DETAILED

FLORA AND VEGETATION

SURVEY

FOR THE

ATLAS PROJECT



Prepared for

Image Resources

by

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EXECUTIVE SUMMARY

Image Resources is proposing to develop their Atlas mineral sands project which is located about 18 km east of Cervantes and 170 km north of Perth. They are seeking approval for the mining project under Part IV of the *Environmental Protection Act 1986* (EP Act).

A flora and vegetation survey was commissioned by Image Resources for the Atlas project in 2019. A single-phase survey of the Atlas project area had been undertaken by 360 Environmental in 2011 (360 Environmental, 2012). The 2019 flora and vegetation survey was undertaken as a second Phase Spring survey to 'top up' the 2011 work and to include such additional works as required to ensure the area was adequately surveyed and that the survey would meet the EPA's Technical Guidance for flora and vegetation surveys (EPA, 2016). Some additional areas were included in the 2019/2020 Atlas mining envelope survey area (MESA) that were not included in the 2011 survey, namely an area south of Wongonderrah Rd and an access corridor between Munbinea Rd and the survey area. In 2021 additional survey work was requested for the Atlas external infrastructure survey area (EISA) for road upgrades and water supplies from proposed bores. The 2019-2021 Atlas survey area ('Atlas survey area' or 'survey area') was 1226.2 ha and included the MESA (1171.8 ha) and the EISA (54.4 ha) (Figure 1).

The survey area lies in the Bassendean Dune System geomorphic element near the northern boundary of the Swan Coastal Plain biogeographic region. A desktop survey found:

- Geomorphic wetlands have been mapped in the MESA that drain west into the Nambung River;
- The Nambung National Park is an Environmentally Sensitive Area (ESA) that lies between 840 m and 3.9 km west of the MESA;
- Nationally Important Wetlands ('Lancelin Defence Training Area. – WA119' wetland system) have been mapped to the south and east of the MESA;
- 'Banksia dominated woodlands of the Swan Coastal Plain' (Priority 3 Priority Ecological Community (PEC)/federal Threatened Ecological Community (TEC) (Endangered) have been mapped across the Atlas survey area;
- The Department of Biodiversity, Conservation and Attractions (DBCA) database searches found that five Threatened taxa and 34 Priority taxa had been previously recorded within the wider locality of the survey area (within about a 10km radius

of the survey area) and ten of those Priority Flora had been recorded in the survey area in the 2011 survey. A table of likelihood of occurrence in the survey area was prepared.

The Atlas 2019-21 flora and vegetation survey work included:

- A phase 2 Spring revisit of the 28 (10 m x 10 m) quadrats from the 2011 survey;
- 33 additional quadrats included in the MESA to ensure, where possible, that at least three quadrats were recorded per vegetation unit; and
- Additional detailed vegetation unit and condition mapping;
- Targeted searches in 2019/20 for flora of conservation significance in the MESA and outside the Atlas survey areas;
- A 'late Autumn' June 2021 revisit of the 61 MESA quadrats to ensure the requirements for supplementary survey were met;
- Single phase Spring survey of the EISA corridors in Spring 2021.

Four hundred and eighty seven (487) native plant taxa and 87 weed taxa were recorded in the survey area, with 422 native plant taxa recorded in the MESA (almost all of them in the southern bushland part of the MESA). This was considered a moderate to high number for the size of the MESA.

Quadrats in *Banksia attenuata-Banksia menziesii* Low Woodlands in the Atlas survey area averaged 56.9 native taxa per quadrat; *Banksia prionotes* vegetation was less species rich, with an average of 42.3 native taxa per quadrat; *Banksia telmatiaea* heaths averaged 32.8 native species per quadrat; and the samphire vegetation units had an average of between 27.0 and 31.0 native species per quadrat.

No Threatened Flora were recorded in the survey area. Twenty three Priority Flora species were recorded in the survey area, with 21 of them recorded in the MESA and 12 in the EISA. These included two Priority 1 taxa; four Priority 2 taxa; twelve Priority 3 taxa and five Priority 4 taxa. Records of all but one of these taxa were made in the 2019 and 2020 surveys. The exception was *Schoenus badius* (Priority 2) which was recorded in 2011 and may have been a misidentification of the very similar taxa *Schoenus pennisetis* (Priority 3), which was recorded at several sites in the 2019/2020 surveys. Five Priority taxa were recorded on the MESA floodplains (including *Grevillea* sp. Cooljarloo (B.J. Keighery 28 B) (Priority 1)); 12 of the Priority taxa were recorded in the

heaths surrounding the floodplains and six (6) were recorded in the *Banksia* woodlands or on the margins of the *Banksia* woodlands and damplands.

Many taxa recorded during the survey were at or near the limits of their ranges: 16 of the Priority Flora taxa and 38 other taxa.

Targeted searches inside the survey area resulted in large numbers of some Priority taxa being recorded, particularly *Grevillea* sp. Cooljarloo (B.J. Keighery 28 B) (P1), *Angianthus micropodioides* (P3), *Babingtonia urbana* (P3), *Conospermum scaposum* (P3), *Isopogon panduratus* subsp. *palustris* (P3), *Stylidium aceratum* (P3) and *Stylidium longitubum* (P4). Some limited targeted searches at a number of locations in the surrounding locality recorded large numbers of the *Grevillea* sp. Cooljarloo (B.J. Keighery 28 B) (P1), *Chordifex reseminans* (P2), *Angianthus micropodioides* (P3), *Babingtonia urbana* (P3), *Desmocladus nodatus* (P3) and *Isopogon panduratus* subsp. *palustris* (P3).

Some targeted searching in the MESA for *Paracaleana dixonii* (T) and *Drakaea elastic* (T) were undertaken in October 2021 in the MESA. The searches were unsuccessful and it was concluded that the habitat and associated vegetation in the MESA was unlikely to be suitable for *Paracaleana dixonii* and that the likelihood of occurrence for *Drakaea elastic* (T) was 'Very Low'. Targeted searches, in the MESA, of the margins of *Banksia attenuata*, *Banksia menziezii* low woodlands around dampland heaths and floodplain heaths, failed to find *Macarthuria keigheryi*. Post survey likelihood of occurrence of some taxa and the effect of the MESA fire history (long unburnt (more than 14 years)) are discussed in the report.

No Weeds of National Significance (WONS) were recorded in the survey area. One leaf Cape Tulip (**Moraea flaccida*), a Declared Pest S22(2), was recorded on farmland in the MESA and at various dampland areas in the EISA corridors, including on the verge at the Nambung River crossing.

A multivariate analysis of the quadrats in the survey area was undertaken and supported the formation of 26 vegetation units used to describe the vegetation in the survey area. Twenty vegetation units were mapped in the MESA and 13 in the EISA. The 26 vegetation units were categorised into four super groups:

- Terrestrial vegetation (*Banksia* Low Woodlands and other);
- Wetland and associated vegetation:
  - Floodplain vegetation;
  - Heaths associated with floodplain and sandplain depressions; and
  - Dampland and drainage line vegetation and associated units.

Two *Banksia* woodland units were described in the survey area: *Banksia attenuata-Banksia menziesii* Low Woodland (grey sands) which occupied the largest area (616 ha (50.2%)) and *Banksia prionotes* Low Woodland (yellow sands). Together they covered 54.3% of the survey area and were mostly in 'Excellent' or better condition.

Two samphire units were described on the floodplain (5.4% of survey area) and included Priority taxa *Angianthus micropodioides* (P3), *Stylidium aceratum* (P3) and *Stylidium longitubum* (P4). A narrow, linear strand of *Melaleuca brevifolia* Open Shrubland vegetation followed the convoluted margins of the floodplain and included most of the *Grevillea* Cooljarloo (B.J. Keighery 28 B) (P1) records in the MESA (recorded in this unit and was also associated with the flowline vegetation). Two vegetation units on the banks of floodplain sumplands were also described.

Heath vegetation surrounded the floodplain, with a *Banksia telmatiaea* heath unit (12.7% of survey area) being the largest of the units. Eleven Priority flora taxa were associated with the heath vegetation.

A number of *Melaleuca* Tall Shrubland units were mapped along Mount Jetty Creek, Bibby Creek and minor flow areas in the MESA and were also mapped in small areas of the EISA corridors (on the Frederick Smith Creek banks and at the Nambung River crossing). *Melaleuca rhaphiophylla*, *Melaleuca teretifolia* Tall Shrublands were recorded at two damplands in the MESA and formed an unusual and species depauperate unit along a spring-fed dampland near the western end of the EISA Nambung Rd corridor.

About 69% of the MESA (about 87% of the bushland part of the MESA) was mapped as 'Excellent' or better condition, including most of the *Banksia attenuata, Banksia menziesii* Low Woodlands and *Banksia prionotes* Low Woodlands and most of the areas

of *Banksia telmatiaea* heaths and other heath units. Weed cover in these areas was generally very low. The *Melaleuca* Tall Shrublands along the minor flowlines on the floodplain had very high weed cover in the grass/herb stratum and were assessed to be in 'Good to Degraded' condition. Large parts of the samphire Low Shrublands on the floodplains were in 'Very Good' to 'Excellent' condition. Their condition declined in areas close to the flow lines. Farmland areas of the MESA and EISA were mostly cleared pasture paddocks and, as assessed for bushland vegetation values, were deemed to be mostly 'Completely Degraded' with some areas 'Degraded to Completely Degraded'.

Regional geomorphic wetland mapping (ENV, 2010) showed six geomorphic wetland types in the survey area:

- Floodplain (largest area);
- Palusplain (very small area);
- Creeks;
- Sumpland (very small area);
- Lake; and
- Damplands.

The degree of coincidence of mapped geomorphic wetland boundaries and mapped vegetation and the assessment of vegetation as 'wetland vegetation' is discussed in the report.

Regional scale mapping of Groundwater Dependant Ecosystems (GDE) in the North Perth Basin showed all of the survey area as potential GDE. An assessment of GDE status was undertaken based on the vegetation types and depth to groundwater, and it was concluded that the entire survey area was potential GDE, including the *Banksia* woodlands area (facultative GDE), the transitional heath area (facultative GDE), the *Melaleuca* shrubland units on the floodplain and damplands (obligate GDE) and the samphire low shrublands. The GDE status of one of the samphire units, *Tecticornia indica* subsp. *bidens* Low Shrublands, is uncertain, but a conservative approach was adopted in assigning it GDE status, given the ground water was mapped to be within 2 to 4 metres of the surface in that area.

In the absence of a suitable regional vegetation dataset that included the northern SCP (and the Atlas survey area), a statistical analysis was undertaken of the Atlas survey area sites against a southern SCP dataset ('Weed and native flora dataset for the Swan Coastal Plain') to see what similarities there may be between vegetation units. PATN cluster analyses using Single Site Insertion (SSI) was followed by some targeted Primer multivariate analyses where further investigation of some similarities was required. Results included:

1. Many of the Atlas sites had little similarity with SCP FCTs, indicated by their clustering with SCP sites at high dissimilarity values and often clustering with SCP sites from a mix of various SCP FCTs. The high dissimilarity index values between the Atlas quadrats and their SCP dataset nearest neighbours suggested substantial differences in floristics between the two datasets.
2. Some *Banksia attenuata*, *B. menziesii* Low Woodland sites ('BaBm') were similar to FCT23b, but most 'BaBm' sites clustered with a mix of SCP FCT sites, namely FCTs 23b, 23a and 28. Site AIQ17 (Bibby Rd verge and close to the SCP boundary with the Geraldton Sandplain bioregion) clustered with one SCP 20c site at moderately high dissimilarity, but with inconsistencies.
3. *Banksia prionotes* Low Woodland sites fused with SCP sites at high dissimilarities (less than 25% similarity).
4. The *Banksia telmatiaea*, *Melaleuca seriata* and *Callitris pyramidalis* dominated heaths on the gentle slopes around the floodplain in the MESA mostly had no notable similarities with southern SCP sites, fusing at high dissimilarities with SCP sites assigned to various FCTs.
5. A number of floodplain sites (including some *Melaleuca brevifolia* shrubland and *Tecticornia indica* subsp. *bidens* low shrubland sites) clustered with FCT7 at mostly high dissimilarities. Further investigation of fourteen select floodplain and related sites showed that these sites, both individually and as a group, formed clusters that were significantly different from the SCP FCT7 sites. Site CNQ18 showed some similarity with SCP FCT7. Site CNQ18 was assigned to a single quadrat vegetation unit 'MrMv' and was in a small patch of *Melaleuca viminea* subsp. *viminea*, (*Melaleuca rhaphiophylla*) Closed Shrubland on the margins of a small claypan. This vegetation unit had limited occurrence in the Atlas survey area.

The *Banksia* woodlands in the survey area (excepting one small area in 'Good' condition) were assessed as 'Banksia woodlands of the Swan Coastal Plain' (Endangered) TEC (federal) (state Priority 3 PEC).

In assessing the significance of flora and vegetation in the survey area, it was noted that the survey area bushland areas lie within vegetation system association 1030, with 69.7% (79,561 ha) of the pre-European extent of this vegetation association that was in the Bassendean System-Perth IBRA sub-region, currently remaining (64% statewide) and 9.7% being protected for conservation. It is noted that the vegetation system associations are very broad vegetation units.

Local significance was assessed for six elements in the survey area:

- Flora rarity (23 Priority flora recorded in the survey area);
- Vegetation diversity (complex of vegetation units associated with the geomorphic wetlands centred around the floodplains);
- Vegetation rarity for the 'Banksia woodlands of the Swan Coastal Plain' TEC (Endangered, Federal)/PEC (Priority 3, State);
- Vegetation rarity for the heaths surrounding the floodplain and growing in a number of 'dampland' depressions on the sand plain (associated with 11 Priority taxa in the survey area);
- Linkage values of survey area vegetation (links Nambung NP bushland to the bushland south of Wongonderrah Rd).
- Functioning geomorphic wetland system of floodplain, palusplain, sumplands and flow channels that drain water from the area to the east and distribute it across a continuation of the floodplains to the west and ultimately to the Nambung River.

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.....

1.0 INTRODUCTION

1.1 Background

Image Resources NL is a mineral sands mining and exploration company. They are currently mining mineral sands at Boonanarring, about 100 km north of Perth. Image Resources also has the Atlas mineral sands project, which is located about 18 km east of Cervantes and 170 km north of Perth. A resource has been measured at the Atlas project and Image Resources is planning to mine the Atlas deposit in the future.

Image Resources is proposing to seek approval for the Atlas Project under Part IV of the *Environmental Protection Act 1986* (EPAct). Image Resources requested Preston Consulting identify and commission ecological studies and surveys that needed to be completed to provide the necessary documents for the environmental impact assessment process.

1.2 Aim of the study

In 2019, following a review of previous environmental surveys that had been undertaken in the Atlas survey area, including a detailed, single phase, flora and vegetation survey undertaken in 2011 by 360 Environmental (2012), Preston Consulting determined that the following flora and vegetation studies and surveys should be undertaken for the bushland areas of the Atlas project:

- A desktop review of previous survey findings;
- 'Top-up' Spring survey to ensure that the Spring survey requirements in the Environmental Protection Authority's (EPA's) Technical Guidance (EPA, 2016) are fully met, including areas additional to that of the 2011 study area;
- Targeted searches for Threatened and/or Priority Flora, both inside the survey area and outside the survey area to provide information on abundance and extent;
- Targeted searches for Threatened and/or Priority Ecological Communities, including provision of relevant boundaries
- Mapping of potential groundwater-dependent vegetation within the survey area.

Subsequently, in 2021, an additional request was made to:

- Undertake a single phase Spring survey of External Infrastructure areas where works would be required to facilitate the proposed mining operation; and
- Undertake an update survey of the northern part of the Atlas project that lies on farmland.

To address the scope of works issued by Preston Consulting and to meet the EPA's Technical Guidance for flora and vegetation surveys (EPA, 2016), and following a review of the 2011 survey work and communication with Department of Biodiversity, Conservation and Attractions (DBCA) officers, the following survey tasks were proposed:

- Record quadrats, where possible, in vegetation units that were not sampled by quadrat in 2011;
- Record additional quadrats in vegetation units, where possible and necessary, to have at least three quadrats per vegetation unit and to sample areas additional to the 2011 study area;
- Ensure all sites were sampled in two phases, including a Spring phase in good season and a supplementary phase after Autumn rains, in accordance with the Technical Guidance (EPA, 2016);
- Record opportunistic flora records to update the species list;
- Edit the updated species list and site descriptions to ensure taxon names and conservation status are current;
- Review the 2011 vegetation unit mapping and vegetation condition mapping and undertake further detailed mapping as required;
- Undertake targeted Threatened and Priority flora searches in the survey area and in suitable areas outside the survey area;
- Undertake a single phase Spring survey of additional External Infrastructure areas;
- Undertake an update survey of the northern part of the Atlas project that is on cleared farmland; and
- Assess the Groundwater Dependent Ecosystem (GDE) status of vegetation units.

The aim of the Atlas flora and vegetation survey was to produce a report that includes the following:

- results of a desktop study of the Atlas survey area and its surrounds;
- an overall flora species list for the Atlas survey area;
- a list of species of conservation significance for the survey area;
- results of targeted searches for selected species of conservation significance, both inside and outside the Atlas survey area;
- a description of the vegetation units in the survey area;
- a vegetation unit map of the Atlas survey area and its surrounds;
- a vegetation condition map for the survey area;

- an assessment of the survey area vegetation for any TECs or PECs;
- a regional assessment of flora and vegetation values in the survey area;
- an assessment and map of GDEs or potential GDEs in the survey area.

1.2 The study area

The Atlas project 2019-2021 flora and vegetation survey areas and the 360 Environmental (2011) study area, are shown in Figure 1. The 2019-2021 Atlas flora and vegetation survey area (hereafter referred to as the 'Atlas survey area' or 'survey area') includes the 'Mine Envelope study area' (MESA) and the 'External Infrastructure study area' (EISA) (Figure 1). The MESA area includes the proposed mine pit and associated operations facilities and coincides with cleared farmland in the northern section and Unallocated Crown Land. The EISA includes proposed corridors for accessing bore water and for road upgrades to facilitate mine operations.

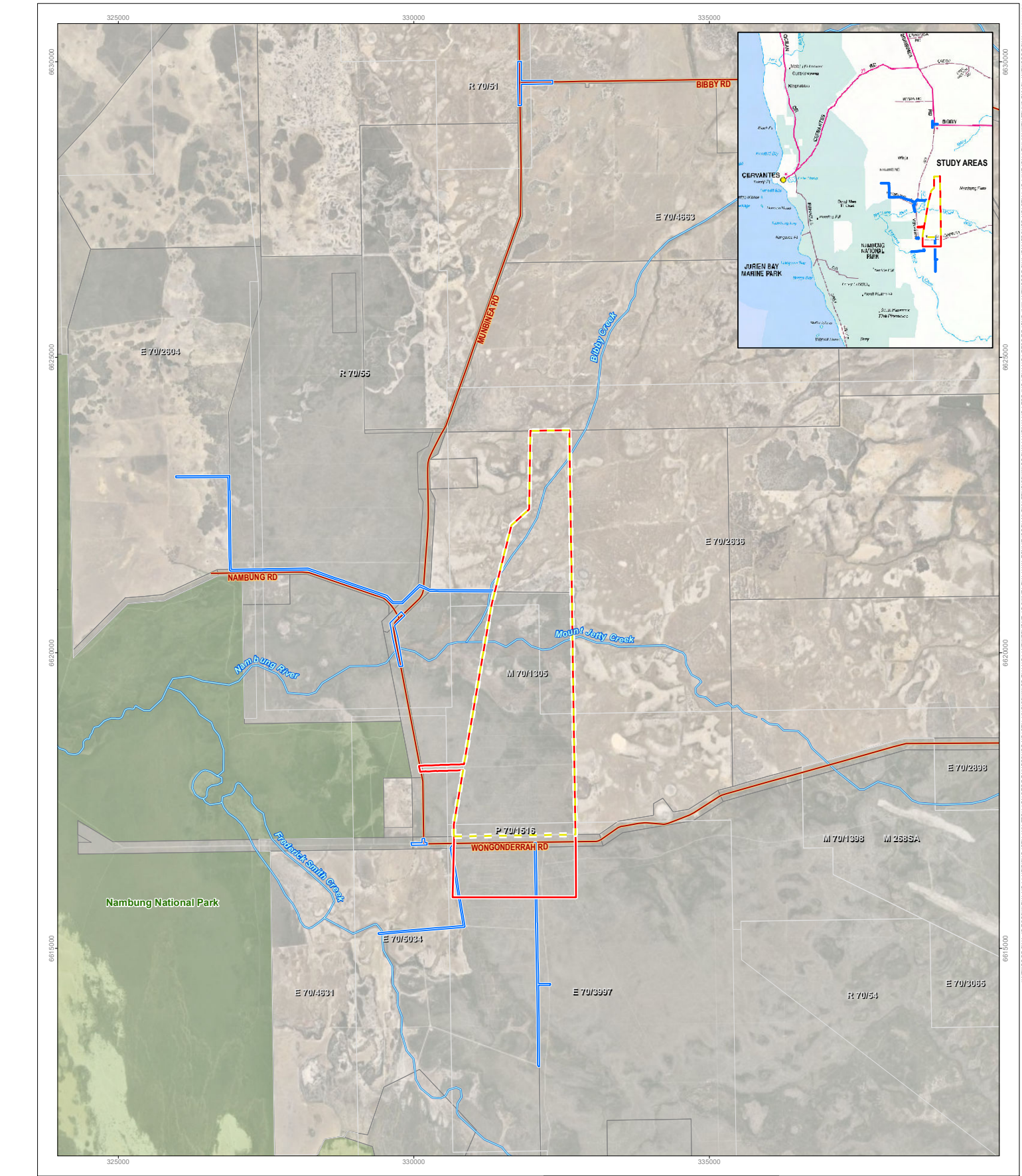
It can be seen from Figure 1 that the Atlas 2019-2021 MESA flora and vegetation study area is very similar to the 2011 study area, but includes the additional areas:

- south of Wongonderrah Rd; and
- corridor linking Munbinea Rd to the mine development envelope area.

The EISA corridors include the:

- Wongonderrah south borefield corridor;
- Nambung Station borefield corridor;
- Nambung Rd borefield corridor;
- Munbinea -Wongonderrah Rd intersection upgrade;
- Nambung River crossing (Munbinea Rd) upgrade; and
- Munbinea -Bibby Rd intersection upgrade.

The Atlas flora and vegetation survey area was 1231 ha in size, comprised of 1172 ha of MESA and 59 ha of EISA.



Legend

- Cadastre
- Tenement
- Nambung National Park
- Road
- Watercourse

Flora and Vegetation Study Areas

- Mine Envelope Study Area
- External Infrastructure Study Area
- 2011 Atlas Study Area

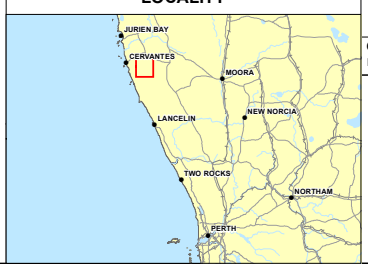
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Figure 1: Locality Map of the Atlas flora and vegetation survey area

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2.0 SITE DESCRIPTION AND BACKGROUND INFORMATION

2.1 Physical environment

2.1.1 Climate

The Swan Coastal Plain, which includes the survey area, has a Mediterranean-type climate with hot, dry summers and mild, wet winters. Average monthly rainfall and average maximum monthly temperatures for Jurien Bay (32 km north-west of the Atlas project area) are shown in Figure 2 and Figure 3 (Australian Bureau of Meteorology website, October 2021).

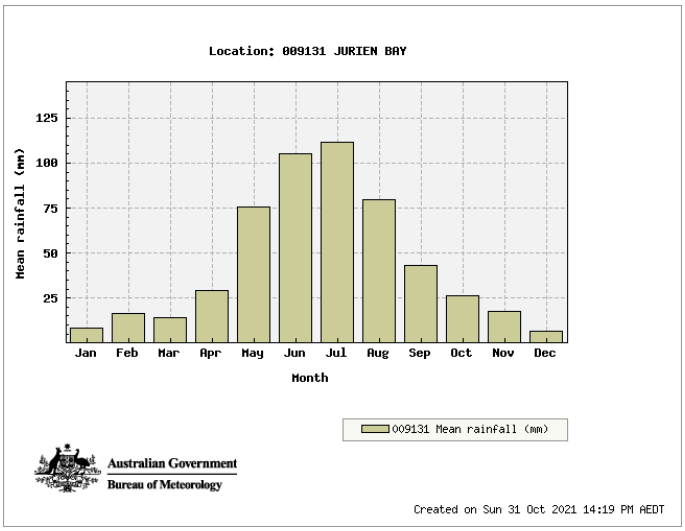


Figure 2: Mean monthly rainfall for Jurien Bay (Australian Bureau of Meteorology website, October 2021).

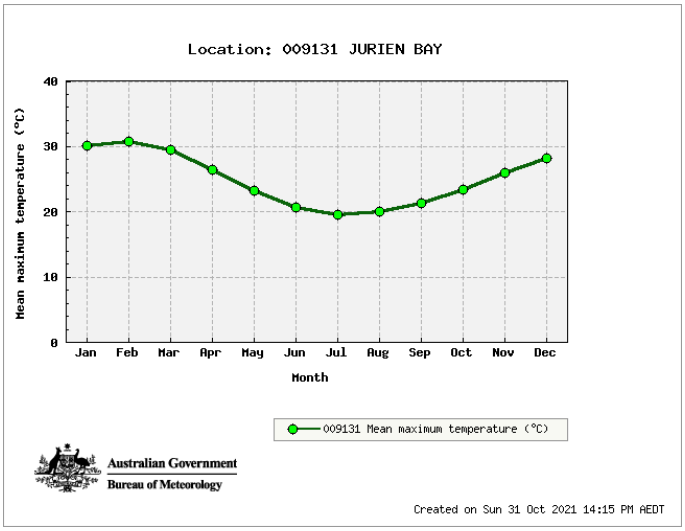


Figure 3: Mean monthly maximum temperature for Jurien Bay (Australian Bureau of Meteorology website, October 2021).

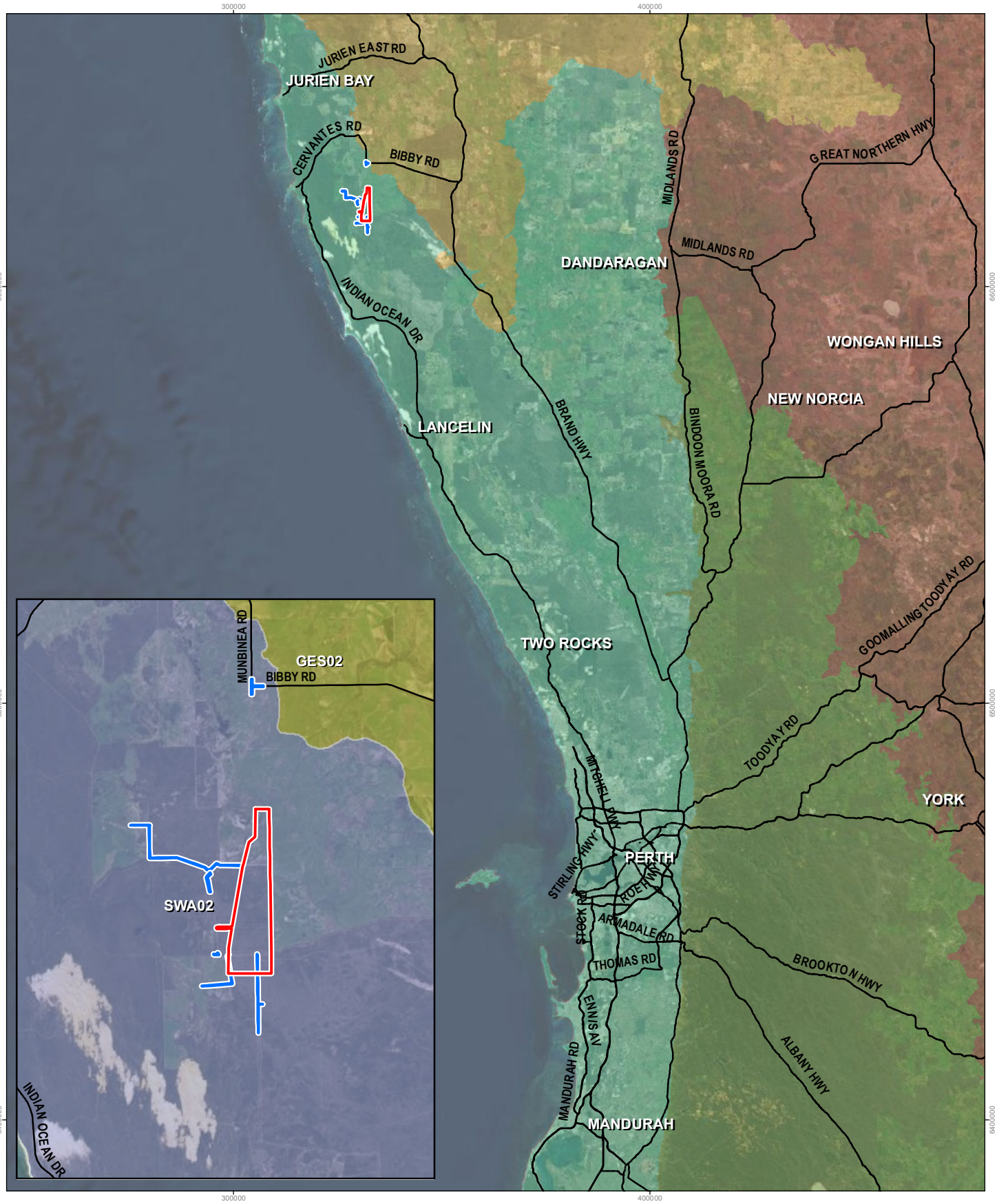
2.12 Geomorphology and soils of the survey area

The Swan Coastal Plain is the biogeographic coastal plain unit that extends from Dunsborough to just north of Jurien Bay, with its inland margin defined by the Gingin Scarp, Dandaragan Scarp and Darling Scarp (Beard, 1981). The Atlas project lies on the Swan Coastal Plain, near its northern most extent (Figure 4).

The Swan Coastal Plain consists of a series of geomorphological elements which are sub-parallel to the present coastline (McArthur and Bettenay, 1960; Churchward and McArthur, 1980). Each of these geomorphic elements has distinctive geology, vegetation, topography, and soils. Lowry (1974) mapped two physiographic units on the coastal plain in the Cervantes region: the westward Coastal Belt that consists of Quaternary dune systems (Quindalup Dune System and Spearwood Dune System) and the eastward Bassendean Dune System.

The Atlas survey area lies on the Bassendean Dune System (Lowry, 1974). The Bassendean Dune System is composed of leached quartz sand and consists of low dunes with numerous inter-dunal swamps (Lowry, 1974; Beard, 1979). It takes the form of a flat plain 'behind' the Coastal Belt, about 60 to 100 metres above sea level, sloping gently seaward and drained by small seasonal streams which generally terminate into large swamps or lakes near the coast or, in the case of Nambung River, drains into caves beneath the coastal limestone (Beard, 1979).

The soils of the survey area are shown in Figure 5, with the soils in the southern half of the survey area being mostly the leached quartz sands of the Bassendean Dune System ('Qe') and the soils in the northern area being mostly alluvium ('Qa'), with several discrete 'swamp deposits' of clayey soils ('Qp'). The western end of the EISA Nambung Rd corridor passes through sections of and finishes in Tamala Limestone formation soils (Figure 5).



Flora and Vegetation Study Areas

- Mine Envelope Study Area
- External Infrastructure Study Area

IBRA V7 Regions

- AVW: Avon Wheatbelt
- GES: Geraldton Sandplains
- JAF: Jarrah Forest
- SWA: Swan Coastal Plain

IBRA V7 Subregions

- GES02: Lesueur Sandplain
- SWA02: Perth

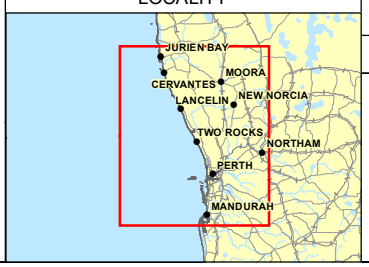
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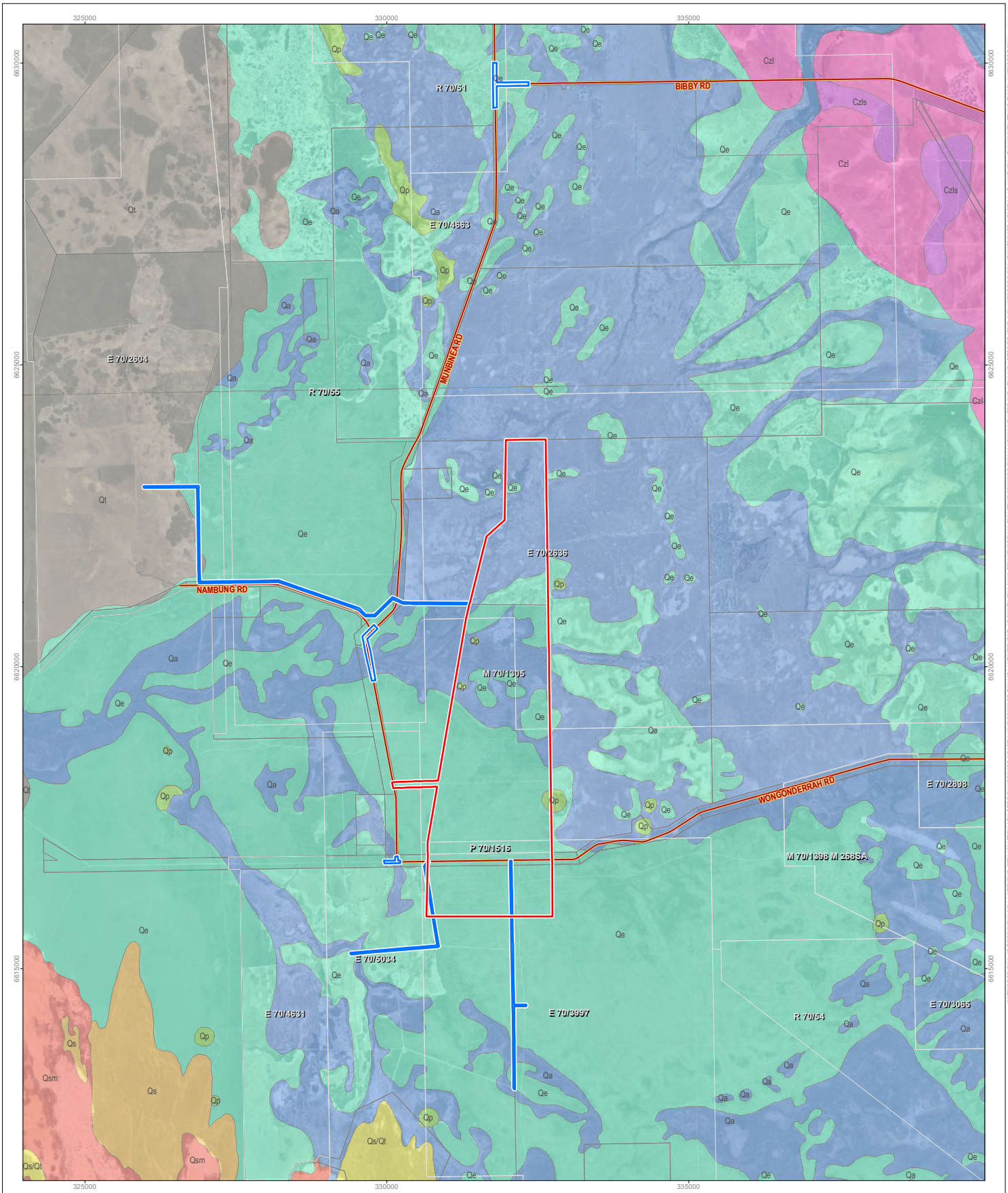
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Figure 4: The Swan Coastal Plain bioeograohical Sub-regions (IBRA 7)

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Legend

Flora and Vegetation Study Areas

- Mine Envelope Study Area
- External Infrastructure Study Area
- Cadastre
- Tenement
- Road

Geology

- Czl: Ferruginous laterite
- Czls: Leached quartz sand associated with laterite
- Qa: Alluvium-sand, silt, and clay
- Qe: Non-calcareous sand reworked by eolian processes
- Qp: Swamp and lacustrine deposits-clay, silt, and diatomite
- Qs/Qt: Eolian dunes-calcareous and quartz sand
- Qs: Eolian dunes-calcareous and quartz sand
- Qsm: Mobile eolian dunes
- Qt: TAMALA LIMESTONE: eolian limestone and sandstone with secondary concretionary and residual calcareous deposits and quartz sand

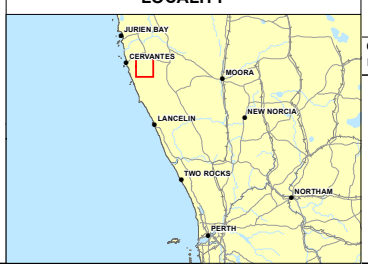
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Figure 5: Surface Geology of the Atlas survey area

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2.2 Vegetation

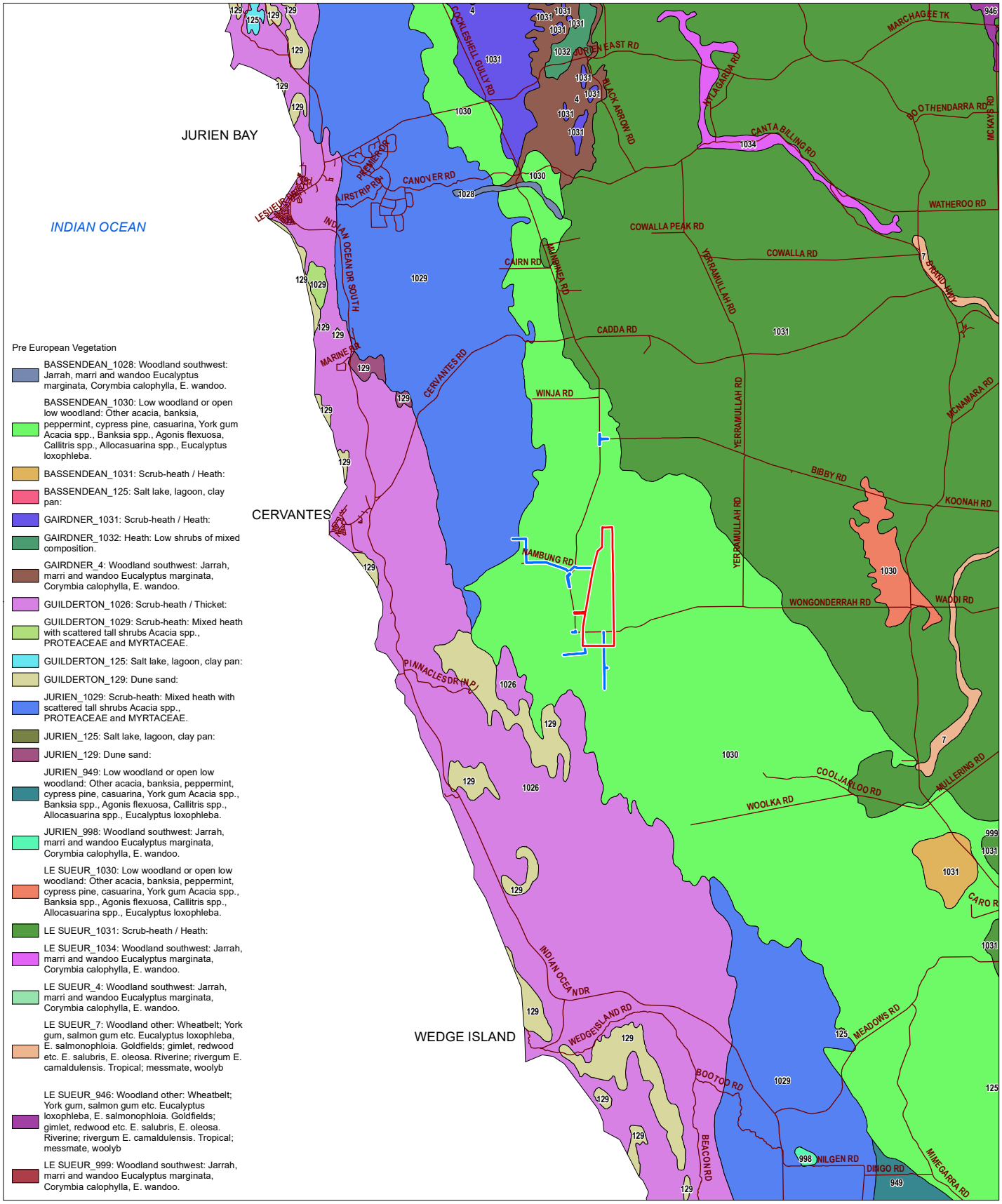
2.2.1 Regional vegetation

Beard defined boundaries for botanical provinces, districts and subdistricts for Western Australia. In this framework, the survey area lies near the northern boundary of the Drummond Botanical Sub-District (more or less equivalent to the Swan Coastal Plain and part of the Dandaragan Plateau) in the Darling Botanical District of the South West Botanical Province of Western Australia (Beard, 1981).

Beard produced 1:250,000 maps of the vegetation of Western Australia, which were compiled to form seven maps at 1:1,000,000 covering Western Australia (Beard *et al*., 2013). The MESA survey area lies within an area of the Drummond Botanical Sub-District mapped as "*Banksia attenuata*, *Banksia menziezii* low woodland on coastal plain white sand" with "numerous patches of heath in swamps" (Beard, 1979). Beard noted that the "heath of the swampy patches varies locally", with abundant taxa including *Banksia sphaerocarpa*, *Calytrix aurea*, *Calytrix flavescens*, *Verticordia densiflora* and *Verticordia drummondii*, with *Frankenia* and samphire occurring in salty patches, and the whole forming a 'mosaic requiring further study'.

The Beard 1:250,000 vegetation mapping has been digitized and Beard's vegetation associations updated into vegetation system associations (Shepherd *et al*., 2002; Beard *et al*., 2013). Almost all of the Atlas survey area is located in the vegetation system association unit 'Bassendean 1030: Low woodland or open low woodland' (Figure 6). The western most end of the EISA Nambung Rd corridor falls into vegetation system association unit 'Jurien 1029: Scrub heath – mixed heath with scattered tall shrubs *Acacia* spp.'.

An Interim Biogeographic Representation of Australia (IBRA) has been developed, that categorizes the Australian continent into regions of like geology, landform, vegetation, fauna and climate (Thackway and Cresswell, 1995). The Western Australian IBRA region boundaries were largely based on Beard's Botanical District boundaries (Beard *et al*., 2013). The Atlas survey area lies in the very northern part of the IBRA Swan Coastal Plain biogeographic region and the Perth biogeographic subregion, near the southern boundary of the Geraldton Sandplains biogeographic region (Lesueur Sandplain biogeographic subregion) (IBRA V7; DEE, 2012) (Figure 4).



Pre European Vegetation

- BASSENDEAN_1028: Woodland southwest: Jarrah, marri and wandoo Eucalyptus marginata, Corymbia calophylla, E. wandoo.
- BASSENDEAN_1030: Low woodland or open low woodland: Other acacia, banksia, peppermint, cypress pine, casuarina, York gum Acacia spp., Banksia spp., Agonis flexuosa, Callitris spp., Allocasuarina spp., Eucalyptus loxophleba.
- BASSENDEAN_1031: Scrub-heath / Heath:
- BASSENDEAN_125: Salt lake, lagoon, clay pan:
- GAIRDNER_1031: Scrub-heath / Heath:
- GAIRDNER_1032: Heath: Low shrubs of mixed composition.
- GAIRDNER_4: Woodland southwest: Jarrah, marri and wandoo Eucalyptus marginata, Corymbia calophylla, E. wandoo.
- GUILDERTON_1026: Scrub-heath / Thicket:
- GUILDERTON_1029: Scrub-heath: Mixed heath with scattered tall shrubs Acacia spp., PROTEACEAE and MYRTACEAE.
- GUILDERTON_125: Salt lake, lagoon, clay pan:
- GUILDERTON_129: Dune sand:
- JURIEN_1029: Scrub-heath: Mixed heath with scattered tall shrubs Acacia spp., PROTEACEAE and MYRTACEAE.
- JURIEN_125: Salt lake, lagoon, clay pan:
- JURIEN_129: Dune sand:
- JURIEN_949: Low woodland or open low woodland: Other acacia, banksia, peppermint, cypress pine, casuarina, York gum Acacia spp., Banksia spp., Agonis flexuosa, Callitris spp., Allocasuarina spp., Eucalyptus loxophleba.
- JURIEN_998: Woodland southwest: Jarrah, marri and wandoo Eucalyptus marginata, Corymbia calophylla, E. wandoo.
- LE SUEUR_1030: Low woodland or open low woodland: Other acacia, banksia, peppermint, cypress pine, casuarina, York gum Acacia spp., Banksia spp., Agonis flexuosa, Callitris spp., Allocasuarina spp., Eucalyptus loxophleba.
- LE SUEUR_1031: Scrub-heath / Heath:
- LE SUEUR_1034: Woodland southwest: Jarrah, marri and wandoo Eucalyptus marginata, Corymbia calophylla, E. wandoo.
- LE SUEUR_4: Woodland southwest: Jarrah, marri and wandoo Eucalyptus marginata, Corymbia calophylla, E. wandoo.
- LE SUEUR_7: Woodland other: Wheatbelt; York gum, salmon gum etc. Eucalyptus loxophleba, E. salmonophloia. Goldfields; gimlet, redwood etc. E. salubris, E. oleosa. Riverine; rivergum E. camaldulensis. Tropical; messmate, woolyb
- LE SUEUR_946: Woodland other: Wheatbelt; York gum, salmon gum etc. Eucalyptus loxophleba, E. salmonophloia. Goldfields; gimlet, redwood etc. E. salubris, E. oleosa. Riverine; rivergum E. camaldulensis. Tropical; messmate, woolyb
- LE SUEUR_999: Woodland southwest: Jarrah, marri and wandoo Eucalyptus marginata, Corymbia calophylla, E. wandoo.

Legend

Flora and Vegetation Study Areas

- Mine Envelope Study Area
- External Infrastructure Study Area

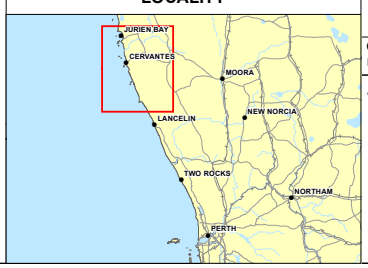
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Figure 6:
Vegetation System Associations

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Some detailed flora and vegetation surveys have been undertaken in the same region or locality as the Atlas project. Griffin and Keighery (1989) undertook a survey of the northern coastal plain between Moore River and Jurien Bay. They included the data from 93 quadrats in their report and sampled *Banksia* woodlands, 'wet heaths', sand heaths and laterite heaths. In another study, Elkington (1986) described vegetation at Cooljarloo as low woodland and heath formations, with vegetation associations including 'wetland heath' and *Hakea obliqua* scrub heath. Wege *et al*. (1993) reviewed this work. Woodman Environmental Consulting (2014) compiled a report from flora and vegetation surveys over a large area from Cooljarloo to Wongonderrah Rd in the north and to Nambung station in the west. The surveys recorded 1063 native taxa and sampled and analysed data from 370 quadrats and described 18 broad vegetation types. Syrinx Environmental (2013) studied and assessed wetlands, watercourses, and groundwater dependent ecosystems at Cooljarloo. More recently, Mattiske Consulting (2017) undertook targeted searches of a select group of flora of conservation significance.

The broad vegetation mapping and vegetation floristic surveys by Heddle *et al* (1980) and Gibson *et al*. (1994) were undertaken on the southern part of the Swan Coastal Plain (SCP) and their study areas did not extend as far north as the Atlas survey area. The Gibson *et al*. (1994) study area extended from Dunsborough as far north as Seabird. An expanded dataset for the SCP, the 'weed and native flora for the SCP' dataset ('Naturemap', DBCA website), includes the Gibson *et al*. 1994 dataset and additional sites from as far north as the Moore River (about 50 km south of the Atlas survey area) (Keighery, B. *et al*, 2012).

2.2.2 Threatened Ecological Communities (TECs) and Priority Ecological Communities (PECs)

2.2.2.1 State

An ecological community is a naturally occurring group of plants, animals and other organisms interacting in a unique habitat (DBCA, 2021a). The *Biodiversity Conservation Act 2016* provides for the statutory listing of threatened ecological communities (TECs) as Critically Endangered, Endangered, Vulnerable and 'Collapsed' (destroyed).

DBCA also maintains a Priority Ecological Community (PEC) List, which includes 'possible threatened ecological communities that do not meet survey criteria or that are not adequately defined' (DBCA, 2021a). PECs are added to the list under Priorities 1, 2 and 3. Priority 4 status is given to "Ecological Communities that are

adequately known and are rare, but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list" (DBCA, 2021a).

2.2.2.2 Commonwealth

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places—defined in the EPBC Act as Matters of National Environmental Significance (NES).

The nine Matters of NES to which the EPBC Act applies includes nationally Threatened species and TECs. The EPBC Act's Matters of NES includes a list of TECs (although they are not always consistent with DBCA's TECs), but does not include a listing of 'PECs'.

2.2.2.3 Database search results

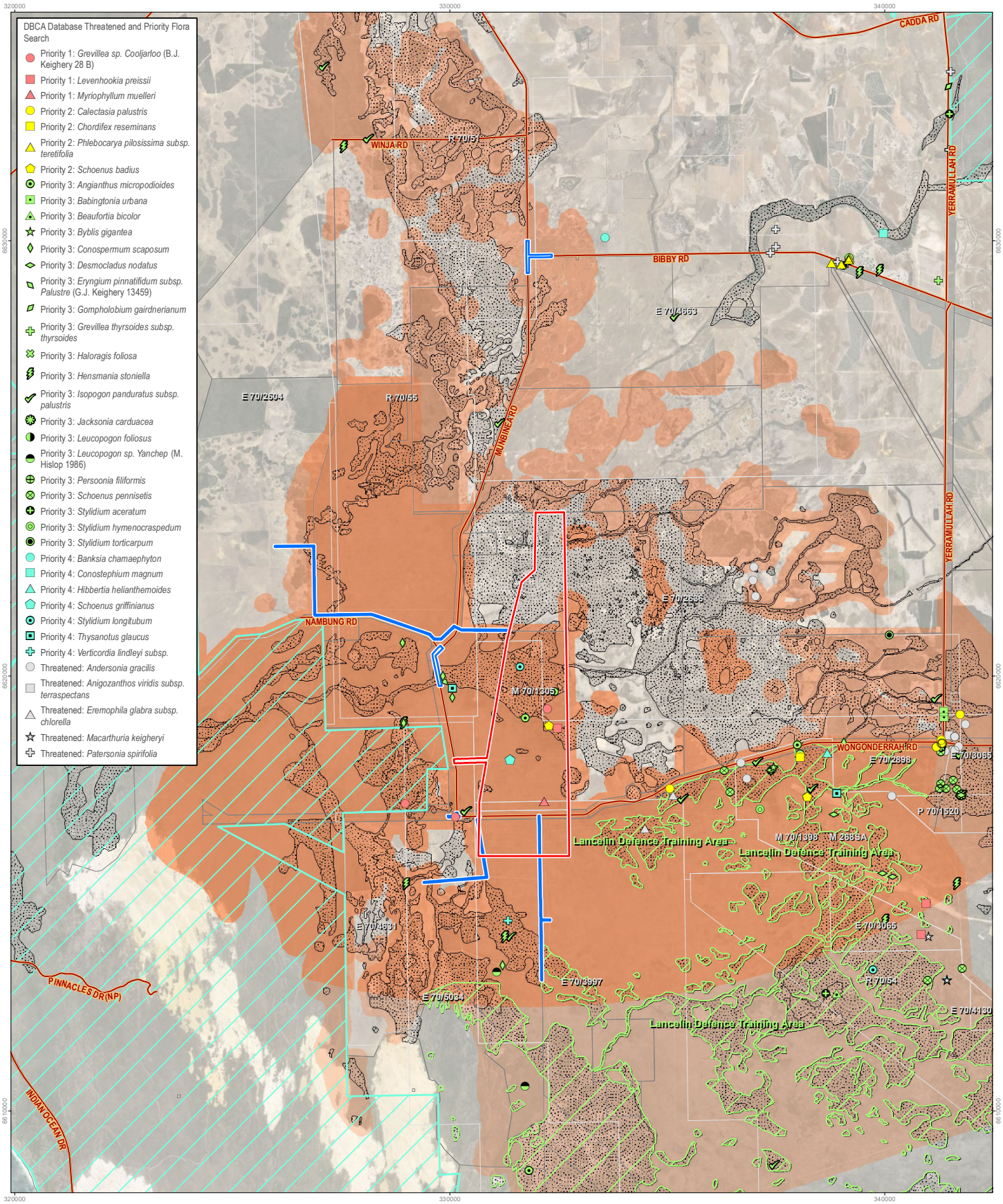
A search for TECs listed Federally under the EPBC Act using the Protected Matters search tool and about 10km buffer around the MESA, found two Federally listed TECs (Appendix 1). They were:

- 'Banksia Woodlands of the Swan Coastal Plain ecological community' (Federal TEC (Endangered); Western Australian State Government PEC (Priority 3)).
- 'Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain ecological community' (Federal TEC (Critically Endangered); Western Australian State Government PEC (Priority 3)).

A search of the DBCA TEC/PEC database in October 2019 found one PEC mapped in the survey area and its surrounds:

- 'Banksia dominated woodlands of the Swan Coastal Plain IBRA region' (State Priority 3; also federal TEC (Endangered), see above).

Figure 7 shows the area mapped as '*Banksia* Woodlands of the Swan Coastal Plain ecological community' in the survey area locality.


DBCA Database Threatened and Priority Flora Search
Priority 1: Grevillea sp. Cooljarloo (B.J. Keighery 28 B)
Priority 1: Levenhookia preissii
Priority 1: Myriophyllum muelleri
Priority 2: Calectasia palustris
Priority 2: Chordifex reseminans
Priority 2: Phlebocarya pilosissima subsp. teretifolia
Priority 2: Schoenus badius
Priority 3: Angianthus micropodioides
Priority 3: Babingtonia urbana
Priority 3: Beaufortia bicolor
Priority 3: Byblis gigantea
Priority 3: Conospermum scaposum
Priority 3: Desmocladus nodatus
Priority 3: Eryngium pinnatifidum subsp. Palustre (G.J. Keighery 13459)
Priority 3: Gompholobium gairdnerianum
Priority 3: Grevillea thyrsoides subsp. thyrsoides
Priority 3: Haloragis foliosa
Priority 3: Hensmania stoniella
Priority 3: Isopogon panduratus subsp. palustris
Priority 3: Jacksonia carduacea
Priority 3: Leucopogon foliosus
Priority 3: Leucopogon sp. Yanchep (M. Hislop 1986)
Priority 3: Persoonia filiformis
Priority 3: Schoenus pennisetis
Priority 3: Stylidium aceratum
Priority 3: Stylidium hymenocraspedum
Priority 3: Stylidium torticarpum
Priority 4: Banksia chamaephyton
Priority 4: Conostephium magnum
Priority 4: Hibbertia helianthemoides
Priority 4: Schoenus griffinianus
Priority 4: Stylidium longitubum
Priority 4: Thysanotus glaucus
Priority 4: Verticordia lindleyi subsp.
Threatened: Andersonia gracilis
Threatened: Anigozanthos viridis subsp. terraspectans
Threatened: Eremophila glabra subsp. chlorella
Threatened: Macarthuria keigheryi
Threatened: Patersonia spirifolia
320000
330000
340000
6630000
6620000
6610000
CADDA RD
WINJA RD
R 70/51
YERRAMULLAH RD
BIBBY RD
E 70/4663
E 70/2504
R 70/55
NAMBUNG RD
E 70/2595
M 70/1305
WONGONDERRAH RD
E 70/2898
E 70/3065
P 70/1320
M 70/1398
M 266SA
Lancelin Defence Training Area
E 70/4931
E 70/3065
E 70/3997
R 70/54
E 70/5034
E 70/4130
PINNACLES DR (NP)
INDIAN OCEAN DR
Legend
Flora and Vegetation Study Areas
Mine Envelope Study Area
External Infrastructure Study Area
Cadastre
Tenement
Environmentally Sensitive Area
Nationally Important Wetlands
Geomorphic Wetland
Threatened and Priority Ecological Communities
Priority 3, Endangered, Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region
Source: Orthophoto - Open Source Imagery
TEC/PEC/FLORA - DBCA, 2021
0 1 2 4
km
N
Scale: 1:85,000 @ A3
- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
LOCALITY
JURIEN BAY
CERVANTES
MOORA
LANCELIN
NEW NORCIA
TWO ROCKS
NORTHAM
PERTH
ENVIRONMAPS t: 0406 590 006
Environmental Mapping Solutions | www.environmaps.com.au
Preston Consulting
CREATED BY: ENVIRONMAPS
JOB: ATLAS INFRA
DATE: 8/11/2021
REVISION: 0
Figure 7:
ESAs, Wetlands and DBCA Database Records of Threatened and Priority Flora and TECs/PECs in the Atlas Project Survey Area Locality
C:\GIS\Jobs\Brian Morgan\Atlas Infrastructure\Figures\AtlasInfra_F07 ESAs Wetlands and DBCA database records of Threatened and Priority flora and TECs-PECs in the Atlas Proj Area Locality_211108.mxd
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2.3 Flora

2.3.1 Past records of flora of conservation significance

The results of a search of Threatened species listed under the Australian Government's EPBC Act using the online 'protected matters search tool' are shown in Table 1. Fourteen threatened taxa were identified from the search.

A search of the DBCA's databases for Threatened and Priority flora (TPFL and WA Herb databases) (10 km radius search centred around Atlas MESA) was undertaken in October 2019, but was updated by a second database search in 2021 (search area as per Figure 5 coverage, covering area to north of Bibby Rd). The search found five Threatened taxa and 34 Priority taxa had been previously recorded in the wider locality of the survey area (Table 1; Figure 7). Ten of these Priority Flora had been recorded in the survey area in the 2011 Atlas survey (360 Environmental, 2012)).

Table 1 assigns a likelihood rating to each listed taxa, using a rating classification shown in Table 2.

2.3.2 Flora of conservation significance recorded in other studies in the locality

Woodman Environmental Consulting (2014) conducted a survey west of Cooljarloo, which covered an area as far north as Wongonderrah Rd and recorded 1063 native taxa, including 23 taxa of Conservation Significance. This total, combined with historical records, produced a total of 67 taxa of Conservation Significance for that area. These included four Threatened species: *Andersonia gracilis*, *Anigozanthos viridis* subsp. *terraspectans*, *Macarthuria keigheryi* and *Paracaleana dixonii*.

Following the Woodman Environmental survey, Mattiske Consulting (2017) undertook additional targeted surveys of eleven taxa in the Cooljarloo area.

Table 1: Likelihood of-Occurrence Table for Threatened and Priority Flora previously recorded in the Atlas survey area locality (from DBCA database searches, October 2019) and for the Protected Matters search results of federally listed Threatened flora (EPBC Act).

Taxon	Status of database records[a]		Likelihood of Occurrence in survey area[b]	Comments (Taxon information sourced from DBCA Florabase, 2021, unless otherwise referenced)
	DEC data	EPBC data		
Anigozanthos viridis subsp. *terraspectans*	T	T (V)	Moderate, (Moderate to High)?	Rhizomatous, perennial, herb, 5 to 20 cm high. Fl. Aug to Sep. Grey sand, clay loam. Winter-wet depressions. Recorded at Cooljarloo.
Banksia catoglypta		T (V)	Low	Shrub to 1 metre; found on lateritic breakaways. Habitat not in survey area. Nearest record about 30 km north of Bibby Rd.
Hakea megalosperma		T (V)	Low	Shrub 1-2 m high. Grey sand, loam. Lateritic hills & rocks. Habitat not in survey area.
Andersonia gracilis	T	T (E)	Moderate to High	Small erect, straggly shrub to 10 to 50 cm. Flowers Sep to Nov. Recorded on white/grey sand, sandy clay, gravelly loam in winter-wet areas, near swamps.
Drakaea elastica		T (E)	Low	Tuberous, perennial, herb. Flowers Oct to Nov. Grows in white or grey sand in *Banksia* woodland; low-lying situations adjoining winter-wet swamps (Brown *et. al*., 2013). Most northerly record was south of Cataby. Mostly south of Perth.
Eremophila glabra subsp. chlorella	T		Moderate	Prostrate & spreading shrub, 0.2-1 m high. Flowers Jul to Nov. Sandy clay. Winter-wet depressions.
Eucalyptus x impensa		T (E)	Very low	Straggly mallee, to 1.5 m high, bark smooth. Fl. pink, Jun to Jul. Yellow sand. Lateritic hills. Geraldton Sand Plain. Soils not in survey area. Recorded in different bioregion.
Eucalyptus leprophloia		T (E)	Low	Mallee, 2-5(-8) m high. Flowers Aug to Oct. White or grey sand over laterite. Valley slopes. Found on Lesueur Sand Plain, GSP.
Eucalyptus x balanites		T (E)	Low	Mallee to 5 m high. Flowers Oct to Dec or Jan to Feb. Sandy soils with lateritic gravel. Geraldton Sand Plain. Soils not in survey area.
Grevillea batrachioides		T (E)	Very low	Shrub, 0.5-1.5 m high. Fl. Oct. Sandy loam. Sandstone outcrops. Geraldton Sand Plain. Soils/rock type not in survey area.

Taxon	Status of database records[a]		Likelihood of Occurrence in survey area[b]	Comments (Taxon information sourced from DBCA Florabase, 2021, unless otherwise referenced)
	DEC data	EPBC data		
Hemiandra gardneri		T (E)	Low	Prostrate, pungent shrub, 0.1-0.2 m high, to 1 m wide. Fl. Aug to Oct. Grey or yellow sand, clayey sand. Sandplains. Geraldton Sand Plain, Avon wheatbelt.
Macarthuria keigheryi	T	T (E)	Moderate, (Moderate to High)?	Erect or spreading perennial, herb or shrub, 20 to 40 cm high. Flowers Sep to Dec or Feb to Mar. White or grey sand. Found in low-lying, winter-wet dampland areas; margins of *Banksia* woodlands on Bassendean sands on low plains (B Keighery, *pers. comm*.). Responds to fire and less abundant in long-unburnt areas. Difficult to find. Previously recorded in Cooljarloo area (Woodman Environmental Consultancy, 2014).
Paracaleana dixonii		T (E)	Low to moderate	Tuberous, perennial. Fl. Oct to Dec or Jan. Grey sand over granite. Southern end of range, but has been recorded between Moore River and Dongara (Brown *et. al*., 2013). Recorded at Cooljarloo, near Brand Hwy (Mattiske, 2017). Sandplain Duck Orchid grows in deep sand in open areas beneath dense, tall shrubs with scattered *Banksia*'s, or in heathland in shallow sand over laterite.
Patersonia spirifolia	T	T (E)	Low	Spreading, woody, tussock-forming rhizomatous, herb, to 0.3 m high, to 0.4 m across. Sand over laterite. Lateritic soils (G. Keighery, *pers. comm*.).
Thelymitra stellata		T (E)	Low	Tuberous, perennial, herb. Fl. Oct to Nov. Sand, gravel, lateritic loam. Favoured habitat is lateritic loams of Jarrah forest near Perth and heath on rocky low hills further north (Brown *et al*., 2008)
Grevillea subsp. Cooljarloo (B.J. Keighery 28 B)	Priority 1		Recorded in survey area (2011)	Low shrub growing to 60cm. Found in *Melaleuca* shrublands along flow areas.
Levenhookia preissii	Priority 1		Recorded (2011)	Annual herb to 17cm. Fls Sep to Dec or Jan. Peaty sand. Swamps.
Myriophyllum muelleri	Priority 1		High	Aquatic annual, herb; stems to 60cm. found in lagoons. Shown as occurring in the survey area.

Taxon	Status of database records[a]		Likelihood of Occurrence in survey area[b]	Comments (Taxon information sourced from DBCA Florabase, 2021, unless otherwise referenced)
	DEC data	EPBC data		
Calectasia palustris	Priority 2		High	Stilt-rooted herb to 0.7 m high. Fls Jul to Oct. White or grey sand. Seasonally inundated swamplands (DBCA FloraBase, October 2021).
Chordifex reseminans	Priority 2		High	Grows to 30cm; found in dampland heaths. Recorded south of Wongonderrah Rd (Woodman Environmental, 2014)
Phlebocarya pilosissima subsp. teretifolia	Priority 2		Moderate	Herb to 40 cm. White or grey sand. (DBCA FloraBase, October 2021). Most records from Geraldton sand plain (DBCA FloraBase, October 2021).
Schoenus badius	Priority 2		?Recorded (2011)	Slender annual, grass-like, to 12 cm high. Fl. brown-green, Sep to Oct. Grey sand. Moist areas. Previously known only from Morseby Rge (north of Geraldton) and near Dongara ((Rye, 1997).
Angianthus micropodioides	Priority 3		Recorded (2011)	Erect small annual herb, 3 to 15 cm high. Fl. Yellow, Nov to Dec or Jan to Feb. Grows in saline sandy soils. River edges, saline depressions, claypans.
Babingtonia urbana	Priority 3		High	Shrub to 70cm. Occurs between Badgingarra and Mundijong and associated with wetlands on the SCP. Recorded near the Atlas survey area. (Rye, 2015).
Beaufortia bicolor	Priority 3		Moderate	Dense shrub, 0.3-1 m high. Fl. Nov to Dec. White sand over laterite. Sandplains.
Biblis gigantea	Priority 3		Moderate	Small, branched perennial, herb (or sub-shrub), to 0.45 m high. Fl. Sep to Dec or Jan. Sandy-peat swamps. Seasonally wet areas. Recorded at Cooljarloo.
Conospermum scaposum	Priority 3		Recorded (2011)	Erect shrub to 60cm high. Fl. blue, Oct to Dec or Jan to Feb. White-grey sand, sandy clay. Low swampy areas.
Desmocladus nodatus	Priority 3		Recorded (2011)	Grass like sedge that grows to about 20cm. Grows in dampland heath.
Eryngium pinnatifidum subsp. Palustre (G. J. Keighery 13459)	Priority 3		High	Grows to 40 cm in dampland areas. Recorded in locality.
Gompholobium gairdnerianum	Priority 3		Low	Prostrate,spreading or scrambling, spindly shrub, (broom-like). Flowers Sept to Nov. Occurs on GSP.

Taxon	Status of database records[a]		Likelihood of Occurrence in survey area[b]	Comments (Taxon information sourced from DBCA Florabase, 2021, unless otherwise referenced)
	DEC data	EPBC data		
Grevillea thyursoides subsp. thyrsoides	Priority 3		Low	Spreading shrub, to 70cm high. Flowers Feb or Aug to Sep. Sand or sandy lateritic gravel (DBCA FloraBase, October 2021). Occurs east of Atlas on Lesueur SP.
Haloragis foliosa	Priority 3		Low	Perennial, herb, 0.2-0.5 m high. White/grey sand over limestone. Occurs north from Jurien Bay.
Hensmania stoniella	Priority 3		Recorded (2011)	Tufted, stilt-rooted perennial herb to 20cm high. Fl. yellow-cream-white, Sep to Nov. White, grey or lateritic sand, often winter-wet.
Isopogon panduratus subsp. *palustris*	Priority 3		Recorded (2011)	Erect shrub to 150cm. Recorded in dampland heaths.
Jacksonia carduacea	Priority 3		Moderate to High	Bushy shrub to 50 cm high. Flowers Aug to Dec. Grey sand, sandy clay.
Leucopogon foliosus	Priority 3		Low	(Formerly L. sp. Cataby ()). Low spreading shrub to 40cm. Found in GSP on lateritic uplands on shallow gravelly soils over laterite (Hislop, 2016).
Leucopogon sp. Yanchep (M. Hislop 1986)	Priority 3		High	Erect shrub, to 60 cm wide. Fl. white/pink, Apr to Jun or Sep. Light grey-yellow sand, brown loam, limestone, laterite, granite. Coastal plain, breakaways, valley slopes, low hills. Occurs in locality.
Persoonia filiformis	Priority 3		Low	Erect, spreading, shrub to 0.4 m high. Flowers Nov to Dec. Yellow or white sand over laterite. Occurs GSP.
Schoenus pennisetis	Priority 3		Moderate to high	Tufted annual, grass-like or herb (sedge), 5 to 15cm high. Fl. purple-black, Aug to Sep. Grey or peaty sand, sandy clay. Swamps, winter-wet depressions.
Stylidium aceratum	Priority 3		Recorded (2011)	Annual herb, to 10 cm high, leaves spathulate. Fl. pink/white, Oct to Nov. Sandy soils. Swamp heathland.
Stylidium hymenocraspedum	Priority 3		Moderate	Rosetted perennial, herb, 20 to 60 cm high. Leaves adpressed Fl. yellow, Sep to Oct. Sand over laterite. Hillslopes. Heath, Banksia, and Eucalyptus low open woodland. Recorded at Cooljarloo
Stylidium torticarpum	Priority		Low	Fl. pink, Sep to Nov. Sandy clay and clay loam over laterite. Adjacent to

Taxon	Status of database records[a]		Likelihood of Occurrence in survey area[b]	Comments (Taxon information sourced from DBCA Florabase, 2021, unless otherwise referenced)
	DEC data	EPBC data		
	3			creeklines, depressions, and beneath breakaways. Heath or mallee shrubland Sandy soils in survey area.
Banksia chamaephyton	Priority 4		Low	Prostrate shrub, to 0.4 m high. Flowers Oct to Dec. Grey or white sand over laterite. Found in GSP and SCP south of Moore River.
Conostephium magnum	Priority 4		Low	Erect shrub to 2m. White grey sands; sand dunes, swampland, open woodland. Occurs well east of Atlas survey area.
Hibbertia helianthemoides	Priority 4		Very low	Spreading to erect, low or prostrate shrub, to 30cm high. Fl. yellow, Jul or Sep to Oct. Clayey sand over sandstone or loam over quartzite. Hills and scree slopes. Soils/rock type not in survey area
Schoenus griffinianus	Priority 4		Known to occur in survey area	Small, tufted perennial, grass-like or herb (sedge), to 10cm high. Fl. Sep to Oct. White sand.
Stylidium longitubum	Priority 4		Recorded (2011)	Erect annual herb, 0.05-0.12 m high. Fl. pink, Oct to Dec. Sandy clay, clay. Seasonal wetlands.
Thysanotus glaucus	Priority 4		Moderate	Caespitose, glaucose perennial, herb, 10 to 20cm high. Fl. purple, Oct to Dec or Jan to Mar. White, grey or yellow sand, sandy gravel.
Verticordia lindleyi subsp. lindleyi	Priority 4		Moderate to high	Erect shrub, 20 to 75 cm high. Fl. pink-purple, May or Nov to Dec or Jan to Feb. White/grey sand, gravelly sand, sandy loam. Seasonal swamps, sandplains.

[a] For the definition of the Threatened and Priority classifications, refer to Appendix 2.
[b] For definitions of likelihood-of-occurrence ratings, see Table 2.

Table 2: 'Likelihood-of-occurrence' classification.

Likelihood of Occurrence Rank	Definition of Ranking
High	There are existing records of the species near the study area (within about 5 to 15 km); AND • the species is strongly linked to a specific habitat, which is present and relatively abundant in the study area; OR • the species has more general habitat preferences, and suitable habitat is present.
Moderate	1. There are existing records of the species from the region (within 40 km), however • the species is strongly linked to a specific habitat, which is known to be in the general locality of the survey area, but not specifically known to be in the survey area; OR • the species has more general habitat preferences, but only some suitable habitat is present. 2. There is suitable habitat in the study area, but the species has been recorded very infrequently in the locality and a significant distance from the study area.
Low	There are existing records of the species from the region (within 40 km), however the occurrences are sparse and not near to the survey area; AND • the species is strongly linked to a specific habitat, which is not thought to occur in the study area; OR • the species has more general habitat preferences, but only limited suitable habitat is present.
Very Low	There are existing records of the species from the region (within 40 km), however there are very few records and they are distant from the survey area AND the species is strongly linked to a specific habitat, which is known not occur in the study area OR • The species' range is very restricted and does not include the study area; OR • the nearest occurrence of the species range is a substantial distance from the survey area (e.g. >50 to 100 km); OR • the species occurs in a different bioregion and is not known from the survey area bioregion.

2.4 Environmentally Sensitive Areas (ESAs)

One ESA occurs to the west of the Atlas survey area (Figure 7). The area marked as ESA is the Nambung National Park.

2.5 Wetlands

Western Australia's wetlands have been defined as 'areas of seasonally, intermittently or permanently waterlogged soils or inundated land whether natural or otherwise, fresh or saline, e.g. waterlogged soils, ponds, billabongs, lakes, swamps, tidal flats, estuaries, rivers and their tributaries (Wetland Advisory Committee 1977, quoted in DEP, 2000).

Hill *et al*. (1996) mapped geomorphic wetlands at 1:25,000 for the Swan Coastal Plain as far north as Wedge Island and this mapping has since been digitised. More recently, wetland mapping was extended to the Cervantes region, including the Atlas survey area (ENV Australia, 2010) (Figure 7). This wetland mapping was undertaken at a scale suitable for viewing at 1:25,000 and classified wetlands by geomorphic type after Semeniuk and Semeniuk (1995; Table 3). A wetland evaluation classification was not undertaken. This geomorphic wetland mapping was largely a desktop exercise using satellite imagery, spatial datasets, and stereoscopic aerial pair photos, with limited field verification (ENV Australia, 2010).

Table 3: Geomorphic wetland types adapted from Semeniuk and Semeniuk (1995).

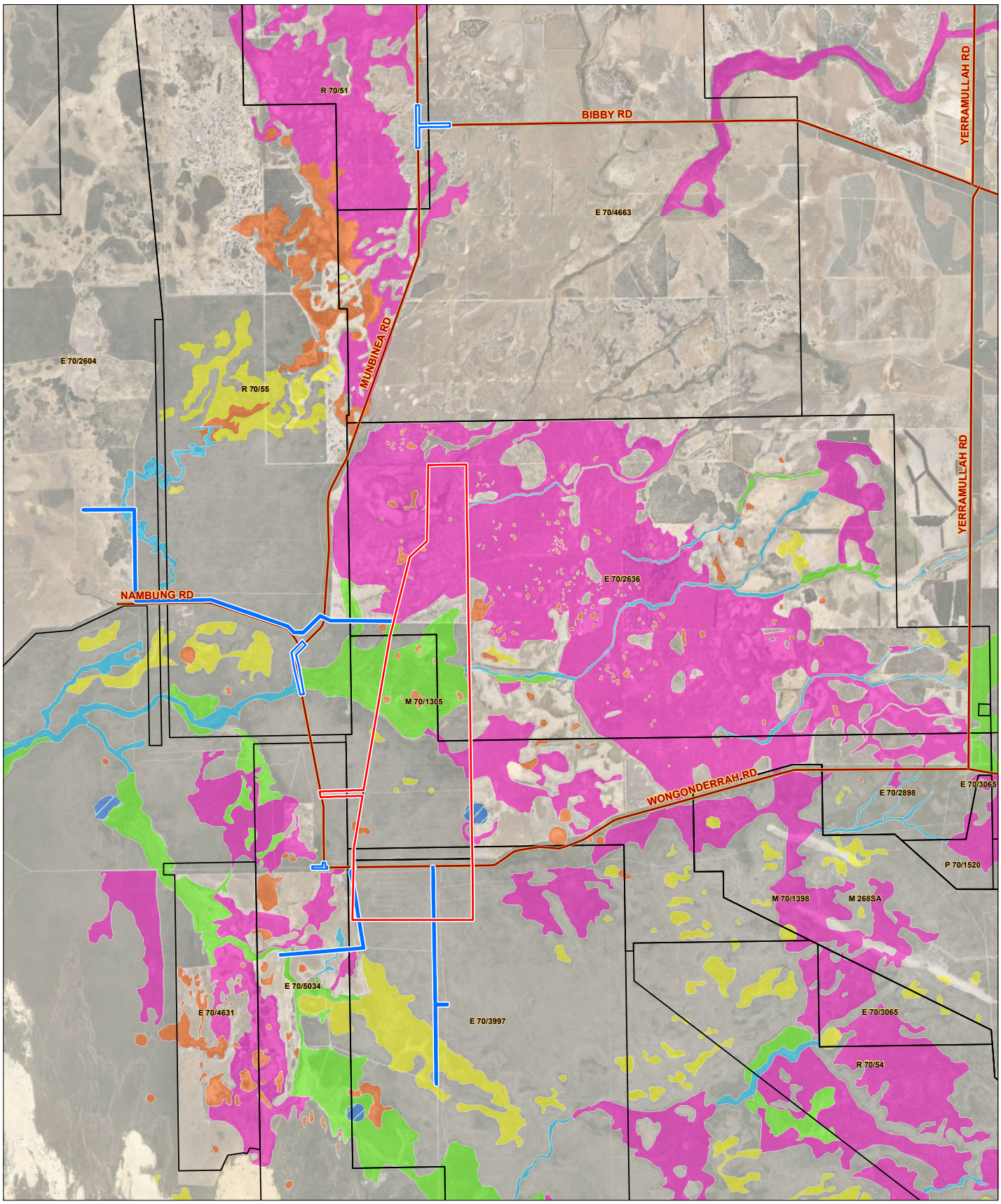
Water Permanence	Landform				
	Basin	**Flat**	**Channel**	**Slope**	**Highland**
Permanently inundated	Lake		River		
Seasonally inundated	Sumpland	Floodplain	Creek		
Intermittently inundated	Playa	Balkarra	Wadi		
Seasonally waterlogged	Dampland	Palusplain	Trough	Paluslope	Palusmont

Six types of geomorphic wetland were mapped in the survey area: Floodplain, Creek, Palusplain, Sumpland, Dampland and Lake (Figure 8).

A list of nationally important wetlands in Australia has been compiled by the States and Territories and the Commonwealth Government of Australia as the Directory of Important Wetlands in Australia (DIWA) (Environment Australia, 2001). The directory used six criteria to identify nationally important wetlands. Currently there

are 904 wetlands listed as Nationally Important Wetlands on the online inventory 'Australian Wetlands Database', of which 120 are wetland systems in Western Australia (DBCA, 2021b). A review of the DIWA list found that no DIWA wetlands are mapped in the Atlas survey area, but a nationally important wetland, 'Lancelin Defence Training Area. – WA119' occurs to the south and south-east of the survey area, south of Wongonderrah Rd (Figure 7).

The 'Lancelin Defence Training Area. – WA119' wetland system is considered part of a regionally significant group, the 'Bassendean Group', and is recognized for its conservation values (DAWE, 2021a). The vegetation of these 'seasonal swamps', which are 'throughout the western portion of the LDTA' is described as variable and being of low or tall heath (DAWE, 2021a). 'A typical heath community is 1 to 1.5 metres high and consists of *Banksia sphaerocarpa*, *Hakea varia, Hypocalymma angustifolium*, *Regelia ciliata*, *Daviesia divaricata* and *Acacia saligna'* (DAWE, 2021a). *Banksia sphaerocarpa,* as referred to in this context, is now known as *Banksia telmatiaea*.



Legend

- Tenement

Geomorphic Wetlands

- Palusplain
- Sumpland
- Dampland
- Floodplain
- Creek
- Lake

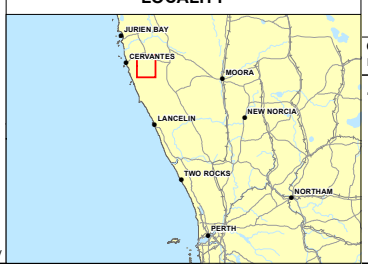
0 0.5 1 2 km

Scale: 1:65,000 @ A3

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- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

LOCALITY



Source: Wetlands - DBCA
Tenement - DMIRS, 2019
Orthophoto - Open Source Imagery

Preston Consulting

CREATED BY	JOB	DATE	REVISION
ENVIRONMAPS	ATLASINFRA	8/11/2021	0

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Figure 8: Geomorphic Wetlands in the locality of the survey area

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2.6 Groundwater Dependent Ecosystems

2.6.1 Introduction to groundwater dependent vegetation

Groundwater is 'water found under the land surface, which occupies the pores of soil or rock' (Hyde, 2006). Groundwater dependent ecosystems (GDEs) are 'ecosystems that require access to groundwater to meet all or some of their water requirements to maintain the communities of plants and animals, ecological processes they support, and ecosystem services they provide' (SKM, 2011).

Eamus *et al*. (2006) recommended that three primary classes of GDEs be adopted:

- Aquifer and cave ecosystems;
- All ecosystems dependent on the surface expression of groundwater. This includes wetlands (e.g. damplands and sumplands); and
- All ecosystems dependent on subsurface presence of groundwater. This includes terrestrial vegetation that depends on groundwater fully or seasonally.

An important consideration of ground water is whether ground water is a perched aquifer. A perched aquifer is water that is separated from an underlying body of groundwater by unsaturated porous material (SKM, 2011). An implication of a GDE being dependent on a perched aquifer is that a perched aquifer may be buffered from the impacts of deeper groundwater abstraction. Conversely, if there is draw down from a perched water table, the impact on related GDEs may be significant. The GDE toolbox document notes that perched aquifers are typically unconfined, can form at quite shallow depths in the unsaturated zone, and tend to be quite localised in extent (SKM, 2011). A shallow aquifer sitting on a low permeability layer that is hydraulically connected to an underlying aquifer by a saturated zone is not considered a perched aquifer.

2.6.2 Groundwater-dependent vegetation in south-west Western Australia

Phreatophytes are plants capable of obtaining groundwater from the zone of saturation either directly, or through the overlying capillary fringe (Froend *et al*., 2004). Phreatophytes have been categorised as obligate phreatophytes (species that rely on permanent access to groundwater) and facultative phreatophytes (access groundwater when it is available) (Canham *et al*., 2009). Canham *et al*. listed *Banksia attenuata* and *Banksia menziesii* as facultative phreatophytes and *Banksia littoralis* and *Banksia ilicifolia* as obligate phreatophytes.

Large areas of woodland, mostly *Banksia* woodland, occur across the Gnangara Mound near Perth. Many of the tree and deep-rooted shrub species are phreatophytic

(Froend *et al*., 2004). Vegetation mortalities have occurred across the Gnangara Mound in areas of ground water abstraction and investigations showed that trees found growing in areas where depth to groundwater was shallow (3-5metres) were most susceptible to changes in water level, where declines have been too rapid to provide adequate time for root systems to respond (Water Authority of WA, 1992 *in* Froend *et al*., 2004). Within the categories of 0-3m, 3-6m and 6-10m, certain *Banksia* spp. are phreatophytic and derive some of their water from groundwater throughout the dry-wet cycle. The highest proportion of groundwater (>50%) is used by plants in the 0-3 and 3-6m depth to groundwater category and *Banksia* spp. are particularly susceptible to groundwater drawdown in areas of these shallow depths (Froend *et al*., 2004). Vegetation accessing groundwater at depths of 6-10m uses proportionally more water from the soil profile above the ground water.

2.6.3 GDE studies in the Nambung region

In 2012-2013 Syrinx Environmental (Syrinx) (2013) was engaged by Tronox Pty Ltd to undertake wetland, watercourse and GDE investigations for the Cooljarloo West project, approximately 13 kilometres south-east of the Atlas project. As part of their study, they reviewed the classification of wetlands present in the study area and GDE indicator species present and the root depths of terrestrial, groundwater indicator and wetland species found on site (Syrinx Environmental, 2013). They also described 'vegetation communities' along transects and undertook stratigraphy/hydrology characterisation.

Syrinx concluded that the distribution and type of wetlands and the vegetation communities on both the wetland and terrestrial landforms indicated a widespread connection with groundwater. They noted that there were two dominant aquifers at the Cooljarloo West site (a Superficial and deeper Yaragadee) and apart from these dominant aquifers, seasonal superficial perched aquifers occurred throughout the site (Syrinx Environmental, 2013). All water intersected in the wetlands and GDE investigation was either perched aquifer or the Superficial Aquifer (Syrinx Environmental, 2013). The Bassendean Sands landform had a minor hydrogeological variant in the sand profile, notably 'diagenetic influences', which were typically ferruginous (with massive ferruginisation in places).

Syrinx Environmental (2013) developed a simple model combining vegetation assemblage, topography, stratigraphy, and hydrogeology. They found that vegetation communities were primarily determined by the underlying thickness of Bassendean Sands, and vegetation community subsets were based on topography and litho-

stratigraphy. Eight broad vegetation associations were classified to Terrestrial and Wetland ecosystems.

2.6.4 GDE mapping

2.6.4.1 GDE Atlas – a national GDE data set

The GDE Atlas is a national dataset of Groundwater Dependent Ecosystems (BOM, 2021). The GDE Atlas mapping process utilised literature review, expert consultation, collation of continental spatial data (Australia divided into 57 ecohydrological zones within which GDEs were determined), rules of groundwater dependency, collation of regional spatial data and remote sensing data, the intersection of spatial layers to classify potential GDEs and weighting rules (Doody *et. al*., 2017). Field validation was not undertaken, but GDEs identified in previous studies offered some means of verification.

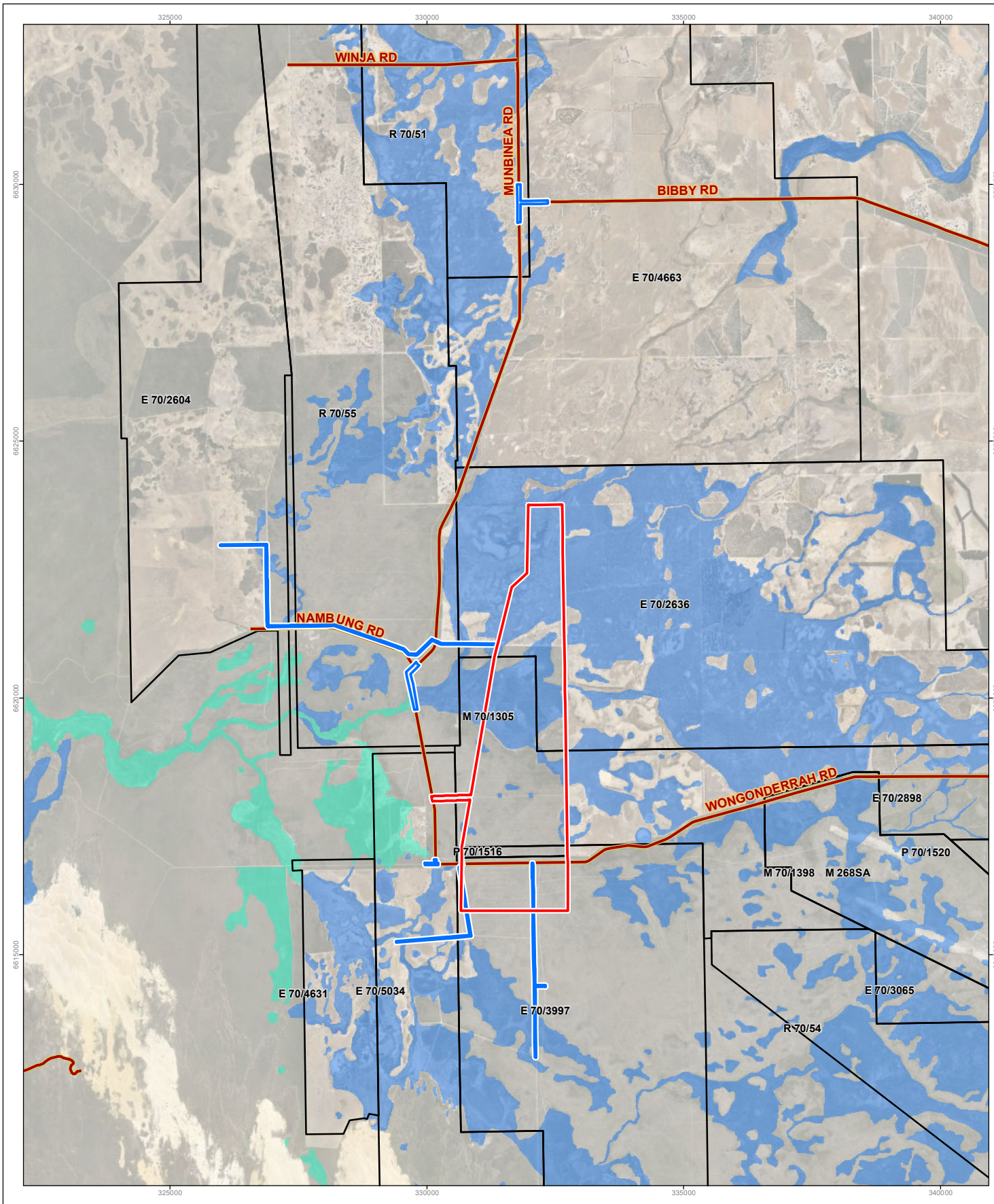
The GDE Atlas presented separate mapped GDEs for subsurface and surface expressions of groundwater (terrestrial and aquatic GDEs). Mapped GDEs were classified according to the likelihood of potential for groundwater interaction. The resulting GDE Atlas was considered to offer a broad overview of GDE locations nationally and would be appropriate to use as a first step in determining if GDEs may be present at a particular locality (Doody *et. al*., 2017).

The GDE Atlas maps of aquatic GDE and terrestrial GDE in the survey area region are shown in Figure 9 and Figure 10 (BOM, 2021). The area of high potential aquatic GDE in the survey area (Figure 9) corresponds with the geomorphic wetland mapping for the area (see Figure 8; ENV, 2010). The mapping shows all of the survey area as high potential aquatic GDE or high potential terrestrial GDE.

2.6.4.2 Other regional scale groundwater mapping

Aquifers and potential GDEs (depth to groundwater) were mapped at a broad scale over the Northern Perth Basin by the Department of Environment (Plate 1 and Plate 2; Rutherford and Johnson, 2005). Temporary aquifers (e.g. perched aquifers) were not included in this mapping (Ray Froend, *pers. comm*.). This GDE mapping presumably formed some of the input for the GDE Atlas mapping.

The area that includes the Atlas survey area (to the east of point 69 in Plate 2) is mostly classified as ‘areas of potential GDE’, with the depth to groundwater either 0 to 5 metres (dark grey areas) or 5 to10 metres (medium grey).



Legend

Flora and Vegetation Study Areas

- Mine Envelope Study Area
- External Infrastructure Study Area
- Tenement

Aquatic Groundwater Dependent Ecosystems

- High potential GDE - from national assessment
- Unclassified potential GDE - from regional studies

Source: GDE - BoM
Tenements - DMIRS

0 0.75 1.5 3 km
Scale: 1:100,000 @ A4

N

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

LOCALITY



Preston Consulting

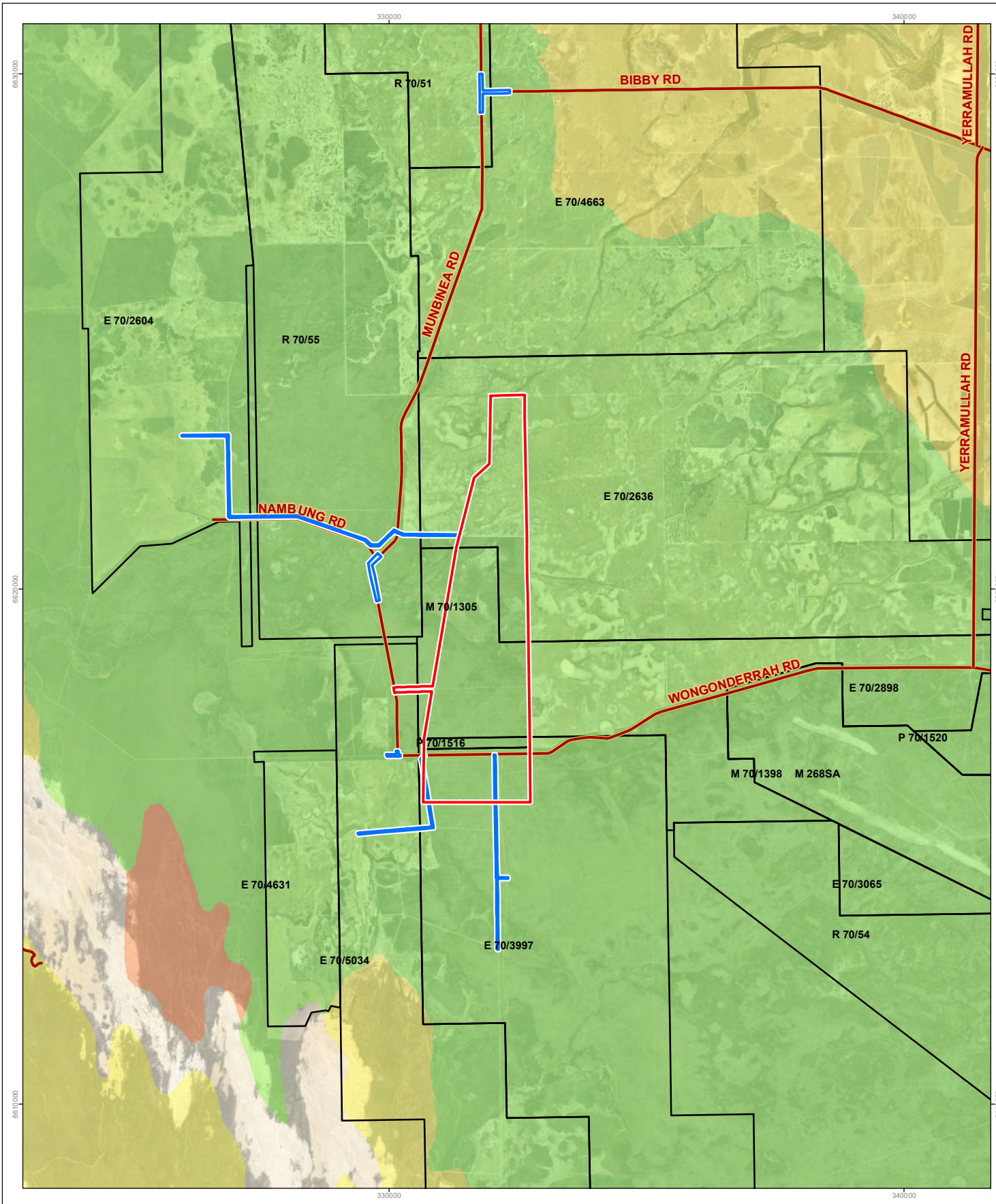
CREATED	JOB	DATE	REVISION
ENVIRONMAPS	ATLAS INFRA	8/11/2021	0

Figure 9: Aquatic Groundwater Dependant Ecosystems

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Legend

Flora and Vegetation Study Areas

- Mine Envelope Study Area
- External Infrastructure Study Area
- Tenement

Terrestrial Groundwater Dependent Ecosystems

- High potential GDE - from national assessment
- Moderate potential GDE - from national assessment
- Low potential GDE - from national assessment

Source: GDE - BoM
Tenements - DMIRS

0 0.75 1.5 3
km
Scale: 1:100,000 @ A4

N

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

LOCALITY



Preston Consulting

CREATED	JOB	DATE	REVISION
ENVIRONMAPS	ATLAS INFRA	8/11/2021	0

Figure 10: Terrestrial Groundwater Dependant Ecosystems

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C:\GIS\Jobs\Brian Morgan\Atlas Infrastructure\Figures\AtlasInfra_F10_GDE Atlas - Terrestrial GDE_211108.mxd

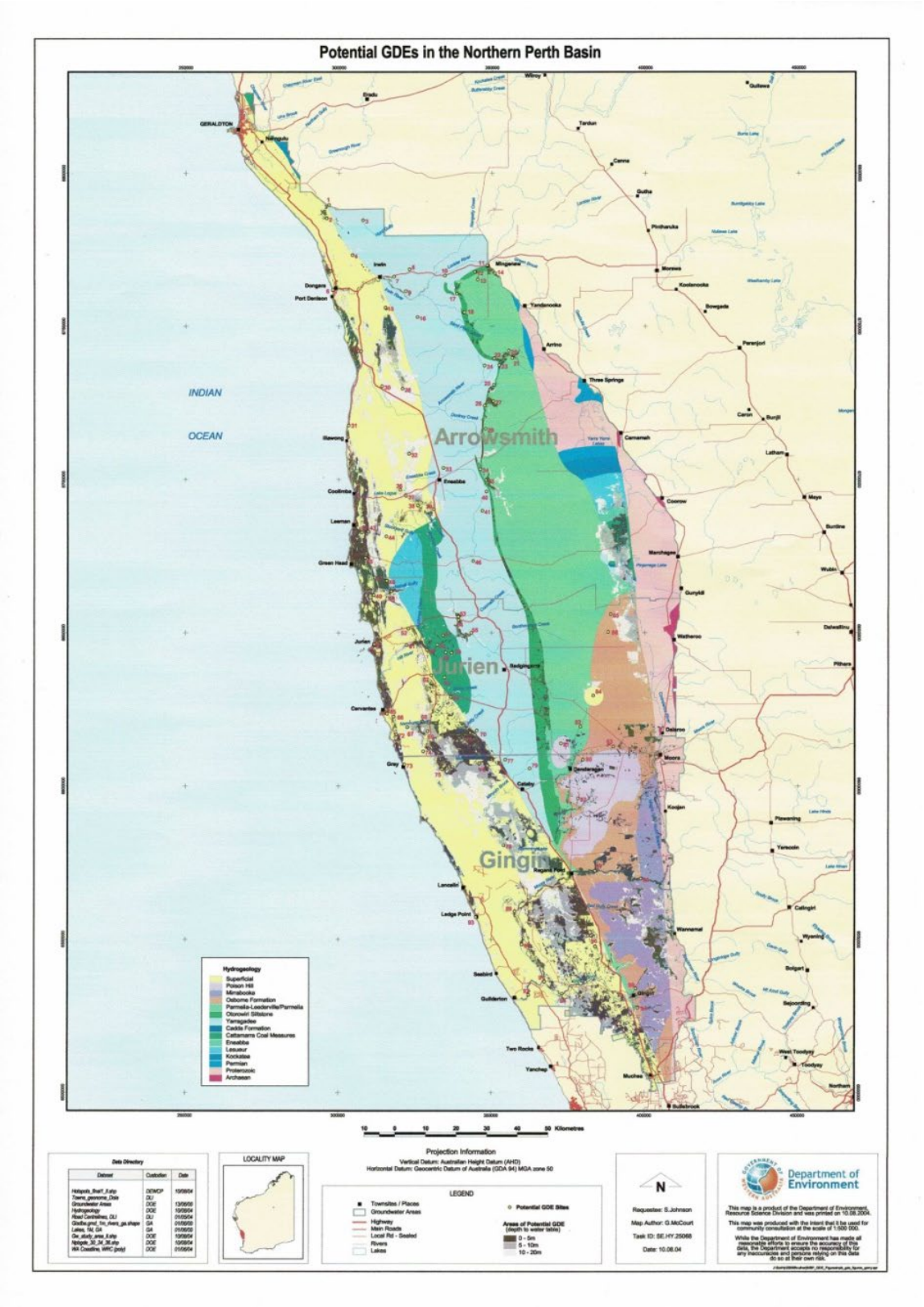


Plate 1. Aquifers and potential Groundwater Dependent Ecosystems

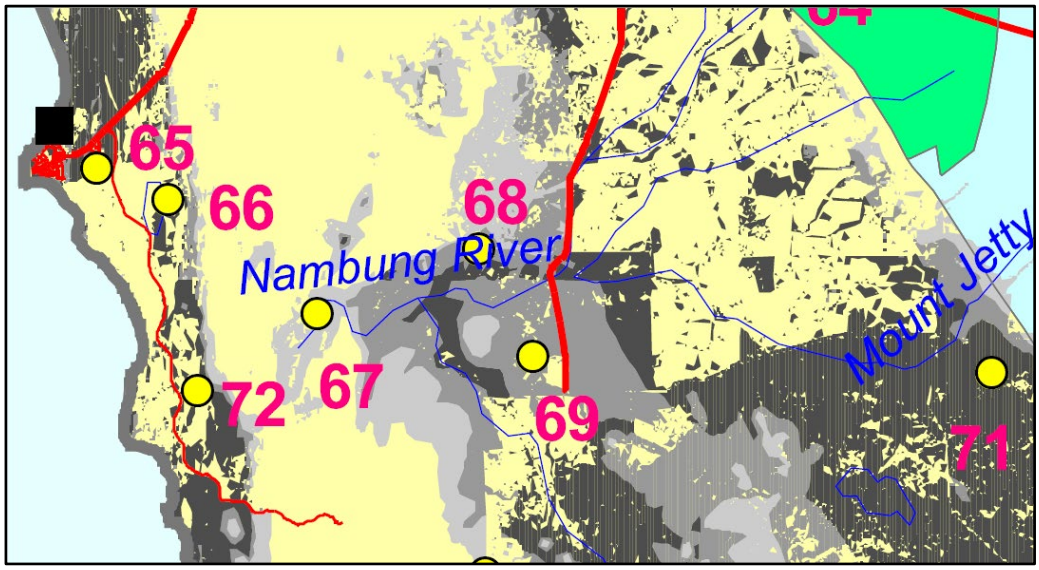


Plate 2: Atlas project and Nambung River area - aquifers and potential Groundwater Dependent Ecosystems (Rutherford *et al*., 2005).

