

# **Vegetation Communities of the Capricornia Cays, Queensland.**

Technical Descriptions and Benchmarks.



**Queensland**  
Government

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May 2022

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# Introduction

The Capricornia Cays are a globally significant conservation area and critically important for large populations of seabirds and marine turtles and support the largest areas of *Pisonia grandis* closed forest in Australia. The Capricornia Cays National Park and Capricornia Cays National Park (Scientific) encompass 13 coral cays.

The vision statement for the current management plan for both parks states that:

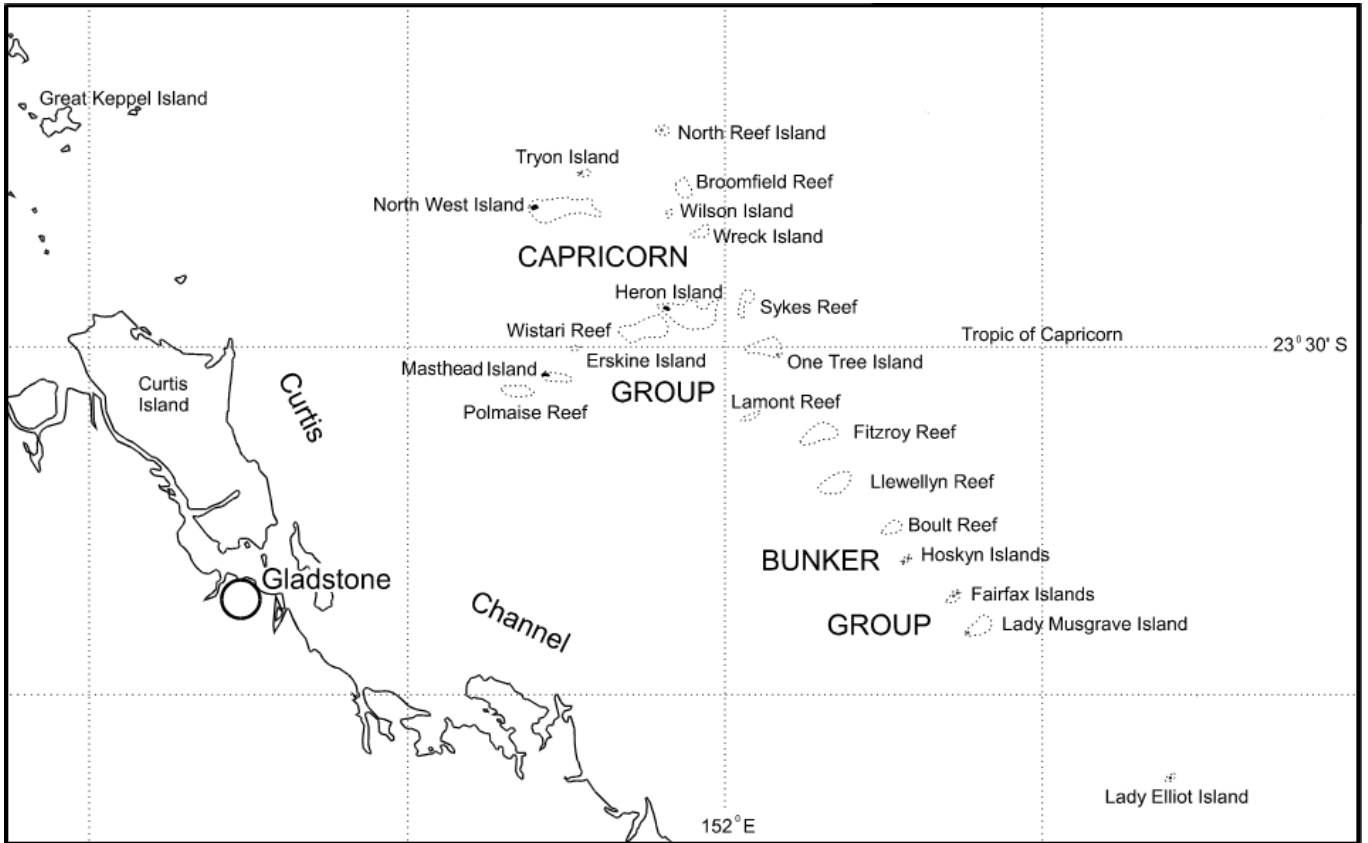
- The parks provide critical habitat for species including globally significant populations of seabirds and marine turtles.
- The parks support world-leading research into coral cays, their wildlife, and their associated ecosystems.
- Conservation management enhances the cays' natural biological resilience, protects them from non-native plant and animal introductions, and restores degraded habitats.
- Capricornia Cays National Park will continue to provide valuable scientific research opportunities in locations that are in a largely natural and unaltered state (QPWS, 2014).

In 2007/2008, the Queensland Herbarium was engaged by Queensland Parks and Wildlife Service (QPWS) to undertake comprehensive vegetation survey and mapping of the Capricornia Cays including Lady Elliot Island and North Reef (Batianoff et al., 2012). The information gained from these projects was used primarily to identify, describe and map the vegetation communities of the Capricorn Bunker cays to assist in understanding the role of key invertebrates in the scale related death of *Pisonia* forests and the consequent need to carry out restoration on Tryon Island.

The data obtained from the 2007/2008 surveys has since been used as reference data for restoration work undertaken on Tryon Island and Lady Musgrave Island and has provided a model for preparation and implementation of the Lady Elliot Island Ecosystem Resilience Plan (Great Barrier Reef Marine Park Authority, 2020). It has also proved invaluable in documenting key values and threats and developing criteria for QPWS Health Check assessments routinely undertaken as part of the recently introduced QPWS Values Based Management Framework (VBMF) for the Capricornia Cays National Park. Management of endemic coral cay communities including *Pisonia grandis* forests needs to be based on contemporary knowledge from accurate data and therefore able to respond to threats from climate change related impacts, pests, pathogens and tourism and recreational development as stated in the Capricornia Cays Monitoring and Research Strategy. The resilience of most if not all other key values (e.g. seabirds and turtles) of the cays is linked to the vegetation communities and the habitat and stability they provide. Aligned with the VBMF, this project is an action in the current Capricornia Cays Monitoring and Research Strategy

North Reef Island and Lady Elliot Island are Commonwealth Islands and although not part of the Capricornia Cays National Parks have been included in this project, as previously by Batianoff et al. (2012). The inclusion of these islands contributes to a more comprehensive understanding of the island ecosystems in the region, and this report refers to the 15 vegetated islands that form the Capricorn-Bunker Islands as the Capricornia Cays.





Locality map of the Capricorn and Bunker Island groups in the southern Great Barrier Reef.



Lady Elliot Island Lighthouse keepers cottages ca 1964. Photo courtesy Australian Maritime Safety Authority (AMSA).

Lady Elliot Island, the southernmost of the coral cays, was extensively cleared and mined for guano from 1863 to 1873. The aim of the Lady Elliot Island Ecosystem Resilience Plan is to rehabilitate much of the vegetation of Lady Elliot Island back to its natural vegetation, as representative of the Capricornia Cays. This project aims to describe the vegetation communities of the Capricornia Cays to provide benchmarks and technical descriptions that can be used to assess the condition of the revegetation on Lady Elliot Island

and other rehabilitation sites within the Capricornia Cays using the BioCondition assessment method (Eyre et al. 2015). BioCondition is a site-based, quantitative and repeatable assessment procedure that provides a numeric score to reflect functional, through to dysfunctional, vegetation condition states for biodiversity. BioCondition is used throughout Queensland for vegetation condition assessment in numerous management applications and policy platforms and is being used to score vegetation condition across the State in the Spatial BioCondition project (Department of Environment and Science 2021). BioCondition has also been used to evaluate the success of vegetation rehabilitation post open cut coal mining at Meandu mine near Nanango in Southeast Queensland (Neldner and Ngugi 2014) and is being used to assess condition of vegetation in Southeast Queensland National Parks (Neldner et al, in prep.).

The project will also establish long term monitoring sites located within representative areas of the range of vegetation communities present in the Capricornia Cays. The survey data recorded at these sites during the 2021 surveys will provide baseline data for these sites.

# Methods

## Vegetation Mapping

Vegetation mapping was produced at a map scale between 1:1000 and 1:2000 depending on the size of the island by Batianoff et al. (2012). Digital mapping data are available from the Queensland Government Open Data Portal (2022). There were minor improvements to the vegetation mapping produced originally in 2012 with the recognition and mapping of the vegetation communities 12.2.18d *Guilandina bonduc* closed scrub, 12.2.19f *Ximenia americana* closed scrub and 12.2.20c *Cordia subcordata* low closed-forest. The vegetation of Tryon Island which is recovering from *Pulvinaria urbicola* (scale insect) induced dieback (Olds, 2018); and the subject of concentrated rehabilitation efforts has been re-mapped by Joy Brushe and this new mapping inserted into the mapping coverage.

## Vegetation Communities and Regional Ecosystems

**Note:** Reference site survey is not appropriate for the communities highlighted in yellow due to dynamic changes constantly occurring in these communities or because of their typically small patch sizes. Survey of these communities was not conducted as part of this current project but Technical Descriptions from Batianoff et al. (2012) are included. The three vegetation communities shaded in blue have been added to the legend from Batianoff et al. (2012), and the legend re-organised for the correct landform situation. Benchmark and technical descriptions for each vegetation community are supplied in this report. Where a vegetation community is restricted in distribution the specific island is noted in brackets ().

### Foreshore Beach Vegetation

D Shingle shores with sparse vegetation e.g., *Canavalia rosea* 12.2.14h

1a \**Cakile edentula* ephemeral herbland 12.2.14f

1b *Spinifex sericeus* open hummock grassland 12.2.14e

1c *Sporobolus virginicus* tussock grassland 12.2.14d

1d Seashore mixed herbland 12.2.14i

1e Very sparse herbland, mainly sand (North Reef) 12.2.14g

### Fringing Shoreline Vegetation

2a *Argusia argentea*-*Scaevola taccada* open scrub (littoral scrub) +/- *Pandanus tectorius* emergents (Masthead) 12.2.19a

2b *Argusia argentea* open scrub with *Casuarina equisetifolia* subsp. *incana* emergents 12.2.19b

6 *Suriana maritima* open to closed scrub 12.2.19c (can occur on interior plains)

7 *Scaevola taccada* open to closed scrub 12.2.19d

8a *Casuarina equisetifolia* subsp. *incana* woodland to low open forest 12.2.14a

8b *Casuarina equisetifolia* subsp. *incana* woodland to low open forest with mid dense shrub of *Argusia argentea*/*Scaevola taccada* (Masthead) 12.2.14b

8c *Casuarina equisetifolia* subsp. *incana* open forest to woodland with *Pandanus tectorius* subcanopy (Wilson) 12.2.14c

9 *Pandanus tectorius* low open forest to low closed forest 12.2.20a (can occur in interior ridges)

10 *Celtis paniculata* +/- *Pisonia grandis* +/- *Pandanus tectorius* woodland to closed forest 12.2.20b

15 *Cordia subcordata* low closed forest (Tryon, Masthead) 12.2.20c

### Interior Ridges, Swales, Plains Vegetation

3b Ephemeral wetlands 12.2.17c

3c *Sesuvium portulacastrum* herbland 12.2.17b

4 Mixed tussock grassland/herbland 12.2.17a

5a *Wollastonia uniflora* +/- *Abutilon albescens* +/- *Plumbago zeylanica* herbland 12.2.18a

5b *Plumbago zeylanica* / *Canavalia rosea* / *Lepturus repens* herbland 12.2.18b

5c *Abutilon albescens* shrubland 12.2.18c

5d *Guilandina bonduc* (Lady Musgrave, West Hoskyn) 12.2.18d

11a *Pisonia grandis* low open forest to low closed forest 12.2.21a

11b *Pisonia grandis* closed forest to low closed forest, sometimes with *Pandanus tectorius* (Wilson, Lady Musgrave, North West), *Celtis paniculata* (North West) and *Ficus* spp. (Lady Musgrave) 12.2.21b

12a *Ficus rubiginosa* open forest 12.2.21c

12b *Ficus opposita* shrubland (Fairfax) 12.2.21d

14 *Ximenia americana* closed scrub (Tryon) 12.2.19f

## Vegetation survey data

Vegetation plot data of 240 sites was collected by George Batianoff and David Halford of the Queensland Herbarium from 1999 to 2009 (Batianoff et al. 2012). These data frequently did not include structural measurements and were collected over variable plot sizes. Floristic data from some of these earlier surveys were included in calculations of the technical descriptions and BioCondition benchmarks, which were primarily based on the full reference data collected in 2021.

Fifty-nine full reference sites were collected in August and October 2021 and used the sampling methods described in Eyre et al. (2017) and Neldner et al. (2022). These sites were all permanently marked with a steel picket at the start and end of the transect line, and a stainless-steel tag was attached to the origin and end posts. The standard plot size for all structural measurements was 50 metres long by 10 metres wide, however this was modified if required to ensure only the vegetation community was sampled. Stem diameters for all species were measured at 1.3 m. Where more than one stem at a height of 1.3 m from the ground was present (a frequent situation in *Pisonia grandis*), diameters of all stems at 1.3 m were measured. Individuals less than 5 cm in diameter at 1.3 m from the ground were not measured. Measurements of height were made using a clinometer for the tallest stratum and visual estimates for the ground and shrub layers.

Each site was entered into the Queensland Biodiversity and Ecosystem Information System (QBEIS) and assigned to a vegetation community defined in Batianoff et al. (2012). The structural and floristic values of representative sites were pooled and averaged to provide technical descriptions and benchmarks of each vegetation community. These are provided in the appendix.



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## Appendix. Technical Descriptions and Benchmarks

Please note that the [Technical Descriptions](#) and [Benchmarks](#) provided here are accurate at the time of publication of this report but may be subject to change over time as new data becomes available. Please refer to the relevant Departmental webpages to ensure you are accessing the most recent versions.

### Glossary for Technical Descriptions:

| Term                     | Definition  |
|--------------------------|---|
| <b>Asterisk (*)</b>      | Naturalised species have an asterisk (*) after the name. Nomenclature follows Brown (2021)  |
| <b>Basal area</b>        | Basal areas are estimated by plotless sampling using the Bitterlich method. Basal area is recorded by species and stratum using a single sweep of a Bitterlich stick or basal area prism or dendrometer with basal area factor of 1 (BAF1) from the centre of the plot. Each tree counted contributes 1 m <sup>2</sup> /ha of basal area. A smaller basal area factor of 0.75 is used in more lightly wooded areas, such as open woodlands and semi-arid and arid areas. Species located outside the 50 x 10 m plot are included in the basal area count. |
| <b>Canopy tree layer</b> | The predominant layer (for example, T1 layer) with the highest biomass.   |
| <b>Dominant species</b>  | 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).  |
| <b>Emergent</b>          | In the modified Specht (1970) system, the Queensland Herbarium describes the vegetation by the predominant stratum, which is the one that is assessed as contributing the most above-ground biomass. The tallest stratum is regarded as the emergent layer if it does not form the most above-ground biomass, regardless of its canopy cover  |
| <b>Forb</b>              | Herbaceous or slightly woody, annual or sometimes perennial plant; not a grass or life form defined under Other species.  |
| <b>Frequent species</b>  | 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.   |
| <b>Graminoid</b>         | Of the families: Poaceae, Cyperaceae and Juncaceae.   |

|                            |  |
|----------------------------|--|
| <b>Shrub</b>               | Woody plant that is multi-stemmed from the base (or within 200mm from ground level) or single stemmed, and less than 2 m tall. |
| <b>Shrub canopy cover</b>  | The estimation of the percentage canopy cover of the shrub layer.  |
| <b>Shrub canopy height</b> | The average canopy height in metres, as estimated for the shrub layer.   |
| <b>Tree</b>                | Woody plants, more than 2 m tall with a single stem or branches well above the base.   |
| <b>Tree canopy cover</b>   | Refers to the estimation of the percentage canopy cover of the tree layer.   |
| <b>Tree canopy height</b>  | The average canopy height in metres, as estimated for the tree layer.  |
|                            |  |

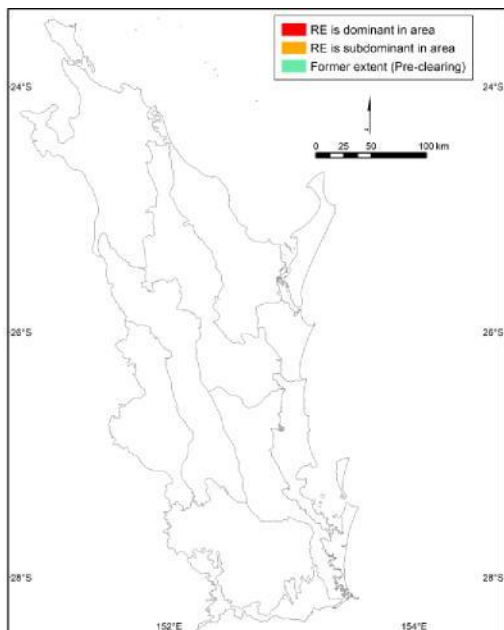
**Note on species nomenclature and growth forms.**

*Lepidium englerianum* and *Portulaca oleracea* while classified as naturalised in Queensland (Brown 2021) are regarded as native species to the Capricornia Cays by Batianoff et al. (2012) and this classification has been followed in this document. The Queensland native species *Pseudognaphalium luteoalbum* is regarded as non-native in the Capricornia Cays by Batianoff et al. (2012) and hence coded with a #, to signify that it is not native to the Cays. However it is a cosmopolitan species that was present at least in New Zealand in the 1770s. Although it does have weedy tendencies, that is a common trait in Asteraceae. It is listed as native in Queensland because there is no evidence to the contrary.

*Plumbago zeylanica* and *Wollastonia uniflora* can occur as the forb life form or if taller and more woody in the stem be classified as shrubs. Hence in herbland Regional Ecosystems such as 12.2.18a and 12.2.18b they may be present as both life forms in the technical descriptions.

For mixed herbland Regional Ecosystems, e.g.12.2.17a, the vegetation at a particular site may vary in time and space and may be dominated by either graminoids or forbs. Therefore the benchmark attribute of perennial grass cover only applies to the grassland component of the regional ecosystem.

