii* subsp. *bladhii* (2, 14%), *Chloris ventricosa* (8, 14%), *Dichanthium sericeum* (17, 14%), *Dichanthium sericeum* subsp. *sericeum* (2, 14%), *Eriochloa procera* (14%), *Megathyrsus maximus*\* (2, 14%), *Sporobolus mitchellii* (3, 14%), *Aristida leptopoda* (8, 10%), *Bothriochloa decipiens* (4, 10%), *Bothriochloa ewartiana* (12, 10%), *Chloris divaricata* (2, 10%), *Chrysopogon fallax* (1, 10%), *Cymbopogon refractus* (1, 10%), *Cyperus indet.* (10%), *Cyperus javanicus* (1, 10%), *Digitaria brownii* (9, 10%), *Echinochloa colona*\* (2, 10%), *Eleocharis acuta* (10%), *Eleocharis pallens* (1, 10%), *Eragrostis lacunaria* (10%), *Eriochloa crebra* (4, 10%), *Megathyrsus maximus* var. *pubiglumis*\* (10%), *Melinis repens*\* (1, 10%), *Panicum laevinode* (10%), *Paspalidium distans* (8, 10%), *Paspalidium gracile* (6, 10%), *Paspalidium indet.* (10%), *Sporobolus creber* (10%), *Thellungia advena* (1, 10%), *Themeda avenacea* (1, 10%)

FORBS: *Malvastrum americanum* var. *americanum*\* (1, 38%), *Eustrephus latifolius* (33%), *Brunoniella australis* (29%), *Parthenium hysterophorus*\* (3, 29%), *Achyranthes aspera* (24%), *Basilicum polystachyon* (1, 24%), *Duma florulenta* (2, 24%), *Einadia nutans* subsp. *linifolia* (24%), *Eremophila debilis* (24%), *Euphorbia drummondii* (1, 24%), *Rostellularia adscendens* (24%), *Senna barclayana* (24%), *Sida hackettiana* (24%), *Alternanthera nodiflora* (19%), *Bidens pilosa*\* (19%), *Sclerolaena muricata* (19%), *Abutilon oxycarpum* (14%), *Boerhavia dominii* (14%), *Calotis cuneata* (14%), *Capparis lasiantha* (14%), *Euphorbia dallachyana* (14%), *Glycine tabacina* (14%), *Marsilea drummondii* (3, 14%), *Oxalis corniculata*\* (14%), *Oxalis perennans* (14%), *Rhynchosia minima* (14%), *Tetragonia tetragonoides* (14%), *Abutilon fraseri* (10%), *Alectryon diversifolius* (10%), *Alternanthera denticulata* (1, 10%), *Atriplex muelleri* (10%), *Boerhavia indet.* (10%), *Campylocarpha barbata* (10%), *Citrus glauca* (10%), *Crotalaria indet.* (10%), *Cyanthillium cinereum* (10%), *Cymbidium canaliculatum* (10%), *Eclipta prostrata*\* (10%), *Enchylaena tomentosa* (1, 10%), *Euphorbia indet.* (10%), *Euphorbia psammogeton* (10%), *Glandularia aristigera*\* (10%), *Gomphrena celosioides*\* (10%), *Haloragis aspera* (10%), *Jasminum didymum* (10%), *Jasminum didymum* subsp. *didymum* (10%), *Jasminum didymum* subsp. *racemosum* (10%), *Lepidium africanum*\* (1, 10%), *Lomandra longifolia* (2, 10%), *Maireana microphylla* (10%), *Marsilea hirsuta* (10%), *Melhantha oblongifolia* (10%), *Mimosa pudica*\* (10%), *Neptunia gracilis* (10%), *Passiflora foetida*\* (1, 10%), *Phyllanthus maderaspatensis* (10%), *Portulaca oleracea*\* (1, 10%), *Rhagodia spinescens* (3, 10%), *Salsola australis* (10%), *Sclerolaena tetracuspsis* (10%), *Scoparia dulcis*\* (10%), *Sida indet.* (10%), *Sida spinosa*\* (10%), *Sida trichopoda* (10%), *Verbena indet.* (10%), *Verbena litoralis*\* (10%), *Wahlenbergia gracilis* (10%), *Zaleya galericulata* subsp. *galericulata* (10%)

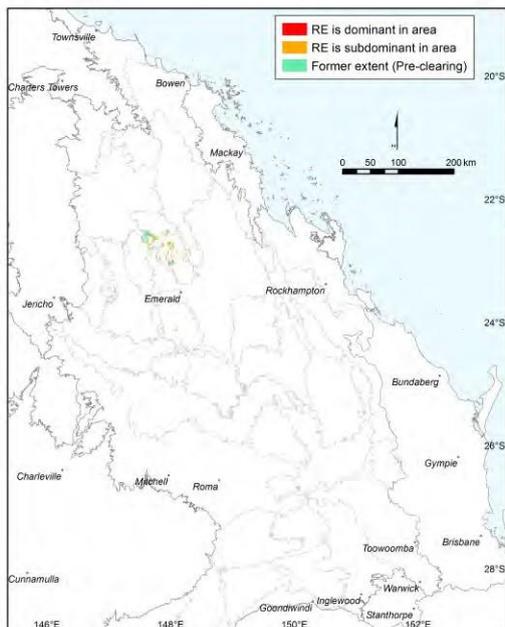
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**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Melaleuca bracteata woodland on alluvial plains



Pre-clearing area (ha), remnant area (ha) and per cent remaining: 17,655 11,043 63%

Species\_recorded: Total: 67; woody: 6; ground: 63; Avg. spp./site: 36.5; std dev.: 6.5, 2 site(s)

Basal area: Avg./site: 16.5 m<sup>2</sup>/ha, range: 16.0 - 17 m<sup>2</sup>/ha, std. deviation: 1 m<sup>2</sup>/ha, 2 site(s)

Structural formation: Open-woodland: 50%; low woodland: 50%, 2 site(s)

Representative\_sites 16966, 19032.

Stratum: Tree 1

Height avg. = 13.5m, range 9-18m, 2 sites

Crown cover avg. = 27.5%, range 15.0-40.0%, 2 sites

Dominant species (relative cover, frequency): *Melaleuca bracteata* (96, 100%), *Acacia salicina* (8, 50%)

Frequent species (cover, frequency): *Melaleuca bracteata* (26, 100%), *Acacia salicina* (3, 50%), *Corymbia tessellaris* (50%)

Stratum: Tree 2

Height avg. = 12.0m, 1 site

Crown cover avg. = 80.0%, 1 site

Dominant species (relative cover, frequency): *Melaleuca bracteata* (100, 50%)

Frequent species (cover, frequency): *Melaleuca bracteata* (80, 50%)

Stratum: Tree 3

Height avg. = 3.5m, 1 site

Crown cover avg. = 1.0%, 1 site

Dominant species (relative cover, frequency): *Melaleuca bracteata* (42, 50%), *Geijera parviflora* (42, 50%), *Ficus opposita* (8, 50%), *Erythroxylum australe* (8, 50%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.3.3a

*Frequent species (cover, frequency): Erythroxylum australe (50%), Ficus opposita (50%), Geijera parviflora (1, 50%), Melaleuca bracteata (1, 50%)*

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Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

1/03/2018

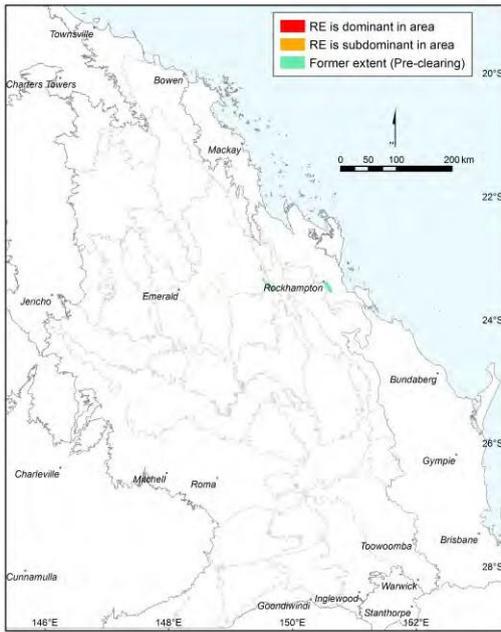
**Technical Description****Regional ecosystem: 11.3.3a****Shrub 1  
Stratum:****Height avg. = 1.5m, 1 site****Crown cover avg. = 20.0%, 1 site***Dominant species (relative cover, frequency): Melaleuca bracteata (95, 50%), Acacia salicina (5, 50%)**Frequent species (cover, frequency): Acacia salicina (1, 50%), Melaleuca bracteata (19, 50%)***Stratum: Ground****Height avg. = 0.7m, range 0.5-0.9m, 2 sites****PFC avg. = 60.0%, range 30-90%, 2 sites***Dominant species (relative cover, frequency): Eriochloa pseudoacrotricha (85, 50%), Dichanthium sericeum (62, 50%), Panicum decompositum var. decompositum (12, 50%), Heteropogon contortus (7, 100%), Oxalis perennans (4, 50%)**Frequent species (cover, frequency): GRAMINOIDS: Heteropogon contortus (5, 100%), Melinis repens\* (1, 100%), Aristida latifolia (50%), Aristida leptopoda (50%), Bothriochloa bladhii subsp. bladhii (1, 50%), Bothriochloa erianthoides (50%), Chloris ventricosa (50%), Cyperus gracilis (50%), Dichanthium fecundum (50%), Dichanthium sericeum (56, 50%), Dichanthium sericeum subsp. sericeum (50%), Dinebra decipiens (50%), Enneapogon truncatus (50%), Eriochloa crebra (50%), Eriochloa pseudoacrotricha (20, 50%), Iseilema macratherum (50%), Panicum decompositum (50%), Panicum decompositum var. decompositum (11, 50%), Paspalidium globoideum (50%), Sarga leiocladum (50%), Sporobolus elongatus (1, 50%), Sporobolus indet. (50%), Themeda triandra (50%)**FORBS: Rhynchosia minima (100%), Abutilon oxycarpum (50%), Acacia salicina (50%), Achyranthes aspera (50%), Ajuga australis (1, 50%), Alectryon oleifolius subsp. elongatus (50%), Bidens pilosa\* (50%), Brunoniella australis (50%), Capsicum annuum var. glabriusculum\* (50%), Convolvulus arvensis\* (50%), Crotalaria juncea\* (50%), Cullen tenax (50%), Cyanthillium cinereum (50%), Denhamia oleaster (50%), Eremophila debilis (50%), Erigeron bonariensis\* (50%), Euphorbia drummondii (50%), Eustrephus latifolius (50%), Geijera parviflora (50%), Haloragis aspera (50%), Indigofera linifolia (50%), Indigofera linnaei (50%), Ipomoea plebeia (50%), Lotus australis (50%), Malvastrum americanum var. americanum\* (3, 50%), Neptunia gracilis (50%), Opuntia stricta\* (50%), Oxalis perennans (4, 50%), Parsonsia indet. (50%), Parsonsia lanceolata (50%), Parthenium hysterophorus\* (50%), Polymeria indet. (50%), Sida atherophora (50%), Sida cordifolia\* (50%), Sida fibulifera (1, 50%), Sida rohlenae (50%), Sonchus oleraceus\* (50%), Vachellia farnesiana\* (50%), Verbena africana (50%), Vigna radiata var. sublobata (50%)*

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Eucalyptus coolabah woodland to open woodland with a sedge or grass understorey in back swamps and old channels**



Pre-clearing area (ha), remnant area (ha) and per cent remaining: 4,794 844 18%

Species\_recorded: Total: 12; woody: 0; ground: 12; Avg. spp./site: 12.0; std dev.: 0.0, 1 site(s)

Basal area: 0

Structural formation: Forbland: 100%, 1 site(s)

Representative\_sites 36832.

**Stratum: Ground**

Height avg. = 0.4m, 1 site

PFC avg. = 77.0%, 1 site

Dominant species (relative cover, frequency): *Marsilea mutica* (29, 100%), *Nymphaea gigantea* (19, 100%), *Najas indet.* (14, 100%), *Eleocharis dulcis* (10, 100%), *Aponogeton queenslandicus* (9, 100%)

Frequent species (cover, frequency): GRAMINOIDS: *Cynodon dactylon*\* (1, 100%), *Cyperus difformis* (2, 100%), *Eleocharis dulcis* (8, 100%)

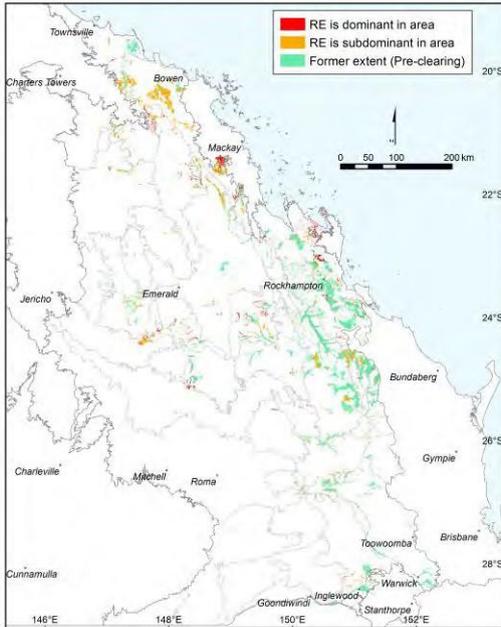
FORBS: *Aponogeton queenslandicus* (7, 100%), *Azolla pinnata* (4, 100%), *Ceratophyllum demersum* (2, 100%), *Eclipta prostrata*\* (2, 100%), *Ludwigia peploides subsp. montevidensis* (1, 100%), *Marsilea mutica* (22, 100%), *Najas indet.* (11, 100%), *Nymphaea gigantea* (15, 100%), *Ottelia ovalifolia subsp. ovalifolia* (2, 100%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Eucalyptus tereticornis and/or Eucalyptus spp. woodland on alluvial plains**



Annie Kelly

**Pre-clearing area (ha), remnant area (ha) and per cent remaining:** 685,082 180,879 26%

**Species recorded:** Total: 271; woody: 39; ground: 239; Avg. spp./site: 36.1; std dev.: 11.0, 14 site(s)

**Basal area:** Avg./site: 15.9 m<sup>2</sup>/ha, range: 10.0 - 25 m<sup>2</sup>/ha, std. deviation: 5 m<sup>2</sup>/ha, 14 site(s)

**Structural formation:** Woodland: 43%; open-woodland: 29%; tall woodland: 14%; open-forest: 14%, 14 site(s)

**Representative sites** 14015, 14107, 14223, 14235, 16565, 16587, 16588, 16601, 17144, 17372, 17592, 17677, 19012, 28797.

**Stratum: Emergent**

**Height avg. = 28.7m, range 26-32m, 3 sites**

**Crown cover avg. = 8.0%, range 2.0-11.0%, 3 sites**

*Dominant species (relative cover, frequency): Eucalyptus tereticornis (76, 21%)*

*Frequent species (cover, frequency): Eucalyptus tereticornis (5, 21%), Corymbia tessellaris (8, 7%), Cymbidium canaliculatum (7%)*

**Stratum: Tree 1**

**Height avg. = 23.4m, range 14-36m, 14 sites**

**Crown cover avg. = 27.8%, range 15.0-55.0%, 14 sites**

*Dominant species (relative cover, frequency): Eucalyptus tereticornis (57, 93%), Corymbia tessellaris (29, 36%), Angophora subvelutina (26, 21%), Corymbia clarksoniana (10, 21%), Lophostemon suaveolens (5, 21%)*

*Frequent species (cover, frequency): Eucalyptus tereticornis (15, 93%), Corymbia tessellaris (5, 36%), Angophora subvelutina (15, 21%), Corymbia clarksoniana (2, 21%), Lophostemon suaveolens (2, 21%), Angophora floribunda (10, 14%), Eucalyptus melanophloia (3, 14%), Eucalyptus populnea (12, 14%), Alstonia constricta (7%), Corymbia citriodora (3, 7%), Corymbia intermedia (22, 7%), Eucalyptus camaldulensis (24, 7%), Eucalyptus longirostrata (22, 7%), Planchonella cotinifolia (7%)*

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.3.4

### Stratum: Tree 2

Height avg. = 15.1m, range 6-25m, 7 sites

Crown cover avg. = 7.3%, range 3.0-10.0%, 8 sites

Dominant species (relative cover, frequency): *Corymbia tessellaris* (50, 21%), *Eucalyptus tereticornis* (44, 36%), *Angophora subvelutina* (42, 21%), *Lophostemon suaveolens* (26, 21%)

Frequent species (cover, frequency): *Eucalyptus tereticornis* (4, 36%), *Angophora subvelutina* (3, 21%), *Corymbia tessellaris* (3, 21%), *Lophostemon suaveolens* (4, 21%), *Eucalyptus melanophloia* (2, 14%), *Acacia salicina* (1, 7%), *Corymbia citriodora* (2, 7%), *Corymbia intermedia* (2, 7%), *Erythrina vesperilio* (7%), *Eucalyptus longirostrata* (3, 7%), *Eucalyptus populnea* (2, 7%)

### Stratum: Tree 3

Height avg. = 4.3m, range 2-6m, 3 sites

Crown cover avg. = 2.0%, range 0.0-6.0%, 3 sites

Dominant species (relative cover, frequency): *Eucalyptus tereticornis* (36, 21%)

Frequent species (cover, frequency): *Eucalyptus tereticornis* (21%), *Acacia glaucocarpa* (6, 7%), *Acacia salicina* (7%), *Eucalyptus melanophloia* (1, 7%)

### Stratum: Shrub 1

Height avg. = 1.9m, range 1-3m, 6 sites

Crown cover avg. = 4.3%, range 1.0-12.0%, 9 sites

Dominant species (relative cover, frequency): *Eucalyptus tereticornis* (70, 21%), *Acacia glaucocarpa* (40, 21%)

Frequent species (cover, frequency): *Acacia glaucocarpa* (1, 21%), *Eucalyptus tereticornis* (1, 21%), *Acacia disparrima* subsp. *disparrima* (2, 14%), *Alphitonia excelsa* (14%), *Acacia crassa* subsp. *longicoma* (3, 7%), *Acacia falcata* (7%), *Acacia leiocalyx* subsp. *leiocalyx* (7%), *Acacia maidenii* (1, 7%), *Angophora floribunda* (1, 7%), *Breynia oblongifolia* (7%), *Bursaria spinosa* subsp. *spinosa* (7%), *Capparis lasiantha* (1, 7%), *Carissa ovata* (1, 7%), *Cassia brewsteri* (7%), *Citrus glauca* (7%), *Denhamia cunninghamii* (7%), *Eucalyptus populnea* (7%), *Eustrephus latifolius* (7%), *Grewia latifolia* (7%), *Hibiscus divaricatus* (7%), *Lantana camara*\* (7, 7%), *Lophostemon suaveolens* (7%), *Mallotus philippensis* (7%), *Pittosporum angustifolium* (7%), *Senna occidentalis*\* (7%), *Sida hackettiana* (9, 7%)

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Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Ground  
Stratum:

Height avg. = 0.6m, range 0.2-0.8m, 14 sites

PFC avg. = 61.6%, range 15-96%, 14 sites

Dominant species (relative cover, frequency): *Arundinella nepalensis* (26, 50%), *Melinis repens*\* (25, 29%), *Heteropogon contortus* (20, 71%), *Bothriochloa bladhii* subsp. *bladhii* (20, 29%), *Dinebra decipiens* (13, 21%)

Frequent species (cover, frequency): GRAMINOIDS: *Heteropogon contortus* (13, 71%), *Cyperus gracilis* (1, 64%), *Arundinella nepalensis* (19, 50%), *Cyperus fulvus* (1, 43%), *Themeda triandra* (3, 43%), *Dichanthium sericeum* (10, 36%), *Bothriochloa bladhii* subsp. *bladhii* (15, 29%), *Capillipedium spicigerum* (29%), *Chloris divaricata* (1, 29%), *Cymbopogon refractus* (6, 29%), *Dichanthium sericeum* subsp. *sericeum* (3, 29%), *Melinis repens*\* (15, 29%), *Panicum simile* (29%), *Sporobolus creber* (1, 29%), *Dinebra decipiens* (9, 21%), *Eragrostis leptostachya* (1, 21%), *Eragrostis sororia* (21%), *Fimbristylis dichotoma* (21%), *Imperata cylindrica* (1, 21%), *Panicum effusum* (1, 21%), *Scleria brownii* (1, 21%), *Aristida calycina* (5, 14%), *Aristida queenslandica* var. *queenslandica* (20, 14%), *Aristida ramosa* (3, 14%), *Bothriochloa decipiens* (8, 14%), *Bothriochloa ewartiana* (13, 14%), *Cenchrus ciliaris*\* (1, 14%), *Cynodon dactylon*\* (1, 14%), *Digitaria didactyla*\* (1, 14%), *Eragrostis elongata* (14%), *Eragrostis lacunaria* (1, 14%), *Paspalidium distans* (14%), *Paspalidium indet.* (10, 14%), *Sorghum nitidum* (2, 14%), *Sporobolus elongatus* (14%), *Alloteropsis semialata* (7%), *Aristida benthamii* var. *benthamii* (2, 7%), *Aristida calycina* var. *praealta* (7%), *Aristida indet.* (2, 7%), *Aristida jerichoensis* var. *subspinulifera* (7%), *Aristida personata* (7%), *Aristida queenslandica* (7%), *Aristida vagans* (1, 7%), *Austrostipa verticillata* (1, 7%), *Bothriochloa bladhii* (4, 7%), *Bothriochloa decipiens* var. *cloncurrans* (25, 7%), *Bothriochloa decipiens* var. *decipiens* (7, 7%), *Capillipedium parviflorum* (2, 7%), *Chloris inflata*\* (7%), *Chloris truncata* (7%), *Chrysopogon fallax* (7%), *Chrysopogon filipes* (7%), *Cynodon dactylon* var. *dactylon*\* (5, 7%), *Cyperus aggregatus*\* (7%), *Cyperus bifax* (7%), *Cyperus indet.* (7%), *Dichanthium sericeum* subsp. *humilius* (7%), *Digitaria brownii* (7%), *Digitaria ciliaris*\* (7%), *Digitaria diffusa* (7%), *Digitaria hystrioides* (7%), *Echinopogon ovatus* (7%), *Enteropogon acicularis* (3, 7%), *Enteropogon ramosus* (7%), *Entolasia stricta* (2, 7%), *Eragrostis brownii* (7%), *Eragrostis indet.* (8, 7%), *Eragrostis spartinooides* (7%), *Eriochloa crebra* (7%), *Eriochloa pseudoacrotricha* (7%), *Eulalia aurea* (3, 7%), *Heteropogon triticeus* (7%), *Juncus polyanthemus* (3, 7%), *Microlaena stipoides* var. *stipoides* (7%), *Oplismenus aemulus* (1, 7%), *Panicum decompositum* (1, 7%), *Panicum decompositum* var. *decompositum* (7%), *Panicum indet.* (7%), *Panicum queenslandicum* (5, 7%), *Panicum queenslandicum* var. *queenslandicum* (7%), *Paspalidium gausum* (7%), *Paspalidium gracile* (7%), *Paspalidium rarum* (1, 7%), *Paspalum dilatatum*\* (7%), *Perotis rara* (7%), *Poaceae indet.* (7%), *Scleria sphacelata* (7%), *Setaria surgens* (1, 7%), *Sporobolus caroli* (2, 7%), *Urochloa foliosa* (7%), *Urochloa piligera* (7%)  
FORBS: *Cyanthillium cinereum* (79%), *Sida hackettiana* (1, 64%), *Eustrephus latifolius* (50%), *Glycine tomentella* (43%), *Desmodium varians* (36%), *Malvastrum americanum* var. *americanum*\* (36%), *Alphitonia excelsa* (29%), *Euphorbia dallachyana* (1, 29%), *Oxalis corniculata*\* (1, 29%), *Oxalis perennans* (29%), *Wahlenbergia gracilis* (29%), *Abutilon oxycarpum* (21%), *Brunoniella australis* (21%), *Einadia hastata* (21%), *Eremophila debilis* (1, 21%), *Glycine clandestina* var. *clandestina* (21%), *Gomphocarpus physocarpus*\* (21%), *Goodenia glabra* (21%), *Grewia latifolia* (21%), *Lobelia purpurascens* (21%), *Lomandra multiflora* subsp. *multiflora* (21%), *Opuntia stricta*\* (21%), *Phyllanthus virgatus* (21%), *Pterocaulon indet.* (21%), *Sida cordifolia*\* (21%), *Sida rhombifolia*\* (21%), *Centipeda minima* (14%), *Cirsium vulgare*\* (14%), *Crotalaria mitchellii* (1, 14%), *Cyclospermum leptophyllum*\* (14%), *Dianella brevipedunculata* (14%), *Dichondra repens* (14%), *Emilia sonchifolia*\* (14%), *Erigeron sumatrensis*\* (14%), *Glycine tabacina* (14%), *Gomphrena celosioides*\* (14%), *Heliotropium amplexicaule*\* (14%), *Hydrocotyle acutiloba* (14%), *Indigofera indet.* (14%), *Lepidium africanum*\* (14%), *Malvastrum coromandelianum* subsp. *coromandelianum*\* (1, 14%), *Mentha satureioides* (14%), *Opuntia tomentosa*\* (14%), *Peripleura hispida* var. *setosa* (14%), *Plectranthus parviflorus* (14%), *Rhynchosia minima* var. *minima* (3, 14%), *Richardia brasiliensis*\* (14%), *Senecio pinnatifolius* var. *pinnatifolius* (14%), *Sida* sp. (Musselbrook M.B.Thomas+ MRS437) (14%), *Sigesbeckia orientalis* (1, 14%), *Solanum nigrum* subsp. *nigrum*\* (14%), *Veronica plebeia* (14%), *Acacia podalyriifolia* (7%), *Achyranthes aspera* (7%), *Ajuga australis* (7%), *Alternanthera denticulata* (7%), *Alternanthera pungens*\* (7%), *Bidens pilosa*\* (7%), *Brachyscome indet.* (1, 7%), *Breynia oblongifolia* (7%), *Calotis lappulacea* (7%), *Calystegia marginata* (7%), *Campactra barbata* (7%), *Cardiospermum grandiflorum*\* (2, 7%), *Cheilanthes distans* (7%), *Cheilanthes sieberi* (7%), *Chrysocephalum apiculatum* (7%), *Convolvulaceae indet.* (1, 7%), *Crotalaria montana* (7%), *Crotalaria montana* var. *exserta* (7%), *Crotalaria novae-hollandiae* (7%), *Cucumis althaeoides* (7%), *Cynoglossum australe* (7%), *Daucus glochidiatus* (7%), *Desmodium gunnii* (1, 7%), *Desmodium indet.* (7%), *Dianella longifolia* (7%), *Eucalyptus tereticornis* (7%), *Euphorbia bifida* (7%), *Euphorbia drummondii* (1, 7%), *Euphorbia hirta*\* (7%), *Evolvulus alsinoides* (7%), *Evolvulus alsinoides* var. *decumbens* (7%), *Galactia tenuiflora* var. *lucida* (7%), *Gamochaeta pensylvanica*\* (7%), *Geranium solanderi* var. *solanderi* (7%), *Goodenia rotundifolia* (7%), *Hibiscus sturtii* (7%), *Hibiscus sturtii* var. *sturtii* (7%), *Ipomoea indet.* (7%), *Ipomoea plebeia* (7%), *Lantana camara*\* (2, 7%), *Lespedeza juncea* subsp. *sericea* (7%), *Liliaceae indet.* (1, 7%), *Livistona decora* (7%), *Lobelia concolor* (7%), *Macropitium lathyroides*\* (7%), *Malvastrum americanum* (7%), *Marsilea hirsuta* (2, 7%), *Medicago polymorpha*\* (2, 7%), *Melaleuca viminalis* (7%), *Murdannia graminea* (7%), *Myoporium acuminatum* (4, 7%), *Neptunia gracilis* (7%), *Ophioglossum indet.* (7%), *Ophioglossum reticulatum* (7%), *Oxalis indet.* (1, 7%), *Parsonsia lanceolata* (7%), *Parsonsia straminea* (1, 7%), *Parthenium hysterophorus*\* (1, 7%), *Passiflora foetida*\* (7%), *Peripleura hispida* (7%), *Petalostigma pubescens* (7%), *Phyllanthus lacunarius* (7%), *Plantago debilis* (7%), *Polymeria calycina* (7%), *Portulaca pilosa*\* (7%), *Pseudanthemum variabile* (7%), *Pteridium esculentum* (8, 7%), *Pterocaulon redolens* (1, 7%), *Raphanus raphanistrum*\* (7%), *Rostellularia adscendens* (7%), *Rubus parvifolius* (7%), *Rumex brownii* (7%), *Senna barclayana* (7%), *Sida atherophora* (7%), *Sida corrugata* (7%), *Sonchus oleraceus*\* (7%), *Spermacoce*

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

## Regional ecosystem: 11.3.4

*brachystema* (7%), *Sphaeromorphaea indet.* (7%), *Tephrosia filipes* (7%), *Trichodesma zeylanicum* (7%), *Tricoryne elatior* (7%),

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Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

## Regional ecosystem: 11.3.4

*Verbena indet.* (1, 7%), *Verbena litoralis*\* (7%), *Verbena macrostachya* (2, 7%), *Verbesina encelioides*\* (7%), *Vicia indet.* (7%), *Vigna lanceolata* (7%), *Vigna lanceolata var. lanceolata* (7%), *Wahlenbergia graniticola* (7%), *Wahlenbergia indet.* (7%), *Wikstroemia indica* (7%), *Xanthium occidentale*\* (7%), *Zornia dyctiocarpa var. dyctiocarpa* (7%), *Zornia muriculata subsp. muriculata* (1, 7%)

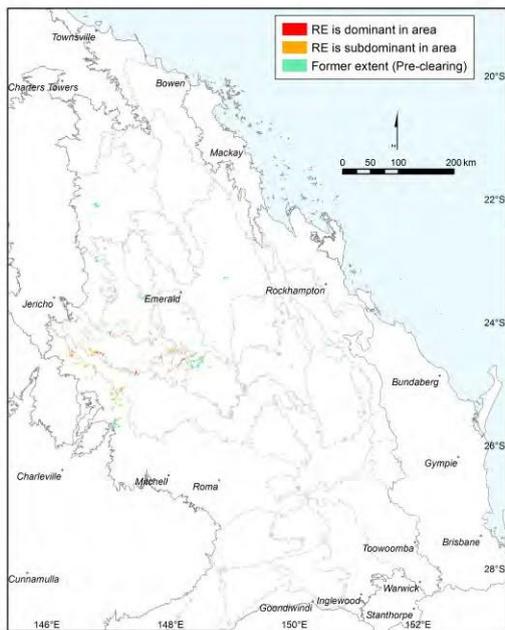
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Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

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**Eucalyptus melanophloia woodland on alluvial plains**



Annie Kelly

**Pre-clearing area (ha), remnant area (ha) and per cent remaining: 64,632 28,872 45%**

**Species recorded: Total: 73; woody: 10; ground: 64; Avg. spp/site: 28.0; std dev.: 7.0, 2 site(s)**

**Basal area: Avg/site: 9.0 m<sup>2</sup>/ha, range: 5.0 - 16 m<sup>2</sup>/ha, std. deviation: 5 m<sup>2</sup>/ha, 3 site(s)**

**Structural formation: Woodland: 67%; low woodland: 33%, 3 site(s)**

**Representative sites 16775, 16977, 17232.**

**Stratum: Tree 1**

**Height avg. = 13.3m, range 7-18m, 3 sites**

**Crown cover avg. = 26.3%, range 20.0-32.0%, 3 sites**

*Dominant species (relative cover, frequency): Eucalyptus melanophloia (86, 100%), Corymbia erythrophloia (21, 67%)*

*Frequent species (cover, frequency): Eucalyptus melanophloia (23, 100%), Corymbia erythrophloia (6, 67%), Brachychiton populneus (33%), Corymbia tessellaris (33%)*

**Stratum: Shrub 1**

**Height avg. = 3.0m, range 2-4m, 2 sites**

**Crown cover avg. = 2.5%, range 0.0-5.0%, 2 sites**

*Dominant species (relative cover, frequency): Acacia salicina (100, 33%), Acacia macradenia (56, 33%), Eucalyptus melanophloia (37, 33%), Indigofera australis (2, 33%), Clerodendrum floribundum (2, 33%)*

*Frequent species (cover, frequency): Acacia longispicata (33%), Acacia macradenia (3, 33%), Acacia salicina (33%), Brachychiton populneus subsp. trilobus (33%), Clerodendrum floribundum (33%), Eucalyptus melanophloia (2, 33%), Indigofera australis (33%)*

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Ground  
Stratum:

Height avg. = 1.1m, range 0.75-1.5m, 2 sites

PFC avg. = 83.5%, range 67-100%, 2 sites

*Dominant species (relative cover, frequency): Themeda triandra (45, 50%), Cymbopogon refractus (42, 50%), Heteropogon contortus (35, 100%), Paspalidium criniforme (9, 50%), Melinis repens\* (6, 50%)*

*Frequent species (cover, frequency): GRAMINOIDS: Heteropogon contortus (33, 100%), Aristida gracilipes (50%), Bothriochloa bladhii subsp. bladhii (3, 50%), Bothriochloa decipiens var. cloncurrrensii (3, 50%), Cenchrus ciliaris\* (50%), Cymbopogon refractus (28, 50%), Dichanthium sericeum (2, 50%), Iseilema vaginiflorum (50%), Melinis repens\* (6, 50%), Panicum effusum (50%), Panicum queenslandicum var. queenslandicum (50%), Paspalidium criniforme (6, 50%), Sorghum x almum\* (50%), Themeda triandra (30, 50%)*

*FORBS: Rhynchosia minima (1, 100%), Asperula conferta (50%), Chrysocephalum apiculatum (50%), Cirsium vulgare\* (50%), Cullen tenax (50%), Cyanthillium cinereum (50%), Einadia nutans subsp. nutans (50%), Galactia tenuiflora (2, 50%), Geitonoplesium cymosum (50%), Glycine tabacina (50%), Indigofera linifolia (50%), Ipomoea plebeia (50%), Jasminum didymum subsp. lineare (50%), Malvastrum americanum var. americanum\* (2, 50%), Opuntia stricta\* (50%), Oxalis chnoodes (50%), Parthenium hysterophorus\* (6, 50%), Peripleura hispidula var. setosa (50%), Sesbania cannabina (50%), Sida atherophora (1, 50%), Sida hackettiana (50%), Sida rhombifolia\* (50%), Sigesbeckia australiensis (50%), Silybum marianum\* (50%), Solanum indet. (50%), Vachellia farnesiana\* (50%), Verbena indet. (50%), Verbena macrostachya (50%), Verbesina encelioides\* (50%), Wahlenbergia tumidifruca (50%)*

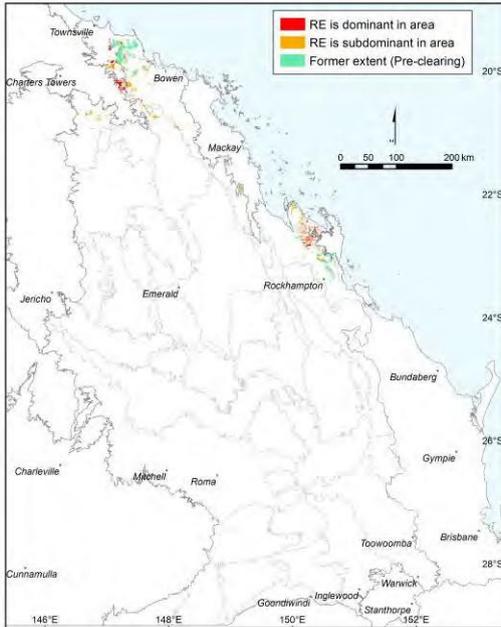
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Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Eucalyptus platyphylla, Corymbia spp. woodland on alluvial plains**



Jesse Rowland

**Pre-clearing area (ha), remnant area (ha) and per cent remaining:** 143,147 62,526 44%

**Species recorded:** Total: 196; woody: 27; ground: 180; Avg. spp./site: 38.2; std dev.: 6.4, 9 site(s)

**Basal area:** Avg./site: 9.6 m<sup>2</sup>/ha, range: 3.5 - 19 m<sup>2</sup>/ha, std. deviation: 5 m<sup>2</sup>/ha, 9 site(s)

**Structural formation:** Woodland: 67%; open-woodland: 33%, 9 site(s)

**Representative sites** 14855, 17043, 19050, 40806, 58454, 58494, 59076, 59081, 59085.

**Stratum: Tree 1**

**Height avg. = 16.8m, range 10-27m, 9 sites**

**Crown cover avg. = 29.3%, range 12.0-90.3%, 9 sites**

*Dominant species (relative cover, frequency): Eucalyptus platyphylla (83, 100%), Corymbia intermedia (14, 22%), Melaleuca viridiflora var. viridiflora (10, 22%), Lophostemon suaveolens (9, 44%)*

*Frequent species (cover, frequency): Eucalyptus platyphylla (25, 100%), Lophostemon suaveolens (2, 44%), Corymbia intermedia (5, 22%), Melaleuca viridiflora var. viridiflora (3, 22%), Corymbia clarksoniana (8, 11%), Eucalyptus crebra (8, 11%), Eucalyptus tereticornis subsp. tereticornis (3, 11%)*

**Stratum: Tree 2**

**Height avg. = 9.2m, range 7-12m, 6 sites**

**Crown cover avg. = 8.3%, range 2.0-25.0%, 6 sites**

*Dominant species (relative cover, frequency): Melaleuca viridiflora var. viridiflora (69, 22%), Eucalyptus platyphylla (68, 56%), Lophostemon suaveolens (33, 22%), Corymbia dallachiana (11, 22%), Corymbia intermedia (10, 33%)*

*Frequent species (cover, frequency): Eucalyptus platyphylla (5, 56%), Corymbia intermedia (1, 33%), Corymbia dallachiana (1, 22%), Lophostemon suaveolens (3, 22%), Melaleuca viridiflora var. viridiflora (8, 22%), Acacia leiocalyx subsp. leiocalyx (1, 11%)*

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Tree 3  
Stratum:

Height avg. = 5.0m, 1 site

Crown cover avg. = 0.0%, 1 site

Frequent species (cover, frequency): *Lophostemon suaveolens* (11%)

Stratum: Shrub 1

Height avg. = 2.4m, range 1-4m, 8 sites

Crown cover avg. = 2.1%, range 0.0-7.0%, 8 sites

Dominant species (relative cover, frequency): *Melaleuca viridiflora* var. *viridiflora* (72, 33%), *Planchonia careya* (69, 33%), *Eucalyptus platyphylla* (31, 44%), *Grewia retusifolia* (22, 22%), *Petalostigma pubescens* (19, 22%)

Frequent species (cover, frequency): *Eucalyptus platyphylla* (44%), *Melaleuca viridiflora* var. *viridiflora* (4, 33%), *Planchonia careya* (2, 33%), *Grewia retusifolia* (22%), *Petalostigma pubescens* (22%), *Acacia disparrima* subsp. *disparrima* (11%), *Alphitonia excelsa* (11%), *Corymbia dallachiana* (11%), *Corymbia tessellaris* (11%), *Cryptostegia grandiflora*\* (11%), *Grewia latifolia* (1, 11%), *Lophostemon suaveolens* (11%), *Melaleuca nervosa* (11%), *Ziziphus mauritiana*\* (11%)

Stratum: Shrub 2

Height avg. = 1.1m, range 0.75-1.5m, 5 sites

Crown cover avg. = 1.1%, range 0.6-2.0%, 5 sites

Dominant species (relative cover, frequency): *Planchonia careya* (57, 22%), *Melaleuca viridiflora* var. *viridiflora* (52, 22%), *Eucalyptus platyphylla* (15, 33%), *Breynia oblongifolia* (8, 22%)

Frequent species (cover, frequency): *Eucalyptus platyphylla* (33%), *Breynia oblongifolia* (22%), *Melaleuca viridiflora* var. *viridiflora* (1, 22%), *Planchonia careya* (22%), *Carissa ovata* (1, 11%), *Cassia brewsteri* (1, 11%), *Coelospermum reticulatum* (11%), *Corymbia intermedia* (11%), *Corymbia tessellaris* (11%), *Cryptostegia grandiflora*\* (11%), *Lantana camara*\* (11%), *Lophostemon suaveolens* (11%), *Melaleuca nervosa* (11%), *Petalostigma pubescens* (11%), *Sida cordifolia*\* (1, 11%), *Sida hackettiana* (1, 11%), *Stylosanthes scabra*\* (1, 11%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Ground  
Stratum:

Height avg. = 0.8m, range 0.5-1.5m, 9 sites

PFC avg. = 59.8%, range 35-94%, 9 sites

Dominant species (relative cover, frequency): *Themeda triandra* (33, 78%), *Arundinella nepalensis* (27, 56%), *Heteropogon contortus* (21, 44%), *Dichanthium sericeum* subsp. *sericeum* (20, 22%), *Heteropogon triticeus* (15, 22%)

Frequent species (cover, frequency): GRAMINOIDS: *Themeda triandra* (20, 78%), *Eragrostis brownii* (5, 67%), *Fimbristylis dichotoma* (1, 67%), *Panicum effusum* (2, 67%), *Arundinella nepalensis* (17, 56%), *Heteropogon contortus* (17, 44%), *Capillipedium spicigerum* (33%), *Chrysopogon fallax* (2, 33%), *Eragrostis sororia* (2, 33%), *Fimbristylis ferruginea* (33%), *Imperata cylindrica* (6, 33%), *Paspalidium distans* (33%), *Paspalum scrobiculatum* (33%), *Sarga leiocladum* (3, 33%), *Cymbopogon refractus* (22%), *Cyperus difformis* (22%), *Cyperus fulvus* (22%), *Cyperus indet.* (22%), *Dichanthium sericeum* subsp. *sericeum* (8, 22%), *Echinochloa colona*\* (22%), *Heteropogon triticeus* (10, 22%), *Alloteropsis semialata* (11%), *Aristida calycina* (5, 11%), *Aristida holathera* var. *holathera* (10, 11%), *Aristida queenslandica* var. *dissimilis* (11%), *Bothriochloa bladhii* subsp. *bladhii* (3, 11%), *Bothriochloa decipiens* var. *cloncurrans* (11%), *Bothriochloa decipiens* var. *decipiens* (1, 11%), *Bothriochloa indet.* (1, 11%), *Bothriochloa pertusa*\* (11%), *Capillipedium parviflorum* (11%), *Chloris divaricata* (11%), *Chloris virgata*\* (1, 11%), *Cyperus distans* (2, 11%), *Cyperus iria* (11%), *Cyperus pulchellus* (11%), *Cyperus sesquiflorus*\* (11%), *Dichanthium fecundum* (15, 11%), *Digitaria ramularis* (1, 11%), *Dinebra neesii* (11%), *Eleocharis philippinensis* (11%), *Eragrostis parviflora* (11%), *Eragrostis spartinooides* (11%), *Eragrostis tenuifolia*\* (5, 11%), *Eriachne armitii* (5, 11%), *Eriochloa crebra* (11%), *Eriochloa procera* (11%), *Eriochloa pseudoacrotricha* (11%), *Fimbristylis microcarya* (1, 11%), *Leersia hexandra* (11%), *Lipocarpha microcephala* (11%), *Panicum decompositum* (1, 11%), *Panicum simile* (1, 11%), *Paspalum conjugatum*\* (1, 11%), *Scleria novae-hollandiae* (11%), *Scleria sphacelata* (11%), *Sorghum nitidum* forma *aristatum* (1, 11%), *Sporobolus creber* (11%)

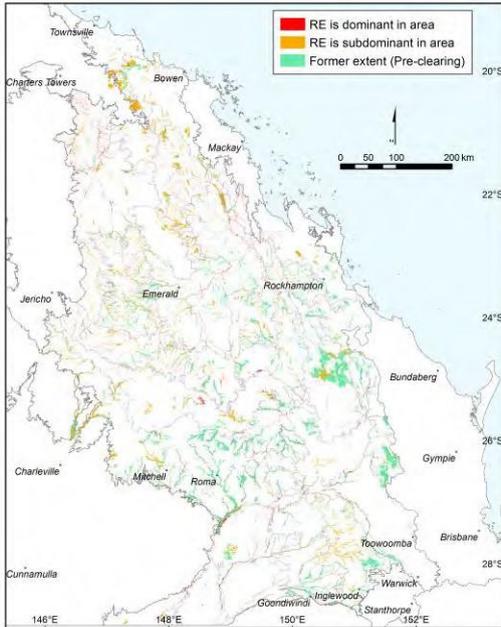
FORBS: *Cyanthillium cinereum* (89%), *Phyllanthus virgatus* (78%), *Crotalaria montana* (44%), *Ludwigia perennis* (44%), *Murdannia graminea* (44%), *Rostellularia adscendens* (44%), *Spermacoce brachystema* (44%), *Stylosanthes scabra*\* (44%), *Flemingia parviflora* (2, 33%), *Galactia tenuiflora* (33%), *Mecardonia procumbens*\* (33%), *Oldenlandia subulata* (33%), *Passiflora foetida*\* (33%), *Sphaeromorphaea indet.* (33%), *Ageratum houstonianum*\* (22%), *Alternanthera denticulata* var. *micrantha* (22%), *Alternanthera nana* (22%), *Apowollastonia spilanthoides* (22%), *Brunoniella acaulis* subsp. *ciliata* (3, 22%), *Centipeda minima* subsp. *minima* (22%), *Chrysocephalum apiculatum* (22%), *Crinum indet.* (22%), *Dianella caerulea* (22%), *Dianella nervosa* (22%), *Eclipta prostrata*\* (1, 22%), *Emilia sonchifolia*\* (22%), *Emilia sonchifolia* var. *sonchifolia*\* (22%), *Eustrephus latifolius* (22%), *Galactia tenuiflora* forma *sericea* (3, 22%), *Glycine tabacina* (22%), *Haloragis heterophylla* (1, 22%), *Lobelia stenophylla* (22%), *Ludwigia octovalvis* (4, 22%), *Melaleuca viridiflora* var. *viridiflora* (9, 22%), *Neptunia gracilis* (22%), *Oldenlandia galioides* (22%), *Planchonia careya* (1, 22%), *Pterocaulon indet.* (22%), *Ruellia tuberosa*\* (22%), *Tephrosia juncea* (22%), *Velleia spathulata* (22%), *Aeschynomene brevifolia* (11%), *Alphitonia excelsa* (11%), *Alysicarpus aurantiacus* (1, 11%), *Asteraceae indet.* (11%), *Bidens pilosa*\* (11%), *Blumea saxatilis* (11%), *Breynia oblongifolia* (11%), *Brunoniella acaulis* subsp. *acaulis* (1, 11%), *Calandrinia indet.* (11%), *Centipeda borealis* (1, 11%), *Chamaecrista nomame* var. *nomame* (11%), *Coelospermum reticulatum* (11%), *Commelina diffusa* (11%), *Crinum flaccidum* (11%), *Desmodium gangeticum* (3, 11%), *Desmodium muelleri* (11%), *Desmodium trichostachyum* (11%), *Desmodium varians* (11%), *Dianella longifolia* (11%), *Emilia sonchifolia* var. *javanica*\* (11%), *Eremophila debilis* (11%), *Erigeron pusillus*\* (11%), *Erigeron sumatrensis*\* (11%), *Eriocaulon cinereum* (11%), *Eucalyptus crebra* (11%), *Eucalyptus platyphylla* (11%), *Euphorbia hyssopifolia*\* (11%), *Evolvulus alsinoides* (11%), *Evolvulus alsinoides* var. *decumbens* (11%), *Glossocardia bidens* (11%), *Glycine clandestina* (11%), *Glycine clandestina* var. *clandestina* (11%), *Glycine indet.* (11%), *Glycine tomentella* (11%), *Gomphocarpus physocarpus*\* (11%), *Gomphrena celosioides*\* (11%), *Goodenia gracilis* (11%), *Hygrophila angustifolia* (11%), *Hypericum gramineum* (11%), *Indigofera hirsuta* (11%), *Indigofera trifoliata* (11%), *Lagenophora indet.* (11%), *Leucas lavandulifolia*\* (11%), *Lindernia crustacea* (11%), *Lindernia tenuifolia* (11%), *Lobelia quadrangularis* (11%), *Lomandra longifolia* (11%), *Lophostemon suaveolens* (11%), *Malvastrum americanum* var. *americanum*\* (11%), *Malvastrum coromandelianum* subsp. *coromandelianum*\* (11%), *Mitracarpus hirtus*\* (11%), *Neptunia monosperma* (11%), *Philydrum lanuginosum* (11%), *Phyllanthus minutiflorus* (11%), *Plectranthus scutellarioides* (11%), *Polygala isingii* (11%), *Portulaca oleracea*\* (11%), *Portulaca pilosa*\* (11%), *Praxelis clematidea*\* (1, 11%), *Pterocaulon serrulatum* (11%), *Pycnospora lutescens* (11%), *Rhynchosia minima* var. *minima* (3, 11%), *Rostellularia adscendens* var. *adscendens* (11%), *Sauropus indet.* (11%), *Sida hackettiana* (1, 11%), *Sida indet.* (11%), *Sida rohlenae* (11%), *Sonchus oleraceus*\* (11%), *Spermacoce multicaulis* (11%), *Sphaeromorphaea australis* (11%), *Stylosanthes guianensis*\* (2, 11%), *Stylosanthes guianensis* var. *guianensis*\* (11%), *Stylosanthes indet.* (1, 11%), *Tephrosia filipes* (11%), *Uraria picta* (11%), *Waltheria indica* (11%), *Zornia areolata* (11%), *Zornia dyctiocarpa* (11%), *Zornia indet.* (11%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Eucalyptus tereticornis or E. camaldulensis woodland fringing drainage lines**



Annie Kelly

**Pre-clearing area (ha), remnant area (ha) and per cent remaining: 685,740 430,808 63%**

**Species\_recorded:** Total: 530; woody: 104; ground: 467; Avg. spp./site: 32.2; std dev.: 12.6, 38 site(s)

**Basal area:** Avg./site: 14.7 m<sup>2</sup>/ha, range: 2.0 - 38 m<sup>2</sup>/ha, std. deviation: 8 m<sup>2</sup>/ha, 46 site(s)

**Structural formation:** Woodland: 44%; open-forest: 23%; open-woodland: 21%; tall woodland: 6%; tall open-forest: 2%; low woodland: 2%; closed-forest: 2%, 48 site(s)

**Representative\_sites** 2459, 14146, 14164, 14595, 16233, 16236, 16590, 16608, 16623, 16641, 16677, 16724, 16736, 16751, 16787, 16795, 16867, 16877, 16936, 16958, 16967, 17094, 17133, 17155, 17260, 17385, 17400, 17482, 17654, 17682, 19112, 19113, 19210, 28778, 30413, 40910, 41705, 41715, 41915, 41916, 41975, 41995, 42015, 42016, 42190, 42194, 42237, 42264.

**Stratum: Emergent**

**Height avg. = 23.9m, range 14-36m, 7 sites**

**Crown cover avg. = 5.0%, range 2.0-9.0%, 7 sites**

*Frequent species (cover, frequency): Eucalyptus tereticornis (6, 10%), Casuarina cunninghamiana (4, 2%), Cymbidium canaliculatum (2%), Eucalyptus camaldulensis (2, 2%)*

**Stratum: Tree 1**

**Height avg. = 22.1m, range 6-32m, 48 sites**

**Crown cover avg. = 34.9%, range 5.0-86.0%, 48 sites**

*Dominant species (relative cover, frequency): Eucalyptus camaldulensis (73, 46%), Eucalyptus tereticornis (61, 48%), Corymbia tessellaris (12, 21%)*

*Frequent species (cover, frequency): Eucalyptus tereticornis (23, 48%), Eucalyptus camaldulensis (25, 46%), Corymbia tessellaris (3, 21%), Angophora floribunda (15, 17%), Eucalyptus coolabah (15, 17%), Eucalyptus populnea (7, 10%), Casuarina cunninghamiana (10, 6%), Corymbia clarksoniana (4, 6%), Lophostemon suaveolens (1, 6%), Acacia salicina (1, 4%), Cymbidium canaliculatum (4%), Eucalyptus crebra (3, 4%), Melaleuca bracteata (47, 4%), Melaleuca leucadendra (27, 4%), Acacia stenophylla (7, 2%), Angophora leiocarpa (1, 2%), Angophora subvelutina (28, 2%), Callitris glaucophylla (10, 2%), Casuarina cunninghamiana subsp. cunninghamiana (8, 2%), Eucalyptus melanophloia (5, 2%), Livistona decora (2, 2%), Livistona nitida (25, 2%), Melaleuca fluviatilis (36, 2%), Melaleuca linariifolia (7, 2%), Melaleuca viminalis (12, 2%)*

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.3.25

### Stratum: Tree 2

Height avg. = 10.9m, range 4-20m, 37 sites

Crown cover avg. = 10.6%, range 0.0-40.0%, 37 sites

Frequent species (cover, frequency): *Eucalyptus camaldulensis* (6, 19%), *Acacia salicina* (6, 15%), *Acacia stenophylla* (10, 15%), *Eucalyptus coolabah* (3, 15%), *Eucalyptus tereticornis* (2, 13%), *Angophora floribunda* (5, 8%), *Corymbia tessellaris* (3, 8%), *Melaleuca trichostachya* (7, 8%), *Lophostemon suaveolens* (2, 6%), *Melaleuca bracteata* (11, 6%), *Callitris glaucophylla* (9, 4%), *Eucalyptus populnea* (17, 4%), *Livistona nitida* (1, 4%), *Melia azedarach* (4%), *Terminalia oblongata subsp. oblongata* (1, 4%), *Acacia fasciculifera* (5, 2%), *Acacia indet.* (2, 2%), *Acacia leiocalyx subsp. leiocalyx* (1, 2%), *Acacia ramiflora* (2%), *Alphitonia excelsa* (2%), *Angophora subvelutina* (4, 2%), *Backhousia angustifolia* (2, 2%), *Brachychiton australis* (2%), *Cassia brewsteri* (2%), *Casuarina cunninghamiana* (1, 2%), *Casuarina cunninghamiana subsp. cunninghamiana* (10, 2%), *Celtis sinensis\** (5, 2%), *Cissus oblonga* (2%), *Corymbia erythrophloia* (24, 2%), *Dendrophthoe glabrescens* (2%), *Ficus fraseri* (10, 2%), *Geijera parviflora* (15, 2%), *Geijera salicifolia* (4, 2%), *Hakea lorea* (2%), *Lysiphillum hookeri* (20, 2%), *Lysiphillum indet.* (20, 2%), *Melaleuca fluviatilis* (2, 2%), *Melaleuca leucadendra* (2%), *Melaleuca linariifolia* (7, 2%), *Planchonella cotinifolia* (1, 2%)

### Stratum: Tree 3

Height avg. = 6.9m, range 4-12m, 12 sites

Crown cover avg. = 11.0%, range 0.0-62.0%, 12 sites

Frequent species (cover, frequency): *Acacia salicina* (1, 4%), *Corymbia tessellaris* (4%), *Eucalyptus camaldulensis* (1, 4%), *Eucalyptus coolabah* (2, 4%), *Melaleuca linariifolia* (4, 4%), *Acacia excelsa* (2%), *Acacia leiocalyx subsp. leiocalyx* (2, 2%), *Alectryon diversifolius* (2%), *Angophora floribunda* (2, 2%), *Casuarina cunninghamiana subsp. cunninghamiana* (3, 2%), *Cymbidium canaliculatum* (2%), *Diospyros geminata* (2%), *Erythrina vespertilio* (2%), *Eucalyptus tereticornis* (2%), *Ficus coronata* (6, 2%), *Ficus opposita* (7, 2%), *Livistona nitida* (4, 2%), *Lysiphillum hookeri* (50, 2%), *Lysiphillum indet.* (10, 2%), *Macaranga tanarius* (2%), *Mallotus philippensis* (3, 2%), *Melaleuca fluviatilis* (3, 2%), *Melaleuca trichostachya* (3, 2%), *Melaleuca viminalis* (4, 2%), *Pleiogynium timorense* (2, 2%), *Terminalia oblongata subsp. oblongata* (10, 2%), *Timonius timon var. timon* (3, 2%)

### Stratum: Shrub 1

Height avg. = 2.5m, range 0.5-6m, 24 sites

Crown cover avg. = 7.2%, range 0.0-40.0%, 25 sites

Frequent species (cover, frequency): *Acacia salicina* (10%), *Ficus opposita* (1, 10%), *Alphitonia excelsa* (1, 6%), *Melaleuca trichostachya* (22, 6%), *Abutilon oxycarpum* (4%), *Alectryon diversifolius* (7, 4%), *Alstonia constricta* (4%), *Brachychiton rupestris* (4%), *Breynia oblongifolia* (4%), *Bridelia leichhardtii* (4%), *Casuarina cunninghamiana* (1, 4%), *Corymbia tessellaris* (4%), *Denhamia disperma* (4%), *Erythroxylum australe* (1, 4%), *Eucalyptus camaldulensis* (1, 4%), *Ficus fraseri* (4%), *Geijera parviflora* (4%), *Grewia latifolia* (1, 4%), *Lophostemon suaveolens* (4%), *Melaleuca bracteata* (4%), *Melaleuca viminalis* (4, 4%), *Notelaea microcarpa* (4%), *Petalostigma pubescens* (3, 4%), *Pleiogynium timorense* (4%), *Turraea pubescens* (4%), *Vachellia farnesiana\** (1, 4%), *Acacia aulacocarpa* (1, 2%), *Acacia disparrima subsp. disparrima* (2%), *Acacia excelsa* (1, 2%), *Acacia glaucocarpa* (5, 2%), *Acacia holosericea* (2%), *Acacia indet.* (2%), *Acacia leiocalyx subsp. leiocalyx* (2%), *Acacia maidenii* (2%), *Acacia ramiflora* (2%), *Acacia stenophylla* (2, 2%), *Alyxia ruscifolia* (2%), *Angophora floribunda* (2%), *Angophora leiocarpa* (2%), *Angophora subvelutina* (2%), *Bertya oleifolia* (2%), *Brachychiton populneus* (2%), *Capparis indet.* (2%), *Carissa ovata* (2, 2%), *Cassia brewsteri* (1, 2%), *Casuarina cristata* (2%), *Casuarina cunninghamiana subsp. cunninghamiana* (1, 2%), *Clematicissus opaca* (2%), *Corymbia erythrophloia* (2%), *Cupaniopsis anacardioides* (2%), *Cymbidium canaliculatum* (2%), *Diospyros geminata* (2%), *Dodonaea viscosa* (2%), *Elaeodendron australe* (2%), *Eremophila mitchellii* (2%), *Erythroxylum sp. (Splityard Creek L. Pedley 5360)* (2%), *Grevillea striata* (2%), *Hovea longipes* (2%), *Jasminum simplicifolium subsp. australiense* (2%), *Leptospermum polygalifolium* (24, 2%), *Livistona decora* (1, 2%), *Livistona nitida* (5, 2%), *Lycium ferocissimum\** (1, 2%), *Lysiphillum hookeri* (12, 2%), *Macaranga tanarius* (1, 2%), *Mallotus philippensis* (2%), *Melaleuca decora* (1, 2%), *Melaleuca fluviatilis* (1, 2%), *Melaleuca indet.* (2%), *Melaleuca linariifolia* (2, 2%), *Melia azedarach* (2%), *Opuntia tomentosa\** (2%), *Pittosporum spinescens* (2%), *Psydrax odorata* (2%), *Santalum lanceolatum* (2%), *Terminalia oblongata subsp. oblongata* (10, 2%), *Timonius timon var. timon* (2%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Shrub 2  
Stratum:

Height avg. = 1.1m, range 0.5-1.5m, 5 sites

Crown cover avg. = 2.2%, range 0.0-5.0%, 5 sites

Frequent species (cover, frequency): *Grewia latifolia* (3, 4%), *Abutilon oxycarpum* (1, 2%), *Acacia aulacocarpa* (2%), *Acacia maidenii* (2%), *Acacia salicina* (2%), *Alyxia ruscifolia* (2%), *Breynia oblongifolia* (2%), *Carissa lanceolata* (1, 2%), *Corymbia tessellaris* (2%), *Glochidion ferdinandi* (2%), *Grewia retusifolia* (2%), *Macaranga tanarius* (2%), *Mallotus philippensis* (1, 2%), *Melaleuca fluviatilis* (2%), *Melia azedarach* (2%), *Pleiogynium timorense* (2%), *Senna barclayana* (2%), *Senna indet.* (2%), *Sida hackettiana* (2%), *Terminalia oblongata* subsp. *oblongata* (4, 2%), *Turraea pubescens* (1, 2%), *Wikstroemia indica* (2%)

Stratum: Ground

Height avg. = 0.5m, range 0.1-1.3m, 38 sites

PFC avg. = 48.6%, range 0-100%, 38 sites

Dominant species (relative cover, frequency): *Phyla canescens*\* (57, 26%), *Arundinella nepalensis* (15, 24%), *Heteropogon contortus* (14, 34%), *Themeda triandra* (8, 21%), *Lomandra longifolia* (8, 50%)

Frequent species (cover, frequency): GRAMINOIDS: *Cyperus gracilis* (34%), *Heteropogon contortus* (10, 34%), *Dichanthium sericeum* subsp. *sericeum* (26%), *Paspalidium distans* (2, 26%), *Arundinella nepalensis* (9, 24%), *Bothriochloa bladhii* subsp. *bladhii* (4, 24%), *Cyperus indet.* (1, 24%), *Paspalidium jubiflorum* (1, 24%), *Cynodon dactylon*\* (1, 21%), *Melinis repens*\* (1, 21%), *Themeda triandra* (8, 21%), *Aristida personata* (6, 18%), *Eriochloa crebra* (18%), *Chrysopogon filipes* (5, 16%), *Dichanthium sericeum* (4, 16%), *Eriochloa procera* (16%), *Sporobolus mitchellii* (1, 16%), *Bromus catharticus*\* (2, 13%), *Capillipedium spicigerum* (13%), *Chloris gayana*\* (1, 13%), *Eulalia aurea* (7, 13%), *Imperata cylindrica* (5, 13%), *Leptochloa digitata* (13%), *Megathyrsus maximus* var. *pubiglumis*\* (15, 13%), *Panicum effusum* (6, 13%), *Anthosachne scabra* (14, 11%), *Bothriochloa bladhii* (11%), *Cymbopogon refractus* (1, 11%), *Cynodon dactylon* var. *dactylon*\* (3, 11%), *Eragrostis leptostachya* (4, 11%), *Megathyrsus maximus*\* (5, 11%), *Panicum laevinode* (2, 11%), *Sorghum halepense*\* (3, 11%), *Sporobolus creber* (3, 11%), *Urochloa foliosa* (3, 11%), *Chionachne cyathopoda* (7, 8%), *Chloris divaricata* (8%), *Chloris ventricosa* (16, 8%), *Chrysopogon fallax* (2, 8%), *Cyperus fulvus* (1, 8%), *Digitaria brownii* (8%), *Echinochloa colona*\* (2, 8%), *Eleocharis plana* (8%), *Enteropogon acicularis* (8%), *Enteropogon ramosus* (8%), *Eragrostis sororia* (8%), *Eriochloa pseudoacrotricha* (8%), *Panicum larcomianum* (2, 8%), *Panicum simile* (1, 8%), *Setaria surgens* (4, 8%), *Themeda avenacea* (3, 8%)

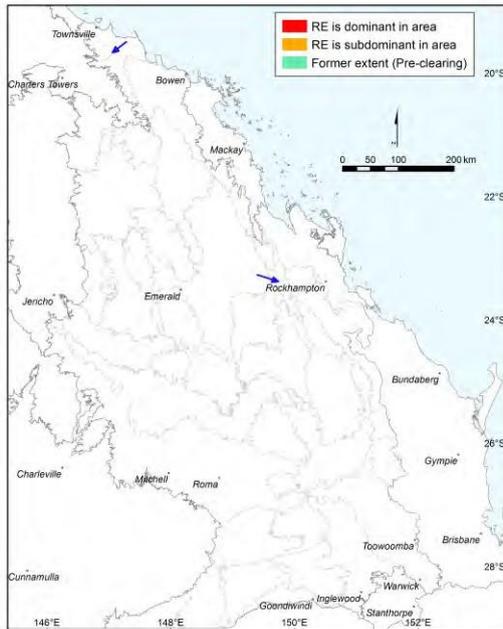
FORBS: *Lomandra longifolia* (4, 50%), *Bidens pilosa*\* (45%), *Eustrephus latifolius* (26%), *Phyla canescens*\* (28, 26%), *Rumex brownii* (26%), *Xanthium occidentale*\* (26%), *Cyanthillium cinereum* (24%), *Cyclosporum leptophyllum*\* (24%), *Rapistrum rugosum*\* (1, 24%), *Sonchus oleraceus*\* (24%), *Marsilea drummondii* (3, 21%), *Oxalis perennans* (21%), *Alternanthera denticulata* var. *denticulata* (1, 18%), *Cirsium vulgare*\* (18%), *Emilia sonchifolia*\* (18%), *Erigeron bonariensis*\* (18%), *Gomphrena celosioides*\* (18%), *Malvastrum americanum* var. *americanum*\* (18%), *Sida hackettiana* (3, 18%), *Alternanthera nodiflora* (16%), *Commelina diffusa* (16%), *Malvastrum coromandelianum* subsp. *coromandelianum*\* (16%), *Rorippa palustris*\* (16%), *Sida rhombifolia*\* (16%), *Crinum flaccidum* (13%), *Euphorbia dallachyana* (13%), *Phyllanthus virgatus* (13%), *Rhynchosia minima* (13%), *Rorippa eustylis* (13%), *Sida cordifolia*\* (4, 13%), *Argemone ochroleuca* subsp. *ochroleuca*\* (11%), *Asperula conferta* (11%), *Boerhavia* sp. (St George A.Hill AQ399299) (11%), *Duma florulenta* (11%), *Eclipta prostrata*\* (11%), *Opuntia stricta*\* (11%), *Sida spinosa*\* (11%), *Solanum nodiflorum*\* (11%), *Vachellia farnesiana*\* (11%), *Verbena indet.* (11%), *Vicia monantha* (11%), *Ageratum houstonianum*\* (8%), *Alternanthera denticulata* (8%), *Arthropodium strictum* (8%), *Asteraceae indet.* (8%), *Basilicum polystachyon* (8%), *Breynia oblongifolia* (8%), *Calostemma luteum* (8%), *Calyptocarpus vialis*\* (8%), *Dianella indet.* (8%), *Dichondra repens* (8%), *Euphorbia drummondii* (8%), *Euphorbia hirta*\* (8%), *Evolvulus alsinoides* (8%), *Galactia tenuiflora* (8%), *Glandularia aristigera*\* (8%), *Glycine tabacina* (8%), *Glycine tomentella* (8%), *Ipomoea lonchophylla* (8%), *Medicago polymorpha*\* (8%), *Neptunia gracilis* (8%), *Parthenium hysterophorus*\* (8%), *Physalis lanceifolia*\* (8%), *Polymeria calycina* (8%), *Portulaca oleracea*\* (8%), *Richardia brasiliensis*\* (8%), *Ricinus communis*\* (8%), *Ruellia tuberosa*\* (1, 8%), *Senna barclayana* (8%), *Spermacoce brachystema* (8%), *Tridax procumbens*\* (8%), *Verbena litoralis*\* (8%), *Verbesina encelioides*\* (8%), *Wahlenbergia gracilis* (8%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Eucalyptus raveretiana (sometimes emergent), Melaleuca fluviatilis woodland fringing drainage lines**



**Pre-clearing area (ha), remnant area (ha) and per cent remaining:** 805            785            98%

**Species\_recorded:** Total: 55; woody: 10; ground: 45; Avg. spp/site: 31.0; std dev.: 4.0, 2 site(s)

**Basal area:** Avg/site: 11.0 m<sup>2</sup>/ha, range: 11.0 - 11 m<sup>2</sup>/ha, std. deviation: 0 m<sup>2</sup>/ha, 2 site(s)

**Structural formation:** Woodland: 50%; open-woodland: 50%, 2 site(s)

**Representative\_sites** 19196, 19234.

**Stratum: Tree 1**

**Height avg. = 16.0m, range 15-17m, 2 sites**  
**Crown cover avg. = 24.5%, range 19.0-30.0%, 2 sites**

*Dominant species (relative cover, frequency):* *Corymbia tessellaris* (38, 100%), *Melaleuca fluviatilis* (33, 50%), *Eucalyptus raveretiana* (18, 100%), *Casuarina cunninghamiana* (18, 100%), *Melaleuca nervosa* (8, 50%)

*Frequent species (cover, frequency):* *Casuarina cunninghamiana* (4, 100%), *Corymbia tessellaris* (9, 100%), *Eucalyptus camaldulensis* (1, 100%), *Eucalyptus raveretiana* (5, 100%), *Lysiphyllum hookeri* (50%), *Melaleuca fluviatilis* (10, 50%), *Melaleuca nervosa* (3, 50%)

**Stratum: Tree 2**

**Height avg. = 8.0m, 1 site**  
**Crown cover avg. = 6.0%, 1 site**

*Dominant species (relative cover, frequency):* *Lysiphyllum hookeri* (67, 50%), *Corymbia tessellaris* (33, 50%)

*Frequent species (cover, frequency):* *Corymbia tessellaris* (2, 50%), *Lysiphyllum hookeri* (4, 50%)

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.3.25a

### Shrub 1 Stratum:

Height avg. = 2.0m, range 1.5-2.5m, 2 sites

Crown cover avg. = 1.0%, range 1.0-1.0%, 2 sites

Dominant species (relative cover, frequency): *Lysiphillum hookeri* (33, 100%), *Lantana camara*\* (25, 50%), *Eucalyptus camaldulensis* (25, 50%), *Breynia oblongifolia* (25, 50%), *Melaleuca fluviatilis* (20, 50%)

Frequent species (cover, frequency): *Lysiphillum hookeri* (100%), *Breynia oblongifolia* (50%), *Casuarina cunninghamiana* (50%), *Eucalyptus camaldulensis* (50%), *Lantana camara*\* (50%), *Lophostemon grandiflorus subsp. riparius* (50%), *Melaleuca fluviatilis* (50%)

### Stratum: Ground

Height avg. = 0.8m, range 0.75-0.8m, 2 sites

PFC avg. = 42.5%, range 40-45%, 2 sites

Dominant species (relative cover, frequency): *Megathyrsus maximus var. pubiglumis*\* (61, 50%), *Arundinella nepalensis* (32, 50%), *Bothriochloa bladhii* (32, 50%), *Emilia sonchifolia var. javanica*\* (6, 50%), *Argemone ochroleuca subsp. ochroleuca*\* (6, 50%)

Frequent species (cover, frequency): GRAMINOIDS: *Melinis repens*\* (1, 100%), *Aristida latifolia* (2, 50%), *Arundinella nepalensis* (15, 50%), *Bothriochloa bladhii* (15, 50%), *Bothriochloa bladhii subsp. bladhii* (50%), *Chloris divaricata* (50%), *Chloris inflata*\* (50%), *Chloris truncata* (50%), *Chloris virgata*\* (50%), *Cyperus indet.* (50%), *Cyperus javanicus* (3, 50%), *Dactyloctenium radulans* (50%), *Echinochloa colona*\* (2, 50%), *Enneapogon virens* (50%), *Heteropogon contortus* (50%), *Megathyrsus maximus var. pubiglumis*\* (25, 50%), *Setaria surgens* (50%)

FORBS: *Tridax procumbens*\* (100%), *Achyranthes aspera* (2, 50%), *Alternanthera indet.* (50%), *Argemone ochroleuca subsp. ochroleuca*\* (3, 50%), *Asteraceae indet.* (50%), *Bidens pilosa*\* (50%), *Commelina ensifolia* (2, 50%), *Commelina indet.* (50%), *Convolvulaceae indet.* (50%), *Crotalaria spectabilis*\* (3, 50%), *Dianella indet.* (50%), *Emilia sonchifolia var. javanica*\* (3, 50%), *Euphorbia hirta*\* (50%), *Lepidium africanum*\* (50%), *Lobelia quadrangularis* (50%), *Macroptilium atropurpureum*\* (50%), *Macroptilium lathyroides*\* (50%), *Malvastrum americanum var. americanum*\* (50%), *Mecardonia procumbens*\* (3, 50%), *Parthenium hysterophorus*\* (2, 50%), *Pterocaulon redolens* (50%), *Rhynchosia minima* (50%), *Senna occidentalis*\* (50%), *Sida hackettiana* (50%), *Sida indet.* (50%), *Sida rhombifolia*\* (2, 50%), *Tagetes minuta*\* (50%), *Tinospora smilacina* (50%)

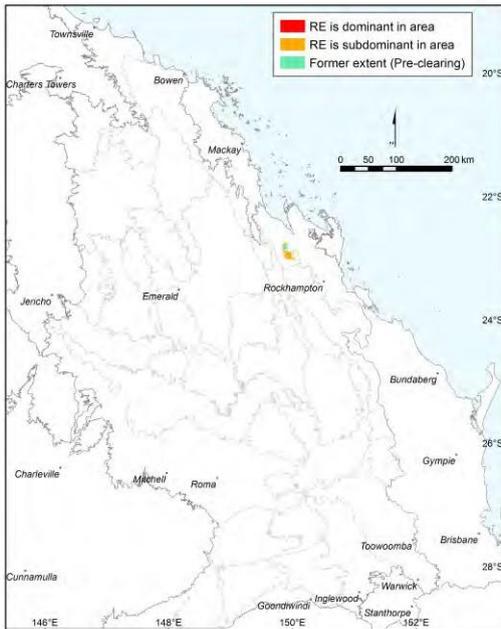
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Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Eucalyptus camaldulensis or E. tereticornis open forest to woodland fringing drainage lines derived from Serpentinite**



Pre-clearing area (ha), remnant area (ha) and per cent remaining: 4,938 4,206 85%

Species\_recorded: Total: 59; woody: 30; ground: 34; Avg. spp./site: 23.3; std dev.: 2.5, 3 site(s)

Basal area: Avg./site: 21.3 m<sup>2</sup>/ha, range: 10.0 - 32 m<sup>2</sup>/ha, std. deviation: 9 m<sup>2</sup>/ha, 3 site(s)

Structural formation: Woodland: 67%; open-forest: 33%, 3 site(s)

Representative\_sites 17062, 41177, 41195.