3.0 METHODS AND LIMITATIONS

3.1 Survey approach

Atlas surveys of the mine envelop survey area (MESA) during 2019-21 were approached as update and completion surveys to update records, complete unfinished survey works, and to extend and improve coverage where necessary, (i.e. increase sampling intensity) to meet the current Technical Guidance (EPA, 2016) and to inform the planning process. The data collected in 2011 (360 Environmental, 2012) was considered relevant and current for the survey as the bushland in the survey area had no noticeable disturbance since 2011 and the vegetation was therefore expected to be, if not the same, very similar in structure, dominance and floristics in 2020 as that recorded in 2011. Furthermore, it was proposed to undertake a second phase visit of the 2011 quadrats in early October (good Spring conditions) to capture the early season ephemeral herbs and complement the mid to late Spring first phase survey. This approach was enabled by the fact that the 28 quadrats recorded in the single phase 2011 survey had their four corners permanently marked with fence droppers (360 Environmental, 2012), which meant that the exact same area could be re-sampled in the Phase 2 survey. The exceptions were a couple of quadrats that had a missing corner peg, however in all but one case, the original locations of these pegs were easily determined from the remaining pegs. As a precaution and to get some measure of the degree of change between the 2011 and 2020 survey times, species observed in the 2020 Phase 2 survey that were also recorded in the 2011 survey were ticked-off the 2011 quadrat species lists.

To also ensure that the overall survey results of the MESA were current to Spring 2020, the 2011 vegetation unit mapping north of Wongonderrah Rd was checked, and the complex of vegetation units on the floodplain area was re-mapped in greater detail. Similarly, the 2011 vegetation condition mapping was re-assessed and re-mapped in Spring 2020, again with more detailed assessment and mapping in the floodplain area in particular.

New quadrats which were established and sampled in the MESA during the Spring seasons in 2019 and 2020, were resampled with a second Spring visit in 2020.

In the process of identifying plant specimens from the 2019/2020 MESA survey seasons, 2011 identifications were reviewed and in a few cases, species names used in 2011 were updated to names applied in the 2019/2020 surveys. Furthermore, numerous species names applied in the 2011 survey had changed in subsequent

taxonomic revisions and these were updated accordingly. The conservation status applied to some species in the 2011 document (360 Environmental, 2012) had also changed since that time and these were updated.

Following a review of survey works in 2021, it was decided to undertake a site revisit in late Autumn 2021 and resample MESA quadrats to ensure that Technical Guidance (EPA, 2016) recommendations for supplementary survey were met.

Following development of mining plans for the Atlas Project, the Atlas External Infrastructure corridors (EISA) were added to the survey area in 2021 and it was decided to undertake an update survey of that part of the MESA that lies on farm land (northern section, Figure 1). These were sampled in September 2021 (Spring), with additional quadrats installed as necessary, vegetation mapped and the corridors searched for rare flora.

3.2 Survey timing

The timing for the recording of new MESA quadrats (2019 and 2020), the phase 2 revisits of the new MESA quadrats and the MESA quadrats first recorded in 2011, the 'Supplementary' revisit of MESA quadrats, the update survey of the MESA area on farmland and the Phase 1 EISA quadrat recordings are shown in Table 4. Survey timing ensured quadrats were sampled at least once in good season in mid Spring (early to mid-October). Most of the targeted rare flora searching was conducted in November of 2019 and 2020, after the other survey work was completed, as most of the species of interest were perennial taxa. However, targeted searches of several ephemeral taxa (e.g. *Stylidium longitubum*, *Stylidium aceratum*) were undertaken in early October 2020.

3.3 Vegetation survey

3.3.1 Sampling vegetation

Vegetation units were sampled at quadrat, relevé ('unbounded' sample sites) and mapping note (abbreviated relevé) sites. These sites were selected at locations that were in representative stands of the interpreted vegetation units. Suitable sites for quadrats were mostly limited to sites in Good or better condition, demonstrating a good number of native species representative of that vegetation type.

During the 2019 and 2020 Spring surveys, a total of 33 new 10 x 10 m quadrats were established in the MESA survey area: eight in the new area south of Wongonderrah Rd (CSQ1 to CSQ8), two in the new access corridor (CNQ14, CNQ15) and twenty

three (CNQ1 to CNQ13; CNQ16 to CNQ25) in the previously surveyed bushland north of Wongonderrah Rd. The additional quadrats in the previously surveyed bushland (2011) were added to increase the number of quadrats in some of the already sampled units, and to sample some of the vegetation units and variation within these units that had not been previously sampled by quadrats. The aim was to have recorded at least three quadrats in each vegetation unit, however, this was limited by the less than 'Good' condition of some vegetation units and the limited size of some vegetation units.

Table 4: Timing of quadrat sampling.

Survey Area	Quadrat Number	Spring Phase 1	Spring Phase 2	Autumn Revisit
MESA	CQ1 to CQ28	29 Oct to 21 Nov 2011	4/10/2020 to 13/10/2020	7,8,18 June
MESA	CSQ01 to CSQ07	25 to 26 Oct 2019	4 to 10 Oct 2020	6th June
MESA	CSQ08	10 Oct 2020	23/11/2020	6th June
MESA	CNQ01 to CNQ12	8 to 30 Nov 2019	5 to 12 Oct 2020	7,8,18 June
MESA	CNQ13 to CNQ18	13 to 14 Oct 2020	23 to 24 Nov 2020	7,8,18 June
MESA	CNQ19 to CNQ25	7 to 8 Nov 2020	24 Nov 2020	7,8,18 June
MESA	AIQ15	29 Sept 2021		
EISA	AIQ01-14, 16,17	21 Sept to 1st Oct 2021		

The new quadrats were established using the same methods as used in 2011. Quadrats were marked out with a field measuring tape, with the corners marked by fence dropper stakes driven into the ground. The 10 x 10 metre quadrat dimensions were used because a $100m^2$ sample area on the Swan Coastal Plain is considered to capture most species in a given plant community, to stay consistent with the area used in the 2011 survey and because this dimension is recommended in the EPA's Technical Guidance (EPA, 2016).

Each new quadrat sampled as part of a Phase 1 survey was photographed and the corner coordinates were recorded (Garmin GPS Map 64, 64X). A description of the

quadrat location, the habitat, surface soil texture and colour were all recorded and the time since the site was last burnt was estimated. Vegetation was described using the NVIS structural formation classes and terminology (ESCAVI, 2003; Appendix 3). Vegetation Condition was described using the classification scale for the South West Botanical Province as set out in the EPA Technical Guidance (EPA, 2016; Appendix 4). All plant species observed in a quadrat were recorded, along with their height, percentage cover and specimen number if collected. Each quadrat was sampled with the aim of recording all species present within the quadrat. Where a plant species was not well known, a specimen was collected and allocated a specimen number.

When quadrats were resampled as part of a Phase 2 survey, they were re-photographed, searched for species not previously recorded and species covers were reviewed and revised where necessary. During the survey of quadrats initially recorded in Spring 2011, the Phase 2 resample included reviewing and where necessary revision of the quadrat descriptions (habitat, soils and 'time since fire' and vegetation condition), re-recording the quadrat (within the area marked by the 2011 corner pegs), ticking-off species observed that were recorded in 2011, adding any taxa not previously recorded, and review and where necessary revision of the taxa covers.

Collected plant specimens were pressed, dried and subsequently identified. Identifications were made by comparison to specimens in the reference and research collections of the Western Australian Herbarium, by the use of keys in various papers and books and by relevant experts on various groups of flora that occur on the Swan Coastal Plain. Where identifications could not be satisfactorily finalised, they were lodged with the Western Australian Herbarium Identification Service.

The DBCA FloraBase website was consulted as required to confirm the conservation category status of plant species in the survey area.

Seven new relevés (CNR02 to 5, CNR07; CRK01, 02) were also recorded in the 2019 and 2020 MESA surveys and used to describe vegetation units. The composition of the relevé descriptions was similar to that of the quadrats, however the area described was 'open' (not a measured 10 x 10m space) and sampling was generally less detailed, recording only the dominant and subdominant species and a short list of associated plant species. Twelve of the sixteen relevés first recorded in 2011 were also used to describe the vegetation, with most revisited and some revised. Five new mapping notes were also recorded in the 2019 and 2020 surveys (MBN01 to 04;

MNK01) and a further five that were first recorded in 2011 were retained and where necessary, revised, for use in referencing the vegetation mapping.

No new quadrats, relevés and mapping notes were recorded during the MESA supplementary survey in June 2021. All quadrats were revisited, with the exception of sites CNQ22, CNQ25 and CQ24, which were inundated or were isolated by inundation. Revisited quadrats were re-sampled and any species recorded that had not been previously listed or which provided better material for identification. While traversing to quadrats or for other survey purposes, opportunistic records were made of species not previously recorded in the survey area.

Quadrats. relevés and mapping notes were also recorded in the 2021 EISA survey and MESA farmland survey. The same methodology was adopted as outlined above. All of the EISA corridors were walked and searched for species of conservation significance.

3.3.2 Vegetation unit and vegetation condition mapping

3.3.2.1 Vegetation unit mapping

Vegetation units and their descriptions in the bushland MESA were derived from the 2019 and 2020 survey quadrat, relevé and mapping note site descriptions. It is estimated that the vegetation units were described at approximately the NVIS sub-association level (ESCAVI, 2003). Vegetation units and their descriptions in the farmland MESA area and the EISA were made during the 2021 Spring survey.

Vegetation unit boundaries were mapped on a computer generated aerial photograph while traversing the study areas, using a hand held GPS.

Vegetation mapping, in less detail, was extended to approximately 500 metres beyond the MESA study area boundaries by a combination of observations during searches for rare flora, aerial photograph interpretation, and broader observations from traverses along the few existing firebreaks and roads. The vegetation outside the MESA study area was assigned a vegetation unit code that had been applied inside the survey area if it was considered similar or was otherwise only described using a few upper strata dominant species. The external vegetation was not compared with survey area vegetation units using detailed floristics.

3.3.2.2 Vegetation condition mapping

Vegetation condition mapping was largely extrapolated from the vegetation condition assessed at the sample points (quadrats, relevés and mapping notes) during the various surveys, where vegetation condition was largely consistent throughout vegetation unit stands. Substantial areas of disturbance such that the condition differed from the extrapolated vegetation condition of that stand, were mapped discretely.

Vegetation condition mapping was also informed by observations on opportunistic walks through the survey area. This was particularly important on the MESA floodplain and associated vegetation north of Wongonderrah Rd, where vegetation condition was more variable and complex. Extensive walking undertaken for the detailed vegetation unit mapping in this area also enabled more detailed vegetation condition mapping.

In areas where vegetation condition of an area was very variable (ranged between two condition classes), a range of condition classes was assigned.

3.3.3 Wetland vegetation and Groundwater Dependent Ecosystems (GDEs)

The wetland and GDE status of vegetation units was assigned after the field surveys. The wetland status of units was estimated by considering the presence/absence of obligate wetland species, considering the landform and drainage patterns, and by considering the 'depth-to-water table' data. Obligate wetland species were considered to be those that only occur in wetland sites and therefore appeared to require wetland conditions for growth (Hill *et al*., 1996).

The GDE status of vegetation in the survey area was estimated by assessing the 'type' of vegetation (wetland/terrestrial), the known GDE status of any species (particularly dominants) in the vegetation units, consideration of other habitat preferences of particular species, depth to groundwater mapping for the area and the consideration of the results of other GDE investigations undertaken in the region.

3.4 Flora survey

3.4.1 Flora survey methods

The flora survey was carried out in parallel with the vegetation survey, with records of flora species predominantly derived from quadrats, as well as relevé and mapping note data. Flora species records were also compiled opportunistically while walking between the vegetation recording sites, while broadly traversing the survey areas to

map the vegetation units, and when conducting targeted flora searches and other traverses.

Plant species not well known to the field botanists were collected and allocated a specimen number. Where observed plant species were of special interest, the location's coordinates and the numbers of species counted at these locations (and their immediate surroundings) were recorded.

Collected specimens were processed and subsequently identified as described in section 3.3.1.

3.4.2 Flora of conservation significance and targeted searches

Flora of conservation significance that were associated with the *Banksia* woodlands were only found occasionally on longer traverses through that vegetation type, and as a consequence, searches were more limited to walks out to and returning from sites, sample sites and a few other traverses.

However, extensive targeted searches were undertaken for flora of conservation significance on the floodplain and in the associated heath areas in 2019 and 2020, which were preferred habitat for a number of taxa of interest. In most cases, the particular habitat for a species had a meandering, convoluted form, and the targeted searches consequently followed the habitat rather than linear grids. In a few areas, linear grids were walked. In the case of a few ephemeral species, searches were undertaken in the earlier Spring season when those species were in a vegetative state and flowering, while searches for perennial shrubs and rushes and sedges were generally undertaken later in the season.

An additional targeted search took place in October 2021 with a particular focus on a search for the Threatened species *Paracaleana dixonii* and to a lesser extent *Drakaea elastica* (T) and *Eremophila glabra* subsp. *chlorella* (T). A range of habitats were visited and searched, including low heath areas on the palusplain, the transitional zone between *Banksia* woodland and the *Banksia telmatiaea* heath, the margins of *Banksia telmatiaea* heath damplands, *Callitris pyramidalis* Tall shrublands around the margins of the floodplain and some areas of *Banksia* woodlands. To improve the context of the targeted search, a Cooljarloo site was visited where there was a past record of *Paracaleana dixonii*, and the habitat and associated vegetation observed, although no *Paracaleana dixonii* plants were seen. Similarly, another site, south of Wongonderrah Rd and outside the Atlas survey area, was visited where there was a

past record of *Eremophila glabra* subsp. *chlorella* (T), but no *Eremophila glabra* subsp. *chlorella* (T) plants were seen.

When flora of conservation significance were observed while on targeted searches, location coordinates were recorded and numbers of plants counted at that point and in the surrounding distance (up to about 20 metres for the larger species). Where there was some uncertainty as to the identity of a particular plant of interest, it was collected and processed as outlined in section 3.3.1.

Extensive targeted searches for flora of conservation significance were also undertaken outside the survey area to obtain some insights into the distribution of these taxa and get some understanding of their abundance, allowing some comparison with numbers of taxa inside the survey area. Targeted searches outside the survey area were undertaken with a similar approach to searches inside the survey area. Again, external searches mainly targeted the heaths and dampland areas where species of particular interest mostly occurred. External search areas included:

- Heaths along Wongonderrah Rd (for up to 7 kms east of the survey area) and around the southern part of Yerramullah Rd (north side of Wongonderrah Rd) (numerous linear transects walked at a few spaced sample sites);
- In the bushland area immediately west of the survey area;
- A cursory search where a north-south track crossed Frederick Smith creek;
- Bushland on the north-west side of Munbinea Rd-Wongonderrah Rd intersection; and,
- Flood banks of Nambung River, on the eastern side where the Nambung River crosses Munbinea Rd.

3.5 Analysis of vegetation data

3.5.1 Statistical analysis of the Atlas survey quadrats

To assist in synthesis of vegetation descriptions into vegetation units, Primer-7 version 7.0.13 (Primer-e, 2021) was used to quantify the similarity between quadrats. A site by species matrix with presence/absence of each species and a site by species matrix with percentage foliar cover (PFC) of each species were prepared from the quadrat data for multivariate analysis. The PFC data was transformed (square root) to improve data normality.

For both data matrices, a similarity matrix based on Bray-Curtis similarities was calculated. A hierarchical agglomerative cluster analysis was undertaken and a dendrogram was computed. The strength of the analysis was checked using non-

metric multidimensional scaling (MDS), which produces an ordination diagram and quantifies stress. Stress of less than 0.2 represents a good fit (Clarke *et. at*., 2014).

3.5.2 Statistical analysis for measures of sample completeness

Completeness of survey was tested by computing species accumulation curves from the presence-absence species data (Clarke *et. at*., 2014) and comparing averages of a set of estimates of species richness (Chao1, Chao2, Jacknife1, Jacknife2, Bootstrap, Michaelis Menton (MM) and (UGE)) against actual observed richness (S_{obs}).

3.5.3 Regional analysis of the Atlas quadrat data

Currently there is no suitable regional dataset with vegetation classification and conservation assessment for the northern part of the Swan Coastal Plain, where the Atlas survey area is located. The 'Weed and native flora data for the Swan Coastal Plain' (DBCA, 2021c; Keighery, B. *et al*., 2012) dataset (hereafter '2005 SCP dataset'), includes 1098 sites from the area between Dunsborough in the south to Lancelin and the Moore River in the north, but the most northerly sites in this dataset are estimated to be some 50 km south of the Atlas survey area. The Atlas MESA and EISA quadrat data (78 quadrats) was analysed against the 2005 SCP dataset to see if some Atlas sites might be floristically similar to 'southern SCP' floristic community types (FCTs). There were significant limitations in interpreting the results of this analysis (see discussion of the limitations in Table 5).

Atlas presence/absence data, including weed species, was analysed with the 2005 SCP dataset. To improve compatibility of the two datasets, Atlas site data species names were reconciled with the names used in the older SCP dataset. Where species names used in the Atlas dataset differed from the name applied to the same species entity in the 2005 SCP dataset, the Atlas names were changed to those used in the 2005 SCP dataset for the purpose of the analysis. Atlas singleton species, and there were numerous, were retained in the dataset if they were species that were recorded or observed a number of times in the Atlas survey area. Atlas species were deleted from the combined dataset if they were singletons and not considered 'a recurring part' of the flora of the Atlas survey area.

PATN version 4.0 (PATN, 2013) was used to run the analysis as it was used by Gibson *et. al*. (1994) to analyse the 1994 SCP dataset which assigned FCTs on the southern SCP. The analysis used :

- 'Two step' association measure for species;

- Agglomerative Hierarchical Fusion classification using 'Flexible UPGMA' and default group numbers;
- SSH (Semi-strong Hybrid multidimensional scaling) ordination technique;
- Bray-Curtis association measure for columns (recommended for presence / absence (1 / 0) data where there are many more '0's than '1's (PATN, 2013))

The single site insertion method, in which Atlas sites were analysed one at a time with the 2005 SCP dataset, was used to improve the PATN analysis results by reducing distortion of the site clustering. In some cases, where the Primer analysis had shown the species composition at two or more Atlas sites to be very similar, representative quadrats were analysed. Analysis results were in the form of dendrograms and nearest neighbour lists.

Where the PATN analysis resulted in some interesting similarities, the degree of similarity between Atlas and 2005 SCP dataset sites was further explored using Primer (Primer-e, 2021) analysis:

- cluster analysis and the SIMPROF test for significance;
- ordination by Multi-Dimensional Scaling (non-metric MDS); and
- ANOSIM test 1-way layout (analysis of similarities - test for differences between groups of samples).

3.6 Limitations

Limitations of the survey are set out in Table 5 below.

Table 5: Limitations of the survey.

Survey Element	Limitations
1. Availability of contextual information at a regional and local scale	Some contextual information was available for flora and vegetation from broad regional studies, and from some detailed studies that were centred at Cooljarloo (about 15 km to the south-east) and extended up to the southern part of the Atlas survey area. Considerable past Threatened and Priority flora searching has been undertaken in the Cooljarloo area. There were no regional scale quadrat-based datasets, such as the SCP datasets, that include vegetation sites from the northern end of the SCP and therefore an appropriate regional statistical analysis could not be undertaken. The most extensive SCP dataset available is the 'Weed and native flora dataset for the Swan Coastal Plain' (DBCA, 2021c; Keighery *et al*., 2012). This dataset includes SCP site data for as far north as Lancelin and the Moore River ('southern SCP', after Keighery *et al*., 2012) and classified vegetation in that part of the SCP into Floristic Community Types (FCTs). Lancelin and the Moore River are about 50 km south of the Atlas survey area. Floristic variation in the vegetation on the SCP north of the Lancelin and the Moore River area (including the Atlas survey area) was not sampled and included in the FCT classification and may not fit into that classification. Nevertheless, PATN analysis was undertaken of Atlas survey area quadrats with the 'Weed and native flora dataset for the Swan Coastal Plain' dataset to see if there was some similarity of Atlas sites with 'southern SCP' FCTs.
2. Competency and experience of the team carrying out the survey, including experience in the bioregion surveyed	The lead consultant botanist for the survey has eighteen years of botanical survey experience and had undertaken previous botanical survey work in the Atlas survey area in 2011. He has undertaken other surveys in the northern SCP at Jurien Bay, Boonanarring, Bidaminna (on the north and south sides of Moore River), as well as along the Indian Ocean Dve road reserve as far north as Seabird. Kelli McCreery, Chris Hancock (quadrating) and Julia Mattner (rare flora searching) assisted with the botanical field work and all are experienced botanists.
3. Proportion of flora recorded and/or collected, any identification issues	Seventy eight quadrats were recorded in the survey area and it is estimated that more than 2000 specimen collections were made during the surveys. Computing species accumulation curves

Survey Element	Limitations
	suggest that the level of sampling was such that more than 90% of species are likely to have been recorded. A number of identification issues were encountered, but these were resolved by lodging a selection of specimens with the Western Australian Herbarium Identification Service. Generally, a major limitation of a flora survey is that any such survey is a sampling procedure of a variable environment with plant populations of variable growth habit, life span and flowering season. Some species, including annuals, are only observable for part of the year. This means that to locate all species that grow in an area is a substantial task, the success of which is related to the time available and the size and diversity of habitat in the survey area. Consequently, it is possible that there are species present in the survey area that were not recorded during this survey. However, this limitation was mitigated by conducting primary surveys during good Spring season and a supplementary survey and recording a substantial number of quadrats.
4. Was the appropriate area fully surveyed (effort and extent)	The survey area was fully surveyed.
5. Access restrictions within the survey area	The wet nature of parts of the survey area was a limiting factor in vehicle access in the MESA. Another related limitation was a self-imposed restriction of field work to dry soil conditions, as a Dieback precaution (a *Phytophthora cinnamomi* dieback survey had not been completed prior to the botanical survey). These limitations were not considered significant.
6. Survey timing, rainfall, season of survey	Most quadrats had at least one sampling before mid-October, in good Spring season. However, seven of the 78 quadrats were surveyed in the MESA on the 7,8th November 2020. All of these 7 sites were on or adjacent to the floodplain and the vegetation was in good seasonal condition at that time, with small annual plants present.
7. Disturbance that may have affected the results of survey such as fire, flood or clearing	There were no significant disturbance events that may have affected the results of the survey. It should be noted that for the 2019/2020 surveys, the survey area had been unburnt for a long time (estimated at more than 14 years). This would reduce the

Survey Element	Limitations
	chances of finding some species that germinate after fire. This is discussed with regard to particular species in the results section.
8. Use of 2011 Phase 1 quadrat data	This is not considered to be a limitation on the survey. The 2011 quadrats were marked at the four corners and the exact same area was able to be resampled (Phase 2) in good Spring conditions in early October 2020. There was no significant disturbance observed that could be attributed to the period between 2011 and the resampling time.
9. Vegetation mapping outside the survey area	The vegetation mapping outside the survey area was undertaken at a broader scale than the mapping inside the survey area. The assignment of survey area vegetation codes to vegetation outside that area was indicative and made by broad observation, and was not tested by floristic analysis. Some areas of vegetation were assigned very generic labels.
10. GDE assessment	The GDE assessments were made after referral to the literature and some discussions with peers. Detailed survey for determining GDE status were not undertaken, and the GDE determinations developed in this report should be regarded accordingly.

4.0 FLORA OF THE ATLAS SURVEY AREA

4.1 Flora list for the survey area

Four hundred and eighty seven (487) native plant taxa were recorded in the Atlas survey area, consisting of 485 species of native flowering plants, one native cycad (the Zamia Palm, *Macrozamia fraseri*) and one native conifer (the Swamp Cypress, *Callitris pyramidalis*) (Appendix 5). In addition, 87 non-native species (weed species) were recorded in the survey area. A list of species recorded in the Atlas survey area is shown in Appendix 5, with species marked according to the survey/survey area in which they were recorded. Four hundred and twenty two (422) native taxa were recorded in the MESA survey area.

The number of native taxa in flowering plant families that had the most native taxa in the Atlas survey area were:

- Forty eight (48) Myrtaceae (eucalyptus family) species (including twelve *Melaleuca* species);
- Thirty seven (37) Cyperaceae (sedge family) species (including seventeen *Schoenus* species);
- Thirty seven (37) Proteaceae (Banksia family) species;
- Twenty nine (29) Fabaceae (pea and *Acacia* family) species;
- Twenty eight (28) Asteraceae (daisy family) species;
- Twenty two (22) Orchidaceae species;
- Twenty one (21) Stylidiaceae (trigger plant family) species, (including nineteen *Stylidium* species);
- Twenty one (21) Haemodoraceae species;
- nineteen (19) Asparagaceae species;
- Sixteen (16) Restionaceae species;
- Fourteen (14) Poaceae (grass family) species, and
- Thirteen (13) Droseraceae (sundew family) species.
- Thirteen (13) Ericaceae species;

Four hundred and one (401) native species were recorded in the MESA survey area in the 2019-2021 surveys, which was considerably more than that recorded in the 2011 survey (297; Appendix 5). This was mostly due to a considerable increase in the number of quadrats recorded in the area, a second phase survey of all quadrats in good Spring season, and the addition of the survey areas south of Wongonderrah Rd and the access corridor on the western side.

Of the 422 native species recorded in the Atlas MESA area, approximately 415 were recorded in the southern bushland area (south of the cleared farmland). This is likely a moderate to large number for the size of that area (928 ha), reflecting the presence of the species-rich *Banksia* woodlands in the survey area and the diverse habitats and consequently, vegetation, found. The average species richness calculated from the MESA survey area sites (two phase sampling) (Table 6), was greatest for the *Banksia attenuata-Banksia menziesii* woodlands ('BaBm'), with an overall average of 56.9 species per quadrat. The *Banksia prionotes* ('Bp') vegetation was less species rich, with an average of 42.3 native species per MESA quadrat. The *Banksia telmatiaea* heaths ('BtRc'), on the gentle slopes around the floodplain and in some dampland areas amongst the *Banksia* woodlands, had an average of 32.8 native species per MESA quadrat. The *Melaleuca seriata* heath unit 'MsVdCaf', on some margins of the floodplain, had an average of 31.7 native species per quadrat and the *Callitris pyramidalis* tall shrubland unit 'CpBt' had an average of 40.3 native species per MESA quadrat. The samphire vegetation units had an average of 31.0 native species per MESA quadrat ('Ti') and 27.0 native species per quadrat ('TmThTs'). Vegetation units with quite low species numbers per quadrat were the *Eucalyptus rudis* Open Forest ('Er'; 8.0 native species per MESA quadrat); *Melaleuca rhaphiophylla* Tall Shrublands ('MrMt'; 19.6 native species per MESA quadrat) and the *Melaleuca viminea* subsp. *viminea-Melaleuca brevifolia* Tall Shrublands along the minor flow lines ('MvMb'; 13.7 native species per MESA quadrat). The lower species richness in these three vegetation units was due to wetland vegetation being typically less species rich, but was also due to the poor condition of these vegetation units ('Good to Degraded' and 'Degraded') due to high weed covers. This was in contrast to the 'Excellent' or better condition of most of the *Banksia* woodlands and the 'Very Good to Excellent' condition of most of the heath vegetation units. Species richness in the EISA quadrats (AIQ sites, Table 6) were similar to the MESA sites in the same vegetation units (Table 6).

Table 6: Numbers of native plant taxa recorded in quadrats*a*.

Quadrat	Total Nos taxa	Nos Native taxa	Nos of Weed taxa	Veg unit[a]	Quadrat	Total Nos taxa	Nos Native taxa	Nos of Weed taxa	Veg unit[a]
CQ1	65	59	6	BaBm	CNQ06	30	28	2	TmThTs
CQ2	31	8	23	MrMt	CNQ07	16	15	1	TmThTs
CQ3	20	9	11	Er	CNQ08	38	35	3	Bp
CQ4	65	61	4	BaBm	CNQ09	43	30	13	
CQ5	67	65	2	BaBm	CNQ10	58	51	7	CpBt
CQ6	36	24	12	BtRc	CNQ11	39	38	1	CpBt
CQ7	57	56	1	BaBm	CNQ12	37	32	5	CpBt
CQ8	59	58	1	BaBm	CNQ13	17	7	10	Er
CQ9	28	28	0	BtRc	CNQ14	52	50	2	BaBm
CQ10	53	47	6		CNQ15	52	52	0	BaBm
CQ11	38	35	3	BtRc	CNQ16	57	38	19	MrMt
CQ12	39	33	6	BtRc	CNQ17	60	47	13	Ms
CQ13	67	60	7	BaBm	CNQ18	48	40	8	MrMv
CQ14	29	10	19	MvMb	CNQ19	35	35	0	MsVdCaf
CQ15	45	36	9	BtRc	CNQ20	32	29	3	MsVdCaf
CQ16	69	51	18	MbGcVp	CNQ21	33	31	2	MsVdCaf
CQ17	55	33	22	Ti	CNQ22	20	10	10	MrMvBc
CQ18	34	28	6		CNQ23	40	24	16	MaMcu
CQ19	57	51	6	Bp	CNQ24	46	32	14	MaMcu
CQ20	51	38	13	TmThTs	CNQ25	17	10	7	MbTi
CQ21	66	61	5	BaBm	CSQ01	59	59	0	BaBm
CQ22	45	41	4	BtRc	CSQ02	55	54	1	
CQ23	62	58	4	BaBm	CSQ03	62	58	4	
CQ24	23	7	16	MvMb	CSQ04	52	45	7	MrHtBt
CQ25	41	41	0	Bp	CSQ05	55	55	0	BaBm
CQ26	58	42	16	MbGcVp	CSQ06	49	41	8	MrHtBt
CQ27	63	42	21	Ms	CSQ07	52	52	0	BaBm
CQ28	51	34	17	Ti	CSQ08	56	56	0	BaBm
CNQ01	54	52	2	BaBm					
CNQ02	30	13	17	MrMt					
CNQ03	38	26	12	Ti					

Quadrat	Total Nos taxa	Nos Native taxa	Nos of Weed taxa	Veg unit[a]	Quadrat	Total Nos taxa	Nos Native taxa	Nos of Weed taxa	Veg unit[a]
CNQ04	44	31	13	MbGcVp					
CNQ05	46	24	22	MvMb					
AIQ01	26	26	0	BtRc	AIQ10	40	30	10	CpBt
AIQ02	30	22	8		AIQ11	18	13	5	MrMvMco
AIQ03	59	59	0	BaBm	AIQ12	16	11	5	
AIQ04	26	25	1	BtRc	AIQ13	19	12	7	
AIQ05	41	41	0	Bp	AIQ14	36	26	10	
AIQ06	6	6	0	MrMtSl	AIQ15	28	19	9	
AIQ07	4	4	0	MrMtSl	AIQ16	74	64	10	AhAccHi
AIQ08	7	7	0	MrMtSl	AIQ17	57	51	6	BaBm
AIQ09	22	18	4						

[a] Quadrats that were considered in too poor a condition, ecotonal or unrepresentative of the norm were not given a vegetation code in this table.

4.2 Flora of conservation significance recorded in the survey area

4.2.1 Threatened Flora

No Threatened Flora were recorded in the survey area.

4.2.2 Priority Flora

Twenty three Priority species were recorded in the Atlas survey area, with twenty one Priority species recorded in the MESA and twelve Priority species in the EISA (Table 7). The distribution and counts of the flora of conservation significance in the Atlas survey area are shown in Figures 11 to 15 and Appendix 6.

The twenty three Priority taxa were:

Priority 1 taxa:

- *Grevillea* sp. Cooljarloo (B.J. Keighery 28 B)
- *Levenhookia preissii*

Priority 2 taxa:

- *Calectasia palustris*
- *Chordifex reseminans*
- *Lepyrodia curvescens*
- *Schoenus badius*

Priority 3 taxa:

- *Angianthus micropodioides*
- *Babingtonia urbana*
- *Conospermum scaposum*
- *Desmocladus nodatus*
- *Eryngium pinnatifidum* subsp. Palustre (G. J. Keighery 13459)
- *Hensmania stoniella*
- *Isopogon panduratus subsp. palustris*
- *Jacksonia carduacea*
- *Leucopogon* sp. Yanchep (M. Hislop 1986)
- *Schoenus pennisetis*
- *Stylidium aceratum*

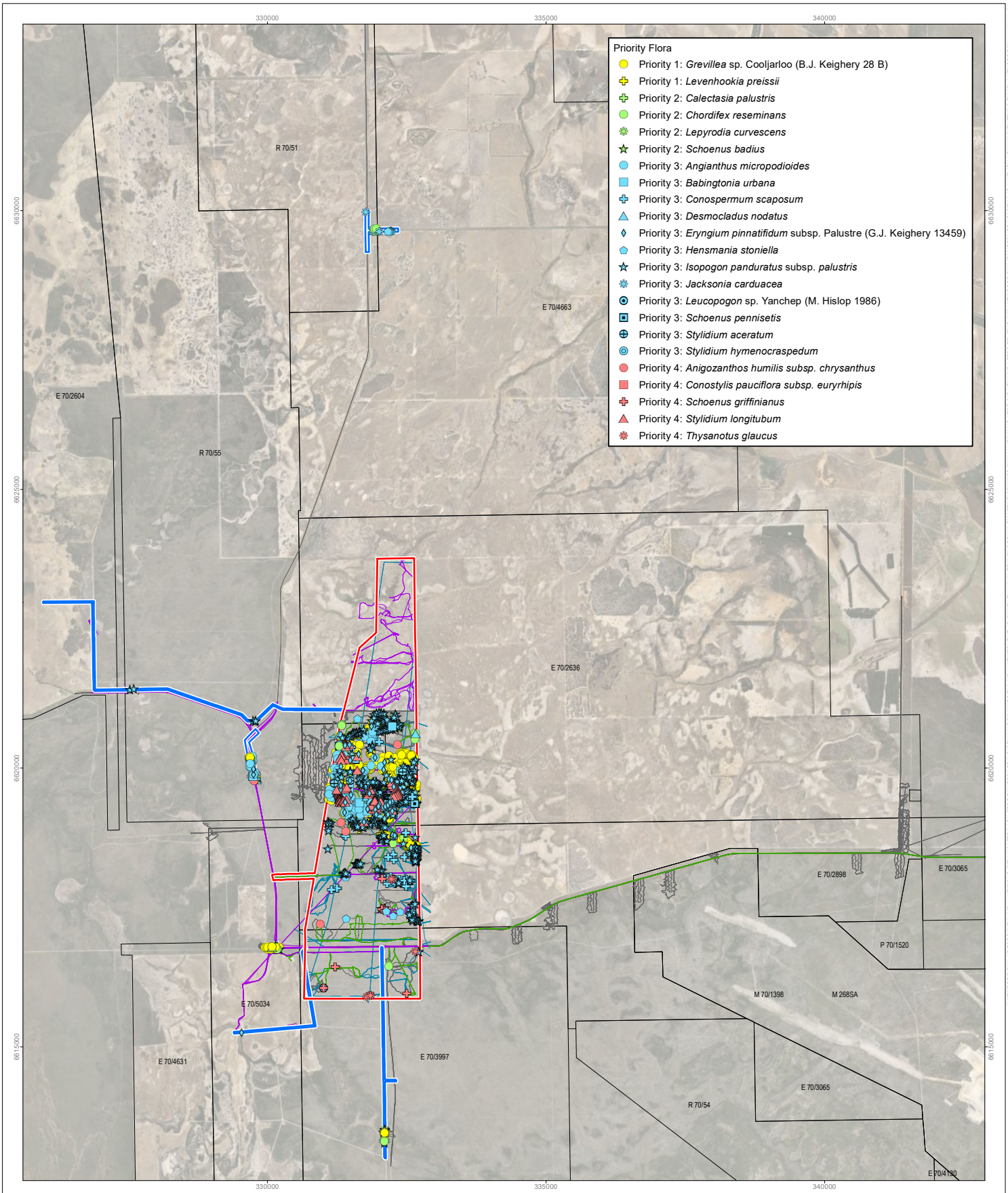
Priority 4 taxa

- *Anigozanthos humilis* subsp. *chrysanthus*
- *Conostylis pauciflora* subsp. *euryrhipis*

- *Schoenus griffinianus*
- *Stylidium hymenocraspedum*
- *Stylidium longitubum*
- *Thysanotus glaucus*

Table 7: Counts of species of conservation significance in the survey area and number of count locations.

Taxa	Consvtn Status	MESA		EISA	
		Number of count locations	Number of plants	Number of count locations	Number of plants
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	396	2405	28	165
Levenhookia preissii	Priority 1	6	30		
Calectasia palustris	Priority 2			2	3
Chordifex reseminans	Priority 2	20	151	18	170
Lepyrodia curvescens	Priority 2	1	1		
Schoenus badius	Priority 2	1	1		
Angianthus micropodioides	Priority 3	103	387,300	23	5911
Babingtonia urbana	Priority 3	47	832	6	10
Conospermum scaposum	Priority 3	100	1981	2	20
Desmocladus nodatus	Priority 3	27	164	5	8
Eryngium pinnatifidum subsp. Palustre (G. J. Keighery 13459)	Priority 3	39	1262	5	104
Hensmania stoniella	Priority 3	8	9	7	9
Isopogon panduratus subsp. *palustris*	Priority 3	318	2664	16	54
Jacksonia carduacea	Priority 3	1	1	3	3
Leucopogon sp. Yanchep (M. Hislop 1986)	Priority 3	1	1		
Schoenus pennisetis	Priority 3	3	14		
Stylidium aceratum	Priority 3	14	1164		
Stylidium hymenocraspedum	Priority 3	1	23		
Anigozanthos humilis subsp. *chrysanthus*	Priority 4	4	4	2	2
Conostylis pauciflora subsp. *euryrhipis*	Priority 4	1	1		
Schoenus griffinianus	Priority 4	8	21		
Stylidium longitubum	Priority 4	105	6068		
Thysanotus glaucus	Priority 4	9	11		



Legend

- 2021 October Track Log
- 2021 June Track Log
- 2020 Track Log
- 2019 Track Log

Flora and Vegetation Study Areas

- Mine Envelope Study Area
- External Infrastructure Study Area

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Scale: 1:65,000 @ A3

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- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

LOCALITY



Source: Orthophoto - Open Source Imagery

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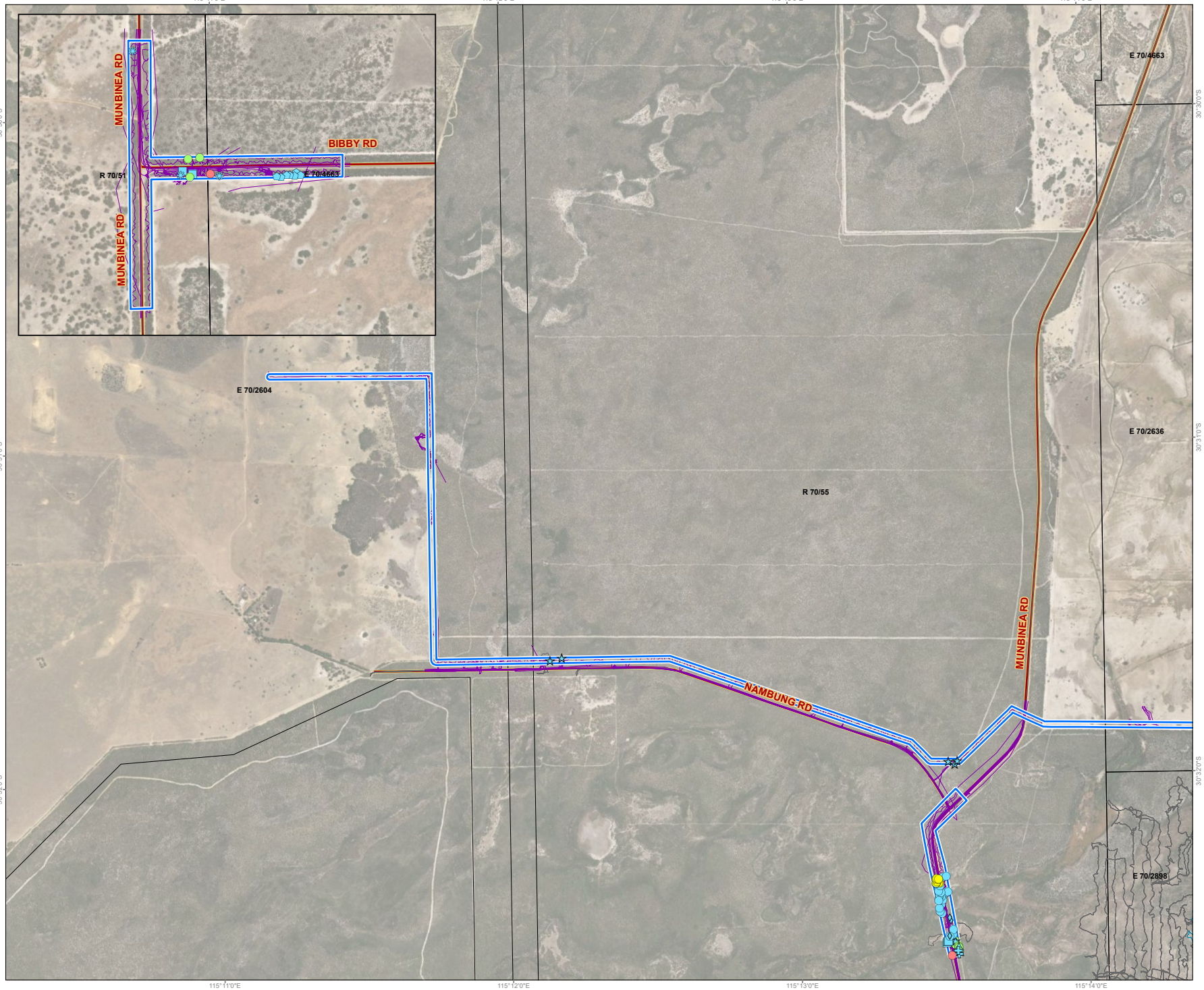
Figure 11: Significant flora locations in the Atlas Survey Area

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Legend

Flora and Vegetation Study Areas
- Mine Envelope Study Area
- External Infrastructure Study Area
- Tenement
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- 2021 June Track Logs
- 2020 Tack Logs
- 2019 Track Logs

Priority Flora
- Priority 1: *Grevillea* sp. Cooljarloo (B.J. Keighery 28 B)
- Priority 1: *Levenhookia preissii*
- Priority 2: *Calectasia palustris*
- Priority 2: *Chordifex reseminans*
- Priority 2: *Lepyrodia curvescens*
- Priority 2: *Schoenus badius*
- Priority 3: *Angianthus micropodioides*
- Priority 3: *Babingtonia urbana*
- Priority 3: *Conospermum scaposum*
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- Priority 3: *Jacksonia carduacea*
- Priority 3: *Leucopogon* sp. Yanchep (M. Hislop 1986)
- Priority 3: *Schoenus pennisetis*
- Priority 3: *Stylidium aceratum*
- Priority 3: *Stylidium hymenocraspedum*
- Priority 4: *Anigozanthos humilis subsp. chrysanthus*
- Priority 4: *Conostylis pauciflora subsp. euryrhipis*
- Priority 4: *Schoenus griffinianus*
- Priority 4: *Stylidium longitubum*
- Priority 4: *Thysanotus glaucus*

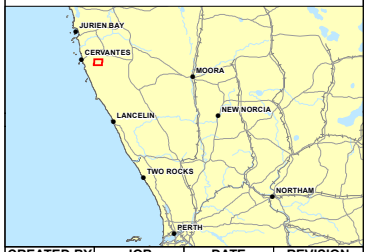
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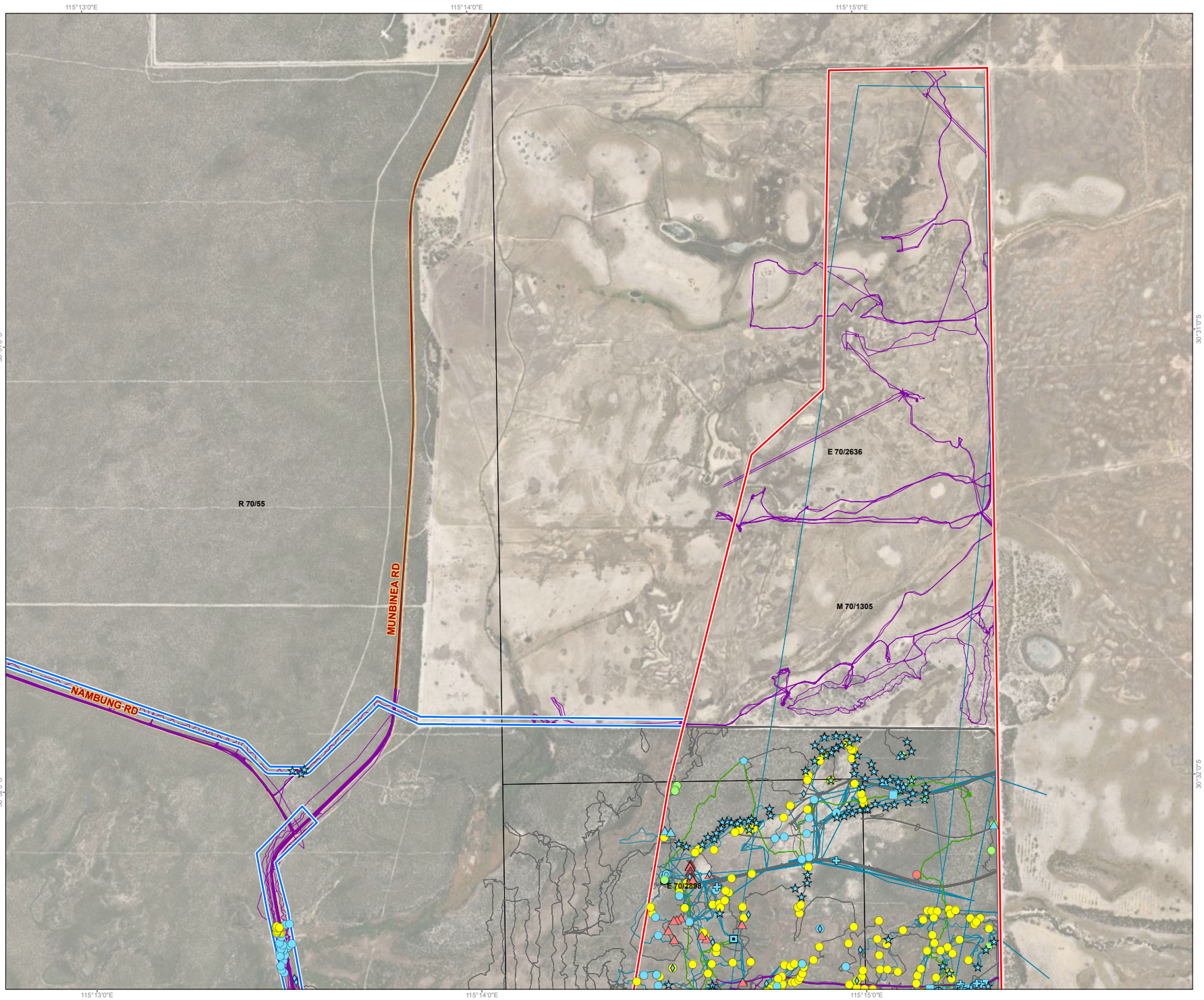


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Figure 12: Significant flora locations in the Atlas survey area – north-west

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Legend

Flora and Vegetation Study Areas
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Priority Flora
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- Priority 1: *Levenhookia preissii*
- Priority 2: *Calectasia palustris*
- Priority 2: *Chordifex reseminans*
- Priority 2: *Lepyrodia curvescens*
- Priority 2: *Schoenus badius*
- Priority 3: *Angianthus micropodioides*
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- Priority 3: *Conospermum scaposum*
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- Priority 4: *Stylidium longitubum*
- Priority 4: *Thysanotus glaucus*

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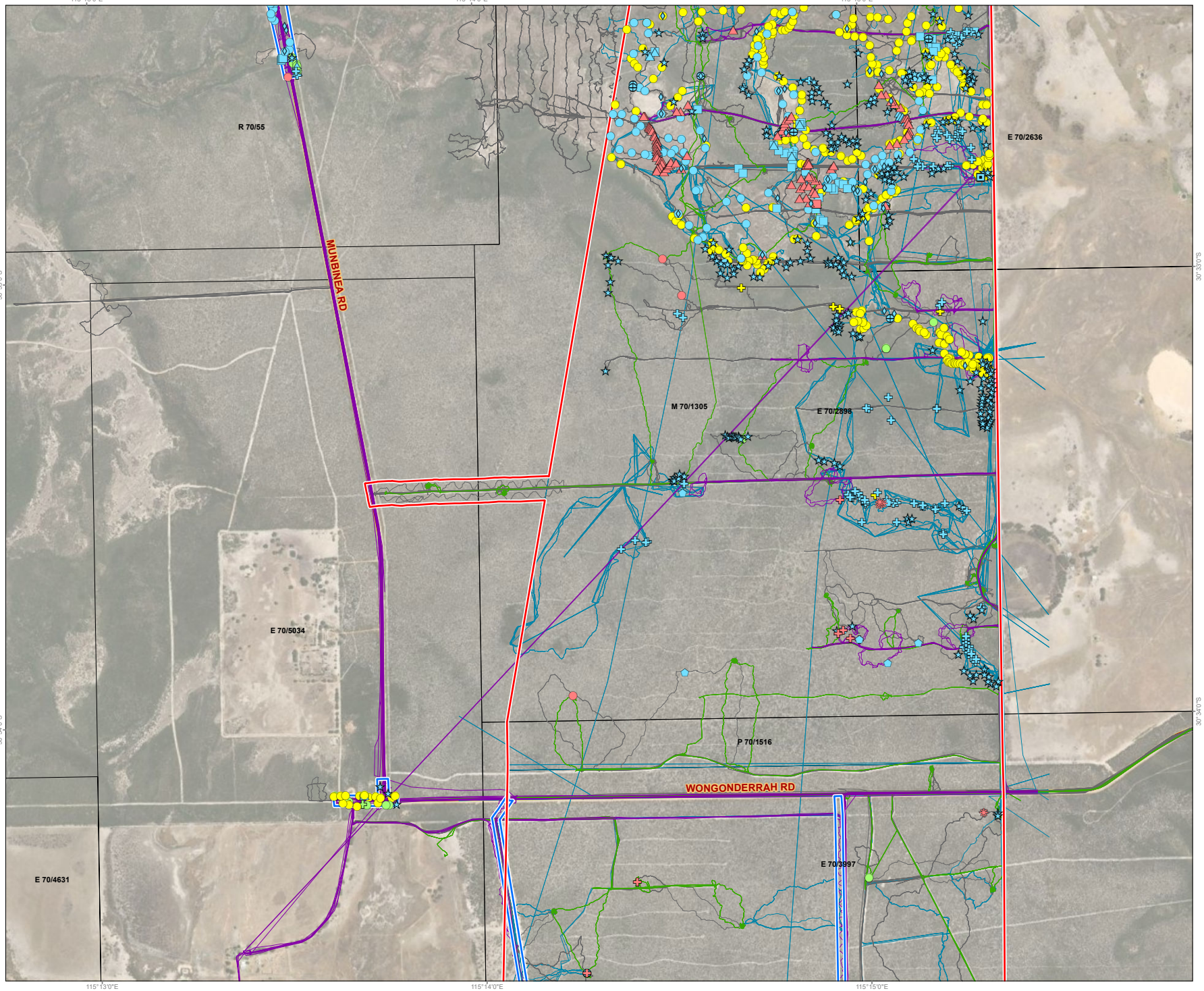
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Figure 13:
Significant flora locations in the Atlas survey area – north-east

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Legend

Flora and Vegetation Study Areas
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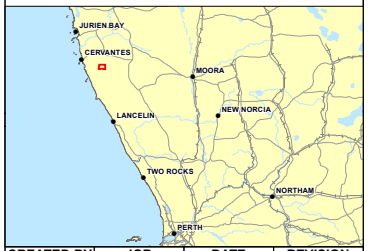
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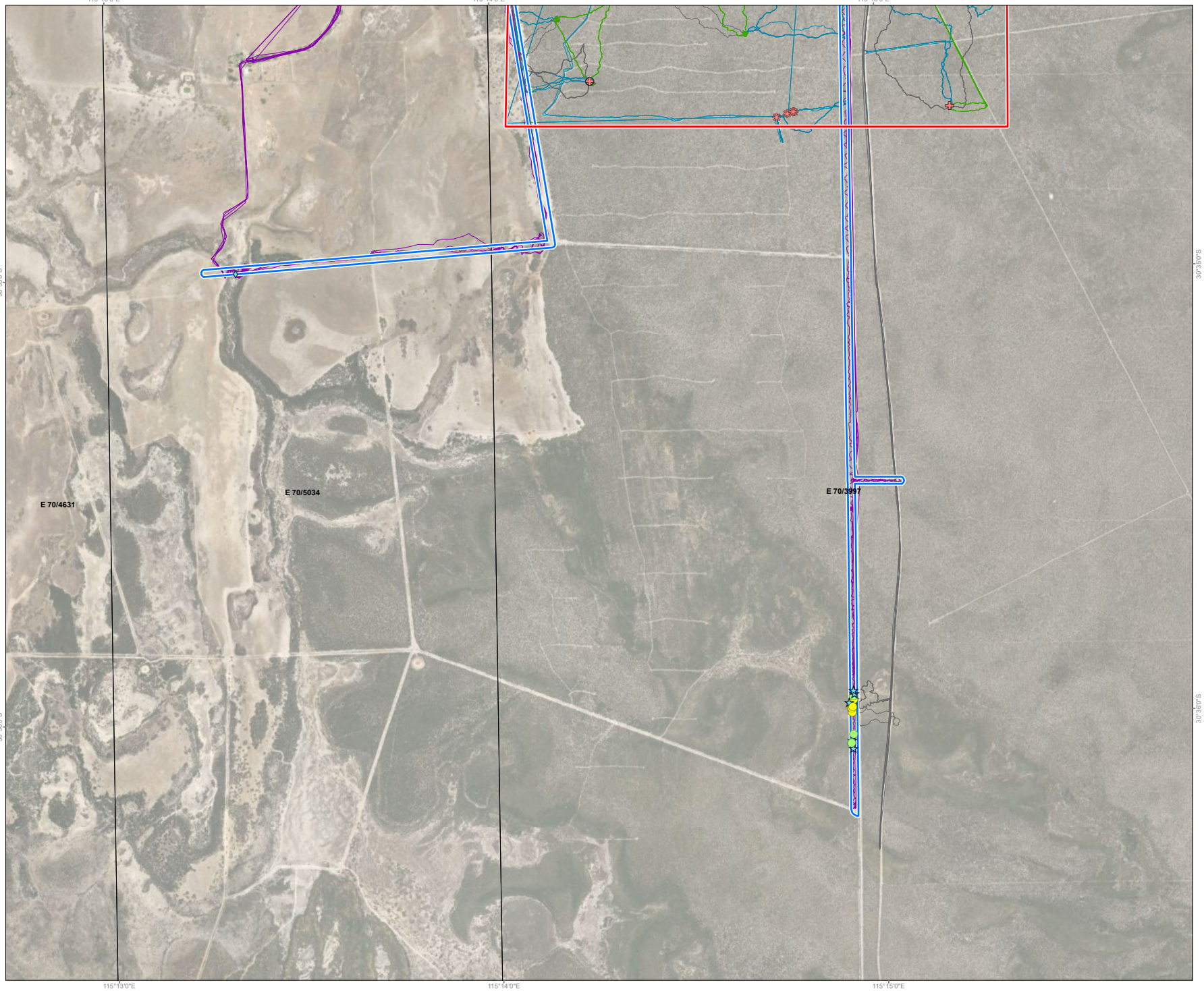
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Figure 14:
Significant flora locations in the Atlas survey area – central

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LOCALITY MAP



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Figure 15:
Significant flora locations in the Atlas survey area – south

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4.2.2.1 Priority One (P1) taxa

***Grevillea* sp. Cooljarloo (B.J. Keighery 28 B) (Priority 1)**

Grevillea sp. Cooljarloo (B.J. Keighery 28 B) is a low shrub generally growing to 50 to 60 cm in the survey area, with dissected leaves (Plates 3 and 4). It differs from *Grevillea thelemanniana* (Threatened; restricted to Perth and south-east of Perth) by having narrower, glabrous leaves and in several flower characters. The identification of a number of *Grevillea* sp. Cooljarloo (B.J. Keighery 28 B) specimen collections from the survey area were confirmed by the Western Australian Herbarium Identification Service.

Grevillea sp. Cooljarloo (B.J. Keighery 28 B) occurs in the MESA along the convoluted margins of the samphire floodplain and is mostly associated with *Melaleuca brevifolia* open shrublands that occur along those margins (see also Figure 13 and Figure 14). It also occurred along the flow areas on the floodplain. *Grevillea* sp. Cooljarloo (B.J. Keighery 28 B) plants were recorded at 396 locations within the MESA and 2,405 plants were counted at those locations (Table 7; Appendix 6). The locations included some vegetation sampling sites (quadrats, relevés and mapping notes), but are mostly records from extensive targeted searches in 2019 and 2020. Consequently, the total number of plants recorded would be expected to give a reasonable indication of the absolute numbers that might occur in the survey area.



Plate 3: *Grevillea sp. Cooljarloo (B.J. Keighery 28 B) (Priority* 1)



Plate 4: *Grevillea* sp. Cooljarloo (B.J. Keighery 28 B) (Priority 1), along Wongonderrah Rd and near the Atlas survey area

Grevillea sp. Cooljarloo (B.J. Keighery 28 B) was also recorded at 28 locations in the EISA corridors in similar habitat to those where it was recorded in the MESA (Figures 11 to 15)

***Levenhookia preissii* (Priority 1)**

Levenhookia preissii is an annual herb with pink flowers (Plate 5) that grows on grey or black, peaty sand in swampy areas (Paczkowska and Chapman, 2000). It occurs in two discrete areas on the Swan Coastal Plain: around the Perth area and around the Wongonderrah Rd area (FloraBase, Western Australian Herbarium, 2021).

In 2011 *Levenhookia preissii* was recorded at five locations in the survey area, in the heaths on the margins of the floodplain, with at least three of those records being from tracks or track verges (360 Environmental, 2012). Ten plants were recorded at one site and 16 plants at another (Appendix 6). A number of these locations were revisited in mid-October 2020, but *Levenhookia preissii* plants were not sighted at that time. However, on the 7th of November 2020, several plants were observed flowering in *Melaleuca seriata* heath on the margins of the floodplain. This was a new location for *Levenhookia preissii* in the survey area. The plants were small (less than 10 centimetres) and underneath thick heath cover and not easily observed. Several plants were also observed flowering on the 21st November 2020 on the margins of

Banksia telmatiaea heath on the south side of Wongonderrah Rd, outside the survey area.

The targeted searches of 2019 and 2020 were not successful in better defining the distribution of *Levenhookia preissii* in the survey area.



Plate 5: *Levenhookia preissii* (Priority 1) (image from FloraBase, Western Australian Herbarium, 2021).

4.2.2.2 Priority Two (P2) taxa

***Calectasia palustris* (P2)**

Calectasia palustris (Priority 2) is a stilt-rooted herb with stems to 70 cm high that grows on white or grey sands in seasonally inundated swamplands (Barrett and Dixon, 2001; Plate 6). It is known from a small number of locations between Cervantes and Coorow.

Calectasia palustris was recorded in the EISA on the Wongonderrah Rd verge near the intersection with Munbinea Rd (Figure 14). Three plants were found at two locations (Table 7). It was not recorded in the MESA.

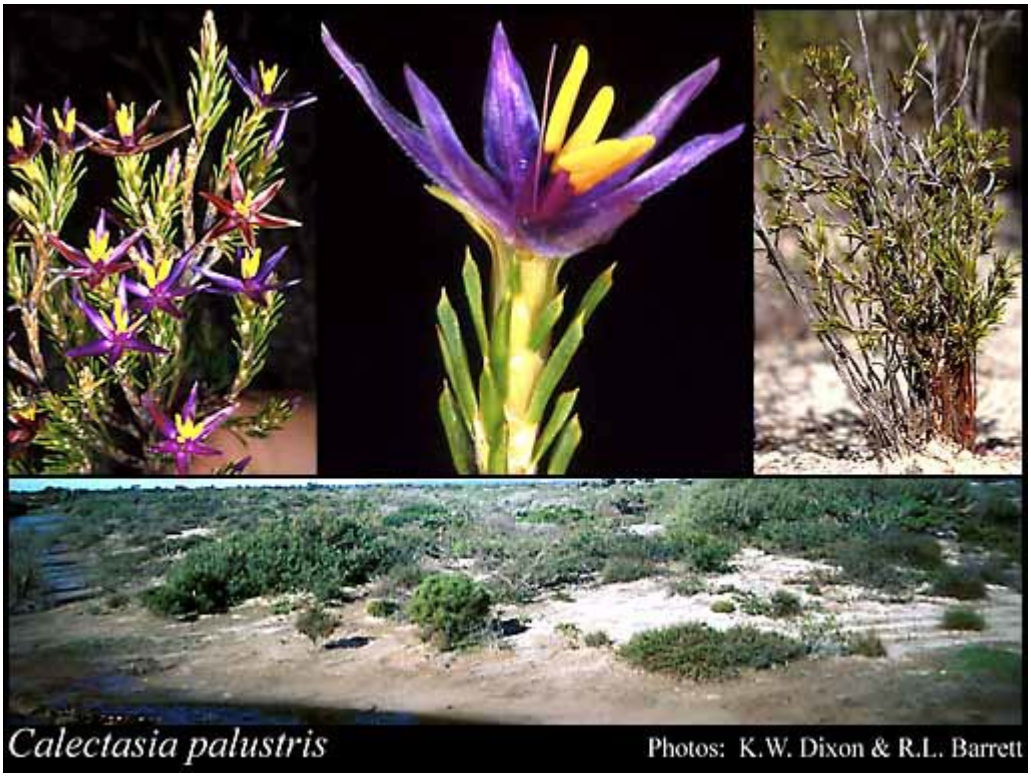


Plate 6: *Calectasia palustris* (Priority 2) (image from FloraBase, Western Australian Herbarium, 2021).

***Chordifex reseminans* (Priority 2)**

Chordifex reseminans is a tufted, erect plant (growing in a clump) with many densely packed, upright culms, or stems (Plate 7), and belongs to the Restionaceae family (sedge-like plants). It was growing to about 60 centimetres in the survey area. It was recorded in the *Banksia telmatiaea* heaths and related heath vegetation growing in dampland areas and on the gentle slopes around the floodplain.

It co-occurred in the survey area with the 'similar' looking and more common rush, *Chordifex sinuosus*. *Chordifex reseminans* can be differentiated from *Chordifex sinuosus* by having much denser clumps (short rhizomes), possessing more spikelets per culm and having purple-brown culm sheaths (less reliable) (Meney and Pate, 1999; M Hislop, Western Australian Herbarium, *pers. comm*.). A selection of specimens was submitted to the Western Australian Herbarium Identification Service and were confirmed as *Chordifex reseminans.*

One hundred and fifty one plants were recorded at twenty locations in the MESA and about 170 plants at eighteen locations in the EISA. *Chordifex reseminans* is not a species that is readily or easily observed in the field, as it is a fairly non-descript rush growing under fairly dense heaths. While the numbers recorded in the EISA are

likely to be a good estimate of the numbers in that survey area, *Chordifex reseminans* is likely to be far more abundant in the MESA survey area than the records reported here would suggest.

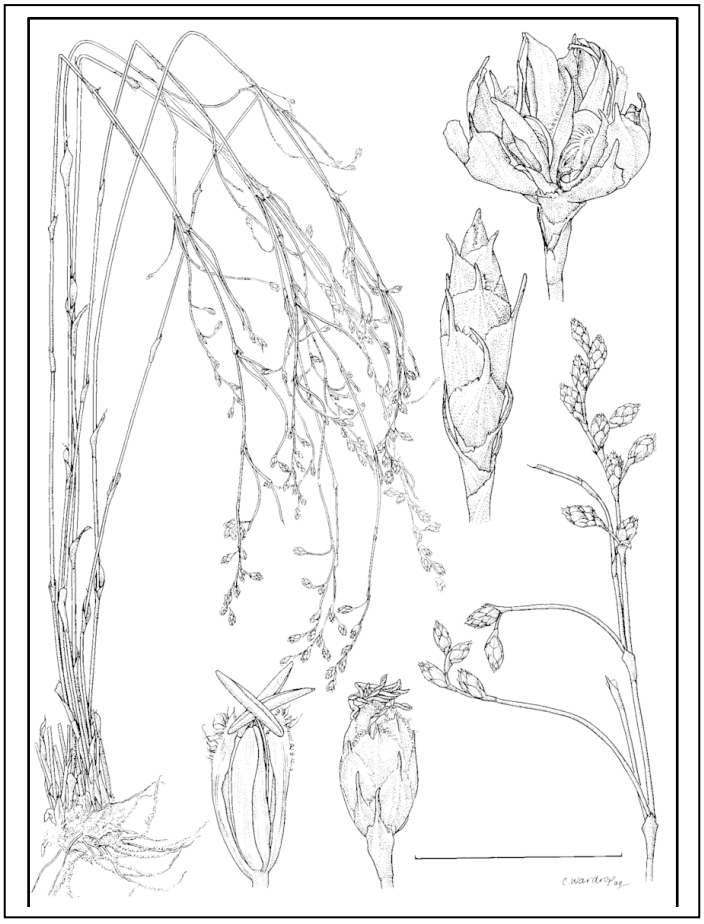


Plate 7: *Chordifex reseminans* (Priority 2) (from Briggs *et al*., 2004).

***Lepyrodia curvescens* (Priority 2)**

Lepyrodia curvescens is a rush that has separate male and female plants and grows in dense 'tufts' or clumps, with very short rhizomes. It grows to about 40 cm height and is has been found to occur in 'seasonally inundated swampland' (Western Australian Herbarium, 2021). It has been recorded at a number of locations extending from south of Perth on the Swan Coastal Plain to as far north as Enneaba.

One *Lepyrodia curvescens* plant was recorded in *Callitris pyramidalis*, *Banksia telmatiaea* closed heath in the MESA. A search around the quadrat failed to find any other *Lepyrodia curvescens* plants, and they were not observed elsewhere in the heaths. The distribution and abundance in the Atlas survey area is not well understood.

Schoenus badius (P2)

Schoenus badius is a slender, annual, grass-like sedge that grows to a height of between 5 and 12 cm, and is known to grow in grey sand in moist areas (Paczkowska and Chapman, 2000). It is known from the Geraldton Sandplains biogeographic region.

Schoenus badius was recorded during the 2011 survey from one location in the MESA area (quadrat CQ12) (360 Environmental, 2012), in *Banksia telmatiaea* heath (Figure 14, Appendix 6). However, in the 2019/2020 surveys, *Schoenus badius* was not collected from any of the sites and it was not observed during the Phase 2 resample of quadrat CQ12. However, *Schoenis pennisetus* was collected at four sites in that survey area during the 2019/2020 survey. *Schoenis pennisetus* looks very similar to *Schoenus badius* and is differentiated by its nut (microscopic) having a smooth surface (with numerous rows of tiny cells) and a rounded summit (Rye, 1997), when compared to the small projections on the surface of the *Schoenus badius* nut (Mike Hislop, Western Australian Herbarium Identification Service, *pers. comm.*). It is most likely that the *Schoenus badius* recorded in the 2011 survey was a misidentification of a *Schoenus pennisetus* (P3) specimen, however this has not been established. It is noted that a similar consideration seems to have occurred regarding a *Schoenus badius* record in the Cooljarloo surveys (Woodman Environmental Consulting, 2014).

4.2.2.3 Priority Three (P3) taxa

***Angianthus micropodioides* (Priority 3)**

Angianthus micropodioides is a small, erect, annual daisy that grows to a height of 3 to 15 cm (Western Australian Herbarium, 2021) (Figures 11 to 13; Plate 8 and Plate 9). It has been recorded on saline sandy soils on river edges, saline depressions and claypans. The identification of *Angianthus micropodioides* specimens from the survey area was confirmed by the Western Australian Herbarium Identification Service in 2012 and 2020.

Angianthus micropodioides occurred in large numbers over large parts of the samphire floodplain in the MESA. It grew where there was slightly elevated sand cover on the floodplain and generally did not occur in areas with high weed cover.

Angianthus micropodioides stands were opportunistically recorded at 103 locations in the MESA with an estimated 387,300 plants (Table 7; Appendix 6). It was also

recorded in the EISA in stands along the Munbinea Rd verge at the Nambung River crossing (Table 7).

***Babingtonia urbana* (Priority 3)**

Babingtonia urbana grew to between 40 to 80 (100) cm in the survey area and its surrounds (Figures 11 to 13; Plate 10 and Plate 11). It is associated with wetlands on the Swan Coastal Plain (SCP) and has been recorded between Cataby and Nambung and around the Perth region of the SCP (Rye, 2015; Western Australian Herbarium, 2021). It is differentiated from *Babingtonia delicata*, that grows in the Cataby area, by its continuous circle of stamens and its larger hypanthium, fruit, and flowers. Sterile specimens are more difficult to differentiate as the two species have similar leaves and leaf length.



Plate 8: *Angianthus micropodioides* (Priority 3).



Plate 9: *Angianthus micropodioides* (Priority 3)

Babingtonia urbana occurred in some parts of the heaths that surrounded the floodplain in the MESA. Larger stands were found associated with areas of *Melaleuca seriata* heaths near the margins of the floodplain. *Babingtonia urbana* did not seem to occur in large parts of the dense *Banksia telmatiaea* heaths. *Babingtonia* sp. was identified from a sterile specimen after the 2019 survey and its determination as *Babingtonia urbana* followed collection of flowering specimens in late December 2020. Some targeted and opportunistic searches for *Babingtonia urbana* in the MESA during the Spring of 2020 resulted in 47 stands being recorded and an estimated eight hundred and thirty two (832) plants counted (Table 7). More stands of *Babingtonia urbana* are likely to be present in the MESA than the records presented here suggest (Appendix 6). Ten *Babingtonia urbana* plants were recorded in the EISA at 6 locations located along the Munbinea Rd verge near the Nambung River crossing and on the Bibby Rd verge near the Munbinea Rd intersection (Figure 8b).



Plate 10: *Babingtonia urbana* (Priority 3), Atlas survey area, December 2020.



Plate 11: *Babingtonia urbana* (Priority 3)

Conospermum scaposum (P3)

Conospermum scaposum (Priority 3) is an erect shrub growing to approximately 50 to 60 cm, with upright basal leaves with a linear, flat blade on a long petiole (Plate 12 and Plate 13). It has small compound heads of small blue flowers (Plate 12). It occurs on the northern Swan Coastal Plain and inland from the Swan Coastal Plain.

It was recorded in the survey area on the margins of *Banksia* woodlands adjacent to the heaths and in some parts of the heaths. It was often recorded growing in small patches of many plants. It appeared to respond to disturbance, growing in numerous locations along old drill lines tracks. One thousand nine hundred and thirty one (1981) *Conospermum scaposum* plants were counted at 100 locations in the MESA (Table 7; Figure 11 to 13, Appendix 6). *Conospermum scaposum* was also recorded in the EISA at 2 locations on the eastern verge of Munbinea Rd just south of the Nambung River crossing.



Plate 12: *Conospermum scaposum* (Priority 3)



Plate 13: *Conospermum scaposum* (Priority 3)

***Desmocladus nodatus* (Priority 3) (formerly *Onychosepalum nodatum*)**

Desmocladus nodatus is a rush that grows in a dense tussock, generally under shrubs (Plate 14 and 15). It appeared to grow to approximately 20cm in the survey area. It is restricted to an area north and north-west of Cataby (Meney and Pate, 1999; Western Australian Herbarium, 2021).

Desmocladus nodatus was found in some parts of the *Banksia telmatiaea* heaths in the northern half of the MESA. It was usually well hidden under and at the base of shrubs and given the extent of the *Banksia telmatiaea* heaths in the survey area, it is likely to be more abundant and more widely spread than the search results suggest (Figures 11 to 15, Appendix 6). *Desmocladus nodatus* was recorded at 27 locations in the MESA (Table 7; Appendix 6), where one hundred and sixty four (164) plants were recorded at sampling sites and during targeted searches (Figures 13 to 15). It was also recorded at 5 locations in the EISA, one at the Wongonderrah Rd-Munbinea Rd intersection and four locations on the Munbinea Rd verge at the Nambung River crossing.



Plate 14: *Desmocladus nodatus* (Priority 3).



Plate 15: *Desmocladus nodatus* (Priority 3).

***Eryngium pinnatifidum* subsp. Palustre (G. J. Keighery 13459) (Priority 3)**

Eryngium pinnatifidum subsp. Palustre (G. J. Keighery 13459) is a herb that grows to 50 cm in winter wet areas and clay pans (Plate 16). It has been recorded between Cervantes and Mandurah.

Specimens from the EISA were identified by Mr Greg Keighery as *Eryngium pinnatifidum* subsp. Palustre (G. J. Keighery 13459). One hundred and four plants were counted at five locations in the EISA, one location at the Wongonderrah Rd-Munbinea Rd intersection and the other locations at the Nambung River crossing along Munbinea Rd and at the Frederick-Smith Creek, Nambung Station. Twelve hundred and sixty two *Eryngium pinnatifidum* subsp. Palustre (G. J. Keighery 13459) plants were recorded in the MESA, but due to confusion over the taxon's determination, this would be a significant underestimate. *Eryngium pinnatifidum* subsp. Palustre (G. J. Keighery 13459) was scattered over the MESA floodplain and was most abundant in the wetter parts of the floodplain.

Specimens of *Eryngium pinnatifidum* from the MESA were initially identified as *Eryngium pinnatifidum* subsp. *pinnatifidum* by the Herbarium Identification Service (HIS) and consequently records in the MESA, other than at quadrat and relevé sites, were limited. Following Greg Keighery's identification in 2021, the HIS was consulted again and subsequently amended their earlier identifications to *Eryngium pinnatifidum* subsp. Palustre (G. J. Keighery 13459), to make them consistent with Greg Keighery's. No formal description of *Eryngium pinnatifidum* subsp. Palustre (G. J. Keighery 13459) has been published.



Plate 16: *Eryngium pinnatifidum* subsp. Palustre (G. J. Keighery 13459) (Priority 3) (image from FloraBase, Western Australian Herbarium, 2021).

***Hensmania stoniella* (Priority 3)**

Hensmania stoniella is a small herb growing to about 20cm. It has small basal flowers and was flowering at the time of the surveys in 2011 and 2019 (Plate 17).

Hensmania stoniella was recorded in *Banksia attenuata*, *Banksia menziesii* woodlands north of Wongonderrah Rd in the MESA, and is most likely sparsely scattered around the margins of the *Banksia* woodlands and damplands in the survey area. Nine specimens were found at eight locations in the MESA (Table 7, Figures 11-15) and nine plants were also recorded in the EISA on the Bibby Rd verge at the Bibby Rd-Munbinea Rd intersection (Figure 12).



Plate 17: *Hensmania stoniella* (Priority 3).

***Isopogon panduratus* subsp. *palustris* (Priority 3)**

Isopogon panduratus subsp. *palustris* (Priority 3) (formerly *Ispopogon* sp. Badgingarra (A.S. George 14200)) is an erect shrub that grows to between 60 to 180 centimetres in the survey area. It has olive-green leaves that are incurved with a short, spiny tip (mucro) (Plate 18), with flowers borne in the leaf axils. It is restricted to the coastal plain from the Cooljarloo area, north-west of Cataby, to north-east of

Cervantes (Hislop and Rye, 2010). It grows in winter-wet areas in heathland communities.

In the survey area, *Isopogon panduratus* subsp. *palustris* was conspicuous in the *Banksia telmatiaea* heaths that occurred in small dampland flats and on the extensive gentle slopes on the margins of the floodplain. Two thousand six hundred and sixty four (2664) plants were counted at 318 locations in the MESA (Table 7; Figures 11-Figure 15, Appendix 6). Most of these were recorded during extensive targeted searches in 2019 and the total number gives a reasonable indication of the absolute numbers that might occur in the MESA. Fifty four plants were recorded at sixteen locations in the EISA (Table 7; Figures 11-15).



Plate 18: *Isopogon panduratus* subsp. *palustris* (Priority 3)

***Jacksonia carduacea* (Priority 3)**

Jacksonia carduacea is an erect shrub growing to about 50 cm (Plate 19). It occurs along the eastern margin of the northern end of the Swan Coastal Plain and further north, on the Geraldton Sand Plain (Western Australian Herbarium, 2021).

One plant was recorded at one site in the MESA, at quadrat CNQ19, located in *Melaleuca seriata* heath. While more plants may be present in the MESA, *Jacksonia*

carduacea would not be expected to be more than sparsely scattered in the survey area. Three plants were recorded in the EISA on the Bibby Rd verge at the Bibby Rd-Munbinea Rd intersection (Figure 12).

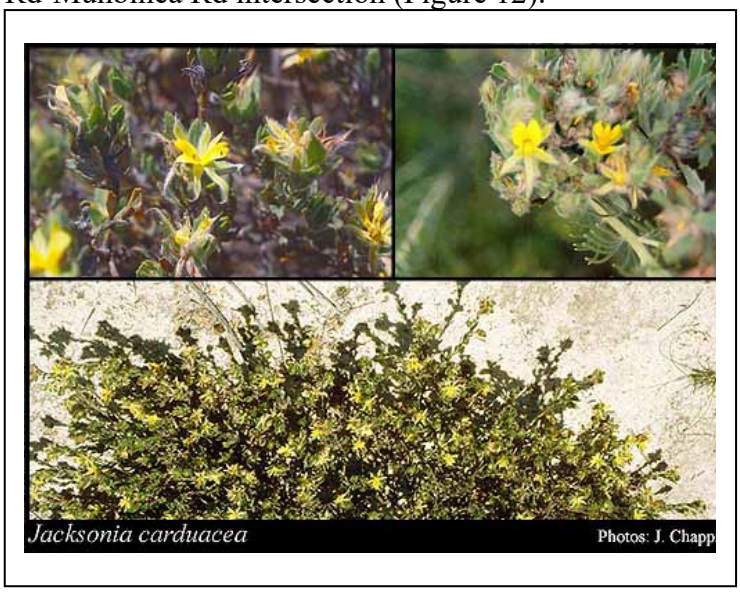


Plate 19: *Jacksonia carduacea* (Priority 3) (image from FloraBase, Western Australian Herbarium, 2021).

Leucopogon sp. Yanchep (M. Hislop 1986) (Priority 3)

Leucopogon sp. Yanchep (M. Hislop 1986) is an erect shrub that grows to 50 to 100 cm high (Plate 20). It occurs on the Swan Coastal Plain north of Perth. The area around Nambung would be at the northern end of its distribution.



Plate 20: *Leucopogon* sp. Yanchep (M. Hislop 1986) (Priority 3) (image from FloraBase, Western Australian Herbarium, 2021).

One plant was recorded at one location, quadrat CSQ02, in the MESA south of Wongonderrah Rd. CSQ02 was located in a small swale within a large area of *Banksia* woodland.

Schoenus pennisetis **(Priority 3)**

Schoenus pennisetis is a small annual sedge that grows to between 5 and 15 cm and is generally found in seasonally damp habitats (Western Australian Herbarium, 2021) (Plate 21). It was found at four different quadrats in the MESA during the 2019/2020 surveys; at two sites in *Callitris pyramidalis* tall open shrubland and at two sites in *Melaleuca seriata* heath, on the margins of the floodplain. Fourteen plants were observed in total.

Schoenus pennisetis is very similar to *Schoenus badius* (see section 4.2.2.2 above) and specimens were identified by the Western Australian Herbarium Identification Service. It is also a difficult plant to observe in the field as it was typically growing in small numbers. It is very slight and small and was found to be generally less than 10cm tall in the survey area. *Schoenus pennisetis* may therefore be considerably more abundant than numbers recorded in the survey area to date would suggest.



Plate 21: ***Schoenus pennisetis*** **(Priority 3).** This photo is of specimen CNQ17-43, collected at quadrat CNQ17 and measuring about 9cm in height.

***Stylidium aceratum* (Priority 3)**

Stylidium aceratum is an annual herb that grows to a height of 5 to 9 cm and occurs on sandy soils in swamp heathland (Paczkowska and Chapman, 2000; Plate 22). It is part of the *S. calcaratum* complex and differs from other species in the complex by having no appendage on the bend of the gynostemium (trigger) (A. Lowrie, *pers. comm*.). Another member of the *S. calcaratum* complex that occurred in the survey area was *Stylidium ecorne*, which has a hanging rectangular brush-like appendage on the bend of the gynostemium.

Stylidium aceratum was recorded at 14 dampland locations in the MESA where estimates were made of 1164 plants (Table 7; Figures 13 to 15, Appendix 6). These counts may be less accurate to the extent that specimens for verification weren't collected at all stands of *S. aceratum,* leaving open the possibility of confusion with *Stylidium ecorne*.



Plate 22: *Stylidium aceratum* (Priority 3). (Photo supplied by A. Lowrie).

***Stylidium hymenocraspedum* (Priority 3)**

Stylidium hymenocraspedum is a rossetted, perennial herb to 30 to 70 cm high (FloraBase, Western Australian Herbarium, 2021) (Plate 23). It grows on sand in heath, shrubland or *Banksia* and/or *Eucalyptus* woodland.

It was recorded near the north-west boundary of the bushland area of the MESA at quadrat CNQ10 and on and around the track nearby (Figure 13; Appendix 6). Twenty three plants were recorded in *Caliitris pyramidalis* open scrub and in the nearby *Banksia prionotes* woodland.



Plate 23: *Stylidium hymenocraspedum* (Priority 3).

4.2.2.4 Priority Four (P4) taxa

***Anigozanthos humilis* subsp. *chrysanthus* (Priority 4)**

Anigozanthos humilis subsp. *chrysanthus* occurs on the Swan Coastal Plain between Perth and Nambung. It is distinguished from *A. humilis* subsp *humilis* by a uniformly yellow flower 20-35mm long, and a longer scape to 40 cm (Hopper, 1987). Yellow specimens of *Anigozanthos humilis* in the survey area were conservatively identified as *Anigozanthos humilis* subsp. *chrysanthus*.

Four plants of *Anigozanthos humilis* subsp. *chrysanthus* were recorded at four sites in the MESA during the 2019/2020 survey. Three of the sites were yellow sand sites in *Banksia prionotes* Low Woodland and one site was in a grey sand site in *Banksia attenuata*, *Banksia menziesii* Low Woodland. One *Anigozanthos humilis* subsp.

chrysanthus plant was recorded at each of two locations in the EISA, one on the Bibby Rd verge at the Bibby Rd-Munbinea Rd intersection (Figure 12) and one along the Munbinea Rd verge near the Nambung River crossing (Figure 12).

Conostylis pauciflora **subsp.** ***euryrhipis*** **(Priority 4)**

Conostylis pauciflora subsp. *euryrhipis* is a herb growing to 20cm. It occurs on consolidated dunes on the Swan Coastal Plain from north of Perth to Jurien Bay.

One plant was recorded at one site in the MESA, CNQ19, which is a *Melaleuca seriata* heath site on the margins of the samphire flats.

Schoenus griffinianus **(Priority 4)**

Schoenus griffinianus is a small perennial herb that occurs on the Swan Coastal Plain north of Perth and on the Geraldton Sand Plain (FloraBase, Western Australian Herbarium, 2021). It is a small, non-descript sedge that is easily overlooked (Plate 24 and 25). A distinguishing feature is its flattened leaves (Wilson, 1997).



Plate 24: ***Schoenus griffinianus*** **(Priority 4).**

The highest specimen recorded in the survey area was 10cm high. *Schoenus griffinianus* was recorded at three quadrats in the MESA south of Wongonderrah Rd, all three sites being in *Banksia attenuata*, *Banksia menziesii* Low Woodland. Seventeen plants were subsequently recorded at 5 locations in the MESA north of

Wongonderrah Rd, on the margins of damplands (Figures 14 and 15). It is therefore likely to be sparsely scattered around the margins of *Banksia attenuata*, *Banksia menziesii* Low Woodland and adjacent damplands in the survey area.



Plate 25: *Schoenus griffinianus* (Priority 4).

***Stylidium longitubum* (Priority 4)**

Stylidium longitubum is an erect annual herb that grows to height of 5 to 12 cm (Plate 26 and Plate 27). It grows in seasonally wet areas along the length of the Swan Coastal Plain. *Stylidium longitubum* is distinguished by being an annual with no basal or apical rosette of leaves, having a pink corolla with a white centre and unequal corolla lobes.

Stylidium longitubum grew in some parts of the floodplain in the MESA and in some parts of the *Melaleuca* spp. shrublands fringing the floodplain, but generally did not occur in areas of high weed cover (Figures 13 to 15, Appendix 6). It was recorded in the earlier part of October 2020 but had 'died back' and was very difficult to recognize by early November 2020. *Stylidium longitubum* was recorded at 105 locations on the floodplains in the MESA from some targeted searches and opportunistic records. Six thousand and sixty eight (6068) plants were recorded in these stands. The search coverage of the suitable habitat areas for

Stylidium longitubum, while reasonable, was not complete and these counts while giving an indication of abundance, would therefore underestimate actual numbers.



Plate 26: *Stylidium longitubum* (P4).



Plate 27: *Stylidium longitubum* amongst other herbs in the Atlas survey area.

***Thysanotus glaucus* (Priority 4)**

Thysanotus glaucus is a perennial herb that grows to 20 cm (Plate 28).

Thysanotus glaucus was recorded opportunistically at nine locations in the MESA, six of which were south of Wongonderrah Rd. A total of 11 plants were recorded, with plants generally occurring as singles.

Thysanotus glaucus was recorded in the *Banksia attenuata*, *Banksia menziesii* Low Woodlands in the survey area. From the transects undertaken during the surveys it was concluded that *Thysanotus glaucus* is sparsely scattered in the *Banksia* woodlands in the survey area.



Plate 28: *Thysanotus glaucus* (P4). (Image sources from FloraBase, Western Australian Herbarium, 2021).

4.2.3 Plant taxa recorded at or near their range limits

Many of the native plant taxa recorded in the survey area were at the limits of their respective recorded ranges. This is not surprising as the survey area was at the very northern end of the Perth sub-region of the Swan Coastal Plain bioregion, as well as near the southern end of the Geraldton Sandplains bioregion.

Sixteen (16) of the taxa of Conservation Significance recorded in the survey area are at or near their range limits and are documented in section 6.1 below. Of the other flora at or near range limits, 26 taxa were at or near their northern range limits and 12 were at or near their southern range limits. These taxa are:

- Taxa at northern limit of range:
  - *Anigozanthos viridus* subsp. Cataby (S.D. Hopper 1786)
  - *Banksia ilicifolia;*
  - *Caladenia discoidea;*
  - *Comesperma virgatum;*
  - *Conostylis festucacea* subsp. *festucacea;*
  - *Daviesia incrassata* subsp. *incrassate;*
  - *Drosera closterostigma;*
  - *Epilobium hirtigerum;*
  - *Geranium solanderi;*
  - *Hibbertia sericosepala;*
  - *Hibbertia stellaris;*
  - *Hypolaena pubescens;*
  - *Kingia australis;*
  - *Leucopogon sprengelioides;*
  - *Lyginia barbata;*
  - *Melaleuca cuticularis;*
  - *Microtis alboviridis*
  - *Schoenus elegans*
  - *Schoenus laevigatus;*
  - *Stylidium schoenoides;*
  - *Styphelia propinqua;*
  - *Tecticornia moniliformis;*
  - *Thysanotus multiflorus;*
  - *Thysanotus tenellus;*
  - *Tricostularia neesii;* and
  - *Triglochin minutissima.*

- Taxa at southern limit of range:
  - *Drosera humilis;*
  - *Acacia dilatata;*
  - *Acacia spathulifolia;*
  - *Conostylis aculeata* subsp. *breviflora;*
  - *Drosera minutiflora;*

- *Eremaea beaufortioides var. beaufortioides;*
- *Jacksonia hakeoides;*
- *Petrophile megalostegia;*
- *Scholtzia umbellifera;*
- *Stenopetalum pedicellare;*
- *Stylidium kalbarriense;* and
- *Thysanotus teretifolius.*

4.2.4 Other species of interest recorded in the survey area

A *Verticordia* that had a similar appearance to the Priority 4 species *Verticordia lindleyi* subsp. *lindleyi,* was seen in the survey area and also south of Wongonderrah Rd outside the survey area. However, these plants had characters that appeared to be a mix of characters from the taxa *Verticordia lindleyi* subsp. *lindleyi* and *Verticordia blepharophylla*. *Verticordia blepharophylla* is distinguished by its fimbriate petals with 'fine segments more than 1mm long', compared to the entire to shortly dentate petals of *Verticordia lindleyi* (George, 2002). Furthermore, *Verticordia blepharophylla* has 'leaves with prominent cilia to 1mm' compared to the shortly ciliate leaves of *Verticordia lindleyi*. Some specimens collected from the Atlas area had petal fimbria that were more than 1mm long, but the leaves had short 'cilia' on the margins. George (2002) did note that *Verticordia blepharophylla* 'appears to have hybridized with *Verticordia lindleyi* subsp. *lindleyi'* at the southern end of its range. These specimens were confirmed as '*Verticordia lindleyi* x *V. blepharophylla*' by the Western Australian Herbarium Identification Service (March 2021). It should be noted that *Verticordia blepharophylla* was also recorded in the Atlas survey area.

Aphelia cyperoides is a small herb found growing to approximately 2 to 5 cm in the survey area. It was recorded during the 2020 survey in heaths adjacent to the floodplain and under a patch of *Melaleuca* shrubland on the edge of a sumpland. Its distribution is shown on Florabase as extending as far north as about the area around Gingin. However, Woodman Environmental Consulting have listed *Aphelia cyperoides* in their Cooljarloo surveys (2014). *Aphelia cyperoides* has most likely been under-recorded in the past due to its small size and annual life cycle.

Calytrix flavescens (the typical form) was recorded in the *Banksia* woodlands in the survey area. A very similar plant that was recorded on the margins of the floodplain and in particular, in *Melaleuca seriata* heaths, was referred to as *Calytrix* aff. *flavescens*. As well as having a distinct and different habitat to the typical form of *Calytrix flavescens*, *Calytrix* aff. *flavescens* was a larger shrub (to 60cm), had an

indumentum of dense, short, white hairs on the branchlets, and broader leaves. The Western Australian Herbarium Identification Service is aware of the entity referred to here as *Calytrix* aff. *flavescens* (Mike Hislop, *pers. comm*.) and work is anticipated in the future to review its status.

Two collections were made of a sterile *Schoenus*, referred to in this report as *Schoenus* sp. Mike Hislop (Western Australian Herbarium Identification Service; *pers. comm*.) has seen another specimen from this region which appears to be the same taxa. No flowering material has been sighted and collections of flowering/fruiting material will need to be made before the identity of this *Shoenus* can be determined.

The *Callitris* sp. in the survey area was referred to as *C. arenaria* in the 2011 survey report (360 Environmental, 2012), however, specimens collected in the 2019 survey were reviewed and identified as *C. pyramidalis* and this determination has been confirmed by the Western Australian Herbarium Identification Service.

Eucalyptus rudis (Flooded Gum) occurs in a small area in the MESA (vegetation unit 'Er'). The Atlas survey area is at about the northern-most extent of the range of *Eucalyptus rudis* and at about the southern most extent of the range of the related taxa *Eucalyptus camaldulensis* (River Red Gum). Hybridisation of these taxa has been reported in this region of overlap and it is possible that the *Eucalyptus rudis* reported in the survey area was in fact a *Eucalyptus rudis x Eucalyptus camaldulensis* hybrid.

4.2.5 Post-survey comments on database search results and likelihood of occurrence

4.2.5.1 Fire history and fire responsive species listed in the Protected Matters Search

The Atlas survey area was assessed as being long unburnt, with no fire thought to have occurred in the area for more than 12 years. The fact that the area has not been burnt for a long time would diminish the likelihood of finding species that respond to fire by germination, resprouting and flowering. This particularly applies to the following species that were listed in the Protected Matters search (see Appendix 1):

- *Macarthuria keigheryi* (Threatened (E)): thought to respond to fire (Lepschi, 1996; NACC, 2021; G. Keighery, *pers. comm*.);
- *Paracaleana dixonii* (Threatened (E)): flowering reportedly more prolific after summer fire (NACC, 2021). Reported from the Cooljarloo area, but not

recorded by Western Botanical (2014) during targeted searches of the Cooljarloo West area and surrounding Reserves in 2013; and,

- *Anigozanthos viridis* subsp. *terraspectans* (Threatened vulnerable): a 'short-lived, post-fire opportunist' that 'responds vigorously to summer fire' (Hopper, 1993).

4.2.5.2 Post-survey comments on likelihood of occurrence of particular species of conservation significance that are known to occur in the locality

Some post-survey comments on the likelihood of occurrence of some taxa listed from the database searches (Table 1) that were not recorded during the survey:

- *Andersonia gracilis* (Threatened (E): *Andersonia gracilis* has been recorded on the south side of Wongonderrah Rd east of the survey area, in the heaths on palusplain wetlands. Palusplain habitat in the Atlas survey area is limited, although the area of heaths is extensive. The likelihood of occurrence in the survey area remains 'moderate';
- The DBCA record of *Myriophyllum muelleri* in the survey area (Table 1, Figure 7) is likely to be an erroneous record or location as it is an aquatic annual plant that is found in lagoons (FloraBase, DBCA website), but its DBCA-listed location in the survey area is shown in an area of *Banksia attenuata, Banksia menziesii* low woodland. It is possible that it was recorded from the dampland north-east of its currently plotted location (Figure 7);
- *Paracaleana dixonii* (T) (Pre-survey likelihood: 'Low to Moderate') - Has been recorded at Cooljarloo, but that site was visited during the Atlas surveys (2021) and the habitat and associated shrublands at that site do not occur in the Atlas survey area. Searches undertaken in the MESA in 2021 did not find *P dixonii* and the MESA *Banksia* woodlands and heaths were not considered likely habitat for the orchid. Post-survey conclusion: Likelihood Low.
- *Eremophila glabra subsp. chlorella* (T) (Pre-survey likelihood: ' Moderate') – Known location east of the MESA and south of Wongonderrah Rd was revisited during the survey in 2021 (plants not seen). The *Melaleuca* dampland areas it is thought to prefer are mostly very weedy and in poor condition in the MESA and tend to occur on the saline flood plain in the MESA. Post-survey conclusion: Likelihood Low to Moderate.
- *Drakaea elastic* (T): (Pre-survey likelihood: 'Low') –most northerly known location is between Reagan's Ford and Cataby and is an outlier. Preferred habitat is low lying areas and often with *Kunzea glabrescens* and *Banksia ilicifolia*. *Banksia attenuata, Banksia menziesii* woodlands and the heaths in

the Atlas survey area not considered suitable habitat. Post-survey conclusion: Likelihood Very Low.

- *Macarthuria keigheryi* (T): Targeted searching undertaken of margins of *Banksia attenuata*, *Banksia menziezii* low woodlands around dampland heaths and floodplain heaths. *Macarthuria keigheryi* was not found during the searches.

4.3 Flora of Conservation Significance Recorded Outside the Survey Area

The number of recording points and the counts of species of conservation significance recorded outside the survey area, are shown in Table 8. Appendix 7 includes a list of all records of species of conservation significance from outside the survey area (also Figures 16 to 20).

Table 8: Counts of species of conservation significance recorded outside the survey area.

Taxa	Conservation Status	Number of count locations	Number of plants
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	271	2987
Levenhookia preissii	Priority 1	1	2
Calectasia palustris	Priority 2	1	20
Chordifex reseminans	Priority 2	107	1390
Angianthus micropodioides	Priority 3	148	807,800
Babingtonia urbana	Priority 3	234	6666
Conospermum scaposum	Priority 3	6	55
Desmocladus nodatus	Priority 3	217	6646
Isopogon panduratus subsp. *palustris*	Priority 3	295	4889

Species of conservation significance that were recorded in *Banksia* woodlands in the survey area were not targeted during these searches as they appear to be mostly sparsely scattered in that habitat. Searches in the locality outside the survey area focused on the following habitats:

- Samphire flats (floodplains) (mostly immediately west of the survey area and further west in the Nambung NP and adjacent to the Nambung National Park);

- *Banksia telmatiaea* heaths and other heaths on palusplains (east of the survey area on mostly the south side of Wongonderrah Rd, up to and including Yerramullah Rd); and
- The margins of the samphire flats and along minor drainage lines and flow areas and flood banks that occurred on parts of the palusplains.