**12.2.14a: *Casuarina equisetifolia* subsp. *incana* woodland to low open forest on exposed frontal areas**



D.A. Halford

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 11                      9                      85.53%

Species recorded:      Total: 20; woody: 6; ground: 16; Avg. spp./site: 8.6; std dev.: 1.5, 8 site(s)

Basal area: Avg./site: 15.1 m<sup>2</sup>/ha, range: 13.5 - 18 m<sup>2</sup>/ha, std. deviation: 2 m<sup>2</sup>/ha, 4 site(s)

Structural formation: Woodland: 63%; open-woodland: 25%; low woodland: 13%, 8 site(s)

Representative sites: 14194, 14195, 16467, 16468, 18381, 18423, 18435, 18452.

**Stratum: Tree 1**

Height avg. = 11.4m, range 8.5-15m, 8 sites

Crown cover avg. = 62.9%, range 37.0-88.2%, 8 sites

Dominant species (relative cover, frequency): *Casuarina equisetifolia* subsp. *incana* (100, 100%), *Celtis paniculata* (1, 25%)

Frequent species (cover, frequency): *Casuarina equisetifolia* subsp. *incana* (63, 100%), *Celtis paniculata* (1, 25%)

**Stratum: Tree 2**

Height avg. = 5.8m, range 5.5-6m, 2 sites

Crown cover avg. = 10.5%, range 2.0-19.0%, 2 sites

Dominant species (relative cover, frequency): *Casuarina equisetifolia* subsp. *incana* (65, 25%)

Frequent species (cover, frequency): *Casuarina equisetifolia* subsp. *incana* (4, 25%), *Celtis paniculata* (13, 13%)

**Stratum: Shrub 1**

Height avg. = 2.6m, range 0.8-5m, 8 sites

Crown cover avg. = 12.8%, range 0.0-51.0%, 8 sites

Dominant species (relative cover, frequency): *Argusia argentea* (86, 88%), *Casuarina equisetifolia* subsp. *incana* (73, 25%)

Frequent species (cover, frequency): *Argusia argentea* (14, 88%), *Casuarina equisetifolia* subsp. *incana* (2, 25%), *Abutilon albescens* (1, 13%), *Celtis paniculata* (13%), *Ficus opposita* (13%), *Scaevola taccada* (13%)

**Stratum: Shrub 2**

Height avg. = 1.5m, 1 site

Crown cover avg. = 0.0%, 1 site

Frequent species (cover, frequency): *Abutilon albescens* (13%), *Argusia argentea* (13%), *Casuarina equisetifolia* subsp. *incana* (13%)

**Stratum: Ground**

Height avg. = 0.2m, range 0.1-0.3m, 8 sites

PFC avg. = 50.5%, range 15-81.5%, 8 sites

Dominant species (relative cover, frequency): *Thuarea involuta* (48, 88%), *Cakile edentula*\* (39, 50%), *Lepturus repens* (20, 100%), *Wollastonia uniflora* (18, 25%), *Stenotaphrum micranthum* (14, 38%)

Frequent species (cover, frequency): GRAMINOIDS: *Lepturus repens* (10, 100%), *Thuarea involuta* (28, 88%), *Stenotaphrum micranthum* (6, 38%), *Dactyloctenium radulans* (1, 13%)

FORBS: *Achyranthes aspera* (3, 75%), *Euphorbia tannensis* subsp. *tannensis* (1, 63%), *Cakile edentula*\* (12, 50%), *Abutilon albescens* (1, 38%), *Boerhavia albiflora* var. *heronensis* (25%), *Passiflora pallida*\* (3, 25%), *Solanum americanum*\* (25%), *Wollastonia uniflora* (15, 25%), *Argusia argentea* (13%), *Ipomoea pes-caprae* subsp. *brasiliensis* (13%), *Lepidium englerianum* (1, 13%), *Pseudognaphalium luteoalbum*# (13%)

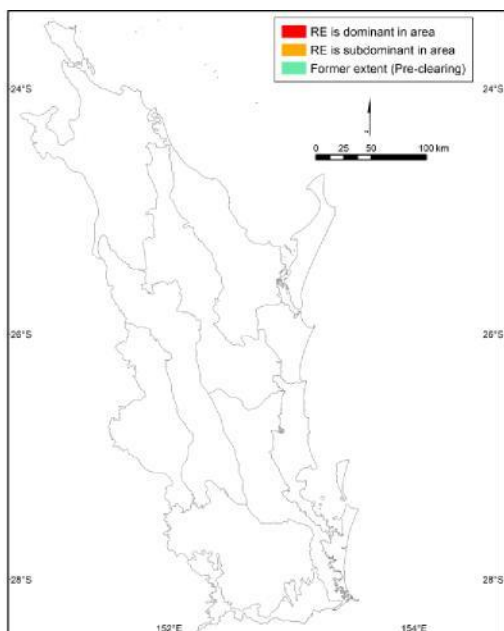
**12.2.14a: *Casuarina equisetifolia* subsp. *incana* woodland to low open forest on exposed frontal areas**

| BioCondition Attributes   | Benchmark |
|---|-----------|
| Recruitment (%)   | 100       |
| Tree canopy cover (%)   | 63        |
| Tree subcanopy cover (%)  | 11        |
| Native shrub cover (%)  | 13        |
| Large eucalypt tree DBH threshold (cm)                          | na        |
| Number of large eucalypt trees (per ha)                         | na        |
| Large non-eucalypt tree DBH threshold (cm)                      | 34        |
| Number of large non-eucalypt trees (per ha)                     | 57        |
| Tree canopy height (m)  | 11        |
| Tree subcanopy height (m)                                       | 6         |
| Coarse woody debris (m/ha)                                      | 61        |
| Species richness – trees  | 1         |
| Species richness – shrubs                                       | 1         |
| Species richness – grasses                                      | 2         |
| Species richness - forbs and other                              | 2         |
| Ground cover – native perennial grass cover (%)                 | 31        |
| Ground cover – organic litter (%)                               | 26        |
| Non-native plant cover (%)                                      | 0         |
| Reliability ranking (* = low reliability; **** highly reliable) | ****      |

Benchmarks developed by the Queensland Herbarium, based on 9 Qld Herbarium QBEIS sites, 2 BioCondition Reference sites from an analogous RE and expert opinion. April, 2022.



**12.2.14b: *Casuarina equisetifolia* subsp. *incana* woodland to low open forest with mid-dense shrub of *Argusia argentea*/ *Scaevola taccada* on exposed frontal areas**



G.N. Batianoff

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 5                      5                      93.04%

Species recorded:        Total: 32; woody: 17; ground: 23; Avg. spp./site: 12.2; std dev.: 3.2, 11 site(s)

Basal area:                      Avg./site: 7.3 m<sup>2</sup>/ha, range: 5.5 - 9 m<sup>2</sup>/ha, std. deviation: 1 m<sup>2</sup>/ha, 3 site(s)

Structural formation: Woodland: 55%; low woodland: 18%; low open-forest: 18%; open-forest: 9%, 11 site(s)

Representative sites: 12039, 12786, 12788, 12866, 13979, 14364, 16633, 16634, 18390, 18410, 18450.

**Stratum: Tree 1**

Height avg. = 10.0m, range 5.5-16m, 11 sites

Crown cover avg. = 52.0%, range 37.0-66.2%, 11 sites

Dominant species (relative cover, frequency): *Casuarina equisetifolia* subsp. *incana* (97, 100%)

Frequent species (cover, frequency): *Casuarina equisetifolia* subsp. *incana* (51, 100%), *Pandanus tectorius* (10, 9%), *Pisonia grandis* (1, 9%)

**Stratum: Tree 2**

Height avg. = 5.0m, range 3-6.5m, 5 sites

Crown cover avg. = 16.5%, range 0.0-31.6%, 5 sites

Dominant species (relative cover, frequency): *Argusia argentea* (54, 36%), *Pandanus tectorius* (36, 36%), *Casuarina equisetifolia* subsp. *incana* (7, 27%)

Frequent species (cover, frequency): *Argusia argentea* (12, 36%), *Pandanus tectorius* (4, 36%), *Casuarina equisetifolia* subsp. *incana* (27%), *Celtis paniculata* (18%), *Sophora tomentosa* subsp. *australis* (10, 18%)

**Stratum: Shrub 1**

Height avg. = 2.4m, range 1-4m, 11 sites

Crown cover avg. = 18.9%, range 0.0-45.5%, 11 sites

Dominant species (relative cover, frequency): *Argusia argentea* (53, 82%), *Scaevola taccada* (41, 73%), *Abutilon albescens* (14, 27%), *Pandanus tectorius* (13, 27%), *Casuarina equisetifolia* subsp. *incana* (4, 27%)

Frequent species (cover, frequency): *Argusia argentea* (12, 82%), *Scaevola taccada* (9, 73%), *Abutilon albescens* (1, 27%), *Casuarina equisetifolia* subsp. *incana* (27%), *Pandanus tectorius* (2, 27%), *Cassytha filiformis* (4, 18%), *Cordia subcordata* (1, 18%), *Pipturus argenteus* (4, 18%), *Sophora tomentosa* subsp. *australis* (1, 18%), *Wollastonia uniiflora* (18%), *Achyranthes aspera* (9%), *Celtis paniculata* (9, 9%), *Clerodendrum inerme* (1, 9%), *Euphorbia tannensis* subsp. *tannensis* (9%), *Opuntia stricta*\* (9%)

**Stratum: Shrub 2**

Height avg. = 1.3m, range 1.2-1.5m, 3 sites

Crown cover avg. = 10.0%, range 5.0-16.0%, 3 sites

Dominant species (relative cover, frequency): *Abutilon albescens* (71, 27%)

Frequent species (cover, frequency): *Abutilon albescens* (8, 27%), *Argusia argentea* (3, 9%), *Ficus opposita* (1, 9%), *Scaevola taccada* (1, 9%)

**Stratum: Ground**

Height avg. = 0.3m, range 0.2-0.35m, 11 sites

PFC avg. = 53.9%, range 5-87.6%, 11 sites

Dominant species (relative cover, frequency): *Thuarea involuta* (31, 91%), *Lepturus repens* (31, 91%), *Sporobolus virginicus* (29, 27%), *Stenotaphrum micranthum* (21, 36%), *Euphorbia tannensis subsp. tannensis* (6, 91%)

Frequent species (cover, frequency): GRAMINOIDS: *Lepturus repens* (18, 91%), *Thuarea involuta* (19, 91%), *Stenotaphrum micranthum* (13, 36%), *Sporobolus virginicus* (12, 27%), *Spinifex sericeus* (16, 18%), *Digitaria ciliaris\** (9%)

FORBS: *Euphorbia tannensis subsp. tannensis* (3, 91%), *Achyranthes aspera* (3, 64%), *Wollastonia uniflora* (3, 55%), *Tribulus cistoides* (1, 45%), *Abutilon albescens* (1, 36%), *Boerhavia albiflora var. heronensis* (3, 27%), *Cakile edentula\** (5, 18%), *Canavalia rosea* (1, 18%), *Cassytha filiformis* (5, 18%), *Euphorbia obliqua* (1, 18%), *Portulaca oleracea* (3, 18%), *Sesuvium portulacastrum* (18%), *Casuarina equisetifolia subsp. incana* (1, 9%), *Salsola australis* (1, 9%), *Scaevola taccada* (9%), *Sisymbrium orientale\** (9%), *Sophora tomentosa subsp. australis* (1, 9%)

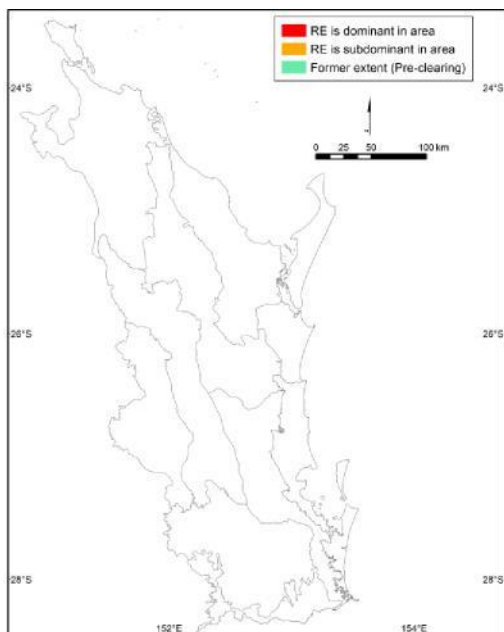
**RE: 12.2.14b** *Casuarina equisetifolia* subsp. *incana* woodland to low open forest with mid-dense shrub of *Argusia argentea*/ *Scaevola taccada*. Exposed frontal areas.

| BioCondition Attributes   | Benchmark |
|---|-----------|
| Recruitment (%)   | 100       |
| Tree canopy cover (%)   | 52        |
| Tree subcanopy cover (%)  | 16        |
| Native shrub cover (%)  | 20        |
| Large eucalypt tree DBH threshold (cm)                          | na        |
| Number of large eucalypt trees (per ha)                         | na        |
| Large non-eucalypt tree DBH threshold (cm)                      | 25        |
| Number of large non-eucalypt trees (per ha)                     | 99        |
| Tree canopy height (m)  | 10        |
| Tree subcanopy height (m)                                       | 5         |
| Coarse woody debris (m/ha)                                      | 113       |
| Species richness – trees  | 2         |
| Species richness – shrubs                                       | 3         |
| Species richness – grasses                                      | 3         |
| Species richness - forbs and other                              | 4         |
| Ground cover – native perennial grass cover (%)                 | 44        |
| Ground cover – organic litter (%)                               | 24        |
| Non-native plant cover (%)                                      | 0         |
| Reliability ranking (* = low reliability; **** highly reliable) | ****      |

Benchmarks developed by the Queensland Herbarium, based on 11 Qld Herbarium QBEIS sites, 2 BioCondition reference sites from an analogous RE and expert opinion. April, 2022.

## Technical Description Regional Ecosystem: 12.2.14 - Vegetation Community: 12.2.14c

### 12.2.14c: *Casuarina equisetifolia* subsp. *incana* open forest with *Pandanus tectorius* sub-canopy



B. Armstrong

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 1 1 100%

Species recorded: Total: 14; woody: 8; ground: 8; Avg. spp./site: 8.5; std dev.: 2.5, 4 site(s)

Basal area: Avg./site: 16.0 m<sup>2</sup>/ha, range: 16.0 - 16 m<sup>2</sup>/ha, std. deviation: 0 m<sup>2</sup>/ha, 1 site(s)

Structural formation: Woodland: 50%; open-forest: 50%, 4 site(s)

Representative sites: 11071, 12998, 16287, 18414.

#### Stratum: Tree 1

Height avg. = 12.4m, range 10-14m, 4 sites

Crown cover avg. = 47.9%, range 16.6-88.0%, 4 sites

Dominant species (relative cover, frequency): *Casuarina equisetifolia* subsp. *incana* (89, 100%), *Pandanus tectorius* (42, 25%), *Pisonia grandis* (1, 25%)

Frequent species (cover, frequency): *Casuarina equisetifolia* subsp. *incana* (39, 100%), *Pandanus tectorius* (37, 25%), *Pisonia grandis* (25%)

#### Stratum: Tree 2

Height avg. = 6.8m, range 3-9m, 4 sites

Crown cover avg. = 23.5%, range 4.0-36.0%, 4 sites

Dominant species (relative cover, frequency): *Pandanus tectorius* (94, 100%), *Argusia argentea* (25, 25%)

Frequent species (cover, frequency): *Pandanus tectorius* (23, 100%), *Argusia argentea* (1, 25%)

#### Stratum: Shrub 1

Height avg. = 2.0m, range 0.5-3m, 4 sites

Crown cover avg. = 6.3%, range 0.0-20.0%, 4 sites

Dominant species (relative cover, frequency): *Pisonia grandis* (100, 25%), *Pandanus tectorius* (60, 50%), *Argusia argentea* (50, 25%), *Ficus opposita* (35, 50%), *Euphorbia tannensis* (20, 25%)

Frequent species (cover, frequency): *Ficus opposita* (5, 50%), *Pandanus tectorius* (2, 50%), *Abutilon albescens* (25%), *Achyranthes aspera* (25%), *Argusia argentea* (10, 25%), *Euphorbia tannensis* (25%), *Pisonia grandis* (1, 25%)

**Stratum: Ground**

Height avg. = 0.3m, range 0.15-0.4m, 4 sites

PFC avg. = 62.1%, range 31-79.4%, 4 sites

*Dominant species (relative cover, frequency): Thuarea involuta (71, 50%), Sporobolus virginicus (39, 75%), Boerhavia albiflora var. heronensis (24, 50%), Lepturus repens (20, 50%), Commicarpus insularum (8, 75%)*

*Frequent species (cover, frequency): GRAMINOIDS: Sporobolus virginicus (28, 75%), Lepturus repens (8, 50%), Thuarea involuta (53, 50%)*

*FORBS: Abutilon albescens (2, 75%), Achyranthes aspera (4, 75%), Commicarpus insularum (3, 75%), Boerhavia albiflora var. heronensis (8, 50%), Euphorbia tannensis subsp. tannensis (25%)*

**RE: 12.2.14c** *Casuarina equisetifolia* subsp. *incana* open forest with *Pandanus tectorius* sub-canopy. Exposed frontal areas.

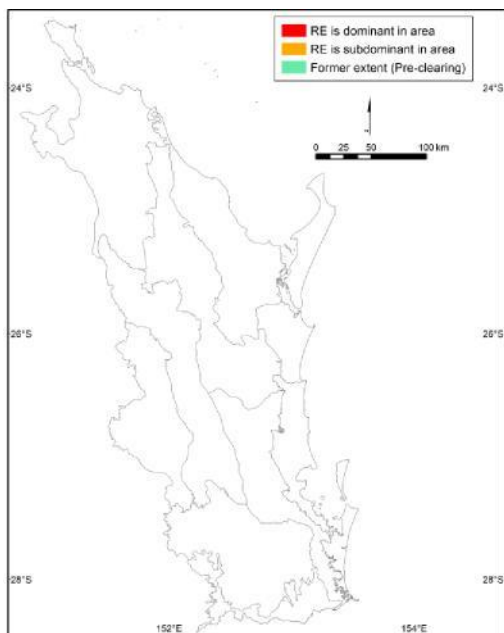
| BioCondition Attributes  | Benchmark |
|--|-----------|
| Recruitment (%)  | 100       |
| Tree canopy cover (%)  | 48        |
| Tree subcanopy cover (%)   | 24        |
| Native shrub cover (%)   | 7         |
| Large eucalypt tree DBH threshold (cm)                           | na        |
| Number of large eucalypt trees (per ha)                          | na        |
| Large non-eucalypt tree DBH threshold (cm)                       | 32        |
| Number of large non-eucalypt trees (per ha)                      | 87        |
| Tree canopy height (m)   | 12        |
| Tree subcanopy height (m)  | 7         |
| Coarse woody debris (m/ha)                                       | 160       |
| Species richness – trees   | 3         |
| Species richness – shrubs  | 2         |
| Species richness – grasses                                       | 2         |
| Species richness - forbs and other                               | 3         |
| Ground cover – native perennial grass cover (%)                  | 51        |
| Ground cover – organic litter (%)                                | 20        |
| Non-native plant cover (%)                                       | 0         |
| Reliability ranking (* = low reliability; ***** highly reliable) | ***       |

Benchmarks developed by the Queensland Herbarium, based on 4 Qld Herbarium QBEIS sites, 2 BioCondition Reference sites from an analogous RE and expert opinion. April, 2022.