**Stratum: Tree 1**

Height avg. = 17.7m, range 12-25m, 3 sites

Crown cover avg. = 34.2%, range 27.0-48.5%, 3 sites

Dominant species (relative cover, frequency): *Eucalyptus tereticornis* (76, 33%), *Melaleuca viminalis* (74, 33%), *Casuarina cunninghamiana* (41, 100%), *Melaleuca hemisticta* (19, 33%), *Livistona decora* (4, 33%)

Frequent species (cover, frequency): *Casuarina cunninghamiana* (12, 100%), *Eucalyptus tereticornis* (16, 33%), *Exocarpos latifolius* (33%), *Livistona decora* (2, 33%), *Melaleuca fluviatilis* (1, 33%), *Melaleuca hemisticta* (5, 33%), *Melaleuca saligna* (1, 33%), *Melaleuca viminalis* (34, 33%), *Neoroepora buxifolia* (33%)

**Stratum: Tree 2**

Height avg. = 5.3m, range 3-8m, 3 sites

Crown cover avg. = 24.5%, range 0.6-58.0%, 3 sites

Dominant species (relative cover, frequency): *Livistona decora* (69, 67%), *Melaleuca viminalis* (57, 67%), *Neoroepora buxifolia* (28, 33%), *Exocarpos latifolius* (15, 33%), *Casuarina cunninghamiana* (4, 33%)

Frequent species (cover, frequency): *Livistona decora* (8, 67%), *Melaleuca viminalis* (11, 67%), *Casuarina cunninghamiana* (2, 33%), *Elaeodendron melanocarpum* (33%), *Exocarpos latifolius* (6, 33%), *Macaranga tanarius* (33%), *Myrsine variabilis* (33%), *Neolitsea brassii* (33%), *Neoroepora buxifolia* (12, 33%), *Trema tomentosa var. aspera* (33%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.3.25c

### Stratum: Tree 3

Height avg. = 5.0m, 1 site

Crown cover avg. = 7.0%, 1 site

Dominant species (relative cover, frequency): *Neolitsea australiensis* (71, 33%), *Neoroepora buxifolia* (29, 33%)

Frequent species (cover, frequency): *Neolitsea australiensis* (5, 33%), *Neoroepora buxifolia* (2, 33%)

### Stratum: Shrub 1

Height avg. = 1.7m, range 1.3-2m, 2 sites

Crown cover avg. = 1.8%, range 0.6-3.0%, 2 sites

Dominant species (relative cover, frequency): *Neoroepora buxifolia* (33, 33%), *Psychotria daphnoides* (22, 33%), *Ficus coronata* (11, 33%), *Melodorum leichhardtii* (11, 33%), *Alyxia ruscifolia* (11, 33%)

Frequent species (cover, frequency): *Lantana camara*\* (1, 67%), *Alyxia ruscifolia* (1, 33%), *Brachychiton bidwillii* (33%), *Cupaniopsis anacardioides* (33%), *Ficus coronata* (1, 33%), *Ficus opposita* (33%), *Gomphocarpus physocarpus*\* (33%), *Mallotus philippensis* (33%), *Melia azedarach* (33%), *Melodorum leichhardtii* (1, 33%), *Neoroepora buxifolia* (3, 33%), *Passiflora suberosa*\* (33%), *Polyscias elegans* (33%), *Psychotria daphnoides* (2, 33%), *Sida cordifolia*\* (33%), *Trema tomentosa* (33%)

### Stratum: Shrub 2

Height avg. = 1.0m, 1 site

Crown cover avg. = 2.0%, 1 site

### Stratum: Ground

Height avg. = 0.8m, range 0.5-1.2m, 3 sites

PFC avg. = 18.0%, range 8-32%, 3 sites

Dominant species (relative cover, frequency): *Antirhea putaminosa* (80, 33%), *Heteropogon contortus* (54, 33%), *Bothriochloa bladhii* (30, 33%), *Ipomoea plebeia* (15, 33%), *Cryptostegia grandiflora*\* (15, 33%)

Frequent species (cover, frequency): GRAMINOIDS: *Digitaria indet.* (1, 67%), *Gahnia aspera* (67%), *Aristida indet.* (1, 33%), *Bothriochloa bladhii* (10, 33%), *Cyperus indet.* (1, 33%), *Fimbristylis indet.* (33%), *Heteropogon contortus* (18, 33%), *Juncus indet.* (33%), *Panicum effusum* (33%), *Phragmites australis* (33%), *Schoenus apogon* var. *apogon* (1, 33%)

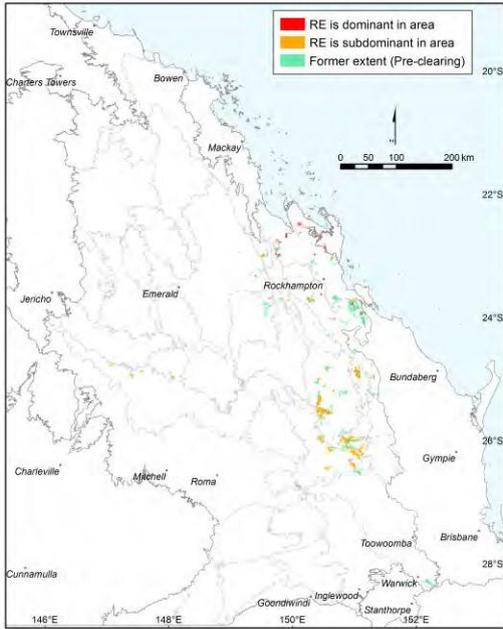
FORBS: *Passiflora suberosa*\* (100%), *Eustrephus latifolius* (67%), *Abutilon auritum* (1, 33%), *Antirhea putaminosa* (11, 33%), *Cassytha indet.* (33%), *Cissus oblonga* (1, 33%), *Commelina ensifolia* (33%), *Cryptostegia grandiflora*\* (1, 33%), *Euphorbia mitchelliana* (33%), *Hydrocotyle acutiloba* (1, 33%), *Ipomoea plebeia* (1, 33%), *Livistona decora* (33%), *Lomandra longifolia* (1, 33%), *Myrsine variabilis* (33%), *Parsonsia lanceolata* (33%), *Pimelea leptospermoides* (33%), *Sida cordifolia*\* (2, 33%), *Solanum seaforthianum*\* (1, 33%), *Solanum stelligerum* (33%), *Stachytarpheta jamaicensis*\* (33%), *Stackhousia indet.* (33%), *Trema tomentosa* var. *aspera* (33%), *Wahlenbergia indet.* (33%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Eucalyptus moluccana or E. microcarpa woodland to open forest on margins of alluvial plains**



Annie Kelly

**Pre-clearing area (ha), remnant area (ha) and per cent remaining:** 121,268      44,386      37%

**Species recorded:** Total: 175; woody: 29; ground: 154; Avg. spp./site: 34.4; std dev.: 20.6, 7 site(s)

**Basal area:** Avg./site: 16.2 m<sup>2</sup>/ha, range: 8.8 - 25 m<sup>2</sup>/ha, std. deviation: 7 m<sup>2</sup>/ha, 7 site(s)

**Structural formation:** Woodland: 57%; open-forest: 29%; tall open-forest: 14%, 7 site(s)

**Representative sites** 14858, 17523, 17539, 17692, 40749, 40807, 59082.

**Stratum: Tree 1**

**Height avg. = 23.4m, range 18-30m, 7 sites**  
**Crown cover avg. = 40.1%, range 20.0-60.0%, 7 sites**  
*Dominant species (relative cover, frequency): Eucalyptus moluccana (100, 86%)*  
*Frequent species (cover, frequency): Eucalyptus moluccana (42, 86%), Eucalyptus microcarpa (29, 14%)*

**Stratum: Tree 2**

**Height avg. = 11.8m, range 6-16m, 5 sites**  
**Crown cover avg. = 6.6%, range 0.0-20.0%, 5 sites**  
*Dominant species (relative cover, frequency): Eucalyptus moluccana (88, 57%)*  
*Frequent species (cover, frequency): Eucalyptus moluccana (4, 57%), Acacia rhodoxylon (10, 14%), Eucalyptus melanophloia (1, 14%), Eucalyptus microcarpa (6, 14%)*

**Stratum: Tree 3**

**Height avg. = 3.0m, 1 site**  
**Crown cover avg. = 2.0%, 1 site**

*Frequent species (cover, frequency): Eucalyptus microcarpa (3, 14%)*

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

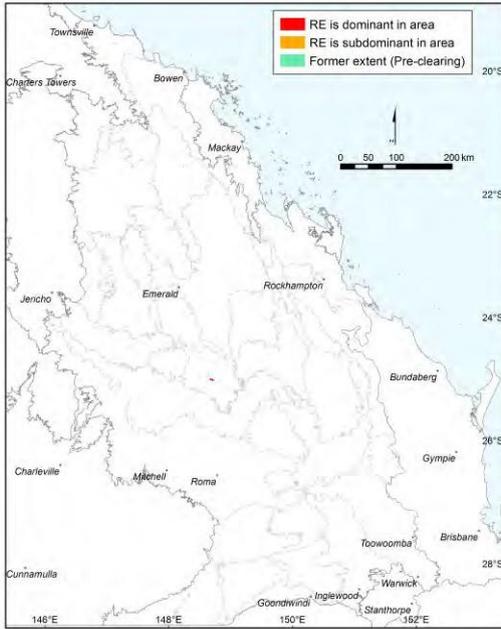
**Technical Description****Regional ecosystem: 11.3.26****Shrub 1****Stratum:****Height avg. = 2.3m, range 0.5-5m, 7 sites****Crown cover avg. = 3.1%, range 0.0-6.0%, 7 sites***Dominant species (relative cover, frequency): Eucalyptus moluccana (50, 43%), Lantana camara\* (37, 43%)**Frequent species (cover, frequency): Eucalyptus moluccana (2, 43%), Lantana camara\* (1, 43%), Acacia aulacocarpa (14%), Acacia disparrima subsp. disparrima (14%), Acacia leptocarpa (1, 14%), Acacia rhodoxylon (2, 14%), Alectryon connatus (14%), Alstonia constricta (14%), Callitris glaucophylla (2, 14%), Carissa ovata (2, 14%), Coelospermum reticulatum (14%), Croton insularis (14%), Cryptostegia grandiflora\* (14%), Denhamia cunninghamii (14%), Diospyros humilis (14%), Ehretia membranifolia (14%), Eucalyptus microcarpa (14%), Flueggea leucopyrus (14%), Geijera salicifolia (4, 14%), Indigofera pratensis (14%), Ludwigia octovalvis (14%), Melaleuca viridiflora (1, 14%), Petalostigma pubescens (2, 14%), Pittosporum spinescens (1, 14%), Planchonia careya (1, 14%), Psydrax odorata (14%), Secamone elliptica (14%), Sida hackettiana (14%)***Stratum: Ground****Height avg. = 4.7m, range 0.1-30m, 7 sites****PFC avg. = 52.4%, range 25-92%, 7 sites***Dominant species (relative cover, frequency): Eragrostis brownii (37, 29%), Heteropogon contortus (28, 29%), Eragrostis lacunaria (27, 29%), Cyperus gracilis (26, 71%), Arundinella nepalensis (18, 43%)**Frequent species (cover, frequency): GRAMINOIDS: Cyperus gracilis (11, 71%), Fimbristylis dichotoma (71%), Arundinella nepalensis (12, 43%), Bothriochloa decipiens (3, 29%), Bothriochloa decipiens var. decipiens (3, 29%), Cymbopogon refractus (29%), Cyperus difformis (29%), Cyperus fulvus (2, 29%), Cyperus javanicus (29%), Dinebra decipiens (3, 29%), Dinebra decipiens var. decipiens (3, 29%), Eragrostis brownii (34, 29%), Eragrostis lacunaria (8, 29%), Eragrostis sororia (1, 29%), Heteropogon contortus (17, 29%), Panicum effusum (29%), Paspalidium distans (1, 29%), Aristida caput-medusae (1, 14%), Aristida gracilipes (14%), Aristida jerichoensis var. subspinulifera (3, 14%), Aristida personata (14%), Aristida queenslandica var. dissimilis (1, 14%), Aristida ramosa (3, 14%), Bothriochloa bladhii subsp. bladhii (2, 14%), Calyptochloa gracillima subsp. gracillima (3, 14%), Capillipedium spicigerum (1, 14%), Chloris divaricata (3, 14%), Chloris truncata (35, 14%), Chloris ventricosa (14%), Chloris virgata\* (14%), Chrysopogon fallax (5, 14%), Chrysopogon sylvaticus (14%), Cyperus concinnus (14%), Cyperus conicus var. conicus (14%), Cyperus dietrichiae var. dietrichiae (1, 14%), Cyperus haspan (1, 14%), Cyperus rotundus\* (14%), Dichanthium tenue (14%), Digitaria gibbosa (14%), Eleocharis setifolia (14%), Enneapogon lindleyanus (1, 14%), Enteropogon acicularis (2, 14%), Enteropogon unispiceus (14%), Eragrostis indet. (3, 14%), Eragrostis leptostachya (1, 14%), Eragrostis spartinoides (25, 14%), Eremochloa bimaculata (14%), Eriochloa crebra (14%), Eriochloa pseudoacrotricha (14%), Fuirena ciliaris (2, 14%), Ottochloa nodosa (14%), Panicum simile (14%), Paspalidium caespitosum (2, 14%), Paspalidium criniforme (2, 14%), Paspalidium indet. (14%), Paspalum conjugatum\* (1, 14%), Paspalum scrobiculatum (1, 14%), Scleria brownii (14%), Sporobolus caroli (14%), Sporobolus elongatus (14%), Themeda triandra (10, 14%), Urochloa mosambicensis\* (14%)**FORBS: Brunoniella australis (1, 71%), Eremophila debilis (71%), Murdannia graminea (57%), Phyllanthus virgatus (57%), Rostellularia adscendens (57%), Alternanthera nana (43%), Breynia oblongifolia (43%), Sida hackettiana (43%), Alphonsonia excelsa (29%), Cyathium cinereum (29%), Desmodium varians (29%), Euphorbia drummondii (29%), Evolvulus alsinoides (29%), Gomphrena celosioides\* (29%), Ludwigia perennis (29%), Mecardonia procumbens\* (29%), Opuntia stricta\* (29%), Pterocaulon indet. (29%), Spermocoe brachystema (29%), Achyranthes aspera (14%), Alstonia constricta (14%), Alternanthera denticulata var. micrantha (14%), Aristolochia thozetii (14%), Bauhinia indet. (1, 14%), Bidens pilosa\* (14%), Boerhavia indet. (14%), Brunoniella acaulis (14%), Calyptocarpus vialis\* (14%), Capparis canescens (14%), Cassinia laevis (1, 14%), Centipeda minima subsp. minima (14%), Cheilanthes sieberi (14%), Corchorus trilocularis (14%), Cymbidium canaliculatum (14%), Denhamia cunninghamii (14%), Dianella caerulea (14%), Dianella longifolia (4, 14%), Dianella nervosa (14%), Dipteracanthus australasicus (14%), Eclipta prostrata\* (14%), Einadia nutans (14%), Emilia sonchifolia\* (14%), Emilia sonchifolia var. sonchifolia\* (14%), Erigeron sumatrensis\* (14%), Euphorbia dallachyana (14%), Euphorbia mitchelliana (14%), Galactia tenuiflora (1, 14%), Glossocardia bidens (14%), Glycine clandestina (14%), Gomphocarpus physocarpus\* (14%), Goodenia gracilis (14%), Grewia latifolia (14%), Hibiscus vitifolius (14%), Lindernia crustacea (14%), Lomandra confertifolia subsp. pallida (14%), Lomandra longifolia (1, 14%), Ludwigia octovalvis (14%), Malvastrum americanum var. americanum\* (14%), Malvastrum coromandelianum subsp. coromandelianum\* (14%), Myoporum acuminatum (14%), Neptunia gracilis (14%), Oldenlandia galioides (14%), Oldenlandia mitrasacmoides subsp. trachymenoides (14%), Opercularia diphylla (14%), Opuntia tomentosa\* (14%), Oxalis corniculata\* (14%), Passiflora suberosa\* (14%), Polygala triflora (14%), Polymeria calycina (14%), Pseuderanthemum variabile (14%), Psydrax odorata (14%), Pterocaulon redolens (14%), Rhynchosia minima (14%), Scoparia dulcis\* (14%), Secamone elliptica (14%), Senna barclayana (14%), Sida indet. (14%), Sida rohlenae (14%), Sida spinosa\* (14%), Solanum nigrum subsp. nigrum\* (14%), Spermacoe multicaulis (1, 14%), Sphaeromorphaea indet. (14%), Stenodia glabella (14%), Stylosanthes scabra\* (1, 14%), Symphyotrichum subulatum\* (14%), Synedrellopsis grisebachii\* (14%), Tephrosia filipes (14%), Triumfetta rhomboidea\* (14%), Verbena indet. (14%), Zornia indet. (14%)*

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Larger ephemeral - permanent water bodies (lakes)



Pre-clearing area (ha), remnant area (ha) and per cent remaining: 4,281 3,784 88%

Species recorded: Total: 33; woody: 3; ground: 30; Avg. spp./site: 18.0; std dev.: 1.0, 2 site(s)

Basal area: 0

Structural formation: Open-herbland: 100%, 2 site(s)

Representative sites 40798, 40799.

Stratum: Shrub 1

Height avg. = 1.0m, range 0.9-1m, 2 sites

Crown cover avg. = 17.5%, range 1.0-34.0%, 2 sites

Dominant species (relative cover, frequency): *Aeschynomene indica* (100, 50%), *Eucalyptus tereticornis* (91, 50%), *Eucalyptus coolabah* (9, 50%)

Frequent species (cover, frequency): *Aeschynomene indica* (34, 50%), *Eucalyptus coolabah* (50%), *Eucalyptus tereticornis* (1, 50%)

Stratum: Ground

Height avg. = 0.2m, range 0.2-0.2m, 2 sites

PFC avg. = 70.0%, range 42-98%, 2 sites

Dominant species (relative cover, frequency): *Spirodela oligorrhiza* (65, 50%), *Glinus lotoides* (24, 50%), *Cynodon dactylon*\* (14, 50%), *Marsilea hirsuta* (12, 100%), *Alternanthera denticulata* (12, 50%)

Frequent species (cover, frequency): GRAMINOIDS: *Hymenachne amplexicaulis 'Olive'*\* (3, 100%), *Cynodon dactylon*\* (6, 50%), *Cyperus exaltatus* (1, 50%), *Eleocharis dietrichiana* (50%), *Panicum paludosum* (3, 50%), *Paspalum distichum* (50%), *Urochloa mutica*\* (2, 50%)

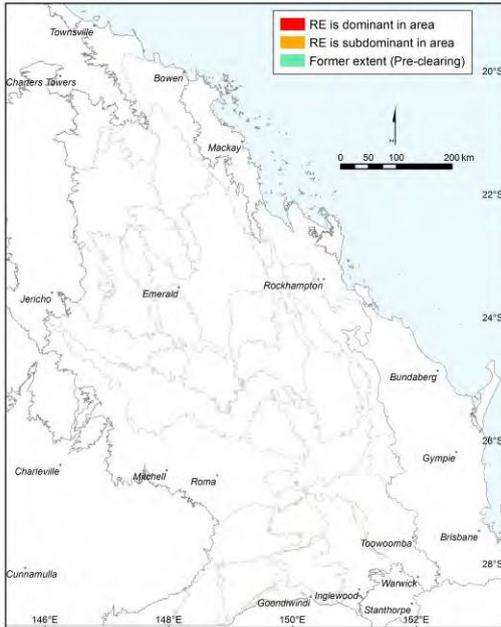
FORBS: *Marsilea hirsuta* (5, 100%), *Persicaria attenuata* (1, 100%), *Alternanthera denticulata* (5, 50%), *Ammannia multiflora* (50%), *Azolla indet.* (50%), *Basilicum polystachyon* (4, 50%), *Cardiospermum halicacabum*\* (50%), *Ceratophyllum demersum* (10, 50%), *Eclipta prostrata*\* (50%), *Eichhornia crassipes*\* (2, 50%), *Glinus lotoides* (10, 50%), *Heliotropium indicum*\* (2, 50%), *Ludwigia peploides subsp. montevidensis* (1, 50%), *Marsilea indet.* (50%), *Nelumbo nucifera* (50%), *Nymphoides geminata* (50%), *Parthenium hysterophorus*\* (50%), *Persicaria orientalis* (50%), *Pistia stratiotes*\* (5, 50%), *Sida indet.* (50%), *Sida spinosa*\* (50%), *Spirodela oligorrhiza* (64, 50%), *Utricularia aurea* (8, 50%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Open water +/- aquatics and emergents associated with lakes and larger waterholes



Pre-clearing area (ha), remnant area (ha) and per cent remaining: 13,008 5,689 44%

Species\_recorded: Total: 103; woody: 14; ground: 93; Avg. spp./site: 14.6; std dev.: 8.9, 10 site(s)

Basal area: Avg./site: 9.7 m<sup>2</sup>/ha, range: 2.0 - 18 m<sup>2</sup>/ha, std. deviation: 6 m<sup>2</sup>/ha, 5 site(s)

Structural formation: Sedgeland: 40%; woodland: 30%; tussock grassland: 10%; open-woodland: 10%; herbland: 10%, 10 site(s)

Representative\_sites 13833, 13834, 14686, 17053, 38902, 40787, 40789, 40790, 40945, 40953.

**Stratum: Emergent**

Height avg. = 25.0m, range 25-25m, 2 sites

Crown cover avg. = 2.0%, range 2.0-2.0%, 2 sites

Frequent species (cover, frequency): *Eucalyptus tereticornis* (2, 10%)

**Stratum: Tree 1**

Height avg. = 16.3m, range 11-20m, 4 sites

Crown cover avg. = 33.0%, range 7.0-48.0%, 4 sites

Dominant species (relative cover, frequency): *Eucalyptus coolabah* (88, 30%)

Frequent species (cover, frequency): *Eucalyptus coolabah* (31, 30%), *Eucalyptus camaldulensis* (1, 20%), *Dendrophthoe homoplatica* (1, 10%), *Eucalyptus tereticornis* (37, 10%), *Lysiphylum hookeri* (10%), *Owenia acidula* (10%)

**Stratum: Tree 2**

Height avg. = 14.0m, 1 site

Crown cover avg. = 10.0%, 1 site

Frequent species (cover, frequency): *Acacia cambagei* (5, 10%), *Acacia harpophylla* (5, 10%), *Acacia salicina* (1, 10%).

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.3.27b

*Amyema maidenii* (1, 10%), *Eremophila mitchellii* (1, 10%)

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Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

1/03/2018

**Technical Description****Regional ecosystem: 11.3.27b****Stratum: Shrub 1****Height avg. = 1.4m, range 1-2.2m, 4 sites****Crown cover avg. = 14.0%, range 1.0-49.0%, 4 sites**

*Frequent species (cover, frequency): Acacia salicina (1, 20%), Duma florulenta (35, 20%), Atalaya hemiglauca (1, 10%), Eucalyptus tereticornis (5, 10%), Ludwigia octovalvis (1, 10%)*

**Stratum: Shrub 2****Height avg. = 1.0m, 1 site****Crown cover avg. = 20.0%, 1 site****Stratum: Ground****Height avg. = 0.4m, range 0.01-1m, 10 sites****PFC avg. = 43.5%, range 1-73%, 10 sites**

*Dominant species (relative cover, frequency): Eleocharis sphacelata (53, 40%), Pseudoraphis spinescens (28, 40%), Marsilea mutica (15, 30%), Ludwigia peploides subsp. montevidensis (10, 40%), Alternanthera denticulata (5, 30%)*

*Frequent species (cover, frequency): GRAMINOIDS: Eleocharis sphacelata (31, 40%), Pseudoraphis spinescens (3, 40%), Cyperus difformis (1, 30%), Cynodon dactylon\* (22, 20%), Cyperus exaltatus (2, 20%), Paspalidium jubiflorum (4, 20%), Paspalum distichum (19, 20%), Bothriochloa decipiens var. decipiens (1, 10%), Carex inversa (10%), Cyperus alopecuroides (10%), Cyperus scariosus (1, 10%), Cyperus victoriensis (10%), Echinochloa colona\* (1, 10%), Eleocharis pallens (50, 10%), Eleocharis plana (2, 10%), Enteropogon ramosus (5, 10%), Eriochloa pseudoacrotricha (10%), Eulalia aurea (10%), Juncus aridicola (10%), Juncus continuus (10%), Juncus usitatus (10%), Leptochloa digitata (10%), Panicum larcomianum (3, 10%), Poaceae indet. (10%), Sporobolus caroli (10%), Sporobolus mitchellii (20, 10%), Urochloa mutica\* (2, 10%)*

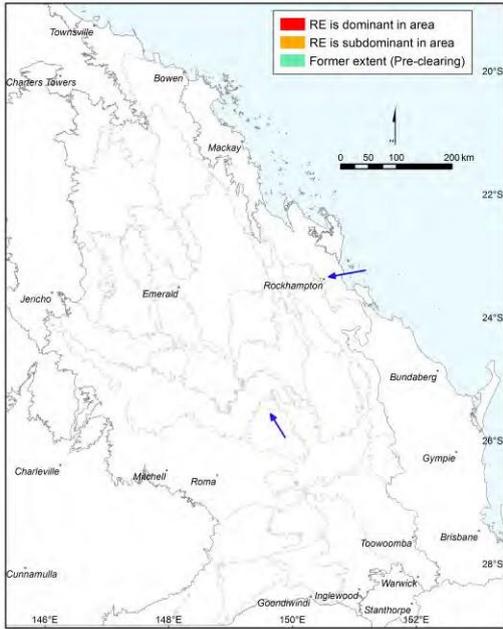
*FORBS: Ludwigia peploides subsp. montevidensis (6, 40%), Xanthium occidentale\* (1, 40%), Alternanthera denticulata (3, 30%), Marsilea indet. (2, 30%), Marsilea mutica (8, 30%), Phyla canescens\* (30%), Azolla pinnata (1, 20%), Commelina diffusa (5, 20%), Haloragis indet. (20%), Medicago polymorpha\* (20%), Ottelia ovalifolia (1, 20%), Persicaria lapathifolia (20%), Persicaria prostrata (20%), Spirodela oligorrhiza (2, 20%), Aeschynomene indica (10%), Alternanthera denticulata var. denticulata (10%), Alternanthera denticulata var. micrantha (10%), Alternanthera nodiflora (10%), Amaranthus macrocarpus (10%), Ammannia multiflora (10%), Boerhavia dominii (1, 10%), Calotis cuneata (10%), Ceratophyllum demersum (10%), Cirsium vulgare\* (10%), Cullen cinereum (10%), Cullen tenax (1, 10%), Dentella repens (2, 10%), Duma florulenta (10%), Eclipta prostrata\* (10, 10%), Einadia nutans subsp. nutans (10%), Elatine gratioloides (1, 10%), Euphorbia dallachyana (10%), Euphorbia indet. (10%), Galactia tenuiflora (10%), Glinus lotoides (6, 10%), Glinus oppositifolius (10%), Goodenia fascicularis (10%), Heliotropium indicum\* (10%), Lemna indet. (10%), Lepidium bonariense\* (10%), Ludwigia octovalvis (10%), Macroptilium lathyroides\* (10%), Malvastrum americanum var. americanum\* (10%), Marsilea drummondii (10%), Marsilea hirsuta (10%), Najas tenuifolia (2, 10%), Neptunia gracilis (10%), Nymphaea gigantea (1, 10%), Nymphoides indica (10%), Parthenium hysterophorus\* (10%), Persicaria attenuata (10%), Phyla indet. (2, 10%), Polygonum aviculare\* (10%), Potamogeton tricarlinatus (10%), Rumex indet. (10%), Senecio brigalowensis (10%), Sesbania cannabina (10%), Sesbania cannabina var. cannabina (3, 10%), Sida rhombifolia\* (10%), Sida rohlenae subsp. rohlenae (10%), Sonchus oleraceus\* (10%), Stellaria angustifolia (2, 10%), Symphyotrichum subulatum\* (10%), Tetragonia tetragonoides (5, 10%), Vigna lanceolata var. lanceolata (10%), Xanthium indet. (10%)*

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Mixed grassland or sedgeland with areas of open water +/- aquatic species



Pre-clearing area (ha), remnant area (ha) and per cent remaining: 1,845 1,345 73%

Species\_recorded: Total: 44; woody: 2; ground: 43; Avg. spp./site: 14.0; std dev.: 4.0, 7 site(s)

Basal area: 0

Structural formation: Closed-herbland: 57%; sedgeland: 14%; herbland: 14%; closed-sedgeland: 14%, 7 site(s)

Representative\_sites 40797, 40918, 40919, 40920, 40923, 40926, 40935.

Stratum: Shrub 1

Height avg. = 1.2m, 1 site

Crown cover avg. = 96.4%, 1 site

Frequent species (cover, frequency): *Nelumbo nucifera* (95, 14%), *Persicaria orientalis* (6, 14%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.3.27c

### Ground Stratum:

Height avg. = 0.4m, range 0.1-0.6m, 7 sites

PFC avg. = 86.7%, range 76-95%, 7 sites

*Dominant species (relative cover, frequency): Eleocharis sphacelata (36, 57%), Marsilea mutica (31, 43%), Najas tenuifolia (20, 57%), Spirodela indet. (18, 43%), Pseudoraphis paradoxa (13, 71%)*

*Frequent species (cover, frequency): GRAMINOIDS: Paspalum distichum (3, 71%), Pseudoraphis paradoxa (10, 71%), Eleocharis sphacelata (30, 57%), Cyperus exaltatus (1, 29%), Echinochloa colona\* (1, 29%), Eleocharis dietrichiana (4, 29%), Hymenachne amplexicaulis\* (29%), Pseudoraphis spinescens (1, 29%), Urochloa mutica\* (29%), Cynodon dactylon\* (14%), Juncus indet. (14%), Juncus usitatus (14%), Leersia hexandra (5, 14%), Panicum paludosum (14%)*

*FORBS: Ludwigia peploides subsp. montevidensis (8, 100%), Azolla pinnata (1, 86%), Ceratophyllum demersum (3, 86%), Najas tenuifolia (15, 57%), Nymphaea immutabilis (5, 57%), Eclipta prostrata\* (2, 43%), Marsilea indet. (3, 43%), Marsilea mutica (28, 43%), Spirodela indet. (15, 43%), Utricularia stellaris (3, 43%), Aeschynomene indica (1, 29%), Eichhornia crassipes\* (5, 29%), Nymphaea indet. (2, 29%), Nymphoides indica (29%), Ottelia ovalifolia (1, 29%), Alternanthera denticulata (14%), Basilicum polystachyon (14%), Centella asiatica (14%), Gnaphalium polycaulon\* (14%), Heliotropium indicum\* (14%), Ipomoea aquatica (48, 14%), Ludwigia octovalvis (14%), Marsilea hirsuta (1, 14%), Nelumbo nucifera (10, 14%), Nymphaea violacea (14%), Nymphoides crenata (14%), Persicaria attenuata (14%), Potamogeton tricarinatus (14%), Vallisneria nana (14%)*

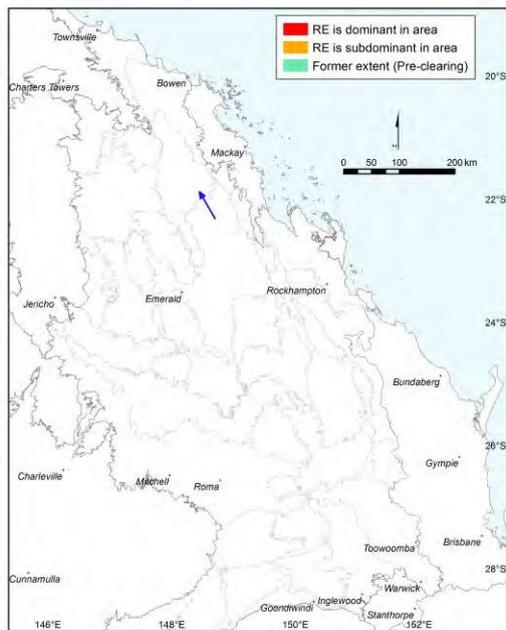
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**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Eucalyptus coolabah and/or E. tereticornis open woodland to woodland fringing swamps**



Pre-clearing area (ha), remnant area (ha) and per cent remaining: 1,670 846 51%

Species\_recorded: Total: 88; woody: 12; ground: 78; Avg. spp./site: 10.8; std dev.: 7.7, 9 site(s)

Basal area: Avg./site: 16.5 m<sup>2</sup>/ha, range: 5.0 - 28 m<sup>2</sup>/ha, std. deviation: 12 m<sup>2</sup>/ha, 4 site(s)

Structural formation: Woodland: 20%; open-sedgeland: 20%; open-forest: 20%; tussock grassland: 10%; open-herbland: 10%; herbland: 10%; closed-sedgeland: 10%, 10 site(s)

Representative\_sites 17031, 17559, 38877, 40785, 40786, 40795, 40936, 40939, 40941, 40946.

**Stratum: Tree 1**

Height avg. = 13.0m, range 7-20m, 4 sites

Crown cover avg. = 34.0%, range 0.0-69.0%, 5 sites

Dominant species (relative cover, frequency): *Eucalyptus coolabah* (83, 30%)

Frequent species (cover, frequency): *Eucalyptus coolabah* (24, 30%), *Allocasuarina luehmannii* (5, 10%), *Eucalyptus camaldulensis* (69, 10%), *Eucalyptus tereticornis* (10%), *Melaleuca bracteata* (25, 10%)

**Stratum: Shrub 1**

Height avg. = 1.3m, range 0.5-2m, 3 sites

Crown cover avg. = 2.3%, range 1.0-4.0%, 3 sites

Frequent species (cover, frequency): *Acacia indet.* (1, 10%), *Aeschynomene indica* (1, 10%), *Bidens pilosa\** (10%), *Eremophila bignoniiflora* (2, 10%), *Parkinsonia aculeata\** (10%), *Psydrax oleifolia* (1, 10%), *Sclerolaena muricata var. muricata* (1, 10%)

**Stratum: Shrub 2**

Height avg. = 1.0m, 1 site

Crown cover avg. = 0.0%, 1 site

Frequent species (cover, frequency): *Aeschynomene indica* (10%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Technical Description****Regional ecosystem: 11.3.27f****Ground  
Stratum:****Height avg. = 0.2m, range 0.1-0.4m, 9 sites****PFC avg. = 42.4%, range 1-100%, 9 sites**

*Dominant species (relative cover, frequency):* *Eleocharis pallens* (78, 22%), *Eleocharis sphacelata* (44, 44%), *Echinochloa colona*\* (36, 22%), *Eleocharis plana* (32, 22%), *Pseudoraphis spinescens* (28, 22%)

*Frequent species (cover, frequency):* GRAMINOIDS: *Eleocharis sphacelata* (12, 44%), *Dinebra divaricatissima* (4, 33%), *Cyperus exaltatus* (22%), *Cyperus indet.* (1, 22%), *Echinochloa colona*\* (25, 22%), *Eleocharis pallens* (56, 22%), *Eleocharis plana* (2, 22%), *Panicum decompositum* var. *decompositum* (3, 22%), *Pseudoraphis spinescens* (17, 22%), *Aristida lignosa* (1, 11%), *Austrostipa verticillata* (5, 11%), *Bothriochloa decipiens* var. *decipiens* (11%), *Cenchrus ciliaris*\* (11%), *Chloris truncata* (11%), *Chrysopogon fallax* (11%), *Cyperus concinnus* (11%), *Cyperus difformis* (11%), *Cyperus haspan* subsp. *haspan* (11%), *Cyperus platystylis* (3, 11%), *Eleocharis blakeana* (30, 11%), *Emneapogon gracilis* (11%), *Enteropogon acicularis* (11%), *Juncus indet.* (11%), *Leersia hexandra* (6, 11%), *Panicum queenslandicum* (3, 11%), *Paspalidium caespitosum* (11%), *Walwhalleya subxerophila* (11%)

FORBS: *Azolla pinnata* (2, 33%), *Boerhavia dominii* (1, 22%), *Einadia nutans* subsp. *nutans* (3, 22%), *Ludwigia peploides* subsp. *montevicensis* (4, 22%), *Marsilea indet.* (1, 22%), *Sclerolaena muricata* var. *muricata* (22%), *Sesbania cannabina* var. *cannabina* (22%), *Abutilon oxycarpum* var. *incanum* (11%), *Alternanthera denticulata* (11%), *Ammannia multiflora* (1, 11%), *Apowollastonia spilanthis* (11%), *Caldesia oligococca* (16, 11%), *Capparis mitchellii* (11%), *Ceratophyllum demersum* (11%), *Cycnogeton procerus* (11%), *Dysphania indet.* (1, 11%), *Dysphania pumilio* (1, 11%), *Eichhornia crassipes*\* (11%), *Enchylaena tomentosa* (11%), *Enchylaena tomentosa* var. *tomentosa* (11%), *Euphorbia dallachyana* (11%), *Glinus lotoides* (11%), *Goodenia gracilis* (11%), *Harrisia martinii*\* (11%), *Lepidium bonariense*\* (11%), *Ludwigia octovalvis* (1, 11%), *Malvastrum americanum* var. *americanum*\* (11%), *Marsilea hirsuta* (15, 11%), *Nymphoides indica* (11%), *Ottelia ovalifolia* (11%), *Oxalis indet.* (11%), *Oxalis perennans* (11%), *Persicaria orientalis* (11%), *Phyla canescens*\* (11%), *Physalis lanceifolia*\* (11%), *Portulaca oleracea*\* (5, 11%), *Sida trichopoda* (11%), *Sonchus oleraceus*\* (11%), *Spirodela indet.* (4, 11%), *Spirodela oligorrhiza* (11%), *Utricularia aurea* (3, 11%), *Xanthium occidentale*\* (1, 11%)

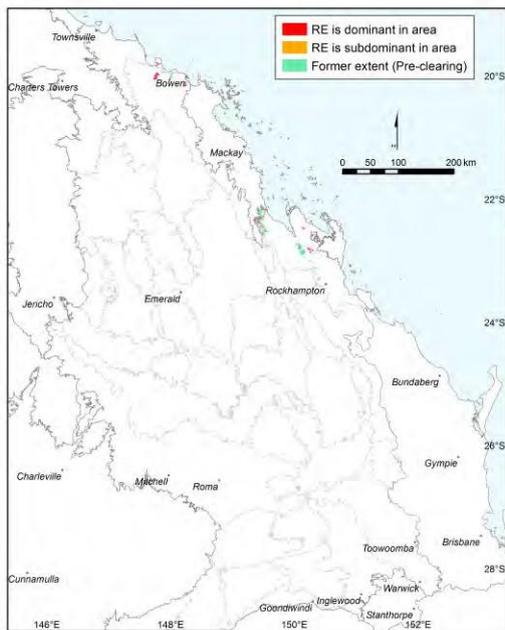
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**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Eucalyptus crebra +/- Corymbia dallachiana +/- C. erythrophloia, E. moluccana woodland**



Jesse Rowland

**Pre-clearing area (ha), remnant area (ha) and per cent remaining:** 51,532 16,793 33%

**Species recorded:** Total: 86; woody: 14; ground: 77; Avg. spp/site: 36.3; std dev.: 11.5, 4 site(s)

**Basal area:** Avg/site: 19.6 m<sup>2</sup>/ha, range: 4.5 - 35 m<sup>2</sup>/ha, std. deviation: 11 m<sup>2</sup>/ha, 4 site(s)

**Structural formation:** Woodland: 100%, 4 site(s)

**Representative sites** 19103, 59083, 59086, 59087.

**Stratum: Tree 1**

**Height avg. = 20.8m, range 17-24m, 4 sites**

**Crown cover avg. = 27.5%, range 20.0-35.0%, 4 sites**

*Dominant species (relative cover, frequency): Eucalyptus crebra (55, 100%), Eucalyptus tereticornis subsp. tereticornis (22, 75%), Eucalyptus populnea (21, 50%), Corymbia clarksoniana (18, 75%), Eucalyptus platyphylla (11, 25%)*

*Frequent species (cover, frequency): Eucalyptus crebra (14, 100%), Corymbia clarksoniana (5, 75%), Eucalyptus tereticornis subsp. tereticornis (6, 75%), Corymbia tessellaris (1, 50%), Eucalyptus populnea (5, 50%), Eucalyptus platyphylla (2, 25%), Eucalyptus tereticornis (25%)*

**Stratum: Tree 2**

**Height avg. = 9.1m, range 7-14m, 4 sites**

**Crown cover avg. = 4.5%, range 1.0-7.0%, 4 sites**

*Dominant species (relative cover, frequency): Eucalyptus tereticornis (71, 25%), Eucalyptus crebra (58, 75%), Eucalyptus populnea (33, 25%), Corymbia clarksoniana (33, 25%), Corymbia dallachiana (27, 50%)*

*Frequent species (cover, frequency): Eucalyptus crebra (2, 75%), Corymbia dallachiana (2, 50%), Corymbia clarksoniana (3, 25%), Eucalyptus platyphylla (25%), Eucalyptus populnea (3, 25%), Eucalyptus tereticornis (1, 25%), Melaleuca viridiflora var. viridiflora (1, 25%)*

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.3.29a

### Stratum: Shrub 1

Height avg. = 3.9m, range 3-5.5m, 4 sites

Crown cover avg. = 1.0%, range 0.0-2.0%, 4 sites

Dominant species (relative cover, frequency): *Acacia disparrima* subsp. *disparrima* (94, 25%), *Melaleuca viridiflora* var. *viridiflora* (67, 50%), *Corymbia dallachiana* (67, 25%), *Vachellia bidwillii* (50, 25%), *Eucalyptus tereticornis* (50, 25%)

Frequent species (cover, frequency): *Melaleuca viridiflora* var. *viridiflora* (2, 50%), *Acacia disparrima* subsp. *disparrima* (2, 25%), *Corymbia dallachiana* (1, 25%), *Eucalyptus tereticornis* (25%), *Psydrax longipes* (25%), *Vachellia bidwillii* (25%)

### Stratum: Shrub 2

Height avg. = 2.2m, 1 site

Crown cover avg. = 1.0%, 1 site

Dominant species (relative cover, frequency): *Petalostigma pubescens* (80, 25%), *Acacia salicina* (20, 25%)

Frequent species (cover, frequency): *Acacia salicina* (1, 25%), *Petalostigma pubescens* (2, 25%)

### Stratum: Ground

Height avg. = 0.5m, range 0.25-0.9m, 4 sites

PFC avg. = 52.5%, range 25-85%, 4 sites

Dominant species (relative cover, frequency): *Themeda triandra* (42, 100%), *Bothriochloa decipiens* var. *decipiens* (21, 75%), *Arundinella nepalensis* (17, 25%), *Eragrostis sororia* (16, 50%), *Paspalidium distans* (12, 50%)

Frequent species (cover, frequency): GRAMINOIDS: *Chrysopogon fallax* (1, 100%), *Fimbristylis dichotoma* (1, 100%), *Heteropogon contortus* (1, 100%), *Themeda triandra* (28, 100%), *Bothriochloa decipiens* var. *decipiens* (6, 75%), *Chloris inflata*\* (50%), *Cymbopogon refractus* (1, 50%), *Cyperus fulvus* (50%), *Cyperus gracilis* (50%), *Dinebra decipiens* var. *decipiens* (2, 50%), *Eragrostis sororia* (7, 50%), *Eragrostis spartinoides* (1, 50%), *Eriochloa pseudoacrotricha* (50%), *Paspalidium distans* (5, 50%), *Abildgaardia ovata* (25%), *Arundinella nepalensis* (10, 25%), *Bothriochloa bladhii* subsp. *bladhii* (1, 25%), *Chloris divaricata* var. *divaricata* (25%), *Dichanthium aristatum*\* (25%), *Dinebra decipiens* (25%), *Melinis repens*\* (25%), *Ottochloa nodosa* (25%), *Panicum effusum* (25%), *Panicum simile* (25%), *Paspalidium rarum* (25%), *Sporobolus creber* (1, 25%), *Urochloa mosambicensis*\* (25%), *Urochloa whiteana* (25%)

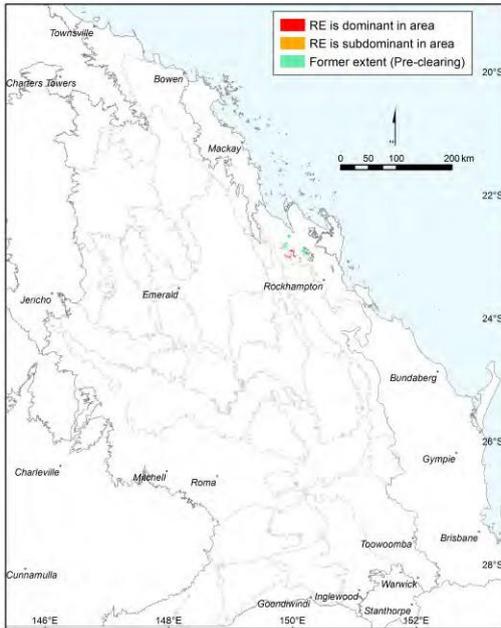
FORBS: *Stylosanthes scabra*\* (100%), *Cyanthillium cinereum* (75%), *Murdannia graminea* (75%), *Phyllanthus virgatus* (1, 75%), *Rostellularia adscendens* (75%), *Sida hackettiana* (75%), *Sida spinosa*\* (75%), *Alternanthera nana* (50%), *Commelina diffusa* (50%), *Corymbia dallachiana* (50%), *Emilia sonchifolia* var. *sonchifolia*\* (50%), *Eremophila debilis* (50%), *Eucalyptus crebra* (1, 50%), *Glycine clandestina* (50%), *Opuntia stricta*\* (50%), *Polygala triflora* (50%), *Pterocaulon redolens* (50%), *Spermacoce brachystema* (50%), *Sphaeromorphaea* indet. (50%), *Acmella grandiflora* var. *brachyglossa* (25%), *Alysicarpus bupleurifolius*\* (25%), *Asclepias curassavica*\* (25%), *Brunoniella acaulis* (3, 25%), *Brunoniella acaulis* subsp. *acaulis* (25%), *Brunoniella australis* (25%), *Centipeda minima* subsp. *minima* (25%), *Corymbia clarksoniana* (25%), *Crinum flaccidum* (25%), *Dianella caerulea* (25%), *Dianella nervosa* (25%), *Erigeron bonariensis*\* (25%), *Eucalyptus tereticornis* subsp. *tereticornis* (25%), *Evolvulus alsinoides* (25%), *Galactia tenuiflora* var. *lucida* (1, 25%), *Glossocardia bidens* (25%), *Glycine cyrtoloba* (25%), *Gomphrena celosioides*\* (25%), *Ludwigia perennis* (25%), *Mecardonia procumbens*\* (25%), *Melaleuca viridiflora* var. *viridiflora* (25%), *Portulaca pilosa*\* (25%), *Praxelis clematidea*\* (25%), *Psydrax odorata* (25%), *Ruellia tuberosa*\* (3, 25%), *Sida cordifolia*\* (25%), *Stylosanthes hamata*\* (1, 25%), *Symphotrichum subulatum*\* (25%), *Urarica picta* (25%), *Zornia dyctiocarpa* var. *filifolia* (25%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Eucalyptus tereticornis, Melaleuca viridiflora, Corymbia tessellaris and Eucalyptus fibrosa subsp. fibrosa tall woodland with a grassy ground layer on alluvial plains and broad drainage lines derived from serpentinite**



Pre-clearing area (ha), remnant area (ha) and per cent remaining: 30,676 8,266 27%

Species\_recorded: Total: 59; woody: 14; ground: 46; Avg. spp./site: 30.0; std dev.: 8.0, 2 site(s)

Basal area: Avg./site: 29.5 m<sup>2</sup>/ha, range: 26.0 - 33 m<sup>2</sup>/ha, std. deviation: 4 m<sup>2</sup>/ha, 2 site(s)

Structural formation: Open-forest: 100%, 2 site(s)

Representative\_sites 41276, 59084.

**Stratum: Tree 1**

Height avg. = 17.5m, range 12-23m, 2 sites

Crown cover avg. = 71.0%, range 58.0-84.0%, 2 sites

Dominant species (relative cover, frequency): *Melaleuca bracteata* (100, 50%), *Eucalyptus tereticornis* subsp. *tereticornis* (100, 50%)

Frequent species (cover, frequency): *Eucalyptus tereticornis* subsp. *tereticornis* (84, 50%), *Melaleuca bracteata* (58, 50%)

**Stratum: Tree 2**

Height avg. = 9.5m, range 5-14m, 2 sites

Crown cover avg. = 19.5%, range 15.9-23.0%, 2 sites

Dominant species (relative cover, frequency): *Melaleuca bracteata* (99, 50%), *Melaleuca viridiflora* var. *viridiflora* (83, 50%), *Lophostemon suaveolens* (10, 50%), *Eucalyptus tereticornis* subsp. *tereticornis* (6, 50%)

Frequent species (cover, frequency): *Diospyros geminata* (50%), *Eucalyptus tereticornis* subsp. *tereticornis* (2, 50%), *Lophostemon suaveolens* (3, 50%), *Maclura cochinchinensis* (50%), *Melaleuca bracteata* (12, 50%), *Melaleuca viridiflora* var. *viridiflora* (20, 50%), *Psyrax odorata* (50%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.3.38

### Stratum: Shrub 1

Height avg. = 2.3m, range 1-3.5m, 2 sites

Crown cover avg. = 10.5%, range 5.0-15.9%, 2 sites

Dominant species (relative cover, frequency): *Cryptostegia grandiflora*\* (99, 50%), *Melaleuca viridiflora* var. *viridiflora* (50, 50%), *Eucalyptus tereticornis* subsp. *tereticornis* (50, 50%)

Frequent species (cover, frequency): *Alectryon connatus* (50%), *Alphitonia excelsa* (50%), *Cryptostegia grandiflora*\* (14, 50%), *Eucalyptus tereticornis* subsp. *tereticornis* (3, 50%), *Ficus opposita* (50%), *Jasminum simplicifolium* subsp. *australiense* (50%), *Lantana camara*\* (50%), *Maclura cochinchinensis* (50%), *Melaleuca viridiflora* var. *viridiflora* (3, 50%), *Psychotria daphnoides* var. *angustifolia* (50%)

### Stratum: Shrub 2

Height avg. = 1.2m, 1 site

Crown cover avg. = 2.0%, 1 site

Dominant species (relative cover, frequency): *Melaleuca viridiflora* var. *viridiflora* (60, 50%), *Eucalyptus tereticornis* subsp. *tereticornis* (40, 50%)

Frequent species (cover, frequency): *Eucalyptus tereticornis* subsp. *tereticornis* (1, 50%), *Melaleuca viridiflora* var. *viridiflora* (2, 50%)

### Stratum: Ground

Height avg. = 0.6m, range 0.35-0.8m, 2 sites

PFC avg. = 40.0%, range 15-65%, 2 sites

Dominant species (relative cover, frequency): *Eleocharis dietrichiana* (56, 50%), *Paspalidium caespitosum* (53, 50%), *Ludwigia octovalvis* (19, 50%), *Monochoria cyanea* (9, 50%), *Arundinella nepalensis* (6, 100%)

Frequent species (cover, frequency): GRAMINOIDS: *Arundinella nepalensis* (2, 100%), *Aristida gracilipes* (50%), *Cyperus difformis* (50%), *Cyperus haspan* subsp. *juncooides* (50%), *Cyperus procerus* (3, 50%), *Eleocharis dietrichiana* (30, 50%), *Eleocharis philippinensis* (1, 50%), *Eragrostis elongata* (1, 50%), *Eragrostis spartinoides* (50%), *Gahnia aspera* (1, 50%), *Imperata cylindrica* (1, 50%), *Leersia hexandra* (1, 50%), *Paspalidium caespitosum* (9, 50%), *Schoenoplectiella mucronata* (50%), *Scleria indet.* (50%), *Sporobolus indet.* (50%)

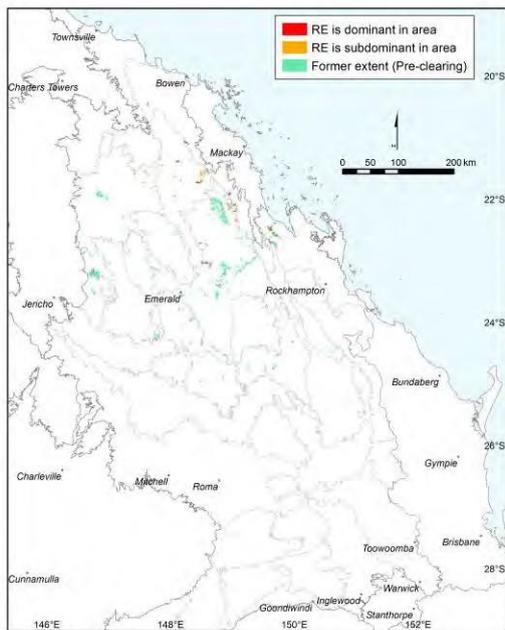
FORBS: *Alternanthera denticulata* var. *denticulata* (50%), *Brachyscome basaltica* (50%), *Breynia oblongifolia* (50%), *Brunoniella acaulis* (1, 50%), *Caldesia oligococca* (50%), *Commelina ensifolia* (50%), *Cryptostegia grandiflora*\* (50%), *Dianella longifolia* var. *longifolia* (50%), *Eremophila debilis* (50%), *Eustrephus latifolius* (50%), *Haloragis indet.* (50%), *Hygrophila angustifolia* (50%), *Ipomoea indet.* (50%), *Lobelia purpurascens* (50%), *Lobelia stenophylla* (50%), *Ludwigia octovalvis* (10, 50%), *Monochoria cyanea* (5, 50%), *Murdannia cryptantha* (50%), *Oldenlandia subulata* (50%), *Parsonsia indet.* (50%), *Passiflora suberosa*\* (50%), *Philydrum lanuginosum* (50%), *Phyllanthus virgatus* (50%), *Pseuderanthemum variabile* (50%), *Pterocaulon redolens* (50%), *Sida rhombifolia*\* (1, 50%), *Stachytarpheta jamaicensis*\* (50%), *Stackhousia tryonii* (50%), *Verbena bonariensis*\* (50%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Eucalyptus spp. and/or Corymbia spp. grassy or shrubby woodland on Cainozoic clay plains**



**Pre-clearing area (ha), remnant area (ha) and per cent remaining: 195,490 34,831 18%**

**Species\_recorded: Total: 64; woody: 20; ground: 46; Average species per site and standard deviation not available**

**Basal area: Avg/site: 14.1 m<sup>2</sup>/ha, range: 9.5 - 17 m<sup>2</sup>/ha, std. deviation: 3 m<sup>2</sup>/ha, 4 site(s)**

**Structural formation: Woodland: 75%; open-woodland: 25%, 4 site(s)**

**Representative\_sites 17194, 17555, 17574, 17578.**

**Stratum: Tree 1**

**Height avg. = 21.8m, range 20-25m, 4 sites**

**Crown cover avg. = 26.3%, range 20.0-35.0%, 4 sites**

*Dominant species (relative cover, frequency): Eucalyptus populnea (94, 100%), Acacia excelsa (10, 25%), Eucalyptus crebra (7, 50%)*

*Frequent species (cover, frequency): Eucalyptus populnea (25, 100%), Eucalyptus crebra (3, 50%), Acacia excelsa (2, 25%), Corymbia dallachiana (25%), Eucalyptus crebra x E. populnea (25%)*

**Stratum: Tree 2**

**Height avg. = 12.0m, range 10-14m, 3 sites**

**Crown cover avg. = 5.7%, range 5.0-7.0%, 3 sites**

*Dominant species (relative cover, frequency): Cassia brewsteri (100, 25%), Eucalyptus populnea (93, 50%), Acacia excelsa (14, 25%)*

*Frequent species (cover, frequency): Eucalyptus populnea (6, 50%), Acacia excelsa (1, 25%), Cassia brewsteri (5, 25%)*

**Stratum: Tree 3**

**Height avg. = 3.0m, 1 site**

**Crown cover avg. = 1.0%, 1 site**

*Dominant species (relative cover, frequency): Denhamia pittosporoides subsp. pittosporoides (50, 25%), Acacia excelsa (50, 25%)*

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

## Regional ecosystem: 11.4.2

*Frequent species (cover, frequency): Acacia excelsa (25%), Denhamia pittosporoides subsp. pittosporoides (25%)*

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Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Technical Description****Regional ecosystem: 11.4.2****Stratum: Shrub 1****Height avg. = 2.0m, range 1.2-3m, 4 sites****Crown cover avg. = 8.8%, range 1.0-30.0%, 4 sites**

*Dominant species (relative cover, frequency): Erythroxylum sp. (Splityard Creek L.Pedley 5360) (50, 25%), Cassia brewsteri (50, 25%), Erythroxylum australe (48, 25%), Denhamia pittosporoides subsp. pittosporoides (48, 25%), Eremophila mitchellii (33, 25%)*

*Frequent species (cover, frequency): Alectryon oleifolius subsp. elongatus (25%), Alstonia constricta (5, 25%), Atalaya hemiglaucula (5, 25%), Breynia oblongifolia (1, 25%), Cassia brewsteri (1, 25%), Denhamia pittosporoides subsp. pittosporoides (1, 25%), Eremophila mitchellii (10, 25%), Erythroxylum australe (1, 25%), Erythroxylum sp. (Splityard Creek L.Pedley 5360) (1, 25%), Flindersia dissosperma (5, 25%), Grewia latifolia (1, 25%), Opuntia streptacantha\* (25%), Owenia acidula (5, 25%), Sida hackettiana (1, 25%), Sida sp. (Musselbrook M.B.Thomas+ MRS437) (1, 25%)*

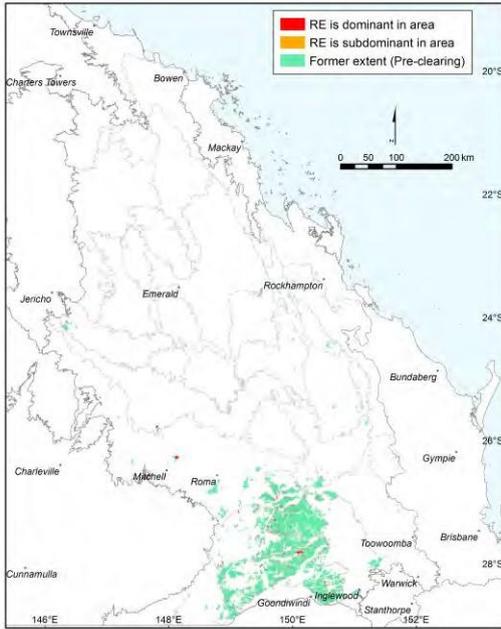
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**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Acacia harpophylla and/or Casuarina cristata shrubby open forest on Cainozoic clay plains**



Don Butler

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 1,548,281 74,017 5%

Species\_recorded: Total: 171; woody: 41; ground: 142; Avg. spp./site: 38.7; std dev.: 8.4, 9 site(s)

Basal area: Avg./site: 23.4 m<sup>2</sup>/ha, range: 8.5 - 50 m<sup>2</sup>/ha, std. deviation: 10 m<sup>2</sup>/ha, 10 site(s)

Structural formation: Open-forest: 55%; woodland: 36%; low open-forest: 9%, 11 site(s)

Representative\_sites 16553, 16638, 16653, 16654, 16744, 16746, 16930, 16931, 16932, 17103, 17491.

**Stratum: Emergent**

Height avg. = 16.0m, 1 site

Crown cover avg. = 2.0%, 1 site

Frequent species (cover, frequency): *Acacia harpophylla* (1, 9%), *Casuarina cristata* (9%), *Eucalyptus woollsiana* (1, 9%)

**Stratum: Tree 1**

Height avg. = 18.1m, range 8.5-24m, 11 sites

Crown cover avg. = 43.5%, range 30.0-61.0%, 11 sites

Dominant species (relative cover, frequency): *Acacia harpophylla* (66, 73%), *Casuarina cristata* (50, 82%)

Frequent species (cover, frequency): *Baumea indet.* (5, 9%), *Casuarina cristata* (19, 82%), *Acacia harpophylla* (32, 73%), *Amyema quandang* (18%), *Eucalyptus woollsiana* (2, 18%), *Lysiphillum carronii* (2, 9%), *Parsonsia lanceolata* (1, 9%)

**Stratum: Tree 2**

Height avg. = 11.0m, range 7.5-17m, 9 sites

Crown cover avg. = 8.9%, range 1.0-24.0%, 9 sites

Dominant species (relative cover, frequency): *Acacia harpophylla* (65, 73%), *Casuarina cristata* (35, 55%)

Frequent species (cover, frequency): *Acacia harpophylla* (7, 73%), *Casuarina cristata* (3, 55%), *Alectryon diversifolius* (1, 9%).

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

## Regional ecosystem: 11.4.3

*Brachychiton rupestris* (9%), *Eremophila mitchellii* (1, 9%), *Eucalyptus populnea* (9%), *Geijera parviflora* (2, 9%), *Opuntia tomentosa*\* (9%)

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Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Tree 3  
Stratum:

Height avg. = 3.5m, range 3-4m, 2 sites

Crown cover avg. = 17.5%, range 15.0-20.0%, 2 sites

Frequent species (cover, frequency): *Eremophila mitchellii* (5, 18%), *Geijera parviflora* (10, 18%), *Santalum lanceolatum* (5, 9%)

Stratum: Shrub 1

Height avg. = 3.7m, range 0.5-8m, 10 sites

Crown cover avg. = 16.0%, range 3.0-30.0%, 10 sites

Dominant species (relative cover, frequency): *Geijera parviflora* (81, 64%), *Acacia harpophylla* (21, 55%), *Alectryon diversifolius* (13, 36%), *Eremophila mitchellii* (8, 27%), *Opuntia tomentosa*\* (4, 27%)

Frequent species (cover, frequency): *Geijera parviflora* (14, 64%), *Acacia harpophylla* (3, 55%), *Alectryon diversifolius* (2, 36%), *Casuarina cristata* (27%), *Eremophila mitchellii* (1, 27%), *Opuntia tomentosa*\* (1, 27%), *Apophyllum anomalum* (18%), *Atalaya hemiglaucata* (18%), *Citrus glauca* (18%), *Ehretia membranifolia* (1, 18%), *Exocarpos aphyllus* (18%), *Jasminum didymum subsp. lineare* (1, 18%), *Melaleuca bracteata* (18%), *Parsonia eucalyptophylla* (18%), *Senna coronilloides* (18%), *Alectryon oleifolius subsp. elongatus* (9%), *Alectryon subdentatus* (1, 9%), *Amyema congener* (9%), *Brachychiton rupestris* (1, 9%), *Bursaria spinosa subsp. spinosa* (9%), *Carissa ovata* (10, 9%), *Clematicissus opaca* (1, 9%), *Diospyros humilis* (1, 9%), *Eremophila deserti* (9%), *Eucalyptus populnea* (9%), *Everistia vacciniifolia* (1, 9%), *Jasminum didymum subsp. racemosum* (1, 9%), *Melaleuca squamophloia* (2, 9%), *Opuntia stricta*\* (9%), *Pimelea neoanglica* (9%), *Pittosporum angustifolium* (9%), *Santalum acuminatum* (9%)

Stratum: Shrub 2

Height avg. = 1.2m, range 0.8-2m, 4 sites

Crown cover avg. = 11.0%, range 1.0-25.0%, 4 sites

Dominant species (relative cover, frequency): *Carissa ovata* (19, 27%)

Frequent species (cover, frequency): *Carissa ovata* (2, 27%), *Eremophila deserti* (11, 18%), *Geijera parviflora* (2, 18%), *Alectryon diversifolius* (2, 9%), *Eremophila glabra subsp. glabra* (1, 9%), *Exocarpos aphyllus* (9%), *Notelaea microcarpa* (9%), *Opuntia tomentosa*\* (9%), *Pimelea neoanglica* (9%), *Scaevola spinescens* (2, 9%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Ground  
Stratum:

Height avg. = 0.3m, range 0.07-0.8m, 9 sites

PFC avg. = 43.4%, range 4-72%, 9 sites

Dominant species (relative cover, frequency): *Paspalidium distans* (32, 33%), *Chloris divaricata* (24, 33%), *Paspalidium caespitosum* (21, 44%), *Geijera parviflora* (12, 22%), *Enteropogon acicularis* (12, 67%)

Frequent species (cover, frequency): GRAMINOIDS: *Ancistrachne uncinulata* (2, 78%), *Enteropogon acicularis* (8, 67%), *Sporobolus caroli* (1, 67%), *Cyperus gracilis* (56%), *Cymbopogon refractus* (6, 44%), *Paspalidium caespitosum* (6, 44%), *Chloris divaricata* (18, 33%), *Paspalidium distans* (18, 33%), *Paspalidium gracile* (33%), *Sporobolus scabridus* (33%), *Carex inversa* (22%), *Dichanthium sericeum* (22%), *Dinebra decipiens* (22%), *Dinebra decipiens var. peacockii* (22%), *Panicum decompositum* (1, 22%), *Walwhalleya subxerophila* (22%), *Austrostipa ramosissima* (11%), *Austrostipa verticillata* (11%), *Calyptochloa gracillima subsp. gracillima* (11%), *Cenchrus ciliaris*\* (11%), *Chloris ventricosa* (1, 11%), *Cyperus betchei* (11%), *Cyperus difformis* (11%), *Cyperus indet.* (2, 11%), *Dinebra decipiens var. asthenes* (11%), *Enneapogon nigricans* (11%), *Eragrostis lacunaria* (11%), *Eragrostis parviflora* (1, 11%), *Eriochloa procera* (11%), *Eriochloa pseudoacrotricha* (11%), *Megathyrsus maximus*\* (11%), *Megathyrsus maximus var. maximus*\* (11%), *Paspalidium albovillosum* (40, 11%), *Paspalidium constrictum* (5, 11%), *Paspalidium criniforme* (10, 11%), *Rytidosperma bipartitum* (2, 11%), *Rytidosperma tenuius* (11%), *Scleria mackaviensis* (11%)

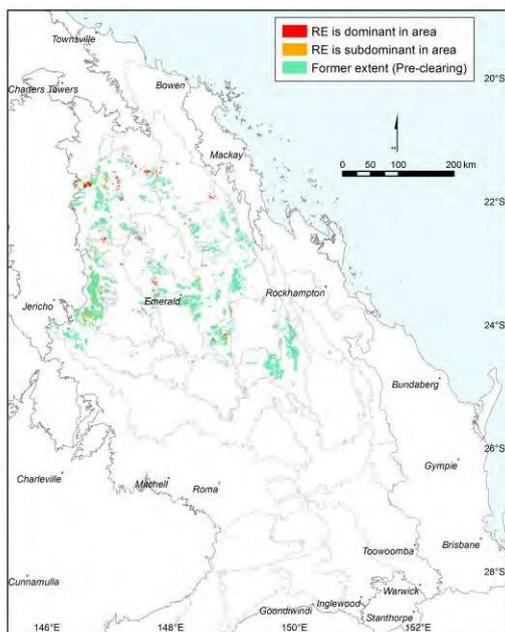
FORBS: *Enchylaena tomentosa* (1, 100%), *Brunoniella australis* (56%), *Commelina diffusa* (1, 56%), *Eremophila debilis* (1, 56%), *Nyssanthes erecta* (56%), *Opuntia tomentosa*\* (56%), *Solanum parvifolium* (56%), *Abutilon oxycarpum* (44%), *Alectryon diversifolius* (44%), *Calandrinia pickeringii* (44%), *Rhagodia parabolica* (4, 44%), *Solanum stelligerum* (44%), *Sonchus oleraceus*\* (44%), *Capparis lasiantha* (33%), *Carissa ovata* (1, 33%), *Cheilanthes distans* (1, 33%), *Cyclosporum leptophyllum*\* (33%), *Desmodium varians* (33%), *Einadia hastata* (1, 33%), *Einadia nutans subsp. linifolia* (33%), *Euchiton sphaericus* (33%), *Hypoestes floribunda* (33%), *Maireana microphylla* (1, 33%), *Oxalis perennans* (33%), *Plectranthus parviflorus* (33%), *Portulaca oleracea*\* (33%), *Rhagodia spinescens* (33%), *Alternanthera denticulata* (22%), *Boerhavia indet.* (22%), *Brunonia australis* (22%), *Cardamine hirsuta*\* (22%), *Cayratia clematidea* (22%), *Clematicissus opaca* (22%), *Dianella caerulea* (22%), *Dipteracanthus australasicus subsp. corynothecus* (22%), *Einadia nutans* (22%), *Evolvulus alsinoides* (22%), *Geijera parviflora* (1, 22%), *Jasminum didymum subsp. lineare* (1, 22%), *Maireana coronata* (22%), *Opuntia stricta*\* (22%), *Pimelea neoanglica* (22%), *Rostellularia adscendens subsp. adscendens* (22%), *Sclerolaena birchii* (22%), *Sclerolaena tetracuspis* (22%), *Sclerolaena tricuspidis* (1, 22%), *Solanum ellipticum* (22%), *Tetragonia tetragonoides* (1, 22%), *Zygophyllum apiculatum* (22%), *Abutilon fraseri* (1, 11%), *Abutilon indet.* (11%), *Abutilon malvifolium* (1, 11%), *Abutilon oxycarpum var. oxycarpum* (11%), *Atriplex semibaccata* (11%), *Boerhavia dominii* (1, 11%), *Centipeda minima subsp. minima* (11%), *Cheilanthes sieberi* (11%), *Cheilanthes sieberi subsp. sieberi* (11%), *Cirsium vulgare*\* (11%), *Commelina lanceolata* (11%), *Crassula sieberiana* (11%), *Cynnogeton multifructus* (11%), *Damasonium minus* (11%), *Denhamia cunninghamii* (11%), *Desmodium brachypodium* (1, 11%), *Desmodium macrocarpum* (11%), *Ehretia membranifolia* (11%), *Elatine gratioloides* (11%), *Eremophila glabra subsp. glabra* (11%), *Everistia vacciniifolia* (11%), *Evolvulus alsinoides var. villosicalyx* (1, 11%), *Flindersia collina* (11%), *Glandularia aristigera*\* (11%), *Harrisia martinii*\* (1, 11%), *Hibiscus indet.* (1, 11%), *Hypochaeris glabra*\* (11%), *Jasminum didymum subsp. racemosum* (11%), *Lobelia concolor* (11%), *Malvastrum americanum var. americanum*\* (11%), *Malvastrum coromandelianum subsp. coromandelianum*\* (11%), *Marsilea indet.* (11%), *Murdannia graminea* (11%), *Opuntia aurantiaca*\* (1, 11%), *Oxalis indet.* (11%), *Parsonsia leichhardtii* (11%), *Phyllanthus gunnii* (11%), *Plantago debilis* (11%), *Plectranthus graveolens* (11%), *Pseuderanthemum variabile* (1, 11%), *Ranunculus sessiliflorus* (11%), *Sclerolaena diacantha* (1, 11%), *Sida fibulifera* (11%), *Sida hackettiana* (5, 11%), *Sida trichopoda* (1, 11%), *Solanum nodiflorum*\* (11%), *Solenogyne bellioides* (11%), *Stellaria angustifolia subsp. angustifolia* (11%), *Tribulus indet.* (1, 11%), *Vittadinia cuneata var. hirsuta* (1, 11%), *Vittadinia indet.* (1, 11%), *Xerothamnella herbacea* (11%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Eucalyptus cambageana woodland to open forest with Acacia harpophylla or A. argyrodendron on Cainozoic clay plains**



Pre-clearing area (ha), remnant area (ha) and per cent remaining: 723,320 69,504 10%

Species\_recorded: Total: 201; woody: 42; ground: 171; Avg. spp./site: 31.8; std dev.: 7.1, 10 site(s)

Basal area: Avg./site: 13.6 m<sup>2</sup>/ha, range: 5.0 - 28 m<sup>2</sup>/ha, std. deviation: 7 m<sup>2</sup>/ha, 15 site(s)

Structural formation: Woodland: 33%; open-woodland: 33%; open-forest: 27%; unrecorded: 7%, 15 site(s)

Representative\_sites 16869, 16905, 16909, 17046, 17234, 17448, 17489, 17672, 19017, 19025, 19168, 19179, 19185, 19259, 28938.

**Stratum: Emergent**

Height avg. = 18.7m, range 15-25m, 6 sites

Crown cover avg. = 6.3%, range 5.0-10.0%, 6 sites

Dominant species (relative cover, frequency): *Eucalyptus cambageana* (100, 40%)

Frequent species (cover, frequency): *Eucalyptus cambageana* (6, 40%), *Eucalyptus populnea* (7%)

**Stratum: Tree 1**

Height avg. = 15.3m, range 10-22m, 15 sites

Crown cover avg. = 29.9%, range 5.0-60.0%, 15 sites

Dominant species (relative cover, frequency): *Acacia harpophylla* (85, 53%), *Eucalyptus cambageana* (59, 73%)

Frequent species (cover, frequency): *Eucalyptus cambageana* (14, 73%), *Acacia harpophylla* (24, 53%), *Eucalyptus populnea* (8, 13%), *Eucalyptus thozetiana* (27, 13%), *Amyema quandang* var. *bancroftii* (7%), *Brachychiton rupestris* (7%), *Corymbia tessellaris* (7%), *Flindersia dissosperma* (7%), *Terminalia oblongata* subsp. *oblongata* (2, 7%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.4.8

### Stratum: Tree 2

Height avg. = 12.1m, range 5-16m, 8 sites

Crown cover avg. = 18.3%, range 5.0-40.0%, 8 sites

Dominant species (relative cover, frequency): *Acacia harpophylla* (80, 47%)

Frequent species (cover, frequency): *Acacia harpophylla* (15, 47%), *Eucalyptus cambageana* (3, 20%), *Eremophila mitchellii* (13, 13%), *Terminalia oblongata subsp. oblongata* (13%), *Alphitonia excelsa* (7%), *Corymbia tessellaris* (7%), *Cymbidium canaliculatum* (7%), *Eucalyptus populnea* (1, 7%), *Flindersia dissosperma* (7%), *Lysiana subfalcatata* (7%), *Lysiphyllum carronii* (7%)

### Stratum: Tree 3

Height avg. = 6.0m, range 5-7m, 3 sites

Crown cover avg. = 15.3%, range 5.0-35.0%, 3 sites

Frequent species (cover, frequency): *Lysiphyllum carronii* (3, 13%), *Acacia harpophylla* (7%), *Brachychiton rupestris* (7%), *Ehretia membranifolia* (6, 7%), *Eremophila mitchellii* (10, 7%), *Erythroxylum australe* (1, 7%), *Flindersia dissosperma* (1, 7%), *Geijera parviflora* (20, 7%), *Owenia acidula* (7%), *Terminalia oblongata subsp. oblongata* (1, 7%)

### Stratum: Shrub 1

Height avg. = 2.8m, range 1-6m, 13 sites

Crown cover avg. = 13.3%, range 1.0-50.0%, 14 sites

Dominant species (relative cover, frequency): *Geijera parviflora* (53, 27%), *Acacia harpophylla* (36, 47%), *Eremophila mitchellii* (35, 73%), *Alectryon diversifolius* (16, 47%), *Carissa ovata* (16, 33%)

Frequent species (cover, frequency): *Eremophila mitchellii* (5, 73%), *Acacia harpophylla* (3, 47%), *Alectryon diversifolius* (2, 47%), *Carissa ovata* (2, 33%), *Atalaya hemiglauca* (1, 27%), *Flindersia dissosperma* (27%), *Geijera parviflora* (14, 27%), *Apophyllum anomalum* (1, 20%), *Alphitonia excelsa* (13%), *Capparis lasiantha* (13%), *Clematicissus opaca* (1, 13%), *Ehretia membranifolia* (13%), *Enchylaena tomentosa* (1, 13%), *Eucalyptus cambageana* (3, 13%), *Terminalia oblongata subsp. oblongata* (2, 13%), *Acacia indet.* (1, 7%), *Casuarina cristata* (7%), *Citrus glauca* (1, 7%), *Croton insularis* (7%), *Cymbidium canaliculatum* (1, 7%), *Denhamia oleaster* (5, 7%), *Dodonaea viscosa* (5, 7%), *Dodonaea viscosa subsp. spatulata* (7%), *Eremophila deserti* (7%), *Erythroxylum australe* (7%), *Harrisia martinii\** (7%), *Jasminum didymum subsp. lineare* (7%), *Lysiphyllum carronii* (5, 7%), *Marsdenia viridiflora* (7%), *Psydrax attenuata* (7%), *Psydrax forsteri* (7%)

### Stratum: Shrub 2

Height avg. = 1.7m, range 1-2m, 3 sites

Crown cover avg. = 15.7%, range 5.0-30.0%, 4 sites

Frequent species (cover, frequency): *Eremophila mitchellii* (5, 13%), *Geijera parviflora* (12, 13%), *Acacia harpophylla* (7%), *Alectryon diversifolius* (7%), *Capparis lasiantha* (1, 7%), *Carissa ovata* (5, 7%), *Cassia brewsteri* (1, 7%), *Diospyros humilis* (1, 7%), *Ehretia membranifolia* (1, 7%), *Eremophila deserti* (5, 7%), *Jasminum didymum subsp. lineare* (1, 7%), *Myoporum indet.* (9, 7%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Technical Description****Regional ecosystem: 11.4.8****Ground  
Stratum:****Height avg. = 0.6m, range 0.4-1m, 10 sites****PFC avg. = 47.0%, range 10-90%, 10 sites**

*Dominant species (relative cover, frequency):* *Chloris ventricosa* (20, 30%), *Enteropogon ramosus* (20, 50%), *Sporobolus scabridus* (18, 40%), *Paspalidium caespitosum* (11, 30%), *Trianthema triquetra* (9, 30%)

*Frequent species (cover, frequency):* GRAMINOIDS: *Sporobolus caroli* (2, 60%), *Cenchrus ciliaris*\* (3, 50%), *Enteropogon acicularis* (2, 50%), *Enteropogon ramosus* (9, 50%), *Cyperus gracilis* (1, 40%), *Eragrostis lacunaria* (2, 40%), *Sporobolus scabridus* (9, 40%), *Aristida personata* (30%), *Chloris ventricosa* (5, 30%), *Dactyloctenium radulans* (2, 30%), *Enneapogon lindleyanus* (1, 30%), *Paspalidium caespitosum* (2, 30%), *Ancistrachne uncinulata* (4, 20%), *Aristida indet.* (3, 20%), *Aristida jerichoensis* (20%), *Astrebla squarrosa* (5, 20%), *Cymbopogon refractus* (5, 20%), *Cyperus indet.* (1, 20%), *Eriochloa pseudoacrotricha* (20%), *Fimbristylis dichotoma* (20%), *Heteropogon contortus* (20%), *Melinis repens*\* (20%), *Panicum effusum* (1, 20%), *Paspalidium constrictum* (15, 20%), *Paspalidium distans* (6, 20%), *Aristida acuta* (20, 10%), *Aristida holathera* var. *holathera* (10%), *Aristida latifolia* (10%), *Aristida ramosa* (10%), *Bothriochloa decipiens* var. *decipiens* (1, 10%), *Bothriochloa ewartiana* (10%), *Chloris inflata*\* (1, 10%), *Chloris lobata* (10%), *Chloris truncata* (10, 10%), *Cyperus bowmannii* (10%), *Cyperus fulvus* (10%), *Cyperus perangustus* (10%), *Digitaria brownii* (10%), *Dinebra decipiens* (10%), *Enneapogon polyphyllus* (10%), *Enneapogon purpurascens* (10%), *Enneapogon virens* (10%), *Enteropogon unispiceus* (10%), *Eragrostis indet.* (10%), *Eragrostis sororia* (10%), *Eriochloa indet.* (10%), *Iseilema membranaceum* (4, 10%), *Megathyrsus maximus* var. *pubiglumis*\* (10, 10%), *Panicum queenslandicum* (10%), *Paspalidium gracile* (10%), *Paspalidium indet.* (15, 10%), *Paspalidium jubiflorum* (2, 10%), *Paspalidium scabrifolium* (1, 10%), *Setaria dielsii* (10%), *Sporobolus australasicus* (10%), *Sporobolus contiguus* (6, 10%), *Sporobolus coromandelianus*\* (10%), *Tragus australianus* (10%), *Walwhalleya subxerophila* (10, 10%)

FORBS: *Enchylaena tomentosa* (70%), *Capparis lasiantha* (60%), *Abutilon oxycarpum* (50%), *Parsonsia lanceolata* (40%), *Salsola australis* (40%), *Achyranthes aspera* (30%), *Carissa ovata* (4, 30%), *Clematicissus opaca* (30%), *Harrisia martinii*\* (30%), *Melhania oblongifolia* (30%), *Nyssanthus erecta* (30%), *Portulaca oleracea*\* (1, 30%), *Sida indet.* (30%), *Trianthema triquetra* (3, 30%), *Atriplex muelleri* (20%), *Capparis indet.* (20%), *Hibiscus indet.* (20%), *Jasminum didymum* subsp. *racemosum* (20%), *Opuntia stricta*\* (20%), *Parsonsia straminea* (20%), *Sclerolaena tetracuspsis* (20%), *Streptoglossa adscendens* (20%), *Abutilon oxycarpum* var. *subsagittatum* (1, 10%), *Acacia decora* (10%), *Alectryon oleifolius* subsp. *elongatus* (10%), *Alternanthera denticulata* var. *micrantha* (10%), *Alternanthera nana* (10%), *Boerhavia dominii* (10%), *Boerhavia indet.* (10%), *Boerhavia paludosa* (1, 10%), *Boerhavia* sp. (*St George A.Hill AQ399299*) (10%), *Brunoniella australis* (10%), *Bursaria incana* (10%), *Cheilanthes distans* (2, 10%), *Chenopodium hubbardii* (10%), *Cleome viscosa* (10%), *Commelina ensifolia* (10%), *Commelina indet.* (10%), *Cynanchum viminale* subsp. *brunonianum* (10%), *Desmodium campylocaulon* (10%), *Dodonaea viscosa* (10%), *Einadia nutans* (10%), *Einadia nutans* subsp. *nutans* (1, 10%), *Erythroxylum australe* (10%), *Eustrephus latifolius* (10%), *Evolvulus alsinoides* (10%), *Glycine tabacina* (10%), *Gomphrena celosioides*\* (10%), *Gomphrena indet.* (10%), *Hibiscus meraukensis* (10%), *Jacquemontia paniculata* (10%), *Jacquemontia paniculata* var. *tomentosa* (10%), *Jasminum didymum* (10%), *Maireana indet.* (1, 10%), *Malvaceae indet.* (10%), *Malvastrum americanum* (10%), *Marsdenia viridiflora* (10%), *Marsdenia viridiflora* subsp. *viridiflora* (10%), *Parsonsia eucalyptophylla* (1, 10%), *Phyllanthus indet.* (10%), *Phyllanthus virgatus* (10%), *Pluchea dentex* (5, 10%), *Polygala triflora* (10%), *Portulaca australis* (10%), *Portulaca indet.* (1, 10%), *Portulaca pilosa*\* (10%), *Ruellia tuberosa*\* (1, 10%), *Sclerolaena convexula* (10%), *Senna artemisioides* (10%), *Sesbania cannabina* (10%), *Sida everistiana* (10%), *Sida fibulifera* (10%), *Sida hackettiana* (10%), *Sida trichopoda* (10%), *Solanum elachophyllum* (10%), *Spermacoce brachystema* (10%), *Stylosanthes scabra*\* (10%), *Terminalia oblongata* subsp. *oblongata* (10%), *Waltheria indica* (10%), *Zornia indet.* (10%)

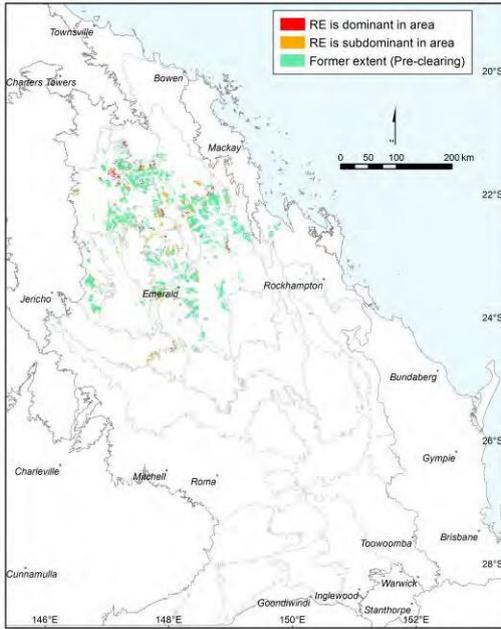
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**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Acacia harpophylla shrubby woodland with Terminalia oblongata on Cainozoic clay plains



Andrew Franks

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 755,307 80,562 11%

Species\_recorded: Total: 150; woody: 34; ground: 123; Avg. spp./site: 29.4; std dev.: 8.5, 9 site(s)

Basal area: Avg./site: 9.4 m<sup>2</sup>/ha, range: 4.0 - 20 m<sup>2</sup>/ha, std. deviation: 5 m<sup>2</sup>/ha, 10 site(s)

Structural formation: Woodland: 40%; open-woodland: 30%; low open-woodland: 30%, 10 site(s)

Representative\_sites 17037, 17041, 19149, 19156, 19176, 19181, 19262, 19271, 32328, 32330.