The palusplain heath was the most abundant of these habitats, and sample transects in the palusplain heaths recorded: *Isopogon panduratus* subsp. *palustris* (P3)*, Desmocladus nodatus* (P4)*, Babingtonia urbana* (P3) and *Chordifex reseminans* (P2) (Figures 16 to 20). *Grevillea* sp. Cooljarloo (B.J. Keighery 28 B) was also recorded in the palusplain heaths, on minor drainage areas, flow areas and flood banks. The samphire floodplain habitat was not common, with the one large area searched being immediately to the west of the survey area (Figures 16 and 17). *Angianthus micropodioides* was found on the floodplain and *Grevillea* sp. Cooljarloo (B.J. Keighery 28 B) was found around the margins of the floodplain.

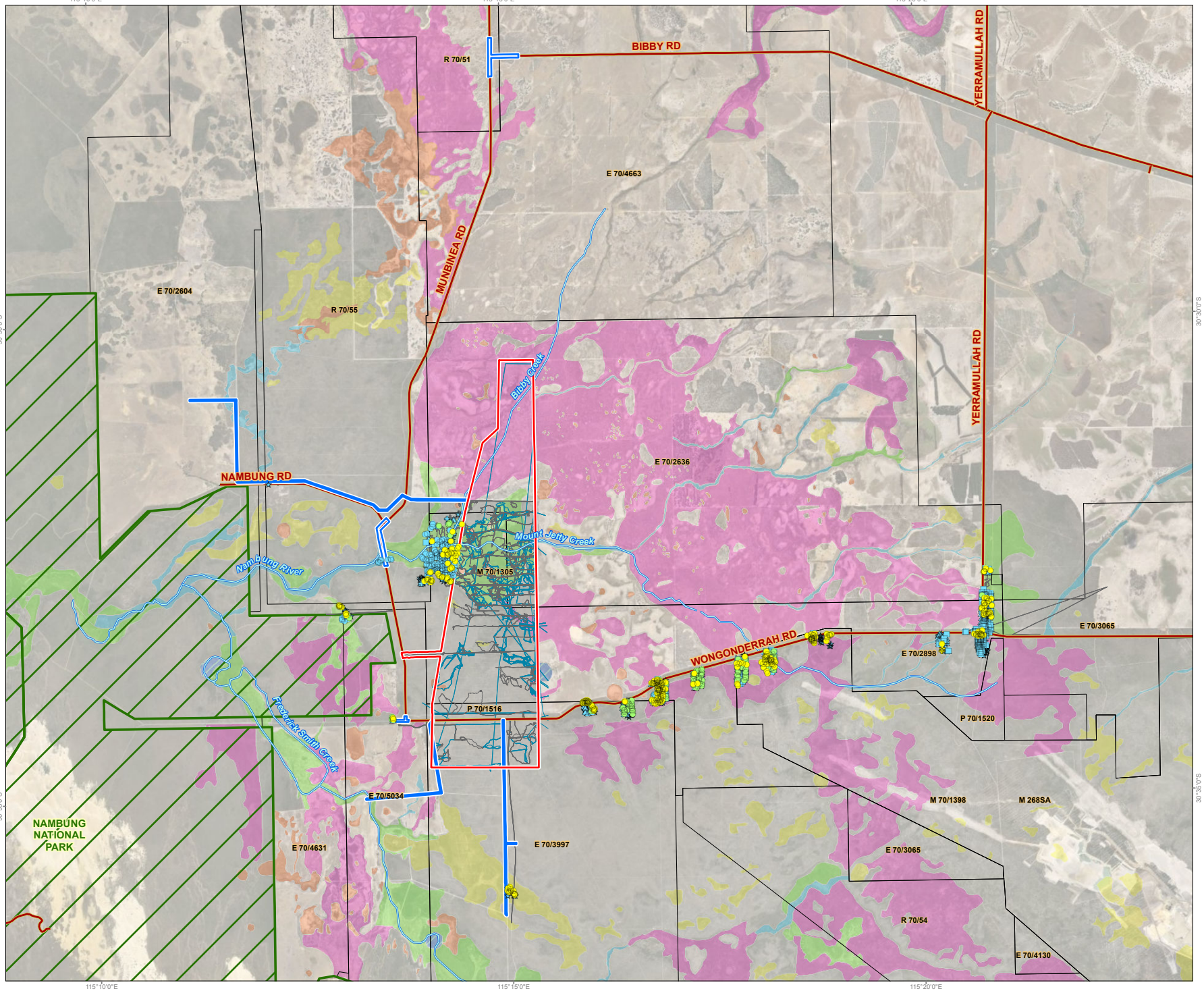
Large numbers of *Angianthus micropodioides, Grevillea* sp. Cooljarloo (B.J. Keighery 28 B), *Isopogon panduratus* subsp. *palustris, Desmocladus nodatus, Babingtonia urbana* and *Chordifex reseminans* were recorded during the targeted searches outside the survey area (Table 8). *Calectasia palustris* was also recorded outside the Atlas survey area. Shrubs resembling *Verticordia lindleyi* subsp. *lindleyi* were recorded south of Wongonderrah Rd, but were subsequently identified as a hybrid *Verticordia lindleyi* x *V. blepharophylla* (section 4.2.4).

4.4 Weeds recorded in the survey area

None of the sixty eight (87) weed species recorded in the survey area are listed as Weeds of National Significance (WONS) (Weeds Australia, 2021).

A search of the Western Australian Organism List database (Department of Primary Industries and Regional Development, 2021) found one Declared Pest under the *Biosecurity and Agriculture Management Act 2007* (BAM Act) - one leaf Cape Tulip (**Moraea flaccida*). Legal Status: Declared Pest S22(2). Keeping Category: Exempt. **Moraea flaccida* was recorded on the farmland in the northern part of the MESA and in dampland areas in the EISA corridors, including at the Nambung River crossing.

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Legend

Flora and Vegetation Study Areas
- Mine Envelope Study Area
- External Infrastructure Study Area
- Tenement
- Nambung National Park
- Watercourse
- 2020 Tack Logs
- 2019 Track Logs

Priority Flora
- Priority 1: *Grevillea* sp. Cooljarloo (B.J. Keighery 28 B)
- Priority 1: *Levenhookia preissii*
- Priority 2: *Calectasia palustris*
- Priority 2: *Chordifex reseminans*
- Priority 3: *Angianthus micropodioides*
- Priority 3: *Babingtonia urbana*
- Priority 3: *Conospermum scaposum*
- Priority 3: *Desmocladus nodatus*
- Priority 3: *Isopogon panduratus subsp. palustris*

Geomorphic Wetlands
- Palusplain
- Sumpland
- Dampland
- Floodplain
- Creek
- Lake

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- TENURE SOURCED DMRS
- WETLANDS SOURCED DBCA
- AERIAL PHOTOGRAPHY OPEN SOURCE

Preston Consulting

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km
Scale: 1:70,000 @ A3

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LOCALITY MAP

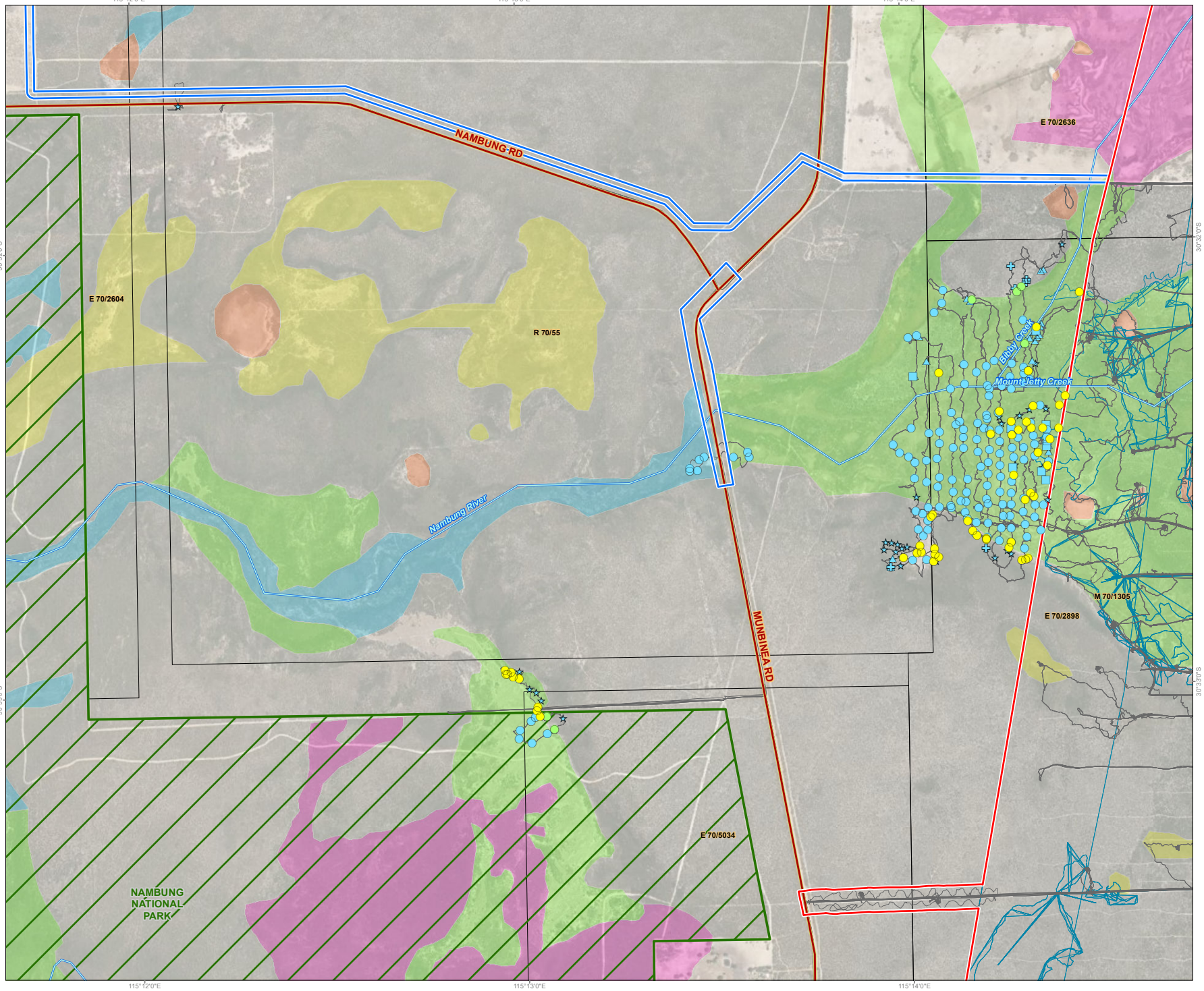


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Figure 16:
Flora of conservation significance recorded from searches outside the survey area

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Priority Flora
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- AERIAL PHOTOGRAPHY OPEN SOURCE

Preston Consulting

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metres

Scale: 1:15,000 @ A3

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LOCALITY MAP

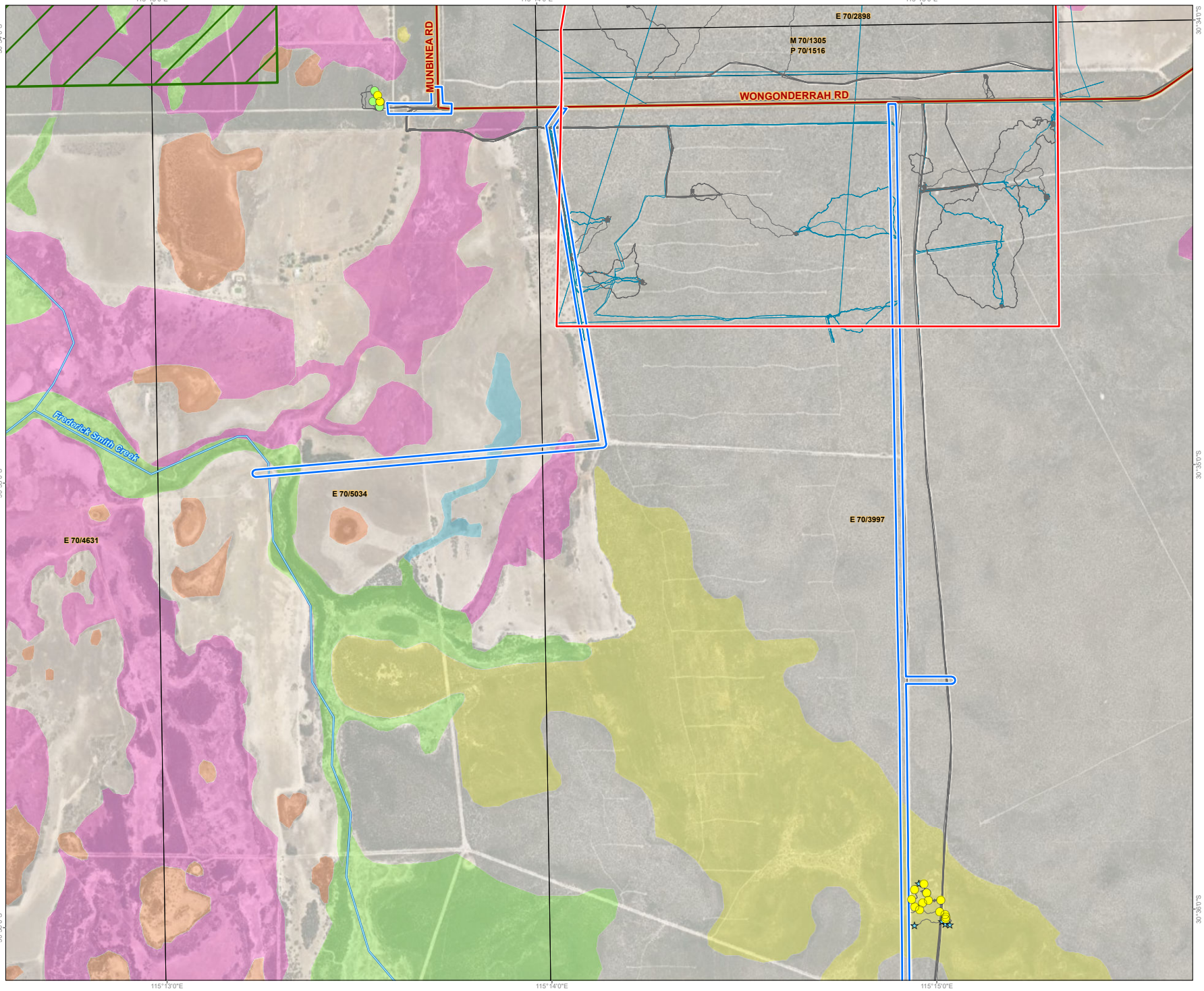


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Figure 17:
Flora of conservation significance recorded from searches outside the survey area (west)

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Legend

Flora and Vegetation Study Areas
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- 2020 Tack Logs
- 2019 Track Logs

Priority Flora
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- Priority 1: *Levenhookia preissii*
- Priority 2: *Calectasia palustris*
- Priority 2: *Chordifex reseminans*
- Priority 3: *Angianthus micropodioides*
- Priority 3: *Babingtonia urbana*
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Geomorphic Wetlands
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- AERIAL PHOTOGRAPHY OPEN SOURCE

Preston Consulting

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metres

Scale: 1:15,000 @ A3

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LOCALITY MAP

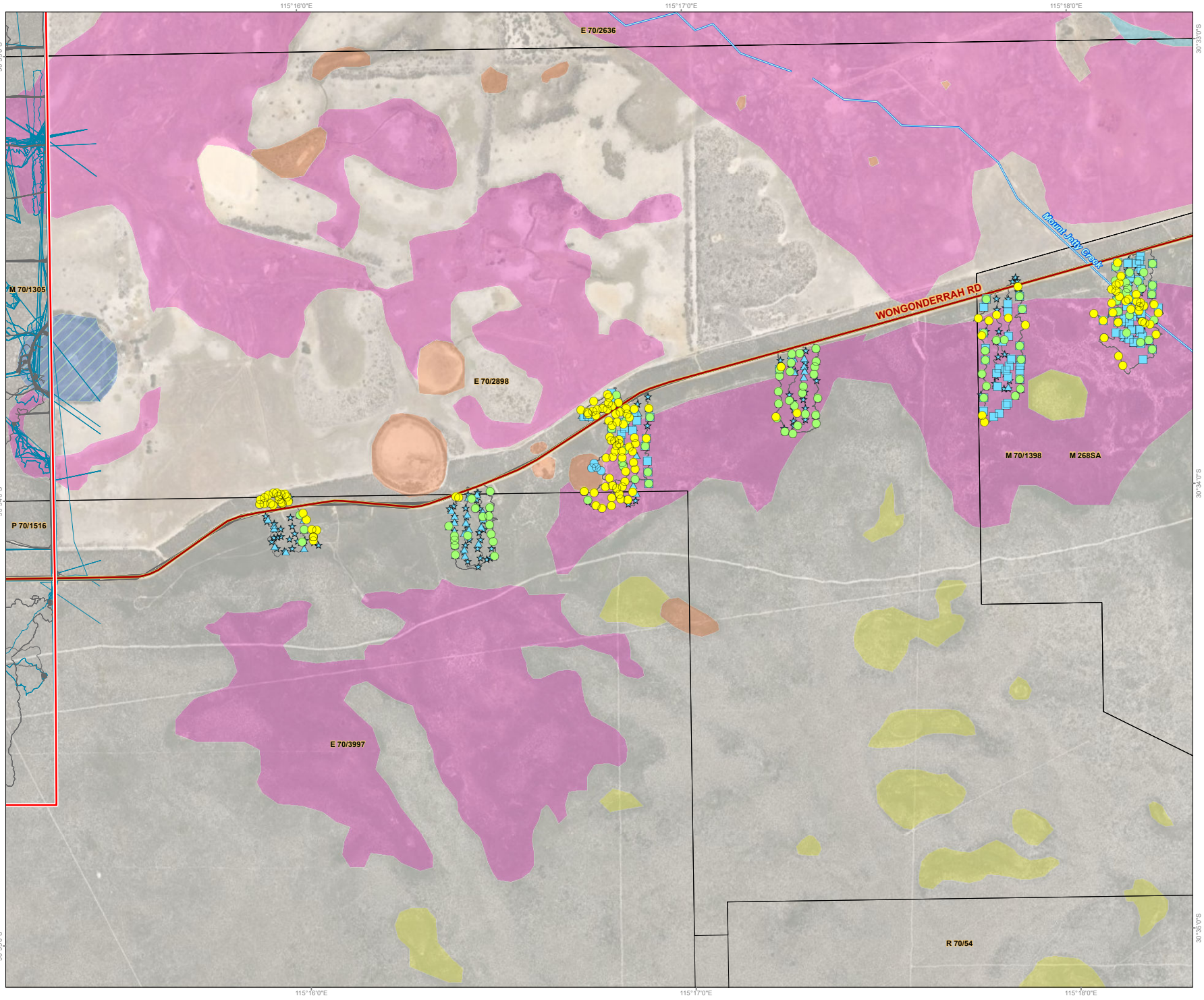


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Figure 18:
Flora of conservation significance recorded from searches outside the survey area (south)

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Legend

Flora and Vegetation Study Areas
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Priority Flora
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- Priority 1: *Levenhookia preissii*
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- Priority 2: *Chordifex reseminans*
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- Priority 3: *Babingtonia urbana*
- Priority 3: *Conospermum scaposum*
- Priority 3: *Desmocladus nodatus*
- Priority 3: *Isopogon panduratus subsp. palustris*

Geomorphic Wetlands
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- AERIAL PHOTOGRAPHY OPEN SOURCE

Preston Consulting

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metres

Scale: 1:15,000 @ A3

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LOCALITY MAP

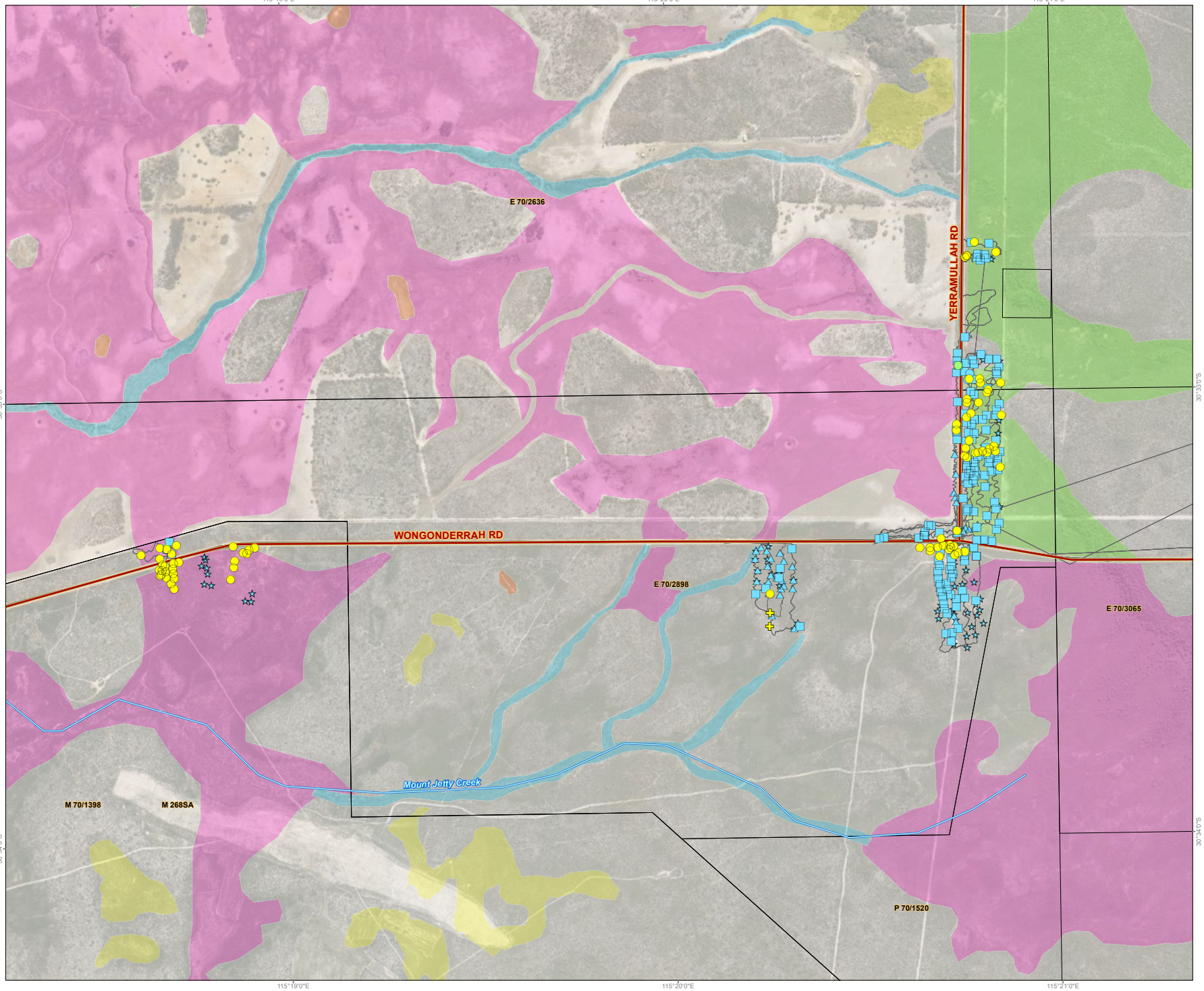


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Figure 19:
Flora of conservation significance recorded from searches outside the survey area (east)

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Legend

Flora and Vegetation Study Areas
- Mine Envelope Study Area
- External Infrastructure Study Area
- Tenement
- Nambung National Park
- Watercourse
- 2020 Tack Logs
- 2019 Track Logs

Priority Flora
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- Priority 1: *Levenhookia preissii*
- Priority 2: *Calectasia palustris*
- Priority 2: *Chordifex reseminans*
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- Priority 3: *Babingtonia urbana*
- Priority 3: *Conospermum scaposum*
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- Priority 3: *Isopogon panduratus subsp. palustris*

Geomorphic Wetlands
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- Floodplain
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- Lake

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- AERIAL PHOTOGRAPHY OPEN SOURCE

Preston Consulting

0 100 200 300 400 500
metres

Scale: 1:15,000 @ A3

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LOCALITY MAP



CREATED BY	JOB	DATE	REVISION
ENVIRONMAPS	ATLASINFRA	8/11/2021	0

Figure 20:
Flora of conservation significance recorded from searches outside the survey area (further east)

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5.0 VEGETATION OF THE SURVEY AREA

5.1 Statistical Analysis of the Quadrat Data

5.1.1 Completeness of Survey Test

A set of species accumulation curves for the 78 quadrats recorded in the Atlas survey area, excluding weeds, are shown in Figure 21. The different plots are different estimates of an accumulation curve. While quadrats captured 393 native species, an average of the accumulation curve indices suggests 458 species could potentially occur in the survey areas, indicating quadrats captured approximately 86% of the estimated potential number of species in the survey area. This high percentage indicates the number of quadrats included in the survey was sufficient to capture a high percentage of the species in the survey area.

It should be noted that, including opportunistic and other non-quadrat records, 487 native species were recorded in the survey area (Section 4.1).

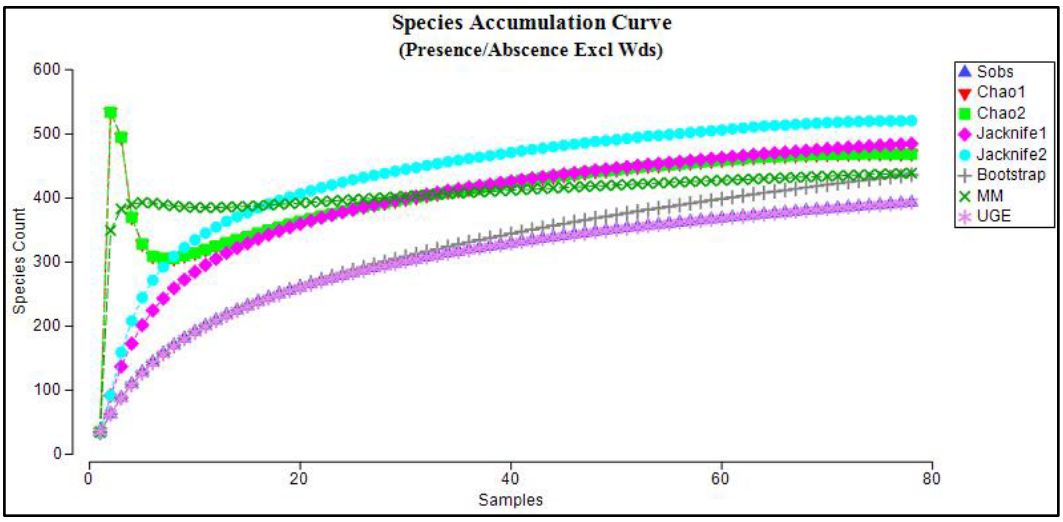


Figure 21: Atlas Species Accumulation Curves (based on Presence/absence data, excluding weeds) for the Atlas survey

5.1.2 Multivariate Analysis of the Survey Area Quadrat Data and Vegetation Units

A multivariate analysis of the 78 Atlas survey quadrats was run twice (Primer 7), using the following two data sets:

- presence/absence data excluding weeds; and
- percentage foliage cover (square root transformed) excluding weeds.

The dendrograms generated from the analyses are shown in Figure 22 and 23.

Both dendrograms show four super groups of sites, described here in relation to the presence/absence dendrogram, from right to left:

- Heaths: on the far right, the *Banksia telmatiaea* and associated heath quadrats (sites AIQ15 to CQ12)
- *Banksia* woodlands: second from the right, the *Banksia* woodland quadrats (CSQ02 to CQ10), forming into *Banksia attenuata-B. menziesii* and *Banksia prionotes* sub groups;
- Floodplain vegetation: Third from the right are the samphire low shrublands and fringing *Melaleuca* shrubland units (AQ12 to CNQ24); and
- Drainage and dampland vegetation: on the far left, the Melaleuca shrublands and other vegetation of the damplands and drainage lines (CA24 to CQ14).

The super groups are presented in reverse order in the percentage cover dendrogram and the composition and arrangement within the super groups varies a little between the two classifications. One site, AIQ16, groups with the *Banksia* woodlands, but at a fairly high level of dissimilarity.

The dendrogram super groups also consisted of subgroups of sites, which related to the vegetation units used to describe and map the vegetation in the Atlas survey area. The subgroups formed were based on the dendrogram classification and field interpretation and did take structure (percentage covers) into account. Quadrat characteristics such as the condition of the site (the poorer the condition of sites, generally the higher the weed cover and the lower the number of native species therefore recorded and analysed), whether the site was ecotonal between a number of vegetation types and variations in sites properties (habitat) were considered in interpreting the dendrogram results. The drainage and dampland sites in particular were generally in poorer condition (high weed cover, loss of native understorey species) and therefore were classified to vegetation units with greater reliance on field interpretation. Table 9 shows the vegetation groupings from the classification and interpretation process, the quadrats belonging to those groups and the vegetation units assigned to them.

One quadrat, AIQ15, joined with the *Banksia telmatiaea* heath sites at a low similarity level (Figure 22) and was shown as significantly different in the Primer cluster analysis. It was a *Regelia ciliata* Shrubland that was sampled because of its different appearance to the *Banksia telmatiaea* heaths. However, it was located on the MESA farmland and was in a 'Good to Degraded' condition and subject to an indeterminant

amount of past change. Because of the uncertainty as to its fundamental nature and its proximity to *Banksia telmatiaea* heaths, it was not given the status of a unique vegetation unit, but rather grouped with the *Banksia telmatiaea* heaths ('BtRc').

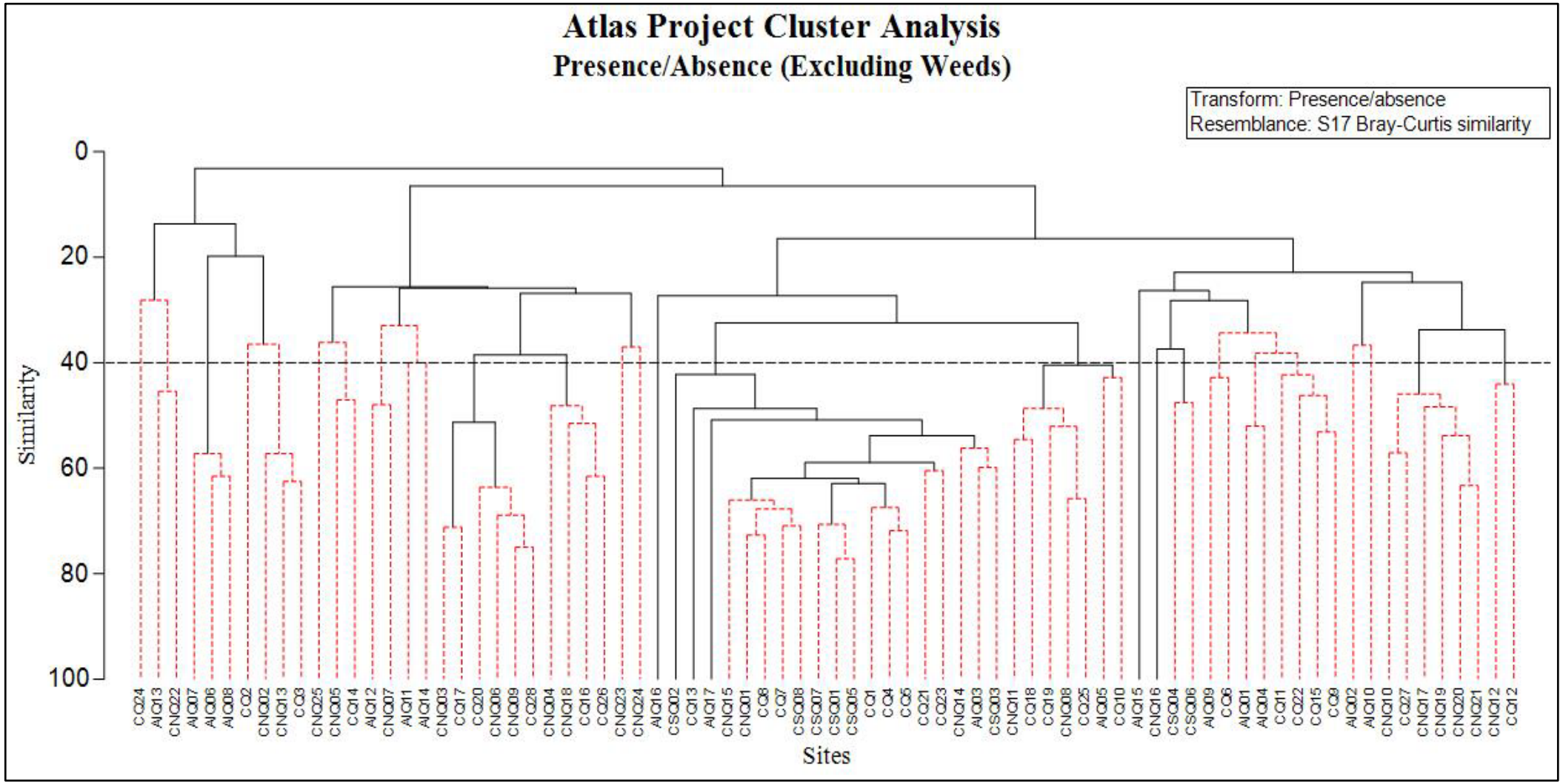


Figure 22: A similarity dendrogram computed from the Atlas presence/absence data (excluding weeds)

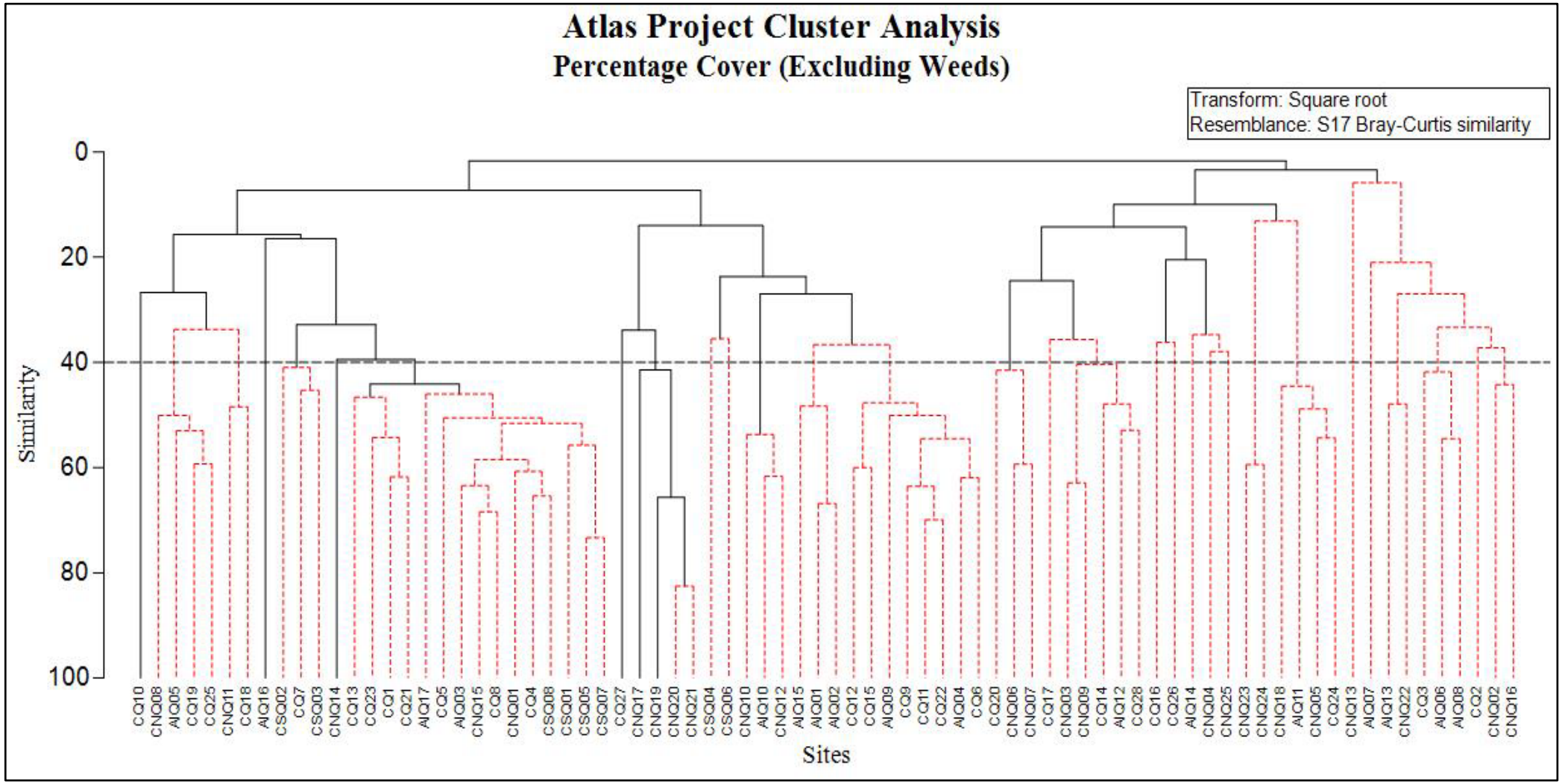


Figure 23: A similarity dendrogram computed from the Atlas percentage cover data (excluding weeds)

Table 9: Classification super groups and sub-groups: sites and vegetation units.

Super Groups	Sub- groups	Sites (Core sites belonging to sub-group)	Vegetation unit	Notes
Terrestrial vegetation	*Banksia attenuata*, *Banksia menziesii* Low Woodland	CQ1, CQ 4, CQ5, CQ7, CQ8, CQ13, CQ21, CQ23; CNQ01, CNQ14, CNQ15, CSQ01, CSQ05, CSQ07, CSQ08; AIQ03; AIQ17	BaBm	Note CSQ02 and CSQ03 were in small swales in Banksia woodland
	Banksia prionotes Low Woodland	CQ19, CQ25, CNQ08, AIQ05, (CNQ10 and CQ18 ecotonal)	Bp	
	Northern heaths	AIQ16	AhAcc	
Heaths	*Banksia telmatiaea*, *Regelia ciliata* Heathland	CQ06, CQ09, CQ11, CQ12, CQ15, CNQ22; AIQ01, AIQ04, AIQ09	BtRc	
	Callitris pyramidalis, *Banksia telmatiaea* Tall Shrubland	CNQ10, CQ12, AIQ10	CpBt	CNQ11 ecotonal
	Melaleuca seriata Low Heathland	CQ27, CNQ17	Ms	
	Melaleuca seriata Low Heathland	CNQ19, CNQ20, CNQ21	MsVdCaf	
	Melaleuca rhaphiophylla, *Banksia telmatiaea* Shrubland (MrHtBt) – heath unit in depressions	CSQ04, CSQ06	MrHtBt	
Floodplain vegetation	*Tecticornia indica* subsp. *bidens* Low Open Shrubland on floodplain	CQ17, CQ28, CNQ03, CNQ09	Ti	
	Tecticornia moniliformis, *Tecticornia halocnemoides*, *Tecticornia syncarpa*	CQ20, CNQ06, CNQ07	TmThTs	

	Low Open Shrubland on floodplain			
	Melaleuca brevifolia Open Shrubland on floodplain margins	CQ16, CQ26, CNQ04	MbGcVp	
	Melaleuca acutifolia Closed Tall Shrubland on floodplain margins	CNQ23, CNQ24	MaMcu	
	Melaleuca rhaphiophylla, Melaleuca viminea subsp. viminea Shrubland	CNQ18	MrMv	On edge of floodplain
Dampland and Drainage vegetation	*Melaleuca rhaphiophylla, Melaleuca teretifolia* Tall Shrubland	CQ02, CNQ02, CNQ16	MrMt	CQ02, CNQ02 were in 'Good to Degraded' condition
	Eucalyptus rudis Open Forest	CQ03, CNQ13	Er	CQ03 ecotonal –to MrMt unit
	Melaleuca viminea subsp *viminea*, *M. brevifolia* Shrublands on minor flowlines	CQ14, CNQ05	MvMb	CQ24 Degraded
	Melaleuca rhaphiophylla, Melaleuca teretifolia flowline (spring fed)	AIQ06, AIQ07, AIQ08	MrMtSl	Species depauperate due to unknown ?water condition
	Other *Melaleuca* drainage vegetation	CNQ22	MrMvBc	

5.2 Vegetation Descriptions

5.2.1 Introduction to the Vegetation Units of the Survey Area

The vegetation units described are assessed to be mostly described at the NVIS vegetation association level (ESCAVI, 2003).

Twenty six (26) vegetation units were used to describe the vegetation in the survey area (Figures 24 to 31), 20 of which were based on quadrat data and the statistical classification. Four vegetation unit descriptions were based on relevé data because the area of the vegetation unit was too small or too irregular in shape to be able to fit a $100m^2$ quadrat, or because the vegetation condition was too poor (due to high weed covers) to result in meaningful quadrat data. Two vegetation units on farmland (Degraded pasture paddocks with regrowth) were described using mapping notes.

The twenty six vegetation units in the survey area could be broadly grouped in line with the four super groups clustered in the dendrogram:
Terrestrial vegetation:

- *Banksia* Low Woodlands on plains and low rises;
- Other terrestrial vegetation

Wetland and associated vegetation:

- Heaths fringing the floodplains and in depressions on the sandplain: *Banksia telmatiaea-Regelia ciliata* Heathlands, *Callitris pyramidalis* Tall Shrublands and *Melaleuca seriata* Low Heathlands that grew on the broad gentle slopes surrounding the floodplain and also in small depressions on the sand plain;
- Floodplain vegetation that included samphire Low Open Shrublands, *Melaleuca* Shrublands that grew on the fringes of the floodplain and vegetation of sumplands;
- Flowline, Dampland and associated vegetation: *Melaleuca* spp. Tall Shrublands on a few dampland flats and associated fringing vegetation and *Melaleuca* spp. Tall Shrublands that grew along flowlines crossing the floodplain

The main terrestrial vegetation types were the two *Banksia* woodland units that were described in the survey area: *Banksia attenuata-Banksia menziesii* Low Woodland and *Banksia prionotes* Low Woodland. The *Banksia attenuata-Banksia menziesii* Low Woodlands occurred on sand plains and low sandy rises and, in a few places, ‘low dunes’. They occurred on grey siliceous sands over most of the southern half of the MESA and in the EISA corridor south of the MESA and Wongonderrah Rd, with

small areas in other EISA corridors (Figures 24 to 31). *Banksia prionotes* Low Woodlands occurred on areas of yellow sand on the plains and low rises in the MESA and included other calcareous soil-loving species such as *Calothamnus quadrifidus*. They were also extensive in the Nambung Rd EISA corridor, east of the MESA and Munbinea Rd, but were a little ecotonal in this area, with regularly sparsely scattered *Banksia attenuata* and *Banksia menziesii* trees within the unit (Figures 24 to 31).

The heaths on the gentle slopes surrounding the floodplain in the MESA were mostly *Banksia telmatiaea-Regelia ciliata* heaths ('BtRc'), which were extensive in that area. Smaller patches of *Banksia telmatiaea-Regelia ciliata* heath also occurred in small dampland depressions that were scattered on the sand plains of the southern half of the MESA, but particularly in the area north of Wongonderrah Rd and nearer the floodplain (Figures 29 and 30). *Banksia telmatiaea-Regelia ciliata* heaths were also mapped in EISA corridors in dampland areas south of Wongonderrah Rd, in a number of locations along the Nambung Rd corridor and in other small areas. *Callitris pyramidalis-Banksia telmatiaea* ('CpBt') Tall Shrublands mostly occurred on the gentle slopes fringing the northern part of the floodplain in the MESA (Figure 29). *Melaleuca seriata* Low Heathlands occurred in the MESA and were more limited in area. Several stands on the edges of the floodplain had very similar floristics and included *Babingtonia urbana* (Priority 3) as a co-dominant as well as *Desmocladus nodatus* (Priority 3) and were described as a separate unit ('MsVdCaf').

Tecticornia indica subsp. *bidens* Low Shrublands ('Ti') covered the southern and greater part of the MESA floodplain, while low samphire shrublands dominated by *Tecticornia moniliformis*, *Tecticornia halocnemoides* and *Tecticornia syncarpa* occurred on the northern part of the MESA floodplain. *Melaleuca brevifolia-Grevillea* sp. Cooljarloo (B.J. Keighery 28 B) (Priority 1) Open Shrublands formed an extensive narrow fringe of vegetation around the edge of the floodplain, between the samphire flats and the heath vegetation on the surrounding broad, gentle slopes. Small, occasional patches of *Melaleuca rhaphiophylla* and *Melaleuca viminea* subsp. *viminea* Shrubland ('MrMv') grew in small patches on the edges of some clay pans and in the wetter margins of the floodplain. *Melaleuca acutifolia-Melaleuca cuticularis-Melaleuca brevifolia* ('MaMcu') Tall Closed Shrubland occurred as a small, narrow, 'linear' unit on the south-western margins of the floodplain.

A number of small 'Sumplands' (seasonally inundated areas) (claypans) occurred on the floodplain in the MESA. The largest sumpland occurred in the south –western part of the floodplain and was still inundated in mid-November 2020 ('McuMvSb').

The other smaller sumplands were generally dry by October/November, but were inundated during winter and all were inundated at the time of a site visit in early June 2021 ('TsTi'). The sumpland vegetation was typically samphire Low Open Shrublands on the lower banks with patches of *Melaleuca* spp. Shrublands on the higher banks.

Melaleuca raphiophyla-Melaleuca teretifolia Tall Shrublands grew in a few wetter dampland depressions in the MESA. Around the margins of one of these was a small area of *Eucalyptus rudis* Open Forest. Another *Melaleuca raphiophyla-Melaleuca teretifolia* spring-fed flowline/dampland unit, 'MrMtSl', was described from three sites in the EISA Nambung Rd corridor and was differentiated by being species depauperate and by the extensive death or poor health of a number of species at the sites. *Melaleuca* Shrublands occurred along the minor flow lines and flow areas and their flood banks on the MESA floodplain and in the statistical analysis of vegetation data, showed some affinity to the floodplain samphire units because of their shared saline habitat. *Melaleuca viminea* subsp. *viminea-Melaleuca brevifolia* dominated shrublands along the minor flowlines and their flood banks ('MvMb') in the MESA. A *Melaleuca raphiophyla- Melaleuca viminea* subsp. *viminea -Melaleuca concreta* Tall Shrubland unit occurred in the MESA along Mount Jetty creek and associated flood areas in the northern part of the survey area and was also sampled and mapped in the Munbinea Rd EISA corridor at the Nambung River crossing. The *Melaleuca raphiophyla- Melaleuca viminea* subsp. *viminea* Tall Shrubland over sedgelands unit ('MrMvBc') grew along the broad shallow flow area of Bibby Creek in the very north-west corner of the MESA and was statistically similar to the *Melaleuca raphiophyla- Melaleuca viminea* subsp. *viminea* Tall Shrublands along the banks of the Frederick Smith Creek in the EISA corridor on Nambung Station.

Vegetation mapping was also extended to about a 500 metre width around the MESA survey area (Figures 32 to 34) and can be considered indicative. This mapping assigned MESA vegetation units to vegetation outside the survey area where there was sufficient confidence in the similarity of dominant species and floristics (mostly where the area was traversed on foot, such as the floodplain west of the MESA). In some cases generic vegetation descriptions were used (for example, 'Bt heath' for *Banksia telmatiaea* dominated heath). No detailed vegetation sampling was undertaken outside the survey area.

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Terrestrial vegetation

(i) *Banksia* low woodlands on plains and low rises

BaBm *Banksia attenuata, Banksia menziesii*, (*Eucalyptus todtiana*) Low Woodland over *Adenanthos cygnorum* subsp. *cygnorum* Isolated Tall Clumps of Shrubs to Sparse Tall Shrubland (in parts) over *Xanthorrhoea preissii* Sparse Shrubland over *Melaleuca clavifolia*, *Hibbertia hypericoides*, *Eremaea pauciflora* var. *lonchophylla*, *Eremaea asterocarpa* subsp. *asterocarpa*, *Melaleuca systena, Bossiaea eriocarpa*, *Petrophile rigida* mixed Low Shrubland over *Mesomelaena pseudostygia* Isolated Sedges to Sparse Sedgeland with *Dasypogon obliquifolius*, *Blancoa canescens*, *Patersonia occidentalis* var. *occidentalis* Low Sparse Forbland.

Bp *Banksia prionotes* Low Woodland over *Calothamnus quadrifidus* subsp. *quadrifidus*, *Scholtzia umbellifera* Tall Open Shrubland over *Hibbertia hypericoides*, *Conospermum stoechadis* subsp. *stoechadis, Melaleuca systena* Low Open Shrubland over *Lepidobolus preissianus* Sparse Sedges.

(ii) Other terrestrial vegetation

Ar *Acacia rostellifera* Tall Shrubland

AhAcc *Allocasuarina humilis*, *Adenanthos cygnorum* subsp. *cygnorum*, *Daviesia incrassata* subsp. *incrassata*, *Melaleuca seriata* Open Shrubland over *Hibbertia hypericoides*, *Hakea incrassata*, *Xanthorrhoea preissii*, *Stirlingia latifolia*, *Conospermum stoechadis* subsp. *stoechadis*, *Daviesia nudiflora* subsp. *nudiflora*, *Daviesia triflora* Low Open Shrubland over *Mesomelaena pseudostygia*, *Chordifex sinuosus*, *Mesomelaena tetragona* Open Sedgeland/Rushland with *Neurachne alopecuroidea* Low Sparse Grassland.

Wetland and associated vegetation

(i) Heaths fringing the floodplain wetlands and in depressions

BtRc *Banksia telmatiaea*, *Hakea obliqua* subsp. *parviflora*, *Regelia ciliata* Heathland to Closed Heathland over *Melaleuca seriata* Low Sparse Heathland to Low Open Heathland over *Conostylis festucacea* subsp. *festucacea* Low Open Forbland.

CpBt *Callitris pyramidalis* Tall Shrubland over *Banksia telmatiaea*, *Regelia seriata*, *Melaleuca seriata* Open Heathland over *Jacksonia hakeoides* Low Isolated Shrubs *Conostylis aculeata* subsp. *breviflora* Low Sparse Forbland.

MrHtBt *Melaleuca rhaphiophylla*, *Banksia telmatiaea*, *Hakea trifurcata* mixed Open to Closed Shrubland over *Melaleuca seriata*, *Jacksonia hakeoides*, *Banksia dallanneyi* subsp. *dallanneyi* Low Sparse Shrubland over *Conostylis festucacea* subsp. *festucacea* Isolated Forbs to Low Open Forbland and *Lepidosperma longitudinale*, *Schoenus subfascicularis* Sparse Sedgeland.

MsVdCaf *Verticordia densiflora* var. *densiflora*, *Babingtonia urbana* (Priority 3), *Regelia ciliata* Sparse Heathland over *Melaleuca seriata*, *Calytrix* aff. *flavescens*, *Jacksonia hakeoides*, *Acacia dilatata* Low Heathland to Low Closed Heathland.

Ms *Melaleuca seriata*, *Verticordia densiflora* var. *densiflora*, *Grevillea* sp. Cooljarloo (B.J. Keighery 28 B) (Priority 1), *Petrophile seminuda, Regelia ciliata* mixed Low Shrubland over *Conostylis aculeata* subsp. *breviflora* Lope Open Forbland.

(ii) Floodplain vegetation

MaMcu *Melaleuca acutifolia* Tall Closed Shrubland over *Melaleuca cuticularis, Melaleuca viminea* subsp. *viminea*, *Melaleuca rhaphiophylla, Rhagodia baccata* subsp. *baccata* Sparse Shrubland over *Gahnia trifida* Sparse to Open Sedgeland and **Vulpia myuros* forma *myuros*, **Ehrharta longiflora* Sparse Grassland with *Samolus repens* var. *paucifolius*, *Angianthus micropodioides*, *Podotheca gnaphalioides*, *Cotula cotuloides* Low Sparse Forbland.

MbGcVp *Melaleuca brevifolia* Open Shrubland over *Grevillea* sp. Coojarloo (B.J. Keighery 28 B), *Verticordia plumosa* var. *brachyphylla, Frankenia pauciflora* Low Open Shrubland over *Gahnia Trifida* Sparse sedges with *Conostylis aculeata subsp. breviflora*, *Brachyscome iberidifolia*, *Angianthus micropodioides*, *Drosera thysanosepala, Centrolepis aristata, Isolepis marginata*, *Apium prostratum* subsp. *prostratum* var. *filiforme* Low Sparse to Open Forbland.

MbTi *Melaleuca brevifolia* Open Shrubland over *Tecticornia indica* subsp. *bidens* Open Samphire Shrubland with **Polypogon monspeliensis, *Hordeum geniculatum* Sparse Grassland and **Crassula natans* var. *minor*, **Cotula coronopifolia, *Lotus subbiflorus, *Arctotheca calendula* Forbland

McuMvSb *Melaleuc cuticularis, Melaleuca viminea* subsp. *viminea*, *Melaleuca brevifolia* (upslope) Open Shrubland over *Salicornia blackiana*, (*Tecticornia indica* subsp. *bidens*) Low Samphire Shrubland to Closed Shrubland and **Crassula natans* var. *minor* Sparse Forbland to Open Forbland.

MrMv *Melaleuca viminea* subsp. *viminea*, *Melaleuca rhaphiophylla* Shrubland to Closed Shrubland over *Leptocarpus coangustatus*, *Leptocarpus canus* Rushland Open Sedgeland/Rushland with Samolus junceus, **Cotula coronopifolia*, *Crassula colorata* var. *acuminata*, *Centrolepis polygyna*, *Brachyscome iberidifolia* Sparse Forbland and **Vulpia myuros* forma *myuros* Sparse Grassland.

Ti *Tecticornia indica* subsp. *bidens*, (*Lawrencia squamata*) Low Open Shrublands over *Angianthus micropodioides* (Priority 3), *Apium prostratum* subsp. *prostratum* var. *filiforme*, *Hydrocotyle diantha*, *Cotula cotuloides*, **Juncus bufonius*, *Quinetia urvillei, Drosera menziesii* subsp. *thysanosepala, Brachyscome iberidifolia*, *Triglochin* sp. A Flora of Australia (G.J. Keighery 2477), *Triglochin mucronata* Low Open Forbland/Sedgeland/Grassland.

TmThTs *Tecticornia moniliformis*, *Tecticornia halocnemoides*, *Tecticornia syncarpa*, *Frankenia pauciflora, Lawrencia squamata* Low Open Shrubland over *Angianthus micropodioides* (Priority 3), *Centrolepis humillima*, *Triglochin minutissima*, *Triglochin mucronata*, *Triglochin centrocarpa* Low Sparse Forbland.

TsTi *Tecticornia syncarpa*, *Tecticornia halocnemoides,* (*Tecticornia indica* subsp. *bidens*) Low Open Samphire Shrubland over **Crassula natans* var. *minor* (acquatic), (**Cotula coronopifolia*) Closed Forbland.

(iii) Flowline, Dampland and associated vegetation

CgMj *Cyperus gymnocaulos*, *Machaerina juncea* Sparse to Open Low Sedgeland/Rushland (regrowth) with **Cyperus tenellus*, *Isolepis marginata*, **Juncus bufonius* Low Sparse Sedgeland with **Lotus subiflorus*, **Arcotheca calendula*, **Romulea* sp, *Crassula decumbens* var. *decumbens* Low Forbland.

EdMp_*Eucalyptus decipiens*, *Melaleuca preissiana* Low Woodland over *Spyridium globulosum*, *Acacia cyclops* Isolated Clumps of Tall Shrubs over *Gahnia trifida* Mid Isolated Sedges and *Lepidosperma longitudinale* Sedgeland (patches) and **Ehrharta longiflora* Grassland.

Er *Eucalyptus rudis* Open Forest over *Rhagodia baccata* subsp. *baccata* Open Shrubland over **Ehrarta longiflora*, **Brassica tournefortii*, **Trifolium campestre* var. *campestre*, **Stellaria media* annual exotic Open Grassland/Forbland with *Clematis linearifolia* Sparse Lianes.

MrMt *Melaleuca raphiophylla* Tall Shrubland over *Melaleuca teretifolia, Rhagodia baccata* subsp. *baccata* Sparse Shrubland over *Conostylis festucacea* subsp. *festucacea*, **Trifolium campestre* var. *campestre*, **Trifolium arvense* var. *arvense* Forbland and *Lepidosperma longitudinale*, *Schoenus subfascicularis*, *Leptocarpus coangustatus* mixed Open Sedgeland/Rushland to Sedgeland/Rushland and **Polypogon monspeliensis*, **Vulpia myuros* forma *myuros*, **Ehrharta longiflora* Open Grassland with *Comesperma integerrimum*, *Clematis linearifolia* Sparse Lianes.

MrMtSl *Melaleuca raphiophylla* Tall Shrubland over *Melaleuca teretifolia* Sparse Shrubland over *Schoenus laevigatus, Lepidosperma longitudinale* Open Sedgeland.

MrMvBc *Melaleuca rhaphiophylla*, *Melaleuca viminea subsp. viminea*, *Melaleuca brevifolia* Tall Shrubland to Tall Closed Shrubland (patches) over *Bolboschoenus caldwellii*, *Baumea juncea*, *Cyperus gymnocaulos* Mid-Sedgeland with **Ehrharta longiflora*, **Hordeum geniculatum*, **Lolium multiflorum* Sparse Grassland and **Cotula coronopifolia*, **Lotus subbiflorus* Low Sparse Forbland.

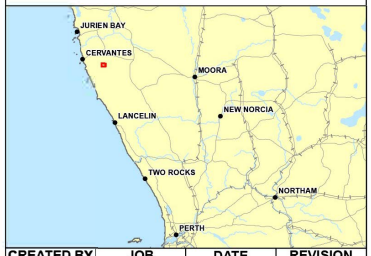
MrMvMco *Melaleuca rhaphiophylla*, *Melaleuca concreta*, (*Melaleuca viminea subsp. viminea*) Tall Open to Closed Shrubland (patchy) over *Melaleuca brevifolia* Sparse Shrubland over *Grevillea* sp. Cooljarloo (B.J. Keighery 28 B) Sparse Low Shrubs over *Cyperus gymnocaulos*, *Lepidosperma longitudinale* Sedgeland (along floor of drain) and **Lotus subbiflorus*, **Polypogon monspeliensis*, **Hordeum geniculatum* Closed Forbland/Grassland.

MvMb *Melaleuca viminea* subsp. *viminea* Tall Shrubland over *Melaleuca brevifolia* Sparse Shrubland over *Grevillea thelemanniana* subsp. Cooljarloo (B.J. Keighery 28 B), *Melaleuca seriata* Low Sparse Shrubland and *Tecticornia indica* subsp. *bidens* Sparse Low Samphire Shrubland over **Lotus subbiflorus*, **Crassula natans* var. *minor*, **Cotula coronopifolia*, *Cotula cotuloides, *Ornithopus pinnatus*, **Crassula glomerata*, **Stellaria media* Low Open Forbland and **Vulpia myuros* forma *myuros*, **Vulpia bromioides, *Polypogon monspeliensis* Low Open Grassland.

TCg *Typha* sp. Tall Rushland with *Ficinia nodosa*, *Lepidosperma longitudinale*, **Juncus acutus* subsp. *acutus*, *Cyperus gymnocaulos* Sedgeland and **Lotus subifolius*, **Cotula coronopifolia* Low Forbland.

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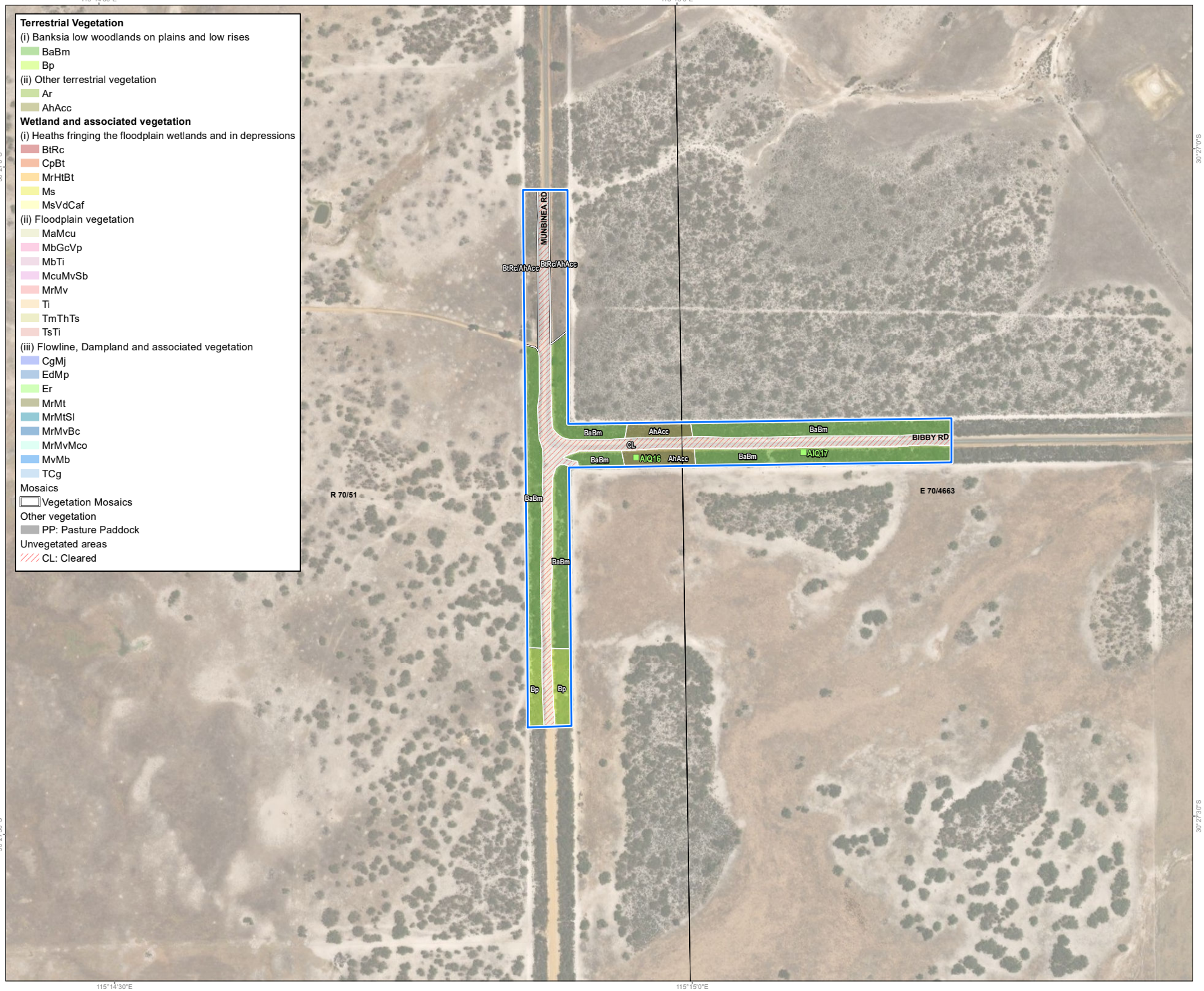


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Figure 24: Vegetation of the Atlas survey area

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Terrestrial Vegetation

(i) Banksia low woodlands on plains and low rises
- BaBm
- Bp

(ii) Other terrestrial vegetation
- Ar
- AhAcc

Wetland and associated vegetation

(i) Heaths fringing the floodplain wetlands and in depressions
- BtRc
- CpBt
- MrHtBt
- Ms
- MsVdCaf

(ii) Floodplain vegetation
- MaMcu
- MbGcVp
- MbTi
- McuMvSb
- MrMv
- Ti
- TmThTs
- TsTi

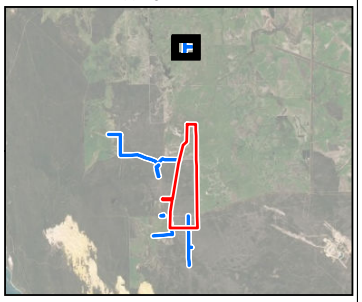
(iii) Flowline, Dampland and associated vegetation
- CgMj
- EdMp
- Er
- MrMt
- MrMtSl
- MrMvBc
- MrMvMco
- MvMb
- TCg

Mosaics
- Vegetation Mosaics

Other vegetation
- PP: Pasture Paddock

Unvegetated areas
- CL: Cleared

Legend
- Mine Envelope Study Area
- External Infrastructure Study Area
- Tenement
- 2021: Quadrat
- 2021: Releve
- 2021: Mapping Note
- 2020: Quadrat
- 2020: Releve
- 2020: Mapping Note
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- 2011: Quadrat
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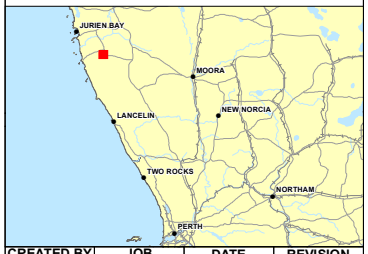
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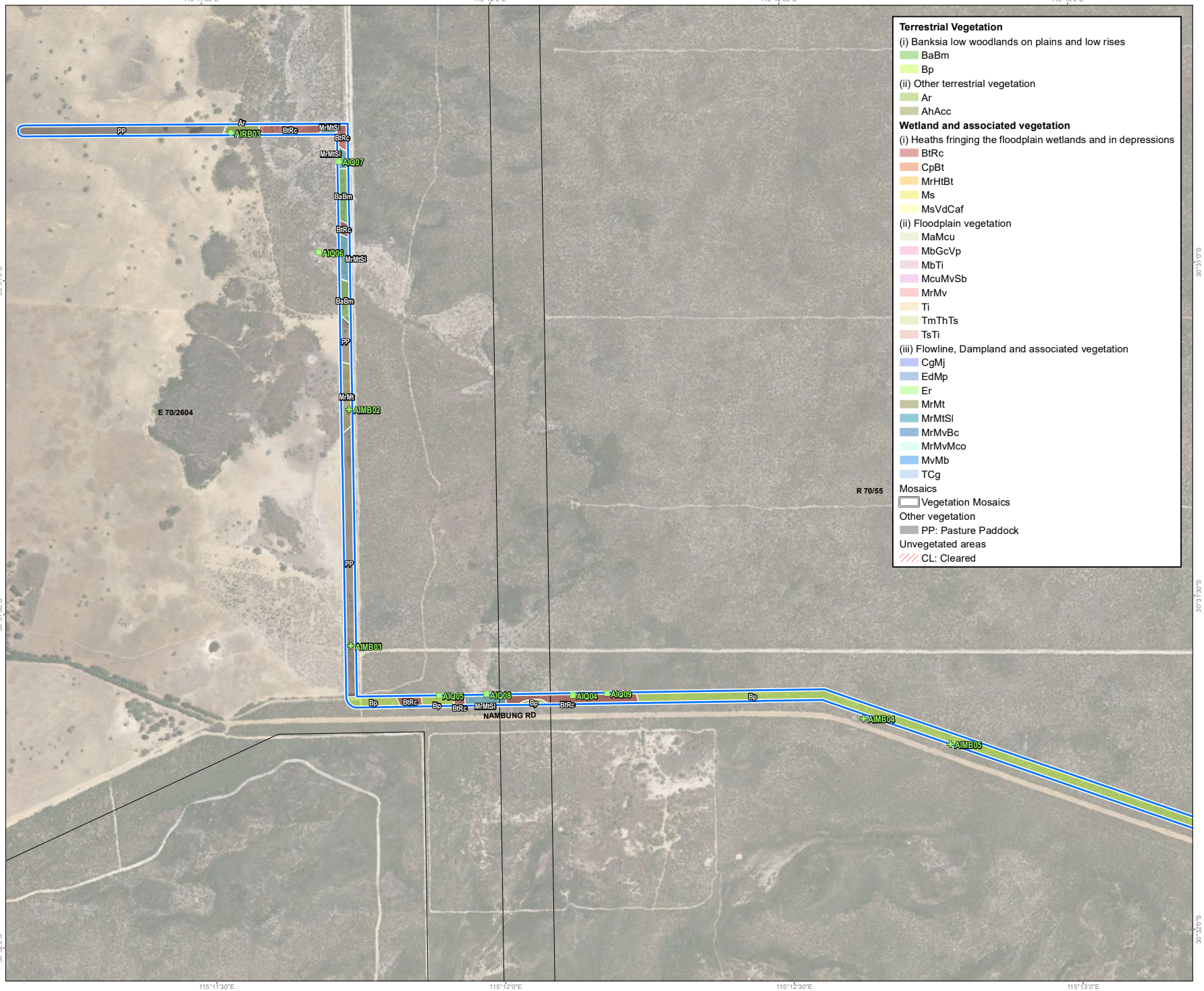
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Figure 25: Vegetation of the Atlas survey area

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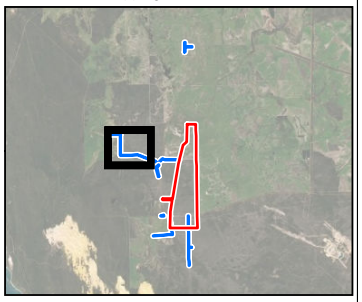
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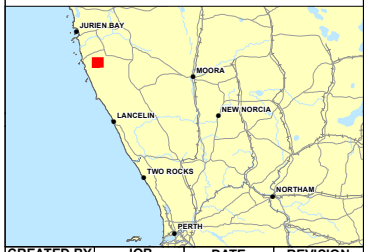
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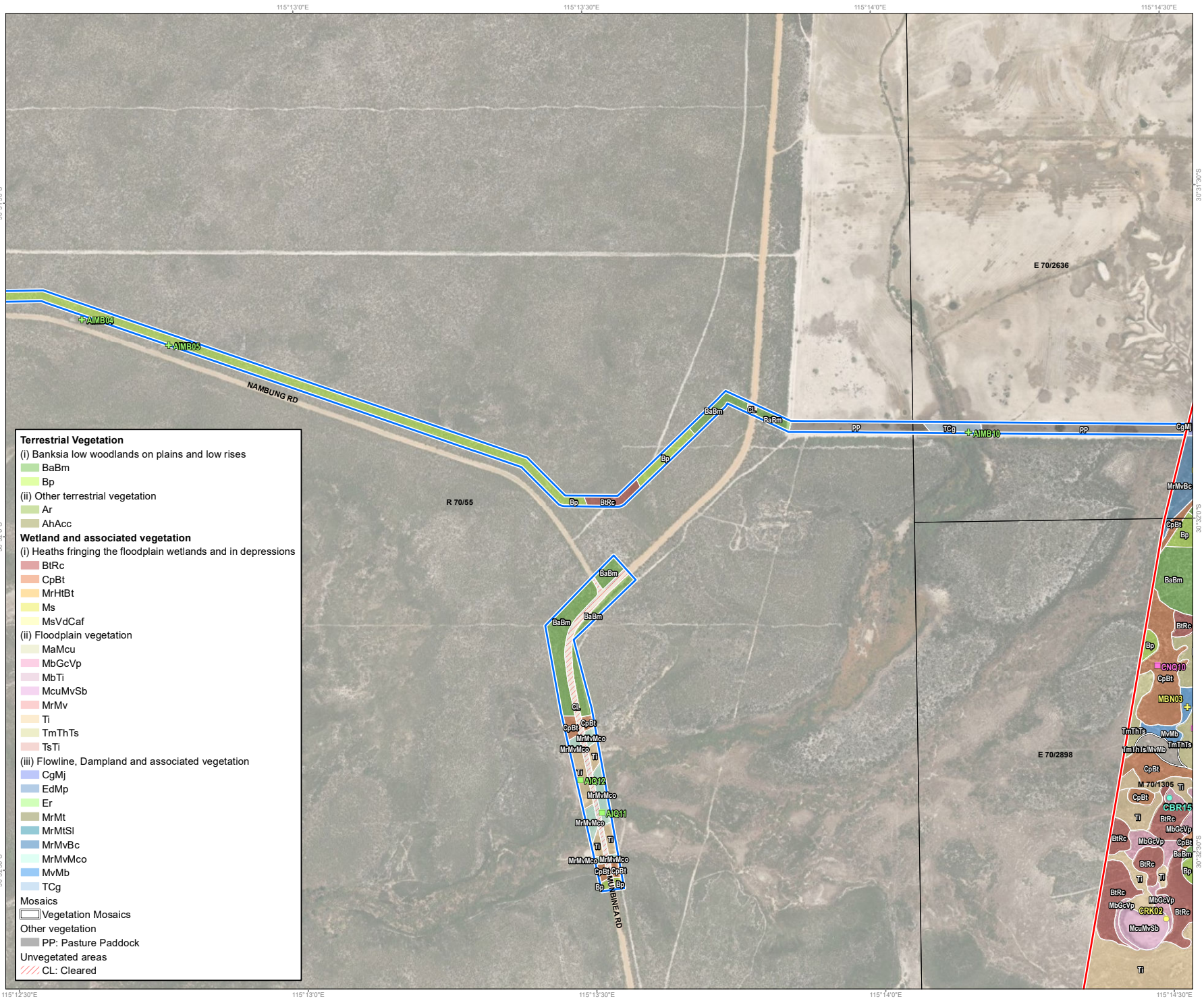
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Figure 26: Vegetation of the Atlas survey area

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- MbTi
- McuMvSb
- MrMv
- Ti
- TmThTs
- TsTi

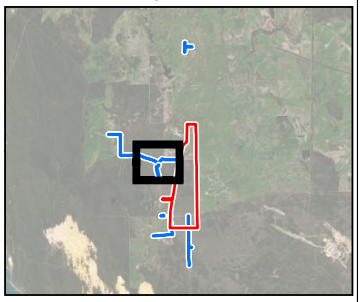
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LOCALITY MAP



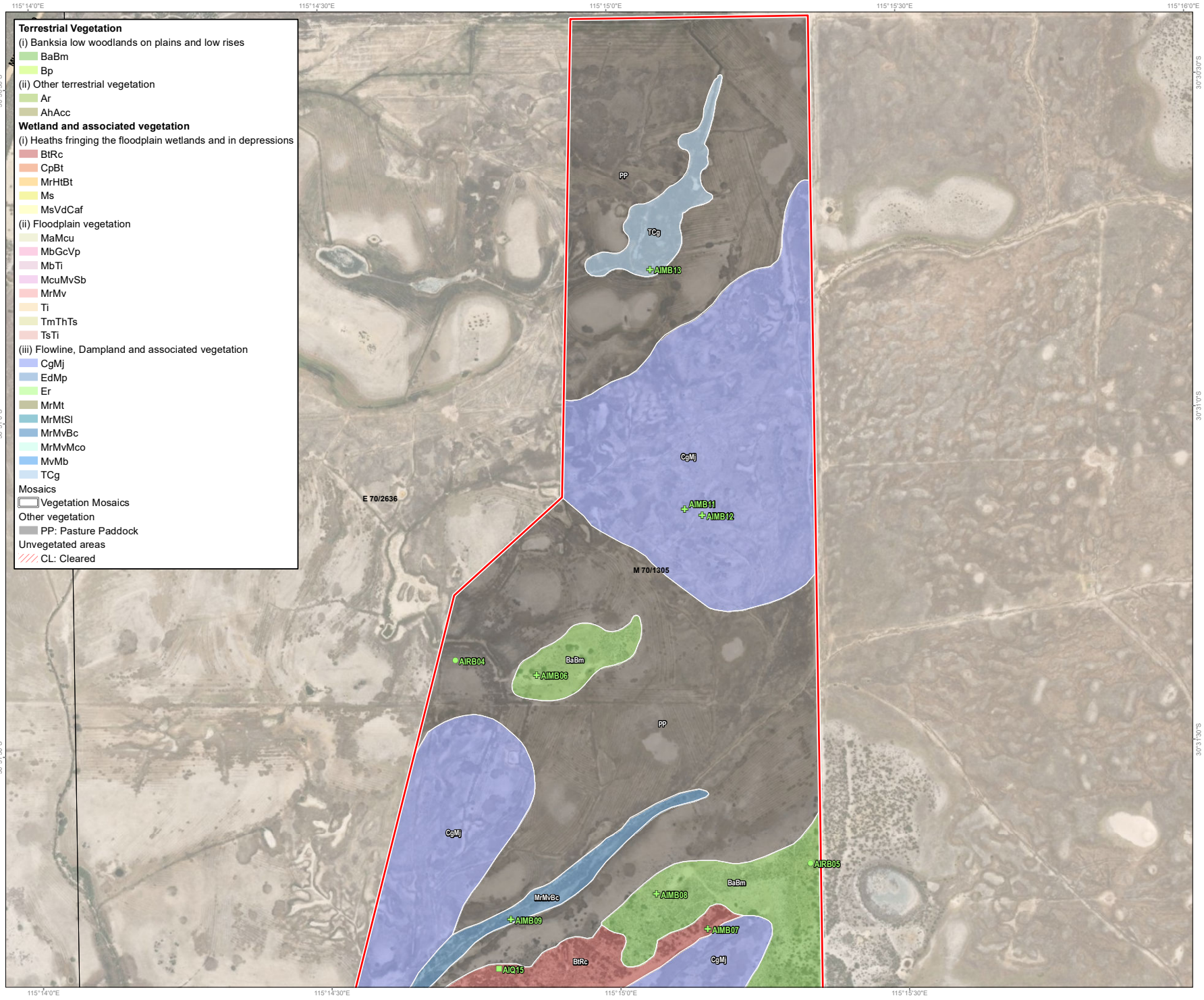
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Figure 27: Vegetation of the Atlas survey area

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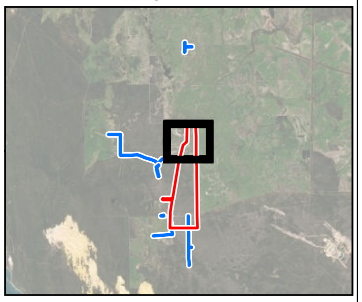
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Legend

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- Tenement
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- 2021: Releve
- 2021: Mapping Note
- 2020: Quadrat
- 2020: Releve
- 2020: Mapping Note
- 2019: Quadrat
- 2011: Quadrat
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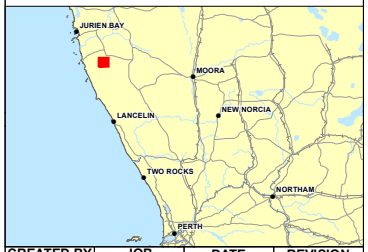
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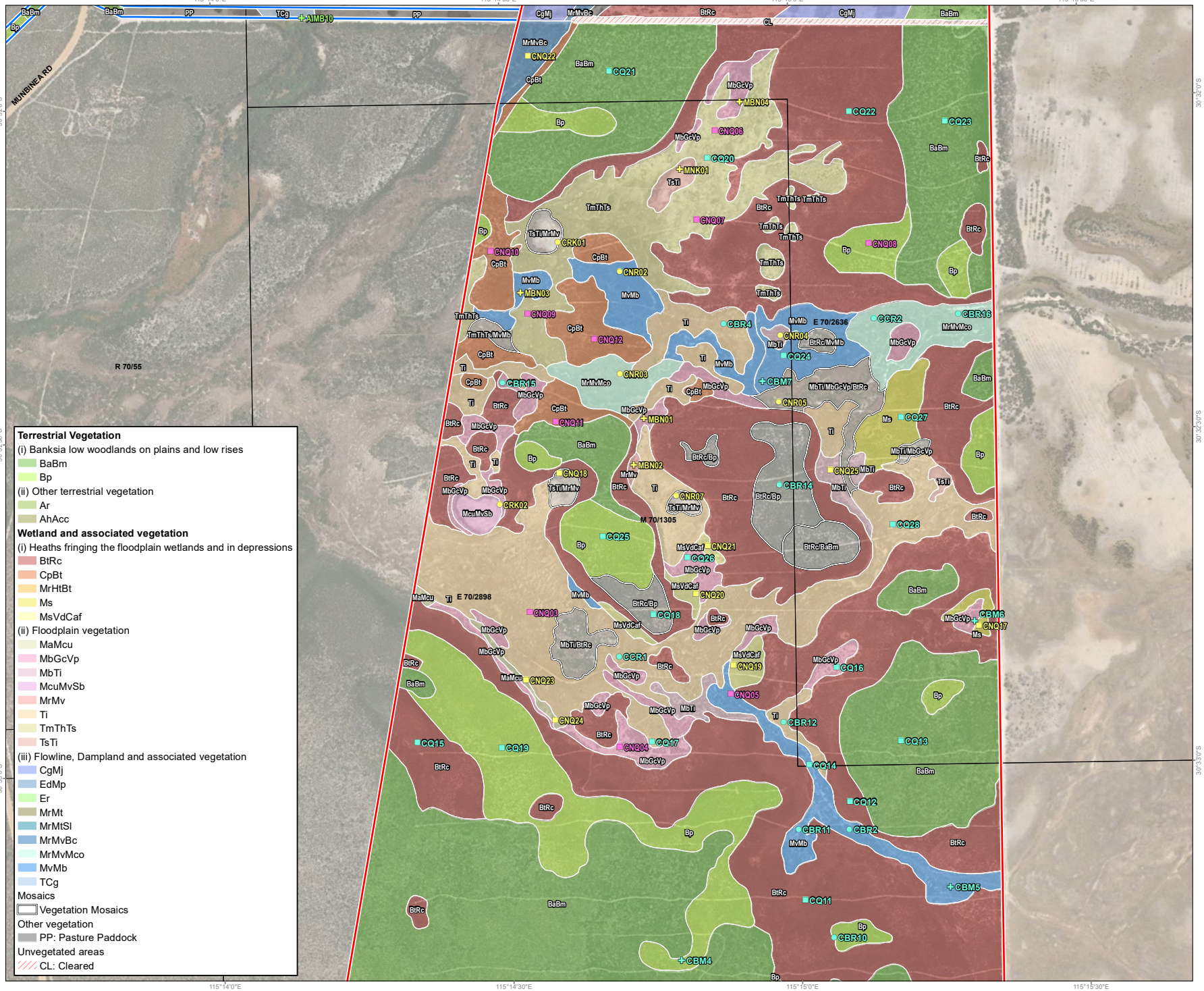
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Figure 28: Vegetation of the Atlas survey area

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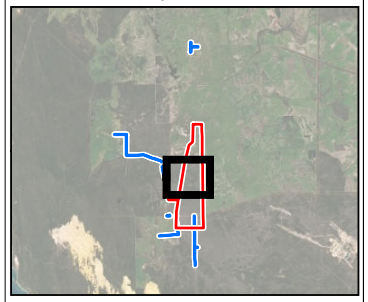
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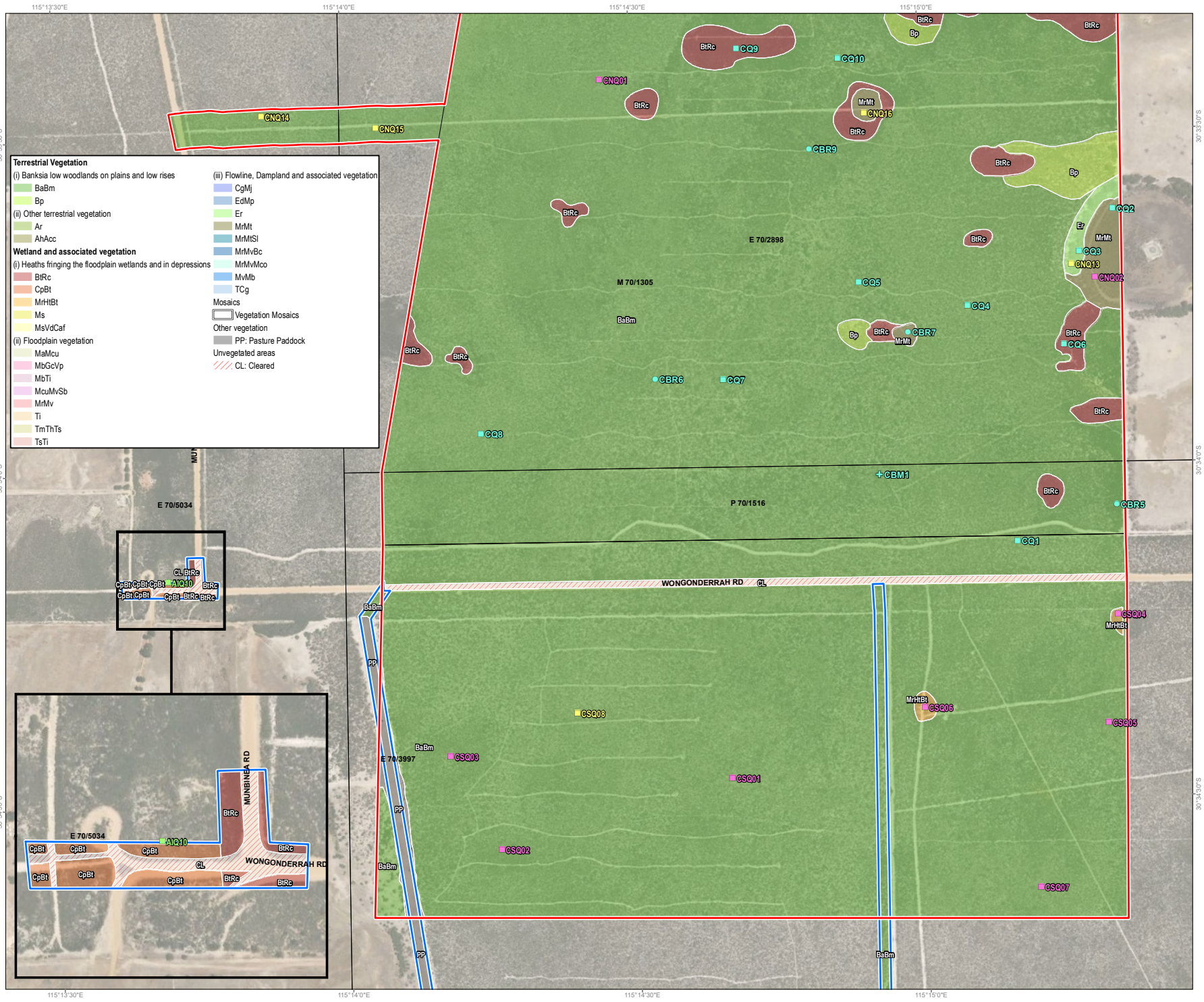
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Figure 29: Vegetation of the Atlas survey area

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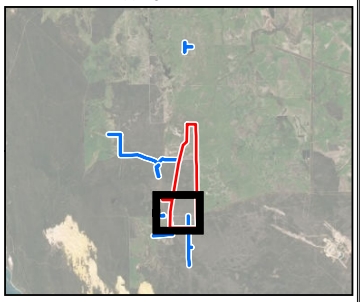
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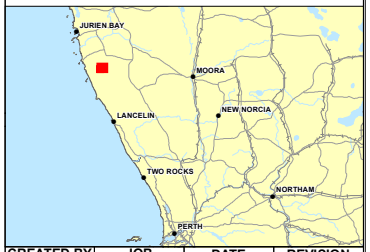
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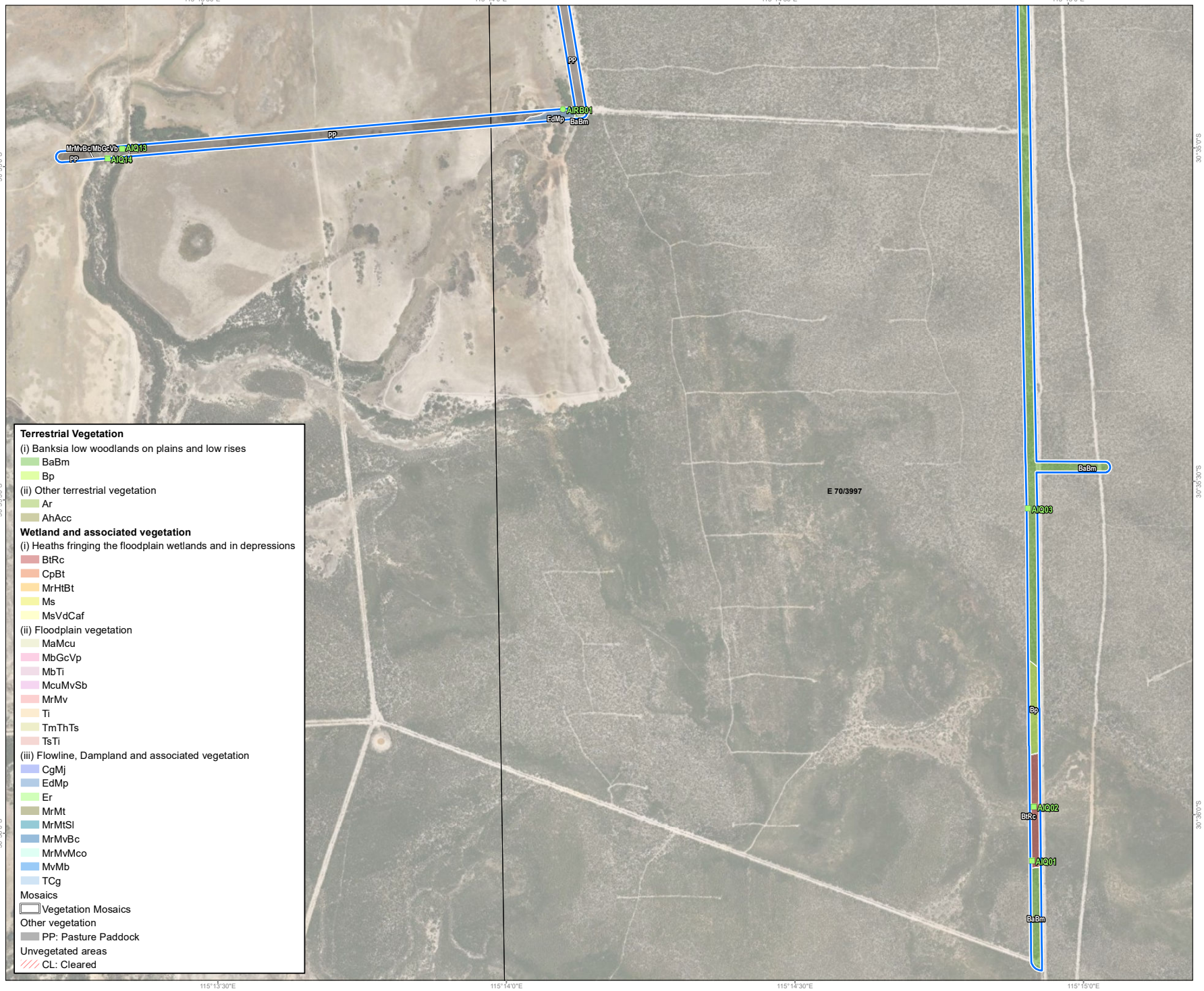
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Figure 30: Vegetation of the Atlas survey area

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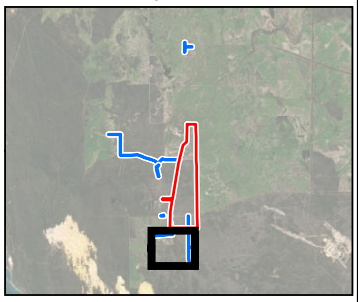
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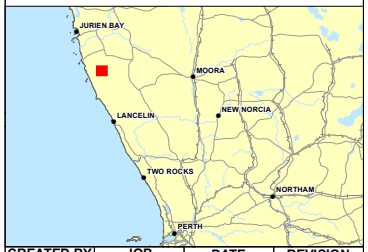
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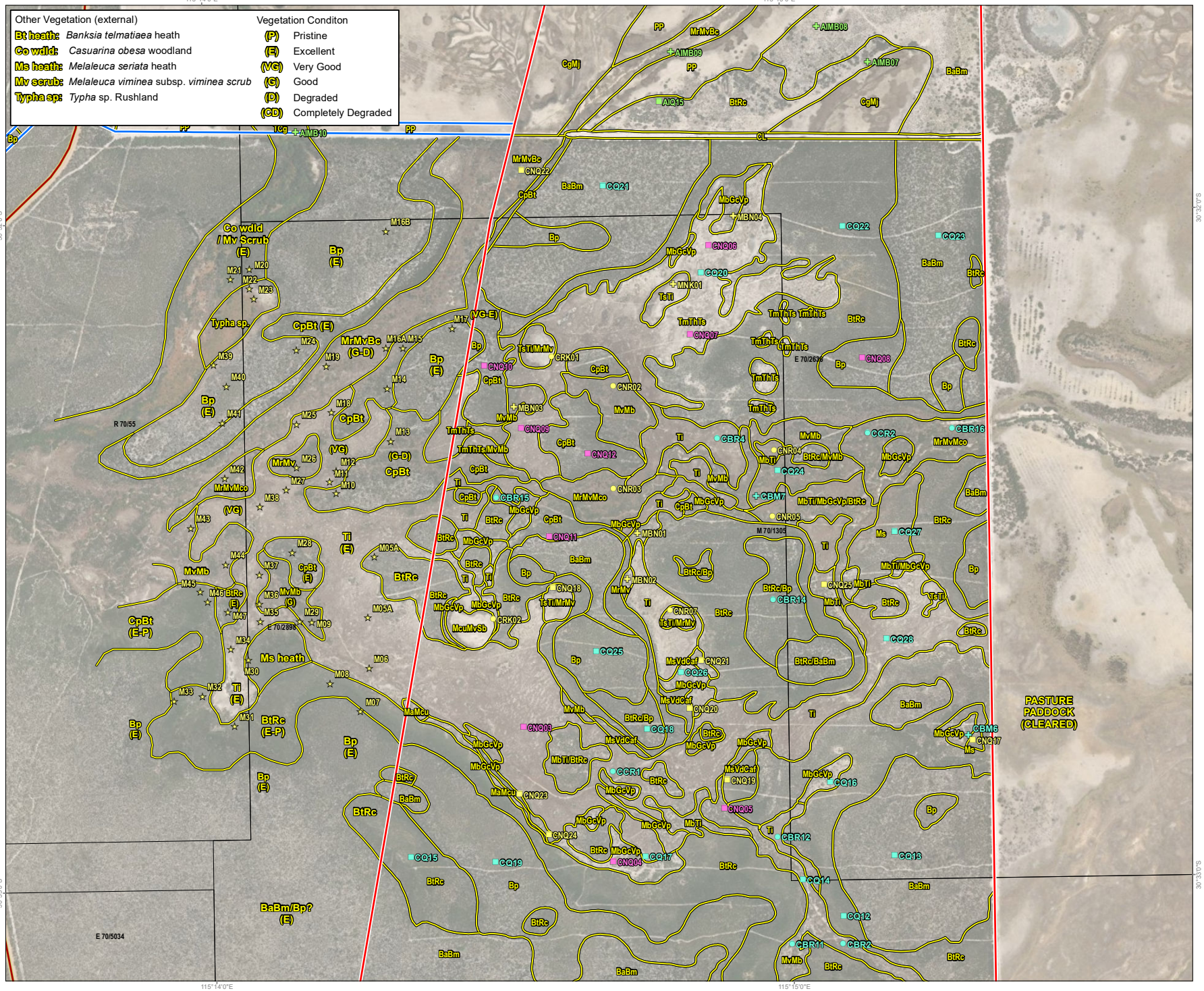


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Figure 31: Vegetation of the Atlas survey area

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- 2011: Quadrat
- 2011: Releve
- 2011: Mapping Note
- 2020: External Site Sample
- Vegetation Unit Boundary

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0 100 200 300 400 500 metres

Scale: 1:10,000 @ A3

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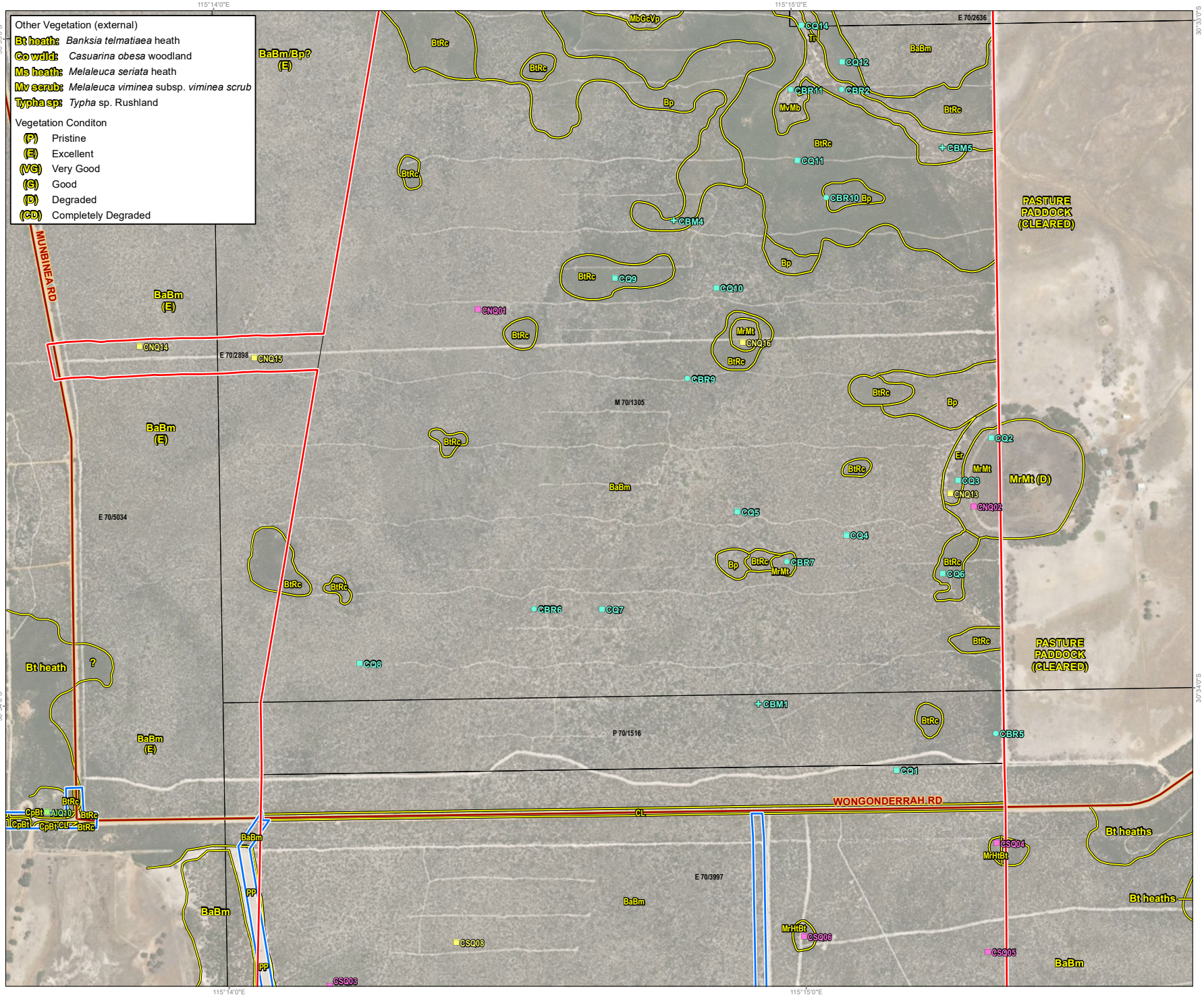
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Figure 32: Vegetation of the Atlas survey area

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- TENURE SOURCED DMIRS
- AERIAL PHOTOGRAPHY OPEN SOURCE

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0 100 200 300 400 500 metres

Scale: 1:10,000 @ A3

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LOCALITY MAP



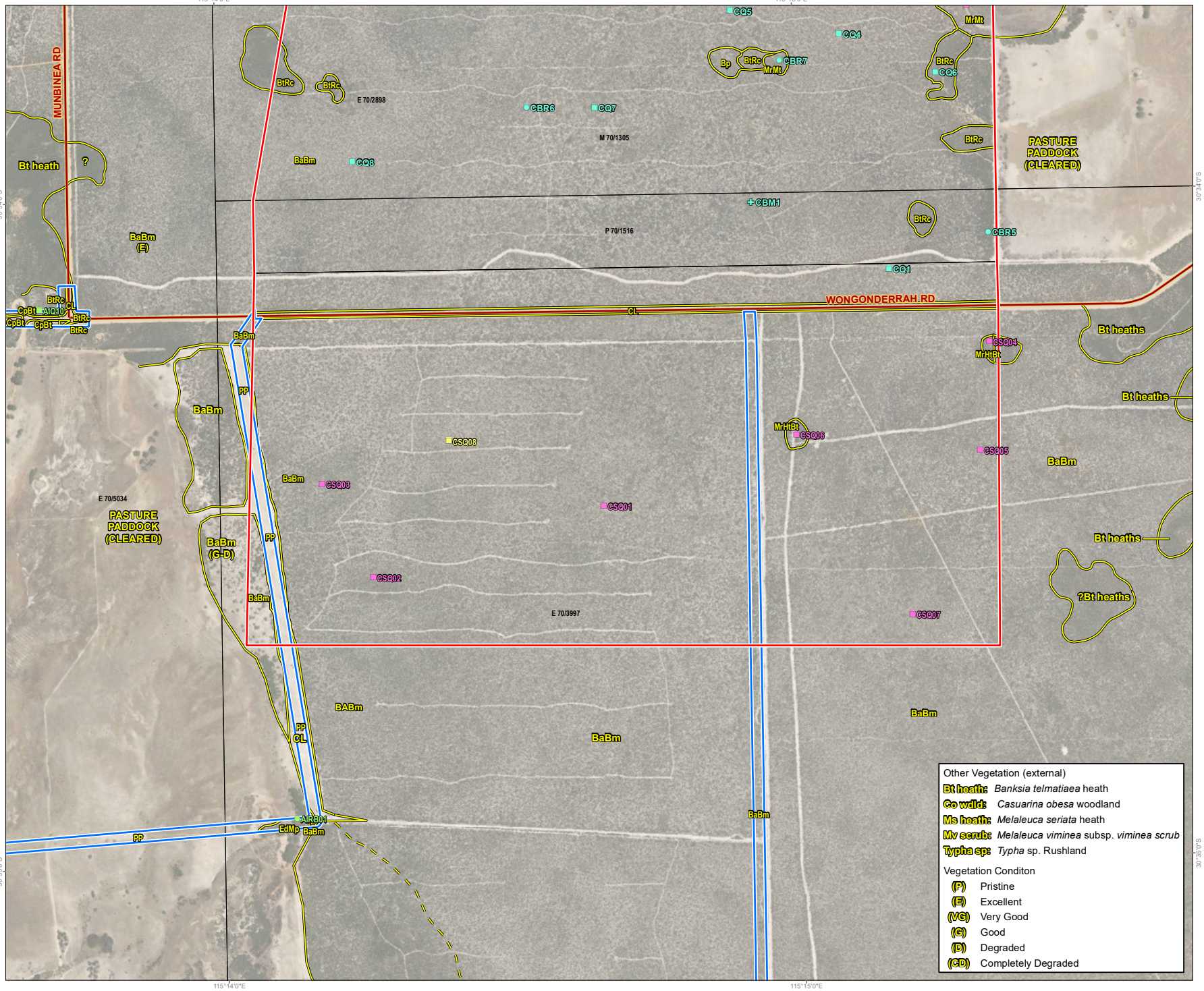
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ENVIRONMAPS	ATLASINFRA	8/11/2021	0

Figure 33: Vegetation of the Atlas survey area

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- TENURE SOURCED DMIRS
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0 100 200 300 400 500 metres

Scale: 1:10,000 @ A3

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LOCALITY MAP



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ENVIRONMAPS	ATLASINFRA	8/11/2021	0

Figure 34:Vegetation of the Atlas survey area

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5.2.2 Detailed Descriptions of the Vegetation Units

Detailed descriptions for the 26 vegetation units recorded in the Atlas survey area are listed below, within their super group: terrestrial vegetation; heaths; floodplain vegetation; and dampland and drainage. Twenty two (22) of the vegetation units were mapped in the MESA and 12 units were mapped in the EISA corridors (Table 10). All vegetation units and their areas in the MESA and EISA are listed in Table 10, as well as for mosaics of the units.