**12.2.14e: *Spinifex sericeus* open-hummock grassland on exposed frontal areas**



B. Armstrong

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 1.3      1.3      100%

Species recorded: Total: 19; woody: 2; ground: 19; Avg. spp./site: 6.7; std dev.: 3.9, 9 site(s)

Basal area: 0

Structural formation: Open-hummock grassland: 78%; hummock grassland: 22%, 9 site(s)

Representative sites: 41460, 41555, 41635, 41661, 41668, 41675, 41700, 41737, 41878.

**Stratum: Emergent**

Height avg. = 1.5m, range 0.5-2.5m, 2 sites

Crown cover avg. = 4.2%, range 0.6-7.9%, 2 sites

Dominant species (relative cover, frequency): *Casuarina equisetifolia* subsp. *incana* (75, 22%)

Frequent species (cover, frequency): *Casuarina equisetifolia* subsp. *incana* (3, 22%), *Argusia argentea* (4, 11%)

**Stratum: Ground**

Height avg. = 0.3m, range 0.15-0.5m, 9 sites

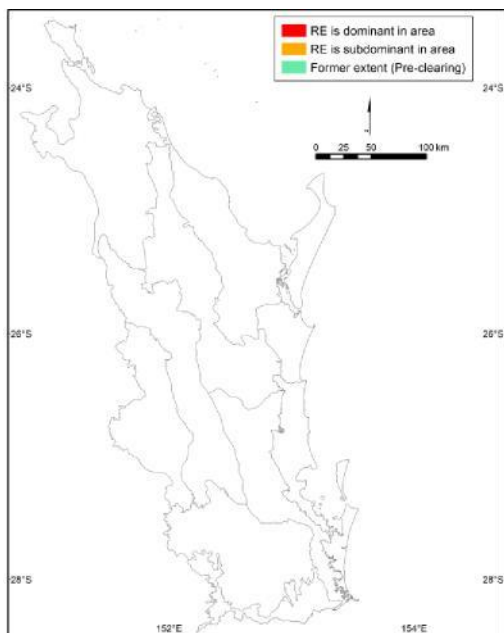
PFC avg. = 29.7%, range 9-60%, 9 sites

Dominant species (relative cover, frequency): *Spinifex sericeus* (55, 100%), *Thuarea involuta* (12, 67%), *Sporobolus virginicus* (12, 44%), *Wollastonia uniflora* (12, 67%), *Euphorbia tannensis* subsp. *tannensis* (10, 33%)

Frequent species (cover, frequency): GRAMINOIDS: *Spinifex sericeus* (16, 100%), *Thuarea involuta* (3, 67%), *Lepturus repens* (1, 44%), *Sporobolus virginicus* (6, 44%), *Stenotaphrum micranthum* (1, 11%)

FORBS: *Wollastonia uniflora* (4, 67%), *Scaevola taccada* (1, 44%), *Cakile edentula*\* (1, 33%), *Euphorbia obliqua* (2, 33%), *Euphorbia tannensis* subsp. *tannensis* (3, 33%), *Tribulus cistoides* (2, 33%), *Argusia argentea* (1, 22%), *Canavalia rosea* (2, 22%), *Salsola australis* (1, 22%), *Abutilon albescens* (1, 11%), *Casuarina equisetifolia* subsp. *incana* (1, 11%), *Ipomoea pes-caprae* subsp. *brasiliensis* (1, 11%), *Pseudognaphalium luteoalbum* (1, 11%), *Sesuvium portulacastrum* (5, 11%)

**12.2.14f: \**Cakile edentula* herbland on exposed frontal areas.**



D.A. Halford

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 0.7      0.7      100%

Species recorded: Total: 10; woody: 0; ground: 10; Avg. spp./site: 5.0; std dev.: 1.2, 6 site(s)

Basal area: 0

Structural formation: Herbland: 83%; open-herbland: 17%, 6 site(s)

Representative sites: 41531, 41738, 41776, 41783, 41790, 41861.

**Stratum: Ground**

Height avg. = 0.2m, range 0.2-0.3m, 6 sites

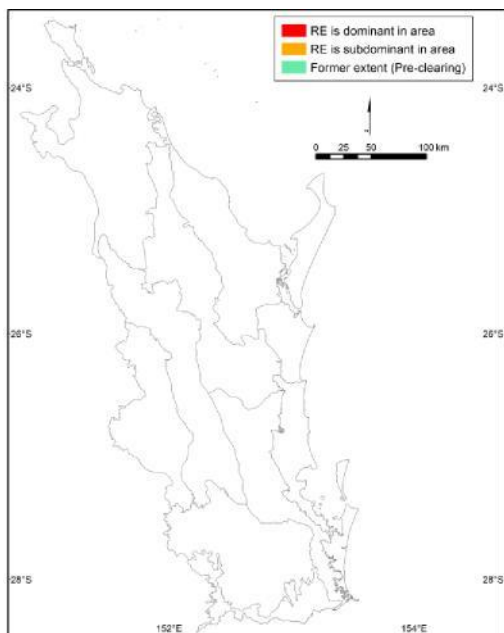
PFC avg. = 19.5%, range 5-38%, 6 sites

Dominant species (relative cover, frequency): *Cakile edentula*\* (60, 100%), *Thuarea involuta* (23, 67%), *Tribulus cistoides* (20, 33%), *Lepturus repens* (9, 100%), *Euphorbia tannensis* subsp. *tannensis* (5, 67%)

Frequent species (cover, frequency): GRAMINOIDS: *Lepturus repens* (1, 100%), *Thuarea involuta* (3, 67%), *Stenotaphrum micranthum* (17%)

FORBS: *Cakile edentula*\* (14, 100%), *Euphorbia tannensis* subsp. *tannensis* (67%), *Pseudognaphalium luteoalbum* (1, 67%), *Tribulus cistoides* (4, 33%), *Abutilon albescens* (17%), *Euphorbia obliqua* (4, 17%), *Wollastonia uniflora* (17%)

**12.2.14g: Very sparse-herbland, mainly sand**



D.A. Halford

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 0.5      0.5      100%

Species recorded: Total: 8; woody: 0; ground: 8; Avg. spp./site: 8.0; std dev.: 0.0, 1 site(s)

Basal area: 0

Structural formation: Sparse herbland: 100%, 1 site(s)

Representative sites: 41817.

**Stratum: Ground**

Height avg. = 0.2m, 1 site

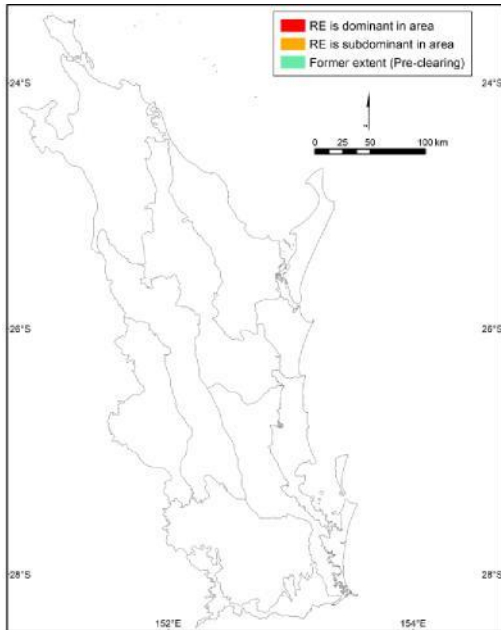
PFC avg. = 12.0%, 1 site

Dominant species (relative cover, frequency): *Cakile edentula*\* (56, 100%), *Pseudognaphalium luteoalbum* (24, 100%), *Thuarea involuta* (16, 100%), *Stenotaphrum micranthum* (1, 100%), *Lepturus repens* (1, 100%)

Frequent species (cover, frequency): GRAMINOIDS: *Cenchrus echinatus*\* (100%), *Lepturus repens* (100%), *Stenotaphrum micranthum* (100%), *Thuarea involuta* (2, 100%)

FORBS: *Cakile edentula*\* (7, 100%), *Casuarina equisetifolia* subsp. *incana* (100%), *Euphorbia cyathophora*\* (100%), *Pseudognaphalium luteoalbum* (3, 100%)

**12.2.14h: Shingle shores with sparse vegetation**



D.A. Halford

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 5.0      4.9      99%

Species recorded: Total: 9; woody: 2; ground: 7; Avg. spp./site: 3.7; std dev.: 0.5, 3 site(s)

Basal area: 0

Structural formation: Sparse herbland: 67%; sparse-forbland: 33%, 3 site(s)

Representative sites: 41377, 41435, 41454.

**Stratum: Emergent**

Height avg. = 2.0m, range 1.5-2.5m, 2 sites

Crown cover avg. = 4.2%, range 0.6-7.9%, 2 sites

Dominant species (relative cover, frequency): *Argusia argentea* (75, 67%), *Casuarina equisetifolia* subsp. *incana* (50, 33%)

Frequent species (cover, frequency): *Argusia argentea* (3, 67%), *Casuarina equisetifolia* subsp. *incana* (4, 33%)

**Stratum: Ground**

Height avg. = 0.2m, range 0.1-0.25m, 3 sites

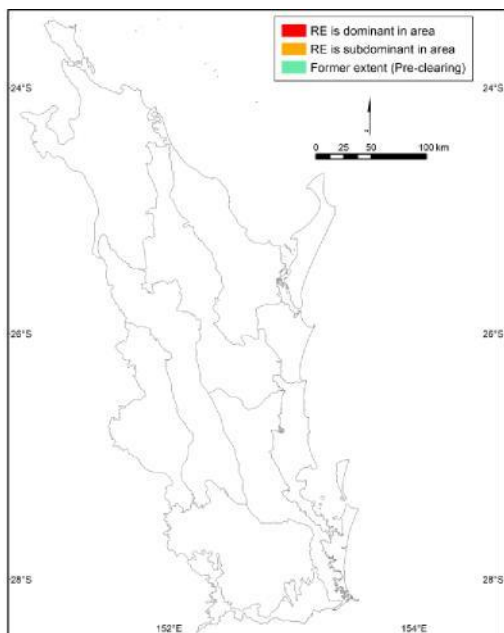
PFC avg. = 4.3%, range 0-10%, 3 sites

Dominant species (relative cover, frequency): *Canavalia rosea* (100, 33%), *Sesuvium portulacastrum* (33, 33%), *Lepturus repens* (33, 33%), *Achyranthes aspera* (29, 67%), *Tetragonia tetragonoides* (25, 33%)

Frequent species (cover, frequency): GRAMINOIDS: *Lepturus repens* (1, 33%)

FORBS: *Achyranthes aspera* (1, 67%), *Canavalia rosea* (10, 33%), *Portulaca oleracea* (33%), *Sesuvium portulacastrum* (1, 33%), *Sonchus oleraceus*\* (33%), *Tetragonia tetragonoides* (33%)

**12.2.14i: Seashore mixed herbland**



D.A. Halford

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 4.3      3.5      83%

Species recorded: Total: 20; woody: 3; ground: 18; Avg. spp./site: 6.3; std dev.: 1.8, 7 site(s)

Basal area: 0

Structural formation: Open-herbland: 43%; herbland: 29%; tussock grassland: 14%; sparse herbland: 14%, 7 site(s)

Representative sites: 41318, 41456, 41549, 41835, 41882, 41996, 41997.

**Stratum: Shrub 1**

Height avg. = 1.0m, range 0.8-1.2m, 2 sites

Crown cover avg. = 3.1%, range 0.0-6.1%, 2 sites

Frequent species (cover, frequency): *Argusia argentea* (14%), *Pandanus tectorius* (14%), *Wollastonia uniflora* (14%)

**Stratum: Ground**

Height avg. = 0.2m, range 0.15-0.35m, 7 sites

PFC avg. = 28.6%, range 18-48%, 7 sites

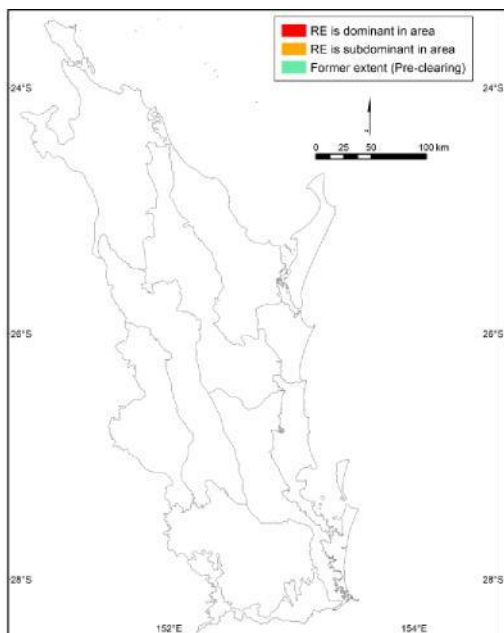
Dominant species (relative cover, frequency): *Thuarea involuta* (38, 86%), *Lepturus repens* (28, 86%), *Cakile edentula*\* (24, 100%), *Tribulus cistoides* (13, 29%), *Euphorbia cyathophora*\* (4, 29%)

Frequent species (cover, frequency): GRAMINOIDS: *Lepturus repens* (8, 86%), *Thuarea involuta* (10, 86%), *Spinifex sericeus* (2, 14%), *Sporobolus virginicus* (6, 14%)

FORBS: *Cakile edentula*\* (6, 100%), *Euphorbia tannensis subsp. tannensis* (1, 43%), *Euphorbia cyathophora*\* (1, 29%), *Pseudognaphalium luteoalbum* (1, 29%), *Scaevola taccada* (29%), *Sonchus oleraceus*\* (1, 29%), *Tribulus cistoides* (4, 29%), *Abutilon albescens* (1, 14%), *Argemone ochroleuca subsp. ochroleuca*\* (14%), *Argusia argentea* (1, 14%), *Casuarina equisetifolia subsp. incana* (1, 14%), *Ipomoea pes-caprae* (1, 14%), *Portulaca oleracea* (1, 14%), *Trachymene cussonii* (5, 14%)



12.2.17a: Mixed tussock grassland to herbland on coral, shingle and sand cays



D.A. Halford

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 16            7            42.74%

Species recorded:      Total: 19; woody: 4; ground: 17; Avg. spp./site: 7.5; std dev.: 1.6, 6 site(s)

Basal area:            0

Structural formation: Herbland: 67%; closed-tussock grassland: 33%, 6 site(s)

Representative sites: 12374, 13169, 13628, 18411, 18429, 18449.

**Stratum: Emergent**

Height avg. = 6.0m, 1 site

Crown cover avg. = 0.3%, 1 site

Frequent species (cover, frequency): *Casuarina equisetifolia* subsp. *incana* (17%)

**Stratum: Shrub 1**

Height avg. = 0.9m, range 0.6-1.3m, 4 sites

Crown cover avg. = 1.5%, range 0.0-4.0%, 4 sites

Dominant species (relative cover, frequency): *Abutilon albescens* (81, 67%)

Frequent species (cover, frequency): *Abutilon albescens* (1, 67%), *Canavalia rosea* (1, 17%), *Celtis paniculata* (17%)

**Stratum: Ground**

Height avg. = 0.2m, range 0.1-0.4m, 6 sites

PFC avg. = 62.5%, range 20-98%, 6 sites

Dominant species (relative cover, frequency): *Sporobolus virginicus* (44, 50%), *Tetragonia tetragonoides* (41, 50%),

*Commicarpus insularum* (30, 33%), *Thuarea involuta* (23, 33%), *Boerhavia albiflora* var. *heronensis* (19, 100%)

Frequent species (cover, frequency): GRAMINOIDS: *Sporobolus virginicus* (38, 50%), *Thuarea involuta* (16, 33%), *Cenchrus echinatus*\* (17%), *Lepturus repens* (16, 17%)

FORBS: *Boerhavia albiflora* var. *heronensis* (8, 100%), *Abutilon albescens* (1, 83%), *Achyranthes aspera* (4, 83%), *Euphorbia tannensis* subsp. *tannensis* (2, 50%), *Portulaca oleracea* (4, 50%), *Tetragonia tetragonoides* (25, 50%), *Bidens pilosa*\* (33%), *Commicarpus insularum* (18, 33%), *Solanum americanum*\* (5, 33%), *Canavalia rosea* (6, 17%), *Sonchus oleraceus*\* (17%), *Tribulus cistoides* (17%), *Wollastonia uniflora* (17%)

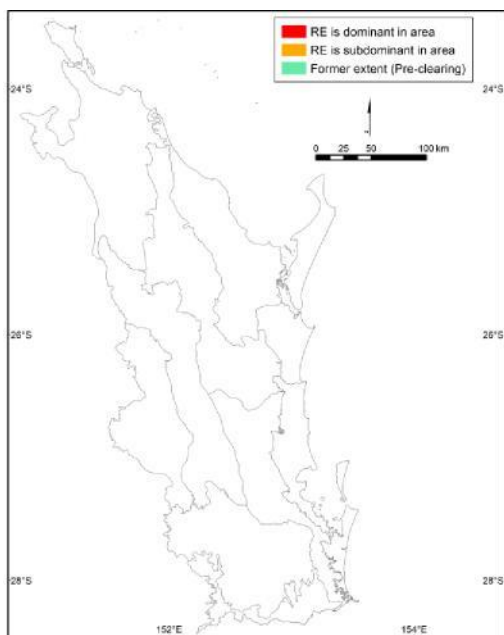
RE: 12.2.17a Mixed tussock grassland to herbland. Restricted to coral, shingle and sand cays..

| <b>BioCondition Attributes</b>  | <b>Benchmark</b> |
|---|------------------|
| <b>Recruitment (%)</b>  | <b>na</b>        |
| <b>Tree canopy cover (%)</b>  | <b>na</b>        |
| <b>Tree subcanopy cover (%)</b>   | <b>na</b>        |
| <b>Native shrub cover (%)</b>   | <b>na</b>        |
| <b>Large eucalypt tree DBH threshold (cm)</b>                           | <b>na</b>        |
| <b>Number of large eucalypt trees (per ha)</b>                          | <b>na</b>        |
| <b>Large non-eucalypt tree DBH threshold (cm)</b>                       | <b>na</b>        |
| <b>Number of large non-eucalypt trees (per ha)</b>                      | <b>na</b>        |
| <b>Tree canopy height (m)</b>   | <b>na</b>        |
| <b>Tree subcanopy height (m)</b>  | <b>na</b>        |
| <b>Coarse woody debris (m/ha)</b>                                       | <b>na</b>        |
| <b>Species richness – trees</b>   | <b>na</b>        |
| <b>Species richness – shrubs</b>  | <b>1</b>         |
| <b>Species richness – grasses</b>                                       | <b>1</b>         |
| <b>Species richness - forbs and other</b>                               | <b>5</b>         |
| <b>Ground cover – native perennial grass cover (%) (where present)</b>  | <b>54</b>        |
| <b>Ground cover – organic litter (%)</b>                                | <b>9</b>         |
| <b>Non-native plant cover (%)</b>                                       | <b>0</b>         |
| <b>Reliability ranking (* = low reliability; ***** highly reliable)</b> | <b>*****</b>     |

Benchmarks developed by the Queensland Herbarium, based on 6 Qld Herbarium QBEIS sites and expert opinion. April, 2022.