Stratum: Tree 1

Height avg. = 8.9m, range 7-11m, 10 sites

Crown cover avg. = 21.5%, range 8.0-42.0%, 10 sites

Dominant species (relative cover, frequency): *Acacia harpophylla* (79, 100%), *Acacia cambagei* (39, 40%), *Eucalyptus thozetiana* (12, 30%)

Frequent species (cover, frequency): *Enteropogon ramosus* (10%), *Acacia harpophylla* (14, 100%), *Acacia cambagei* (7, 40%), *Eucalyptus thozetiana* (5, 30%), *Amyema quandang* var. *quandang* (1, 10%), *Eucalyptus crebra* (10%), *Lysiphillum carronii* (3, 10%)

Stratum: Tree 2

Height avg. = 5.4m, range 4.5-6m, 4 sites

Crown cover avg. = 9.8%, range 6.0-13.0%, 4 sites

Dominant species (relative cover, frequency): *Acacia harpophylla* (68, 30%)

Frequent species (cover, frequency): *Acacia harpophylla* (7, 30%), *Acacia cambagei* (3, 20%), *Santalum lanceolatum* (2, 20%), *Amyema quandang* var. *quandang* (2, 10%), *Eremophila mitchellii* (5, 10%), *Eucalyptus thozetiana* (3, 10%), *Terminalia oblongata* subsp. *oblongata* (1, 10%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Technical Description****Regional ecosystem: 11.4.9****Shrub 1  
Stratum:****Height avg. = 1.3m, range 0.5-2m, 10 sites****Crown cover avg. = 6.5%, range 1.0-17.0%, 10 sites**

*Dominant species (relative cover, frequency):* *Acacia harpophylla* (59, 60%), *Eremophila mitchellii* (35, 50%), *Carissa ovata* (27, 50%), *Santalum lanceolatum* (13, 40%), *Terminalia oblongata* subsp. *oblongata* (8, 50%)

*Frequent species (cover, frequency):* *Acacia harpophylla* (6, 60%), *Carissa ovata* (2, 50%), *Eremophila mitchellii* (1, 50%), *Terminalia oblongata* subsp. *oblongata* (1, 50%), *Santalum lanceolatum* (1, 40%), *Alectryon diversifolius* (30%), *Acacia cambagei* (1, 20%), *Amyema quandang* var. *quandang* (2, 20%), *Apophyllum anomalum* (20%), *Cynanchum viminale* subsp. *brunonianum* (20%), *Ehretia membranifolia* (20%), *Enchylaena tomentosa* (1, 20%), *Flindersia dissosperma* (20%), *Acacia rhodoxylon* (10%), *Alphitonia excelsa* (4, 10%), *Atalaya hemiglauca* (1, 10%), *Brachychiton rupestris* (1, 10%), *Breynia oblongifolia* (10%), *Capparis* *indet.* (10%), *Casuarina cristata* (1, 10%), *Citrus glauca* (10%), *Cryptostegia grandiflora*\* (10%), *Eremophila deserti* (10%), *Erythroxylum australe* (1, 10%), *Eucalyptus crebra* (10%), *Eucalyptus thozetiana* (1, 10%), *Flindersia australis* (10%), *Geijera parviflora* (1, 10%), *Grevillea parallela* (10%), *Melaleuca tamariscina* (10%), *Opuntia tomentosa*\* (1, 10%), *Sesbania cannabina* (10%)

**Stratum: Ground****Height avg. = 0.5m, range 0.3-1m, 9 sites****PFC avg. = 42.8%, range 25-80%, 9 sites**

*Dominant species (relative cover, frequency):* *Paspalidium caespitosum* (31, 44%), *Cenchrus ciliaris*\* (17, 56%), *Enteropogon ramosus* (15, 22%), *Parthenium hysterophorus*\* (15, 33%), *Panicum decompositum* (15, 22%)

*Frequent species (cover, frequency):* **GRAMINOIDS:** *Sporobolus scabridus* (1, 67%), *Cenchrus ciliaris*\* (9, 56%), *Astrebula squarrosa* (44%), *Enteropogon acicularis* (2, 44%), *Paspalidium caespitosum* (10, 44%), *Paspalidium distans* (44%), *Sporobolus caroli* (1, 44%), *Cyperus* *indet.* (6, 33%), *Dactyloctenium radulans* (33%), *Enneapogon lindleyanus* (1, 33%), *Aristida* *indet.* (1, 22%), *Dinebra decipiens* var. *decipiens* (3, 22%), *Dinebra ligulata* (1, 22%), *Enteropogon ramosus* (1, 22%), *Eragrostis tenellula* (2, 22%), *Eriochloa pseudoacrotricha* (1, 22%), *Panicum decompositum* (8, 22%), *Aristida gracilipes* (11%), *Aristida personata* (2, 11%), *Bothriochloa decipiens* var. *decipiens* (11%), *Brachyachne convergens* (4, 11%), *Cleistochloa subjuncea* (11%), *Cymbopogon refractus* (11%), *Cyperus alterniflorus* (11%), *Cyperus compressus*\* (11%), *Cyperus fulvus* (11%), *Cyperus gracilis* (11%), *Digitaria* *indet.* (2, 11%), *Digitaria parviflora* (11%), *Elytrophorus spicatus* (1, 11%), *Eragrostis brownii* (11%), *Eriochloa* *indet.* (11%), *Fimbristylis dichotoma* (11%), *Iseilema fragile* (11%), *Iseilema membranaceum* (11%), *Iseilema vaginiflorum* (11%), *Leptochloa digitata* (11%), *Panicum queenslandicum* (11%), *Paspalidium* *indet.* (3, 11%), *Paspalidium rarum* (3, 11%), *Sporobolus disjunctus* (1, 11%), *Sporobolus* *indet.* (11%), *Sporobolus partimpatens* (11%), *Tragus australianus* (11%)

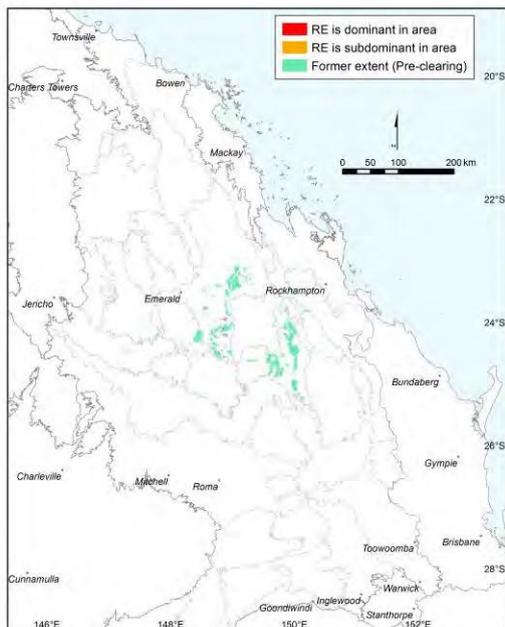
**FORBS:** *Enchylaena tomentosa* (5, 78%), *Portulaca oleracea*\* (67%), *Trianthema triquetra* (1, 67%), *Abutilon oxycarpum* (1, 44%), *Capparis lasiantha* (1, 44%), *Salsola australis* (1, 44%), *Streptoglossa adscendens* (1, 44%), *Cynanchum viminale* subsp. *brunonianum* (33%), *Malvastrum americanum* var. *americanum*\* (7, 33%), *Parthenium hysterophorus*\* (5, 33%), *Achyranthes aspera* (22%), *Alternanthera nana* (22%), *Boerhavia* sp. (St George A.Hill AQ399299) (1, 22%), *Cucumis melo* (22%), *Gomphrena celosioides*\* (22%), *Hibiscus meraukensis* (22%), *Marsilea* *indet.* (22%), *Melhantha oblongifolia* (22%), *Opuntia aurantiaca*\* (1, 22%), *Parsonsia lanceolata* (22%), *Rostellularia adscendens* (22%), *Sclerolaena tetracuspis* (2, 22%), *Sesbania cannabina* (1, 22%), *Sida fibulifera* (22%), *Sida* sp. (Musselbrook M.B.Thomas+ MRS437) (22%), *Sida trichopoda* (1, 22%), *Abutilon* *indet.* (11%), *Alternanthera denticulata* var. *micrantha* (11%), *Amyema quandang* (11%), *Atriplex muelleri* (11%), *Basilicum polystachyon* (11%), *Calandrinia pickeringii* (11%), *Carissa ovata* (11%), *Centipeda minima* subsp. *minima* (11%), *Cheilanthes distans* (11%), *Cheilanthes sieberi* (11%), *Chenopodium desertorum* subsp. *andiophyllum* (11%), *Chenopodium murale*\* (1, 11%), *Clematicissus opaca* (3, 11%), *Commelina* *indet.* (1, 11%), *Commelina lanceolata* (1, 11%), *Convolvulaceae* *indet.* (11%), *Corchorus aestuans* (11%), *Crinum flaccidum* (11%), *Cryptostegia grandiflora*\* (11%), *Datura leichhardtii*\* (11%), *Einadia* *indet.* (11%), *Einadia nutans* subsp. *nutans* (11%), *Euphorbia* *indet.* (11%), *Gomphrena* *indet.* (11%), *Harrisia martinii*\* (1, 11%), *Jacquemontia paniculata* (11%), *Maireana* *indet.* (11%), *Malvaceae* *indet.* (11%), *Marsdenia viridiflora* subsp. *viridiflora* (11%), *Melochia pyramidata*\* (11%), *Murdannia* *indet.* (11%), *Nyssanthus erecta* (11%), *Plectranthus parviflorus* (11%), *Plumbago zeylanica* (11%), *Portulaca australis* (11%), *Portulaca pilosa*\* (11%), *Psydrax attenuata* (11%), *Ruellia tuberosa*\* (11%), *Santalum lanceolatum* (3, 11%), *Scoparia dulcis*\* (11%), *Sida corrugata* (11%), *Sida* *indet.* (11%), *Sida rohlenae* (11%), *Tetragonia tetragonoides* (11%), *Tribulus micrococcus* (11%), *Tribulus terrestris* (4, 11%)

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. *indet.* after listed name = indeterminate species or genus

**Acacia harpophylla, Lysiphyllum carronii +/- Casuarina cristata open forest to woodland**



Pre-clearing area (ha), remnant area (ha) and per cent remaining: 217,706 6,529 3%

Species\_recorded: Total: 88; woody: 15; ground: 77; Avg. spp./site: 40.0; std dev.: 0.0, 2 site(s)

Basal area: Avg./site: 15.0 m<sup>2</sup>/ha, range: 7.5 - 26 m<sup>2</sup>/ha, std. deviation: 8 m<sup>2</sup>/ha, 3 site(s)

Structural formation: Open-forest: 67%; woodland: 33%, 3 site(s)

Representative\_sites 16965, 16983, 17228.

**Stratum: Tree 1**

Height avg. = 14.3m, range 11-20m, 3 sites

Crown cover avg. = 58.3%, range 30.0-86.0%, 3 sites

Dominant species (relative cover, frequency): *Acacia harpophylla* (61, 100%), *Lysiphyllum carronii* (50, 67%), *Brachychiton rupestris* (10, 33%), *Eucalyptus populnea* (5, 33%)

Frequent species (cover, frequency): *Acacia harpophylla* (33, 100%), *Lysiphyllum carronii* (34, 67%), *Brachychiton rupestris* (6, 33%), *Eucalyptus populnea* (3, 33%)

**Stratum: Tree 2**

Height avg. = 7.0m, range 6-8m, 3 sites

Crown cover avg. = 33.3%, range 10.0-60.0%, 3 sites

Dominant species (relative cover, frequency): *Geijera parviflora* (45, 67%), *Eremophila mitchellii* (41, 67%), *Lysiphyllum carronii* (34, 67%), *Terminalia oblongata subsp. oblongata* (30, 33%), *Acacia harpophylla* (30, 33%)

Frequent species (cover, frequency): *Eremophila mitchellii* (8, 67%), *Geijera parviflora* (15, 67%), *Lysiphyllum carronii* (10, 67%), *Acacia harpophylla* (18, 33%), *Terminalia oblongata subsp. oblongata* (18, 33%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.4.9a

### Stratum: Shrub 1

Height avg. = 2.2m, range 1.5-3m, 3 sites

Crown cover avg. = 30.0%, range 10.0-50.0%, 3 sites

*Dominant species (relative cover, frequency):* *Acacia harpophylla* (96, 33%), *Eremophila mitchellii* (40, 33%), *Carissa ovata* (33, 33%), *Geijera parviflora* (31, 100%), *Pittosporum spinescens* (17, 33%)

*Frequent species (cover, frequency):* *Geijera parviflora* (13, 100%), *Acacia harpophylla* (10, 33%), *Acacia salicina* (33%), *Alectryon diversifolius* (5, 33%), *Carissa ovata* (10, 33%), *Diospyros humilis* (33%), *Drypetes deplanchei* (33%), *Eremophila mitchellii* (20, 33%), *Eucalyptus populnea* (33%), *Exocarpos latifolius* (33%), *Lysiphyllum carronii* (33%), *Owenia acidula* (33%), *Pittosporum spinescens* (5, 33%), *Terminalia oblongata subsp. oblongata* (33%)

### Stratum: Ground

Height avg. = 0.5m, range 0.2-0.7m, 2 sites

PFC avg. = 25.0%, range 20-30%, 2 sites

*Dominant species (relative cover, frequency):* *Panicum effusum* (37, 50%), *Chloris divaricata* (35, 50%), *Aristida calycina* (26, 50%), *Panicum decompositum* (11, 50%), *Cenchrus ciliaris\** (10, 100%)

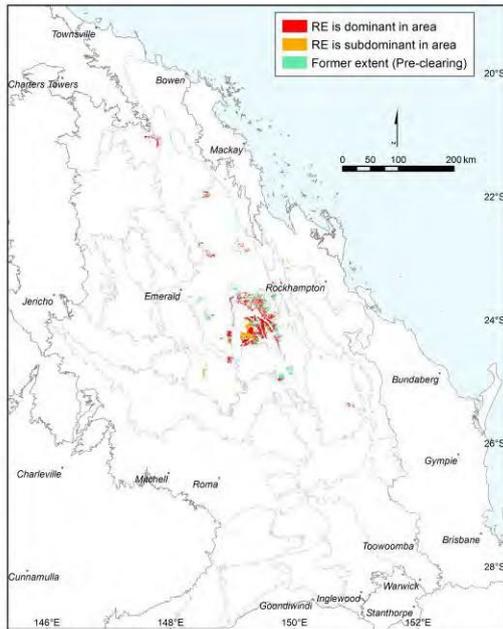
*Frequent species (cover, frequency):* GRAMINOIDS: *Cenchrus ciliaris\** (5, 100%), *Ancistrachne indet.* (1, 50%), *Aristida calycina* (6, 50%), *Aristida leptopoda* (50%), *Chloris divaricata* (8, 50%), *Cyperus bifax* (50%), *Dichanthium sericeum* (50%), *Echinochloa colona\** (50%), *Enneapogon indet.* (50%), *Enneapogon lindleyanus* (50%), *Eragrostis brownii* (50%), *Eriochloa pseudoacrotricha* (3, 50%), *Panicum decompositum* (6, 50%), *Panicum effusum* (20, 50%), *Paspalidium caespitosum* (50%), *Paspalidium distans* (1, 50%), *Paspalidium indet.* (50%), *Sporobolus caroli* (50%), *Sporobolus indet.* (50%), *Tragus indet.* (50%)  
FORBS: *Einadia hastata* (1, 100%), *Malvastrum americanum var. americanum\** (2, 100%), *Abutilon indet.* (50%), *Abutilon oxycarpum* (1, 50%), *Acanthus indet.* (50%), *Alectryon diversifolius* (50%), *Amaranthaceae indet.* (50%), *Amaranthus indet.* (50%), *Amyema quandang* (50%), *Bidens pilosa\** (2, 50%), *Boerhavia paludosa* (1, 50%), *Brachychiton rupestris* (50%), *Brunonia australis* (50%), *Calotis cuneata* (3, 50%), *Capparis indet.* (50%), *Carissa ovata* (50%), *Casuarina cristata* (50%), *Chenopodiaceae indet.* (50%), *Chenopodium indet.* (50%), *Commelina diffusa* (50%), *Coreopsis indet.* (50%), *Dendrophthoe vitellina* (50%), *Denhamia bilocularis* (50%), *Denhamia oleaster* (50%), *Enchylaena tomentosa* (50%), *Geijera salicifolia* (50%), *Herissantia crispa* (50%), *Hibiscus divaricatus* (50%), *Ipomoea cairica\** (50%), *Jasminum didymum* (50%), *Neptunia gracilis* (50%), *Parsonsia indet.* (50%), *Parsonsia straminea* (50%), *Peripleura hispidula var. hispidula* (50%), *Phyllanthus maderaspatensis* (50%), *Portulaca indet.* (50%), *Salvia reflexa\** (50%), *Santalum lanceolatum* (50%), *Sclerolaena indet.* (50%), *Sida cordifolia\** (4, 50%), *Symphyotrichum subulatum\** (50%), *Terminalia oblongata subsp. oblongata* (50%), *Ventilago viminalis* (50%), *Verbena indet.* (50%), *Verbesina encelioides\** (50%), *Vittadinia indet.* (50%)

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Eucalyptus crebra, Corymbia spp., with E. moluccana woodland on lower slopes of Cainozoic sand plains and/or remnant surfaces**



**Pre-clearing area (ha), remnant area (ha) and per cent remaining: 304,452 173,128 57%**

**Species recorded: Total: 197; woody: 49; ground: 156; Avg. spp./site: 36.0; std dev.: 7.6, 4 site(s)**

**Basal area: Avg./site: 15.7 m<sup>2</sup>/ha, range: 5.0 - 29 m<sup>2</sup>/ha, std. deviation: 6 m<sup>2</sup>/ha, 17 site(s)**

**Structural formation: Woodland: 76%; open-woodland: 24%, 17 site(s)**

**Representative sites 16312, 17157, 17170, 17195, 17198, 17375, 17390, 17391, 17398, 17403, 17458, 17460, 17461, 17670, 17691, 19129, 60764.**

**Stratum: Tree 1**

**Height avg. = 18.5m, range 15-26m, 17 sites**

**Crown cover avg. = 26.6%, range 15.0-45.0%, 17 sites**

*Dominant species (relative cover, frequency): Corymbia citriodora (77, 29%), Eucalyptus crebra (50, 94%), Corymbia clarksoniana (28, 35%), Corymbia trachyphloia subsp. trachyphloia (11, 24%)*

*Frequent species (cover, frequency): Eucalyptus crebra (14, 94%), Corymbia clarksoniana (7, 35%), Corymbia citriodora (21, 29%), Corymbia trachyphloia subsp. trachyphloia (3, 24%), Eucalyptus moluccana (15, 12%), Acacia rhodoxylon (2, 6%), Allocasuarina luehmannii (6%), Corymbia citriodora subsp. citriodora (18, 6%), Corymbia intermedia (18, 6%), Corymbia tessellaris (3, 6%), Corymbia trachyphloia (8, 6%), Corymbia watsoniana (1, 6%), Eucalyptus apothalassica (8, 6%), Eucalyptus tereticornis (6%)*

**Stratum: Tree 2**

**Height avg. = 6.2m, range 1.2-14m, 12 sites**

**Crown cover avg. = 9.0%, range 0.6-35.0%, 14 sites**

*Dominant species (relative cover, frequency): Alphitonia excelsa (66, 35%), Petalostigma pubescens (37, 29%)*

*Frequent species (cover, frequency): Alphitonia excelsa (3, 35%), Petalostigma pubescens (8, 29%), Allocasuarina luehmannii (3, 18%), Eucalyptus crebra (1, 18%), Callitris glaucophylla (9, 12%), Lysicarpus angustifolius (3, 12%), Pittosporum spinescens (1, 12%), Acacia complanata (6%), Acacia crassa (2, 6%), Acacia crassa subsp. longicoma (2, 6%), Corymbia citriodora subsp. citriodora (2, 6%), Corymbia clarksoniana (1, 6%), Corymbia intermedia (2, 6%), Corymbia trachyphloia (2, 6%), Corymbia watsoniana (6%), Eucalyptus apothalassica (6%), Eucalyptus tenuipes (4, 6%), Grevillea parallela (6%), Jacksonia scoparia (6%), Planchonella cotinifolia var. pubescens (8, 6%)*

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.5.2

### Stratum: Tree 3

Height avg. = 4.0m, 1 site

Crown cover avg. = 6.0%, 1 site

*Frequent species (cover, frequency):* *Alphitonia excelsa* (4, 6%), *Brachychiton populneus* (6%), *Eucalyptus tenuipes* (6%), *Lysicarpus angustifolius* (2, 6%)

### Stratum: Shrub 1

Height avg. = 1.5m, range 1-2m, 11 sites

Crown cover avg. = 6.2%, range 0.0-15.9%, 11 sites

*Dominant species (relative cover, frequency):* *Petalostigma pubescens* (27, 24%)

*Frequent species (cover, frequency):* *Petalostigma pubescens* (1, 24%), *Acacia crassa* (11, 18%), *Alphitonia excelsa* (18%), *Eucalyptus crebra* (1, 18%), *Corymbia clarksoniana* (1, 12%), *Erythroxylum* sp. (*Splityard Creek L.Pedley 5360*) (1, 12%), *Flindersia dissosperma* (12%), *Pittosporum spinescens* (12%), *Acacia complanata* (3, 6%), *Acacia conferta* (1, 6%), *Acacia crassa* subsp. *longicoma* (6%), *Acacia penninervis* (1, 6%), *Allocasuarina torulosa* (1, 6%), *Breynia oblongifolia* (6%), *Capparis canescens* (6%), *Corymbia citriodora* subsp. *citriodora* (1, 6%), *Corymbia intermedia* (1, 6%), *Corymbia trachyphloia* (1, 6%), *Corymbia watsoniana* (6%), *Daviesia ulicifolia* (1, 6%), *Daviesia villifera* (1, 6%), *Dodonaea lanceolata* (2, 6%), *Dodonaea triangularis* (2, 6%), *Dodonaea viscosa* (6%), *Eremophila mitchellii* (3, 6%), *Erythroxylum australe* (6%), *Eucalyptus apothalassica* (1, 6%), *Grevillea parallela* (6%), *Grewia latifolia* (1, 6%), *Larsenaikia ochreatea* (6%), *Planchonella cotinifolia* var. *pubescens* (1, 6%), *Psyrax odorata* (6%), *Pultenaea* indet. (5, 6%)

### Stratum: Shrub 2

Height avg. = 0.4m, 1 site

Crown cover avg. = 5.0%, 1 site

*Frequent species (cover, frequency):* *Alphitonia excelsa* (6%), *Corymbia trachyphloia* (6%), *Daviesia ulicifolia* (1, 6%), *Daviesia villifera* (1, 6%), *Macrozamia crassifolia* (1, 6%), *Melichrus adpressus* (3, 6%), *Persoonia sericea* (6%), *Pultenaea bracteamajor* (1, 6%)

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Technical Description****Regional ecosystem: 11.5.2****Ground  
Stratum:****Height avg. = 0.4m, range 0.25-0.5m, 4 sites****PFC avg. = 50.0%, range 35-80%, 4 sites**

*Dominant species (relative cover, frequency): Perotis rara (53, 25%), Entolasia stricta (26, 25%), Calyptochloa gracillima subsp. gracillima (25, 25%), Cymbopogon refractus (17, 50%), Aristida queenslandica var. dissimilis (15, 25%)*

*Frequent species (cover, frequency): GRAMINOIDS: Panicum effusum (1, 75%), Aristida calycina (3, 50%), Cymbopogon refractus (12, 50%), Digitaria brownii (1, 50%), Enneapogon lindleyanus (1, 50%), Melinis repens\* (2, 50%), Alloteropsis semialata (2, 25%), Aristida calycina var. calycina (10, 25%), Aristida holathera var. holathera (1, 25%), Aristida personata (25%), Aristida queenslandica var. dissimilis (7, 25%), Aristida queenslandica var. queenslandica (2, 25%), Arundinella nepalensis (4, 25%), Calyptochloa gracillima subsp. gracillima (20, 25%), Capillipedium spicigerum (25%), Cyperus bifax (25%), Cyperus fulvus (25%), Digitaria ramularis (2, 25%), Enneapogon polyphyllus (8, 25%), Enneapogon robustissimus (3, 25%), Entolasia stricta (10, 25%), Eragrostis indet. (25%), Eragrostis sororia (25%), Eremochloa bimaculata (2, 25%), Eriachne mucronata (10, 25%), Eriachne pallescens (25%), Eulalia aurea (3, 25%), Heteropogon contortus (2, 25%), Perotis rara (25, 25%), Setaria surgens (25%), Tragus australianus (1, 25%)*

*FORBS: Rostellularia adscendens (75%), Cyanthillium cinereum (50%), Desmodium rhytidophyllum (50%), Evolvulus alsinoides (1, 50%), Oxalis perennans (50%), Phyllanthus virgatus (50%), Sida hackettiana (1, 50%), Spermacoce multicaulis (50%), Acacia leiocalyx subsp. leiocalyx (25%), Aeschynomene indet. (25%), Alstonia constricta (25%), Apowollastonia spilanthis (25%), Bonamia media (1, 25%), Breynia oblongifolia (25%), Brunoniella australis (25%), Bursaria incana (25%), Capparis canescens (25%), Carissa ovata (25%), Cheilanthes sieberi (25%), Chorizema parviflorum (1, 25%), Coelospermum reticulatum (25%), Commelina lanceolata (25%), Crotalaria montana (25%), Desmodium brachypodum (25%), Dianella indet. (25%), Dianella revoluta (1, 25%), Dodonaea viscosa (25%), Emilia sonchifolia\* (25%), Eremophila debilis (25%), Euphorbia drummondii (25%), Everistia vacciniifolia (25%), Glycine clandestina (25%), Glycine tomentella (25%), Goodenia delicata (25%), Grewia latifolia (25%), Hardenbergia violacea (1, 25%), Hibbertia cistoidea (25%), Indigofera indet. (25%), Lantana montevidensis\* (25%), Laxmannia gracilis (25%), Lomandra filiformis subsp. filiformis (1, 25%), Lomandra leucocephala (1, 25%), Lomandra longifolia (1, 25%), Malvastrum americanum var. americanum\* (25%), Melhania oblongifolia (25%), Opuntia indet. (25%), Peripleura hispidula (25%), Planchonia careya (25%), Portulaca filifolia (25%), Psydrax oleifolia (25%), Rhynchosia minima (25%), Sauropus trachyspermus (25%), Sida cordifolia\* (1, 25%), Solanum ellipticum (25%), Stylidium eriorhizum (25%), Wahlenbergia gracilis (1, 25%), Waltheria indica (1, 25%), Zornia dyctiocarpa (25%)*

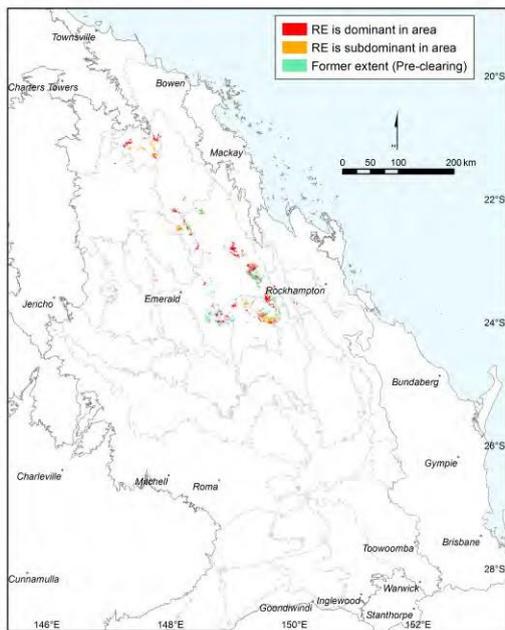
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**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Eucalyptus crebra, E. tenuipes, Lysicarpus angustifolius +/- Corymbia spp. woodland**



Pre-clearing area (ha), remnant area (ha) and per cent remaining: 177,019 101,621 57%

Species\_recorded: Total: 165; woody: 31; ground: 143; Avg. spp./site: 35.0; std dev.: 6.8, 9 site(s)

Basal area: Avg./site: 15.0 m<sup>2</sup>/ha, range: 4.0 - 27 m<sup>2</sup>/ha, std. deviation: 6 m<sup>2</sup>/ha, 14 site(s)

Structural formation: Woodland: 71%; open-woodland: 14%; open-forest: 7%; low open-forest: 7%, 14 site(s)

Representative\_sites 16304, 17196, 17454, 17561, 17562, 17564, 17565, 17668, 17669, 17673, 17676, 17687, 17689, 17690.

**Stratum: Emergent**

Height avg. = 18.0m, range 17-19m, 2 sites

Crown cover avg. = 4.5%, range 4.0-5.0%, 2 sites

Frequent species (cover, frequency): *Brachychiton populneus* (4, 7%), *Eucalyptus crebra* (5, 7%)

**Stratum: Tree 1**

Height avg. = 16.6m, range 9-27m, 14 sites

Crown cover avg. = 31.0%, range 15.0-60.0%, 14 sites

Dominant species (relative cover, frequency): *Eucalyptus tenuipes* (68, 29%), *Lysicarpus angustifolius* (63, 50%), *Eucalyptus crebra* (55, 57%), *Corymbia clarksoniana* (27, 50%)

Frequent species (cover, frequency): *Eucalyptus crebra* (13, 57%), *Corymbia clarksoniana* (7, 50%), *Lysicarpus angustifolius* (25, 50%), *Eucalyptus tenuipes* (22, 29%), *Acacia shirleyi* (3, 14%), *Corymbia dallachiana* (4, 14%), *Alphitonia excelsa* (2, 7%), *Eucalyptus exserta* (2, 7%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.5.9b

### Stratum: Tree 2

Height avg. = 8.0m, range 4-15m, 13 sites

Crown cover avg. = 9.0%, range 3.0-30.0%, 13 sites

*Dominant species (relative cover, frequency): Eucalyptus crebra (52, 21%), Lysicarpus angustifolius (44, 50%), Petalostigma pubescens (31, 64%), Corymbia clarksoniana (31, 21%), Alphitonia excelsa (27, 57%)*

*Frequent species (cover, frequency): Petalostigma pubescens (3, 64%), Alphonis excelsa (4, 57%), Lysicarpus angustifolius (6, 50%), Corymbia clarksoniana (2, 21%), Eucalyptus crebra (2, 21%), Alstonia constricta (14%), Eucalyptus tenuipes (1, 14%), Acacia aulacocarpa (7%), Brachychiton populneus (2, 7%), Bursaria spinosa subsp. spinosa (2, 7%), Corymbia dallachiana (4, 7%), Geijera parviflora (7%), Pittosporum spinescens (1, 7%), Planchonella cotinifolia var. pubescens (6, 7%)*

### Stratum: Tree 3

Height avg. = 3.8m, range 3-4m, 4 sites

Crown cover avg. = 4.8%, range 2.0-10.0%, 4 sites

*Dominant species (relative cover, frequency): Alphonis excelsa (59, 21%), Eucalyptus crebra (12, 21%)*

*Frequent species (cover, frequency): Alphonis excelsa (4, 21%), Eucalyptus crebra (21%), Bursaria spinosa subsp. spinosa (1, 14%), Acacia aulacocarpa (2, 7%), Acacia indet. (7%), Corymbia clarksoniana (1, 7%), Corymbia dallachiana (1, 7%), Denhamia pittosporoides subsp. pittosporoides (7%), Eremophila deserti (7%), Petalostigma pubescens (7%), Pittosporum spinescens (7%)*

### Stratum: Shrub 1

Height avg. = 1.6m, range 1-2.5m, 10 sites

Crown cover avg. = 4.6%, range 1.0-15.0%, 10 sites

*Dominant species (relative cover, frequency): Alphonis excelsa (51, 43%), Lysicarpus angustifolius (37, 36%), Petalostigma pubescens (34, 21%)*

*Frequent species (cover, frequency): Alphonis excelsa (3, 43%), Lysicarpus angustifolius (2, 36%), Petalostigma pubescens (2, 21%), Acacia leiocalyx subsp. leiocalyx (1, 14%), Bursaria spinosa subsp. spinosa (1, 14%), Acacia bancroftiorum (1, 7%), Acacia julifera (7%), Acacia rhodoxylon (1, 7%), Acacia shirleyi (1, 7%), Corymbia clarksoniana (7%), Corymbia dallachiana (7%), Erythroxylum sp. (Splityard Creek L.Pedley 5360) (1, 7%), Eucalyptus crebra (7%), Everistia vacciniifolia (7%), Persoonia falcata (7%), Pultenaea petiolaris (1, 7%), Sida hackettiana (2, 7%)*

### Stratum: Shrub 2

Height avg. = 0.7m, range 0.5-1m, 3 sites

Crown cover avg. = 11.7%, range 7.0-20.0%, 3 sites

*Frequent species (cover, frequency): Alphonis excelsa (8, 14%), Bursaria spinosa subsp. spinosa (7%), Grewia latifolia (1, 7%), Lysicarpus angustifolius (10, 7%), Opuntia stricta\* (7%), Sida hackettiana (1, 7%), Stylosanthes scabra\* (7, 7%)*

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Ground  
Stratum:

Height avg. = 0.4m, range 0.15-0.5m, 9 sites

PFC avg. = 68.9%, range 40-85%, 9 sites

Dominant species (relative cover, frequency): *Aristida caput-medusae* (31, 67%), *Calyptochloa gracillima* subsp. *gracillima* (23, 78%), *Arundinella nepalensis* (21, 33%), *Aristida lignosa* (12, 22%), *Aristida jerichoensis* var. *subspinulifera* (11, 22%)

Frequent species (cover, frequency): GRAMINOIDS: *Calyptochloa gracillima* subsp. *gracillima* (15, 78%), *Panicum effusum* (4, 78%), *Aristida caput-medusae* (22, 67%), *Themeda triandra* (3, 67%), *Cymbopogon refractus* (1, 56%), *Eragrostis lacunaria* (1, 56%), *Eriachne mucronata* (3, 56%), *Chrysopogon fallax* (1, 44%), *Melinis repens*\* (6, 44%), *Arundinella nepalensis* (17, 33%), *Enneapogon lindleyanus* (3, 33%), *Enneapogon polyphyllus* (1, 33%), *Heteropogon contortus* (8, 33%), *Aristida benthamii* var. *benthamii* (2, 22%), *Aristida calycina* (8, 22%), *Aristida calycina* var. *calycina* (2, 22%), *Aristida jerichoensis* var. *subspinulifera* (8, 22%), *Aristida lignosa* (7, 22%), *Aristida personata* (3, 22%), *Aristida queenslandica* var. *dissimilis* (3, 22%), *Aristida queenslandica* var. *queenslandica* (4, 22%), *Cenchrus ciliaris*\* (6, 22%), *Digitaria ammophila* (6, 22%), *Digitaria breviglumis* (3, 22%), *Eragrostis sororia* (1, 22%), *Eremochloa bimaculata* (1, 22%), *Fimbristylis dichotoma* (4, 22%), *Panicum decompositum* (2, 22%), *Tragus australianus* (3, 22%), *Alloteropsis semialata* (2, 11%), *Aristida benthamii* (2, 11%), *Aristida gracilipes* (10, 11%), *Aristida jerichoensis* var. *jerichoensis* (3, 11%), *Aristida longicollis* (11%), *Aristida queenslandica* (3, 11%), *Cymbopogon bombycinus* (1, 11%), *Digitaria parviflora* (1, 11%), *Dinebra decipiens* (4, 11%), *Enteropogon acicularis* (1, 11%), *Eragrostis brownii* (1, 11%), *Eragrostis spartinioides* (11%), *Eriochloa pseudoacrotricha* (1, 11%), *Gahnia aspera* (11%), *Oplismenus aemulus* (1, 11%), *Panicum queenslandicum* (1, 11%), *Paspalidium caespitosum* (1, 11%), *Perotis rara* (11%), *Scleria brownii* (11%), *Scleria mackaviensis* (11%), *Tripogon loliiformis* (1, 11%), *Urochloa mosambicensis*\* (1, 11%), *Urochloa piligera* (11%)

FORBS: *Brunoniella australis* (89%), *Cheilanthes sieberi* (67%), *Phyllanthus virgatus* (56%), *Rostellularia adscendens* (56%), *Sida hackettiana* (56%), *Ajuga australis* (44%), *Desmodium brachypodum* (1, 44%), *Evolvulus alsinoides* (44%), *Goodenia rotundifolia* (44%), *Grewia latifolia* (44%), *Solanum ellipticum* (44%), *Alphitonia excelsa* (33%), *Euphorbia drummondii* (33%), *Glycine tomentella* (33%), *Sida cordifolia*\* (33%), *Alternanthera nana* (22%), *Cassia brewsteri* (22%), *Chrysocephalum apiculatum* (22%), *Cyanthillium cinereum* (22%), *Dianella caerulea* (22%), *Dianella revoluta* (22%), *Glycine tabacina* (22%), *Goodenia glabra* (22%), *Oxalis* indet. (22%), *Oxalis radicata* (22%), *Parsonia lanceolata* (22%), *Peripleura hispidula* (2, 22%), *Senecio pinnatifolius* (22%), *Sida* sp. (*Musselbrook M.B.Thomas+ MRS437*) (22%), *Spermacoce multicaulis* (22%), *Acacia shirleyi* (1, 11%), *Achyranthes aspera* (11%), *Boerhavia dominii* (11%), *Breynia oblongifolia* (11%), *Calotis cuneifolia* (11%), *Camptacra barbata* (11%), *Chamaecrista mimosoides* (11%), *Clematicissus opaca* (11%), *Coelospermum reticulatum* (11%), *Crotalaria* indet. (11%), *Desmodium rhytidophyllum* (11%), *Dianella longifolia* (11%), *Dissiliaria muelleri* (11%), *Dysphania carinata* (3, 11%), *Dysphania glomulifera* (11%), *Euphorbia dallachyana* (11%), *Eustrephus latifolius* (11%), *Glycine* sp. (*Laglan Station L.S.Smith 10302*) (11%), *Heliotropium* indet. (11%), *Indigofera* indet. (10, 11%), *Jasminum didymum* subsp. *lineare* (11%), *Lactuca serriola* forma *serriola*\* (11%), *Lobelia purpurascens* (11%), *Lomandra confertifolia* (11%), *Lomandra longifolia* (11%), *Lysicarpus angustifolius* (11%), *Marsdenia viridiflora* (11%), *Melhantha oblongifolia* (11%), *Opuntia stricta*\* (11%), *Oxalis corniculata*\* (11%), *Peripleura bicolor* (11%), *Peripleura hispidula* var. *setosa* (11%), *Petalostigma pubescens* (11%), *Phyllanthus maderaspatensis* (11%), *Pittosporum spinescens* (11%), *Portulaca oleracea*\* (11%), *Portulaca pilosa*\* (11%), *Pseuderanthemum variabile* (11%), *Sida spinosa*\* (1, 11%), *Solanum nemophilum* (1, 11%), *Solanum parvifolium* subsp. *parvifolium* (11%), *Sonchus oleraceus*\* (11%), *Spermacoce brachystema* (11%), *Tephrosia filipes* (11%), *Wahlenbergia gracilis* (11%)

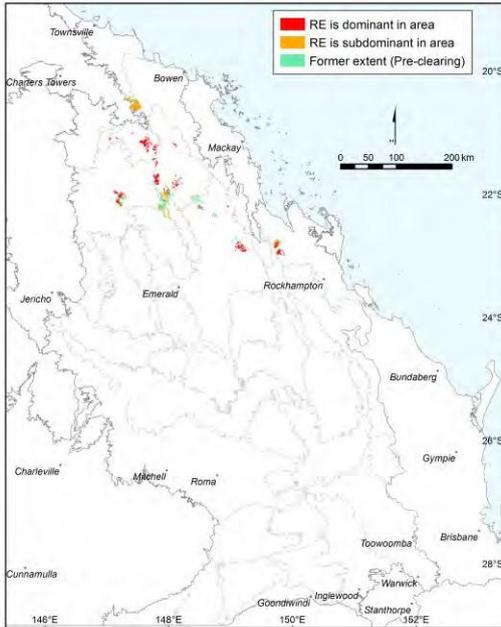
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Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Eucalyptus crebra +/- Corymbia intermedia +/- E. moluccana +/- C. dallachiana woodland**



**Pre-clearing area (ha), remnant area (ha) and per cent remaining: 134,284 91,598 68%**

**Species\_recorded: Total: 31; woody: 14; ground: 19; Avg. spp./site: 31.0; std dev.: 0.0, 1 site(s)**

**Basal area: Avg./site: 3.0 m<sup>2</sup>/ha, range: 3.0 - 3 m<sup>2</sup>/ha, std. deviation: 0 m<sup>2</sup>/ha, 1 site(s)**

**Structural formation: Open-woodland: 100%, 1 site(s)**

**Representative\_sites 19187.**

**Stratum: Tree 1**

**Height avg. = 13.0m, 1 site**

**Crown cover avg. = 15.0%, 1 site**

*Dominant species (relative cover, frequency): Corymbia tessellaris (50, 100%), Eucalyptus crebra (25, 100%), Corymbia clarksoniana (25, 100%)*

*Frequent species (cover, frequency): Acacia excelsa subsp. excelsa (100%), Corymbia clarksoniana (5, 100%), Corymbia tessellaris (10, 100%), Eucalyptus crebra (5, 100%), Grevillea striata (100%)*

**Stratum: Shrub 1**

**Height avg. = 1.2m, 1 site**

**Crown cover avg. = 4.0%, 1 site**

*Dominant species (relative cover, frequency): Ventilago viminalis (21, 100%), Ehretia membranifolia (21, 100%), Alphitonia excelsa (21, 100%), Jasminum didymum (10, 100%), Corymbia clarksoniana (10, 100%)*

*Frequent species (cover, frequency): Acacia excelsa subsp. excelsa (100%), Alectryon diversifolius (100%), Alphitonia excelsa (1, 100%), Capparis indet. (100%), Carissa ovata (100%), Corymbia clarksoniana (1, 100%), Corymbia tessellaris (100%), Ehretia membranifolia (1, 100%), Grevillea striata (100%), Grewia latifolia (100%), Jasminum didymum (1, 100%), Owenia acidula (100%), Ventilago viminalis (1, 100%)*

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Technical Description****Regional ecosystem: 11.5.9c****Stratum: Shrub 2****Height avg. = 0.5m, 1 site****Crown cover avg. = 50.0%, 1 site***Dominant species (relative cover, frequency): Acacia excelsa subsp. excelsa (100, 100%)**Frequent species (cover, frequency): Acacia excelsa subsp. excelsa (10, 100%)***Stratum: Ground****Height avg. = 0.5m, 1 site****PFC avg. = 10.0%, 1 site***Dominant species (relative cover, frequency): Grewia latifolia (11, 100%), Tragus australianus (11, 100%), Cenchrus ciliaris\* (11, 100%), Parsonsia lanceolata (11, 100%), Jasminum didymum (11, 100%)**Frequent species (cover, frequency): GRAMINOIDS: Bothriochloa decipiens (100%), Cenchrus ciliaris\* (1, 100%), Chloris divaricata (100%), Chrysopogon fallax (1, 100%), Dactyloctenium radulans (100%), Enneapogon purpurascens (1, 100%), Heteropogon contortus (100%), Paspalidium distans (100%), Tragus australianus (1, 100%)**FORBS: Boerhavia sp. (St George A.Hill AQ399299) (100%), Breynia oblongifolia (100%), Euphorbia tannensis subsp. eremophila (100%), Grewia latifolia (1, 100%), Jasminum didymum (1, 100%), Melhania oblongifolia (100%), Parsonsia lanceolata (1, 100%), Ptilotus macrocephalus (100%), Tinospora smilacina (100%), Trianthema triquetra (1, 100%)*

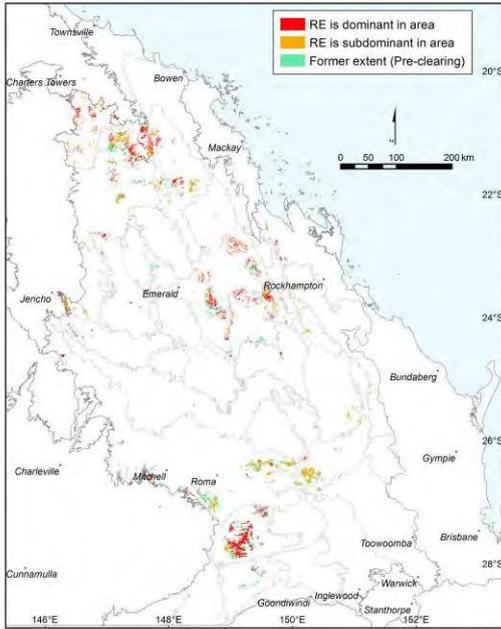
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**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Acacia spp. woodland on Cainozoic lateritic duricrust. Scarp retreat zone



Annie Kelly

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 564,695 367,290 65%

Species\_recorded: Total: 290; woody: 86; ground: 226; Avg. spp./site: 19.3; std dev.: 7.0, 29 site(s)

Basal area: Avg./site: 16.0 m<sup>2</sup>/ha, range: 4.0 - 29 m<sup>2</sup>/ha, std. deviation: 6 m<sup>2</sup>/ha, 40 site(s)

Structural formation: Open-forest: 38%; woodland: 26%; open-woodland: 17%; low woodland: 7%; low open-forest: 7%; low open-woodland: 2%; closed-forest: 2%, 42 site(s)

Representative\_sites 16231, 16243, 16330, 16338, 16563, 16830, 16870, 17021, 17045, 17154, 17156, 17176, 17182, 17367, 17383, 17388, 17451, 17452, 17552, 17554, 17558, 17560, 17563, 17566, 17567, 17568, 17570, 17571, 17656, 17675, 17688, 17694, 19119, 19154, 19159, 19161, 19258, 28761, 28853, 28869, 28936, 28944.

**Stratum: Emergent**

Height avg. = 18.5m, range 11-30m, 12 sites

Crown cover avg. = 5.7%, range 1.0-15.0%, 12 sites

Frequent species (cover, frequency): *Eucalyptus crebra* (5, 10%), *Corymbia citriodora* (5, 7%), *Acacia catenulata* (5, 2%), *Corymbia clarksoniana* (2%), *Corymbia dallachiana* (2, 2%), *Corymbia erythrophloia* (2, 2%), *Corymbia tessellaris* (5, 2%), *Eucalyptus cambageana* (2%), *Eucalyptus moluccana* (3, 2%), *Eucalyptus populnea* (5, 2%), *Eucalyptus suffulgens* (10, 2%), *Flindersia australis* (2%)

**Stratum: Tree 1**

Height avg. = 14.3m, range 6.5-27m, 42 sites

Crown cover avg. = 41.9%, range 8.0-82.0%, 42 sites

Dominant species (relative cover, frequency): *Acacia catenulata* (86, 26%), *Acacia shirleyi* (84, 45%), *Acacia rhodoxylon* (68, 29%), *Eucalyptus crebra* (14, 26%)

Frequent species (cover, frequency): *Acacia shirleyi* (43, 45%), *Acacia rhodoxylon* (28, 29%), *Acacia catenulata* (33, 26%), *Eucalyptus crebra* (6, 26%), *Eucalyptus exserta* (5, 12%), *Corymbia clarksoniana* (8, 7%), *Corymbia citriodora* (8, 5%), *Eucalyptus thozetiana* (9, 5%), *Alstonia constricta* (2%), *Angophora leiocarpa* (6, 2%), *Atalaya hemiglauca* (1, 2%), *Brachychiton populneus* (2%), *Corymbia intermedia* (2%), *Corymbia leichhardtii* (2, 2%), *Corymbia trachyphloia* (10, 2%), *Corymbia trachyphloia* subsp. *trachyphloia* (2, 2%), *Eucalyptus persistens* (2, 2%), *Hakea lorea* subsp. *lorea* (1, 2%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Technical Description****Regional ecosystem: 11.7.2****Stratum: Tree 2****Height avg. = 7.2m, range 2-16m, 26 sites****Crown cover avg. = 9.6%, range 1.6-55.0%, 26 sites***Dominant species (relative cover, frequency): Acacia catenulata (85, 21%), Acacia shirleyi (59, 24%)**Frequent species (cover, frequency): Acacia shirleyi (10, 24%), Acacia catenulata (7, 21%), Alphitonia excelsa (2, 12%), Alstonia constricta (1, 10%), Acacia rhodoxylon (8, 7%), Eucalyptus exserta (7%), Eucalyptus crebra (11, 5%), Acacia aprepta (2, 2%), Brachychiton rupestris (2%), Breynia oblongifolia (1, 2%), Callitris glaucophylla (2%), Corymbia leichhardtii (1, 2%), Croton insularis (10, 2%), Denhamia cunninghamii (2%), Eremophila latrobei (1, 2%), Erythroxyllum sp. (Splityard Creek L.Pedley 5360) (2, 2%), Flindersia australis (2, 2%), Geijera parviflora (1, 2%), Hakea lorea subsp. lorea (2, 2%), Lysicarpus angustifolius (2, 2%), Opuntia tomentosa\* (2%), Pandorea pandorana (2%), Petalostigma pubescens (1, 2%), Psydrax forsteri (1, 2%), Psydrax odorata (3, 2%)***Stratum: Tree 3****Height avg. = 4.6m, range 3-7m, 10 sites****Crown cover avg. = 8.0%, range 2.0-25.0%, 10 sites***Frequent species (cover, frequency): Acacia shirleyi (6, 7%), Acacia rhodoxylon (8, 5%), Alphitonia excelsa (2, 5%), Erythroxyllum australe (7, 5%), Erythroxyllum sp. (Splityard Creek L.Pedley 5360) (1, 5%), Petalostigma pubescens (3, 5%), Acacia bancroftiorum (5, 2%), Acacia catenulata (4, 2%), Alstonia constricta (1, 2%), Capparis canescens (2%), Eremophila latrobei subsp. glabra (6, 2%), Eucalyptus crebra (2, 2%), Lysicarpus angustifolius (1, 2%)***Stratum: Shrub 1****Height avg. = 2.0m, range 0.5-5m, 33 sites****Crown cover avg. = 10.4%, range 1.0-40.0%, 33 sites***Dominant species (relative cover, frequency): Acacia shirleyi (60, 26%), Acacia catenulata (22, 21%), Alstonia constricta (19, 26%)**Frequent species (cover, frequency): Acacia shirleyi (6, 26%), Alstonia constricta (1, 26%), Acacia catenulata (1, 21%), Erythroxyllum sp. (Splityard Creek L.Pedley 5360) (2, 17%), Everistia vacciniifolia (2, 14%), Erythroxyllum australe (4, 12%), Alphitonia excelsa (3, 10%), Croton insularis (4, 10%), Acacia rhodoxylon (5, 7%), Capparis lasiantha (1, 5%), Eremophila latrobei (14, 5%), Eremophila mitchellii (5%), Geijera parviflora (2, 5%), Opuntia tomentosa\* (5%), Phebalium glandulosum (2, 5%), Terminalia oblongata subsp. oblongata (1, 5%), Abutilon oxycarpum var. oxycarpum (2, 2%), Acacia aprepta (1, 2%), Acacia leiocalyx subsp. leiocalyx (2%), Acalypha eremorum (2%), Allocasuarina littoralis (2%), Angophora leiocarpa (4, 2%), Atalaya hemiglauca (1, 2%), Bertya oleifolia (30, 2%), Beyeria viscosa (2, 2%), Carissa ovata (10, 2%), Cerbera dumicola (1, 2%), Claoxylon australe (2, 2%), Clematicissus opaca (1, 2%), Corymbia trachyphloia subsp. trachyphloia (2, 2%), Dodonaea filifolia (1, 2%), Enchylaena tomentosa (2%), Eremophila latrobei subsp. glabra (6, 2%), Euphorbia tannensis subsp. eremophila (5, 2%), Everistia vacciniifolia forma vacciniifolia (1, 2%), Flindersia australis (2%), Hakea lorea (1, 2%), Herissantia crispata (2%), Hibiscus sp. (Emerald S.L. Everist 2124) (2%), Leptospermum indet. (5, 2%), Marsdenia viridiflora (2%), Micromyrtus capricornia (10, 2%), Olearia canescens (2, 2%), Opuntia aurantiaca\* (1, 2%), Parsonsia eucalyptophylla (2%), Petalostigma pubescens (1, 2%), Phebalium glandulosum subsp. glandulosum (14, 2%), Phebalium nottii (8, 2%), Pittosporum spinescens (2, 2%), Planchonella cotinifolia (2%), Psydrax forsteri (2%), Psydrax odorata (1, 2%), Psydrax odorata forma buxifolia (1, 2%), Secamone elliptica (2%), Sida rohlenae (1, 2%), Solanum ferocissimum (2%), Waltheria indica (2%),***Stratum: Shrub 2****Height avg. = 0.8m, range 0.5-1.5m, 4 sites****Crown cover avg. = 5.0%, range 0.0-8.0%, 4 sites***Frequent species (cover, frequency): Acacia shirleyi (1, 2%), Alphitonia excelsa (5, 2%), Petalostigma pubescens (1, 2%), Seringia hookeriana (5, 2%)*

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Ground  
Stratum:

Height avg. = 0.4m, range 0.2-1.2m, 28 sites

PFC avg. = 27.0%, range 1-70%, 29 sites

Dominant species (relative cover, frequency): *Calyptochloa gracillima* subsp. *gracillima* (36, 34%), *Thyridolepis xerophila* (36, 21%), *Aristida caput-medusae* (20, 45%), *Eragrostis lacunaria* (17, 24%), *Entolasia stricta* (14, 24%)

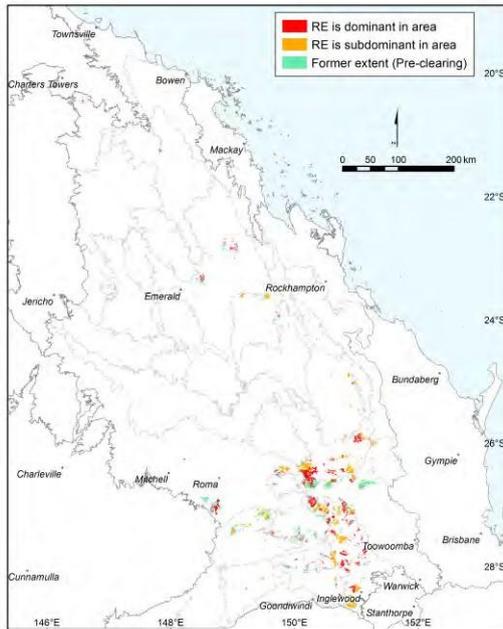
Frequent species (cover, frequency): GRAMINOIDS: *Aristida caput-medusae* (5, 45%), *Calyptochloa gracillima* subsp. *gracillima* (13, 34%), *Entolasia stricta* (5, 24%), *Eragrostis lacunaria* (3, 24%), *Aristida calycina* (1, 21%), *Paspalidium criniforme* (3, 21%), *Thyridolepis xerophila* (13, 21%), *Aristida jerichoensis* var. *subspinulifera* (3, 17%), *Paspalidium distans* (3, 17%), *Aristida queenslandica* var. *dissimilis* (1, 14%), *Cenchrus ciliaris*\* (1, 14%), *Melinis repens*\* (14%), *Panicum effusum* (14%), *Scleria sphacelata* (3, 14%), *Ancistrachne uncinulata* (1, 10%), *Cleistochloa subjuncea* (12, 10%), *Digitaria breviglumis* (5, 10%), *Digitaria ramularis* (4, 10%), *Dinebra decipiens* (10%), *Enneapogon lindleyanus* (2, 10%), *Gahnia aspera* (10%), *Paspalidium gracile* (4, 10%), *Setaria dielsii* (1, 10%), *Aristida* indet. (7%), *Aristida lignosa* (1, 7%), *Aristida queenslandica* var. *queenslandica* (3, 7%), *Chrysopogon fallax* (7%), *Cleistochloa* sp. (*Duaringa* K.B.Addison 42) (13, 7%), *Cyperus bowmannii* (1, 7%), *Eragrostis sororia* (7%), *Eriachne mucronata* (1, 7%), *Eriochloa pseudoacrotricha* (7%), *Panicum decompositum* (3, 7%), *Paspalidium constrictum* (2, 7%), *Schoenus kennyi* (1, 7%), *Sporobolus caroli* (7%), *Thyridolepis mitchelliana* (2, 7%)  
FORBS: *Cheilanthes sieberi* (1, 48%), *Alphitonia excelsa* (24%), *Calotis cuneifolia* (1, 24%), *Evolvulus alsinoides* (24%), *Sida* sp. (*Musselbrook* M.B.Thomas+ MRS437) (1, 24%), *Solanum ellipticum* (21%), *Clematicissus opaca* (1, 17%), *Oxalis radicata* (1, 17%), *Solanum parvifolium* (17%), *Brunoniella australis* (14%), *Cheilanthes sieberi* subsp. *sieberi* (14%), *Lomandra longifolia* (14%), *Parsonia straminea* (1, 14%), *Sida hackettiana* (14%), *Sida trichopoda* (7, 14%), *Everistia vacciniifolia* (10%), *Goodenia rotundifolia* (1, 10%), *Lomandra confertifolia* subsp. *pallida* (10%), *Malvastrum americanum* var. *americanum*\* (1, 10%), *Melhantha oblongifolia* (2, 10%), *Opuntia stricta*\* (10%), *Sida* indet. (3, 10%), *Solanum* indet. (10%), *Abutilon oxycarpum* (1, 7%), *Achyranthes aspera* (7%), *Alstonia constricta* (7%), *Dysphania valida* (1, 7%), *Euphorbia dallachyana* (7%), *Euphorbia drummondii* (7%), *Euphorbia hyssopifolia*\* (7%), *Euphorbia tannensis* subsp. *eremophila* (7%), *Harrisia martinii*\* (7%), *Hibiscus* sp. (*Emerald* S.L.Everist 2124) (1, 7%), *Hibiscus sturtii* (1, 7%), *Jasminum didymum* subsp. *didymum* (7%), *Laxmannia gracilis* (7%), *Lomandra multiflora* subsp. *multiflora* (1, 7%), *Marsdenia viridiflora* (7%), *Olearia gordonii* (7%), *Opuntia tomentosa*\* (7%), *Oxalis* indet. (7%), *Phyllanthus carpentariae* (1, 7%), *Phyllanthus virgatus* (1, 7%), *Portulaca filifolia* (7%), *Pseuderanthemum variabile* (7%), *Psydrax johnsonii* (1, 7%), *Sida aprica* var. *aprica* (7%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Eucalyptus decorticans and/or Eucalyptus spp., Corymbia spp., Acacia spp., Lysicarpus angustifolius woodland on Cainozoic lateritic duricrust**



Pre-clearing area (ha), remnant area (ha) and per cent remaining: 315,862 196,274 62%

Species\_recorded: Total: 283; woody: 119; ground: 202; Avg. spp./site: 27.4; std dev.: 11.2, 19 site(s)

Basal area: Avg./site: 13.3 m<sup>2</sup>/ha, range: 4.5 - 23 m<sup>2</sup>/ha, std. deviation: 5 m<sup>2</sup>/ha, 25 site(s)

Structural formation: Woodland: 48%; open-forest: 28%; open-woodland: 12%; low open-woodland: 4%; closed-forest: 4%; unrecorded: 4%, 25 site(s)

Representative\_sites 14200, 16557, 16662, 16705, 16706, 16709, 16753, 16757, 16806, 16810, 16814, 16818, 16827, 16833, 16914, 16955, 24582, 24667, 24722, 28746, 28747, 28904, 59174, 60758, 60779.

**Stratum: Emergent**

Height avg. = 15.3m, range 10-18m, 3 sites

Crown cover avg. = 4.3%, range 1.0-10.0%, 3 sites

Frequent species (cover, frequency): *Eucalyptus fibrosa* subsp. *nubilis* (6, 8%), *Eucalyptus beaniana* (2, 4%)

**Stratum: Tree 1**

Height avg. = 15.7m, range 7-26m, 25 sites

Crown cover avg. = 37.6%, range 10.0-70.0%, 25 sites

Dominant species (relative cover, frequency): *Eucalyptus crebra* (29, 40%), *Corymbia trachyphloia* (25, 28%), *Eucalyptus exserta* (25, 24%)

Frequent species (cover, frequency): *Eucalyptus crebra* (12, 40%), *Corymbia trachyphloia* (6, 28%), *Eucalyptus exserta* (11, 24%), *Eucalyptus tenuipes* (11, 20%), *Acacia burrowii* (26, 16%), *Angophora leiocarpa* (9, 16%), *Corymbia trachyphloia* subsp. *trachyphloia* (6, 16%), *Acacia sparsiflora* (6, 12%), *Eucalyptus apothalassica* (3, 12%), *Eucalyptus decorticans* (31, 12%), *Eucalyptus fibrosa* subsp. *nubilis* (9, 12%), *Lysicarpus angustifolius* (5, 12%), *Allocasuarina inophloia* (5, 8%), *Amyema quandang* var. *quandang* (8%), *Callitris endlicheri* (5, 8%), *Corymbia clarksoniana* (5, 8%), *Eucalyptus fibrosa* (50, 8%), *Eucalyptus viridis* (35, 8%), *Acacia crassa* subsp. *crassa* (4, 4%), *Acacia* indet. (5, 4%), *Acacia shirleyi* (45, 4%), *Acacia striatifolia* (5, 4%), *Alphitonia excelsa* (4%), *Brachychiton populneus* (1, 4%), *Callitris glaucophylla* (4%), *Corymbia citriodora* (10, 4%), *Corymbia citriodora* subsp. *variegata* (6, 4%), *Corymbia dallachiana* (4%), *Corymbia watsoniana* (4, 4%), *Eucalyptus baileyana* (1, 4%), *Eucalyptus beaniana* (2, 4%), *Eucalyptus curtisii* (5, 4%), *Eucalyptus melanoleuca* (11, 4%), *Eucalyptus*

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.7.4

*moluccana* (4%), *Eucalyptus panda* (14, 4%), *Eucalyptus taurina* (19, 4%), *Solanum nemophilum* (4%)

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Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

1/03/2018

Tree 2  
Stratum:

Height avg. = 9.4m, range 3-16m, 14 sites

Crown cover avg. = 19.9%, range 5.0-85.0%, 14 sites

Frequent species (cover, frequency): *Allocasuarina inophloia* (5, 20%), *Eucalyptus crebra* (3, 20%), *Corymbia trachyphloia* (2, 16%), *Corymbia trachyphloia subsp. trachyphloia* (10, 16%), *Eucalyptus exserta* (1, 12%), *Eucalyptus tenuipes* (14, 12%), *Callitris endlicheri* (15, 8%), *Eucalyptus apothalassica* (2, 8%), *Eucalyptus decorticans* (11, 8%), *Eucalyptus fibrosa* (3, 8%), *Eucalyptus fibrosa subsp. nubilis* (6, 8%), *Lysicarpus angustifolius* (2, 8%), *Acacia burrowii* (1, 4%), *Acacia crassa* (4%), *Acacia indet.* (25, 4%), *Acacia julifera* (6, 4%), *Acacia sparsiflora* (6, 4%), *Alphitonia excelsa* (4%), *Angophora leiocarpa* (12, 4%), *Callitris glaucophylla* (4, 4%), *Corymbia citriodora* (10, 4%), *Corymbia watsoniana* (1, 4%)

Stratum: Tree 3

Height avg. = 5.2m, range 4-7m, 3 sites

Crown cover avg. = 12.7%, range 9.0-15.0%, 3 sites

Frequent species (cover, frequency): *Allocasuarina inophloia* (5, 8%), *Eucalyptus apothalassica* (1, 8%), *Eucalyptus decorticans* (7, 8%), *Acacia crassa* (2, 4%), *Acacia julifera* (1, 4%), *Callitris glaucophylla* (7, 4%), *Corymbia trachyphloia* (6, 4%)

Stratum: Shrub 1

Height avg. = 2.6m, range 0.8-5m, 22 sites

Crown cover avg. = 13.1%, range 0.0-58.0%, 23 sites

Dominant species (relative cover, frequency): *Allocasuarina inophloia* (31, 28%), *Alphitonia excelsa* (26, 36%)

Frequent species (cover, frequency): *Aristida calycina* (4%), *Arundinella nepalensis* (1, 4%), *Cleistochloa subjuncea* (4%), *Digitaria ramularis* (4%), *Enteropogon unispiceus* (4%), *Entolasia stricta* (4%), *Gahnia aspera* (4%), *Panicum effusum* (4%), *Scleria sphacelata* (4, 4%), *Alphitonia excelsa* (3, 36%), *Allocasuarina inophloia* (6, 28%), *Acacia conferta* (5, 16%), *Acacia crassa* (3, 16%), *Eucalyptus crebra* (3, 16%), *Petalostigma pubescens* (1, 16%), *Acacia julifera* (4, 12%), *Angophora leiocarpa* (12%), *Eucalyptus tenuipes* (3, 12%), *Acacia buxifolia subsp. pubiflora* (8%), *Acacia complanata* (1, 8%), *Acacia leiocalyx subsp. leiocalyx* (6, 8%), *Acacia semilunata* (8%), *Acacia sparsiflora* (5, 8%), *Callitris endlicheri* (2, 8%), *Eucalyptus exserta* (1, 8%), *Lysicarpus angustifolius* (1, 8%), *Acacia aulacocarpa* (4%), *Acacia bancroftiorum* (1, 4%), *Acacia burrowii* (1, 4%), *Acacia crassa subsp. crassa* (26, 4%), *Acacia crassa subsp. longicoma* (4%), *Acacia indet.* (1, 4%), *Acacia juncifolia* (5, 4%), *Acacia loroloba* (3, 4%), *Acacia podalyriifolia* (4%), *Acacia pustula* (4%), *Acacia shirleyi* (2, 4%), *Acacia striatifolia* (5, 4%), *Alectryon diversifolius* (4%), *Allocasuarina luehmannii* (1, 4%), *Alstonia constricta* (4%), *Asteraceae indet.* (4, 4%), *Boronia indet.* (1, 4%), *Breynia oblongifolia* (4%), *Callitris glaucophylla* (3, 4%), *Calytrix gurlumundensis* (5, 4%), *Calytrix tetragona* (1, 4%), *Capparis indet.* (4%), *Carissa ovata* (4%), *Corymbia citriodora* (2, 4%), *Corymbia citriodora subsp. variegata* (4%), *Corymbia trachyphloia* (2, 4%), *Corymbia trachyphloia subsp. trachyphloia* (4%), *Croton phebalioides* (1, 4%), *Cyanthillium cinereum* (4%), *Denhamia bilocularis* (4%), *Denhamia cunninghamii* (1, 4%), *Dianella longifolia* (4%), *Dodonaea triangularis* (4%), *Erythroxylum australe* (8, 4%), *Eucalyptus decorticans* (10, 4%), *Eucalyptus fibrosa* (2, 4%), *Eucalyptus panda* (4%), *Euphorbia dallachyana* (4%), *Eustrephus latifolius* (4%), *Evolvulus alsinoides* (4%), *Gonocarpus elatus* (4%), *Hibiscus sturtii* (4%), *Jacksonia rhadinoclona* (5, 4%), *Jacksonia scoparia* (4%), *Jasminum didymum* (1, 4%), *Kunzea opposita var. opposita* (8, 4%), *Leucopogon blakei* (1, 4%), *Lobelia purpurascens* (4%), *Lomandra multiflora subsp. multiflora* (4%), *Marsdenia indet.* (4%), *Micromyrtus capricornia* (4%), *Opercularia diphylla* (4%), *Opuntia stricta\** (1, 4%), *Philotheca difformis* (1, 4%), *Phyllanthus fuernrohrrii* (4%), *Pseuderanthemum variabile* (4%), *Psydrax odorata forma subnitida* (51, 4%), *Senna aciphylla* (4%), *Sida corrugata* (4%), *Solanum jucundum* (4%), *Solanum nemophilum* (4%), *Xanthorrhoea johnsonii* (1, 4%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Technical Description****Regional ecosystem: 11.7.4****Shrub 2  
Stratum:****Height avg. = 1.3m, range 0.5-2.2m, 10 sites****Crown cover avg. = 13.8%, range 1.0-40.0%, 9 sites**

*Frequent species (cover, frequency):* *Alphitonia excelsa* (1, 20%), *Acacia conferta* (8, 16%), *Acacia sparsiflora* (1, 8%), *Allocasuarina inophloia* (3, 8%), *Boronia bipinnata* (1, 8%), *Dodonaea triangularis* (9, 8%), *Hibbertia cistoidea* (8%), *Acacia buxifolia* subsp. *pubiflora* (4%), *Acacia crassa* subsp. *longicoma* (4%), *Acacia julifera* (1, 4%), *Acacia juncifolia* (1, 4%), *Acacia neriifolia* (2, 4%), *Acacia podalyriifolia* (4%), *Allocasuarina luehmannii* (1, 4%), *Boronia glabra* (6, 4%), *Boronia rosmarinifolia* (20, 4%), *Brachyloma daphnoides* (4%), *Callitris endlicheri* (1, 4%), *Cassinia laevis* (2, 4%), *Corymbia citriodora* (1, 4%), *Corymbia trachyphloia* (1, 4%), *Cryptandra longistaminea* (5, 4%), *Denhamia cunninghamii* (1, 4%), *Dodonaea peduncularis* (1, 4%), *Eucalyptus exserta* (1, 4%), *Leucopogon biflorus* (1, 4%), *Marsdenia indet.* (4%), *Melichrus sp.* (*Isla Gorge P.Sharpe+ 601*) (1, 4%), *Notelaea sp.* (*Barakula A.R.Bean 7553*) (5, 4%), *Olearia microphylla* (1, 4%), *Persoonia terminalis* subsp. *recurva* (1, 4%), *Pittosporum spinescens* (1, 4%), *Seringia corollata* (10, 4%), *Xanthorrhoea johnsonii* (1, 4%), *Zieria cytisoides* (1, 4%)

**Stratum: Ground****Height avg. = 0.4m, range 0.1-1m, 18 sites****PFC avg. = 31.8%, range 1-70%, 19 sites**

*Dominant species (relative cover, frequency):* *Dodonaea triangularis* (24, 21%), *Panicum simile* (22, 26%), *Aristida caput-medusae* (20, 68%), *Cleistochloa subjuncea* (17, 32%), *Entolasia stricta* (16, 42%)

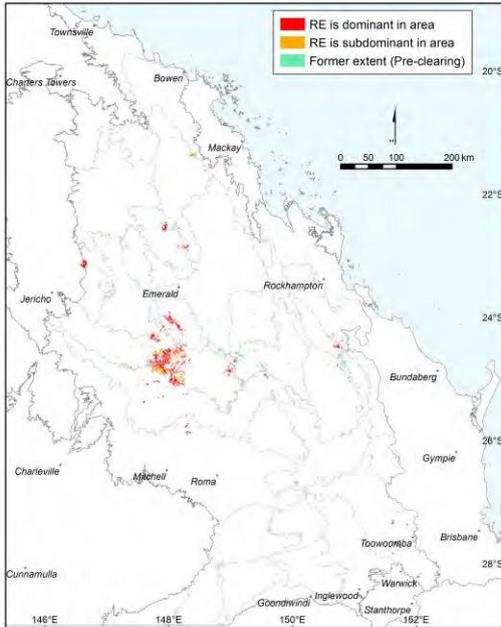
*Frequent species (cover, frequency):* GRAMINOIDS: *Aristida caput-medusae* (6, 68%), *Entolasia stricta* (6, 42%), *Gahnia aspera* (42%), *Scleria sphacelata* (3, 42%), *Aristida calycina* (4, 37%), *Cleistochloa subjuncea* (4, 32%), *Cymbopogon refractus* (1, 26%), *Panicum simile* (8, 26%), *Ancistrachne uncinulata* (1, 21%), *Eriachne pallescens* (1, 21%), *Lepidosperma laterale* (1, 21%), *Paspalidium gracile* (21%), *Aristida jerichoensis* var. *jerichoensis* (1, 16%), *Aristida queenslandica* var. *dissimilis* (2, 16%), *Calypochloa gracillima* subsp. *gracillima* (16%), *Digitaria ramularis* (2, 16%), *Dimorphochloa rigida* (7, 16%), *Eragrostis lacunaria* (16%), *Panicum effusum* (5, 16%), *Aristida indet.* (11%), *Aristida leichhardtiana* (11%), *Aristida queenslandica* var. *queenslandica* (1, 11%), *Aristida vagans* (3, 11%), *Enneapogon lindleyanus* (1, 11%), *Enteropogon indet.* (11%), *Eragrostis indet.* (11%), *Eragrostis leptostachya* (3, 11%), *Eragrostis sororia* (2, 11%), *Eragrostis spartinoideus* (11%), *Eriachne mucronata* (1, 11%), *Eulalia aurea* (10, 11%), *Oplismenus aemulus* (11%), *Panicum decompositum* (11%), *Paspalidium distans* (11%), *Schoenus indet.* (3, 11%), *Schoenus kemmyi* (2, 11%), *Thyridolepis mitchelliana* (1, 11%)  
FORBS: *Dianella revoluta* (37%), *Cheilanthes sieberi* subsp. *sieberi* (1, 32%), *Brunoniella australis* (26%), *Cheilanthes sieberi* (26%), *Lomandra filiformis* (26%), *Lomandra multiflora* subsp. *multiflora* (26%), *Pomax umbellata* (1, 26%), *Boronia bipinnata* (21%), *Cyanthillium cinereum* (21%), *Dodonaea triangularis* (2, 21%), *Pseuderanthemum variabile* (1, 21%), *Chrysocephalum apiculatum* (16%), *Cryptandra longistaminea* (8, 16%), *Goodenia delicata* (16%), *Goodenia glabra* (16%), *Hibiscus sturtii* (16%), *Laxmannia gracilis* (16%), *Opuntia tomentosa*\* (16%), *Oxalis perennans* (16%), *Phyllanthus virgatus* (16%), *Sida sp.* (*Musselbrook M.B.Thomas+ MRS437*) (16%), *Solanum nemophilum* (16%), *Brunfelsia australis*\* (11%), *Dianella brevipedunculata* (11%), *Dianella longifolia* (1, 11%), *Glycine clandestina* (11%), *Gonocarpus indet.* (11%), *Hibbertia cistoidea* (1, 11%), *Lomandra filiformis* subsp. *filiformis* (1, 11%), *Lomandra longifolia* (1, 11%), *Melichrus urceolatus* (1, 11%), *Oxalis corniculata*\* (11%), *Rostellularia adscendens* (11%), *Sida trichopoda* (11%)

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Eucalyptus melanophloia open woodland on Cainozoic igneous rocks.**



**Pre-clearing area (ha), remnant area (ha) and per cent remaining:** 217,356 151,409 70%

**Species recorded:** Total: 168; woody: 29; ground: 143; Avg. spp./site: 36.3; std dev.: 14.4, 6 site(s)

**Basal area:** Avg./site: 12.6 m<sup>2</sup>/ha, range: 6.0 - 28 m<sup>2</sup>/ha, std. deviation: 7 m<sup>2</sup>/ha, 7 site(s)

**Structural formation:** Open-woodland: 29%; open-forest: 29%; woodland: 14%; low open-woodland: 14%; low open-forest: 14%, 7 site(s)

**Representative sites** 16969, 16971, 16975, 17219, 17547, 19254, 24616.

**Stratum: Tree 1**

**Height avg. = 14.4m, range 8-22m, 7 sites**

**Crown cover avg. = 37.3%, range 12.0-66.0%, 7 sites**

*Dominant species (relative cover, frequency): Eucalyptus melanophloia (81, 57%), Corymbia citriodora (63, 43%), Eucalyptus crebra (31, 57%), Corymbia erythrophloia (11, 57%)*

*Frequent species (cover, frequency): Corymbia erythrophloia (4, 57%), Eucalyptus crebra (15, 57%), Eucalyptus melanophloia (15, 57%), Corymbia citriodora (40, 43%), Atalaya hemiglauca (1, 14%), Brachychiton populneus (1, 14%), Brachychiton populneus subsp. populneus (2, 14%), Eucalyptus cambageana (14%)*

**Stratum: Tree 2**

**Height avg. = 7.5m, range 4-11m, 2 sites**

**Crown cover avg. = 7.5%, range 5.0-10.0%, 2 sites**

*Dominant species (relative cover, frequency): Eucalyptus crebra (13, 29%)*

*Frequent species (cover, frequency): Eucalyptus crebra (29%), Alphitonia excelsa (14%), Atalaya hemiglauca (14%), Corymbia citriodora (14%), Eremophila mitchellii (3, 14%), Eucalyptus melanophloia (2, 14%), Melia azedarach (14%)*

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Technical Description****Regional ecosystem: 11.8.4****Shrub 1****Stratum:****Height avg. = 2.6m, range 1.2-4m, 6 sites****Crown cover avg. = 14.8%, range 1.0-50.0%, 6 sites**

*Dominant species (relative cover, frequency): Macrozamia moorei (54, 29%), Acacia leiocalyx subsp. leiocalyx (30, 29%), Alphitonia excelsa (20, 29%), Corymbia citriodora (20, 29%)*

*Frequent species (cover, frequency): Acacia leiocalyx subsp. leiocalyx (15, 29%), Alphitonia excelsa (9, 29%), Corymbia citriodora (6, 29%), Macrozamia moorei (3, 29%), Acacia bancroftiorum (14%), Acacia catenulata (14%), Acacia disparrima subsp. disparrima (14%), Acacia excelsa (1, 14%), Acacia implexa (1, 14%), Alectryon diversifolius (14%), Atalaya hemiglauca (1, 14%), Callitris glaucophylla (1, 14%), Capparis canescens (14%), Corymbia tessellaris (14%), Eremophila mitchellii (14%), Eucalyptus crebra (10, 14%), Eucalyptus melanophloia (2, 14%), Ficus opposita (14%), Leptospermum lamellatum (14%), Owenia acidula (14%), Trema tomentosa (14%), Turraea pubescens (12, 14%), Vachellia bidwillii (14%)*

**Stratum: Shrub 2****Height avg. = 1.5m, 1 site****Crown cover avg. = 20.0%, 1 site**

*Frequent species (cover, frequency): Acacia leiocalyx subsp. leiocalyx (14%), Alphitonia excelsa (6, 14%), Corymbia citriodora (14%), Dodonaea lanceolata var. subsessilifolia (14, 14%)*

**Stratum: Ground****Height avg. = 0.6m, range 0.1-1m, 6 sites****PFC avg. = 50.0%, range 15-80%, 6 sites**

*Dominant species (relative cover, frequency): Cymbopogon refractus (63, 33%), Cymbopogon obtectus (13, 33%), Aristida personata (11, 50%), Eremochloa bimaculata (8, 50%), Themeda triandra (6, 33%)*

*Frequent species (cover, frequency): GRAMINOIDS: Scleria mackaviensis (1, 67%), Aristida personata (3, 50%), Eremochloa bimaculata (4, 50%), Heteropogon contortus (2, 50%), Aristida queenslandica var. queenslandica (1, 33%), Chrysopogon fallax (1, 33%), Cymbopogon obtectus (16, 33%), Cymbopogon refractus (37, 33%), Cyperus gracilis (33%), Cyperus trinervis (33%), Dichanthium sericeum (1, 33%), Digitaria parviflora (33%), Enneapogon lindleyanus (33%), Fimbristylis bisumbellata (33%), Melinis repens\* (1, 33%), Paspalidium constrictum (33%), Themeda triandra (4, 33%), Aristida calycina var. calycina (48, 17%), Aristida caput-medusae (17%), Aristida gracilipes (31, 17%), Aristida indet. (3, 17%), Aristida vagans (17%), Arundinella nepalensis (2, 17%), Bothriochloa decipiens (1, 17%), Bothriochloa decipiens var. decipiens (17%), Bothriochloa ewartiana (50, 17%), Bulbostylis barbata (17%), Chloris ventricosa (4, 17%), Cleistochloa subjuncea (17%), Cymbopogon indet. (3, 17%), Cyperus indet. (17%), Dichelachne micrantha (17%), Digitaria brownii (17%), Enneapogon gracilis (17%), Eragrostis brownii (17%), Eragrostis lacunaria (17%), Eragrostis megalosperma (7, 17%), Mnesithea rottboellioides (17%), Panicum decompositum (17%), Panicum effusum (5, 17%), Panicum larcomianum (17%), Paspalidium caespitosum (17%), Paspalidium gracile (17%), Scleria sphacelata (17%), Sporobolus natalensis\* (8, 17%), Tripogon loliiformis (17%)*

*FORBS: Opuntia stricta\* (50%), Peripleura hispidula var. hispidula (50%), Phyllanthus virgatus (50%), Rostellularia adscendens (2, 50%), Breyntia oblongifolia (33%), Brunoniella australis (33%), Cheilanthes distans (33%), Cheilanthes sieberi subsp. sieberi (1, 33%), Euphorbia dallachyana (33%), Evolvulus alsinoides (33%), Grewia latifolia (33%), Hibiscus sturtii (33%), Macrozamia moorei (33%), Oxalis chnoodes (33%), Phyllanthus gunnii (33%), Pseuderanthemum variabile (33%), Sida hackettiana (33%), Spermacoe brachystema (33%), Verbena indet. (33%), Vittadinia sulcata (33%), Abelmoschus indet. (17%), Acacia angusta (17%), Acacia bancroftiorum (17%), Acacia concurrens (17%), Acacia leiocalyx subsp. leiocalyx (17%), Adiantum formosum (17%), Anisomeles indet. (17%), Boerhavia dominii (17%), Boerhavia indet. (17%), Bridelia leichhardtii (17%), Brunoniella acaulis (17%), Calotis cuneata (17%), Calotis lappulacea (17%), Camptacra barbata (17%), Cayratia clematidea (17%), Cleistanthus cunninghamii (17%), Coronidium rupicola (17%), Cyanthillium cinereum (17%), Desmodium varians (1, 17%), Dianella caerulea (17%), Dianella indet. (17%), Dianella revoluta (3, 17%), Diospyros humilis (17%), Dodonaea viscosa (17%), Dysphania carinata (17%), Einadia nutans (17%), Eremophila debilis (17%), Euphorbia drummondii (17%), Eustrephus latifolius (17%), Fabaceae indet. (5, 17%), Galactia tenuiflora (17%), Geitonoplesium cymosum (17%), Glycine indet. (17%), Glycine tabacina (17%), Gomphrena celosioides\* (17%), Goodenia calcarata (17%), Grewia retusifolia (5, 17%), Hibbertia indet. (17%), Hibiscus meraukensis (17%), Leptospermum lamellatum (17%), Lomandra multiflora subsp. multiflora (17%), Maireana microphylla (17%), Malvastrum americanum var. americanum\* (17%), Myrsine variabilis (17%), Neptunia gracilis (17%), Opuntia tomentosa\* (17%), Parthenium hysterophorus\* (17%), Peripleura bicolor (17%), Phyllanthus indet. (17%), Polygala triflora (17%), Pterocaulon redolens (17%), Rhynchosia minima (1, 17%), Rhynchosia minima var. minima (17%), Ruellia tuberosa\* (1, 17%), Sida corrugata (17%), Sida fibulifera (17%), Sida sp. (Musselbrook M.B.Thomas+MRS437) (17%), Sida spinosa\* (1, 17%), Sigesbeckia orientalis (17%), Solanum ellipticum (17%), Solanum stelligerum (17%),*

*Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).*

*Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.*

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

## Regional ecosystem: 11.8.4

*Stylosanthes indet.* (17%), *Tinospora smilacina* (17%), *Wahlenbergia tumidifructa* (17%), *Zornia muriculata* (17%)

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Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.9.1

### Stratum: Tree 3

Height avg. = 3.7m, range 3-4m, 3 sites

Crown cover avg. = 6.3%, range 3.0-8.0%, 3 sites

Dominant species (relative cover, frequency): *Eremophila mitchellii* (67, 22%), *Erythroxylum* sp. (Splityard Creek L.Pedley 5360) (40, 22%), *Acacia harpophylla* (23, 22%)

Frequent species (cover, frequency): *Acacia harpophylla* (1, 22%), *Eremophila mitchellii* (5, 22%), *Erythroxylum* sp. (Splityard Creek L.Pedley 5360) (2, 22%), *Alectryon diversifolius* (1, 11%), *Psydrax oleifolia* (2, 11%)

### Stratum: Shrub 1

Height avg. = 2.7m, range 1.2-4m, 6 sites

Crown cover avg. = 12.3%, range 2.0-20.0%, 7 sites

Dominant species (relative cover, frequency): *Eremophila mitchellii* (48, 33%), *Geijera parviflora* (32, 56%), *Pittosporum spinescens* (30, 22%), *Alectryon diversifolius* (12, 22%), *Acacia harpophylla* (3, 22%)

Frequent species (cover, frequency): *Ancistrachne uncinulata* (11%), *Cenchrus ciliaris*\* (2, 11%), *Dinebra decipiens* (11%), *Enneapogon gracilis* (11%), *Enneapogon intermedius* (11%), *Enneapogon polyphyllus* (11%), *Enteropogon acicularis* (40, 11%), *Enteropogon unispiceus* (1, 11%), *Eragrostis* *indet.* (11%), *Eragrostis megalosperma* (11%), *Paspalidium gracile* (15, 11%), *Geijera parviflora* (5, 56%), *Eremophila mitchellii* (7, 33%), *Acacia harpophylla* (3, 22%), *Alectryon diversifolius* (1, 22%), *Pittosporum spinescens* (5, 22%), *Abutilon oxycarpum* (11%), *Alphitonia excelsa* (1, 11%), *Atalaya hemiglaucula* (1, 11%), *Boerhavia dominii* (11%), *Capparis mitchellii* (2, 11%), *Carissa ovata* (4, 11%), *Clematicissus opaca* (2, 11%), *Cynanchum viminale* *subsp. brunonianum* (1, 11%), *Dianella* *indet.* (11%), *Diospyros humilis* (10, 11%), *Erythroxylum australe* (8, 11%), *Euphorbia tannensis* *subsp. eremophila* (11%), *Maireana microcarpa* (11%), *Parsonsia lanceolata* (11%), *Phyllanthus similis* (11%), *Pittosporum* *indet.* (4, 11%), *Psydrax oleifolia* (11%), *Sida* *indet.* (11%)

### Stratum: Shrub 2

Height avg. = 1.1m, range 0.5-1.5m, 4 sites

Crown cover avg. = 17.6%, range 2.0-50.0%, 5 sites

Dominant species (relative cover, frequency): *Carissa ovata* (64, 33%)

Frequent species (cover, frequency): *Carissa ovata* (18, 33%), *Acacia shirleyi* (1, 11%), *Acalypha eremorum* (45, 11%), *Alectryon diversifolius* (11%), *Capparis lasiantha* (11%), *Croton insularis* (1, 11%), *Eucalyptus thozetiana* (1, 11%), *Hibiscus sturtii* *var. sturtii* (11%), *Petalostigma pubescens* (1, 11%), *Sclerolaena birchii* (11%)

### Stratum: Ground

Height avg. = 0.3m, range 0.25-0.5m, 4 sites

PFC avg. = 29.0%, range 8-55%, 4 sites

Dominant species (relative cover, frequency): *Sporobolus scabridus* (100, 25%), *Echinochloa colona*\* (37, 25%), *Paspalidium caespitosum* (24, 75%), *Carissa ovata* (20, 25%), *Cenchrus* *indet.* (13, 25%)

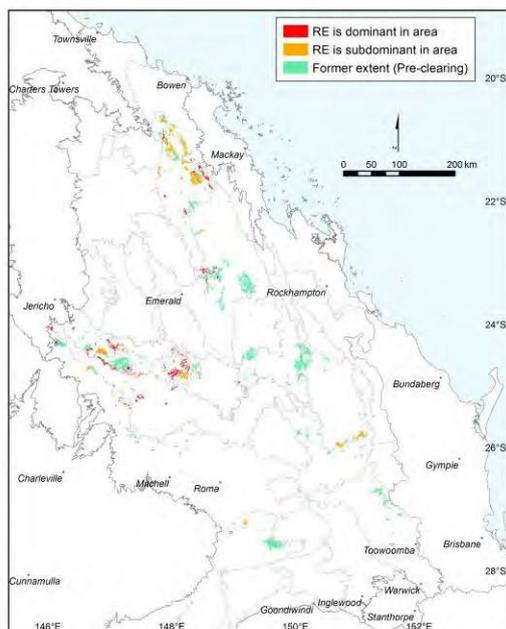
Frequent species (cover, frequency): GRAMINOIDS: *Ancistrachne uncinulata* (1, 75%), *Cenchrus ciliaris*\* (2, 75%), *Paspalidium caespitosum* (3, 75%), *Cymbopogon refractus* (1, 50%), *Cyperus gracilis* (1, 50%), *Aristida gracilipes* (25%), *Aristida jerichoensis* *var. subspinulifera* (25%), *Aristida personata* (2, 25%), *Astrebula* *indet.* (25%), *Bothriochloa decipiens* *var. decipiens* (25%), *Cenchrus* *indet.* (2, 25%), *Chloris gayana*\* (25%), *Chloris virgata*\* (6, 25%), *Dactyloctenium radulans* (25%), *Digitaria* *indet.* (25%), *Echinochloa colona*\* (20, 25%), *Enneapogon polyphyllus* (1, 25%), *Enteropogon ramosus* (6, 25%), *Eragrostis brownii* (1, 25%), *Eragrostis lacunaria* (1, 25%), *Heteropogon contortus* (25%), *Melinis repens*\* (25%), *Paspalidium jubiflorum* (2, 25%), *Setaria palmifolia*\* (25%), *Sporobolus caroli* (4, 25%), *Sporobolus* *indet.* (1, 25%), *Sporobolus scabridus* (25%), *Tragus australianus* (25%), *Urochloa mosambicensis*\* (25%)  
FORBS: *Enchylaena tomentosa* (75%), *Capparis lasiantha* (1, 50%), *Marsdenia viridiflora* (1, 50%), *Opuntia stricta*\* (50%), *Solanum ellipticum* (1, 50%), *Abutilon* *indet.* (25%), *Abutilon oxycarpum* (25%), *Achyranthes aspera* (25%), *Alternanthera* *indet.* (25%), *Apocynaceae* *indet.* (25%), *Atalaya hemiglaucula* (1, 25%), *Brunonia australis* (25%), *Capparis* *indet.* (25%), *Carissa ovata* (3, 25%), *Einadia hastata* (25%), *Euphorbia* *indet.* (25%), *Ficus rubiginosa* (25%), *Herissantia crispa* (25%), *Hibiscus sturtii* (25%), *Lamiaceae* *indet.* (25%), *Maireana microphylla* (2, 25%), *Malvastrum americanum* *var. americanum*\* (25%), *Ocimum* *indet.* (25%), *Oxalis* *indet.* (1, 25%), *Parsonsia* *indet.* (25%), *Parthenium hysterophorus*\* (25%), *Pseuderanthemum variabile* (1, 25%), *Sclerolaena muricata* (25%), *Sida fibulifera* (25%), *Sida* sp. (Musselbrook M.B.Thomas+ MRS437) (1, 25%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. *indet.* after listed name = indeterminate species or genus

**Eucalyptus melanophloia +/- E. orgadophila woodland on fine-grained sedimentary rocks**



**Pre-clearing area (ha), remnant area (ha) and per cent remaining: 373,585 142,997 38%**

**Species\_recorded: Total: 247; woody: 79; ground: 180; Avg. spp./site: 38.6; std dev.: 9.3, 9 site(s)**

**Basal area: Avg./site: 11.5 m<sup>2</sup>/ha, range: 2.0 - 28 m<sup>2</sup>/ha, std. deviation: 9 m<sup>2</sup>/ha, 11 site(s)**

**Structural formation: Woodland: 55%; open-woodland: 27%; shrubland: 9%; closed-tussock grassland: 9%, 11 site(s)**

**Representative\_sites 14137, 14259, 16782, 17028, 17256, 17258, 17579, 19130, 19195, 30423, 41015.**

**Stratum: Emergent**

**Height avg. = 14.0m, range 10-18m, 2 sites**

**Crown cover avg. = 2.5%, range 1.0-4.0%, 2 sites**

*Frequent species (cover, frequency): Eucalyptus melanophloia (4, 9%), Eucalyptus orgadophila (1, 9%)*

**Stratum: Tree 1**

**Height avg. = 15.2m, range 10-19m, 10 sites**

**Crown cover avg. = 20.3%, range 5.0-32.0%, 10 sites**

*Dominant species (relative cover, frequency): Eucalyptus orgadophila (87, 36%), Eucalyptus melanophloia (77, 64%)*

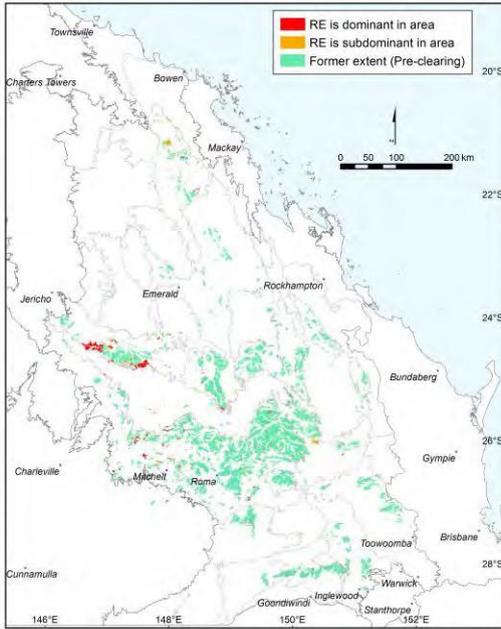
*Frequent species (cover, frequency): Eucalyptus melanophloia (18, 64%), Eucalyptus orgadophila (10, 36%), Acacia excelsa (5, 9%), Angophora subvelutina (1, 9%), Brachychiton populneus (9%), Brachychiton populneus subsp. populneus (1, 9%), Corymbia citriodora (9%), Corymbia erythrophloia (5, 9%), Corymbia trachyphloia (1, 9%), Eremophila mitchellii (10, 9%), Eucalyptus populnea (3, 9%), Lysiphyllum carronii (9%)*

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Acacia harpophylla and/or Casuarina cristata open forest on fine-grained sedimentary rocks



Don Butler

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 1,922,397 140,205 7%

Species\_recorded: Total: 240; woody: 75; ground: 197; Avg. spp./site: 31.1; std dev.: 12.0, 14 site(s)

Basal area: Avg./site: 19.7 m<sup>2</sup>/ha, range: 7.5 - 39 m<sup>2</sup>/ha, std. deviation: 8 m<sup>2</sup>/ha, 20 site(s)

Structural formation: Open-forest: 48%; woodland: 43%; open-woodland: 5%; low open-forest: 5%, 21 site(s)

Representative\_sites 16232, 16235, 16560, 16619, 16664, 16671, 16741, 16927, 17138, 17139, 17148, 17185, 17277, 17298, 17471, 17478, 24567, 24673, 24726, 28742, 32124.