Full details of the quadrat, relevé and mapping note sites referred to in the following sections can be found in Appendices 8 and 9. Sites and vegetation units can be seen in Figures 24 to 31.

Table 10: Area (hectares) of mapped vegetation units, including mosaics (areas of ecotonal and 'patchy' vegetation) ('x/y')).

Vegetation unit	MESA		EISA		Total	
	Area (ha)	% of Area	Area (ha)	% of Area	Area (ha)	% of Area
AhAcc			0.4	0.8	0.4	0.0
Ar			0.3	0.5	0.3	0.0
BaBm	599.7	51.2	16.3	29.9	615.9	50.2
Bp	41.4	3.5	9.2	16.9	50.6	4.1
BtRc	151.3	12.9	3.9	7.2	155.2	12.7
CgMj	76.3	6.5			76.3	6.2
CpBt	12.2	1.0	1.2	2.1	13.3	1.1
EdMp			0.3	0.6	0.3	0.0
Er	1.4	0.1			1.4	0.1
MaMcu	0.8	0.1			0.8	0.1
MbGcVp	13.0	1.1			13.0	1.1
MbTi	2.9	0.2			2.9	0.2
McuMvSb	1.2	0.1			1.2	0.1
MrHtBt	0.6	0.1			0.6	0.0
MrMt	3.9	0.3	0.6	1.0	4.5	0.4
MrMtSl			1.0	1.9	1.0	0.1
MrMv	0.2	0.0			0.2	0.0
MrMvBc	7.0	0.6			7.0	0.6
MrMvMco	8.2	0.7	1.1	2.0	9.3	0.8
Ms	4.1	0.4			4.1	0.3

MsVdCaf	2.4	0.2			2.4	0.2
MvMb	16.3	1.4			16.3	1.3
TCg	5.3	0.5	0.5	0.8	5.8	0.5
Ti	42.4	3.6	1.1	2.1	43.5	3.6
TmThTs	22.7	1.9			22.7	1.8
TsTi	1.3	0.1			1.3	0.1
BtRc/AhAcc			0.9	1.7	0.9	0.1
BtRc/BaBm	2.3	0.2			2.3	0.2
BtRc/Bp	6.8	0.6			6.8	0.6
BtRc/MvMb	0.5	0.0			0.5	0.0
MbTi/BtRc	2.0	0.2			2.0	0.2
MbTi/MbGcVp	0.3	0.0			0.3	0.0
MbTi/MbGcVp/BtRc	3.9	0.3			3.9	0.3
MrMvBc/MbGcVb			0.3	0.6	0.3	0.0
TmThTs/MvMb	0.6	0.1			0.6	0.0
TsTi/MrMv	2.2	0.2			2.2	0.2
Cleared	5.8	0.5	4.3	7.9	10.1	0.8
Pasture Paddock (CD)	132.6	11.3	13.0	23.9	145.7	11.9
Total	1171.8	100.0	54.4	100.0	1226.3	100.0

5.2.2.1 Terrestrial vegetation

(i) *Banksia* low woodlands on plains and low rises

BaBm

Banksia attenuata, Banksia menziesii, (*Eucalyptus todtiana*) Low Woodland over *Adenanthos cygnorum* subsp. *cygnorum* Isolated Tall Clumps of Shrubs to Sparse Tall Shrubland (in some parts) over *Xanthorrhoea preissii* Sparse Shrubland over *Melaleuca clavifolia*, *Hibbertia hypericoides*, *Eremaea pauciflora* var. *lonchophylla*, *Eremaea asterocarpa* subsp. *asterocarpa*, *Melaleuca systena, Bossiaea eriocarpa*, *Petrophile rigida* mixed Low Shrubland over *Mesomelaena pseudostygia* Isolated Sedges to Sparse Sedgeland with *Dasypogon obliquifolius*, *Blancoa canescens*, *Patersonia occidentalis* var. *occidentalis* Low Sparse Forbland.

Habitat and soil: Plains and low rises. Grey sand.

Associated species: *Banksia illicifolia*, *Calytrix flavescens*, *Alexgeorgia nitens*, *Acacia pulchella* var. *glaberrima*, *Amphipogon turbinatus*, *Hypocalymma*

xanthopetalum, *Jacksonia hakeoides*, *Jacksonia nutans*, *Conostylis teretifolia* subsp. *teretifolia*, *Conostylis juncea*

Notes: This vegetation unit occupied most of the southern half of the survey area and was by far the largest vegetation unit in the survey area (51.2% and 598 ha in the MESA) (Table 10). It was recorded at quadrats CQ1, CQ4, CQ5, CQ7, CQ8 (Plate 29), CQ13, CQ21, CQ23, CNQ01, CNQ14, CNQ15 and sites south of Wongonderrah Rd CSQ01, CSQ05, CSQ07 and CSQ08. It was also recorded at site AIQ03 south of the MESA and AIQ17, on Bibby Rd verge. *Eucalyptus todtiana* was typically scattered through the unit. *Banksia ilicifolia* was sparsely scattered in lower parts of the unit. This vegetation was quite species rich, with an average of 56.9 native species per quadrat (Table 6 above) occurring in a $100m^2$ quadrat. Vegetation condition was generally 'Excellent' to 'Pristine' in the MESA and in the EISA, with very low numbers of weed species and very low weed cover, with no weeds recorded in some quadrats. There was some variation within *Banksia attenuata, Banksia menziesii* Low Woodland vegetation (see dendrogram, Figure 22). Site CNQ14, located on the upper slopes of a low dune north of Wongonderrah Rd, showed some floristic differences from other *Banksia attenuata, Banksia menziesii* Low Woodland quadrats.

Three *Banksia attenuata, Banksia menziesii* Low Woodland sites that grouped at significantly lower similarities to the other 'BaBm' sites (presence/absence analysis, Figure 22) were:

CSQ02: this was located in a small swale within an area of 'BaBm' vegetation and was assessed as ecotonal.

CQ13: Apparently typical 'BaBm' low woodland.

AIQ17: this site was located on Bibby Rd verge about 9 km north of the nearest MESA *Banksia* woodland sites and was much closer to the boundary of the SCP biogeographic region, factors that would explain the floristic variation.

Bp

Banksia prionotes Low Woodland over *Calothamnus quadrifidus* subsp. *quadrifidus*, *Scholtzia umbellifera* Tall Open Shrubland over *Hibbertia hypericoides*, *Conospermum stoechadis* subsp. *stoechadis*, *Melaleuca systena* Low Open Shrubland over *Lepidobolus preissianus* Sparse Sedges.

Habitat and soil: Flat plain and low rises. Yellow sand.

Associated species: *Acacia spathulifolia*, *Anigoznathos humilis* subsp. *chrysanthus*, *Actinotus leucocephalus*, *Conostylis candicans* subsp. *candicans*, *Eremaea pauciflora* var. *lonchophylla*, *Conostylis teretifolia* subsp. *teretifolia*

Notes: This vegetation occupied a smaller part of the survey area (4.5%; 41.4 ha) and occurred in discrete areas, mostly in the immediate surrounds of the dampland heaths. It was recorded at quadrats CQ19, CQ25 (Plate 30) and CNQ08.

The *Banksia prionotes* trees in the survey area grew to approximately 3 to 4 metres height, and were in dense stands in places. The 'Bp' vegetation was significantly less species rich than the 'BaBm' low woodlands, with approximately 40 to 55 native species in a 100m^2 quadrat (Table 10). Vegetation condition was generally found to be 'Excellent to Pristine', with very low numbers of weed species and very low weed cover. There were numerous broad low rises on the floodplain that demonstrated vegetation that was transitional or ecotonal between unit 'Bp' and the *Banksia telmatiaea* heaths, and were mapped as mosaics. One quadrat, CQ10, was in a small area of *Banksia prionotes* Low Woodland surrounded by *Banksia attenuata* and *Banksia menziesii* Low Woodland and was ecotonal (see dendrogram, Figure 22; Table 9).

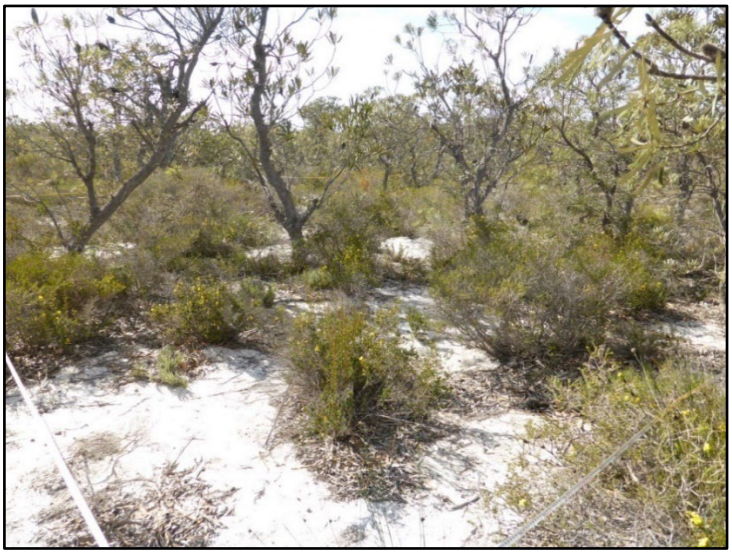


Plate 29: Vegetation unit 'BaBm' at site CQ8 (2020)



Plate 30: Vegetation unit 'Bp' at site CQ25 (2020)

(ii) Other terrestrial vegetation

Ar

Acacia rostellifera Tall Shrubland.

Habitat and soil: Plain at base of dune. Yellow sand.

Associated species: **Ehrharta longiflora*, **Bromus diandrus*, **Hypochaeris glabra*, **Arctotheca calendula*, **Trifolium hirtum*, **Lupinus cosentinii*.

Notes: This vegetation occupied a small part of the EISA Nambung Rd corridor, near its western end, on farmland. It was part of a linear band of vegetation located along the base of a broad dune. It was in a 'Degraded' condition with a Closed Grassland/Forbland of weed species under the *Acacia rostellifera* Tall Shrubland. It was described at relevé AIRB03 (Plate 31).



Plate 31: Vegetation unit 'Ar' at relevé AIRB03

AhAcc

Allocasuarina humilis, *Adenanthos cygnorum* subsp. *cygnorum*, *Daviesia incrassata* subsp. *incrassata*, *Melaleuca seriata* Open Shrubland over *Hibbertia hypericoides*, *Hakea incrassata*, *Xanthorrhoea preissii*, *Stirlingia latifolia*, *Conospermum stoechadis* subsp. *stoechadis*, *Daviesia nudiflora* subsp. *nudiflora*, *Daviesia triflora* Low Open Shrubland over *Mesomelaena pseudostygia*, *Chordifex sinuosus*, *Mesomelaena tetragona* Open Sedgeland/Rushland with *Neurachne alopecuroidea* Low Sparse Grassland.

Habitat and soil: Sand plain. Grey clayey sand with localised clay pockets.

Associated species: *Anigozanthos humilis* subsp. *humilis*, *Austrostipa macalpinei*, *Calectasia narragara*, *Calothamnus sanguineus*, *Caustis dioica*, *Conospermum stoechadis* subsp. *stoechadis*, *Daviesia nudiflora* subsp. *nudiflora*, *Daviesia triflora*, *Isopogon linearis*, *Lepidosperma calcicola*, *Scaevola repens* var. *repens*, *Schoenus elegans*, *Schoenus andrewsii*.

Notes: This vegetation was recorded at quadrat AIQ16 (Plate 32) on the Bibby Rd verge near the intersection with Munbinea Rd. It occupied a small area and was the only occurrence of this vegetation unit in the Atlas survey area. It was located about

nine km north of the nearest of the bushland parts of the Atlas survey area to the south. It was much closer to the SCP biogeographic region boundary with the Lesueur Sandplains (Geraldton Sandplain biogeographic region) than the other MESA and EISA bushland areas.



Plate 32: Vegetation unit 'AhAcc' at quadrat AIQ16.

5.2.2.2 Wetland and associated vegetation

(i) Heaths fringing the floodplain and in depressions

BtRc

Banksia telmatiaea, *Hakea obliqua* subsp. *parviflora*, *Regelia ciliata* Heathland to Closed Heathland over *Melaleuca seriata* Low Sparse Shrubland to Low Open Shrubland over *Conostylis festucacea* subsp. *festucacea* Low Open Forbland.

Habitat and soil: Very gentle slopes and elevated areas adjacent to floodplains and in depression areas on the sand plain. Grey sands.

Associated species: *Acacia stenoptera*, *Banksia platycarpa*, *Schoenus subfascicularis*, *Jacksonia hakeoides*, *Callitris pyramidalis*, *Banksia nivea* subsp. *nivea*, *Chordifex sinuosus*, *Conostylis aculeata* subsp. *breviflora*, *Hibbertia aurea*, *Isopogon panduratus* subsp. *palustris* (Priority 3).

Notes: This vegetation unit was recorded at quadrats on the gentle slopes around the floodplain (CQ11, CQ12, (Plate 33) CQ22) and in small depression areas on the sandplain (CQ6, CQ9 (Plate 34), CQ15, AIQ01, AIQ04, AIQ09). Quadrats from

these two habitats were floristically similar (Figures 22 and 23). These heaths occupied 151.3 ha (12.9%) of the MESA. The depressions on the sandplain where 'BtRc' occurred were sometimes small but increased in size and occurrence nearer to the floodplains. There was a consistent transition in the 'BtRc' vegetation fringing the floodplain, from the taller areas of this unit in dryer parts with high covers of *Banksia telmatiaea* to lower heaths lower on the slopes and nearer the margins of the floodplain, where *Regelia ciliata* and *Melaleuca seriata* had higher covers and where *Callitris pyramidalis* and *Banksia nivea* were typically present, along with some dampland herb species (such as *Drosera gigantea*). *Isopogon panduratus* subsp. *palustris* (Priority 3) was common in this vegetation unit. 'BtRc' was moderately species rich with an average of 32.8 native species per MESA quadrat; Table 6). The vegetation condition of these dense heaths was 'Excellent', with a very low occurrence of weeds. In some parts, weeds were mostly absent ('Pristine').



Plate 33: Vegetation unit 'BtRc' at quadrat CQ12 on the very gentle slopes adjacent to the floodplain (2020).



Plate 34: Vegetation unit 'BtRc' at quadrat CQ9 (in a depression on the sandplain; mapped as a geomorphic 'dampland' (ENV, 2010)).

CpBt

Callitris pyramidalis Tall Shrubland over *Banksia telmatiaea*, *Regelia seriata*, *Melaleuca seriata* Open Heathland over *Jacksonia hakeoides* Low Isolated Shrubs *Conostylis aculeata* subsp. *breviflora* Low Sparse Forbland.

Habitat and soil: Very gentle slope on edge of floodplain; pale grey-brown sand.

Associated species: *Acacia saligna*, *Banksia nivea* subsp. *nivea*, *Chordifex sinuosus*, *Verticordia densiflora* var. *densiflora*, *Desmocladus laterifolius*.

Notes: The unit 'CpBt' was similar floristically to 'BtRc' (Figures 22 and 23; Table 9), but was quite different structurally and was mapped separately. It was recorded at quadrats CNQ10 (Plate 35), CNQ11 (ecotonal with *Banksia* woodlands) and CNQ12 (Plate 36). It mostly occurred on the gentle slopes around the floodplain in the northern part of the survey area (12.2 ha and 1.0% of the MESA). *Callitris pyramidalis* typically formed Tall Shrublands to 4m in height in areas of this unit (CNQ10 and 11), but in some parts it formed a dense Closed Heath to about 1.9 to 2m height (quadrat CNQ12). This vegetation was mostly in 'Excellent' condition.



Plate 35: Vegetation unit 'CpBt' at quadrat CNQ10 (2020).

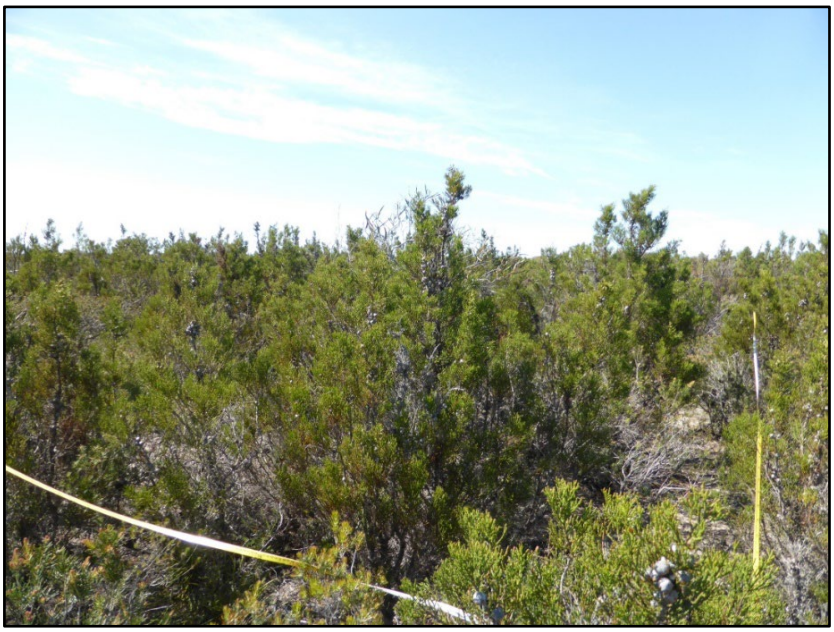


Plate 36: Vegetation unit 'CpBt' at quadrat CNQ12 (2020).

MrHtBt

Melaleuca rhaphiophylla, *Banksia telmatiaea*, *Hakea trifurcata* mixed Open to Closed Shrubland over *Melaleuca seriata*, *Jacksonia hakeoides*, *Banksia dallanneyi* subsp. *dallanneyi* Low Sparse Shrubland over *Conostylis festucacea* subsp. *festucacea* Isolated Forbs to Low Open Forbland and *Lepidosperma longitudinale*, *Schoenus subfascicularis* Sparse Sedgeland.

Habitat and soil: Small, very shallow, depression areas on plain. Brown-grey sand.

Associated species: *Isopogon panduratus* subsp. *palustris* (Priority 3), *Acacia pulchella* var. *glaberrima*, *Allocasuarina lehmanniana* subsp. *lehmanniana, Xanthorrhoea preissii*, *Hibbertia subvaginata*.

Notes: This vegetation occurred in two small depressions in the MESA *Banksia* woodlands south of Wongonderrah Rd (0.6 ha, Table 10; Figure 30). They represent ecotonal 'transitional dampland' *Banksia telmatiaea* heaths and grouped separately from, but together with, the 'BtRc' sites in the multivariate analysis (at about the 40% similarity level; see Figures 22 and 23). The quadrats recorded in this vegetation unit were CSQ04 and CSQ06. Vegetation condition at these sites was 'Good to Very Good'.

MsVdCaf

Verticordia densiflora var. *densiflora*, *Babingtonia urbana* (Priority 3), *Regelia ciliata* Sparse Shrubland over *Melaleuca seriata*, *Calytrix aff. flavescens*, *Jacksonia hakeoides*, *Acacia dilatata* Low Heathland to Low Closed Heathland.

Habitat and soil: Very gentle slopes on the edge of the floodplain. Pale grey sand.

Associated species: *Banksia nivea* subsp. *nivea*, *Chordifex sinuosus*, *Conostylis aculeata* subsp. *breviflora*, *Hibbertia aurea*, *Hibbertia stellaris*, *Petrophile seminuda*, *Desmocladus nodatus* (Priority 3), *Drosera gigantea*, *Schoenus subfascicularis*.

Notes: This vegetation unit was dominated by *Melaleuca seriata.* It occurred at five or six small patches (2.4 ha in total) on the floodplain margins on the southern-central part of the floodplain in the MESA (Figure 29). The *Banksia telmatiaea* heaths grew on the slopes behind 'MsVdCaf' ('upslope' of it). 'MsVdCaf' was recorded at quadrats CNQ19 (Plate 37), CNQ20 and CNQ21. It was differentiated from other heaths by the occurrence of *Babingtonia urbana* (Priority 3) as a co-dominant. *Desmocladus nodatus* (Priority 3) was also associated with this unit. 'MsVdCaf' vegetation was moderately species rich (31.7 native species per quadrat; Table 6). Vegetation condition was 'Excellent to Pristine', with very few weeds being present.

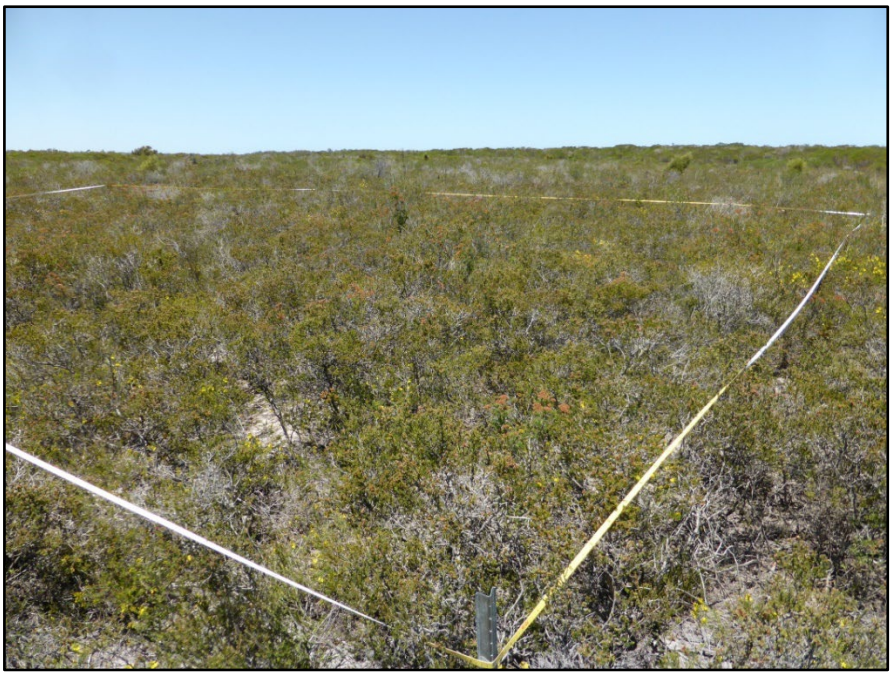


Plate 37: Vegetation unit 'MsVdCaf' at quadrat CNQ19 (2020).

Ms

Melaleuca seriata, *Verticordia densiflora* var. *densiflora*, *Grevillea* sp. Cooljarloo (B.J. Keighery 28 B) (Priority 1), *Petrophile seminuda*, *Regelia ciliata* mixed Low Shrubland over *Conostylis aculeata* subsp. *breviflora* Low Open Forbland.

Habitat and soil: Very gentle slopes and slightly elevated flats on the edge of the floodplain. Pale grey sand.

Associated species: *Calytrix aff. flavescens*, *Jacksonia hakeoides*, *Acacia dilatata*, *Babingtonia urbana* (Priority 3),

Notes: This unit was recorded in two areas (one very small), each described with one quadrat, and could best be described as *Melaleuca seriata* miscellaneous heaths. At the site of quadrat CQ27, 'Ms' probably represents an area ecotonal between 'MsVdCaf' and the *Banksia telmatiaea* unit 'BtRc'. Quadrat CNQ17 was in a small area of *Melaleuca seriata* heath that was near an occurrence of small ironstone debris (on the edge of a nearby section of firebreak). This suggested there may be ironstone near the surface and influencing this area of heath. In fact, this area of 'Ms' heath was differentiated by having a *Desmocladus lateriflorus* Open Rushland and *Neurachne alopecuroidea* Low Sparse grassland, both elements that may suggest the influence of ironstone.

(ii) Floodplain vegetation

Floodplain vegetation units include samphire low shrublands ('Ti' and 'TmThTs'); *Melaleuca* shrublands fringing the floodplain ('MaMcu', 'MbGcVp', and 'MrMv') and on wetter parts of the floodplain ('MbTi') and sumpland clay pans ('McuMvSb' and 'TsTi').

MaMcu

Melaleuca acutifolia Tall Closed Shrubland over *Melaleuca cuticularis*, *Melaleuca viminea* subsp. *viminea*, *Melaleuca rhaphiophylla*, *Rhagodia baccata* subsp. *baccata* Sparse Shrubland over *Gahnia trifida* Sparse to Open Sedgeland and **Vulpia myuros* forma *myuros*, **Ehrharta longiflora* Sparse Grassland with *Samolus repens* var. *paucifolius*, *Angianthus micropodioides* (Priority 3), *Podotheca gnaphalioides*, *Cotula cotuloides* Low Sparse Forbland.

Habitat and soil: Narrow linear unit along edge of the floodplain, at the base of a very gentle slope of a broad low rise. Yellow-brown sand

Associated Species: *Melaleuca brevifolia*, *Apium prostratum* subsp. *prostratum* var. *filiforme*, *Comesperma integerrimum*, *Dampiera coronata*, *Eryngium pinnatifidum subsp. Palustre (G. J. Keighery 13459)*, *Isolepis cernua* var. *setiformis*, *Tecticornia indica* subsp. *bidens*, *Trachymene pilosa*, *Triglochin mucronata*, *Austrostipa flavescens*.

Notes: There was only one patch of this vegetation in the survey area, along the south-western edge of the floodplain (Figure 29). The vegetation was described by two quadrats in close proximity to each other, CNQ23 (Plate 38) and CNQ24. It was a narrow linear unit and was situated along and at the base of the adjacent gentle slope. The MaMcu unit was inundated in winter (June 2021). Vegetation condition was considered to be 'Very Good' overall.



Plate 38: Vegetation unit 'MaMcu' at quadrat CNQ23 (2020).

MbGcVp

Melaleuca brevifolia Open Shrubland over *Grevillea* sp. Coojarloo (B.J. Keighery 28 B) (Priority 1), *Verticordia plumosa var. brachyphylla*, *Frankenia pauciflora* Low Open Shrubland over *Gahnia Trifida* Sparse sedges with *Conostylis aculeata* subsp. *breviflora*, *Brachyscome iberidifolia*, *Angianthus micropodioides* (Priority 3), *Drosera thysanosepala*, *Centrolepis aristata*, *Isolepis marginata*, *Apium prostratum* subsp. *prostratum var. filiforme* Low Sparse to Open Forbland.

Habitat and soil: Margins of the floodplain. Grey-brown sand.

Associated species: *Melaleuca seriata*, *Tecticornia indica* subsp. *bidens*, *Cotula cotuloides*, **Juncus capitatus*, *Samolus repens* var. *paucifolius*, *Tecticornia indica* subsp. *bidens*, *Eryngium pinnatifidum subsp. Palustre (G. J. Keighery 13459)*.

Notes: This unit occurred as a mostly very narrow belt or strand of vegetation around the edge of the floodplain, making this vegetation difficult to capture in a quadrat. These narrow strand occurrences were often too narrow to be represented on the vegetation unit maps but were mostly continuous and very expansive given the convoluted nature of the floodplain boundary. The mapped area covered 13.0 ha (1.1%) of the survey area. It was recorded at quadrats CQ16, CQ26 (Plate 39) and

CNQ04. *Grevillea* sp. Coojarloo (B.J. Keighery 28 B) (Priority 1) was a consistent co-dominant in this unit and its distribution and the distribution of 'MbGcVp' in the survey area were closely aligned (see Figures 13, 14 and 29). Two of the 'MbGcVp' sites had high numbers of native species (51 and 42 species; Table 6). The vegetation condition varied from 'Very Good' to 'Excellent'



Plate 39: Vegetation unit 'MbGcVp' at quadrat CQ26 (2020)

MbTi

Melaleuca brevifolia Open Shrubland over *Tecticornia indica* subsp. *bidens* Open Samphire Shrubland with **Polypogon monspeliensis*, **Hordeum geniculatum* Sparse Grassland and **Crassula natans* var. minor, **Cotula coronopifolia*, **Lotus subbiflorus*, **Arctotheca calendula Forbland*.

Habitat and soil: Floodplain. Pale yellow-grey sand.

Associated species: *Cotula cotuloides*, **Vulpia* sp., *Eryngium pinnatifidum subsp. Palustre (G. J. Keighery 13459)*, *Samolus repens* var. *paucifolius*, *Isolepis cernua* var. *setiformis*, *Frankenia pauciflora* var. *pauciflora*, *Triglochin calcitrapa*, **Lolium multiflorum*.

Notes: This small unit was found in wetter parts of the MESA floodplain. 'MbTi' mostly occurred around the drainage lines with *Melaleuca* Closed Shrubland in unit 'MrMvMco' (Figure 29). It was recorded at quadrat CNQ25 and relevé CNR04 and

had high weed cover ('Good to Degraded' condition), which limited sampling by quadrat.

McuMvSb

Melaleuca cuticularis, *Melaleuca viminea* subsp. *viminea*, *Melaleuca brevifolia* (higher on sumpland banks) Open Shrubland over *Salicornia blackiana*, (*Tecticornia indica* subsp. *bidens*) Low Samphire Shrubland to Closed Shrubland and **Crassula natans* var. minor Sparse Forbland to Open Forbland.

Habitat and soil: Gently sloping banks of brackish sumpland. The soil profile was not investigated.

Associated species: *Melaleuca rhaphiophylla, *Cotula coronopifolia*, *Sporobolus virginicus*, *Eryngium pinnatifidum subsp. Palustre (G. J. Keighery 13459)*, **Briza minor*, *Isolepis cernua* var. *setiformis*, *Cycnogeton lineare*.

Notes: This vegetation was described at relevé site CRK02 (Plate 40) on the banks of an inundated sumpland (at mid-November 2021). The sumpland was near the western boundary in the western part of the MESA floodplain (Figure 29). Vegetation condition was 'Very Good to Excellent'.



Plate 40: Vegetation unit 'McuMvSb' at relevé site CRK02 on the edges of a sumpland near the western boundary of the survey area (October 2020).

MrMv

Melaleuca viminea subsp. *viminea*, *Melaleuca rhaphiophylla* Shrubland to Closed Shrubland over *Leptocarpus coangustatus*, *Leptocarpus canus* Rushland Open Sedgeland/Rushland with *Samolus junceus*, **Cotula coronopifolia*, *Crassula colorata* var. *acuminata*, *Centrolepis polygyna*, *Brachyscome iberidifolia* Sparse Forbland and **Vulpia myuros forma myuros* Sparse Grassland.

Habitat and soil: Small areas on some sumpland banks and small patches on wetter margins of floodplain.

Associated species: *Tecticornia indica* subsp. *bidens*, *Angianthus preissianus*, *Lepisosperma longitudinale*, *Stylidium longitubum* (Priority 4), *Stylidium aceratum* (Priority 3), *Sporobolis virginicus*, *Eryngium pinnatifidum subsp. Palustre (G. J. Keighery 13459), Senecio glossanthus*, *Samolus junceus*.

Notes: This vegetation occurred in a number of small, scattered patches associated with the wetter margins of the floodplain (MESA), including the margins of sumplands. Because of the small, irregular shape of these patches and the fact that some of them were in areas of high weed cover; it was difficult to find suitable locations for quadrats. The vegetation was recorded at quadrat CNQ18 (on the upper banks of a sumpland area) (Plate 41), relevé CNR07 (also on the upper banks of a sumpland area) and with mapping note MBN02. Vegetation condition of the sample sites ranged from 'Good' to 'Excellent'. *Stylidium longitubum* (Priority 4) and *Stylidium aceratum* (Priority 3) were associated with wetter sites.

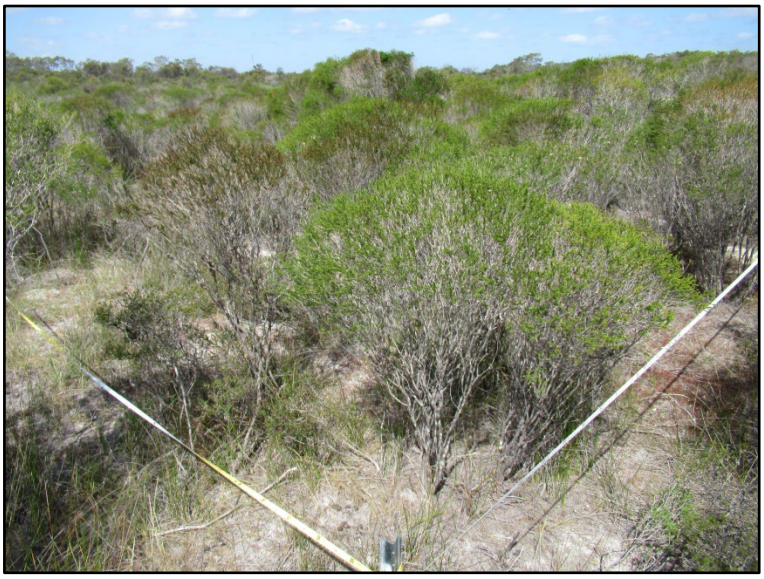


Plate 41: Vegetation unit 'MrMv' at site CNQ18 on the banks of a small sumpland.

Ti

Tecticornia indica subsp. *bidens*, (*Lawrencia squamata*) Low Open Shrublands over *Angianthus micropodioides* (Priority 3), *Apium prostratum* subsp. *prostratum* var. *filiforme*, *Hydrocotyle diantha*, *Cotula cotuloides*, **Juncus bufonius*, *Quinetia urvillei*, *Drosera menziesii* subsp. *thysanosepala*, *Brachyscome iberidifolia*, *Triglochin* sp. A Flora of Australia (G.J. Keighery 2477), *Triglochin mucronata* Low Open Forbland/Sedgeland/Grassland.

Habitat and soil: Floodplain. Light brown-grey sand.

Associated species: *Triglochin nana*, *Triglochin minutissima*, *Triglochin centrocarpa*, *Triglochin calcitrapa*, *Angianthus preissianus*, *Centrolepis polygyna*, *Bulbine semibarbata*, *Eryngium pinnatifidum subsp. Palustre (G. J. Keighery 13459)*, *Isolepis cernua* var. *setiformis*, *Senecio glossanthus*.

Notes: This vegetation covered the southern and larger part of the MESA floodplain (42.4 ha (3.6%), Table 10). It was recorded at quadrats CQ17, CQ28 (Plate 42) and CNQ03. Vegetation condition was 'Excellent' in parts and 'Very Good' where weed cover was a bit higher. These sites did include numerous weed species, but the overall weed cover was low, and the sites were also abundant in many small native forbs and moderately rich in native species (average of 31 native species per quadrat; Table 6). The wettest parts of the floodplain and those nearest the flow lines had higher weed cover, presumably related to weeds coming in water flows from neighbouring pasture paddocks and with grazing animals (kangaroos and stray cattle). The slightly more elevated parts of the samphire flats generally had less weed cover. The dominance of *Tecticornia indica* subsp. *bidens* in the southern part of the MESA floodplain suggests the saline soils there are better drained (Datson, 2002) and most of these floodplain areas were not inundated in June 2021 (Plate 42). *Angianthus micropodioides* (Priority 3) is a small daisy that occurred in large numbers over extensive parts (less weedy parts) of these samphire flats (Plates 8 and 9). *Stylidium longitubum* (Priority 4) also occurred over some less weedy parts of the samphire flats.

TmThTs

Tecticornia moniliformis, T*ecticornia halocnemoides*, *Tecticornia syncarpa*, *Frankenia pauciflora*, *Lawrencia squamata* Low Open Shrubland over *Angianthus micropodioides* (Priority 3), *Centrolepis humillima*, *Triglochin minutissima*, *Triglochin mucronata*, *Triglochin centrocarpa* Low Sparse Forbland.

Habitat and soil: Floodplain with microrelief (included very slightly raised areas). Grey clayey sand with a surface crust.

Associated species: *Apium prostratum* subsp. *prostratum* var. *filiforme*, *Cotula cotuloides*, **Juncus bufonius*, *Quinetia urvillei*, *Drosera thysanosepala*, *Brachyscome iberidifolia*, *Isotoma scapigera*, *Samolus repens* var. *paucifolius*, *Tecticornia indica* subsp. *Bidens*.

Notes: This vegetation was recorded at quadrats CNQ06, (Plate 43), CNQ07 and on a slightly elevated area, CQ20, in the northern part of the MESA floodplain (Figure 29). This samphire unit, 'TmThTs' has a different suite of dominant samphire species to the 'Ti' unit, where *Tecticornia indica* subsp. *bidens* was dominant. Its distribution may be due to soils in this northern part of the survey area being more saline and less well drained (the water table is within 2m of the surface). The mapped area of this unit (22.7 ha, 1.9%, Table 10) may be overestimated and it may not extend as far south as mapped. Mapped extent was based on the interpreted dominant *Tecticornia'*s in the field, but it is noted that site CNQ09, mapped as 'TmThTs', was floristically most similar to 'Ti' sites (Figures 22 and 23). Vegetation condition was generally 'Very Good to Excellent'.

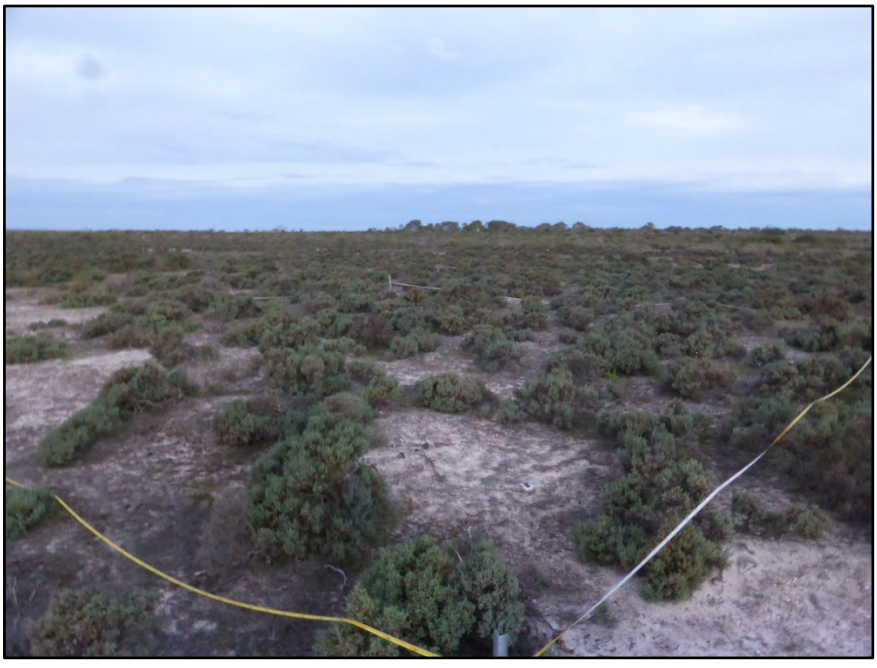


Plate 42: Vegetation unit 'Ti' at site CQ28 (June 2021).

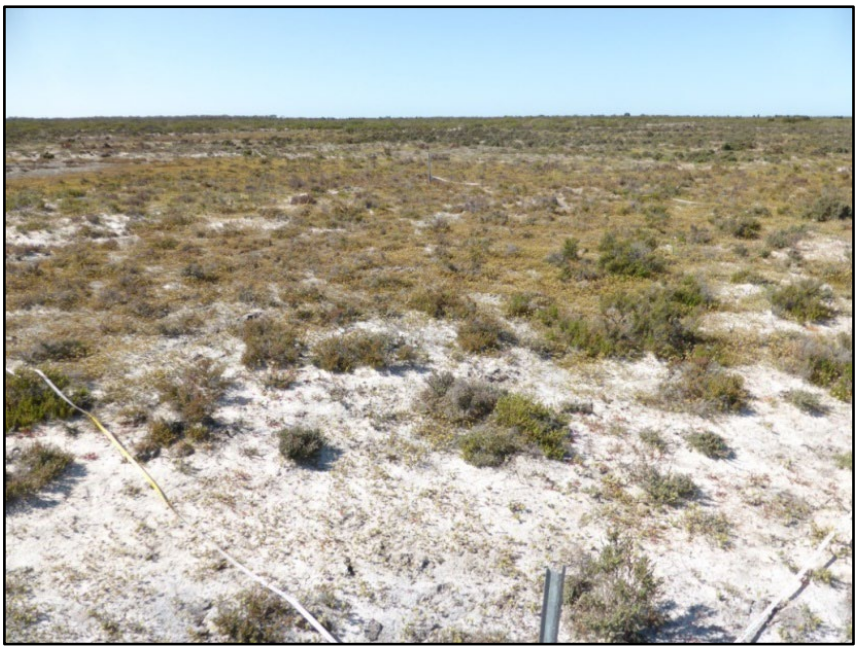


Plate 43: Vegetation unit 'TmThTs' at quadrat CNQ06 (2020).

TsTi

Tecticornia syncarpa, *Tecticornia halocnemoides*, (*Tecticornia indica* subsp. *bidens*) Low Open Samphire Shrubland over **Crassula natans* var. minor (aquatic), (**Cotula coronopifolia*) Closed Herbland.

Habitat and soil: Banks of saline claypan.

Associated species: *Liparophyllum capitatum*, *Triglochin* sp. A Flora of Australia (G.J. Keighery 2477), *Triglochin mucronata*, *Triglochin minutissima*, *Cycnogeton lineare*, *Isolepis cernua* var. *setiformis*, *Sporobolus virginicus*, * *Cotula coronopifolia,*

Notes: This sumpland unit was described at two sumplands on the MESA floodplain, with relevé CRK01 and mapping note MNK01 (Plate 44; Figure 29). Scattered small patches of *Melaleuca viminea* subsp. *viminea*, (*Melaleuca rhaphiophylla*) Sparse Shrubland to Open Shrubland occurred occasionally higher up on the sumpland banks. Vegetation condition was 'Very Good to Excellent'.



Plate 44: Vegetation unit 'TsTi' at mapping not site MNK01 on the 'floor' of a sumpland in the northern part of the survey area (October 2020).

(iii) Flowline, Dampland and associated vegetation

This vegetation includes flowline vegetation units ('MrMvBc', 'MrMvMco'. 'MrMtSl', 'MvMb' and 'TCg'); Dampland vegetation ('CgMj', 'EdMp' and 'MrMt') and associated vegetation unit ('Er').

CgMj

Cyperus gymnocaulos, *Machaerina juncea* Sparse to Open Low Sedgeland/Rushland (regrowth) with **Cyperus tenellus*, *Isolepis marginata*, **Juncus bufonius* Low Sparse Sedgeland with **Lotus subiflorus*, **Arcotheca calendula*, **Romulea* sp, *Crassula decumbens* var. *decumbens* Low Forbland.

Habitat and soil: Low plain (flood plain). Grey sand.

Associated species: *Schoenus subfascicularis* (patches), *Drosera ramellosa*, **Monopsis deblis*, **Lupinus cosentinii*,

Notes: This vegetation was recorded at several sites (AIMB07, AIMB11 and AIMB12; Plate 45) in cleared farm paddocks and was typical of areas of open sedgeland regrowth in some parts of the pasture paddocks. Weed forbs and sedges generally had high cover and the vegetation condition was assessed as 'Degraded to

Completely Degraded'. Small patches of *Lawrencia squamata* Low Sparse Shrubland with *Triglochin* spp. ('Degraded') occurred in the central part of the farmland in the northern MESA (Figure 28).



Plate 45: Vegetation unit 'CgMj' at mapping note site AIMB11 in the central part of the farmland area in the northern MESA.

EdMp

Eucalyptus decipiens, *Melaleuca preissiana* Low Woodland over *Spyridium globulosum*, *Acacia cyclops* Isolated Clumps of Tall Shrubs over *Gahnia trifida* Mid Isolated Sedges and *Lepidosperma longitudinale* Sedgeland (patches) and **Ehrharta longiflora* Grassland.

Habitat and soil: Depression on plain. Dark brown loamy sand.

Associated species: **Moraea flaccida*, **Arcotheca calendula*, **Lysimachia arvensis*, **Hypochaeris glabra*, *Austropstipa macalpinei.*

Notes: This vegetation was recorded at relevé site AIRB01 in the EISA corridor on Nambung Station (Figure 31). It was a dampland area in a corner of a farm paddock and was in 'Degraded' condition. It was the only location where this vegetation type was recorded in the survey area.

Er

Eucalyptus rudis subsp. *rudis* Open Forest over *Rhagodia baccata subsp. baccata* Open Shrubland over **Ehrarta longiflora, *Brassica tournefortii, *Trifolium campestre* var. *campestre, *Stellaria media* annual Open Grassland/Forbland of exotics with *Clematis linearifolia Sparse Lianes.*

Habitat and soil: Very gentle, east-facing slope on margin of wetland. Grey sand.

Notes: *Eucalyptus rudis* subsp. *rudis* Open Forest covered a small area on the margins of a 'MrMt' dampland on the eastern boundary of the MESA (Figure 30), north of Wongonderrah Rd. Two quadrats were recorded in this vegetation: CNQ13 (Plate 46) and an ecotonal CQ3, which was downslope and nearer to the *Melaleuca rhaphiophylla* wetland unit and had a *Melaleuca rhaphiophylla* Tall Shrubland stratum. 'Er' vegetation had high weed cover and was depauperate in native species and was assessed as 'Degraded'.



Plate 46: Vegetation unit 'Er' at quadrat CNQ13 (2020).

MrMt

Melaleuca raphiophylla Tall Shrubland over Melaleuca *teretifolia*, *Rhagodia baccata* subsp. *baccata* Sparse Shrubland over *Conostylis festucacea* subsp. *festucacea*, **Trifolium campestre* var. *campestre*, **Trifolium arvense* var. *arvense* Forbland and *Lepidosperma longitudinale*, *Schoenus subfascicularis*, *Leptocarpus coangustatus* mixed Open Sedgeland/Rushland to Sedgeland/Rushland and **Polypogon*

monspeliensis, **Vulpia myuros forma myuros*, **Ehrharta longiflora* Open Grassland with *Comesperma integerrimum*, *Clematis linearifolia Sparse Lianes*.

Habitat and soil: Low lying depression on plain (wetland). Brown clayey sand.

Associated species: **Cotula coronopifolia*, *Ptilotus polystachyus*, *Allocasuarina lehmanniana* subsp. *lehmanniana*, *Centrolepis polygyna*, *Acacia stenoptera, Hakea trifurcata*.

Notes: This vegetation unit was recorded at a large, prominent 'dampland' on the eastern boundary of the MESA just north of Wongonderrah Rd (quadrats CQ2 and CNQ02) (Plate 47) and at a dampland along the powerline track (CNQ16). Ironstone cobbles and pebbles were noted on the side of the powerline track near CNQ16, suggesting the possibility of an ironstone hardpan layer at that dampland. The wetland vegetation at CQ2/CNQ02 was in 'Good to Degraded' condition, while the vegetation at CNQ16 was in 'Very Good' condition.



Plate 47: Vegetation unit 'MrMt' at quadrat CNQ02, in a dampland area on the eastern boundary of the MESA (2020).

MrMtSl

Melaleuca raphiophylla Tall Shrubland over *Melaleuca teretifolia* Sparse Shrubland over *Schoenus laevigatus, Lepidosperma longitudinale* Open Sedgeland.

Habitat and soil: Depression on plain – dampland, broad flow area (spring-fed, surface water present). Dark grey sand.

Associated species: *Verticordia densiflora*, *Acacia saligna*, *Conostylis festucacea* subsp. *festucacea*, *Solanum symonii*

Notes: This vegetation was recorded at three quadrats: AIQ06, AIQ07 and AIQ08 (Plate 48) in the EISA Nambung Rd corridor and were located along the same broad, shallow, flow line/dampland (Figure 26). Surface water was present at AIQ08, fed from a small nearby spring. Vegetation at these sites appeared stressed and dying or dead, perhaps related to inundation or a water parameter, such as pH (alkaline?).



Plate 48: Vegetation unit ‘‘MrMtSl’ at quadrat AIQ08, in a spring-fed broad shallow flow area dampland in the EISA corridor on the north side of Nambung Rd, near its western end.

MrMvBc

Melaleuca rhaphiophylla, *Melaleuca viminea* subsp. *viminea*, *Melaleuca brevifolia* Tall Shrubland to Tall Closed Shrubland (patches) over *Bolboschoenus caldwellii*, *Baumea juncea*, *Cyperus gymnocaulos* Mid-Sedgeland with **Ehrharta longiflora*,

**Hordeum geniculatum*, **Lolium multiflorum* Sparse Grassland of exotics and **Cotula coronopifolia*, **Lotus subbiflorus* Low Sparse Forbland of exotics.

Habitat and soil: Broad, shallow flow line (Bibby Creek). Grey-brown sandy clay loam.

Associated species: *Isolepis cernua* var. *setiformis*, *Samolus junceus*, **Polypogon monspeliensis*, *Sporobolus virginicus*.

Notes: This vegetation unit was recorded at Bibby creek in the very north-west corner of the bushland part of the MESA, at quadrat CNQ22 (Plate 49, Figure 29). A few hundred metres upstream was farm paddock and the flow line had high weed cover over large areas ('Good to Degraded'). Bibby Creek was not flowing in early November.



Plate 49: Vegetation unit 'MrMvBc' at quadrat CNQ22, on Bibby Creek (2020).

MrMvMco

Melaleuca rhaphiophylla, *Melaleuca concreta*, (*Melaleuca viminea subsp. viminea*) Tall Open to Closed Shrubland (patchy) over *Melaleuca brevifolia* Sparse Shrubland over *Grevillea* sp. Cooljarloo (B.J. Keighery 28 B) Sparse Low Shrubs over *Cyperus gymnocaulos*, *Lepidosperma longitudinale* Sedgeland (along floor of drain) and

**Lotus subbiflorus*, **Polypogon monspeliensis*, **Hordeum geniculatum* Closed Herbland/Grassland.

Habitat and soil: Flow line bed and flood banks (the eastern part of which was historically excavated to enhance drainage). Light brown sand.

Associated species: *Regelia ciliata*, *Acacia saligna*, **Sonchus oleraceus*, *Leptocarpus coangustatus*, **Bromus hordeaceus*, *Schoenus subfascicularis*, *Sporobolus virginicus*, *Cassytha racemosa forma racemosa*, **Lolium perenne* x *rigidum*.

Notes: This vegetation was described at relevé sites CBR16 (Plate 50), CCR2 and CNR03 on the flood banks and associated flood areas of Mount Jetty Creek on the MESA floodplain (Figure 29). and are probably very similar to quadrat AIQ11, recorded on the Nambung River flood plain on the verge of Munbinea Rd. *Melaleuca rhaphiophylla* and *Melaleuca concreta* were dominant in the eastern part where Mount Jetty Creek flows into the survey area. Further west along the flow line, *Melaleuca viminea subsp. viminea* was also dominant. Flowline disturbance (excavated deeper near the eastern boundary) and the large area of pasture paddocks that Mount Jetty Creek flowed through prior to entering the survey area, are the likely causes for the closed forbland/grassland of exotic species (weeds) in this unit, resulting in a vegetation condition of 'Good to Degraded'. No quadrats were recorded in this unit because of its poor condition.



Plate 50: Vegetation unit 'MrMvMco' described at relevé site CBR16 (2020).

MvMb

Melaleuca viminea subsp. *viminea* Tall Shrubland over *Melaleuca brevifolia* Sparse Shrubland over *Grevillea thelemanniana* subsp. Cooljarloo (B.J. Keighery 28 B) (Priority 1), *Melaleuca seriata* Low Sparse Shrubland and *Tecticornia indica* subsp. *bidens* Sparse Low Samphire Shrubland over **Lotus subbiflorus*, **Crassula natans* var. *minor*, **Cotula coronopifolia*, *Cotula cotuloides, *Ornithopus pinnatus*, **Crassula glomerata*, **Stellaria media* Low Open Forbland and **Vulpia myuros* forma *myuros*, **Vulpia bromioides, *Polypogon monspeliensis* Low Open Grassland.

Habitat and soil: Minor flowline banks and bed. Pale grey-brown sand

Associated species: *Callitris pyramidalis*, **Holcus setiger*, **Juncus bufonius*, *Melaleuca rhaphiophylla, Centrolepis polygyna, *Monopsis debilis, *Cotula coronopifolia, Samolus junceus, Crassula decumbens* var. *decumbens, Gahnia trifida, Schoenus subfascicularis, Eryngium pinnatifidum subsp. Palustre (G. J. Keighery 13459).*

Notes: This vegetation unit was recorded at quadrats CQ14, CQ24 ('Degraded') and CNQ05 (Plate 51) and at relevés CBR2, CBR11 and CNR02. It was recorded along the banks of minor flow channels (Figure 29). It typically had a herbland/sedgeland dominated by weed species and was mostly in a 'Good to Degraded' condition.



Plate 51: Vegetation unit 'MvMb' at quadrat CNQ05 (2020).

TCg

Typha sp. Tall Rushland with *Ficinia nodosa*, *Lepidosperma longitudinale*, **Juncus acutus* subsp. *acutus*, *Cyperus gymnocaulos* Sedgeland and **Lotus subifolius*, **Cotula coronopifolia* Low Forbland.

Habitat and soil: Drainage line. Yellow sand.

Associated species: *Caladenia longicauda*

Notes: This vegetation was described at mapping note AIMB10 (Plate 52) at a broad drainage line in cleared pasture paddocks in the EISA corridor along the southern boundary of farmland between Munbinea Rd and the MESA (Figure 27). *Typha* sp. grew along deeper sections of the drainage line. The drainage line vegetation was considered 'Degraded' due to the impact of past clearing and grazing and when compared to the structure and composition of vegetation south of the farm boundary fence, in 'unallocated crown land' bushland. Vegetation along another drainage area in the northern part of the MESA on the same farm (site AIMB13; Figure 28) was assigned the same vegetation unit, 'TCg', with *Typha* sp. growing along the main drainage line (?man-made or altered) and other sedge and rush species growing further out on its banks (Plate 53).



Plate 52: Looking along the east-west boundary fence and across the drainage line and vegetation unit 'TCg' at mapping note AIMB10, on the southern boundary of farmland, west of the MESA.



Plate 53: Vegetation 'TCg' along a drainage line in the northern part of the MESA at mapping note AIMB13.

5.3 Wetland vegetation units

The 'wetland' status of vegetation units was largely determined by considering what vegetation units were associated with the area mapped as wetlands by ENV (2010), with some consideration of the wetland status (where known) of species associated with the vegetation units (Table 11). That is, in general, vegetation units that occur in the area mapped as geomorphic wetland and which include species considered to be obligate wetland species (ENV, 2010), were assessed to be wetland units in this report. The wetland status applied in this report is not based on a detailed vegetation, soils and hydrological analysis undertaken by a wetlands expert.

For example, the *Tecticornia indica* subsp. *bidens* Low Open Shrublands unit ('Ti') occurs in that part of the study area mapped as 'floodplain' ENV (2010). The wetland status of *Tecticornia indica* subsp. *bidens* was not listed by ENV (2010), so 'Ti' has been assessed as a 'wetland' unit in this report on the basis that it occurs in an area mapped as 'floodplain'. *Melaleuca* flowline vegetation in the survey area, such as unit 'MvMb' could be more confidently labelled 'wetland' since it both occurred in the area mapped as geomorphic wetland by ENV, and because two dominant species in the unit, *Melaleuca viminea* subsp. *viminea* and *Melaleuca brevifolia* are both considered obligate wetland species (ENV, 2010).

ENV (2010) mapped six types of geomorphic wetlands in the MESA and EISA: floodplain (seasonally inundated flat), sumplands (seasonally inundated basin), damplands (seasonally waterlogged basin), creek (seasonally inundated channel), lake (permanently inundated basin) and palusplain (seasonally waterlogged flat) (Table 3; Figure 8). The degree of coincidence and alignment of the boundaries of the vegetation units and those of the mapped geomorphic wetlands (ENV's, 2010) can be seen in Figure 35. Some of the vegetation units described in this study could be reasonably categorized into one of four of these geomorphic wetland classes: floodplain, sumplands, damplands and creeks (flowlines) (Table 11). The area mapped by ENV (2010) as a 'lake' was a prominent wetland on the eastern boundary of the MESA about 700 metres north of Wongonderrah Rd (Figure 8; Figure 29). It was not inundated during the October/November period of two survey years (2019 and 2020, although it was inundated mid-October, 2021) and so has not been treated in this report as a 'lake' ('permanently inundated'). Two thirds of that wetland area and its centre, lies in the adjacent cleared farm paddock and has been largely cleared. The vegetation unit occurring in that wetland (and in two other locations in the survey area) has been assigned to the 'dampland' geomorphic wetland category. The small area on the eastern side of the MESA that ENV mapped as palusplain, just north of that 'lake' (Figure 8), was more difficult to interpret in the field and includes a flow line and adjacent vegetation that was part of a much more extensive area of *Banksia telmatiaea* heaths.

ENV's geomorphic wetland mapping (Figure 8, Figure 35) coincided with some areas of *Banksia telmatiaea* heaths (northern and central area) (Figure 35), but not others (heaths on southern side of floodplain). Syrinx Environmental (2013), in their study at Cooljarloo, found that *Banksia telmatiaea* heaths occurred on palusplains and damplands, and also occurred on lower dune slopes. They concluded that the 'communities on the edges of the wetlands are transitional communities dominated by dryland species and are not part of the wetland zonal sequence as such'. Indeed, the vegetation classification of the Atlas vegetation presented earlier in the dendrograms in Figures 22 and 23, ultimately grouped the heath super group with that of the 'dryland' *Banksia* woodlands. However, numerous dominant and co-dominant species occurring in the heaths are known to be facultative wetland species (Table 11). While the actual wetland status of these heaths cannot be definitively stated in this report, they are widely associated with wetlands and are therefore considered in this report as transitional vegetation associated with wetlands. More detailed wetland studies would be required should wetland boundaries need to be mapped with more certainty.

While the ENV (2010) geomorphic wetland mapping boundaries are generally consistent with the wetland vegetation unit boundaries (Figure 35), there are some inconsistencies. As mentioned above, one inconsistency is the mixed coincidence of the *Banksia telmatiaea* heaths with the mapped wetland area. Another inconsistency is that two large, low sandy rises (dunes) that are located on the floodplain and are covered by *Banksia telmatiaea* heath mosaics and, in some parts, by *Banksia* woodlands, were included in the broader floodplain area by ENV (2010). It is also noted that some of the *Banksia telmatiaea* heaths that occurred in small depression areas on the sand plains were categorised as 'dampland' in the geomorphic mapping and were floristically very similar to *Banksia telmatiaea* heaths mapped as 'floodplain' in other parts (Figure 35).

It should be noted that the geomorphic wetland mapping was regional mapping at a very broad scale (less detailed) and included little ground truthing (ENV, 2010).

5.4 Groundwater Dependent Ecosystems (GDE)

5.4.1 Groundwater hydrology in the survey area

There are a number of groundwater attributes which influence the relationship with GDEs, depth to groundwater generally being the most important attribute for GDEs that rely primarily on groundwater, while depth and frequency of inundation are most important for GDEs that rely on both surface expressions of groundwater and overland flow of surface water (e.g. floodplains and wetlands) (Froend and Loomes, 2006).

In the survey area, a recent hydrology study (MWES Consulting, 2021) formed a conceptual hydrological model of the study area that was comprised of two aquifer systems, the Superficial/Tamala Limestone aquifer and the deeper Mesozoic aquifer system. The superficial formations are considered to be a single unconfined aquifer system that is generally thin near the Atlas deposit and thickens to the north and south. Recharge to the Superficial Aquifer from rainfall and associated runoff is widespread over the project area.

MWES Consulting (2021) found that depth to the water table increases from less than 2 metres in the northern part of the MESA to 8 to 10 metres in the south-east (Figure 36).

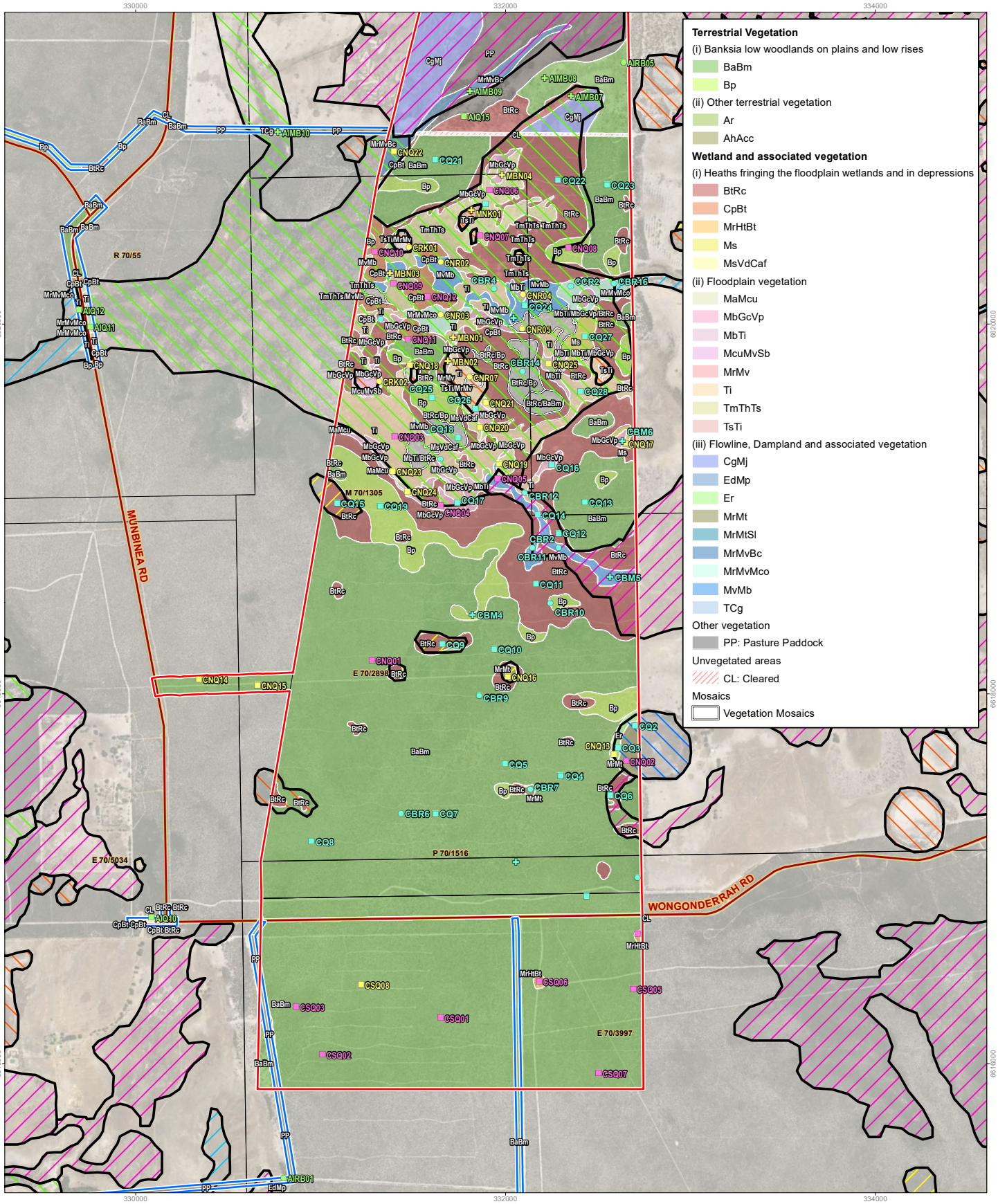
Table 11: Wetland status of vegetation units

Vegetation grouping		**Vegetation unit**	**Wetland status**	**Obligate/facultative wetland species present in the vegetation units (sourced from ENV (2010) unless otherwise referenced)** ***a***
I. Terrestrial	(i) *Banksia* low woodlands	BaBm	Dryland	
		Bp	Dryland	
	(ii) Other terrestrial	Ar	Dryland	
		AhAcc	Dryland?	
II. Wetland & associated veg	(i) Floodplain vegetation	MbGcVp	Wetland : Floodplain	Obligate: *Melaleuca brevifolia, Gahnia trifida, Frankenia pauciflora*
		MbTi	"	Obligate: *Melaleuca brevifolia*
		McuMvSb	Wetland : Sumpland	Obligate: *Melaleuca rhaphiophylla, M. viminea* subsp. *viminea. Salicornia blackiana* grows on periodically waterlogged saline soils
		MrMv	"	Obligate: *Melaleuca rhaphiophylla, M. viminea* subsp. *viminea*
		Ti	" (?)	*Tecticornia indica* subsp. *bidens:* associated with well drained, saline soils around saline flats, salt lakes etc (Datson, 2002)
		TsTi	"	Obligate: *Tecticornia syncarpa*
		TmThTs	"	Obligate: *Tecticornia syncarpa; T. halocnemoides:* found in wettest and most saline parts of floodplain (Datson, 2002)
	(ii) Heaths fringing the floodplain and in depressions	BtRc	Transitional dampland/dryland	Facultative: *Banksia telmatiaea; Regelia ciliata, Calothamnus quadrifidus*
		CpBt	"	Facultative: *Banksia telmatiaea; Regelia ciliata; Callitris pyramidalis* occurs on soils subject to winter inundation, salt tolerant (Marchant *et al*., 1987)

Vegetation grouping		**Vegetation unit**	**Wetland status**	**Obligate/facultative wetland species present in the vegetation units (sourced from ENV (2010) unless otherwise referenced) *a***
		MrHtBt	"	Obligate: *Melaleuca rhaphiophylla, Facultative: Banksia telmatiaea; Hakea trifurcata*
		MsVdCaf	"	Obligate: *Schoenus subvascicularis, Chaetanthus aristatus;* Falcultative*: Verticordia densiflora, Regelia ciliata; Melaleuca seriata* (optimal on moist sites; deep rooted)b
		Ms	"	Falcultative: *Verticordia densidlora, Regelia ciliata; Melaleuca seriata* (optimal on moist sites; deep rooted)b
	(iii) Drainage and dampland vegetation	MrMt	Wetland : Dampland	Obligate: *Melaleuca rhaphiophylla, Melaleuca teretifolia*
		MrMtSl	Wetland : 'Creek'	Obligate: *Melaleuca rhaphiophylla, Melaleuca teretifolia*
		MrMvBc	Wetland : Creek	Obligate*: Melaleuca rhaphiophylla, M. viminea* subsp*. viminea; Cyperus gymnocaulis*
		MrMvMco	Wetland : Creek	Obligate: *Melaleuca rhaphiophylla, M. viminea subsp. viminea*
		MvMb	Wetland : Creek	Obligate: *M. viminea subsp. viminea; Melaleuca brevifolia*
		MaMcu	Wetland : ?Creek	Obligate (?): *Melaleuca acutifolia and M. cuticularis* (saline soils) occur in swamps and winter-wet depressions; (Marchant *et al*., 1987; Wheeler *et al*., 2002)
III. Other		Er	Transitional, fringing dampland	Obligate: *Eucalyptus rudis subsp rudis.*

a: ENV (2010) list of obligate and facultative wetland species is limited and not complete.

b: Groom *et. al*. (2000); Syrinx Environmental (2013).



Legend

- Mine Envelope Study Area
- External Infrastructure Study Area
- Tenement

Geomorphic Wetlands

- Palusplain
- Sumpland
- Dampland
- Floodplain
- Creek
- Lake

- 2021: Quadrat
- 2021: Releve
- 2021: Mapping Note
- 2020: Quadrat
- 2020: Releve
- 2020: Mapping Note
- 2019: Quadrat
- 2011: Quadrat
- 2011: Releve
- 2011: Mapping Note

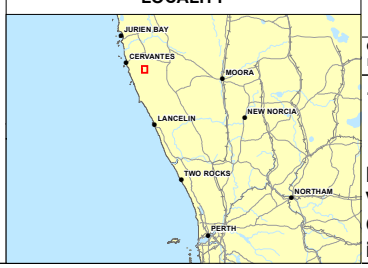
0 0.25 0.5 1 km

Scale: 1:20,000 @ A3

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- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

LOCALITY



Source: Orthophoto - Open Source Imagery

Preston Consulting

CREATED BY	JOB	DATE	REVISION
ENVIRONMAPS	AtlasInfra	8/11/2021	0

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Figure 35: Vegetation Units and Geomorphic Wetland Boundaries in the MESA Survey Area

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5.4.2 Groundwater dependent ecosystem (GDE) status of vegetation

5.4.2.1 Terrestrial vegetation

Terrestrial vegetation in the survey area comprised of *Banksia attenuata*, *Banksia menziesii* Low Woodlands and *Banksia prionotes* Low Woodlands. *Banksia attenuata*, *Banksia menziesii* and *Banksia prionotes* are facultative phreatophytes (use ground water if it is accessible) (Thomas, 2014; Syrinx Environmental, 2013). *Eucalyptus todtiana*, which was a co-dominant scattered throughout the *Banksia* woodland, is also a facultative phreatophyte (Syrinx Environmental, 2013). *Banksia ilicifolia*, which was sparsely scattered in the lower parts of the *Banksia* woodlands in the study area, is considered an obligate phreatophyte. Several terrestrial shrub species present in the *Banksia* woodlands, are also known to be facultative groundwater users: *Eremaea pauciflora*, *Jacksonia floribunda* and *Stirlingia latifolia* (Thomas, 2014; Syrinx Environmental, 2013).

Most of the *Banksia* woodlands in the study area have a depth to water table of between 4 to 8 metres depth (Figures 35 and 36). Given that studies of *Banksia* woodlands on the Swan Coastal Plain have shown that within 0-3m, 3-6m and 6-10m of water table, *Banksia* spp. are phreatophytic and derive some of their water from groundwater (Froend and Loomes, 2006); it can be concluded that the *Banksia* woodlands in the survey area can be considered potential terrestrial GDE.

5.4.2.2 Wetland and associated vegetation

Froend *et al*. (2004) noted that the groundwater dependence of many wetland ecosystems has been largely inferred from their position in the landscape and the occurrence of plant species associated with shallow groundwater.

The *Melaleuca* shrubland units in damplands and along flowlines and their flood banks and on some other parts of the floodplain, include dominant taxa that are considered obligate wetland taxa (*Melaleuca brevifolia*, *M. rhaphiophylla*, *M. teretifolia*) and which through association are considered potential wetland GDE.

The *Tecticornia* unit 'TmThTs', which occurred in the northern part of the survey area where there is a shallower water table (<2 metres), includes waterlogging-tolerant species and it would be reasonable to assert that this unit may be 'wetland GDE'. This is also true for the sumpland vegetation units.

The southern and western part of the floodplain area had a depth to groundwater of 2 to 4 metres (Figure 36) and *Tecticornia indica* subsp. *bidens* Low Shrublands occurred in these parts (Figure 29). *Tecticornia indica* subsp. *bidens* is known to occur in 'well drained, saline soils' (Datson, 2002). Equinox Environmental (2013) reported the findings of a modelling study which suggested that the ecological water requirements of the fringing samphire communities (including *Tecticornia indica* subsp. *bidens*) are wholly or predominantly met by surface inputs. However, samphire root excavations have found that the fine roots can extend up to 2.5 metres (Equinox Environmental, 2013). In conclusion, the GDE status of *Tecticornia indica* subsp. *bidens* in the Atlas study area is not known, but its occurrence in a floodplain area in association with a water table that may be accessible to its roots leads to a conservative assessment for this report that it may be potential GDE.

The *Banksia telmatiaea* heaths that occurred in depressions on the sandplain and that, together with other heaths, fringed the floodplains in the MESA, were in areas with relatively low depths to groundwater table of 2 to 4 metres (Figures 35 and 36) and are therefore likely to be potential GDE. The general association of *Banksia telmatiaea* heaths with wetlands suggests it is facultative GDE.

Finally, *Eucalyptus rudis* subsp. *rudis* is considered an obligate wetland taxon (ENV, 2010) and the *Eucalyptus rudis* subsp. *rudis* Open Forest that fringes a dampland in the survey area would be considered GDE.

In summary, the entire Atlas survey area vegetation can be considered either a potential wetland GDE or a potential terrestrial GDE.

5.4.3 Perched aquifers

The Atlas hydrology study concluded there was no evidence of substantive perched aquifers under the floodplain in the survey area (Gary Meyer, MWES Consulting, *pers. comm.*). However, there were a number of locations where 'ironstone' cobbles etc were observed on the ground. One location was on the edge of the powerline access track in the seasonal dampland at quadrat CNQ16 (Figure 30), suggesting that the dampland could be related to a ferruginous impeding layer. Historical exploration drilling in the study area did not find significant evidence of calcareous hardpan, but did find underlying ironstone approximately 1 metre thick over some of the southern part of the deposit, north and south of Wongonderrah Rd (Paul Leandri, Image Resources, *pers. comm*.). The recollection was that the 'iron oxide' layer was about 4 to 5 metres beneath the soil surface in the *Banksia* woodland and that numerous holes

on the eastern side of the survey area went through ironstone. Perhaps the few small heath depression areas and *Melaleuca* dampland areas scattered on the sand plain (Figure 30) are occurrences of shallow soils over ferruginous layers.

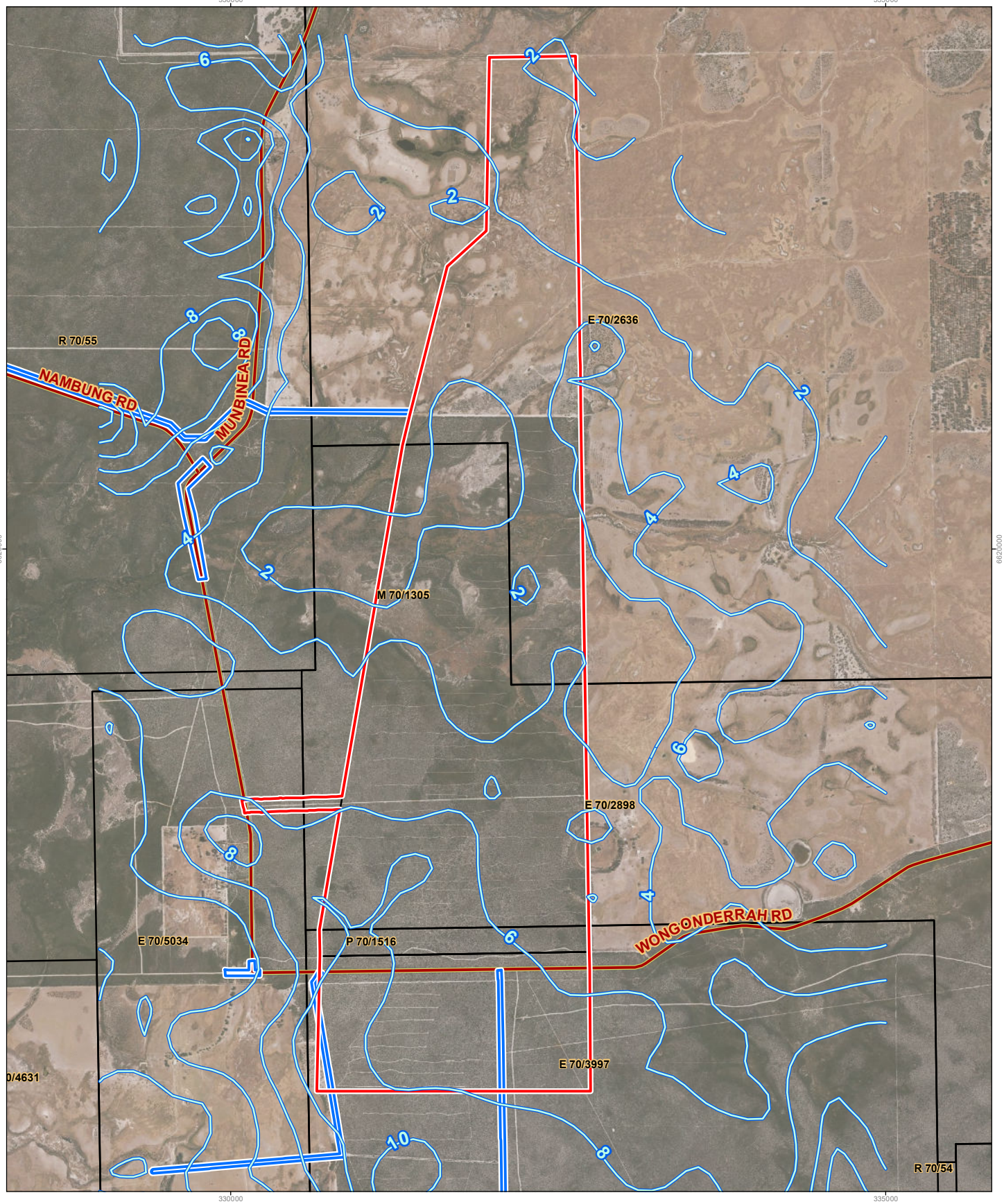
5.5 Vegetation condition

5.5.1 Vegetation condition in the survey area

About 69% of the MESA was in 'Excellent' or better condition and if the farmland area in the northern part of the MESA is excluded, that percentage rises to 87% (Figure 37 to 43; Table 12). Vegetation in 'Excellent' or better condition in the survey area included most of the *Banksia attenuata, Banksia menziesii* Low Woodlands and *Banksia prionotes* Low Woodlands and most of the areas of *Banksia telmatiaea* heaths and other heath units. These areas had low or very low weed covers. Areas mapped as 'Pristine' had almost no weeds and numerous quadrats in these areas had no weeds recorded.

Table 12: Area (ha) of vegetation condition classes in the survey area.

Vegetation Condition Class		MESA		EISA		Total	
		Area (ha)	%	Area (ha)	%	Area (ha)	%
P	Pristine	3.8	0.3			3.8	0.3
E-P	Excellent to Pristine	594.5	50.7	0.0	0.0	594.5	48.5
E	Excellent	211.9	18.1	27.5	50.5	239.4	19.5
VG-E	Very Good to Excellent	28.5	2.4	0.5	0.9	28.9	2.4
VG	Very Good	15.1	1.3	4.4	8.1	19.5	1.6
G-VG	Good to Very Good	7.6	0.6	1.1	2.1	8.7	0.7
G	Good	13.9	1.2	0.7	1.3	14.6	1.2
G-D	Good to Degraded	64.6	5.5	0.5	1.0	65.1	5.3
D	Degraded	7.5	0.6	1.9	3.4	9.4	0.8
D-CD	Degraded to Completely Degraded	85.6	7.3			85.6	7.0
CD	Completely Degraded	135.0	11.5	13.6	24.9	148.5	12.1
CL	Cleared	4.0	0.3	4.3	7.9	8.3	0.7
Total		1171.8	100.0	54.4	100.0	1226.3	100.0



Legend

- Mine Envelope Study Area
- External Infrastructure Study Area
- Tenement
- Depth to Groundwater (m)

0 0.25 0.5 1 km

Scale: 1:40,000 @ A4

N

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

LOCALITY



Source: Tenements - DMIRS

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ENVIRONMAPS	ATLASINFRA	8/11/2021	0

Figure 36: Depth to Groundwater in the MESA Survey Area

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C:\GIS\Jobs\Brian Morgan\Atlas Infrastructure\Figures\AtlasInfra_F36 Depth to Groundwater in the MESA Survey Area_211108.mxd

The vegetation condition of the *Melaleuca* Spp. Tall Shrublands along the main flow lines and their flood banks were mostly in 'Good to Degraded' condition in the MESA, with very high weed cover in the herbland/sedgeland/grassland strata (Figures 40 to 42; Plate 54). The high weed cover in these areas could be attributed to a combination of suitable habitat and the introduction of weeds in water flows from adjacent pasture paddocks (east and north of MESA) and by grazing animals (cattle that have found their way into the survey area previously, and large numbers of kangaroos in the locality). The condition of the *Melaleuca rhaphiophylla, Melaleuca teretifolia* dampland ('MrMt') on the eastern boundary of the MESA, north of Wongonderrah Rd, was also 'Good to Degraded' due to high weed cover. This dampland was divided from an adjacent cleared pasture paddock by a fence line (Figure 42). The surrounding *Eucalyptus rudis* subsp. *rudis* Open Forest also had very high weed cover and significant loss of lower strata species, and was in a 'Degraded' condition (Plate 46 above).

Large parts of the samphire Low Shrublands on the MESA floodplains were in 'Excellent' condition, with low weed cover and a species-rich herb layer. However, the weed cover was greater and the vegetation condition lower in wetter parts of the floodplain and near the weedy flowlines (Figure 41).



Plate 54: An area of 'MrMvMco' vegetation at relevé CNR03, in the northern part of the survey area (Figure 41), with a high cover of grass and forb weed species (2020) (Good to Degraded condition).

The northern part of the MESA was cleared farmland with pasture paddocks and mostly has a condition in the range of 'Degraded' to 'Completely Degraded' from a native vegetation perspective (Figure 40). Much of the farmland was mapped as Palusplain and some parts had some regrowth sedges and rushes present (mapped 'Degraded to Completely Degraded'). Much of the Nambung Station EISA corridor and the western end of the Nambung Rd EISA corridor were on farmland and large parts 'Completely Degraded' (Figures 42 and 43).

5.5.2 Salt encroachment and land clearing

The extent of salinity on the Nambung flats prior to clearing in the district and the extent of the samphire flats on the floodplain, is not known, but it is likely that their area may have increased since clearing. However, these ideas are a matter of conjecture. Therefore, historical changes in the hydrology of the survey area and its impact on the vegetation has not been taken into account in assessing vegetation condition in the Atlas survey area.

5.5.3 *Banksia* spp. deaths in the survey area

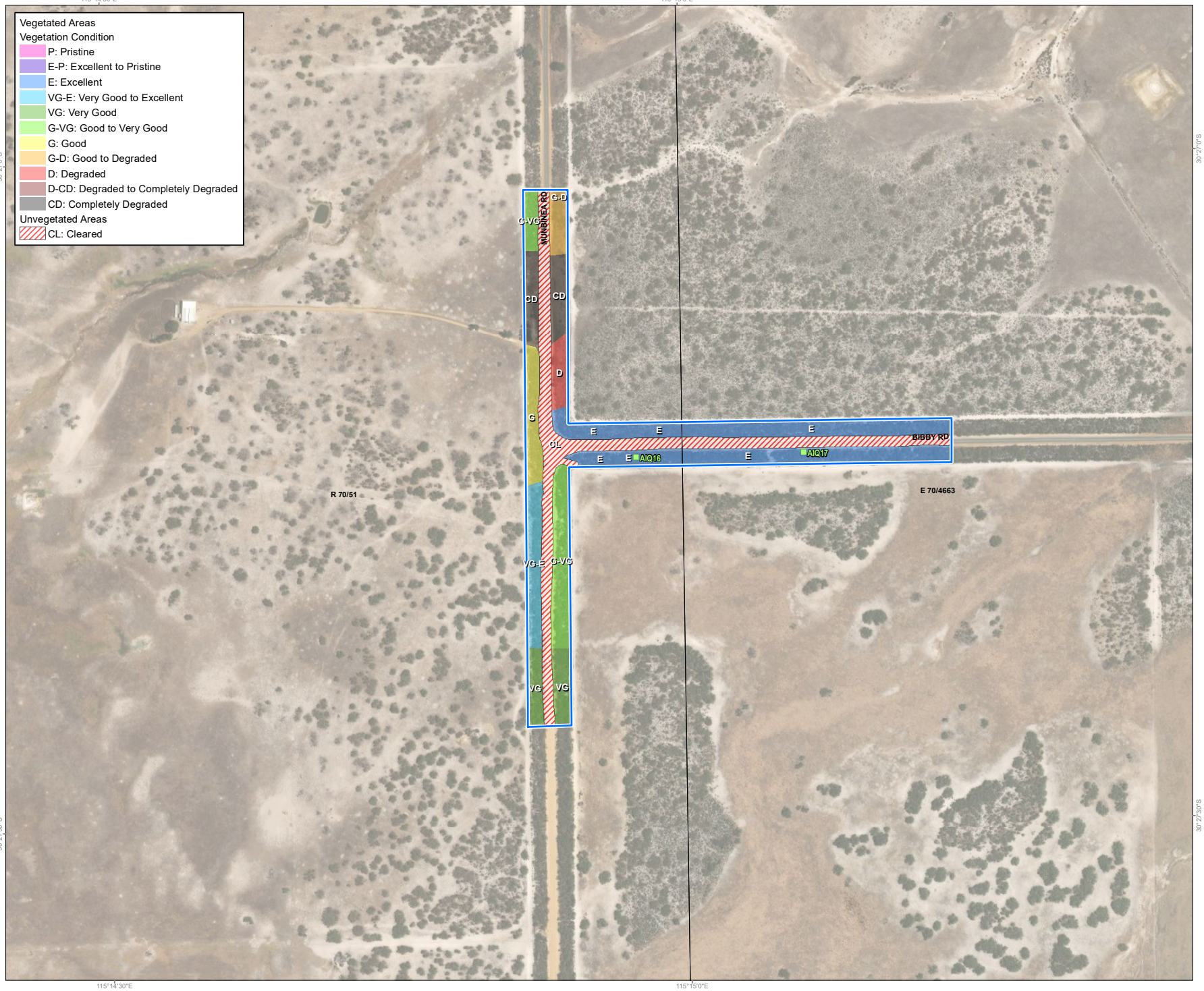
A number of areas of concentrated *Banksia* deaths were noted in the *Banksia attenuata-Banksia menziesii* low woodlands vegetation unit, including fairly recent deaths (Plate 55). The deaths could not be attributed to fire, as it is estimated that most of the survey area had not been burnt for 14 or more years. Healthy *Banksia* trees were in the surrounding areas.

Agents such as fire and drought (including rapidly falling water tables or salination of water tables) can be responsible for *Banksia* tree deaths. The deaths and decline of *Banksia* trees may also indicate the presence of the Dieback fungus *Phytophthora cinnamomi*, as well as other pathogens. A number of *Phytophthora* spp. have been detected in the survey area region, including in the area of Nambung National Park to the west and along Wongonderrah Rd to the east (Hart *et al*., ref. in CALM, 1998). It was recommended that a *Phytophthora cinnamomi* dieback survey by accredited 'dieback interpreters' be undertaken to determine if Dieback is present. This has since taken place.



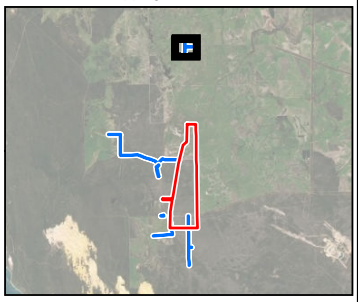
Plate 55: *Banksia* deaths in an area of *Banksia* woodland south of Wongonderrah Rd.