This benchmark is reflective of the grassland variation of the RE, the attribute native perennial grass cover should not be used if the area being assessed is a herbland.

**12.2.17b: *Sesuvium portulacastrum* herbland on coral, shingle and sand cays**



D.A. Halford

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 0                      0                      95.07%

Species recorded:        Total: 9; woody: 0; ground: 9; Avg. spp./site: 3.6; std dev.: 2.7, 5 site(s)

Basal area:                      0

Structural formation: Closed-herbland: 60%; herbland: 40%, 5 site(s)

Representative sites: 11903, 12375, 18403, 18436, 18479.

**Stratum: Ground**

Height avg. = 0.2m, range 0.05-0.35m, 5 sites

PFC avg. = 71.3%, range 39-99%, 5 sites

*Dominant species (relative cover, frequency): Sesuvium portulacastrum (96, 100%), Lepturus repens (4, 60%), Ipomoea violacea (3, 40%)*

*Frequent species (cover, frequency): GRAMINOIDS: Lepturus repens (2, 60%)*

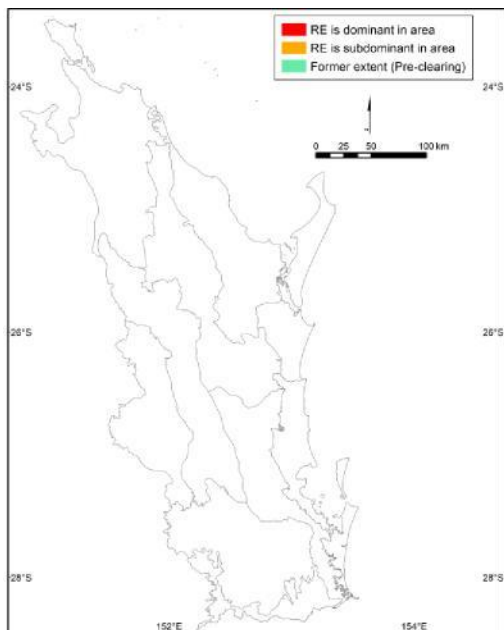
*FORBS: Sesuvium portulacastrum (69, 100%), Achyranthes aspera (40%), Canavalia rosea (40%), Ipomoea violacea (3, 40%), Abutilon albescens (20%), Boerhavia albiflora var. heronensis (20%), Portulaca oleracea (20%), Tetragonia tetragonoides (20%)*

RE: 12.2.17b *Sesuvium portulacastrum* herbland. Coral, shingle and sand cays.

| BioCondition Attributes  | Benchmark |
|--|-----------|
| Recruitment (%)  | na        |
| Tree canopy cover (%)  | na        |
| Tree subcanopy cover (%)   | na        |
| Native shrub over (%)  | na        |
| Large eucalypt tree DBH threshold (cm)                           | na        |
| Number of large eucalypt trees (per ha)                          | na        |
| Large non-eucalypt tree DBH threshold (cm)                       | na        |
| Number of large non-eucalypt trees (per ha)                      | na        |
| Tree canopy height (m)   | na        |
| Tree subcanopy height (m)  | na        |
| Coarse woody debris (m/ha)                                       | na        |
| Species richness – trees   | na        |
| Species richness – shrubs  | na        |
| Species richness – grasses                                       | 1         |
| Species richness - forbs and other                               | 3         |
| Ground cover – native perennial grass cover (%)                  | na        |
| Ground cover – organic litter (%)                                | 5         |
| Non-native plant cover (%)                                       | 0         |
| Reliability ranking (* = low reliability; ***** highly reliable) | ****      |

Benchmarks developed by the Queensland Herbarium, based on 5 Qld Herbarium QBEIS sites and expert opinion. April, 2022.

**12.2.18a: *Wollastonia uniflora* +/- *Abutilon albescens* +/- *Plumbago zeylanica* herbland. Restricted to coral, shingle and sand cays**



D.A. Halford

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 1                      1                      100%

Species recorded: Total: 19; woody: 6; ground: 15; Avg. spp./site: 8.0; std dev.: 3.1, 6 site(s)

Basal area: 0

Structural formation: Shrubland: 50%; open-scrub: 17%; open-herbland: 17%; herbland: 17%, 6 site(s)

Representative sites: 12384, 13407, 13409, 18391, 18421, 18430.

**Stratum: Emergent**

Height avg. = 2.0m, range 1.5-2.5m, 3 sites

Crown cover avg. = 9.9%, range 0.0-27.0%, 3 sites

Dominant species (relative cover, frequency): *Ficus opposita* (61, 33%), *Scaevola taccada* (58, 50%)

Frequent species (cover, frequency): *Scaevola taccada* (3, 50%), *Ficus opposita* (8, 33%), *Argusia argentea* (17%)

**Stratum: Shrub 1**

Height avg. = 0.7m, range 0.3-1.4m, 5 sites

Crown cover avg. = 40.0%, range 0.0-100.0%, 5 sites

Dominant species (relative cover, frequency): *Wollastonia uniflora* (81, 67%), *Abutilon albescens* (38, 33%)

Frequent species (cover, frequency): *Wollastonia uniflora* (50, 67%), *Abutilon albescens* (33%), *Argusia argentea* (17%), *Cassytha filiformis* (17%), *Ficus opposita* (17%)

**Stratum: Ground**

Height avg. = 0.3m, range 0.2-0.4m, 6 sites

PFC avg. = 59.6%, range 0-94%, 6 sites

Dominant species (relative cover, frequency): *Sporobolus virginicus* (53, 50%), *Thuarea involuta* (49, 67%), *Wollastonia uniflora* (35, 50%), *Plumbago zeylanica* (16, 33%), *Lepturus repens* (8, 83%)

Frequent species (cover, frequency): GRAMINOIDS: *Lepturus repens* (6, 83%), *Thuarea involuta* (19, 67%), *Sporobolus virginicus* (25, 50%), *Stenotaphrum micranthum* (1, 17%)

FORBS: *Canavalia rosea* (5, 50%), *Wollastonia uniflora* (31, 50%), *Achyranthes aspera* (7, 33%), *Boerhavia albiflora* var. *heronensis* (5, 33%), *Euphorbia tannensis* subsp. *tannensis* (33%), *Plumbago zeylanica* (13, 33%), *Pseudognaphalium luteoalbum* (33%), *Tetragonia tetragonoides* (1, 33%), *Tribulus cistoides* (33%), *Abutilon albescens* (10, 17%), *Ipomoea violacea* (5, 17%)

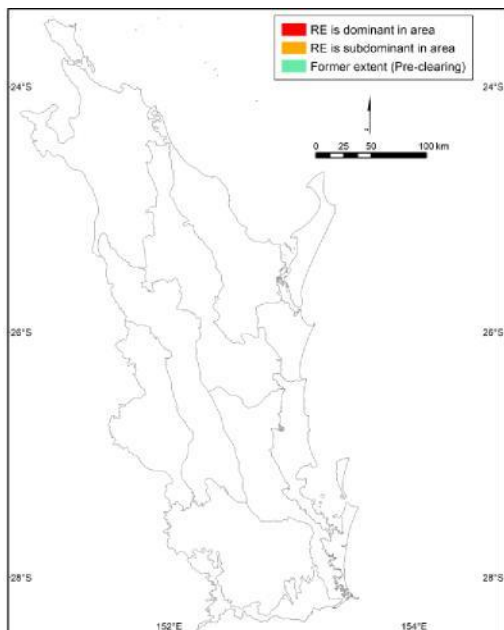
RE: 12.2.18a *Wollastonia uniflora* +/- *Abutilon albescens* +/- *Plumbago zeylanica* herbland.  
 Restricted to coral, shingle and sand cays.

| <b>BioCondition Attributes</b>  | <b>Benchmark</b> |
|---|------------------|
| <b>Recruitment (%)</b>  | <b>100</b>       |
| <b>Tree canopy cover (%)</b>  | <b>na</b>        |
| <b>Tree subcanopy cover (%)</b>   | <b>na</b>        |
| <b>Native shrub cover (%)</b>   | <b>40</b>        |
| <b>Large eucalypt tree DBH threshold (cm)</b>                           | <b>na</b>        |
| <b>Number of large eucalypt trees (per ha)</b>                          | <b>na</b>        |
| <b>Large non-eucalypt tree DBH threshold (cm)</b>                       | <b>na</b>        |
| <b>Number of large non-eucalypt trees (per ha)</b>                      | <b>na</b>        |
| <b>Tree canopy height (m)</b>   | <b>na</b>        |
| <b>Tree subcanopy height (m)</b>  | <b>na</b>        |
| <b>Coarse woody debris (m/ha)</b>                                       | <b>na</b>        |
| <b>Species richness – trees</b>   | <b>na</b>        |
| <b>Species richness – shrubs</b>  | <b>2</b>         |
| <b>Species richness – grasses</b>                                       | <b>2</b>         |
| <b>Species richness - forbs and other</b>                               | <b>4</b>         |
| <b>Ground cover – native perennial grass cover (%)</b>                  | <b>31</b>        |
| <b>Ground cover – organic litter (%)</b>                                | <b>26</b>        |
| <b>Non-native plant cover (%)</b>                                       | <b>0</b>         |
| <b>Reliability ranking (* = low reliability; ***** highly reliable)</b> | <b>****</b>      |

Benchmarks developed by the Queensland Herbarium, based on 6 Qld Herbarium QBEIS sites and expert opinion. April, 2022.



**12.2.18b: *Plumbago zeylanica* / *Canavalia rosea* / *Lepturus repens* herbland. Restricted to coral, shingle and sand cays**



D.A. Halford

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 1                      1                      100%

Species recorded:        Total: 17; woody: 6; ground: 16; Avg. spp./site: 10.3; std dev.: 1.9, 4 site(s)

Basal area:                      0

Structural formation:    Herbland: 50%; shrubland: 25%; closed-herbland: 25%, 4 site(s)

Representative sites: 12230, 13486, 13488, 18447.

**Stratum: Emergent**

Height avg. = 1.3m, range 0.45-2m, 3 sites

Crown cover avg. = 9.2%, range 0.0-27.0%, 3 sites

Dominant species (relative cover, frequency): *Ficus opposita* (100, 25%), *Abutilon albescens* (86, 50%), *Wollastonia uniflora* (28, 25%)

Frequent species (cover, frequency): *Abutilon albescens* (8, 50%), *Ficus opposita* (25%), *Wollastonia uniflora* (6, 25%)

**Stratum: Shrub 1**

Height avg. = 0.9m, 1 site

Crown cover avg. = 55.5%, 1 site

Dominant species (relative cover, frequency): *Plumbago zeylanica* (54, 25%), *Abutilon albescens* (23, 25%), *Ficus opposita* (15, 25%), *Canavalia rosea* (7, 25%)

Frequent species (cover, frequency): *Abutilon albescens* (15, 25%), *Achyranthes aspera* (25%), *Canavalia rosea* (5, 25%), *Ficus opposita* (10, 25%), *Plumbago zeylanica* (34, 25%)

**Stratum: Ground**

Height avg. = 0.4m, range 0.3-0.7m, 4 sites

PFC avg. = 70.5%, range 58-92%, 4 sites

Dominant species (relative cover, frequency): *Thuarea involuta* (43, 25%), *Plumbago zeylanica* (34, 75%), *Lepturus repens* (29, 75%), *Sporobolus virginicus* (23, 25%), *Canavalia rosea* (18, 100%)

Frequent species (cover, frequency): GRAMINOIDS: *Lepturus repens* (22, 75%), *Sporobolus virginicus* (15, 25%), *Stenotaphrum micranthum* (25%), *Thuarea involuta* (29, 25%)

FORBS: *Boerhavia albiflora* var. *heronensis* (1, 100%), *Canavalia rosea* (14, 100%), *Commicarpus insularum* (11, 75%), *Plumbago zeylanica* (25, 75%), *Tetragonia tetragonoides* (75%), *Achyranthes aspera* (3, 50%), *Ipomoea violacea* (2, 50%), *Solanum americanum*\* (1, 50%), *Wollastonia uniflora* (1, 50%), *Abutilon albescens* (25%), *Euphorbia tannensis* subsp. *tannensis* (25%), *Tribulus cistoides* (25%)

**RE: 12.2.18b *Plumbago zeylanica* / *Canavalia rosea* / *Lepturus repens* herbland. Restricted to coral, shingle and sand cays.**

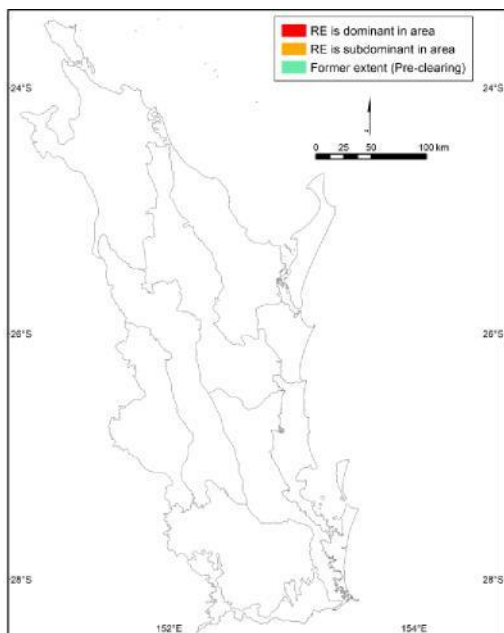
| <b>BioCondition Attributes</b>  | <b>Benchmark</b> |
|---|------------------|
| Recruitment (%)   | <b>100</b>       |
| Tree canopy cover (%)   | <b>na</b>        |
| Tree subcanopy cover (%)  | <b>na</b>        |
| Native shrub cover (%) (where present)                                  | <b>56</b>        |
| Large eucalypt tree DBH threshold (cm)                                  | <b>na</b>        |
| Number of large eucalypt trees (per ha)                                 | <b>na</b>        |
| Large non-eucalypt tree DBH threshold (cm)                              | <b>na</b>        |
| Number of large non-eucalypt trees (per ha)                             | <b>na</b>        |
| Tree canopy height (m)  | <b>na</b>        |
| Tree subcanopy height (m)   | <b>na</b>        |
| Coarse woody debris (m/ha)  | <b>na</b>        |
| Species richness – trees  | <b>1</b>         |
| Species richness – shrubs   | <b>1</b>         |
| Species richness – grasses  | <b>2</b>         |
| Species richness - forbs and other                                      | <b>7</b>         |
| Ground cover – native perennial grass cover (%)                         | <b>36</b>        |
| Ground cover – organic litter (%)                                       | <b>27</b>        |
| Non-native plant cover (%)  | <b>0</b>         |
| <b>Reliability ranking (* = low reliability; ***** highly reliable)</b> | <b>*****</b>     |

Benchmarks developed by the Queensland Herbarium, based on 4 Qld Herbarium QBEIS sites and expert opinion. April, 2022.

. 'Eucalypt' refers to species belonging the genera *Eucalyptus*, *Corymbia*, *Angophora*, *Lophostemon* and *Syncarpia*.

The attribute native shrub cover is only applicable where the area of the RE being assessed has shrubs present and is not purely a herbland.

**12.2.18c: *Abutilon albescens* shrubland. Restricted to coral, shingle and sand cays.**



V.J. Neldner

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 18                      14                      77.66%

Species recorded:      Total: 20; woody: 5; ground: 19; Avg. spp./site: 8.0; std dev.: 2.6, 7 site(s)

Basal area:                      0

Structural formation: Shrubland: 86%; dwarf open-heath: 14%, 7 site(s)

Representative sites: 11801, 12266, 13166, 13261, 16630, 18439, 18481.