**Stratum: Emergent**

Height avg. = 16.0m, range 13-18m, 4 sites

Crown cover avg. = 8.3%, range 3.0-20.0%, 4 sites

Frequent species (cover, frequency): *Casuarina cristata* (13, 10%), *Acacia harpophylla* (3, 5%), *Eucalyptus cambageana* (5%), *Eucalyptus decorticans* (5, 5%)

**Stratum: Tree 1**

Height avg. = 17.2m, range 8-27.5m, 21 sites

Crown cover avg. = 45.4%, range 15.0-72.0%, 21 sites

Dominant species (relative cover, frequency): *Acacia harpophylla* (73, 95%), *Casuarina cristata* (54, 52%)

Frequent species (cover, frequency): *Acacia harpophylla* (33, 95%), *Casuarina cristata* (26, 52%), *Lysiphyllum carronii* (5, 14%), *Brachychiton rupestris* (1, 10%), *Alectryon diversifolius* (5%), *Eucalyptus woolliana* (1, 5%), *Flindersia australis* (5%), *Lysiana subfalcata* (5%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.9.5

### Stratum: Tree 2

Height avg. = 9.2m, range 3-18m, 19 sites

Crown cover avg. = 13.6%, range 1.0-45.0%, 19 sites

Dominant species (relative cover, frequency): *Geijera parviflora* (65, 29%), *Casuarina cristata* (61, 33%), *Eremophila mitchellii* (54, 33%), *Acacia harpophylla* (48, 48%)

Frequent species (cover, frequency): *Acacia harpophylla* (6, 48%), *Casuarina cristata* (6, 33%), *Eremophila mitchellii* (3, 33%), *Geijera parviflora* (14, 29%), *Elaeodendron australe* var. *integrifolium* (2, 10%), *Notelaea microcarpa* (10%), *Alectryon diversifolius* (2, 5%), *Alectryon oleifolius* subsp. *elongatus* (1, 5%), *Alstonia constricta* (5, 5%), *Atalaya hemiglauca* (5%), *Brachychiton rupestris* (5%), *Croton insularis* (20, 5%), *Cymbidium canaliculatum* (5%), *Lysiphyllum hookeri* (5, 5%), *Opuntia tomentosa*\* (5, 5%), *Owenia acidula* (5, 5%), *Psydrax odorata* forma *buxifolia* (5%)

### Stratum: Tree 3

Height avg. = 5.8m, range 4-9m, 8 sites

Crown cover avg. = 15.6%, range 0.0-30.0%, 8 sites

Frequent species (cover, frequency): *Acacia harpophylla* (8, 14%), *Eremophila mitchellii* (9, 14%), *Geijera parviflora* (17, 14%), *Atalaya hemiglauca* (10%), *Casuarina cristata* (2, 10%), *Clematicissus opaca* (2, 5%), *Erythroxylum* sp. (*Spliyard* Creek L.Pedley 5360) (5%), *Owenia venosa* (3, 5%), *Parsonsia eucalyptophylla* (5%), *Psydrax johnsonii* (1, 5%), *Terminalia oblongata* subsp. *oblongata* (13, 5%)

### Stratum: Shrub 1

Height avg. = 2.8m, range 1.2-6m, 18 sites

Crown cover avg. = 13.4%, range 3.0-38.0%, 18 sites

Dominant species (relative cover, frequency): *Geijera parviflora* (46, 67%), *Eremophila mitchellii* (22, 33%), *Eremophila deserti* (18, 24%), *Acacia harpophylla* (17, 38%), *Alectryon diversifolius* (12, 33%)

Frequent species (cover, frequency): *Geijera parviflora* (6, 67%), *Acacia harpophylla* (1, 38%), *Alectryon diversifolius* (2, 33%), *Eremophila mitchellii* (2, 33%), *Casuarina cristata* (1, 24%), *Eremophila deserti* (3, 24%), *Ehretia membranifolia* (19%), *Apophyllum anomalum* (14%), *Croton insularis* (10, 14%), *Brachychiton rupestris* (1, 10%), *Capparis lasiantha* (1, 10%), *Clematicissus opaca* (1, 10%), *Diospyros humilis* (10%), *Elaeodendron australe* var. *integrifolium* (2, 10%), *Eustrephus latifolius* (10%), *Opuntia tomentosa*\* (1, 10%), *Parsonsia eucalyptophylla* (10%), *Psydrax odorata* (10%), *Terminalia oblongata* subsp. *oblongata* (9, 10%), *Alectryon oleifolius* subsp. *elongatus* (1, 5%), *Alstonia constricta* (5%), *Amyema congener* subsp. *congener* (5%), *Archidendropsis basaltica* (5%), *Atalaya hemiglauca* (5%), *Atalaya salicifolia* (1, 5%), *Capparis indet.* (2, 5%), *Capparis mitchellii* (1, 5%), *Carissa ovata* (5, 5%), *Citrus glauca* (5%), *Denhamia oleaster* (5%), *Denhamia silvestris* (5%), *Elaeodendron australe* var. *australe* (5%), *Elattostachys xylocarpa* (1, 5%), *Eremophila indet.* (5%), *Exocarpos latifolius* (2, 5%), *Glycine clandestina* var. *sericea* (5%), *Hovea linearis* (20, 5%), *Jasminum didymum* subsp. *racemosum* (2, 5%), *Jasminum simplicifolium* subsp. *australiense* (2, 5%), *Myoporum acuminatum* (5%), *Notelaea microcarpa* (3, 5%), *Opuntia stricta*\* (5%), *Pimelea neoanglica* (5%), *Pittosporum angustifolium* (13, 5%), *Pittosporum spinescens* (2, 5%), *Planchonella cotinifolia* (5%), *Psydrax johnsonii* (1, 5%), *Ricinocarpos ledifolius* (5%), *Santalum lanceolatum* (5%), *Senna artemisioides* subsp. *zygophylla* (5%), *Triflorensia ixoroides* (5%)

### Stratum: Shrub 2

Height avg. = 0.8m, range 0.5-1.2m, 6 sites

Crown cover avg. = 8.5%, range 0.0-18.0%, 6 sites

Frequent species (cover, frequency): *Ancistrachne uncinulata* (1, 5%), *Austrostipa ramosissima* (1, 5%), *Carissa ovata* (9, 14%), *Geijera parviflora* (2, 14%), *Acacia harpophylla* (3, 10%), *Eremophila deserti* (3, 10%), *Abutilon fraseri* (5%), *Alectryon oleifolius* (5%), *Atalaya salicifolia* (5%), *Capparis lasiantha* (5%), *Capparis loranthifolia* (5%), *Citrus glauca* (5%), *Excoecaria dallachyana* (1, 5%), *Hovea tholiformis* (5%), *Maireana microphylla* (5%), *Opuntia tomentosa*\* (5%), *Phyllanthus gunnii* (5%), *Psydrax odorata* (5%), *Rhagodia spinescens* (9, 5%), *Solanum parvifolium* (1, 5%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Ground  
Stratum:

Height avg. = 0.3m, range 0.01-0.7m, 13 sites

PFC avg. = 22.3%, range 1-70%, 14 sites

Dominant species (relative cover, frequency): *Enteropogon acicularis* (25, 36%), *Calyptochloa gracillima* subsp. *gracillima* (25, 21%), *Enteropogon unispiceus* (19, 21%), *Einadia nutans* (19, 50%), *Paspalidium caespitosum* (13, 50%)

Frequent species (cover, frequency): GRAMINOIDS: *Ancistrachne uncinulata* (1, 64%), *Paspalidium caespitosum* (4, 50%), *Cyperus gracilis* (43%), *Enteropogon acicularis* (10, 36%), *Paspalidium gracile* (1, 36%), *Chloris divaricata* (8, 29%), *Aristida personata* (1, 21%), *Calyptochloa gracillima* subsp. *gracillima* (5, 21%), *Enteropogon unispiceus* (4, 21%), *Eragrostis lacunaria* (1, 21%), *Paspalidium distans* (1, 21%), *Sporobolus caroli* (7, 21%), *Austrostipa verticillata* (14%), *Cenchrus ciliaris*\* (1, 14%), *Cymbopogon refractus* (14%), *Dinebra decipiens* (14%), *Dinebra decipiens* var. *decipiens* (14%), *Enneapogon gracilis* (1, 14%), *Aristida caput-medusae* (7%), *Aristida gracilipes* (7%), *Aristida vagans* (7%), *Chloris indet.* (7%), *Chloris truncata* (10, 7%), *Cyperus indet.* (7%), *Dichanthium sericeum* (7%), *Digitaria minima* (7%), *Dinebra decipiens* var. *asthenes* (7%), *Echinochloa colona*\* (7%), *Enneapogon pallidus* (7%), *Enteropogon paucispiceus* (7%), *Eragrostis leptocarpa* (7%), *Eragrostis megalosperma* (7%), *Gahnia aspera* (7%), *Hyparrhenia rufa*\* (7%), *Juncus indet.* (7%), *Megathyrsus maximus*\* (1, 7%), *Panicum buncei* (1, 7%), *Paspalidium constrictum* (7%), *Paspalidium criniforme* (7%), *Paspalidium indet.* (7%), *Rytidosperma tenuius* (7%), *Setaria dielsii* (7%), *Sporobolus contiguus* (7%), *Sporobolus elongatus* (7%), *Tragus australianus* (7%), *Urochloa foliosa* (7%), *Urochloa indet.* (7%)

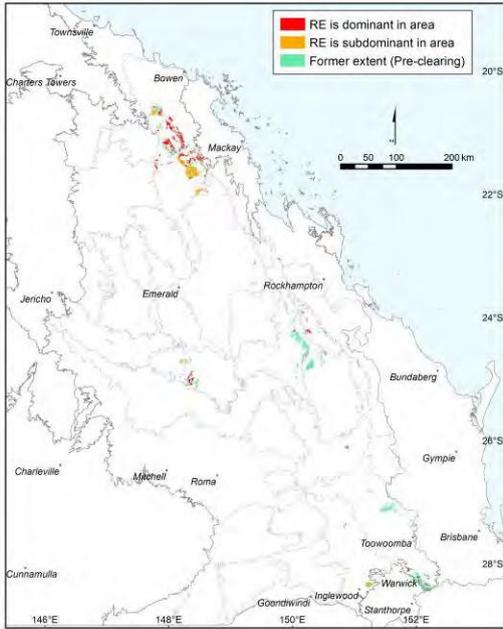
FORBS: *Abutilon oxycarpum* (64%), *Carissa ovata* (1, 50%), *Einadia nutans* (4, 50%), *Enchylaena tomentosa* (50%), *Brunoniella australis* (43%), *Clematicissus opaca* (1, 36%), *Commelina diffusa* (36%), *Nyssanthes erecta* (36%), *Opuntia stricta*\* (36%), *Opuntia tomentosa*\* (36%), *Solanum parvifolium* (1, 36%), *Alectryon diversifolius* (1, 29%), *Maireana microphylla* (29%), *Malvastrum americanum* var. *americanum*\* (29%), *Solanum semiarmatum* (29%), *Capparis lasiantha* (1, 21%), *Dianella brevipedunculata* (21%), *Oxalis perennans* (21%), *Parsonsia eucalyptophylla* (21%), *Solanum stelligerum* (21%), *Vittadinia sulcata* (21%), *Abutilon oxycarpum* var. *oxycarpum* (14%), *Achyranthes aspera* (14%), *Apophyllum anomalum* (14%), *Boerhavia indet.* (14%), *Cheilanthes distans* (14%), *Cyanthillium cinereum* (14%), *Desmodium brachypodium* (14%), *Dipteracanthus australasicus* subsp. *corynothecus* (14%), *Einadia nutans* subsp. *linifolia* (14%), *Einadia nutans* subsp. *nutans* (3, 14%), *Eremophila debilis* (14%), *Hypoestes floribunda* (8, 14%), *Maireana microcarpa* (14%), *Marsdenia australis* (14%), *Opuntia aurantiaca*\* (14%), *Sclerolaena birchii* (14%), *Sclerolaena tetracuspis* (1, 14%), *Sida fibulifera* (14%), *Solanum ellipticum* (14%), *Solanum indet.* (14%), *Tetragonia tetragonoides* (14%), *Acacia harpophylla* (7%), *Alphitonia excelsa* (7%), *Amyema congener* subsp. *rotundifolia* (7%), *Brachychiton rupestris* (7%), *Brachyscome dalbyensis* (7%), *Brassica indet.* (7%), *Brunfelsia australis*\* (7%), *Brunonia australis* (2, 7%), *Bursaria spinosa* subsp. *spinosa* (7%), *Calotis cuneata* (7%), *Calotis lappulacea* (7%), *Capparis loranthifolia* (7%), *Casuarina cristata* (6, 7%), *Cheilanthes sieberi* subsp. *sieberi* (7%), *Cheilanthes tenuifolia* (1, 7%), *Cirsium vulgare*\* (7%), *Cissus hypoglauca* (7%), *Citrus glauca* (1, 7%), *Commelina lanceolata* (7%), *Cyclosporum leptophyllum*\* (7%), *Deeringia amaranthoides* (7%), *Denhamia cunninghamii* (7%), *Denhamia oleaster* (7%), *Denhamia silvestris* (7%), *Dysphania carinata* (7%), *Einadia hastata* (7%), *Elattostachys xylocarpa* (7%), *Eremophila deserti* (7%), *Eremophila glabra* subsp. *glabra* (7%), *Erigeron bonariensis*\* (7%), *Eucalyptus moluccana* (7%), *Euphorbia dallachyana* (7%), *Euphorbia drummondii* (7%), *Geijera parviflora* (1, 7%), *Glandularia aristigera*\* (7%), *Hibiscus sturtii* (7%), *Jasminum didymum* (7%), *Jasminum didymum* subsp. *racemosum* (1, 7%), *Jasminum simplicifolium* subsp. *australiense* (7%), *Lomandra confertifolia* subsp. *pallida* (7%), *Maireana decalvans* (7%), *Malvastrum americanum* (7%), *Marsdenia viridiflora* (7%), *Melhanianthus oblongifolia* (7%), *Nicotiana megalosiphon* (7%), *Parsonsia leichhardtii* (7%), *Peripleura indet.* (7%), *Pimelea neoanglica* (7%), *Pittosporum angustifolium* (7%), *Pittosporum spinescens* (7%), *Plectranthus graveolens* (7%), *Plectranthus parviflorus* (7%), *Pseuderanthemum variabile* (7%), *Psyrax odorata* (7%), *Rhagodia spinescens* (3, 7%), *Rivina humilis*\* (7%), *Salsola australis* (7%), *Secamone elliptica* (7%), *Senecio hispidulus* (7%), *Senna coronilloides* (7%), *Sida hackettiana* (7%), *Sida indet.* (7%), *Sida platycalyx* (7%), *Sida pleiantha* (7%), *Sigesbeckia orientalis* (7%), *Solanum nemophilum* (7%), *Solanum opacum* (7%), *Sonchus oleraceus*\* (7%), *Verbena litoralis*\* (7%), *Xerochrysum bracteatum* (7%), *Zygophyllum apiculatum* (7%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Eucalyptus crebra woodland on fine-grained sedimentary rocks**



Annie Kelly

**Pre-clearing area (ha), remnant area (ha) and per cent remaining: 219,132 106,929 49%**

**Species recorded: Total: 100; woody: 40; ground: 64; Avg. spp./site: 23.0; std dev.: 4.0, 2 site(s)**

**Basal area: Avg./site: 9.3 m<sup>2</sup>/ha, range: 3.0 - 14 m<sup>2</sup>/ha, std. deviation: 5 m<sup>2</sup>/ha, 5 site(s)**

**Structural formation: Woodland: 60%; open-woodland: 40%, 5 site(s)**

**Representative sites 16840, 16859, 17411, 19073, 30781.**

**Stratum: Tree 1**

**Height avg. = 16.5m, range 11-18.5m, 5 sites**

**Crown cover avg. = 23.2%, range 10.0-44.0%, 5 sites**

*Dominant species (relative cover, frequency): Eucalyptus crebra (73, 100%)*

*Frequent species (cover, frequency): Eucalyptus crebra (16, 100%), Allocasuarina luehmannii (20%), Amyema miquelii (20%), Corymbia clarksoniana (10, 20%), Corymbia erythrophloia (14, 20%), Corymbia tessellaris (5, 20%), Eucalyptus melanophloia (20%), Eucalyptus tereticornis (2, 20%)*

**Stratum: Tree 2**

**Height avg. = 7.7m, range 6-9m, 3 sites**

**Crown cover avg. = 2.7%, range 1.0-5.0%, 3 sites**

*Frequent species (cover, frequency): Callitris glaucophylla (5, 20%), Casuarina cristata (1, 20%), Geijera parviflora (1, 20%), Geijera salicifolia (1, 20%), Vachellia nilotica\*(20%)*

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.9.9

### Shrub 1 Stratum:

Height avg. = 2.8m, range 1-7m, 5 sites

Crown cover avg. = 6.6%, range 1.0-20.0%, 5 sites

Dominant species (relative cover, frequency): *Eremophila mitchellii* (22, 40%), *Eucalyptus crebra* (12, 40%)

Frequent species (cover, frequency): *Eremophila mitchellii* (1, 40%), *Eucalyptus crebra* (1, 40%), *Acacia deanei* (5, 20%), *Acacia everistii* (20%), *Acacia shirleyi* (1, 20%), *Alphitonia excelsa* (2, 20%), *Brachychiton populneus* (20%), *Bursaria spinosa* subsp. *spinosa* (20%), *Capparis sarmentosa* (1, 20%), *Carissa ovata* (20%), *Cassia* indet. (20%), *Cassinia laevis* (20%), *Corymbia clarksoniana* (20%), *Corymbia tessellaris* (20%), *Denhamia oleaster* (20%), *Diospyros humilis* (1, 20%), *Erythroxylum australe* (20%), *Geijera parviflora* (1, 20%), *Opuntia tomentosa*\* (20%), *Petalostigma pubescens* (20%), *Terminalia* indet. (20%)

### Stratum: Shrub 2

Height avg. = 1.3m, range 1-1.5m, 3 sites

Crown cover avg. = 8.3%, range 5.0-15.0%, 3 sites

Dominant species (relative cover, frequency): *Pittosporum spinescens* (12, 40%)

Frequent species (cover, frequency): *Ancistrachne uncinulata* (20%), *Pittosporum spinescens* (1, 40%), *Alphitonia excelsa* (4, 20%), *Bursaria incana* (20%), *Cryptandra armata* (20%), *Cyanthillium cinereum* (20%), *Dodonaea triangularis* (15, 20%), *Erythroxylum* sp. (*Splityard Creek L. Pedley 5360*) (2, 20%), *Melichrus urceolatus* (20%), *Solanum* indet. (20%)

### Stratum: Ground

Height avg. = 0.4m, range 0.25-0.5m, 2 sites

PFC avg. = 57.5%, range 40-75%, 2 sites

Dominant species (relative cover, frequency): *Gahnia aspera* (77, 50%), *Sarga plumosum* (20, 50%), *Carissa ovata* (20, 50%), *Cenchrus ciliaris*\* (20, 50%), *Euphorbia* indet. (20, 50%)

Frequent species (cover, frequency): GRAMINOIDS: *Ancistrachne uncinulata* (50%), *Aristida calycina* (50%), *Aristida caput-medusae* (5, 50%), *Aristida vagans* (1, 50%), *Cenchrus ciliaris*\* (15, 50%), *Chloris ventricosa* (50%), *Cymbopogon refractus* (50%), *Digitaria* indet. (50%), *Enteropogon acicularis* (50%), *Eragrostis sororia* (50%), *Gahnia aspera* (23, 50%), *Panicum effusum* (50%), *Sarga plumosum* (15, 50%), *Tragus australianus* (15, 50%)

FORBS: *Apowollastonia* indet. (50%), *Boerhavia* indet. (50%), *Carissa ovata* (15, 50%), *Cassia* indet. (50%), *Cheilanthes sieberi* (50%), *Clerodendrum* indet. (50%), *Dianella revoluta* (50%), *Erythrina vespertilio* (50%), *Euphorbia* indet. (15, 50%), *Grewia retusifolia* (50%), *Jacquemontia* indet. (50%), *Lomandra multiflora* subsp. *multiflora* (50%), *Terminalia* indet. (50%)

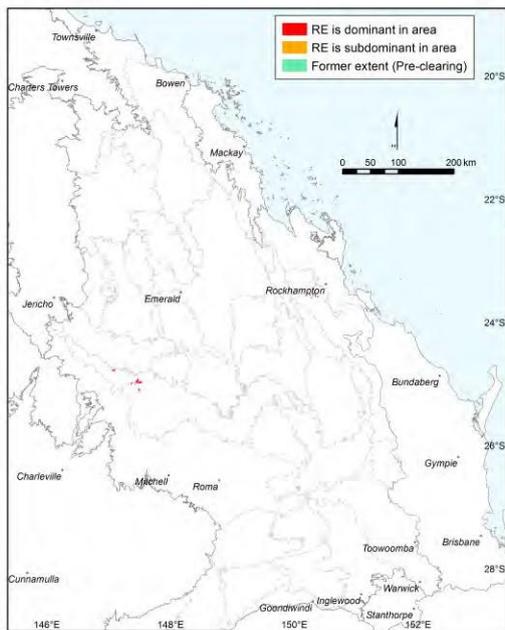
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Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Eucalyptus crebra woodland**



Pre-clearing area (ha), remnant area (ha) and per cent remaining: 9,057 8,610 95%

Species\_recorded: Total: 86; woody: 29; ground: 62; Avg. spp./site: 29.0; std dev.: 9.8, 3 site(s)

Basal area: Avg./site: 7.3 m<sup>2</sup>/ha, range: 5.0 - 10 m<sup>2</sup>/ha, std. deviation: 2 m<sup>2</sup>/ha, 4 site(s)

Structural formation: Woodland: 40%; open-woodland: 20%; open-forest: 20%; low open-woodland: 20%, 5 site(s)

Representative\_sites 14579, 14671, 17039, 17444, 17549.

**Stratum: Emergent**

Height avg. = 22.5m, range 20-25m, 2 sites

Crown cover avg. = 3.0%, range 2.0-4.0%, 2 sites

Frequent species (cover, frequency): *Eucalyptus crebra* (4, 20%), *Eucalyptus suffulgens* (2, 20%)

**Stratum: Tree 1**

Height avg. = 13.2m, range 8-18m, 5 sites

Crown cover avg. = 23.0%, range 8.0-49.0%, 5 sites

Dominant species (relative cover, frequency): *Eucalyptus crebra* (99, 60%), *Lysicarpus angustifolius* (1, 40%)

Frequent species (cover, frequency): *Eucalyptus crebra* (19, 60%), *Lysicarpus angustifolius* (40%), *Acacia rhodoxylon* (49, 20%), *Corymbia citriodora* (20%), *Corymbia dallachiana* (1, 20%), *Corymbia trachyphloia* subsp. *trachyphloia* (20%), *Eucalyptus panda* (8, 20%)

**Stratum: Tree 2**

Height avg. = 7.0m, range 4-10m, 2 sites

Crown cover avg. = 9.5%, range 3.0-16.0%, 2 sites

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.10.1d

*Frequent species (cover, frequency): Corymbia erythrophloia (8, 20%), Eucalyptus crebra (8, 20%)*

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Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

1/03/2018

## Technical Description

Regional ecosystem: 11.10.1d

### Stratum: Tree 3

Height avg. = 5.0m, 1 site

Crown cover avg. = 3.0%, 1 site

Frequent species (cover, frequency): *Corymbia erythrophloia* (2, 20%), *Eucalyptus crebra* (2, 20%)

### Stratum: Shrub 1

Height avg. = 2.3m, range 1-5m, 5 sites

Crown cover avg. = 15.4%, range 3.0-60.0%, 5 sites

Dominant species (relative cover, frequency): *Alphitonia excelsa* (17, 40%)

Frequent species (cover, frequency): *Alphitonia excelsa* (4, 40%), *Acacia bancroftiorum* (60, 20%), *Acacia excelsa* (1, 20%), *Acacia leiocalyx subsp. leiocalyx* (1, 20%), *Acacia rhodoxylon* (3, 20%), *Brachychiton australis* (20%), *Cerbera dumicola* (2, 20%), *Corymbia erythrophloia* (2, 20%), *Dodonaea peduncularis* (1, 20%), *Erythroxylum australe* (20%), *Eucalyptus crebra* (2, 20%), *Eucalyptus panda* (2, 20%), *Grevillea striata* (1, 20%), *Hakea lorea* (1, 20%), *Hibiscus sturtii* (1, 20%), *Petalostigma pubescens* (3, 20%), *Solanum jucundum* (20%)

### Stratum: Shrub 2

Height avg. = 1.3m, range 0.5-2.5m, 3 sites

Crown cover avg. = 2.0%, range 1.0-3.0%, 3 sites

Frequent species (cover, frequency): *Alyxia ruscifolia* (1, 20%), *Capparis canescens* (1, 20%), *Carissa ovata* (1, 20%), *Cycas megacarpa* (2, 20%), *Erythroxylum australe* (1, 20%), *Graptophyllum ilicifolium* (1, 20%), *Grewia latifolia* (1, 20%), *Psyrax oleifolia* (1, 20%)

### Stratum: Ground

Height avg. = 0.4m, range 0.25-0.5m, 3 sites

PFC avg. = 18.7%, range 6-30%, 3 sites

Dominant species (relative cover, frequency): *Eremochloa bimaculata* (26, 33%), *Paspalidium albobillosum* (24, 33%), *Boronia bipinnata* (24, 33%), *Aristida calycina* (15, 33%), *Peripleura bicolor* (15, 33%)

Frequent species (cover, frequency): GRAMINOIDS: *Cleistochloa subjuncea* (1, 67%), *Digitaria parviflora* (1, 67%), *Eragrostis sororia* (1, 67%), *Panicum effusum* (1, 67%), *Aristida benthamii* (5, 33%), *Aristida calycina* (3, 33%), *Aristida personata* (33%), *Calypochloa gracillima subsp. gracillima* (1, 33%), *Cymbopogon bombycinus* (2, 33%), *Cymbopogon refractus* (33%), *Eragrostis longipedicellata* (33%), *Eremochloa bimaculata* (9, 33%), *Eriachne rara* (1, 33%), *Heteropogon contortus* (33%), *Melinis repens\** (33%), *Paspalidium albobillosum* (2, 33%), *Paspalidium gracile* (2, 33%), *Scleria sphacelata* (33%), *Setaria surgens* (33%), *Themeda triandra* (33%), *Triodia mitchellii* (5, 33%), *Urochloa gilesii* (33%)

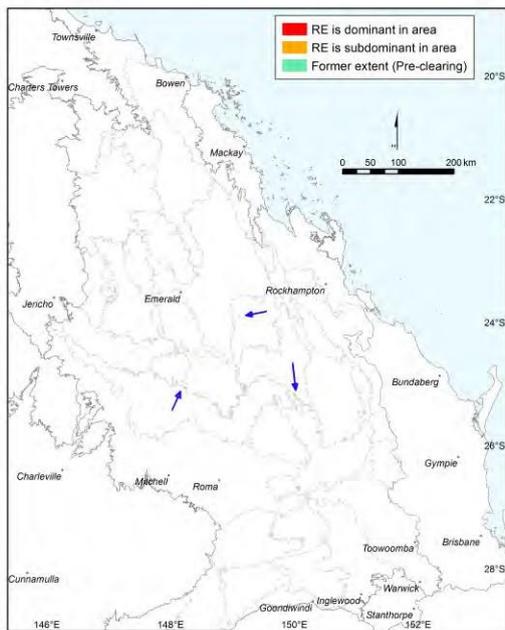
FORBS: *Dianella revoluta* (67%), *Lomandra confertifolia subsp. pallida* (67%), *Acacia buxifolia subsp. pubiflora* (1, 33%), *Acacia rhodoxylon* (33%), *Alphitonia excelsa* (33%), *Boronia bipinnata* (2, 33%), *Calotis cuneifolia* (33%), *Cassinia laevis* (33%), *Cheilanthes distans* (33%), *Eucalyptus exserta* (33%), *Evolvulus alsinoides* (33%), *Goodenia rotundifolia* (33%), *Goodenia sp. (Mt Castletower M.D.Crisp 2753)* (33%), *Homoranthus indet.* (3, 33%), *Hypericum gramineum* (3, 33%), *Laxmannia compacta* (1, 33%), *Laxmannia gracilis* (33%), *Leucopogon indet.* (1, 33%), *Lomandra filiformis* (2, 33%), *Malvastrum americanum var. americanum\** (1, 33%), *Marsdenia microlepis* (33%), *Marsdenia viridiflora* (33%), *Opuntia tomentosa\** (33%), *Peripleura bicolor* (3, 33%), *Phyllanthus indet.* (33%), *Plectranthus parviflorus* (33%), *Prostanthera sp. (Baking Board V.Hando 135)* (33%), *Psyrax odorata* (33%), *Pterocaulon redolens* (33%), *Sclerolaena birchii* (33%), *Seringia corollata* (33%), *Solanum stelligerum* (33%), *Sphaeromorphaea indet.* (33%), *Thryptomene parviflora* (3, 33%), *Waltheria indica* (33%), *Xanthorrhoea johnsonii* (2, 33%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Open forest in sheltered gorges on coarse-grained sedimentary rocks



Pre-clearing area (ha), remnant area (ha) and per cent remaining: 1,443 1,387 96%

Species\_recorded: Total: 72; woody: 26; ground: 46; Avg. spp./site: 36.0; std dev.: 0.0, 1 site(s)

Basal area: Avg./site: 11.5 m<sup>2</sup>/ha, range: 5.0 - 18 m<sup>2</sup>/ha, std. deviation: 7 m<sup>2</sup>/ha, 2 site(s)

Structural formation: Woodland: 100%, 2 site(s)

Representative\_sites 17020, 28929.

**Stratum: Emergent**

Height avg. = 24.0m, 1 site

Crown cover avg. = 5.0%, 1 site

Dominant species (relative cover, frequency): *Corymbia citriodora* (58, 50%), *Corymbia aureola* (38, 50%), *Pleiogonium timorense* (4, 50%)

Frequent species (cover, frequency): *Corymbia aureola* (2, 50%), *Corymbia citriodora* (3, 50%), *Pleiogonium timorense* (50%)

**Stratum: Tree 1**

Height avg. = 16.0m, range 10-22m, 2 sites

Crown cover avg. = 27.4%, range 24.7-30.0%, 2 sites

Dominant species (relative cover, frequency): *Eucalyptus longirostrata* (82, 50%), *Acacia rhodoxylon* (46, 50%), *Ficus rubiginosa* (31, 50%), *Syncarpia glomulifera subsp. glomulifera* (23, 50%), *Angophora floribunda* (15, 50%)

Frequent species (cover, frequency): *Acacia rhodoxylon* (15, 50%), *Angophora floribunda* (3, 50%), *Eucalyptus crebra* (50%), *Eucalyptus longirostrata* (16, 50%), *Eucalyptus melanophloia* (1, 50%), *Eucalyptus tereticornis* (50%), *Ficus rubiginosa* (10, 50%), *Syncarpia glomulifera subsp. glomulifera* (8, 50%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.10.2

### Stratum: Tree 2

Height avg. = 6.3m, range 2.5-10m, 2 sites

Crown cover avg. = 7.2%, range 4.4-10.0%, 2 sites

Dominant species (relative cover, frequency): *Acacia longispicata* (99, 50%), *Erythroxylum australe* (33, 50%), *Cerbera dumicola* (33, 50%), *Drypetes deplanchei* (11, 50%), *Alphitonia excelsa* (11, 50%)

Frequent species (cover, frequency): *Acacia longispicata* (2, 50%), *Acalypha eremorum* (1, 50%), *Alphitonia excelsa* (1, 50%), *Cerbera dumicola* (3, 50%), *Diospyros humilis* (50%), *Drypetes deplanchei* (1, 50%), *Erythroxylum australe* (3, 50%), *Lophostemon suaveolens* (50%)

### Stratum: Shrub 1

Height avg. = 5.0m, 1 site

Crown cover avg. = 6.9%, range 2.0-11.8%, 2 sites

Dominant species (relative cover, frequency): *Acacia leiocalyx subsp. leiocalyx* (73, 50%), *Cerbera dumicola* (45, 50%), *Canavalia papuana* (45, 50%), *Acacia longispicata* (26, 50%), *Breynia oblongifolia* (5, 50%)

Frequent species (cover, frequency): *Acacia leiocalyx subsp. leiocalyx* (2, 50%), *Acacia longispicata* (1, 50%), *Alyxia ruscifolia* (50%), *Breynia oblongifolia* (50%), *Canavalia papuana* (2, 50%), *Cerbera dumicola* (2, 50%), *Larsenaikia ochreatea* (50%), *Leptospermum brachyandrum* (50%)

### Stratum: Shrub 2

Height avg. = 2.0m, 1 site

Crown cover avg. = 2.9%, 1 site

Dominant species (relative cover, frequency): *Acacia leiocalyx subsp. leiocalyx* (98, 50%), *Leptospermum brachyandrum* (1, 50%), *Acacia longispicata* (1, 50%)

Frequent species (cover, frequency): *Acacia leiocalyx subsp. leiocalyx* (2, 50%), *Acacia longispicata* (50%), *Leptospermum brachyandrum* (50%)

### Stratum: Ground

Height avg. = 0.5m, 1 site

PFC avg. = 22.0%, 1 site

Dominant species (relative cover, frequency): *Aristida indet.* (64, 100%), *Arundinella nepalensis* (21, 100%), *Chrysocephalum apiculatum* (4, 100%)

Frequent species (cover, frequency): GRAMINOIDS: *Aristida indet.* (15, 100%), *Arundinella nepalensis* (5, 100%), *Poaceae indet.* (100%)

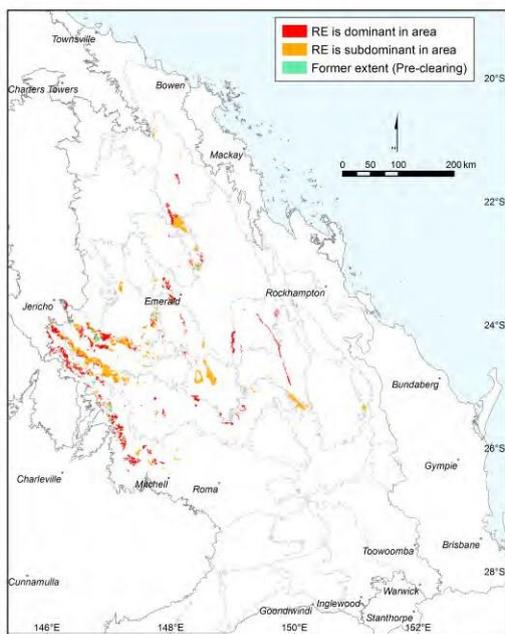
FORBS: *Ajuga australis* (100%), *Brunoniella australis* (100%), *Cassinia laevis* (100%), *Centella asiatica* (100%), *Cheilanthes distans* (100%), *Cheilanthes sieberi subsp. sieberi* (100%), *Chrysocephalum apiculatum* (1, 100%), *Clematis glycinoides* (100%), *Dichondra repens* (100%), *Einadia nutans* (100%), *Glossocardia bidens* (100%), *Glycine tabacina* (100%), *Goodenia glabra* (100%), *Haloragis heterophylla* (100%), *Hypericum gramineum* (100%), *Lagenophora gracilis* (100%), *Oxalis indet.* (100%), *Plantago debilis* (100%), *Rostellularia adscendens* (100%), *Rubus parvifolius* (100%), *Viola betonicifolia subsp. betonicifolia* (100%), *Wahlenbergia gracilis* (100%), *Wahlenbergia queenslandica* (100%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Acacia catenulata or A. shirleyi open forest on coarse-grained sedimentary rocks. Crests and scarps**



Annie Kelly

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 377,414 332,222 88%

Species\_recorded: Total: 234; woody: 62; ground: 189; Avg. spp./site: 24.5; std dev.: 7.8, 15 site(s)

Basal area: Avg./site: 17.7 m<sup>2</sup>/ha, range: 3.0 - 37 m<sup>2</sup>/ha, std. deviation: 8 m<sup>2</sup>/ha, 26 site(s)

Structural formation: Open-forest: 54%; woodland: 31%; open-woodland: 12%; low open-forest: 4%, 26 site(s)

Representative\_sites 2098, 16302, 16784, 16921, 16972, 17019, 17048, 17159, 17162, 17169, 17197, 17215, 17284, 17384, 17546, 19021, 19146, 28766, 28769, 28771, 28779, 28781, 28789, 28793, 28921, 54094.

**Stratum: Emergent**

Height avg. = 19.4m, range 11-25m, 9 sites

Crown cover avg. = 3.2%, range 0.0-5.0%, 9 sites

Dominant species (relative cover, frequency): *Eucalyptus crebra* (57, 23%)

Frequent species (cover, frequency): *Eucalyptus crebra* (1, 23%), *Corymbia citriodora* (3, 12%), *Eucalyptus suffulgens* (3, 8%), *Eucalyptus tholiformis* (4%), *Eucalyptus thozetiana* (3, 4%)

**Stratum: Tree 1**

Height avg. = 15.3m, range 8-19m, 26 sites

Crown cover avg. = 47.9%, range 15.0-85.6%, 26 sites

Dominant species (relative cover, frequency): *Acacia shirleyi* (75, 92%), *Eucalyptus crebra* (37, 35%)

Frequent species (cover, frequency): *Acacia shirleyi* (40, 92%), *Eucalyptus crebra* (10, 35%), *Callitris glaucophylla* (2, 8%), *Corymbia leichhardtii* (6, 8%), *Eucalyptus tenuipes* (7, 8%), *Eucalyptus tholiformis* (32, 8%), *Acacia catenulata* (4%), *Acacia rhodoxylon* (24, 4%), *Coelospermum reticulatum* (4%), *Corymbia aureola* (3, 4%), *Corymbia clarksoniana* (14, 4%), *Corymbia hendersonii* (6, 4%), *Corymbia trachyphloia* (21, 4%), *Eucalyptus decorticans* (30, 4%), *Eucalyptus exserta* (4%), *Eucalyptus melanophloia* (4%), *Eucalyptus thozetiana* (10, 4%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.10.3

### Stratum: Tree 2

Height avg. = 7.4m, range 4-11m, 14 sites

Crown cover avg. = 11.9%, range 1.0-55.0%, 16 sites

Dominant species (relative cover, frequency): *Acacia shirleyi* (75, 46%)

Frequent species (cover, frequency): *Acacia shirleyi* (11, 46%), *Erythroxylum sp. (Splityard Creek L.Pedley 5360)* (1, 8%), *Lysicarpus angustifolius* (6, 8%), *Acacia leiocalyx subsp. leiocalyx* (1, 4%), *Alstonia constricta* (4%), *Corymbia clarksoniana* (1, 4%), *Corymbia leichhardtii* (4%), *Croton insularis* (20, 4%), *Eucalyptus crebra* (1, 4%), *Eucalyptus tenuipes* (4%), *Eucalyptus tholiformis* (4%), *Eucalyptus thozetiana* (2, 4%), *Hibiscus heterophyllus* (4%), *Leptospermum lamellatum* (4%), *Melaleuca tamariscina* (1, 4%), *Psychdrax forsteri* (1, 4%)

### Stratum: Tree 3

Height avg. = 3.8m, range 3-4.5m, 2 sites

Crown cover avg. = 6.7%, range 2.0-12.0%, 3 sites

Frequent species (cover, frequency): *Acacia shirleyi* (2, 8%), *Lysicarpus angustifolius* (2, 8%), *Alstonia constricta* (1, 4%), *Bursaria incana* (2, 4%), *Corymbia clarksoniana* (1, 4%), *Erythroxylum australe* (1, 4%), *Petalostigma pubescens* (10, 4%)

### Stratum: Shrub 1

Height avg. = 2.3m, range 0.5-6m, 21 sites

Crown cover avg. = 7.6%, range 0.0-45.0%, 22 sites

Dominant species (relative cover, frequency): *Acacia shirleyi* (37, 35%), *Alphitonia excelsa* (35, 42%)

Frequent species (cover, frequency): *Alphitonia excelsa* (2, 42%), *Acacia shirleyi* (2, 35%), *Alstonia constricta* (19%), *Erythroxylum sp. (Splityard Creek L.Pedley 5360)* (2, 19%), *Erythroxylum australe* (4, 15%), *Bertya opponens* (19, 8%), *Hovea lanceolata* (8%), *Psychdrax johnsonii* (4, 8%), *Acacia complanata* (4%), *Acacia crassa* (1, 4%), *Acacia flavescens* (4%), *Acacia leiocalyx subsp. leiocalyx* (4%), *Acacia leptostachya* (4%), *Acacia longispicata* (4%), *Acacia rhodoxylon* (2, 4%), *Boronia duiganiae* (2, 4%), *Callitris glaucophylla* (8, 4%), *Capparis canescens* (4%), *Cassinia laevis* (4%), *Clematicissus opaca* (4%), *Corymbia trachyphloia* (5, 4%), *Corymbia trachyphloia subsp. trachyphloia* (4%), *Eremophila bignoniiflora* (4%), *Eucalyptus crebra* (1, 4%), *Eucalyptus decorticans* (4%), *Eucalyptus tholiformis* (4%), *Eucalyptus thozetiana* (1, 4%), *Everistia vacciniifolia* (4%), *Geijera parviflora* (4%), *Grevillea sessilis* (1, 4%), *Grevillea striata* (4%), *Hibiscus heterophyllus* (4%), *Hibiscus meraukensis* (4%), *Labichea nitida* (3, 4%), *Leptospermum lamellatum* (4%), *Lysicarpus angustifolius* (1, 4%), *Melaleuca tamariscina* (5, 4%), *Olearia xerophila* (4%), *Pandorea pandorana* (4%), *Parsonsia straminea* (1, 4%), *Petalostigma pubescens* (4%), *Phebalium nottii* (6, 4%), *Philotheca difformis subsp. difformis* (4%), *Psychdrax forsteri* (1, 4%), *Psychdrax oleifolia* (4%), *Solanum mitchellianum* (1, 4%), *Terminalia oblongata subsp. oblongata* (4%), *Westringia indet.* (4%)

### Stratum: Shrub 2

Height avg. = 1.0m, 1 site

Crown cover avg. = 2.0%, 1 site

Frequent species (cover, frequency): *Acacia rhodoxylon* (2, 4%), *Larsenaikia ochreatea* (1, 4%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Ground  
Stratum:

Height avg. = 0.3m, range 0.1-0.5m, 15 sites

PFC avg. = 34.2%, range 10-85%, 15 sites

Dominant species (relative cover, frequency): *Cleistochloa subjuncea* (35, 33%), *Scleria sphacelata* (28, 33%), *Entolasia stricta* (19, 40%), *Eragrostis lacunaria* (13, 40%), *Thyridolepis xerophila* (12, 33%)

Frequent species (cover, frequency): GRAMINOIDS: *Aristida caput-medusae* (1, 60%), *Panicum effusum* (53%), *Aristida queenslandica* var. *dissimilis* (2, 47%), *Entolasia stricta* (4, 40%), *Eragrostis lacunaria* (4, 40%), *Cleistochloa subjuncea* (11, 33%), *Scleria sphacelata* (5, 33%), *Thyridolepis xerophila* (3, 33%), *Digitaria parviflora* (2, 27%), *Eragrostis sororia* (1, 27%), *Setaria dielsii* (4, 27%), *Aristida gracilipes* (1, 20%), *Aristida jerichoensis* var. *subspinulifera* (7, 20%), *Cymbopogon refractus* (1, 20%), *Digitaria ramularis* (1, 20%), *Melinis repens*\* (1, 20%), *Paspalidium distans* (2, 20%), *Paspalidium gracile* (4, 20%), *Aristida jerichoensis* var. *jerichoensis* (13%), *Calyptochloa gracillima* subsp. *gracillima* (11, 13%), *Cyperus gracilis* (1, 13%), *Digitaria breviglumis* (2, 13%), *Schoenus kennyi* (13%), *Aristida benthamii* var. *benthamii* (7%), *Aristida calycina* (3, 7%), *Aristida holathera* var. *holathera* (7%), *Aristida indet.* (10, 7%), *Aristida lazardis* (2, 7%), *Aristida lignosa* (1, 7%), *Aristida personata* (7%), *Aristida queenslandica* var. *queenslandica* (1, 7%), *Cyperaceae indet.* (7, 7%), *Cyperus bowmannii* (1, 7%), *Cyperus dietrichiae* var. *brevibracteatus* (2, 7%), *Cyperus indet.* (7%), *Cyperus isabellinus* (7%), *Digitaria fumida* (5, 7%), *Digitaria violascens*\* (7%), *Enneapogon truncatus* (7%), *Eragrostis brownii* (7%), *Eragrostis indet.* (7%), *Eriachne mucronata* (1, 7%), *Gahnia aspera* (7%), *Leptochloa indet.* (7%), *Oplismenus indet.* (70, 7%), *Panicum larcomianum* (7%), *Paspalidium albobillosum* (7%), *Paspalidium criniforme* (7%), *Paspalidium indet.* (2, 7%), *Paspalidium jubiflorum* (7%), *Perotis rara* (7%), *Scleria mackaviensis* (1, 7%), *Setaria surgens* (7%), *Sporobolus scabridus* (7, 7%), *Themeda triandra* (7%), *Triodia pungens* (3, 7%), *Urochloa foliosa* (5, 7%)

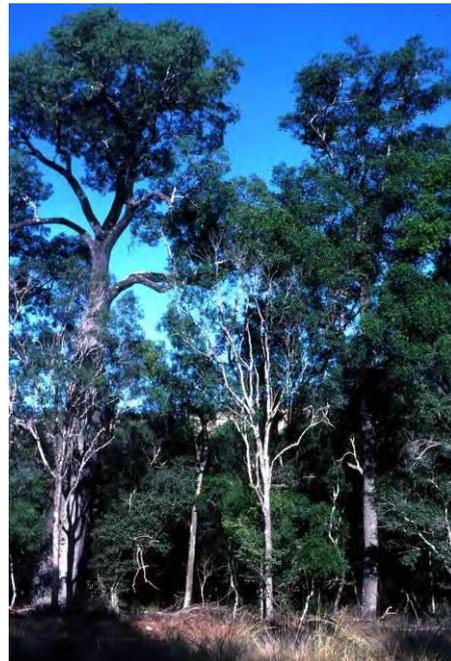
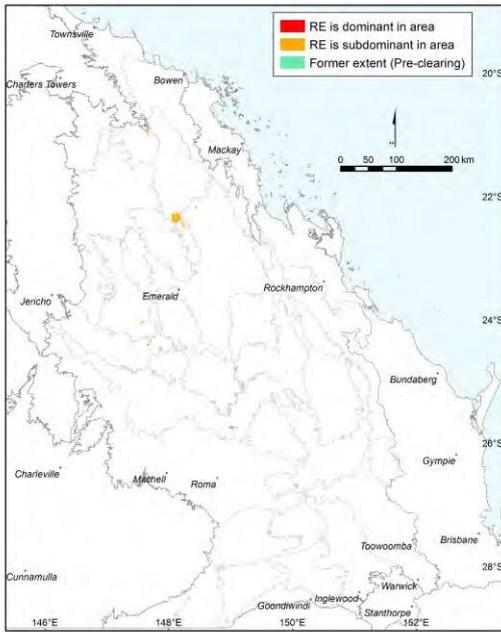
FORBS: *Cheilanthes sieberi* (53%), *Solanum ellipticum* (53%), *Alphitonia excelsa* (40%), *Cyanthillium cinereum* (1, 33%), *Hibiscus sturtii* (1, 33%), *Evolvulus alsinoides* (27%), *Goodenia rotundifolia* (27%), *Sida* sp. (Musselbrook M.B.Thomas+MRS437) (27%), *Lomandra filiformis* (20%), *Oxalis corniculata*\* (1, 20%), *Acacia shirleyi* (13%), *Calotis cuneifolia* (13%), *Cheilanthes sieberi* subsp. *sieberi* (13%), *Dianella caerulea* (13%), *Goodenia grandiflora* (1, 13%), *Hannafordia shanesii* (1, 13%), *Laxmannia gracilis* (13%), *Parsonsia lanceolata* (13%), *Pseuderanthemum variabile* (13%), *Psydrax johnsonii* (1, 13%), *Rostellularia adscendens* (13%), *Rubiaceae indet.* (13%), *Solanum parvifolium* (13%), *Abutilon fraseri* (7%), *Acacia leiocalyx* subsp. *leiocalyx* (7%), *Achyranthes aspera* (7%), *Alstonia constricta* (1, 7%), *Asteraceae indet.* (1, 7%), *Boronia bipinnata* (1, 7%), *Boronia duiganiae* (2, 7%), *Boronia occidentalis* (1, 7%), *Breynia oblongifolia* (7%), *Brunoniella australis* (7%), *Callitris glaucophylla* (1, 7%), *Calotis dentex* (7%), *Cassytha filiformis* (5, 7%), *Coelospermum reticulatum* (7%), *Crotalaria indet.* (7%), *Desmodium rhytidophyllum* (7%), *Dianella indet.* (7%), *Dianella revoluta* (7%), *Dysphania glomulifera* subsp. *glomulifera* (1, 7%), *Eucalyptus brownii* (7%), *Euphorbia drummondii* (7%), *Euphorbia tannensis* (7%), *Galactia tenuiflora* var. *lucida* (7%), *Glycine indet.* (7%), *Goodenia hirsuta* (7%), *Goodenia* sp. (Mt Castletower M.D.Crisp 2753) (7%), *Grewia latifolia* (7%), *Hibbertia acicularis* (7%), *Hibiscus indet.* (7%), *Hibiscus meraukensis* (7%), *Hibiscus* sp. (Emerald S.L.Everist 2124) (1, 7%), *Leucopogon mitchellii* (7%), *Lomandra confertifolia* subsp. *pallida* (7%), *Lomandra longifolia* (1, 7%), *Lomandra multiflora* subsp. *multiflora* (7%), *Lysicarpus angustifolius* (1, 7%), *Malvastrum americanum* var. *americanum*\* (1, 7%), *Marsdenia microlepis* (7%), *Marsdenia viridiflora* (7%), *Melhania oblongifolia* (7%), *Notelaea indet.* (7%), *Opuntia tomentosa*\* (7%), *Oxalis radicata* (7%), *Parsonsia straminea* (7%), *Peripleura bicolor* (7%), *Persoonia amaliae* (7%), *Petalostigma pubescens* (1, 7%), *Phebalium nottii* (3, 7%), *Phyllanthus fuernrohrrii* (1, 7%), *Phyllanthus virgatus* (7%), *Pimelea linifolia* subsp. *linifolia* (7%), *Polianthion minutiflorum* (1, 7%), *Polygala triflora* (7%), *Portulaca pilosa*\* (7%), *Psydrax indet.* (7%), *Pterocaulon serrulatum* (7%), *Ptilotus macrocephalus* (7%), *Senna aciphylla* (7%), *Senna barclayana* (1, 7%), *Seringia collina* (1, 7%), *Sida aprica* var. *aprica* (7%), *Sida atherophora* (1, 7%), *Sida corrugata* (7%), *Sida indet.* (7%), *Sida spinosa*\* (7%), *Sida trichopoda* (7%), *Solanum crebrispinum* (7%), *Solanum galbinum* (7%), *Solanum nemophilum* (7%), *Spermacoce brachystema* (7%), *Sphaeromorphaea indet.* (7%), *Stylidium eriorhizum* (7%), *Tinospora smilacina* (7%), *Trema tomentosa* (7%), *Wahlenbergia communis* (7%), *Waltheria indica* (7%), *Xenostegia tridentata* (7%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Semi-evergreen vine thicket in sheltered habitats on medium to coarse-grained sedimentary rocks



Pre-clearing area (ha), remnant area (ha) and per cent remaining: 14,589 9,093 62%

Species\_recorded: Total: 173; woody: 131; ground: 94; Avg. spp./site: 67.8; std dev.: 10.6, 5 site(s)

Basal area: Avg/site: 21.2 m<sup>2</sup>/ha, range: 14.0 - 30 m<sup>2</sup>/ha, std. deviation: 5 m<sup>2</sup>/ha, 7 site(s)

Structural formation: Open-woodland: 29%; open-forest: 14%; low woodland: 14%; low open-forest: 14%; unrecorded: 29%, 7 site(s)

Representative\_sites 17223, 17404, 40985, 40986, 40987, 47438, 47454.

**Stratum: Emergent**

Height avg. = 17.8m, range 11-24m, 4 sites

Crown cover avg. = 7.0%, range 5.0-10.0%, 5 sites

Dominant species (relative cover, frequency): *Brachychiton rupestris* (48, 29%)

Frequent species (cover, frequency): *Brachychiton rupestris* (4, 29%), *Acacia fasciculifera* (1, 14%), *Brachychiton bidwillii* (14%), *Corymbia citriodora* (2, 14%), *Drypetes deplanchei* (10, 14%), *Eucalyptus decorticans* (4, 14%), *Ficus rubiginosa* (5, 14%), *Flindersia australis* (4, 14%), *Sterculia quadrifida* (2, 14%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.10.8

### Stratum: Tree 1

Height avg. = 11.7m, range 7-22m, 7 sites

Crown cover avg. = 35.7%, range 10.0-60.0%, 7 sites

*Dominant species (relative cover, frequency): Gossia bidwillii (40, 29%), Flindersia australis (32, 29%), Diosperma erythrococtum (17, 57%), Sterculia quadrifida (10, 29%), Diospyros geminata (9, 43%)*

*Frequent species (cover, frequency): Cayratia acris (1, 57%), Cissus oblonga (2, 57%), Diosperma erythrococtum (5, 57%), Brachychiton australis (1, 43%), Diospyros geminata (3, 43%), Drypetes deplanchei (1, 43%), Parsonsia leichhardtii (43%), Strychnos psilosperma (3, 43%), Alectryon connatus (29%), Alectryon subdentatus (1, 29%), Alstonia constricta (1, 29%), Atalaya salicifolia (29%), Bridelia leichhardtii (3, 29%), Cupaniopsis anacardioides (29%), Denhamia disperma (1, 29%), Diospyros fasciculosa (1, 29%), Flindersia australis (7, 29%), Gossia bidwillii (20, 29%), Melodorum leichhardtii (1, 29%), Planchonella cotinifolia (2, 29%), Secamone elliptica (2, 29%), Sterculia quadrifida (2, 29%), Tetrastigma nitens (29%), Trophis scandens subsp. scandens (1, 29%), Zanthoxylum brachyacanthum (29%), Acronychia laevis (14%), Austrosteenisia blackii var. blackii (1, 14%), Backhousia angustifolia (3, 14%), Brachychiton rupestris (2, 14%), Capparis arborea (1, 14%), Celtis paniculata (1, 14%), Cissus reniformis (14%), Clematicissus opaca (14%), Coatesia paniculata (1, 14%), Croton insularis (10, 14%), Croton phebaloides (20, 14%), Cymbidium canaliculatum (14%), Dendrocnide photinophylla (14%), Denhamia pittosporoides subsp. pittosporoides (14%), Elattostachys bidwillii (14%), Euroschinus falcatus var. falcatus (3, 14%), Excoecaria dallachyana (15, 14%), Ficus rubiginosa (14%), Geijera salicifolia (14%), Glossocarya hemiderma (2, 14%), Grevillea helmsiae (1, 14%), Harpullia pendula (7, 14%), Jasminum simplicifolium subsp. australiense (14%), Notelaea microcarpa (10, 14%), Owenia venosa (10, 14%), Pandorea pandorana (14%), Parsonsia plaesiophylla (14%), Parsonsia rotata (14%), Petalostigma pubescens (30, 14%), Pittosporum spinescens (14%), Pleiogynium timorense (14%), Psydrax odorata (1, 14%), Psydrax odorata forma australiana (5, 14%), Tinospora smilacina (14%), Vincetoxicum ovatum (14%)*

### Stratum: Tree 2

Height avg. = 8.1m, range 6-13m, 4 sites

Crown cover avg. = 37.5%, range 25.0-55.0%, 4 sites

*Dominant species (relative cover, frequency): Coatesia paniculata (48, 29%), Planchonella cotinifolia (20, 29%), Owenia venosa (10, 29%), Exocarpos latifolius (8, 43%), Strychnos psilosperma (5, 43%)*

*Frequent species (cover, frequency): Bridelia leichhardtii (2, 57%), Dendrocnide photinophylla (2, 43%), Drypetes deplanchei (2, 43%), Exocarpos latifolius (4, 43%), Strychnos psilosperma (2, 43%), Tinospora smilacina (43%), Acronychia laevis (29%), Capparis arborea (29%), Cayratia acris (29%), Cissus oblonga (1, 29%), Coatesia paniculata (13, 29%), Denhamia disperma (29%), Diosperma erythrococtum (1, 29%), Elaeodendron australe var. integrifolium (1, 29%), Geijera salicifolia (29%), Jasminum simplicifolium subsp. australiense (29%), Melodorum leichhardtii (29%), Notelaea microcarpa (1, 29%), Owenia venosa (6, 29%), Parsonsia leichhardtii (29%), Parsonsia plaesiophylla (29%), Planchonella cotinifolia (9, 29%), Siphonodon australis (2, 29%), Zanthoxylum brachyacanthum (29%), Acronychia pauciflora (14%), Alectryon connatus (14%), Alstonia constricta (14%), Archidendropsis thozetiana (5, 14%), Atalaya salicifolia (1, 14%), Auranticarpa rhombifolia (2, 14%), Casearia multinervosa (1, 14%), Cissus reniformis (14%), Claoxylon tenerifolium subsp. tenerifolium (14%), Croton insularis (10, 14%), Cyclophyllum coprosmoides (5, 14%), Diospyros australis (1, 14%), Diospyros humilis (2, 14%), Erythroxylum sp. (Splityard Creek L.Pedley 5360) (1, 14%), Excoecaria dallachyana (2, 14%), Ficus rubiginosa (1, 14%), Geijera parviflora (10, 14%), Glossocarya hemiderma (2, 14%), Gossia bidwillii (5, 14%), Marsdenia pleiadenia (14%), Myoporum acuminatum (5, 14%), Parsonsia velutina (14%), Secamone elliptica (1, 14%), Sterculia quadrifida (3, 14%), Tetrastigma nitens (14%)*

### Stratum: Tree 3

Height avg. = 7.0m, 1 site

Crown cover avg. = 15.0%, 1 site

*Frequent species (cover, frequency): Atalaya salicifolia (14%), Brachychiton australis (14%), Capparis arborea (1, 14%), Claoxylon tenerifolium subsp. tenerifolium (14%), Coatesia paniculata (2, 14%), Croton acronychioides (1, 14%), Croton insularis (1, 14%), Diospyros geminata (1, 14%), Erythroxylum sp. (Splityard Creek L.Pedley 5360) (14%), Exocarpos latifolius (14%), Glossocarya hemiderma (14%), Gossia bidwillii (2, 14%), Hoya australis subsp. australis (1, 14%), Melia azedarach (14%), Pittosporum viscidum (1, 14%), Planchonella cotinifolia (8, 14%), Psydrax odorata forma subnitida (2, 14%)*

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Technical Description****Regional ecosystem: 11.10.8****Shrub 1  
Stratum:****Height avg. = 2.2m, range 1.6-3m, 7 sites****Crown cover avg. = 30.0%, range 10.0-80.0%, 7 sites**

*Dominant species (relative cover, frequency):* *Strychnos psilosperma* (43, 71%), *Alchornea ilicifolia* (29, 57%), *Acalypha eremorum* (18, 57%), *Carissa ovata* (6, 86%), *Pavetta australiensis* var. *australiensis* (4, 29%)

*Frequent species (cover, frequency):* *Carissa ovata* (3, 86%), *Strychnos psilosperma* (11, 71%), *Turraea pubescens* (71%), *Acalypha eremorum* (4, 57%), *Alchornea ilicifolia* (8, 57%), *Capparis arborea* (57%), *Croton acronychioides* (57%), *Hoya australis* subsp. *australis* (1, 57%), *Breynia oblongifolia* (43%), *Glossocarya hemiderma* (43%), *Murraya ovatifoliolata* (43%), *Passiflora aurantia* var. *aurantia* (43%), *Planchonella cotinifolia* (43%), *Solanum furfuraceum* (43%), *Solanum seaforthianum*\* (1, 43%), *Trema tomentosa* (43%), *Alectryon diversifolius* (29%), *Alstonia constricta* (29%), *Alyxia ruscifolia* (1, 29%), *Atalaya salicifolia* (29%), *Baloghia inophylla* (29%), *Cissus oblonga* (1, 29%), *Clerodendrum floribundum* (29%), *Coatesia paniculata* (29%), *Deeringia amaranthoides* (29%), *Diplocyclos palmatus* subsp. *palmatus* (29%), *Erythroxylum* sp. (*Splityard Creek L. Pedley 5360*) (29%), *Gossia bidwillii* (1, 29%), *Hibiscus heterophyllus* (29%), *Lantana camara*\* (29%), *Melodorum leichhardtii* (29%), *Pavetta australiensis* (1, 29%), *Pavetta australiensis* var. *australiensis* (1, 29%), *Pittosporum viscidum* (29%), *Trifloria ixoroides* (29%), *Abutilon oxycarpum* var. *oxycarpum* (14%), *Acronychia laevis* (1, 14%), *Acronychia pauciflora* (1, 14%), *Alectryon connatus* (14%), *Archidendropsis thozetiana* (5, 14%), *Backhousia angustifolia* (14%), *Boronia palasepala* (14%), *Bursaria incana* (14%), *Capparis sarmentosa* (14%), *Casearia multinervosa* (14%), *Cayratia acris* (1, 14%), *Cossinia australiana* (14%), *Croton phebaloides* (25, 14%), *Cyclophyllum coprosmoides* (2, 14%), *Dendrocnide photinophylla* (14%), *Elaeodendron australe* var. *integrifolium* (14%), *Everistia vacciniifolia* (10, 14%), *Exocarpos latifolius* (1, 14%), *Ficus opposita* (14%), *Geijera salicifolia* (14%), *Glycine* sp. (*Marburg K.A. Williams 83006*) (14%), *Jasminum didymum* subsp. *racemosum* (14%), *Jasminum simplicifolium* subsp. *australiense* (14%), *Myrsine variabilis* (14%), *Opuntia tomentosa*\* (14%), *Owenia venosa* (5, 14%), *Parsonia lanceolata* (14%), *Parsonia plaesiophylla* (14%), *Passiflora suberosa*\* (14%), *Petalostigma pubescens* (20, 14%), *Phyllanthus subcrenulatus* (14%), *Pittosporum spinescens* (1, 14%), *Plectorrhiza tridentata* (14%), *Pleurostyliya opposita* (14%), *Psychotria daphnoides* var. *pubescens* (14%), *Psydrax odorata* (1, 14%), *Psydrax odorata* forma *australiana* (14%), *Senna sophera* var. *sophera* (14%), *Smilax australis* (1, 14%), *Solanum stelligerum* (14%), *Stephania renifolia* (14%), *Tinospora smilacina* (14%), *Tragia novae-hollandiae* (14%), *Trema tomentosa* var. *tomentosa* (14%), *Trophis scandens* subsp. *scandens* (1, 14%), *Vincetoxicum ovatum* (14%), *Ximenia americana* (14%)

**Stratum: Ground****Height avg. = 0.7m, range 0.4-0.9m, 5 sites****PFC avg. = 18.0%, range 5-40%, 5 sites**

*Dominant species (relative cover, frequency):* *Ancistrachne uncinulata* (28, 100%), *Oplismenus aemulus* (16, 100%), *Scleria sphaelata* (13, 60%), *Paspalidium distans* (8, 80%), *Rivina humilis*\* (7, 100%)

*Frequent species (cover, frequency):* GRAMINOIDS: *Ancistrachne uncinulata* (4, 100%), *Oplismenus aemulus* (3, 100%), *Paspalidium distans* (1, 80%), *Cyperus gracilis* (1, 60%), *Scleria sphaelata* (5, 60%), *Cyperus alterniflorus* (10, 20%), *Cyperus dietrichiae* var. *dietrichiae* (20%), *Scleria mackaviensis* (20%), *Setaria surgens* (20%)

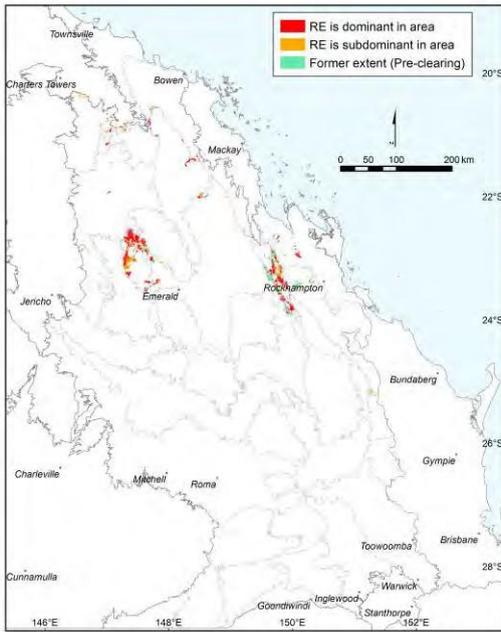
FORBS: *Rivina humilis*\* (3, 100%), *Dinosperma erythrococtum* (80%), *Hoya australis* subsp. *australis* (1, 80%), *Solanum seaforthianum*\* (80%), *Solanum stelligerum* (80%), *Strychnos psilosperma* (80%), *Abutilon oxycarpum* var. *oxycarpum* (60%), *Alchornea ilicifolia* (60%), *Croton acronychioides* (60%), *Deeringia amaranthoides* (60%), *Diplocyclos palmatus* subsp. *palmatus* (60%), *Dysphania carinata* (60%), *Erigeron sumatrensis*\* (60%), *Alyxia ruscifolia* (40%), *Brachychiton australis* (40%), *Carissa ovata* (40%), *Cayratia acris* (40%), *Coatesia paniculata* (40%), *Dendrocnide photinophylla* (40%), *Dioscorea transversa* (40%), *Gossia bidwillii* (40%), *Passiflora aurantia* var. *aurantia* (40%), *Phytolacca octandra*\* (40%), *Planchonella cotinifolia* (40%), *Stephania japonica* var. *discolor* (40%), *Tetrastigma nitens* (40%), *Tinospora smilacina* (40%), *Tragia novae-hollandiae* (40%), *Acalypha eremorum* (20%), *Achyranthes aspera* (20%), *Alectryon connatus* (20%), *Brachychiton rupestris* (20%), *Breynia oblongifolia* (20%), *Bridelia leichhardtii* (20%), *Capparis sarmentosa* (20%), *Cayratia clematidea* (20%), *Celtis paniculata* (20%), *Cissus oblonga* (20%), *Claoxylon tenerifolium* subsp. *tenerifolium* (20%), *Commelina diffusa* (20%), *Croton insularis* (20%), *Cyclophyllum coprosmoides* (20%), *Dianella caerulea* var. *asserata* (20%), *Dianella caerulea* var. *vannata* (20%), *Geijera salicifolia* (20%), *Glossocarya hemiderma* (20%), *Jasminum simplicifolium* subsp. *australiense* (20%), *Melia azedarach* (20%), *Melodorum leichhardtii* (20%), *Nyssanthes diffusa* (20%), *Parsonia leichhardtii* (20%), *Parsonia plaesiophylla* (20%), *Pavetta australiensis* (20%), *Pavetta australiensis* var. *australiensis* (20%), *Pellaea nana* (20%), *Pleioygnium timorense* (20%), *Pseuderanthemum variabile* (20%), *Psydrax odorata* (20%), *Secamone elliptica* (20%), *Smilax australis* (20%), *Solanum ellipticum* (20%), *Solanum mitchellianum* (20%), *Solanum nodiflorum*\* (20%), *Sonchus oleraceus*\* (20%), *Stephania japonica* (20%), *Stephania renifolia* (20%), *Trema tomentosa* (20%), *Vincetoxicum ovatum* (20%)

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Eucalyptus crebra +/- Acacia rhodoxylon woodland on old sedimentary rocks with varying degrees of metamorphism and folding**



Annie Kelly

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 243,056 160,740 66%

Species\_recorded: Total: 188; woody: 63; ground: 139; Avg. spp./site: 29.3; std dev.: 10.5, 10 site(s)

Basal area: Avg./site: 13.0 m<sup>2</sup>/ha, range: 6.5 - 18 m<sup>2</sup>/ha, std. deviation: 4 m<sup>2</sup>/ha, 14 site(s)

Structural formation: Woodland: 47%; open-woodland: 40%; open-forest: 13%, 15 site(s)

Representative\_sites 3087, 16889, 16894, 16925, 17631, 17646, 17649, 17679, 17680, 17681, 17684, 19011, 19026, 19265, 19268.