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metres
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LOCALITY MAP



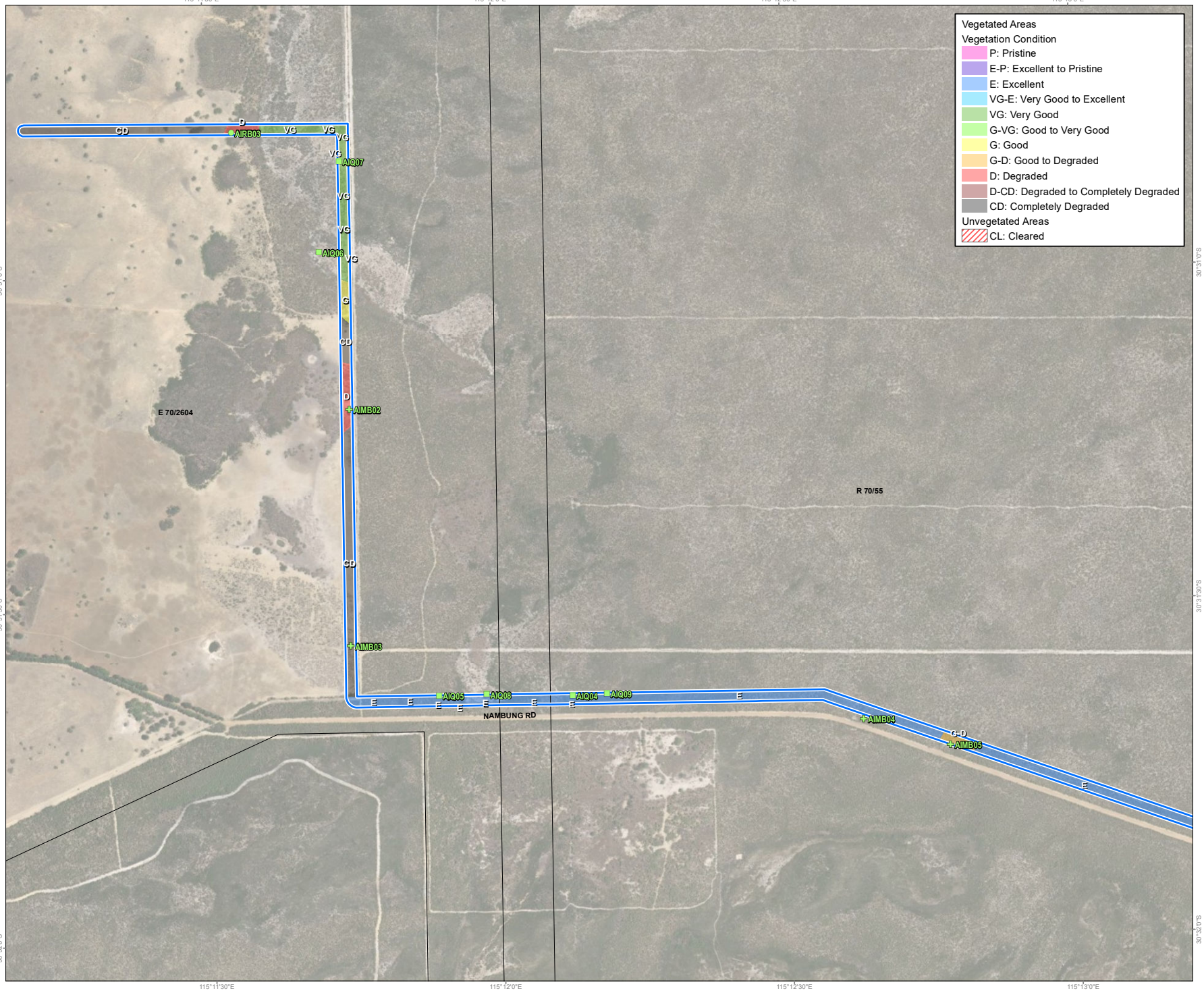
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Figure 37:
Vegetation Condition

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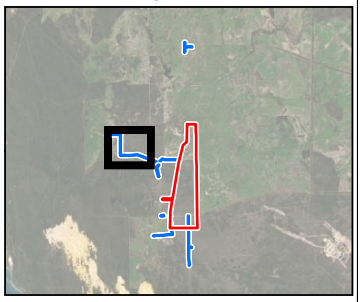
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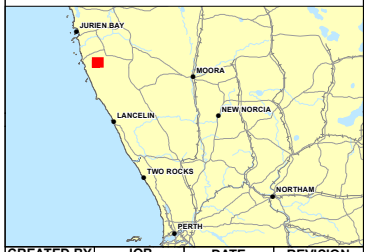
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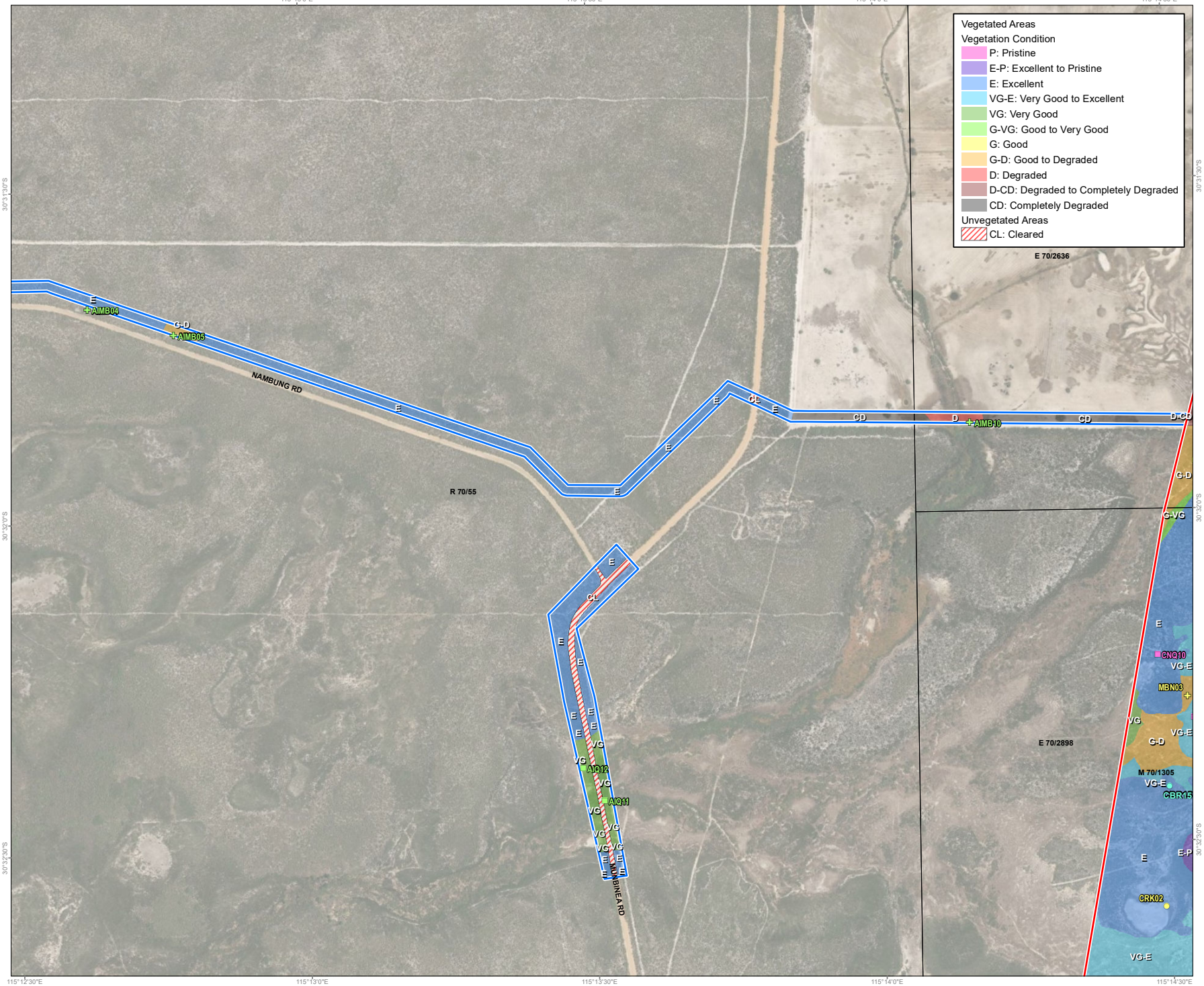


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Figure 38:
Vegetation Condition

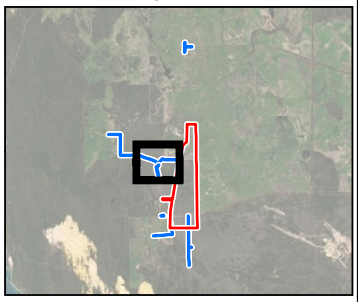
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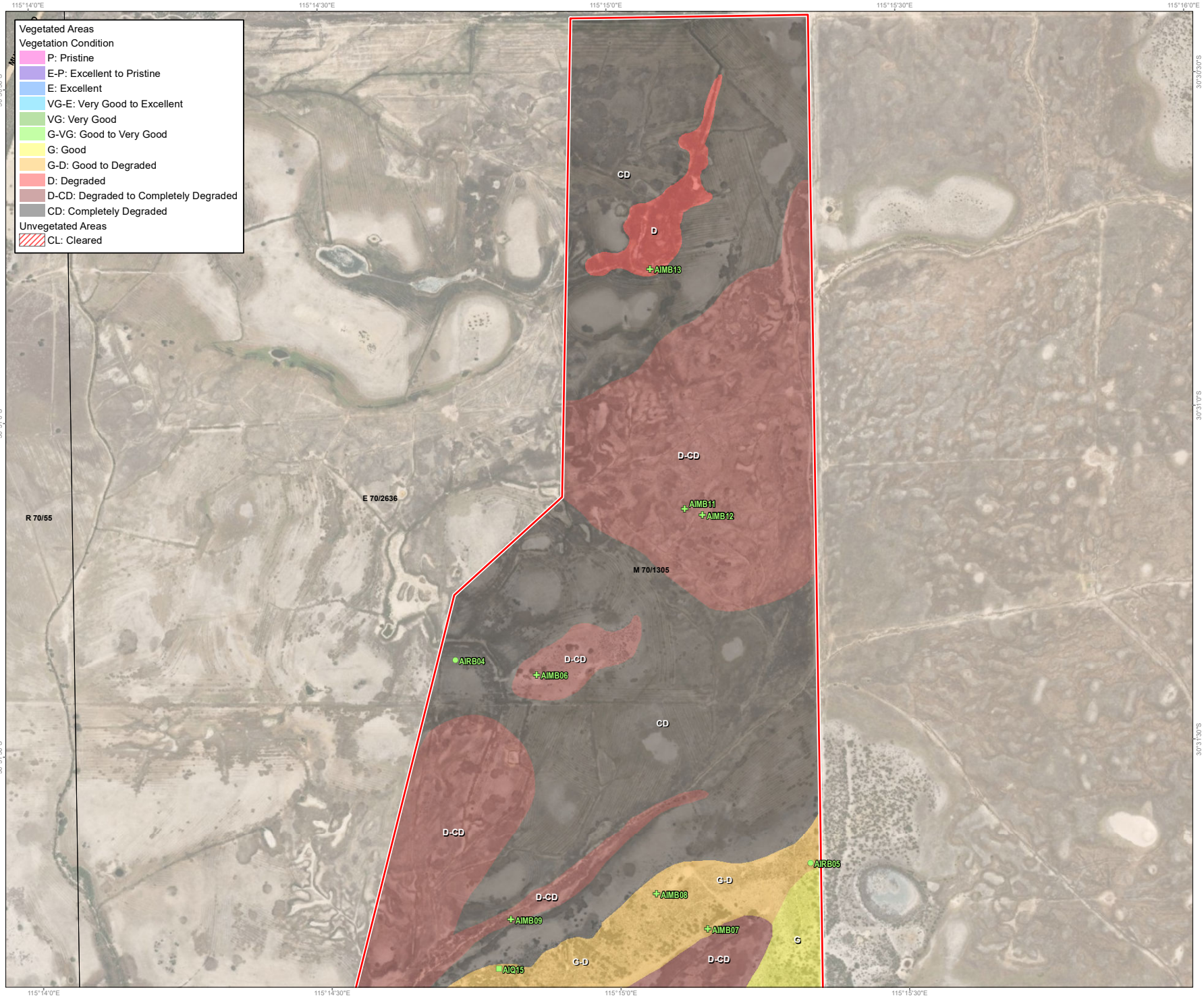
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Figure 39:
Vegetation Condition

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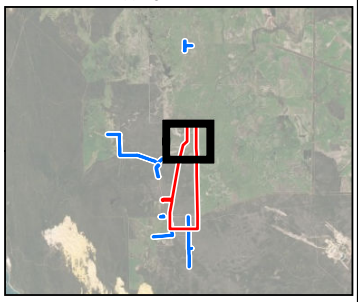
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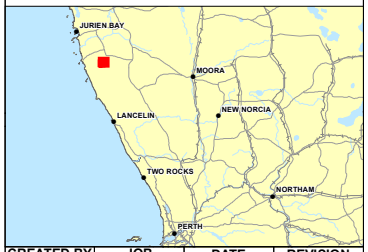
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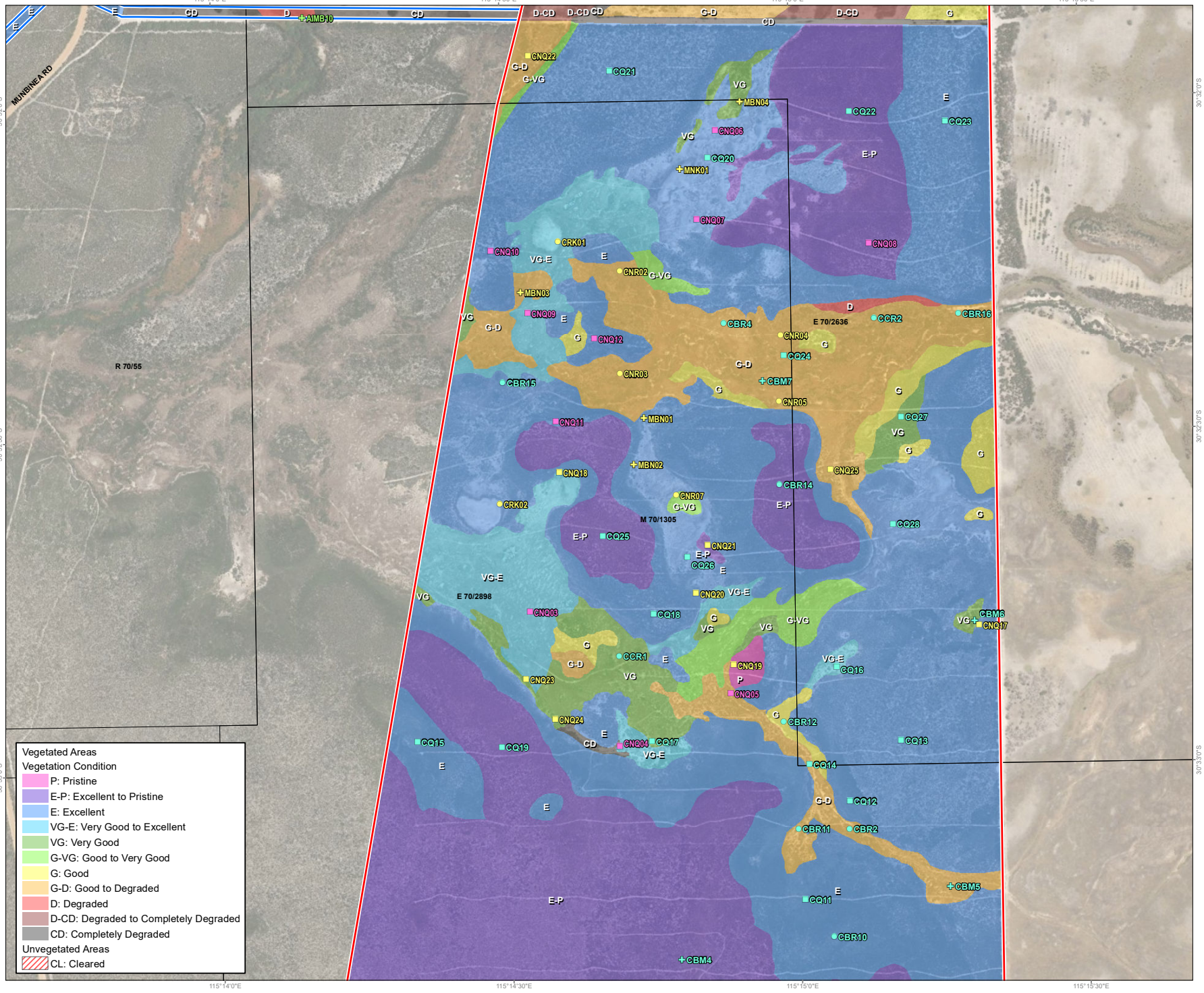


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Figure 40:
Vegetation Condition

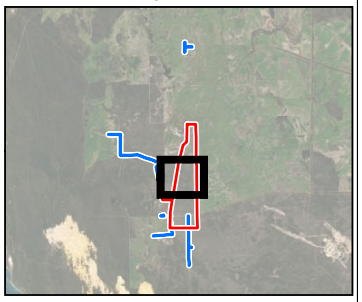
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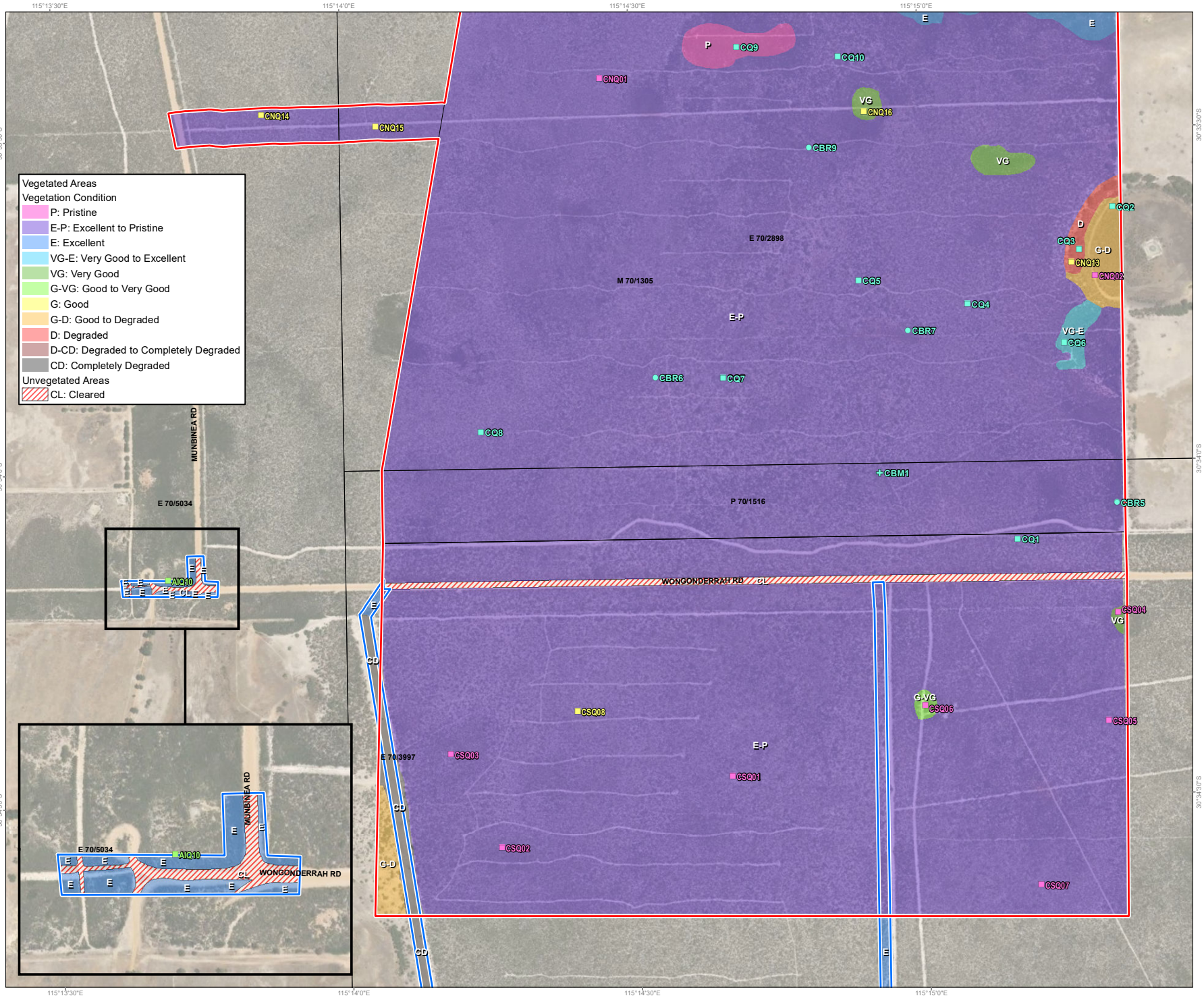


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Figure 41:
Vegetation Condition

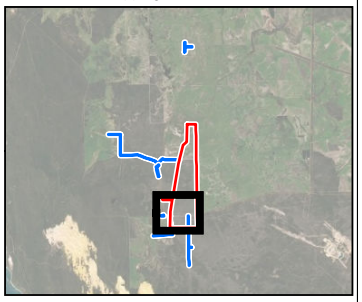
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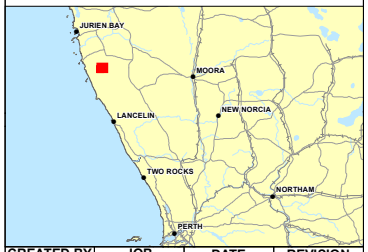
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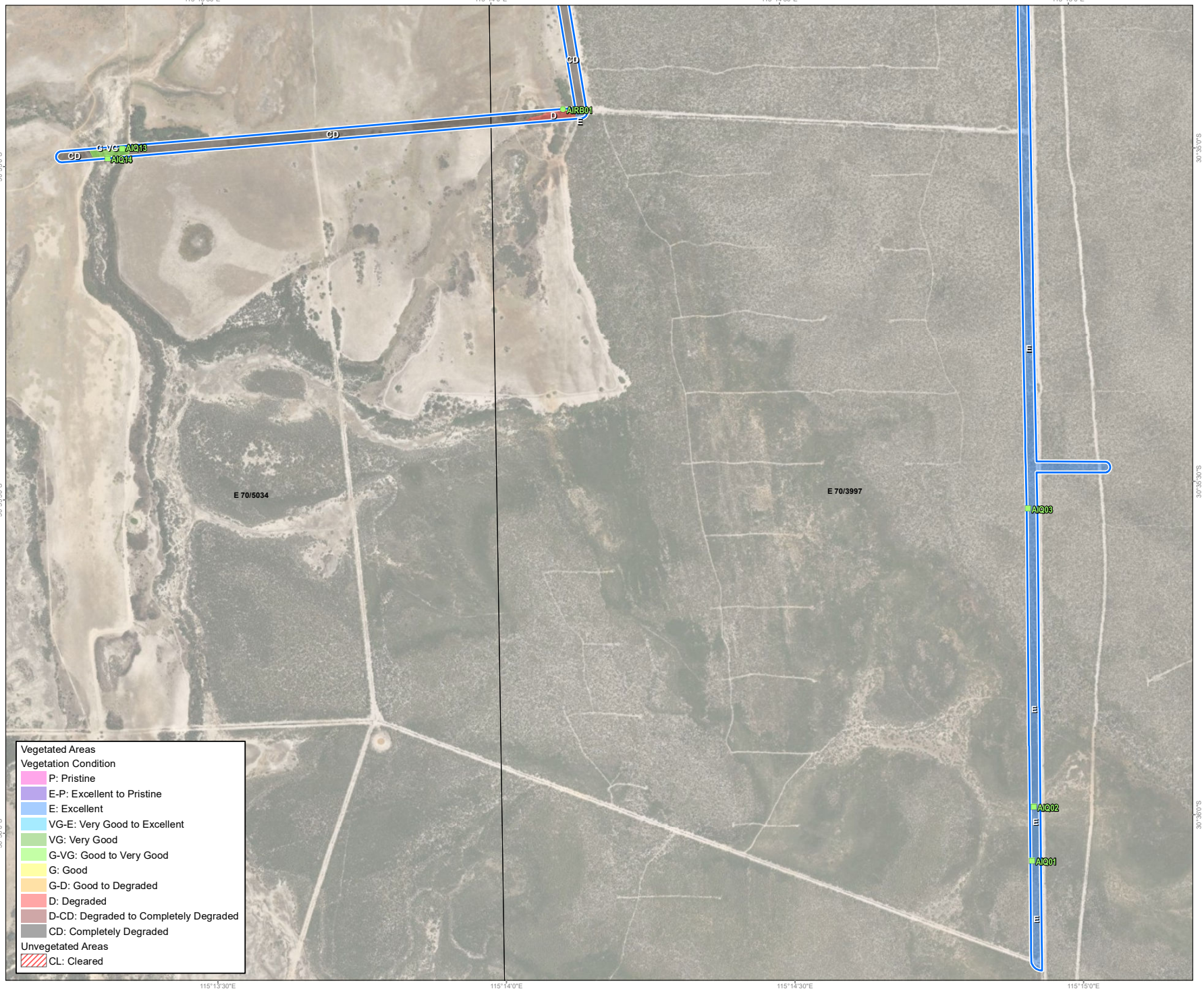


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Figure 42:
Vegetation Condition

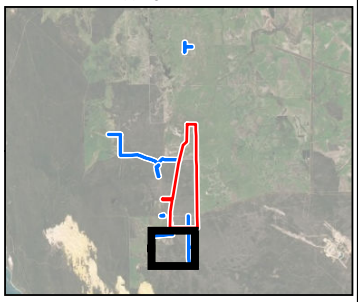
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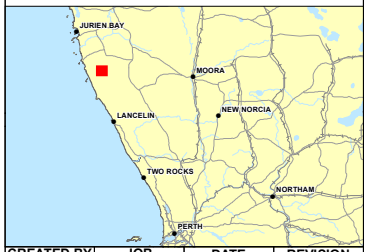
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LOCALITY MAP



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Figure 43:
Vegetation Condition

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6.0 FLORA AND VEGETATION VALUES

6.1 Flora values

Four hundred and eighty seven (487) native plant taxa were recorded in the Atlas survey area, with 422 native plant taxa recorded in the MESA and approximately 415 in the bushland part of the MESA (southern part). Four hundred and fifteen is a moderate to high number of native plant taxa for the size of that part of the MESA (928 ha). It compares with a 2012 'Cooljarloo West' study which listed 1063 native plant taxa for an area of 34,424 hectares (Woodman Environmental Consulting, 2014). The number of species recorded in the Atlas survey area reflects a diversity of habitats ranging from various geomorphic wetland types to sandplain and low dunes. While the *Banksia attenuata*, *Banksia menziesii* Low Woodland ('BaBm') vegetation unit was quite species rich (average of 56.9 native species per quadrat), it mostly did not vary greatly floristically over the large area of the unit. Other vegetation units such as *Banksia prionotes* Low Woodland ('Bp') (average of 42.3 native species per quadrat) and the heaths surrounding the floodplain (average of 30 to 40 native species per quadrat) were less species rich. In conclusion, the survey area is considered to have moderate to high values for species richness.

No Threatened flora species were recorded in the survey area. However, twenty three Priority taxa were recorded in the Atlas survey area. Some of these Priority taxa, such as *Grevillea* sp. Cooljarloo (B.J. Keighery 28 B) (Priority 1), *Chordifex reseminans* (Priority 2), *Isopogon panduratus* subsp. *palustris* (Priority 3) and *Desmocladus nodatus* (Priority 4), have a distribution restricted to the region (Table 13).

Large numbers of Priority taxa were recorded during targeted searches in particular habitats in the survey area (Table 7), notably *Grevillea* sp. Cooljarloo (B.J. Keighery 28 B) (Priority 1), *Angianthus micropodioides* (Priority 3), *Babingtonia urbana* (Priority 3), *Conospermum scaposum* (Priority 3), *Isopogon panduratus* subsp. *palustris* (Priority 3), *Stylidium aceratum* (Priority 3) and *Stylidium longitubum* (Priority 4).

An assessment of the significance of the Conservation Significant flora recorded in the survey area is presented in Table 13. It is concluded that flora values for Conservation Significant flora in the survey area are high because:

- A large number of Priority taxa were recorded in the survey area;
- Some 16 of the Priority taxa were at or near the limits of their range; and,

- There are extensive areas of preferred habitat for a number of these Conservation Significant taxa within the survey area.

Significant numbers of Conservation Significant flora (excepting the annual *Stylidium* spp.) were also recorded at various locations outside the survey area from searches undertaken as part of this study (Figures 16-20). Significant numbers of Conservation Significant flora have also been reported by others in the area between Wongonderrah Rd and Cooljarloo (Woodman Environmental Consulting, 2014; Mattiske Consulting, 2017).

Table 13: Assessment of significance of Conservation Significant flora records in the study area

Taxon	Conservatn Code[a]	Location of survey area within taxon range	Approx. number of regional populatns[c]	Assessment of Significance of local population to overall Conservation Significance of taxon	Comments
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	P1	Centre of very restricted range	6	Moderate	Found over wide area south of Wongonderrah Rd (Mattiske Consulting, 2017)
Levenhookia preissii	P1	At northern edge of range	na	Moderate to High	Limited locations recorded in study area (6), with most records from 2011 survey.
Calectasia palustris	P2	At south-western limit of range	8	Low to Moderate	Only 3 plants recorded (Wongonderrah Rd verge at intersection with Munbinea Rd)
Chordifex reseminans	P2	Centre of fairly restricted range	6	Moderate	Large numbers on palusplains south of Wongonderrah Rd (Table 8; Mattiske Consulting, 2017)
Lepyrodia curvescens	P2	Not near edge of range	na	Low to Moderate	Only one location recorded in survey area. Not likely to be abundant in survey area.
Schoenus badius	P2	Southern end of range	na	na	Most likely a 2011 misidentification and probably doesn't occur in survey area
Angianthus micropodioides	P3	Western edge of range	17	Moderate	Large numbers recorded on the MESA floodplain, inside and outside the survey area
Babingtonia urbana	P3	Northern edge of range	12	Low to moderate	Relatively small counts in the survey area; large numbers on the palusplains south of Wongonderrah Rd (Table 8)
Conospermum scaposum	P3	Near northern end of range	30	Low to Moderate	Reported as scattered over wide area south of Wongonderrah Rd (Mattiske Consulting, 2017)
Desmocladus nodatus	P3	Northern edge of limited range	9	Low to Moderate	Large numbers on palusplains south of Wongonderrah Rd (Table 8)
Eryngium pinnatifidum subsp. Palustre (G.J. Keighery 13459)	P3	Near northern end of range	16	Low	Widely scattered in locality along flow lines and wetter parts of floodplains
Hensmania stoniella	P3	Near southern end of range	41	Low	Sparsely scattered in *Banksia* woodland
Isopogon panduratus subsp. *palustris*	P3	Centre of restricted range	11	Moderate	Large numbers in survey area, but also large numbers on palusplains south of Wongonderrah Rd (Table 8)
Jacksonia carduacea	P3	South-western edge of	16	Low	Only 4 plants at 4 locations recorded in survey area:

Taxon	Conservatn Code[a]	Location of survey area within taxon range	Approx. number of regional populatns[c]	Assessment of Significance of local population to overall Conservation Significance of taxon	Comments
		range			1 in MESA and 3 on Bibby Rd EISA
Leucopogon sp. Yanchep (M. Hislop 1986)	P3	Northern edge of range	9	Low	Only 1 record in survey area (MESA)- likely sparsely scattered in *Banksia* woodland
Schoenus pennisetis	P3	Not near edge of range	30	Low to moderate	Only recorded at a few locations in study area; small plant difficult to observe and counts likely to be underestimates inside and outside survey area
Stylidium aceratum	P3	At northern end of range	2	Moderate	Recorded in survey area but counts possibly overestimated due to co-occurrence with very similar *S. ecorne*
Stylidium hymenocraspedum	P3	Northern edge of restricted range	13	Low	One stand recorded near north-west corner of survey area. Many records in parts of large area south of Wongonderrah Rd (Mattiske Consulting, 2017)
Anigozanthos humilis subsp. *chrysanthus*	P4	North-western edge of range	43	Low to moderate	Sparsely scattered in *Banksia* woodland in study area
Conostylis pauciflora subsp. *euryrhipis*	P4	Near northern end of range		Low	One record in survey area
Schoenus griffinianus	P4	Not near edge of range	25	Low	Recorded in few lower parts of *Banksia* woodland and margins of damplands in study area. Counts likely an underestimate.
Stylidium longitubum	P4	Near northern limit of main range	37	Low to Moderate	Large numbers over numerous locations on MESA floodplain
Thysanotus glaucus	P4	Not near edge of range	24	Low	Sparsely scattered in parts of *Banksia* woodland in study area

a Appendix 2; current code sourced from Florabase, DBCA website.

b Numbers recorded from limited surveys outside survey area, in the Nambung region

c Sourced from Woodman Environmental Consulting (2014)

6.2 Vegetation values

6.2.1 Regional analysis of Atlas vegetation sample sites

A suitable quadrat-based regional dataset with evaluated vegetation conservation values was not available for the Atlas area (northern Swan Coastal Plain (SCP)). However, it was decided to analyse the Atlas dataset against the 'southern SCP' dataset that covers the SCP to as far north as the Moore River to determine what similarities there might be between the Atlas vegetation and the southern SCP vegetation. An analysis was undertaken of Atlas quadrats with the 2005 'Weed and native flora dataset for the Swan Coastal Plain' ('2005 SCP dataset') using the PATN software (PATN, 2013). Limitations of the analysis are addressed in Table 5. The PATN analysis methodology, reconciliation of Atlas species names to the 2005 SCP dataset names, dendrogram results (extracts) and nearest neighbour results are set out in Appendix 10. An analysis of all of the 78 Atlas sites and the 2005 SCP dataset (1098 sites) was undertaken initially and then most of the Atlas sites (61 of the 78 quadrats) were compared individually against the 2005 SCP dataset (i.e. using 'single site insertion' (SSI)).

At a 35 group level, the analysis of all 78 Atlas sites with the 2005 SCP dataset resulted in the Atlas sites clustering in 7 different groups in the dendrogram:

- the Atlas *Banksia* woodland and associated sites (26 sites; 'BaBm' and 'Bp') formed an exclusive group that did not include any 2005 SCP sites. Quadrat AIQ17 was part of this group;
- the Atlas heath sites (20 sites; predominantly 'BtRc', 'CpBt' and *Melaleuca seriata* dominated heath sites) formed an exclusive group with the exception of one SCP FCT23c site;
- The broad grouping of Atlas floodplain sites (19 sites, including the samphire sites, fringing 'MbGcVp' sites, 'MvMb' creek sites and others) formed an exclusive group that didn't include any SCP sites;
- Quadrat AIQ16 ('AhAcc') was a single Atlas site that grouped at a fairly high dissimilarity level with SCP FCT28 sites;
- The three 'MrMtSl' wetland sites (AIQ6-8) grouped with a mix of 2005 SCP sites;
- Five *Melaleuca* tall shrubland sites grouped at high dissimilarity with 2005 SCP sites and four 'Degraded' dampland *Melaleuca* tall shrubland and a *Eucalyptus rudis* Woodland site grouped with another group of 2005 SCP sites.

These results may include an element of proximity, whereby sites from the same locality, such as the Atlas survey area, have a propensity to group together. A high two-dimensional ordination stress value (0.33) for the analysis also indicates that the clustering exercise for this dataset struggled to adequately explain the floristic relationships between these sites.

Detailed results of the SSI are shown in Table 14. The dendrogram and nearest neighbour results for the SSI analyses (Appendix 10) posed some difficulties in interpretation, particularly when the Atlas sites clustered with sites from a particular SCP FCT, but at relatively high dissimilarities. The dissimilarity levels and consistency of the nearest neighbour SCP FCTs and the dendrogram results of other Atlas sites from the same vegetation unit were also considered when interpreting the results for particular sites.

The following is a summary of the SSI analysis results.

1. Many of the Atlas sites had little similarity with SCP FCTs, indicated by their clustering with SCP sites at relatively high dissimilarity values (Table 14) and often clustering with SCP sites from a mix of various SCP FCTs. The high dissimilarity index values between the Atlas quadrats and their SCP dataset nearest neighbours, suggests substantial differences in floristics between the two datasets.
2. Some *Banksia attenuata*, *B. menziesii* Low Woodland sites ('BaBm') were similar to FCT23b, but most 'BaBm' sites clustered with a mix of SCP FCT sites, namely FCTs 23b, 23a and 28. The four 'BaBm' sites south of Wongonderrah Rd (CSQ01, 05, 07, 08) were similar to FCT23b and two 'BaBm' sites from the MESA north of Wongonderrah Rd had similarity with FCT23b (CNQ01 and CNQ15). Site AIQ17 (on the Bibby Rd verge near the Bibby Rd-Munbinea Rd intersection and close to the SCP boundary with the Geraldton Sandplain bioregion) had inconsistent results, fusing at high dissimilarity with FCT20c sites, but having mostly FCT23a nearest neighbours (21 of 30 nearest neighbours were FCT23a SCP sites; Appendix 10).
3. *Banksia prionotes* Low Woodland sites ('Bp') fused with SCP sites at high dissimilarities (Table 14). They had some similarity with sites assigned to SCP FCTs 28, S09 and 23c.
4. One Atlas site, CNQ18, had some similarity with FCT7 as it fused with several SCP FCT7 sites at dissimilarity levels between 0.61 and 0.64. A similar result was found when CNQ18 was run against the smaller Gibson *et al* (1994) dataset. Site CNQ18 was in a small patch of *Melaleuca viminea* subsp. *viminea*, (*Melaleuca rhaphiophylla*) Closed Shrubland on the margins of a small clay pan.

5. Two of the three sites in *Melaleuca brevifolia* shrublands, that occurred around the margins of the MESA floodplain (unit 'MbGcVp', sites CQ16 and CQ26) and site AIQ14 that was on the flood banks of the Frederick-Smith Crk, together with *Tecticornia indica* subsp. *bidens* low samphire shrubland sites on the MESA floodplain (CQ17, CQ28, CNQ03) and CQ20) clustered with some FCT7 sites at relatively high dissimilarity levels (>0.7; Table 14, Appendix 10).
6. The *Banksia telmatiaea*, *Melaleuca seriata* and *Callitris pyramidalis* dominated heaths on the gentle slopes around the floodplain in the MESA (units 'BtRc', 'CpBt', 'Ms, and 'MsVdCaf') mostly had no notable similarities with FCTs, fusing at high dissimilarities with SCP sites assigned to various FCTs. Site CQ27 ('Ms') was an exception, clustering with some FCT7 sites.
7. The EISA 'MrMtSl' wetland vegetation site analysis had a high ordination stress value, but had similarity with FCTs 17/S19.

That the Atlas *Banksia attenuata*, *B. menziesii* Low Woodland sites ('BaBm') had either some similarity to FCT23b or had some mixed similarities with FCTs 23b/23a/28 is not unexpected. FCT23 is generally restricted to the Bassendean system. Gibson *et al*. (1994) subdivided FCT23 into species rich FCT23a (62.8 species/quadrat), which occurs between Woodman Point and Bullsbrook and FCT23b, which occurs from Melaleuca Park north to Gingin. FCT28 is the 'Spearwood *Banksia attenuata* or *Banksia attenuata-Eucalyptus woodlands*' FCT.

Some sites listed in items '4', '5' and '6' above, showed some clustering with 2005 SCP FCT 7 sites, albeit fusing at relatively high dissimilarity levels. As FCT 7 'Herb rich saline shrublands in clay pans' has TEC status at both State (TEC (Vulnerable)) and federal levels (part of 'Clay Pans of the Swan Coastal Plain' TEC (Critically Endangered)), it was decided to further investigate the relationship of the Atlas sites with FCT 7.

Similarly, some additional analysis was undertaken to better determine the similarity of the *Banksia* woodland site AIQ17 with FCTs 20c and 23a.

6.2.1.1 Atlas sites and FCT 7 – further analysis

(i) Primer cluster analysis and SIMPROF test for selected Atlas sites and the 2005 SCP dataset

A representative group of Atlas sites that had shown some similarity with FCT 7 SCP sites were re-analysed with the 2005 SCP dataset to determine the statistical

significance of the differences using Primer v7 software and the SIMPROF test (Primer-e, 2021). Three sets of analyses were run:

- Single Site Insertion (SSI) analysis of four representative Atlas sites (CNQ18 ('MrMv'), CQ26 ('MbGcVp'), CQ27 ('Ms') and CQ28 ('Ti')) with the 2005 SCP dataset;
- Cluster analysis of a small group of Atlas *Melaleuca brevifolia* shrubland ('MbGcVp') sites (CNQ04, CQ16, CQ26 and AIQ14) with the 2005 SCP dataset;
- Cluster analysis of a small group of Atlas samphire sites (CNQ03, CQ17, CQ28 ('Ti') and CQ20 ('TmThTs')) with the 2005 SCP dataset.

The dendrograms resulting from the four SSI analyses showed the Atlas sites CNQ18, CQ26 and CQ28 formed single-site groups that were significantly different from the 2005 SCP dataset sites at the 5% significance level (indicated by the black cluster lines in the dendrograms) (Appendix 11). CQ27 formed a statistically significant group with eight 2005 SCP sites of various FCTs: FCT7 (1 site), FCT5 (3 sites), FCT6 (3 sites) and FCT28 (1 site) (Appendix 11).

The 'MbGcVp' and samphire groups of sites formed significantly different clusters from the 2005 SCP dataset sites at the 5% significance level (Appendix 11).

While the PATN analysis showed the general result that some Atlas sites clustered with some SCP FCT 7 sites at relatively high dissimilarity values, the Primer SIMPROF test found that the Atlas sites included in this particular analysis, with the exception of CQ27, were significantly different from the 2005 SCP site clusters. Atlas site CQ27, while not significantly different from a small group of 2005 SCP sites, grouped with sites of various FCTs (which it also did in the PATN analysis (Appendix 10)).

(ii) Primer cluster analysis and SIMPROF test and other multivariate analyses for 14 Atlas floodplain and related sites and the 2005 SCP dataset FCT 7 sites

The SIMPROF test for significance of cluster groups tested for significance at the 5% level (see (i) above). However, the SCP FCT groups are generally very broad floristic groupings of sites and in fact the SIMPROF analysis described in (i) above also resulted in numerous significantly different clusters within the SCP FCT 7 sites. Therefore it was decided to determine how a group of Atlas floodplain and related sites, that had shown some clustering at high dissimilarity with FCT 7 sites in the PATN analysis, clustered when analysed with just the 25 2005 SCP dataset FCT 7

sites. Fourteen Atlas floodplain and related sites were used in this analysis: AIQ10, AIQ14; CNQ03, CNQ04, CNQ05, CNQ18, CNQ23; CQ14, CQ16, CQ17, CQ20, CQ26, CQ27 and CQ28.

The fourteen Atlas sites clustered together and were significantly different from the SCP FCT 7 site clusters (SIMPROF) (Figure A11-04a, Appendix 11). The group of Atlas sites fused with the SCP FCT 7 sites at about the 20% similarity level.

A non-metric multi-dimensional scaling (MDS) ordination of this dataset showed that the fourteen Atlas sites grouped together and were separate from the SCP FCT 7 sites (Figure A11-04b, Appendix 11). In this ordination, distances between sites are related to dissimilarities in site floristics (Primer-e, 2021). That is, the greater the distance between sites in the ordination, the greater the expected dissimilarity in floristics between those sites. Atlas site CNQ18 was the closest Atlas site to the FCT 7 sites in the ordination (Figure A11-04b, c; Appendix 11). The ordination stress value dropped to 0.16 with 3 D ordination (Figure A11-04c; Appendix 11).

A statistical test for differences between groups of samples (ANOSIM, Primer-e, 2021) was applied to the group of 14 Atlas sites and the group of 25 2005 SCP FCT 7 sites, to compare within and between group similarities. The calculated R statistic was significant (0.54; significance level of sample statistic 0.1%; Figure A11-04d; Appendix 11) and thus similarity within the two groups of sites is significantly greater than similarities between the two groups of sites.

With weed species excluded a similar dendrogram resulted, again with the 14 Atlas sites grouping together and significantly different from the groups of SCP FCT 7 sites (fusing with the FCT7 site cluster at about 15% similarity; Appendix 11).

The PATN analysis found that some of the 14 Atlas floodplain and related sites clustered with SCP FCT7 sites at high dissimilarity values. The more detailed analysis of these Atlas sites, with only the SCP FCT7 sites, found that the 14 Atlas sites group together and separately from the SCP FCT7 sites and, as a group, are significantly different from the SCP FCT7 sites at the 5% significance level.

(iii) Primer analysis of subgroups of the 14 Atlas floodplain and related sites and the 2005 SCP FCT7 sites

Primer analyses were undertaken on subgroups of the 14 Atlas floodplain and related sites, namely the 'MbGcVp' vegetation unit sites (CNQ04, CQ16, CQ26 and AIQ14)

and a group of samphire sites (CNQ03, CQ17, CQ20 and CQ28), with the 2005 SCP FCT7 sites.

The dendrogram for the cluster analysis of the four Atlas 'MbGcVp' sites and the SCP FCT7 sites is shown in Figure A11-05a (Appendix 11). The Atlas sites cluster together and their cluster fuses to the SCP FCT7 sites at a very low similarity of about 20% and is significantly different to the SCP FCT7 site clusters (SIMPROF test).

The MDS ordination of this dataset showed the 'MbGcVp' sites grouped together and to one side of the SCP FCT7 sites (Figure A11-05b). An ANOSIM test for differences between these two groups found that they were significantly different (R statistic of 0.42; Figure A11-05c).

Similar results were obtained for the subgroup of Atlas samphire sites, with the Atlas sites grouping together and again significantly different from the SCP FCT7 sites (Appendix 11).

(iv) Primer analysis of the Atlas floodplain sites and SCP FCT 7 sites using Single Site Insertion (SSI)

The ordination of the 14 Atlas floodplain and related sites showed them grouping together and separately from the SCP FCT7 sites (Appendix 11). The Atlas sites that are located closer to SCP FCT7 sites in the ordination are expected to be more similar to them compared to Atlas sites located further away. Hence, Atlas site CNQ18 will have more similarity with SCP FCT7 sites than Atlas site CNQ04 (Figure A11-04b, Appendix 11). Primer SSI analyses were undertaken for a number of representative sites from the 14 Atlas floodplain and related sites, with the focus on the sites located closer to the cluster of FCT7 sites.

The SSI cluster analysis of Atlas site CNQ18 with the 2005 SCP FCT7 sites showed CNQ18 as a significantly different cluster (by SIMPROF test) from SCP FCT7 site clusters, but fused with three FCT7 sites at about 35% similarity (Figure A11-07a, Appendix 11). These were 3 of the 4 SCP FCT7 sites that CNQ18 fused with in the PATN analysis (see Appendix 10). The ordination placed CNQ18 among the SCP FCT7 sites (Figure A11-07b). If weed species were excluded from this analysis, CNQ18 fused with 3 different SCP FCT7 sites (Figure A11-07c, Appendix 11). SIMPER procedures showed that 10 to 16 species contributed in excess of 90% of the similarity between CNQ18 and the SCP FCT7 sites AUSTB-2, YULE-5, AUSTB-7, AUSTB-8 and MUCK-2 (section 12.1.1, Appendix 12). When the dissimilarities

were compared between CNQ18 and the same 5 SCP FCT7 sites, between 38 and 50 species were present at one site and not the other, contributing in each case to more than 80% of the dissimilarity (section 12.1.3, Appendix 12).

As a contrast to this analysis, a SSI analysis of Atlas site CNQ04, which had a relatively high ordination distance from the SCP FCT7 sites, was undertaken (Figure A11-04b, Appendix 11). Site CNQ04 was found to be significantly different from the SCP FCT7 sites, fusing with them at less than 20% similarity (Figure A11-08a, Appendix 11). The ordination showed CNQ04 separated from the cluster of SCP FCT7 sites (Appendix 11).

Having used SSI to analyse the nearest Atlas site to the SCP FCT7 sites (CNQ18) and one of the farthest Atlas sites from the SCP FCT7 sites on the ordination map (CNQ04), SSI analysis was applied to the six 'next nearest' Atlas sites to the FCT7 sites (CQ28 and CQ20 (samphire sites), CQ26, CQ16 and AIQ14 ('MbGcVp') and CQ27). The samphire site CQ28 was significantly different from the SCP FCT7 sites, but clustered with three SCP FCT7 sites at a similarity of about 30% (Figure A11-9a, b; Appendix 11). When weeds were excluded from the analysis, CQ28 was again significantly different from the SCP FCT7 sites (SIMPROF) and fused with a different group of SCP FCT7 sites at a lower similarity of about 20% (Figure A11-9c, d; Appendix 11), showing that weed species were contributing a significant portion of the similarity. Atlas site CQ20 fused with the same SCP FCT7 sites as did CQ28 (excluding weeds) but at a lower similarity (less than 25%) and fused with a similarity of less than 20% when weed species were excluded from the analysis (Appendix 11). Another Atlas samphire site, CNQ03, was further from the SCP FCT7 sites in the ordination and fused with the SCP FCT7 sites at an even lower similarity (less than 20%) (Appendix 11).

Similar results were found for the SSI of the Atlas 'MbGcVp' sites CQ26, CQ16 and AIQ14. All three sites were significantly different from the SCP FCT7 sites (5% significance level). CQ26 and AIQ14 fused with the same three SCP FCT7 sites at low similarities (less than 30%), while CQ16 fused at a broader level with SCP FCT7 sites (similarity less than 25%). When weeds were excluded from the analysis, both CQ26 and AIQ14 fused with the SCP FCT7 grouping at a broader level and at lower similarities (about 20% similarity or less) (Appendix 11).

Like CNQ18, site CQ27 was not significantly different from the SCP FCT7 site it fused with (BAMBUN-1, about 30% similarity) (Appendix 11). CQ27 was another

site with a high weed species count (19 of 63 species recorded). When CQ27 was analysed with weed species excluded, it no longer fused with an FCT7 site, but formed its own significantly different group and fused with the SCP FCT7 sites at a lower similarity of less than 20% (Appendix 11). That is, weed species contributed a considerable part of the similarity between CQ27 and FCT7 sites. As was noted in section 6.2.1.1 (i) above, in the SSI analysis with all 2005 SCP sites, CQ27 fused with sites from various FCTs.

(v) Conclusions

The more detailed analysis of 14 Atlas floodplain and related sites that clustered with some FCT7 sites at high dissimilarity in the PATN analysis, showed that the Atlas sites, both as a group of 14 sites and as subsets of sites aligned with Atlas vegetation units, consistently formed their own cluster that was significantly different from the SCP FCT7 site clusters.

Given that the 2005 SCP regional dataset used in the analysis does not include vegetation data for the SCP north of Moore River and hence a classification of that vegetation, the following findings of analyses suggests that it is possible that the 14 Atlas sites may belong to a distinct northern wetland SCP FCT:

- the clustering of these Atlas sites with 2005 SCP FCT7 sites at relatively high dissimilarity values;
- SSI shows that these sites are mostly significantly different from clusters of 2005 SCP sites (SIMPROF test);
- these Atlas sites group together in clusters that are significantly different from 2005 SCP site clusters (including FCT7 clusters);
- The dissimilarity of Atlas sites with 2005 SCP sites generally increases with the removal of weed species from the data and often significantly so.

The results of these analyses show that the 14 Atlas floodplain and related sites have relatively low similarity with SCP FCT7 sites and, both individually and as a group (subgroups), form significantly different clusters from the SCP FCT7 sites. One of those sites, CNQ18, was considered to have some similarity with SCP FCT7 sites.

6.2.1.2 Atlas site AIQ17 and FCT 20c/23a - further analysis

(i) Primer cluster analysis and SIMPROF test for Atlas site AIQ17 and the 2005 SCP dataset

A single site insertion (SSI) cluster analysis with SIMPROF test was undertaken of site AIQ17 and the 2005 SCP dataset (PRIMER-e, 2021). AIQ17 fused with the SCP

FCT20c site 'bushm02' (at 31.5% similarity) and SCP FCT23c site 'yuri03' (at about 27% similarity), with the 3 sites forming a significantly different group at the 5% significance level (Figure A11-16).

(ii) Primer cluster analysis and SIMPROF test for Atlas site AIQ17 and relevant subgroups of sites from the 2005 SCP dataset

AIQ17 was included in a dataset with only 2005 SCP FCT20a, 20b and 20c sites (43 sites). The dendrogram with SIMPROF test and MDS ordination is shown in Appendix 11. AIQ17 formed a significantly different floristic group with FCT20c site 'bushm02' (fused at about 32% similarity). The ordination showed AIQ17 and FCT20c 'bushm02' as outliers of the SCP FCT20a/b/c sites and well separated from each other in the ordination.

AIQ17 was also compared with a broader group of *Banksia* woodland SCP FCTs which were most relevant to the Atlas area (FCTs 20a, 20b, 20c, 23a, 23b, 23c and 28; 244 sites). In the resulting dendrogram, AIQ17 fused together with 'much01' (FCT28) and 'perth03' (FCT20b) sites (at about 35% similarity), which in turn fused with a very broad group of sites from a number of FCTs (Figure A11-18a, Appendix 11). The ordination placed AIQ17 to one side of a large cluster of the *Banksia* woodland SCP FCT sites, with sites classified to SCP FCT23c, 28 and 23a placed closest (Figure A11-18b, Appendix 11).

Finally, AIQ17 was included in a dataset of the 2005 SCP FCT23a sites to determine how it grouped with these. AIQ17 was in its own significantly different group that fused with a broad grouping of almost all the SCP FCT23a sites, at about 40% similarity (Figure A11-19a). The ordination showed AIQ17 to be an outlier relative to the SCP FCT23a sites (Figure A11-19b, Appendix 11).

(iii) SIMPER analysis and species contributions to similarity and dissimilarity

Additional SIMPER analysis was undertaken of the AIQ17 and SCP FCT20a, 20b, 20c and 23a sites, to determine the similarity between these sites at a species level. In the SIMPER analysis results shown in 12.2.1 (Appendix 12), the AIQ7 and 'bushm02' sites were grouped; the average similarity within this group was 31% and 13 species contributed 93% of that similarity. Conversely, the SIMPER analysis shown in 12.2.2 (Appendix 12) included 'bushm02' (FCT20c) as a separate factor to Atlas AIQ17 site, so as to get a list of species contributing to the dissimilarity between AIQ17 and bushm02. Whereas 13 species contributed to 93% of the similarity of AIQ17 and 'bushm02', 49 species contributed to about 80% of the 68% dissimilarity between AIQ17 and 'bushm02'. That is, at the level of about 68% dissimilarity between sites AIQ17 and bushm02, there were a lot more species that occurred in one site and not the other, than species that occurred in both sites.

A SIMPER analysis comparing AIQ17 and each SCP FCT20a, 20b and 20c sites (four groups) found that AIQ17 had the following dissimilarities with those FCT groups (section 12.2.3 in Appendix 12):
70% with the group of FCT20a sites;
78% with the group of FCT20b sites; and
68% with the group of FCT20c sites.

Finally, site AIQ17 had relatively high dissimilarities with floristic sub-groups of SCP FCT23a sites (11 sub-groups; section 12.2.4, Appendix 12), with dissimilarities ranging between 61% and 76%.

(iv) Conclusion

The analysis of Atlas site AIQ17 with the 2005 SCP dataset and sub-groups of that dataset, resulted in AIQ17 showing some similarity with 'bushm02' (FCT20c) site at a relatively low similarity level, as well as fusing with other sites from different FCTs. SIMPER analysis showed that relatively few species occurred in both the AIQ17 and 'bushm02' sites, whereas a larger number of species contributed to their dissimilarity (i.e. present at one site, but not the other). Additional analysis did not show high similarity between AIQ17 and FCT23a sites, although some FCT23a site subgroups had lower dissimilarities than that between AIQ17 and bushm02 (FCT20c).

While AIQ17 showed some similarity (at a low level of similarity) with FCT20c, it also showed some similarity with sites assigned to various other FCTs and given that

there is no floristic vegetation classification for the northern SCP (including the Atlas area), AIQ17 has not been assigned to an FCT.

6.2.2 Threatened Ecological Communities (TECs) and Priority Ecological Communities (PECs)

6.2.2.1 '*Banksia* woodlands of the Swan Coastal Plain'

(i) '*Banksia* woodlands of the Swan Coastal Plain' TEC (Endangered) (EPBC Act) – federal level

The *Banksia attenuata, Banksia menziesii* Low Woodlands ('BaBm') and the *Banksia prionotes* Low Woodlands ('Bp') in the Atlas survey area meet the criteria to be characterised as the federally listed TEC 'Banksia woodlands of the Swan Coastal Plain' (Endangered) (DEE, 2016; DAWE, 2021b). An assessment of vegetation units 'BaBm' and 'Bp' against the diagnostic criteria for the 'Banksia woodlands of the Swan Coastal Plain' TEC (DAWE, 2021c; DEE, 2019) is presented in Table 15. These *Banksia* woodlands are classified as 'Banksia dominated woodlands of the Swan Coastal Plain IBRA region' (PEC Priority 3) by the Western Australian State Government.

However, condition thresholds for minimum 'patch' size apply in assessing if an area of *Banksia* woodland qualifies as 'Banksia woodlands of the Swan Coastal Plain' TEC (DAWE, 2021c; DEE, 2019). The *Banksia attenuata, Banksia menziesii* Low Woodland and *Banksia prionotes* Low Woodland covered 54.3% (666.5 ha) of the survey area. The *Banksia* woodlands covered 67.5% of the MESA bushland area (south of farmland). The vegetation condition of the *Banksia* woodlands varied, but was mostly in the range 'Excellent' to 'Pristine'. The exceptions were areas mapped as *Banksia* woodland on the farm in the northern part of the MESA and to a lesser extent, in parts of the EISA corridor on farmland at the western end of Nambung Rd (Figures 26, 28, 38 and 40). The *Banksia* woodlands were mostly continuous over a large area of sand plain but occurred in smaller 'patches' amongst and around the floodplain area.

Table 14: Summary of SSI PATN analysis of Atlas quadrats against the 2005 SCP dataset and assignment of FCTs.

Site	Location[b]	Atlas Vegetation Unit	Ordination Stress Value (OSV)	Most Similar Site Analysed	Dendrogram Clustering FCT[c]	NNB FCT[c]	Some similarity with:	Comments
AIQ16	EIDE- Bibby Rd-Munbinia Rd intersctn upgde	AhAcc	0.3310		na	mxd	FCT28 (at high dissimilarity)	High OSV; fuses with SCP sites at high dis=0.78; NNBs dissimilarity >=0.65.
CQ1	MDE	BaBm	0.2625		23b(28)	23a/23b	23b/23a/28	Fuses with SCP sites at dis=0.57; NNBs dissimilarity >=0.45
CQ4	MDE	BaBm	0.2630		23b(23c/28)	23a/28/23b	23b/23a/28/23c	Fuses with SCP sites at dis=0.58; NNBs dissimilarity >=0.53
CQ5	MDE	BaBm	0.3284		23b(28)	23a/23b	23b/23a/28	High OSV; Fuses with SCP sites at dis=0.59; NNBs dissimilarity >=0.50
CQ7[a]	MDE	BaBm		CSQ08			23b	(See CSQ08)
CQ8	MDE	BaBm	0.3304		23b/28	23b/23a/28	23b/23a/28	High OSV; Fuses with SCP sites at high dis=0.71; NNBs dissimilarity >=0.56
CQ13	MDE	BaBm	0.3283		23b/28	28/23a/23b	28/23a/23b	High OSV; Fuses with SCP sites at dis=0.58; NNBs dissimilarity >=0.57
CQ21	MDE	BaBm	0.3292		23b/28	28/23a/23b	28/23a/23b	High OSV; Fuses with SCP sites at dis=0.54; NNBs dissimilarity >=0.50
CQ23	MDE	BaBm	0.2482		23b/28	23a/28/23b	23a/28/23b	Fuses with SCP sites at dis=0.59; NNBs dissimilarity >=0.53
CNQ01	MDE	BaBm			23b	23a/23b	23b	Fuses with SCP sites at dis=0.48; NNBs dissimilarity >=0.48
CNQ14	MDE	BaBm	0.3317		23c	28/23b/23a	23c/28/23b/23a	High OSV; Fuses with SCP sites at high dis=0.70; NNBs dissimilarity >=0.64; NNBs inconsistent with dengrm.
CNQ15	MDE	BaBm	0.3315		23b	23b	23b	High OSV; Fuses with SCP sites at high dis=0.70; NNBs dissimilarity >=0.56
CSQ01	MDE	BaBm	0.3284		23b	23b	23b	High OSV; Fuses with SCP sites at high dis=0.64; NNBs dissimilarity >=0.53
CSQ02	MDE	BaBm	0.2646		S06	23b	FCT S06/23b (at high dissimilarity)	swale; Fuses with SCP sites at dis=0.73; NNBs dissimilarity >=0.65.
CSQ03[a]	MDE	BaBm		CNQ14			28/23b/23a	Small shallow swale in Banksia wdld.
CSQ05	MDE	BaBm	0.2367		23b	23b	23b	Fuses with SCP sites at dis=0.57; NNBs dissimilarity >=0.52
CSQ07	MDE	BaBm	0.3285		23b	23b	23b	High OSV; Fuses with SCP sites at high dis=0.61; NNBs dissimilarity >=0.51
CSQ08	MDE	BaBm	0.2404		23b/28	23b(23a,28)	23b	Fuses with SCP sites at dis=0.57; NNBs dissimilarity >=0.54
AIQ03[a]	EIDE - bore fld sth Wongonderrah Rd	BaBm		CNQ14			28/23b/23a	
AIQ17	EIDE- Bibby Rd-Munbinia Rd intersctn upgde	BaBm	0.2662		?20c	23a	??FCT20c/23a (at high dissimilarity)	Fuses with SCP sites at high dis=0.69; NNBs dissimilarity >=0.55 = FCT23a; some similarity with FCT20c (but fusing at high dissim.). NNB and Cluster analysis results inconsistent (1st FCT20c NNB is 17th, diss=0.61)
CQ10[a]	MDE	Bp		AIQ05				Not analysed: ecotonal with neighbouring BaBm vegetation
CQ19	MDE	Bp	0.2842		28	26b/28	FCT28 (at high dissimilarity)	Fuses with SCP sites at high dis=0.74; NNBs dissimilarity >=0.61
CQ25	MDE	Bp	0.2658		na	28/26b	FCT28/S09/23c (at high dissimilarity)	Fuses with SCP sites at high dis=0.80; NNBs dissimilarity >=0.64
CNQ08[a]	MDE	Bp		CQ25				
AIQ05	EIDE - bore fld Nambung Rd	Bp	0.2420		na	26b/28	FCT28 (at high dissimilarity)	Fuses with SCP sites at high dis=0.77; NNBs dissimilarity >=0.64
CQ18	MDE	Bp/BtRc						Not analysed: ecotonal site
CQ6	MDE	BtRc	0.2296		?29a	mxd		Fuses with SCP sites at high dis=0.80; NNBs dissimilarity >=0.68
CQ9	MDE	BtRc	0.2286		na	na		Fuses with SCP sites at high dis=0.93; high NNBs dissimilarity >=0.8
CQ11	MDE	BtRc	0.3286		na	mxd		High OSV; Fuses with SCP sites at high dis=0.69;NNBs dissimilarity >=0.69

[a] Sites that were not included in the SSI analyses.

[b]. MDE: Atlas Mine Dvpt Envp; EIDE: External Infrastructure Dvpt Envp

[c]. NNB: nearest neighbour; FCT: Floristic Community Type

Table 14 (cont). Summary of SSI PATN analysis of Atlas quadrats against the 2005 SCP dataset and assignment of FCTs

Site	Location[b]	Atlas Vegetation Unit	Ordination Stress Value (OSV)	Most Similar Site Analysed	Dendrogram Clustering FCT	NNB FCT	Some similarity with:	Comments
CQ12	MDE	BtRc	0.2469		na	mxd		Fuses with SCP sites at high dis=0.76; high NNBs dissimilarity >=0.71
CQ15	MDE	BtRc	0.2512		na	na		Fuses with SCP sites at high dis=0.90; high NNBs dissimilarity >=0.70
CQ22	MDE	BtRc	0.3307		na	na	FCTs S07/17 (at high dissimilarity)	High OSV; Fuses with SCP sites at high dis=0.88; high NNBs dissimilarity >=0.73.
AIQ01	EIDE - bore fld sth Wongonderrah Rd	BtRc	0.2578		na	na		Fuses with SCP sites at dis=0.93; High NNBs dissimilarity >=0.78
AIQ02	EIDE - bore fld sth Wongonderrah Rd	BtRc	0.2612		na	na		Fuses with SCP sites at dis=0.78; high NNBs dissimilarity >=0.74
AIQ04[a]	EIDE - bore fld Nambung Rd	BtRc		AIQ01				
AIQ09	EIDE - bore fld Nambung Rd	BtRc	0.2677		na	na		Fuses with SCP30a2 at high dis=0.81; high NNBs dissimilarity >=0.73
AIQ15	MDE - Cockram's farm	BtRc	0.3291		na	na		High OSV; fuses with SCP sites at high dis=0.71; NNBs dissimilarity >=0.71.
CNQ10	MDE	CpBt	0.2517		5/7	5	FCT5 (at high dissimilarity)	Fuses with SCP sites at high dis=0.77; high NNBs dissimilarity >=0.71.
CNQ11[a]	MDE	CpBt		CQ18				Ecotonal quadrat - not analysed
CNQ12	MDE	CpBt	0.2278		na	na	FCT5 (at high dissimilarity)	Fuses with SCP sites at high dis=0.76; high NNBs dissimilarity >=0.70.
AIQ10	EIDE - upgde Munbinia-Wongonderrah intersctn	CpBt	0.3305		na	na	na	High OSV; Fuses with SCP sites at dis=0.84; High NNBs dissimilarity >=0.73.
CQ3[a]	MDE	Er		CNQ13				Degraded vegetation - unreliable result
CNQ13	MDE	Er	0.3291					High OSV; Degraded vegetation with few native spp.; high OSV - unreliable result
CNQ23	MDE	MaMcu	0.3292		na	na		High OSV; Fuses with SCP sites at high dis=0.82; NNBs dissimilarity >=0.73
CNQ24[a]	MDE	MaMcu		CNQ23				
CQ16	MDE	MbGcVp	0.3299		na	na	FCT7 (at high dissimilarity)	High OSV; Fuses with SCP sites at high dis=0.74; NNBs dissimilarity >=0.68.
CQ26	MDE	MbGcVp	0.2344		na	na	FCT7 (at high dissimilarity)	Fuses with SCP sites at high dis=0.74; NNBs dissimilarity >=0.69.
CNQ04	MDE	MbGcVp			na	mxd		Fuses with SCP sites at high dis=0.87; high NNBs dissimilarity >=0.71
AIQ14	EIDE- bore fld - Frederick Smith Crk	MbGcVp	0.2312		na	na	FCT7 (at high dissimilarity)	Fuses with SCP sites at high dis=0.74; NNBs dissimilarity >=0.62.
CNQ25	MDE	MbTi	0.3290		na	na		High OSV; Fuses with SCP sites at high dis=0.79; NNBs dissimilarity >=0.73.
CSQ04	MDE	MrHtBt	0.2355		na	26b/28		Fuses with SCP sites at dis=0.81; NNBs dissimilarity >=0.67; DNGRM: fuses FCT5 at high diss; NNB: 26b/28 - inconsistent.
CSQ06[a]	MDE	MrHtBt		CSQ04				
CQ2[a]	MDE	MrMt		CNQ02				Degraded vegetation - unreliable result
CNQ02	MDE	MrMt	0.3291		?S07	na		Vegetation near Degraded; high OSV - unrealiable result
CNQ16	MDE	MrMt	0.3292		na	mxd		High OSV; Fuses with SCP sites at high dis=0.77; NNBs dissimilarity >=0.68; NNB and Dngrm inconsistent.
AIQ06[a]	EIDE - bore fld Nambung Rd	MrMtSl		AIQ08			FCTs 17/S19	
AIQ07[a]	EIDE - bore fld Nambung Rd	MrMtSl		AIQ08			FCTs 17/S19	
AIQ08	EIDE - bore fld Nambung Rd	MrMtSl	0.3280		17/S19	17/S19	FCTs 17/S19	High OSV; Fuses with SCP sites at high dis=0.60; NNBs dissimilarity >=0.60.

[a] Sites that were not included in the SSI analyses.

[b]. MDE: Atlas Mine Dvpt Envp; EIDE: External Infrastructure Dvpt Envp

[c]. NNB: nearest neighbour; FCT: Floristic Community Type

Table 14 (cont). Summary of SSI PATN analysis of Atlas quadrats against the 2005 SCP dataset and assignment of FCTs

Site	Location[b]	Atlas Vegetation Unit	Ordination Stress Value (OSV)	Most Similar Site Analysed	Dendrogram Clustering FCT	NNB FCT	Some similarity with:	Comments
CNQ18	MDE	MrMv	0.3292		7	7/5	FCT7	High OSV; Fuses with SCP sites at high dis=0.61; NNBs dissimilarity >=0.58
CNQ22	MDE	MrMvBc	0.3291		na	16/17/S07	FCTs S07/17/16 (at high dissimilarity)	High OSV; Fuses with SCP sites at high dis=0.78; NNBs dissimilarity >=0.66.
AIQ13	EIDE- bore fld - Frederick Smith Crk	MrMvBc	0.3291		17	17	17	High OSV; Fuses with SCP sites at dis=0.64; NNBs dissimilarity >=0.61
AIQ11	EIDE - Upgde Munbinia Rd-Nambung River crossg	MrMvMco	0.3290		na	17		High OSV; Fuses with SCP sites at dis=0.77; High NNBs dissimilarity >=0.73
CQ27	MDE	Ms	0.2712		7/6	7/8/6/5	FCT7/6 (at high dissimilarity)	Fuses with SCP sites at high dis=0.69; NNBs dissimilarity >=0.64
CNQ17	MDE	Ms	0.2449		na	na		High OSV; Fuses with SCP sites at high dis=0.88; NNBs dissimilarity >=0.74
CNQ19	MDE	MsVdCaf	0.2461		na	na (mxd)		Fuses with SCP sites at high dis=0.81; high NNBs dissimilarity >=0.80
CNQ20	MDE	MsVdCaf	0.3296		nan	na		High OSV; Fuses with SCP sites at high dis=0.75; NNBs dissimilarity >=0.76
CNQ21[a]	MDE	MsVdCaf		CNQ20				
CQ14	MDE	MvMb	0.3292		na	mxd	FCTs 7/17/18 (at high dissimilarity)	High OSV; Fuses with SCP sites at high dis=0.80; NNBs dissimilarity >=0.69
CQ24	MDE	MvMb						Degraded site - not analysed
CNQ05	MDE	MvMb	0.2804		na	mxd	FCTs 7/17/18 (at high dissimilarity)	Fuses with SCP sites at high dis=0.80; NNBs dissimilarity >=0.68
CQ17	MDE	Ti	0.2421		na	na	FCT 7 (at high dissimilarity)	Fuses with SCP sites at high dis=0.73; NNBs dissimilarity >=0.65
CQ28	MDE	Ti	0.3288		na	na	FCT 7 (at high dissimilarity)	High OSV; Fuses with SCP sites at high dis=0.73; NNBs dissimilarity >=0.69
CNQ03	MDE	Ti	0.2307		na	na	FCT 7/17/18 (at high dissimilarity)	Fuses with SCP sites at high dis=0.78; high NNBs dissimilarity >=0.70
AIQ12	EIDE - Upgde Munbinia Rd-Nambung River crossg	Ti	0.2270		na	mxd		Fuses with SCP sites at high dis=0.87; NNBs dissimilarity >=0.74
CQ20	MDE	TmThTs	0.2353		na	na	FCT7 (at high dissimilarity)	Fuses with SCP sites at high dis=0.78; NNBs dissimilarity >=0.70
CNQ06	MDE	TmThTs	0.3298		na	na		High OSV; Fuses with SCP sites at high dis=0.91; high NNBs dissimilarity >=0.81
CNQ07[a]	MDE	TmThTs		AIQ12				
CNQ09	MDE	TmThTs	0.2325		na	na		Fuses with SCP sites at high dis=0.80; high NNBs dissimilarity >=0.74

[a] Sites that were not included in the SSI analyses.

[b]. MDE: Atlas Mine Dvpt Envp; EIDE: External Infrastructure Dvpt Envp

[c]. NNB: nearest neighbour; FCT: Floristic Community Type

Table 16 shows patch size and vegetation condition and an assessment for TEC for each area of *Banksia* woodland in the MESA. Only one area of *Banksia* woodland in the MESA bushland area (southern part) did not meet the patch size for the condition criteria. It was a 1.7 ha area of unit 'Bp' on the eastern boundary, which was assessed as being in 'Good' condition (2 ha area is the threshold). Two areas of remnant *Banksia* woodland on farmland in the MESA were assessed as not meeting the minimum condition criteria ('Good'). Therefore, 625.7 ha of *Banksia* woodlands in MESA were assessed to be 'Banksia woodlands of the Swan Coastal Plain' TEC (Endangered) (Figure 44).

There was 25.5 ha of *Banksia* woodland ('BaBm' and 'Bp') in the EISA corridors. This was all assessed as TEC, even when the discrete areas in the corridors were small, because all corridor patches were assessed as being continuous with or part of larger adjacent or surrounding *Banksia* woodland patches.

Therefore, a total area of 651.2 ha of the total area of 666.5 ha of *Banksia* woodlands in the Atlas study area was assessed to be 'Banksia woodlands of the Swan Coastal Plain' TEC (Endangered) at the federal level.

(ii). *Banksia* woodlands PEC/TEC status at Western Australian state government level

Banksia woodlands on the SCP (as far north as Seabird) have been classified into a number of floristic community types (FCTs) (Gibson *et al*, 1994). While Western Australia has a general PEC category for *Banksia* woodlands on the Swan Coastal Plain (SCP) as '*Banksia* dominated woodlands of the Swan Coastal Plain IBRA region' (PEC Priority 3), it has applied particular TEC/PEC status to a number of *Banksia* woodland FCTs.

Following the analysis of Atlas *Banksia attenuata, Banksia menziesii* Low Woodland sites ('BaBm') with the 2005 SCP dataset sites as described above, six Atlas sites were found to have some similarity with FCT23b and, with two exceptions (CSQ02 and AIQ17), the other 'BaBm' sites had similarity with FCTs 23b/23a/28. FCT23b has Priority 3 status, the same status applied to the general category of '*Banksia* dominated woodlands of the Swan Coastal Plain IBRA region' PEC (Priority 3). . Given the limitation of the analysis with the 2005 SCP dataset and consequently the reservation in assigning Atlas sites to the southern SCP FCTs, it was therefore considered most appropriate to assign all the Atlas *Banksia* woodland sites to the

'*Banksia* dominated woodlands of the Swan Coastal Plain IBRA region' PEC (Priority 3).

AIQ17 (Bibby Rd verge) fused at high dissimilarity with a SCP FCT20c site, but also fused with a number of other sites from various other FCTs and had mostly FCT23a nearest neighbours (PATN analysis) and, given also that there is no floristic vegetation classification for the northern SCP, it was therefore could not assigned to a SCP FCT (see section 6.2.1.2 above). It therefore seems appropriate to assign AIQ17 *Banksia* woodland to the '*Banksia* dominated woodlands of the Swan Coastal Plain IBRA region' PEC (Priority 3) at the state level, while noting some similarity with FCT20c. It should be noted that FCT20c is the 'Eastern shrublands and woodlands' FCT that is a TEC (Critically Endangered).

The site CSQ02 was in a small area of swale vegetation surrounded by *Banksia* woodland and was treated as ecotonal with the *Banksia* woodland and was included in the mapped area of '*Banksia* dominated woodlands of the Swan Coastal Plain IBRA region' PEC (Priority 3).

6.2.2.2 'Herb rich saline shrublands in clay pans' (FCT 7)

(i) Introduction

While PATN analysis found that a number of Atlas sites clustered with 2005 SCP FCT7 sites at relatively high dissimilarities, additional analyses of 14 floodplain and related sites led to the conclusion that they individually and as a group, formed clusters that were significantly different from SCP FCT7 sites and had relatively low similarities with those sites. It was noted that one of these Atlas sites, CNQ18, showed some similarity with SCP FCT7. This section is included to provide some information on FCT7 and site CNQ18 vegetation.

The vegetation sampled at CNQ18 was *Melaleuca viminea* subsp. *viminea*, (*M. rhaphiophylla*) shrubland which covered a small area on the banks of a small sumpland in the MESA. It was included in the vegetation unit 'MrMv'. The 'MrMv' vegetation unit was broadly defined to describe small, scattered patches of *Melaleuca rhaphiophylla, Melaleuca viminea* subsp. *viminea* shrublands that were observed occasionally on the margins of some of the small sumplands/claypans on the floodplain and in a few locations on the wetter margins of the MESA floodplain (Figure 29). It should be noted that the overall sumpland/claypan vegetation was described in two other units: 'McuMvSb' and 'TsTi'.

'Herb rich saline shrublands in clay pans' (FCT 7) was described by Gibson *et al*. (1994) as being generally 'dominated by either *Melaleuca viminea*, *M. uncinata*, *M. cuticularis* or *Casuarina obesa* or a mixture of these species' and as occurring 'on heavy clay soils that are generally inundated from winter to mid-summer' (DSEWPC, 2012). This description does not appear to closely match the habitat of Atlas site CNQ18, although the determination of vegetation as FCT 7 is largely guided by the floristic similarity analysis (Val English, DBCA; *pers. comm*.).

The 'Herb rich saline shrublands in clay pans' FCT is recognised as TEC at both federal and state level, but the scope and status of the TEC differs between the two levels of government.

(ii) Status of FCT 7 'Herb rich saline shrublands in clay pans'

a) State level: 'Herb rich saline shrublands in clay pans (Community Type 7 (SCP07))

'Herb rich saline shrublands in clay pans' (Community Type 7 (SCP07)) is recognised as a TEC (Vulnerable) at state government level.

b) Federal level: 'Clay Pans of the Swan Coastal Plain'

'Clay Pans of the Swan Coastal Plain' is listed under the EPBC Act as TEC (Critically Endangered). This federally listed TEC consists of five ecological communities recognised by the Western Australian government, one of which is the 'Herb rich saline shrublands in clay pans' (Community Type 7 (SCP07)).

To be classified to this TEC, a patch should have a functioning hydrologic regime and be at least in 'Good' condition (DSEWPC, 2012). The hydrological regime of inundation in winter and spring followed by drying is still occurring at the sumplands on the Atlas MESA floodplain and the condition of site CNQ18 was 'Excellent' and so the vegetation at CNQ18 would otherwise meet those requirements to be considered 'Herb rich saline shrublands in clay pans' (Community Type 7 (SCP07) at state level and 'Clay Pans of the Swan Coastal Plain' at federal level. No minimum patch size applies.

(iii). Extent of CNQ18 ('MrMv) vegetation in the Atlas survey area

The *Melaleuca viminea* subsp. *viminea*, Melaleuca *rhaphiophylla* shrubland at CNQ18 (Plate 41) was one of what was considered to be a few small patches of this vegetation that occurred on the edges of some of the 'sumplands' on the floodplain. These patches were generally very small, irregular in shape and few in number, such that despite some effort, additional suitable locations for quadrats (10 x 10metres) to replicate the CNQ18 site were not found. Hence, the 'MrMv' unit was only described from one quadrat, one relevé and one mapping note. These patches were also too small to be mapped discretely. CNQ18 was part of the 'MrMv' vegetation unit that also included what was considered structurally similar patches of *Melaleuca rhaphiophylla, Melaleuca viminea* subsp. *viminea* shrublands on the wetter margins of the flood plain. They also occurred in small patches and in few occurrences and often with high weed cover and hence a suitable location to sample these by quadrat was not found. Hence the similarity of floristics between these *Melaleuca* shrublands and CNQ18 on the 'sumpland' banks could not be tested.

Table 15: Assessment of *Banksia* woodland vegetation units 'BaBm' and 'Bp' against the diagnostic criteria for the Banksia Woodlands TEC [a,b]

Key diagnostic characteristics	Information	Key diagnostic questions	Response (yes/no/possibly) and detailed comments.
Location and physical environments	Bioregion	Is the proposal site within the Swan Coastal Plain IBRA bioregion (including Dandaragan plateau), or adjacent areas within the Jarrah Forest IBRA bioregion?	Yes. Survey area is located in the SCP IBRA bioregion (see Figure 2). Located on the SCP south of Jurien Bay.
Soils and Landform	Soil type	Is the soil type consistent with where the *Banksia* Woodlands TEC may occur?	Yes. Soils types are grey sands ('BaBm') and yellow sands ('Bp') [b]. 'BaBm' and 'Bp' occurred on sandplain, low dunes and other low rises.
	Location in the landscape, topography	Is the topography/physical environment consistent with where the *Banksia* Woodlands TEC may occur?	Yes. Undulating sandplain.
Structure	Tree composition, understory composition, diversity, species	Is the structure consistent with the characteristics set out in the conservation advice?	Yes. 'BaBm' Low Woodland was dominated by *Banksia attenuata* and *Banksia menziesii* [b] 'Bp' Low Woodland dominated by *Banksia prionotes* [b] Both 'BaBm' and 'Bp' are species rich (particularly 'BaBm') and have a sclerophyllous shrub stratum and herbaceous ground stratum. (See descriptions section 5.2.2.1)

[a] Source: DEE, 2021

[b] DAWE, 2021b

Table 16: Assessment of areas (polygons) of *Banksia* woodland in the MESA against vegetation condition thresholds (minimum patch size) for 'Banksia woodlands of the Swan Coastal Plain' TEC.

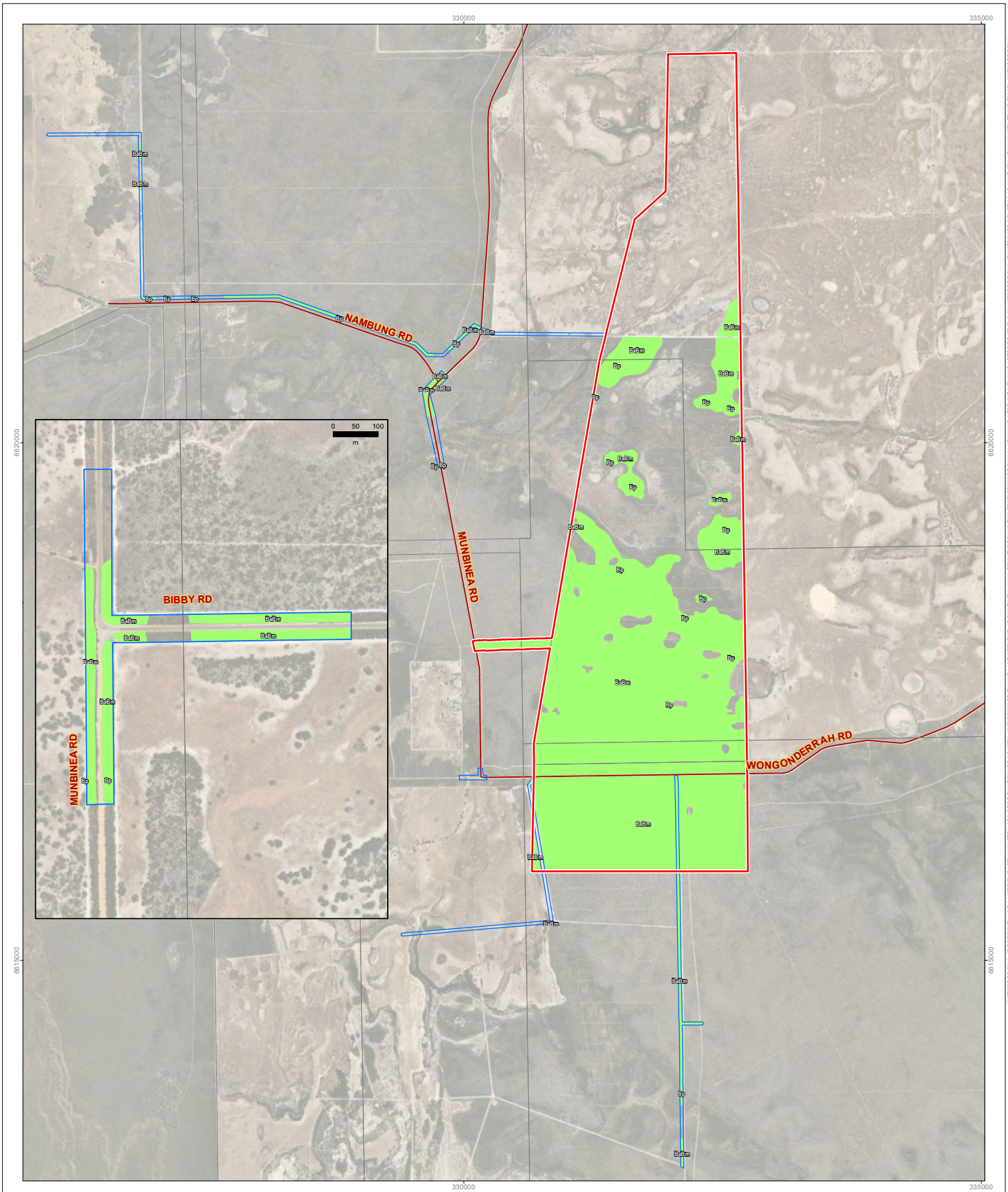
Veg unit	Vegetation Condition	Vegetation condition class for assessment	Minimum patch sizes for condition class $(ha)_c$	Polygon area (ha)	Is minimum patch size condition met	Other Considerations	Assessed as TEC
BaBm	E-P	P	No min.	520.5	Y		Y
BaBm	E	E	0.5	18.2	Y		Y
BaBm	E	E	0.5	16.5	Y		Y
BaBm	E	E	0.5	16.4	Y		Y
BaBm	E-P	P	No min.	3.7	Y		Y
BaBm	G-D	G	2	2.0	Y		Y
BaBm	E	E	0.5	1.9	Y		Y
BaBm	E	E	0.5	0.9	Y		Y
BaBm	E-P	P	No min.	0.6	Y		Y
BaBm	G	G	2	5.3	Y	Remnant in SE corner of MESA farm area	Y
BaBm	D-CD	G	na		na	Doesn't meet minimum 'Good' criteria	N
BaBm	G-D	<G	na		na	Doesn't meet minimum 'Good' criteria	N
Bp	E-P	P	No min.	21.6	Y		Y
Bp	E-P	P	No min.	4.4	Y		Y
Bp	E-P	P	No min.	3.8	Y		Y
Bp	E-P	P	No min.	2.7	Y		Y
Bp	E	E	0.5	1.9	Y		Y

Bp	G	G	2	1.7	N	NB. Remnant *Banksia* woodland in the paddock just to the east of this area was considered 'Degraded'	N
Bp	E	E	0.5	1.1	Y		Y
Bp	E	E	0.5	0.9	Y		Y
Bp	E-P	P	No min.	0.9	Y		Y
Bp	E-P	P	No min.	0.7	Y		Y
Bp	E	E	0.5	0.7	Y		Y
Bp	E-P	P	No min.	0.6	Y		Y
Bp	E	E	0.5	0.3	N	Polygon is on north-west boundary of survey area, but the patch continues outside the survey area (Figure 12) and is part of a larger area of 'Bp'	Y

a P: Pristine; E: Excellent; VG: Very good; G; Good; D: Degraded (see Appendix 4)

b If a condition range has been used, the assessment has been made against the 'higher' condition class.

c Minimum patch sizes by vegetation condition classes sourced from DAWE (2021c.)



Legend

- Mine Envelope Study Area
- External Infrastructure Study Area
- Tenement
- Banksia Woodlands of the Swan Coastal Plain (Federal TEC (Endangered)) (State PEC (Priority 3))
- Vegetation Condition Boundary

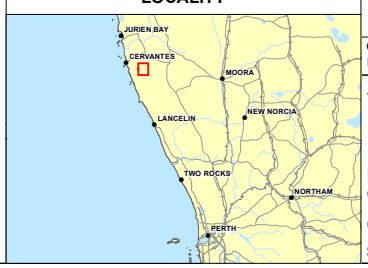
0 0.425 0.85 1.7 km

N

Scale: 1:35,000 @ A3

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

LOCALITY



Source: Orthophoto - Open Source Imagery

Preston Consulting

CREATED BY	JOB	DATE	REVISION
ENVIRONMAPS	AtlasInfra	8/11/2021	0

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Figure 44: '*Banksia* Woodlands of the Swan Coastal Plain TEC' in the Atlas survey area

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C:\GIS\Jobs\Brian Morgan\Atlas Infrastructure\Figures\AtlasInfra_F44 Banksia Woodland of the Swan Coastal Plain TEC_211108.mxd

6.2.3 Other values of vegetation units in the survey area

Given the limitations of regional comparisons of the Atlas vegetation with the 'southern' SCP dataset, it is useful to further consider the major vegetation types occurring in the Atlas survey area against information from other studies on the extent and nature of similar vegetation types in the Atlas locality and in region.

6.2.3.1 *Banksia* woodlands in the Nambung region and on the Swan Coastal Plain

The *Banksia* low woodlands in the Atlas Tenement are near the northern most extent of the Bassendean System on the Swan Coastal Plain (Figures 4 and 6). *Banksia attenuata, Banksia menziesii* Low Woodlands and *Banksia prionotes* Low Woodlands extend to the west of the MESA to Munbinea Rd and beyond, to the north-west and to the south and south-east of the survey area (Figures 32 to 34).

Although the vegetation of Nambung National Park 'has not been documented in any detail' (CALM, 1998), *Banksia* low woodlands are not extensive in the Park, although a small area does occur in the eastern part of the Park, west of the Atlas survey area.

Woodman Environmental Consulting (2014) classified *Banksia* low woodlands in a Cooljarloo study into Super-group 2, comprising Vegetation Types (VTs) 17 and 18. The study area extended north from Cooljarloo to Wongonderrah Rd (see inset, Fig 1) and west to Nambung station (34,424 ha). The *Banksia* low woodlands were mapped over a large part (66%; 22,720 ha) of that area. In an earlier study Elkington (1986) noted that *Banksia attenuata*, *Banksia menziesii* and *Banksia prionotes* were common in his Cooljarloo study area with a wide distribution and with *Banksia prionotes* being well represented along the mid-eastern edge of the tenement area.

Banksia low woodland covers an extensive area north of Perth, with Beard describing the overall cover of the Bassendean System as '*Banksia* low woodland dominated by *Banksia attenuata*, *Banksia menziesii*, *Banksia ilicifolia*, *Eucalyptus todtiana* and *Nuytsia floribunda*', with swampy lows in the topography (Beard, 1981). Griffin and Keighery (1989) found that *Banksia* woodland sites between Moore River and Jurien Bay divided into a southern group around Moore River and Namming and a northern group between Cooljarloo and Jurien. Griffin and Keighery's (1989) study would suggests that the *Banksia* woodlands in the Atlas survey area locality may be part of a distinct floristic grouping between Cooljarloo and Jurien Bay.

6.2.3.2 *Banksia telmatiaea* heath and related Atlas heath vegetation

Banksia telmatiaea heaths cover 12.7% of the Atlas survey area, with the other related heaths and Tall Shrublands ('CpBt', 'Ms' and 'MsVdCaf') covering another 1.6 %.

Beard (1981) noted that on the Bassendean Dunes unit, the lows in the topography north of the Moore River were typically underlain by a calcareous hardpan and were vegetated by heath communities. Elsewhere he noted also that the heath on swampy patches varies locally and that the whole was a mosaic that needed further study (Beard 1979). Griffin and Keighery (1989) studied kwongan heaths across a large area from Moore River to Jurien Bay. They included sites west of Munbinea Rd, Nambung (west of the Atlas survey area). They found that the 'wet heath' quadrats were very heterogeneous and were classified into five Super Groups. The 'wet heaths' separated into a distinct southern group (Moore River to Namming) and the northern areas, with the northern area generally dividing into an eastern area and a western area, the latter including the wetlands of the Bassendean Dunes (including the Nambung area). The Griffin and Keighery (1989) Cooljarloo and Wongonderrah 'wet heath' quadrats, that included *Banksia telmatiaea* and *Regelia ciliata* as dominants, grouped into their Super Group II, while 'wet heath' sites to the east and north to Jurien Bay region, formed another Super Group (III).

Of 18 vegetation types (VTs) described in their large Cooljarloo West study area, Woodman Environmental Consulting (hereafter 'Woodman') (2014) defined group VT5 as being a *Banksia telmatiaea* dominated heaths unit. Group VT1 was also described as including these heaths, but also included *Melaleuca rhaphiophylla* shrubs and appeared to be quite floristically separate from VT5. Woodman's VT5 unit covered an area of 1887 hectares (5.49%) and coincided with the mapped palusplain Wetlands of National Significance on the south side of Wongonderrah Rd (Figure 5). The Atlas vegetation unit 'BtRc' is most likely aligned with Woodman's unit VT5. The Atlas 'BtRc' heaths occurred on gentle slopes and some slightly elevated flats around the floodplain and some depressions on the sand plain, while 'VT5' was described as occurring on 'broad damp depression on flat to gently undulating plains'. The degree of floristic similarity between Atlas 'BtRc' heaths and Woodman's unit VT5 has not been statistically tested.

Woodman's (2014) vegetation grouping VT5 also included *Melaleuca seriata* dominated heaths and may have affinities with the Atlas survey area vegetation units 'Ms' and 'MsVdCaf', but again this has not been tested. The extent of *Callitris pyramidalis* heaths in Woodman's Cooljarloo survey area is not known. However,

extensive areas of *Callitris pyramidalis* heaths occurred west of the MESA, on the margins of the floodplain (Figures 32 to 34).

In summary, the work of Griffin and Keighery (1989) suggest that the heath vegetation in the Atlas survey area is likely to have close affinities to heaths in the Cooljarloo area, south of Wongonderrah Rd. The extent of these heaths may be limited, as a floristic grouping, to the Nambung-Cooljarloo region. These heaths are associated with numerous taxa of Conservation Significance.

6.2.3.3 *Melaleuca* spp. Tall Shrublands

The Atlas survey area *Melaleuca* Tall Shrublands units 'MrMvMco', 'MrMvBc', 'MaMcu' and 'MvMb' (flowlines and wetter parts of floodplain) would all most likely align with Woodman's (2014) vegetation type VT2 (1055 ha; 3.07% of the Cooljarloo study area). *Grevillea* sp. Cooljarloo (B.J. Keighery 28 B) (Priority 1) was associated with both Woodman's VT2 and the *Melaleuca* Tall Shrublands in the Atlas survey area. The Atlas survey area dampland unit 'MrMt' would most likely align with Woodman's vegetation type VT9a (279ha; 0.81%).

In the Atlas survey area *Melaleuca* Tall Shrublands typically had very high weed cover in the herbland/sedgeland/grassland layer. The loss of the native herbland/sedgeland/grassland strata in these units led to the assessment of their vegetation condition as mostly 'Good to Degraded'. The poor condition of the *Melaleuca* Tall Shrublands in the Atlas survey area diminishes their conservation values.

The Atlas dampland unit 'MrMt' only occurred in a well developed form at two locations in the survey area. One dampland was in 'Good to Degraded' condition while the second area was moderately weedy ('Very Good' condition).

The *Melaleuca* spp. Tall Shrublands in the Atlas survey area would have low conservation value, mostly due to their poor condition (high weed cover).

6.2.3.4 *Tecticornia* Low Shrublands (samphires) and associated floodplain units

The samphire low shrublands on the floodplain in the MESA are in a habitat with an apparently complex hydrology. The species composition of the samphire shrublands varied from the southern parts of the MESA floodplain (vegetation unit 'Ti') to the apparently more saline areas in the northern part of the floodplain (vegetation unit

'TmThTs'). The salt distribution and concentrations are not known and these may change seasonally with influxes of fresh water. The herblands present in parts of these flats suggest a tolerance of saline soils and perhaps a surface with at least seasonally lower salt levels. Eleanor Bennett (*pers. comm*.) reported sampling a similar suite of herbs on low flats in the Jurien Bay area.

The MESA floodplain extends some 650 metres to the west of the survey area (Figure 8), draining into the Nambung River. A smaller area of floodplain with samphire low shrublands, part of which was included in the external targeted searches for flora of conservation significance, was observed west of Munbinea Rd, in the Nambung NP (Figure 17 and 32).

A samphire vegetation type VT13 was described by Woodman (2014) from four quadrats in the Cooljarloo study area, with *Tecticornia* ?*halocnemoides* and *Tecticornia indica* subsp. *bidens* as dominant taxa. The Atlas samphire units 'Ti' and 'TmThTs' are likely to align with VT13 sites. Woodman's VT13 unit occupied 167.7ha (0.49%) of the Woodman study area compared to the 66.2 ha (5.4%) that 'Ti' and 'TmThTs' vegetation occupies in the Atlas survey area.

The Atlas samphire flats unit 'Ti' was associated with occurrences of *Stylidium longitubum* (P4), while *Angianthus micropodioides* (P3) occurred in very large numbers in both the 'Ti' and 'TmThTs' samphire units.

The *Melaleuca brevifolia* Open Shrublands unit ('MbGcVp'), which occurred along the convoluted margins of the floodplain and which is where most of the *Grevillea* sp. Cooljarloo (B.J. Keighery 28 B) (Priority 1) plants were recorded in the Atlas survey area, is likely to align with Woodman's vegetation type VT2 (see section 6.2.2.3).

The extent of similar samphire floodplains and fringing vegetation on the SCP, beyond those associated with the Nambung River in the Atlas locality, is not known.

6.2.3.5 Sumplands on the floodplain

Vegetation of the saline sumplands or 'claypans', were described by two units, 'TsTi' and 'McuMvSb'. All but one of these sumplands were dry by early October ('TsTi') and some didn't have well developed and differentiated fringing vegetation. The 'McuMvSb' claypan was inundated until at least mid-November (2020).

The occurrence of similar sumplands in the region surrounding the survey area is not known.

6.2.4 Representation of vegetation units in regional Reserves

Woodman (2014) listed the areas of their vegetation types mapped in two Reserves that were included in their Cooljarloo survey area, Wongonderrah Reserve and Reserve A40916. The areas of their vegetation types in these Reserves and the areas of the Atlas survey area vegetation units considered likely 'aligned' to those vegetation types, are shown in Table 17.

Table 17: Areas of Atlas survey area vegetation units found in regional Reserves[a]

Atlas survey area vegetation unit	Area of veg unit in Atlas survey area (ha)	Woodman Env. (2014) aligned vegetation type	Area of vegetation types in local Reserves (Woodman Env. Consulting (2014)		
			Wongonderrah NR (ha) [a]	Reserve A40916 (ha) [a]	Total Reserve area (ha)[a]
'BaBm'	615.9	VT17	144.4	471.3	615.7
'MrMvMco', 'MrMvBc', 'MvMb', 'MrMv', 'MaMcu'	33.6	VT2	14.1	-	14.1
'BtRc', 'Ms', 'MsVdCaf'	161.7	VT5	47.7	11.9	59.6
MrMt	4.5	VT9a	-	50.6	50.6

[a] Data other than the Atlas survey area data was sourced from Woodman Environmental (2014)

Griffin and Keighery (1989) found that their 'wet heath' vegetation types in the Cataby-Hill River floristic area occurred in only small areas of conservation reserves in the locality (Badgingarra NP, Mullering Reserve, Wongonderrah Reserve, Nambung National Park and Hill River Reserve). They concluded that the 'wet heath' and *Banksia* woodlands on the Bassendean Dunes in the Cataby-Hill River floristic area were very poorly represented in conservation reserves.

6.2.5 The geomorphic wetlands and associated vegetation in the survey area

The geomorphic wetlands in the survey area, as mapped by ENV (2010) and that aren't on cleared farmland, are dominated by the area of MESA floodplain and the three other types of geomorphic wetland that are directly associated with it. The floodplain and associated flow channels, including Mount Jetty Creek, drain to the west into the Nambung River, which continues a short distance west into Nambung National Park.

The nationally important wetlands 'Lancelin Defence Training Area. – WA119' occur to the south and south-east of the survey area (south of Wongonderrah Rd) (Figure 7). These wetlands appear to be mostly palusplain wetlands (Figure 7 and Figure 8), compared to the mostly floodplain wetland area that was mapped in the Atlas study area (ENV, 2010; Figure 8). The vegetation of the 'seasonal swamps' in these nationally important wetlands is described as variable heath that typically includes *Banksia telmatiaea* and *Regelia ciliata* (DAWE, 2021a). *Banksia telmatiaea* and *Regelia ciliata* are also dominants in much of the extensive heaths in the Atlas survey area, albeit where the palusplain habitat has a lesser occurrence (ENV, 2010). As noted above, the degree of floristic similarity between these has not been tested.

Within the survey area, the vegetation of the floodplain area of geomorphic wetlands and their surrounds, form a sequence of vegetation types from the *Tecticornia* spp. Low Samphire Shrublands ('Ti' and 'TmThTs') on the floodplain with *Melaleuca* spp. Tall Shrublands along the floodplain flow lines ('MrMvMco', 'MvMb', 'MrMv') and *Melaleuca brevifolia* Open Shrublands around the floodplain margins, progressing to the various heath units on the gentle slopes surrounding the floodplains ('BtRc', 'CpBt', 'MsVdCaf' and 'Ms') and ultimately to the *Banksia* woodlands on the low sandy rises and plains ('BaBm' and 'Bp'). The convoluted nature of the floodplain boundary, together with the presence of several large low sandy rises ('islands') on the floodplain, results in quite a complex of vegetation. Numerous Priority plant species occur on the floodplain and in the heath vegetation units. It should be noted that some similar sequences of vegetation types with similar, but more expansive suite of Priority and Threatened species, have been documented in the Cooljarloo area south of the Atlas survey area (Syrinx Environmental, 2013; Woodman Environmental Consulting, 2014).

Figure 45 shows the occurrence of geomorphic wetlands in the wider region around the Atlas survey area. Some geomorphic floodplain is shown occurring in the Cooljarloo area and a considerable area west of Cooljarloo, around the Frederick

Smith Creek. The type of vegetation on these floodplains and how they compare with the floodplain vegetation in the survey area has not been examined as part of this study.

The vegetation associated with the geomorphic floodplains and related wetlands in the survey area is considered to have high value for its complexity and the high number of associated plant species of conservation significance (Priority species).

6.2.6 Extent of the survey area Vegetation System Association – regional vegetation

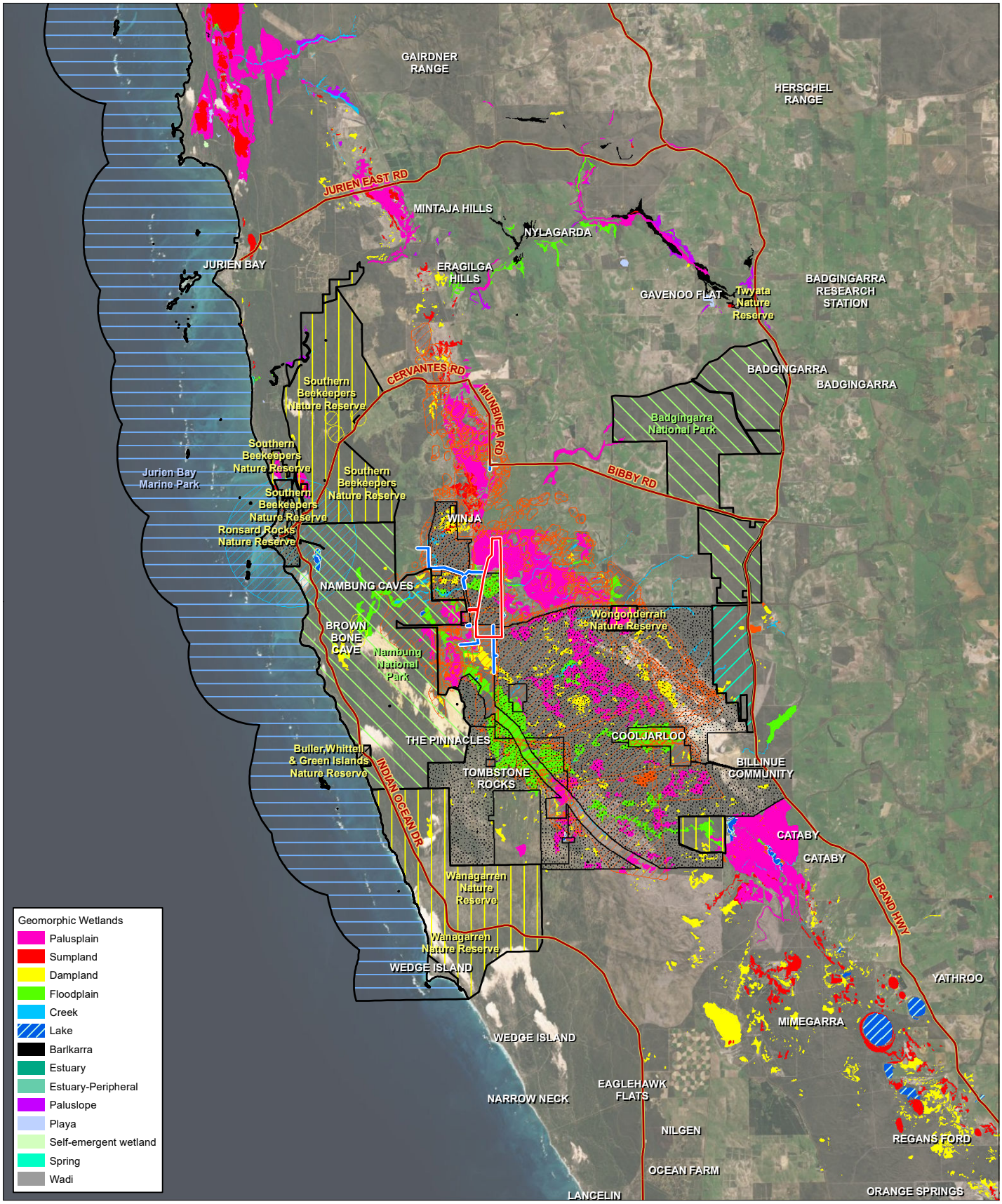
Most of the survey area lies within the Bassendean System in the Perth IBRA sub-region and almost all of it is located in an area mapped as vegetation system association Bassendean 1030 (Figure 6; Table 18). The western-most section of Nambung Rd EISA corridor, an area of 1.3 ha, is in vegetation association 'Jurien 1029' and lies entirely in cleared farmland. As none of this area is currently bushland that might be impacted by clearing or other disturbance, the pre-European extent of the Jurien 1029 vegetation system association in the Perth IBRA sub-region is not included in Table 18.

Table 18 shows that 69.7% (79,561 ha) of the pre-European extent of the Bassendean 1030 in the Perth IBRA sub-region, remains, and 64% state-wide. Of the 'current extent' of Bassendean 1030 vegetation system association in the Perth IBRA sub-region, 9.7% is protected for conservation. It should be noted that the vegetation system associations are very broad vegetation units.