**Stratum: Emergent**

Height avg. = 3.8m, range 0.9-6.5m, 3 sites

Crown cover avg. = 2.6%, range 0.0-6.1%, 3 sites

Dominant species (relative cover, frequency): *Ficus opposita* (67, 43%)

Frequent species (cover, frequency): *Ficus opposita* (1, 43%), *Abutilon albescens* (14%), *Pandanus tectorius* (6, 14%)

**Stratum: Shrub 1**

Height avg. = 1.0m, range 0.6-1.6m, 7 sites

Crown cover avg. = 68.9%, range 14.3-100.0%, 7 sites

Dominant species (relative cover, frequency): *Abutilon albescens* (91, 100%), *Canavalia rosea* (17, 29%), *Ficus opposita* (5, 57%), *Guilandina bonduc* (4, 29%)

Frequent species (cover, frequency): *Abutilon albescens* (66, 100%), *Ficus opposita* (3, 57%), *Canavalia rosea* (4, 29%), *Guilandina bonduc* (2, 29%)

**Stratum: Ground**

Height avg. = 0.2m, range 0.1-0.35m, 7 sites

PFC avg. = 28.1%, range 3-58%, 7 sites

Dominant species (relative cover, frequency): *Achyranthes aspera* (35, 57%), *Canavalia rosea* (34, 86%), *Abutilon albescens* (25, 43%), *Solanum americanum\** (14, 57%), *Sonchus oleraceus\** (11, 86%)

Frequent species (cover, frequency): GRAMINOIDS: *Lepturus repens* (43%), *Cenchrus echinatus\** (14%), *Thuarea involuta* (21, 14%)

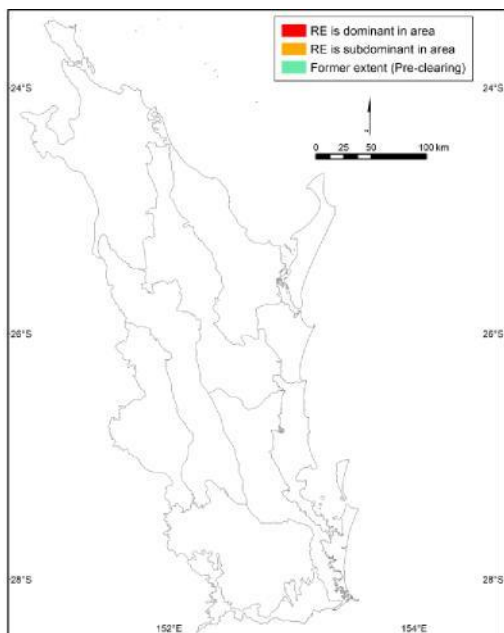
FORBS: *Canavalia rosea* (12, 86%), *Sonchus oleraceus\** (86%), *Achyranthes aspera* (9, 57%), *Solanum americanum\** (2, 57%), *Tetragonia tetragonoides* (3, 57%), *Abutilon albescens* (8, 43%), *Bidens pilosa\** (43%), *Boerhavia albiflora* var. *heronensis* (2, 43%), *Amaranthus viridis\** (1, 14%), *Erigeron bonariensis\** (14%), *Euphorbia tannensis* subsp. *tannensis* (14%), *Ficus opposita* (14%), *Guilandina bonduc* (1, 14%), *Ipomoea indica\** (14%), *Ipomoea violacea* (14%), *Plumbago zeylanica* (12, 14%)

RE: 12.2.18c *Abutilon albescens* shrubland. Restricted to coral, shingle and sand cays.

| <b>BioCondition Attributes</b>                                   | <b>Benchmark</b> |
|--|------------------|
| Recruitment (%)  | 100              |
| Tree canopy cover (%)  | na               |
| Tree subcanopy cover (%)   | na               |
| Native shrub cover (%)   | 69               |
| Large eucalypt tree DBH threshold (cm)                           | na               |
| Number of large eucalypt trees (per ha)                          | na               |
| Large non-eucalypt tree DBH threshold (cm)                       | na               |
| Number of large non-eucalypt trees (per ha)                      | na               |
| Tree canopy height (m)   | na               |
| Tree subcanopy height (m)  | na               |
| Coarse woody debris (m/ha)                                       | na               |
| Species richness – trees   | na               |
| Species richness – shrubs  | 2                |
| Species richness – grasses                                       | 1                |
| Species richness - forbs and other                               | 3                |
| Ground cover – native perennial grass cover (%)                  | na               |
| Ground cover – organic litter (%)                                | 30               |
| Non-native plant cover (%)                                       | 0                |
| Reliability ranking (* = low reliability; ***** highly reliable) | ****             |

Benchmarks developed by the Queensland Herbarium, based on 7 Qld Herbarium QBEIS sites and expert opinion. April, 2022.

**12.2.18d: *Guilandina bonduc* closed scrub.**



V.J. Neldner

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 5                      5                      100%

Species recorded:        Total: 6; woody: 3; ground: 3; Avg. spp./site: 3.5; std dev.: 2.5, 2 site(s)

Basal area:                      0

Structural formation: Closed-scrub: 100%, 2 site(s)

Representative sites: 18393, 18399.

**Stratum: Shrub 1**

Height avg. = 2.4m, range 1.7-3m, 2 sites

Crown cover avg. = 100.0%, range 100.0-100.0%, 2 sites

Dominant species (relative cover, frequency): *Guilandina bonduc* (100, 100%)

Frequent species (cover, frequency): *Guilandina bonduc* (100, 100%), *Abutilon albescens* (50%), *Ipomoea violacea* (50%)

**Stratum: Ground**

Height avg. = 0.1m, range 0.01-0.1m, 2 sites

PFC avg. = 2.0%, 1 site

Dominant species (relative cover, frequency): *Tetragonia tetragonoides* (48, 50%), *Solanum americanum\** (48, 50%), *Canavalia rosea* (5, 50%)

Frequent species (cover, frequency): GRAMINOIDS:

FORBS: *Canavalia rosea* (50%), *Solanum americanum\** (1, 50%), *Tetragonia tetragonoides* (1, 50%)

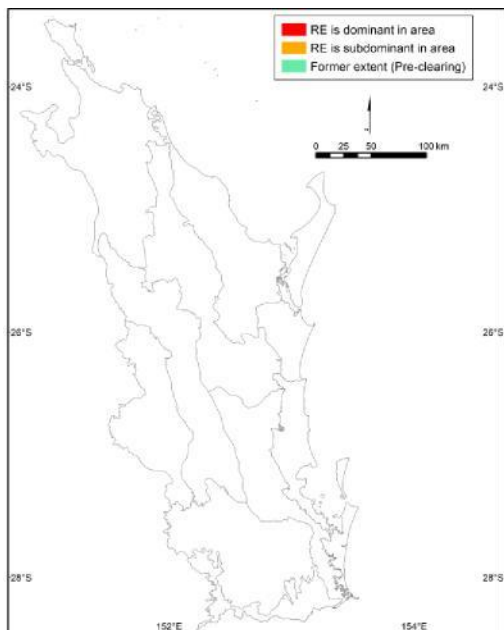
**RE: 12.2.18d *Guilandina bonduc* closed scrub**

| <b>BioCondition Attributes</b>  | <b>Benchmark</b> |
|---|------------------|
| Recruitment (%)   | <b>100</b>       |
| Tree canopy cover (%)   | <b>na</b>        |
| Tree subcanopy cover (%)  | <b>na</b>        |
| Native shrub cover (%)  | <b>100</b>       |
| Large eucalypt tree DBH threshold (cm)                                  | <b>na</b>        |
| Number of large eucalypt trees (per ha)                                 | <b>na</b>        |
| Large non-eucalypt tree DBH threshold (cm)                              | <b>na</b>        |
| Number of large non-eucalypt trees (per ha)                             | <b>na</b>        |
| Tree canopy height (m)  | <b>na</b>        |
| Tree subcanopy height (m)   | <b>na</b>        |
| Coarse woody debris (m/ha)  | <b>na</b>        |
| Species richness – trees  | <b>na</b>        |
| Species richness – shrubs   | <b>2</b>         |
| Species richness – grasses  | <b>na</b>        |
| Species richness - forbs and other                                      | <b>2</b>         |
| Ground cover – native perennial grass cover (%)                         | <b>na</b>        |
| Ground cover – organic litter (%)                                       | <b>95</b>        |
| Non-native plant cover (%)  | <b>0</b>         |
| <b>Reliability ranking (* = low reliability; ***** highly reliable)</b> | <b>***</b>       |

Benchmarks developed by the Queensland Herbarium, based on 2 Qld Herbarium QBEIS sites and expert opinion. April, 2022.



**12.2.19a: *Argusia argentea*, *Scaevola taccada* open scrub. Restricted to coral, shingle and sand cays**



D.A. Halford

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 10                      8                      85.21%

Species recorded:        Total: 26; woody: 12; ground: 18; Avg. spp./site: 8.4; std dev.: 2.5, 14 site(s)

Basal area:                      0

Structural formation: Open-scrub: 79%; shrubland: 14%; closed-scrub: 7%, 14 site(s)

Representative sites: 11976, 12044, 12144, 12307, 12760, 12858, 12860, 13435, 13484, 13981, 14012, 14013, 14023, 14950.

**Stratum: Emergent**

Height avg. = 7.3m, range 6-10m, 9 sites

Crown cover avg. = 15.2%, range 3.0-28.0%, 9 sites

Dominant species (relative cover, frequency): *Pandanus tectorius* (86, 43%), *Casuarina equisetifolia subsp. incana* (50, 29%), *Celtis paniculata* (42, 21%), *Pisonia grandis* (5, 21%)

Frequent species (cover, frequency): *Pandanus tectorius* (17, 43%), *Casuarina equisetifolia subsp. incana* (3, 29%), *Celtis paniculata* (4, 21%), *Pisonia grandis* (1, 21%), *Argusia argentea* (4, 7%)

**Stratum: Shrub 1**

Height avg. = 3.4m, range 1.7-6m, 14 sites

Crown cover avg. = 60.5%, range 25.0-100.0%, 14 sites

Dominant species (relative cover, frequency): *Argusia argentea* (71, 100%), *Scaevola taccada* (46, 43%), *Pisonia grandis* (17, 21%), *Ficus opposita* (7, 21%)

Frequent species (cover, frequency): *Argusia argentea* (42, 100%), *Scaevola taccada* (26, 43%), *Ficus opposita* (7, 21%), *Pisonia grandis* (15, 21%), *Cassipoupa filiformis* (7%), *Cordia subcordata* (19, 7%), *Pandanus tectorius* (1, 7%), *Sophora tomentosa subsp. australis* (19, 7%)

**Stratum: Shrub 2**

Height avg. = 1.4m, range 0.8-2m, 9 sites

Crown cover avg. = 30.1%, range 5.0-84.0%, 9 sites

Dominant species (relative cover, frequency): *Scaevola taccada* (80, 36%), *Abutilon albescens* (56, 43%)

Frequent species (cover, frequency): *Abutilon albescens* (13, 43%), *Scaevola taccada* (18, 36%), *Ficus opposita* (1, 14%), *Argusia argentea* (11, 7%), *Pandanus tectorius* (1, 7%), *Wollastonia uniflora* (84, 7%)

**Stratum: Ground**

Height avg. = 0.3m, range 0.2-0.6m, 14 sites

PFC avg. = 28.9%, range 2-65%, 14 sites

Dominant species (relative cover, frequency): *Thuarea involuta* (63, 50%), *Wollastonia uniflora* (34, 36%), *Cakile edentula*\* (33, 29%), *Sporobolus virginicus* (31, 36%), *Lepturus repens* (23, 57%)

Frequent species (cover, frequency): GRAMINOIDS: *Lepturus repens* (9, 57%), *Thuarea involuta* (28, 50%), *Sporobolus virginicus* (10, 36%), *Cenchrus echinatus*\* (1, 7%), *Stenotaphrum micranthum* (2, 7%)

FORBS: *Boerhavia albiflora* var. *heronensis* (2, 43%), *Achyranthes aspera* (1, 36%), *Wollastonia uniflora* (7, 36%), *Cakile edentula*\* (5, 29%), *Euphorbia tannensis* subsp. *tannensis* (1, 29%), *Tribulus cistoides* (1, 29%), *Pseudognaphalium luteoalbum* (2, 21%), *Abutilon albescens* (1, 14%), *Cassytha filiformis* (1, 14%), *Canavalia rosea* (7%), *Pandanus tectorius* (1, 7%), *Salsola australis* (7%), *Sesuvium portulacastrum* (1, 7%)

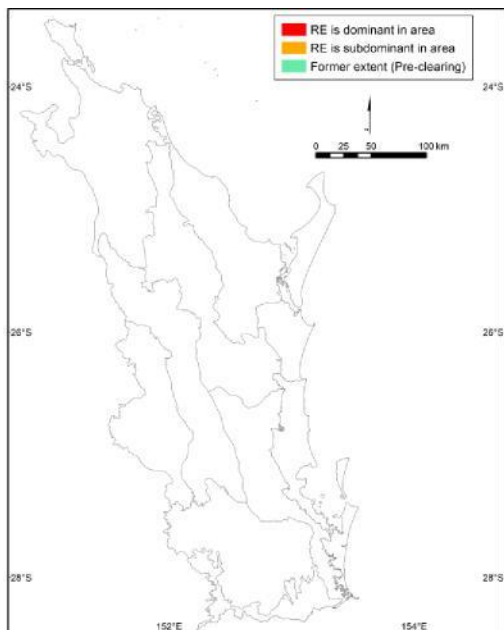
**RE: 12.2.19a *Argusia argentea*, *Scaevola taccada* open scrub. Restricted to coral, shingle and sand cays.**

| BioCondition Attributes  | Benchmark |
|--|-----------|
| Recruitment (%)  | 100       |
| Tree emergent cover (%)  | 8         |
| Tree canopy cover (%)  | na        |
| Tree subcanopy cover (%)   | na        |
| Native shrub cover (%)   | 61        |
| Large eucalypt tree DBH threshold (cm)                           | na        |
| Number of large eucalypt trees (per ha)                          | na        |
| Large non-eucalypt tree DBH threshold (cm)                       | na        |
| Number of large non-eucalypt trees (per ha)                      | na        |
| Tree emergent height (m)   | 7         |
| Tree canopy height (m)   | na        |
| Tree subcanopy height (m)  | na        |
| Coarse woody debris (m/ha)                                       | na        |
| Species richness – trees   | 1         |
| Species richness – shrubs  | 3         |
| Species richness – grasses                                       | 2         |
| Species richness - forbs and other                               | 3         |
| Ground cover – native perennial grass cover (%)                  | 26        |
| Ground cover – organic litter (%)                                | 19        |
| Non-native plant cover (%)                                       | 0         |
| Reliability ranking (* = low reliability; ***** highly reliable) | *****     |

Benchmarks developed by the Queensland Herbarium, based on 14 Qld Herbarium QBEIS sites and expert opinion. April, 2022.

Note: *Argusia argentea* can occur as a tall shrub, up to 6m tall

**12.2.19b: *Argusia argentea* open scrub to closed scrub with *Casuarina equisetifolia* subsp. *incana* emergents. Restricted to coral, shingle and sand cays**



V.J. Neldner

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 7                      7                      99.22%

Species recorded:        Total: 27; woody: 9; ground: 22; Avg. spp./site: 7.4; std dev.: 2.6, 13 site(s)

Basal area:                      Avg./site: 15.5 m<sup>2</sup>/ha, range: 11.0 - 20 m<sup>2</sup>/ha, std. deviation: 5 m<sup>2</sup>/ha, 2 site(s)

Structural formation: Open-scrub: 46%; open-shrubland: 23%; shrubland: 15%; closed-scrub: 15%, 13 site(s)

Representative sites: 11070, 11889, 11972, 12389, 13002, 13410, 13427, 13627, 14022, 14944, 14945, 18416, 18485.

**Stratum: Emergent**

Height avg. = 9.4m, range 5-14m, 7 sites

Crown cover avg. = 6.7%, range 2.0-10.0%, 7 sites

Dominant species (relative cover, frequency): *Casuarina equisetifolia* subsp. *incana* (77, 46%)

Frequent species (cover, frequency): *Casuarina equisetifolia* subsp. *incana* (5, 46%), *Pandanus tectorius* (5, 15%), *Pisonia grandis* (7, 8%)

**Stratum: Shrub 1**

Height avg. = 3.1m, range 0.5-5m, 13 sites

Crown cover avg. = 42.1%, range 9.0-73.8%, 13 sites

Dominant species (relative cover, frequency): *Argusia argentea* (100, 100%)

Frequent species (cover, frequency): *Argusia argentea* (42, 100%), *Ficus opposita* (8%)

**Stratum: Shrub 2**

Height avg. = 1.0m, range 0.5-1.3m, 5 sites

Crown cover avg. = 9.2%, range 0.0-23.0%, 5 sites

Dominant species (relative cover, frequency): *Abutilon albescens* (86, 38%)

Frequent species (cover, frequency): *Abutilon albescens* (8, 38%), *Wollastonia uniflora* (3, 15%), *Achyranthes aspera* (8%), *Scaevola taccada* (1, 8%)

**Stratum: Ground**

Height avg. = 0.3m, range 0.15-0.4m, 13 sites

PFC avg. = 36.1%, range 4-85%, 13 sites

Dominant species (relative cover, frequency): *Thuarea involuta* (40, 69%), *Sporobolus virginicus* (38, 23%), *Pseudognaphalium luteoalbum* (27, 23%), *Cakile edentula*\* (27, 54%), *Wollastonia uniflora* (22, 38%)

Frequent species (cover, frequency): GRAMINOIDS: *Thuarea involuta* (23, 69%), *Lepturus repens* (3, 62%), *Stenotaphrum micranthum* (5, 38%), *Cenchrus echinatus*\* (1, 23%), *Sporobolus virginicus* (15, 23%), *Digitaria ciliaris*\* (8%)

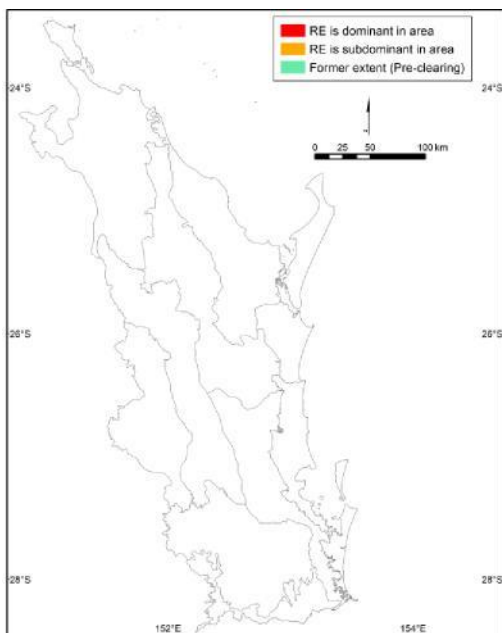
FORBS: *Cakile edentula*\* (8, 54%), *Achyranthes aspera* (1, 38%), *Euphorbia tannensis* subsp. *tannensis* (1, 38%), *Wollastonia uniflora* (4, 38%), *Pseudognaphalium luteoalbum* (14, 23%), *Abutilon albescens* (5, 15%), *Argusia argentea* (1, 15%), *Boerhavia albiflora* var. *heronensis* (1, 15%), *Cassytha filiformis* (1, 15%), *Portulaca oleracea* (2, 15%), *Canavalia rosea* (5, 8%), *Commicarpus insularum* (2, 8%), *Euphorbia cyathophora*\* (1, 8%), *Ipomoea pes-caprae* subsp. *brasiliensis* (1, 8%), *Solanum americanum*\* (2, 8%), *Tribulus cistoides* (8%)

**RE: 12.2.19b *Argusia argentea* open scrub to closed scrub with emergent *Casuarina equisetifolia* subsp. *incana*. Restricted to coral, shingle and sand cays.**

| BioCondition Attributes   | Benchmark    |
|---|--------------|
| Recruitment (%)   | 100          |
| Tree emergent cover (%)   | 7            |
| Tree canopy cover (%)   | na           |
| Tree subcanopy cover (%)  | na           |
| Native shrub cover (%)  | 42           |
| Large eucalypt tree DBH threshold (cm)                                  | na           |
| Number of large eucalypt trees (per ha)                                 | na           |
| Large non-eucalypt tree DBH threshold (cm)                              | 35           |
| Number of large non-eucalypt trees (per ha)                             | 235          |
| Tree emergent height (m)  | 10           |
| Tree canopy height (m)  | na           |
| Tree subcanopy height (m)   | na           |
| Coarse woody debris (m/ha)  | 110          |
| Species richness – trees  | 1            |
| Species richness – shrubs   | 1            |
| Species richness – grasses  | 2            |
| Species richness - forbs and other                                      | 2            |
| Ground cover – native perennial grass cover (%)                         | 25           |
| Ground cover – organic litter (%)                                       | 17           |
| Non-native plant cover (%)  | 0            |
| <b>Reliability ranking (* = low reliability; ***** highly reliable)</b> | <b>*****</b> |

Benchmarks developed by the Queensland Herbarium, based on 12 Qld Herbarium QBEIS sites and expert opinion. April, 2022.