**Stratum: Emergent**

Height avg. = 20.0m, 1 site

Crown cover avg. = 3.0%, 1 site

Frequent species (cover, frequency): *Eucalyptus crebra* (3, 7%)

**Stratum: Tree 1**

Height avg. = 16.9m, range 9-28m, 15 sites

Crown cover avg. = 27.9%, range 10.0-60.0%, 15 sites

Dominant species (relative cover, frequency): *Eucalyptus crebra* (82, 87%), *Acacia rhodoxylon* (47, 40%)

Frequent species (cover, frequency): *Eucalyptus crebra* (21, 87%), *Acacia rhodoxylon* (14, 40%), *Corymbia clarksoniana* (3, 20%), *Acacia shirleyi* (4, 13%), *Acacia falciformis* (7%), *Alstonia constricta* (7%), *Corymbia dallachiana* (1, 7%), *Eucalyptus exserta* (10, 7%), *Eucalyptus moluccana* (3, 7%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.11.1

### Stratum: Tree 2

Height avg. = 8.8m, range 6-19m, 12 sites

Crown cover avg. = 20.2%, range 3.0-70.0%, 12 sites

Dominant species (relative cover, frequency): *Acacia rhodoxylon* (59, 73%), *Alphitonia excelsa* (28, 27%), *Eucalyptus crebra* (19, 60%)

Frequent species (cover, frequency): *Acacia rhodoxylon* (17, 73%), *Eucalyptus crebra* (2, 60%), *Alphitonia excelsa* (2, 27%), *Petalostigma pubescens* (9, 13%), *Acacia decora* (1, 7%), *Acacia falciformis* (7%), *Acacia salicina* (1, 7%), *Capparis canescens* (7%), *Corymbia clarksoniana* (7%), *Corymbia erythrophloia* (5, 7%), *Denhamia cunninghamii* (7%), *Eucalyptus exserta* (7%), *Flindersia dissosperma* (7%), *Grevillea parallela* (7%), *Lysicarpus angustifolius* (1, 7%), *Petalostigma banksii* (2, 7%)

### Stratum: Tree 3

Height avg. = 3.9m, range 3-6m, 5 sites

Crown cover avg. = 6.6%, range 0.0-20.0%, 5 sites

Frequent species (cover, frequency): *Acacia rhodoxylon* (7, 20%), *Alphitonia excelsa* (1, 20%), *Acacia decora* (7%), *Acacia fodinalis* (4, 7%), *Acacia leiocalyx subsp. leiocalyx* (2, 7%), *Capparis loranthifolia* (7%), *Eucalyptus crebra* (1, 7%), *Flindersia dissosperma* (7%), *Psydrax odorata* (2, 7%), *Terminalia oblongata subsp. oblongata* (7%), *Turraea pubescens* (7%)

### Stratum: Shrub 1

Height avg. = 2.0m, range 1-6m, 15 sites

Crown cover avg. = 6.9%, range 0.0-25.0%, 15 sites

Dominant species (relative cover, frequency): *Erythroxylum australe* (41, 27%), *Acacia rhodoxylon* (40, 53%), *Alphitonia excelsa* (18, 33%), *Eucalyptus crebra* (15, 60%)

Frequent species (cover, frequency): *Eucalyptus crebra* (1, 60%), *Acacia rhodoxylon* (5, 53%), *Alphitonia excelsa* (1, 33%), *Erythroxylum australe* (1, 27%), *Acacia leiocalyx subsp. leiocalyx* (1, 20%), *Capparis canescens* (20%), *Carissa ovata* (1, 20%), *Alectryon subdentatus* (1, 13%), *Cassia brewsteri* (2, 13%), *Grewia latifolia* (1, 13%), *Opuntia tomentosa\** (1, 13%), *Psydrax indet.* (13%), *Acacia falciformis* (2, 7%), *Acacia sp. (Comet L.Pedley 4091)* (7%), *Acronychia laevis* (7%), *Alstonia constricta* (7%), *Alyxia ruscifolia* (1, 7%), *Atalaya hemiglauca* (2, 7%), *Breynia oblongifolia* (7%), *Bridelia leichhardtii* (1, 7%), *Corymbia clarksoniana* (7%), *Cupaniopsis anacardioides* (1, 7%), *Cyclophyllum coprosmoides var. spathulatum* (9, 7%), *Denhamia cunninghamii* (1, 7%), *Diospyros humilis* (7%), *Dodonaea triangularis* (7%), *Dodonaea viscosa subsp. spatulata* (7%), *Ehretia membranifolia* (7%), *Eremophila mitchellii* (7%), *Ficus opposita* (7%), *Flindersia australis* (7%), *Flueggea leucopyrus* (7%), *Grewia retusifolia* (7%), *Hibiscus divaricatus* (1, 7%), *Jasminum simplicifolium subsp. australiense* (7%), *Lantana camara\** (7%), *Myoporum acuminatum* (7%), *Parsonia lanceolata* (7%), *Petalostigma pubescens* (6, 7%), *Pittosporum spinescens* (7%), *Psydrax attenuata* (2, 7%), *Psydrax forsteri* (7%), *Psydrax oleifolia* (7%), *Santalum lanceolatum* (7%), *Solanum seafortianum\** (7%), *Terminalia oblongata subsp. oblongata* (7%), *Wrightia saligna* (7%)

### Stratum: Shrub 2

Height avg. = 2.0m, 1 site

Crown cover avg. = 30.0%, 1 site

Frequent species (cover, frequency): *Acacia rhodoxylon* (12, 7%), *Capparis canescens* (7%), *Erythroxylum australe* (18, 7%)

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Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Technical Description****Regional ecosystem: 11.11.1****Ground  
Stratum:****Height avg. = 0.6m, range 0.25-1 m, 10 sites****PFC avg. = 29.3%, range 3-65%, 10 sites**

*Dominant species (relative cover, frequency):* *Aristida queenslandica* var. *dissimilis* (23, 30%), *Themeda triandra* (20, 30%), *Digitaria ramularis* (17, 30%), *Aristida queenslandica* var. *queenslandica* (14, 40%), *Enteropogon unispiceus* (12, 50%)

*Frequent species (cover, frequency):* GRAMINOIDS: *Enneapogon lindleyanus* (5, 50%), *Enteropogon unispiceus* (2, 50%), *Aristida queenslandica* var. *queenslandica* (3, 40%), *Eragrostis lacunaria* (1, 40%), *Panicum effusum* (1, 40%), *Aristida queenslandica* var. *dissimilis* (4, 30%), *Digitaria ramularis* (3, 30%), *Dinebra decipiens* (2, 30%), *Melinis repens*\* (1, 30%), *Paspalidium criniforme* (2, 30%), *Paspalidium gracile* (2, 30%), *Themeda triandra* (10, 30%), *Aristida personata* (20%), *Cenchrus ciliaris*\* (20%), *Chrysopogon fallax* (20%), *Cymbopogon queenslandicus* (32, 20%), *Cymbopogon refractus* (1, 20%), *Cyperus fulvus* (20%), *Cyperus gracilis* (2, 20%), *Eragrostis brownii* (1, 20%), *Eragrostis sororia* (1, 20%), *Eriachne mucronata* (20%), *Panicum decompositum* (20%), *Panicum simile* (2, 20%), *Paspalidium caespitosum* (2, 20%), *Scleria mackaviensis* (20%), *Ancistrachne uncinulata* (3, 10%), *Aristida benthamii* var. *benthamii* (10%), *Aristida calycina* (1, 10%), *Aristida* *indet.* (1, 10%), *Aristida jerichoensis* var. *jerichoensis* (10%), *Bothriochloa decipiens* var. *decipiens* (5, 10%), *Calyptochloa gracillima* subsp. *gracillima* (1, 10%), *Cyperus bowmannii* (10%), *Cyperus enervis* (10%), *Digitaria bicornis* (10%), *Digitaria breviglumis* (2, 10%), *Digitaria fumida* (2, 10%), *Digitaria parviflora* (10, 10%), *Dinebra divaricatissima* (10%), *Enneapogon robustissimus* (10%), *Enteropogon ramosus* (1, 10%), *Entolasia stricta* (10%), *Eragrostis* *indet.* (2, 10%), *Eragrostis megalosperma* (10%), *Eragrostis spartinoides* (1, 10%), *Gahnia aspera* (10%), *Heteropogon contortus* (1, 10%), *Oplismenus aemulus* (2, 10%), *Paspalidium albobillosum* (10%), *Paspalidium distans* (1, 10%), *Tripogon loliiiformis* (10%)

FORBS: *Cyanthillium cinereum* (40%), *Phyllanthus virgatus* (40%), *Sida hackettiana* (40%), *Achyranthes aspera* (30%), *Brennia oblongifolia* (30%), *Cheilanthes distans* (30%), *Cheilanthes sieberi* (30%), *Galactia tenuiflora* (30%), *Opuntia stricta*\* (30%), *Solanum ellipticum* (30%), *Alphitonia excelsa* (1, 20%), *Amaranthus interruptus* (20%), *Boerhavia* *indet.* (20%), *Capparis canescens* (20%), *Cymbidium canaliculatum* (20%), *Einadia hastata* (20%), *Eustrephus latifolius* (20%), *Geijera salicifolia* (20%), *Goodenia glabra* (20%), *Jasminum didymum* (20%), *Jasminum didymum* subsp. *lineare* (20%), *Malvastrum americanum* var. *americanum*\* (20%), *Opuntia tomentosa*\* (20%), *Oxalis* *indet.* (20%), *Parsonsia lanceolata* (20%), *Plucheaxanthina* (20%), *Portulaca australis* (20%), *Sida* *indet.* (20%), *Sida rohlenae* (20%), *Tephrosia filipes* (20%), *Acacia oswaldii* (10%), *Adiantum* *indet.* (10%), *Alternanthera nana* (10%), *Brunoniella australis* (10%), *Cynanchum viminalis* subsp. *brunonianum* (10%), *Desmodium rhytidophyllum* (10%), *Dianella brevipedunculata* (10%), *Eremophila mitchellii* (10%), *Erythroxylum* sp. (*Splityard Creek L. Pedley 5360*) (10%), *Euphorbia drummondii* (10%), *Euphorbia psammogeton* (10%), *Everistia vacciniifolia* (10%), *Evolvulus alsinoides* var. *decumbens* (10%), *Geitonoplesium cymosum* (10%), *Goodenia rotundifolia* (10%), *Grewia latifolia* (10%), *Hibiscus sturtii* var. *sturtii* (10%), *Jasminum simplicifolium* subsp. *australiense* (10%), *Lobelia purpurascens* (10%), *Lomandra confertifolia* subsp. *pallida* (10%), *Lomandra filiformis* (10%), *Malvastrum americanum* (10%), *Marsdenia viridiflora* (10%), *Oxalis corniculata*\* (10%), *Oxalis perennans* (10%), *Pandorea pandorana* (10%), *Parsonsia eucalyptophylla* (10%), *Parsonsia straminea* (10%), *Phyllanthus fuernrohrii* (10%), *Pseuderanthemum variabile* (10%), *Psydrax odorata* (10%), *Psydrax oleifolia* (10%), *Pterocaulon redolens* (10%), *Rhynchosia minima* (10%), *Rostellularia adscendens* (10%), *Sclerolaena birchii* (10%), *Scoparia dulcis*\* (10%), *Solanum parvifolium* (10%), *Solanum seaforthianum*\* (5, 10%)

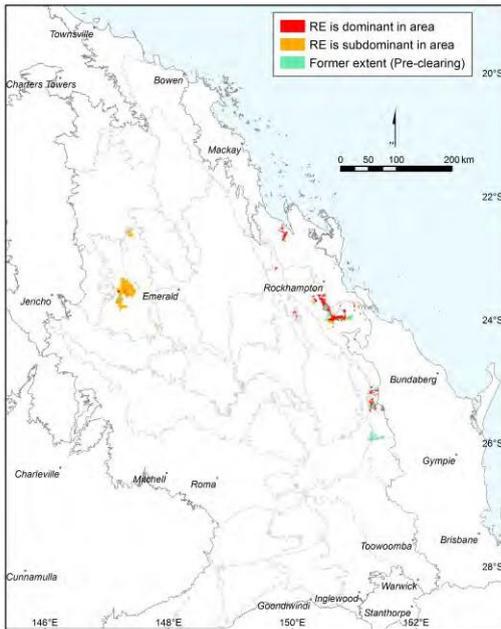
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**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. *indet.* after listed name = indeterminate species or genus

**Corymbia citriodora, Eucalyptus crebra, E. acmenoides open forest on old sedimentary rocks with varying degrees of metamorphism and folding. Coastal ranges**



Pre-clearing area (ha), remnant area (ha) and per cent remaining: 125,770 88,472 70%

Species\_recorded: Total: 162; woody: 52; ground: 129; Avg. spp./site: 26.6; std dev.: 7.2, 11 site(s)

Basal area: Avg./site: 19.1 m<sup>2</sup>/ha, range: 12.0 - 29 m<sup>2</sup>/ha, std. deviation: 5 m<sup>2</sup>/ha, 21 site(s)

Structural formation: Woodland: 57%; open-forest: 33%; tall woodland: 10%, 21 site(s)

Representative\_sites 17509, 17511, 17520, 17584, 17585, 17588, 17596, 17597, 17598, 17599, 17602, 17603, 17612, 17613, 17619, 17648, 17650, 19014, 28805, 28807, 28808.

**Stratum: Emergent**

Height avg. = 40.0m, range 40-40m, 2 sites

Crown cover avg. = 5.0%, range 5.0-5.0%, 2 sites

Frequent species (cover, frequency): *Corymbia citriodora* (5, 10%)

**Stratum: Tree 1**

Height avg. = 27.0m, range 18-35m, 21 sites

Crown cover avg. = 41.5%, range 20.0-75.0%, 21 sites

Dominant species (relative cover, frequency): *Corymbia citriodora* (65, 95%), *Eucalyptus acmenoides* (60, 33%), *Eucalyptus crebra* (18, 62%)

Frequent species (cover, frequency): *Corymbia citriodora* (25, 95%), *Eucalyptus crebra* (6, 62%), *Eucalyptus acmenoides* (32, 33%), *Eucalyptus moluccana* (7, 10%), *Eucalyptus tereticornis* (9, 10%), *Corymbia clarksoniana* (5%), *Corymbia erythrophloia* (5%), *Corymbia trachyphloia* subsp. *trachyphloia* (17, 5%), *Eucalyptus exserta* (19, 5%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.11.3

### Stratum: Tree 2

Height avg. = 16.2m, range 8-25m, 21 sites

Crown cover avg. = 7.7%, range 2.0-25.0%, 21 sites

Dominant species (relative cover, frequency): *Eucalyptus crebra* (58, 86%), *Corymbia citriodora* (33, 67%)

Frequent species (cover, frequency): *Eucalyptus crebra* (5, 86%), *Corymbia citriodora* (3, 67%), *Eucalyptus acmenoides* (2, 19%), *Lophostemon suaveolens* (1, 14%), *Alphitonia excelsa* (2, 10%), *Eucalyptus moluccana* (2, 10%), *Lophostemon confertus* (3, 10%), *Acacia aulacocarpa* (1, 5%), *Acacia fasciculifera* (1, 5%), *Acacia shirleyi* (5%), *Corymbia intermedia* (1, 5%), *Corymbia trachyphloia subsp. trachyphloia* (2, 5%), *Eucalyptus exserta* (3, 5%), *Eucalyptus melanophloia* (5, 5%), *Notelaea ovata* (1, 5%)

### Stratum: Tree 3

Height avg. = 6.3m, range 3-15m, 15 sites

Crown cover avg. = 4.5%, range 1.0-10.0%, 15 sites

Dominant species (relative cover, frequency): *Corymbia citriodora* (52, 24%), *Eucalyptus crebra* (21, 24%)

Frequent species (cover, frequency): *Corymbia citriodora* (2, 24%), *Eucalyptus crebra* (1, 24%), *Allocasuarina torulosa* (2, 14%), *Alphitonia excelsa* (1, 14%), *Eucalyptus acmenoides* (1, 14%), *Lophostemon confertus* (3, 14%), *Corymbia erythrophloia* (1, 10%), *Acacia aulacocarpa* (4, 5%), *Acacia leiocalyx subsp. leiocalyx* (1, 5%), *Acacia maidenii* (1, 5%), *Acacia rhodoxylon* (6, 5%), *Acacia shirleyi* (10, 5%), *Brachychiton populneus* (1, 5%), *Cycas megacarpa* (5%), *Eucalyptus melanophloia* (1, 5%), *Lophostemon suaveolens* (1, 5%), *Macrozamia moorei* (2, 5%), *Petalostigma pubescens* (5%), *Xanthorrhoea johnsonii* (5%)

### Stratum: Shrub 1

Height avg. = 1.7m, range 1-2.5m, 20 sites

Crown cover avg. = 7.1%, range 2.0-20.0%, 20 sites

Dominant species (relative cover, frequency): *Xanthorrhoea johnsonii* (30, 24%), *Corymbia citriodora* (29, 29%), *Alphitonia excelsa* (25, 24%), *Acacia leiocalyx subsp. leiocalyx* (23, 29%), *Acacia maidenii* (12, 33%)

Frequent species (cover, frequency): *Acacia maidenii* (1, 33%), *Acacia leiocalyx subsp. leiocalyx* (1, 29%), *Corymbia citriodora* (2, 29%), *Alphitonia excelsa* (2, 24%), *Xanthorrhoea johnsonii* (2, 24%), *Eucalyptus acmenoides* (1, 14%), *Lantana camara\** (3, 14%), *Lophostemon confertus* (2, 14%), *Macrozamia miquelii* (8, 14%), *Acacia aulacocarpa* (1, 10%), *Allocasuarina torulosa* (1, 10%), *Breynia oblongifolia* (10%), *Bursaria spinosa subsp. spinosa* (2, 10%), *Daviesia villifera* (9, 10%), *Eucalyptus crebra* (1, 10%), *Ficus opposita* (1, 10%), *Hibiscus heterophyllus* (2, 10%), *Macrozamia moorei* (2, 10%), *Acacia fasciculifera* (1, 5%), *Acacia podalyriifolia* (1, 5%), *Acacia rhodoxylon* (3, 5%), *Alectryon diversifolius* (4, 5%), *Capparis canescens* (5%), *Cassia tomentella* (1, 5%), *Corymbia erythrophloia* (2, 5%), *Eucalyptus moluccana* (1, 5%), *Exocarpos cupressiformis* (3, 5%), *Indigofera indet.* (5%), *Jacksonia scoparia* (6, 5%), *Macrozamia macleayi* (5, 5%), *Opuntia tomentosa\** (5%), *Pittosporum spinescens* (1, 5%), *Psydrax odorata* (5%), *Samadera sp. (Dam Creek T.S.Ryan 1006)* (5%), *Sida cordifolia\** (1, 5%), *Swainsona galegifolia* (5%), *Xanthorrhoea latifolia* (1, 5%)

### Stratum: Shrub 2

Height avg. = 1.1m, range 0.9-1.4m, 6 sites

Crown cover avg. = 13.7%, range 2.0-30.0%, 6 sites

Dominant species (relative cover, frequency): *Macrozamia miquelii* (69, 24%)

Frequent species (cover, frequency): *Macrozamia miquelii* (9, 24%), *Acacia maidenii* (1, 10%), *Alphitonia excelsa* (1, 10%), *Acacia aulacocarpa* (5, 5%), *Acacia fasciculifera* (5%), *Acronychia laevis* (2, 5%), *Coelospermum reticulatum* (1, 5%), *Corymbia citriodora* (2, 5%), *Cycas media* (4, 5%), *Exocarpos cupressiformis* (5%), *Hibiscus heterophyllus* (5%), *Jacksonia scoparia* (6, 5%), *Lantana camara\** (1, 5%), *Macrozamia macleayi* (10, 5%), *Opuntia tomentosa\** (5%), *Sida cordifolia\** (2, 5%)

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Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Technical Description****Regional ecosystem: 11.11.3****Ground  
Stratum:****Height avg. = 0.4m, range 0.15-1m, 11 sites****PFC avg. = 28.7%, range 5-65%, 11 sites**

*Dominant species (relative cover, frequency): Entolasia stricta (35, 27%), Themeda triandra (35, 73%), Panicum effusum (18, 27%), Arundinella nepalensis (14, 27%), Cymbopogon refractus (14, 27%)*

*Frequent species (cover, frequency): GRAMINOIDS: Themeda triandra (14, 73%), Aristida personata (4, 27%), Aristida queenslandica var. dissimilis (3, 27%), Arundinella nepalensis (5, 27%), Cymbopogon refractus (1, 27%), Entolasia stricta (3, 27%), Imperata cylindrica (1, 27%), Panicum effusum (3, 27%), Aristida calycina (18%), Aristida latifolia (7, 18%), Cyperus gracilis (18%), Enneapogon lindleyanus (2, 18%), Eremochloa bimaculata (3, 18%), Heteropogon contortus (2, 18%), Melinis repens\* (4, 18%), Paspalidium caespitosum (1, 18%), Paspalidium gracile (18%), Scleria mackaviensis (1, 18%), Scleria sphacelata (18%), Sorghum nitidum (6, 18%), Aristida caput-medusae (15, 9%), Aristida queenslandica var. queenslandica (9%), Cenchrus ciliaris\* (9%), Cymbopogon queenslandicus (7, 9%), Digitaria brownii (5, 9%), Dinebra decipiens (1, 9%), Eragrostis sororia (9%), Gahnia aspera (9%), Mnesithea rottboellioides (9%), Oplismenus aemulus (9%), Panicum decompositum (1, 9%), Panicum simile (2, 9%), Paspalidium distans (9%), Paspalidium jubiflorum (9%), Perotis rara (30, 9%), Poaceae indet. (3, 9%)*

*FORBS: Hardenbergia violacea (1, 73%), Lomandra longifolia (64%), Desmodium rhytidophyllum (55%), Dianella revoluta (55%), Eustrephus latifolius (55%), Dianella caerulea (1, 45%), Goodenia rotundifolia (45%), Phyllanthus virgatus (45%), Cheilanthes sieberi (36%), Jasminum didymum (36%), Alphitonia excelsa (27%), Brunoniella australis (27%), Coelospermum reticulatum (27%), Glycine tomentella (27%), Opercularia diphylla (27%), Passiflora suberosa\* (27%), Sida hackettiana (27%), Breynia oblongifolia (18%), Desmodium brachypodum (18%), Einadia hastata (18%), Grewia latifolia (18%), Indigofera australis (1, 18%), Lomandra filiformis (18%), Peripleura hispidula (18%), Senna barclayana (18%), Senna pendula var. glabrata\* (18%), Swainsona galegifolia (1, 18%), Acacia decora (9%), Acacia leiocalyx subsp. leiocalyx (9%), Achyranthes aspera (9%), Ajuga australis (9%), Amaranthus interruptus (9%), Boerhavia burbidgeana (9%), Capparis canescens (9%), Capparis shanesiana (9%), Chamaecrista concinna (9%), Crassocephalum crepidioides\* (9%), Crotalaria dissitiflora (9%), Crotalaria montana (9%), Crotalaria montana var. angustifolia (9%), Cyathillium cinereum (9%), Desmodium varians (2, 9%), Dianella longifolia (9%), Euphorbia drummondii (9%), Euphorbia tannensis (9%), Glycine tabacina (9%), Goodenia grandiflora (9%), Hypericum gramineum (9%), Indigofera australis subsp. australis (9%), Jasminum simplicifolium subsp. australiense (9%), Lantana montevidensis\* (1, 9%), Lomandra confertifolia (9%), Macrozamia miquelii (9%), Malvastrum americanum (9%), Marsdenia viridiflora (9%), Marsdenia viridiflora subsp. viridiflora (9%), Opuntia tomentosa\* (9%), Oxalis corniculata\* (9%), Oxalis radicata (9%), Phyllanthus indet. (9%), Portulaca pilosa\* (9%), Psychotria daphnoides (9%), Rhynchosia minima (9%), Rostellularia adscendens (9%), Sida cordifolia\* (9%), Sida rohlenae (9%), Spermaceae indet. (9%), Tephrosia filipes (9%), Xanthorrhoea johnsonii (9%), Xanthorrhoea latifolia (1, 9%)*

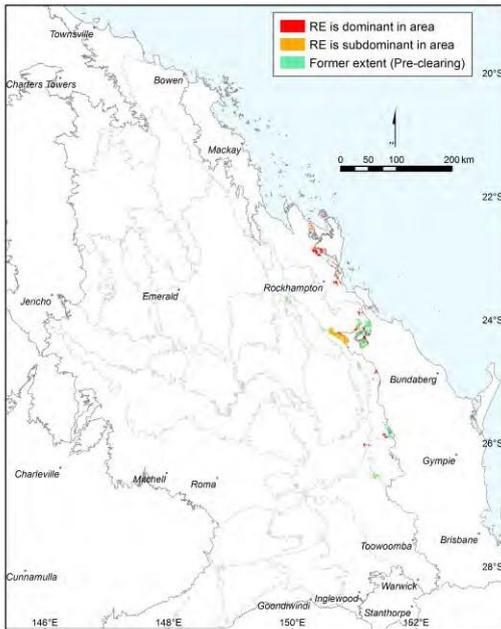
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**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Eucalyptus crebra woodland on old sedimentary rocks with varying degrees of metamorphism and folding. Coastal ranges**



Annie Kelly

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 107,423 52,157 49%

Species\_recorded: Total: 97; woody: 33; ground: 68; Avg. spp./site: 29.7; std dev.: 13.0, 3 site(s)

Basal area: Avg./site: 12.2 m<sup>2</sup>/ha, range: 7.0 - 16 m<sup>2</sup>/ha, std. deviation: 3 m<sup>2</sup>/ha, 5 site(s)

Structural formation: Woodland: 80%; tall woodland: 20%, 5 site(s)

Representative\_sites 14856, 17075, 17518, 24669, 40685.

**Stratum: Tree 1**

Height avg. = 22.2m, range 15-33m, 5 sites

Crown cover avg. = 23.2%, range 20.0-25.0%, 5 sites

Dominant species (relative cover, frequency): *Corymbia citriodora* (59, 80%), *Eucalyptus crebra* (36, 100%)

Frequent species (cover, frequency): *Eucalyptus crebra* (8, 100%), *Corymbia citriodora* (14, 80%), *Corymbia citriodora* subsp. *variegata* (10, 20%), *Corymbia intermedia* (4, 20%), *Eucalyptus exserta* (2, 20%), *Eucalyptus moluccana* (5, 20%)

**Stratum: Tree 2**

Height avg. = 11.8m, range 8-15m, 4 sites

Crown cover avg. = 10.0%, range 0.0-15.0%, 4 sites

Dominant species (relative cover, frequency): *Eucalyptus crebra* (41, 60%)

Frequent species (cover, frequency): *Eucalyptus crebra* (2, 60%), *Acacia flavescens* (1, 20%), *Allocasuarina torulosa* (1, 20%), *Corymbia citriodora* (20%), *Corymbia citriodora* subsp. *variegata* (10, 20%), *Geijera salicifolia* (1, 20%), *Lophostemon confertus* (15, 20%), *Lophostemon suaveolens* (7, 20%)

**Stratum: Tree 3**

Height avg. = 2.8m, range 2-3.5m, 2 sites

Crown cover avg. = 4.5%, range 4.0-5.0%, 2 sites

Dominant species (relative cover, frequency): *Alphitonia excelsa* (43, 40%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.11.4

*Frequent species (cover, frequency): Alphitonia excelsa (3, 40%), Acacia aulacocarpa (2, 20%), Acacia flavescens (1, 20%), Allocasuarina torulosa (1, 20%), Bridelia tomentosa (1, 20%), Denhamia disperma (1, 20%), Eucalyptus crebra (1, 20%), Ficus opposita (1, 20%)*

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Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Technical Description****Regional ecosystem: 11.11.4****Stratum: Shrub 1****Height avg. = 2.0m, range 1-3m, 5 sites****Crown cover avg. = 7.4%, range 1.0-20.0%, 5 sites**

*Dominant species (relative cover, frequency):* *Acacia leiocalyx subsp. leiocalyx* (52, 40%), *Jacksonia scoparia* (23, 40%), *Coelospermum reticulatum* (18, 60%), *Alphitonia excelsa* (15, 40%)

*Frequent species (cover, frequency):* *Coelospermum reticulatum* (1, 60%), *Acacia leiocalyx subsp. leiocalyx* (6, 40%), *Alphitonia excelsa* (2, 40%), *Jacksonia scoparia* (1, 40%), *Acacia decora* (1, 20%), *Acacia disparrima subsp. disparrima* (20%), *Acacia julifera* (1, 20%), *Acacia loroloba* (3, 20%), *Allocasuarina torulosa* (1, 20%), *Angophora leiocarpa* (20%), *Corymbia citriodora subsp. variegata* (2, 20%), *Dodonaea lanceolata var. subsessilifolia* (1, 20%), *Dodonaea tenuifolia* (20%), *Eucalyptus crebra* (4, 20%), *Lantana camara\** (5, 20%), *Lophostemon suaveolens* (1, 20%), *Planchonia careya* (2, 20%), *Psychotria daphnoides* (1, 20%), *Psydrax odorata* (1, 20%)

**Stratum: Shrub 2****Height avg. = 0.6m, range 0.5-0.6m, 2 sites****Crown cover avg. = 2.0%, range 1.0-3.0%, 2 sites**

*Frequent species (cover, frequency):* *Alphitonia excelsa* (1, 20%), *Coelospermum reticulatum* (1, 20%), *Lantana camara\** (20%), *Macrozamia miquelii* (20%), *Psychotria daphnoides var. daphnoides* (1, 20%), *Solanum stelligerum* (1, 20%)

**Stratum: Ground****Height avg. = 0.6m, range 0.3-0.75m, 3 sites****PFC avg. = 18.0%, range 11-23%, 3 sites**

*Dominant species (relative cover, frequency):* *Macrozamia miquelii* (80, 33%), *Themeda triandra* (73, 33%), *Aristida caput-medusae* (17, 33%), *Bothriochloa decipiens* (13, 33%), *Aristida queenslandica var. dissimilis* (11, 67%)

*Frequent species (cover, frequency):* GRAMINOIDS: *Aristida queenslandica var. dissimilis* (2, 67%), *Panicum effusum* (67%), *Aristida caput-medusae* (5, 33%), *Aristida indet.* (33%), *Aristida jerichoensis var. jerichoensis* (1, 33%), *Aristida vagans* (2, 33%), *Arundinella nepalensis* (3, 33%), *Bothriochloa decipiens* (4, 33%), *Calyptochloa gracillima subsp. gracillima* (33%), *Cymbopogon refractus* (3, 33%), *Digitaria ramularis* (33%), *Entolasia stricta* (33%), *Eragrostis elongata* (33%), *Eragrostis leptostachya* (33%), *Eragrostis spartinooides* (33%), *Eremochloa bimaculata* (1, 33%), *Eriachne pallescens* (33%), *Eulalia aurea* (33%), *Fimbristylis dichotoma* (33%), *Fimbristylis microcarya* (33%), *Juncus usitatus* (33%), *Scleria brownii* (33%), *Themeda triandra* (8, 33%)

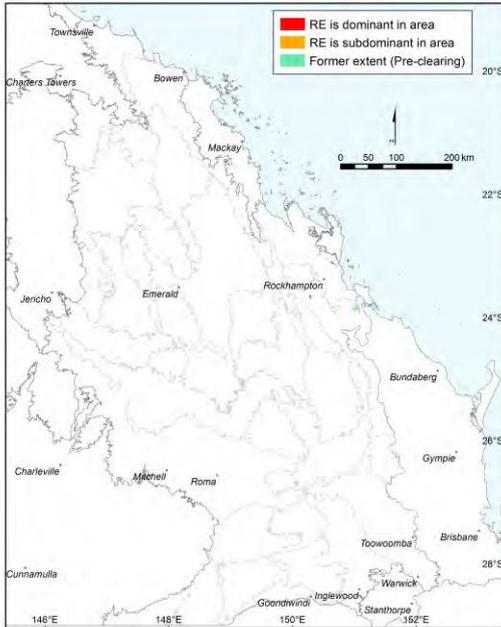
FORBS: *Phyllanthus virgatus* (67%), *Acacia leiocalyx subsp. leiocalyx* (33%), *Brachyscome multifida* (33%), *Cheilanthes sieberi* (33%), *Chrysocephalum apiculatum* (33%), *Clematicissus opaca* (1, 33%), *Corymbia citriodora subsp. variegata* (2, 33%), *Cyanthillium cinereum* (33%), *Desmodium varians* (33%), *Dianella brevipedunculata* (33%), *Dianella longifolia* (33%), *Dianella revoluta* (1, 33%), *Einadia nutans* (33%), *Evolvulus alsinoides* (33%), *Goodenia indet.* (33%), *Hibbertia stricta* (33%), *Laxmannia gracilis* (33%), *Lomandra confertifolia subsp. pallida* (2, 33%), *Lomandra filiformis* (1, 33%), *Lomandra longifolia* (2, 33%), *Macrozamia miquelii* (20, 33%), *Malvastrum americanum* (33%), *Oldenlandia mitrasacmoides subsp. trachymenoides* (33%), *Opuntia stricta\** (33%), *Opuntia tomentosa\** (33%), *Passiflora suberosa\** (2, 33%), *Peripleura hispidula* (33%), *Pterocaulon indet.* (33%), *Rostellularia adscendens* (33%), *Sida hackettiana* (33%), *Solanum nemophilum* (33%), *Spermacoce indet.* (33%), *Sphaeromorphaea indet.* (33%)

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Eucalyptus moluccana, Corymbia citriodora, Eucalyptus crebra woodland**



Pre-clearing area (ha), remnant area (ha) and per cent remaining: 11,496 6,065 53%

Species\_recorded: Total: 8; woody: 7; ground: 1; Avg. spp./site: 8.0; std dev.: 0.0, 1 site(s)

Basal area: Avg./site: 9.0 m<sup>2</sup>/ha, range: 9.0 - 9 m<sup>2</sup>/ha, std. deviation: 0 m<sup>2</sup>/ha, 1 site(s)

Structural formation: Open-forest: 100%, 1 site(s)

Representative\_sites 17058.

**Stratum: Tree 1**

Height avg. = 26.0m, 1 site

Crown cover avg. = 55.0%, 1 site

Dominant species (relative cover, frequency): *Corymbia citriodora* (91, 100%), *Eucalyptus crebra* (9, 100%)

Frequent species (cover, frequency): *Corymbia citriodora* (50, 100%), *Eucalyptus crebra* (5, 100%)

**Stratum: Tree 2**

Height avg. = 18.0m, 1 site

Crown cover avg. = 3.0%, 1 site

Dominant species (relative cover, frequency): *Eucalyptus exserta* (100, 100%)

Frequent species (cover, frequency): *Eucalyptus exserta* (5, 100%)

**Stratum: Tree 3**

Height avg. = 6.0m, 1 site

Crown cover avg. = 5.0%, 1 site

Dominant species (relative cover, frequency): *Lophostemon suaveolens* (100, 100%)

Frequent species (cover, frequency): *Lophostemon suaveolens* (5, 100%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.11.4c

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### Stratum: Shrub 1

Height avg. = 2.0m, 1 site

Crown cover avg. = 25.0%, 1 site

*Dominant species (relative cover, frequency): Acacia leiocalyx subsp. leiocalyx (100, 100%)*

*Frequent species (cover, frequency): Acacia leiocalyx subsp. leiocalyx (25, 100%)*

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### Stratum: Shrub 2

Height avg. = 1.0m, 1 site

Crown cover avg. = 5.0%, 1 site

*Dominant species (relative cover, frequency): Coelospermum reticulatum (60, 100%), Jacksonia scoparia (40, 100%)*

*Frequent species (cover, frequency): Coelospermum reticulatum (3, 100%), Jacksonia scoparia (2, 100%)*

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### Stratum: Ground

Height avg. = 0.5m, 1 site

PFC avg. = 5.0%, 1 site

*Dominant species (relative cover, frequency): Aristida queenslandica var. queenslandica (100, 100%)*

*Frequent species (cover, frequency): GRAMINOIDS: Aristida queenslandica var. queenslandica (5, 100%)*

*FORBS:*

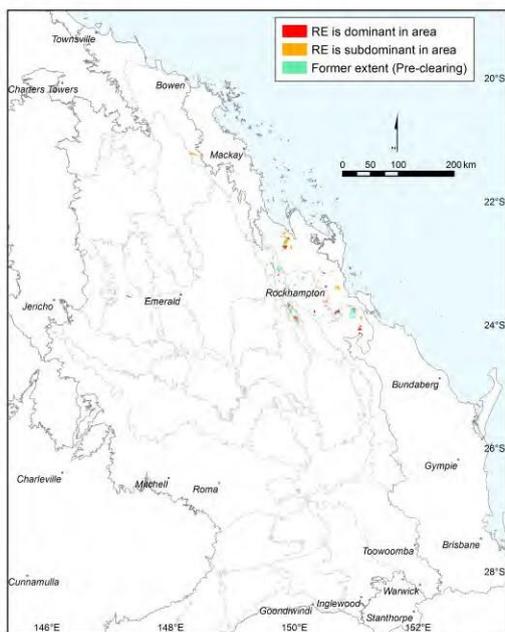
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**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Microphyll vine forest +/- Araucaria cunninghamii on old sedimentary rocks with varying degrees of metamorphism and folding**



Pre-clearing area (ha), remnant area (ha) and per cent remaining: 65,962 27,166 41%

Species\_recorded: Total: 155; woody: 111; ground: 71; Avg. spp./site: 63.3; std dev.: 3.9, 3 site(s)

Basal area: Avg/site: 17.0 m<sup>2</sup>/ha, range: 13.0 - 25 m<sup>2</sup>/ha, std. deviation: 5 m<sup>2</sup>/ha, 5 site(s)

Structural formation: Woodland: 33%; unrecorded: 67%, 6 site(s)

Representative\_sites 14461, 17651, 17662, 17667, 50374, 50434.

**Stratum: Emergent**

Height avg. = 24.9m, range 12.5-36m, 5 sites

Crown cover avg. = 4.8%, range 2.0-7.0%, 5 sites

Dominant species (relative cover, frequency): *Araucaria cunninghamii* var. *cunninghamii* (100, 33%), *Euroschinus falcatus* var. *falcatus* (68, 33%), *Brachychiton rupestris* (65, 33%)

Frequent species (cover, frequency): *Araucaria cunninghamii* var. *cunninghamii* (4, 33%), *Brachychiton rupestris* (3, 33%), *Euroschinus falcatus* var. *falcatus* (4, 33%), *Corymbia clarksoniana* (17%), *Eucalyptus melanophloia* (1, 17%), *Pleiogynium timorense* (2, 17%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.11.5

### Stratum: Tree 1

Height avg. = 12.8m, range 7.5-24m, 6 sites

Crown cover avg. = 38.7%, range 25.0-65.0%, 6 sites

*Dominant species (relative cover, frequency): Terminalia porphyrocarpa (34, 50%), Elattostachys xylocarpa (27, 33%), Euroschinus falcatus var. falcatus (24, 33%), Aidia racemosa (13, 33%), Diospyros geminata (11, 33%)*

*Frequent species (cover, frequency): Drypetes deplanchei (3, 67%), Planchonella cotinifolia (3, 50%), Terminalia porphyrocarpa (15, 50%), Acacia fasciculifera (2, 33%), Aidia racemosa (4, 33%), Cissus oblonga (1, 33%), Denhamia pittosporoides subsp. pittosporoides (1, 33%), Diospyros geminata (5, 33%), Elattostachys xylocarpa (6, 33%), Euroschinus falcatus var. falcatus (9, 33%), Geijera salicifolia (1, 33%), Sterculia quadrifida (1, 33%), Alectryon connatus (1, 17%), Alectryon subdentatus (1, 17%), Alphitonia excelsa (17%), Alstonia constricta (17%), Alstonia scholaris (6, 17%), Araucaria cunninghamii var. cunninghamii (6, 17%), Brachychiton australis (2, 17%), Brachychiton rupestris (5, 17%), Cissus reniformis (17%), Coatesia paniculata (5, 17%), Cryptocarya triplinervis (1, 17%), Cryptocarya triplinervis var. triplinervis (3, 17%), Dinosperma erythroccum (1, 17%), Diospyros humilis (5, 17%), Elaeodendron melanocarpum (17%), Erythroxyllum sp. (Splityard Creek L.Pedley 5360) (17%), Eucalyptus fibrosa (4, 17%), Excoecaria dallachyana (2, 17%), Ficus microcarpa (17%), Ficus rubiginosa (2, 17%), Flindersia australis (6, 17%), Gossia bidwillii (5, 17%), Gyrocarpus americanus (17%), Homalium alnifolium (17%), Hovea longipes (10, 17%), Jasminum simplicifolium subsp. australiense (2, 17%), Melodorum leichhardtii (2, 17%), Notelaea microcarpa (1, 17%), Owenia venosa (10, 17%), Pittosporum spinescens (1, 17%), Pleiogygium timorense (2, 17%), Pleurostylia opposita (3, 17%), Polyalthia nitidissima (17%), Polyscias elegans (1, 17%), Psydrax odorata (1, 17%), Rhamnella vitiensis (1, 17%), Sarcocochilus hillii (17%), Secamone elliptica (1, 17%), Vitex lignum-vitae (3, 17%)*

### Stratum: Tree 2

Height avg. = 5.8m, range 3.5-11m, 6 sites

Crown cover avg. = 23.3%, range 5.0-55.0%, 6 sites

*Dominant species (relative cover, frequency): Diospyros geminata (32, 33%), Alectryon connatus (23, 33%), Gossia bidwillii (20, 67%), Aidia racemosa (18, 33%), Pleurostylia opposita (15, 33%)*

*Frequent species (cover, frequency): Gossia bidwillii (5, 67%), Polyscias elegans (1, 50%), Aidia racemosa (5, 33%), Alectryon connatus (4, 33%), Brachychiton australis (3, 33%), Croton insularis (33%), Cryptocarya triplinervis (3, 33%), Diospyros geminata (2, 33%), Erythroxyllum sp. (Splityard Creek L.Pedley 5360) (1, 33%), Exocarpos latifolius (1, 33%), Pittosporum spinescens (1, 33%), Planchonella cotinifolia (1, 33%), Pleurostylia opposita (1, 33%), Psydrax odorata (1, 33%), Alectryon subdentatus (4, 17%), Alphitonia excelsa (17%), Archidendropsis thozetiana (4, 17%), Atalaya multiflora (1, 17%), Bridelia leichhardtii (17%), Bursaria incana (17%), Capparis arborea (17%), Cissus oblonga (2, 17%), Denhamia disperma (2, 17%), Diospyros humilis (2, 17%), Drypetes deplanchei (4, 17%), Ehretia membranifolia (1, 17%), Elattostachys xylocarpa (1, 17%), Flueggea leucopyrus (10, 17%), Geijera parviflora (4, 17%), Glossocarya hemiderma (1, 17%), Harpullia hillii (2, 17%), Jasminum simplicifolium subsp. australiense (1, 17%), Mallotus philippensis (1, 17%), Notelaea microcarpa (1, 17%), Opuntia tomentosa\* (17%), Polyscias australiana (17%), Psychotria daphnoides var. pubescens (1, 17%), Secamone elliptica (1, 17%), Solanum seaforthianum\* (17%), Sterculia quadrifida (2, 17%), Strychnos pilosperma (2, 17%), Tarenna monticola (2, 17%), Terminalia porphyrocarpa (1, 17%)*

### Stratum: Tree 3

Height avg. = 6.0m, 1 site

Crown cover avg. = 20.0%, 1 site

*Frequent species (cover, frequency): Acronychia laevis (17%), Aphananthe philippinensis (2, 17%), Cryptocarya triplinervis (2, 17%), Diospyros australis (2, 17%), Diospyros geminata (2, 17%), Drypetes deplanchei (2, 17%), Elaeodendron melanocarpum (2, 17%), Elattostachys xylocarpa (2, 17%), Ficus microcarpa (17%), Gossia bidwillii (17%), Kennedyia rubicunda (5, 17%), Mallotus philippensis (2, 17%), Melodorum leichhardtii (1, 17%), Murraya ovatifoliolata (2, 17%), Polyalthia nitidissima (17%), Strychnos pilosperma (6, 17%)*

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**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Technical Description****Regional ecosystem: 11.11.5****Stratum: Shrub 1****Height avg. = 1.9m, range 1.5-2.5m, 6 sites****Crown cover avg. = 20.8%, range 4.0-40.0%, 6 sites**

*Dominant species (relative cover, frequency): Alyxia ruscifolia (16, 83%), Acalypha eremorum (15, 50%), Acronychia laevis (14, 33%), Diospyros humilis (14, 50%), Drypetes deplanchei (12, 33%)*

*Frequent species (cover, frequency): Alyxia ruscifolia (3, 83%), Murraya ovatifoliolata (2, 67%), Acalypha eremorum (3, 50%), Carissa ovata (1, 50%), Diospyros geminata (1, 50%), Diospyros humilis (3, 50%), Flueggea leucopyrus (2, 50%), Melodorum leichhardtii (1, 50%), Pittosporum spinescens (1, 50%), Strychnos psilosperma (1, 50%), Acronychia laevis (4, 33%), Clematicissus opaca (1, 33%), Drypetes deplanchei (3, 33%), Pavetta australiensis var. australiensis (33%), Solanum furfuraceum (33%), Turraea pubescens (2, 33%), Abutilon auritum (1, 17%), Abutilon oxycarpum var. oxycarpum (5, 17%), Acalypha capillipes (17%), Actephila sessilifolia (17%), Alectryon connatus (17%), Alectryon subdentatus (3, 17%), Aphananthe philippinensis (17%), Atalaya multiflora (1, 17%), Atalaya salicifolia (17%), Barklya syringifolia (17%), Brachychiton rupestris (17%), Breynia oblongifolia (1, 17%), Capparis arborea (17%), Capparis canescens (2, 17%), Cassinia laevis (17%), Cissus reniformis (17%), Claoxylon australe (1, 17%), Croton acronychioides (17%), Cupaniopsis wadsworthii (17%), Dioscorea transversa (17%), Diospyros australis (6, 17%), Ehretia membranifolia (17%), Ficus microcarpa (1, 17%), Geijera parviflora (17%), Gossia bidwillii (2, 17%), Gyrocarpus americanus (1, 17%), Hibiscus heterophyllus (17%), Jasminum simplicifolium subsp. australiense (2, 17%), Lantana camara\* (1, 17%), Murraya paniculata 'Exotica'\* (1, 17%), Myoporum acuminatum (17%), Notelaea microcarpa (1, 17%), Olearia canescens (17%), Planchonella cotinifolia (1, 17%), Polyalthia nitidissima (1, 17%), Psydrax odorata (1, 17%), Psydrax odorata subsp. australiana (17%), Ricinocarpos ledifolius (17%), Secamone elliptica (17%), Senna gaudichaudii (17%), Solanum seaforthianum\* (17%), Strychnos lucida (1, 17%), Tarenna monticola (1, 17%), Triflorensia ixoroides (1, 17%), Ximenia americana (17%)*

**Stratum: Shrub 2****Height avg. = 0.7m, range 0.6-0.7m, 2 sites****Crown cover avg. = 15.0%, range 5.0-25.0%, 2 sites**

*Frequent species (cover, frequency): Alyxia ruscifolia (1, 17%), Lantana camara\* (1, 17%), Notelaea microcarpa (1, 17%), Pleurostyliia opposita (1, 17%), Rivina humilis\* (20, 17%), Synostemon albiflorus (5, 17%), Turraea pubescens (2, 17%)*

**Stratum: Ground****Height avg. = 0.3m, range 0.05-0.5m, 3 sites****PFC avg. = 11.7%, range 5-20%, 3 sites**

*Dominant species (relative cover, frequency): Ottochloa gracillima (41, 33%), Ancistrachne uncinulata (23, 100%), Oplismenus aemulus (18, 67%), Alyxia ruscifolia (10, 33%), Turraea pubescens (10, 33%)*

*Frequent species (cover, frequency): GRAMINOIDS: Ancistrachne uncinulata (3, 100%), Dinebra decipiens (67%), Oplismenus aemulus (3, 67%), Aristida caput-medusae (33%), Cyperus gracilis (33%), Digitaria ramularis (33%), Ottochloa gracillima (3, 33%), Scleria brownii (33%)*

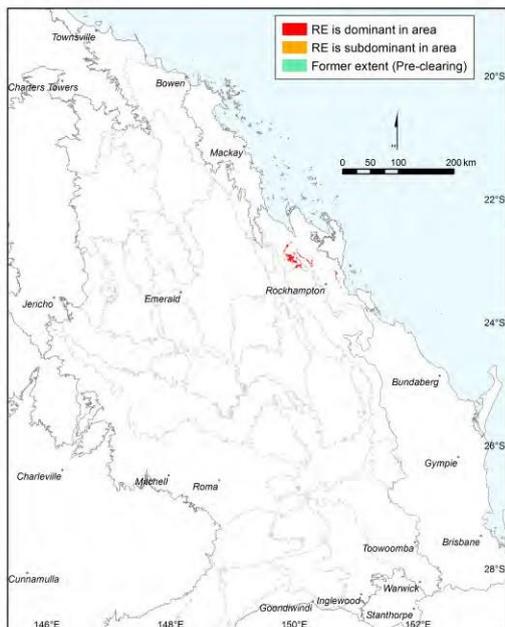
*FORBS: Dioscorea transversa (100%), Jasminum didymum subsp. racemosum (100%), Passiflora suberosa\* (1, 100%), Pseuderanthemum variabile (100%), Solanum seaforthianum\* (100%), Cissus oblonga (1, 67%), Clematicissus opaca (67%), Diplocyclos palmatus subsp. palmatus (67%), Glossocarya hemiderma (67%), Grewia latifolia (67%), Psychotria daphnoides (67%), Rivina humilis\* (2, 67%), Secamone elliptica (67%), Smilax australis (67%), Abutilon albescens (33%), Abutilon oxycarpum (33%), Acalypha eremorum (33%), Alyxia ruscifolia (3, 33%), Aristolochia elegans\* (33%), Atalaya salicifolia (33%), Brachychiton australis (33%), Canavalia papuana (33%), Carissa ovata (33%), Cayratia acris (33%), Cheilanthes sieberi (33%), Cyathillium cinereum (33%), Dianella indet. (1, 33%), Diospyros australis (33%), Diospyros humilis (1, 33%), Doryopteris concolor (33%), Drynaria sparsisora (33%), Elaeodendron australe (33%), Eustrephus latifolius (33%), Flindersia australis (33%), Flueggea leucopyrus (33%), Geitonoplesium cymosum (33%), Homalium alnifolium (33%), Jasminum simplicifolium subsp. australiense (33%), Lantana camara\* (2, 33%), Lantana montevidensis\* (33%), Melia azedarach (33%), Melodorum leichhardtii (33%), Olearia canescens (33%), Pandorea pandorana (33%), Pellaea nana (33%), Praxelis clematidea\* (33%), Triflorensia ixoroides (33%), Trophis scandens subsp. scandens (33%), Turraea pubescens (3, 33%)*

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Eucalyptus fibrosa subsp. fibrosa, Corymbia xanthope woodland on serpentinite**



Pre-clearing area (ha), remnant area (ha) and per cent remaining: 35,707 30,136 84%

Species\_recorded: Total: 162; woody: 54; ground: 125; Avg. spp./site: 25.2; std dev.: 7.3, 10 site(s)

Basal area: Avg./site: 16.5 m<sup>2</sup>/ha, range: 4.0 - 25 m<sup>2</sup>/ha, std. deviation: 6 m<sup>2</sup>/ha, 13 site(s)

Structural formation: Woodland: 92%; open-forest: 8%, 13 site(s)

Representative\_sites 17060, 17061, 17623, 17624, 17625, 17635, 17642, 17659, 17663, 41036, 41055, 41075, 41255.

**Stratum: Emergent**

Height avg. = 28.0m, 1 site

Crown cover avg. = 5.0%, 1 site

Frequent species (cover, frequency): *Eucalyptus fibrosa subsp. fibrosa* (5, 8%)

**Stratum: Tree 1**

Height avg. = 18.1m, range 10-22m, 13 sites

Crown cover avg. = 29.3%, range 15.9-52.0%, 13 sites

Dominant species (relative cover, frequency): *Eucalyptus fibrosa subsp. fibrosa* (63, 100%), *Corymbia xanthope* (38, 85%)

Frequent species (cover, frequency): *Eucalyptus fibrosa subsp. fibrosa* (16, 100%), *Corymbia xanthope* (10, 85%), *Corymbia citriodora* (8%), *Corymbia citriodora subsp. citriodora* (10, 8%), *Corymbia erythrophloia* (3, 8%), *Eucalyptus crebra* (1, 8%), *Lophostemon suaveolens* (2, 8%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.11.7

### Stratum: Tree 2

Height avg. = 8.9m, range 5-15m, 10 sites

Crown cover avg. = 5.1%, range 1.0-11.0%, 10 sites

Dominant species (relative cover, frequency): *Eucalyptus fibrosa* subsp. *fibrosa* (65, 54%), *Acacia leiocalyx* subsp. *leiocalyx* (57, 23%), *Corymbia xanthope* (44, 38%)

Frequent species (cover, frequency): *Eucalyptus fibrosa* subsp. *fibrosa* (2, 54%), *Corymbia xanthope* (2, 38%), *Acacia leiocalyx* subsp. *leiocalyx* (5, 23%), *Acacia leptostachya* (10, 8%), *Allocasuarina littoralis* (2, 8%), *Alphitonia excelsa* (1, 8%), *Corymbia citriodora* subsp. *citriodora* (8%), *Ficus opposita* (8%), *Petalostigma pubescens* (1, 8%)

### Stratum: Tree 3

Height avg. = 5.3m, range 4-6m, 3 sites

Crown cover avg. = 3.3%, range 3.0-4.0%, 3 sites

Frequent species (cover, frequency): *Acacia leptostachya* (2, 15%), *Acacia julifera* (2, 8%), *Alphitonia excelsa* (1, 8%), *Corymbia xanthope* (1, 8%), *Eucalyptus fibrosa* subsp. *fibrosa* (2, 8%), *Petalostigma pubescens* (1, 8%)

### Stratum: Shrub 1

Height avg. = 1.7m, range 0.9-3m, 13 sites

Crown cover avg. = 10.4%, range 1.0-27.0%, 13 sites

Dominant species (relative cover, frequency): *Xanthorrhoea johnsonii* (55, 23%), *Alphitonia excelsa* (37, 54%), *Macrozamia serpentina* (26, 23%), *Acacia leiocalyx* subsp. *leiocalyx* (24, 31%), *Diospyros geminata* (20, 23%)

Frequent species (cover, frequency): *Alphitonia excelsa* (5, 54%), *Acacia leiocalyx* subsp. *leiocalyx* (3, 31%), *Eucalyptus fibrosa* subsp. *fibrosa* (1, 31%), *Corymbia xanthope* (1, 23%), *Diospyros geminata* (2, 23%), *Macrozamia serpentina* (4, 23%), *Xanthorrhoea johnsonii* (4, 23%), *Acacia crassa* subsp. *crassa* (4, 15%), *Acacia leptostachya* (3, 15%), *Dodonaea indet.* (15%), *Dodonaea lanceolata* var. *subsessilifolia* (4, 15%), *Melodorum leichhardtii* (3, 15%), *Psychotria daphnoides* (2, 15%), *Acacia aulacocarpa* (8%), *Acacia complanata* (8%), *Acacia decora* (2, 8%), *Acacia disparrima* subsp. *disparrima* (8%), *Acacia* sp. (*Canoona* S.T.Blake 15321) (8%), *Anisomeles moschata* (8%), *Antirhea putaminosa* (8%), *Astrotricha intermedia* (8%), *Breynia oblongifolia* (8%), *Capparis canescens* (1, 8%), *Cerbera dumicola* (8%), *Coelospermum reticulatum* (8%), *Corymbia citriodora* (8%), *Denhamia disperma* (1, 8%), *Erythroxylum indet.* (8%), *Ficus opposita* (1, 8%), *Hovea indet.* (8%), *Leucopogon cuspidatus* (1, 8%), *Macrozamia miquelii* (8%), *Mallotus philippensis* (1, 8%), *Myrsine variabilis* (1, 8%), *Pavetta australiensis* var. *australiensis* (8%), *Pimelea leptospermoides* (9, 8%), *Pittosporum spinescens* (1, 8%), *Polyscias elegans* (8%), *Solanum parvifolium* (1, 8%), *Turraea pubescens* (8%), *Xanthorrhoea latifolia* (6, 8%)

### Stratum: Shrub 2

Height avg. = 0.7m, range 0.3-1m, 7 sites

Crown cover avg. = 7.6%, range 2.0-15.0%, 7 sites

Dominant species (relative cover, frequency): *Macrozamia serpentina* (43, 31%), *Alphitonia excelsa* (40, 23%)

Frequent species (cover, frequency): *Macrozamia serpentina* (2, 31%), *Alphitonia excelsa* (2, 23%), *Pimelea leptospermoides* (3, 15%), *Astrotricha intermedia* (8%), *Coelospermum reticulatum* (1, 8%), *Ficus opposita* (8%), *Grewia latifolia* (7, 8%), *Hibiscus divaricatus* (8%), *Marsdenia viridiflora* (8%), *Melodorum leichhardtii* (8%), *Psychotria daphnoides* (1, 8%), *Psychotria daphnoides* var. *angustifolia* (8%), *Pultenaea setulosa* (1, 8%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Technical Description****Regional ecosystem: 11.11.7****Ground  
Stratum:****Height avg. = 0.4m, range 0.2-0.6m, 10 sites****PFC avg. = 27.5%, range 5-61%, 10 sites**

*Dominant species (relative cover, frequency):* *Triodia mitchellii* (55, 60%), *Heteropogon contortus* (14, 30%), *Xanthorrhoea johnsonii* (14, 40%), *Aristida calycina* (13, 30%), *Panicum effusum* (10, 60%)

*Frequent species (cover, frequency):* **GRAMINOIDS:** *Panicum effusum* (2, 60%), *Triodia mitchellii* (23, 60%), *Gahnia aspera* (1, 40%), *Aristida calycina* (4, 30%), *Aristida queenslandica* (1, 30%), *Heteropogon contortus* (2, 30%), *Scleria indet.* (1, 30%), *Themeda triandra* (2, 30%), *Aristida indet.* (1, 20%), *Cleistochloa subjuncea* (8, 20%), *Cymbopogon refractus* (1, 20%), *Cyperus gracilis* (1, 20%), *Panicum indet.* (1, 20%), *Paspalidium gausum* (5, 20%), *Paspalidium indet.* (20%), *Alloternopsis semialata* (10%), *Ancistrachne uncinulata* (10%), *Aristida gracilipes* (10, 10%), *Aristida latifolia* (3, 10%), *Cenchrus caliculatus* (1, 10%), *Cyperus trinervis* (10%), *Dichanthium indet.* (10%), *Digitaria indet.* (1, 10%), *Entolasia stricta* (10%), *Eragrostis brownii* (10%), *Eragrostis indet.* (10%), *Eragrostis leptostachya* (10%), *Melinis repens\** (1, 10%), *Paspalidium gracile* (5, 10%), *Paspalum distichum* (10%), *Scleria brownii* (10%), *Scleria mackaviensis* (10%)

**FORBS:** *Breynia oblongifolia* (40%), *Passiflora suberosa\** (1, 40%), *Xanthorrhoea johnsonii* (4, 40%), *Glycine tabacina* (30%), *Grewia latifolia* (1, 30%), *Hardenbergia violacea* (30%), *Lomandra multiflora subsp. multiflora* (30%), *Macrozamia miquelii* (1, 30%), *Phyllanthus virgatus* (30%), *Pimelea leptospermoides* (30%), *Tephrosia filipes* (30%), *Cyanthillium cinereum* (20%), *Denhamia disperma* (20%), *Lomandra confertifolia subsp. pallida* (1, 20%), *Marsdenia brevifolia* (1, 20%), *Parsonsia indet.* (20%), *Rostellularia adscendens* (20%), *Stachytarpheta jamaicensis\** (1, 20%), *Acacia complanata* (10%), *Acacia disparrima subsp. disparrima* (10%), *Acacia leptostachya* (2, 10%), *Alphitonia excelsa* (10%), *Alyxia ruscifolia* (10%), *Asteraceae indet.* (1, 10%), *Astrotricha intermedia* (10%), *Boerhavia indet.* (10%), *Brunoniella acaulis* (10%), *Brunoniella australis* (10%), *Capparis thozetiana* (1, 10%), *Carissa ovata* (10%), *Cassytha filiformis* (1, 10%), *Cerbera dumicola* (1, 10%), *Chamaecrista indet.* (10%), *Cheilanthes distans* (1, 10%), *Crotalaria montana* (10%), *Crotalaria montana var. angustifolia* (10%), *Cryptostegia grandiflora\** (10%), *Cycas ophiolitica* (1, 10%), *Desmodium rhytidophyllum* (10%), *Dianella indet.* (10%), *Dianella rara* (10%), *Dianella revoluta* (10%), *Dodonaea lanceolata var. lanceolata* (10%), *Emilia sonchifolia\** (10%), *Eremophila debilis* (10%), *Euphorbia psammogeton* (10%), *Eustrephus latifolius* (4, 10%), *Galactia tenuiflora* (10%), *Glycine tomentella* (10%), *Gomphrena celosioides\** (10%), *Hardenbergia indet.* (10%), *Leucopogon cuspidatus* (7, 10%), *Lomandra confertifolia* (10%), *Oldenlandia indet.* (10%), *Opercularia diphylla* (10%), *Oxalis indet.* (10%), *Pandorea pandorana* (1, 10%), *Parthenium hysterophorus\** (10%), *Polygala indet.* (10%), *Polygala triflora* (10%), *Psychotria daphnoides* (10%), *Psychotria daphnoides var. angustifolia* (10%), *Psydrax odorata* (10%), *Senna occidentalis\** (10%), *Sida cordifolia\** (10%), *Sida indet.* (1, 10%), *Sida rohlenae* (4, 10%), *Solanum ellipticum* (10%), *Solanum indet.* (10%), *Tricoryne anceps subsp. anceps* (1, 10%)

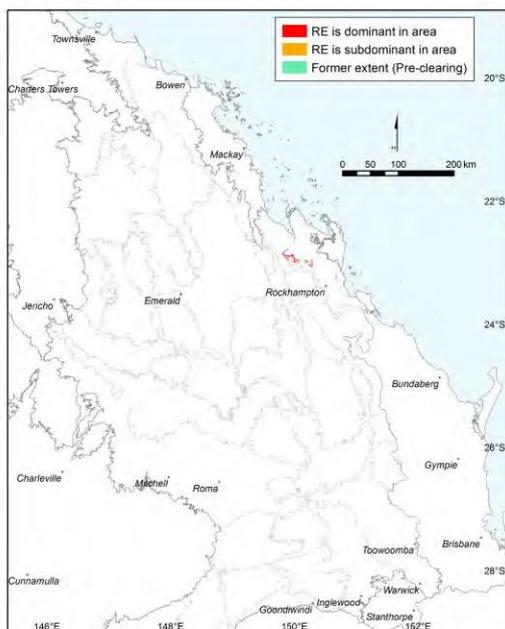
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**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Eucalyptus fibrosa subsp. fibrosa +/- Corymbia spp. +/- Eucalyptus spp. woodland with a diverse shrub layer including several endemic species occurring on undulating low hills and colluvial aprons**



Pre-clearing area (ha), remnant area (ha) and per cent remaining: 20,270 15,583 77%

Species recorded: Total: 151; woody: 49; ground: 113; Avg. spp./site: 36.6; std dev.: 6.8, 5 site(s)

Basal area: Avg./site: 19.5 m<sup>2</sup>/ha, range: 13.0 - 40 m<sup>2</sup>/ha, std. deviation: 8 m<sup>2</sup>/ha, 9 site(s)

Structural formation: Woodland: 100%, 9 site(s)

Representative sites 17627, 17628, 17664, 17665, 19264, 41076, 41077, 41135, 41176.

**Stratum: Tree 1**

Height avg. = 19.4m, range 14-24.5m, 9 sites

Crown cover avg. = 29.9%, range 15.0-48.5%, 9 sites

Dominant species (relative cover, frequency): *Eucalyptus fibrosa subsp. fibrosa* (76, 100%), *Corymbia erythrophloia* (40, 22%), *Corymbia xanthope* (19, 33%)

Frequent species (cover, frequency): *Eucalyptus fibrosa subsp. fibrosa* (24, 100%), *Corymbia xanthope* (4, 33%), *Corymbia erythrophloia* (10, 22%), *Corymbia dallachiana* (5, 11%), *Eucalyptus crebra* (15, 11%)

**Stratum: Tree 2**

Height avg. = 9.9m, range 5-14m, 9 sites

Crown cover avg. = 4.3%, range 0.6-10.0%, 9 sites

Dominant species (relative cover, frequency): *Eucalyptus fibrosa subsp. fibrosa* (90, 89%), *Alphitonia excelsa* (35, 22%)

Frequent species (cover, frequency): *Eucalyptus fibrosa subsp. fibrosa* (4, 89%), *Alphitonia excelsa* (1, 22%), *Acacia leptostachya* (11%), *Amorphospermum antilogum* (11%), *Lophostemon suaveolens* (1, 11%), *Pleiogynium timorense* (1, 11%), *Psyrax oleifolia* (1, 11%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.11.7a

### Stratum: Tree 3

Height avg. = 4.0m, 1 site

Crown cover avg. = 3.0%, 1 site

Frequent species (cover, frequency): *Alphitonia excelsa* (1, 11%), *Petalostigma triloculare* (2, 11%)

### Stratum: Shrub 1

Height avg. = 1.8m, range 0.7-3.5m, 9 sites

Crown cover avg. = 5.5%, range 1.0-15.0%, 9 sites

Dominant species (relative cover, frequency): *Acacia* sp. (*Canoona* S.T.Blake 15321) (50, 22%), *Grewia latifolia* (43, 22%), *Acacia leptostachya* (32, 33%), *Dodonaea triquetra* (29, 22%), *Petalostigma pubescens* (28, 33%)

Frequent species (cover, frequency): *Alphitonia excelsa* (1, 56%), *Eucalyptus fibrosa* subsp. *fibrosa* (56%), *Acacia leptostachya* (2, 33%), *Petalostigma pubescens* (1, 33%), *Pimelea leptospermoides* (1, 33%), *Acacia leiocalyx* subsp. *leiocalyx* (1, 22%), *Acacia* sp. (*Canoona* S.T.Blake 15321) (3, 22%), *Corymbia xanthope* (1, 22%), *Dodonaea triquetra* (1, 22%), *Ficus opposita* (1, 22%), *Grewia latifolia* (1, 22%), *Psychodax odorata* (1, 22%), *Sida hackettiana* (1, 22%), *Acacia crassa* subsp. *crassa* (7, 11%), *Acacia disparrima* subsp. *disparrima* (11%), *Acacia excelsa* (1, 11%), *Alyxia ruscifolia* (1, 11%), *Alyxia spicata* (11%), *Breynia oblongifolia* (11%), *Carissa ovata* (11%), *Coelospermum reticulatum* (11%), *Cryptostegia grandiflora*\* (11%), *Diospyros geminata* (11%), *Diospyros humilis* (11%), *Grewia australis* (11%), *Gymnanthera indet.* (11%), *Lantana camara*\* (11%), *Macrozamia indet.* (11%), *Neoroepera buxifolia* (11%), *Parsonia indet.* (11%), *Petalostigma triloculare* (11%), *Pittosporum spinescens* (11%), *Planchonia careya* (11%), *Psychotria daphnoides* (11%), *Psychotria daphnoides* var. *angustifolia* (11%), *Trema tomentosa* var. *aspera* (11%), *Xanthorrhoea johnsonii* (11%)

### Stratum: Shrub 2

Height avg. = 1.1m, range 0.7-1.5m, 3 sites

Crown cover avg. = 25.3%, range 6.0-45.0%, 3 sites

Dominant species (relative cover, frequency): *Grewia latifolia* (39, 33%), *Alphitonia excelsa* (11, 33%), *Breynia oblongifolia* (2, 22%)

Frequent species (cover, frequency): *Alphitonia excelsa* (3, 33%), *Grewia latifolia* (15, 33%), *Breynia oblongifolia* (1, 22%), *Coelospermum reticulatum* (1, 11%), *Cyclophyllum coprosmoides* (1, 11%), *Dodonaea lanceolata* var. *subsessilifolia* (5, 11%), *Eucalyptus fibrosa* subsp. *fibrosa* (1, 11%), *Hibiscus heterophyllus* (1, 11%), *Macrozamia serpentina* (8, 11%), *Melhanium oblongifolia* (1, 11%), *Petalostigma pubescens* (11%), *Xanthorrhoea johnsonii* (4, 11%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Ground  
Stratum:

Height avg. = 0.4m, range 0.2-0.5m, 4 sites

PFC avg. = 22.4%, range 6-60%, 5 sites

Dominant species (relative cover, frequency): *Sorghum nitidum* (14, 40%), *Paspalidium indet.* (10, 40%), *Scleria brownii* (10, 80%), *Panicum effusum* (9, 80%), *Eragrostis brownii* (8, 40%)

Frequent species (cover, frequency): GRAMINOIDS: *Cymbopogon refractus* (1, 80%), *Panicum effusum* (1, 80%), *Scleria brownii* (1, 80%), *Fimbristylis indet.* (60%), *Gahnia aspera* (1, 60%), *Whiteochloa indet.* (60%), *Aristida indet.* (40%), *Aristida queenslandica* (40%), *Arundinella nepalensis* (40%), *Chrysopogon fallax* (40%), *Dichanthium tenue* (2, 40%), *Eragrostis brownii* (2, 40%), *Eragrostis indet.* (40%), *Heteropogon contortus* (40%), *Paspalidium gausum* (40%), *Paspalidium indet.* (1, 40%), *Sorghum nitidum* (4, 40%), *Alloteropsis semialata* (20%), *Aristida queenslandica var. dissimilis* (5, 20%), *Bothriochloa indet.* (20%), *Capillipedium spicigerum* (20%), *Digitaria indet.* (2, 20%), *Digitaria parviflora* (20%), *Enneapogon lindleyanus* (1, 20%), *Oplismenus aemulus* (20%), *Oplismenus compositus* (20%), *Panicum simile* (20%), *Paspalidium distans* (20%), *Poaceae indet.* (20%), *Scleria indet.* (3, 20%), *Triodia mitchellii* (20%)

FORBS: *Cyanthillium cinereum* (80%), *Lomandra confertifolia* (80%), *Brunoniella australis* (60%), *Goodenia sp. (Mt Castletower M.D.Crisp 2753)* (60%), *Phyllanthus virgatus* (60%), *Crotalaria montana* (40%), *Eustrephus latifolius* (40%), *Grewia latifolia* (40%), *Lomandra multiflora subsp. multiflora* (40%), *Rostellularia adscendens* (1, 40%), *Stachytarpheta jamaicensis\** (40%), *Tricoryne anceps* (40%), *Acacia leptostachya* (20%), *Bidens bipinnata\** (20%), *Breynia oblongifolia* (20%), *Brunoniella acaulis* (20%), *Capparis canescens* (20%), *Capparis thozetiana* (20%), *Corchorus trilocularis* (20%), *Dianella rara* (20%), *Dianella revoluta* (20%), *Dodonaea triquetra* (20%), *Eucalyptus fibrosa subsp. fibrosa* (1, 20%), *Euphorbia indet.* (20%), *Euphorbia maculata\** (20%), *Evolvulus alsinoides* (20%), *Flemingia parviflora* (20%), *Galactia muelleri* (1, 20%), *Galactia tenuiflora* (20%), *Glossocarya indet.* (20%), *Glycine tabacina* (20%), *Goodenia rotundifolia* (20%), *Hardenbergia violacea* (20%), *Indigofera linifolia* (2, 20%), *Lomandra longifolia* (7, 20%), *Oxalis perennans* (20%), *Passiflora suberosa\** (20%), *Polygala triflora* (20%), *Psychotria daphnoides* (20%), *Pterocaulon indet.* (20%), *Rostellularia indet.* (20%), *Ruellia indet.* (20%), *Ruellia tuberosa\** (20%), *Scaevola indet.* (20%), *Sida hackettiana* (20%), *Solanum ellipticum* (20%), *Spermacoce brachystema* (20%), *Stackhousia tryonii* (20%), *Tephrosia filipes* (20%), *Vittadinia indet.* (20%)

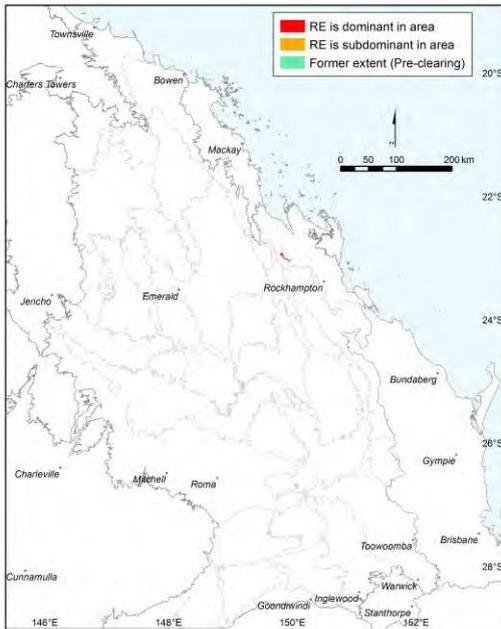
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Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Eucalyptus fibrosa subsp. fibrosa +/- Corymbia spp. tall woodland with rainforest elements in the understorey on laterised serpentinite**



Pre-clearing area (ha), remnant area (ha) and per cent remaining: 5,874 5,174 88%

Species recorded: Total: 166; woody: 73; ground: 108; Avg. spp./site: 38.7; std dev.: 9.6, 6 site(s)

Basal area: Avg./site: 20.7 m<sup>2</sup>/ha, range: 12.0 - 26 m<sup>2</sup>/ha, std. deviation: 4 m<sup>2</sup>/ha, 8 site(s)

Structural formation: Woodland: 38%; tall woodland: 38%; open-woodland: 25%, 8 site(s)

Representative sites 17638, 17639, 17640, 17666, 41056, 41097, 41118, 41355.

**Stratum: Tree 1**

Height avg. = 25.5m, range 14.5-35m, 8 sites

Crown cover avg. = 29.3%, range 11.8-52.0%, 8 sites

Dominant species (relative cover, frequency): *Eucalyptus fibrosa subsp. fibrosa* (73, 88%), *Corymbia citriodora* (47, 50%)

Frequent species (cover, frequency): *Eucalyptus fibrosa subsp. fibrosa* (23, 88%), *Corymbia citriodora* (14, 50%), *Corymbia erythrophloia* (1, 13%), *Eucalyptus crebra* (12, 13%)

**Stratum: Tree 2**

Height avg. = 10.1m, range 5-18m, 8 sites

Crown cover avg. = 16.3%, range 1.0-66.2%, 8 sites

Dominant species (relative cover, frequency): *Drypetes deplanchei* (52, 25%), *Acacia disparrima subsp. disparrima* (50, 25%), *Corymbia erythrophloia* (50, 25%), *Corymbia citriodora* (33, 25%), *Eucalyptus fibrosa subsp. fibrosa* (28, 50%)

Frequent species (cover, frequency): *Alphitonia excelsa* (3, 50%), *Eucalyptus fibrosa subsp. fibrosa* (2, 50%), *Acacia disparrima subsp. disparrima* (25%), *Acacia julifera* (3, 25%), *Corymbia citriodora* (2, 25%), *Corymbia erythrophloia* (4, 25%), *Diospyros geminata* (3, 25%), *Drypetes deplanchei* (14, 25%), *Psychodora odorata* (1, 25%), *Acacia aulacocarpa* (3, 13%), *Alchornea ilicifolia* (13%), *Alectryon connatus* (13%), *Alyxia spicata* (13%), *Corymbia xanthope* (1, 13%), *Cupaniopsis anacardioides* (13%), *Denhamia disperma* (13%), *Diospyros humilis* (3, 13%), *Erythroxylum sp. (Splityard Creek L. Pedley 5360)* (3, 13%), *Eucalyptus acmenoides* (13%), *Euroschinus falcatus* (13%), *Exocarpos latifolius* (13%), *Geijera parviflora* (13%), *Jagera pseudorhus* (1, 13%), *Mallotus philippensis* (13%), *Petalostigma pubescens* (13%), *Petalostigma triloculare* (2, 13%), *Pittosporum spinescens* (5, 13%), *Polyscias elegans* (13%), *Turraea pubescens* (1, 13%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.11.7x1

### Stratum: Tree 3

Height avg. = 5.0m, 1 site

Crown cover avg. = 3.0%, 1 site

*Frequent species (cover, frequency):* *Acacia falcata* (1, 13%), *Acacia leiocalyx subsp. leiocalyx* (1, 13%), *Eucalyptus fibrosa subsp. fibrosa* (1, 13%)

### Stratum: Shrub 1

Height avg. = 1.6m, range 1.2-2.5m, 8 sites

Crown cover avg. = 23.5%, range 5.0-45.0%, 8 sites

*Dominant species (relative cover, frequency):* *Jasminum simplicifolium subsp. australiense* (40, 25%), *Alphitonia excelsa* (27, 63%), *Acacia leiocalyx subsp. leiocalyx* (20, 25%), *Coelospermum reticulatum* (11, 25%), *Eucalyptus fibrosa subsp. fibrosa* (10, 25%)

*Frequent species (cover, frequency):* *Alphitonia excelsa* (2, 63%), *Psychotria daphnoides var. angustifolia* (50%), *Diospyros humilis* (1, 38%), *Grewia latifolia* (1, 38%), *Pittosporum spinescens* (1, 38%), *Acacia leiocalyx subsp. leiocalyx* (1, 25%), *Alectryon diversifolius* (25%), *Alyxia spicata* (25%), *Breynia oblongifolia* (25%), *Coelospermum reticulatum* (1, 25%), *Eucalyptus fibrosa subsp. fibrosa* (1, 25%), *Jasminum simplicifolium subsp. australiense* (8, 25%), *Pimelea leptospermoides* (25%), *Psychotria odorata* (25%), *Acacia fasciculifera* (3, 13%), *Acacia julifera* (2, 13%), *Acacia julifera subsp. julifera* (13%), *Acacia leptostachya* (25, 13%), *Alectryon connatus* (13%), *Amyema conspicua subsp. conspicua* (13%), *Cajanus confertiflorus* (13%), *Capparis thozetiana* (13%), *Carissa ovata* (1, 13%), *Cassytha indet.* (1, 13%), *Claoxylon tenerifolium subsp. tenerifolium* (13%), *Corymbia xanthope* (13%), *Diospyros geminata* (13%), *Dodonaea triquetra* (5, 13%), *Drypetes deplanchei* (1, 13%), *Erythroxylum sp. (Splityard Creek L. Pedley 5360)* (13%), *Eucalyptus crebra* (13%), *Exocarpos latifolius* (13%), *Ficus opposita* (13%), *Gymnanthera indet.* (13%), *Hibiscus divaricatus* (1, 13%), *Lantana camara\** (1, 13%), *Lissanthe brevistyla* (13%), *Maclura cochinchinensis* (13%), *Macrozamia miquelii* (13%), *Macrozamia serpentina* (15, 13%), *Marsdenia brevifolia* (13%), *Monotoca scoparia* (13%), *Murraya ovatifoliolata* (13%), *Notelaea microcarpa* (13%), *Pandorea pandorana* (13%), *Pavetta granitica* (13%), *Petalostigma triloculare* (1, 13%), *Secamone elliptica* (13%), *Sida cordifolia\** (13%), *Sida sp. (Musselbrook M.B. Thomas + MRS437)* (13%), *Tephrosia indet.* (13%), *Trophis scandens subsp. scandens* (13%), *Xanthorrhoea johnsonii* (15, 13%), *Zanthoxylum brachyacanthum* (13%)

### Stratum: Shrub 2

Height avg. = 0.9m, range 0.6-1.1m, 3 sites

Crown cover avg. = 4.7%, range 4.0-5.0%, 3 sites

*Dominant species (relative cover, frequency):* *Coelospermum reticulatum* (10, 25%)

*Frequent species (cover, frequency):* *Gahnia aspera* (13%), *Coelospermum reticulatum* (1, 25%), *Acacia fasciculifera* (2, 13%), *Alyxia ruscifolia* (3, 13%), *Eucalyptus fibrosa subsp. fibrosa* (2, 13%), *Grewia latifolia* (4, 13%), *Macrozamia serpentina* (13%), *Pimelea leptospermoides* (2, 13%), *Psychotria daphnoides var. angustifolia* (13%), *Psychotria daphnoides var. daphnoides* (13%), *Psychotria odorata* (13%)

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Technical Description****Regional ecosystem: 11.11.7x1****Ground  
Stratum:****Height avg. = 0.5m, range 0.4-0.7m, 6 sites****PFC avg. = 16.2%, range 1-25%, 6 sites**

*Dominant species (relative cover, frequency): Gahnia aspera (26, 67%), Cymbopogon refractus (22, 50%), Panicum effusum (12, 50%), Scleria mackaviensis (3, 50%), Rostellularia adscendens (2, 50%)*

*Frequent species (cover, frequency): GRAMINOIDS: Gahnia aspera (3, 67%), Cymbopogon refractus (5, 50%), Panicum effusum (2, 50%), Scleria mackaviensis (1, 50%), Digitaria parviflora (1, 33%), Paspalidium gracile (33%), Scleria brownii (33%), Whiteochloa indet. (33%), Ancistrachne indet. (1, 17%), Aristida indet. (17%), Aristida latifolia (3, 17%), Aristida lignosa (3, 17%), Aristida queenslandica (17%), Arundinella nepalensis (15, 17%), Bothriochloa decipiens var. decipiens (17%), Chloris ventricosa (17%), Dichanthium tenue (5, 17%), Enneapogon lindleyanus (17%), Entolasia stricta (5, 17%), Eragrostis sororia (17%), Melinis repens\* (17%), Panicum simile (17%), Paspalidium distans (2, 17%), Paspalidium gausum (17%), Paspalidium indet. (17%), Sorghum nitidum (3, 17%), Themeda triandra (11, 17%), Triodia mitchellii (17%)*

*FORBS: Brunoniella australis (67%), Cyathium cinereum (67%), Eustrephus latifolius (67%), Galactia tenuiflora (50%), Grewia latifolia (1, 50%), Phyllanthus virgatus (50%), Rostellularia adscendens (50%), Breynia oblongifolia (33%), Passiflora suberosa\* (33%), Pterocaulon indet. (33%), Acacia fasciculifera (17%), Bidens bipinnata\* (17%), Capparis canescens (1, 17%), Carissa ovata (17%), Cayratia trifolia (17%), Cheilanthes indet. (17%), Clematis glycinoides (17%), Coelospermum reticulatum (17%), Commelina ensifolia (17%), Crotalaria mitchellii (17%), Crotalaria montana (17%), Denhamia celastroides (17%), Denhamia cunninghamii (17%), Desmodium rhytidophyllum (1, 17%), Drypetes deplanchei (17%), Euphorbia bifida (17%), Euphorbia mitchelliana (17%), Evolvulus alsinoides (17%), Ficus opposita (17%), Flemingia parviflora (17%), Glycine tomentella (17%), Goodenia grandiflora (17%), Goodenia sp. (Mt Castletower M.D.Crisp 2753) (17%), Indigofera linifolia (17%), Indigofera pratensis (17%), Jasminum simplicifolium subsp. australiense (4, 17%), Lagenophora gracilis (17%), Lomandra confertifolia (17%), Lomandra confertifolia subsp. pallida (17%), Lomandra longifolia (17%), Lomandra multiflora subsp. multiflora (17%), Marsdenia viridiflora (17%), Myrsine variabilis (17%), Neptunia gracilis (17%), Oldenlandia indet. (17%), Opercularia diphylla (4, 17%), Oxalis perennans (17%), Parsonia straminea (17%), Peripleura hispidula var. hispidula (17%), Pimelea leptospermoides (17%), Pseuderanthemum variabile (17%), Psychotria daphnoides var. daphnoides (3, 17%), Pteridium esculentum (17%), Rhynchosia minima (17%), Scaevola indet. (17%), Secamone elliptica (17%), Senna occidentalis\* (17%), Sida hackettiana (17%), Solanum esuriale (17%), Solanum parvifolium (17%), Solanum parvifolium subsp. parvifolium (17%), Spermacoe brachystema (17%), Spermacoe multicaulis (17%), Stachytarpheta jamaicensis\* (17%), Stackhousia tryonii (17%), Tephrosia filipes (17%), Tephrosia juncea (17%), Uraria picta (17%), Vittadinia pustulata (17%), Zornia dyctiocarpa (17%)*

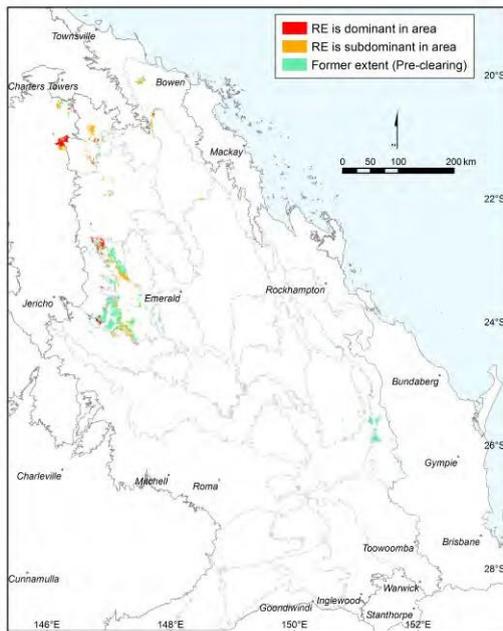
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**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Eucalyptus populnea or E. brownii woodland on deformed and metamorphosed sediments and interbedded volcanics**



Pre-clearing area (ha), remnant area (ha) and per cent remaining: 139,550 55,230 40%

Species\_recorded: Total: 73; woody: 27; ground: 46; Avg. spp./site: 25.7; std dev.: 7.4, 3 site(s)

Basal area: Avg./site: 12.5 m<sup>2</sup>/ha, range: 1.0 - 28 m<sup>2</sup>/ha, std. deviation: 11 m<sup>2</sup>/ha, 3 site(s)

Structural formation: Open-woodland: 67%; woodland: 33%, 3 site(s)

Representative\_sites 2226, 16572, 19099.