6.3 Other flora and vegetation values - Linkages

The Atlas survey area lies a few kilometres east of Nambung National Park. As such, the area does have important linkage values. Presently the northern part of MESA and land further to the north of that, is cleared farmland and land to the east of the survey area on the north side of Wongonderrah Rd and to the west of the survey area south of Wongonderrah Rd, is cleared farmland. The survey area bushland therefore provides linkage between Nambung National Park and the bushland south and south-east of the survey area (south of Wongonderrah Rd). Continuity of bushland between Nambung National Park and the bushland to the east (south of Wongonderrah Rd) is otherwise mostly broken by cleared farmland and bare sand dune deposit for a distance north-south of approximately 10 km (Google Earth, 2021).

The linkage values of the survey area would be considered to be high for linkage between Nambung National Park and the bushland areas south of Wongonderrah Rd.



Legend

- Mine Envelope Study Area
- External Infrastructure Study Area
- Unallocated Crown Land

Threatened and Priority Ecological Community Buffers

- Priority 3: Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region.
- Priority 3: Tuart *(Eucalyptus gomphocephala)* woodlands and forests of the Swan Coastal Plain.
- Vulnerable: Stromatolite community of stratified hypersaline coastal lake (Lake Thetis).

Legislated Lands and Waters (DBCA)

- Conservation Park
- National Park
- Marine Park
- Nature Reserve
- Section 5(1)(h) Reserve

Source: TEC/PEC - DBCA, 2019
Orthophoto - Open Source Imagery
Legislated Lands & Waters and Lands of Interest - DBCA

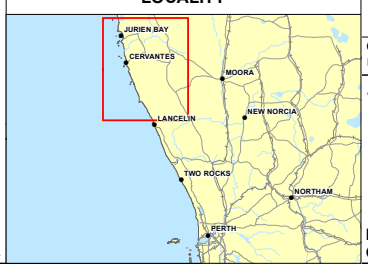
0 2.5 5 10 km

Scale: 1:300,000 @ A3

N

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

LOCALITY



Preston Consulting

CREATED BY	JOB	DATE	REVISION
ENVIRONMAPS	ATLASINFRA	8/11/2021	0

Figure 45:
Geomorphic Wetlands of the Nambung area

ENVIRONMAPS t: 0406 590 006 Environmental Mapping Solutions | www.environmaps.com.au

C:\GIS\Jobs\Brian Morgan\Atlas Infrastructure\Figures\AtlasInfra_F45 Geomorphic Wetlands in the Nambung Region_211108.mxd

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Table 18: Pre-European and current extent of the Beard vegetation associations that occur in the survey area[a]

IBRA Region Code	IBRA Sub-Region Code	IBRA Sub-Region Name*	System	Vegetation Association	SA_CODE	Pre-European Extent	Current Extent	% Remaining	Current Extent Protected for Conservtn (ha)	% Current Extent Protected for Conservation
GES	GES02	Lesueur Sandplain	BASSENDEAN	1030	1030.2	1,556.67	555.90	35.71	75.70	4.86
SWA	SWA01	Dandaragan Plateau	BASSENDEAN	1030	1030.2	292.07	73.90	25.30		
SWA	SWA02	Perth	BASSENDEAN	1030	1030.2	114,213.39	79,560.88	69.66	11,028.59	9.66
WAR	WAR01	Warren	BORANUP	1030	1030.3	139.65	102.78	73.60	35.66	25.53
SWA	SWA01	Dandaragan Plateau	DANDARAGAN	1030	1030	1,383.46	570.51	41.24		
GES	GES02	Lesueur Sandplain	GAIRDNER	1030	1030	295.78	287.56	97.22	287.56	97.22
SWA	SWA02	Perth	GAIRDNER	1030	1030	2.22	2.22	100.00	2.22	100.00
SWA	SWA01	Dandaragan Plateau	GINGIN	1030	1030	13,028.81	4,519.70	34.69	88.92	0.68
JAF	JAF01	Northern Jarrah Forest	KOOJAN	1030	1030.2	236.12	42.28	17.91	13.33	5.65
SWA	SWA01	Dandaragan Plateau	KOOJAN	1030	1030.2	5,868.61	1,286.69	21.93	176.68	3.01
GES	GES02	Lesueur Sandplain	LE SUEUR	1030	1030.1	1,996.07	1,947.13	97.55	1,724.02	86.37
Statewide						139,012.86	88,949.55	64.0	13,432.67	15.1

a Data sourced from Data WA (Govt of Western Australia, 2019)

6.4 Significance of flora and vegetation values

6.4.1 Assessment for significance

An assessment of the significance of the flora and vegetation values in the Atlas survey area is presented in Table 19.

The survey area is considered to have local significance for:

- Flora rarity (23 Priority flora recorded in the survey area);
- Vegetation diversity (complex of vegetation units associated with the geomorphic wetlands centred around the floodplains). The extent of similar samphire floodplains and associated vegetation on the SCP, beyond those associated with the Nambung River in the Atlas locality, is not known.
- Vegetation rarity for the 'Banksia woodlands of the Swan Coastal Plain' TEC (Endangered, federal)/PEC (Priority 3, state);
- Vegetation rarity for the heaths surrounding the flood plain and growing in the depressions on the sandplain;
- Linkage values of survey area vegetation (links Nambung National Park bushland to the bushland south of Wongonderrah Rd); and,
- Functioning geomorphic wetland system of floodplain, palusplain, sumplands and flow channels that drain water from the area to the east and distribute it across a continuation of the floodplains to the west and ultimately to the Nambung River.

6.4.2 Regional view and reservation

The heath vegetation in the Atlas survey area was assessed as having local significance. However, it is noted that these heaths, which are considered to fall within Griffin and Keighery's (1989) 'wet heath' group, were considered by Griffin and Keighery to be a distinct floristic group, distinct from the heaths to the south (Moore River National Park and Namming) and the heaths to the east.

Given that the Nambung-Cooljarloo heaths have been found to be distinct and given that they are associated with many Conservation Significant flora taxa, some in large numbers, these heaths may have high value at a more regional level.

Griffin and Keighery (1989) noted that the Bassendean dunes in the Cataby-Hill River area, 'with its Wet Heath and *Banksia* Woodlands', were poorly represented in conservation reserves and that remains the current situation.

Table 19: Flora and vegetation values assessed for significance

Element	Values Assessed	Comment	Significance
Flora	Diversity	487 native taxa recorded in the survey area of 1226.2 ha. This is assessed as moderate to high for this area.	Not significant (moderate to high values)
	Rarity	Twenty one (23) Priority flora were recorded in the survey area. Thirteen of these were at or near the limits of their range and some had very limited ranges. A number of Priority taxa were recorded in large numbers and were associated with a particular habitat. Nine of these Priority taxa (excluding *S. badius*) were recorded in the heath vegetation units, 7 of these only in the heath vegetation.	Locally Significant. Noted that large numbers of some of these Priorities were recorded in the surrounding locality as part of this survey, and large numbers of most of these and other Threatened and Priority flora have been recorded between Cooljarloo and Wongonderrah Rd, south-east of the survey area.
Vegetation	Extent of Vegetation System Associations	Survey area lies within Vegetation System Association 1030, in the Bassendean System in the Perth IBRA sub-region: 114,213.39 ha of Pre-European extent, 69.66% remaining, 9.66% protected.	Not significant
	Diversity	The survey area vegetation was described by 20 units at about the association level. *Banksia* woodland occupied about 67.5% of the survey area, *Banksia telmatiaea* heaths and other heaths about 17.5% and *Tecticornia* low shrublands about 7%. Diversity around the floodplain area was high because the sequence of vegetation units from the samphire flats through to the surrounding heaths and then the *Banksia* woodlands on the sand plains and low sandy rises and because of the convoluted nature of the floodplain boundaries.	Locally Significant on the floodplain and its surrounds. Noted that similar sequences of main vegetation types occur in the Cooljarloo locality.
	Rarity	*Banksia* low woodlands in the survey area are categorized as - 'Banksia woodlands of the Swan Coastal Plain' (Endangered) TEC (federal) - 'Banksia dominated woodlands of the Swan Coastal Plain IBRA region' (PEC Priority 3) (Western Australian govt)	Locally Significant for PEC (Priority 3; state)/TEC (Endangered; federal). 22,720 ha of *Banksia* low woodland in the Cooljarloo study area to south (Woodman Environmental Consulting (2014). *Banksia* woodlands from Cooljarloo to Jurien Bay considered floristically different to those to south in Moore River/Namming area (Griffin and Keighery, 1989)
	Rarity	Heathlands ('BtRc', 'CpBt', 'MsVdCaf', 'Ms'): - 'Wet heaths' in Nambung-Cooljarloo region are thought to be floristically distinctive (Griffin and Keighery, 1989) High number of Conservation Significant flora taxa associated with these heaths (11), including *Babingtonia urbana* (P3), *Chordifex reseminans* (P2), *Conospermum scaposum* (P3), *Conostylis pauciflora* subsp. *euryrhipis* (P4); *Desmocladus nodatus* (P3), *Isopogon panduratus* subsp. *palustris* (P3), *Jacksonia carduacea* (P3); *Lepyrodia curvescens* (P2), *Levenhookia preissii* (P1), *Schoenus pennisetis* (P3), *Stylidium hymenocraspedum* (P3)	Locally Significant A large area of probably similar heaths, with dominants including *Banksia telmatiaea*, *Regelia ciliata* and *Melaleuca seriata*, occurs between Cooljarloo and Wongonderrah Rd on palusplain, basins and lower slopes (Woodman Environmental Consulting, 2014; Syrinx Environmental, 2013). These are associated with numerous Conservation Significant taxa, including large numbers of some recorded in the heaths in the Atlas survey area.

Element	Values Assessed	Comment	Significance
Maintaining Ecological Processes	Linkages	Survey area bushland links Nambung NP to west with bushland south of Wongonderrah Rd	Locally significant
	Geomorphic wetlands draining into Nambung River	Geomorphic wetlands centred around the floodplain in the survey area drain the Mount Jetty Creek and other water flows from the flats to the north and east, spreading the water through and across the floodplain and its flow channels in the survey area and to the west, ultimately transmitting water into the Nambung River and Nambung NP.	Locally significant

7.0 ACKNOWLEDGEMENTS

Quadrats in 2011 were recorded by Brian Morgan and Chris Hancock. Chris Hancock, Julia Mattner and Ben Baylis assisted with establishing nineteen additional quadrats in the MESA in Spring 2019 and Kelli McCreary helped record additional quadrats in Spring 2020. Kelli McCreary assisted with revisiting the 2011 and 2019 quadrats in Spring 2020. Julia Mattner and Ben Baylis assisted with the targeted searches for species of conservation significance in 2019 and 2020. Julia Mattner assisted with recording quadrats and other survey of the External Infrastructure Envelope areas (EISA) in 2021.

John Ewing (W.A. Native Orchid Study and Conservation Group) assisted with targeted searches for orchids in 2021.

Plant identifications in 2011 were undertaken principally by Brian Morgan, Eleanor Bennett and Chris Hancock. In 2019 and 2020 all identifications were undertaken by Brian Morgan, with the following specialist help: Andrew Brown identified the orchid specimens; Allen Lowrie identified the more difficult *Drosera* and *Stylidium* specimens; Frank Obbens identified the *Calandrinia* specimens and Mike Hislop and Rob Davis (Western Australian Herbarium) helped with the Ericaceae and *Ptilotus* groups respectively. The Western Australian Herbarium Identification Service identified the core group of *Tecticornia* specimens (Kelly Shepherd) and identified a number of other select difficult specimens and confirmed identifications of a number of taxa of conservation significance (Mike Hislop). Greg Keighery assisted with plant identifications in 2021.

Julia Mattner assisted with data entry in 2021.

The GIS mapping was undertaken by Simon Crofts (EnvironMaps).

Matt Williams ('Data Analysis Solutions') provided advice on multivariate statistics and reviewed the statistics summarised in section 6.2.1 and Appendices 10 to 12.

8.0 REFERENCES

360 Environmental (2012). Level 2 flora and vegetation survey – North Perth Mineral Sands Project (Single Phase). Unpublished report prepared for Image Resources NL.

Barrett, R. L. and Dixon, K. W. (2001). A revision of the genus Calectasia (Calectasiaceae) with eight new species described from south-west Western Australia. Nuytsia V13(3), p411-448.

Beard, J. S. (1979). The vegetation of the Moora and Hill River Areas. Western Australia. Map and explanatory memoir. 1:250,000 series. Vegmap Publications, Perth.

Beard, J. S. (1981). Vegetation Survey of Western Australia. Swan. 1:1000000 Vegetation series. University of Western Australia Press.

Beard, J. S., Beeston, G. R., Harvey, J. M., Hopkins, A. J. M., and Shepherd, D. P. (2013).The vegetation of Western Australia at the 1:3,000,000 scale. Explanatory memoir. Second edition. Conservation Science Western Australia 9, 1 pp.1–152

Briggs, B. G., and Johnson, L. A. S. (2004). New combinations in *Chordifex* (Restionaceae) from eastern Australia and new species from Western Australia. Telopea V10(3), p683.

Brown, A., Dixon, K., French, C. and Brockman, G. (2013). *Field Guide to the Orchids of Western Australia*. Simon Nevill Publications.

Brown, A., Dundas, P., Dixon, K. and Hopper, S. (2008). *Orchids of Western Australia*. UWA Press.

Bureau of Meteorology (BOM). (2021). Groundwater Dependent Ecosystems Atlas website. http://www.bom.gov.au/water/groundwater/gde/map.shtml.

Canham, C. A., Froend, R. H. and Stock, W. D. (2009). Water stress vulnerability of four *Banksia* species in contrasting ecohydrological habitats on the Gnangara Mound, Western Australia. *Plant, Cell and Environment* 32, 64-72.

Churchwood, H. M. and McArthur, W. M. (1980). Landforms and soils of the Darling System, Western Australia. *In* Atlas of Natural Resources Darling System Western Australia. Dept of Conservation and Environment. University of Western Australia Press.

Clarke, K. R., Gorley, R. N., Somerfield, P. J. and Warwick, R. M. (2014). "Change in marine communities: an approach to statistical analysis and interpretation. 3rd Edtn. PRIMER-e, Plymouth.

Datson, B. (2002). Samphires in Western Australia. A Field Guide to Chenopodiaceae tribe Salicornieae. Dept of Conservation and Land Management. Western Australia.

Department of Agriculture, Water and the Environment (DAWE). (2021a). 'Directory of Important Wetlands in Australia'. https://www.environment.gov.au/water/wetlands/australian-wetlands-database/directory-important-wetlands.

Department of Agriculture, Water and the Environment (DAWE). (2021b). 'Species Profile and Threats Database. Banksia Woodlands of the Swan Coastal Plain ecological community'. Available from: https://www.environment.gov.au/cgi-bin/sprat/public/publicshowcommunity.pl?id=131&status=Endangered.

Department of Agriculture, Water and the Environment (DAWE). (2021c). Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (s 266B) Approved Conservation Advice (incorporating listing advice) for the Banksia Woodlands of the Swan Coastal Plain ecological community. Available from http://www.environment.gov.au/biodiversity/threatened/communities/pubs/131-conservation-advice.pdf.

Department of Biodiversity, Conservation and Attractions (DBCA). (2021a). website *Threatened Ecological Communities*. https://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/wa-s-threatened-ecological-communities.

Department of Biodiversity, Conservation and Attractions (DBCA). (2021b). website 'Wetlands of National and International Importance'. Accessed February 2021:

https://www.dpaw.wa.gov.au/management/wetlands/wetlands-of-national-and-international-importance.

Department of Biodiversity, Conservation and Attractions (DBCA). (2021c). Nature Map: Data Directory: https://naturemap.dbca.wa.gov.au/.

Department of Conservation and Land Management (CALM). (1998). Nambung National Park Management Plan 1998 – 2008. Management Plan No. 37. Western Australia.

Department of the Environment and Energy (DEE). (2012). IBRA Version 7. Australian Government.

Department of Environment and Energy (DEE). (2016). Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (s 266B) Approved Conservation Advice (incorporating listing advice) for the Banksia Woodlands of the Swan Coastal Plain ecological community.

Department of the Environment and Energy (DEE). (2019) EPBC Referral Guidance - Banksia Woodlands of the Swan Coastal Plain ecological community. Australian Government.

Department of Environmental Protection (DEP). (2000) Bush Forever Vol. 2 Directory of Bush Forever Sites. Dept of Environmental Protection, Perth.

Department of Primary Industries and Regional Development. (2021). Western Australian Organism List (WAOL) website. https://www.agric.wa.gov.au/bam/western-australian-organism-list-waol

Department of Sustainability, Environment, Water, Population and Communities, (DSEWPC) (2012). Advice to the Minister for Sustainability, Environment, Water, Population and Communities from the Threatened Species Scientific Committee on an Amendment to the List of Threatened Ecological Communities under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

Doody, T. M., Barron, O. V., Dowsley, K., Emelyanova, I., Fawcett, J., Overton, I. C., Pritchard, J. L., Van Dijk, A. I. J. M. and Warren, G. (2017). Continental mapping of

groundwater dependent ecosystems: a methodological framework to integrate diverse data and expert opinion. *Journal of Hydrology*: Regional Studies 10, 61-81.

Eamus, D., Froend, R., Loomes, R., Hose, G. and Murray, B. (2006). A functional methodology for determining the groundwater regime needed to maintain the health of groundwater-dependent vegetation. *Aust J Botany*, 54, 97-114.

Elkington, J. E. (1986). Report on the vegetation at Cooljarloo W.A. (SH 50-9). Unpublished report prepared for TIO2 Corporation N.L.

ENV Australia. (2010). Wetland Mapping and Classification. Cervantes South. Prepared for Department of Environment and Conservation, Australian Government.

Environment Australia. (2001). A Directory of Important Wetlands in Australia, Third Edition. Environment Australia, Canberra.

Environmental Protection Authority (EPA) (2016). Technical Guidance. Flora and Vegetation Surveys for Environmental Impact Assessment. EPA, Western Australia.

Equinox Environmental PL. (2013). Fortescue Marsh: Synthesis of eco-hydrological knowledge. Final Report. Prepared by Equinox Environmental PL for Fortescue Metals Group.

ESCAVI (Executive steering committee for Australian Vegetation Information), (2003). Australian Vegetation Attribute Manual: National Vegetation Information System, Version 6.0. Department of the Environment and Heritage, Canberra.

Froend, R. and Loomes, R. (2006). Determination of Ecological Water Requirements for Wetland and Terrestrial Vegetation – Southern Blackwood and Eastern Scott Coastal Plain. A Report to the Department of Water. Centre for Ecosystem Management, Edith Cowan University.

Froend, R., Loomes, R., Horwitz, P., Bertuch, M., Storey, A. and Bamford, M. (2004). Task 2: Determination of Ecological Water Requirements. Prepared for the water and Rivers Commission, Western Australia.

George, E. A. (2002). '*Verticordia. The Turner of Hearts*'. UWA Press, Western Australia.

Gibson, N., Keighery, B.J., Keighery, G.J., Burbidge, A.H., and Lyons, M.N. (1994) A Floristic Survey of the Southern Swan Coastal Plain. Unpublished report for the Australian Heritage Commission prepared by the Department of Conservation and Land Management and the Conservation Council of Western Australia (Inc).

Google Earth (2021). Google Earth Pro 7.3.3.7786. Imagery date: 8/13/2018.

Government of Western Australia. (2019). 2018 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). Current as of March 2019. WA Department of Biodiversity, Conservation and Attractions, Perth. https://catalogue.data.wa.gov.au/dataset/dbca-statewide-vegetation-statistics.

Griffin, E. A. and Keighery, B. J. (1989). Moore River to Jurien Sandplain Survey. Western Australian Wildflower Society. Perth. 90pp.

Groom, P. K., Froend, R. H., Mattiske, E. M., and Koch, B. (2000). Myrtaceous shrub species respond to long term decreasing groundwater levels on the Gnangara Groundwater Mound, northern Swan Coastal Plain. *Journal of the Royal Society of Western Australia*, 83, 75-82.

Heddle, E.M., Loneragan, O.W., and Havel, J.J. (1980) 'Vegetation complexes of the Darling System, Western Australia.' In: *Atlas of Natural Resources, Darling System Western Australia.*, M.J. Mulcahy (ed.) pp37-76 and accompanying map. Department of Conservation and Environment, Perth.

Hill, A. L., Semeniuk, C. A., Semeniuk, V., Del Marco, A. (1996). Wetlands of the Swan Coastal Plain. Vol. 2A. Wetland Mapping, Classification and Evaluation, Main Report. Water and Rivers Commission, Perth.

Hislop, M. (2016). New species of *Leucopogon s. str.* (Ericaceae: Epacridoideae: Styphelieae) from the Geraldton Sandplains. Nuytsia V27: 217-242.

Hislop, M. & Rye, B.L. (2010). Two new, glaucous-leaved species of *Isopogon* (Proteaceae: Proteoideae: Leucadendreae) from south-western Australia. *Nuytsia* 20: 169–181.

Hopper, S. D. (1987). Anigozanthos, Flora of Australia 45: p120. Australian Government Publishing Service, Canberra.

Hopper, S. D. (1993). Kangaroo Paws and Catspaws. A Natural History and field Guide. Dept of CALM, Western Australia.

Hyde, N. L. (2006). A summary of investigations into ecological water requirements of groundwater-dependent ecosystems in the South-West groundwater areas. Environmental Water Report 3, Department of Water, Perth.

Keighery, B., Keighery, G., Longman, V.M., and Clarke, K.A. (2012). Weed and native flora quadrat data compiled between 1990-1996 for the Swan Coastal Plain. Data compiled for DEP and Dept of CALM.

Lepschi, B. J. (1996). A taxonomic revision of *Macarthuria* (Molluginaceae) in Western Australia. Nuytsia V11(1), 37-54.

Lowry, D. C. (1974). 1:250,000 Geological Series – Explanatory Notes. Dongara-Hill River. Western Australia. Sheet SH/50-5, 9. Geological Survey of Western Australia. Australian Govt Publishing Service, Canberra.

Marchant, N. G., Wheeler, J. R., Rye, B. L., Bennett, E. M., Lander, N. S. and Macfarlane, T. D. (1987). *Flora of the Perth Region*. *Parts One and Two*. Western Australian Herbarium, Western Australia.

Mattiske Consulting (2017). Conservation Significant Flora Survey and Impact Assessment, Tronox Cooljarloo West Project. Prepared for Tronox Management PL.

McArthur, W. M. and Bettenay, E. (1960). The development and distribution of the soils of the Swan Coastal Plain, Western Australia. Soil Publication No. 16. CSIRO. Melbourne.

Meney, K. A. and Pate, J. S. (Eds) (1999). *Australian Rushes: biology, identification and conservation of Restionaceae and allied families.* University of Western Australia Press, Western Australia.

MWES Consulting. (2021). Atlas Mineral Sands Project. Groundwater Hydrology Report (Draft). Prepared for Image Resources PL.

National Agriculture Catchment Council (NACC). (2021). Website : https://www.nacc.com.au/threatenedspecies-of-the-week-sandplain-duck-orchid-paracaleana-dixonii/.

Paczkowska, G. and Chapman, A. R. (2000). *The Western Australian Flora. A Descriptive Catalogue*. Western Australian Herbarium (DEC). 652p..

PATN (2013). PATN Version 4.0. Lee Belbin, Blatant Fabrications PL.

Primer-e (Quest Research Ltd). (2021). Primer 7. Version 7.0.13. Auckland, New Zealand.

Rutherford, J. L., Roy, V. J. and Johnson, S.L. (2005). The Hydrology of Groundwater Dependent Ecosystems in the Northern Perth Basin. Hydrogeological Record Series HG11, Department of Environment.

Rye, B. L. (1997). Three new annual species of *Schoenus* (Cyperaceae) from the south-west of Western Australia. *Nuytsia*, 11(2), p263-268.

Rye, B. L. (2015). A revision of the south-western Australian genus *Babingtonia* (Myrtaceae: Chamelaucieae). *Nuytsia* 25: 219-250.

Semeniuk, C. A. and Semeniuk, V. (1995). A comprehensive classification of inland wetlands of Western Australia using the geomorphic-hydrologic approach. *J. of the Royal Soc of Western Australia*, 94: 449-464.

Shepherd, D. P., Beeston, G. R. and Hopkins, A. J. M. (2002). Native Vegetation in Western Australia. Extent, Type and Status. Resource Management Technical Report 249. Department of Agriculture, Govt of Western Australia.

Sinclair Knight Merz (SKM). (2011). Australian groundwater-dependent ecosystems toolbox part 1: assessment framework. Waterlines Report Series No 69. National Water Commission, Australian Government.

Syrinx Environmental. (2013). Cooljarloo West. Wetlands, Watercourses & Groundwater Dependent Ecosystems Investigation. Technical Report prepared for Tronox PL.

Thackway, R. & Cresswell I. D. (1995). An Interim Biogeographical Regionalisation for Australia: a Framework for Setting Priorities in the National Reserves System Cooperative Program. Australian Nature Conservation Agency, Canberra, ACT.

Thomas, F. M. (2014) Ecology of Phreatophytes, *In* Luttge *et al*. (Eds). *Progress in Botany* 75, p335.

Weeds Australia. (2021). Centre for Invasive Species Solutions website. https://weeds.org.au/.

Wege, J., Loneragan, W. A. and Bell, D. T. (1993). Assessment of the botanical data collected for the Tiwest joint venture - Cooljarloo, Western Australia. UWA.

Western Australian Herbarium. (2021). FloraBase—the Western Australian Flora. Department of Biodiversity, Conservation and Attractions. https://florabase.dpaw.wa.gov.au/.

Western Botanical. (2014). *Paracaleana dixonii* Targeted Regional Surveys, December 2013. Report prepared for Tronox Management PL.

Wheeler, J. R., Marchant, N. G. and Lewington, M. (2002). *Flora of the South West*. *Volumes 1 and 2*. UWA Press, Western Australia.

Wilson, K. L. (1997). New species of Cyperaceae in Western Australia. *Nuytsia* 11(2), p270.

Woodman Environmental Consulting PL. (2014). Cooljarloo West Titanium Mineral Sands Mine. Flora and Vegetation Assessment. Report prepared for Tronox Management PL.

9.0 APPENDICES

APPENDIX ONE. Results of the Atlas EPBC Act Protected Matters Search

Australian Government

Department of Agriculture, Water and the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

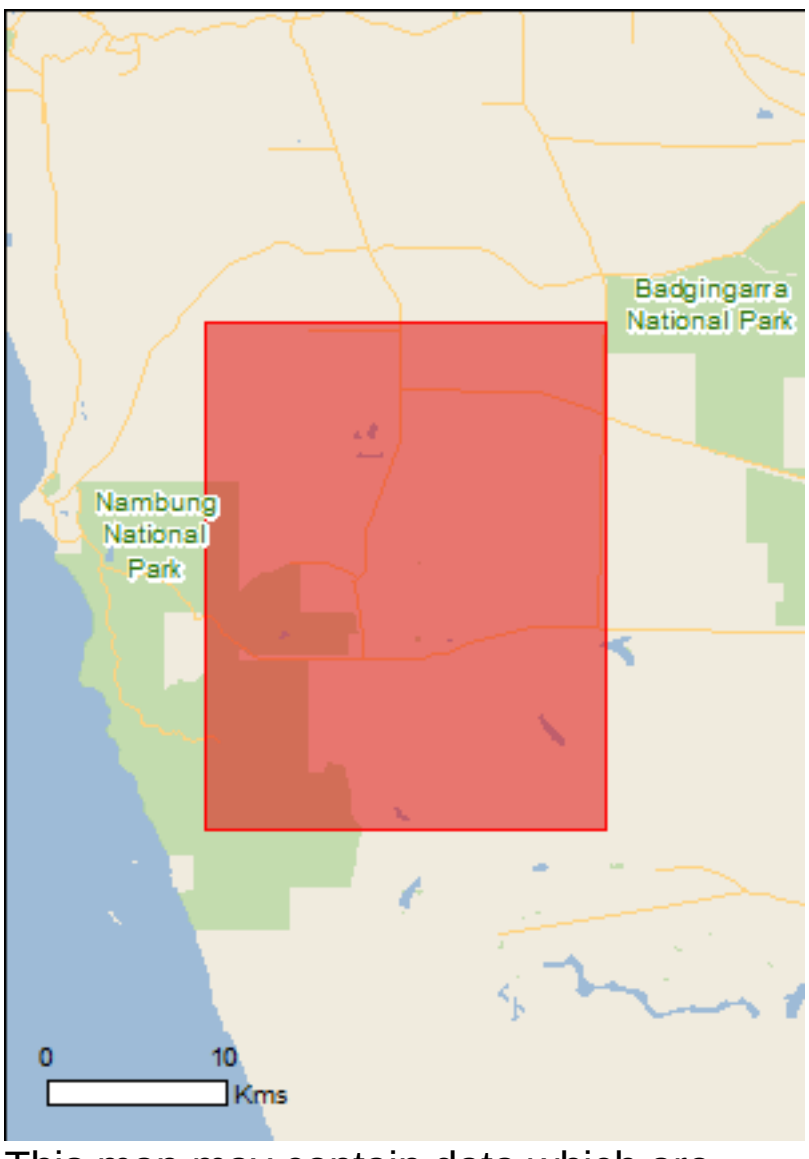
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 31/10/21 18:19:24

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

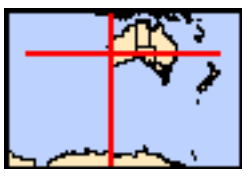
Caveat
Acknowledgements



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2015

Coordinates

Buffer: 0.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	24
Listed Migratory Species:	11

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	16
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	3
Regional Forest Agreements:	None
Invasive Species:	18
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community likely to occur within area
Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain ecological community	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calyptorhynchus latirostris Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat known to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Species or species habitat known to occur within area
Mammals		
Bettongia penicillata ogilbyi Woylie [66844]	Endangered	Species or species habitat known to occur within area
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area
Parantechinus apicalis Dibbler [313]	Endangered	Species or species habitat may occur within

Name	Status	Type of Presence
		area
Plants		
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat known to occur within area
Anigozanthos viridis subsp. terraspectans Dwarf Green Kangaroo Paw [3435]	Vulnerable	Species or species habitat known to occur within area
Banksia catoglypta [85021]	Vulnerable	Species or species habitat may occur within area
Drakaea elastica Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat may occur within area
Eucalyptus impensa Eneabba Mallee [56711]	Endangered	Species or species habitat likely to occur within area
Eucalyptus leprophloia Scaly Butt Mallee, Scaly-butt Mallee [56712]	Endangered	Species or species habitat likely to occur within area
Eucalyptus x balanites Cadda Road Mallee, Cadda Mallee [87816]	Endangered	Species or species habitat likely to occur within area
Grevillea batrachioides Mt Lesueur Grevillea [21735]	Endangered	Species or species habitat likely to occur within area
Hakea megalosperma Lesueur Hakea [10505]	Vulnerable	Species or species habitat likely to occur within area
Hemiandra gardneri Red Snakebush [7945]	Endangered	Species or species habitat likely to occur within area
Macarthuria keigheryi Keighery's Macarthuria [64930]	Endangered	Species or species habitat likely to occur within area
Paracaleana dixonii Sandplain Duck Orchid [86882]	Endangered	Species or species habitat may occur within area
Patersonia spirifolia Spiral-leaved Patersonia [83927]	Endangered	Species or species habitat likely to occur within area
Thelymitra stellata Star Sun-orchid [7060]	Endangered	Species or species habitat may occur within area

Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		

Name	Threatened	Type of Presence
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
Calidris canutus		
Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus		
Osprey [952]		Species or species habitat likely to occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat known to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Species or species habitat likely to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Nambung	WA
Southern Beekeepers	WA
Wongonderrah	WA

Invasive Species

[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Mammals		
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Brachiaria mutica Para Grass [5879]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within

Name	Status	Type of Presence
		area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-30.425 115.15,-30.425 115.35,-30.64222 115.35,-30.64222 115.15,-30.425 115.15

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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APPENDIX TWO. Threatened Flora (*Biodiversity Conservation Act 2016*) and DBCA Priority Flora Categories (DBCA website, 2021)

Threatened Flora

Critically Endangered species (CR)

Threatened species considered to be "facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines".

Endangered species (EN)

Threatened species considered to be"facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines".

Vulnerable species (VU)

Threatened species considered to be"facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines".

Priority Flora

Priority One - Poorly Known Species.

Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes.

Priority Two - Poorly Known Species.

Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes.

Priority Three – Poorly Known Species.

Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population

size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes

Priority Four – Rare, Near Threatened and other species in need of monitoring .

(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands.

(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent.

(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

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APPENDIX THREE. NVIS Vegetation Structure Classes
(from ESCAVI, (2003). Australian Vegetation Attribute Manual: National Vegetation Information System, Version 6.0. Department of the Environment and Heritage, Canberra.)

Reproduction of 'Table 4: NVIS Structural Formation Terminology' (ESCAVI, 2003)								
	Cover Characteristics							
	Foliage cover	70-100	30-70	10-30	<10	» 0-5	~0	unknown
Growth Form	**Height Ranges (m)**	**Structural Formation Classes**						
tree, palm	Tall; Mid;Low >30; 10-30; <10	closed forest	open forest	woodland	open woodland	isolated trees	isolated clumps of trees	trees
tree mallee		closed mallee forest	open mallee forest	mallee woodland	open mallee woodland	isolated mallee trees	isolated clumps of mallee trees	mallee trees
shrub, cycad,grass-tree, tree-fern	Tall; Mid;Low	closed shrubland	shrubland	open shrubland	sparse shrubland	isolated shrubs	isolated clumps of shrubs	shrubs
mallee shrub	Tall; Mid;Low	closed mallee shrubland	mallee shrubland	open mallee shrubland	sparse mallee shrubland	isolated mallee shrubs	isolated clumps of mallee shrubs	mallee shrubs
heath shrub	Tall; Mid;Low	closed heathland	heathland	open heathland	sparse heathland	isolated heath shrubs	isolated clumps of heath shrubs	heath shrubs
chenopod shrub	Tall; Mid;Low	closed chenopod shrubland	chenopod shrubland	open chenopod shrubland	sparse chenopod shrubland	isolated chenopod shrubs	isolated clumps of chenopod shrubs	chenopod shrubs
samphire shrub	Mid;Low	closed samphire shrubland	samphire shrubland	open samphire shrubland	sparse samphire shrubland	isolated samphire shrubs	isolated clumps of samphire shrubs	samphire shrubs
hummock grass	Mid;Low	closed hummock grassland	hummock grassland	open hummock grassland	sparse hummock grassland	isolated hummock grasses	isolated clumps of hummock grasses	hummock grasses

tussock grass	Mid;Low	closed tussock grassland	tussock grassland	open tussock grassland	sparse tussock grassland	isolated tussock grasses	isolated clumps of tussock grasses	tussock grasses
other grass	Mid;Low	closed grassland	grassland	open grassland	sparse grassland	isolated grasses	isolated clumps of grasses	other grasses
sedge	Mid;Low	closed sedgeland	sedgeland	open sedgeland	sparse sedgeland	isolated sedges	isolated clumps of sedges	sedges
rush	Mid;Low	closed rushland	rushland	open rushland	sparse rushland	isolated rushes	isolated clumps of rushes	rushes
forb	Mid;Low	closed forbland	forbland	open forbland	sparse forbland	isolated forbs	isolated clumps of forbs	forbs
fern	Mid;Low	closed fernland	fernland	open fernland	sparse fernland	isolated ferns	isolated clumps of ferns	ferns
vine		closed vineland	vineland	open vineland	sparse vineland	isolated vines	isolated clumps of vines	vines

Reproduction of Table 3: Height classes defined for the NVIS. The word in the body of the table is used to "qualify" the structural formation (ESCAVI, 2003)**.**

Height		Growth Form				
Height Class	**Height Range (m)**	**tree, vine (M & U), palm (single-stemmed)**	**shrub, heath shrub, chenopod shrub, ferns,samphire shrub, cycad, tree-fern,grass-tree, palm (multi-stemmed)**	**tree mallee, mallee shrub**	**tussock grass, hummock grass, other grass, sedge, rush, forbs, vine (G)**	**bryophyte, lichen, seagrass, aquatic**
8	**>30**	tall	NA	NA	NA	NA
7	**10-30**	mid	NA	tall	NA	NA
6		low	NA	mid	NA	NA
5		NA	NA	low	NA	NA
4	**>2**	NA	tall	NA	tall	NA
3	**1-2**	NA	mid	NA	tall	NA
2	**0.5-1**	NA	low	NA	mid	tall
1		NA	low	NA	low	low

Source: (Based on Walker & Hopkins 1990).

APPENDIX FOUR. Vegetation condition scale and descriptions: South-West and Interzone (EPA, 2016)

Pristine : Pristine or nearly so, no obvious signs of disturbance or damage caused by human activities since European settlement.

Excellent : Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks.

Very Good : Vegetation structure altered, obvious signs of disturbance. Disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.

Good : Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. Disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds, partial clearing, dieback and grazing.

Degraded : Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback and grazing.

Completely Degraded : The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees and shrubs.

APPENDIX FIVE. Species List for the 2019/2021 Atlas Survey Area

Notes:
1. Plant families are listed in alphabetical order within the main classification groups.
2. An asterisk (*) beside the taxon name indicates an introduced species exotic to Western Australia (weed).
3. The 'status' column shows the conservation status of significant flora species on the list.
T = Threatened flora; P1 to P4 = Priority 1 to Priority 4 (see definitions in Appendix 2); RS = other regionally significant flora.
4. Survey: Atlas survey area
2011: Atlas single phase survey (360 Environmental, 2012).
MESA 2019/21: Atlas MESA survey area - Spring 2019; Spring 2020; Autumn 2021; Spring 2021 (MESA farmland)
EISA 2021: Atlas EISA survey area (Infrastructure corridors) - Spring 2021

FAMILY/TAXA	COMMON NAMES	CONS STATUS	SURVEY 2011	2019/21 MESA	2021 EISA
GYMNOSPERMAE					
Class CYCADOPSIDA (Cycads)					
ZAMIACEAE					
Macrozamia fraseri			X	X	X
Class PINOPSIDA (conifers)					
CUPRESSACEAE					
Callitris pyramidalis			X	X	X
PINACEAE					
*Pinus pinaster					X
ANGIOSPERMAE (flowering plants)					
AIZOACEAE					
*Carpobrotus edulis			X	X	
Carpobrotus virescens			X	X	X
AMARANTHACEAE					
Ptilotus humilis subsp. humilis			X	X	
Ptilotus manglesii			X	X	
Ptilotus polystachyus			X	X	X
Ptilotus stirlingii subsp. stirlingii				X	
ANARTHRIACEAE					
Anarthria laevis			X	X	X
Lyginia barbata			X	X	X
Lyginia imberbis			X	X	X
APIACEAE					
Actinotus leucocephalus			X	X	
Apium prostratum subsp. prostratum var. filiforme			X	X	X

FAMILY/TAXA	COMMON NAMES	CONS STATUS	SURVEY 2011	2019/21 MESA	2021 EISA
APIACEAE (cont)					
Centella asiatica					X
Daucus glochidiatus			X	X	X
Eryngium pinnatifidum subsp. pinnatifidum ms			X	X	
Eryngium pinnatifidum subsp. Palustre (G. J. Keighery 13459)		**P3**	X	X	X
Platysace xerophila			X	X	
Xanthosia huegelii			X	X	X
ARALIACEAE					
Hydrocotyle alata			X	X	
Hydrocotyle diantha				X	X
Trachymene coerulea subsp. coerulea			X	X	
Trachymene pilosa			X	X	X
ASPARAGACEAE					
Acanthocarpus canaliculatus					X
Laxmannia ramosa subsp. ramosa			X	X	X
Lomandra caespitosa			X	X	X
Lomandra hermaphrodita			X	X	X
Lomandra micrantha subsp. micrantha				X	X
Lomandra preissii			X	X	X
Lomandra suaveolens				X	X
Thysanotus arbuscula				X	
Thysanotus arenarius				X	X
Thysanotus asper			X		
Thysanotus glaucus		**P4**		X	
Thysanotus manglesianus			X	X	X
Thysanotus multiflorus			X		
Thysanotus patersonii					X
Thysanotus sparteus			X	X	X
Thysanotus tenellus				X	
Thysanotus teretifolius				X	X
Thysanotus thyrsoideus			X	X	X
Thysanotus triandrus					X
ASPHODELACEAE					
*Asphodelus fistulosus	(onion weed)		X		
Bulbine semibarbata				X	
ASTERACEAE					
Angianthus micropodioides		**P3**	X	X	X
Angianthus preissianus			X	X	X
*Arctotheca calendula	(Cape Weed)		X	X	X
Asteridea pulverulenta			X	X	X
Brachyscome bellidioides			X	X	X
Brachyscome iberidifolia			X	X	X

FAMILY/TAXA	COMMON NAMES	CONS STATUS	SURVEY 2011	2019/21 MESA	2021 EISA
ASTERACEAE (cont)					
*Cotula coronopifolia			X	X	X
Cotula cotuloides			X	X	X
Euchiton sphaericus			X	X	
Gnephosis drummondii			X	X	
*Hypochaeris glabra			X	X	X
*Hypochaeris radicata				X	
Lagenophora huegelii			X	X	X
*Leontodon rhagadioloides	(Cretan Weed)				X
Millotia myosotidifolia				X	X
Millotia tenuifolia var. tenuifolia				X	X
Olearia axillaris			X	X	X
Olearia rudis			X	X	X
Podolepis gracilis			X	X	X
Podolepis sp.				X	
Podotheca angustifolia			X	X	
Podotheca chrysantha			X	X	
Podotheca gnaphalioides			X	X	X
Pogonolepis stricta			X	X	
Pterochaeta paniculata			X	X	X
Quinetia urvillei			X	X	
Rhodanthe citrina					X
Senecio glossanthus				X	
Senecio pinnatifolius var. latilobus			X	X	X
Siemssenia capillaris	(formerly Podolepis capillaris)		X	X	
Siloxerus filifolius				X	
Siloxerus humifusus			X	X	
*Sonchus asper			X		
*Sonchus oleraceus			X	X	X
*Urospermum picroides				X	X
*Ursinia anthemoides subsp. anthemoides			X	X	X
*Vellereophyton dealbatum	(White cudweed)		X	X	
Waitzia suaveolens var. suaveolens			X		X
BRASSICACEAE					
*Brassica tournefortii	(Wild turnip)		X	X	
*Heliophila pusilla			X	X	X
Stenopetalum pedicellare					X
Stenopetalum robustum			X		
BYBLIDACEAE					
Byblis lamellata			X		
CAMPANULACEAE					
Isotoma hypocrateriformis			X	X	
Isotoma scapigera			X	X	
Lobelia anceps					X

FAMILY/TAXA	COMMON NAMES	CONS STATUS	SURVEY 2011	2019/21 MESA	2021 EISA
CAMPANULACEAE (cont)					
Lobelia heterophylla			X		
* Monopsis debilis var. depressa			X	X	X
* Wahlenbergia capensis			X	X	X
Wahlenbergia gracilenta				X	
Wahlenbergia preissii			X	X	
CARYOPHYLLACEAE					
* Cerastium glomeratum			X	X	X
* Petrorhagia dubia				X	X
* Polycarpon tetraphyllum			X	X	
* Sagina apetala	(Annual Pearlwort)			X	
* Silene gallica				X	X
Spergularia brevifolia				X	X
* Stellaria media	(Chick weed)			X	
CASUARINACEAE					
Allocasuarina humilis			X	X	X
Allocasuarina lehmanniana subsp. lehmanniana			X	X	X
Allocasuarina microstachya					X
Casuarina obesa					X
CELASTRACEAE					
Stackhousia monogyna			X	X	
Tripterococcus brunonis			X	X	X
CENTROLEPIDACEAE					
Aphelia cyperoides			X	X	X
Aphelia nutans				X	
Centrolepis aristata			X	X	X
Centrolepis drummondiana			X	X	X
Centrolepis humillima				X	
Centrolepis mutica			X		
Centrolepis polygyna			X	X	X
CHENOPODIACEAE					
* Atriplex prostrata				X	X
Dysphania plantaginella			X		
Dysphania pumilio				X	
Rhagodia baccata subsp. baccata			X	X	
Salicornia blackiana				X	X
Tecticornia halocnemoides			X	X	
Tecticornia indica subsp. bidens			X	X	X
Tecticornia moniliformis			X	X	
Tecticornia syncarpa			X	X	

FAMILY/TAXA	COMMON NAMES	CONS STATUS	SURVEY 2011	2019/21 MESA	2021 EISA
COLCHICACEAE					
Burchardia bairdiae			X	X	X
Burchardia congesta			X	X	X
Burchardia multiflora				X	X
Wurmbea dioica subsp. alba			X	X	
CONVONVULACEAE					
Wilsonia humilis			X	X	
CRASSULACEAE					
Crassula closiana				X	X
Crassula colorata var. acuminata			X	X	X
Crassula colorata var. colorata			X	X	X
Crassula decumbens var. decumbens			X	X	X
* Crassula glomerata			X	X	X
* Crassula natans var. minor			X	X	X
CYPERACEAE					
Ammothryon grandiflorum	(formerly Schoenus grandiflorus)		X		X
Bolboschoenus caldwellii			X	X	
Caustis dioica			X	X	X
Chaetospora curvifolia	(formerly Schoenus curvifolius)		X	X	X
Chorizandra enodis					X
Cyathochaeta equitans				X	
Cyperaceae sp. 2				X	
Cyperus gymnocaulos			X	X	X
* Cyperus tenellus			X	X	X
Ficinia nodosa				X	X
Gahnia trifida			X	X	X
Isolepis cernua var. cernua					X
Isolepis cernua var. setiformis			X	X	X
Isolepis marginata			X	X	X
Lepidosperma calcicola			X	X	X
Lepidosperma longitudinale			X	X	X
Machaerina juncea	(formerly Baumea juncea)		X	X	X
Mesomelaena graciliceps				X	
Mesomelaena pseudostygia			X	X	X
Mesomelaena tetragona					X
Schoenus andrewsii				X	X
Schoenus badius		**P2**	X		
Schoenus brevisetis			X	X	
Schoenus caespititius				X	
Schoenus clandestinus			X	X	X
Schoenus elegans					X
Schoenus griffinianus		**P4**		X	X
Schoenus laevigatus				X	X
Schoenus nitens					X

FAMILY/TAXA	COMMON NAMES	CONS STATUS	SURVEY 2011	2019/21 MESA	2021 EISA
CYPERACEAE (cont)					
Schoenus pennisetis		**P3**		X	
Schoenus pleiostemoneus			X	X	X
Schoenus plumosus			X	X	X
Schoenus rigens				X	X
Schoenus sculptus				X	
Schoenus sp.				X	
Schoenus subfascicularis			X	X	X
Schoenus unispiculatus					X
Tricostularia neesii			X	X	X
DASYPOGONACEAE					
Calectasia narragara				X	X
Calectasia palustris		**P2**			X
Dasypogon obliquifolius			X	X	X
Kingia australis			X	X	X
DILLENIACEAE					
Hibbertia aurea			X	X	X
Hibbertia huegelii				X	X
Hibbertia hypericoides			X	X	X
Hibbertia racemosa				X	X
Hibbertia sericosepala	(formerly H. sp. Gnangara (J.R. Wheeler 2329))		X	X	X
Hibbertia stellaris			X	X	
Hibbertia subvaginata			X	X	X
DROSERACEAE					
Drosera closterostigma			X	X	X
Drosera drummondii	(formerly D. menziesii subsp. penicillaris)		X	X	X
Drosera gigantea			X	X	
Drosera glanduligera				X	X
Drosera heterophylla				X	
Drosera humilis			X	X	X
Drosera magna	(formerly D. erythrhorrhiza subsp. magna)		X	X	X
Drosera menziesii	(formerly D. menziesii subsp. menziesii)			X	X
Drosera minutiflora				X	X
Drosera pallida				X	X
Drosera porrecta					X
Drosera ramellosa				X	X
Drosera thysanosepala	(formerly D. menziesii subsp. thysanosepala)		X	X	X
ERICACEAE					
Andersonia heterophylla			X	X	X
Andersonia lehmanniana subsp. lehmanniana				X	
Conostephium pendulum			X	X	X
Leucopogon sp. Coujinup (M.A. Burgman 1085)			X	X	X
Leucopogon sp. Yanchep (M. Hislop 1986)		**P3**		X	

FAMILY/TAXA	COMMON NAMES	CONS STATUS	SURVEY 2011	2019/21 MESA	2021 EISA
ERICACEAE(cont)					
Leucopogon sprengelioides			X	X	X
Leucopogon stenophyllus	(formerly L. sp. Lesueur (B. Evans 530))		X	X	
Lysinema pentapetalum			X	X	X
Styphelia conostephioides	(formerly Leucopogon conostephioides)		X	X	X
Styphelia planifolia	(formerly Leucopogon planifolius)		X	X	X
Styphelia propinqua	(formerly Leucopogon propinquus)		X	X	X
Styphelia tortifolia	(formerly Astroloma glaucescens)		X	X	
Styphelia xerophylla	(formerly Astroloma xerophyllum)			X	X
EUPHORBIACEAE					
Adriana quadripartita					X
*Euphorbia terracina					X
Ricinocarpos undulatus					X
FABACEAE					
Acacia cyclops			X	X	X
Acacia dilatata				X	
Acacia lasiocarpa var. lasiocarpa			X	X	X
Acacia pulchella var. glaberrima			X	X	X
Acacia rostellifera				X	X
Acacia saligna			X	X	X
Acacia sessilis			X	X	X
Acacia spathulifolia			X	X	X
Acacia stenoptera			X	X	X
Bossiaea eriocarpa			X	X	X
* Chamaecytisus palmensis	(Tagasaste)				X
Daviesia angulata					X
Daviesia decurrens subsp. decurrens			X	X	X
Daviesia divaricata subsp. divaricata			X	X	X
Daviesia incrassata subsp. incrassata			X	X	X
Daviesia nudiflora subsp. nudiflora					X
Daviesia physodes					X
Daviesia podophylla				X	X
Daviesia triflora					X
Gompholobium knightianum					X
Gompholobium tomentosum			X	X	X
Isotropis cuneifolia subsp. cuneifolia				X	X
Jacksonia carduacea		**P3**		X	X
Jacksonia floribunda			X	X	X
Jacksonia furcellata					X
Jacksonia hakeoides			X	X	X
Jacksonia nutans			X	X	X
Jacksonia sp.				X	
Jacksonia sternbergiana			X	X	X
* Lotus subbiflorus			X	X	X

FAMILY/TAXA	COMMON NAMES	CONS STATUS	SURVEY 2011	2019/21 MESA	2021 EISA
FABACEAE (cont)					
* Lupinus cosentinii				X	X
* Ornithopus compressus				X	
* Ornithopus pinnatus			X	X	
* Ornithopus sativus					X
* Trifolium arvense var. arvense			X	X	
* Trifolium campestre var. campestre				X	X
* Trifolium cernuum				X	
* Trifolium hirtum					X
* Trifolium hybridum var. hybridum				X	
Viminaria juncea			X	X	X
FRANKENIACEAE					
Frankenia pauciflora var. pauciflora			X	X	X
GENTIANACEAE					
* Centaurium tenuiflorum			X	X	
GERANIACEAE					
* Erodium botrys				X	X
* Erodium cicutarium			X	X	
Erodium cygnorum				X	
Geranium solanderi			X	X	
Pelargonium littorale subsp. littorale			X	X	X
GOODENIACEAE					
Dampiera coronata				X	X
Dampiera linearis			X	X	X
Goodenia coerulea			X	X	
Goodenia micrantha				X	
Goodenia pulchella subsp. Coastal Plain A (M. Hislop 634)			X	X	
Goodenia pulchella subsp. Coastal Plain B (L.W. Sage 2336)			X		
Goodenia trinervis	(formerly Velleia trinervis)		X	X	X
Lechenaultia floribunda			X	X	X
Lechenaultia linearioides					X
Lechenaultia stenosepala			X	X	
Scaevola canescens					X
Scaevola phlebopetala			X	X	X
Scaevola repens var. repens					X
Scaevola thesioides subsp. thesioides					X
GYROSTEMONACEAE					
Gyrostemon ramulosus				X	
Gyrostemon subnudus			X	X	X

FAMILY/TAXA	COMMON NAMES	CONS STATUS	SURVEY 2011	2019/21 MESA	2021 EISA
HAEMODORACEAE					
Anigozanthos humilis subsp. chrysanthus		**P4**		X	X
Anigozanthos humilis subsp. humilis	Cat's Paw		X	X	X
Anigozanthos pulcherrimus	Yellow Kangaroo Paw		X	X	X
Anigozanthos viridis subsp. Cataby (S.D. Hopper 1786)					X
Blancoa canescens			X	X	X
Conostylis aculeata subsp. breviflora			X	X	
Conostylis aurea			X	X	X
Conostylis candicans subsp. candicans			X	X	X
Conostylis festucacea subsp. festucacea			X	X	X
Conostylis juncea			X	X	X
Conostylis pauciflora subsp. euryrhipis		**P4**		X	
Conostylis setigera subsp. setigera					X
Conostylis teretifolia subsp. teretifolia			X	X	X
Haemodorum spicatum			X	X	X
Haemodorum venosum					X
Macropidia fuliginosa	Black Kangaroo Paw				X
Phlebocarya ciliata			X	X	X
Phlebocarya filifolia			X	X	X
Tribonanthes monantha				X	
Tribonanthes variabilis				X	X
Tribonanthes violacea					X
HEMEROCALLIDACEAE					
Arnocrinum preissii			X	X	X
Corynotheca micrantha var. micrantha			X	X	X
Dianella revoluta var. divaricata				X	X
Hensmania stoniella		**P3**	X	X	X
Johnsonia pubescens subsp. pubescens					X
Tricoryne elatior			X		
Tricoryne sp. Eneabba (E.A. Griffin 1200)				X	X
IRIDACEAE					
* Gladiolus caryophyllaceus				X	X
* Moraea flaccida	One-leaf Cape Tulip				X
Patersonia occidentalis var. occidentalis			X	X	X
* Romulea rosea				X	X
JUNCACEAE					
* Juncus acutus subp. acutus				X	X
* Juncus bufonius			X	X	X
* Juncus capitatus			X	X	X
Juncus kraussii subsp. australiensis				X	
Juncus pallidus					X

FAMILY/TAXA	COMMON NAMES	CONS STATUS	SURVEY 2011	2019/21 MESA	2021 EISA
JUNCAGINACEAE					
Cycnogeton lineare				X	X
Triglochin calcitrapa				X	
Triglochin centrocarpa			X	X	
Triglochin minutissima			X	X	X
Triglochin mucronata			X	X	X
Triglochin nana			X	X	X
Triglochin sp. A Flora of Australia (G.J. Keighery 2477)			X	X	X
LAMIACEAE					
Hemiandra glabra					X
Hemiandra linearis			X		
Hemiandra pungens					X
Hemiphora bartlingii			X	X	
Hemiphora uncinata				X	
LAURACEAE					
Cassytha flava			X	X	
Cassytha glabella				X	X
Cassytha racemosa forma racemosa			X	X	X
LENTIBULARIACEAE					
Utricularia multifida			X	X	X
Utricularia tenella			X		
LOGANIACEAE					
Phyllangium divergens			X	X	X
LORANTHACEAE					
Nuytsia floribunda			X	X	X
LYTHRACEAE					
* Lythrum hyssopifolia			X	X	X
MALVACEAE					
Lawrencia squamata			X	X	X
MENYANTHACEAE					
Liparophyllum capitatum			X	X	
MOLLUGINACEAE					
Macarthuria apetala			X	X	X
Macarthuria australis			X	X	

FAMILY/TAXA	COMMON NAMES	CONS STATUS	SURVEY 2011	2019/21 MESA	2021 EISA
MONTIACEAE (formerly Calandrinia spp. incl under PORTULACACEAE)					
Calandrinia corrigioloides			X	X	X
Calandrinia granulifera			X	X	X
Calandrinia liniflora			X	X	X
Calandrinia sp. Kenwick (G.J. Keighery 10905)			X	X	X
MYRTACEAE					
Babingtonia urbana	(formerly Baeckea sp. Perth Region)	**P3**		X	X
Beaufortia elegans					X
Beaufortia squarrosa				X	X
Calothamnus hirsutus				X	
Calothamnus quadrifidus subsp. quadrifidus			X	X	X
Calothamnus sanguineus				X	X
Calytrix aurea				X	X
Calytrix depressa			X	X	
Calytrix flavescens			X	X	
Calytrix aff. flavescens				X	X
Calytrix fraseri			X	X	
Calytrix leschenaultii			X	X	
Calytrix sapphirina			X	X	
Chamelaucium uncinatum					X
Darwinia pinifolia					X
Eremaea asterocarpa subsp. asterocarpa			X	X	X
Eremaea beaufortioides var. beaufortioides			X	X	
Eremaea pauciflora var. lonchophylla			X	X	X
Eucalyptus decipiens					X
Eucalyptus rudis subsp. rudis	(Flooded Gum)		X	X	X
Eucalyptus todtiana	(Prickly Bark)		X	X	X
Hypocalymma angustifolium subsp. Swan Coastal Plain (G.J.				X	X
Hypocalymma xanthopetalum			X	X	X
Kunzea glabrescens				X	
*Leptospermum laevigatum					X
Leptospermum spinescens			X	X	X
Melaleuca acutifolia	(formerly M. lateriflora subsp. acutifolia)		X	X	X
Melaleuca brevifolia			X	X	X
Melaleuca clavifolia			X	X	X
Melaleuca concreta			X	X	X
Melaleuca cuticularis	(Saltwater paperbark)		X	X	
Melaleuca leuropoma			X		
Melaleuca preissiana	(Moonah)		X		X
Melaleuca rhaphiophylla	(Swamp paperbark)		X	X	X
Melaleuca seriata			X	X	X
Melaleuca systena			X	X	X
Melaleuca teretifolia			X	X	X
Melaleuca viminea subsp. viminea	(Mohan)		X	X	X
Pericalymma ellipticum					X
Pileanthus filifolius					X

FAMILY/TAXA	COMMON NAMES	CONS STATUS	SURVEY 2011	2019/21 MESA	2021 EISA
MYRTACEAE (cont)					
Regelia ciliata			X	X	X
Scholtzia involucrata				X	X
Scholtzia sp. Wongonderrah (M.E. & M.R. Trudgen MET 12000)				X	X
Scholtzia umbellifera			X	X	X
Verticordia blepharophylla				X	
Verticordia lindleyi x V. blepharophylla				X	
Verticordia densiflora var. densiflora			X	X	X
Verticordia pennigera					X
Verticordia plumosa var. brachyphylla			X	X	X
OLACACEAE					
?Olax benthamiana				X	
ONAGRACEAE					
Epilobium hirtigerum			X		
ORCHIDACEAE					
Caladenia discoidea				X	X
Caladenia flava subsp. flava	(Cowslip orchid)		X	X	X
Caladenia latifolia					X
Caladenia longicauda subsp. albella				X	X
Caladenia longicauda subsp. borealis			X	X	X
Caladenia nobilis			X		
Caladenia varians				X	
Diuris laxiflora				X	
Diuris sp. (D. corymbosa complex)				X	
Elythranthera brunonis	(Purple enamel orchid)			X	X
Eriochilus dilatatus subsp. multiflorus	(White Bunny orchid)		X	X	X
Leptoceras menziesii					X
Microtis alboviridis			X		
Microtis media subsp. media			X		X
Prasophyllum gracile			X	X	
Pterostylis dilatata				X	
Pterostylis orbiculata				X	X
Pterostylis aff. vittata			X		
Pyrorchis nigricans			X	X	X
Thelymitra benthamiana				X	
Thelymitra campanulata				X	X
Thelymitra crinita				X	
OROBANCHACEAE					
* Orobanche minor			X		
* Parentucellia latifolia			X	X	
PHILYDRACEAE					
Philydrella pygmaea subsp. pygmaea			X	X	

FAMILY/TAXA	COMMON NAMES	CONS STATUS	SURVEY 2011	2019/21 MESA	2021 EISA
PHYLLANTHACEAE					
Phyllanthus calycinus			X	X	
Poranthera ericoides				X	
Poranthera microphylla			X	X	
PITTOSPORACEAE					
Billardiera variifolia					X
PLANTAGINACEAE					
*Plantago coronopus subsp. commutata					X
POACEAE					
* Aira cupaniana			X	X	X
* Aira praecox				X	
Amphipogon turbinatus			X	X	X
Aristida sp.					X
Austrostipa compressa			X	X	X
Austrostipa elegantissima			X	X	X
Austrostipa flavescens				X	
Austrostipa macalpinei				X	X
* Avellinia michelii				X	X
* Briza maxima	(Blowfly grass)		X	X	X
* Briza minor			X	X	X
* Bromus diandrus	(Great Brome)		X	X	X
* Bromus hordeaceus			X	X	X
* Cynodon dactylon					X
* Ehrharta brevifolia var. cuspidate			X	X	
* Ehrharta calycina	(Perennial veldt grass)		X	X	X
* Ehrharta longiflora	(Annual veldt grass)		X	X	X
* Eragrostis curvula					X
Eragrostis dielsii				X	X
* Hainardia cylindrical				X	
* Holcus setiger				X	X
* Hordeum hystrix	(formerly H. geniculatum; Mediterranean barley grass)		X	X	X
Lachnagrostis filiformis				X	
* Lolium multiflorum	(Italian ryegrass)			X	
* Lolium perenne x rigidum	(Ryegrass)		X	X	X
* Lolium temulentum			X		
Microlaena stipoides var. stipoides			X	X	
Neurachne alopecuroidea			X	X	X
* Parapholis incurva				X	
* Pentameris airoides subsp. airoides				X	
* Polypogon monspeliensis			X	X	
* Poa annua				X	X
Poa drummondiana					X
*Polypogon monspeliensis					X

FAMILY/TAXA	COMMON NAMES	CONS STATUS	SURVEY 2011	2019/21 MESA	2021 EISA
POACEAE (cont)					
Polypogon tenellus				X	
Rytidosperma occidentale	(formerly Austrodanthonia occidentalis)			X	X
Sporobolus virginicus	(Marine couch)		X	X	X
* Vulpia bromoides			X	X	X
* Vulpia fasciculata				X	X
* Vulpia myuros forma myuros	(Silver grass)		X	X	X
POLYGALACEAE					
Comesperma calymega					X
Comesperma integerrimum			X	X	X
Comesperma virgatum				X	
Comesperma volubile			X		
POLYGONACEAE					
Muehlenbeckia adpressa					X
* Rumex crispus				X	X
PRIMULACEAE					
* Lysimachia arvensis	(formerly Anagallis arvensis)		X	X	X
Samolus junceus			X	X	X
Samolus repens var. paucifolius			X	X	X
PROTEACEAE					
Adenanthos cygnorum subsp. cygnorum			X	X	X
Banksia attenuata			X	X	X
Banksia dallanneyi subsp. dallanneyi var. dallanneyi	(formerly Dryandra lindleyana var. lindleyana)		X	X	X
Banksia ilicifolia			X	X	
Bankisa littoralis					X
Banksia menziesii			X	X	X
Banksia nivea subsp. nivea	(formerly Dryandra nivea subsp. nivea)		X	X	X
Banksia platycarpa	(formerly Dryandra platycarpa)		X	X	X
Banksia prionotes			X	X	X
Banksia telmatiaea	(Swamp Fox Banksia)		X	X	X
Conospermum crassinervium			X	X	X
Conospermum scaposum		**P3**	X	X	X
Conospermum stoechadis subsp. stoechadis			X	X	X
Conospermum triplinervium			X	X	X
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	(formerly G. thelemanniana subsp. Cooljarloo (B.J. Keighery 28 B))	**P1**	X	X	X
Hakea candolleana				X	X
Hakea costata			X	X	X
Hakea incrassata					X
Hakea obliqua subsp. parviflora			X	X	X
Hakea prostrata			X	X	X
Hakea psilorrhyncha					X

FAMILY/TAXA	COMMON NAMES	CONS STATUS	SURVEY 2011	2019/21 MESA	2021 EISA
PROTEACEAE (cont)					
Hakea ruscifolia			X	X	
Hakea trifurcata	(Two-leaf Hakea)		X	X	
Hakea varia	(Variable-leaved Hakea)		X	X	X
Isopogon linearis					X
Isopogon panduratus subsp. palustris	(formerly I. sp. Badgingarra)	**P3**	X	X	X
Persoonia comata			X	X	
Petrophile brevifolia					X
Petrophile drummondii			X	X	X
Petrophile linearis			X	X	X
Petrophile macrostachya			X	X	X
Petrophile megalostegia			X		
Petrophile rigida			X	X	X
Petrophile seminuda			X	X	X
Stirlingia latifolia			X	X	X
Stirlingia simplex			X	X	X
Synaphea spinulosa subsp. spinulosa					X
RANUNCULACEAE					
Clematis linearifolia			X	X	X
Ranunculus pumilio					X
* Ranunculus trilobus					X
RESTIONACEAE					
Alexgeorgea nitens			X	X	X
Alexgeorgea subterranean					X
Chaetanthus aristatus			X	X	X
Chordifex reseminans		**P2**		X	X
Chordifex sinuosus			X	X	X
Desmocladus asper				X	X
Desmocladus flexuosus					X
Desmocladus lateriflorus				X	X
Desmocladus nodatus		**P3**		X	X
Desmocladus virgatus				X	X
Hypolaena exsulca			X	X	X
Hypolaena pubescens				X	
Lepidobolus preissianus			X	X	X
Leptocarpus canus	(formerly Meeboldina cana)		X	X	
Leptocarpus coangustatus	(formerly Meeboldina coangustata)		X	X	X
Lepyrodia curvescens		**P2**		X	
RHAMNACEAE					
Cryptandra arbutiflora					X
Cryptandra scoparia					X
Spyridium globulosum				X	X

FAMILY/TAXA	COMMON NAMES	CONS STATUS	SURVEY 2011	2019/21 MESA	2021 EISA
RHAMNACEAE (cont)					
Stenanthemum notiale subsp. chamelum				X	
Stenanthemum pomaderroides					X
RUBIACEAE					
* Galium murale				X	X
Opercularia vaginata			X	X	X
RUPPIACEAE					
Ruppia polycarpa				X	
RUTACEAE					
Cyanothamnus ramosus subsp. anethifolius	(formerly Boronia ramosa subsp. anethifolia)		X	X	X
Philotheca spicata			X	X	X
SANTALACEAE					
Exocarpos sparteus			X	X	X
Leptomeria empetriformis				X	
Leptomeria pauciflora				X	X
SCROPHULARIACEAE					
* Dischisma arenarium			X	X	X
* Dischisma capitatum					X
Myoporum insulare			X	X	
* Zaluzianskya divaricata					X
SOLANACEAE					
Anthocercis ilicifolia subsp. ilicifolia					X
* Solanum aviculare				X	
Solanum symonii					X
STYLIDIACEAE					
Levenhookia preissii		**P1**	X	X	
Levenhookia stipitata			X	X	X
Stylidium aceratum		**P3**	X	X	
Stylidium adpressum				X	
Stylidium araeophyllum			X	X	X
Stylidium bicolor			X	X	X
Stylidium calcaratum				X	X
Stylidium crossocephalum			X	X	X
Stylidium cygnorum			X	X	X
Stylidium dichotomum			X	X	
Stylidium diuroides subsp. diuroides				X	X
Stylidium ecorne				X	
Stylidium hymenocraspedum		**P3**		X	

FAMILY/TAXA	COMMON NAMES	CONS STATUS	SURVEY 2011	2019/21 MESA	2021 EISA
STYLIDIACEAE (cont)					
Stylidium kalbarriense				X	X
Stylidium longitubum		**P4**	X	X	X
Stylidium mimeticum			X		
Stylidium obtusatum				X	X
Stylidium purpureum				X	X
Stylidium repens				X	X
Stylidium rigidulum			X	X	X
Stylidium schoenoides				X	
THYMELAEACEAE					
Pimelea imbricata var. piligera			X	X	
Pimelea sulphurea			X	X	X
TYPHACEAE					
Typha ?orientalis	(Bulrush)		X	X	X
VIOLACEAE					
Hybanthus calycinus			X	X	X
XANTHORRHOEACEAE					
Xanthorrhoea preissii	(Grass tree)		X	X	X

APPENDIX SIX. Records of flora of conservation significance in the Atlas survey area

I. MESA flora of conservation significance

TaxonName	Conservation Signif.	Easting	Northing	Site	Count	Survey Year
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332598	6618616		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332581	6618621		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332495	6618624		17	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332652	6619394		8	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332659	6619414		20	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332659	6619427		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332598	6619607		4	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332562	6619623		6	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332613	6619407		7	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332586	6619404		10	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332295	6619300		15	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332267	6619282		7	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332236	6619266		6	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332282	6619299		4	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332199	6619225		20	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332170	6619189		20	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332133	6619301		7	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332106	6619316		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332158	6619306		8	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332220	6619366		15	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332640	6619354		10	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332075	6619339		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331986	6619293		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331955	6619243		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331899	6619411		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331918	6619409		4	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331999	6619459		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331990	6619478		8	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331954	6619469		15	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331922	6619488		12	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331908	6619518		20	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331919	6619552		15	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331883	6619569		8	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331873	6619597		15	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331893	6619633		30	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331903	6619674		10	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331902	6619698		15	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331865	6619727		15	2019

Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331826	6619752		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331802	6619774		30	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331705	6619884		6	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331705	6619905		20	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331790	6620038		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331815	6620032		10	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331831	6620044		10	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331811	6619527		8	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331834	6619549		10	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331853	6619519		10	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331872	6619513		20	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331505	6619487		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331406	6619713		7	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331386	6619688		20	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331356	6619652		20	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331111	6619437		10	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331150	6619410		20	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331364	6619193		20	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331379	6619173		30	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331402	6619157		20	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331456	6619101		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331524	6619052		10	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332639	6620190		7	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332517	6620144		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332468	6620112		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332438	6620098		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332419	6619986		4	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332417	6619874		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332433	6619816		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332427	6619740		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332421	6619728		8	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332405	6619710		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332391	6619704		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332364	6619729		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332327	6619788		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332317	6619788		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332265	6619799		13	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332215	6619821		25	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332218	6619792		25	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332183	6619800		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332296	6619881		9	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332306	6619914		8	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332337	6619961		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332341	6619995		7	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332357	6620023		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332382	6620096		2	2019

Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332411	6620130		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332405	6620162		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332366	6620226		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332383	6620264		7	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332401	6620263		14	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332424	6620262		11	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332472	6620270		30	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332479	6620251		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332500	6620266		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331653	6620606		4	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331661	6620604		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331646	6620596		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331604	6620599		4	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331583	6620590		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331433	6620518		7	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331418	6620506		4	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331385	6620379		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331401	6620374		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331353	6620339		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331353	6620323		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332124	6620702		8	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332118	6620712		10	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332115	6620728		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332108	6620749		6	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332082	6620792		6	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332070	6620896		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332079	6620930		4	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332068	6620932		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332058	6620949		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332053	6620958		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331957	6620911		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331937	6620887		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332679	6618605		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332672	6618573		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332673	6618565		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332668	6618564		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332666	6618567		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332672	6618555		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332677	6618556		6	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332683	6618556		6	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332679	6618548		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332677	6618542		8	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332684	6618541		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332676	6618532		4	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332638	6618608		10	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332620	6618585		2	2019

Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332630	6618581		15	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332627	6618572		11	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332581	6618621		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332520	6618602		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332512	6618603		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332506	6618596		6	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332511	6618587		7	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332518	6618588		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332526	6618582		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332536	6618585		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332542	6618581		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332550	6618582		6	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332561	6618583		8	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332571	6618575		7	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332581	6618583		10	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332592	6618570		12	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332591	6618587		12	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332609	6618569		6	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332616	6618557		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332613	6618578		7	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332147	6618724		14	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332160	6618727		30	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332172	6618739		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332155	6618752		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332135	6618757		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332118	6618753		7	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332152	6618801		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332129	6618795		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332299	6618769		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332364	6618747		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332379	6618727		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332389	6618725		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332393	6618714		9	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332419	6618702		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332410	6618711		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332475	6618711		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332481	6618701		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332473	6618668		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332494	6618663		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332515	6618681		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332493	6618730		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332506	6618695		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332516	6618681		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332673	6619359		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332672	6619370		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332675	6619377		1	2019

Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332667	6619398		4	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332671	6619403		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332676	6619410		7	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332677	6619436		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332682	6619446		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332681	6619453		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332650	6619589		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332669	6619583		7	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332654	6619599		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332653	6619656		15	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332671	6619656		35	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332676	6619707		10	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332607	6619710		4	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332581	6619728		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332576	6619735		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332571	6619766		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332564	6619775		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332556	6619788		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332565	6619797		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332539	6619604		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332532	6619592		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332515	6619595		4	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332501	6619590		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332634	6619420		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332182	6619089		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332099	6619156		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332128	6619172		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332135	6619179		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332129	6619180		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332172	6619216		12	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332180	6619231		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332224	6619243		20	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332253	6619237		10	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332238	6619269		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332253	6619281		8	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332289	6619292		7	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332296	6619302		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332281	6619318		6	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332309	6619452		7	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332310	6619509		9	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332291	6619500		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332266	6619494		4	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332339	6619542		4	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332381	6619507		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332389	6619522		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332425	6619581		2	2019

Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332442	6619583		4	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332149	6619446		11	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332131	6619461		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332025	6619460		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332065	6619443		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332092	6619423		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332111	6619430		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331744	6619824		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331742	6619839		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331746	6619853		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331737	6619869		6	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331738	6619892		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331732	6619909		8	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331732	6619926		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331746	6619951		10	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331762	6619944		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331779	6619949		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331782	6619960		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331819	6619966		12	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331834	6619966		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331849	6619976		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331855	6619986		10	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331864	6620003		6	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331869	6620029		6	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331863	6620042		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331779	6619990		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331763	6619981		10	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331729	6619941		4	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331721	6619928		4	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331696	6619864		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331809	6619508		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331835	6619509		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331670	6619229		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331782	6619231		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331869	6619098		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331884	6619100		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331783	6619025		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331776	6619006		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331763	6619002		10	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331758	6618992		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331746	6618974		10	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331730	6618960		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331716	6618993		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331714	6619008		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331699	6619012		20	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331682	6619008		10	2019

Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331675	6618989		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331656	6619009		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331674	6619038		11	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331659	6619062		6	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331529	6619083		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331539	6619065		8	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331559	6619054		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331586	6619036		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331596	6619007		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331649	6619010		7	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331884	6620684		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331814	6620700		8	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332554	6620057		7	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332488	6620086		6	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332475	6620005		15	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332485	6619982		12	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332502	6619879		6	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332536	6619805		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332547	6619791		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332521	6619823		8	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332496	6619854		17	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332470	6619854		10	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332432	6619859		4	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332441	6619824		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332464	6619731		6	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332433	6619704		4	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332326	6619631		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332291	6619659		10	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332311	6619643		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332265	6619687		8	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332224	6619723		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332184	6619787		4	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332194	6619826		7	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332189	6619854		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332184	6619904		11	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332156	6619937		10	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332122	6619940		20	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332089	6619945		20	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332111	6619989		10	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332116	6620015		20	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332175	6620146		4	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332183	6620078		8	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332186	6620021		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332217	6620019		6	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332214	6620124		6	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332282	6620183		1	2019

Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332410	6620233		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332562	6620233		8	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332580	6620207		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332602	6620232		6	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331785	6620650		7	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331497	6620516		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331288	6620568		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331351	6620366		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331353	6620339		4	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331242	6620251		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331233	6620280		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331408	6620041		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331271	6619990		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331258	6619997		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331175	6619969		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331242	6619890		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331193	6619848		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331206	6619827		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331220	6619812		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331286	6619763		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331321	6619812		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331487	6620042		4	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331575	6620047		4	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331507	6620092		8	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331507	6620111		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331462	6620159		10	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331453	6620172		8	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331491	6620289		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331519	6620292		4	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331541	6620306		6	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331559	6620340		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331545	6620348		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331570	6620398		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331654	6620417		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331472	6620003		9	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331523	6620277		5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331890	6620824		1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331885	6620807		3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332681	6618605		2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332652	6618571		7	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332654	6618559		15	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332654	6618542		20	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332673	6618604			2011
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332059	6619957			2011
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332250	6619238	CQ16		2011
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331837	6619542	CQ26		2011

Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332145	6618790	CBR11		2011
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331392	6619196	CBR13		2011
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331325	6620026	CBR15		2011
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332587	6620218	CBR16		2011
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332566	6618630	CBM5		2011
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332633	6619368	CBM6		2011
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332045	6620031	CBM7		2011
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331888	6620445		4	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331616	6620279		11	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331620	6620234		5	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331910	6620060		15	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331934	6620113		5	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332077	6620197		10	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331852	6620253		3	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331845	6620278		10	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331858	6620287		15	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331982	6620805		8	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332182	6620221		20	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332056	6620128		1	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332260	6620010		6	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331963	6619111		10	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331213	6619629		3	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331126	6619656		3	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332480	6619870		7	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332431	6619932		3	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332361	6619925		3	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332357	6619922		3	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331650	6619018	CNQ04	11% cover	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331893	6619575	CNQ21	3	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331957	6619165	CNQ05	0.5% cover	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332645	6619355	CNQ17	11	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331650	6620051	CNR03		2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332090	6619974	CNR05		2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331717	6619928	MBN01		2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331375	6620276	MBN03		2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331982	6620805	MBN04		2020
Levenhookia preissii	Priority 1	332207	6618034		na	2011
Levenhookia preissii	Priority 1	332476	6618797		1	2011
Levenhookia preissii	Priority 1	332033	6618817		1	2011
Levenhookia preissii	Priority 1	332060	6618809		16	2011
Levenhookia preissii	Priority 1	331651	6618897		10	2011
Levenhookia preissii	Priority 1	331965	6619244	CNQ19	3	2020
Chordifex reseminans	Priority 2	331010	6616050	CSQ2	1	2019
Chordifex reseminans	Priority 2	332372	6620728		>20	2019
Chordifex reseminans	Priority 2	332318	6620806		>10	2019

Chordifex reseminans	Priority 2	332252	6618644		1	2020
Chordifex reseminans	Priority 2	332252	6618644		5	2020
Chordifex reseminans	Priority 2	332279	6620908		1	2020
Chordifex reseminans	Priority 2	331342	6620782		3	2020
Chordifex reseminans	Priority 2	331335	6620767		10	2020
Chordifex reseminans	Priority 2	331334	6620762		5	2020
Chordifex reseminans	Priority 2	332660	6620621		40	2020
Chordifex reseminans	Priority 2	332649	6620513		30	2020
Chordifex reseminans	Priority 2	332637	6620114		5	2020
Chordifex reseminans	Priority 2	332543	6619943		4	2020
Chordifex reseminans	Priority 2	332518	6619945		2	2020
Chordifex reseminans	Priority 2	332396	6619770		3	2020
Chordifex reseminans	Priority 2	332450	6618753		5	2020
Chordifex reseminans	Priority 2	331658	6618268	CQ9	1	2020
Chordifex reseminans	Priority 2	332284	6620778	CQ22	4	2020
Chordifex reseminans	Priority 2	332182	6616445	CSQ06		2020
Chordifex reseminans	Priority 2	331292	6620391	CNQ10	1	2021
Lepyrodia curvescens	Priority 2	331579	6620148	CNQ12	1	2019
Schoenus badius	Priority 2	332104	6619087	CQ12		2011
Angianthus micropodioides	Priority 3	332135	6619294		1000	2019
Angianthus micropodioides	Priority 3	332110	6619311		1000	2019
Angianthus micropodioides	Priority 3	332113	6619334		1000	2019
Angianthus micropodioides	Priority 3	332175	6619367		1000	2019
Angianthus micropodioides	Priority 3	332206	6619388		1000	2019
Angianthus micropodioides	Priority 3	332032	6619360		1000	2019
Angianthus micropodioides	Priority 3	332010	6619347		1000	2019
Angianthus micropodioides	Priority 3	331955	6619243		1000	2019
Angianthus micropodioides	Priority 3	331929	6619222		1000	2019
Angianthus micropodioides	Priority 3	331764	6619291		1000	2019
Angianthus micropodioides	Priority 3	331960	6619461		1000	2019
Angianthus micropodioides	Priority 3	331868	6619698		1000	2019
Angianthus micropodioides	Priority 3	331734	6619791		1000	2019
Angianthus micropodioides	Priority 3	331501	6619477		1000	2019
Angianthus micropodioides	Priority 3	331479	6619549		1000	2019
Angianthus micropodioides	Priority 3	331318	6619618		1000	2019
Angianthus micropodioides	Priority 3	332200	6619237		1000	2019
Angianthus micropodioides	Priority 3	332236	6619232		2000	2019
Angianthus micropodioides	Priority 3	332274	6619297		1000	2019
Angianthus micropodioides	Priority 3	332276	6619325		1000	2019
Angianthus micropodioides	Priority 3	332245	6619400		2000	2019
Angianthus micropodioides	Priority 3	332234	6619404		1000	2019
Angianthus micropodioides	Priority 3	332244	6619417		2000	2019
Angianthus micropodioides	Priority 3	332265	6619416		5000	2019
Angianthus micropodioides	Priority 3	332301	6619448		5000	2019
Angianthus micropodioides	Priority 3	332351	6619459		2000	2019
Angianthus micropodioides	Priority 3	332383	6619512		1000	2019

Angianthus micropodioides	Priority 3	332395	6619553		2000	2019
Angianthus micropodioides	Priority 3	332168	6619409		1000	2019
Angianthus micropodioides	Priority 3	332208	6619431		1000	2019
Angianthus micropodioides	Priority 3	332039	6619480		1000	2019
Angianthus micropodioides	Priority 3	331757	6619950		500	2019
Angianthus micropodioides	Priority 3	331863	6620042		200	2019
Angianthus micropodioides	Priority 3	331675	6619776		100	2019
Angianthus micropodioides	Priority 3	331870	6619467		200	2019
Angianthus micropodioides	Priority 3	331452	6619383		5000	2019
Angianthus micropodioides	Priority 3	331477	6619303		5000	2019
Angianthus micropodioides	Priority 3	331589	6619253		2000	2019
Angianthus micropodioides	Priority 3	331671	6619161		1000	2019
Angianthus micropodioides	Priority 3	331508	6619144		2000	2019
Angianthus micropodioides	Priority 3	331461	6619300		5000	2019
Angianthus micropodioides	Priority 3	332389	6619671		2000	2019
Angianthus micropodioides	Priority 3	331352	6620325		500	2019
Angianthus micropodioides	Priority 3	331253	6620237		100	2019
Angianthus micropodioides	Priority 3	331265	6620161		1000	2019
Angianthus micropodioides	Priority 3	331258	6619997		1000	2019
Angianthus micropodioides	Priority 3	331205	6619996		2000	2019
Angianthus micropodioides	Priority 3	331203	6619868		2000	2019
Angianthus micropodioides	Priority 3	331228	6619728		2000	2019
Angianthus micropodioides	Priority 3	332006	6620670		5000	2019
Angianthus micropodioides	Priority 3	331582	6619000	CBGC50		2011
Angianthus micropodioides	Priority 3	331937	6620190	CBR4		2011
Angianthus micropodioides	Priority 3	332045	6620031	CBM7		2011
Angianthus micropodioides	Priority 3	331739	6619032	CQ17	5% cov	2011
Angianthus micropodioides	Priority 3	331837	6619542	CQ26	2% cov	2011
Angianthus micropodioides	Priority 3	332406	6619635	CQ28	4% cov	2011
Angianthus micropodioides	Priority 3	331648	6619268	CCR1	1% cov	2011
Angianthus micropodioides	Priority 3	331788	6620570		500	2020
Angianthus micropodioides	Priority 3	331750	6620564		1000	2020
Angianthus micropodioides	Priority 3	331883	6620585		5000	2020
Angianthus micropodioides	Priority 3	331892	6620485		5000	2020
Angianthus micropodioides	Priority 3	331721	6619903		10000	2020
Angianthus micropodioides	Priority 3	331717	6619854		10000	2020
Angianthus micropodioides	Priority 3	331505	6620350		1000	2020
Angianthus micropodioides	Priority 3	331845	6619609		10000	2020
Angianthus micropodioides	Priority 3	331822	6619659		10000	2020
Angianthus micropodioides	Priority 3	332236	6619447		500	2020
Angianthus micropodioides	Priority 3	331268	6619447		5000	2020

Angianthus micropodioides	Priority 3	331327	6619458		10000	2020
Angianthus micropodioides	Priority 3	331374	6619470		2000	2020
Angianthus micropodioides	Priority 3	331420	6619422		10000	2020
Angianthus micropodioides	Priority 3	331265	6619953		2000	2020
Angianthus micropodioides	Priority 3	331251	6619715		10000	2020
Angianthus micropodioides	Priority 3	331398	6619602		10000	2020
Angianthus micropodioides	Priority 3	331272	6619556		20000	2020
Angianthus micropodioides	Priority 3	331232	6619569		10000	2020
Angianthus micropodioides	Priority 3	331207	6619598		20000	2020
Angianthus micropodioides	Priority 3	331154	6619617		10000	2020
Angianthus micropodioides	Priority 3	331144	6619583		20000	2020
Angianthus micropodioides	Priority 3	331117	6619617		30000	2020
Angianthus micropodioides	Priority 3	331492	6619106		10000	2020
Angianthus micropodioides	Priority 3	331434	6619155		1000	2020
Angianthus micropodioides	Priority 3	331213	6619545		10000	2020
Angianthus micropodioides	Priority 3	331292	6619520		5000	2020
Angianthus micropodioides	Priority 3	331347	6619517		10000	2020
Angianthus micropodioides	Priority 3	331403	6619514		10000	2020
Angianthus micropodioides	Priority 3	331412	6619459		10000	2020
Angianthus micropodioides	Priority 3	331359	6619455		10000	2020
Angianthus micropodioides	Priority 3	331306	6619449		5000	2020
Angianthus micropodioides	Priority 3	331250	6619451		5000	2020
Angianthus micropodioides	Priority 3	331195	6619456		5000	2020
Angianthus micropodioides	Priority 3	331144	6619472		3000	2020
Angianthus micropodioides	Priority 3	331107	6619526		5000	2020
Angianthus micropodioides	Priority 3	331471	6619093	CNQ24	100	2020
Angianthus micropodioides	Priority 3	331913	6620725	CNQ06	2000	2019
Angianthus micropodioides	Priority 3	332250	6619238	CQ16		2011
Angianthus micropodioides	Priority 3	331394	6620218	CNQ09		2019
Angianthus micropodioides	Priority 3	331862	6620478	CNQ07	6% cover	2019
Angianthus micropodioides	Priority 3	331390	6619204	CNQ23	500	2020
Angianthus micropodioides	Priority 3	331892	6620649	CQ20	1000	2020
Angianthus micropodioides	Priority 3	331650	6619018	CNQ04		2019
Angianthus micropodioides	Priority 3	331401	6619391	CNQ03	2000	2019
Angianthus micropodioides	Priority 3	331806	6619714	CNR07	100	2020
Babingtonia urbana	Priority 3	332588	6619960		9	2020

Babingtonia urbana	Priority 3	332620	6619961		2	2020
Babingtonia urbana	Priority 3	332543	6619943		9	2020
Babingtonia urbana	Priority 3	332531	6619943		8	2020
Babingtonia urbana	Priority 3	332518	6619945		14	2020
Babingtonia urbana	Priority 3	332333	6619762		1	2020
Babingtonia urbana	Priority 3	332390	6619774		1	2020
Babingtonia urbana	Priority 3	332411	6619773		1	2020
Babingtonia urbana	Priority 3	332444	6619761		35	2020
Babingtonia urbana	Priority 3	332056	6619329		4	2020
Babingtonia urbana	Priority 3	332075	6619325		15	2020
Babingtonia urbana	Priority 3	332091	6619308		15	2020
Babingtonia urbana	Priority 3	332035	6619303		12	2020
Babingtonia urbana	Priority 3	332025	6619309		15	2020
Babingtonia urbana	Priority 3	332009	6619312		5	2020
Babingtonia urbana	Priority 3	331973	6619271		10	2020
Babingtonia urbana	Priority 3	331918	6619378		4	2020
Babingtonia urbana	Priority 3	331867	6619451		45	2020
Babingtonia urbana	Priority 3	331849	6619460		25	2020
Babingtonia urbana	Priority 3	331831	6619453		35	2020
Babingtonia urbana	Priority 3	331806	6619465		30	2020
Babingtonia urbana	Priority 3	331785	6619488		50	2020
Babingtonia urbana	Priority 3	331865	6619410		10	2020
Babingtonia urbana	Priority 3	331859	6619396		20	2020
Babingtonia urbana	Priority 3	331640	6619391		15	2020
Babingtonia urbana	Priority 3	331659	6619372		30	2020
Babingtonia urbana	Priority 3	331976	6619166		5	2020
Babingtonia urbana	Priority 3	331978	6619180		5	2020
Babingtonia urbana	Priority 3	331993	6619173		6	2020
Babingtonia urbana	Priority 3	331798	6619226		6	2020
Babingtonia urbana	Priority 3	331960	6619222		1	2020
Babingtonia urbana	Priority 3	331903	6619565		40	2020
Babingtonia urbana	Priority 3	331900	6619582		50	2020
Babingtonia urbana	Priority 3	331471	6619636		10	2020
Babingtonia urbana	Priority 3	331291	6619876		8	2020
Babingtonia urbana	Priority 3	331271	6619857		4	2020
Babingtonia urbana	Priority 3	332443	6619906		14	2020
Babingtonia urbana	Priority 3	332460	6619895		2	2020
Babingtonia urbana	Priority 3	332449	6619876		1	2020
Babingtonia urbana	Priority 3	332444	6619929		5	2020
Babingtonia urbana	Priority 3	332393	6619939		1	2020
Babingtonia urbana	Priority 3	332284	6620778	CQ22	1	2020
Babingtonia urbana	Priority 3	331893	6619575	CNQ21	93	2020
Babingtonia urbana	Priority 3	332429	6619932	CQ27	4	2020
Babingtonia urbana	Priority 3	331861	6619442	CNQ20	99	2020
Babingtonia urbana	Priority 3	331965	6619244	CNQ19	47	2020
Babingtonia urbana	Priority 3	332241	6620745		10	2021

Conospermum scaposum	Priority 3	332575	6617403		16	2019
Conospermum scaposum	Priority 3	332627	6617355		9	2019
Conospermum scaposum	Priority 3	332497	6617999		4	2019
Conospermum scaposum	Priority 3	332570	6617976		9	2019
Conospermum scaposum	Priority 3	332587	6617969		14	2019
Conospermum scaposum	Priority 3	332255	6618016		5	2019
Conospermum scaposum	Priority 3	332165	6617999		6	2019
Conospermum scaposum	Priority 3	332154	6618013		25	2019
Conospermum scaposum	Priority 3	332143	6618031		40	2019
Conospermum scaposum	Priority 3	332139	6618044		20	2019
Conospermum scaposum	Priority 3	332124	6618051		12	2019
Conospermum scaposum	Priority 3	332095	6618038		20	2019
Conospermum scaposum	Priority 3	331209	6617847		2	2019
Conospermum scaposum	Priority 3	332464	6618397		3	2019
Conospermum scaposum	Priority 3	332368	6619431		20	2019
Conospermum scaposum	Priority 3	332389	6619415		30	2019
Conospermum scaposum	Priority 3	332450	6619387		20	2019
Conospermum scaposum	Priority 3	332517	6619403		40	2019
Conospermum scaposum	Priority 3	332592	6617401		19	2019
Conospermum scaposum	Priority 3	332598	6617406		1	2019
Conospermum scaposum	Priority 3	332586	6617414		8	2019
Conospermum scaposum	Priority 3	332585	6617421		9	2019
Conospermum scaposum	Priority 3	332584	6617433		13	2019
Conospermum scaposum	Priority 3	332584	6617449		1	2019
Conospermum scaposum	Priority 3	332597	6617395		13	2019
Conospermum scaposum	Priority 3	332594	6617382		9	2019
Conospermum scaposum	Priority 3	332607	6617362		1	2019
Conospermum scaposum	Priority 3	332608	6617376		5	2019
Conospermum scaposum	Priority 3	332625	6617342		1	2019
Conospermum scaposum	Priority 3	332626	6617352		1	2019
Conospermum scaposum	Priority 3	332488	6617877		20	2019
Conospermum scaposum	Priority 3	332454	6617980		55	2019
Conospermum scaposum	Priority 3	332462	6617978		8	2019
Conospermum scaposum	Priority 3	332409	6617988		3	2019
Conospermum scaposum	Priority 3	332400	6617990		12	2019
Conospermum scaposum	Priority 3	332406	6617993		2	2019
Conospermum scaposum	Priority 3	332368	6618001		4	2019
Conospermum scaposum	Priority 3	332298	6618004		2	2019
Conospermum scaposum	Priority 3	332282	6618002		13	2019
Conospermum scaposum	Priority 3	332265	6618005		6	2019
Conospermum scaposum	Priority 3	332167	6618005		70	2019
Conospermum scaposum	Priority 3	332112	6618023		19	2019
Conospermum scaposum	Priority 3	332108	6618025		20	2019
Conospermum scaposum	Priority 3	332099	6618033		20	2019
Conospermum scaposum	Priority 3	332095	6618039		20	2019
Conospermum scaposum	Priority 3	332103	6618026		15	2019

Conospermum scaposum	Priority 3	332152	6617923		16	2019
Conospermum scaposum	Priority 3	332296	6617924		4	2019
Conospermum scaposum	Priority 3	331366	6618096		100	2019
Conospermum scaposum	Priority 3	331261	6617841		1	2019
Conospermum scaposum	Priority 3	331254	6617839		1	2019
Conospermum scaposum	Priority 3	331152	6617809		2	2019
Conospermum scaposum	Priority 3	332504	6619538		3	2019
Conospermum scaposum	Priority 3	332506	6619531		2	2019
Conospermum scaposum	Priority 3	332516	6619513		40	2019
Conospermum scaposum	Priority 3	332556	6619522		20	2019
Conospermum scaposum	Priority 3	332547	6619524		20	2019
Conospermum scaposum	Priority 3	332552	6619535		12	2019
Conospermum scaposum	Priority 3	332552	6619543		4	2019
Conospermum scaposum	Priority 3	332561	6619548		30	2019
Conospermum scaposum	Priority 3	332570	6619547		20	2019
Conospermum scaposum	Priority 3	332609	6619429		7	2019
Conospermum scaposum	Priority 3	332468	6619548		20	2019
Conospermum scaposum	Priority 3	332471	6619538		10	2019
Conospermum scaposum	Priority 3	332457	6619530		60	2019
Conospermum scaposum	Priority 3	332464	6619518		50	2019
Conospermum scaposum	Priority 3	332404	6619400		10	2019
Conospermum scaposum	Priority 3	332383	6619399		10	2019
Conospermum scaposum	Priority 3	332005	6620471		13	2019
Conospermum scaposum	Priority 3	332521	6619958		6	2019
Conospermum scaposum	Priority 3	332582	6619956		2	2019
Conospermum scaposum	Priority 3	332606	6619960		1	2019
Conospermum scaposum	Priority 3	332566	6619936		11	2019
Conospermum scaposum	Priority 3	332545	6619904		2	2019
Conospermum scaposum	Priority 3	331408	6618085		30	2011
Conospermum scaposum	Priority 3	332250	6620755		1	2011
Conospermum scaposum	Priority 3	332647	6617570		20	2011
Conospermum scaposum	Priority 3	332491	6617873		20	2011
Conospermum scaposum	Priority 3	332458	6617974		20	2011
Conospermum scaposum	Priority 3	332567	6617985		8	2011
Conospermum scaposum	Priority 3	332217	6618047		20	2011
Conospermum scaposum	Priority 3	332164	6618017		200	2011
Conospermum scaposum	Priority 3	331413	6618081		30	2011
Conospermum scaposum	Priority 3	332463	6618395			2011
Conospermum scaposum	Priority 3	332273	6618347		1	2011
Conospermum scaposum	Priority 3	332262	6618441		50	2011
Conospermum scaposum	Priority 3	332180	6618395		5	2011
Conospermum scaposum	Priority 3	332170	6618396		5	2011
Conospermum scaposum	Priority 3	332475	6618822		50	2011
Conospermum scaposum	Priority 3	332507	6619402		5	2011
Conospermum scaposum	Priority 3	332448	6619400		200	2011
Conospermum scaposum	Priority 3	331933	6619757		5	2011

Conospermum scaposum	Priority 3	331509	6620363		10	2011
Conospermum scaposum	Priority 3	332484	6618838		10	2020
Conospermum scaposum	Priority 3	331660	6619729		4	2020
Conospermum scaposum	Priority 3	332588	6619960		7	2020
Conospermum scaposum	Priority 3	332528	6619938		3	2020
Conospermum scaposum	Priority 3	331386	6618788		65	2020
Conospermum scaposum	Priority 3	331408	6618773		20	2020
Conospermum scaposum	Priority 3	332605	6619480		50	2021
Desmocladus nodatus	Priority 3	332275	6619378		7	2019
Desmocladus nodatus	Priority 3	332290	6619379		5	2019
Desmocladus nodatus	Priority 3	332191	6619678		1	2019
Desmocladus nodatus	Priority 3	332262	6620774		1	2019
Desmocladus nodatus	Priority 3	332204	6620801		1	2019
Desmocladus nodatus	Priority 3	332004	6620990		2	2019
Desmocladus nodatus	Priority 3	331955	6620986		10	2019
Desmocladus nodatus	Priority 3	332284	6620778	CQ22	3	2011
Desmocladus nodatus	Priority 3	332307	6619624		20	2020
Desmocladus nodatus	Priority 3	332310	6619610		2	2020
Desmocladus nodatus	Priority 3	332320	6619607		4	2020
Desmocladus nodatus	Priority 3	332327	6619599		10	2020
Desmocladus nodatus	Priority 3	332332	6619586		3	2020
Desmocladus nodatus	Priority 3	332272	6620912		1	2020
Desmocladus nodatus	Priority 3	332660	6620621		1	2020
Desmocladus nodatus	Priority 3	332523	6619936		3	2020
Desmocladus nodatus	Priority 3	332333	6619762		40	2020
Desmocladus nodatus	Priority 3	332370	6619773		12	2020
Desmocladus nodatus	Priority 3	332396	6619770		3	2020
Desmocladus nodatus	Priority 3	331785	6619488		1	2020
Desmocladus nodatus	Priority 3	331291	6619876		1	2020
Desmocladus nodatus	Priority 3	331271	6619857		11	2020
Desmocladus nodatus	Priority 3	331291	6620596		6	2020
Desmocladus nodatus	Priority 3	331317	6620592		8	2020
Desmocladus nodatus	Priority 3	331965	6619244	CNQ19	2	2020
Desmocladus nodatus	Priority 3	331893	6619575	CNQ21	1	2020
Desmocladus nodatus	Priority 3	331861	6619442	CNQ20	5	2020
Eryngium pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	331870	6620749		10	2020
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	331491	6620134		300	2020
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	332273	6619672		200	2020
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	331941	6619246		200	2020
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	331497	6619515		10	2020
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	332245	6619400		5	2019
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	331395	6620406		5	2019
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	332185	6619800		1	2019
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	332167	6619170		15	2019
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	332133	6619301		10	2019