**12.2.19c: *Suriana maritima* open to closed scrub. Restricted to coral, shingle and sand cays.**



G.N. Batiannoff

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 1                      1                      100%

Species recorded:      Total: 8; woody: 4; ground: 4; Avg. spp./site: 5.0; std dev.: 3.0, 2 site(s)

Basal area:                      0

Structural formation: Shrubland: 50%; closed-scrub: 50%, 2 site(s)

Representative sites: 18422, 18424.

**Stratum: Emergent**

Height avg. = 3.5m, 1 site

Crown cover avg. = 0.0%, 1 site

Dominant species (relative cover, frequency): *Pipturus argenteus* (33, 50%), *Ficus opposita* (33, 50%), *Celtis paniculata* (33, 50%)

Frequent species (cover, frequency): *Celtis paniculata* (50%), *Ficus opposita* (50%), *Pipturus argenteus* (50%)

**Stratum: Shrub 1**

Height avg. = 1.5m, range 1.4-1.5m, 2 sites

Crown cover avg. = 70.8%, range 41.6-100.0%, 2 sites

Dominant species (relative cover, frequency): *Suriana maritima* (100, 100%)

Frequent species (cover, frequency): *Suriana maritima* (71, 100%)

**Stratum: Ground**

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

PFC avg. = 32.0%, range 1-63%, 2 sites

Dominant species (relative cover, frequency): *Thuarea involuta* (96, 100%), *Lepturus repens* (7, 50%)

Frequent species (cover, frequency): GRAMINOIDS: *Thuarea involuta* (30, 100%), *Lepturus repens* (4, 50%), *Sporobolus virginicus* (50%)

FORBS: *Abutilon albescens* (50%)

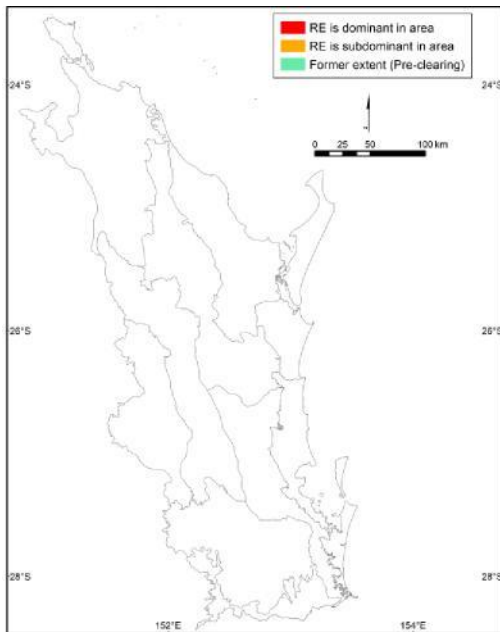
RE: 12.2.19c *Suriana maritima* open to closed scrub. Restricted to coral, shingle and sand cays.

| <b>BioCondition Attributes</b>  | <b>Benchmark</b> |
|---|------------------|
| <b>Recruitment (%)</b>  | <b>100</b>       |
| <b>Tree canopy cover (%)</b>  | <b>na</b>        |
| <b>Tree subcanopy cover (%)</b>   | <b>na</b>        |
| <b>Native shrub cover (%)</b>   | <b>71</b>        |
| <b>Large eucalypt tree DBH threshold (cm)</b>                           | <b>na</b>        |
| <b>Number of large eucalypt trees (per ha)</b>                          | <b>na</b>        |
| <b>Large non-eucalypt tree DBH threshold (cm)</b>                       | <b>na</b>        |
| <b>Number of large non-eucalypt trees (per ha)</b>                      | <b>na</b>        |
| <b>Tree canopy height (m)</b>   | <b>na</b>        |
| <b>Tree subcanopy height (m)</b>  | <b>na</b>        |
| <b>Coarse woody debris (m/ha)</b>                                       | <b>na</b>        |
| <b>Species richness – trees</b>   | <b>1</b>         |
| <b>Species richness – shrubs</b>  | <b>1</b>         |
| <b>Species richness – grasses</b>                                       | <b>2</b>         |
| <b>Species richness - forbs and other</b>                               | <b>1</b>         |
| <b>Ground cover – native perennial grass cover (%)</b>                  | <b>32</b>        |
| <b>Ground cover – organic litter (%)</b>                                | <b>62</b>        |
| <b>Non-native plant cover (%)</b>                                       | <b>0</b>         |
| <b>Reliability ranking (* = low reliability; ***** highly reliable)</b> | <b>***</b>       |

Benchmarks developed by the Queensland Herbarium, based on 2 Qld Herbarium QBEIS sites and expert opinion. April 2022.



**12.2.19d: *Scaevola taccada* open to closed scrub. Restricted to coral, shingle and sand cays**



D.A. Halford

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 1                      0                      66.21%

Species recorded:      Total: 13; woody: 6; ground: 10; Avg. spp./site: 6.7; std dev.: 1.7, 3 site(s)

Basal area:                      0

Structural formation: Open-scrub: 67%; shrubland: 33%, 3 site(s)

Representative sites: 11888, 12999, 18431.

**Stratum: Shrub 1**

Height avg. = 1.7m, range 1.4-2.3m, 3 sites

Crown cover avg. = 49.3%, range 25.0-65.0%, 3 sites

Dominant species (relative cover, frequency): *Scaevola taccada* (92, 100%), *Argusia argentea* (22, 33%)

Frequent species (cover, frequency): *Scaevola taccada* (45, 100%), *Argusia argentea* (14, 33%), *Cassutha filiformis* (33%), *Celtis paniculata* (33%), *Ficus opposita* (33%)

**Stratum: Shrub 2**

Height avg. = 0.5m, 1 site

Crown cover avg. = 27.0%, 1 site

Dominant species (relative cover, frequency): *Wollastonia uniflora* (100, 33%)

Frequent species (cover, frequency): *Wollastonia uniflora* (27, 33%)

**Stratum: Ground**

Height avg. = 0.2m, range 0.03-0.3m, 3 sites

PFC avg. = 15.6%, range 8-20.2%, 3 sites

Dominant species (relative cover, frequency): *Wollastonia uniflora* (73, 67%), *Sporobolus virginicus* (32, 100%), *Stenotaphrum micranthum* (13, 33%), *Pseudognaphalium luteoalbum* (13, 33%), *Lepturus repens* (13, 33%)

Frequent species (cover, frequency): GRAMINOIDS: *Sporobolus virginicus* (4, 100%), *Lepturus repens* (1, 33%), *Stenotaphrum micranthum* (1, 33%)

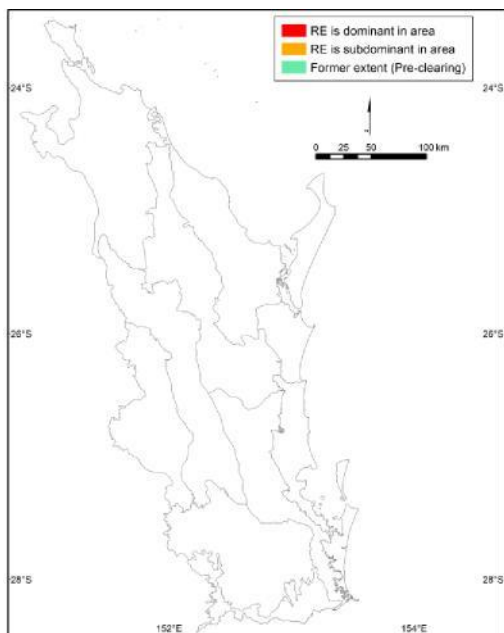
FORBS: *Boerhavia albiflora* var. *heronensis* (1, 67%), *Wollastonia uniflora* (14, 67%), *Abutilon albescens* (33%), *Cassutha filiformis* (2, 33%), *Euphorbia tannensis* subsp. *tannensis* (33%), *Pseudognaphalium luteoalbum* (1, 33%), *Scaevola taccada* (1, 33%)

RE: 12.2.19d *Scaevola taccada* open to closed scrub. Restricted to coral, shingle and sand cays

| <b>BioCondition Attributes</b>                                   | <b>Benchmark</b> |
|--|------------------|
| Recruitment (%)  | 100              |
| Tree canopy cover (%)  | na               |
| Tree subcanopy cover (%)   | na               |
| Native shrub cover (%)   | 49               |
| Large eucalypt tree DBH threshold (cm)                           | na               |
| Number of large eucalypt trees (per ha)                          | na               |
| Large non-eucalypt tree DBH threshold (cm)                       | na               |
| Number of large non-eucalypt trees (per ha)                      | na               |
| Tree canopy height (m)   | na               |
| Tree subcanopy height (m)  | na               |
| Coarse woody debris (m/ha)                                       | na               |
| Species richness – trees   | na               |
| Species richness – shrubs  | 2                |
| Species richness – grasses                                       | 2                |
| Species richness - forbs and other                               | 3                |
| Ground cover – native perennial grass cover (%)                  | 5                |
| Ground cover – organic litter (%)                                | 76               |
| Non-native plant cover (%)                                       | 0                |
| Reliability ranking (* = low reliability; ***** highly reliable) | ***              |

Benchmarks developed by the Queensland Herbarium, based on 3 Qld Herbarium QBEIS sites and expert opinion. April, 2022.

**12.2.19f: *Ximenia americana* closed scrub**



J. Brushe

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 0.1                      0.1                      100%

Species recorded:        Total: 5; woody: 1; ground: 5; Avg. spp./site: 5.0; std dev.: 0.0, 1 site(s)

Basal area:                      0

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

Representative sites: 18455.

**Stratum: Shrub 1**

Height avg. = 3.0m, 1 site

Crown cover avg. = 100.0%, 1 site

Dominant species (relative cover, frequency): *Ximenia americana* (100, 100%)

Frequent species (cover, frequency): *Ximenia americana* (100, 100%)

**Stratum: Ground**

Height avg. = 0.2m, 1 site

PFC avg. = 7.6%, 1 site

Dominant species (relative cover, frequency): *Thuarea involuta* (46, 100%), *Ximenia americana* (36, 100%), *Ipomoea violacea* (15, 100%), *Commicarpus insularum* (1, 100%), *Abutilon albescens* (1, 100%)

Frequent species (cover, frequency): GRAMINOIDS: *Thuarea involuta* (4, 100%)

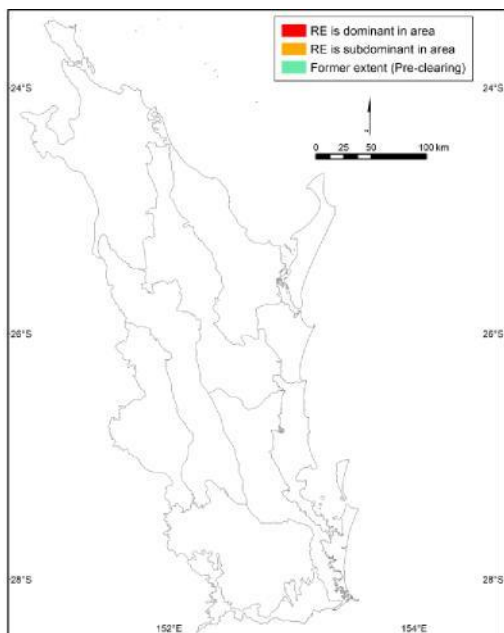
FORBS: *Abutilon albescens* (100%), *Commicarpus insularum* (100%), *Ipomoea violacea* (1, 100%), *Ximenia americana* (3, 100%)

**RE: 12.2.19f *Ximenia americana* closed scrub**

| <b>BioCondition Attributes</b>  | <b>Benchmark</b> |
|---|------------------|
| Recruitment (%)   | <b>100</b>       |
| Tree canopy cover (%)   | <b>na</b>        |
| Tree subcanopy cover (%)  | <b>na</b>        |
| Native shrub cover (%)  | <b>100</b>       |
| Large eucalypt tree DBH threshold (cm)                                  | <b>na</b>        |
| Number of large eucalypt trees (per ha)                                 | <b>na</b>        |
| Large non-eucalypt tree DBH threshold (cm)                              | <b>na</b>        |
| Number of large non-eucalypt trees (per ha)                             | <b>na</b>        |
| Tree canopy height (m)  | <b>na</b>        |
| Tree subcanopy height (m)   | <b>na</b>        |
| Coarse woody debris (m/ha)  | <b>na</b>        |
| Species richness – trees  | <b>na</b>        |
| Species richness – shrubs   | <b>1</b>         |
| Species richness – grasses  | <b>1</b>         |
| Species richness - forbs and other                                      | <b>4</b>         |
| Ground cover – native perennial grass cover (%)                         | <b>4</b>         |
| Ground cover – organic litter (%)                                       | <b>91</b>        |
| Non-native plant cover (%)  | <b>0</b>         |
| <b>Reliability ranking (* = low reliability; ***** highly reliable)</b> | <b>***</b>       |

Benchmarks developed by the Queensland Herbarium, based on 1 Qld Herbarium QBEIS site and expert opinion. April, 2022.

**12.2.20a: *Pandanus tectorius* low open forest to closed forest. Restricted to established cays**



V.J. Neldner

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 4                      4                      100%

Species recorded:        Total: 22; woody: 12; ground: 16; Avg. spp./site: 9.4; std dev.: 3.1, 5 site(s)

Basal area:                Avg./site: 33.0 m<sup>2</sup>/ha, range: 20.0 - 42 m<sup>2</sup>/ha, std. deviation: 9 m<sup>2</sup>/ha, 3 site(s)

Structural formation: Open-forest: 40%; low woodland: 20%; low closed-forest: 20%; closed-forest: 20%, 5 site(s)

Representative sites: 11904, 14967, 18394, 18407, 18448.

**Stratum: Emergent**

Height avg. = 15.2m, range 13.3-17m, 2 sites

Crown cover avg. = 44.8%, range 40.0-49.5%, 2 sites

Frequent species (cover, frequency): *Casuarina equisetifolia* subsp. *incana* (50, 20%), *Pisonia grandis* (40, 20%)

**Stratum: Tree 1**

Height avg. = 7.8m, range 5-12m, 5 sites

Crown cover avg. = 80.6%, range 65.8-91.0%, 5 sites

Dominant species (relative cover, frequency): *Pandanus tectorius* (90, 100%), *Pisonia grandis* (17, 60%)

Frequent species (cover, frequency): *Pandanus tectorius* (73, 100%), *Pisonia grandis* (12, 60%), *Argusia argentea* (20%), *Ficus opposita* (20%)

**Stratum: Tree 2**

Height avg. = 4.3m, range 3.5-5m, 2 sites

Crown cover avg. = 4.1%, range 0.0-8.2%, 2 sites

Dominant species (relative cover, frequency): *Pandanus tectorius* (71, 40%)

Frequent species (cover, frequency): *Pandanus tectorius* (4, 40%), *Abutilon albescens* (20%), *Canavalia rosea* (1, 20%), *Ficus opposita* (20%), *Pisonia grandis* (20%)

**Stratum: Shrub 1**

Height avg. = 1.8m, range 1-2.5m, 5 sites

Crown cover avg. = 14.5%, range 0.0-47.0%, 5 sites

Dominant species (relative cover, frequency): *Pandanus tectorius* (58, 100%), *Argusia argentea* (16, 60%), *Abutilon albescens* (12, 80%), *Pisonia grandis* (12, 40%), *Ficus opposita* (4, 40%)

Frequent species (cover, frequency): *Pandanus tectorius* (8, 100%), *Abutilon albescens* (2, 80%), *Argusia argentea* (7, 60%), *Ficus opposita* (1, 40%), *Pisonia grandis* (40%), *Achyranthes aspera* (20%), *Canavalia rosea* (1, 20%), *Celtis paniculata* (20%), *Euphorbia tannensis subsp. tannensis* (20%), *Scaevola taccada* (20%), *Stephania japonica* (20%)

**Stratum: Ground**

Height avg. = 0.3m, range 0.15-0.4m, 5 sites

PFC avg. = 33.0%, range 0.8-71%, 5 sites

Dominant species (relative cover, frequency): *Thuarea involuta* (64, 60%), *Pandanus tectorius* (47, 40%), *Lepturus repens* (16, 40%), *Commicarpus insularum* (10, 60%), *Stenotaphrum micranthum* (7, 40%)

Frequent species (cover, frequency): GRAMINOIDS: *Thuarea involuta* (24, 60%), *Lepturus repens* (3, 40%), *Stenotaphrum micranthum* (5, 40%), *Sporobolus virginicus* (6, 20%)