**Stratum: Tree 1**

Height avg. = 15.0m, range 10-18m, 3 sites

Crown cover avg. = 19.7%, range 5.0-35.0%, 3 sites

Dominant species (relative cover, frequency): *Eucalyptus brownii* (100, 33%), *Eucalyptus melanophloia* (71, 33%), *Eucalyptus populnea* (62, 67%), *Atalaya hemiglauca* (2, 33%), *Acacia harpophylla* (2, 33%)

Frequent species (cover, frequency): *Eucalyptus populnea* (8, 67%), *Acacia harpophylla* (33%), *Atalaya hemiglauca* (33%), *Eucalyptus brownii* (19, 33%), *Eucalyptus melanophloia* (25, 33%)

**Stratum: Tree 2**

Height avg. = 7.7m, range 6-9m, 3 sites

Crown cover avg. = 11.0%, range 5.0-22.0%, 3 sites

Dominant species (relative cover, frequency): *Acacia rhodoxylon* (100, 33%), *Lysiphyllum carronii* (62, 33%), *Eucalyptus melanophloia* (60, 33%), *Eucalyptus populnea* (40, 33%), *Alectryon oleifolius* (34, 33%)

Frequent species (cover, frequency): *Acacia excelsa* (33%), *Acacia rhodoxylon* (22, 33%), *Alectryon oleifolius* (2, 33%), *Denhamia cunninghamii* (33%), *Eucalyptus melanophloia* (3, 33%), *Eucalyptus populnea* (2, 33%), *Flindersia dissosperma* (33%), *Geijera parviflora* (33%), *Grevillea striata* (33%), *Lysiana subfalcata* (33%), *Lysiphyllum carronii* (3, 33%), *Owenia acidula* (33%), *Ventilago viminalis* (33%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Technical Description****Regional ecosystem: 11.11.9****Shrub 1  
Stratum:****Height avg. = 2.7m, range 1.5-4m, 3 sites****Crown cover avg. = 6.3%, range 1.0-9.8%, 3 sites***Dominant species (relative cover, frequency): Eremophila mitchellii (78, 33%), Acacia rhodoxylon (71, 33%), Geijera parviflora (59, 67%), Hibiscus sturtii (7, 33%), Hibiscus krichauffianus (7, 33%)**Frequent species (cover, frequency): Geijera parviflora (5, 67%), Psydrax oleifolia (67%), Acacia rhodoxylon (1, 33%), Alphitonia excelsa (33%), Apophyllum anomalum (33%), Archidendropsis basaltica (33%), Capparis lasiantha (33%), Cassinia laevis (33%), Eremophila mitchellii (6, 33%), Erythroxyllum australe (33%), Grewia latifolia (33%), Hibiscus krichauffianus (33%), Hibiscus sturtii (33%), Lysiphyllum carronii (33%)***Stratum: Ground****Height avg. = 0.4m, range 0.3-0.5m, 3 sites****PFC avg. = 30.7%, range 5-45%, 3 sites***Dominant species (relative cover, frequency): Cenchrus ciliaris\* (92, 33%), Cymbopogon refractus (42, 33%), Bothriochloa decipiens var. decipiens (21, 33%), Cheilanthes indet. (18, 33%), Calotis indet. (18, 33%)**Frequent species (cover, frequency): GRAMINOIDS: Fimbristylis dichotoma (2, 67%), Aristida calycina (5, 33%), Aristida indet. (1, 33%), Aristida jerichoensis (33%), Aristida personata (33%), Aristida vagans (1, 33%), Bothriochloa decipiens var. decipiens (10, 33%), Cenchrus ciliaris\* (40, 33%), Chloris divaricata (1, 33%), Cymbopogon refractus (20, 33%), Cyperus gracilis (5, 33%), Enneapogon intermedius (1, 33%), Enneapogon lindleyanus (33%), Enneapogon pallidus (1, 33%), Eragrostis sororia (1, 33%), Fimbristylis macrantha (33%), Heteropogon contortus (1, 33%), Paspalidium distans (33%), Sporobolus caroli (1, 33%)**FORBS: Acacia oswaldii (33%), Achyranthes aspera (33%), Bonamia media (1, 33%), Calotis indet. (1, 33%), Carissa ovata (1, 33%), Cheilanthes indet. (1, 33%), Denhamia oleaster (33%), Desmodium varians (33%), Dianella caerulea (33%), Einadia hastata (33%), Enchylaena tomentosa (1, 33%), Evolvulus alsinoides (33%), Indigofera indet. (33%), Jasminum didymum (33%), Marsdenia viridiflora (33%), Opuntia stricta\* (1, 33%), Opuntia tomentosa\* (33%), Parsonsia eucalyptophylla (33%), Parsonsia lanceolata (33%), Phyllanthus fuernrohrii (33%), Phyllanthus virgatus (33%), Rostellularia adscendens (33%), Salsola australis (33%), Sida hackettiana (33%), Solanum indet. (33%), Uraria lagopodioides (33%), Zornia indet. (33%)*

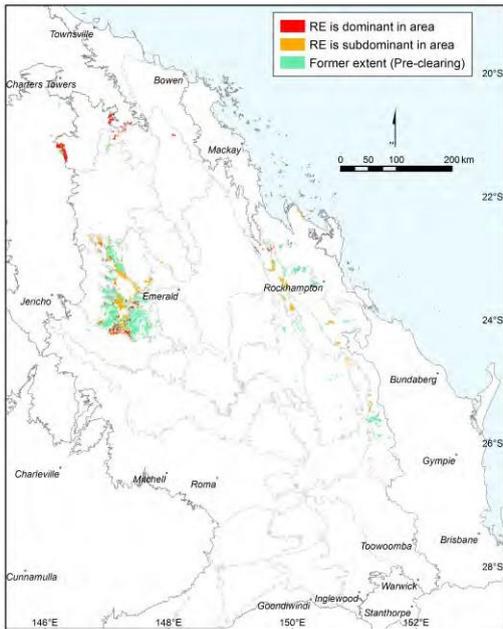
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**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Eucalyptus melanophloia woodland on deformed and metamorphosed sediments and interbedded volcanics**



Pre-clearing area (ha), remnant area (ha) and per cent remaining: 317,592 101,033 32%

Species\_recorded: Total: 112; woody: 26; ground: 95; Avg. spp./site: 33.7; std dev.: 4.5, 3 site(s)

Basal area: Avg./site: 8.1 m<sup>2</sup>/ha, range: 4.0 - 14 m<sup>2</sup>/ha, std. deviation: 3 m<sup>2</sup>/ha, 8 site(s)

Structural formation: Woodland: 75%; open-woodland: 25%, 8 site(s)

Representative\_sites 16767, 16861, 16866, 16903, 16908, 16922, 28801, 28804.

**Stratum: Tree 1**

Height avg. = 12.4m, range 10-16m, 8 sites

Crown cover avg. = 25.6%, range 10.0-40.0%, 8 sites

Dominant species (relative cover, frequency): *Eucalyptus melanophloia* (84, 100%), *Corymbia dallachiana* (10, 50%), *Corymbia erythrophloia* (8, 38%)

Frequent species (cover, frequency): *Eucalyptus melanophloia* (22, 100%), *Corymbia dallachiana* (2, 50%), *Corymbia erythrophloia* (2, 38%), *Atalaya hemiglauca* (1, 13%), *Eremophila mitchellii* (13%), *Eucalyptus populnea* (14, 13%), *Eucalyptus tereticornis* (13%)

**Stratum: Tree 2**

Height avg. = 7.0m, range 6-8m, 2 sites

Crown cover avg. = 20.0%, range 0.0-40.0%, 2 sites

Frequent species (cover, frequency): *Brachychiton populneus* (13%), *Corymbia dallachiana* (13%), *Eucalyptus melanophloia* (15, 13%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Technical Description****Regional ecosystem: 11.11.10****Stratum: Shrub 1****Height avg. = 2.6m, range 0.75-5m, 7 sites****Crown cover avg. = 6.9%, range 1.0-20.0%, 7 sites**

*Dominant species (relative cover, frequency):* *Carissa ovata* (50, 25%), *Eremophila mitchellii* (46, 63%), *Eucalyptus melanophloia* (41, 38%), *Acacia excelsa* (18, 38%), *Archidendropsis basaltica* (17, 38%)

*Frequent species (cover, frequency):* *Eremophila mitchellii* (14, 63%), *Acacia excelsa* (38%), *Archidendropsis basaltica* (11, 38%), *Eucalyptus melanophloia* (2, 38%), *Carissa ovata* (1, 25%), *Acacia fodinalis* (6, 13%), *Acacia indet.* (13%), *Atalaya hemiglauca* (13%), *Callitris glaucophylla* (3, 13%), *Cassia brewsteri* (13%), *Cryptandra orbicularis* (13%), *Dodonaea viscosa* (10, 13%), *Dodonaea viscosa subsp. spatulata* (13%), *Erythroxylum australe* (13%), *Erythroxylum sp.* (Splityard Creek L.Pedley 5360) (13%), *Geijera parviflora* (13%), *Grevillea striata* (13%), *Hakea lorea* (13%), *Psyrax forsteri* (13%)

**Stratum: Shrub 2****Height avg. = 2.0m, 1 site****Crown cover avg. = 10.0%, 1 site**

*Frequent species (cover, frequency):* *Eremophila mitchellii* (1, 13%), *Erythroxylum australe* (1, 13%), *Grewia latifolia* (1, 13%), *Myoporum acuminatum* (8, 13%)

**Stratum: Ground****Height avg. = 1.0m, range 1-1m, 3 sites****PFC avg. = 57.7%, range 52-65%, 3 sites**

*Dominant species (relative cover, frequency):* *Eragrostis brownii* (20, 33%), *Themeda triandra* (16, 100%), *Bothriochloa ewartiana* (13, 67%), *Aristida queenslandica var. dissimilis* (12, 100%), *Peripleura hispidula var. setosa* (11, 33%)

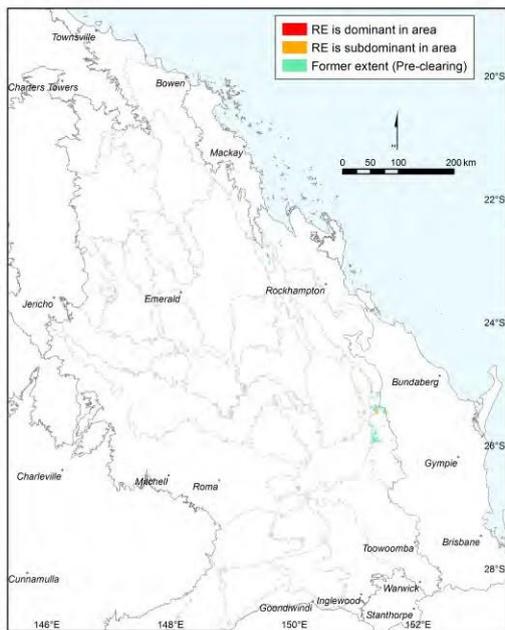
*Frequent species (cover, frequency):* GRAMINOIDS: *Aristida queenslandica var. dissimilis* (6, 100%), *Heteropogon contortus* (5, 100%), *Themeda triandra* (9, 100%), *Bothriochloa ewartiana* (7, 67%), *Cymbopogon refractus* (1, 67%), *Cyperus fulvus* (67%), *Dichanthium sericeum* (4, 67%), *Enteropogon acicularis* (4, 67%), *Eragrostis alveiformis* (1, 67%), *Eragrostis lacunaria* (4, 67%), *Eragrostis sororia* (2, 67%), *Eragrostis speciosa* (1, 67%), *Eulalia aurea* (3, 67%), *Fimbristylis dichotoma* (2, 67%), *Panicum decompositum* (2, 67%), *Aristida personata* (1, 33%), *Aristida ramosa* (1, 33%), *Bothriochloa bladhii subsp. glabra\** (33%), *Cenchrus ciliaris\** (2, 33%), *Chloris divaricata* (1, 33%), *Chloris ventricosa* (33%), *Enneapogon gracilis* (2, 33%), *Enneapogon lindleyanus* (3, 33%), *Enneapogon polyphyllus* (2, 33%), *Eragrostis brownii* (11, 33%), *Melinis repens\** (1, 33%), *Paspalidium constrictum* (1, 33%), *Sporobolus creber* (33%), *Tripogon loliiformis* (1, 33%)  
FORBS: *Brunoniella australis* (1, 67%), *Carissa ovata* (1, 67%), *Evolvulus alsinoides* (1, 67%), *Hibiscus krichauffianus* (1, 67%), *Rostellularia adscendens* (1, 67%), *Sida atherophora* (67%), *Ajuga australis* (1, 33%), *Apowollastonia spilanthisoides* (33%), *Brachychiton populneus subsp. trilobus* (1, 33%), *Calotis lappulacea* (1, 33%), *Dianella revoluta* (1, 33%), *Eremophila debilis* (1, 33%), *Euphorbia drummondii* (1, 33%), *Galactia tenuiflora* (33%), *Glycine indet.* (1, 33%), *Glycine tabacina* (1, 33%), *Hibiscus sturtii var. grandiflorus* (1, 33%), *Jasminum didymum* (1, 33%), *Marsdenia viridiflora* (1, 33%), *Melhantha oblongifolia* (1, 33%), *Opercularia diphylla* (1, 33%), *Opuntia tomentosa\** (1, 33%), *Peripleura hispidula var. setosa* (6, 33%), *Phyllanthus virgatus* (1, 33%), *Pterocaulon redolens* (1, 33%), *Sclerolaena convexula* (1, 33%), *Sida hackettiana* (33%), *Sida sp.* (Musselbrook M.B.Thomas+ MRS437) (1, 33%), *Spermacoce indet.* (2, 33%), *Wahlenbergia gracilis* (33%)

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Eucalyptus moluccana woodland on lower slopes**



Pre-clearing area (ha), remnant area (ha) and per cent remaining: 18,162 1,941 11%

Species\_recorded: Total: 26; woody: 5; ground: 22; Avg. spp./site: 26.0; std dev.: 0.0, 1 site(s)

Basal area: Avg./site: 7.0 m<sup>2</sup>/ha, range: 7.0 - 7 m<sup>2</sup>/ha, std. deviation: 0 m<sup>2</sup>/ha, 1 site(s)

Structural formation: Open-woodland: 100%, 1 site(s)

Representative\_sites 19266.

**Stratum: Tree 1**

Height avg. = 11.0m, 1 site

Crown cover avg. = 14.0%, 1 site

Dominant species (relative cover, frequency): *Eucalyptus moluccana* (99, 100%), *Corymbia dallachiana* (1, 100%)

Frequent species (cover, frequency): *Corymbia dallachiana* (100%), *Eucalyptus moluccana* (14, 100%)

**Stratum: Shrub 1**

Height avg. = 1.5m, 1 site

Crown cover avg. = 4.0%, 1 site

Dominant species (relative cover, frequency): *Eucalyptus moluccana* (71, 100%), *Sida indet.* (24, 100%), *Opuntia tomentosa*\* (2, 100%), *Grewia retusifolia* (2, 100%)

Frequent species (cover, frequency): *Eucalyptus moluccana* (3, 100%), *Grewia retusifolia* (100%), *Opuntia tomentosa*\* (100%), *Sida indet.* (1, 100%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

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 Ground  
 Stratum:

Height avg. = 0.5m, 1 site

PFC avg. = 80.0%, 1 site

*Dominant species (relative cover, frequency): Heteropogon contortus (26, 100%), Bothriochloa bladhii (26, 100%), Bothriochloa decipiens var. decipiens (7, 100%), Bothriochloa ewartiana (7, 100%), Dinebra decipiens (7, 100%)*

*Frequent species (cover, frequency): GRAMINOIDS: Bothriochloa bladhii (20, 100%), Bothriochloa decipiens var. decipiens (5, 100%), Bothriochloa ewartiana (5, 100%), Chloris divaricata (100%), Cymbopogon refractus (100%), Cyperus fulvus (100%), Dinebra decipiens (5, 100%), Eragrostis sororia (100%), Eriochloa indet. (100%), Eulalia aurea (5, 100%), Heteropogon contortus (20, 100%), Holcolemma dispar (5, 100%), Panicum effusum (100%), Sporobolus creber (100%) FORBS: Eremophila debilis (5, 100%), Lantana camara\* (100%), Phyllanthus virgatus (100%), Portulaca pilosa\* (100%), Rhynchosia minima (100%), Ruellia tuberosa\* (100%), Sida indet. (5, 100%), Zornia indet. (100%)*

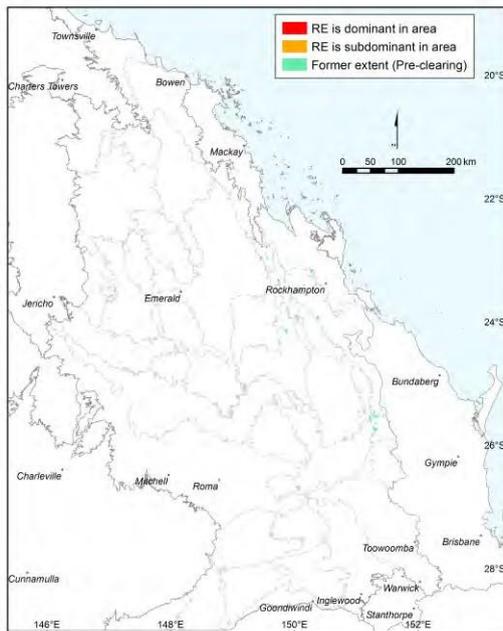
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Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Acacia harpophylla open forest on deformed and metamorphosed sediments and interbedded volcanics**



Pre-clearing area (ha), remnant area (ha) and per cent remaining: 39,799 4,543 11%

Species\_recorded: Total: 49; woody: 15; ground: 34; Avg. spp./site: 26.5; std dev.: 5.5, 2 site(s)

Basal area: Avg./site: 13.0 m<sup>2</sup>/ha, range: 12.0 - 14 m<sup>2</sup>/ha, std. deviation: 1 m<sup>2</sup>/ha, 2 site(s)

Structural formation: Open-woodland: 100%, 2 site(s)

Representative\_sites 17583, 17645.

**Stratum: Emergent**

Height avg. = 19.0m, 1 site  
 Crown cover avg. = 5.0%, 1 site  
 Dominant species (relative cover, frequency): *Eucalyptus crebra* (100, 50%)  
 Frequent species (cover, frequency): *Eucalyptus crebra* (5, 50%)

**Stratum: Tree 1**

Height avg. = 10.5m, range 10-11m, 2 sites  
 Crown cover avg. = 15.0%, range 15.0-15.0%, 2 sites  
 Dominant species (relative cover, frequency): *Casuarina cristata* (100, 50%), *Eucalyptus melanophloia* (80, 50%), *Corymbia erythrophloia* (20, 50%)  
 Frequent species (cover, frequency): *Casuarina cristata* (15, 50%), *Corymbia erythrophloia* (3, 50%), *Eucalyptus melanophloia* (12, 50%)

**Stratum: Tree 2**

Height avg. = 4.5m, range 3-6m, 2 sites  
 Crown cover avg. = 8.5%, range 2.0-15.0%, 2 sites  
 Dominant species (relative cover, frequency): *Denhamia cunninghamii* (100, 50%), *Melaleuca viridiflora* (73, 50%), *Eucalyptus crebra* (13, 50%), *Casuarina cristata* (7, 50%), *Acacia aulacocarpa* (7, 50%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.11.14

*Frequent species (cover, frequency): Acacia aulacocarpa (1, 50%), Casuarina cristata (1, 50%), Denhamia cunninghamii (2, 50%), Eucalyptus crebra (2, 50%), Melaleuca viridiflora (11, 50%)*

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Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

1/03/2018

## Technical Description

Regional ecosystem: 11.11.14

### Stratum: Shrub 1

Height avg. = 1.8m, range 1.5-2m, 2 sites

Crown cover avg. = 3.5%, range 2.0-5.0%, 2 sites

*Dominant species (relative cover, frequency):* *Acacia leiocalyx subsp. leiocalyx* (55, 50%), *Hibiscus splendens* (50, 50%), *Denhamia cunninghamii* (50, 50%), *Petalostigma pubescens* (36, 50%), *Eremophila mitchellii* (9, 50%)

*Frequent species (cover, frequency):* *Acacia leiocalyx subsp. leiocalyx* (3, 50%), *Denhamia cunninghamii* (1, 50%), *Eremophila mitchellii* (1, 50%), *Hibiscus splendens* (1, 50%), *Petalostigma pubescens* (2, 50%)

### Stratum: Shrub 2

Height avg. = 0.8m, range 0.6-1m, 2 sites

Crown cover avg. = 4.0%, range 3.0-5.0%, 2 sites

*Dominant species (relative cover, frequency):* *Grewia latifolia* (94, 50%), *Sida hackettiana* (2, 50%), *Lantana camara\** (2, 50%), *Breynia oblongifolia* (2, 50%)

*Frequent species (cover, frequency):* *Breynia oblongifolia* (50%), *Grewia latifolia* (5, 50%), *Lantana camara\** (50%), *Sida hackettiana* (50%)

### Stratum: Ground

Height avg. = 0.4m, range 0.3-0.5m, 2 sites

PFC avg. = 55.0%, range 40-70%, 2 sites

*Dominant species (relative cover, frequency):* *Themeda triandra* (48, 100%), *Enneapogon lindleyanus* (28, 50%), *Aristida gracilipes* (14, 50%), *Heteropogon contortus* (11, 50%), *Aristida queenslandica var. dissimilis* (11, 50%)

*Frequent species (cover, frequency):* GRAMINOIDS: *Arundinella nepalensis* (1, 100%), *Panicum effusum* (1, 100%), *Themeda triandra* (28, 100%), *Aristida gracilipes* (10, 50%), *Aristida queenslandica var. dissimilis* (5, 50%), *Aristida ramosa* (1, 50%), *Cenchrus ciliaris\** (50%), *Cymbopogon bombycinus* (50%), *Cyperus polystachyos* (50%), *Enneapogon lindleyanus* (20, 50%), *Eragrostis sororia* (2, 50%), *Eremochloa bimaculata* (5, 50%), *Heteropogon contortus* (8, 50%), *Melinis repens\** (1, 50%), *Sorghum nitidum* (50%), *Tripogon loliformis* (50%)

FORBS: *Lomandra longifolia* (1, 100%), *Alphitonia excelsa* (50%), *Brunoniella australis* (50%), *Coronidium boormanii* (1, 50%), *Desmodium brachypodum* (50%), *Dianella caerulea* (50%), *Dianella revoluta* (50%), *Eustrephus latifolius* (50%), *Fabaceae indet.* (50%), *Glycine tabacina* (50%), *Opuntia stricta\** (50%), *Oxalis indet.* (50%), *Peripleura hispidula var. hispidula* (50%), *Pomax umbellata* (4, 50%), *Rhynchosia minima* (50%), *Rostellularia adscendens* (50%), *Tephrosia filipes* (50%)

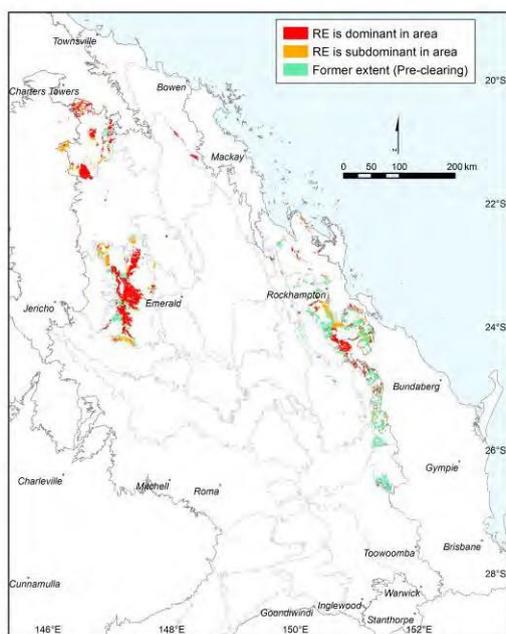
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**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Eucalyptus crebra woodland on deformed and metamorphosed sediments and interbedded volcanics**



Annie Kelly

**Pre-clearing area (ha), remnant area (ha) and per cent remaining: 814,414 466,139 57%**

**Species recorded: Total: 267; woody: 65; ground: 214; Avg. spp./site: 30.0; std dev.: 9.5, 17 site(s)**

**Basal area: Avg./site: 10.6 m<sup>2</sup>/ha, range: 2.0 - 20 m<sup>2</sup>/ha, std. deviation: 6 m<sup>2</sup>/ha, 24 site(s)**

**Structural formation: Woodland: 63%; open-woodland: 33%; open-forest: 4%, 24 site(s)**

**Representative sites 14313, 14462, 14859, 16871, 16898, 16900, 16902, 17065, 17069, 17476, 17508, 17586, 17587, 17594, 17604, 17632, 19015, 19016, 19020, 19065, 40710, 40774, 40805, 41575.**

**Stratum: Tree 1**

**Height avg. = 16.5m, range 10-25m, 24 sites**

**Crown cover avg. = 24.5%, range 5.0-57.0%, 24 sites**

*Dominant species (relative cover, frequency): Eucalyptus crebra (81, 92%), Corymbia erythrophloia (30, 46%), Eucalyptus melanophloia (27, 29%)*

*Frequent species (cover, frequency): Eucalyptus crebra (19, 92%), Corymbia erythrophloia (9, 46%), Eucalyptus melanophloia (8, 29%), Corymbia dallachiana (2, 17%), Acacia fodinalis (4%), Corymbia clarksoniana (5, 4%), Corymbia tessellaris (3, 4%), Eucalyptus exserta (2, 4%), Eucalyptus platyphylla (1, 4%)*

**Stratum: Tree 2**

**Height avg. = 9.9m, range 5-16m, 19 sites**

**Crown cover avg. = 9.1%, range 2.0-46.0%, 19 sites**

*Dominant species (relative cover, frequency): Corymbia erythrophloia (64, 38%), Eucalyptus crebra (41, 46%)*

*Frequent species (cover, frequency): Eucalyptus crebra (3, 46%), Corymbia erythrophloia (6, 38%), Corymbia dallachiana (2, 17%), Eucalyptus melanophloia (2, 17%), Alphitonia excelsa (6, 13%), Acacia fasciculifera (2, 8%), Erythrina vespertilio (8%), Acacia harpophylla (1, 4%), Acacia leiocalyx subsp. leiocalyx (5, 4%), Alstonia constricta (15, 4%), Brachychiton australis (4%), Corymbia clarksoniana (3, 4%), Corymbia tessellaris (2, 4%), Denhamia cunninghamii (4%), Eremophila mitchellii (3, 4%), Persoonia falcata (1, 4%), Pittosporaceae indet. (4%), Planchonia careya (15, 4%), Santalum lanceolatum (4%), Vachellia bidwillii (5, 4%), Vachellia nilotica\* (2, 4%)*

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.11.15

### Stratum: Tree 3

Height avg. = 4.7m, range 2.5-7m, 5 sites

Crown cover avg. = 6.9%, range 1.0-13.0%, 7 sites

*Frequent species (cover, frequency):* *Acacia leiocalyx* subsp. *leiocalyx* (2, 17%), *Alphitonia excelsa* (2, 17%), *Corymbia erythrophloia* (2, 13%), *Eucalyptus crebra* (1, 8%), *Petalostigma pubescens* (4, 8%), *Acacia aulacocarpa* (3, 4%), *Acacia disparrima* subsp. *disparrima* (4, 4%), *Acacia excelsa* subsp. *excelsa* (4%), *Acacia fasciculifera* (2, 4%), *Acacia julifera* (1, 4%), *Denhamia oleaster* (4%), *Erythrina vespertilio* (1, 4%), *Psyrdrax oleifolia* (5, 4%), *Vachellia nilotica*\* (3, 4%)

### Stratum: Shrub 1

Height avg. = 2.2m, range 0.6-5m, 23 sites

Crown cover avg. = 4.9%, range 0.0-50.0%, 24 sites

*Dominant species (relative cover, frequency):* *Eucalyptus crebra* (17, 29%)

*Frequent species (cover, frequency):* *Eucalyptus crebra* (1, 29%), *Acacia disparrima* subsp. *disparrima* (1, 17%), *Alphitonia excelsa* (2, 17%), *Corymbia erythrophloia* (1, 17%), *Lantana camara*\* (2, 17%), *Sida cordifolia*\* (2, 17%), *Acacia fodinalis* (4, 13%), *Corymbia dallachiana* (1, 13%), *Cycas megacarpa* (1, 13%), *Indigofera pratensis* (13%), *Petalostigma pubescens* (13%), *Acacia decora* (1, 8%), *Acacia fasciculifera* (1, 8%), *Acacia leiocalyx* subsp. *leiocalyx* (1, 8%), *Cryptostegia grandiflora*\* (1, 8%), *Planchonia careya* (8%), *Vachellia bidwillii* (1, 8%), *Acacia aulacocarpa* (4%), *Acacia implexa* (4%), *Acacia longispicata* (48, 4%), *Acacia maidenii* (4%), *Alectryon diversifolius* (2, 4%), *Antidesma* indet. (4%), *Archidendropsis basaltica* (2, 4%), *Breynia cernua* (4%), *Bursaria incana* (1, 4%), *Cajanus reticulatus* var. *reticulatus* (3, 4%), *Callicarpa candicans* (4%), *Capparis canescens* (1, 4%), *Capparis* indet. (4%), *Carissa ovata* (2, 4%), *Cupaniopsis anacardioides* (1, 4%), *Cycasmedia* (4%), *Denhamia cunninghamii* (4%), *Dodonaea lanceolata* var. *subsessilifolia* (1, 4%), *Eremophila mitchellii* (1, 4%), *Erythrina vespertilio* (2, 4%), *Erythroxylum australe* (4%), *Flueggea virosa* subsp. *melanthesoides* (4%), *Geijera parviflora* (2, 4%), *Grewia latifolia* (4%), *Grewia retusifolia* (1, 4%), *Jasminum didymum* (4%), *Lophostemon suaveolens* (1, 4%), *Pseuderanthemum variabile* (2, 4%), *Psyrdrax saligna* forma *saligna* (4%), *Santalum lanceolatum* (4%)

### Stratum: Shrub 2

Height avg. = 1.8m, range 1.5-2m, 2 sites

Crown cover avg. = 11.0%, range 3.0-15.0%, 3 sites

*Frequent species (cover, frequency):* *Acacia fodinalis* (4%), *Carissa ovata* (1, 4%), *Dodonaea lanceolata* var. *subsessilifolia* (4%), *Erythroxylum australe* (3, 4%), *Eucalyptus crebra* (4%), *Grewia latifolia* (1, 4%), *Lantana camara*\* (2, 4%), *Macrozamia miquelii* (13, 4%), *Psyrdrax saligna* forma *saligna* (4%), *Sida cordifolia*\* (4%), *Stylosanthes guianensis*\* (15, 4%), *Xanthorrhoea johnsonii* (4%)

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Ground  
Stratum:

Height avg. = 0.7m, range 0.1-1m, 15 sites

PFC avg. = 52.9%, range 16-100%, 17 sites

Dominant species (relative cover, frequency): *Cymbopogon queenslandicus* (51, 35%), *Themeda triandra* (44, 65%), *Heteropogon contortus* (16, 76%), *Aristida queenslandica* var. *dissimilis* (14, 24%), *Melinis repens*\* (14, 35%)

Frequent species (cover, frequency): GRAMINOIDS: *Heteropogon contortus* (9, 76%), *Themeda triandra* (26, 65%), *Panicum effusum* (2, 59%), *Enneapogon lindleyanus* (41%), *Scleria brownii* (41%), *Cymbopogon queenslandicus* (24, 35%), *Melinis repens*\* (6, 35%), *Cyperus fulvus* (29%), *Abildgaardia ovata* (24%), *Aristida queenslandica* var. *dissimilis* (10, 24%), *Capillipedium spicigerum* (24%), *Heteropogon triticeus* (6, 24%), *Aristida personata* (5, 18%), *Chrysopogon fallax* (3, 18%), *Cyperus gracilis* (1, 18%), *Sporobolus caroli* (2, 18%), *Aristida indet.* (1, 12%), *Aristida ramosa* (6, 12%), *Aristida spuria* (3, 12%), *Bothriochloa ewartiana* (1, 12%), *Capillipedium parviflorum* (12%), *Dichanthium tenue* (12%), *Fimbristylis dichotoma* (12%), *Paspalidium distans* (12%), *Sarga leiocladum* (1, 12%), *Scleria mackaviensis* (12%), *Sehima nervosum* (12%), *Sorghum nitidum* (11, 12%), *Alloteropsis semialata* (6%), *Aristida acuta* (6%), *Aristida benthamii* var. *benthamii* (6%), *Aristida calycina* var. *calycina* (6%), *Aristida queenslandica* var. *queenslandica* (6%), *Arundinella nepalensis* (1, 6%), *Bothriochloa decipiens* var. *decipiens* (6%), *Cenchrus ciliaris*\* (6%), *Chloris ventricosa* (6%), *Cleistochloa subjuncea* (2, 6%), *Cymbopogon bombycinus* (1, 6%), *Cymbopogon refractus* (20, 6%), *Cyperus cyperoides* (6%), *Dichanthium fecundum* (6%), *Dichanthium sericeum* (6%), *Dichanthium sericeum* subsp. *sericeum* (6%), *Digitaria brownii* (1, 6%), *Digitaria indet.* (6%), *Enneapogon intermedius* (3, 6%), *Enneapogon polyphyllus* (1, 6%), *Eragrostis leptostachya* (6%), *Eragrostis sororia* (1, 6%), *Eragrostis spartinoides* (6%), *Eriachne mucronata* (1, 6%), *Eriochloa procera* (6%), *Eulalia aurea* (4, 6%), *Hyparrhenia rufa*\* (1, 6%), *Microlaena stipoides* var. *stipoides* (6%), *Panicum simile* (6%), *Paspalidium criniforme* (6%), *Paspalidium gracile* (6%), *Sarga plumosum* (1, 6%), *Scleria indet.* (6%), *Sporobolus elongatus* (6%), *Themeda avenacea* (6%), *Tragus australianus* (6%), *Tripogon loliiformis* (6%), *Urochloa foliosa* (6%)

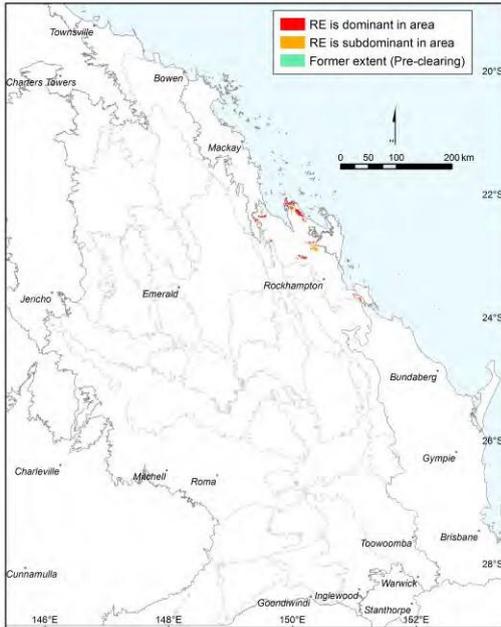
FORBS: *Eustrephus latifolius* (41%), *Rhynchosia minima* (41%), *Cyanthillium cinereum* (35%), *Glycine tomentella* (35%), *Phyllanthus virgatus* (35%), *Spermacoce brachystema* (35%), *Brunoniella australis* (29%), *Galactia tenuiflora* (29%), *Indigofera pratensis* (29%), *Rostellularia adscendens* (29%), *Desmodium rhytidophyllum* (24%), *Evolvulus alsinoides* (24%), *Lomandra longifolia* (24%), *Apowollastonia spilanthisoides* (1, 18%), *Capparis canescens* (18%), *Crotalaria montana* (18%), *Desmodium varians* (18%), *Grewia latifolia* (18%), *Grewia retusifolia* (18%), *Indigofera linifolia* (3, 18%), *Indigofera linnaei* (18%), *Pterocaulon indet.* (18%), *Tephrosia filipes* (18%), *Wahlenbergia gracilis* (18%), *Breynia oblongifolia* (2, 12%), *Cassytha filiformis* (8, 12%), *Chamaecrista nomame* (12%), *Desmodium brachypodum* (12%), *Dianella caerulea* (12%), *Dianella revoluta* (12%), *Euphorbia drummondii* (12%), *Euphorbia mitchelliana* (12%), *Flemingia parviflora* (12%), *Glycine tabacina* (12%), *Lantana montevidensis*\* (12%), *Lomandra multiflora* subsp. *multiflora* (12%), *Melhantha oblongifolia* (12%), *Neptunia gracilis* (12%), *Passiflora foetida*\* (12%), *Passiflora suberosa*\* (12%), *Pterocaulon redolens* (12%), *Pycnospora lutescens* (1, 12%), *Sida rohlenae* (12%), *Stylosanthes scabra*\* (12, 12%), *Zornia dyctiocarpa* var. *dyctiocarpa* (12%), *Acacia excelsa* (6%), *Aeschynomene brevifolia* (6%), *Ajuga australis* (6%), *Alphitonia excelsa* (6%), *Alternanthera nana* (6%), *Alysicarpus bupleurifolius*\* (6%), *Aristolochia pubera* (6%), *Aristolochia thozetii* (6%), *Bidens bipinnata*\* (1, 6%), *Bidens pilosa*\* (2, 6%), *Brunoniella acaulis* (6%), *Calyplocarpus indet.* (6%), *Canavalia papuana* (6%), *Chamaecrista concinna* (1, 6%), *Chamaecrista nomame* var. *nomame* (6%), *Cheilanthes distans* (6%), *Cheilanthes sieberi* (6%), *Chrysocephalum apiculatum* (6%), *Corymbia erythrophloia* (6%), *Crotalaria lanceolata* subsp. *lanceolata*\* (6%), *Cycas ophiolitica* (6%), *Cymbidium canaliculatum* (6%), *Cynanchum brevipedicellatum* (6%), *Dampiera stricta* (6%), *Denhamia cunninghamii* (6%), *Denhamia disperma* (6%), *Desmodium gangeticum* (6%), *Desmodium trichostachyum* (6%), *Dianella indet.* (6%), *Diospyros geminata* (6%), *Dodonaea lanceolata* (6%), *Emilia sonchifolia*\* (6%), *Erigeron madatrensis*\* (6%), *Erythroxylum australe* (6%), *Eucalyptus melanophloia* (6%), *Euphorbia psammogeton* (6%), *Galactia tenuiflora* var. *lucida* (6%), *Glandularia aristigera*\* (6%), *Glycine indet.* (6%), *Gomphocarpus physocarpus*\* (6%), *Grevillea striata* (6%), *Hardenbergia violacea* (6%), *Heliotropium brachygyne* (6%), *Hibiscus heterophyllus* (6%), *Hibiscus sturtii* (6%), *Indigofera indet.* (6%), *Ipomoea plebeia* (6%), *Jasminum simplicifolium* subsp. *australiense* (6%), *Lindernia crustacea* (6%), *Lomandra confertifolia* (6%), *Lomandra indet.* (1, 6%), *Lotus australis* (6%), *Marsdenia fraseri* (6%), *Marsdenia indet.* (6%), *Medicago indet.* (6%), *Melia azedarach* (6%), *Opuntia tomentosa*\* (6%), *Oxalis corniculata*\* (6%), *Parthenium indet.* (6%), *Peripleura hispidula* (6%), *Peripleura hispidula* var. *hispidula* (6%), *Peripleura hispidula* var. *setosa* (6%), *Phyllanthus maderaspatensis* (6%), *Polycarpaea corymbosa* var. *minor* (6%), *Polygala triflora* (6%), *Polymeria calycina* (6%), *Rhynchosia minima* var. *australis* (6%), *Sauropus indet.* (6%), *Scaevola humilis* (6%), *Sida hackettiana* (6%), *Sida rhombifolia*\* (6%), *Sida spinosa*\* (6%), *Solanum indet.* (6%), *Spermacoce indet.* (6%), *Stachytarpheta jamaicensis*\* (6%), *Stylosanthes guianensis*\* (6%), *Tephrosia juncea* (6%), *Uraria picta* (6%), *Vigna lanceolata* var. *lanceolata* (6%), *Vittadinia indet.* (6%), *Xanthorrhoea johnsonii* (5, 6%), *Xanthorrhoea latifolia* subsp. *latifolia* (1, 6%), *Zinnia peruviana*\* (1, 6%), *Zornia dyctiocarpa* var. *filifolia* (6%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Eucalyptus crebra, E. exserta woodland**



Annie Kelly

**Pre-clearing area (ha), remnant area (ha) and per cent remaining: 56,564 36,361 64%**

**Species recorded: Total: 137; woody: 36; ground: 113; Avg. spp./site: 40.4; std dev.: 21.2, 5 site(s)**

**Basal area: Avg./site: 17.9 m<sup>2</sup>/ha, range: 10.0 - 25 m<sup>2</sup>/ha, std. deviation: 5 m<sup>2</sup>/ha, 7 site(s)**

**Structural formation: Woodland: 71%; open-forest: 14%; unrecorded: 14%, 7 site(s)**

**Representative sites 17063, 17522, 17626, 17658, 59077, 59078, 59094.**

**Stratum: Tree 1**

**Height avg. = 16.4m, range 12-24m, 7 sites**

**Crown cover avg. = 32.7%, range 21.0-45.0%, 7 sites**

*Dominant species (relative cover, frequency): Eucalyptus crebra (50, 100%), Eucalyptus exserta (36, 86%), Corymbia clarksoniana (22, 43%), Corymbia intermedia (17, 29%), Corymbia dallachiana (7, 43%)*

*Frequent species (cover, frequency): Eucalyptus crebra (19, 100%), Eucalyptus exserta (10, 86%), Corymbia clarksoniana (5, 43%), Corymbia dallachiana (3, 43%), Corymbia intermedia (5, 29%), Eucalyptus moluccana (1, 14%), Lophostemon suaveolens (5, 14%)*

**Stratum: Tree 2**

**Height avg. = 8.3m, range 3-15m, 6 sites**

**Crown cover avg. = 13.7%, range 5.0-25.0%, 6 sites**

*Dominant species (relative cover, frequency): Petalostigma pubescens (61, 43%), Alphitonia excelsa (47, 29%), Eucalyptus crebra (39, 29%)*

*Frequent species (cover, frequency): Petalostigma pubescens (6, 43%), Alphitonia excelsa (8, 29%), Eucalyptus crebra (3, 29%), Acacia disparrima subsp. disparrima (8, 14%), Acacia leiocalyx subsp. leiocalyx (25, 14%), Corymbia clarksoniana (2, 14%), Corymbia intermedia (2, 14%), Livistona decora (1, 14%), Lophostemon confertus (5, 14%), Melaleuca viridiflora (1, 14%), Vachellia bidwillii (1, 14%)*

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.11.15a

### Stratum: Tree 3

Height avg. = 4.0m, 1 site

Crown cover avg. = 15.0%, 1 site

Frequent species (cover, frequency): *Acacia aulacocarpa* (5, 14%), *Coelospermum reticulatum* (1, 14%), *Eucalyptus crebra* (4, 14%), *Petalostigma pubescens* (5, 14%)

### Stratum: Shrub 1

Height avg. = 2.1m, range 1-3.5m, 7 sites

Crown cover avg. = 16.2%, range 2.0-66.2%, 7 sites

Dominant species (relative cover, frequency): *Acacia crassa* subsp. *longicoma* (48, 29%), *Acacia leiocalyx* subsp. *leiocalyx* (40, 29%), *Petalostigma pubescens* (29, 57%), *Lophostemon confertus* (27, 29%), *Eucalyptus crebra* (25, 43%)

Frequent species (cover, frequency): *Coelospermum reticulatum* (57%), *Petalostigma pubescens* (4, 57%), *Acacia disparrima* subsp. *disparrima* (43%), *Alphitonia excelsa* (3, 43%), *Eucalyptus crebra* (1, 43%), *Acacia crassa* subsp. *longicoma* (7, 29%), *Acacia leiocalyx* subsp. *leiocalyx* (2, 29%), *Eucalyptus exserta* (29%), *Lantana camara*\* (5, 29%), *Lophostemon confertus* (11, 29%), *Trema tomentosa* (1, 29%), *Acacia decora* (1, 14%), *Acronychia laevis* (14%), *Amyema congener* subsp. *congener* (14%), *Cryptostegia grandiflora*\* (8, 14%), *Dodonaea lanceolata* var. *subsessilifolia* (1, 14%), *Eucalyptus platyphylla* (1, 14%), *Grewia latifolia* (14%), *Jacksonia scoparia* (1, 14%), *Jagera pseudorhus* var. *pseudorhus* (14%), *Livistona decora* (3, 14%), *Lophostemon suaveolens* (2, 14%), *Psychotria daphnoides* (14%), *Psydrax attenuata* var. *attenuata* (14%)

### Stratum: Shrub 2

Height avg. = 0.7m, range 0.5-0.9m, 2 sites

Crown cover avg. = 5.5%, range 1.0-10.0%, 2 sites

Dominant species (relative cover, frequency): *Coelospermum reticulatum* (60, 29%)

Frequent species (cover, frequency): *Coelospermum reticulatum* (2, 29%), *Alphitonia excelsa* (3, 14%), *Breynia oblongifolia* (14%), *Cupaniopsis anacardioides* (14%), *Dodonaea viscosa* (14%), *Jacksonia scoparia* (2, 14%), *Melaleuca viridiflora* (3, 14%), *Planchonia careya* (14%), *Tephrosia filipes* (14%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Technical Description****Regional ecosystem: 11.11.15a****Ground  
Stratum:****Height avg. = 0.3m, range 0.25-0.5m, 5 sites****PFC avg. = 43.2%, range 22-60%, 5 sites**

*Dominant species (relative cover, frequency): Themeda triandra (64, 40%), Praxelis clematidea\* (14, 60%), Heteropogon contortus (13, 40%), Coelospermum reticulatum (10, 40%), Eragrostis sororia (9, 40%)*

*Frequent species (cover, frequency): GRAMINOIDS: Aristida queenslandica var. dissimilis (3, 60%), Cymbopogon refractus (1, 60%), Paspalidium distans (1, 60%), Bothriochloa decipiens var. decipiens (40%), Cyperus fulvus (40%), Cyperus gracilis (40%), Digitaria violascens\* (40%), Eragrostis sororia (3, 40%), Eragrostis spartinooides (2, 40%), Fimbristylis dichotoma (2, 40%), Heteropogon contortus (5, 40%), Ottochloa nodosa (40%), Panicum effusum (40%), Sporobolus creber (3, 40%), Themeda triandra (36, 40%), Alloteropsis semialata (20%), Aristida calycina (20%), Chloris divaricata var. divaricata (20%), Chrysopogon fallax (2, 20%), Dichanthium sericeum (20%), Dinebra decipiens var. decipiens (2, 20%), Eragrostis lacunaria (20%), Heteropogon triticeus (20%), Juncus usitatus (20%), Panicum queenslandicum (20%), Schizachyrium pseudeulalia (20%), Scleria brownii (20%), Scleria novae-hollandiae (20%), Scleria sphacelata (20%), Urochloa whiteana (20%)  
FORBS: Alphitonia excelsa (1, 80%), Cyanthillium cinereum (1, 80%), Desmodium rhytidophyllum (1, 80%), Phyllanthus virgatus (80%), Sida hackettiana (2, 80%), Breynia oblongifolia (60%), Brunoniella australis (60%), Lomandra multiflora subsp. multiflora (60%), Praxelis clematidea\* (8, 60%), Alternanthera nana (40%), Brunoniella acaulis (40%), Cheilanthes sieberi subsp. sieberi (40%), Chrysocephalum apiculatum (40%), Coelospermum reticulatum (3, 40%), Desmodium varians (1, 40%), Dianella caerulea (40%), Emilia sonchifolia var. sonchifolia\* (40%), Galactia tenuiflora (1, 40%), Grewia latifolia (2, 40%), Lomandra confertifolia subsp. pallida (40%), Murdannia graminea (40%), Scoparia dulcis\* (1, 40%), Sida spinosa\* (1, 40%), Solanum parvifolium subsp. parvifolium (40%), Spermacoce brachystema (40%), Stylosanthes scabra\* (1, 40%), Zornia dyctiocarpa var. filifolia (40%), Abutilon guineense\* (20%), Acacia crassa subsp. longicoma (3, 20%), Achyranthes aspera (20%), Ageratum conyzoides subsp. conyzoides\* (20%), Aristolochia thozetii (20%), Bidens pilosa\* (20%), Cassytha filiformis (20%), Chamaecrista absus var. absus (20%), Cheilanthes distans (20%), Cheilanthes nudiuscula (20%), Cheilanthes tenuifolia (20%), Crotalaria calycina (20%), Crotalaria mitchellii subsp. mitchellii (20%), Crotalaria montana (20%), Cryptostegia grandiflora\* (20%), Desmodium heterocarpon var. strigosum (20%), Dianella revoluta (20%), Eucalyptus crebra (20%), Eucalyptus exserta (20%), Eucalyptus platyphylla (8, 20%), Eustrephus latifolius (20%), Evolvulus alsinoides (20%), Glossocardia bidens (20%), Glycine cyrtoloba (20%), Indigofera australis subsp. australis (20%), Indigofera hirsuta (1, 20%), Indigofera polygaloides (20%), Leucas lavandulifolia\* (20%), Lindernia crustacea (20%), Lomandra longifolia (20%), Lophostemon confertus (15, 20%), Lophostemon suaveolens (1, 20%), Mecardonia procumbens\* (20%), Opercularia diphylla (2, 20%), Opuntia tomentosa\* (20%), Physalis angulata\* (20%), Psychotria daphnoides (20%), Psydrax odorata (1, 20%), Pterocaulon redolens (20%), Rostellularia adscendens (20%), Sida cordifolia\* (20%), Sigesbeckia orientalis (3, 20%), Solanum ellipticum (20%), Spermacoce multicaulis (1, 20%), Sphaeromorphaea indet. (20%), Stachytarpheta jamaicensis\* (20%), Xanthorrhoea latifolia subsp. latifolia (15, 20%)*

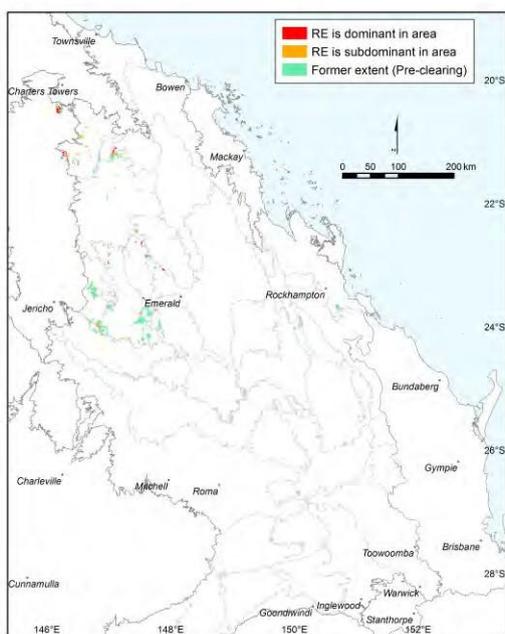
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**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Eucalyptus cambageana, Acacia harpophylla woodland on old sedimentary rocks with varying degrees of metamorphism and folding. Lowlands**



Pre-clearing area (ha), remnant area (ha) and per cent remaining: 89,041 25,453 29%

Species\_recorded: Total: 60; woody: 17; ground: 45; Avg. spp./site: 23.5; std dev.: 4.5, 2 site(s)

Basal area: Avg./site: 6.6 m<sup>2</sup>/ha, range: 4.3 - 9 m<sup>2</sup>/ha, std. deviation: 2 m<sup>2</sup>/ha, 4 site(s)

Structural formation: Woodland: 50%; open-woodland: 50%, 4 site(s)

Representative\_sites 1996, 16895, 16904, 16924.

**Stratum: Tree 1**

Height avg. = 20.8m, range 18-25m, 4 sites

Crown cover avg. = 20.0%, range 15.0-30.0%, 4 sites

Dominant species (relative cover, frequency): *Eucalyptus cambageana* (100, 100%), *Eucalyptus populnea* (1, 25%), *Eucalyptus melanophloia* (1, 25%), *Corymbia dallachiana* (1, 25%)

Frequent species (cover, frequency): *Eucalyptus cambageana* (20, 100%), *Corymbia dallachiana* (25%), *Eucalyptus melanophloia* (25%), *Eucalyptus populnea* (25%)

**Stratum: Tree 2**

Height avg. = 8.5m, range 7-10m, 4 sites

Crown cover avg. = 21.3%, range 5.0-50.0%, 4 sites

Dominant species (relative cover, frequency): *Acacia harpophylla* (96, 50%), *Flindersia dissosperma* (77, 25%), *Acacia rhodoxylon* (70, 25%), *Eucalyptus crebra* (30, 25%), *Eremophila mitchellii* (15, 25%)

Frequent species (cover, frequency): *Acacia harpophylla* (37, 50%), *Acacia rhodoxylon* (4, 25%), *Eremophila mitchellii* (1, 25%), *Eucalyptus cambageana* (2, 25%), *Eucalyptus crebra* (2, 25%), *Flindersia dissosperma* (5, 25%), *Lysiphylum carronii* (1, 25%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.11.16

### Stratum: Shrub 1

Height avg. = 3.9m, range 2.5-5m, 4 sites

Crown cover avg. = 7.8%, range 1.0-10.0%, 4 sites

Dominant species (relative cover, frequency): *Eremophila mitchellii* (78, 75%), *Eucalyptus cambageana* (45, 25%), *Lysiphyllum carronii* (27, 25%), *Acacia harpophylla* (22, 50%), *Flindersia dissosperma* (18, 25%)

Frequent species (cover, frequency): *Eremophila mitchellii* (9, 75%), *Acacia harpophylla* (3, 50%), *Atalaya hemiglaucula* (50%), *Erythroxylum australe* (2, 25%), *Eucalyptus cambageana* (1, 25%), *Flindersia dissosperma* (25%), *Geijera parviflora* (1, 25%), *Lysiphyllum carronii* (25%)

### Stratum: Shrub 2

Height avg. = 1.4m, range 0.1-2m, 3 sites

Crown cover avg. = 12.0%, range 1.0-30.0%, 3 sites

Dominant species (relative cover, frequency): *Dodonaea viscosa* (90, 25%), *Atalaya hemiglaucula* (67, 25%), *Eremophila deserti* (48, 25%), *Carissa lanceolata* (33, 25%), *Geijera parviflora* (27, 50%)

Frequent species (cover, frequency): *Geijera parviflora* (2, 50%), *Acacia harpophylla* (25%), *Atalaya hemiglaucula* (1, 25%), *Carissa lanceolata* (1, 25%), *Dodonaea viscosa* (27, 25%), *Enchylaena tomentosa* (25%), *Eremophila deserti* (3, 25%), *Eremophila mitchellii* (2, 25%), *Eucalyptus cambageana* (25%)

### Stratum: Ground

Height avg. = 0.6m, range 0.2-1m, 2 sites

PFC avg. = 6.0%, range 5-7%, 2 sites

Dominant species (relative cover, frequency): *Carissa ovata* (59, 50%), *Enteropogon acicularis* (33, 100%), *Enteropogon unispiceus* (12, 50%), *Bothriochloa ewartiana* (7, 50%), *Paspalidium caespitosum* (7, 100%)

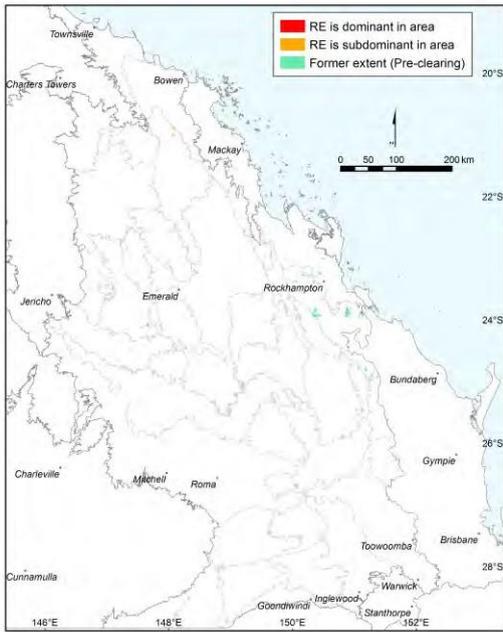
Frequent species (cover, frequency): GRAMINOIDS: *Enteropogon acicularis* (2, 100%), *Paspalidium caespitosum* (1, 100%), *Ancistrachne uncinulata* (50%), *Aristida jerichoensis* var. *jerichoensis* (50%), *Bothriochloa ewartiana* (1, 50%), *Cenchrus ciliaris*\* (50%), *Chrysopogon fallax* (50%), *Cymbopogon refractus* (50%), *Cyperus fulvus* (50%), *Digitaria brownii* (50%), *Enneapogon lindleyanus* (50%), *Enteropogon unispiceus* (1, 50%), *Eragrostis indet.* (50%), *Eragrostis lacunaria* (50%), *Eriochloa pseudoacrotricha* (50%), *Eulalia aurea* (50%), *Fimbristylis dichotoma* (50%), *Oxychloris scariosa* (50%), *Panicum effusum* (50%), *Panicum laevinode* (50%), *Sporobolus caroli* (50%), *Sporobolus scabridus* (50%), *Triodia pungens* (50%)  
FORBS: *Enchylaena tomentosa* (100%), *Abutilon fraseri* (50%), *Alternanthera denticulata* var. *micrantha* (50%), *Apophyllum anomalum* (50%), *Capparis lasiantha* (50%), *Carissa ovata* (5, 50%), *Einadia nutans* subsp. *linifolia* (50%), *Lysiphyllum carronii* (50%), *Salsola australis* (50%), *Trianthema triquetra* (50%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Semi-evergreen vine thicket on old sedimentary rocks with varying degrees of metamorphism and folding



Bill McDonald

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 49,048 4,419 9%

Species\_recorded: Total: 238; woody: 179; ground: 123; Avg. spp./site: 75.1; std dev.: 10.3, 8 site(s)

Basal area: Avg/site: 27.5 m<sup>2</sup>/ha, range: 18.0 - 34 m<sup>2</sup>/ha, std. deviation: 6 m<sup>2</sup>/ha, 5 site(s)

Structural formation: Low woodland: 13%; unrecorded: 88%, 8 site(s)

Representative\_sites 14847, 14870, 14872, 47375, 47393, 47814, 47815, 50454.

Stratum: Emergent

Height avg. = 18.3m, range 13-24m, 6 sites

Crown cover avg. = 5.3%, range 2.0-10.0%, 6 sites

Dominant species (relative cover, frequency): *Brachychiton rupestris* (60, 25%), *Flindersia collina* (50, 25%)

Frequent species (cover, frequency): *Brachychiton rupestris* (3, 25%), *Flindersia collina* (5, 25%), *Archidendropsis thozetiana* (5, 13%), *Brachychiton australis* (10, 13%), *Eucalyptus crebra* (2, 13%), *Euroschinus falcatus* var. *falcatus* (13%), *Ficus rubiginosa* (4, 13%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Tree 1  
Stratum:

Height avg. = 11.0m, range 7-16.5m, 8 sites

Crown cover avg. = 33.1%, range 10.0-60.0%, 8 sites

Dominant species (relative cover, frequency): *Terminalia porphyrocarpa* (23, 38%), *Backhousia angustifolia* (20, 25%), *Pleiogynium timorense* (17, 38%), *Drypetes deplanchei* (14, 63%), *Planchonella cotinifolia* (12, 63%)

Frequent species (cover, frequency): *Bridelia leichhardtii* (2, 75%), *Cissus oblonga* (2, 63%), *Drypetes deplanchei* (2, 63%), *Excoecaria dallachyana* (3, 63%), *Planchonella cotinifolia* (4, 63%), *Trophis scandens subsp. scandens* (63%), *Acacia fasciculifera* (1, 50%), *Diospyros geminata* (2, 50%), *Brachychiton rupestris* (2, 38%), *Coatesia paniculata* (3, 38%), *Dinosperma erythroccum* (1, 38%), *Dockrillia bowmanii* (38%), *Glossocarya hemiderma* (1, 38%), *Notelaea microcarpa* (3, 38%), *Pleiogynium timorense* (4, 38%), *Pyrrosia rupestris* (38%), *Terminalia porphyrocarpa* (9, 38%), *Alectryon subdentatus* (3, 25%), *Austrostenisia blackii var. blackii* (1, 25%), *Backhousia angustifolia* (10, 25%), *Brachychiton australis* (1, 25%), *Bursaria incana* (25%), *Capparis ornans* (25%), *Cayratia acris* (1, 25%), *Croton insularis* (2, 25%), *Dendrocnide photinophylla* (1, 25%), *Denhamia disperma* (25%), *Elattostachys xylocarpa* (1, 25%), *Flindersia australis* (2, 25%), *Grevillea helmsiae* (1, 25%), *Strychnos psilosperma* (4, 25%), *Acacia aulacocarpa* (13%), *Alectryon connatus* (13%), *Alphitonia excelsa* (1, 13%), *Amyema congener* (13%), *Aphananthe philippinensis* (1, 13%), *Asparagus africanus\** (1, 13%), *Atalaya multiflora* (1, 13%), *Atalaya salicifolia* (1, 13%), *Cassytha filiformis* (13%), *Clematicissus opaca* (13%), *Cupaniopsis parvifolia* (1, 13%), *Cymbidium canaliculatum* (13%), *Denhamia pittosporoides subsp. pittosporoides* (2, 13%), *Diospyros humilis* (1, 13%), *Ehretia membranifolia* (1, 13%), *Elaeocarpus obovatus* (13%), *Euroschinus falcatus* (5, 13%), *Euroschinus falcatus var. falcatus* (1, 13%), *Everistia vacciniifolia* (1, 13%), *Exocarpos latifolius* (13%), *Ficus rubiginosa* (2, 13%), *Flindersia collina* (1, 13%), *Geijera salicifolia* (1, 13%), *Gossia bidwillii* (10, 13%), *Gyrocarpus americanus* (1, 13%), *Homalium alnifolium* (1, 13%), *Jasminum simplicifolium subsp. australiense* (2, 13%), *Mallotus philippensis* (1, 13%), *Melia azedarach* (13%), *Melodorum leichhardtii* (13%), *Myrsine variabilis* (13%), *Planchonella pohlmiana* (1, 13%), *Pleurostylia opposita* (1, 13%), *Polyscias elegans* (1, 13%), *Pyrrosia confluens* (13%), *Sterculia quadrifida* (1, 13%), *Vitex lignum-vitae* (10, 13%)

Stratum: Tree 2

Height avg. = 7.0m, range 4.8-9m, 6 sites

Crown cover avg. = 37.8%, range 7.0-65.0%, 6 sites

Dominant species (relative cover, frequency): *Coatesia paniculata* (27, 25%), *Gossia bidwillii* (16, 75%), *Bridelia leichhardtii* (12, 25%), *Strychnos psilosperma* (10, 38%), *Backhousia angustifolia* (9, 25%)

Frequent species (cover, frequency): *Gossia bidwillii* (5, 75%), *Acacia fasciculifera* (2, 50%), *Alectryon subdentatus* (1, 50%), *Diospyros geminata* (4, 50%), *Grevillea helmsiae* (1, 50%), *Planchonella cotinifolia* (1, 50%), *Capparis arborea* (1, 38%), *Cissus oblonga* (1, 38%), *Drypetes deplanchei* (1, 38%), *Psydrax odorata subsp. australiana* (3, 38%), *Pyrrosia rupestris* (38%), *Strychnos psilosperma* (2, 38%), *Turraea pubescens* (1, 38%), *Acacia maidenii* (25%), *Alectryon connatus* (1, 25%), *Atalaya salicifolia* (25%), *Backhousia angustifolia* (6, 25%), *Barklya syringifolia* (1, 25%), *Bridelia leichhardtii* (3, 25%), *Coatesia paniculata* (18, 25%), *Croton insularis* (1, 25%), *Dendrocnide photinophylla* (25%), *Dockrillia bowmanii* (25%), *Elaeodendron melanocarpum* (1, 25%), *Excoecaria dallachyana* (3, 25%), *Glossocarya hemiderma* (1, 25%), *Jasminum simplicifolium subsp. australiense* (25%), *Melodorum leichhardtii* (1, 25%), *Notelaea microcarpa* (2, 25%), *Parsonsia plaesiophylla* (25%), *Pleiogynium timorense* (1, 25%), *Tinospora smilacina* (25%), *Trophis scandens subsp. scandens* (1, 25%), *Acacia aulacocarpa* (1, 13%), *Acronychia laevis* (1, 13%), *Acronychia pauciflora* (13%), *Alectryon diversifolius* (13%), *Alphitonia excelsa* (1, 13%), *Amyema congener* (13%), *Asparagus plumosus\** (13%), *Brachychiton australis* (13%), *Brachychiton bidwillii* (13%), *Bursaria incana* (13%), *Capparis ornans* (13%), *Casearia multinervosa* (2, 13%), *Cayratia acris* (13%), *Claoxylon tenerifolium subsp. tenerifolium* (13%), *Croton acronchioides* (25, 13%), *Croton phebalioides* (13%), *Cryptostegia grandiflora\** (13%), *Cupaniopsis anacardioides* (1, 13%), *Cupaniopsis parvifolia* (1, 13%), *Cupaniopsis wadsworthii* (13%), *Cynanchum viminale subsp. brunonianum* (13%), *Denhamia pittosporoides subsp. pittosporoides* (1, 13%), *Diospyros humilis* (1, 13%), *Ehretia membranifolia* (13%), *Elaeodendron australe var. integrifolium* (13%), *Elattostachys xylocarpa* (25, 13%), *Everistia vacciniifolia var. vacciniifolia* (2, 13%), *Flindersia australis* (1, 13%), *Mallotus claoxyloides* (13%), *Marsdenia indet.* (13%), *Myrsine variabilis* (13%), *Opuntia tomentosa\** (2, 13%), *Pandorea floribunda* (13%), *Pandorea pandorana* (13%), *Parsonsia lanceolata* (1, 13%), *Parsonsia leichhardtii* (1, 13%), *Parsonsia rotata* (13%), *Parsonsia velutina* (13%), *Pavetta australiensis* (13%), *Pittosporum viscidum* (13%), *Pyrrosia confluens* (13%), *Ripogonum brevifolium* (13%), *Rivina humilis\** (1, 13%), *Sarcophilus dilatatus* (13%), *Sarcophilus hillii* (13%), *Secamone elliptica* (1, 13%), *Streblus brunonianus* (1, 13%), *Terminalia porphyrocarpa* (1, 13%), *Triflorensia ixoroides* (13%), *Vincetoxicum ovatum* (13%), *Vitex lignum-vitae* (1, 13%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Tree 3  
Stratum:

Height avg. = 4.5m, 1 site

Crown cover avg. = 15.0%, 1 site

Frequent species (cover, frequency): *Atalaya salicifolia* (13%), *Austrosteenisia blackii* var. *blackii* (13%), *Capparis arborea* (13%), *Casearia multinervosa* (13%), *Cissus oblonga* (1, 13%), *Cissus reniformis* (1, 13%), *Gossia bidwillii* (7, 13%), *Grevillea helmsiae* (1, 13%), *Marsdenia pleiadenia* (13%), *Strychnos psilosperma* (5, 13%), *Vitex lignum-vitae* (1, 13%)

Stratum: Shrub 1

Height avg. = 3.2m, range 1.6-6m, 8 sites

Crown cover avg. = 42.1%, range 10.0-70.0%, 8 sites

Dominant species (relative cover, frequency): *Alchornea ilicifolia* (27, 25%), *Coatesia paniculata* (20, 25%), *Alyxia ruscifolia* (17, 50%), *Hovea longipes* (17, 25%), *Strychnos psilosperma* (12, 63%)

Frequent species (cover, frequency): *Turraea pubescens* (1, 100%), *Acalypha eremorum* (5, 63%), *Carissa ovata* (2, 63%), *Cissus oblonga* (1, 63%), *Glossocarya hemiderma* (1, 63%), *Murraya ovatifoliolata* (3, 63%), *Pittosporum spinescens* (4, 63%), *Strychnos psilosperma* (6, 63%), *Tinospora smilacina* (63%), *Alyxia ruscifolia* (6, 50%), *Bridelia leichhardtii* (1, 50%), *Lantana camara*\* (50%), *Sarcocochilus dilatatus* (50%), *Solanum seaforthianum*\* (50%), *Capparis arborea* (1, 38%), *Croton acronychioides* (1, 38%), *Croton insularis* (1, 38%), *Croton phebaloides* (2, 38%), *Denhamia disperma* (38%), *Gossia bidwillii* (2, 38%), *Jasminum simplicifolium* subsp. *australiense* (1, 38%), *Melodorum leichhardtii* (38%), *Triflorensia ixoroides* (1, 38%), *Trophis scandens* subsp. *scandens* (38%), *Alchornea ilicifolia* (3, 25%), *Alphitonia excelsa* (25%), *Backhousia angustifolia* (1, 25%), *Casearia multinervosa* (25%), *Cayratia acris* (1, 25%), *Coatesia paniculata* (12, 25%), *Cynanchum viminale* subsp. *brunonianum* (25%), *Deeringia amaranthoides* (25%), *Denhamia pittosporoides* subsp. *pittosporoides* (25%), *Diospyros geminata* (1, 25%), *Diospyros humilis* (1, 25%), *Erythroxylum* sp. (*Splityard Creek L.Pedley 5360*) (25%), *Eustrephus latifolius* (25%), *Everistia vacciniifolia* var. *vacciniifolia* (2, 25%), *Exocarpos latifolius* (1, 25%), *Geijera salicifolia* (3, 25%), *Hovea longipes* (10, 25%), *Marsdenia micradenia* (25%), *Myrsine variabilis* (25%), *Parsonsia plaesiophylla* (25%), *Passiflora suberosa*\* (25%), *Pavetta australiensis* (25%), *Planchonella cotinifolia* (25%), *Pleurostyliia opposita* (25%), *Psydrax odorata* (25%), *Psydrax odorata* forma *australiana* (1, 25%), *Psydrax odorata* subsp. *australiana* (2, 25%), *Sarcocochilus hillii* (25%), *Secamone elliptica* (25%), *Senna gaudichaudii* (25%), *Solanum stelligerum* (2, 25%), *Sterculia quadrifida* (25%), *Vincetoxicum ovatum* (25%), *Abutilon oxycarpum* (1, 13%), *Acacia aulacocarpa* (13%), *Acalypha capillipes* (5, 13%), *Acronychia laevis* (13%), *Acronychia pauciflora* (13%), *Alectryon connatus* (13%), *Alectryon diversifolius* (13%), *Alstonia constricta* (13%), *Atalaya salicifolia* (13%), *Backhousia kingii* (13%), *Barklya syringifolia* (13%), *Breynia oblongifolia* (13%), *Cassytha pubescens* (13%), *Claoxylon australe* (13%), *Cleistanthus cunninghamii* (1, 13%), *Clerodendrum floribundum* (13%), *Croton stigmatosus* (1, 13%), *Cupaniopsis parvifolia* (13%), *Cupaniopsis wadsworthii* (13%), *Cyclophyllum coprosmoides* var. *coprosmoides* (13%), *Dansiea elliptica* (13%), *Denhamia oleaster* (1, 13%), *Dioscorea transversa* (13%), *Diplocyclos palmatus* subsp. *palmatus* (13%), *Dockrillia bowmanii* (13%), *Dodonaea viscosa* subsp. *burmanniana* (13%), *Drypetes deplanchei* (13%), *Elaeodendron melanocarpum* (13%), *Elattostachys xylocarpa* (5, 13%), *Erythroxylum australe* (13%), *Euroschinus falcatus* (13%), *Ficus indet.* (13%), *Ficus opposita* (13%), *Ficus rubiginosa* (13%), *Flueggea leucopyrus* (8, 13%), *Geitonoplesium cymosum* (13%), *Grevillea helmsiae* (13%), *Harnieria hygrophiloides* (13%), *Hoya australis* subsp. *australis* (1, 13%), *Ixora queenslandica* (13%), *Jasminum didymum* subsp. *racemosum* (13%), *Mallotus claoxyloides* (30, 13%), *Mallotus philippensis* (1, 13%), *Marsdenia indet.* (13%), *Micromelum minutum* (1, 13%), *Notelaea microcarpa* (13%), *Olearia canescens* (13%), *Olearia canescens* subsp. *discolor* (13%), *Opuntia tomentosa*\* (1, 13%), *Pandorea pandorana* (13%), *Parsonsia lanceolata* (13%), *Parsonsia leichhardtii* (1, 13%), *Parsonsia paulforsteri* (13%), *Parsonsia rotata* (13%), *Parsonsia straminea* (13%), *Phyllanthus microcladus* (13%), *Pleogyne australis* (13%), *Polyscias elegans* (13%), *Psychotria daphnoides* (13%), *Pyrrosia confluens* (13%), *Solanum furfuraceum* (13%), *Stephania renifolia* (13%), *Tarennia indet.* (1, 13%), *Trema tomentosa* (13%), *Ventilago pubiflora* (13%), *Vitex lignum-vitae* (13%), *Xylosma terrae-reginae* (13%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Technical Description****Regional ecosystem: 11.11.18****Shrub 2****Stratum:****Height avg. = 1.9m, range 0.8-3m, 3 sites****Crown cover avg. = 18.3%, range 5.0-30.0%, 3 sites**

*Dominant species (relative cover, frequency):* *Murraya ovatifoliolata* (37, 25%), *Flueggea leucopyrus* (5, 25%), *Solanum seforthianum*\* (4, 25%), *Carissa ovata* (3, 38%), *Alyxia ruscifolia* (1, 25%)

*Frequent species (cover, frequency):* *Carissa ovata* (38%), *Alyxia ruscifolia* (25%), *Flueggea leucopyrus* (1, 25%), *Murraya ovatifoliolata* (10, 25%), *Solanum seforthianum*\* (25%), *Acalypha eremorum* (1, 13%), *Aidia racemosa* (13%), *Alchornea ilicifolia* (13%), *Breynia oblongifolia* (13%), *Capparis ornans* (13%), *Cassytha pubescens* (13%), *Cynanchum viminalis* subsp. *brunonianum* (13%), *Deeringia amarantoides* (13%), *Denhamia pittosporoides* subsp. *pittosporoides* (13%), *Dioscorea transversa* (13%), *Erythroxylum australe* (13%), *Everistia vacciniifolia* forma *vacciniifolia* (13%), *Glossocarya hemiderma* (1, 13%), *Grewia latifolia* (13%), *Hibiscus heterophyllus* (1, 13%), *Hovea longipes* (5, 13%), *Jasminum didymum* subsp. *racemosum* (1, 13%), *Lantana camara*\* (13%), *Macrozamia miquelii* (13%), *Mallotus claoxyloides* (5, 13%), *Marsdenia microlepis* (13%), *Melodorum leichhardtii* (5, 13%), *Micromelum minutum* (13%), *Pandorea pandorana* (13%), *Passiflora suberosa*\* (13%), *Pleogyne australis* (13%), *Rivina humilis*\* (3, 13%), *Secamone elliptica* (13%), *Smilax australis* (13%), *Solanum stelligerum* (3, 13%), *Tinospora smilacina* (13%), *Trophis scandens* subsp. *scandens* (13%), *Turraea pubescens* (13%)

**Stratum: Ground****Height avg. = 0.4m, range 0.1-0.65m, 8 sites****PFC avg. = 25.0%, range 5-55%, 8 sites**

*Dominant species (relative cover, frequency):* *Gahnia aspera* (22, 25%), *Rivina humilis*\* (21, 63%), *Ancistrachne uncinulata* (21, 88%), *Oplismenus aemulus* (16, 88%), *Coatesia paniculata* (12, 25%)

*Frequent species (cover, frequency):* **GRAMINOIDS:** *Ancistrachne uncinulata* (3, 88%), *Oplismenus aemulus* (7, 88%), *Cyperus gracilis* (75%), *Ottochloa gracillima* (5, 50%), *Aristida gracilipes* (25%), *Chloris truncata* (25%), *Dinebra decipiens* (25%), *Gahnia aspera* (2, 25%), *Megathyrsus maximus*\* (1, 25%), *Scleria brownii* (25%), *Chrysopogon sylvaticus* (13%), *Cymbopogon refractus* (13%), *Digitaria minima* (13%), *Enteropogon ramosus* (13%), *Enteropogon unispiceus* (2, 13%), *Panicum effusum* (13%), *Paspalidium criniforme* (13%), *Setaria oplismenoides* (13%)

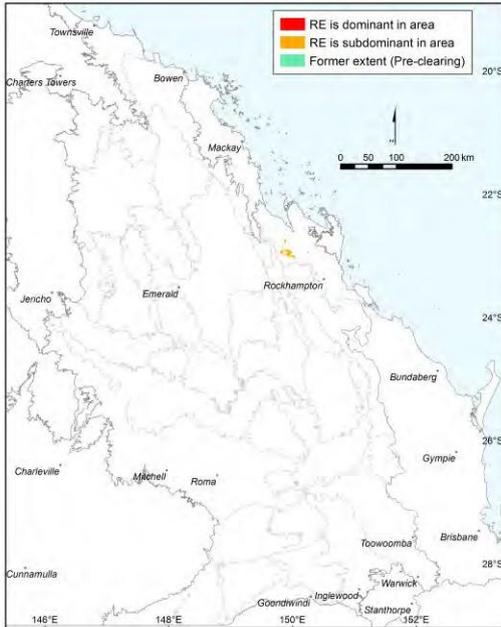
**FORBS:** *Geitonoplesium cymosum* (75%), *Pseuderanthemum variabile* (63%), *Rivina humilis*\* (10, 63%), *Solanum seforthianum*\* (1, 63%), *Glossocarya hemiderma* (2, 50%), *Lantana montevidensis*\* (50%), *Pandorea pandorana* (50%), *Plumbago zeylanica* (1, 50%), *Adiantum hispidulum* (38%), *Breynia oblongifolia* (38%), *Cissus oblonga* (38%), *Croton acronychioides* (38%), *Deeringia amarantoides* (1, 38%), *Desmodium brachypodium* (38%), *Dioscorea transversa* (38%), *Doryopteris concolor* (38%), *Erigeron sumatrensis*\* (38%), *Harnieria hygrophiloides* (38%), *Jasminum didymum* subsp. *racemosum* (38%), *Jasminum simplicifolium* subsp. *australiense* (1, 38%), *Lantana camara*\* (38%), *Murraya ovatifoliolata* (1, 38%), *Nyssanthus diffusa* (1, 38%), *Pellaea nana* (38%), *Secamone elliptica* (38%), *Smilax australis* (38%), *Solanum stelligerum* (38%), *Abutilon oxycarpum* (25%), *Alyxia ruscifolia* (1, 25%), *Backhousia angustifolia* (25%), *Carissa ovata* (25%), *Coatesia paniculata* (1, 25%), *Diplocyclos palmatus* subsp. *palmatus* (25%), *Everistia vacciniifolia* var. *vacciniifolia* (25%), *Grewia latifolia* (25%), *Hoya australis* subsp. *australis* (2, 25%), *Melodorum leichhardtii* (2, 25%), *Nicotiana forsteri* (25%), *Parsonsia lanceolata* (25%), *Psychotria daphnoides* (25%), *Rhynchosia acuminatissima* (25%), *Abutilon oxycarpum* var. *oxycarpum* (2, 13%), *Acalypha capillipes* (13%), *Acalypha eremorum* (13%), *Aneilema acuminatum* (1, 13%), *Aristolochia pubera* (13%), *Arytera divaricata* (13%), *Bidens bipinnata*\* (13%), *Brachychiton rupestris* (13%), *Bursaria incana* (13%), *Capparis arborea* (13%), *Cayratia acris* (13%), *Chamaecrista rotundifolia* var. *rotundifolia*\* (13%), *Cheilanthes tenuifolia* (13%), *Cissus reniformis* (1, 13%), *Cleistanthus cunninghamii* (13%), *Clematicissus opaca* (13%), *Crassocephalum crepidioides*\* (13%), *Croton phebaloides* (13%), *Cyanthillium cinereum* (13%), *Cynanchum viminalis* subsp. *brunonianum* (13%), *Dendrocnide photinophylla* (13%), *Desmodium gunnii* (13%), *Dianella caerulea* (13%), *Diospyros fasciculosa* (13%), *Diospyros geminata* (13%), *Emilia sonchifolia*\* (13%), *Erythroxylum australe* (13%), *Everistia vacciniifolia* forma *vacciniifolia* (13%), *Gynura drymophila* (13%), *Lomandra multiflora* subsp. *multiflora* (13%), *Macrozamia miquelii* (13%), *Mallotus claoxyloides* (2, 13%), *Malvastrum americanum* (13%), *Malvastrum americanum* var. *americanum*\* (13%), *Marsdenia micradenia* (13%), *Marsdenia pleiadenia* (13%), *Micromelum minutum* (1, 13%), *Olearia canescens* subsp. *discolor* (13%), *Pandorea floribunda* (13%), *Parsonsia plaesiophylla* (13%), *Parsonsia velutina* (13%), *Passiflora aurantia* (1, 13%), *Passiflora aurantia* var. *aurantia* (1, 13%), *Peperomia blanda* var. *floribunda* (13%), *Phyllanthus gunnii* (13%), *Pittosporum viscidum* (13%), *Plectranthus graveolens* (13%), *Pleogyne australis* (13%), *Praxelis clematidea*\* (13%), *Psydrax odorata* subsp. *australiana* (13%), *Pteris tremula* (13%), *Pyrrosia confluens* (13%), *Pyrrosia rupestris* (13%), *Senna surattensis* (13%), *Sigesbeckia orientalis* (13%), *Solanum nigrum* subsp. *nigrum*\* (13%), *Solanum nodiflorum*\* (13%), *Stephania renifolia* (13%), *Tinospora smilacina* (13%), *Trema tomentosa* (13%), *Trophis scandens* subsp. *scandens* (1, 13%), *Vitex melicopea* (13%), *Zehneria cunninghamii* (13%)

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Semi-evergreen vine thicket on serpentinite



Pre-clearing area (ha), remnant area (ha) and per cent remaining: 1,894 1,635 86%

Species\_recorded: Total: 87; woody: 67; ground: 28; Avg. spp/site: 66.0; std dev.: 0.0, 1 site(s)

Basal area: Avg./site: 27.5 m<sup>2</sup>/ha, range: 27.5 - 28 m<sup>2</sup>/ha, std. deviation: 0 m<sup>2</sup>/ha, 1 site(s)

Structural formation: Low closed-forest: 50%; closed-forest: 50%, 2 site(s)

Representative\_sites 17661, 41035.