E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	332117	6619308		15	2019
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	332165	6619336		30	2019
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	332206	6619388		20	2019
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	332010	6619347		100	2019
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	331802	6619268		50	2019
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	331715	6619960		100	2019
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	331318	6619618		100	2019
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	332246	6618800		5	2011
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	332242	6619227		20	2011
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	331639	6620248		10	2011
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	332581	6618573		5	2011
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	331997	6619310		30	2011
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	331831	6619722		5	2011
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	331401	6619391	CNQ03	1	2019
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	331957	6619165	CNQ05	1	2019
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	331482	6619777	CNQ18	1	2020
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	331390	6619204	CNQ23	1	2020
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	332233	6619785	CNQ25	1	2020
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	331739	6619032	CQ17	1	2011
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	332104	6620101	CQ24	1	2011
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	331837	6619542	CQ26	1	2011
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	332286	6618790	CBR2	1	2011
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	331937	6620190	CBR4	1	2011
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	332104	6619087	CBR12	1	2011
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	331325	6620026	CBR15	1	2011
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	332090	6619974	CNR05	1	2020
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	331806	6619714	CNR07	1	2020
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	331478	6620416	CRK01	1	2020
E. pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	331317	6619690	CRK02	1	2020
Hensmania stoniella	Priority 3	331407	6618045		1	2019
Hensmania stoniella	Priority 3	332258	6618004		1	2019
Hensmania stoniella	Priority 3	332386	6617423		1	2011
Hensmania stoniella	Priority 3	331416	6617299		1	2020
Hensmania stoniella	Priority 3	331620	6620889	CQ21		2020
Hensmania stoniella	Priority 3	332259	6617340		1	2021
Hensmania stoniella	Priority 3	332074	6617474		1	2021
Hensmania stoniella	Priority 3	332141	6617436		2	2021
Isopogon panduratus subsp. palustris	Priority 3	332501	6619590		1	2019
Isopogon panduratus subsp. palustris	Priority 3	332719	6617261		30	2019
Isopogon panduratus subsp. palustris	Priority 3	332661	6617312		17	2019
Isopogon panduratus subsp. palustris	Priority 3	332576	6617306		8	2019
Isopogon panduratus subsp. palustris	Priority 3	332446	6618640		1	2019
Isopogon panduratus subsp. palustris	Priority 3	332602	6618511		4	2019
Isopogon panduratus subsp. palustris	Priority 3	332627	6618547		20	2019
Isopogon panduratus subsp. palustris	Priority 3	332061	6618157		1	2019
Isopogon panduratus subsp. palustris	Priority 3	332037	6618171		1	2019

Isopogon panduratus subsp. palustris	Priority 3	331995	6618177		9	2019
Isopogon panduratus subsp. palustris	Priority 3	331972	6618181		3	2019
Isopogon panduratus subsp. palustris	Priority 3	332559	6618472		3	2019
Isopogon panduratus subsp. palustris	Priority 3	332660	6619376		2	2019
Isopogon panduratus subsp. palustris	Priority 3	332612	6619562		7	2019
Isopogon panduratus subsp. palustris	Priority 3	332583	6619726		3	2019
Isopogon panduratus subsp. palustris	Priority 3	332597	6619760		12	2019
Isopogon panduratus subsp. palustris	Priority 3	332596	6619782		25	2019
Isopogon panduratus subsp. palustris	Priority 3	332600	6619795		5	2019
Isopogon panduratus subsp. palustris	Priority 3	332615	6619773		2	2019
Isopogon panduratus subsp. palustris	Priority 3	332612	6619754		3	2019
Isopogon panduratus subsp. palustris	Priority 3	332605	6619744		2	2019
Isopogon panduratus subsp. palustris	Priority 3	332552	6619588		12	2019
Isopogon panduratus subsp. palustris	Priority 3	332189	6619290		2	2019
Isopogon panduratus subsp. palustris	Priority 3	332167	6619264		1	2019
Isopogon panduratus subsp. palustris	Priority 3	332326	6619358		13	2019
Isopogon panduratus subsp. palustris	Priority 3	332443	6619373		8	2019
Isopogon panduratus subsp. palustris	Priority 3	332470	6619393		1	2019
Isopogon panduratus subsp. palustris	Priority 3	332492	6619393		25	2019
Isopogon panduratus subsp. palustris	Priority 3	331445	6619632		1	2019
Isopogon panduratus subsp. palustris	Priority 3	331370	6619671		8	2019
Isopogon panduratus subsp. palustris	Priority 3	331501	6619058		40	2019
Isopogon panduratus subsp. palustris	Priority 3	331531	6619028		20	2019
Isopogon panduratus subsp. palustris	Priority 3	331548	6619009		10	2019
Isopogon panduratus subsp. palustris	Priority 3	331566	6618998		10	2019
Isopogon panduratus subsp. palustris	Priority 3	331563	6618958		10	2019
Isopogon panduratus subsp. palustris	Priority 3	331593	6618939		30	2019
Isopogon panduratus subsp. palustris	Priority 3	332660	6620136		4	2019
Isopogon panduratus subsp. palustris	Priority 3	332593	6620029		8	2019
Isopogon panduratus subsp. palustris	Priority 3	332448	6620035		3	2019
Isopogon panduratus subsp. palustris	Priority 3	332415	6619867		6	2019
Isopogon panduratus subsp. palustris	Priority 3	332418	6619774		12	2019
Isopogon panduratus subsp. palustris	Priority 3	332425	6619758		5	2019
Isopogon panduratus subsp. palustris	Priority 3	332354	6619741		1	2019
Isopogon panduratus subsp. palustris	Priority 3	332354	6619777		10	2019
Isopogon panduratus subsp. palustris	Priority 3	332353	6619777		1	2019
Isopogon panduratus subsp. palustris	Priority 3	332371	6619787		6	2019
Isopogon panduratus subsp. palustris	Priority 3	332348	6619797		2	2019
Isopogon panduratus subsp. palustris	Priority 3	331672	6620630		1	2019
Isopogon panduratus subsp. palustris	Priority 3	331644	6620601		2	2019
Isopogon panduratus subsp. palustris	Priority 3	332058	6620694		58	2019
Isopogon panduratus subsp. palustris	Priority 3	332136	6620689		20	2019
Isopogon panduratus subsp. palustris	Priority 3	332114	6620779		10	2019
Isopogon panduratus subsp. palustris	Priority 3	332125	6620815		50	2019
Isopogon panduratus subsp. palustris	Priority 3	332079	6620836		12	2019
Isopogon panduratus subsp. palustris	Priority 3	332082	6620867		10	2019

Isopogon panduratus subsp. palustris	Priority 3	332091	6620909		5	2019
Isopogon panduratus subsp. palustris	Priority 3	332060	6620964		27	2019
Isopogon panduratus subsp. palustris	Priority 3	332027	6620953		25	2019
Isopogon panduratus subsp. palustris	Priority 3	332004	6620943		14	2019
Isopogon panduratus subsp. palustris	Priority 3	332004	6620943		9	2019
Isopogon panduratus subsp. palustris	Priority 3	331985	6620921		12	2019
Isopogon panduratus subsp. palustris	Priority 3	331962	6620910		3	2019
Isopogon panduratus subsp. palustris	Priority 3	331945	6620931		6	2019
Isopogon panduratus subsp. palustris	Priority 3	332717	6616716		10	2019
Isopogon panduratus subsp. palustris	Priority 3	332673	6618586		4	2019
Isopogon panduratus subsp. palustris	Priority 3	332674	6618573		7	2019
Isopogon panduratus subsp. palustris	Priority 3	332677	6618556		2	2019
Isopogon panduratus subsp. palustris	Priority 3	332690	6618555		2	2019
Isopogon panduratus subsp. palustris	Priority 3	332687	6618540		2	2019
Isopogon panduratus subsp. palustris	Priority 3	332689	6618515		8	2019
Isopogon panduratus subsp. palustris	Priority 3	332690	6618498		5	2019
Isopogon panduratus subsp. palustris	Priority 3	332679	6618490		1	2019
Isopogon panduratus subsp. palustris	Priority 3	332692	6618480		7	2019
Isopogon panduratus subsp. palustris	Priority 3	332690	6618461		9	2019
Isopogon panduratus subsp. palustris	Priority 3	332685	6618439		11	2019
Isopogon panduratus subsp. palustris	Priority 3	332677	6618428		10	2019
Isopogon panduratus subsp. palustris	Priority 3	332687	6618416		10	2019
Isopogon panduratus subsp. palustris	Priority 3	332682	6618398		14	2019
Isopogon panduratus subsp. palustris	Priority 3	332684	6618382		30	2019
Isopogon panduratus subsp. palustris	Priority 3	332679	6618358		1	2019
Isopogon panduratus subsp. palustris	Priority 3	332686	6618345		10	2019
Isopogon panduratus subsp. palustris	Priority 3	332683	6618336		14	2019
Isopogon panduratus subsp. palustris	Priority 3	332676	6618326		12	2019
Isopogon panduratus subsp. palustris	Priority 3	332671	6618316		3	2019
Isopogon panduratus subsp. palustris	Priority 3	332653	6618321		4	2019
Isopogon panduratus subsp. palustris	Priority 3	332656	6618329		8	2019
Isopogon panduratus subsp. palustris	Priority 3	332651	6618341		3	2019
Isopogon panduratus subsp. palustris	Priority 3	332651	6618355		8	2019
Isopogon panduratus subsp. palustris	Priority 3	332646	6618376		2	2019
Isopogon panduratus subsp. palustris	Priority 3	332648	6618404		11	2019
Isopogon panduratus subsp. palustris	Priority 3	332649	6618415		1	2019
Isopogon panduratus subsp. palustris	Priority 3	332649	6618427		17	2019
Isopogon panduratus subsp. palustris	Priority 3	332710	6617242		10	2019
Isopogon panduratus subsp. palustris	Priority 3	332686	6617255		4	2019
Isopogon panduratus subsp. palustris	Priority 3	332676	6617262		10	2019
Isopogon panduratus subsp. palustris	Priority 3	332680	6617281		20	2019
Isopogon panduratus subsp. palustris	Priority 3	332660	6617291		20	2019
Isopogon panduratus subsp. palustris	Priority 3	332627	6617292		15	2019
Isopogon panduratus subsp. palustris	Priority 3	332614	6617265		2	2019
Isopogon panduratus subsp. palustris	Priority 3	332601	6617288		7	2019
Isopogon panduratus subsp. palustris	Priority 3	332556	6617992		2	2019

Isopogon panduratus subsp. palustris	Priority 3	332341	6617940		1	2019
Isopogon panduratus subsp. palustris	Priority 3	332346	6617923		1	2019
Isopogon panduratus subsp. palustris	Priority 3	332602	6617537		1	2019
Isopogon panduratus subsp. palustris	Priority 3	332616	6617523		1	2019
Isopogon panduratus subsp. palustris	Priority 3	332650	6617561		1	2019
Isopogon panduratus subsp. palustris	Priority 3	331365	6618097		1	2019
Isopogon panduratus subsp. palustris	Priority 3	331373	6618108		7	2019
Isopogon panduratus subsp. palustris	Priority 3	331372	6618096		2	2019
Isopogon panduratus subsp. palustris	Priority 3	331390	6618106		25	2019
Isopogon panduratus subsp. palustris	Priority 3	331395	6618123		30	2019
Isopogon panduratus subsp. palustris	Priority 3	331413	6618114		20	2019
Isopogon panduratus subsp. palustris	Priority 3	332115	6618709		3	2019
Isopogon panduratus subsp. palustris	Priority 3	332139	6618694		1	2019
Isopogon panduratus subsp. palustris	Priority 3	332145	6618696		2	2019
Isopogon panduratus subsp. palustris	Priority 3	332060	6618742		4	2019
Isopogon panduratus subsp. palustris	Priority 3	332057	6618731		6	2019
Isopogon panduratus subsp. palustris	Priority 3	332044	6618737		5	2019
Isopogon panduratus subsp. palustris	Priority 3	332034	6618731		1	2019
Isopogon panduratus subsp. palustris	Priority 3	332043	6618717		4	2019
Isopogon panduratus subsp. palustris	Priority 3	332054	6618715		8	2019
Isopogon panduratus subsp. palustris	Priority 3	332051	6618751		6	2019
Isopogon panduratus subsp. palustris	Priority 3	332044	6618763		15	2019
Isopogon panduratus subsp. palustris	Priority 3	332048	6618783		13	2019
Isopogon panduratus subsp. palustris	Priority 3	332083	6618783		2	2019
Isopogon panduratus subsp. palustris	Priority 3	332096	6618793		3	2019
Isopogon panduratus subsp. palustris	Priority 3	332077	6619003		2	2019
Isopogon panduratus subsp. palustris	Priority 3	332053	6619023		6	2019
Isopogon panduratus subsp. palustris	Priority 3	332011	6619007		4	2019
Isopogon panduratus subsp. palustris	Priority 3	332011	6618998		3	2019
Isopogon panduratus subsp. palustris	Priority 3	332023	6618995		1	2019
Isopogon panduratus subsp. palustris	Priority 3	332044	6618994		2	2019
Isopogon panduratus subsp. palustris	Priority 3	332058	6618984		9	2019
Isopogon panduratus subsp. palustris	Priority 3	332070	6618970		5	2019
Isopogon panduratus subsp. palustris	Priority 3	332077	6618950		9	2019
Isopogon panduratus subsp. palustris	Priority 3	332109	6618943		1	2019
Isopogon panduratus subsp. palustris	Priority 3	332683	6619359		1	2019
Isopogon panduratus subsp. palustris	Priority 3	332675	6619377		2	2019
Isopogon panduratus subsp. palustris	Priority 3	332668	6619492		7	2019
Isopogon panduratus subsp. palustris	Priority 3	332655	6619565		1	2019
Isopogon panduratus subsp. palustris	Priority 3	332578	6619797		5	2019
Isopogon panduratus subsp. palustris	Priority 3	332525	6619591		1	2019
Isopogon panduratus subsp. palustris	Priority 3	332489	6619588		1	2019
Isopogon panduratus subsp. palustris	Priority 3	332263	6619200		6	2019
Isopogon panduratus subsp. palustris	Priority 3	332268	6619176		1	2019
Isopogon panduratus subsp. palustris	Priority 3	332255	6619156		1	2019
Isopogon panduratus subsp. palustris	Priority 3	332137	6619189		2	2019

Isopogon panduratus subsp. palustris	Priority 3	332154	6619206		2	2019
Isopogon panduratus subsp. palustris	Priority 3	332277	6619338		4	2019
Isopogon panduratus subsp. palustris	Priority 3	332266	6619342		1	2019
Isopogon panduratus subsp. palustris	Priority 3	332264	6619359		6	2019
Isopogon panduratus subsp. palustris	Priority 3	332246	6619348		8	2019
Isopogon panduratus subsp. palustris	Priority 3	332227	6619364		2	2019
Isopogon panduratus subsp. palustris	Priority 3	332235	6619374		6	2019
Isopogon panduratus subsp. palustris	Priority 3	332258	6619370		10	2019
Isopogon panduratus subsp. palustris	Priority 3	332275	6619378		4	2019
Isopogon panduratus subsp. palustris	Priority 3	332297	6619378		1	2019
Isopogon panduratus subsp. palustris	Priority 3	332286	6619399		13	2019
Isopogon panduratus subsp. palustris	Priority 3	332261	6619393		6	2019
Isopogon panduratus subsp. palustris	Priority 3	332305	6619429		10	2019
Isopogon panduratus subsp. palustris	Priority 3	332419	6619572		1	2019
Isopogon panduratus subsp. palustris	Priority 3	332131	6619485		4	2019
Isopogon panduratus subsp. palustris	Priority 3	332132	6619511		2	2019
Isopogon panduratus subsp. palustris	Priority 3	332114	6619508		7	2019
Isopogon panduratus subsp. palustris	Priority 3	332097	6619497		3	2019
Isopogon panduratus subsp. palustris	Priority 3	332084	6619514		20	2019
Isopogon panduratus subsp. palustris	Priority 3	332068	6619525		10	2019
Isopogon panduratus subsp. palustris	Priority 3	332052	6619503		10	2019
Isopogon panduratus subsp. palustris	Priority 3	332039	6619480		5	2019
Isopogon panduratus subsp. palustris	Priority 3	332024	6619473		2	2019
Isopogon panduratus subsp. palustris	Priority 3	332023	6619502		10	2019
Isopogon panduratus subsp. palustris	Priority 3	332019	6619529		2	2019
Isopogon panduratus subsp. palustris	Priority 3	332003	6619540		5	2019
Isopogon panduratus subsp. palustris	Priority 3	332026	6619574		1	2019
Isopogon panduratus subsp. palustris	Priority 3	332008	6619657		1	2019
Isopogon panduratus subsp. palustris	Priority 3	331993	6619670		4	2019
Isopogon panduratus subsp. palustris	Priority 3	331945	6619672		6	2019
Isopogon panduratus subsp. palustris	Priority 3	331942	6619693		6	2019
Isopogon panduratus subsp. palustris	Priority 3	331945	6619710		10	2019
Isopogon panduratus subsp. palustris	Priority 3	331975	6619710		6	2019
Isopogon panduratus subsp. palustris	Priority 3	331964	6619732		30	2019
Isopogon panduratus subsp. palustris	Priority 3	331953	6619752		6	2019
Isopogon panduratus subsp. palustris	Priority 3	331898	6619751		2	2019
Isopogon panduratus subsp. palustris	Priority 3	331809	6619778		3	2019
Isopogon panduratus subsp. palustris	Priority 3	331682	6619845		1	2019
Isopogon panduratus subsp. palustris	Priority 3	331675	6619827		2	2019
Isopogon panduratus subsp. palustris	Priority 3	331662	6619806		4	2019
Isopogon panduratus subsp. palustris	Priority 3	331658	6619725		5	2019
Isopogon panduratus subsp. palustris	Priority 3	331681	6619699		5	2019
Isopogon panduratus subsp. palustris	Priority 3	331755	6619552		1	2019
Isopogon panduratus subsp. palustris	Priority 3	331757	6619529		1	2019
Isopogon panduratus subsp. palustris	Priority 3	331884	6619100		8	2019
Isopogon panduratus subsp. palustris	Priority 3	331927	6619081		20	2019

Isopogon panduratus subsp. palustris	Priority 3	331925	6619051		20	2019
Isopogon panduratus subsp. palustris	Priority 3	331938	6619019		2	2019
Isopogon panduratus subsp. palustris	Priority 3	331896	6619009		30	2019
Isopogon panduratus subsp. palustris	Priority 3	331854	6619005		10	2019
Isopogon panduratus subsp. palustris	Priority 3	331838	6618984		15	2019
Isopogon panduratus subsp. palustris	Priority 3	331797	6619008		6	2019
Isopogon panduratus subsp. palustris	Priority 3	331763	6618988		16	2019
Isopogon panduratus subsp. palustris	Priority 3	331728	6618942		6	2019
Isopogon panduratus subsp. palustris	Priority 3	331702	6618944		15	2019
Isopogon panduratus subsp. palustris	Priority 3	331534	6619084		6	2019
Isopogon panduratus subsp. palustris	Priority 3	331601	6619055		6	2019
Isopogon panduratus subsp. palustris	Priority 3	331594	6618996		5	2019
Isopogon panduratus subsp. palustris	Priority 3	331640	6618985		7	2019
Isopogon panduratus subsp. palustris	Priority 3	331618	6618973		10	2019
Isopogon panduratus subsp. palustris	Priority 3	331619	6618956		30	2019
Isopogon panduratus subsp. palustris	Priority 3	332626	6620103		3	2019
Isopogon panduratus subsp. palustris	Priority 3	332475	6620005		1	2019
Isopogon panduratus subsp. palustris	Priority 3	332637	6619950		3	2019
Isopogon panduratus subsp. palustris	Priority 3	332557	6619920		2	2019
Isopogon panduratus subsp. palustris	Priority 3	332508	6619928		1	2019
Isopogon panduratus subsp. palustris	Priority 3	332537	6619870		30	2019
Isopogon panduratus subsp. palustris	Priority 3	332549	6619840		15	2019
Isopogon panduratus subsp. palustris	Priority 3	332432	6619859		6	2019
Isopogon panduratus subsp. palustris	Priority 3	332258	6619628		9	2019
Isopogon panduratus subsp. palustris	Priority 3	332283	6619652		2	2019
Isopogon panduratus subsp. palustris	Priority 3	332202	6619669		9	2019
Isopogon panduratus subsp. palustris	Priority 3	332181	6619655		8	2019
Isopogon panduratus subsp. palustris	Priority 3	332206	6619687		1	2019
Isopogon panduratus subsp. palustris	Priority 3	332136	6619872		4	2019
Isopogon panduratus subsp. palustris	Priority 3	332221	6620146		1	2019
Isopogon panduratus subsp. palustris	Priority 3	331731	6620660		12	2019
Isopogon panduratus subsp. palustris	Priority 3	331728	6620690		2	2019
Isopogon panduratus subsp. palustris	Priority 3	331652	6620647		6	2019
Isopogon panduratus subsp. palustris	Priority 3	331641	6620638		22	2019
Isopogon panduratus subsp. palustris	Priority 3	331605	6620640		5	2019
Isopogon panduratus subsp. palustris	Priority 3	331594	6620627		2	2019
Isopogon panduratus subsp. palustris	Priority 3	331569	6620634		10	2019
Isopogon panduratus subsp. palustris	Priority 3	331551	6620635		2	2019
Isopogon panduratus subsp. palustris	Priority 3	331532	6620634		7	2019
Isopogon panduratus subsp. palustris	Priority 3	331526	6620607		7	2019
Isopogon panduratus subsp. palustris	Priority 3	331506	6620587		6	2019
Isopogon panduratus subsp. palustris	Priority 3	331499	6620565		7	2019
Isopogon panduratus subsp. palustris	Priority 3	331472	6620571		2	2019
Isopogon panduratus subsp. palustris	Priority 3	331447	6620540		10	2019
Isopogon panduratus subsp. palustris	Priority 3	331381	6620533		3	2019
Isopogon panduratus subsp. palustris	Priority 3	331351	6620543		2	2019

Isopogon panduratus subsp. palustris	Priority 3	331308	6619957		1	2019
Isopogon panduratus subsp. palustris	Priority 3	331252	6619878		2	2019
Isopogon panduratus subsp. palustris	Priority 3	331332	6619833		2	2019
Isopogon panduratus subsp. palustris	Priority 3	331490	6619953		1	2019
Isopogon panduratus subsp. palustris	Priority 3	331491	6619935		8	2019
Isopogon panduratus subsp. palustris	Priority 3	331521	6620255		2	2019
Isopogon panduratus subsp. palustris	Priority 3	332006	6620652		5	2019
Isopogon panduratus subsp. palustris	Priority 3	332039	6620657		40	2019
Isopogon panduratus subsp. palustris	Priority 3	332073	6620670		20	2019
Isopogon panduratus subsp. palustris	Priority 3	332103	6620682		10	2019
Isopogon panduratus subsp. palustris	Priority 3	332126	6620687		14	2019
Isopogon panduratus subsp. palustris	Priority 3	332135	6620687		16	2019
Isopogon panduratus subsp. palustris	Priority 3	332167	6620707		15	2019
Isopogon panduratus subsp. palustris	Priority 3	332210	6620695		20	2019
Isopogon panduratus subsp. palustris	Priority 3	332247	6620706		13	2019
Isopogon panduratus subsp. palustris	Priority 3	332304	6620718		14	2019
Isopogon panduratus subsp. palustris	Priority 3	332372	6620728		20	2019
Isopogon panduratus subsp. palustris	Priority 3	332377	6620755		20	2019
Isopogon panduratus subsp. palustris	Priority 3	332376	6620780		30	2019
Isopogon panduratus subsp. palustris	Priority 3	332318	6620806		11	2019
Isopogon panduratus subsp. palustris	Priority 3	332323	6620752		10	2019
Isopogon panduratus subsp. palustris	Priority 3	332272	6620764		22	2019
Isopogon panduratus subsp. palustris	Priority 3	332262	6620800		7	2019
Isopogon panduratus subsp. palustris	Priority 3	332228	6620809		4	2019
Isopogon panduratus subsp. palustris	Priority 3	332195	6620806		18	2019
Isopogon panduratus subsp. palustris	Priority 3	332161	6620842		11	2019
Isopogon panduratus subsp. palustris	Priority 3	332151	6620874		10	2019
Isopogon panduratus subsp. palustris	Priority 3	332092	6620980		20	2019
Isopogon panduratus subsp. palustris	Priority 3	332046	6620992		30	2019
Isopogon panduratus subsp. palustris	Priority 3	332004	6620990		23	2019
Isopogon panduratus subsp. palustris	Priority 3	331955	6620986		14	2019
Isopogon panduratus subsp. palustris	Priority 3	331917	6620953		12	2019
Isopogon panduratus subsp. palustris	Priority 3	331915	6620890		4	2019
Isopogon panduratus subsp. palustris	Priority 3	331876	6620845		14	2019
Isopogon panduratus subsp. palustris	Priority 3	332654	6618760		1	2019
Isopogon panduratus subsp. palustris	Priority 3	332652	6618595		7	2019
Isopogon panduratus subsp. palustris	Priority 3	332655	6618580		3	2019
Isopogon panduratus subsp. palustris	Priority 3	332658	6618522		3	2019
Isopogon panduratus subsp. palustris	Priority 3	332646	6618481		2	2019
Isopogon panduratus subsp. palustris	Priority 3	332656	6618450		1	2019
Isopogon panduratus subsp. palustris	Priority 3	332654	6618439		4	2019
Isopogon panduratus subsp. palustris	Priority 3	332429	6619932	CQ27		2011
Isopogon panduratus subsp. palustris	Priority 3	332047	6617472			2011
Isopogon panduratus subsp. palustris	Priority 3	332360	6617939		2	2011
Isopogon panduratus subsp. palustris	Priority 3	332654	6618334		6	2011
Isopogon panduratus subsp. palustris	Priority 3	331089	6619030	CQ15		2011

Isopogon panduratus subsp. palustris	Priority 3	332284	6620778	CQ22		2011
Isopogon panduratus subsp. palustris	Priority 3	332092	6619744	CBR14	na	2011
Isopogon panduratus subsp. palustris	Priority 3	331140	6619008		1	2020
Isopogon panduratus subsp. palustris	Priority 3	331105	6619024		10	2020
Isopogon panduratus subsp. palustris	Priority 3	331109	6619022		10	2020
Isopogon panduratus subsp. palustris	Priority 3	331098	6618991		4	2020
Isopogon panduratus subsp. palustris	Priority 3	331106	6618922		26	2020
Isopogon panduratus subsp. palustris	Priority 3	331098	6618878		14	2020
Isopogon panduratus subsp. palustris	Priority 3	332112	6617492		3	2020
Isopogon panduratus subsp. palustris	Priority 3	332552	6617374		4	2020
Isopogon panduratus subsp. palustris	Priority 3	332300	6620966		5	2020
Isopogon panduratus subsp. palustris	Priority 3	332318	6620925		12	2020
Isopogon panduratus subsp. palustris	Priority 3	332279	6620908		5	2020
Isopogon panduratus subsp. palustris	Priority 3	331886	6620415		25	2020
Isopogon panduratus subsp. palustris	Priority 3	331883	6620382		20	2020
Isopogon panduratus subsp. palustris	Priority 3	331833	6620359		15	2020
Isopogon panduratus subsp. palustris	Priority 3	331860	6620322		6	2020
Isopogon panduratus subsp. palustris	Priority 3	331982	6620805		6	2020
Isopogon panduratus subsp. palustris	Priority 3	332333	6619762		9	2020
Isopogon panduratus subsp. palustris	Priority 3	332411	6619773		3	2020
Isopogon panduratus subsp. palustris	Priority 3	331087	6618550		3	2020
Isopogon panduratus subsp. palustris	Priority 3	331584	6618284		10	2020
Isopogon panduratus subsp. palustris	Priority 3	331594	6618279		10	2020
Isopogon panduratus subsp. palustris	Priority 3	331601	6618275		10	2020
Isopogon panduratus subsp. palustris	Priority 3	331611	6618281		10	2020
Isopogon panduratus subsp. palustris	Priority 3	331617	6618280		10	2020
Isopogon panduratus subsp. palustris	Priority 3	331624	6618277		10	2020
Isopogon panduratus subsp. palustris	Priority 3	331630	6618278		10	2020
Isopogon panduratus subsp. palustris	Priority 3	331640	6618279		10	2020
Isopogon panduratus subsp. palustris	Priority 3	331642	6618274		10	2020
Isopogon panduratus subsp. palustris	Priority 3	331649	6618269		10	2020
Isopogon panduratus subsp. palustris	Priority 3	331678	6618281		10	2020
Isopogon panduratus subsp. palustris	Priority 3	332716	6616704	CSQ04		2019
Jacksonia carduacea	Priority 3	331965	6619244	CNQ19	1	2020
Leucopogon sp. Yanchep (M. Hislop 1986)	Priority 3	331010	6616050	CSQ02		2020
Schoenus pennisetis	Priority 3	331292	6620391	CNQ10	10	2019
Schoenus pennisetis	Priority 3	332645	6619355	CNQ17		2020
Schoenus pennisetis	Priority 3	331579	6620148	CNQ12		2019
Schoenus pennisetis	Priority 3	331965	6619244	CNQ19	2	2020
Stylidium aceratum	Priority 3	332270	6618770	CBR2	na	2011
Stylidium aceratum	Priority 3	332250	6619238	CQ16	na	2011
Stylidium aceratum	Priority 3	331837	6619542	CQ26	na	2011
Stylidium aceratum	Priority 3	332429	6619932	CQ27	4	2011
Stylidium aceratum	Priority 3	331868	6619543		50	2020
Stylidium aceratum	Priority 3	331827	6619550		200	2020
Stylidium aceratum	Priority 3	331818	6619545		200	2020

Stylidium aceratum	Priority 3	331811	6619534		200	2020
Stylidium aceratum	Priority 3	331804	6619533		10	2020
Stylidium aceratum	Priority 3	331827	6619560		50	2020
Stylidium aceratum	Priority 3	331202	6619738		20	2020
Stylidium aceratum	Priority 3	331201	6619729		100	2020
Stylidium aceratum	Priority 3	331482	6619777	CNQ18	300	2020
Stylidium aceratum	Priority 3	331292	6620391	CNQ10	30	2020
Stylidium hymenocraspedum	Priority 3	331294	6620407		8	2019
Stylidium hymenocraspedum	Priority 3	331286	6620411		2	2019
Stylidium hymenocraspedum	Priority 3	331306	6620416		2	2019
Stylidium hymenocraspedum	Priority 3	331299	6620416		10	2019
Stylidium hymenocraspedum	Priority 3	331292	6620391	CNQ10		2020
Anigozanthos humilis subsp. chrysanthus	Priority 4	331404	6618863		1	2020
Anigozanthos humilis subsp. chrysanthus	Priority 4	332339	6620413	CNQ08		2019
Anigozanthos humilis subsp. chrysanthus	Priority 4	331323	6619016	CQ19		2020
Anigozanthos humilis subsp. chrysanthus	Priority 4	330951	6617201	CQ8		2020
Conostylis pauciflora subsp. euryrhipis	Priority 4	331965	6619244	CNQ19	1	2020
Schoenus griffinianus	Priority 4	331219	6616428	CSQ08		2020
Schoenus griffinianus	Priority 4	332504	6615948	CSQ07		2020
Schoenus griffinianus	Priority 4	331010	6616050	CSQ02		2020
Schoenus griffinianus	Priority 4	332074	6617474		1	2021
Schoenus griffinianus	Priority 4	332054	6617459		2	2021
Schoenus griffinianus	Priority 4	332105	6617442		5	2021
Schoenus griffinianus	Priority 4	332141	6617436		9	2021
Schoenus griffinianus	Priority 4	332061	6618013		2	2021
Stylidium longitubum	Priority 4	331613	662007	CBR3	na	2011
Stylidium longitubum	Priority 4	332250	6619238	CQ16	na	2011
Stylidium longitubum	Priority 4	331739	6619032	CQ17	na	2011
Stylidium longitubum	Priority 4	331837	6619542	CQ26	na	2011
Stylidium longitubum	Priority 4	331465	6620149		40	2020
Stylidium longitubum	Priority 4	331445	6620161		200	2020
Stylidium longitubum	Priority 4	332330	6619599		10	2020
Stylidium longitubum	Priority 4	332340	6619600		5	2020
Stylidium longitubum	Priority 4	332313	6619645		50	2020
Stylidium longitubum	Priority 4	332289	6619660		10	2020
Stylidium longitubum	Priority 4	332279	6619675		2	2020
Stylidium longitubum	Priority 4	332273	6619672		5	2020
Stylidium longitubum	Priority 4	332252	6619699		3	2020
Stylidium longitubum	Priority 4	332232	6619699		30	2020
Stylidium longitubum	Priority 4	332223	6619740		2	2020
Stylidium longitubum	Priority 4	332023	6619391		3	2020
Stylidium longitubum	Priority 4	331934	6619250		300	2020
Stylidium longitubum	Priority 4	331920	6619269		100	2020
Stylidium longitubum	Priority 4	331892	6619267		5	2020
Stylidium longitubum	Priority 4	331896	6619309		6	2020
Stylidium longitubum	Priority 4	331912	6619320		150	2020

Stylidium longitubum	Priority 4	331930	6619318		30	2020
Stylidium longitubum	Priority 4	331948	6619297		100	2020
Stylidium longitubum	Priority 4	331957	6619288		300	2020
Stylidium longitubum	Priority 4	331977	6619325		10	2020
Stylidium longitubum	Priority 4	331957	6619343		100	2020
Stylidium longitubum	Priority 4	331943	6619354		50	2020
Stylidium longitubum	Priority 4	331930	6619358		200	2020
Stylidium longitubum	Priority 4	331898	6619352		100	2020
Stylidium longitubum	Priority 4	331859	6619326		50	2020
Stylidium longitubum	Priority 4	331401	6620460		15	2020
Stylidium longitubum	Priority 4	331399	6620455		15	2020
Stylidium longitubum	Priority 4	331397	6620451		15	2020
Stylidium longitubum	Priority 4	331397	6620450		15	2020
Stylidium longitubum	Priority 4	331397	6620447		15	2020
Stylidium longitubum	Priority 4	331399	6620431		15	2020
Stylidium longitubum	Priority 4	331398	6620427		15	2020
Stylidium longitubum	Priority 4	331398	6620417		15	2020
Stylidium longitubum	Priority 4	331402	6620407		15	2020
Stylidium longitubum	Priority 4	331402	6620402		15	2020
Stylidium longitubum	Priority 4	331405	6620399		15	2020
Stylidium longitubum	Priority 4	331409	6620391		15	2020
Stylidium longitubum	Priority 4	331359	6620233		4	2020
Stylidium longitubum	Priority 4	331343	6620228		5	2020
Stylidium longitubum	Priority 4	331330	6620225		50	2020
Stylidium longitubum	Priority 4	331307	6620182		10	2020
Stylidium longitubum	Priority 4	331331	6620144		50	2020
Stylidium longitubum	Priority 4	332342	6619586		50	2020
Stylidium longitubum	Priority 4	332347	6619575		50	2020
Stylidium longitubum	Priority 4	332349	6619547		10	2020
Stylidium longitubum	Priority 4	332345	6619538		50	2020
Stylidium longitubum	Priority 4	332342	6619531		100	2020
Stylidium longitubum	Priority 4	332328	6619516		10	2020
Stylidium longitubum	Priority 4	332297	6619496		50	2020
Stylidium longitubum	Priority 4	332267	6619490		50	2020
Stylidium longitubum	Priority 4	331819	6619550		20	2020
Stylidium longitubum	Priority 4	331800	6619529		1	2020
Stylidium longitubum	Priority 4	331829	6619567		10	2020
Stylidium longitubum	Priority 4	331832	6619581		100	2020
Stylidium longitubum	Priority 4	331837	6619593		100	2020
Stylidium longitubum	Priority 4	331849	6619599		100	2020
Stylidium longitubum	Priority 4	331859	6619610		100	2020
Stylidium longitubum	Priority 4	331398	6619628		2	2020
Stylidium longitubum	Priority 4	331382	6619629		10	2020
Stylidium longitubum	Priority 4	331250	6619611		1	2020
Stylidium longitubum	Priority 4	331267	6619568		100	2020
Stylidium longitubum	Priority 4	331268	6619562		100	2020

Stylidium longitubum	Priority 4	331274	6619559		100	2020
Stylidium longitubum	Priority 4	331279	6619555		100	2020
Stylidium longitubum	Priority 4	331282	6619547		100	2020
Stylidium longitubum	Priority 4	331289	6619531		100	2020
Stylidium longitubum	Priority 4	331292	6619524		100	2020
Stylidium longitubum	Priority 4	331298	6619510		100	2020
Stylidium longitubum	Priority 4	331301	6619504		100	2020
Stylidium longitubum	Priority 4	331300	6619494		100	2020
Stylidium longitubum	Priority 4	331301	6619485		100	2020
Stylidium longitubum	Priority 4	331300	6619472		100	2020
Stylidium longitubum	Priority 4	331300	6619465		100	2020
Stylidium longitubum	Priority 4	331300	6619452		100	2020
Stylidium longitubum	Priority 4	331300	6619447		100	2020
Stylidium longitubum	Priority 4	331300	6619438		100	2020
Stylidium longitubum	Priority 4	331311	6619426		100	2020
Stylidium longitubum	Priority 4	331321	6619424		100	2020
Stylidium longitubum	Priority 4	331320	6619412		100	2020
Stylidium longitubum	Priority 4	331313	6619399		100	2020
Stylidium longitubum	Priority 4	331303	6619393		100	2020
Stylidium longitubum	Priority 4	331300	6619382		100	2020
Stylidium longitubum	Priority 4	331330	6619379		100	2020
Stylidium longitubum	Priority 4	331340	6619392		100	2020
Stylidium longitubum	Priority 4	331348	6619404		100	2020
Stylidium longitubum	Priority 4	331354	6619411		100	2020
Stylidium longitubum	Priority 4	331357	6619417		100	2020
Stylidium longitubum	Priority 4	331379	6619415		100	2020
Stylidium longitubum	Priority 4	331425	6619446		100	2020
Stylidium longitubum	Priority 4	331428	6619656		3	2020
Stylidium longitubum	Priority 4	331921	6619403		1	2020
Stylidium longitubum	Priority 4	331923	6619408		10	2020
Stylidium longitubum	Priority 4	331926	6619419		10	2020
Stylidium longitubum	Priority 4	331929	6619418		10	2020
Stylidium longitubum	Priority 4	331931	6619410		10	2020
Stylidium longitubum	Priority 4	332035	6619405		5	2020
Stylidium longitubum	Priority 4	331401	6619391	CNQ03	40	2020
Stylidium longitubum	Priority 4	331478	6620416	CRK01	15	2020
Stylidium longitubum	Priority 4	331244	6619610		20	2021
Stylidium longitubum	Priority 4	331616	6619967		70	2021
Thysanotus glaucus	Priority 4	331830	6615913		1	2019
Thysanotus glaucus	Priority 4	331856	6615923		1	2019
Thysanotus glaucus	Priority 4	331859	6615923		1	2019
Thysanotus glaucus	Priority 4	332241	6618000		1	2019
Thysanotus glaucus	Priority 4	332225	6617996		1	2019
Thysanotus glaucus	Priority 4	332226	6618008		1	2019
Thysanotus glaucus	Priority 4	331786	6615898		3	2019
Thysanotus glaucus	Priority 4	331854	6615921		1	2019

Thysanotus glaucus	Priority 4	332658	6616716		1	2020

II EISA flora of conservation significance

TaxonName	Conservatn Signif.	Easting	Northing	Site	Count	Survey Year
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332100	6613426		3	2021
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332102	6613458		3	2021
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332107	6613479		1	2021
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	330065	6616784		14	2021
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	330082	6616785		7	2021
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	330104	6616779		14	2021
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	330132	6616782		3	2021
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	330141	6616755		6	2021
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	330200	6616777		4	2021
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332103	6613448	AIQ02	2	2021
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	330085	6616789	AIQ10	16	2021
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332098	6613443		2	2021
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	330055	6616742		2	2021
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	330021	6616749		2	2021
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	329994	6616754		15	2021
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	329958	6616782		2	2021
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	329986	6616785		15	2021
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	330006	6616786		30	2021
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	330214	6616785		2	2021
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	330152	6616777		1	2021
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	329698	6620171		1	2021
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	329691	6620172		10	2021
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	329679	6620174		2	2021
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	329683	6620180		2	2021
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	329690	6620189		3	2021
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	329677	6620193		1	2021
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	329681	6620199		1	2021
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	329692	6620194		1	2021
Calectasia palustris	Priority 2	330010	6616760		2	2021
Calectasia palustris	Priority 2	330078	6616750		1	2021
Chordifex reseminans	Priority 2	332107	6613334		1	2021
Chordifex reseminans	Priority 2	332104	6613493		2	2021
Chordifex reseminans	Priority 2	330096	6616747		40	2021
Chordifex reseminans	Priority 2	330020	6616760		20	2021
Chordifex reseminans	Priority 2	330007	6616756		10	2021
Chordifex reseminans	Priority 2	329964	6616784		1	2021
Chordifex reseminans	Priority 2	329787	6619829		8	2021
Chordifex reseminans	Priority 2	329785	6619852		7	2021
Chordifex reseminans	Priority 2	329803	6619826		3	2021
Chordifex reseminans	Priority 2	329805	6619817		3	2021
Chordifex reseminans	Priority 2	329807	6619794		6	2021

Chordifex reseminans	Priority 2	331928	6629624		3	2021
Chordifex reseminans	Priority 2	331923	6629673		10	2021
Chordifex reseminans	Priority 2	331955	6629677		10	2021
Chordifex reseminans	Priority 2	330188	6616748		20	2021
Chordifex reseminans	Priority 2	330175	6616746		12	2021
Chordifex reseminans	Priority 2	332098	6613299	AIQ01	13	2021
Chordifex reseminans	Priority 2	330085	6616789	AIQ10	1	2021
Angianthus micropodioides	Priority 3	329772	6619886		300	2021
Angianthus micropodioides	Priority 3	329775	6619915		300	2021
Angianthus micropodioides	Priority 3	329715	6620205		100	2021
Angianthus micropodioides	Priority 3	329728	6620111		300	2021
Angianthus micropodioides	Priority 3	329734	6620120		1000	2021
Angianthus micropodioides	Priority 3	329734	6620210		500	2021
Angianthus micropodioides	Priority 3	329744	6620126		1000	2021
Angianthus micropodioides	Priority 3	329755	6619878		100	2021
Angianthus micropodioides	Priority 3	329711	6620006		200	2021
Angianthus micropodioides	Priority 3	329700	6620018		50	2021
Angianthus micropodioides	Priority 3	329708	6620054		25	2021
Angianthus micropodioides	Priority 3	329697	6620033		100	2021
Angianthus micropodioides	Priority 3	329699	6620077		1	2021
Angianthus micropodioides	Priority 3	329712	6620081		50	2021
Angianthus micropodioides	Priority 3	329715	6620079		10	2021
Angianthus micropodioides	Priority 3	329708	6620098		100	2021
Angianthus micropodioides	Priority 3	329693	6620088		50	2021
Angianthus micropodioides	Priority 3	329697	6620106		100	2021
Angianthus micropodioides	Priority 3	329706	6620121		500	2021
Angianthus micropodioides	Priority 3	329691	6620129		500	2021
Angianthus micropodioides	Priority 3	329700	6620155		500	2021
Angianthus micropodioides	Priority 3	329678	6620169		25	2021
Angianthus micropodioides	Priority 3	329694	6620075	AIQ12	100	2021
Babingtonia urbana	Priority 3	331908	6629639		4	2021
Babingtonia urbana	Priority 3	331935	6629632		2	2021
Babingtonia urbana	Priority 3	329739	6619841		1	2021
Babingtonia urbana	Priority 3	329742	6619846		1	2021
Babingtonia urbana	Priority 3	329743	6619849		1	2021
Babingtonia urbana	Priority 3	329747	6619850		1	2021
Conospermum scaposum	Priority 3	329806	6619778		15	2021
Conospermum scaposum	Priority 3	329801	6619796		5	2021
Desmocladus nodatus	Priority 3	329785	6619852		2	2021
Desmocladus nodatus	Priority 3	329803	6619826		3	2021
Desmocladus nodatus	Priority 3	329805	6619817		1	2021
Desmocladus nodatus	Priority 3	329807	6619794		1	2021
Desmocladus nodatus	Priority 3	330085	6616789	AIQ10	1	2021
Eryngium pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	329773	6619880		50	2021
Eryngium pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	329761	6619968		20	2021

Eryngium pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	329754	6619984	AIQ11	10	2021
Eryngium pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	329538	6615245	AIQ14	10	2021
Eryngium pinnatifidum subsp. Palustre (G.J. Keighery 13459)	Priority 3	329754	6619879		14	2021
Hensmania stoniella	Priority 3	332222	6629637		1	2021
Hensmania stoniella	Priority 3	332234	6629631		1	2021
Hensmania stoniella	Priority 3	332218	6629628		3	2021
Hensmania stoniella	Priority 3	332205	6629629		1	2021
Hensmania stoniella	Priority 3	332195	6629631		1	2021
Hensmania stoniella	Priority 3	332180	6629625		1	2021
Hensmania stoniella	Priority 3	332168	6629626		1	2021
Isopogon panduratus subsp. palustris	Priority 3	332088	6613467		2	2021
Isopogon panduratus subsp. palustris	Priority 3	332105	6613516		1	2021
Isopogon panduratus subsp. palustris	Priority 3	330183	6616796		12	2021
Isopogon panduratus subsp. palustris	Priority 3	330219	6616750		1	2021
Isopogon panduratus subsp. palustris	Priority 3	329686	6620195		1	2021
Isopogon panduratus subsp. palustris	Priority 3	327603	6621419	AIQ09	1	2021
Isopogon panduratus subsp. palustris	Priority 3	332105	6613275		2	2021
Isopogon panduratus subsp. palustris	Priority 3	332101	6613308		4	2021
Isopogon panduratus subsp. palustris	Priority 3	332107	6613479		1	2021
Isopogon panduratus subsp. palustris	Priority 3	332109	6613502		1	2021
Isopogon panduratus subsp. palustris	Priority 3	327539	6621403		3	2021
Isopogon panduratus subsp. palustris	Priority 3	329745	6620845		2	2021
Isopogon panduratus subsp. palustris	Priority 3	329782	6620834		15	2021
Isopogon panduratus subsp. palustris	Priority 3	329795	6620852		4	2021
Isopogon panduratus subsp. palustris	Priority 3	330150	6616826		2	2021
Isopogon panduratus subsp. palustris	Priority 3	329785	6619852		2	2021
Jacksonia carduacea	Priority 3	331902	6629629		1	2021
Jacksonia carduacea	Priority 3	332009	6629628		1	2021
Jacksonia carduacea	Priority 3	331769	6629974		10	2021
Anigozanthos humilis subsp. chrysanthus	Priority 4	331984	6629633		1	2021
Anigozanthos humilis subsp. chrysanthus	Priority 4	329767	6619771		1	2021

APPENDIX SEVEN. Records of flora of conservation significance from targeted searches outside the Atlas survey area

TaxonName	Conservation Signif.	Easting	Northing	Site	Number	Survey Year
Angianthus micropodioides	Priority 3	331103	6619691		10000	2020
Angianthus micropodioides	Priority 3	331125	6619872		10000	2020
Angianthus micropodioides	Priority 3	331118	6619975		5000	2020
Angianthus micropodioides	Priority 3	331118	6620004		3000	2020
Angianthus micropodioides	Priority 3	331089	6620106		500	2020
Angianthus micropodioides	Priority 3	330972	6619983		10000	2020
Angianthus micropodioides	Priority 3	330974	6619929		10000	2020
Angianthus micropodioides	Priority 3	330980	6619888		20000	2020
Angianthus micropodioides	Priority 3	330972	6619788		10000	2020
Angianthus micropodioides	Priority 3	330970	6619740		30000	2020
Angianthus micropodioides	Priority 3	330970	6619692		25000	2020
Angianthus micropodioides	Priority 3	330966	6619644		10000	2020
Angianthus micropodioides	Priority 3	330970	6619594		20000	2020
Angianthus micropodioides	Priority 3	330970	6619536		10000	2020
Angianthus micropodioides	Priority 3	330870	6619557		20000	2020
Angianthus micropodioides	Priority 3	330873	6619615		3000	2020
Angianthus micropodioides	Priority 3	330874	6619695		3000	2020
Angianthus micropodioides	Priority 3	330835	6619679		1000	2020
Angianthus micropodioides	Priority 3	330868	6619716		5000	2020
Angianthus micropodioides	Priority 3	330870	6619771		10000	2020
Angianthus micropodioides	Priority 3	330873	6619819		20000	2020
Angianthus micropodioides	Priority 3	330875	6619868		30000	2020
Angianthus micropodioides	Priority 3	330878	6619920		20000	2020
Angianthus micropodioides	Priority 3	330883	6619986		1000	2020
Angianthus micropodioides	Priority 3	330880	6620002		2000	2020
Angianthus micropodioides	Priority 3	330856	6620009		2000	2020
Angianthus micropodioides	Priority 3	330870	6620049		5000	2020
Angianthus micropodioides	Priority 3	330868	6620065		4000	2020
Angianthus micropodioides	Priority 3	330878	6620144		1000	2020
Angianthus micropodioides	Priority 3	330878	6620174		2000	2020
Angianthus micropodioides	Priority 3	331017	6620201		2000	2020
Angianthus micropodioides	Priority 3	331022	6620237		3000	2020
Angianthus micropodioides	Priority 3	331041	6620248		200	2020
Angianthus micropodioides	Priority 3	331021	6620263		5000	2020
Angianthus micropodioides	Priority 3	331018	6620460		500	2020
Angianthus micropodioides	Priority 3	331047	6620214		500	2020
Angianthus micropodioides	Priority 3	330871	6620189		300	2020
Angianthus micropodioides	Priority 3	330866	6620269		500	2020
Angianthus micropodioides	Priority 3	330686	6620583		4000	2020
Angianthus micropodioides	Priority 3	330680	6620529		30000	2020

Angianthus micropodioides	Priority 3	330649	6620491		30000	2020
Angianthus micropodioides	Priority 3	330773	6620275		1000	2020
Angianthus micropodioides	Priority 3	330775	6620194		6000	2020
Angianthus micropodioides	Priority 3	330755	6620037		2000	2020
Angianthus micropodioides	Priority 3	330772	6620004		2000	2020
Angianthus micropodioides	Priority 3	330771	6619972		5000	2020
Angianthus micropodioides	Priority 3	330773	6619926		5000	2020
Angianthus micropodioides	Priority 3	330788	6619799		5000	2020
Angianthus micropodioides	Priority 3	330784	6619744		1000	2020
Angianthus micropodioides	Priority 3	330782	6619705		3000	2020
Angianthus micropodioides	Priority 3	330760	6619707		5000	2020
Angianthus micropodioides	Priority 3	330778	6619661		5000	2020
Angianthus micropodioides	Priority 3	330787	6619635		3000	2020
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Chordifex reseminans	Priority 2	334402	6616940		7	2020
Chordifex reseminans	Priority 2	334403	6616901		15	2020
Chordifex reseminans	Priority 2	334567	6616895		3	2020
Chordifex reseminans	Priority 2	334562	6616956		7	2020
Chordifex reseminans	Priority 2	334552	6616986		10	2020
Chordifex reseminans	Priority 2	334546	6617025		7	2020
Chordifex reseminans	Priority 2	334544	6617062		6	2020
Chordifex reseminans	Priority 2	334547	6617096		4	2020
Chordifex reseminans	Priority 2	334548	6617164		3	2020
Chordifex reseminans	Priority 2	335054	6617424		5	2020
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Chordifex reseminans	Priority 2	334955	6617127		1	2020
Chordifex reseminans	Priority 2	335208	6617197		1	2020
Chordifex reseminans	Priority 2	335204	6617244		2	2020
Chordifex reseminans	Priority 2	335192	6617352		1	2020
Chordifex reseminans	Priority 2	335213	6617473		2	2020
Chordifex reseminans	Priority 2	335073	6617563		20	2020
Chordifex reseminans	Priority 2	335757	6617680		10	2020

Chordifex reseminans	Priority 2	335751	6617670		30	2020
Chordifex reseminans	Priority 2	335751	6617643		30	2020
Chordifex reseminans	Priority 2	335746	6617578		20	2020
Chordifex reseminans	Priority 2	335747	6617528		5	2020
Chordifex reseminans	Priority 2	335739	6617468		20	2020
Chordifex reseminans	Priority 2	335773	6617412		10	2020
Chordifex reseminans	Priority 2	335806	6617404		20	2020
Chordifex reseminans	Priority 2	335903	6617446		15	2020
Chordifex reseminans	Priority 2	335901	6617481		10	2020
Chordifex reseminans	Priority 2	335910	6617550		15	2020
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Chordifex reseminans	Priority 2	335896	6617681		20	2020
Chordifex reseminans	Priority 2	335903	6617703		30	2020
Chordifex reseminans	Priority 2	335903	6617756		20	2020
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Chordifex reseminans	Priority 2	336598	6617821		30	2020
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Chordifex reseminans	Priority 2	336606	6617710		20	2020
Chordifex reseminans	Priority 2	336592	6617651		10	2020
Chordifex reseminans	Priority 2	336611	6617602		5	2020
Chordifex reseminans	Priority 2	336600	6617552		5	2020
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Chordifex reseminans	Priority 2	336751	6617590		3	2020
Chordifex reseminans	Priority 2	336749	6617630		3	2020
Chordifex reseminans	Priority 2	336754	6617712		4	2020
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Chordifex reseminans	Priority 2	336759	6617921		12	2020
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Chordifex reseminans	Priority 2	337152	6617956		20	2020
Chordifex reseminans	Priority 2	337158	6617910		4	2020
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Chordifex reseminans	Priority 2	337306	6617876		13	2020
Chordifex reseminans	Priority 2	337298	6617982		18	2020
Chordifex reseminans	Priority 2	337301	6618021		15	2020
Chordifex reseminans	Priority 2	337301	6618110		5	2020
Chordifex reseminans	Priority 2	329924	6616774		4	2020
Chordifex reseminans	Priority 2	329926	6616794		3	2020
Chordifex reseminans	Priority 2	329903	6616839		3	2020
Chordifex reseminans	Priority 2	329073	6618759			2020
Chordifex reseminans	Priority 2	329041	6618812		1	2020

Chordifex reseminans	Priority 2	333767	6616954		8	2020
Chordifex reseminans	Priority 2	333776	6617005		15	2020
Chordifex reseminans	Priority 2	333759	6617066		1	2020
Chordifex reseminans	Priority 2	330806	6620544		2	2020
Chordifex reseminans	Priority 2	334456	6616979		2	2020
Chordifex reseminans	Priority 2	334518	6617058		4	2020
Chordifex reseminans	Priority 2	334487	6617093		6	2020
Chordifex reseminans	Priority 2	334472	6617133		4	2020
Chordifex reseminans	Priority 2	335114	6617457		9	2020
Chordifex reseminans	Priority 2	335109	6617335		3	2020
Chordifex reseminans	Priority 2	335098	6617284		125	2020
Chordifex reseminans	Priority 2	335101	6617268		7	2020
Chordifex reseminans	Priority 2	335150	6617214		9	2020
Chordifex reseminans	Priority 2	335801	6617733		12	2020
Chordifex reseminans	Priority 2	335799	6617698		12	2020
Chordifex reseminans	Priority 2	335794	6617661		18	2020
Chordifex reseminans	Priority 2	335792	6617541		15	2020
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Chordifex reseminans	Priority 2	335826	6617437		20	2020
Chordifex reseminans	Priority 2	335858	6617485		15	2020
Chordifex reseminans	Priority 2	335845	6617572		15	2020
Chordifex reseminans	Priority 2	335850	6617599		20	2020
Chordifex reseminans	Priority 2	335835	6617738		20	2020
Chordifex reseminans	Priority 2	336652	6617792		13	2020
Chordifex reseminans	Priority 2	336685	6617793		15	2020
Chordifex reseminans	Priority 2	337206	6618075		15	2020
Chordifex reseminans	Priority 2	337189	6618032		20	2020
Chordifex reseminans	Priority 2	337198	6618007		100	2020
Chordifex reseminans	Priority 2	337190	6617989		50	2020
Chordifex reseminans	Priority 2	337206	6617895		18	2020
Chordifex reseminans	Priority 2	337193	6617823		20	2020
Chordifex reseminans	Priority 2	337251	6617783		7	2020
Chordifex reseminans	Priority 2	337256	6618008		9	2020
Chordifex reseminans	Priority 2	337239	6618037		6	2020
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Chordifex reseminans	Priority 2	329896	6616796		15	2020
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Conospermum scaposum	Priority 3	331031	6620616		8	2020
Conospermum scaposum	Priority 3	331034	6620628		25	2020
Conospermum scaposum	Priority 3	330470	6619432		5	2020
Conospermum scaposum	Priority 3	330985	6620589		6	2020
Conospermum scaposum	Priority 3	330968	6620682		10	2020
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Desmocladus nodatus	Priority 3	341388	6618724	no site	20	2019
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Desmocladus nodatus	Priority 3	331125	6619941		3	2020
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Desmocladus nodatus	Priority 3	331046	6620384		4	2020
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Desmocladus nodatus	Priority 3	331094	6620446		8	2020
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Desmocladus nodatus	Priority 3	341196	6618501		21	2020
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Desmocladus nodatus	Priority 3	341367	6618722		75	2020
Desmocladus nodatus	Priority 3	341370	6618742		70	2020
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Desmocladus nodatus	Priority 3	341504	6618821		30	2020
Desmocladus nodatus	Priority 3	341503	6618798		20	2020
Desmocladus nodatus	Priority 3	341362	6618519		12	2020
Desmocladus nodatus	Priority 3	341333	6618637		30	2020
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Desmocladus nodatus	Priority 3	341319	6618082		5	2020

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Desmocladus nodatus	Priority 3	341368	6618415		30	2020
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Desmocladus nodatus	Priority 3	334403	6616901		5	2020
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Desmocladus nodatus	Priority 3	334544	6617062		6	2020
Desmocladus nodatus	Priority 3	334547	6617096		40	2020
Desmocladus nodatus	Priority 3	334548	6617164		4	2020
Desmocladus nodatus	Priority 3	335208	6617197		22	2020
Desmocladus nodatus	Priority 3	335203	6617291		50	2020
Desmocladus nodatus	Priority 3	335192	6617352		5	2020
Desmocladus nodatus	Priority 3	335207	6617509		2	2020
Desmocladus nodatus	Priority 3	335048	6617519		1	2020
Desmocladus nodatus	Priority 3	335751	6617670		5	2020
Desmocladus nodatus	Priority 3	335773	6617412		7	2020
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Desmocladus nodatus	Priority 3	340508	6618355		50	2020
Desmocladus nodatus	Priority 3	340503	6618309		140	2020
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Desmocladus nodatus	Priority 3	340567	6618166		10	2020
Desmocladus nodatus	Priority 3	340660	6618113		20	2020
Desmocladus nodatus	Priority 3	340684	6618121		40	2020
Desmocladus nodatus	Priority 3	340676	6618135		20	2020
Desmocladus nodatus	Priority 3	340653	6618278		20	2020
Desmocladus nodatus	Priority 3	340656	6618314		30	2020
Desmocladus nodatus	Priority 3	340652	6618371		10	2020

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Desmocladus nodatus	Priority 3	337158	6617991		1	2020
Desmocladus nodatus	Priority 3	337152	6617956		8	2020
Desmocladus nodatus	Priority 3	337158	6617910		7	2020
Desmocladus nodatus	Priority 3	337157	6617866		50	2020
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Desmocladus nodatus	Priority 3	337306	6617876		55	2020
Desmocladus nodatus	Priority 3	337298	6617982		20	2020
Desmocladus nodatus	Priority 3	337301	6618021		10	2020
Desmocladus nodatus	Priority 3	337301	6618110		50	2020
Desmocladus nodatus	Priority 3	329924	6616774		50	2020
Desmocladus nodatus	Priority 3	329926	6616794		35	2020
Desmocladus nodatus	Priority 3	329916	6616821		20	2020
Desmocladus nodatus	Priority 3	333626	6617048		20	2020
Desmocladus nodatus	Priority 3	333652	6617011		5	2020
Desmocladus nodatus	Priority 3	333653	6616936		1	2020
Desmocladus nodatus	Priority 3	333700	6616914		1	2020
Desmocladus nodatus	Priority 3	333777	6616927		11	2020
Desmocladus nodatus	Priority 3	333767	6616954		10	2020
Desmocladus nodatus	Priority 3	333776	6617005		20	2020
Desmocladus nodatus	Priority 3	333774	6617047		22	2020
Desmocladus nodatus	Priority 3	333759	6617066		8	2020
Desmocladus nodatus	Priority 3	331103	6620670		14	2020
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Desmocladus nodatus	Priority 3	335143	6617189		100	2020
Desmocladus nodatus	Priority 3	335156	6617313		30	2020
Desmocladus nodatus	Priority 3	335146	6617431		50	2020
Desmocladus nodatus	Priority 3	335162	6617492		15	2020
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Desmocladus nodatus	Priority 3	340555	6618260		50	2020
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Desmocladus nodatus	Priority 3	337202	6618033		100	2020
Desmocladus nodatus	Priority 3	337193	6618013		30	2020
Desmocladus nodatus	Priority 3	337215	6617915		7	2020
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Desmocladus nodatus	Priority 3	337198	6617860		100	2020
Desmocladus nodatus	Priority 3	337212	6617857		100	2020
Desmocladus nodatus	Priority 3	337217	6617844		100	2020
Desmocladus nodatus	Priority 3	337203	6617834		100	2020
Desmocladus nodatus	Priority 3	337179	6617804		100	2020
Desmocladus nodatus	Priority 3	337193	6617799		100	2020
Desmocladus nodatus	Priority 3	337211	6617796		100	2020
Desmocladus nodatus	Priority 3	337222	6617798		100	2020
Desmocladus nodatus	Priority 3	337222	6617779		100	2020
Desmocladus nodatus	Priority 3	337250	6617780		100	2020
Desmocladus nodatus	Priority 3	337261	6617786		100	2020
Desmocladus nodatus	Priority 3	337269	6617791		100	2020
Desmocladus nodatus	Priority 3	337250	6617809		100	2020
Desmocladus nodatus	Priority 3	337245	6617823		50	2020
Desmocladus nodatus	Priority 3	337256	6617841		50	2020
Desmocladus nodatus	Priority 3	337259	6617891		20	2020
Desmocladus nodatus	Priority 3	337247	6618027		30	2020
Desmocladus nodatus	Priority 3	337253	6618057		50	2020
Desmocladus nodatus	Priority 3	337240	6618093		40	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	333637	6617113	no site	1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	333646	6617106	no site	4	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	333673	6617128	no site	2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	333681	6617118	no site	1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	333685	6617113	no site	1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	333710	6617122	no site	1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341424	6618844	no site	15	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341443	6618849	no site	20	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341433	6619132	no site	6	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341429	6619152	no site	5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341465	6619104	no site	1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341460	6619094	no site	3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341470	6618860	no site	9	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341461	6618844	no site	1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341368	6618433	no site	3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341341	6618427	no site	2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341327	6618418	no site	5	2019

Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	338334	6618392	no site	56	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	338331	6618367	no site	17	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	338318	6618316	no site	1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	338328	6618452	no site	1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	336742	6618015	no site	2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331253	6620575	no site	2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331194	6620146	no site	4	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331166	6620011	no site	1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331101	6620012	no site	1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331130	6619965	no site	1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331081	6619908	no site	1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331119	6619855	no site	4	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	333771	6617072	no site	9	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	333786	6617046	no site	24	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	333808	6617006	no site	15	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	333829	6617002	no site	24	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	333814	6616975	no site	5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	333814	6616975	no site	1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	333814	6616959	no site	4	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	333610	6617111	no site	4	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	333590	6617110	no site	3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	333593	6617128	no site	7	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	333611	6617138	no site	11	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	333627	6617148	no site	6	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	333648	6617157	no site	1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	333662	6617159	no site	5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	333670	6617142	no site	1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	333680	6617153	no site	1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	333696	6617152	no site	1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	333704	6617141	no site	6	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341377	6618823	no site	3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341367	6618830	no site	5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341413	6618843	no site	8	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341371	6618861	no site	2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341386	6618894	no site	8	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341374	6618990	no site	2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341393	6619006	no site	2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341378	6619052	no site	3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341377	6619065	no site	1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341387	6619150	no site	1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341517	6619135	no site	3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341520	6619000	no site	2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341489	6618870	no site	7	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341496	6618850	no site	5	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341516	6618784	no site	1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341323	6618454	no site	3	2019

Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341307	6618460	no site	2	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341310	6618450	no site	4	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341280	6618456	no site	12	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341255	6618450	no site	3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341224	6618449	no site	1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341181	6618450	no site	3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341225	6618436	no site	1	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341303	6618442	no site	3	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	338419	6618448	no site	14	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	338394	6618439	no site	17	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	338370	6618427	no site	18	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	338386	6618423	no site	6	2019
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331169	6620107		1	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331060	6620101		10	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	330969	6620037		3	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	330972	6619983		1	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	330980	6619815		1	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	330970	6619536		6	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	330960	6619514		8	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	330867	6619547		12	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	330886	6619987		1	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331041	6620248		1	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331074	6620431		1	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	330789	6619624		6	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	330810	6619583		7	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	330828	6619564		8	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	330867	6619552		8	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	330644	6619649		5	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	330651	6619508		1	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	330653	6619486		1	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	330669	6619474		2	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	330648	6619455		3	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	330522	6619472		3	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	330590	6619520		5	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	330670	6620239		3	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341336	6618519		1	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341333	6618936		3	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341334	6618962		2	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341370	6619655		2	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341498	6619678		1	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341408	6619719		2	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	334407	6617141		2	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	334418	6617138		4	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335089	6617493		35	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335070	6617485		40	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335076	6617451		4	2020

Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335041	6617457		25	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335056	6617436		1	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335045	6617390		2	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335052	6617376		2	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335066	6617374		9	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335085	6617362		8	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335074	6617353		25	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335068	6617330		15	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335058	6617307		4	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335030	6617303		9	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335044	6617218		40	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335057	6617187		30	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335028	6617181		23	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	334980	6617158		40	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	334940	6617164		10	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	334987	6617106		15	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335013	6617093		21	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335052	6617104		30	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335054	6617137		20	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335074	6617177		5	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335197	6617384		4	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335207	6617509		7	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335081	6617532		13	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335055	6617519		12	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335035	6617505		43	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	334988	6617479		15	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	334925	6617501		11	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	334979	6617538		1	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335036	6617567		6	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335757	6617680		1	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335736	6617473		1	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	336577	6617882		40	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	336621	6617874		10	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	336590	6617812		3	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	336593	6617480		3	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	336602	6617450		40	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	336772	6617854		20	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	338074	6618423		10	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	338024	6618401		1	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	337947	6618416		5	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	338024	6618447		1	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	338053	6618442		5	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	338093	6618456		9	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	337155	6618114		1	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	337169	6618058		42	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	337162	6618030		10	2020

Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	337149	6618022		30	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	337130	6618004		10	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	337149	6617997		10	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	337164	6617973		26	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	337132	6617945		40	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	337135	6617907		30	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	337096	6617873		70	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	337057	6617902		100	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	337157	6617866		2	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	337099	6617801		50	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	337159	6617726		50	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	337178	6617687		60	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	337315	6617816		13	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	337291	6617858		10	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	337325	6617905		50	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	337307	6617941		32	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332255	6613476		24	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332181	6613465		23	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332147	6613448		26	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332135	6613479		26	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332145	6613519		2	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332186	6613543		10	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332197	6613506		10	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332204	6613475		30	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	329926	6616794		2	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	329916	6616821		20	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	328999	6618835		4	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	329013	6618812		2	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331064	6619727		2	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331050	6619740		4	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331052	6620011		3	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331033	6620035		5	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	330999	6620003		3	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331027	6619713		2	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331040	6619469		12	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331030	6619465		5	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	331013	6619462		8	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	330921	6620080		2	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	330637	6619640		3	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	330597	6619494		2	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	330578	6619491		2	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341270	6618487		2	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341425	6619053		2	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341376	6619662		4	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341377	6619663		4	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	341264	6618412		2	2020

Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335113	6617508		80	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335117	6617486		50	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335128	6617471		14	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335102	6617443		7	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335084	6617378		4	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335126	6617349		23	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335096	6617330		8	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335097	6617305		16	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335111	6617247		16	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335109	6617204		40	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335099	6617184		40	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335085	6617152		14	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335091	6617132		8	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335121	6617129		7	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335141	6617161		25	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335150	6617256		30	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335144	6617284		40	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335140	6617328		20	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335153	6617363		16	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335148	6617388		13	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335147	6617506		13	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335040	6617531		4	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335018	6617509		7	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	334993	6617503		9	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	334975	6617497		6	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	334956	6617485		13	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	334952	6617491		3	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335042	6617554		6	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	335824	6617488		7	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	336652	6617897		8	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	336701	6617885		12	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	340560	6618255		3	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	338081	6618383		27	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	338104	6618386		12	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	338077	6618361		24	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	338080	6618339		19	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	338083	6618319		5	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	338083	6618276		20	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	338071	6618299		4	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	338052	6618322		3	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	338049	6618347		1	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	338045	6618371		9	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	338033	6618355		3	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	338031	6618338		3	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	338026	6618332		4	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	338022	6618355		2	2020

Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	338036	6618377		6	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	337200	6617962		16	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	337188	6617955		12	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	337210	6617921		14	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	337269	6617864		6	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	337257	6617870		14	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	337244	6617914		22	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	337245	6617930		16	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	337265	6617934		9	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	337250	6617948		6	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	337235	6617954		6	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	337233	6617982		5	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332252	6613428		6	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332168	6613436		11	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332273	6613417		7	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332276	6613398		4	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	332277	6613405		3	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	328925	6618968		2	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	328892	6618994		4	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	328877	6618988		2	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	328867	6619003		3	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	328870	6618987		1	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	328900	6618975		4	2020
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Priority 1	329003	6618851		1	2020
Isopogon panduratus subsp. palustris	Priority 3	333719	6617055	no site	19	2019
Isopogon panduratus subsp. palustris	Priority 3	333727	6617021	no site	25	2019
Isopogon panduratus subsp. palustris	Priority 3	333737	6616988	no site	9	2019
Isopogon panduratus subsp. palustris	Priority 3	333749	6616957	no site	3	2019
Isopogon panduratus subsp. palustris	Priority 3	333778	6616961	no site	5	2019
Isopogon panduratus subsp. palustris	Priority 3	333693	6616917	no site	1	2019
Isopogon panduratus subsp. palustris	Priority 3	333727	6616925	no site	8	2019
Isopogon panduratus subsp. palustris	Priority 3	333715	6616966	no site	1	2019
Isopogon panduratus subsp. palustris	Priority 3	333680	6616977	no site	5	2019
Isopogon panduratus subsp. palustris	Priority 3	333679	6617009	no site	11	2019
Isopogon panduratus subsp. palustris	Priority 3	333686	6617113	no site	1	2019
Isopogon panduratus subsp. palustris	Priority 3	341364	6618392	no site	16	2019
Isopogon panduratus subsp. palustris	Priority 3	341373	6618357	no site	2	2019
Isopogon panduratus subsp. palustris	Priority 3	341358	6618298	no site	3	2019
Isopogon panduratus subsp. palustris	Priority 3	341380	6618181	no site	12	2019
Isopogon panduratus subsp. palustris	Priority 3	341396	6618121	no site	49	2019
Isopogon panduratus subsp. palustris	Priority 3	341446	6618135	no site	32	2019
Isopogon panduratus subsp. palustris	Priority 3	341419	6618168	no site	18	2019
Isopogon panduratus subsp. palustris	Priority 3	341430	6618189	no site	1	2019
Isopogon panduratus subsp. palustris	Priority 3	341415	6618212	no site	2	2019
Isopogon panduratus subsp. palustris	Priority 3	341433	6618237	no site	5	2019
Isopogon panduratus subsp. palustris	Priority 3	341406	6618307	no site	1	2019

Isopogon panduratus subsp. palustris	Priority 3	336743	6617996	no site	1	2019
Isopogon panduratus subsp. palustris	Priority 3	336744	6617991	no site	20	2019
Isopogon panduratus subsp. palustris	Priority 3	336738	6618041	no site	2	2019
Isopogon panduratus subsp. palustris	Priority 3	336731	6618054	no site	1	2019
Isopogon panduratus subsp. palustris	Priority 3	336719	6618037	no site	2	2019
Isopogon panduratus subsp. palustris	Priority 3	331102	6619846	no site	1	2019
Isopogon panduratus subsp. palustris	Priority 3	333816	6616952	no site	1	2019
Isopogon panduratus subsp. palustris	Priority 3	333836	6616941	no site	1	2019
Isopogon panduratus subsp. palustris	Priority 3	333663	6616928	no site	16	2019
Isopogon panduratus subsp. palustris	Priority 3	333641	6616957	no site	38	2019
Isopogon panduratus subsp. palustris	Priority 3	333651	6616972	no site	37	2019
Isopogon panduratus subsp. palustris	Priority 3	333666	6616975	no site	7	2019
Isopogon panduratus subsp. palustris	Priority 3	333653	6617005	no site	39	2019
Isopogon panduratus subsp. palustris	Priority 3	333652	6617030	no site	38	2019
Isopogon panduratus subsp. palustris	Priority 3	333621	6617041	no site	27	2019
Isopogon panduratus subsp. palustris	Priority 3	333616	6617060	no site	1	2019
Isopogon panduratus subsp. palustris	Priority 3	333719	6617141	no site	1	2019
Isopogon panduratus subsp. palustris	Priority 3	341383	6619224	no site	3	2019
Isopogon panduratus subsp. palustris	Priority 3	341445	6619232	no site	3	2019
Isopogon panduratus subsp. palustris	Priority 3	341514	6619225	no site	3	2019
Isopogon panduratus subsp. palustris	Priority 3	341510	6618979	no site	1	2019
Isopogon panduratus subsp. palustris	Priority 3	341507	6618926	no site	3	2019
Isopogon panduratus subsp. palustris	Priority 3	341513	6618622	no site	1	2019
Isopogon panduratus subsp. palustris	Priority 3	341325	6618408	no site	5	2019
Isopogon panduratus subsp. palustris	Priority 3	341325	6618379	no site	4	2019
Isopogon panduratus subsp. palustris	Priority 3	341323	6618334	no site	6	2019
Isopogon panduratus subsp. palustris	Priority 3	341326	6618290	no site	6	2019
Isopogon panduratus subsp. palustris	Priority 3	341326	6618231	no site	14	2019
Isopogon panduratus subsp. palustris	Priority 3	341320	6618195	no site	5	2019
Isopogon panduratus subsp. palustris	Priority 3	341323	6618171	no site	9	2019
Isopogon panduratus subsp. palustris	Priority 3	341332	6618149	no site	32	2019
Isopogon panduratus subsp. palustris	Priority 3	341333	6618111	no site	70	2019
Isopogon panduratus subsp. palustris	Priority 3	341376	6618083	no site	130	2019
Isopogon panduratus subsp. palustris	Priority 3	341379	6618033	no site	14	2019
Isopogon panduratus subsp. palustris	Priority 3	341322	6618049	no site	12	2019
Isopogon panduratus subsp. palustris	Priority 3	341291	6618088	no site	14	2019
Isopogon panduratus subsp. palustris	Priority 3	341260	6618156	no site	1	2019
Isopogon panduratus subsp. palustris	Priority 3	341256	6618184	no site	3	2019
Isopogon panduratus subsp. palustris	Priority 3	341270	6618210	no site	3	2019
Isopogon panduratus subsp. palustris	Priority 3	341270	6618246	no site	25	2019
Isopogon panduratus subsp. palustris	Priority 3	341270	6618272	no site	3	2019
Isopogon panduratus subsp. palustris	Priority 3	338409	6618259	no site	40	2019
Isopogon panduratus subsp. palustris	Priority 3	338403	6618224	no site	103	2019
Isopogon panduratus subsp. palustris	Priority 3	338379	6618226	no site	3	2019
Isopogon panduratus subsp. palustris	Priority 3	338238	6618292	no site	10	2019
Isopogon panduratus subsp. palustris	Priority 3	338209	6618299	no site	30	2019

Isopogon panduratus subsp. palustris	Priority 3	338223	6618340	no site	86	2019
Isopogon panduratus subsp. palustris	Priority 3	338219	6618366	no site	1	2019
Isopogon panduratus subsp. palustris	Priority 3	338198	6618373	no site	72	2019
Isopogon panduratus subsp. palustris	Priority 3	338213	6618398	no site	3	2019
Isopogon panduratus subsp. palustris	Priority 3	338210	6618410	no site	4	2019
Isopogon panduratus subsp. palustris	Priority 3	331121	6619712		1	2020
Isopogon panduratus subsp. palustris	Priority 3	331114	6620092		3	2020
Isopogon panduratus subsp. palustris	Priority 3	331045	6620087		1	2020
Isopogon panduratus subsp. palustris	Priority 3	331005	6620062		15	2020
Isopogon panduratus subsp. palustris	Priority 3	330969	6620037		20	2020
Isopogon panduratus subsp. palustris	Priority 3	330986	6619858		1	2020
Isopogon panduratus subsp. palustris	Priority 3	330954	6619504		15	2020
Isopogon panduratus subsp. palustris	Priority 3	330970	6619488		10	2020
Isopogon panduratus subsp. palustris	Priority 3	330865	6619511		1	2020
Isopogon panduratus subsp. palustris	Priority 3	331073	6620415		2	2020
Isopogon panduratus subsp. palustris	Priority 3	331181	6620775		1	2020
Isopogon panduratus subsp. palustris	Priority 3	331076	6620420		2	2020
Isopogon panduratus subsp. palustris	Priority 3	330660	6619459		40	2020
Isopogon panduratus subsp. palustris	Priority 3	330514	6619475		40	2020
Isopogon panduratus subsp. palustris	Priority 3	330477	6619467		20	2020
Isopogon panduratus subsp. palustris	Priority 3	330470	6619432		10	2020
Isopogon panduratus subsp. palustris	Priority 3	330510	6619439		20	2020
Isopogon panduratus subsp. palustris	Priority 3	330576	6619725		10	2020
Isopogon panduratus subsp. palustris	Priority 3	341382	6618610		1	2020
Isopogon panduratus subsp. palustris	Priority 3	341367	6619181		3	2020
Isopogon panduratus subsp. palustris	Priority 3	341456	6619652		20	2020
Isopogon panduratus subsp. palustris	Priority 3	341479	6619648		30	2020
Isopogon panduratus subsp. palustris	Priority 3	341498	6619678		4	2020
Isopogon panduratus subsp. palustris	Priority 3	341408	6619719		14	2020
Isopogon panduratus subsp. palustris	Priority 3	334418	6617138		15	2020
Isopogon panduratus subsp. palustris	Priority 3	334398	6617105		20	2020
Isopogon panduratus subsp. palustris	Priority 3	334380	6617094		30	2020
Isopogon panduratus subsp. palustris	Priority 3	334401	6617062		40	2020
Isopogon panduratus subsp. palustris	Priority 3	334399	6617037		60	2020
Isopogon panduratus subsp. palustris	Priority 3	334377	6617019		55	2020
Isopogon panduratus subsp. palustris	Priority 3	334399	6617000		15	2020
Isopogon panduratus subsp. palustris	Priority 3	334401	6616962		10	2020
Isopogon panduratus subsp. palustris	Priority 3	334402	6616940		16	2020
Isopogon panduratus subsp. palustris	Priority 3	334403	6616901		14	2020
Isopogon panduratus subsp. palustris	Priority 3	334535	6616882		12	2020
Isopogon panduratus subsp. palustris	Priority 3	334548	6616889		12	2020
Isopogon panduratus subsp. palustris	Priority 3	334567	6616895		35	2020
Isopogon panduratus subsp. palustris	Priority 3	334555	6616928		50	2020
Isopogon panduratus subsp. palustris	Priority 3	334552	6616986		100	2020
Isopogon panduratus subsp. palustris	Priority 3	334546	6617025		90	2020
Isopogon panduratus subsp. palustris	Priority 3	334544	6617062		40	2020

Isopogon panduratus subsp. palustris	Priority 3	334547	6617096		40	2020
Isopogon panduratus subsp. palustris	Priority 3	335052	6617376		11	2020
Isopogon panduratus subsp. palustris	Priority 3	334940	6617164		4	2020
Isopogon panduratus subsp. palustris	Priority 3	334956	6617122		20	2020
Isopogon panduratus subsp. palustris	Priority 3	334987	6617106		20	2020
Isopogon panduratus subsp. palustris	Priority 3	335208	6617197		41	2020
Isopogon panduratus subsp. palustris	Priority 3	335204	6617244		15	2020
Isopogon panduratus subsp. palustris	Priority 3	335203	6617291		20	2020
Isopogon panduratus subsp. palustris	Priority 3	335192	6617352		6	2020
Isopogon panduratus subsp. palustris	Priority 3	335202	6617439		1	2020
Isopogon panduratus subsp. palustris	Priority 3	335207	6617509		6	2020
Isopogon panduratus subsp. palustris	Priority 3	335203	6617557		31	2020
Isopogon panduratus subsp. palustris	Priority 3	335755	6617708		14	2020
Isopogon panduratus subsp. palustris	Priority 3	335751	6617670		40	2020
Isopogon panduratus subsp. palustris	Priority 3	335747	6617528		26	2020
Isopogon panduratus subsp. palustris	Priority 3	335770	6617428		20	2020
Isopogon panduratus subsp. palustris	Priority 3	335773	6617412		10	2020
Isopogon panduratus subsp. palustris	Priority 3	335806	6617404		15	2020
Isopogon panduratus subsp. palustris	Priority 3	335903	6617446		20	2020
Isopogon panduratus subsp. palustris	Priority 3	335901	6617481		70	2020
Isopogon panduratus subsp. palustris	Priority 3	335910	6617550		15	2020
Isopogon panduratus subsp. palustris	Priority 3	335905	6617625		1	2020
Isopogon panduratus subsp. palustris	Priority 3	335893	6617649		7	2020
Isopogon panduratus subsp. palustris	Priority 3	335903	6617703		15	2020
Isopogon panduratus subsp. palustris	Priority 3	335903	6617756		10	2020
Isopogon panduratus subsp. palustris	Priority 3	336599	6617929		15	2020
Isopogon panduratus subsp. palustris	Priority 3	336621	6617874		10	2020
Isopogon panduratus subsp. palustris	Priority 3	336609	6617831		40	2020
Isopogon panduratus subsp. palustris	Priority 3	336607	6617758		30	2020
Isopogon panduratus subsp. palustris	Priority 3	336606	6617710		21	2020
Isopogon panduratus subsp. palustris	Priority 3	336592	6617651		15	2020
Isopogon panduratus subsp. palustris	Priority 3	336611	6617602		20	2020
Isopogon panduratus subsp. palustris	Priority 3	336587	6617567		40	2020
Isopogon panduratus subsp. palustris	Priority 3	336600	6617552		15	2020
Isopogon panduratus subsp. palustris	Priority 3	336598	6617497		10	2020
Isopogon panduratus subsp. palustris	Priority 3	336602	6617450		10	2020
Isopogon panduratus subsp. palustris	Priority 3	336664	6617488		20	2020
Isopogon panduratus subsp. palustris	Priority 3	336692	6617523		10	2020
Isopogon panduratus subsp. palustris	Priority 3	336751	6617590		10	2020
Isopogon panduratus subsp. palustris	Priority 3	336750	6617668		45	2020
Isopogon panduratus subsp. palustris	Priority 3	336754	6617712		15	2020
Isopogon panduratus subsp. palustris	Priority 3	336748	6617974		7	2020
Isopogon panduratus subsp. palustris	Priority 3	340501	6618435		10	2020
Isopogon panduratus subsp. palustris	Priority 3	340497	6618402		25	2020
Isopogon panduratus subsp. palustris	Priority 3	340508	6618355		45	2020
Isopogon panduratus subsp. palustris	Priority 3	340503	6618309		16	2020

Isopogon panduratus subsp. palustris	Priority 3	340500	6618254		7	2020
Isopogon panduratus subsp. palustris	Priority 3	340660	6618113		7	2020
Isopogon panduratus subsp. palustris	Priority 3	340676	6618135		30	2020
Isopogon panduratus subsp. palustris	Priority 3	340656	6618314		25	2020
Isopogon panduratus subsp. palustris	Priority 3	337147	6618096		20	2020
Isopogon panduratus subsp. palustris	Priority 3	337130	6618004		15	2020
Isopogon panduratus subsp. palustris	Priority 3	337149	6617997		15	2020
Isopogon panduratus subsp. palustris	Priority 3	337152	6617956		30	2020
Isopogon panduratus subsp. palustris	Priority 3	337158	6617910		60	2020
Isopogon panduratus subsp. palustris	Priority 3	337157	6617866		50	2020
Isopogon panduratus subsp. palustris	Priority 3	337149	6617822		40	2020
Isopogon panduratus subsp. palustris	Priority 3	337261	6617712		4	2020
Isopogon panduratus subsp. palustris	Priority 3	337299	6617755		5	2020
Isopogon panduratus subsp. palustris	Priority 3	337306	6617876		20	2020
Isopogon panduratus subsp. palustris	Priority 3	337298	6617982		10	2020
Isopogon panduratus subsp. palustris	Priority 3	337301	6618021		50	2020
Isopogon panduratus subsp. palustris	Priority 3	332145	6613519		8	2020
Isopogon panduratus subsp. palustris	Priority 3	332163	6613546		6	2020
Isopogon panduratus subsp. palustris	Priority 3	328999	6618835		1	2020
Isopogon panduratus subsp. palustris	Priority 3	329073	6618759		5	2020
Isopogon panduratus subsp. palustris	Priority 3	329109	6618804		10	2020
Isopogon panduratus subsp. palustris	Priority 3	329041	6618812		5	2020
Isopogon panduratus subsp. palustris	Priority 3	327508	6621348		2	2020
Isopogon panduratus subsp. palustris	Priority 3	330902	6619473		2	2020
Isopogon panduratus subsp. palustris	Priority 3	330930	6620029		2	2020
Isopogon panduratus subsp. palustris	Priority 3	330919	6620058		1	2020
Isopogon panduratus subsp. palustris	Priority 3	331071	6620279		1	2020
Isopogon panduratus subsp. palustris	Priority 3	330516	6619510		12	2020
Isopogon panduratus subsp. palustris	Priority 3	330490	6619498		15	2020
Isopogon panduratus subsp. palustris	Priority 3	330442	6619505		12	2020
Isopogon panduratus subsp. palustris	Priority 3	330448	6619535		20	2020
Isopogon panduratus subsp. palustris	Priority 3	330472	6619534		4	2020
Isopogon panduratus subsp. palustris	Priority 3	330498	6619528		8	2020
Isopogon panduratus subsp. palustris	Priority 3	330538	6619517		7	2020
Isopogon panduratus subsp. palustris	Priority 3	341021	6618499		12	2020
Isopogon panduratus subsp. palustris	Priority 3	341412	6619667		8	2020
Isopogon panduratus subsp. palustris	Priority 3	341439	6619664		7	2020
Isopogon panduratus subsp. palustris	Priority 3	341454	6619662		20	2020
Isopogon panduratus subsp. palustris	Priority 3	341413	6618089		14	2020
Isopogon panduratus subsp. palustris	Priority 3	334457	6617153		3	2020
Isopogon panduratus subsp. palustris	Priority 3	334446	6617095		20	2020
Isopogon panduratus subsp. palustris	Priority 3	334450	6617058		28	2020
Isopogon panduratus subsp. palustris	Priority 3	334452	6617025		24	2020
Isopogon panduratus subsp. palustris	Priority 3	334449	6616997		19	2020
Isopogon panduratus subsp. palustris	Priority 3	334462	6616962		14	2020
Isopogon panduratus subsp. palustris	Priority 3	334446	6616941		8	2020

Isopogon panduratus subsp. palustris	Priority 3	334439	6616914		7	2020
Isopogon panduratus subsp. palustris	Priority 3	334455	6616874		11	2020
Isopogon panduratus subsp. palustris	Priority 3	334499	6616851		8	2020
Isopogon panduratus subsp. palustris	Priority 3	334508	6616888		6	2020
Isopogon panduratus subsp. palustris	Priority 3	334496	6616929		13	2020
Isopogon panduratus subsp. palustris	Priority 3	334509	6616964		25	2020
Isopogon panduratus subsp. palustris	Priority 3	334502	6616993		30	2020
Isopogon panduratus subsp. palustris	Priority 3	334521	6617007		40	2020
Isopogon panduratus subsp. palustris	Priority 3	334518	6617041		14	2020
Isopogon panduratus subsp. palustris	Priority 3	334519	6617072		8	2020
Isopogon panduratus subsp. palustris	Priority 3	334505	6617092		13	2020
Isopogon panduratus subsp. palustris	Priority 3	334493	6617104		25	2020
Isopogon panduratus subsp. palustris	Priority 3	334493	6617129		25	2020
Isopogon panduratus subsp. palustris	Priority 3	334498	6617160		14	2020
Isopogon panduratus subsp. palustris	Priority 3	335123	6617111		6	2020
Isopogon panduratus subsp. palustris	Priority 3	335153	6617127		5	2020
Isopogon panduratus subsp. palustris	Priority 3	335161	6617464		2	2020
Isopogon panduratus subsp. palustris	Priority 3	335160	6617529		32	2020
Isopogon panduratus subsp. palustris	Priority 3	335072	6617570		9	2020
Isopogon panduratus subsp. palustris	Priority 3	335807	6617706		17	2020
Isopogon panduratus subsp. palustris	Priority 3	335798	6617681		11	2020
Isopogon panduratus subsp. palustris	Priority 3	335816	6617665		14	2020
Isopogon panduratus subsp. palustris	Priority 3	335792	6617567		9	2020
Isopogon panduratus subsp. palustris	Priority 3	335807	6617538		35	2020
Isopogon panduratus subsp. palustris	Priority 3	335811	6617504		30	2020
Isopogon panduratus subsp. palustris	Priority 3	335808	6617458		16	2020
Isopogon panduratus subsp. palustris	Priority 3	335811	6617439		30	2020
Isopogon panduratus subsp. palustris	Priority 3	335857	6617463		6	2020
Isopogon panduratus subsp. palustris	Priority 3	335858	6617510		14	2020
Isopogon panduratus subsp. palustris	Priority 3	335851	6617547		2	2020
Isopogon panduratus subsp. palustris	Priority 3	335848	6617567		40	2020
Isopogon panduratus subsp. palustris	Priority 3	335857	6617578		17	2020
Isopogon panduratus subsp. palustris	Priority 3	335856	6617675		14	2020
Isopogon panduratus subsp. palustris	Priority 3	335858	6617699		20	2020
Isopogon panduratus subsp. palustris	Priority 3	335860	6617749		6	2020
Isopogon panduratus subsp. palustris	Priority 3	336653	6617963		7	2020
Isopogon panduratus subsp. palustris	Priority 3	336654	6617920		5	2020
Isopogon panduratus subsp. palustris	Priority 3	336662	6617831		12	2020
Isopogon panduratus subsp. palustris	Priority 3	336648	6617789		8	2020
Isopogon panduratus subsp. palustris	Priority 3	336659	6617725		6	2020
Isopogon panduratus subsp. palustris	Priority 3	336661	6617677		11	2020
Isopogon panduratus subsp. palustris	Priority 3	336651	6617643		30	2020
Isopogon panduratus subsp. palustris	Priority 3	336645	6617613		30	2020
Isopogon panduratus subsp. palustris	Priority 3	336684	6617593		8	2020
Isopogon panduratus subsp. palustris	Priority 3	336701	6617593		13	2020
Isopogon panduratus subsp. palustris	Priority 3	336706	6617626		11	2020

Isopogon panduratus subsp. palustris	Priority 3	336688	6617654		30	2020
Isopogon panduratus subsp. palustris	Priority 3	336705	6617720		8	2020
Isopogon panduratus subsp. palustris	Priority 3	336686	6617734		17	2020
Isopogon panduratus subsp. palustris	Priority 3	336697	6617819		6	2020
Isopogon panduratus subsp. palustris	Priority 3	336690	6617929		7	2020
Isopogon panduratus subsp. palustris	Priority 3	336701	6617963		13	2020
Isopogon panduratus subsp. palustris	Priority 3	340552	6618456		9	2020
Isopogon panduratus subsp. palustris	Priority 3	340550	6618402		3	2020
Isopogon panduratus subsp. palustris	Priority 3	340554	6618380		13	2020
Isopogon panduratus subsp. palustris	Priority 3	340567	6618341		6	2020
Isopogon panduratus subsp. palustris	Priority 3	340548	6618300		11	2020
Isopogon panduratus subsp. palustris	Priority 3	340600	6618292		6	2020
Isopogon panduratus subsp. palustris	Priority 3	340596	6618343		30	2020
Isopogon panduratus subsp. palustris	Priority 3	337202	6618128		12	2020
Isopogon panduratus subsp. palustris	Priority 3	337195	6618084		5	2020
Isopogon panduratus subsp. palustris	Priority 3	337207	6618052		4	2020
Isopogon panduratus subsp. palustris	Priority 3	337205	6618034		14	2020
Isopogon panduratus subsp. palustris	Priority 3	337188	6618024		11	2020
Isopogon panduratus subsp. palustris	Priority 3	337199	6617997		28	2020
Isopogon panduratus subsp. palustris	Priority 3	337204	6617976		32	2020
Isopogon panduratus subsp. palustris	Priority 3	337199	6617939		24	2020
Isopogon panduratus subsp. palustris	Priority 3	337210	6617905		11	2020
Isopogon panduratus subsp. palustris	Priority 3	337186	6617883		36	2020
Isopogon panduratus subsp. palustris	Priority 3	337217	6617847		22	2020
Isopogon panduratus subsp. palustris	Priority 3	337199	6617830		27	2020
Isopogon panduratus subsp. palustris	Priority 3	337220	6617787		7	2020
Isopogon panduratus subsp. palustris	Priority 3	337269	6617796		9	2020
Isopogon panduratus subsp. palustris	Priority 3	337261	6617852		1	2020
Isopogon panduratus subsp. palustris	Priority 3	337249	6617887		7	2020
Isopogon panduratus subsp. palustris	Priority 3	337251	6617907		4	2020
Isopogon panduratus subsp. palustris	Priority 3	337250	6617989		17	2020
Isopogon panduratus subsp. palustris	Priority 3	337262	6618015		31	2020
Isopogon panduratus subsp. palustris	Priority 3	337254	6618066		6	2020
Isopogon panduratus subsp. palustris	Priority 3	337260	6618082		12	2020
Isopogon panduratus subsp. palustris	Priority 3	337236	6618105		6	2020
Isopogon panduratus subsp. palustris	Priority 3	332146	6613372		1	2020
Isopogon panduratus subsp. palustris	Priority 3	332261	6613388		1	2020
Isopogon panduratus subsp. palustris	Priority 3	332273	6613378		1	2020
Isopogon panduratus subsp. palustris	Priority 3	332293	6613375		2	2020
Isopogon panduratus subsp. palustris	Priority 3	328968	6618924		3	2020
Isopogon panduratus subsp. palustris	Priority 3	328926	6618998		3	2020
Isopogon panduratus subsp. palustris	Priority 3	328996	6618912		1	2020
Isopogon panduratus subsp. palustris	Priority 3	329016	6618876		2	2020
Levenhookia preissii	Priority 1	340559	6618176		1	2020
Levenhookia preissii	Priority 1	340558	6618120		1	2020

APPENDIX EIGHT. Quadrat descriptions and species lists for the Atlas Survey Area

Atlas 2020 Update **Site** AIQ01

Described by JM **Date** 20/09/2021 **Type** Q 10x10

Season E **Uniformity**

Location Bore corridor, Wongonderrah Sth

MGA Zone 50 332098 **mE** 6613299 **mN** 115.248622 **E** -30.600987 **S**

Habitat Dampland

Soil Grey sand

Rock Type n/a

Vegetation Banksia telmatiaea, Regelia ciliata closed mid-shrubland over Chordifex reseminans, Lyginia imberbis Sparse Rushland

Veg Condition Excellent (near firebreak and fenceline; weeds in adjacent areas)

Fire Age More than 10 years since fire

Notes

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia pulchella var. glaberrima	+		60-120	AIQ01-13	Acacia pulchella
Banksia dallanneyi subsp. dallanneyi var. dallanneyi	+		20	AIQ01-23	Banksia dal dal
Banksia platycarpa	+		50	AIQ01-21	Banksia ?platycarpa
Banksia telmatiaea	40		110		Banksia telmatiaea
Caladenia flava subsp. flava	+		20		Caladenia flava subsp. flava
Cassytha glabella	+			AIQ01-03	Cassytha racemosa glab
Chordifex reseminans	0.5		40	AIQ01-01	Chordifex reseminans; Also AIQ01-20
Conospermum stoechadis subsp. stoechadis	+		60	AIQ01-08	Conospermum stoechadis
Conostylis festucacea subsp. festucacea	+		20	AIQ01-02	Conostylis ?festucaceae
Corynotheca micrantha var. micrantha	+		40	AIQ01-11	Thysanotus
Darwinia pinifolia	+		10	AIQ01-07	Darwinia
Daviesia decurrens subsp. decurrens	+		45	AIQ01-18	Daviesia ?decurrens
Desmocladus flexuosus	+		30	AIQ01-09	Desmo virg
Hibbertia hypericoides	+		25		Hibbertia hypericoides
Isolepis marginata	+		5	AIQ01-19	Isolepis cernua
Jacksonia hakeoides	+		60	AIQ01-22	Jacksonia ?hakeoides
Leucopogon sp. Coujinup (M.A. Burgman 1085)	+		15	AIQ01-17	Styphelia ?cono
Leucopogon sprengelioides	+		30	AIQ01-04	Leucopogon ?spreng
Lyginia imberbis	0.25		80	AIQ01-10	Lyginia ?Imberbis
Melaleuca seriata	+		30	AIQ01-16	Melaleuca seriata
Petrophile brevifolia	+		15	AIQ01-14	Petrophile white flower terete leaf
Pterostylis orbiculata	+		20	AIQ01-15	orchid greenhood Ptero
Regelia ciliata	60		90		Regelia ciliata
Stirlingia simplex	+		15		Stir sim
Stylidium repens	+		10		Styl repens
Trachymene pilosa	+		5		Trachy pil

Atlas 2020 Update **Site** AIQ02

Described by JM **Date** 20/09/2021 **Type** Q 10 m x 10 m

Season E **Uniformity**

Location Borefield Corridor Wongonderrah South

MGA Zone 50 332103 **mE** 6613448 **mN** 115.248698 **E** -30.599644 **S**

Habitat Broad, seasonally wet depression on plain; dampland.