FORBS: *Achyranthes aspera* (3, 80%), *Commicarpus insularum* (5, 60%), *Solanum americanum\** (1, 60%), *Abutilon albescens* (40%), *Euphorbia tannensis subsp. tannensis* (40%), *Pandanus tectorius* (1, 40%), *Amaranthus viridis\** (20%), *Canavalia rosea* (20%), *Ficus opposita* (20%), *Ipomoea pes-caprae subsp. brasiliensis* (20%), *Lepidium virginicum\** (20%), *Wollastonia uniflora* (40, 20%)

**RE: 12.2.20a *Pandanus tectorius* low open forest to closed forest. Restricted to established cays.**

| BioCondition Attributes  | Benchmark |
|--|-----------|
| Recruitment (%)  | 100       |
| Tree emergent cover (%) (where present)                          | 45        |
| Tree canopy cover (%)  | 81        |
| Tree subcanopy cover (%)   | na        |
| Native shrub cover (%)   | 14        |
| Large eucalypt tree DBH threshold (cm)                           | na        |
| Number of large eucalypt trees (per ha)                          | na        |
| Large non-eucalypt tree DBH threshold (cm)                       | 36        |
| Number of large non-eucalypt trees (per ha)                      | 362       |
| Tree emergent height (m)   | 15        |
| Tree canopy height (m)   | 8         |
| Tree subcanopy height (m)  | na        |
| Coarse woody debris (m/ha)                                       | 543       |
| Species richness – trees   | 3         |
| Species richness – shrubs  | 4         |
| Species richness – grasses                                       | 2         |
| Species richness - forbs and other                               | 3         |
| Ground cover – native perennial grass cover (%)                  | 19        |
| Ground cover – organic litter (%)                                | 49        |
| Non-native plant cover (%)                                       | 0         |
| Reliability ranking (* = low reliability; ***** highly reliable) | ***       |

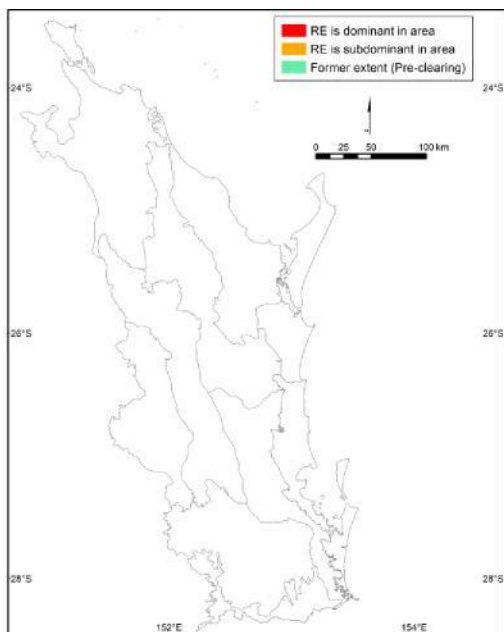
Benchmarks developed by the Queensland Herbarium, based on 5 Qld Herbarium QBEIS sites and expert opinion. April, 2022.

Not all expressions of this community have an emergent layer, apply emergent cover and height attributes only where relevant.



Technical Description Regional Ecosystem: 12.2.20 - Vegetation Community: 12.2.20b

12.2.20b: *Celtis paniculata* woodland +/- *Pisonia grandis* +/- *Pandanus tectorius*. Restricted to established cays



V.J. Neldner

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 3 3 98.10%

Species\_recorded: Total: 19; woody: 13; ground: 9; Avg. spp./site: 10.5; std dev.: 0.5, 2 site(s)

Basal area: Avg./site: 21.5 m<sup>2</sup>/ha, range: 16.0 - 27 m<sup>2</sup>/ha, std. deviation: 6 m<sup>2</sup>/ha, 2 site(s)

Structural formation: Woodland: 50%; low open-forest: 50%, 2 site(s)

Representative sites: 18413, 18418.

**Stratum: Emergent**

Height avg. = 12.5m, 1 site

Crown cover avg. = 22.0%, 1 site

Dominant species (relative cover, frequency): *Casuarina equisetifolia* subsp. *incana* (100, 50%)

Frequent species (cover, frequency): *Casuarina equisetifolia* subsp. *incana* (22, 50%)

**Stratum: Tree 1**

Height avg. = 8.5m, range 8-9m, 2 sites

Crown cover avg. = 57.7%, range 46.0-69.4%, 2 sites

Dominant species (relative cover, frequency): *Celtis paniculata* (93, 100%), *Ficus opposita* (10, 50%), *Pisonia grandis* (1, 100%)

Frequent species (cover, frequency): *Celtis paniculata* (53, 100%), *Pisonia grandis* (1, 100%), *Ficus opposita* (7, 50%), *Ipomoea violacea* (50%), *Pipturus argenteus* (50%)

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**Stratum: Tree 2****Height avg. = 4.0m, 1 site****Crown cover avg. = 24.6%, 1 site***Dominant species (relative cover, frequency): Pisonia grandis (99, 50%)**Frequent species (cover, frequency): Celtis paniculata (50%), Ficus opposita (50%), Pipturus argenteus (50%), Pisonia grandis (25, 50%)*

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**Stratum: Shrub 1****Height avg. = 2.8m, range 1.5-4m, 2 sites****Crown cover avg. = 3.0%, range 0.0-6.0%, 2 sites***Dominant species (relative cover, frequency): Pisonia grandis (57, 100%), Pipturus argenteus (17, 50%), Ficus opposita (17, 50%), Euphorbia cyathophora\* (17, 50%), Commicarpus insularum (17, 50%)**Frequent species (cover, frequency): Pisonia grandis (3, 100%), Abutilon albescens (50%), Argusia argentea (50%), Commicarpus insularum (50%), Euphorbia cyathophora\* (50%), Ficus opposita (50%), Pipturus argenteus (50%), Scaevola taccada (50%)*

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**Stratum: Shrub 2****Height avg. = 0.8m, 1 site****Crown cover avg. = 13.0%, 1 site***Dominant species (relative cover, frequency): Wollastonia uniflora (76, 50%), Achyranthes aspera (23, 50%), Scaevola taccada (1, 50%)**Frequent species (cover, frequency): Achyranthes aspera (3, 50%), Scaevola taccada (50%), Wollastonia uniflora (10, 50%)*

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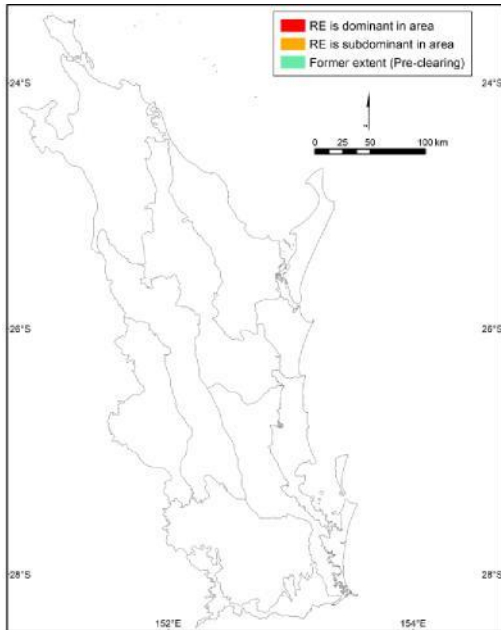
**Stratum: Ground****Height avg. = 0.3m, range 0.2-0.3m, 2 sites****PFC avg. = 49.5%, range 9.8-89.2%, 2 sites***Dominant species (relative cover, frequency): Euphorbia cyathophora\* (76, 50%), Lepturus repens (73, 50%), Eleusine indica\* (22, 50%), Achyranthes aspera (13, 50%), Thuarea involuta (11, 50%)**Frequent species (cover, frequency): GRAMINOIDS: Eleusine indica\* (2, 50%), Lepturus repens (65, 50%), Stenotaphrum micranthum (50%), Thuarea involuta (10, 50%)**FORBS: Achyranthes aspera (11, 50%), Boerhavia albiflora var. heronensis (1, 50%), Euphorbia cyathophora\* (7, 50%), Pseudognaphalium luteoalbum (1, 50%), Wollastonia uniflora (50%)*

RE: 12.2.20b *Celtis paniculata* woodland +/- *Pisonia grandis* +/- *Pandanus tectorius* trees with *Wollastonia uniflora* / *Abutilon albescens* shrubs. Restricted to established cays.

| <b>BioCondition Attributes</b>  | <b>Benchmark</b> |
|---|------------------|
| <b>Recruitment (%)</b>  | <b>100</b>       |
| <b>Tree canopy cover (%)</b>  | <b>58</b>        |
| <b>Tree subcanopy cover (%)</b>   | <b>na</b>        |
| <b>Native shrub cover (%)</b>   | <b>3</b>         |
| <b>Large eucalypt tree DBH threshold (cm)</b>                           | <b>na</b>        |
| <b>Number of large eucalypt trees (per ha)</b>                          | <b>na</b>        |
| <b>Large non-eucalypt tree DBH threshold (cm)</b>                       | <b>40</b>        |
| <b>Number of large non-eucalypt trees (per ha)</b>                      | <b>230</b>       |
| <b>Tree canopy height (m)</b>   | <b>9</b>         |
| <b>Tree subcanopy height (m)</b>  | <b>na</b>        |
| <b>Coarse woody debris (m/ha)</b>                                       | <b>17</b>        |
| <b>Species richness – trees</b>   | <b>5</b>         |
| <b>Species richness – shrubs</b>  | <b>6</b>         |
| <b>Species richness – grasses</b>                                       | <b>2</b>         |
| <b>Species richness - forbs and other</b>                               | <b>2</b>         |
| <b>Ground cover – native perennial grass cover (%)</b>                  | <b>38</b>        |
| <b>Ground cover – organic litter (%)</b>                                | <b>22</b>        |
| <b>Non-native plant cover (%)</b>                                       | <b>0</b>         |
| <b>Reliability ranking (* = low reliability; ***** highly reliable)</b> | <b>***</b>       |

Benchmarks developed by the Queensland Herbarium, based on 2 Qld Herbarium QBEIS sites and expert opinion. April, 2022.

**12.2.20c: *Cordia subcordata* low closed-forest.**



B. Armstrong

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 1                      1                      100.00%

Species recorded:            Total: 14; woody: 10; ground: 8; Avg. spp./site: 9.0; std dev.: 3.0, 2 site(s)

Basal area:                    Avg./site: 22.0 m<sup>2</sup>/ha, range: 18.0 - 26 m<sup>2</sup>/ha, std. deviation: 4 m<sup>2</sup>/ha, 2 site(s)

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

Representative sites: 18409, 18428.

**Stratum: Tree 1**

Height avg. = 7.5m, range 5-10m, 2 sites

Crown cover avg. = 81.1%, range 74.3-87.8%, 2 sites

Dominant species (relative cover, frequency): *Cordia subcordata* (95, 100%), *Pandanus tectorius* (10, 50%)

Frequent species (cover, frequency): *Cordia subcordata* (77, 100%), *Argusia argentea* (50%), *Celtis paniculata* (50%), *Ficus opposita* (50%), *Pandanus tectorius* (9, 50%), *Pisonia grandis* (50%)

**Stratum: Tree 2**

Height avg. = 4.3m, range 3.5-5m, 2 sites

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

Dominant species (relative cover, frequency): *Argusia argentea* (100, 50%), *Pisonia grandis* (25, 50%), *Pipturus argenteus* (25, 50%), *Cordia subcordata* (25, 50%), *Celtis paniculata* (25, 50%)

Frequent species (cover, frequency): *Argusia argentea* (50%), *Celtis paniculata* (50%), *Cordia subcordata* (50%), *Pipturus argenteus* (50%), *Pisonia grandis* (50%)

**Stratum: Shrub 1**

Height avg. = 2.1m, range 1.2-3m, 2 sites

Crown cover avg. = 2.9%, range 0.0-5.8%, 2 sites

Dominant species (relative cover, frequency): *Argusia argentea* (95, 50%), *Pisonia grandis* (20, 50%), *Ficus opposita* (20, 50%), *Achyranthes aspera* (20, 50%), *Abutilon albescens* (20, 50%)

Frequent species (cover, frequency): *Cordia subcordata* (100%), *Abutilon albescens* (50%), *Achyranthes aspera* (50%), *Argusia argentea* (6, 50%), *Ficus opposita* (50%), *Pandanus tectorius* (50%), *Pisonia grandis* (50%), *Scaevola taccada* (50%)

**Stratum: Ground**

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

PFC avg. = 7.4%, range 0.6-14.2%, 2 sites

Dominant species (relative cover, frequency): *Pandanus tectorius* (50, 50%), *Stenotaphrum micranthum* (41, 100%), *Cordia subcordata* (25, 50%), *Thuarea involuta* (21, 50%), *Abutilon albescens* (13, 50%)

Frequent species (cover, frequency): GRAMINOIDS: *Stenotaphrum micranthum* (5, 100%), *Lepturus repens* (1, 50%), *Thuarea involuta* (3, 50%)

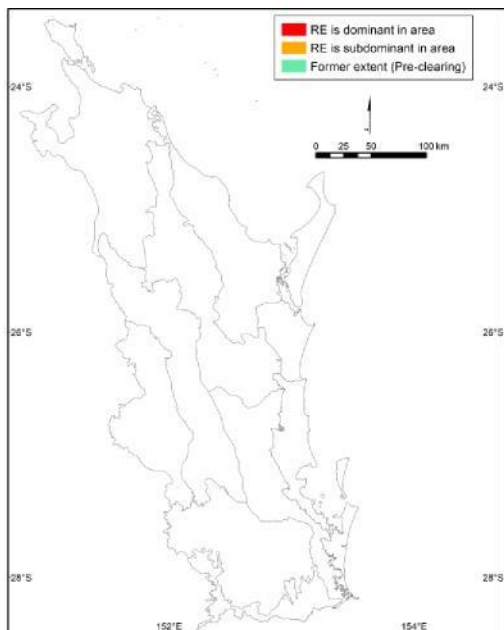
FORBS: *Abutilon albescens* (50%), *Achyranthes aspera* (50%), *Boerhavia albiflora* var. *heronensis* (50%), *Cordia subcordata* (50%), *Pandanus tectorius* (50%)

**RE: 12.2.20c *Cordia subcordata* low closed-forest.**

| BioCondition Attributes  | Benchmark |
|--|-----------|
| Recruitment (%)  | 100       |
| Tree canopy cover (%)  | 81        |
| Tree subcanopy cover (%)   | na        |
| Native shrub cover (%)   | 3         |
| Large eucalypt tree DBH threshold (cm)                           | na        |
| Number of large eucalypt trees (per ha)                          | na        |
| Large non-eucalypt tree DBH threshold (cm)                       | 35        |
| Number of large non-eucalypt trees (per ha)                      | 323       |
| Tree canopy height (m)   | 8         |
| Tree subcanopy height (m)  | na        |
| Coarse woody debris (m/ha)                                       | 458       |
| Species richness – trees   | 5         |
| Species richness – shrubs  | 4         |
| Species richness – grasses                                       | 2         |
| Species richness - forbs and other                               | 3         |
| Ground cover – native perennial grass cover (%)                  | 7         |
| Ground cover – organic litter (%)                                | 69        |
| Non-native plant cover (%)                                       | 0         |
| Reliability ranking (* = low reliability; ***** highly reliable) | ***       |

Benchmarks developed by the Queensland Herbarium, based on 2 Qld Herbarium QBEIS sites and expert opinion. April, 2022.

**12.2.21a: *Pisonia grandis* low open forest to low closed forest, sometimes with *Pandanus tectorius*. Restricted to established cays**



G.N. Batianoff

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 31                      26                      85.49%

Species recorded:      Total: 15; woody: 7; ground: 11; Avg. spp./site: 4.0; std dev.: 2.3, 8 site(s)

Basal area: Avg./site: 41.9 m<sup>2</sup>/ha, range: 20.5 - 70 m<sup>2</sup>/ha, std. deviation: 18 m<sup>2</sup>/ha, 4 site(s)

Structural formation: Low closed-forest: 63%; low open-forest: 25%; closed-forest: 13%, 8 site(s) Representative sites: 13344, 13408, 14014, 18392, 18419, 18432, 18438, 18483.