**Stratum: Emergent**

Height avg. = 19.0m, 1 site

Crown cover avg. = 10.0%, 1 site

Dominant species (relative cover, frequency): *Brachychiton rupestris* (79, 50%), *Gyrocarpus americanus subsp. americanus* (16, 50%), *Alstonia constricta* (2, 50%), *Alphitonia excelsa* (2, 50%), *Acacia fasciculifera* (2, 50%)

Frequent species (cover, frequency): *Acacia fasciculifera* (50%), *Alphitonia excelsa* (50%), *Alstonia constricta* (50%), *Brachychiton rupestris* (5, 50%), *Gyrocarpus americanus subsp. americanus* (1, 50%)

**Stratum: Tree 1**

Height avg. = 12.0m, range 11-13m, 2 sites

Crown cover avg. = 32.5%, range 15.0-50.0%, 2 sites

Dominant species (relative cover, frequency): *Geijera salicifolia* (44, 50%), *Backhousia kingii* (43, 100%), *Flindersia australis* (30, 50%), *Drypetes deplanchei* (8, 100%), *Grevillea helmsiae* (7, 100%)

Frequent species (cover, frequency): *Backhousia kingii* (15, 100%), *Drypetes deplanchei* (1, 100%), *Flindersia collina* (100%), *Grevillea helmsiae* (3, 100%), *Owenia venosa* (100%), *Polyscias elegans* (100%), *Acacia fasciculifera* (50%), *Euroschinus falcatus* (50%), *Flindersia australis* (5, 50%), *Geijera salicifolia* (8, 50%), *Gossia bidwillii* (50%), *Harpullia pendula* (1, 50%), *Melia azedarach* (50%), *Planchonella cotinifolia* (50%), *Psydrax oleifolia* (50%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.11.21

### Stratum: Tree 2

Height avg. = 5.0m, range 5-5m, 2 sites

Crown cover avg. = 35.0%, range 35.0-35.0%, 2 sites

*Dominant species (relative cover, frequency): Gossia bidwillii (30, 50%), Croton insularis (18, 100%), Flindersia australis (8, 50%), Exocarpos latifolius (8, 50%), Erythroxylum sp. (Splityard Creek L.Pedley 5360) (8, 50%)*

*Frequent species (cover, frequency): Croton insularis (5, 100%), Notelaea microcarpa (1, 100%), Strychnos psilosperma (100%), Alchornea ilicifolia (50%), Alphonsea excelsa (50%), Alstonia constricta (50%), Austrosteenisia blackii var. blackii (50%), Brachychiton rupestris (50%), Canavalia papuana (50%), Capparis arborea (1, 50%), Cayratia acris (50%), Cayratia trifolia (50%), Cissus oblonga (1, 50%), Claoxylon tenerifolium subsp. tenerifolium (50%), Cupaniopsis wadsworthii (50%), Cyclophyllum coprosmoides (1, 50%), Cynanchum viminalis subsp. brunonianum (50%), Diospyros humilis (50%), Drypetes deplanchei (50%), Erythroxylum sp. (Splityard Creek L.Pedley 5360) (3, 50%), Exocarpos latifolius (3, 50%), Flindersia australis (3, 50%), Gossia bidwillii (10, 50%), Grevillea helmstiae (50%), Jasminum simplicifolium subsp. australiense (50%), Mallotus claoxylodes (50%), Micromelum minutum (50%), Psydrax oleifolia (50%), Terminalia porphyrocarpa (50%), Tetrastigma nitens (1, 50%), Turraea pubescens (50%)*

### Stratum: Shrub 1

Height avg. = 1.1m, range 1-1.2m, 2 sites

Crown cover avg. = 7.5%, range 5.0-10.0%, 2 sites

*Dominant species (relative cover, frequency): Croton insularis (19, 50%), Alchornea ilicifolia (15, 50%), Murraya ovatifoliolata (11, 100%), Alyxia ruscifolia (7, 50%), Carissa ovata (7, 100%)*

*Frequent species (cover, frequency): Antirhea putaminosa (100%), Breynia oblongifolia (100%), Carissa ovata (1, 100%), Melodorum leichhardtii (1, 100%), Murraya ovatifoliolata (1, 100%), Turraea pubescens (100%), Acacia fasciculifera (50%), Alchornea ilicifolia (2, 50%), Alstonia constricta (1, 50%), Alyxia ruscifolia (1, 50%), Anisomeles indet. (50%), Backhousia kingii (50%), Bridelia leichhardtii (50%), Cissus oblonga (1, 50%), Croton insularis (3, 50%), Cyclophyllum coprosmoides (50%), Cynanchum viminalis subsp. australe (50%), Deeringia amaranthoides (50%), Diospyros geminata (50%), Drypetes deplanchei (50%), Euroschinus falcatus (50%), Exocarpos latifolius (50%), Geijera salicifolia (50%), Glossocarya hemiderma (50%), Gossia bidwillii (50%), Gyrocarpus americanus subsp. americanus (50%), Homalium alnifolium (50%), Lantana camara\* (50%), Notelaea microcarpa (50%), Pavetta australiensis (50%), Pavetta australiensis var. australiensis (50%), Phytolacca octandra\* (50%), Planchonella cotinifolia (50%), Psychotria daphnoides var. angustifolia (50%), Psydrax odorata subsp. australiana (1, 50%), Senna occidentalis\* (50%), Solanum seafortianum\* (50%), Solanum stelligerum (50%), Strychnos psilosperma (50%), Tinospora smilacina (50%), Trema tomentosa var. aspera (50%), Wrightia saligna (50%)*

### Stratum: Ground

Height avg. = 0.1m, 1 site

PFC avg. = 1.0%, 1 site

*Dominant species (relative cover, frequency): Dysphania carinata (5, 100%), Ancistrachne uncinulata (5, 100%), Anisomeles indet. (5, 100%), Capparis arborea (5, 100%), Cayratia acris (5, 100%)*

*Frequent species (cover, frequency): GRAMINOIDS: Ancistrachne uncinulata (100%), Cyperus enervis (100%)  
FORBS: Abutilon oxycarpum var. oxycarpum (100%), Anisomeles indet. (100%), Capparis arborea (100%), Cayratia acris (100%), Cayratia trifolia (100%), Cheilanthes sieberi subsp. sieberi (100%), Chenopodium indet. (100%), Cissus oblonga (100%), Deeringia amaranthoides (100%), Dysphania carinata (100%), Einadia indet. (100%), Gomphocarpus physocarpus\* (100%), Parsonsia plaesiophylla (100%), Passiflora suberosa\* (100%), Pittosporum spinescens (100%), Pterocaulon serrulatum (100%), Senna sophera (100%), Sida cordifolia\* (100%), Solanum furfuraceum (100%), Tinospora smilacina (100%)*

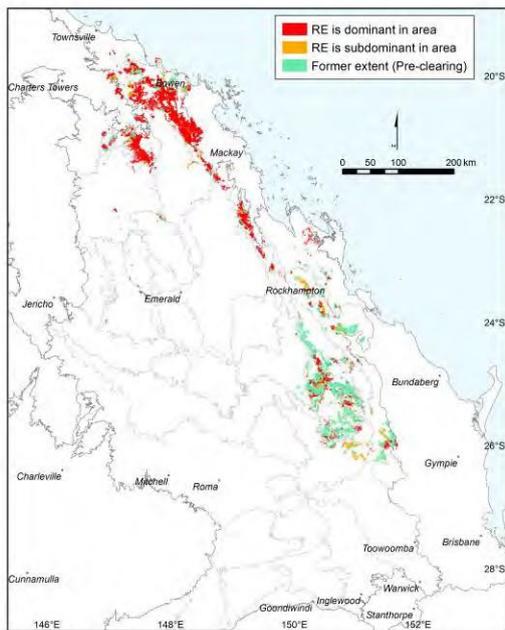
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**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Eucalyptus crebra woodland on igneous rocks**



Annie Kelly

**Pre-clearing area (ha), remnant area (ha) and per cent remaining:** 1,347,742 811,573 60%

**Species recorded:** Total: 397; woody: 109; ground: 316; Avg. spp./site: 30.6; std dev.: 12.4, 22 site(s)

**Basal area:** Avg./site: 11.4 m<sup>2</sup>/ha, range: 3.0 - 40 m<sup>2</sup>/ha, std. deviation: 8 m<sup>2</sup>/ha, 38 site(s)

**Structural formation:** Woodland: 53%; open-woodland: 42%; low open-woodland: 5%, 38 site(s)

**Representative sites** 14845, 15929, 16640, 16857, 16865, 17029, 17036, 17082, 17464, 17465, 17467, 17472, 17474, 17480, 17497, 17601, 17611, 17616, 17618, 17620, 17621, 19041, 19042, 19067, 19083, 19088, 19089, 19096, 19097, 19098, 19110, 19235, 19260, 19267, 28725, 40882, 40884, 59075.

**Stratum: Emergent**

**Height avg. = 24.0m, 1 site**

**Crown cover avg. = 6.1%, 1 site**

*Frequent species (cover, frequency): Corymbia tessellaris (6, 3%)*

**Stratum: Tree 1**

**Height avg. = 15.8m, range 8-23m, 38 sites**

**Crown cover avg. = 23.2%, range 7.0-79.2%, 38 sites**

*Dominant species (relative cover, frequency): Eucalyptus crebra (80, 97%), Corymbia erythrophloia (29, 45%)*

*Frequent species (cover, frequency): Eucalyptus crebra (17, 97%), Corymbia erythrophloia (6, 45%), Corymbia dallachiana (1, 16%), Eucalyptus melanophloia (9, 16%), Corymbia clarksoniana (11, 5%), Acacia disparrima subsp. disparrima (11, 3%), Allocasuarina luehmannii (3%), Brachychiton populneus (1, 3%), Bursaria incana (5, 3%), Callitris glaucophylla (10, 3%), Corymbia tessellaris (3%), Eucalyptus exserta (1, 3%), Eucalyptus persistens (1, 3%), Eucalyptus tereticornis (2, 3%), Melaleuca viridiflora (3%), Pleiogynium timorensis (2, 3%)*

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.12.1

### Stratum: Tree 2

Height avg. = 9.8m, range 4-15m, 20 sites

Crown cover avg. = 7.9%, range 1.0-35.0%, 22 sites

Dominant species (relative cover, frequency): *Eucalyptus crebra* (66, 39%)

Frequent species (cover, frequency): *Eucalyptus crebra* (4, 39%), *Corymbia erythrophloia* (3, 18%), *Corymbia clarksoniana* (1, 8%), *Alphitonia excelsa* (3, 5%), *Bursaria incana* (2, 5%), *Corymbia dallachiana* (1, 5%), *Acacia aulacocarpa* (5, 3%), *Acacia disparrima subsp. disparrima* (5, 3%), *Acacia salicina* (1, 3%), *Angophora leiocarpa* (5, 3%), *Brachychiton populneus* (2, 3%), *Callitris glaucophylla* (5, 3%), *Corymbia indet.* (1, 3%), *Diospyros humilis* (1, 3%), *Erythrina vespertilio* (3%), *Eucalyptus melanophloia* (18, 3%), *Eucalyptus platyphylla* (3, 3%), *Euroschinus falcatus* (3%), *Euroschinus falcatus var. angustifolius* (3, 3%), *Geijera salicifolia* (3%), *Lophostemon suaveolens* (2, 3%), *Petalostigma pubescens* (1, 3%), *Planchonia careya* (3, 3%), *Psyrax oleifolia* (10, 3%)

### Stratum: Tree 3

Height avg. = 5.8m, range 3.5-8m, 9 sites

Crown cover avg. = 3.9%, range 0.0-12.0%, 10 sites

Frequent species (cover, frequency): *Eucalyptus crebra* (1, 11%), *Alphitonia excelsa* (2, 5%), *Acacia aulacocarpa* (2, 3%), *Acacia disparrima subsp. disparrima* (5, 3%), *Acacia fasciculifera* (3%), *Allocasuarina luehmannii* (4, 3%), *Breynia oblongifolia* (1, 3%), *Bursaria incana* (1, 3%), *Callitris glaucophylla* (2, 3%), *Casuarina cristata* (2, 3%), *Corymbia clarksoniana* (4, 3%), *Eucalyptus melanophloia* (4, 3%), *Geijera salicifolia* (1, 3%), *Lophostemon confertus* (3%), *Petalostigma pubescens* (2, 3%), *Xanthorrhoea johnsonii* (3, 3%)

### Stratum: Shrub 1

Height avg. = 2.1m, range 1-4m, 31 sites

Crown cover avg. = 7.8%, range 0.0-71.0%, 34 sites

Dominant species (relative cover, frequency): *Eucalyptus crebra* (39, 29%), *Alphitonia excelsa* (19, 21%)

Frequent species (cover, frequency): *Eucalyptus crebra* (1, 29%), *Alphitonia excelsa* (1, 21%), *Grewia retusifolia* (16%), *Corymbia erythrophloia* (13%), *Petalostigma pubescens* (4, 13%), *Sida hackettiana* (1, 13%), *Acacia disparrima subsp. disparrima* (2, 11%), *Carissa ovata* (1, 11%), *Hibiscus heterophyllus* (1, 11%), *Lantana camara\** (3, 11%), *Turraea pubescens* (3, 11%), *Acacia leiocalyx subsp. leiocalyx* (2, 8%), *Breynia oblongifolia* (8%), *Bursaria incana* (1, 8%), *Corymbia dallachiana* (8%), *Planchonia careya* (1, 8%), *Acacia indet.* (5%), *Alectryon connatus* (1, 5%), *Allocasuarina luehmannii* (1, 5%), *Bursaria spinosa subsp. spinosa* (5%), *Capparis canescens* (5%), *Coelospermum reticulatum* (5%), *Eremophila bignoniiflora* (5%), *Geijera parviflora* (5%), *Geijera salicifolia* (1, 5%), *Grewia latifolia* (1, 5%), *Indigofera pratensis* (1, 5%), *Melaleuca viridiflora* (5%), *Myoporum acuminatum* (5%), *Notelaea microcarpa* (5%), *Psyrax odorata* (1, 5%), *Santalum lanceolatum* (2, 5%), *Vachellia bidwillii* (36, 5%), *Acacia crassa* (2, 3%), *Acacia fasciculifera* (3%), *Acacia humifusa* (3%), *Acacia implexa* (3%), *Acacia leptostachya* (3%), *Acacia maidenii* (3%), *Acacia nesophila* (3%), *Acacia pustula* (3%), *Acacia salicina* (3%), *Albizia canescens* (1, 3%), *Alectryon diversifolius* (2, 3%), *Alstonia constricta* (1, 3%), *Archidendropsis basaltica* (2, 3%), *Atalaya hemiglauc* (3%), *Brachychiton acerifolius* (3%), *Brachychiton populneus* (3%), *Breynia cernua* (3%), *Bridelia tomentosa* (10, 3%), *Capparis indet.* (3%), *Cassia brewsteri* (1, 3%), *Cassia tomentella* (2, 3%), *Cryptostegia grandiflora\** (1, 3%), *Denhamia disperma* (3%), *Denhamia oleaster* (2, 3%), *Diospyros geminata* (2, 3%), *Dodonaea viscosa* (10, 3%), *Elaeodendron australe var. integrifolium* (3%), *Erythrina vespertilio* (2, 3%), *Erythroxylum australe* (1, 3%), *Eucalyptus exserta* (3%), *Eucalyptus platyphylla* (3%), *Eucalyptus tereticornis* (3%), *Flueggea leucopyrus* (3%), *Flueggea virosa subsp. melanthesoides* (3%), *Glochidion indet.* (1, 3%), *Grewia indet.* (3%), *Grewia scabrella* (5, 3%), *Hibiscus meraukensis* (3%), *Jasminum didymum subsp. lineare* (1, 3%), *Larsenaikia jardinei* (3%), *Lophostemon confertus* (1, 3%), *Macrozamia miquelii* (5, 3%), *Mallotus philippensis* (1, 3%), *Opuntia stricta\** (1, 3%), *Opuntia tomentosa\** (3%), *Persoonia falcata* (3%), *Salsola australis* (1, 3%), *Tephrosia astragaloides* (2, 3%), *Triumfetta rhomboidea\** (3%), *Urena lobata\** (3%), *Vachellia farnesiana\** (3%), *Waltheria indica* (3%), *Xanthorrhoea johnsonii* (4, 3%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.12.1

### Shrub 2 Stratum:

Height avg. = 1.2m, range 0.7-2m, 8 sites

Crown cover avg. = 6.4%, range 1.0-30.0%, 9 sites

*Frequent species (cover, frequency): Eucalyptus crebra (8%), Grewia latifolia (1, 8%), Carissa ovata (2, 5%), Acacia deanei (1, 3%), Acacia disparrima subsp. disparrima (3, 3%), Acacia nesophila (3%), Alphitonia excelsa (3%), Breynia oblongifolia (3%), Capparis canescens (3%), Clerodendrum floribundum (3%), Corymbia erythrophloia (3%), Cryptostegia grandiflora\* (3%), Cycas media (3, 3%), Gomphocarpus physocarpus\* (3%), Grewia retusifolia (3%), Lantana camara\* (5, 3%), Macrozamia miquelii (8, 3%), Murraya ovatifoliolata (3%), Persoonia falcata (3%), Sida cordifolia\* (30, 3%), Sida hackettiana (3%), Stachytarpheta jamaicensis\* (3%)*

### Stratum: Ground

Height avg. = 0.6m, range 0.01-1.5m, 21 sites

PFC avg. = 49.5%, range 7-90%, 22 sites

*Dominant species (relative cover, frequency): Bothriochloa pertusa\* (56, 32%), Themeda triandra (33, 55%), Heteropogon contortus (17, 59%), Cymbopogon refractus (13, 36%), Cenchrus ciliaris\* (13, 23%)*

*Frequent species (cover, frequency): GRAMINOIDS: Heteropogon contortus (7, 59%), Themeda triandra (17, 55%), Panicum effusum (1, 41%), Cymbopogon refractus (9, 36%), Melinis repens\* (1, 36%), Bothriochloa pertusa\* (23, 32%), Scleria mackaviensis (27%), Cenchrus ciliaris\* (7, 23%), Fimbristylis dichotoma (1, 23%), Chrysopogon fallax (1, 18%), Enneapogon lindleyanus (2, 18%), Abildgaardia ovata (14%), Aristida gracilipes (4, 14%), Bothriochloa decipiens (8, 14%), Bothriochloa decipiens var. decipiens (7, 14%), Cyperus fulvus (14%), Cyperus gracilis (2, 14%), Cyperus indet. (1, 14%), Eragrostis indet. (1, 14%), Panicum indet. (14%), Paspalidium gracile (14%), Scleria brownii (1, 14%), Aristida calycina (5, 9%), Aristida indet. (2, 9%), Aristida personata (5, 9%), Aristida queenslandica var. dissimilis (3, 9%), Arundinella nepalensis (7, 9%), Eragrostis brownii (10, 9%), Heteropogon triticeus (3, 9%), Paspalidium distans (13, 9%), Paspalidium indet. (2, 9%)*

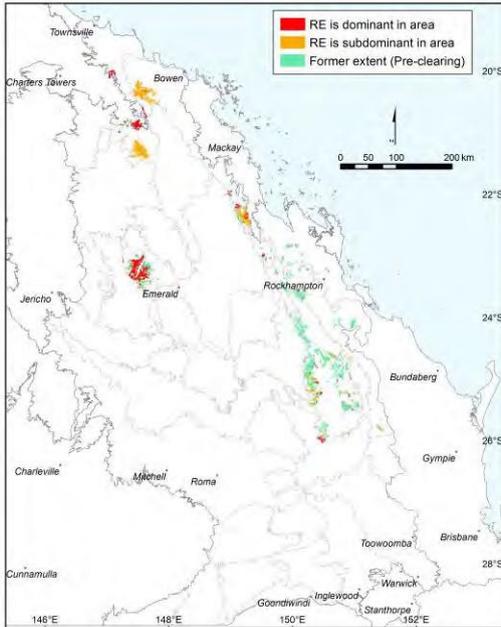
*FORBS: Cyanthillium cinereum (59%), Phyllanthus virgatus (55%), Rostellularia adscendens (36%), Evolvulus alsinoides (32%), Galactia tenuiflora (27%), Grewia latifolia (1, 27%), Chamaecrista absus var. absus (23%), Eustrephus latifolius (23%), Indigofera pratensis (23%), Rhynchosia minima (1, 23%), Crotalaria montana (18%), Euphorbia indet. (18%), Grewia retusifolia (1, 18%), Pterocaulon redolens (18%), Sida hackettiana (18%), Spermacoce brachystema (18%), Spermacoce multicaulis (18%), Tephrosia juncea (18%), Alphitonia excelsa (14%), Apowollastonia spilanthis (14%), Breynia oblongifolia (1, 14%), Brunoniella acaulis (14%), Cheilanthes sieberi (14%), Dianella caerulea (14%), Dianella indet. (1, 14%), Emilia sonchifolia\* (1, 14%), Glycine indet. (1, 14%), Glycine tabacina (1, 14%), Indigofera linnaei (14%), Lomandra longifolia (14%), Pterocaulon indet. (14%), Stylosanthes guianensis\* (1, 14%), Stylosanthes indet. (14%), Stylosanthes scabra\* (4, 14%), Zornia indet. (14%), Achyranthes aspera (9%), Alysicarpus ovalifolius\* (9%), Chamaecrista indet. (9%), Chrysocephalum apiculatum (9%), Coelospermum reticulatum (9%), Commelina diffusa (9%), Desmodium campylocaulon (1, 9%), Eremophila debilis (9%), Galactia tenuiflora var. lucida (2, 9%), Glycine tomentella (3, 9%), Indigofera hirsuta (3, 9%), Indigofera linifolia (2, 9%), Ipomoea polymorpha (1, 9%), Lobelia indet. (9%), Melhania oblongifolia (9%), Murdannia graminea (9%), Opercularia diphylla (9%), Oxalis perennans (9%), Parsonsia lanceolata (9%), Peripleura hispida var. setosa (2, 9%), Praxelis clematidea\* (3, 9%), Solanum ellipticum (9%), Tephrosia filipes (1, 9%), Vittadinia sulcata (9%), Wahlenbergia gracilis (3, 9%)*

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Eucalyptus melanophloia woodland on igneous rocks**



Annie Kelly

**Pre-clearing area (ha), remnant area (ha) and per cent remaining:** 455,169 185,247 41%

**Species recorded:** Total: 104; woody: 9; ground: 95; Avg. spp./site: 38.3; std dev.: 3.9, 3 site(s)

**Basal area:** Avg./site: 10.5 m<sup>2</sup>/ha, range: 5.0 - 17 m<sup>2</sup>/ha, std. deviation: 5 m<sup>2</sup>/ha, 4 site(s)

**Structural formation:** Woodland: 75%; low open-woodland: 25%, 4 site(s)

**Representative sites** 13969, 16596, 16862, 17652.

**Stratum: Tree 1**

**Height avg. = 14.3m, range 7-20m, 4 sites**

**Crown cover avg. = 26.0%, range 11.0-38.0%, 4 sites**

*Dominant species (relative cover, frequency): Eucalyptus melanophloia (82, 100%), Corymbia erythrophloia (28, 50%), Alphitonia excelsa (9, 25%), Eucalyptus crebra x E. melanophloia (9, 25%)*

*Frequent species (cover, frequency): Eucalyptus melanophloia (21, 100%), Corymbia erythrophloia (9, 50%), Alphitonia excelsa (1, 25%), Eucalyptus crebra x E. melanophloia (3, 25%)*

**Stratum: Shrub 1**

**Height avg. = 1.8m, range 1-2.5m, 3 sites**

**Crown cover avg. = 2.7%, range 1.0-5.0%, 3 sites**

*Dominant species (relative cover, frequency): Acacia leiocalyx subsp. leiocalyx (100, 25%), Grewia latifolia (71, 25%), Eucalyptus melanophloia (54, 50%), Hibiscus heterophyllus (7, 25%), Eremophila mitchellii (7, 25%)*

*Frequent species (cover, frequency): Eucalyptus melanophloia (1, 50%), Acacia leiocalyx subsp. leiocalyx (5, 25%), Cassia brewsteri (25%), Eremophila mitchellii (25%), Grewia latifolia (1, 25%), Hibiscus heterophyllus (25%)*

**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Technical Description****Regional ecosystem: 11.12.2****Ground  
Stratum:****Height avg. = 0.5m, range 0.45-0.6m, 3 sites****PFC avg. = 66.7%, range 40-90%, 3 sites**

*Dominant species (relative cover, frequency):* *Aristida personata* (38, 33%), *Tripogon loliiformis* (31, 33%), *Eragrostis brownii* (31, 33%), *Heteropogon contortus* (25, 100%), *Themeda triandra* (19, 67%)

*Frequent species (cover, frequency):* GRAMINOIDS: *Cymbopogon refractus* (4, 100%), *Heteropogon contortus* (13, 100%), *Arundinella nepalensis* (5, 67%), *Chloris divaricata* (67%), *Cyperus gracilis* (2, 67%), *Themeda triandra* (17, 67%), *Abildgaardia ovata* (33%), *Aristida calycina* var. *calycina* (1, 33%), *Aristida personata* (35, 33%), *Aristida queenslandica* (33%), *Bothriochloa bladhii* subsp. *bladhii* (33%), *Bothriochloa bladhii* subsp. *glabra*\* (2, 33%), *Bothriochloa decipiens* var. *decipiens* (5, 33%), *Cymbopogon queenslandicus* (33%), *Cyperus fulvus* (33%), *Cyperus polystachyos* (33%), *Digitaria bicornis* (33%), *Digitaria hystrichoides* (33%), *Echinopogon ovatus* (33%), *Enneapogon lindleyanus* (33%), *Eragrostis brownii* (20, 33%), *Eragrostis leptocarpa* (33%), *Eragrostis sororia* (33%), *Eulalia aurea* (33%), *Fimbristylis dichotoma* (33%), *Melinis repens*\* (4, 33%), *Panicum decompositum* (5, 33%), *Panicum effusum* (33%), *Panicum simile* (1, 33%), *Paspalidium caespitosum* (33%), *Sporobolus creber* (33%), *Tripogon loliiformis* (20, 33%)

FORBS: *Sida hackettiana* (100%), *Brunoniella australis* (67%), *Cheilanthes sieberi* (67%), *Cyanthillium cinereum* (67%), *Dianella caerulea* (67%), *Murdannia graminea* (67%), *Oxalis perennans* (67%), *Phyllanthus virgatus* (67%), *Rhynchosia minima* (67%), *Boerhavia dominii* (33%), *Breynia oblongifolia* (33%), *Calotis cuneata* (33%), *Cheilanthes distans* (33%), *Chrysocephalum apiculatum* (33%), *Commelina* *indet.* (33%), *Desmodium rhytidophyllum* (33%), *Desmodium varians* (33%), *Drosera* *indet.* (33%), *Einadia hastata* (33%), *Eremophila debilis* (33%), *Euphorbia psammogeton* (33%), *Eustrephus latifolius* (33%), *Evolvulus alsinoides* (33%), *Glossocardia bidens* (33%), *Glycine tabacina* (33%), *Glycine tomentella* (33%), *Goodenia* *indet.* (33%), *Haloragis heterophylla* (33%), *Hypericum gramineum* (33%), *Indigofera* *indet.* (33%), *Jacksonia scoparia* (33%), *Lagenophora gracilis* (33%), *Lepidium africanum*\* (33%), *Leucopogon trichostylus* (33%), *Lobelia purpurascens* (33%), *Malvastrum americanum* var. *americanum*\* (33%), *Marsdenia viridiflora* (33%), *Mentha satureioides* (33%), *Opuntia stricta*\* (33%), *Opuntia tomentosa*\* (33%), *Oxalis* *indet.* (33%), *Portulaca oleracea*\* (33%), *Psydrax odorata* forma *buxifolia* (33%), *Pterocaulon redolens* (33%), *Rostellularia adscendens* (33%), *Rostellularia adscendens* subsp. *adscendens* (33%), *Solanum nemophilum* (33%), *Sonchus oleraceus*\* (33%), *Stackhousia muricata* (33%), *Tephrosia filipes* (33%), *Verbena litoralis*\* (33%), *Veronica plebeia* (33%), *Vittadinia sulcata* (33%), *Zornia muriculata* (33%)

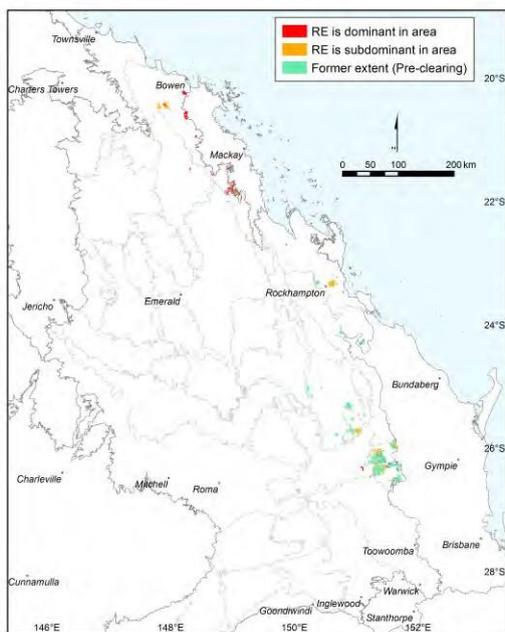
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**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. *indet.* after listed name = indeterminate species or genus

**Eucalyptus crebra, E. tereticornis, Angophora leiocarpa woodland on igneous rocks especially granite**



Pre-clearing area (ha), remnant area (ha) and per cent remaining: 158,098 55,734 35%

Species\_recorded: Total: 149; woody: 30; ground: 129; Avg. spp./site: 36.4; std dev.: 8.5, 5 site(s)

Basal area: Avg./site: 13.0 m<sup>2</sup>/ha, range: 8.5 - 20 m<sup>2</sup>/ha, std. deviation: 4 m<sup>2</sup>/ha, 8 site(s)

Structural formation: Woodland: 50%; open-woodland: 50%, 8 site(s)

Representative\_sites 14846, 15770, 15772, 15933, 16627, 16647, 16648, 19232.

**Stratum: Emergent**

Height avg. = 24.5m, 1 site  
 Crown cover avg. = 6.0%, 1 site

Frequent species (cover, frequency): *Eucalyptus tereticornis* (6, 13%)

**Stratum: Tree 1**

Height avg. = 16.3m, range 10-24.5m, 8 sites  
 Crown cover avg. = 21.8%, range 12.0-35.0%, 8 sites

Dominant species (relative cover, frequency): *Eucalyptus crebra* (38, 88%), *Eucalyptus tereticornis* (37, 75%), *Angophora leiocarpa* (36, 25%), *Corymbia clarksoniana* (34, 50%), *Eucalyptus melanophloia* (34, 25%)

Frequent species (cover, frequency): *Eucalyptus crebra* (9, 88%), *Eucalyptus tereticornis* (8, 75%), *Corymbia clarksoniana* (5, 50%), *Angophora leiocarpa* (11, 25%), *Corymbia tessellaris* (2, 25%), *Eucalyptus melanophloia* (10, 25%), *Angophora subvelutina* (13%), *Eucalyptus melliodora* (13%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.12.3

### Stratum: Tree 2

Height avg. = 10.9m, range 7-14.5m, 5 sites

Crown cover avg. = 12.9%, range 2.0-35.0%, 7 sites

Dominant species (relative cover, frequency): *Angophora leiocarpa* (47, 25%), *Eucalyptus melanophloia* (47, 25%), *Corymbia clarksoniana* (41, 63%), *Corymbia tessellaris* (28, 25%), *Eucalyptus tereticornis* (26, 63%)

Frequent species (cover, frequency): *Corymbia clarksoniana* (7, 63%), *Eucalyptus tereticornis* (1, 63%), *Eucalyptus crebra* (2, 50%), *Angophora leiocarpa* (11, 25%), *Corymbia tessellaris* (5, 25%), *Eucalyptus melanophloia* (2, 25%), *Angophora subvelutina* (3, 13%), *Drynaria rigidula* (13%)

### Stratum: Tree 3

Crown cover avg. = 8.7%, range 2.0-12.0%, 3 sites

Dominant species (relative cover, frequency): *Corymbia clarksoniana* (44, 38%), *Petalostigma pubescens* (36, 25%), *Eucalyptus crebra* (26, 25%), *Angophora leiocarpa* (22, 25%)

Frequent species (cover, frequency): *Corymbia clarksoniana* (5, 38%), *Angophora leiocarpa* (3, 25%), *Eucalyptus crebra* (1, 25%), *Petalostigma pubescens* (3, 25%)

### Stratum: Shrub 1

Height avg. = 2.9m, range 1.2-5m, 5 sites

Crown cover avg. = 5.5%, range 0.0-23.0%, 8 sites

Dominant species (relative cover, frequency): *Acacia leiocalyx subsp. leiocalyx* (50, 38%), *Eucalyptus melanophloia* (35, 25%), *Jacksonia scoparia* (34, 25%), *Petalostigma pubescens* (25, 38%), *Acacia implexa* (15, 25%)

Frequent species (cover, frequency): *Acacia leiocalyx subsp. leiocalyx* (8, 38%), *Eucalyptus crebra* (38%), *Petalostigma pubescens* (1, 38%), *Acacia implexa* (1, 25%), *Eucalyptus melanophloia* (1, 25%), *Eucalyptus tereticornis* (25%), *Jacksonia scoparia* (3, 25%), *Acacia maidenii* (13%), *Angophora leiocarpa* (2, 13%), *Corymbia clarksoniana* (1, 13%), *Corymbia tessellaris* (1, 13%), *Dodonaea viscosa subsp. viscosa* (2, 13%), *Exocarpos cupressiformis* (1, 13%), *Grewia retusifolia* (13%), *Lophostemon confertus* (13%), *Melaleuca nervosa* (13%), *Sida hackettiana* (1, 13%), *Xanthorrhoea glauca* (6, 13%), *Xanthorrhoea latifolia* (13%)

### Stratum: Shrub 2

Height avg. = 1.2m, range 1.1-1.2m, 2 sites

Crown cover avg. = 3.5%, range 3.0-4.0%, 2 sites

Frequent species (cover, frequency): *Acacia maidenii* (13%), *Alphitonia excelsa* (13%), *Bridelia leichhardtii* (13%), *Diospyros geminata* (13%), *Eucalyptus tereticornis* (13%), *Gomphocarpus physocarpus\** (13%), *Hibiscus heterophyllus* (13%), *Macrozamia miquelii* (3, 13%), *Mallotus philippensis* (13%), *Planchonella pohlmaniana* (13%), *Xanthorrhoea glauca* (4, 13%), *Xanthorrhoea latifolia* (1, 13%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Technical Description****Regional ecosystem: 11.12.3****Ground  
Stratum:****Height avg. = 0.4m, range 0.2-0.6m, 5 sites****PFC avg. = 43.6%, range 12-95%, 5 sites**

*Dominant species (relative cover, frequency): Themeda triandra (23, 80%), Heteropogon contortus (21, 80%), Melinis repens\* (19, 80%), Arundinella nepalensis (10, 80%), Cymbopogon refractus (7, 60%)*

*Frequent species (cover, frequency): GRAMINOIDS: Arundinella nepalensis (3, 80%), Heteropogon contortus (5, 80%), Melinis repens\* (5, 80%), Themeda triandra (22, 80%), Cymbopogon refractus (2, 60%), Cyperus gracilis (1, 60%), Aristida calycina var. praealta (40%), Chrysopogon fallax (2, 40%), Cyperus fulvus (40%), Eragrostis spartinoides (1, 40%), Panicum simile (40%), Paspalidium distans (40%), Abildgaardia ovata (20%), Aristida calycina (20%), Aristida calycina var. calycina (20%), Aristida contorta (1, 20%), Aristida holathera var. holathera (2, 20%), Aristida indet. (20%), Aristida spuria (20%), Capillipedium spicigerum (20%), Chloris truncata (20%), Cymbopogon queenslandicus (5, 20%), Cyperus indet. (20%), Dichanthium sericeum subsp. sericeum (20%), Digitaria breviglumis (20%), Dinebra decipiens (1, 20%), Enneapogon intermedius (20%), Enneapogon polyphyllus (20%), Enteropogon indet. (20%), Eragrostis leptocarpa (1, 20%), Eragrostis sororia (25, 20%), Fimbristylis dichotoma (20%), Gahnia aspera (20%), Melinis minutiflora\* (5, 20%), Oplismenus aemulus (20%), Perotis rara (20%), Schizachyrium fragile (20%), Sporobolus creber (20%)*

*FORBS: Glycine tomentella (80%), Cyanthillium cinereum (60%), Opuntia stricta\* (60%), Alphonsea excelsa (40%), Cheilanthes sieberi (40%), Chrysocephalum apiculatum (1, 40%), Desmodium varians (40%), Glycine tabacina (40%), Lomandra leucocephala subsp. leucocephala (40%), Oxalis perennans (40%), Portulaca pilosa\* (40%), Wahlenbergia graniticola (1, 40%), Achyranthes aspera (20%), Alternanthera nana (20%), Anisomeles indet. (20%), Apowollastonia spilanthis (20%), Brachychiton populneus (20%), Brachycome microcarpa (20%), Breynia oblongifolia (20%), Brunoniella australis (20%), Cassinia laevis (20%), Centipeda minima (20%), Chamaecrista indet. (20%), Chamaecrista nomame var. nomame (20%), Clematicissus opaca (20%), Clerodendrum floribundum (20%), Commelina lanceolata (20%), Crotalaria montana (20%), Cupaniopsis parvifolia (20%), Cyclophyllum coprosmoides (20%), Desmodium rhytidophyllum (20%), Dianella brevipedunculata (20%), Dianella caerulea (20%), Dodonaea lanceolata (20%), Emilia sonchifolia\* (20%), Euphorbia sphaericus (20%), Euphorbia drummondii (20%), Euphorbia indet. (20%), Eustrephus latifolius (20%), Evolvulus alsinoides (20%), Flemingia parviflora (20%), Galactia tenuiflora (20%), Glycine clandestina (20%), Glycine clandestina var. clandestina (20%), Gomphocarpus physocarpus\* (20%), Grewia latifolia (20%), Grewia retusifolia (20%), Hibiscus heterophyllus (20%), Indigofera hirsuta (20%), Indigofera pratensis (20%), Jasminum didymum (20%), Jasminum simplicifolium subsp. australiense (20%), Laxmannia gracilis (20%), Lobelia purpurascens (20%), Lomandra indet. (20%), Lomandra leucocephala (20%), Lomandra longifolia (20%), Macroptilium atropurpureum\* (20%), Melaleuca nervosa (20%), Murdannia graminea (20%), Peripleura hispidula var. hispidula (20%), Phyllanthus virgatus (20%), Richardia brasiliensis\* (20%), Rostellularia adscendens (20%), Secamone elliptica (20%), Sida cordifolia\* (20%), Sida indet. (20%), Solanum ellipticum (20%), Solanum stelligerum (20%), Spermocoe brachystema (20%), Spermocoe multicaulis (20%), Tephrosia rufula (20%), Vernonia indet. (20%), Waltheria indica (20%), Xanthorrhoea glauca (20%), Zornia muelleriana (20%)*

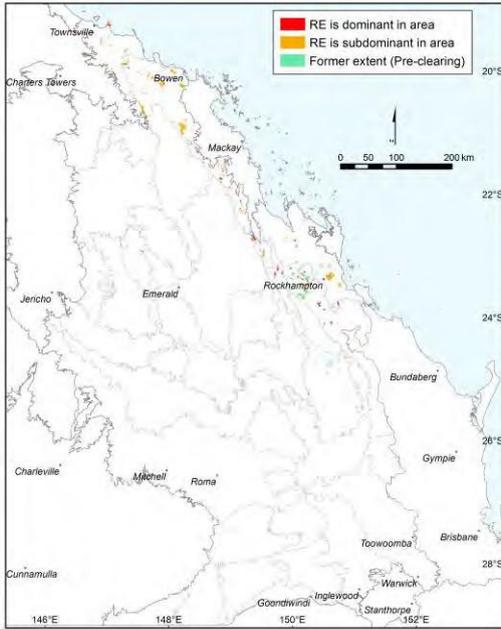
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**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Semi-evergreen vine thicket and microphyll vine forest on igneous rocks



Annie Kelly

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 98,323 55,916 57%

Species\_recorded: Total: 168; woody: 117; ground: 65; Avg. spp./site: 43.4; std dev.: 10.5, 5 site(s)

Basal area: Avg./site: 16.5 m<sup>2</sup>/ha, range: 7.0 - 26 m<sup>2</sup>/ha, std. deviation: 10 m<sup>2</sup>/ha, 2 site(s)

Structural formation: Closed-forest: 67%; woodland: 17%; unrecorded: 17%, 6 site(s)

Representative\_sites 14843, 17081, 26556, 28941, 40684, 40704.

**Stratum: Emergent**

Height avg. = 25.0m, range 18-32m, 2 sites

Crown cover avg. = 3.5%, range 2.0-5.0%, 2 sites

Frequent species (cover, frequency): *Araucaria cunninghamii* var. *cunninghamii* (5, 17%), *Casuarina cristata* (17%), *Flindersia collina* (1, 17%)

**Stratum: Tree 1**

Height avg. = 13.7m, range 11-17m, 6 sites

Crown cover avg. = 65.7%, range 20.0-84.0%, 6 sites

Dominant species (relative cover, frequency): *Gyrocarpus americanus* (39, 33%), *Euroschinus falcatus* (19, 33%), *Drypetes deplanchei* (14, 33%), *Archidendropsis thozetiana* (11, 50%), *Terminalia porphyrocarpa* (11, 50%)

Frequent species (cover, frequency): *Brachychiton australis* (4, 67%), *Archidendropsis thozetiana* (5, 50%), *Terminalia porphyrocarpa* (8, 50%), *Drypetes deplanchei* (11, 33%), *Elattostachys xylocarpa* (1, 33%), *Euroschinus falcatus* (15, 33%), *Gyrocarpus americanus* (26, 33%), *Pleiogynium timorense* (2, 33%), *Polyscias elegans* (2, 33%), *Sterculia quadrifida* (1, 33%), *Acacia fasciculifera* (1, 17%), *Alectryon diversifolius* (2, 17%), *Araucaria cunninghamii* var. *cunninghamii* (80, 17%), *Bosistoa transversa* (1, 17%), *Croton insularis* (6, 17%), *Cupaniopsis anacardioides* (2, 17%), *Dinosperma melanophloia* (4, 17%), *Diospyros geminata* (1, 17%), *Dissiliaria muelleri* (45, 17%), *Eucalyptus crebra* (3, 17%), *Excoecaria dallachyana* (2, 17%), *Ficus rubiginosa* (4, 17%), *Flindersia collina* (6, 17%), *Geijera parviflora* (14, 17%), *Hernandia bivalvis* (17%), *Owenia venosa* (10, 17%), *Planchonella cotinifolia* (22, 17%), *Planchonella pohlmaniana* (1, 17%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.12.4

### Stratum: Tree 2

Height avg. = 6.9m, range 5-11m, 5 sites

Crown cover avg. = 15.7%, range 4.0-48.5%, 5 sites

Dominant species (relative cover, frequency): *Strychnos psilosperma* (24, 50%), *Gossia bidwillii* (24, 33%)

Frequent species (cover, frequency): *Strychnos psilosperma* (2, 50%), *Gossia bidwillii* (1, 33%), *Acacia disparrima* subsp. *disparrima* (17%), *Acronychia laevis* (1, 17%), *Alectryon diversifolius* (2, 17%), *Alphitonia excelsa* (1, 17%), *Apophyllum anomalum* (1, 17%), *Atalaya salicifolia* (1, 17%), *Canarium australianum* (2, 17%), *Capparis arborea* (17%), *Corymbia tessellaris* (1, 17%), *Croton insularis* (6, 17%), *Deeringia amaranthoides* (1, 17%), *Denhamia disperma* (17%), *Denhamia pittosporoides* subsp. *pittosporoides* (1, 17%), *Diospyros humilis* (1, 17%), *Drypetes deplanchei* (17%), *Elaeodendron australe* (1, 17%), *Everistia vacciniifolia* (1, 17%), *Excoecaria dallachyana* (2, 17%), *Ficus obliqua* (1, 17%), *Ficus virens* var. *virens* (1, 17%), *Flueggea leucopyrus* (1, 17%), *Geijera salicifolia* (1, 17%), *Hernandia bivalvis* (1, 17%), *Mallotus philippensis* (1, 17%), *Melia azedarach* (1, 17%), *Notelaea microcarpa* (1, 17%), *Pandanus cookii* (1, 17%), *Passiflora aurantia* (17%), *Petalostigma pubescens* (1, 17%), *Planchonella cotinifolia* (1, 17%), *Psydrax odorata* (1, 17%), *Terminalia porphyrocarpa* (3, 17%)

### Stratum: Tree 3

Height avg. = 5.0m, range 4-6m, 2 sites

Crown cover avg. = 20.0%, range 5.0-35.0%, 2 sites

Frequent species (cover, frequency): *Acalypha eremorum* (1, 17%), *Actephila sessilifolia* (1, 17%), *Alyxia ruscifolia* (1, 17%), *Atalaya multiflora* (1, 17%), *Bursaria incana* (1, 17%), *Elaeodendron melanocarpum* (1, 17%), *Erythroxylum* sp. (Splityard Creek L.Pedley 5360) (1, 17%), *Euroschinus falcatus* (1, 17%), *Mallotus philippensis* (1, 17%), *Opuntia tomentosa*\* (1, 17%), *Pachygone ovata* (1, 17%), *Pleiogynium timorense* (1, 17%), *Sersalisia sericea* (1, 17%)

### Stratum: Shrub 1

Height avg. = 1.8m, range 1-2.5m, 6 sites

Crown cover avg. = 14.2%, range 1.0-25.0%, 6 sites

Dominant species (relative cover, frequency): *Diospyros geminata* (25, 33%), *Psydrax odorata* (22, 33%), *Drypetes deplanchei* (17, 33%), *Jasminum simplicifolium* subsp. *australiense* (9, 33%), *Lantana camara*\* (8, 33%)

Frequent species (cover, frequency): *Carissa ovata* (50%), *Strychnos psilosperma* (1, 50%), *Abutilon oxycarpum* (1, 33%), *Acalypha eremorum* (33%), *Arytera divaricata* (33%), *Diospyros geminata* (3, 33%), *Drypetes deplanchei* (1, 33%), *Geijera salicifolia* (33%), *Jasminum simplicifolium* subsp. *australiense* (33%), *Lantana camara*\* (2, 33%), *Planchonella cotinifolia* (33%), *Psydrax odorata* (3, 33%), *Solanum seafortianum*\* (2, 33%), *Abutilon micropetalum* (8, 17%), *Acronychia pauciflora* (17%), *Aidia racemosa* (1, 17%), *Alchornea ilicifolia* (17%), *Alyxia ruscifolia* (17%), *Capparis arborea* (17%), *Capparis loranthifolia* (17%), *Capparis mitchellii* (1, 17%), *Capparis sarmentosa* (1, 17%), *Clematicissus opaca* (1, 17%), *Cordyline murchisoniae* (1, 17%), *Croton acronychioides* (17%), *Deeringia amaranthoides* (1, 17%), *Dendrocnide photinophylla* (17%), *Dinosperma melanophloia* (17%), *Dockrillia bowmanii* (17%), *Drynaria sparsisora* (1, 17%), *Erythroxylum australe* (17%), *Eugenia reinwardtiana* (2, 17%), *Excoecaria dallachyana* (1, 17%), *Exocarpos latifolius* (17%), *Flueggea leucopyrus* (1, 17%), *Glossocarya hemiderma* (17%), *Gossia bidwillii* (17%), *Grewia scabrella* (17%), *Hibiscus sturtii* (1, 17%), *Hibiscus vitifolius* (1, 17%), *Medicosma cunninghamii* (17%), *Melodorum leichhardtii* (1, 17%), *Microsorium punctatum* (1, 17%), *Murraya ovatifoliolata* (17%), *Myrsine variabilis* (1, 17%), *Olearia canescens* (17%), *Pandorea pandorana* (17%), *Parsonsia longipetiolata* (17%), *Parsonsia velutina* (17%), *Phyllanthus novae-hollandiae* (2, 17%), *Pipturus argenteus* (1, 17%), *Platycerium veitchii* (1, 17%), *Plectranthus graveolens* (1, 17%), *Rivina humilis*\* (1, 17%), *Secamone elliptica* (17%), *Sida hackettiana* (1, 17%), *Solanum furfuraceum* (17%), *Streblus brunonianus* (1, 17%), *Tetrastigma nitens* (1, 17%), *Tinospora smilacina* (17%), *Turraea pubescens* (1, 17%)

### Stratum: Shrub 2

Height avg. = 0.8m, range 0.7-0.8m, 2 sites

Crown cover avg. = 12.0%, range 6.0-18.0%, 2 sites

Dominant species (relative cover, frequency): *Rivina humilis*\* (61, 33%)

Frequent species (cover, frequency): *Rivina humilis*\* (5, 33%), *Malvastrum americanum* (17%), *Phyllanthus subcrenulatus* (17%), *Psychotria daphnoides* (17%), *Solanum seafortianum*\* (3, 17%), *Teucrium* sp. (Ormeau G.Leiper AQ476858) (10, 17%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.12.4

### Ground Stratum:

Height avg. = 0.4m, range 0.3-0.5m, 5 sites

PFC avg. = 5.8%, range 4-8%, 5 sites

*Dominant species (relative cover, frequency):* *Ancistrachne uncinulata* (29, 60%), *Smilax australis* (10, 40%), *Solanum seaforthianum*\* (7, 40%), *Jasminum didymum* (5, 40%), *Oplismenus aemulus* (5, 60%)

*Frequent species (cover, frequency):* GRAMINOIDS: *Ancistrachne uncinulata* (1, 60%), *Oplismenus aemulus* (60%), *Aristida indet.* (5, 20%), *Cymbopogon refractus* (1, 20%), *Cyperus gracilis* (1, 20%), *Cyperus javanicus* (1, 20%), *Enteropogon unispiceus* (20%), *Eragrostis speciosa* (1, 20%), *Panicum trichoides* (1, 20%), *Paspalidium indet.* (20%), *Scleria brownii* (1, 20%), *Scleria mackaviensis* (1, 20%), *Setaria dielsii* (5, 20%), *Setaria indet.* (1, 20%)

FORBS: *Doryopteris concolor* (40%), *Jasminum didymum* (40%), *Jasminum didymum subsp. racemosum* (40%), *Smilax australis* (1, 40%), *Solanum seaforthianum*\* (40%), *Adiantum hispidulum* (20%), *Ageratum conyzoides*\* (20%), *Aneilema acuminatum* (20%), *Anisomeles indet.* (20%), *Aristolochia pubera var. pubera* (20%), *Austrosteenisia blackii* (20%), *Breynia oblongifolia* (20%), *Cheilanthes distans* (20%), *Cheilanthes sieberi* (20%), *Cissus oblonga* (20%), *Cissus repens* (1, 20%), *Clematicissus opaca* (20%), *Croton phebaloides* (20%), *Cynanchum viminalis* (1, 20%), *Dioscorea transversa* (20%), *Drypetes deplanchei* (20%), *Euphorbia hirta*\* (20%), *Flueggea leucopyrus* (20%), *Glossocarya hemiderma* (20%), *Hoya australis* (20%), *Legnephora moorei* (20%), *Malvastrum americanum* (20%), *Pandorea pandorana* (20%), *Pellaea paradoxa* (20%), *Phyllanthus novae-hollandiae* (20%), *Pleiogynium timorense* (20%), *Proiphys cunninghamii* (20%), *Pseuderanthemum variabile* (20%), *Psydrax odorata forma buxifolia* (20%), *Sarcophilus hillii* (20%), *Secamone elliptica* (20%), *Sida sp. (Greenvale R.J.Fensham 1150)* (20%), *Solanum furfuraceum* (20%), *Solanum indet.* (20%), *Solanum parvifolium* (20%), *Solanum stelligerum* (1, 20%), *Terminalia porphyrocarpa* (20%), *Teucrium sp. (Ormeau G.Leiper AQ476858)* (20%), *Trophis scandens subsp. scandens* (20%), *Turraea pubescens* (20%)

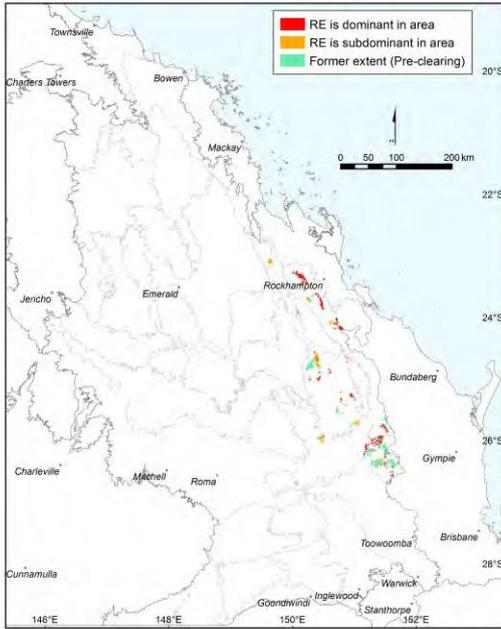
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**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Corymbia citriodora open forest on igneous rocks (granite)**



**Pre-clearing area (ha), remnant area (ha) and per cent remaining:** 134,817 73,822 55%

**Species recorded:** Total: 157; woody: 43; ground: 126; Avg. spp./site: 35.3; std dev.: 6.6, 3 site(s)

**Basal area:** Avg./site: 21.8 m<sup>2</sup>/ha, range: 9.5 - 33 m<sup>2</sup>/ha, std. deviation: 7 m<sup>2</sup>/ha, 15 site(s)

**Structural formation:** Woodland: 67%; open-forest: 20%; tall woodland: 13%, 15 site(s)

**Representative sites** 16642, 16643, 17463, 17466, 17479, 17481, 17600, 17614, 17615, 17633, 17634, 17641, 17643, 17644, 24674.

**Stratum: Emergent**

Height avg. = 25.0m, 1 site

Crown cover avg. = 5.0%, 1 site

Frequent species (cover, frequency): *Corymbia citriodora* (5, 7%)

**Stratum: Tree 1**

Height avg. = 25.5m, range 18-36m, 15 sites

Crown cover avg. = 38.9%, range 20.0-58.0%, 15 sites

Dominant species (relative cover, frequency): *Corymbia citriodora* (56, 67%), *Eucalyptus acmenoides* (38, 27%), *Eucalyptus crebra* (37, 80%)

Frequent species (cover, frequency): *Eucalyptus crebra* (14, 80%), *Corymbia citriodora* (22, 67%), *Eucalyptus acmenoides* (14, 27%), *Corymbia trachyphloia subsp. trachyphloia* (11, 20%), *Corymbia citriodora subsp. variegata* (15, 13%), *Corymbia erythrophloia* (4, 13%), *Eucalyptus exserta* (3, 13%), *Eucalyptus tereticornis* (13%), *Angophora leiocarpa* (18, 7%), *Brachychiton populneus* (7%), *Corymbia clarksoniana* (6, 7%), *Eucalyptus moluccana* (18, 7%), *Lophostemon suaveolens* (22, 7%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.12.6

### Stratum: Tree 2

Height avg. = 12.4m, range 4-22m, 13 sites

Crown cover avg. = 8.3%, range 0.0-30.0%, 13 sites

Dominant species (relative cover, frequency): *Eucalyptus crebra* (54, 40%), *Corymbia citriodora* (46, 33%)

Frequent species (cover, frequency): *Eucalyptus crebra* (7, 40%), *Corymbia citriodora* (3, 33%), *Corymbia clarksoniana* (1, 20%), *Eucalyptus acmenoides* (4, 20%), *Corymbia trachyphloia* subsp. *trachyphloia* (3, 13%), *Acacia aulacocarpa* (2, 7%), *Acacia crassa* subsp. *crassa* (7%), *Acacia leiocalyx* subsp. *leiocalyx* (2, 7%), *Acacia shirleyi* (5, 7%), *Angophora leiocarpa* (2, 7%), *Brachychiton populneus* (7%), *Corymbia citriodora* subsp. *variegata* (2, 7%), *Lophostemon suaveolens* (8, 7%)

### Stratum: Tree 3

Height avg. = 4.7m, range 2-8m, 3 sites

Crown cover avg. = 6.0%, range 3.0-10.0%, 3 sites

Frequent species (cover, frequency): *Acacia leiocalyx* subsp. *leiocalyx* (10, 7%), *Eucalyptus crebra* (3, 7%), *Vachellia bidwillii* (5, 7%)

### Stratum: Shrub 1

Height avg. = 1.8m, range 0.5-5m, 15 sites

Crown cover avg. = 5.3%, range 0.0-20.0%, 15 sites

Dominant species (relative cover, frequency): *Xanthorrhoea latifolia* (51, 33%), *Acacia leiocalyx* subsp. *leiocalyx* (41, 60%), *Alphitonia excelsa* (39, 40%)

Frequent species (cover, frequency): *Acacia leiocalyx* subsp. *leiocalyx* (2, 60%), *Alphitonia excelsa* (1, 40%), *Xanthorrhoea latifolia* (5, 33%), *Acacia flavescens* (4, 13%), *Corymbia citriodora* (1, 13%), *Jacksonia scoparia* (2, 13%), *Vachellia bidwillii* (1, 13%), *Acacia crassa* subsp. *crassa* (1, 7%), *Acacia decora* (2, 7%), *Acacia fasciculifera* (4, 7%), *Acacia loroloba* (1, 7%), *Acacia maidenii* (1, 7%), *Acacia striatifolia* (2, 7%), *Alectryon diversifolius* (7%), *Breynia oblongifolia* (7%), *Cassinia laevis* (1, 7%), *Coelospermum reticulatum* (7%), *Corymbia citriodora* subsp. *variegata* (2, 7%), *Ficus opposita* (7%), *Geijera parviflora* (7%), *Hibiscus splendens* (7%), *Lophostemon suaveolens* (1, 7%), *Petalostigma pubescens* (1, 7%), *Pittosporum spinescens* (1, 7%), *Pittosporum viscidum* (7%), *Psydrax odorata* (7%), *Solanum parvifolium* (7%)

### Stratum: Shrub 2

Height avg. = 1.2m, range 0.9-2m, 4 sites

Crown cover avg. = 6.3%, range 1.0-12.0%, 4 sites

Frequent species (cover, frequency): *Coelospermum reticulatum* (1, 13%), *Macrozamia miquelii* (7, 13%), *Xanthorrhoea latifolia* (4, 13%), *Alphitonia excelsa* (1, 7%), *Carissa ovata* (1, 7%), *Corymbia citriodora* subsp. *variegata* (7%), *Denhamia cunninghamii* (1, 7%), *Hakea lorea* (7%), *Petalostigma pubescens* (7%), *Psydrax odorata* (1, 7%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Ground  
Stratum:

Height avg. = 0.4m, range 0.3-0.65m, 3 sites

PFC avg. = 30.3%, range 17-46%, 3 sites

*Dominant species (relative cover, frequency):* *Arundinella nepalensis* (53, 100%), *Heteropogon contortus* (22, 33%), *Cymbopogon refractus* (8, 100%), *Acacia leiocalyx subsp. leiocalyx* (8, 33%), *Bothriochloa decipiens var. decipiens* (7, 33%)

*Frequent species (cover, frequency):* GRAMINOIDS: *Arundinella nepalensis* (20, 100%), *Cymbopogon refractus* (2, 100%), *Aristida queenslandica var. queenslandica* (2, 67%), *Cyperus fulvus* (67%), *Cyperus gracilis* (67%), *Digitaria breviglumis* (1, 67%), *Eragrostis elongata* (1, 67%), *Panicum simile* (1, 67%), *Aristida calycina var. calycina* (2, 33%), *Aristida caput-medusae* (1, 33%), *Aristida lignosa* (33%), *Aristida spuria* (1, 33%), *Bothriochloa decipiens* (1, 33%), *Bothriochloa decipiens var. decipiens* (2, 33%), *Chrysopogon fallax* (33%), *Cynodon dactylon\** (33%), *Enneapogon lindleyanus* (33%), *Eragrostis cilianensis\** (33%), *Eragrostis leptostachya* (33%), *Eragrostis spartinoides* (1, 33%), *Fimbristylis dichotoma* (33%), *Heteropogon contortus* (6, 33%), *Melinis repens\** (33%), *Panicum effusum* (33%), *Sporobolus creber* (33%), *Themeda avenacea* (1, 33%), *Themeda triandra* (33%)

FORBS: *Cheilanthes sieberi* (100%), *Desmodium rhytidophyllum* (100%), *Alphitonia excelsa* (67%), *Brunoniella australis* (67%), *Chrysocephalum apiculatum* (67%), *Cyanthillium cinereum* (67%), *Glycine clandestina* (1, 67%), *Lomandra longifolia* (67%), *Acacia leiocalyx subsp. leiocalyx* (2, 33%), *Achyranthes aspera* (33%), *Aneilema acuminatum* (33%), *Capparis canescens* (33%), *Carissa ovata* (33%), *Crotalaria montana* (33%), *Denhamia bilocularis* (33%), *Desmodium varians* (33%), *Dianella longifolia var. longifolia* (33%), *Dianella revoluta* (33%), *Evolvulus alsinoides* (33%), *Glycine tabacina* (33%), *Hakea lorea* (33%), *Hardenbergia violacea* (1, 33%), *Hibiscus sturtii* (33%), *Jacksonia scoparia* (33%), *Laxmannia gracilis* (33%), *Lomandra confertifolia subsp. pallida* (2, 33%), *Lomandra filiformis* (33%), *Lomandra multiflora subsp. multiflora* (1, 33%), *Marsdenia indet.* (33%), *Murdannia graminea* (33%), *Opuntia stricta\** (33%), *Opuntia tomentosa\** (33%), *Phyllanthus virgatus* (33%), *Psydrax odorata* (2, 33%), *Rostellularia adscendens* (33%), *Spermacoce multicaulis* (33%), *Stackhousia viminea* (33%), *Tricoryne elatior* (33%), *Zornia muriculata* (33%)

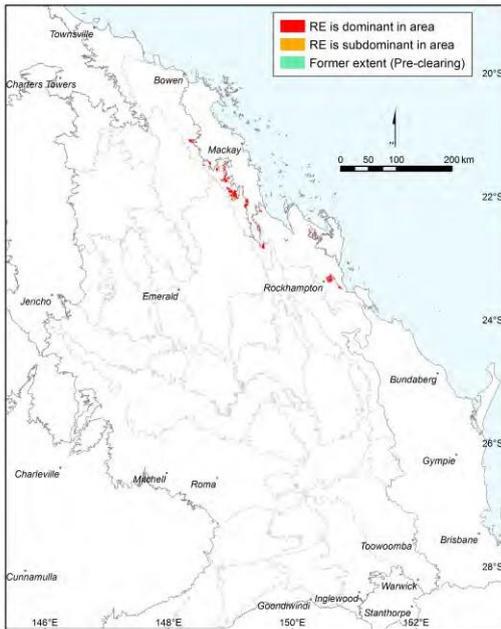
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**Dominant species:** Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

**Frequent species:** Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

**Eucalyptus crebra +/- Corymbia citriodora and/or E. acmenoides +/- Lophostemon suaveolens woodland to open forest**



Pre-clearing area (ha), remnant area (ha) and per cent remaining: 80,619 69,820 87%

Species\_recorded: Total: 138; woody: 24; ground: 117; Avg. spp./site: 48.7; std dev.: 16.0, 3 site(s)

Basal area: Avg./site: 9.8 m<sup>2</sup>/ha, range: 5.0 - 19 m<sup>2</sup>/ha, std. deviation: 5 m<sup>2</sup>/ha, 5 site(s)

Structural formation: Woodland: 60%; tall woodland: 40%, 5 site(s)

Representative\_sites 14848, 17521, 17527, 24678, 24680.

**Stratum: Emergent**

Height avg. = 28.0m, 1 site

Crown cover avg. = 5.0%, 1 site

Frequent species (cover, frequency): *Corymbia citriodora* (15, 20%)

**Stratum: Tree 1**

Height avg. = 26.8m, range 20-37m, 5 sites

Crown cover avg. = 30.2%, range 20.0-45.0%, 5 sites

Dominant species (relative cover, frequency): *Corymbia citriodora* (64, 100%), *Eucalyptus crebra* (30, 100%)

Frequent species (cover, frequency): *Corymbia citriodora* (19, 100%), *Eucalyptus crebra* (8, 100%), *Acacia excelsa subsp. angusta* (20%), *Eucalyptus acmenoides* (4, 20%), *Eucalyptus exserta* (20%), *Eucalyptus populnea* (20%), *Euroschinus falcatus* (3, 20%)

**Stratum: Tree 2**

Height avg. = 14.5m, range 11-18m, 4 sites

Crown cover avg. = 3.5%, range 0.0-8.0%, 4 sites

Dominant species (relative cover, frequency): *Eucalyptus crebra* (71, 80%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.12.6a

*Frequent species (cover, frequency): Eucalyptus crebra (3, 80%), Corymbia citriodora (20%), Eucalyptus exserta (6, 20%), Lophostemon suaveolens (2, 20%)*

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Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

1/03/2018

## Technical Description

Regional ecosystem: 11.12.6a

### Stratum: Tree 3

Height avg. = 9.0m, 1 site

Crown cover avg. = 3.0%, 1 site

Frequent species (cover, frequency): *Eucalyptus crebra* (1, 20%), *Eucalyptus exserta* (1, 20%), *Lophostemon confertus* (1, 20%)

### Stratum: Shrub 1

Height avg. = 3.0m, range 1.5-5m, 5 sites

Crown cover avg. = 2.4%, range 0.0-5.0%, 5 sites

Dominant species (relative cover, frequency): *Lophostemon confertus* (44, 40%), *Eucalyptus crebra* (37, 40%)

Frequent species (cover, frequency): *Eucalyptus crebra* (1, 40%), *Lophostemon confertus* (1, 40%), *Acacia crassa* subsp. *crassa* (4, 20%), *Acacia excelsa* subsp. *angusta* (20%), *Acacia glaucocarpa* (20%), *Acacia leiocalyx* subsp. *leiocalyx* (2, 20%), *Callicarpa pedunculata* (20%), *Capparis canescens* (20%), *Corymbia citriodora* (20%), *Cycas ophiolitica* (1, 20%), *Exocarpos cupressiformis* (20%), *Hibiscus heterophyllus* (20%), *Jacksonia scoparia* (1, 20%), *Lophostemon suaveolens* (1, 20%), *Mallotus philippensis* (20%)

### Stratum: Shrub 2

Height avg. = 1.0m, range 1-1m, 2 sites

Crown cover avg. = 15.5%, range 6.0-25.0%, 2 sites

Dominant species (relative cover, frequency): *Macrozamia miquelii* (28, 40%), *Coelospermum reticulatum* (14, 40%)

Frequent species (cover, frequency): *Coelospermum reticulatum* (2, 40%), *Macrozamia miquelii* (6, 40%), *Acacia leiocalyx* subsp. *leiocalyx* (1, 20%), *Acacia maidenii* (2, 20%), *Corymbia citriodora* (2, 20%), *Lantana camara*\* (1, 20%), *Xanthorrhoea latifolia* (10, 20%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Ground  
Stratum:

Height avg. = 0.3m, range 0.2-0.4m, 3 sites

PFC avg. = 13.7%, range 5-21%, 3 sites

Dominant species (relative cover, frequency): *Arundinella nepalensis* (23, 100%), *Bothriochloa decipiens* (17, 33%), *Scleria sphacelata* (17, 67%), *Cleistochloa subjuncea* (14, 67%), *Chrysopogon fallax* (9, 67%)

Frequent species (cover, frequency): GRAMINOIDS: *Arundinella nepalensis* (3, 100%), *Aristida caput-medusae* (1, 67%), *Chrysopogon fallax* (2, 67%), *Cleistochloa subjuncea* (1, 67%), *Cyperus gracilis* (2, 67%), *Panicum effusum* (67%), *Scleria sphacelata* (1, 67%), *Amphipogon strictus* (33%), *Aristida calycina* var. *calycina* (1, 33%), *Aristida jerichoensis* var. *subspinulifera* (33%), *Aristida personata* (33%), *Aristida queenslandica* var. *queenslandica* (33%), *Aristida ramosa* (1, 33%), *Aristida vagans* (33%), *Bothriochloa decipiens* (4, 33%), *Chloris ventricosa* (33%), *Cymbopogon bombycinus* (33%), *Cymbopogon refractus* (1, 33%), *Cyperus fulvus* (33%), *Dichanthium tenue* (33%), *Digitaria diffusa* (33%), *Dinebra decipiens* (33%), *Enneapogon lindleyanus* (1, 33%), *Eragrostis elongata* (33%), *Eragrostis leptostachya* (33%), *Eriachne* indet. (33%), *Gahnia aspera* (33%), *Heteropogon contortus* (33%), *Paspalidium criniforme* (33%), *Paspalidium distans* (33%), *Paspalidium gracile* (33%), *Schoenus kennyi* (33%), *Scleria brownii* (33%), *Sporobolus creber* (33%), *Sporobolus elongatus* (33%), *Themeda avenacea* (33%), *Themeda triandra* (33%)

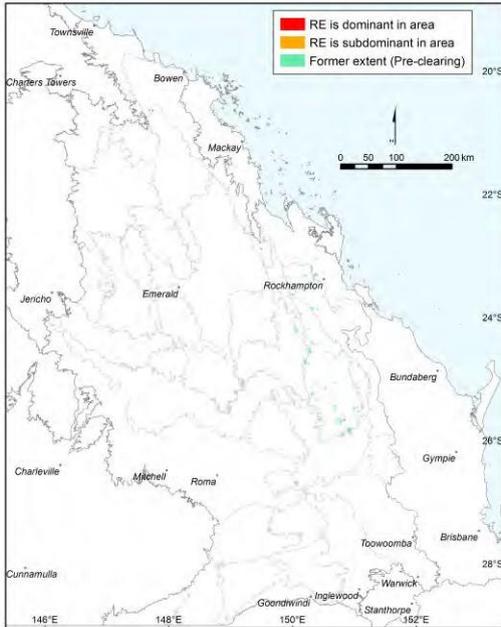
FORBS: *Lomandra filiformis* (100%), *Brunoniella australis* (67%), *Cyanthillium cinereum* (67%), *Dianella revoluta* (67%), *Evolvulus alsinoides* (67%), *Laxmannia gracilis* (67%), *Lomandra multiflora* subsp. *multiflora* (67%), *Opuntia stricta*\* (67%), *Opuntia tomentosa*\* (67%), *Phyllanthus virgatus* (67%), *Psydrax oleifolia* (1, 67%), *Sida hackettiana* (67%), *Acacia aulacocarpa* (33%), *Acacia fasciculifera* (33%), *Acacia penninervis* (33%), *Achyranthes aspera* (33%), *Alphitonia excelsa* (33%), *Alternanthera nana* (33%), *Anisomeles* indet. (33%), *Atalaya hemiglauca* (33%), *Boerhavia dominii* (33%), *Cayratia clematidea* (33%), *Chrysocephalum apiculatum* (33%), *Commelina diffusa* (33%), *Crotalaria montana* (33%), *Denhamia cunninghamii* (33%), *Desmodium brachypodum* (33%), *Desmodium rhytidophyllum* (33%), *Dianella brevipedunculata* (33%), *Dianella caerulea* (33%), *Dodonaea lanceolata* (33%), *Eremophila debilis* (33%), *Erigeron sumatrensis*\* (33%), *Eustrephus latifolius* (33%), *Exocarpos cupressiformis* (33%), *Ficus opposita* (33%), *Galactia tenuiflora* (33%), *Geijera parviflora* (33%), *Glossocardia bidens* (33%), *Glycine tabacina* (33%), *Gomphocarpus physocarpus*\* (33%), *Goodenia* indet. (33%), *Grewia latifolia* (33%), *Hakea lorea* (33%), *Hibiscus heterophyllus* (33%), *Hibiscus sturtii* (33%), *Jagera pseudorhus* (33%), *Jasminum didymum* subsp. *racemosum* (33%), *Lantana camara*\* (33%), *Lomandra longifolia* (33%), *Maireana microphylla* (33%), *Mallotus claoxyloides* (33%), *Malvastrum americanum* var. *americanum*\* (33%), *Marsdenia micradenia* (33%), *Marsdenia viridiflora* (33%), *Melhantha oblongifolia* (33%), *Melichrus erubescens* (33%), *Nyssanthes erecta* (33%), *Oxalis corniculata*\* (33%), *Passiflora suberosa*\* (33%), *Peripleura hispidula* (33%), *Petalostigma pubescens* (33%), *Pittosporum angustifolium* (33%), *Pseuderanthemum variabile* (33%), *Rhynchosia minima* (33%), *Rostellularia adscendens* (33%), *Sida* indet. (33%), *Solanum* indet. (33%), *Spermacoce brachystema* (33%), *Spermacoce* indet. (33%), *Stackhousia viminea* (33%), *Turraea pubescens* (33%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Acacia harpophylla open forest on igneous rocks. Colluvial lower slopes



Annie Kelly

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 72,572 6,505 9%

Species\_recorded: Total: 80; woody: 34; ground: 53; Avg. spp/site: 41.0; std dev.: 14.0, 2 site(s)

Basal area: Avg/site: 21.7 m<sup>2</sup>/ha, range: 13.0 - 27 m<sup>2</sup>/ha, std. deviation: 6 m<sup>2</sup>/ha, 3 site(s)

Structural formation: Woodland: 67%; open-forest: 33%, 3 site(s)

Representative\_sites 16598, 16615, 28727.

**Stratum: Emergent**

Height avg. = 20.5m, range 19-22m, 2 sites

Crown cover avg. = 9.5%, range 5.0-14.0%, 2 sites

Dominant species (relative cover, frequency): *Casuarina cristata* (100, 33%), *Acacia harpophylla* (100, 33%)

Frequent species (cover, frequency): *Acacia harpophylla* (5, 33%), *Casuarina cristata* (14, 33%)

**Stratum: Tree 1**

Height avg. = 14.3m, range 10-19m, 3 sites

Crown cover avg. = 43.3%, range 25.0-60.0%, 3 sites

Dominant species (relative cover, frequency): *Acacia harpophylla* (98, 67%), *Brachychiton rupestris* (30, 33%), *Acacia fasciculifera* (24, 33%), *Diospyros humilis* (17, 33%), *Elaeodendron australe* var. *integrifolium* (6, 33%)

Frequent species (cover, frequency): *Acacia harpophylla* (40, 67%), *Abutilon oxycarpum* (2, 33%), *Acacia fasciculifera* (8, 33%), *Alectryon diversifolius* (2, 33%), *Brachychiton rupestris* (10, 33%), *Coatesia paniculata* (2, 33%), *Diospyros humilis* (6, 33%), *Ehretia membranifolia* (2, 33%), *Elaeodendron australe* var. *integrifolium* (2, 33%), *Elattostachys xylocarpa* (33%), *Eucalyptus populnea* (2, 33%), *Flindersia collina* (1, 33%), *Geijera parviflora* (33%)

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

Tree 2  
Stratum:

Height avg. = 10.3m, range 5.5-15m, 2 sites

Crown cover avg. = 34.0%, range 13.0-55.0%, 2 sites

Dominant species (relative cover, frequency): *Acacia harpophylla* (88, 33%), *Planchonella cotinifolia* var. *pubescens* (53, 33%), *Croton insularis* (11, 33%), *Casuarina cristata* (9, 33%), *Coatesia paniculata* (8, 33%)

Frequent species (cover, frequency): *Acacia fasciculifera* (2, 33%), *Acacia harpophylla* (50, 33%), *Brachychiton populneus* (1, 33%), *Capparis loranthifolia* (1, 33%), *Casuarina cristata* (5, 33%), *Clematicissus opaca* (33%), *Coatesia paniculata* (2, 33%), *Croton insularis* (3, 33%), *Cyclophyllum coprosmoides* (1, 33%), *Diospyros humilis* (1, 33%), *Ehretia membranifolia* (1, 33%), *Elaeodendron australe* var. *integrifolium* (2, 33%), *Excoecaria dallachyana* (33%), *Flindersia collina* (1, 33%), *Gossia bidwillii* (33%), *Melaleuca lanceolata* (1, 33%), *Opuntia tomentosa*\* (1, 33%), *Planchonella cotinifolia* var. *pubescens* (14, 33%)

Stratum: Tree 3

Height avg. = 3.0m, 1 site

Crown cover avg. = 5.0%, 1 site

Dominant species (relative cover, frequency): *Acacia harpophylla* (100, 33%)

Frequent species (cover, frequency): *Acacia harpophylla* (5, 33%)

Stratum: Shrub 1

Height avg. = 4.1m, range 2.2-6m, 3 sites

Crown cover avg. = 22.7%, range 8.0-30.0%, 3 sites

Dominant species (relative cover, frequency): *Geijera parviflora* (71, 67%), *Acalypha eremorum* (34, 33%), *Abutilon oxycarpum* (21, 33%), *Acacia harpophylla* (15, 67%), *Alectryon diversifolius* (11, 100%)

Frequent species (cover, frequency): *Alectryon diversifolius* (2, 100%), *Acacia harpophylla* (5, 67%), *Geijera parviflora* (23, 67%), *Abutilon oxycarpum* (3, 33%), *Acalypha eremorum* (4, 33%), *Alstonia constricta* (1, 33%), *Bursaria spinosa* subsp. *spinosa* (1, 33%), *Capparis loranthifolia* (1, 33%), *Casuarina cristata* (3, 33%), *Denhamia bilocularis* (33%), *Elaeodendron australe* var. *integrifolium* (33%), *Eremophila mitchellii* (33%), *Jasminum simplicifolium* subsp. *australiense* (33%), *Melaleuca lanceolata* (2, 33%), *Opuntia tomentosa*\* (33%), *Parsonsia eucalyptophylla* (33%), *Pittosporum spinescens* (1, 33%), *Solanum seaforthianum*\* (33%)

Stratum: Shrub 2

Height avg. = 1.3m, range 0.6-2m, 2 sites

Crown cover avg. = 7.0%, range 2.0-12.0%, 2 sites

Dominant species (relative cover, frequency): *Carissa ovata* (54, 67%), *Geijera parviflora* (46, 33%), *Acacia harpophylla* (46, 33%)

Frequent species (cover, frequency): *Carissa ovata* (1, 67%), *Acacia harpophylla* (6, 33%), *Geijera parviflora* (6, 33%)

Stratum: Ground

Height avg. = 0.2m, range 0.1-0.2m, 2 sites

PFC avg. = 5.0%, range 5-5%, 2 sites

Dominant species (relative cover, frequency): *Abutilon oxycarpum* (37, 50%), *Paspalidium gracile* (28, 50%), *Einadia hastata* (16, 50%), *Calypochloa gracillima* subsp. *gracillima* (13, 50%), *Solanum semiarmatum* (8, 50%)

Frequent species (cover, frequency): GRAMINOIDS: *Ancistrachne uncinulata* (1, 100%), *Aristida gracilipes* (1, 100%), *Cyperus gracilis* (1, 100%), *Enteropogon unispiceus* (100%), *Megathyrsus maximus*\* (100%), *Aristida calycina* var. *calycina* (1, 50%), *Aristida personata* (50%), *Austrostipa ramosissima* (1, 50%), *Calypochloa gracillima* subsp. *gracillima* (1, 50%), *Chloris ventricosa* (50%), *Digitaria divaricatissima* (50%), *Enneapogon intermedius* (50%), *Enneapogon lindleyanus* (50%), *Oplismenus aemulus* (50%), *Paspalidium caespitosum* (50%), *Paspalidium distans* (1, 50%), *Paspalidium gracile* (6, 50%), *Scleria mackaviensis* (50%), *Sporobolus caroli* (50%)

FORBS: *Nyssanthus diffusa* (100%), *Abutilon oxycarpum* (8, 50%), *Alectryon diversifolius* (50%), *Brunoniella australis* (50%), *Capparis loranthifolia* (50%), *Cheilanthes distans* (50%), *Clematicissus opaca* (50%), *Cyanthillium cinereum* (50%), *Denhamia*

Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

## Technical Description

Regional ecosystem: 11.12.21

*bilocularis* (50%), *Einadia hastata* (1, 50%), *Eustrephus latifolius* (50%), *Everistia vacciniifolia* (50%), *Glycine tabacina* (50%), *Jasminum didymum* (50%), *Opuntia stricta*\* (50%), *Oxalis perennans* (50%), *Phyllanthus virgatus* (50%), *Plectranthus parviflorus* (50%), *Sida spinosa*\* (50%), *Solanum ellipticum* (50%), *Solanum indet.* (50%), *Solanum seaforthianum*\* (50%), *Solanum semiarmatum* (1, 50%)

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Dominant species: Relative cover (mean of cover of species / total cover of all species in that stratum for all values > zero) and frequency (percent of total sites) ordered by decreasing relative abundance. Up to five most dominant species with frequency > 20% listed for each stratum, (only comprehensive sites used for ground stratum).