**Stratum: Emergent**

Height avg. = 12.0m, 1 site

Crown cover avg. = 0.0%, 1 site

Frequent species (cover, frequency): *Casuarina equisetifolia* subsp. *incana* (11%)

**Stratum: Tree 1**

Height avg. = 8.0m, range 4.0-11m, 8 sites

Crown cover avg. = 85.6%, range 51.0-100.0%, \* sites

Dominant species (relative cover, frequency): *Pisonia grandis* (98, 100%), *Pandanus tectorius* (5, 22%)

Frequent species (cover, frequency): *Pisonia grandis* (83, 100%), *Pandanus tectorius* (5, 25%), *Argusia argentea* (4, 13%)

**Stratum: Tree 2**

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

Crown cover avg. = 5.9%, range 0.0-17.6%, 3 sites

Dominant species (relative cover, frequency): *Pisonia grandis* (78, 33%)

Frequent species (cover, frequency): *Pisonia grandis* (5, 38%), *Argusia argentea* (13%), *Ficus opposita* (3, 13%)

**Stratum: Shrub 1**

Height avg. = 1.4m, range 0.5-2.5m, 7 sites

Crown cover avg. = 0.4%, range 0.0-1.0%, 7 sites

Dominant species (relative cover, frequency): *Pisonia grandis* (70, 63%), *Abutilon albescens* (67, 38%)

Frequent species (cover, frequency): *Pisonia grandis* (63%), *Abutilon albescens* (38%), *Argusia argentea* (1, 13%), *Celtis paniculata* (13%)



**Stratum: Ground**

Height avg. = 0.2m, range 0.01-0.7m, 7 sites

PFC avg. = 3.3%, range 0-20.2%, 7 sites

Dominant species (relative cover, frequency): *Pisonia grandis* (100, 25%), *Solanum americanum*\* (62, 25%), *Stenotaphrum micranthum* (20, 38%), *Achyranthes aspera* (9, 38%)

Frequent species (cover, frequency): GRAMINOIDS: *Stenotaphrum micranthum* (38%), *Lepturus repens* (3, 13%), *Thuarea involuta* (17, 13%)

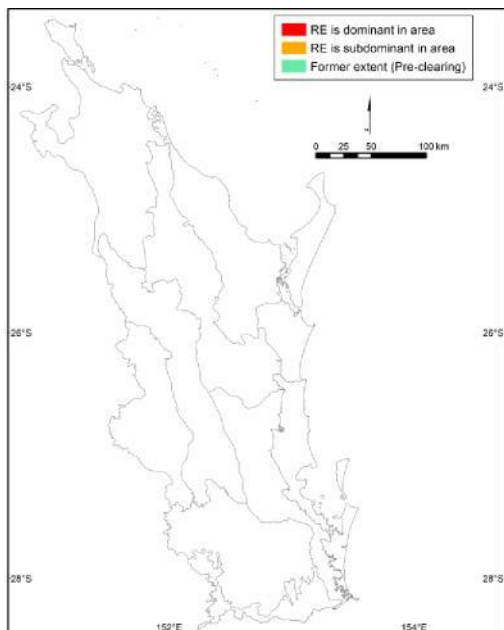
FORBS: *Achyranthes aspera* (38%), *Pisonia grandis* (25%), *Abutilon albescens* (13%), *Commicarpus insularum* (13%), *Pandanus tectorius* (13%), *Pseudognaphalium luteoalbum* (13%), *Sonchus oleraceus*\* (13%)

**RE: 12.2.21a *Pisonia grandis* low open forest to low closed forest, sometimes with *Pandanus tectorius*. Restricted to established cays.**

| BioCondition Attributes  | Benchmark |
|--|-----------|
| Recruitment (%)  | 100       |
| Tree canopy cover (%)  | 86        |
| Tree subcanopy cover (%)   | na        |
| Native shrub cover (%)   | na        |
| Large eucalypt tree DBH threshold (cm)                           | na        |
| Number of large eucalypt trees (per ha)                          | na        |
| Large non-eucalypt tree DBH threshold (cm)                       | 35        |
| Number of large non-eucalypt trees (per ha)                      | 196       |
| Tree canopy height (m)   | 8         |
| Tree subcanopy height (m)  | na        |
| Coarse woody debris (m/ha)                                       | 556       |
| Species richness – trees   | 2         |
| Species richness – shrubs  | 1         |
| Species richness – grasses                                       | na        |
| Species richness - forbs and other                               | 1         |
| Ground cover – native perennial grass cover (%)                  | na        |
| Ground cover – organic litter (%)                                | 79        |
| Non-native plant cover (%)                                       | 0         |
| Reliability ranking (* = low reliability; ***** highly reliable) | *****     |

Benchmarks developed by the Queensland Herbarium, based on 8 Qld Herbarium QBEIS sites and expert opinion. April, 2022.

**12.2.21b: *Pisonia grandis* closed forest sometimes with *Pandanus tectorius* and *Celtis paniculata*. Restricted to established cays**



D.A. Halford

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 154                      132                      85.89%

Species recorded:            Total: 16; woody: 9; ground: 15; Avg. spp./site: 5.2; std dev.: 2.2, 13 site(s)

Basal area:                    Avg./site: 45.9 m<sup>2</sup>/ha, range: 22.5 - 62 m<sup>2</sup>/ha, std. deviation: 10 m<sup>2</sup>/ha, 10 site(s)

Structural formation: Closed-forest: 100%, 13 site(s)

Representative sites: 12141, 12142, 12304, 13443, 18400, 18404, 18406, 18415, 18420, 18451, 18453, 18454, 18482.

**Stratum: Tree 1**

Height avg. = 14.9m, range 10-21m, 13 sites

Crown cover avg. = 93.1%, range 75.0-100.0%, 13 sites

Dominant species (relative cover, frequency): *Pisonia grandis* (97, 100%), *Celtis paniculata* (8, 23%), *Pandanus tectorius* (4, 23%)

Frequent species (cover, frequency): *Pisonia grandis* (93, 100%), *Celtis paniculata* (13, 23%), *Pandanus tectorius* (6, 23%), *Ficus opposita* (1, 8%), *Ficus rubiginosa* (4, 8%)

**Stratum: Tree 2**

Height avg. = 6.4m, range 3.5-12m, 7 sites

Crown cover avg. = 6.3%, range 0.0-28.4%, 7 sites

Dominant species (relative cover, frequency): *Celtis paniculata* (81, 23%), *Pisonia grandis* (75, 46%)

Frequent species (cover, frequency): *Pisonia grandis* (6, 46%), *Celtis paniculata* (2, 23%), *Ficus rubiginosa* (8%), *Pandanus tectorius* (8%)

**Stratum: Shrub 1**

Height avg. = 1.7m, range 0.7-3m, 12 sites

Crown cover avg. = 8.7%, range 0.0-52.0%, 12 sites

Dominant species (relative cover, frequency): *Pisonia grandis* (73, 62%), *Abutilon albescens* (39, 69%), *Celtis paniculata* (21, 38%), *Pipturus argenteus* (14, 31%), *Ficus opposita* (10, 31%)

Frequent species (cover, frequency): *Abutilon albescens* (6, 69%), *Pisonia grandis* (4, 62%), *Celtis paniculata* (1, 38%), *Ficus opposita* (31%), *Pipturus argenteus* (2, 31%), *Achyranthes aspera* (1, 8%), *Pandanus tectorius* (6, 8%), *Solanum americanum*\* (3, 8%)

## Technical Description Regional Ecosystem: 12.2.21 - Vegetation Community: 12.2.21b

### Stratum: Ground

Height avg. = 0.2m, range 0.01-0.4m, 12 sites

PFC avg. = 3.7%, range 0-12%, 12 sites

Dominant species (relative cover, frequency): *Pisonia grandis* (58, 23%), *Passiflora pallida*\* (58, 23%), *Solanum americanum*\* (53, 31%), *Thuarea involuta* (41, 23%), *Achyranthes aspera* (39, 38%)

Frequent species (cover, frequency): GRAMINOIDS: *Thuarea involuta* (3, 23%), *Eleusine indica*\* (15%), *Lepturus repens* (8%), *Stenotaphrum micranthum* (8%)

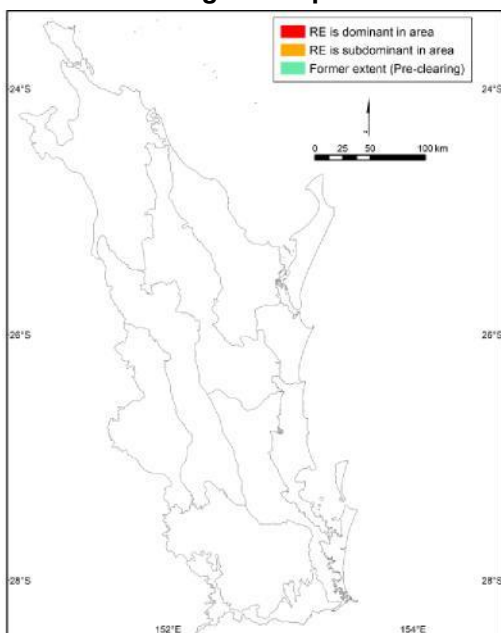
FORBS: *Abutilon albescens* (1, 46%), *Achyranthes aspera* (3, 38%), *Pipturus argenteus* (31%), *Solanum americanum*\* (3, 31%), *Passiflora pallida*\* (2, 23%), *Pisonia grandis* (23%), *Ficus opposita* (15%), *Boerhavia albiflora* var. *heronensis* (1, 8%), *Celtis paniculata* (8%), *Crassocephalum crepidioides*\* (8%), *Pandanus tectorius* (8%)

**RE: 12.2.21b *Pisonia grandis* closed forest, sometimes with *Pandanus tectorius* and *Celtis paniculata*.**

| BioCondition Attributes  | Benchmark |
|--|-----------|
| Recruitment (%)  | 100       |
| Tree canopy cover (%)  | 93        |
| Tree subcanopy cover (%)   | 6         |
| Native shrub cover (%)   | 9         |
| Large eucalypt tree DBH threshold (cm)                           | na        |
| Number of large eucalypt trees (per ha)                          | na        |
| Large non-eucalypt tree DBH threshold (cm)                       | 76        |
| Number of large non-eucalypt trees (per ha)                      | 203       |
| Tree canopy height (m)   | 15        |
| Tree subcanopy height (m)  | 8         |
| Coarse woody debris (m/ha)                                       | 832       |
| Species richness – trees   | 2         |
| Species richness – shrubs  | 3         |
| Species richness – grasses                                       | na        |
| Species richness - forbs and other                               | 2         |
| Ground cover – native perennial grass cover (%)                  | na        |
| Ground cover – organic litter (%)                                | 52        |
| Non-native plant cover (%)                                       | 0         |
| Reliability ranking (* = low reliability; ***** highly reliable) | *****     |

Benchmarks developed by the Queensland Herbarium, based on 13 Qld Herbarium QBEIS sites and expert opinion. April, 2022.

**12.2.21c: *Ficus rubiginosa* open forest. Restricted to established cays**



G.N. Batianoff

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 0.2                      0.2                      100%

Species\_recorded:        Total: 12; woody: 8; ground: 8; Avg. spp./site: 10.5; std dev.: 0.5, 2 site(s)

Basal area:                      Avg./site: 36.0 m<sup>2</sup>/ha, range: 36.0 - 36 m<sup>2</sup>/ha, std. deviation: 0 m<sup>2</sup>/ha, 1 site(s)

Structural formation: Open-forest: 50%; closed-forest: 50%, 2 site(s)

Representative sites: 13437, 18456.

**Stratum: Tree 1**

Height avg. = 15.5m, range 14-17m, 2 sites

Crown cover avg. = 31.5%, range 5.0-58.0%, 2 sites

Dominant species (relative cover, frequency): *Ipomoea violacea* (96, 50%), *Ficus rubiginosa* (51, 100%), *Celtis paniculata* (2, 50%)

Frequent species (cover, frequency): *Ficus rubiginosa* (29, 100%), *Celtis paniculata* (50%), *Ipomoea violacea* (5, 50%)

**Stratum: Tree 2**

Height avg. = 7.8m, range 4.5-11m, 2 sites

Crown cover avg. = 1.8%, range 1.5-2.0%, 2 sites

Dominant species (relative cover, frequency): *Ipomoea violacea* (88, 50%), *Pandanus tectorius* (50, 50%), *Celtis paniculata* (50, 50%), *Pisonia grandis* (6, 50%), *Ficus rubiginosa* (6, 50%)

Frequent species (cover, frequency): *Celtis paniculata* (1, 50%), *Ficus rubiginosa* (50%), *Ipomoea violacea* (2, 50%), *Pandanus tectorius* (1, 50%), *Pisonia grandis* (50%)

**Stratum: Tree 3**

Height avg. = 3.5m, 1 site

Crown cover avg. = 0.0%, 1 site

Dominant species (relative cover, frequency): *Pisonia grandis* (50, 50%), *Celtis paniculata* (50, 50%)

Frequent species (cover, frequency): *Celtis paniculata* (50%), *Pisonia grandis* (50%)

**Stratum: Shrub 1**

Height avg. = 2.0m, range 1.5-2.5m, 2 sites

Crown cover avg. = 9.8%, range 4.0-15.5%, 2 sites

Dominant species (relative cover, frequency): *Celtis paniculata* (74, 50%), *Pipturus argenteus* (25, 50%), *Ficus opposita* (25, 50%), *Abutilon albescens* (25, 100%), *Pisonia grandis* (13, 100%)

Frequent species (cover, frequency): *Abutilon albescens* (3, 100%), *Pisonia grandis* (1, 100%), *Celtis paniculata* (12, 50%), *Ficus opposita* (1, 50%), *Ipomoea violacea* (50%), *Pipturus argenteus* (1, 50%)

**Stratum: Ground**

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

PFC avg. = 8.0%, range 4-12%, 2 sites

Dominant species (relative cover, frequency): *Commicarpus insularum* (44, 100%), *Ipomoea violacea* (17, 100%), *Achyranthes aspera* (16, 50%), *Stenotaphrum micranthum* (14, 100%), *Euphorbia cyathophora*\* (14, 100%)

Frequent species (cover, frequency): GRAMINOIDS: *Stenotaphrum micranthum* (1, 100%)

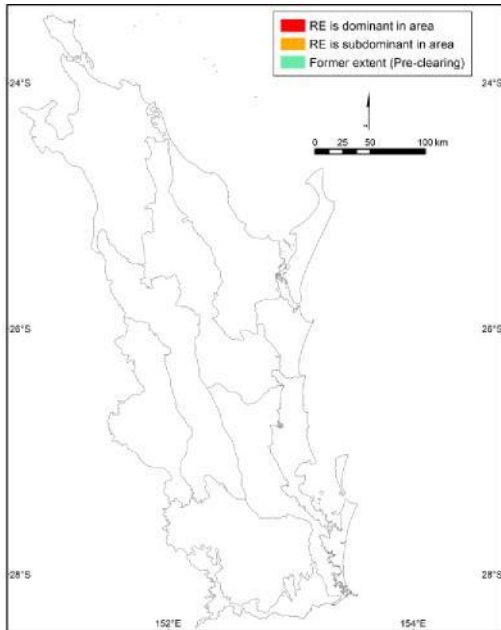
FORBS: *Commicarpus insularum* (4, 100%), *Euphorbia cyathophora*\* (1, 100%), *Ipomoea violacea* (1, 100%), *Abutilon albescens* (50%), *Achyranthes aspera* (2, 50%), *Celtis paniculata* (50%), *Ficus opposita* (1, 50%)

**RE: 12.2.21c *Ficus rubiginosa* open forest. Restricted to established cays.**

| BioCondition Attributes  | Benchmark |
|--|-----------|
| Recruitment (%)  | 100       |
| Tree canopy cover (%)  | 32        |
| Tree subcanopy cover (%)   | 2         |
| Native shrub cover (%)   | 10        |
| Large eucalypt tree DBH threshold (cm)                           | na        |
| Number of large eucalypt trees (per ha)                          | na        |
| Large non-eucalypt tree DBH threshold (cm)                       | 42        |
| Number of large non-eucalypt trees (per ha)                      | 200       |
| Tree canopy height (m)   | 16        |
| Tree subcanopy height (m)  | 8         |
| Coarse woody debris (m/ha)                                       | 330       |
| Species richness – trees   | 4         |
| Species richness – shrubs  | 4         |
| Species richness – grasses                                       | 1         |
| Species richness - forbs and other                               | 4         |
| Ground cover – native perennial grass cover (%)                  | na        |
| Ground cover – organic litter (%)                                | 60        |
| Non-native plant cover (%)                                       | 0         |
| Reliability ranking (* = low reliability; ***** highly reliable) | ***       |

Benchmarks developed by the Queensland Herbarium, based on 2 Qld Herbarium QBEIS sites and expert opinion. April, 2022.

**12.2.21d: *Ficus opposita* shrubland. Restricted to established cays**



D.A. Halford

Pre-clearing area (ha), remnant area (ha) and per cent remaining: 0.2                      0.2                      100%

Species recorded:        Total: 11; woody: 5; ground: 7; Avg. spp./site: 6.0; std dev.: 1.0, 2 site(s)

Basal area:                      0

Structural formation: Open-scrub: 50%; closed-scrub: 50%, 2 site(s)

Representative sites: 18433, 18434.

**Stratum: Shrub 1**

Height avg. = 1.4m, range 0.8-2m, 2 sites

Crown cover avg. = 82.2%, range 64.4-100.0%, 2 sites

Dominant species (relative cover, frequency): *Ficus opposita* (78, 100%), *Celtis paniculata* (20, 50%), *Passiflora pallida*\* (18, 50%), *Abrutylon albescens* (6, 50%)

Frequent species (cover, frequency): *Ficus opposita* (70, 100%), *Abrutylon albescens* (5, 50%), *Celtis paniculata* (20, 50%), *Passiflora pallida*\* (14, 50%)

**Stratum: Shrub 2**

Height avg. = 0.8m, 1 site

Crown cover avg. = 50.0%, 1 site

Dominant species (relative cover, frequency): *Cassytha filiformis* (100, 50%)

Frequent species (cover, frequency): *Cassytha filiformis* (50, 50%)

**Stratum: Ground**

Height avg. = 0.4m, range 0.2-0.5m, 2 sites

PFC avg. = 8.6%, range 3-14.2%, 2 sites

Dominant species (relative cover, frequency): *Passiflora pallida*\* (85, 50%), *Commicarpus insularum* (67, 50%), *Sporobolus virginicus* (33, 50%), *Solanum americanum*\* (11, 50%), *Sonchus oleraceus*\* (3, 50%)

Frequent species (cover, frequency): GRAMINOIDS: *Sporobolus virginicus* (1, 50%)

FORBS: *Achyranthes aspera* (50%), *Commicarpus insularum* (2, 50%), *Passiflora pallida*\* (12, 50%), *Solanum americanum*\* (2, 50%), *Sonchus oleraceus*\* (50%), *Tetragonia tetragonoides* (50%)



**RE: 12.2.21d *Ficus opposita* shrubland. Restricted to established cays.**

| <b>BioCondition Attributes</b>  | <b>Benchmark</b> |
|---|------------------|
| Recruitment (%)   | <b>100</b>       |
| Tree canopy cover (%)   | <b>na</b>        |
| Tree subcanopy cover (%)  | <b>na</b>        |
| Native shrub cover (%)  | <b>82</b>        |
| Large eucalypt tree DBH threshold (cm)                                  | <b>na</b>        |
| Number of large eucalypt trees (per ha)                                 | <b>na</b>        |
| Large non-eucalypt tree DBH threshold (cm)                              | <b>na</b>        |
| Number of large non-eucalypt trees (per ha)                             | <b>na</b>        |
| Tree canopy height (m)  | <b>na</b>        |
| Tree subcanopy height (m)   | <b>na</b>        |
| Coarse woody debris (m/ha)  | <b>na</b>        |
| Species richness – trees  | <b>na</b>        |
| Species richness – shrubs   | <b>3</b>         |
| Species richness – grasses  | <b>1</b>         |
| Species richness - forbs and other                                      | <b>2</b>         |
| Ground cover – native perennial grass cover (%)                         | <b>na</b>        |
| Ground cover – organic litter (%)                                       | <b>36</b>        |
| Non-native plant cover (%)  | <b>0</b>         |
| <b>Reliability ranking (* = low reliability; ***** highly reliable)</b> | <b>***</b>       |

Benchmarks developed by the Queensland Herbarium, based on 2 Qld Herbarium QBEIS sites and expert opinion. April, 2022.