Frequent species: Cover (mean of all values > zero) and frequency (percent of total sites) of all species occurring in more than 5% of sites ordered by decreasing frequency. Ground layer species % (of comprehensive sites) are listed as either graminoid or forb.

Naturalised species have an asterisk (\*) after the name. indet. after listed name = indeterminate species or genus

APPENDIX

C

PMST DATABASE REVIEW

## Protected Matters Search Tool

A Protected Matters Search Tool (PMST) search was conducted for the LGA to identify known or potential MNES. A summary of the results returned is presented in **Table 2-1**.

Table 2-1 Summarised PMST results

MNES	May occur in or relate to the region
World Heritage Properties	One (Great Barrier Reef)
National Heritage Properties	One (Great Barrier Reef)
Wetlands of International Significance	None
Great Barrier Reef Marine Park	None
Commonwealth Marine Area	None
Threatened Ecological Communities	6
Threatened Species	65
Migratory Species	46

Listing advice and conservation advice for these TECs include:

- > Approved Conservation Advice for the Brigalow (Acacia harpophylla dominant and co-dominant) ecological community (DoE, 2013).
- > Conservation advice (incorporating listing advice) for the Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community (DoEE, 2018b).
- > Commonwealth Listing Advice on Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions (TSSC, 2011).
- > Commonwealth Listing Advice on Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin (TSSC, 2009).
- > National recovery plan for the "Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions" ecological community (McDonald, W.J.F, 2010).
- > Commonwealth Listing Advice on Weeping Myall Woodlands (TSSC, 2009).

A review of the listing advice, conservation advice and recovery plans for the TECs indicate that each TEC generally correlates with a number of REs. The TEC and corresponding Regional Ecosystems that potentially occur in the region are presented in **Table 2-2**.

Table 2-2 Threatened Ecological Communities within Rockhampton Regional Council

Threatened Ecological Community	Status	Corresponding RE in Rockhampton Region	RE Description
Brigalow (Acacia harpophylla dominant and co-dominant)	Endangered	11.3.1	Acacia harpophylla and/or Casuarina cristata open forest on alluvial plains.
		11.4.3	Acacia harpophylla and/or Casuarina cristata shrubby open forest on Cainozoic clay plains.
		11.4.8	Eucalyptus cambageana woodland to open forest with Acacia harpophylla or A. argyrodendron on Cainozoic clay plains.
		11.4.9	Acacia harpophylla shrubby open forest to woodland with Terminalia oblongata on Cainozoic clay plains.
		11.9.1	Acacia harpophylla-Eucalyptus cambageana open forest to woodland on fine-grained sedimentary rocks.
		11.9.5	Acacia harpophylla and/or Casuarina cristata open forest on fine-grained sedimentary rocks.

Threatened Ecological Community	Status	Corresponding RE in Rockhampton Region	RE Description
		11.11.14	Acacia harpophylla open forest on deformed and metamorphosed sediments and interbedded volcanics.
		11.12.21	Acacia harpophylla open forest on igneous rocks; colluvial lower slopes.
Coastal Swamp Oak ( <i>Casuarina glauca</i> ) Forest of New South Wales and South East Queensland ecological community	Endangered	-	No equivalent REs in LGA
Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	Endangered	11.3.3	Eucalyptus coolabah woodland on alluvial plains
Natural Grasslands of the Queensland Central Highlands and northern Fitzroy Basin	Endangered	-	No equivalent REs in LGA
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Endangered	11.2.3	Microphyll vine forest ("beach scrub") on sandy beach ridges
		11.3.11	Semi-evergreen vine thicket on alluvial plains
		11.4.1	Semi-evergreen vine thicket ± <i>Casuarina cristata</i> on Cainozoic clay plains
		11.11.18	Semi-evergreen vine thicket on old sedimentary rocks with varying degrees of metamorphism and folding

APPENDIX

# D

ALA SPECIES REVIEW

# 1 Atlas of Living Australia

The Atlas of Living Australia (ALA) and the Australian Virtual Herbarium (AVH) were interrogated to identify threatened species listed under the EPBC Act and/or NC Act 1992. Many species records were replicated across the databases with the exception for two species records from the AVH that lacked spatial data and were therefore disregarded. As the ALA and AVH data were duplicated data, as such the ALA data was utilised for the purpose of creating a threatened species list for the region.

The species data records were further refined with based on the approach outlined in the Biodiversity Assessment and Mapping Methodology (DES, 2014) to vet records that would not be suitable for the purpose of biodiversity planning. Specifically the following were vetted:

- > records based upon georeferencing precision of  $\leq 2,000\text{m}$ ; and
- > which were collected  $\geq 1950$  (flora) or 1975 (fauna).

This also had the consequence of removing records for sensitive species for which accuracy has been denatured. For example, some cycads and turtles are targeted for illegal harvesting and as such the ALA denatures records as not to facilitate such activities.

Wildnet species data form an integral part of the ALA dataset and as such were not interrogated separately. The resulting unvetted and vetted lists are presented in **Table 1-1** and **Table 1-2** respectively.

Table 1-1 Unvetted ALA list

Scientific Name	Common Name	Status	
		NC Act	EPBC Status
<b>Flora</b>			
<i>Acacia acronastes</i>		Near Threatened	-
<i>Actephila bella</i>		Vulnerable	-
<i>Backhousia oligantha</i>		Endangered	-
<i>Bertya pedicellata</i>		Near Threatened	-
<i>Bursaria reevesii</i>		Vulnerable	-
<i>Cadellia pentastylis</i>	Ooline	Vulnerable	Vulnerable
<i>Callicarpa thozetii</i>		Endangered	-
<i>Capparis humistrata</i>		Endangered	-
<i>Capparis thozetiana</i>		Vulnerable	Vulnerable
<i>Cassia marksiana</i>		Vulnerable	-
<i>Cerbera dumicola</i>		Near Threatened	-
<i>Comesperma oblongatum</i>	Byfield Matchstick	Vulnerable	Vulnerable
<i>Corymbia xanthope</i>	Glen Geddes Bloodwood	Vulnerable	Vulnerable
<i>Cossinia australiana</i>	Cossinia	Endangered	Endangered
<i>Cycas megacarpa</i>		Endangered	Endangered
<i>Cycas ophiolitica</i>		Endangered	Endangered
<i>Cyperus clarus</i>		Vulnerable	-

Scientific Name	Common Name	Status	
		NC Act	EPBC Status
<i>Dansiea elliptica</i>		Near Threatened	-
<i>Decaspermum struckoilicum</i>		Endangered	Endangered
<i>Denhamia parvifolia</i>	Small-leaved Denhamia	Vulnerable	Vulnerable
<i>Eucalyptus raveretiana</i>	Black Ironbox	-	Vulnerable
<i>Graptophyllum excelsum</i>		Near Threatened	-
<i>Graptophyllum ilicifolium</i>	Holly-leaved Graptophyllum	Vulnerable	Vulnerable
<i>Grevillea hockingsii</i>		Vulnerable	-
<i>Grevillea venusta</i>		Vulnerable	-
<i>Habenaria xanthantha</i>		Near Threatened	-
<i>Hakea trineura</i>	Three-veined Hakea	Vulnerable	Vulnerable
<i>Hernandia bivalvis</i>	Cudgerie	Near Threatened	-
<i>Lissanthe brevistyla</i>		Vulnerable	-
<i>Lobelia membranacea</i>		Near Threatened	-
<i>Macropteranthes leiocaulis</i>		Near Threatened	-
<i>Macrozamia serpentina</i>		Endangered	-
<i>Marsdenia brevifolia</i>		Vulnerable	Vulnerable
<i>Myrsine serpicicola</i>		Endangered	-
<i>Neoroepera buxifolia</i>		Vulnerable	Vulnerable
<i>Olearia macdonnellensis</i>		Endangered	Vulnerable
<i>Parsonsia larcomensis</i>	Mt Larson Silk Pod	Vulnerable	Vulnerable
<i>Phaius australis</i>	Lesser Swamp-orchid	Endangered	Endangered
<i>Pimelea leptospermoides</i>		Near threatened	Vulnerable
<i>Pimelea umbratica</i>		Near Threatened	Vulnerable
<i>Pultenaea setulosa</i>		Vulnerable	Vulnerable
<i>Samadera bidwillii</i>	Quassia	Vulnerable	Vulnerable
<i>Sannantha brachypoda</i>		Vulnerable	-
<i>Sowerbaea subtilis</i>		Vulnerable	-
<i>Sphaeromorphaea major</i>		Near Threatened	-
<i>Stackhousia tryonii</i>		Near Threatened	-
<i>Xylosma ovata</i>		Near Threatened	-

Scientific Name	Common Name	Status	
		NC Act	EPBC Status
<b>Fauna</b>			
<i>Adelotus brevis</i>	Tusked Frog	Vulnerable	-
<i>Acanthophis antarcticus</i>	Common Death Adder	Vulnerable	-
<i>Aspidites ramsayi</i>	Woma	Near Threatened	-
<i>Botaurus poiciloptilus</i>	Australasian Bittern	-	Endangered
<i>Calidris ferruginea</i>	Curlew Sandpiper	Endangered	Critically Endangered
<i>Calidris tenuirostris</i>	Great Knot	Endangered	Critically Endangered
<i>Calyptorhynchus lathamii</i>	Glossy Black-Cockatoo	Vulnerable	-
<i>Chalinolobus dwyeri</i>	Large-Eared Pied Bat	Vulnerable	Vulnerable
<i>Charadrius leschenaultii</i>	Greater Sand Plover	Vulnerable	Vulnerable
<i>Charadrius mongolus</i>	Lesser Sand Plover	Endangered	Endangered
<i>Dasyurus hallucatus</i>	Northern Quoll	-	Endangered
<i>Denisonia maculata</i>	Ornamental Snake	Vulnerable	Vulnerable
<i>Eelseya albagula</i>	Southern Snapping Turtle	Endangered	Critically Endangered
<i>Epthianura crocea</i>	Yellow Chat	Vulnerable	-
<i>Eretmochelys imbricata</i>	Hawksbill Turtle	Endangered	Vulnerable
<i>Erythroriorchis radiatus</i>	Red Goshawk	Endangered	Vulnerable
<i>Esacus magnirostris</i>	Beach Stone-Curlew	Vulnerable	-
<i>Falco hypoleucos</i>	Grey Falcon	Vulnerable	-
<i>Furina dunmalli</i>	Dunmall's Snake	Vulnerable	Vulnerable
<i>Geophaps scripta</i>	Squatter Pigeon	Vulnerable	Vulnerable
<i>Hemiaspis damelii</i>	Grey Snake	Endangered	-
<i>Lathamus discolor</i>	Swift Parrot	Endangered	Critically Endangered
<i>Lepidochelys olivacea</i>	Olive Ridley Turtle	Endangered	Endangered
<i>Macroderma gigas</i>	Ghost Bat	Endangered	Vulnerable
<i>Natator depressus</i>	Flatback Turtle	Vulnerable	Vulnerable
<i>Ninox strenua</i>	Powerful Owl	Vulnerable	-
<i>Numenius madagascariensis</i>	Eastern Curlew	Endangered	Critically Endangered
<i>Onychogalea fraenata</i>	Bridled Nailtail Wallaby	Endangered	Endangered
<i>Petauroides volans</i>	Greater Glider	Vulnerable	Vulnerable

Scientific Name	Common Name	Status	
		NC Act	EPBC Status
<i>Petrogale penicillata</i>	Brush-Tailed Rock-Wallaby	Vulnerable	Vulnerable
<i>Phascolarctos cinereus</i>	Koala	Vulnerable	Vulnerable
<i>Poephila cincta</i>	Black-Throated Finch	Endangered	Endangered
<i>Pteropus poliocephalus</i>	Grey-Headed Flying-Fox	Vulnerable	-
<i>Rheodytes leukops</i>	Fitzroy River Turtle	Vulnerable	Vulnerable
<i>Rostratula australis</i>	Australian Painted Snipe	Vulnerable	Endangered
<i>Taphozous australis</i>	Coastal Sheath-tail Bat	Near Threatened	-
<i>Turnix melanogaster</i>	Black-Breasted Button-Quail	Vulnerable	Vulnerable

Note: Records of species which were recorded outside of their known range and distribution have been excluded from the above list due to the obvious spurious nature of the records. Species removed include the Northern Hairy-Nosed Wombat (*Lasiorhinus krefftii*), *Cycas cairnsiana* and the Golden Bell Frog (*Litoria aurea*).

Table 1-2 Vetted ALA list

Scientific Name	Common Name	Status	
		NC Act	EPBC Act
<b>Flora</b>			
<i>Cadellia pentastylis</i>	Ooline	Vulnerable	Vulnerable
<i>Capparis thozetiana</i>		Vulnerable	Vulnerable
<i>Comesperma oblongatum</i>	Byfield Matchstick	Vulnerable	Vulnerable
<i>Corymbia xanthope</i>	Glen Geddes Bloodwood	Vulnerable	Vulnerable
<i>Cossinia australiana</i>	Cossinia	Endangered	Endangered
<i>Cycas megacarpa</i>		Endangered	Endangered
<i>Decaspermum struckoiligum</i>		Endangered	Endangered
<i>Eucalyptus raveretiana</i>	Black Ironbox	-	Vulnerable
<i>Graptophyllum ilicifolium</i>	Holly-leaved Graptophyllum	Vulnerable	Vulnerable
<i>Hakea trineura</i>	Three-veined Hakea	Vulnerable	Vulnerable
<i>Marsdenia brevifolia</i>		Vulnerable	Vulnerable
<i>Neoroepora buxifolia</i>		Vulnerable	Vulnerable
<i>Olearia macdonnellensis</i>		Endangered	Vulnerable
<i>Parsonsia larcomensis</i>	Mt Larson Silk Pod	Vulnerable	Vulnerable
<i>Pimelea leptospermoides</i>		Near threatened	Vulnerable
<i>Pultenaea setulosa</i>		Vulnerable	Vulnerable

Scientific Name	Common Name	Status	
		NC Act	EPBC Act
<i>Samadera bidwillii</i>	Quassia	Vulnerable	Vulnerable
<b>Fauna</b>			
<i>Adelotus brevis</i>	Tusked Frog	Vulnerable	-
<i>Eelseya albagula</i>	White-throated Snapping Turtle	Endangered	Critically Endangered
<i>Rheodytes leukops</i>	Fitzroy River Turtle	Vulnerable	Vulnerable
<i>Geophaps scripta scripta</i>	Squatter Pigeon	Vulnerable	Vulnerable
<i>Numenius madagascariensis</i>	Eastern Curlew	Endangered	Critically Endangered
<i>Ninox strenua</i>	Powerful Owl	Vulnerable	-
<i>Dasyurus hallucatus</i>	Northern Quoll	-	Endangered
<i>Phascolarctos cinereus</i>	Koala	Vulnerable	Vulnerable
<i>Petauroides volans</i>	Greater Glider	Vulnerable	Vulnerable
<i>Macroderma gigas</i>	Ghost Bat	Endangered	Vulnerable
<i>Bidyanus bidyanus</i>	Silver Perch	-	Critically Endangered

Note: A comment received during the project review was that ALA alone is likely to miss records available in other databases. Advice from the ALA stated that the last upload from Queensland's datasets was in September 2017. Review of the following databases found:

- > The Queensland Museum has not made any records since September 2017;
- > The Herbarium have not made any records available since September 2017;
- > Wildnet were unwilling to provide any spatial records for species (i.e. we could not validate whether additional species were added to the list between September 2017 and 2019).

APPENDIX

# E

BIODIVERSITY AREA MAPPING  
REVIEW

# 1 Approach to mapping Biodiversity Areas

The current planning scheme biodiversity overlay maps MLES (**Figure E-1**) in accordance with areas defined in 2010 by RPS and therefore is based on data that is at least 10 years old. MLES is divided into areas of High MLES and Low MLES. While some planning scheme updates have reflected changes in the extent of remnant vegetation where clearing has occurred, the mapping does not consider contemporary vegetation mapping and records for threatened species documented over the past decade. A range of resources is available to aid in updating mapping (see **Appendix A**).

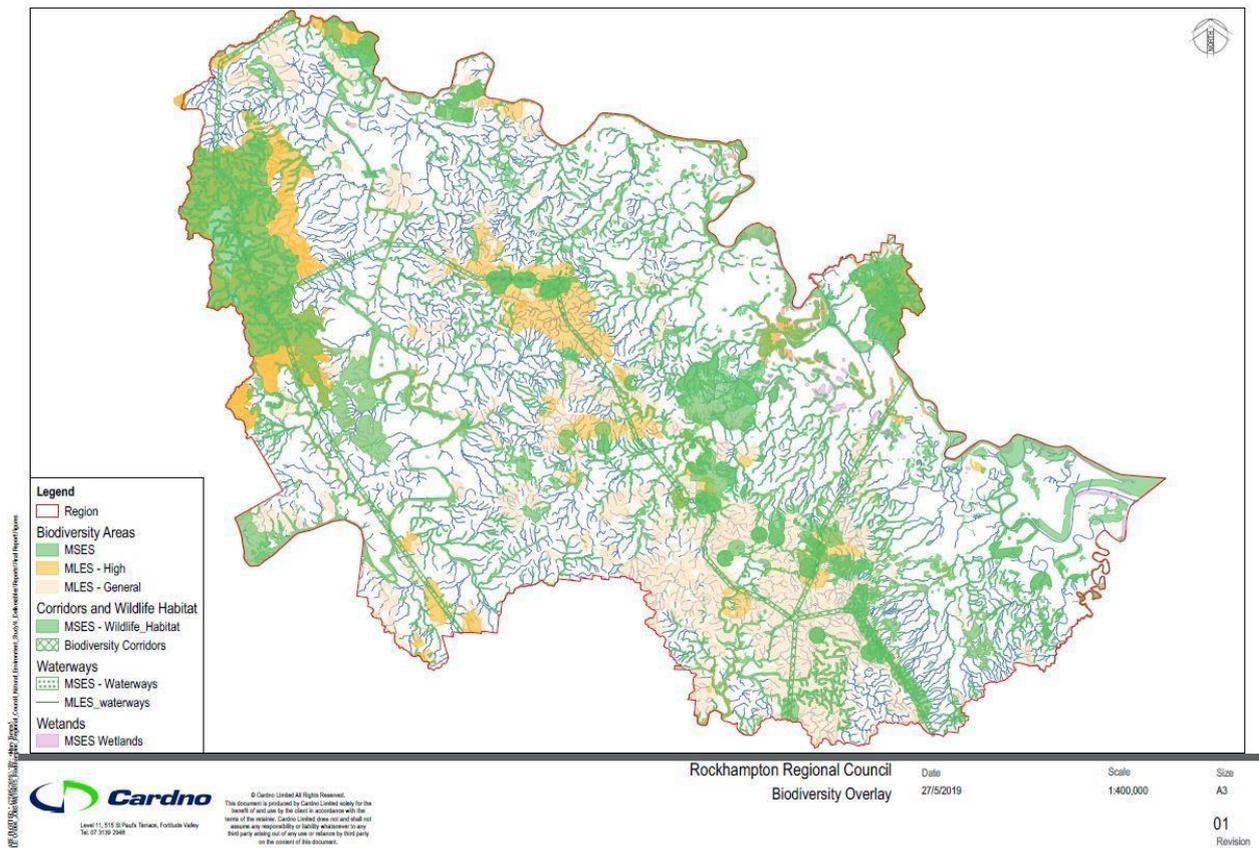


Figure E1 - Biodiversity overlay

While the mapping is generally fit for purpose because it has been amended to ‘capture’ areas that have been cleared, it does not take into account changes in Regional Ecosystem mapping, regrowth mapping and new records for threatened species.

The RPS study included the preparation of mapping that delineated natural areas of importance based on a ‘biophysical rating’ based a modified version of the Biodiversity Assessment and Mapping Methodology (BAMM) (DES, 2014). Specifically, the RPS methodology is similar to the BAMM in that they are both criteria based assessment methods and the RPS method includes some of the same criteria included in the BAMM (albeit via a different metric). One of the main deviations from the BAMM in the RPS mapping was the omission of the second stage in the method which is an expert panel. Table E1 presents a comparison between the attributes considered by RPS with the BAMM. An expert panel allows for input of local knowledge to confirm features such as wildlife corridors and areas with natural environmental values.

Table E1 - BAMM Criteria compared with RPS method

Diagnostic Criteria	RPS method Considers in part?	Expert Panel Criteria	RPS method Considers in part?
A: Habitat for EVNT taxa	y	H: Habitat for priority taxa	n
B: Ecosystem value at two scales:	n	I: Special biodiversity values	n

Diagnostic Criteria	RPS method Considers in part?	Expert Panel Criteria	RPS method Considers in part?
B1: State			
B2: Regional			
C: Tract Size	y	J: Corridors	n
D: Relative size of regional system	n	K: Threatening processes	n
E: Condition	y		
F: Ecosystem diversity	y		
G: Context and connection	y		

The current overlay mapping has removed the attributes of the RPS mapping and metadata for the original mapping is unavailable. This means there is a lack of transparency between the mapped output and why an area is mapped of significance.

Given the issues with data age and transparency the recommended approach is to build a new Biodiversity Overlay Mapping layer based on the BAMB and the Common Nature Conservation Classification System (CNCCS) (Chenoweth, 2001). The CNCCS takes into account local environmental values that are omitted in the BAMB. The method provides a consistent and defensible approach to assessing natural environmental values at a region or landscape scale. An expert panel review is incorporated into the method, which includes local knowledge is represented within the system and the final output is a simple legible map indicating three levels of conservation significance throughout the region.

To adequately run the BAMB/CNCCS it is necessary to have the appropriate datasets. While the diagnostic criteria can be run using much of the data included in **Appendix A**, there is a significant data gap relating to resources that can inform the expert panel criteria. In particular, the workshop conducted with Council officers and some external parties identified some local values that should be reflected in the mapping for which there is limited data available and that other parties engaged in an expert panel consultant process to adequately capture local values. Some examples include:

- > A list of locally significant species of flora and fauna. Discussions during the workshop identified that this will include a number of species including snails. It is understood there is useful data relating to snail distributions, but this would only be available from experts such as Dr John Stanisic.
- > Additional records of significant species. A clear example of this is *Cycas ophiolitica*, where ALA records have been denatured and only show a limited number of records for the LGA. It is apparent that this species has a wider distribution that would be better represented by way of extra data points or a habitat model identified by and/or agreed with an expert panel.
- > Some information is available, but is too coarse for planning purposes (e.g. Yellow Chat and Black Breasted Button Quail habitat models available from <https://fba.maps.arcgis.com/apps/webappviewer/index.html?id=9aa3cb4963ba459d8b539bceb43e8761>).
- > Some information may be available, but is currently regarded as sensitive (e.g. habitat for the Fitzroy River Turtle and White lipped Snapping Turtle). Further discussion is required with experts to understand the most appropriate way to represent important habitat for these or similar species.
- > While some data is available for flying foxes camps through the State, local knowledge about the accuracy of these camps would be beneficial. This data is vital not only to identify potential areas for protection, but also areas where certain development uses should be excluded (e.g. new public swimming pools would be separated from known and permanent camps).
- > The Fitzroy River floodplain (note this data is available and is presented in **Figure 1-13**). While mapping is available specific clear justification and consensus is required from an expert panel as to why this area is to be included in mapping outputs.

Given this, for the purpose of the current study it has not been possible to progress mapping that is contemporary, transparent and incorporates information gaps that would otherwise be addressed by an expert panel.

APPENDIX

F

TOWN PLANNING ASSESSMENT

# 1 Town Planning Assessment

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## 1.1 Introduction

This section provides a review of the Rockhampton Region Planning Scheme and how it relates to protection and management of the natural environment. The review focuses predominantly on the elements of the planning scheme that have a direct role in terms of providing a regulatory framework for planning and development decisions and the impacts on natural features and environmental values.

## 1.2 Rockhampton Region Planning Scheme 2015

### 1.2.1 Background

The Rockhampton Region planning scheme (the scheme) commenced on 24 August 2015. The scheme was originally prepared under the Queensland Planning Provisions (QPP) that provided a consistent format and set of planning provisions for all planning schemes across Queensland. Upon commencement of the *Planning Act 2016*, an alignment amendment of the scheme was recently undertaken to align the existing scheme with the new terminology and decision rules of the Act. The alignment amendment version of the scheme commenced was adopted on 3 July 2017, and is the version of the scheme reviewed for this project.

The purpose of this review is to analyse the operation and intent of the scheme in relation to how it protects and manages the impact of development on the natural environment. Based on preliminary conversations with Council officers, it is our understanding that one of the key aims of the scheme is to ensure that there is 'no net loss' within the local government area in relation to the natural environment. On this basis, the review will focus on key elements of the scheme and provide an analysis of:

- > the effectiveness of the provisions in protecting and managing the natural environment;
- > the operation of the scheme in terms of delivering the intended outcomes; and
- > any improvements that may be considered that will facilitate the scheme in ensuring 'no net loss' of environmental values.

As discussed in the introduction the term 'natural environment' has not been specifically defined as part of this project, but for the purposes of this study is taken to relate predominantly to MES being MSES and MLES.

## 1.3 Strategic Framework

### 1.3.1 Strategic Framework overview

The strategic framework provides the overall policy position and land use intent for planning and development within the region. The framework includes six (6) themes that address individual aspects of development relating to:

- > Settlement pattern;
- > Natural environment and hazards;
- > Community identify and biodiversity;
- > Access and mobility;
- > Infrastructure and services; and
- > Natural resources and economic development.

While there is some overlap between the themes, they are reasonably contained in terms of their subject matter. In relation to natural environment and vegetation management, the most relevant themes are 'Settlement Pattern' theme and 'Natural environment and hazards' theme.

### 1.3.2 Settlement Pattern

The settlement pattern theme is predominantly concerned with identifying and describing the location and type of development that is intended to be established throughout the region. However, it also includes some provisions that provide guidance as to how development relates to the particular place context. In particular,

the settlement pattern theme includes the following guidance that is relevant to vegetation management and natural environment matters.

#### Strategic Outcomes

- (4) *Residential development is compact, encourages strong neighbourhoods with attractive places for residents, makes efficient use of land and optimises the delivery and use of infrastructure and services. Expansion beyond these identified areas will not occur to ensure a focus on urban infill and intensification areas and to avoid further encroachment on natural assets and ecologically vulnerable areas.*
- (17) *Rural lands and natural areas are maintained for their rural and landscape values.*
- (18) *The scenic and environmental values of areas identified as nature conservation or natural corridor link are protected.*

#### Nature conservation, open space and natural corridor or link

- (1) *Nature conservation and open space areas contain national parks, public open space and important ecological and landscape values. These areas are protected from urban development.*
- (2) *Nature conservation and open space areas do not accommodate development other than activities, which allow access for recreation and maintenance. Other forms of development may be suitable when designed to accommodate, integrate with and where possible rehabilitate the natural environment (this may include some low scale ecotourism development).*
- (3) *Urban development that encroaches into undeveloped natural places will not be supported. Environmentally significant natural features (including wetlands, waterways, threatened flora species and hill slopes) will continue to be protected from urban encroachment.*
- (4) *Development is designed to assist with the achievement of energy efficiency outcomes, is sensitive to adjoining natural features and is undertaken in a way that ensures the protection of the ecological and scenic values.*
- (5) *On privately owned land, rural or other activities do not intrude on the ecological values of these places.*
- (6) *Environmentally significant areas and corridors as shown on the strategic framework maps (SFM-1 to SFM-4) will be appropriately managed in accordance with best practice methods.*
- (7) *Urban development that further encroaches on the undeveloped Berserker foothills will not be supported. The steep and environmentally significant land within the Berserker Range (including the foothills and Mount Archer National Park) are protected from incompatible development to ensure the scenic and natural backdrop to Rockhampton is maintained.*

#### Rural residential

- (2) *Rural residential development is limited to existing designated areas for the following reasons:  
(a) protect existing agricultural land, natural resources and the natural environment.*

#### Rural

- (10) *Intensive animal industry (particularly feedlots), is a potential growth industry but will be required to be located away from sensitive land use(s), areas subject to natural hazards and areas of environmental significance. These uses will also need to consider the impact and location with respect to the local transport network.*

#### Industrial

- (3) *On larger sites a structure plan will be required in accordance with the relevant zone and planning scheme policies. These areas are well planned and demonstrate the following:  
(b) the land does not have significant environmental or ecological values, including but not limited to, areas of environmental significance, wildlife and environmental corridors and waterways and wetlands;*

#### Urban and new urban

- (3) *Urban development is contained within the urban and new urban areas to achieve the following outcomes:*

- (b) biophysical values and green breaks are maintained;*
- (d) rural, natural asset, landscape and environmental values are protected;*
- (12) These new communities are well planned and demonstrate the following:*
  - (b) the land does not have significant environmental or ecological values, including but not limited to areas of environmental significance, wildlife and environmental corridors and waterways and wetlands;*

#### 1.3.2.1 Analysis and comment

While the identified provisions are generally appropriate, they are imprecise and do not necessarily provide targeted statements that would more suitably address the protection and management of natural environment/vegetation communities. In particular, it is noted:

- > The strategic outcomes do not include a general outcome to the effect that development will protect and maintain the natural environment/vegetation communities. This would provide a simple overarching statement that clearly sets the intent that identified environmental features/areas of significance are to be protected as a general premise. While strategic outcome 18 does provide a statement regarding protection of nature conservation areas and natural corridor linkages, this is quite specific and does not refer to the other mapped ecological elements on strategic framework maps or overlay maps;
- > Statements regarding protection of areas of ecological significance from urban development are limited to the 'Nature' place typology only. While this approach is supported and appropriate, limiting such statements to this place typology does not sufficiently recognise that urban place typologies also should seek to protect ecological values where possible;
- > Development on Rural land has the potential to impact significantly on environmental values, however the strategic framework does not provide a clear and precise statement that rural activities must protect, maintain and enhance these values. The strategic framework is also silent in terms of emerging rural land uses such as renewable industries which can have potential environmental impacts, and the inclusion of statements to this effect would ensure that the planning scheme was responding to contemporary development pressures;
- > The terminology used to describe areas of ecological significance are imprecise and inconsistent across the various sections and include references and terms such as areas of ecological significance, wildlife and environmental corridors, bio-physical values, green breaks, natural environment, environmentally significant land, ecological values, and others. Additionally, the areas referenced are not all mapped on the strategic framework mapping or otherwise defined in terms of their spatial location and extent.

#### 1.3.3 Natural environment and hazards

The Natural environment and hazards theme is the principal element of the strategic framework that seeks to identify and protect environmental values. In particular, the following provisions are relevant.

##### Strategic outcomes

- (1) The natural environment and landscape are highly valued by the community for their contribution to the planning scheme area's biodiversity, economic prosperity, culture, character and sense of place. These areas are to be protected from incompatible development.*
- (2) Development does not create unsustainable impacts on:*
  - (b) environmentally significant areas, including areas of state and locally significant vegetation, which provide fauna habitat and support biodiversity*

##### Areas of environmental significance

- (1) A network of environmental areas and linking natural corridors of environmental significance are identified within the planning scheme area (as shown on strategic framework maps (SFM-5 to SFM-8) for protection and enhancement. These areas and corridors include:*
  - (a) places of national, state and local environmental significance;*
  - (b) regulated vegetation;*
  - (c) flora and fauna habitats;*
  - (d) wetlands and watercourses, in particular, wetlands of high environmental significance in Great Barrier Reef catchments;*
  - (f) coastal areas;*

- (g) undeveloped hill slopes;
- (h) areas of high environmental significance; and
- (i) natural corridors ensuring the ecological sustainability of flora and fauna.

- (2) Environmentally significant natural corridors are maintained and where appropriate, rehabilitated and expanded to support:
  - (a) the natural movement and proliferation of native species;
  - (b) ecological responses to climate change;
  - (c) the maintenance of large-scale migratory lifecycle processes; and
  - (d) connectivity between significant habitat areas and patches of regulated vegetation.
- (3) Development avoids significant and adverse environmental impacts or where this cannot be reasonably achieved, impacts are minimised and residual impacts offset locally, unless the development of such areas will result in a net public benefit.

#### 1.3.3.1 Analysis and comment

The Natural environment and hazards theme provides more specific and detailed guidance relating to protection and management of natural environment features. The provisions are generally appropriate, and include reference to offsets requirements. However, the following aspects are noted:

- > The strategic outcome identifies that the natural environment is valued, however protection is only offered against 'incompatible' development. This term is imprecise, and it is unclear if this refers to development that is incompatible with relevant ecological values, or development that is an incompatible land use in a given area for amenity or other reasons;
- > The terminology used to describe areas of ecological significance are imprecise and inconsistent across the various sections. Additionally, the relevant strategic framework mapping appears only to identify MSES and MLES, and it is unclear what is the relationship between the list of other nominated environmental areas in specific outcome 2 and whether this is actually included in the strategic framework mapping. This may be overcome by creating a mapping layer and associated defined term that consolidates all relevant areas of ecological significance into a single term such as 'ecologically important area'. As an example the term may be defined as:

*Ecologically important area means:*

- i. A natural wetland or waterway; or
- ii. An area of remnant vegetation mapped as MSES or MLES identified in the Biodiversity overlay maps; or
- iii. An area of wildlife habitat identified in the Biodiversity overlay maps;
- iv. National parks and State forests;
- v. Of concern and endangered regional ecosystems

The exact range of elements may be further considered by Council to meet any specific needs and known areas of concern.

- > The reference to avoidance of significant adverse environmental impacts is qualified, and introduce the concepts of offsets and 'net public benefit'. It is unclear whether this means that offsets are not required if there is a 'net public benefit', or what a 'net public benefit' would be and how it would be balanced against some form of adverse environmental impact;
- > The reference to environmentally significant natural corridors is not precise, and these elements are not mapped on the strategic framework mapping. This aspect could include further guidance on how development can maintain, provide or enhance these corridors in both the urban and rural context.

## 1.4 Tables of assessment

### 1.4.1 Tables of assessment overview

Part 5 of the scheme provides the Tables of Assessment. The tables identify the category of development and assessment for proposed development within the region, and identify:

- > Whether the proposed development is accepted development (or accepted development subject to requirements), or assessable development;
- > If assessable development, whether the proposed development is code assessable or impact assessable; and
- > The assessment benchmarks for assessable development (the Biodiversity overlay code for the Biodiversity overlay table of assessment).

1.4.1.1 *Analysis and comment*

The scheme includes a table of assessment for the Biodiversity overlay (Table 5.9.3). The Biodiversity overlay table of assessment potentially changes the category of development and assessment for development on a site subject to the overlay maps.

Relevantly, the Biodiversity overlay Table of Assessment in the current scheme:

- > Does not change the category of development and assessment for any form of development (Material Change of Use, Reconfiguring a Lot, or Operational Work); and
- > Specifically states that the assessment benchmarks (the Biodiversity overlay code) are not applicable to development that is identified as being Accepted development subject to requirements. It is noted that this statement is included in an Editor’s Note which does not form a statutory part of the scheme, and as such technically does not exclude accepted development subject to requirements from assessment.

While the presence of the overlay not changing the level of assessment is a common approach across many planning schemes, the exemption of accepted development subject to requirements from assessment against the overlay code is potentially problematic. This approach would mean that potentially significant development is able to establish on a site with no scrutiny of environmental impacts by local government (it is noted that State based referrals and assessment may still apply however only for MSES – areas of MLES would not be captured at all).

This could have potentially perverse impacts. As an example, many typical and relatively low impact uses such as dwelling house, dual occupancy, and caretaker’s residence, are routinely made accepted development or accepted development subject to requirements throughout all residential zones in the planning scheme. While many urban zones have only limited in situ environmental features, the exemption would potentially allow for a small but incremental loss of vegetation (or other ecologically important features) over time. Arguably, in these already urbanised areas protection of remaining ecological features is even more warranted, and scrutiny as part of the development application process would be appropriate to ensure that important environmental features are retained. It would be prudent to consider amending Table 5.3.9 to remove the Editor’s note to explicitly make accepted development and accepted development subject to requirements assessable against the provisions of the Biodiversity overlay code. To provide for this form of assessment, additional simple and objective assessment benchmarks could be drafted and included into the Biodiversity overlay code and applicable to accepted development and accepted development subject to requirements including the following:

Performance outcome	Acceptable outcome
A dwelling house, dual occupancy, or caretaker’s residence is located on a site to protect waterways and wetlands, and the clearing of native vegetation is avoided or minimized.	<p>A dwelling house, dual occupancy, or caretaker’s residence is not located on land identified as being a waterway or wetland on a Biodiversity overlay map.</p> <p>Where a dwelling house, dual occupancy, or caretaker’s residence is located on a lot containing or adjoining a wetland or waterway, the use is setback a minimum of 25m.</p> <p>A dwelling house, dual occupancy, or caretaker’s residence is not located on land identified as being MSES or MLES on a Biodiversity overlay map</p> <p>OR</p>

	<p>Where there is an approved building envelope plan, the clearing of native vegetation does not extend beyond the approved building envelope</p> <p>OR</p> <p>Where there is no approved building envelope plan, clearing of vegetation does not extend beyond</p> <ul style="list-style-type: none"> <li>• 20m or 1.5 times canopy height in bushfire area; and</li> <li>• Does not exceed 600m<sup>2</sup>.</li> </ul>
Rural uses are located to protect waterway and wetlands from negative impacts.	<p>Rural uses are not located on land identified as being a waterway or wetland on a Biodiversity overlay map.</p> <p>Where a rural use is located on a lot containing or adjoining a wetland or waterway, the use is setback a minimum of 25m.</p>

This approach is considered to provide Council with an opportunity to assess and consider the cumulative impacts of small vegetation clearing associated with generally low impact uses, while not being an onerous burden on either the community or Council assessment resources. It is noted that the actual setbacks or areas that are included may be further refined to better reflect local circumstances.

The scheme also includes a Table of Assessment for the Environmental management and conservation zone. Within the Environmental management and conservation zone, all uses are identified as being Impact Assessable except for landing, park, emergency services, utility installation, and animal keeping. This approach is supported, as land within this zone is typically of high environmental value and any development should be subject to appropriate scrutiny to ensure those values are protected and maintained.

## 1.5 Zone Codes

### 1.5.1 Environmental management and conservation zone code

The Environmental management and conservation zone code is the only zone that provides specifically for environmental management. The purpose of the zone code is to:

- protect regionally significant environmental areas, such as national parks, resource reserves, conservation parks and world heritage areas;*
- protect other significant natural features such as creeks, gullies, waterways, wetlands, habitats, vegetation and bushland areas, in public or private ownership, from the negative impacts of development; and*
- provide for limited development to occur where it is compatible with the significant environmental values of the land and can be developed in a sustainable way.*

The overall outcomes provide for the conservation values of the and to be maintained and enhanced, and also envisage that small scale rural or eco-tourism uses may be appropriate where they are compatible with the environmental values of the locality. The code also includes specific Acceptable Outcomes relating to vegetation clearing, with Acceptable outcome AO5.1 stating that:

*Development does not involve any clearing of vegetation.*

#### 1.5.1.1 Analysis and comment

Based on a brief review of the zone mapping, it appears that the zone relates predominantly to land that is in a 'protected area' such as National Parks, State Forests, and other reserve tenures. This is a relatively common approach across many local governments, and recognises that the environmental values of these areas are generally very high and development should be limited to small-scale operations only.

It is however unclear whether the purported purpose of the zone to protect significant natural features such as creeks, gullies, waterways etc is being facilitated through the current scheme. From a review of scheme zone mapping, only very limited land included in the Environmental management and conservation zone code relates to land that is a waterway corridor or wetland. This land appears to be more likely included in the Open space zone, with many urban waterway corridors being identified as being in this zone. There is

therefore a mismatch between the stated purpose of the zone, and the type and nature of the land that has been included in the zone.

It is also noted that the opportunity for significant development to occur within a protected area is in any case very limited. Development within a national park or state forest would require a range of consents for the use of the land, is potentially subject to other legislation which regulates land use and development (such as the Environmental Protection and Biodiversity Conservation Act), and would also potentially require other State and federal approvals due to the sensitive and often threatened ecological communities that are included within these areas.

In this regard, the Environmental management and conservation zone is a reinforcement of other layers of environmental protection for existing land within a protected area tenure, and affords limited protection in the scheme to land in private tenure. If the intention is for the planning scheme to identify and protect environmental values at a range of scales and levels of concern, it may be prudent to investigate whether additional zones may be included in the planning scheme. This would allow the scheme to take a finer grained approach to managing development in environmentally sensitive or challenging areas by having a range of zones that afforded a sliding scale of protection. Typically, the environmental management and conservation zone is used for the highest value areas and tightly controls all development, while available zones under the *Planning Regulation 2017* such as the Environmental management zone provide a mechanism to identify environmentally significant areas while potentially allowing for a greater range of development to occur.

## **1.6 Biodiversity overlay code and mapping**

### **1.6.1 Biodiversity overlay and mapping overview**

The purpose of the Biodiversity overlay code is:

*...to protect, rehabilitate and manage areas of environmental significance and the ecological processes and biodiversity values of terrestrial and aquatic ecosystems being:*

- (a) land mapped as containing matters of state or local environmental significance;*
- (b) a biodiversity corridor or wildlife habitat; and*
- (c) a wetland or waterway and its buffer area.*

The code is supported by a series of overlay maps, with each series specifically relating to the following individual aspects:

- > Overlay map series that identifies MSES, MLES (High value) and MLES (General);
- > Overlay map series that identifies Biodiversity corridors and MSES – Wildlife habitats;
- > Overlay map series that identifies MSES waterways and other waterways; and
- > Overlay map series that identifies MSES wetlands.

#### *1.6.1.1 Analysis and comment – overall outcomes*

The overall outcomes provide the broad outcomes that are sought to be achieved through implementation of the overlay code.

At the outset it is noted that there is no overall outcome that relates to the principle of ‘no net loss’ of vegetation or environmental values. Given that this is understood as being an aim of the scheme, it is considered that this would be a key outcome and such a provision should be included. This would provide a strong statement of intent that would align with other code provisions relating to offsets and clearly link overall outcomes with detailed development responses.

In this regard, overall outcome (a) is essentially a re-statement of the SPP approach of avoid, minimise, offset. While this is acknowledged as a requirement in terms of reflected the SPP, the inclusion of this in the overall outcomes potentially weakens the ability of the scheme to prevent unnecessary clearing to facilitate development. The overall outcomes should provide a clear statement of intent to protect ecologically valuable areas, and it is considered more appropriate that the potential mitigate, minimise and offset options are provided in the lower order code provisions. Similarly, overall outcome (b) relating to MLES (general) is equivocal, and does not provide a clear statement of the intent to protect these areas.

Overall outcomes (d) and (e) relate to wetlands and waterways. The general intent of overall outcome (e) is supported, and is a good example of the above in that a clear statement regarding the expectations of development is provided. However, there is some disagreement between the outcomes, as while (e) clearly states that development should be located outside mapped waterways, wetlands and associated buffers, (d) tacitly accepts that development may occur in these areas and provides a mitigation and minimisation strategy. While the principle is supported, this weakens the overall outcome intended for waterways and such options are more appropriately addressed in lower order code provisions.

It is noted that there is also some uncertainty and lack of clarity around terms used in the overall outcomes. In particular, overall outcomes (h) and (i) refer to 'environmentally significant areas'. This term is not separately defined, and it is unclear if this term is an umbrella term that refers to the mapped overlay elements, or is a broader term that could apply to any area of environmental significance within the region.

#### 1.6.1.2 Analysis and comment – Assessment benchmarks

With the commencement of the *Planning Act 2016*, new decision rules were implemented. In relation to code assessable development, the decision rules have particular importance as they more strictly limit the assessment of an application to the identified benchmarks. Where an application meets the benchmarks, or can be conditioned to meet the benchmarks, then an application must be approved. In this regard, it is important that codes are carefully drafted to ensure that an application is subject to the appropriate level of scrutiny, and the outcomes clearly articulate the required outcomes that development should achieve.

In this context, it is noted that of the fourteen (14) the assessment benchmarks, nine (9) do not include Acceptable outcomes. While this approach is not unusual, it means that there are effectively no standard or accepted design and management responses provided by the code, and all applications have to be assessed against the performance outcomes only. This does allow maximum flexibility in terms of how a development application may be assessed, however it is time and resource intensive both for Council and for applicants. It is likely that the lack of acceptable outcomes is the reason why accepted development has been exempted from assessment against the Biodiversity overlay, as accepted development should have simple, objective and achievable criteria against which to be assessed.

Performance outcome 1 (PO1) is effectively a re-statement of Overall outcome 1 and relates to the avoid, mitigate, offset principles as espoused through the SPP. As noted previously, it is preferable that this approach be included in the lower order outcomes, and as such this PO is generally supported. However, while the row header suggests that the PO relates to MSES and MLES (high), the text is poorly drafted and refers to protection of significant natural assets, habitats and values. It is assumed that this refers to the mapped elements, however the inconsistency between terms diminishes clarity and understanding and a simple and consistent terminology would be preferred. There is also disagreement between the initial statement which provides for protection of environmental values to the greatest extent possible, however item (a) of the minimisation list suggests that the retention of native vegetation will demonstrate mitigation. It is unclear whether this requires all native vegetation on the site to be retained (which presumably would be part of the mapped MSES/MLES), or whether only some should be retained. It is also unclear if native vegetation is the mapped MSES/MLES or is some sub-set of this as the term is not defined. These uncertainties also apply to PO2 which relates to the retention, regeneration and rehabilitation of native vegetation. Being a separate PO implies that this element is a separate type or form of vegetation, however it is not included on any scheme mapping.

The note to PO1 relating to offsets is supported, and provides clear indication that where vegetation clearing is unavoidable provision of offsets is an appropriate way to manage residual impacts. Offsets are also closely linked to the concept of 'no net loss', and as such supports and facilitates achievement of this aim. However, the note only relates to clearing of MLES (High), and this may create confusion as to whether offsets are required for clearing of MLES (general) or MSES<sup>11</sup>. Further, there is no guidance as to how offsets are triggered (e.g. are they triggered where there is a Significant Residual Impact), how offsets are calculated and where they are to be directed.

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<sup>11</sup> It is acknowledged that offsets for MSES are provided through agreement with the State, and offsets for MLES cannot be required where they have already been provided for MSES in the same location.

The Performance outcome relating to MLES (general) (PO3) is very open and does not have regulatory strength. Further, there is imprecision and inconsistency of terminology in PO3 in that the column header relates to MLES (general) elements, however the text refers to impacts on biodiversity values with no reference to MLES (general). In operation, it is unclear how this provision would prevent or minimise clearing in areas of MLES (general), as the minimisation strategies are included in an editor's note. An editor's note does not form part of the regulatory planning scheme, and is an extrinsic explanatory device only. In this regard, no minimisation strategies are called up by the scheme as being required to be considered, and the provision is not supported by a strong statement in the overall outcomes that seeks to protect ecological values. Given the lack of regulatory strength as currently drafted, it begs the question as to why MLES (general) is separately mapped and defined in the scheme as it potentially creates administrative complications with little clear benefit to vegetation/ecological outcomes.

There is further imprecision in terms in Performance outcome 6 (PO6) which relates to waterways and wetlands. The only obvious reference to waterway ecology is water quality. It is noted that the terminology used has broad application, however provisions relating to maintenance of riparian vegetation, prevention of sedimentation, and protection or provision of buffer areas would normally be expected.

Performance outcome 13 (PO13) relates to rehabilitation. It is unclear if the 'area' referred to is any degraded area due to development, only those areas mapped under the overlay and/or for lands to be surrendered as a dedication or protected under covenant. If it is presumed that the PO relates to rehabilitation of MSES and MLES areas, rehabilitation is already required under other POs and this provision is somewhat of a duplication. However, it is useful for the scheme to include guidance as to how rehabilitation should occur, and it will also potentially provide opportunity to further reinforce and regulate the concept of 'no net loss'.

Performance outcome 14 (PO14) relates to reconfiguring a lot. The provision does include an acceptable outcome, which provides for no new lots to be established on sites that are entirely subject to a mapped overlay element. This provision reflects a very hard line approach, and is presumably to ensure that undisturbed areas of high ecological value remain free of development. This approach reflects the apparent underlying Council policy position, in that a more permissive approach is taken to those sites that are already earmarked via subdivision to support urban development, while development in more natural areas is tightly controlled. While the general approach is appropriate, the PO14 text refers only to 'existing habitat', which is a specific element within the overlay mapping. While the AO14 text refers specifically to all mapped elements, the inconsistency between terminology lacks clarity and certainty of intent.

#### *1.6.1.3 Analysis and comments – overlay mapping*

The overlay maps are broken down into four (4) series that relate to specific environmental and ecological values and areas. In general, the overlay maps are appropriate and are sufficient to identify the extent of the overlay elements at a lot level.

The Biodiversity Corridors and Wildlife Habitat Overlay map identifies MSES – wildlife habitat and biodiversity corridors. A comparison with the strategic framework mapping for environmental matters identifies that some of the natural corridors and links shown in the strategic framework mapping are not included as part of the overlay mapping. This is not unusual, and strategic framework mapping is a conceptual form of mapping that does not necessarily translate directly into cadastrally based mapping such as overlays. However, given that the strategic framework seeks to protect natural corridors identified in the strategic framework maps, this will only apply to impact assessable development unless the natural corridors are mapped in the overlay code mapping. In this regard, there is a degree of misalignment between the outcomes for natural corridors in the strategic framework and delivery through the planning scheme.

The Biodiversity Corridors and Wildlife Habitat Overlay map identifies MSES – wildlife habitat and biodiversity corridors. A comparison with the strategic framework mapping for environmental matters identifies that some of the natural corridors and links shown in the strategic framework mapping are not included as part of the overlay mapping. This is not unusual, and strategic framework mapping is a conceptual form of mapping that does not necessarily translate directly into cadastrally based mapping such as overlays. However, given that the strategic framework seeks to protect natural corridors identified in the strategic framework maps, this will only apply to impact assessable development unless the natural corridors are mapped in the overlay code mapping. In this regard, there is a degree of misalignment between the outcomes for natural corridors in the strategic framework and delivery through the planning scheme.

The present overlay mapping of Biodiversity Areas has been prepared as follows:

FRPS undertook a study in 2010 for Rockhampton Regional Council that resulted in the preparation of mapping identifying “areas of environmental significance”.

G This mapping formed the basis of the ‘MLES – High’ and ‘MLES – General’ layers in the planning scheme.

H Further, as part of Major Amendments this mapping has been amended (in particular we refer to ‘Bio\_MLES\_Gen\_Nov2018’ and ‘Bio\_MLES\_High\_Nov2018’). This has not resulted in a change in content of the mapping, only the spatial extent particularly where vegetation has been cleared.

A full assessment of the appropriateness of the process and its appropriateness is presented in **Appendix E**. This assessment has concluded that:

1. The base mapping is close to 10 years old and would largely be based on information older than decade.
2. The present mapping does not have a clean line of site between the level of significance afforded and the reason for assigning significance.
3. New information regarding the extent of remnant and regrowth vegetation plus species distributions could inform a new overlay map.
4. There is much information that should be reflected in the mapping that is not readily available (e.g. Yellow chat habitat; koala habitat areas) that could be gleaned from experts in the community.
5. That the Biodiversity Planning Assessment Methodology / Common Nature Conservation Significance Assessment methodologies could form the basis of a new map that captures contemporary information, expert input and results in a transparent product.

The current Corridors and Wildlife habitats mapping displays MSES habitat mapping and corridors as mapped by Council. It is recommended that the corridor overlay be updated to reflect those presented in **Figure 1-15** to ensure corridors of appropriate scale and location are protected.

The present waterway and wetland overlay maps are fit for purpose subject to future refinement as per recommendations presented herein.

## 1.7 Planning Scheme Policy

The Ecological assessment planning scheme policy applies to assessable development where the site is identified as having biodiversity values.

The purpose of the policy is to “...*encourage more ecologically sustainable development.*”

The policy includes a range of potential design and operational measures that can be incorporated into a development to protect and mitigate environmental impacts. These measures include:

- *retaining native vegetation to the greatest extent possible through integration with development of the site and minimising edge effects;*
- *locating and designing public access to avoid disturbance to areas of environmental significance through measures such as exclusion devices, legal covenants, signage and designated access points;*
- *avoiding or minimising alterations to the natural landform, hydrology and drainage patterns and groundwater recharge processes so that development on the site does not negatively affect areas of environmental significance;*
- *clustering development lots and building envelopes and minimising development footprints to maximise the ecological connectivity of native vegetation within the subject site and on adjoining properties;*
- *allowing for the regeneration of native vegetation to the area or rehabilitating with local endemic plants in non-vegetated areas of the site adjacent to the area of environmental significance, immediately following practical completion of the development, and landscaping with local endemic plant species;*
- *incorporating measures that avoid the disruption of threatened wildlife and their habitat and allows for their safe movement through the site to the adjacent area of environmental significance. Appropriate measures may include vegetated buffers, fauna-friendly fencing, wildlife underpasses or overpasses, road signs alerting motorists to fauna movement, noise control and sensitive lighting,*

*and use of nest boxes in retained or nearby vegetation (for example ensuring artificial lighting as seen from a turtle nesting beach is not increased);*

The policy also includes guidance on how to prepare typical types of ecological assessment and reports (including ecological assessment reports, environmental management plans, and rehabilitation plans). The guidance sets out the range of matters that should be included, as well as providing a suggested format that will provide sufficient information to allow for an assessment of the proposed development and any potential impacts.

#### *1.7.1.1 Analysis and comments*

In general the policy is a useful tool. While the list of mitigation and design considerations provides a useful toolkit for an applicant, the policy is more of an explanatory guideline on what information will be required to support an application. In this regard it will assist applicants in preparing at least a basic ecological assessment and report that addresses the typical range of issues.

However, the mechanism to implement the policy is uncertain. The policy states that it applies to assessable development where the site is identified as having biodiversity values, which may include land that is subject to the Biodiversity overlay. This suggests that any land that is taken to have 'biodiversity values' could potentially be subject to the policy, not just land identified in the scheme through the biodiversity overlay mapping. It is unclear how this would work in practice, and presumably relies on Council or an applicant making a judgement on whether land not subject to the biodiversity overlay has sufficient values to warrant consideration under the policy. While a certain amount of flexibility is required to allow for exceptional or unforeseen circumstances, the application of the policy could be better targeted to any assessable development that is on land subject to the biodiversity overlay.

In this regard, it is also noted that the Biodiversity overlay code only references the policy through an Editor's Note in two (2) circumstances:

- Where on land within a mapped biodiversity corridor or wildlife habitat; and
- Where rehabilitation is required.

It is unclear whether in operation this means that development in or near mapped wetlands or waterways, or involving mapped MSES or MLES, does not necessarily trigger consideration of the policy.

If the intention for the scheme is to protect, maintain and enhance environmental values, it is considered prudent that the policy be applied more broadly. This could be achieved through explicit reference to the policy in the Biodiversity overlay code through Notes or Editor's Notes in all sub-sections. This approach would direct scheme users to the policy, and provide Council with a mechanism to encourage development proponents to prepare assessment reports across a range of circumstances. While a comprehensive report may not be warranted in all circumstances, it creates a framework in which an applicant will be encouraged to engage with Council regarding environmental matters, and provide a forum where potential impacts and agreed options/responses can be discussed and confirmed through the application process.

The Planning Scheme Policy is also very prescriptive and would benefit from some simplification. For example, the policy could have reduced requirements for ecological assessments in particular locations (i.e. 'basic' assessments), while others may require a 'detailed' assessment. To improve tree retention and protection on developments inclusion of a requirements around tree surveys and tree protection plans would be beneficial.

APPENDIX

G

BIODIVERSITY OFFSET ASSESSMENT

# 1 Local Government Offset Benchmarking

The Queensland environmental offset framework encompasses the:

- > *Environmental Offsets Act 2014* - coordinates the delivery of environmental offsets across jurisdictions and provides a single point-of truth for offsets in Queensland
- > *Environmental Offsets Regulation 2014* - provides detail of the prescribed activities regulated under existing legislation and prescribed environmental matters which the Act applies
- > *Queensland Environmental Offsets Policy* (The Policy) - provides a single, consistent, whole-of-government policy for the assessment of offset proposals to satisfy offset conditions and ensure they meet the requirements of the *Environmental Offsets Act 2014*.

The Policy is a statutory instrument, given effect through section 12 of the *Environmental Offsets Act 2014* and prescribed under the *Environmental Offsets Regulation 2014*. It is a decision-making support tool when the relevant administering agency, including local governments, has identified that an offset is required for a significant residual impact on a prescribed environmental matter. The Policy is for the use by all administering agencies including local government. The Policy states that a local government may only impose an offset condition where there will be a significant residual impact on:

- > a matter of local environmental significance (MLES); or
- > a matter of state or national significance if authorised under the *Environmental Offsets Regulation 2014*.

A MLES for which an offset is required, must be specified in a local government planning scheme and be approved by the state in accordance with Statutory Guideline for making and amending local planning instruments.

To gain a greater understanding of approaches adopted by other local governments a review of planning instruments adopted by three local authorities was undertaken. Specifically, the review included a comparison of triggers, calculation ratios and multipliers and delivery mechanisms. Brisbane City Council (BCC), Gold Coast Council (GCCC) and Sunshine Coast Council (SCC) planning scheme overlay codes and planning scheme policies (PSP), which relate to offset triggers and application were review and an overview has been provided in **Table 1-1**.

Table 1-1 Review of local government offset provisions

Offset Provisions	Brisbane City Council	Gold Coast City Council	Sunshine Coast Council
Relationship of Offset PSP to planning scheme	<p>The Offsets PSP provides:</p> <ul style="list-style-type: none"> <li>&gt; information that Council may request in a development application.</li> <li>&gt; guidance or advice about satisfying an assessment benchmarks of the Biodiversity Areas Overlay Code which identifies this planning scheme policy as providing that guidance or advice</li> </ul>	<p>The Environmental Offsets Policy is to assist applicant to address the performance outcomes of the Environmental significance overlay code relating to environmental offsets for MLES.</p>	<p>The purpose of the PSP is to:</p> <ul style="list-style-type: none"> <li>&gt; state standards identified in the <i>Biodiversity, waterways and wetlands overlay code</i> and <i>Vegetation management code</i> relating to biodiversity offsets; and</li> <li>&gt; identify and provide guidance about information that may be required to support a development application providing a biodiversity offset.</li> </ul>
Offset Triggers	<p>In accordance with the Environmental Offsets Act 2014, offsets are indicated in performance outcomes PO9 and acceptable outcome AO9 of the Biodiversity Areas Overlay Code.</p> <p>Therefore, if a site is wholly or partially located in the High ecological significance (HES) sub-category or the General ecological significance (GES) sub-category (other than for a dwelling house) for development which has or is</p>	<p>Applies when significant residual impacts occur to areas mapped within the Environmental vegetation management overlay map as medium prior vegetation and where those values are located outside of the mapped biodiversity areas on the Environmental significance – biodiversity area overlay map.</p>	<p>Applies to assessable development providing a biodiversity offset for the removal of a native vegetation area.</p> <p>The Biodiversity, waterways and wetlands overlay code states that –</p>

Offset Provisions	Brisbane City Council	Gold Coast City Council	Sunshine Coast Council
	<p>likely to have a significant residual impact on a MSES or MLES, after all reasonable on-site mitigation measures have been or will be undertaken, provides an environmental offset.</p> <p>Sites containing mapped koala habitat areas of South- east Queensland (SEQ) are offset based on the number of non-juvenile koala habitat tree being impacted.</p>		<p><i>Where the clearing of native vegetation cannot practicably be avoided, development:-</i></p> <p><i>provides a biodiversity offset for the area that is adversely affected by the development.</i></p> <p>The Vegetation management codes applies to assessable development identified as requiring assessment against the Vegetation management code by the tables of assessment within the planning scheme.</p>
Offset provision	The offset achieves an <u>equivalent environmental outcome</u> where development will or is likely to have a significant residual impact on a MLES or MSES.	The offset achieves an <u>equivalent environmental outcome</u> .	The offset results in a <u>net environmental benefit and net gain</u> in mature and actively regenerating koala habitat.
Offset Calculation Methodology	<p>In accordance with the <i>Environmental Offsets Act 2014</i>, a local government may attribute a rating multiplier to each local environmental matter that does not exceed a multiplier of 4. Brisbane City Council's application is generally as follows:</p> <ul style="list-style-type: none"> <li>&gt; HES – multiplier of 4</li> <li>&gt; GES – multiplier of 3</li> </ul> <p>Application is dependent on site specific diversity values.</p> <p>Koala offsets in SEQ are calculated based on the number of trees being impacted (i.e. impact area (ha) = Number of non-juvenile koala habitat trees being impacted x 0.004 ha.</p>	<p>Offsets are calculated in accordance with the <i>Environmental Offsets Act 2014</i> using the State Government financial settlement offset calculator.</p> <p>The following matter groups from the financial settlement offset calculator are used to calculate offset areas and costs:</p> <ul style="list-style-type: none"> <li>&gt; For impacts on medium priority vegetation areas greater than 500m<sup>2</sup>: <ul style="list-style-type: none"> <li>– State offset calculator ratio of 3:1 (area) for medium priority vegetation; and</li> <li>– For impacts on medium priority vegetation greater than 500m<sup>2</sup>, the matter group 'MLES 3' (multiplier of 3) shall be used in the State offset calculator.</li> </ul> </li> <li>&gt; For impacts on medium priority vegetation areas less than 500m<sup>2</sup>: <ul style="list-style-type: none"> <li>– State offset calculator ratio of 3:1 (area) for medium priority vegetation; and</li> <li>– For impacts on medium priority vegetation less than 500m<sup>2</sup>, the matter group 'SEQ Koala Habitat' shall be used in the State offset calculator.</li> </ul> </li> </ul> <p>Note: SEQ koala Habitat Offsets are calculated based on the number of trees being impacted (i.e. impact area (ha) = Number of non-juvenile koala habitat</p>	<p>The Vegetation management code indicates a table of Biodiversity offset requirements (Table 9.4.3.2) as follows:</p> <p>For areas mapped within the Biodiversity, Waterways and Wetlands Overlay Maps as containing the ecologically important areas:-</p> <ul style="list-style-type: none"> <li>&gt; <i>Native vegetation area - offset ratio 1:1 (where involving development in a centre zone or industry zone) or 1.5:1 (where not otherwise specified); and</i></li> <li>&gt; <i>Riparian area, waterway or wetland – offset ratio 2:1</i></li> </ul> <p>For areas mapped within the Biodiversity, Waterways and Wetlands Overlay Maps as containing Habitat for rare and threatened species: -</p> <p>Koala Habitat or Habitat for other endangered species, vulnerable species and rare species – offset ratio is 5:1 where for koala habitat and 2:1 for other habitat.</p>

Offset Provisions	Brisbane City Council	Gold Coast City Council	Sunshine Coast Council
		trees being impacted x 0.004 ha.	
Delivery Options	<p>As per the <i>Environmental Offsets Act 2014</i>:</p> <ul style="list-style-type: none"> <li>a) financial settle offsets; or</li> <li>b) proponent-driven offset; or</li> <li>c) combination of financial and proponent-driven offset pursuant to an agreed delivery arrangement under the <i>Environmental Offsets Act 2014</i>.</li> </ul>	<p>The Environmental offsets policy states that offset may be delivered as:</p> <ul style="list-style-type: none"> <li>a) proponent driven offset; or</li> <li>b) financial settlement offset.</li> </ul>	<p>The Offset PSP states the following options for biodiversity offset deliver:</p> <ul style="list-style-type: none"> <li>c) on-ground biodiversity offset; or</li> <li>d) financial contribution; or</li> <li>e) advance biodiversity offset for seeking in-principle approval for future development.</li> </ul>

The review demonstrates that triggers vary across local governments and the calculation of offset obligations vary, but the capacity to delivery land-based or financial settlement offsets is constant.

## 2 Potential approaches for the Rockhampton Region

Given PO1 of the Biodiversity Overlay Code includes the following statutory note:

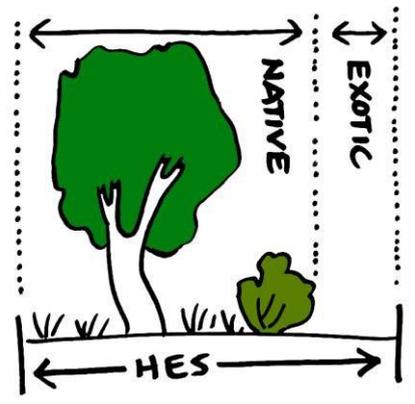
*“An environmental offset is provided for any permanent, irreversible loss or reduction in matters of local (high) environmental significance caused by the development. An environmental offset is carried out as per the requirements of the Queensland Government’s Environmental Offsets Policy, as amended from time to time”*

There is a need to provide greater guidance to both Council officers and applicants regarding:

1. What constitutes “permanent, irreversible loss or reduction in matters of local (high) environmental significance”.
2. Specifically what “matters of local (high) environmental significance” constitutes (i.e. is it any impact in a mapped area, impacts to a list of MLES values within mapped areas; or any loss of MLES values irrespective of location).
3. Greater guidance around how the *Queensland Government’s Environmental Offsets Policy* applies (e.g. what offset ratio is to be used).
4. Greater guidance around where preferred offset sites are located.

A standalone offset policy in the planning scheme would provide the ideal mechanism to communicate Council’s expectations around environmental offsets. In the meantime, Council should consider developing internal practice note to guide Council officers about the circumstances where offsets should prevail and how they should be implemented. Using the same format as **Table 1-1**, presents recommended content of a practice note. This note can be trialled with Council officers and refined as needed. When satisfied that the approach is ‘fit for purpose’ then a formalised planning scheme policy can be developed.

Table 2-1 Recommended content of a biodiversity offset practice note

Offset Provisions	Recommended practice note content
Relationship of Offset PSP to planning scheme	Not applicable at this stage.
Offset Triggers	<p>Any clearing of native vegetation irrespective of remnant or regrowth status within areas mapped by Council as matters of local (high) environmental significance. The extent of impact is based on the vertical projection of native vegetation as conceptually illustrated below:</p>  <p>Such clearing would be regarded as constituting a significance residual impact.</p>
Offset provision	The offset achieves an <u>equivalent environmental outcome</u> where development will or is likely to have a significant residual impact. This is determined according to the “Offset Calculation Methodology”.
Offset Calculation Methodology	In accordance with the <i>Environmental Offsets Act 2014</i> , a local government may attribute a rating multiplier to each local environmental matter that does not exceed a multiplier of 4.

Offset Provisions	Recommended practice note content
	<p>It is recommended that a multiplier of 3 is used which is consistent with other local authorities.</p> <p>Offset contributions can be calculated in accordance with the methods outlined in:  <a href="https://www.qld.gov.au/environment/pollution/management/offsets/delivering">https://www.qld.gov.au/environment/pollution/management/offsets/delivering</a></p>
Delivery Options	<p>As per the <i>Environmental Offsets Act 2014</i>:</p> <ul style="list-style-type: none"> <li>d) financial settle offsets; or</li> <li>e) proponent-driven offset; or</li> <li>f) combination of financial and proponent-driven offset pursuant to an agreed delivery arrangement under the <i>Environmental Offsets Act 2014</i>.</li> </ul> <p>A proponent driven offset can be delivered at a site of their choice, which may include the development site or elsewhere in the local government area where it can be demonstrated it will have a positive ecological outcome (e.g. is located within a corridor; builds on the edge of existing protected estate; provides a buffering outcome to a waterway or wetland). Where a site cannot be found it is directed to one of Council's preferred sites. Where a financial settlement is provided it is used to fund enhancement efforts at one of Council's preferred sites.</p> <p>Council's preferred site may include those described in the following section.</p>

## 3 Potential offset receiving sites

### 3.1 Identification of offset receiving sites

Potential offset receiving sites were identified using the methodology detailed below:

- > Identification of land owned by Council was obtained from a spatial layer provided by Council (RRC Property Layer Regional Ecosystem Assessment, Dec 2018) from the 'Formatted\_Owner\_Name' Field.
- > The land use was chosen from the 'Land\_use\_description' field including the following land uses:
  - o Vacant Land;
  - o Vacant Rural Land; and
  - o Parks & Gardens.
- > Subsequently sites were visually assessed using aerial imagery to select additional sites that could accommodate offsets because of their position, size and existing limited development. This included land in the following land use descriptions:
  - o Large Homesite Dwelling;
  - o Animals Special; and
  - o Cattle Breeding/Fattening.
- > Remnant regional ecosystems were clipped out as these areas are generally not suitable for offset receiving sites;
- > Preclearing Regional Ecosystems were used to identify likely Regional Ecosystems to the extent of these that can be established within the receiving sites.
- > This resulted in a first cut map of Council owned lands where offsets could be accommodated.
- > High quality, strategic sites were then identified by clipping the first cut mapping the corridor layer prepared (Cardno\_corridors\_combined).
- > Where overall patch size was <1ha these areas were removed from the resulting dataset.

The preferred offset receiving sites are located within ecological corridors which provides a strategic approach to located offset receiving sites. **Table G1** lists potential sites along with the pre-clearing regional ecosystem and **Figure G1** provides an overview of the location of these sites.

Table G1 - Potential offset receive sites

Priority sites (within corridors)		Supplementary sites (outside of corridors)	
LotPlan	Pre-clear regional ecosystem	LotPlan	Pre-clear regional ecosystem
<b>2SP296977</b>	11.1.4b	<b>51RN253</b>	11.12.1
<b>203RN1556</b>	11.12.6	<b>203RN1556</b>	11.3.25/11.3.4
<b>203RN1556</b>	11.3.25/11.3.4	<b>203RN1556</b>	11.12.1
<b>203RN1556</b>	11.12.1	<b>203RN1556</b>	11.12.1
<b>203RN1556</b>	11.3.25/11.3.4	<b>1RP616988</b>	11.3.3/11.3.4/11.3.2
<b>101CP886610</b>	11.3.4/11.3.2/11.3.2	<b>124LN2658</b>	11.3.27b
<b>101CP886610</b>	11.3.4/11.3.2/11.3.2	<b>101CP886610</b>	11.3.4/11.3.2/11.3.2
<b>203RN1556</b>	11.3.25/11.3.4	<b>101CP886610</b>	11.3.4/11.3.2/11.3.2
<b>203RN1556</b>	11.3.25/11.3.4	<b>2RP616741</b>	11.12.1
<b>203RN1556</b>	11.12.6	<b>203RN1556</b>	11.3.25/11.3.4
<b>203RN1556</b>	11.12.6	<b>101CP886610</b>	11.3.4/11.3.2/11.3.2
<b>203RN1556</b>	11.12.6	<b>203RN1556</b>	11.3.25/11.3.4
<b>203RN1556</b>	11.12.6	<b>2SP296977</b>	11.3.3

Priority sites (within corridors)		Supplementary sites (outside of corridors)	
LotPlan	Pre-clear regional ecosystem	LotPlan	Pre-clear regional ecosystem
<b>203RN1556</b>	11.3.25/11.3.4	<b>2RP616741</b>	11.12.1/11.3.4
<b>203RN1556</b>	11.3.25/11.3.4	<b>124LN2658</b>	11.3.3/11.3.4/11.3.2
<b>101CP886610</b>	11.3.4/11.3.2/11.3.2	<b>124LN2658</b>	11.3.25/11.3.27c
<b>203RN1556</b>	11.12.6	<b>101CP886610</b>	11.3.2
<b>2SP296977</b>	11.3.3	<b>101CP886610</b>	11.3.2
<b>203RN1556</b>	11.3.25/11.3.4	<b>203RN1556</b>	11.12.6
<b>101CP886610</b>	11.3.2	<b>203RN1556</b>	11.3.25/11.3.4
<b>203RN1556</b>	11.3.25/11.3.4	<b>203RN1556</b>	11.12.6
<b>203RN1556</b>	11.12.6	<b>203RN1556</b>	11.12.1
<b>203RN1556</b>	11.12.6	<b>101CP886610</b>	11.3.2
<b>203RN1556</b>	11.12.6	<b>5RP616988</b>	11.3.3/11.3.4/11.3.2
<b>203RN1556</b>	11.3.25/11.3.4	<b>203RN1556</b>	11.12.6
<b>203RN1556</b>	11.3.25/11.3.4	<b>38RP602043</b>	11.12.6a/11.12.4/11.
<b>203RN1556</b>	11.12.6	<b>2SP300248</b>	11.12.3
<b>203RN1556</b>	11.12.6	<b>151LN2379</b>	11.3.27a
<b>203RN1556</b>	11.3.25/11.3.4	<b>16RP612555</b>	11.3.27c
<b>101CP886610</b>	11.3.2	<b>151LN2379</b>	11.12.1/11.3.2
<b>203RN1556</b>	11.12.6	<b>200SP260353</b>	11.12.1/11.3.4
<b>203RN1556</b>	11.12.6	<b>2RP608152</b>	11.12.6a/11.12.4/11.
<b>200SP260353</b>	11.12.1/11.3.4	<b>1RP618495</b>	11.11.3
<b>3RP603358</b>	11.3.3	<b>3RP608152</b>	11.12.6a/11.12.4/11.
<b>3RP603358</b>	11.3.3	<b>74LN2497</b>	11.3.4/11.3.2/11.3.2
<b>3RP603358</b>	ocean	<b>74LN2497</b>	11.3.27a
<b>74LN2497</b>	11.3.4/11.3.2/11.3.2	<b>195LN1530</b>	11.12.6a/11.12.4/11.
<b>74LN2497</b>	11.3.27a	<b>1RP618495</b>	11.12.6a/11.12.4/11.
<b>2SP300248</b>	11.3.4	<b>151LN2379</b>	11.3.2/11.3.4
<b>2SP300248</b>	11.3.4	<b>2SP300248</b>	11.3.4
<b>3RP603358</b>	11.1.4b	<b>16RP612555</b>	11.3.1
<b>3RP603358</b>	11.1.4b	<b>2SP300248</b>	11.12.1/11.11.15
<b>2SP300248</b>	11.12.4	<b>2SP300248</b>	11.12.4
<b>74LN2497</b>	11.3.2/11.3.4	<b>74LN2497</b>	11.3.2/11.3.4
		<b>37RP602043</b>	11.12.6a/11.12.4/11.
		<b>141LN2860</b>	11.3.27a
		<b>141LN2860</b>	11.3.2/11.3.4

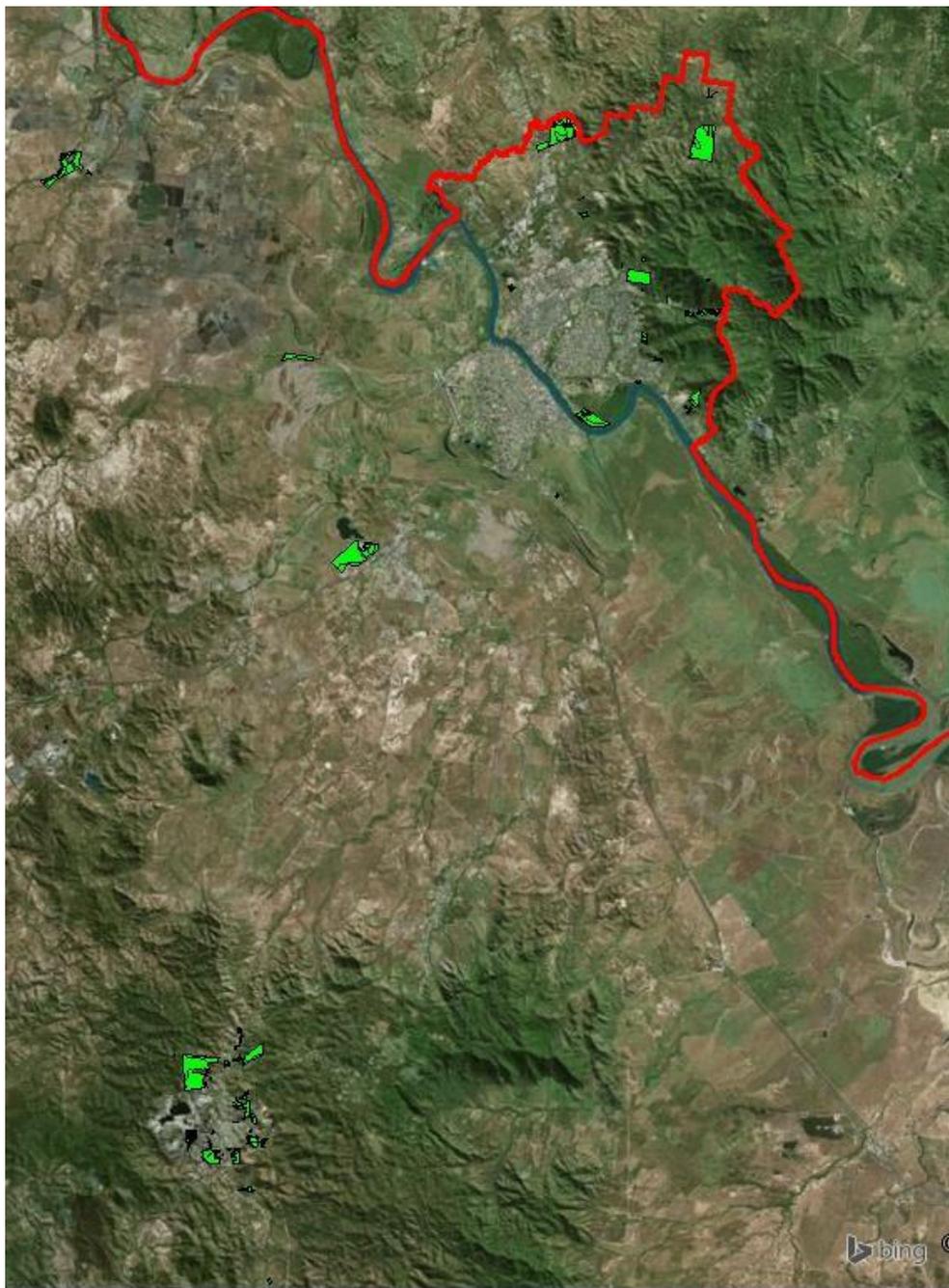


Figure G1 - Potential offset receiving sites identified using the above method