Soil Grey loamy sand; scattered pieces of laterite nearby on firebreak

Rock Type n/a

Vegetation Regelia ciliata, Banksia telmatiaea Mid-shrubland over Gahnia trifida Tall Sparse Sedgeland.

Veg Condition Very Good

Fire Age More than 10 years since last fire

Notes Grevillea sp. Cooljarloo: 2 individuals in quadrat

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia pulchella var. glaberrima	+		70	(=AIQ01-13	Aca pul
Acacia spathulifolia	+		80	AIQ02-15	Acacia spathulifolia
Aira cupaniana	+		10		Aira cupaniana
Banksia telmatiaea	15		140		
Brachyscome iberidifolia	+		10	AIQ02-09	Brachyscome white
Caladenia longicauda	+		30	AIQ02-08b	Caladenia longicauda
Centrolepis aristata	+		10		Centrolepis aristata
Cerastium glomeratum	+		10	AIQ02-02	Cerastium glomeratum caryo weed
Crassula colorata var. acuminata	+		1	AIQ02-11	Crassula colorata
Crassula decumbens var. decumbens	+		5	AIQ02-04	?Crassula
Darwinia pinifolia	+		20	(=AIQ01-07	Darwinia
Drosera menziesii	+		10	AIQ02-14	Drosera
Drosera ramellosa	+		2	AIQ02-13	Drosera sterile green
Gahnia trifida	0.5		110		
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	1		60		n=2
Heliophila pusilla	+		10	AIQ02-01	Heliophila pusilla
Hydrocotyle diantha	+		1	AIQ02-06	Hydrocotyle
Hypochaeris glabra	+		1		
Isolepis marginata	+		6		isolepis marg; also AIQ02-10
Lysimachia arvensis	+		5		
Machaerina juncea	+		40	AIQ02-03	Baumea ?juncea
Moraea flaccida	+		60		Cape Tulip single leaf; also AIQ02-07
Pterostylis orbiculata	+		25	(=AIQ01-15	Pterostylis sang
Regelia ciliata	35		120	AIQ02-08	Regelia ?ciliata
Romulea rosea	+		10		Rom ros orange flower
Schoenus plumosus	+		5	AIQ02-12	Schoenus ?plumosus (annual)
Senecio pinnatifolius var. latilobus	+		20	AIQ02-05	Senecio ?glossanthus
Thysanotus manglesianus	+				
Trachymene pilosa	+		1		
Ursinia anthemoides subsp. anthemoides	+		10		

Atlas 2020 Update

Site AIQ03

Described by JM **Date** 20/09/2021 **Type** Q 10 m x 10 m

Season E **Uniformity**

Location Borefield Corridor Wongonderrah South

MGA Zone 50 332087 **mE** 6614275 **mN** 115.248665 **E** -30.592183 **S**

Habitat Dune crest

Soil Grey-brown sand

Rock Type n/a

Vegetation Banksia attenuata, Banksia menziezii Low Woodland over Adenanthos cygnorum subsp. cygnorum Tall Sparse Shrubland over Eremaea pauciflora var. lonchophylla, Jacksonia nutans Mid Open Shrubland over Hibbertia hypericoides, Hypocalymma xanthopetalum, Acacia pulchella var. glaberrima Low Open Shrubland over Dasypogon obliquifolius, Blancoa canescens Low Sparse Forbland.

Veg Condition Pristine

Fire Age More than 10 years since last fire

Notes

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia pulchella var. glaberrima	1		30	(=AIQ01-13	Aca pul glab
Acacia sessilis	+		70		
Adenanthos cygnorum subsp. cygnorum	2.5		300		
Alexgeorgea nitens	+		10		
Amphipogon turbinatus	+		15		
Anigozanthos humilis subsp. humilis	+		25		
Arnocrinum preissii	+		40		
Austrostipa compressa	+		5	AIQ03-15	Austrostipa compressa
Banksia attenuata	22		380		
Banksia menziesii	4		280		
Blancoa canescens	4		20		
Brachyscome bellidioides	+		15	AIQ03-07	Brachyscome white
Caladenia flava subsp. flava	+		20		
Calandrinia corrigioloides	+		1	AIQ03-06	Calandrinia

Cassytha glabella	+		(=AIQ01-03	Cassytha
Centrolepis drummondiana	+	5		
Chaetospora curvifolia	+	30		
Conostephium pendulum	+	60		
Conostylis candicans subsp. candicans	+	40		
Conostylis teretifolia subsp. teretifolia	+	15		
Crassula colorata var. acuminata	+	2	AIQ03-08	Crassula colorata
Cryptandra arbutiflora	+	20	AIQ03-12	Cryptandra
Dasypogon obliquifolius	4	30		
Daviesia triflora	+	12		
Desmocladus virgatus	+	20	AIQ03-03	Desmocladus ?virgatus
Drosera closterostigma	+	1	AIQ03-09	Drosera pygmaea
Drosera drummondii	+	20	AIQ03-14	Drosera climber
Drosera humilis	+	10		
Drosera magna	+	1		
Eremaea asterocarpa subsp. asterocarpa	1	40		
Eremaea pauciflora var. lonchophylla	11	70-110		
Gompholobium tomentosum	+	40		
Hibbertia hypericoides	21	60		
Hypocalymma xanthopetalum	1	30		
Isolepis marginata	+	4		
Jacksonia nutans	2.5	140		
Lepidosperma calcicola	+	40	AIQ03-04	Lepidosp flat, rhizomes
Lomandra hermaphrodita	+	20		
Lyginia barbata	+	60		
Macrozamia fraseri	+	30		Mac fra juvenile
Mesomelaena pseudostygia	+	30		
Opercularia vaginata	+	20		
Patersonia occidentalis var. occidentalis	+	50		
Petrophile linearis	+	50		
Petrophile macrostachya	+	80		
Phyllangium divergens	+	10	AIQ03-05	Phyllangium
Pimelea sulphurea	+	40	AIQ03-13	Pimelia
Pyrorchis nigricans	+	1		
Rytidosperma occidentale	+	20		
Schoenus clandestinus	+	1		
Scholtzia involucrata	+	40		
Scholtzia umbellifera	+	80	AIQ03-11	?Calytrix
Stylidium araeophyllum	+	10		
Stylidium cygnorum	+	10	AIQ03-10	Stylidium stilts
Styphelia conostephioides	+	20		
Styphelia xerophylla	+	20	AIQ03-02	Astroloma ?sera(now Styphelia)
Thysanotus manglesianus	+			
Trachymene pilosa	+	5		
Xanthosia huegelii	+	12		

Atlas 2020 Update

Site AIQ04

Described by BRM **Date** 23/09/2021 **Type** Q 10 m x 10 m

Season E **Uniformity**

Location Nambung Road

MGA Zone 50 327508 **mE** 6621414 **mN** 115.202114 **E** -30.527142 **S**

Habitat Depression on plain

Soil Grey-brown sand

Rock Type n/a

Vegetation Banksia telmatiaea, Hakea obliqua subsp. parviflora, Callitris pyramidalis Heathland over Regelia ciliata Sparse Heathland over Conostylis festucacea subsp. festucacea Sparse Forbland

Veg Condition Excellent

Fire Age More than 10 years since fire.

Notes elevation = 33 m; Regelia cilialta: about 3% of cover was dead, not included in %cover

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia pulchella var. glaberrima	+		60	AIQ04-01	Aca ?pul
Acacia rostellifera	+		60		
Banksia telmatiaea	40		110		
Caladenia flava subsp. flava	+		15	AIQ04-03	Caladenia flava
Callitris pyramidalis	1.5		190		
Conospermum stoechadis subsp. stoechadis	+		45		
Conostylis festucacea subsp. festucacea	1		20	AIQ04-07	Conostylis near

Crassula colorata	+	5		
Gompholobium tomentosum	+	50		
Hakea obliqua subsp. parviflora	8	140		
Hibbertia aurea	+	20	AIQ04-10	Hibbertia
Hibbertia hypericoides	+	20		
Hypochaeris glabra	+	1		
Isolepis marginata	+	5	AIQ04-04	Isolepis ?marginata
Lomandra hermaphrodita	+	15		
Lomandra suaveolens	+	10	AIQ04-08	Lomandra ?suaveolens
Lyginia imberbis	+	10	AIQ04-05	Restio bit curly, ?Lygimb
Melaleuca seriata	+	80	AIQ04-09	Mela ?seriata, pink
Opercularia vaginata	+	10		
Petrophile brevifolia	+	40	AIQ04-02	Petrophile
Regelia ciliata	2	90		
Stirlingia latifolia	+	40		
Stylidium repens	+	10		
Trachymene pilosa	+	10		
Tricostularia neesii	+	20	AIQ04-06	Mesomelaena ?graciliceps
Ursinia anthemoides subsp. anthemoides	+	10		

Atlas 2020 Update — Site AIQ05

Described by BRM **Date** 22/09/2021 **Type** Q 10 m x 10 m
Season E **Uniformity**
Location Nambung Road - north side
MGA Zone 50 327128 **mE** 6621412 **mN** 115.198154 **E** -30.527106 **S**
Habitat Crest of low dune
Soil Yellow-brown sand
Rock Type n/a
Vegetation Banksia prionotes Low Woodland over Acacia spathulifolia Sparse Tall Shrubland over Scholtzia umbellifera, Eremaea pauciflora var. lonchophylla Open Shrubland over Hibbertia hypericoides Sparse Low Shrubland over Mesomelaena pseudostygia, Lepidobolus preissianus Sparse Sedgeland/Rushland.
Veg Condition Excellent to Pristine
Fire Age More than 10 years since last fire
Notes Elevation: 42 m
NB: numerous dead Banksia prionotes trees.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia pulchella var. glaberrima	+		130		
Acacia spathulifolia	5		280		
Ammothryon grandiflorum	+		70	AIQ05-11	Schoenus grandiflorus
Amphipogon turbinatus	+		35		
Anigozanthos humilis subsp. humilis	+		30		
Austrostipa compressa	+		20		?aus com, just forming inflorescence
Banksia prionotes	11		400		
Brachyscome bellidioides	+		15	AIQ05-18	Brachyscome
Burchardia congesta	+		45		
Centrolepis drummondiana	+		3	AIQ05-10	Centrolepis ?drummond
Conostylis candicans subsp. candicans	+		30		
Crassula colorata var. colorata	+		3	AIQ05-04	Cassula colorata
Daucus glochidiatus	+		2	AIQ05-09	herb
Desmocladus asper	+		12	AIQ05-03	Desmocladus
Drosera drummondii	+		150	AIQ05-08	Drosera climber
Drosera humilis	+		15		
Eremaea pauciflora var. lonchophylla	8		120 (180)	AIQ05-06	Eremaea ?beaufort
Gompholobium tomentosum	+		30		
Gyrostemon subnudus	+		40	AIQ05-16	Gyrostemon
Hakea prostrata	+		45		
Hibbertia huegelii	+		30		
Hibbertia hypericoides	7		70		
Hypocalymma xanthopetalum	+		30		
Hypochaeris glabra	+		3+		
Isolepis marginata	+		5		
Isotropis cuneifolia subsp. cuneifolia	+		5		
Lepidobolus preissianus	0.5		50	AIQ05-02	Lepidobolus ?preissii
Melaleuca sp.	6		120	AIQ05-05	Melaleuca ?systena

Mesomelaena pseudostygia	1.5	60		
Opercularia vaginata	+	25		
Petrophile macrostachya	+	30		
Poa drummondiana	+	50	AIQ05-17	grass
Podotheca gnaphalioides	+	20		
Scaevola canescens	+	10		
Schoenus clandestinus	+	4		
Scholtzia umbellifera	12	160	AIQ05-07	Scholtzia umbelifera
Styphelia planifolia	+	45	AIQ05-12	Epacrid grey
Thysanotus manglesianus	+	50	AIQ05-15	Thysanotus mang
Thysanotus patersonii	+	20	AIQ05-01	Thysanothus climber
Trachymene pilosa	+	3		
Tricoryne sp. Eneabba (E.A. Griffin 1200)	+	25-40	AIQ05-14	Tricoryne or Arnocrinum

Atlas 2020 Update — Site AIQ06

Described by JM **Date** 22/09/2021 **Type** Q 10 m x 10 m
Season E **Uniformity**
Location Nambung Road / Farm
MGA Zone 50 326804 **mE** 6622641 **mN** 115.194984 **E** -30.515974 **S**
Habitat Wetland
Soil Grey sand at surface
Rock Type n/a
Vegetation Melaleuca rhaphiophylla Tall Open Shrubland over Verticordia densiflora Shrubland over Schoenus laevigatus, (Lepidosperma longitudinale) Open Sedgeland.
Veg Condition Excellent
Fire Age ??Less than 2 years since fire
Notes Quadrat displaced to East, outside corridor, due to wetland being inundated; area used by cattle; dead annual grass covering 8%

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia saligna	0.1		110		
Lepidosperma longitudinale	+		30		
Melaleuca rhaphiophylla	25		210		
Melaleuca teretifolia	+		30	AIQ06-02	Mela ?rhaph juvenile
Schoenus laevigatus	14		35	AIQ06-03	sedge?
Verticordia densiflora	40		130	AIQ06-04	Verticordia white;

Atlas 2020 Update — Site AIQ07

Described by BRM **Date** 22/09/2021 **Type** Q 10 m x 10 m
Season E **Uniformity**
Location Nambung Road / Farm
MGA Zone 50 326860 **mE** 6622892 **mN** 115.195609 **E** -30.513718 **S**
Habitat Seasonally inundated depression
Soil Grey sand (light gery on surface, dark grey below 5 cm depth)
Rock Type n/a
Vegetation Melaleuca rhaphiophylla Open Shrubland over Verticordia densiflora Low open Shrubalnd over Schoenus laevigatus Isolated Sedges and Conostylis festucacea subsp. festucacea Low Open Forbland.
Veg Condition Very Good (no weeds; Conostylis tussocks dying suggests a change in conditions)
Fire Age More than 5 years since last fire
Notes Ground is bare, no dead annual grass, as in AIQ06; short log in quadrat; evidence of cattle trampling

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Conostylis festucacea subsp. festucacea	6		30	AIQ07-02	Conostylis (affected by waterlogging?)
Melaleuca rhaphiophylla	4		170		
Schoenus laevigatus	0.1		35	AIQ07-01	sedge, long rhizome shiny base

Verticordia densiflora	8	90	(=AIQ06-04	Verticordia

Atlas 2020 Update **Site** AIQ08

Described by BRM **Date** 25/09/2021 **Type** Q 10 m x 10 m
Season E **Uniformity**
Location Nambung Road
MGA Zone 50 327269 **mE** 6621417 **mN** 115.199624 **E** -30.527081 **S**
Habitat Depression on plain - dampland (spring-fed, surface water present)
Soil Dark grey sand (wet)
Rock Type n/a
Vegetation Melaleuca rhaphiophylla Tall Shrubland over Melaleuca teretifolia Open Shrubland over Schoenus laevigatus Sedgeland.
Veg Condition Excellent
Fire Age More than 10 years since last fire
Notes Several dead shrubs, possibly due to changing hydrological conditions/salinity or other water factor; no cattle pads.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Conostylis festucacea subsp. festucacea	+		15	(=AIBopp58	dead Conostylis tussock
Lechenaultia floribunda	+		60	AIQ08-06	Lech florib
Lepidosperma longitudinale	+		30		
Melaleuca rhaphiophylla	35		350	AIQ08-03	Mela rhaph
Melaleuca teretifolia	5		150	AIQ08-04	Mela tereti
Schoenus laevigatus	65		90	AIQ08-02	?Schoenus
Solanum symonii	0.5		160	AIQ08-01	shrub (odd) Solanum ?symonii

Atlas 2020 Update **Site** AIQ09

Described by BRM **Date** 24/09/2021 **Type** Q 10 m x 10 m
Season E **Uniformity**
Location Nambung Road (East - West Corridor)
MGA Zone 50 327603 **mE** 6621419 **mN** 115.203104 **E** -30.527111 **S**
Habitat Low flat on plain
Soil Yellow sand
Rock Type n/a
Vegetation Allocasuarina lehmanniana subsp. lehmanniana Tall Open Shrubland over Banksia telmatiaea, Hakea obliqua subsp. parviflora, Regelia ciliata Closed Heathland over Opercularia vaginata, Trachymene pilosa Sparse Forbland.
Veg Condition Excellent
Fire Age More than 10 years since last fire (long unburnt)
Notes Numerous dead Regelia ciliata, not included in %cover

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Allocasuarina lehmanniana subsp. lehmanniana	25		350	AIQ09-01	Allocasuarina lehmann
Arctotheca calendula	+		10		
Austrostipa macalpinei	+		50	AIQ09-11	tall grass
Banksia telmatiaea	75		180-220		
Caladenia flava subsp. flava	+		10		
Caladenia longicauda	+		25	AIQ09-05	Caladenia ?longicauda
Cassytha flava	+		40	AIQ09-07	Cassytha hairy
Conostylis festucacea subsp. festucacea	+		15	AIQ09-12	Constylis ?festucacea
Daucus glochidiatus	+		10	AIQ09-03	Daucus glochidiatus
Dianella revoluta var. divaricata	+		30		
Drosera menziesii	+		10	AIQ09-10	Drosera
Ehrharta longiflora	+		10	AIQ09-08	Erharta long
Hakea obliqua subsp. parviflora	1		230	AIQ09-02	Hakea obliqua
Hypochaeris glabra	+		20		
Isopogon panduratus subsp. palustris	+		70		Iso pan, n=1

Melaleuca seriata	+	70	AIQ09-06	Melaleuca ?seriata
Opercularia vaginata	3	30		
Podotheca gnaphalioides	+	10	AIQ09-09	Podotheca
Regelia ciliata	5	180		
Rytidosperma occidentale	+	30	AIQ09-04	shiny leaf grass
Sonchus oleraceus	+	5		
Trachymene pilosa	0.5	15		

Atlas 2020 Update — Site AIQ10

Described by BRM **Date** 27/09/2021 **Type** Q 10 m x 10 m
Season E **Uniformity**
Location Wongonderrah / Munbinea upgrade
MGA Zone 50 330085 **mE** 6616789 **mN** 115.228205 **E** -30.569225 **S**
Habitat Low-lying flat on plain
Soil Grey sand
Rock Type n/a
Vegetation Callitris pyramidalisShrubland over Banksia telmatiaea, Melaleuca seriata, Melaleuca brevifolia, Grevillea sp. Cooljarloo (B.J. Keighery 28 B), Banksia nivea subsp. nivea Low Open Shrubland over Conostylis festucacea subsp. festucacea Isolated Herbs.
Veg Condition Excellent
Fire Age More than 10 years since last fire
Notes
SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Aira cupaniana	+		10	AIQ10-11	Aira
Avellinia michelii	+		15	AIQ10-29	Vulpia brom
Banksia nivea subsp. nivea	5		90		
Banksia telmatiaea	7		90		
Briza minor	+		20		
Caladenia longicauda	+		20	AIQ10-07	Caladenia longicauda
Calandrinia granulifera	+		1	AIQ10-32	Calandrinia
Callitris pyramidalis	50		120		
Cassytha sp.	+		40	AIQ10-27	Cassytha
Centrolepis aristata	+		3		
Centrolepis polygyna	+		2	AIQ10-19	also AIQ10-24
Chaetanthus aristatus	+		25	AIQ10-12	Chaeto
Chordifex reseminans	+		20	AIQ10-10	curly restio Chordifex
Conostylis festucacea subsp. festucacea	0.5		20	AIQ10-01	Conostylis; also AIQ10-36
Cotula coronopifolia	+		5	AIQ10-23	billy button; AIQ10-28
Crassula colorata var. colorata	+		10	AIQ10-30	Crassula colorata
Crassula decumbens var. decumbens	+		5	AIQ10-03	Crassula
Desmocladus lateriflorus	+		10	AIQ10-17	?Desmocladus latifolius
Desmocladus nodatus	+		10	AIQ10-09	Desmocladus nodif, n=1
Drosera menziesii	+		10	AIQ10-06	Drosera
Drosera minutiflora	+		1	AIQ10-33	Drosera pygmy
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	3		20		n = 16
Haemodorum spicatum	+			AIQ10-22	?Haemodorum
Heliophila pusilla	+		15		
Hypochaeris glabra	+		2		
Isolepis marginata	+		2	AIQ10-05	Isolepis marginata; also AIQ10-26
Juncus bufonius	+		15	AIQ10-21	Junbuf?
Juncus capitatus	+		5	AIQ10-25	Juncus ?capitatus
Lyginia imberbis	+		20		
Lysimachia arvensis	+		10		
Melaleuca brevifolia	3		90		
Melaleuca seriata	5		80	AIQ10-02	Mela seriata
Phyllangium divergens	+		10	AIQ10-31	Phyllangium
Romulea rosea	+		10		
Thysanotus manglesianus	+		50		Thysanothus, 3 long 3 short, climbing
Trachymene pilosa	+		5		
Triglochin minutissima	+		5	AIQ10-13	fruiting herb
Triglochin nana	+		5	AIQ10-35	Triglochin ?centrocarpa
Ursinia anthemoides subsp. anthemoides	+		15		
Wahlenbergia capensis	+		15	AIQ10-16	?Wahlenbergia capensis, sterile

Atlas 2020 Update **Site** AIQ11

Described by BRM **Date** 27/09/2021 **Type** Q 10 m x 10 m

Season E **Uniformity**

Location Nambung River Crossing Road Upgrade

MGA Zone 50 329754 **mE** 6619984 **mN** 115.225280 **E** -30.540361 **S**

Habitat Drainage flats (Nambung River)

Soil Grey sandy clay

Rock Type n/a

Vegetation Melaleuca viminea, Melaleuca concreta, Acacia saligna Tall Shrubland to Tall Closed Shrubland over Tecticornia indica subsp. bidens Low Sparse Shrubland over Gahnia trifida, Leptocarpus coangustatus Sparse Sedgeland/Rushland with Samolus repens var. paucifolius, *Cotula coronopifolia, *Crassula natans var. minor Open Forbland.

Veg Condition Very Good

Fire Age More than 10 years since last fire

Notes Quadrat located between fire break (east side) and road (west side)

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia saligna	6		350		
Callitris pyramidalis	+		160		
Cotula coronopifolia	1.5		10-20		
Crassula natans var. minor	0.25		3	AIQ11-06	herb
Cycnogeton lineare	+		20	AIQ11-08	?Triglochin lineare
Ehrharta longiflora	+		60		
Eryngium pinnatifidum subsp. Palustre (G. J. Keighery 13459)	+		40	AIQ11-10	Eryngium pinn pinn
Gahnia trifida	0.5		150		
Isolepis cernua var. setiformis	+		10	AIQ11-07	Isolepis cernua
Leptocarpus coangustatus	+		70	AIQ11-13	sedge terete; also AIQ11-15
Melaleuca concreta	9		260	AIQ11-01	Melaleuca ?concreta
Melaleuca viminea subsp. viminea	60		250	AIQ11-04	Melaleuca viminea
Rumex crispus	+		10	AIQ11-11	Rumex
Samolus junceus	+		70	AIQ11-14	Samolus
Samolus repens var. paucifolius	0.5		50	AIQ11-02	Samolus; also AIQ11-12
Sporobolus virginicus	+		30		
Tecticornia indica subsp. bidens	8		50	AIQ11-05	Tecticornia indica
Triglochin sp. A Flora of Australia (G.J. Keighery 2477)	+		15	AIQ11-09	Triglochin?calcitrapa

Atlas 2020 Update **Site** AIQ12

Described by BRM **Date** 27/09/2021 **Type** Q 10 m x 10 m

Season E **Uniformity**

Location Nambung River Crossing

MGA Zone 50 329694 **mE** 6620075 **mN** 115.224669 **E** -30.539532 **S**

Habitat Broad, shallow flow area (Nambung River)

Soil Grey clayey sand

Rock Type n/a

Vegetation Tecticornia indica subsp. bidens, Lawrencia squamata Low Open Shrubland over *Crassula natans var. minor, *Cotula coronopifolia Open Forbland.

Veg Condition Very Good

Fire Age More than 10 years since last fire

Notes

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Angianthus micropodioides	+		2	AIQ12-17	Angianthus
Atriplex prostrata	+		10	AIQ12-05	Also AIQ12-14
Bromus hordeaceus	+		25	AIQ12-09B	grass bluish
Cotula coronopifolia	4		10	AIQ12-03	Cotula coronop
Crassula natans var. minor	11		2	AIQ12-07	Crassula low flat
Hydrocotyle diantha	+		1	AIQ12-12	Hydrocotyle
Isolepis cernua var. setiformis	+		5	AIQ12-06	Isolepis

Juncus bufonius	+	5	AIQ12-10	?Juncus small
Lawrencia squamata	0.5	30		
Lysimachia arvensis	+	1		
Salicornia blackiana	+	20	AIQ12-18	Tecticornia stiff upright
Samolus repens var. paucifolius	+	30	AIQ12-02	Samolus
Spergularia brevifolia	+	2	AIQ12-11	low herb
Tecticornia indica subsp. bidens	15	40	AIQ12-01	Tecticicornia ?indica (coarse)
Triglochin minutissima	+	3	AIQ12-13	?Triglochin small; also AIQ12-16
Triglochin sp. A Flora of Australia (G.J. Keighery 2477)	+	10	AIQ12-04	Triglochin ?sp,A; also AIQ12-08

Atlas 2020 Update — Site AIQ13

Described by BRM **Date** 28/09/2021 **Type** Q 10 m x 10 m
Season E **Uniformity**
Location Fredrick Smith Creek, Nambung Station (western end of corridor)
MGA Zone 50 329578 **mE** 6615272 **mN** 115.222671 **E** -30.582836 **S**
Habitat Gentle, west-facing floodbanks of creek (?seepage area)
Soil Grey sand
Rock Type n/a
Vegetation Melaleuca rhaphiophylla, Melaleuca viminea subsp. viminea Tall Shrubland to Tall Closed Shrubland over Gahnia trifida Tall Open Sedgeland over Machaerina juncea, Schoenus nitens Sparse Low Sedgeland with Centella asiatica Open Forbland and Sporobolus virginicus Open Grassland.
Veg Condition Very Good. General area in Good to Very Good condition.
Fire Age More than 10 years since last fire
Notes NW corner left pegged, remaining 3 pegs removed.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Cassytha racemosa forma racemosa	+		230	AIQ13-01	Cassytha
Centella asiatica	15		20	AIQ13-02	round leaf
Ehrharta longiflora	1		30		
Gahnia trifida	25		160		
Holcus setiger	+		20	AIQ13-13	?Phalaris grass
Isolepis cernua var. cernua	+		2	AIQ13-07	Isolepis ?cernua
Lobelia anceps	+		60	AIQ13-15	narrow long dentate herb ?Dampiera
Lolium perenne x rigidum	+		30	AIQ13-14	Lolium
Lysimachia arvensis	+		10		
Lythrum hyssopifolia	+		15	AIQ13-06	Lythrum
Machaerina juncea	5		40	AIQ13-03	Baumea. Also AIQ13-10; glaucous sedge
Melaleuca rhaphiophylla	80		550		
Melaleuca viminea subsp. viminea	8		450		
Microtis media subsp. media	+		40	AIQ13-05	?Microtis
Romulea rosea	+		20		
Samolus junceus	+		45	AIQ13-11	Samolus
Schoenus nitens	0.5		20	AIQ13-12	fine terete sedge
Sonchus asper	+		30	AIQ13-16	Sonchus asper
Sporobolus virginicus	6		10		?Cynodon dactylon

Atlas 2020 Update — Site AIQ14

Described by JM **Date** 28/09/2021 **Type** Q 10 m x 10 m
Season E **Uniformity**
Location Fredrick Smith Creek, Nambung Station (western end of corridor)
MGA Zone 50 329538 **mE** 6615245 **mN** 115.222250 **E** -30.583074 **S**
Habitat Floodbank of Fredrick Smith Creek
Soil Grey sandy clay
Rock Type n/a
Vegetation Melaleuca brevifolia Open Shrubland over Gahnia trifida Isolated Tall Sedges over Machaerina juncea Low Sedgeland with *Romulea rosea, Samolus repens var. paucifolius, Triglochin mucronata, Triglochin sp. A Flora of Australia (G.J. Keighery 2477) Forbland and Sporobolus virginicus Sparse Grassland.

Veg Condition Very Good. General area in Very Good to Degraded condition (in paddock; significant weeds present; open to grazing; vegetation appears to be modified over time).;

Fire Age More than 10 years since last fire

Notes 3 pegs in place; sheep grazing in unfenced lupin paddock adjacent.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Angianthus preissianus	+		5	AIQ14-23	tiny herb
Apium prostratum subsp. prostratum var. filiforme	+		5	AIQ14-21	Hom hom
Briza minor	+		15		
Bromus hordeaceus	+		20	AIQ14-29	Bromus / Hordeum
Calandrinia sp. Kenwick (G.J. Keighery 10905)	+		5	AIQ14-11	Calandrinia
Centella asiatica	+		30	(=AIQ13-02	round leaf herb
Chaetanthus aristatus	+		30	AIQ14-18	rush
Comesperma integerrimum	+		45	AIQ14-05	straggler
Cotula coronopifolia	+		15		
Cotula cotuloides	+		15	AIQ14-03	Cotula ?cotuloides
Cycnogeton lineare	+		25	AIQ14-20	Cycnogeton lineare
Eragrostis dielsii	+		10	AIQ14-16	?Eragrostis
Eryngium pinnatifidum subsp. Palustre (G. J. Keighery 13459)	+		20	AIQ14-10	Eryngium
Gahnia trifida	0.5		170		
Goodenia trinervis	+		15	AIQ14-06	Brght grn, linear dentate spdg arm
Hypochaeris glabra	+		30		
Isolepis cernua var. setiformis	+		10	AIQ14-12	Isolepis
Juncus bufonius	+		15	AIQ14-28	Juncus ?bufonius
Lawrencia squamata	+		30		
Lolium perenne x rigidum	+		45	AIQ14-02	Lolium; also AIQ14-08
Lysimachia arvensis	+		2		
Machaerina juncea	40		40	(=AIQ13-10	glaucous segde
Melaleuca brevifolia	25		150		melbre flowering
Microtis media subsp. media	+		30	(=AIQ13-05	?Mor fla / Mic?; also AIQ14-13
Plantago coronopus subsp. commutata	+		15	AIQ14-24	?Plumbago/Plantago
Romulea rosea	12		15		
Samolus repens var. paucifolius	0.3		30	(=AIQ11-02	Samolus
Schoenus plumosus	+		15	AIQ14-04	Schoenus annual red stem
Sonchus oleraceus	+		20		
Spergularia brevifolia	+		15	AIQ14-22	herb pendulous head
Sporobolus virginicus	1		5	AIQ14-17	?Cyn dact; Also AIQ14-25
Tecticornia indica subsp. bidens	+		40	AIQ14-26	Tecticornia
Triglochin minutissima	+		10	AIQ14-15	Triglochin minutissia
Triglochin mucronata	0.3		10	AIQ14-01	Triglochin ?mucronata (buffy); also AIQ14-14
Triglochin sp. A Flora of Australia (G.J. Keighery 2477)	0.2		10	AIQ14-07	Triglochin narrow
Utricularia multifida	+		15	AIQ14-09	Utricularia

Atlas 2020 Update

Site AIQ15

Described by BRM **Date** 29/09/2021 **Type** Q 10 m x 10 m

Season E **Uniformity**

Location Cockram's farm

MGA Zone 50 331776 **mE** 6621123 **mN** 115.246534 **E** -30.530373 **S**

Habitat Very low rise on broad plain (adjacent to wetland)

Soil Grey sand

Rock Type n/a

Vegetation Regelia ciliata Shrubland over Jacksonia nutans Low Sparse Shrubs over Schoenus subfascicularis Sparse Sedgeland and Dasypogon obliquifolius, Conostylis festucacea subsp. festucacea,, *Hypochaeris glabra Sparse Forbland with *Ehrharta calycina Sparse Grassland.

Veg Condition Good to Degraded

Fire Age More than 10 years since last fire

Notes

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Anigozanthos humilis subsp. humilis	+		25		
Banksia dallanneyi subsp. dallanneyi var. dallanneyi	+		15	AIQ15-11	Banksia dal dal
Caladenia flava subsp. flava	+		15		

Calandrinia corrigioloides	+	1	AIQ15-10	Calandrinia
Chordifex sinuosus	+	25	AIQ15-08	Desmocladus /
Conostylis festucacea subsp. festucacea	1	40	AIQ15-03	Conostyilis ?aculeata brev; also AIQ15-07
Crassula colorata var. colorata	+	3	AIQ15-13	Crassula colorata
Cyperus tenellus	+	5	=AIMB06-02	Isolepis
Dasypogon obliquifolius	0.5	40		
Dischisma arenarium	+	5		
Ehrharta calycina	1.5	120		Ehrcal is grazed; AIQ15-05
Hibbertia sericosepala	+	40		
Hypochaeris glabra	0.3	20		
Isolepis marginata	+	3		
Jacksonia hakeoides	+	30		
Jacksonia nutans	3	70		
Lolium perenne x rigidum	+	30	AIQ15-12	Lolium
Lomandra caespitosa	+	45		
Lotus subbiflorus	+	10		
Machaerina juncea	+	40	AIQ15-04	?Baumea
Patersonia occidentalis var. occidentalis	+	20		grazed
Podotheca gnaphalioides	+	15		
Regelia ciliata	40	140	AIQ15-01	Regelia ciliata
Schoenus subfascicularis	0.5	40	AIQ15-02	Schoenus; Also AIQ15-06
Trachymene pilosa	+	5		
Ursinia anthemoides subsp. anthemoides	+	30		
Vulpia myuros forma myuros	+	25	AIQ15-09	Vulpia brom
Wahlenbergia capensis	+	40		

Atlas 2020 Update — Site AIQ16

Described by KM **Date** 30/09/2021 **Type** Q 10 m x 10 m
Season E **Uniformity**
Location Bibby Rd; just east of Bibby Rd - Munbinea Road intersection
MGA Zone 50 331913 **mE** 6629632 **mN** 115.249337 **E** -30.453644 **S**
Habitat Plain
Soil Grey clayey sand with localised clay pockets / pans
Rock Type n/a
Vegetation Allocasuarina humilis, Adenanthos cygnorum subsp. cygnorum, Daviesia incrassata subsp. incrassata, Melaleuca seriata Open Shrubland over Hibbertia hypericoides, Hakea incrassata, Xanthorrhoea preissii, Stirlingia latifolia, Conospermum stoechadis subsp. stoechadis, Daviesia nudiflora subsp. nudiflora, Daviesia triflora Low Open Shrubland over Mesomelaena pseudostygia, Chordifex sinuosus, Mesomelaena tetragona Open Sedgeland/Rushland with Neurachne alopecuroidea Low Sparse Grassland.
Veg Condition Very Good to Excellent (weeds 1%)
Fire Age More than 10 years since last fire
Notes Elevation: 63 m

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia stenoptera	1		30		
Adenanthos cygnorum subsp. cygnorum	2		190		
Allocasuarina humilis	7		130		
Anigozanthos humilis subsp. humilis	0.5		30		
Aphelia cyperoides	0.1		3	AIQ16-23	Aphelia cyperoides
Arctotheca calendula	0.1		15		
Austrostipa macalpinei	0.1		20		also AIQ16-21
Burchardia congesta	0.1		40		
Caladenia flava subsp. flava	0.1		10		Calfla grazed, no
Calectasia narragara	0.1		40	AIQ16-04	Calectasia ?narragarra
Calothamnus sanguineus	0.1		40	AIQ16-20	Calothamnus sang / hirs
Cassytha flava	0.1		cr	AIQ16-18	Cassytha hairy
Cassytha glabella	0.2		cr	AIQ16-17	Cassytha glabrous
Caustis dioica	0.3		40	AIQ16-11	Caustis dioica
Centrolepis aristata	0.1		5	AIQ16-30	Centrolepis
Centrolepis drummondiana	0.1		3		
Chordifex sinuosus	3		20	AIQ16-14	Cordifex sinuous
Conospermum stoechadis subsp. stoechadis	1		90	AIQ16-06	Conospermum stoe
Conostylis setigera subsp. setigera	0.1		15		

Crassula closiana	0.1	2	AIQ16-16	Crassula red
Crassula colorata var. acuminata	0.3	3	AIQ16-22	Crassula colorata
Crassula decumbens var. decumbens	0.1	3	AIQ16-31	Crassula 3
Daviesia incrassata subsp. incrassata	4	120	AIQ16-05	Daviesia ?decurrens
Daviesia nudiflora subsp. nudiflora	1	40		
Daviesia triflora	1	70	AIQ16-03	Daviesia triflora
Drosera glanduligera	0.1	3	AIQ16-15	Drosera ?glanduligera
Drosera magna	1	1		
Ehrharta longiflora	0.1	35		
Elythranthera brunonis	0.1	20		
Eremaea pauciflora var. lonchophylla	0.1	20	AIQ16-35	Eremaea ?beaufort
Haemodorum venosum	0.2	70	AIQ16-24	Haemodorum ?loratum 10 plants
Hakea costata	0.1	120		
Hakea incrassata	3	90		
Hibbertia hypericoides	3	70		
Hypocalymma xanthopetalum	0.1	35	AIQ16-34	Hypocalymma xantho type
Hypochaeris glabra	0.2	20		
Isolepis marginata	0.1	3		
Isopogon linearis	0.1	70	AIQ16-03B	Isopogon
Isotropis cuneifolia subsp. cuneifolia	0.1	10		
Jacksonia hakeoides	1	130	AIQ16-01	Jacksonia
Johnsonia pubescens subsp. pubescens	0.1	20	AIQ16-19	Johnsonia fine
Lepidosperma calcicola	0.1	50	AIQ16-37	Lepidosperma flat narrow
Leucopogon sp. Coujinup (M.A. Burgman 1085)	1	35	AIQ16-07	Styphelia fine
Levenhookia stipitata	0.1	3		
Lolium perenne x rigidum	0.1	30		
Lomandra hermaphrodita	0.1	25		
Lomandra preissii	0.1	40	AIQ16-36	Lomandra preissii
Macropidia fuliginosa	0.1	10	AIQ16-33	Macropidia fuliginosa
Melaleuca seriata	1	130	AIQ16-02	Melaleuca pink
Mesomelaena pseudostygia	7	20		
Mesomelaena tetragona	2	50		
Neurachne alopecuroidea	3	50		
Opercularia vaginata	0.1	30		
Ornithopus compressus	0.1	10	AIQ16-27	Pea
Podotheca gnaphalioides	0.1	15		
Pterochaeta paniculata	0.1	10		
Scaevola repens var. repens	0.3	10	AIQ16-10	Scaevola repens
Schoenus andrewsii	0.1	20	AIQ16-28	Schoenis penn type
Schoenus clandestinus	0.1	10	AIQ16-25	Schoenus clandestinus
Schoenus elegans	0.1	10	AIQ16-12	Juncus
Silene gallica	0.1	0.1		20
Sonchus oleraceus	0.1	10		
Stenanthemum pomaderroides	0.1	20	AIQ16-26	Rhamnaceae
Stirlingia latifolia	2	40		
Synaphea spinulosa subsp. spinulosa	0.1	40	AIQ16-09	Synaphea spinul
Thysanotus sparteus	0.5	120	AIQ16-29	Thysanothus sparteus
Trachymene pilosa	0.2	10		
Tricoryne sp. Eneabba (E.A. Griffin 1200)	0.1	40	AIQ16-13	Tricoryne giant
Ursinia anthemoides subsp. anthemoides	0.1	20		
Verticordia densiflora	0.1	40	AIQ16-08	Babbingtonia
Vulpia bromoides	0.1	30	AIQ16-32	Vulpia
Wahlenbergia capensis	0.1	30		
Xanthorrhoea preissii	2	90		
Xanthosia huegelii	0.1	15		

Atlas 2020 Update **Site** AIQ17

Described by BRM **Date** 30/09/2021 **Type** Q 10 m x 10 m

Season E **Uniformity**

Location Bibby Rd - Munbinea Rd intgersection

MGA Zone 50 332145 **mE** 6629639 **mN** 115.251753 **E** -30.453613 **S**

Habitat Plain

Soil Grey sand.

Rock Type N/a

Vegetation Banksia menziesii, Banksia attenuata Low Woodland over Tall Sparse Shrubland over Melaleuca clavifolia, Eremaea pauciflora var. lonchophylla, Jacksonia furcellata Open Shrubland over Hibbertia hypericoides, Stirlingia latifolia Low Open Shrubland over Mesomelaena pseudostygia, Lepidosperma calcicola, Lyginia barbata, Alexgeorgea subterranea Sparse Sedgeland/Rushland

with Dasypogon obliquifolius, Laxmannia ramosa subsp. ramosa Open Forbland.

Veg Condition Excellent (lots of species, intact structure, but some weeds).

Fire Age More than 10 years since last fire

Notes Euc todtiana scattered in general area.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Adenanthos cygnorum subsp. cygnorum	9		280		
Alexgeorgea nitens	+		20		
Alexgeorgea subterranea	0.5		20	AIQ17-10	rush
Amphipogon turbinatus	+		60		
Anigozanthos humilis subsp. humilis	+		40		
Austrostipa compressa	+		20		
Banksia attenuata	6		500		
Banksia menziesii	23		450		
Blancoa canescens	+		30		
Bossiaea eriocarpa	+		40	AIQ17-23	Bosseia eriocarpa
Briza maxima	+		30		
Caladenia flava subsp. flava	+		15		
Chaetospora curvifolia	+		30		
Conostephium pendulum	+		30	AIQ17-27	Conostephium pendulum
Conostylis aurea	+		40	AIQ17-03	Conostylis festucacea
Conostylis juncea	+		40		Also ; also AIQ16-21
Conostylis teretifolia subsp. teretifolia	+		15	AIQ17-15	Conostylis teretifolia
Crassula closiana	+		3	AIQ17-06	Crassula
Dampiera linearis	+		30		
Dasypogon obliquifolius	3		60	AIQ17-28	Dasypogon obliqu
Desmocladus flexuosus	+		45	AIQ17-13	Desmocladus
Drosera drummondii	+		40	AIQ17-19	Drosera climber
Drosera magna	+		1		
Drosera porrecta	+		30	AIQ17-16	Drosera ?porrecta
Ehrharta calycina	+		90		
Eremaea asterocarpa subsp. asterocarpa	+		40		
Eremaea pauciflora var. lonchophylla	4		50-120	AIQ17-08	Eremaea pauciflora
Gompholobium tomentosum	+		80		
Haemodorum spicatum	+		70		
Hibbertia hypericoides	4		70		
Hibbertia sericosepala	+		30		
Hypochaeris glabra	+		1		
Isotropis cuneifolia subsp. cuneifolia	+		25		
Jacksonia furcellata	1		120-170	AIQ17-22	Jacksonia
Laxmannia ramosa subsp. ramosa	8		20	AIQ17-07	Laxmannia
Lepidosperma calcicola	1		60	AIQ17-09	Lepidosperma flat
Leucopogon sp. Coujinup (M.A. Burgman 1085)	+		60	AIQ17-20	Leucopogon
Lomandra caespitosa	+		30	AIQ17-14	Lomandra caespitosa
Lomandra preissii	+		45		
Lyginia barbata	0.5		50	AIQ17-02	Lyginia barbata
Melaleuca clavifolia	7		130-260	AIQ17-18	Melaleuca
Mesomelaena pseudostygia	5		60		
Opercularia vaginata	+		20		
Petrophile linearis	+		50		
Pileanthus filifolius	+		50	AIQ17-24	?Pileanthus filifolius
Podotheca angustifolia	+		6		
Pterostylis orbiculata	+		25	AIQ17-12	Pterostylis ?sang
Scaevola repens var. repens	+		20		
Stirlingia latifolia	1		60	AIQ17-26	
Stylidium crossocephalum	+		15	AIQ17-21	?Stylidium
Stylidium rigidulum	+		20	AIQ17-04	Stylidium
Thysanotus thyrsoideus	+		50	AIQ17-11	Thysanotus
Thysanotus triandrus	+		30	AIQ17-01	Thysanotus
Trachymene pilosa	+		10		
Ursinia anthemoides subsp. anthemoides	+		30		
Vulpia bromoides	+		20	AIQ17-05	Vulpia
Wahlenbergia capensis	+		30		

Atlas 2020 Update **Site** CNQ01

Described by BRM **Date** 8/11/2019 **Type** Q 10x10

Season **Uniformity**

Location Wongonderrah Rd north; western side

MGA Zone 50 331279 **mE** 6618171 **mN** 115.240876 **E** -30.556929 **S**

Habitat North-facing, very gentle slope on very gently undulating plain.

Soil Pale grey-brown sand.

Rock Type na

Vegetation Banksia menziesii, Banksia attenuata, Eucalyptus todtiana Low Woodland over Xanthorrhoea preissii Sparse Shrubland over Melaleuca clavifolia, Hibbertia hypericoides, Eremaea asterocarpa subsp. asterocarpa, Jacksonia nutans, Petrophile rigida, Bossiaea eriocarpa Low Open Shrubland.

Veg Condition Pristine (very few weeds)

Fire Age More than 12 years since fire.

Notes Autumn revisit; 18/06/2021; photo BM107-932.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia stenoptera	+	<1 %	10		Acacia stenoptera
Alexgeorgea nitens	+	<1 %	15		
Amphipogon turbinatus	+	<1 %	10		
Anigozanthos humilis subsp. humilis	+	<1 %	20		
Arnocrinum preissii	+	<1 %	40	CNQ01R-04	?Arnocrinum
Asteridea pulverulenta	+	<1 %	20		wte petal
Austrostipa compressa	+	<1 %	10		
Banksia attenuata	11	<1 %	350		
Banksia menziesii	11	<1 %	400		A nos of sdlgs and juv in qdt
Blancoa canescens	2	1-5%	15		
Bossiaea eriocarpa	1	<1 %	30		
Burchardia congesta	+	<1 %	40		Burchardia cong
Calytrix flavescens	+	<1 %	45	CNQ01-13	Calytrix
Centrolepis drummondiana	+	<1 %	1	CNQ01R-08	Centrolepis
Conostephium pendulum	+	<1 %	35	CNQ01-18	Conostephium
Conostylis juncea	+	<1 %	30	CNQ01-02	Conostylis ? Juncea
Conostylis teretifolia subsp. teretifolia	+	<1 %	12	CNQ01-12	Conostylis ?s
Dasypogon obliquifolius	0.5	<1 %	25		
Drosera drummondii	+	<1 %	35	CNQ01-11	Drosera climber; also CNQ01R-03, CNQ01R-02
Drosera magna	+	<1 %	1		Drosera eryth (4 lf)
Drosera minutiflora	+	<1 %	3	CNQ01-07	Drosera wte pyg
Eremaea asterocarpa subsp. asterocarpa	3	1-5%	40		
Eucalyptus todtiana	4	1-5%	400		
Gompholobium tomentosum	+	<1 %	45		
Hibbertia aurea	+	<1 %	25	CNQ01-01	Hibbertia glauc lf
Hibbertia hypericoides	4	1-5%	50		
Hypocalymma xanthopetalum	+	<1 %	30		
Jacksonia nutans	2	1-5%	40	CNQ01-17	Jacksonia glauc
Lepidosperma calcicola	+	<1 %	40	CNQ01R-09	Lepidosperma ?calc
Leucopogon sprengelioides	+	<1 %	30	CNQ01-15	?Leucopogon; also CNQ01R-11
Levenhookia stipitata	+	<1 %	13	CNQ01-10	Levenhookia stip
Lomandra caespitosa	+	<1 %	30		
Lomandra hermaphrodita	+	<1 %	20		
Lyginia barbata	+	<1 %	40		grazed
Melaleuca clavifolia	4	1-5%	60	CNQ01-16	Mel ?systina (terete); also CNQ01R-01
Mesomelaena pseudostygia	+	<1 %	40		
Opercularia vaginata	+	<1 %	25		
Petrophile linearis	+	<1 %	30		
Petrophile rigida	1.5	1-5%	90	(=CGJ08)	Petrophile ylw
Philotheca spicata	+	<1 %	45		
Phyllangium divergens	+	<1 %	4	CNQ01-09	Phyllangium; also CNQ01R-07
Podotheca chrysantha	+	<1 %	12	CNQ01R-05	Podotheca
Poranthera microphylla	+	<1 %	3		Poranthera mic
Pterostylis orbiculata	+		15	(=CQ11AR01	AUT21 Pterostylis
Scholtzia involucrata	+	<1 %	30	CNQ01-06	
Stirlingia latifolia	+	<1 %	60		
Stylidium araeophyllum	+	<1 %	30		Stylid araeophyllum
Stylidium bicolor	+	<1 %	3	CNQ01-14	Stylidium linear flat rosette, termnl hair
Styphelia conostephioides	+	<1 %	30	CNQ01R-06	Leucopogon
Thysanotus thyrsoideus	+	<1 %	35	CNQ01-04	Thysanotus terete lf;

					also CNQ01R-10
Trachymene pilosa	+	<1 %	10		
Ursinia anthemoides subsp. anthemoides	+	<1 %	30		Ursinia ant
Wahlenbergia capensis	+	<1 %	12	CNQ01-08	?Silene
Xanthorrhoea preissii	2.5	1-5%	70-130		

Atlas 2020 Update — Site CNQ02

Described by JM **Date** 8/11/2019 **Type** Q 10x10
Season **Uniformity**
Location North of Wongonderrah Rd
MGA Zone 50 332652 **mE** 6617636 **mN** 115.255099 **E** -30.561947 **S**
Habitat Depression on plain (wetland).
Soil Grey sand
Rock Type na
Vegetation Melaleuca rhaphiophylla Tall Shrubland over Melaleuca teretifolia, Rhagodia baccata subsp. baccata Sparse Shrubs over Ptilotus polystachyus, Conostylis festucacea subsp. festucacea, *Trifolium campestre var. campestre, *Trifolium arvense var. arvense, *Ursinia anthemoides subsp. anthemoides Herbland and Lepidosperma longitudinale Open Sedgeland to Sedgeland and *Vulpia myuros forma myuros, *Ehrharta longiflora Open Grassland with Comesperma integerrimum, Clematis linearifolia Sparse Lianes
Veg Condition Good (weeds to 80% cover - bordering on Degraded)
Fire Age More than 12 years since fire
Notes Elevation 43m; Autumn revisit 07/06/2021; photo BM107-865, 866.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Arctotheca calendula	1	<1 %	10		capeweed
Bromus diandrus	1	<1 %	30	CNQ02R-04	Bromus
Bromus hordeaceus	+	<1 %	20	CNQ02-09	coarse grass
Cerastium glomeratum	+	<1 %	5	CNQ02R-07	Cerastium glom
Clematis linearifolia	1	<1 %	190	(=CBG03)	
Comesperma integerrimum	4	1-5%	300	CNQ02-07	Comesperma climber
Conostylis festucacea subsp. festucacea	4	1-5%	15	CNQ02-08	Conostylis green
Crassula colorata var. acuminata	+	<1 %	5	CNQ02R-03	Crassula col
Dianella revoluta var. divaricata	1	<1 %	60	CNQ02-11	
Ehrharta longiflora	15	10-25%	10		
Erodium cygnorum	1	<1 %	30	CNQ02R-01	Erodiuim
Galium murale	+	<1 %	5	CNQ02R-06	Galium
Geranium solanderi	+	<1 %	0.2	CNQ02-14	Geranium/Erodium; also CNQ02R-02
Hypochaeris glabra	+	<1 %	10	CNQ02-06	Strange wte herb
Lepidosperma longitudinale	25	25-33.3%	40		
Lolium perenne x rigidum	0.2	<1 %	40		Lolium per
Lotus subbiflorus	1	<1 %	5		Lotus sub
Lysimachia arvensis	+	<1 %	10		
Melaleuca rhaphiophylla	45	33.3-50%	350		
Melaleuca teretifolia	2	1-5%	170		
Microlaena stipoides var. stipoides	+	<1 %	0.4	CNQ02-15	?Microlaena
Ornithopus compressus	0.5	<1 %	40	CNQ02R-05	Ornithopsis
Petrorhagia dubia	+	<1 %	10		
Ptilotus polystachyus	12	<1 %	30	CNQ02-03	Ptilotus polystachyus
Rhagodia baccata subsp. baccata	5	5-10%	210	CNQ02-12	
Sonchus oleraceus	+	<1 %	20		
Trifolium arvense var. arvense	10	5-10%	5	CNQ02-02	Trifolium arvens
Trifolium campestre var. campestre	10	5-10%	10	CNQ02-01	
Ursinia anthemoides subsp. anthemoides	5	5-10%	30		
Vulpia myuros forma myuros	20	10-25%	15	CNQ02-05	Vulpia; cover difficult to assess

Atlas 2020 Update **Site** CNQ03

Described by BRM **Date** 27/11/2019 **Type** Q 10x10

Season **Uniformity**

Location North of Wongonderrah Rd

MGA Zone 50 331401 **mE** 6619391 **mN** 115.242346 **E** -30.545942 **S**

Habitat Flood plain (samphire flats)

Soil Pale grey-brown sand

Rock Type na

Vegetation Tecticornia indica subsp. bidens Low Open Shrubland over Angianthus micropodioides, Hydrocotyle diantha, Apium prostratum subsp. prostratum var. filiforme, Cotula cotuloides Low Open Herbland and *Polypogon monspeliensis Sparse Grassland.

Veg Condition Very Good

Fire Age More than 12 years since fire

Notes Autumn revisit; 18/06/2021; photo BM107-937, 938.
Site not inundated; parts of flat are inundated.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Angianthus micropodioides	9	<1 %	5-10	CNQ03-04	Angianthus (2000 plants); CNQ03-16,26
Angianthus preissianus	+	<1 %	4	CNQ03R-09	cap daisy
Apium prostratum subsp. prostratum var. filiforme	1	<1 %	20	CNQ03-11	Hydrocotyl; also CNQ03R-06
Brachyscome iberidifolia	+	<1 %	10	CNQ03R-03	Brachyscome
Briza minor	+	<1 %	20	CNQ03-30B	
Bulbine semibarbata	+	<1 %	20	CNQ03-12	Also CNQ03-19, CNQ03R-07
Calandrinia granulifera	+	<1 %	8	CNQ03-25C	also CNQ03R-01
Calandrinia sp. Kenwick (G.J. Keighery 10905)	+	<1 %	2	CNQ03R-12	Calndrinia fine
Centrolepis polygyna	+	<1 %	3	CNQ03-16B	Centrolepis
Cotula coronopifolia	1	<1 %	20	CNQ03-13	daisy: Cotula
Cotula cotuloides	1.5	1-5%	3	CNQ03-06	daisy
Crassula colorata var. acuminata	+	<1 %	3	CNQ03-25	Crassula
Crassula decumbens var. decumbens	+	<1 %	3	CNQ03R-04	herb
Crassula glomerata	+	<1 %	5	CNQ03-24	Levenhookia ?pusilla; also CNQ03R-11
Crassula natans var. minor	0.5	<1 %	3	CNQ03-17	filamentous spec; also CNQ03R-18
Eragrostis dielsii	+	<1 %	5	(=CQ28R-	Eragrostis diels
Eryngium pinnatifidum subsp. Palustre (G. J. Keighery 13459)	+	<1 %	20	CNQ03-33	Eryngium
Hainardia cylindrica	+	<1 %	5-6	CNQ03-07	grass (nrw cylinder); also CNQ03R-13
Hydrocotyle diantha	4	1-5%	5	CNQ03-15	Hydrocotyl flat fruit
Isolepis cernua var. setiformis	+	<1 %	3	CNQ03R-02	Isolepis cenua
Isolepis marginata	+	<1 %	3	CNQ03-19C	
Juncus bufonius	0.5	<1 %	5-7	CNQ03-05	Juncus; CNQ03-20
Lawrencia squamata	+	<1 %	20	CNQ03-01	shrub (3 specimens)
Lolium perenne x rigidum	+	<1 %	30	CNQ03-29	Lolium; also CNQ03R-19
Lotus subbiflorus	+	<1 %	10	CNQ03R-10	lotus
Lysimachia arvensis	+	<1 %	5		Scarlet pimp
Polypogon monspeliensis	1	<1 %	40	CNQ03-03	Polypogon mon; CNQ03-34
Sonchus oleraceus	+	<1 %	40	CNQ03-32	?Sonchus
Spergularia brevifolia	+	<1 %	20	(=CQ28R-08	Spergularia pple flr
Stylidium longitubum	+	<1 %	10	CNQ03R-14	Stylid long (n=40)
Stylidium obtusatum	+	<1 %	3	CNQ03R-08	Stylid
Tecticornia indica subsp. bidens	15-20	10-25%	30-60	CNQ03-02	Tecticornia
Tribonanthes monantha	+	<1 %	10	CNQ03-18	Wurmbea
Tribonanthes variabilis	+	<1 %	20	CNQ03R-16	Tribonanthes
Triglochin calcitrapa	+	<1 %	15	(=CQ28R-	Triglochin sp A
Triglochin minutissima	+	<1 %	3	CNQ03-21	Trigloch fine bches; also CNQ03R-17
Triglochin mucronata	+	<1 %	20	CNQ03-14	Triglochin #2; also CNQ03R-05
Triglochin sp. A Flora of Australia (G.J. Keighery 2477)	+	<1 %	10	CNQ03-10	Triglochin; also CNQ03R-15

Atlas 2020 Update **Site** CNQ04

Described by BRM **Date** 27/11/2019 **Type** Q 10x10

Season **Uniformity**

Location North of Wongonderrah Rd

MGA Zone 50 331650 **mE** 6619018 **mN** 115.244880 **E** -30.549342 **S**

Habitat Margins of flood plain

Soil Pale grey sand

Rock Type na

Vegetation Melaleuca brevifolia Open Shrubland over Grevillea sp. Cooljarloo (B.J. Keighery 28 B), Verticordia plumosa var. brachyphylla, Regelia ciliata Low Open Shrubland over Conostylis aculeata subsp. breviflora Low Sparse Herbland and Gahnia trifida Sparse Sedgeland with *Vulpia myuros forma myuros Low Sparse Grassland.

Veg Condition Very Good (moderate weed cover)

Fire Age More than 12 years since fire.

Notes Autumn revisit; 08/06/2021; photo BM107-908.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia dilatata	+	<1 %	30	CNQ04-30	Acacia
Aira cupaniana	+	<1 %	5	CNQ04-12	Aira
Angianthus micropodioides	+	<1 %	3	CNQ04-23	Aster
Brachyscome iberidifolia	+	<1 %	5	CNQ04-09	Brachyscome
Briza minor	+	<1 %	10		
Calandrinia granulifera	+	<1 %	3	CNQ04R-02	Calandrinia torp
Calytrix aff. flavescens	+	<1 %	35	CNQ04-17	Calytrix
Cassytha glabella	+	<1 %	50	CNQ04-31	Cassytha
Centrolepis aristata	+	<1 %	2	CNQ04-10	Centrolepis aristata
Chaetanthus aristatus	+	<1 %	40	CNQ04-14	Meeboldina
Comesperma virgatum	+	<1 %	40	CNQ04-32	Comesperma
Conostylis aculeata subsp. breviflora	2.5	1-5%	30	CNQ04-27	Conostylis long bristle, sht hair
Crassula colorata var. acuminata	+	<1 %	2	CNQ04R-06	Crassula col
Drosera sp.	+	<1 %	3	CNQ04-11	pygmy Drosera
Drosera thysanosepala	+	<1 %	20	CNQ04-06	Drosera menz ssp
Ehrharta longiflora	+	<1 %	20	CNQ04-26	Ehrharta ?long; also CNQ04R-01
Frankenia pauciflora var. pauciflora	+	<1 %	12	CNQ04-03	Frankenia
Gahnia trifida	7	5-10%	130		
Gnephosis drummondii	+	<1 %	3	CNQ04-25	Gnephosis
Goodenia micrantha	+	<1 %	3	CNQ04-19	Goodenia micrantha
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	11	<1 %	45	(=CGB42)	Grevillea sp cool
Heliophila pusilla	+	<1 %	20		Heterophylla puscilla
Hypochaeris glabra	+	<1 %	15	CNQ04-29	daisy Sonchus
Isolepis marginata	+	<1 %	3	CNQ04R-10	Isolepis
Juncus capitatus	+	<1 %	3	CNQ04-21	Juncus; also CNQ04R-04
Lomandra micrantha subsp. micrantha	+	<1 %	45	CNQ04R-09	Lomandra caespitosa
Lysimachia arvensis	+	<1 %	10		scarlet pimp
Melaleuca brevifolia	35	33.3-50%	130	CNQ04-01	Melaleuca ?brev
Ornithopus pinnatus	+	<1 %	20	CNQ04R-08	Ornithopsis
Parentucellia latifolia	+	<1 %	4	CNQ04R-03	Parentucellia
Petrophile seminuda	1.5	1-5%	35	CNQ04-24	Petrophile trifurcate
Phyllangium divergens	+	<1 %	4	CNQ04-13	Phyllangium
Quinetia urvillei	+	<1 %	10	CNQ04R-07	Quinettia urv
Regelia ciliata	1.5	1-5%	60	CNQ04-02	Regelia ?cil
Samolus junceus	+	<1 %	70	CNQ04-05	Samolus
Senecio pinnatifolius var. latilobus	+	<1 %	50	(=CGBM51	Senecio
Siemssenia capillaris	+	<1 %	20		
Silene gallica	+	<1 %	35	CNQ04-16	Silene; also CNQ04-22, CNQ04R-12
Tecticornia indica subsp. bidens	+	<1 %	20	CNQ04-28	Tecticornia
Trachymene pilosa	+	<1 %	10		
Tribonanthes variabilis	+	<1 %	30	CNQ04-18	Tribonanthes; also CNQ04R-05
Ursinia anthemoides subsp. anthemoides	+	<1 %	30		
Verticordia plumosa var. brachyphylla	4	1-5%	60	CNQ04-04	Verticordia plumosa brev
Vulpia myuros forma myuros	1.5	1-5%	15	CNQ04-08	Vulpia
Wahlenbergia capensis	+	<1 %	20	CNQ04R-11	Wahlenbergia cap

Atlas 2020 Update **Site** CNQ05

Described by BRM **Date** 28/11/2019 **Type** Q 10x10

Season **Uniformity**

Location North of Wongonderrah Rd

MGA Zone 50 331957 **mE** 6619165 **mN** 115.248103 **E** -30.548059 **S**

Habitat Minor flowline (banks 95%, bed 5%)

Soil Pale grey-brown sand

Rock Type na

Vegetation Melaleuca viminea subsp. viminea, Callitris pyramidalis Tall Shrubland over Melaleuca brevifolia, Banksia telmatiaea, Melaleuca seriata Sparse Shrubland over Grevillea sp. Cooljarloo (B.J. Keighery 28 B), Tecticornia indica subsp. bidens Low Sparse Shrubland over *Lotus subbiflorus, *Crassula natans var. minor, Cotula cotuloides, *Ornithopus pinnatus, *Stellaria media, *Hypochaeris glabra Low Open Herbland and *Vulpia myuros forma myuros, *Polypogon monspeliensis Low Open Grassland.

Veg Condition Good to Degraded (high cover of weeds)

Fire Age More than 12 years since fire.

Notes Low cover of rushes/sedges in plot. Autumn revisit; 08/06/2021; photo BM107-910.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Aira cupaniana	+	<1 %	10	CNQ05-05	Aira
Apium prostratum subsp. prostratum var. filiforme	+	<1 %	25		Apium prost
Arctotheca calendula	+	<1 %	15		cape weed
Banksia telmatiaea	1	<1 %	110	CNQ05-06	Banksia telmatiaea
Briza maxima	+	<1 %	30		Briza max
Briza minor	+	<1 %	5		
Calandrinia granulifera	+	<1 %	4	CNQ05R-12	Calandrinia
Callitris pyramidalis	1	<1 %	205	CNQ05-03	Callitris
Carpobrotus sp.	+	<1 %	3		
Centrolepis polygyna	+	<1 %	3		Centrolepis poly
Cerastium glomeratum	+	<1 %	12	CNQ05R-14	herb weed
Comesperma integerrimum	+	<1 %	220	CNQ05-19	Comesperma integ
Conostylis aculeata subsp. breviflora	+	<1 %	20	CNQ05-22	Conostylis
Cotula coronopifolia	+	<1 %	12		Cotula cor
Cotula cotuloides	0.5	<1 %	15	CNQ05R-06	Cotula cot
Crassula colorata var. acuminata	+	<1 %	3	CNQ05-18	Crassula
Crassula decumbens var. decumbens	+	<1 %	2	CNQ05R-04	Crassula fine red
Crassula glomerata	1.5	1-5%	4	CNQ05-11	Crassula glomerata
Crassula natans var. minor	4	1-5%	1	CNQ05R-08	Crassula prostrate red
Eryngium pinnatifidum subsp. Palustre (G. J. Keighery 13459)	+	<1 %	20	CNQ05-23	Eryngium
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	0.5	<1 %	70		Grevillea sp cool (x11)
Hordeum hystrix	+	<1 %	20	CNQ05R-07	Hordeum
Hypochaeris glabra	1.5	1-5%	10		
Isolepis cernua var. setiformis	1	<1 %	2	CNQ05R-13	?Isolepis cen - mat on grnd; also CNQ05R-09
Isolepis marginata	+	<1 %	3		Isolepis marg
Lolium perenne x rigidum	+	<1 %	15	CNQ05-10	Lolium
Lotus subbiflorus	8	<1 %	3	CNQ05R-05	Lotus
Lysimachia arvensis	+	<1 %	10		scarlet pimp
Melaleuca brevifolia	5	5-10%	190	CNQ05-01	Melaleuca ?brev
Melaleuca seriata	+	<1 %	120	CNQ05-07	Melaleuca seriata
Melaleuca viminea subsp. viminea	50	50-75%	280	CNQ05-02	Melaleuca ?vim
Monopsis debilis var. depressa	+	<1 %	10	CNQ05R-11	weed herb pple (not
Ornithopus pinnatus	1	<1 %	5	CNQ05-20	?Ornithopus; also CNQ05R-03
Polypogon monspeliensis	2	1-5%	10	CNQ05-24	Polypogon; also CNQ05-09
Quinetia urvillei	+	<1 %	4		Quin urv
Senecio glossanthus	+	<1 %	35	CNQ05R-16	Senecio
Sonchus oleraceus	+	<1 %	20	CNQ05-15	?Sonchus oleraceus
Spergularia brevifolia	+	<1 %	20	CNQ05R-10	Spergularia pk flr (finished flrg)
Stellaria media	0.5	<1 %	5	CNQ05R-15	prostrate herb
Tecticornia indica subsp. bidens	2.5	1-5%	45	CNQ05-08	Tecticornia
Thysanotus manglesianus	+	<1 %	70		Thys mang/pat sterile (3L3S outside)
Trachymene pilosa	+	<1 %	20		Trachymene pilosa
Trifolium campestre var. campestre	+	<1 %	4	CNQ05-21	Trifolium camp; also CNQ05R-02
Triglochin mucronata	+	<1 %	3	CNQ05-16	red herb
Ursinia anthemoides subsp. anthemoides	+	<1 %	20		Ursinia ant
Vulpia myuros forma myuros	8	<1 %	15	CNQ05-04	Vulpia; also CNQ05R-01

Atlas 2020 Update **Site** CNQ06

Described by BRM **Date** 28/11/2019 **Type** Q 10x10

Season P **Uniformity**

Location North of Wongonderrah Rd

MGA Zone 50 331913 **mE** 6620725 **mN** 115.247897 **E** -30.533982 **S**

Habitat Slight depression on flood plain (samphire flats)

Soil Pale grey sand with surface crust

Rock Type na

Vegetation Tecticornia moniliformis, Tecticornia halocnemoides, Tecticornia syncarpa, Salicornia blackiana, Lawrencia squamata Low Open Shrubland over Angianthus micropodioides, Centrolepis humillima, Triglochin minutissima, Triglochin mucronata, Triglochin centrocarpa Low Sparse Herbland.

Veg Condition Excellent (cow pads present; some weeds)

Fire Age More than 12 years since fire.

Notes CNQ6 was in slight depression on flood plain. CQ20 was nearby on very slightly elevated area (slight sandy rise). Overall area is mosaic of CNQ6 and CQ20. Autumn revisit; 08/06/2021; photo BM107-885.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Angianthus micropodioides	5	5-10%	12	CNQ06-02	Angianthis tall;' 2020 n=2000; also CNQ06-01,13,17
Apium prostratum subsp. prostratum var. filiforme	+	<1 %	5	CNQ06-19	herb; also CNQ06R-22
Brachyscome iberidifolia	+	<1 %	5	CNQ06-09	Brachyscome; also CNQ06R-10
Calandrinia granulifera	+	<1 %	3	CNQ06R-13	Calandrn red torp lvs; also CNQ06R-16
Calandrinia sp. Kenwick (G.J. Keighery 10905)	+	<1 %	1	CNQ06R-15	Calandrinia fine prostrate
Centrolepis aristata	+	<1 %	4	CNQ06R-19	Centrolepis aristata
Centrolepis humillima	0.3	<1 %	1	CNQ06-05	
Centrolepis polygyna	+	<1 %	2	CNQ06-10	Centrolepis (poly)
Cotula cotuloides	+	<1 %	10	CNQ06R-12	Cot coluloid
Crassula colorata var. acuminata	+	<1 %	4	CNQ06R-21	Crassula col
Drosera heterophylla	+	<1 %	15	CNQ06R-20	Drosera erect; also CNQ06AR-01
Eragrostis dielsii	+	<1 %	5	CNQ06R-18	Eragrostis diels
Frankenia pauciflora var. pauciflora	+	<1 %	15	(=CGB54)	Frankenia linear leaf
Hainardia cylindrica	+	<1 %	10	CNQ06-15	grass sp; also CNQ06R-05
Isotoma scapigera	+	<1 %	10-15	CNQ06R-04	Isotoma
Lawrencia squamata	1	<1 %	30	CNQ06-06	?Lawrencia
Lolium perenne x rigidum	+	<1 %	20	CNQ06R-14	lolium (in cow pad)
Quinetia urvillei	+	<1 %	3	CNQ06-14	
Salicornia blackiana	0.5	<1 %	25	CNQ06R-03	Tecticornia red cyl uprgt (Ph BM106-989)
Samolus repens var. paucifolius	+	<1 %	30	CNQ06R-17	Samolus
Schoenus plumosus	+	<1 %	4	CNQ06R-11	herb long involuc bract
Tecticornia halocnemoides	4	1-5%	30	CNQ06-03	Tecticornia (shiny green); CNQ06R-02
Tecticornia moniliformis	4	1-5%	40	CNQ06R-01	Tect glaucous. Flrg (Photo BM106:983-985; also CNQ06-04
Tecticornia syncarpa	3	1-5%	15	CNQ06-21	Tecticornia (red globular)
Thysanotus manglesianus	+	<1 %	10		Thysanotus mang/pat (sterile)
Tribonanthes monantha	+	<1 %	5	CNQ06-18	
Triglochin calcitrapa	+	<1 %	10	CNQ06R-07	Triglochin arrow
Triglochin centrocarpa	+	<1 %	3	CNQ06-16	Triglochin logs; also CNQ06R-06
Triglochin mucronata	+	<1 %	4	CNQ06-08	Trig cren; ;CNQ06-07, CNQ06R-08
Triglochin sp. A Flora of Australia (G.J. Keighery 2477)	+	<1 %	4	CNQ06-12	herb 2 Triglochin hooks
Utricularia multifida	+	<1 %	20	CNQ06R-09	

Atlas 2020 Update **Site** CNQ07

Described by BB **Date** 28/11/2019 **Type** Q 10x10

Season P **Uniformity**

Location North of Wongonderrah Rd

MGA Zone 50 331862 **mE** 6620478 **mN** 115.247326 **E** -30.536203 **S**

Habitat Slight depression on flood plain (samphire flat).

Soil Dark brown silty fine clayey sand with thin saline crust.

Rock Type na

Vegetation Tecticornia syncarpa, Tecticornia halocnemoides, Tecticornia indica subsp. bidens, Tecticornia moniliformis, Lawrencia squamata Low Open Shrubland over Angianthus preissianus. Angianthus micropodioides, Triglochin minutissima, Triglochin mucronata, Triglochin centrocarpa Low Sparse Herbland.

Veg Condition Very Good (track nearby, impacted by affect on flows of farm clearing to the east; rabbit scats).

Fire Age More than 12 years since fire.

Notes NW peg coordinates estimated: not recorded in 2011. 2020: qdt not species rich; quadrat in lower part of the flood plain. Elevation 46m. Autumn revisit; 08/06/2021; photo BM107-888. Quadrat very wet in autumn.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Angianthus micropodioides	1	<1 %	10	CNQ07-06	Angianthus tall; CNQ7-13,5; CNQ07R-05
Angianthus preissianus	0.5		1	CNQ07-9	?centro; also CNQ07R-04; CNQ07R-06
Cotula cotuloides	+	<1 %	4	CNQ07-07	CNQ07R-02
Frankenia pauciflora var. pauciflora	+	<1 %	10	CNQ07-15	Frankenia
Isolepis cernua var. setiformis	+	<1 %	3	CNQ07R-03	Isolepis
Juncus bufonius	+	<1 %	5	CNQ07-11	
Lawrencia squamata	1	<1 %	30	CNQ07-01	low shrub linear lvs
Schoenus sculptus	+	<1 %	3	CNQ07R-01	
Tecticornia halocnemoides	3	1-5%	15	CNQ07-16	Tect low grn shiny; (=CQ20R-05
Tecticornia indica subsp. bidens	2	1-5%	10	CNQ07-04	Tect low flt purpl; (=CGK01)
Tecticornia moniliformis	1	<1 %	40	(=CQ20R-04	Tecticornia tall blue
Tecticornia syncarpa	5	5-10%	15	CNQ07R-07	Tecticornia short
Triglochin centrocarpa	0.2	<1 %	10	(=CQ20R-03	Triglochin rubbery
Triglochin minutissima	0.3	<1 %	3	CNQ07-14	fine tiffted herb
Triglochin mucronata	0.2	<1 %	2	(=CNQ06-08	Triglochin crenate; + CNQ07-08
Triglochin sp. A Flora of Australia (G.J. Keighery 2477)	+	<1 %	4	CNQ07-12	Triglochin arrow head

Atlas 2020 Update **Site** CNQ08

Described by BRM **Date** 28/11/2019 **Type** Q 10x10

Season **Uniformity**

Location North of Wongonderrah Rd

MGA Zone 50 332339 **mE** 6620413 **mN** 115.252286 **E** -30.536856 **S**

Habitat Low broad sandy rise on very gently undulating plain

Soil Pale grey-brown yellow sand

Rock Type na

Vegetation Banksia prionotes, Eucalyptus todtiana Low Woodland over Scholtzia umbellifera, Calothamnus quadrifidus subsp. quadrifidus Tall Open Shrubland over Banksia telmatiaea, Eremaea pauciflora var. lonchophylla Open Shrubland over Conospermum stoechadis subsp. stoechadis, Hibbertia hypericoides Low Sparse Shrubs over Corynotheca micrantha var. micrantha Sparse Herbland and Mesomelaena pseudostygia Sparse Sedgeland.

Veg Condition Excellent. Track nearby, very few weeds.

Fire Age More than 12 years since fire.

Notes Banksia telmatiaea veg nearby - possibly ecotonal effects in quadrat. Autumn revisit; 08/06/2021; photo BM107-881.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia spathulifolia	+	<1 %	10	CNQ08-20	Acacia seedling
Actinotus leucocephalus	+	<1 %	15	CNQ08-09	Apiaceae
Anigozanthos humilis subsp. chrysanthus	+	<1 %	30	CNQ08-18	Anigozanthus hum

Austrostipa compressa	+	<1 %	20	CNQ08-16	?Rytidosperma; also CNQ8-21
Banksia prionotes	9	<1 %	350		1 tree recently died
Banksia telmatiaea	20	10-25%	100-150	CNQ08-02	Banksia ?spaer
Briza maxima	+	<1 %	15		
Burchardia congesta	+	<1 %	40-60		
Caladenia flava subsp. flava	+	<1 %	10	CNQ08R-03	Caladenia flava
Calothamnus quadrifidus subsp. quadrifidus	4	1-5%	180-280	CNQ08-01	Calothamnus quad
Cassytha glabella	+	<1 %	180	CNQ08R-06	Cassytha glabrous
Conospermum stoechadis subsp. stoechadis	1.5	1-5%	70-110	CNQ08-17	Conospermum stack
Conostylis teretifolia subsp. teretifolia	+	<1 %	5	CNQ08-06	Conostylis ?setig; wte hairs
Corynotheca micrantha var. micrantha	1	<1 %	30	CNQ08-11	Corynotheca mic
Crassula colorata var. colorata	+	<1 %	3	CNQ08R-07	Crassula col
Cyanothamnus ramosus subsp. anethifolius	+	<1 %	30	CNQ08-07	Boronia ramosa
Dasypogon obliquifolius	+	<1 %	40		
Drosera humilis	+	<1 %	10		Drosera humilis
Drosera magna	+	<1 %	1	CNQ08-23	Drosera eryth rosette
Eremaea pauciflora var. lonchophylla	2.5	1-5%	120	CNQ08-03	Eremaea
Eucalyptus todtiana	3	1-5%	300		
Hibbertia hypericoides	1	<1 %	50		
Isolepis marginata	+	<1 %	3		Isolepis marg
Lepidobolus preissianus	+	<1 %	45	CNQ08-10	Lepidobolus
Melaleuca systena	+	<1 %	40	CNQ08R-05	Melaleuca ?systina
Mesomelaena pseudostygia	3	1-5%	45		
Petrophile linearis	+	<1 %	40		
Poranthera microphylla	1.5	1-5%	3	CNQ08-22	Poranthera; also CNQ08R-08
Schoenus clandestinus	+	<1 %	2	CNQ08-14	Schoenus
Scholtzia umbellifera	11	<1 %	140-220	CNQ08-15	Scholtz; also CNQ8-13,24; CNQ08R-01
Siloxerus humifusus	+	<1 %	2	CNQ08-05	Siloxerous hum
Stylidium bicolor	+	<1 %	20	CNQ08-08	Stylidium lin flat rosette termnl hair
Stylidium kalbarriense	+	<1 %	20	CNQ08-12	Stylid
Thysanotus manglesianus	+	<1 %	80	CNQ08-19	climber (Thysanotus)
Thysanotus thyrsoideus	+	<1 %	35	CNQ08R-02	Thysanotus thysoides 1 teret lf
Trachymene pilosa	+	<1 %	10		
Ursinia anthemoides subsp. anthemoides	+	<1 %	20		
Wahlenbergia capensis	+	<1 %	30	CNQ08-04	Wahlenbergia capensis

Atlas 2020 Update — Site CNQ09

Described by BB **Date** 29/11/2019 **Type** Q 10x10
Season P **Uniformity**
Location North of Wongonderrah Rd
MGA Zone 50 331394 **mE** 6620218 **mN** 115.242407 **E** -30.538482 **S**
Habitat Flood plain (samphire flat)
Soil Pale grey-brown sand with hard crust.
Rock Type na
Vegetation Tecticornia moniliformis, Tecticornia indica subsp. bidens, Tecticornia halocnemoides Low Open Shrubland over Angianthus micropodioides, Cotula cotuloides, Hydrocotyle diantha, Apium prostratum subsp. prostratum var. filiforme, Centrolepis humillima, Centrolepis polygyna, *Cotula coronopifolia Low Open Herbland with *Polypogon monspeliensis Low Sparse Grassland.
Veg Condition Excellent
Fire Age More than 12 years since fire.
Notes Autumn revisit 08/06/2021; photo BM107-983 to 985.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Angianthus micropodioides	11	<1 %	10	CNQ09-05	Angianthus tall; also CNQ9-26
Angianthus preissianus	+	<1 %	1	CNQ09R-23	cushion daisy
Apium prostratum subsp. prostratum var. filiforme	0.3	<1 %	15	CNQ09-01	also CNQ9-23, CNQ09R-01
Brachyscome iberidifolia	+	<1 %	10	CNQ09-12	CNQ09R-04, 12
Briza minor	+	<1 %	10		
Calandrinia granulifera	+	<1 %	5	CNQ09R-13	Calandrinia
Centrolepis humillima	3	1-5%	1	CNQ09-20	herb in tgt clump
Centrolepis polygyna	1.5	1-5%	2	CNQ09-19	
Cotula coronopifolia	2.5	1-5%	5		Cotula coronopifolioa
Cotula cotuloides	2	1-5%	15	CNQ09-06	
Crassula colorata var. acuminata	+	<1 %	4	CNQ09-08	

Crassula natans var. minor	+	<1 %	5	CNQ09-25	filamentous herb, scrambling; under Tecticornia
Drosera heterophylla	+		15	CNQ09AR-01	AUT21 Drosera heterophylla
Drosera ramellosa	+	<1 %	5	CNQ09R-21	Drosera g
Frankenia pauciflora var. pauciflora	+	<1 %	4	CNQ09-09	Frankenia
Hainardia cylindrica	+	<1 %	5	(=CNQ06R-	cylinder grass
Heliophila pusilla	+	<1 %	30		
Hordeum hystrix	+	<1 %	20	CNQ09R-10	Hordeum
Hydrocotyle diantha	4	1-5%	2-5	CNQ09-14	flat frt; also CNQ09R-08
Isolepis cernua var. setiformis	+	<1 %	3	CNQ09R-06	Isolepis cenua
Isolepis marginata	+	<1 %	15	CNQ09R-11	Isolepis tall
Juncus bufonius	+	<1 %	3	CNQ09-18	
Lawrencia squamata	+	<1 %	30	CNQ09-24	Lawrencia
Lolium perenne x rigidum	+	<1 %	30	CNQ09R-19	Lolium
Lotus subbiflorus	+	<1 %	20	CNQ09R-15	Lotus
Ornithopus pinnatus	+		10	CNQ09R-22	?Swainsona
Polypogon monspeliensis	2.5	1-5%	10	CNQ09-11`	grass - feather head
Quinetia urvillei	+	<1 %	5		Quin urv
Sagina apetala	+	<1 %	3	CNQ09R-07	herb
Schoenus plumosus	+	<1 %	10	CNQ09R-20	Schoenus sedge
Senecio glossanthus	+	<1 %	40	CNQ09R-17	daisy; also CNQ09AR-02
Sonchus oleraceus	+	<1 %	10	CNQ09-22	Sonchus
Spergularia brevifolia	+	<1 %	15	CNQ09R-05	herb pk flr
Tecticornia halocnemoides	0.5	<1 %	25	CNQ09-02	Tecticornia red shiny globe
Tecticornia indica subsp. bidens	3	1-5%	40	CNQ09-03	Tecticornia tall
Tecticornia moniliformis	10	5-10%	15-25	CNQ09-04	Tecticornia ylw/grn fat
Tribonanthes monantha	+	<1 %	15	CNQ09-07	
Tribonanthes variabilis	+	<1 %	12	CNQ09R-02	Tribonanthes
Trifolium cernuum	+	<1 %	10	CNQ09R-16	Callotis
Triglochin calcitrapa	+	<1 %	10	CNQ09R-24	Triglochin sp A
Triglochin centrocarpa	+	<1 %	2	CNQ09-13	Trichoglochin linear logs; CNQ09R-14
Triglochin mucronata	+	<1 %	5	CNQ09-10	also CNQ09R-09
Triglochin sp. A Flora of Australia (G.J. Keighery 2477)	+	<1 %	10	CNQ09-16	Triglochin - spear head; CNQ09R-18
Utricularia multifida	+	<1 %	20	CNQ09R-03	

Atlas 2020 Update — Site CNQ10

Described by BRM **Date** 30/11/2019 **Type** Q 10x10
Season P **Uniformity**
Location North of Wongonderrah Rd
MGA Zone 50 331292 **mE** 6620391 **mN** 115.241372 **E** -30.536908 **S**
Habitat Very gentle, SE-facing slope on margins of flood plain
Soil Pale grey-brown sand.
Rock Type na
Vegetation Callitris pyramidalis Tall Shrubland over Regelia ciliata, Melaleuca seriata, Verticordia densiflora var. densiflora Sparse Shrubland over Banksia telmatiaea, Petrophile seminuda, Banksia nivea subsp. nivea Low Open Shrubland over Conostylis aculeata subsp. breviflora Low Sparse Herbland and Chaetanthus aristatus, Chordifex sinuosus, Schoenus fascicularis, Desmocladus lateriflorus, Caustis dioica Sparse Rushland/Sedgeland
Veg Condition Excellent (low weed cover)
Fire Age More than 12 years since fire.
Notes Elevation 51m. Autumn revisit; 08/06/2021; photo BM107-892.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Aira cupaniana	+	<1 %	10	CNQ10R-15	Pent sp
Aphelia cyperoides	+	<1 %	3	CNQ10R-21	Aphelia
Aphelia nutans	+	<1 %	3	CNQ10R-17	
Banksia nivea subsp. nivea	0.5	<1 %	45	CNQ10-18	Dryandra nivea
Banksia telmatiaea	11	<1 %	80		
Brachyscome iberidifolia	+	<1 %	10	CNQ10-01	Brachyscome; also CNQ10-2,24
Briza maxima	+	<1 %	15		
Burchardia multiflora	+	<1 %	40	CNQ10R-04	Burc
Caladenia sp.	+	<1 %	10	CNQ10R-23	orchid
Calandrinia granulifera	0.1	<1 %	1	(=CQ20R-20	Calandrinia gran

Callitris pyramidalis	40	33.3-50%	280-400	CNQ10-08	Callitris
Cassytha glabella	+	<1 %	80	CNQ10-16	Climber ?Thysanotus
Caustis dioica	0.3	<1 %	40	CNQ10-28	Caustis dioc
Centrolepis drummondiana	+	<1 %	1	(=CQ23R-10	Cent inco
Centrolepis polygyna	0.2	<1 %	3	CNQ10-21	Centrolepis
Chaetanthus aristatus	1	<1 %	50	CNQ10-13	Meeboldina; also CNQ10R-08, 10
Chordifex reseminans	+		30	CNQ10AR-02	AUT21 rush
Chordifex sinuosus	1	<1 %	15	CNQ10-04	rush
Conostylis aculeata subsp. breviflora	1	<1 %	15	CNQ10-14	Conostylis bristly
Crassula colorata var. acuminata	+	<1 %	2	CNQ10-25	Crassula
Desmocladus lateriflorus	0.5	<1 %	30	CNQ10R-13	Chor resi (n=15)
Drosera closterostigma	+	<1 %	1	CNQ10-15	Drosera pygmy
Drosera gigantea	+	<1 %	40	CNQ10R-05	Drosera gigantea odd
Drosera glanduligera	+	<1 %	3	CNQ10R-16	Drosera glan
Drosera magna	+	<1 %	1		Drosera eryth
Drosera menziesii	+	<1 %	70	CNQ10R-02	Dorsera menz
Gnephosis drummondii	+	<1 %	3	CNQ10R-22	Gnephosis
Gompholobium tomentosum	+	<1 %	80		
Hibbertia stellaris	+	<1 %	20	CNQ10R-14	Hibb
Hypochaeris glabra	+	<1 %	10		
Isolepis marginata	+	<1 %	3	CNQ10R-07	Isolepis marg
Jacksonia hakeoides	+	<1 %	70	CNQ10R-25	Jack hak
Juncus capitatus	+	<1 %	3	CNQ10R-20	Cyp spikey
Laxmannia ramosa subsp. ramosa	+	<1 %	20	CNQ10-30	Laxmannia
Lomandra suaveolens	+	<1 %	15	CNQ10-29	Lomandra ?suaveolens
Melaleuca seriata	1	<1 %	110	CNQ10-11	Melaleuca ?seriata
Opercularia vaginata	+	<1 %	20		
Petrophile seminuda	0.5	<1 %	45-60	CNQ10-12	Petrophile 'trilobe'
Podotheca angustifolia	0.2	<1 %	4	CNQ10-27	Podotheca angust
Pterostylis orbiculata	+	<1 %	15	CNQ10-22	Pterostylis sang; also CNQ10AR-01
Quinetia urvillei	+	<1 %	4	CNQ10-07	
Regelia ciliata	7	5-10%	120	CNQ10-10	Regelia ciliata
Schoenus pennisetis	+	<1 %	6	CNQ10R-03	Schoenus ?bad (n=10); CNQ10-23B
Schoenus subfascicularis	+	<1 %	60	CNQ10-05	Schoenus; also CNQ10R-12
Siloxerus humifusus	+	<1 %	2	CNQ10-03	Siloxerus
Stirlingia simplex	+	<1 %	15	CNQ10-19	Stirlingia
Stylidium aceratum	+	<1 %	3	CNQ10R-06	Stylid tiny pink (n=30) Photo 719,720
Stylidium araeophyllum	+	<1 %	30	CNQ10-20	Stylidium brun complex
Stylidium cygnorum	+	<1 %	10	CNQ10R-11	Stylid cyg
Stylidium hymenocraspedum	+	<1 %	3	CNQ10R-24	Stylid hyme
Stylidium purpureum	+	<1 %	40	CNQ10R-01	Stylid 'brun'
Thysanotus thyrsoideus	+	<1 %		CNQ10R-25B	
Trachymene pilosa	0.2	<1 %	10		
Triglochin nana	+	<1 %	3	CNQ10-23	Triglochin
Ursinia anthemoides subsp. anthemoides	+	<1 %	20		
Verticordia densiflora var. densiflora	0.3	<1 %	120	CNQ10-09	Verticordia densiflora
Vulpia myuros forma myuros	+	<1 %	10	CNQ10-17	Vulpia
Wahlenbergia capensis	+	<1 %	15		

Atlas 2020 Update **Site** CNQ11

Described by BRM **Date** 30/11/2019 **Type** Q 10x10

Season P **Uniformity**

Location North of Wongonderrah Rd

MGA Zone 50 331472 **mE** 6619918 **mN** 115.243171 **E** -30.541199 **S**

Habitat Very gentle slope on edge of flood plain

Soil Pale grey-brown sand.

Rock Type na

Vegetation Callitris pyramidalis Tall Open Shrubland over Banksia telmatiaea, Scholtzia umbellifera Open Shrubland over Hibbertia hypericoides, Calothamnus quadrifidus subsp. quadrifidus, Xanthorrhoea preissii Low Sparse Shrubland over Lepidobolus preissianus Sparse Rushland

Veg Condition Pristine; almost no weeds

Fire Age Long unburnt

Notes Elevation 41m; Callitris vegetation lies on slope between Bansia low woodland and samphire flats. It is more upslope so more Banksia woodland influence than CNQ10. Dead Bansia trunk in quadrat. Autumn revisit; 08/06/2021; photo BM107-896.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia pulchella var. glaberrima	+	<1 %	40	CNQ11-13	Acacia pulchella var?
Actinotus leucocephalus	+	<1 %	12		Actinotus
Alexgeorgea nitens	0.01	<1 %	20	CNQ11-02	Alexgeorgia
Amphipogon turbinatus	+	<1 %	20	CNQ11-05	Amphipogon turb
Anigozanthos humilis subsp. humilis	+	<1 %	10		Anigozanthos hum
Arnocrinum preissii	+	<1 %	45	(=CBG71)	Arnocrinum
Austrostipa compressa	+	<1 %	20	CNQ11-08	?Austrostipa comp
Austrostipa macalpinei	+	<1 %	30	CNQ11-14	Austrostipa 2
Banksia telmatiaea	15	10-25%	140	CNQ11-01	Banksia telmat
Burchardia congesta	+	<1 %	40		
Calandrinia corrigioloides	+	<1 %	5	CNQ11R-01	Calandrinia
Callitris pyramidalis	25	25-33.3%	400	(=CNQ10-)	Callitris
Calothamnus quadrifidus subsp. quadrifidus	4	1-5%	90	CNQ11-15	Calothamnus quad
Cassytha glabella	+	<1 %	80	CNQ11-12	Cassytha
Conostylis teretifolia subsp. teretifolia	+	<1 %	10	CNQ11R-05	Conostylis
Crassula colorata var. acuminata	+	<1 %	3	(=CNQ10-25	Crassula
Drosera magna	+	<1 %	1	CNQ11R-07	Drosera eryth - 4 lvs
Hibbertia hypericoides	3	1-5%	60		
Isolepis marginata	+	<1 %	4		
Lepidobolus preissianus	1	<1 %	60	CNQ11-04	Lepidobolus
Lyginia barbata	+	<1 %	40	CNQ11R-09	Lyginea
Mesomelaena graciliceps	+	<1 %	40	CNQ11R-08	
Mesomelaena pseudostygia	+	<1 %	30	CNQ11-18	Lepidosperma/Mesomelaena
Opercularia vaginata	+	<1 %	20	CNQ11R-04	Operc vag
Phyllangium divergens	+	<1 %	6	CNQ11R-03	Phyllangium; also CNQ11-09
Podotheca angustifolia	+	<1 %	6		
Poranthera microphylla	+	<1 %	3		
Pterostylis orbiculata	+		12	=CNQ10AR-1	AUT21 Pterostylis
Rytidosperma occidentale	+	<1 %	45	CNQ11-16	Rytidosperma
Schoenus clandestinus	+	<1 %	3	CNQ11-03	Schoenus
Schoenus pleiostemoneus	+	<1 %	30	CNQ11R-02	Schoenus
Scholtzia umbellifera	5	5-10%	170	CNQ11-07	?Scholtsia umbel; also CNQ11-6
Stylidium araeophyllum	+	<1 %	30	(=CNQ10-20	Stylid 'brunon'
Stylidium kalbarriense	+	<1 %	10	CNQ11R-06	Stylis rigid
Thysanotus manglesianus	+	<1 %	30		Thysanotus climber; dead
Trachymene pilosa	+	<1 %	5		
Wahlenbergia capensis	+	<1 %	+	CNQ11-11	Wahl capensis
Xanthorrhoea preissii	1	<1 %	80		
Xanthosia huegelii	+	<1 %	10	CNQ11-17	Xanthosia

Atlas 2020 Update

Site CNQ12

Described by BRM **Date** 30/11/2019 **Type** Q 10x10

Season P **Uniformity**

Location North of Wongonderrah Rd

MGA Zone 50 331579 **mE** 6620148 **mN** 115.244323 **E** -30.539140 **S**

Habitat Very gentle, north-facing slope on edge of flood plain.

Soil Pale grey-brown sand.

Rock Type

Vegetation Acacia saligna Isolated Tall Shrubs over Callitris pyramidalis, Banksia telmatiaea, Melaleuca seriata, Calytrix depressa Closed Heathland over Jacksonia hakeoides Low Sparse Shrubland.

Veg Condition Excellent (very low weed cover)

Fire Age More than 12 years since fire.

Notes Elevtn:35m
Autumn revisit; 18/06/2021; photo BM107-939.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia pulchella var. glaberrima	+	<1 %	30		Acacia pulchella
Acacia saligna	1	<1 %	190-250		
Aira cupaniana	+	<1 %	10	CNQ12-13	Aira
Banksia nivea subsp. nivea	+	<1 %	30	(=CNQ10-18	Dryandra nivea
Banksia telmatiaea	13	<1 %	120	(=CNQ11-01	Banksia telmatiaea
Beaufortia squarrosa	+	<1 %	160	CNQ12R-05	Melaleuca tall/check Regelia
Burchardia sp.	+	<1 %	40		sterile, lf only

Caladenia flava subsp. flava	+	<1 %	10	CNQ12R-04	Caladenia flava
Callitris pyramidalis	60	50-75%	190-200	(=CNQ10-)	Callitris
Calytrix depressa	1	<1 %	110	CNQ12-02	Calytrix pple; also CNQ12R-01
Calytrix flavescens	+	<1 %	30	CNQ12-08	Leucopogon ?sp Yanchip x4
Cassytha flava	+	<1 %	60	CNQ12-05	Cassytha
Conostylis aculeata subsp. breviflora	+	<1 %	15	(=CNQ10-14	Conostylis
Desmocladus lateriflorus	+	<1 %	20	CNQ12-15	rush; also CNQ12R-03
Drosera gigantea	+	<1 %	40	CNQ12R-09	Drosera gigantea
Drosera glanduligera	+	<1 %	6	CNQ12R-02	Drosera pyg
Drosera minutiflora	+			CNQ12AR-02	AUT21 Droasera pygmy
Drosera sp.	+	<1 %		CNQ12R-10	Drosera climber
Haemodorum sp.	+	<1 %	20		lf only
Hypochaeris glabra	+	<1 %	10		
Jacksonia hakeoides	1	<1 %	80	CNQ12-12	Jacksonia hak
Lepidobolus preissianus	+	<1 %	20	(=CNQ11-04	Lepidobolus
Lepyrodia curvescens	+	<1 %	40	CNQ12-14	rush
Lyginia imberbis	+	<1 %	50	CNQ12-07	Lyginea
Melaleuca seriata	2.5	1-5%	70-130	(=CNQ10-11	Melaleuca ?seriata
Neurachne alopecuroidea	+	<1 %	30	CNQ12R-06	Amphipogon/Neurach
Opercularia vaginata	+	<1 %	20		
Poaceae sp.	+	<1 %	20	CNQ12-06	?Amphipogon
Pterostylis orbiculata	+	<1 %	25	CNQ12R-08	Pterostylis ?sang; also CNQ12AR-01
Schoenus pennisetis	+	<1 %	12	CNQ12-11	Triglochin
Siloxerus humifusus	+	<1 %	3	CNQ12-04	
Thysanotus manglesianus	+	<1 %	80		Thysanotus climber (dead, sterile)
Trachymene pilosa	+	<1 %	10		
Ursinia anthemoides subsp. anthemoides	+	<1 %	20		
Verticordia densiflora var. densiflora	+	<1 %	90-120	(=CNQ10-09	Verticordia densiflora
Vulpia myuros forma myuros	+	<1 %	25	CNQ12R-07	Vulpia; also CNQ12-09
Wahlenbergia capensis	+	<1 %	15	(=CNQ11-11	Wahl capensis

Atlas 2020 Update — Site CNQ13

Described by BRM **Date** 13/10/2020 **Type** Q 10x10

Season E **Uniformity**

Location Atlas, North of Wongonderrah Rd

MGA Zone 50 332587 **mE** 6617672 **mN** 115.254427 **E** -30.561613 **S**

Habitat Very gentle, east-facing slope on edge of wetland.

Soil Grey sand

Rock Type na

Vegetation Eucalyptus rudis Open Forest over Rhagodia baccata subsp. baccata Open Shrubland over Clematis linearifolia Sparse Lianes with *Ehrharta longiflora exotic Sparse Grassland and *Brassica tournefortii, *Trifolium campestre var. campestre, *Stellaria media Sparse Herbland.

Veg Condition Degraded (high weed cover in understorey)

Fire Age Long unburnt. (more than 12 yrs since fire)

Notes Autumn revisit; 07/06/2021; photo BM107-867.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Brassica tournefortii	2		60		Brassica torn
Bromus diandrus	+		30		Bromus diandrus
Clematis linearifolia	7		170		Clematis lin
Crassula colorata var. acuminata	+		10	CNQ13-02	Crassula col
Ehrharta longiflora	20		30-50		Erharta long
Erodium cicutarium	+		10	CNQ13-05	Erodium
Eucalyptus rudis subsp. rudis	40		800-1100		Euc rud
Galium murale	+		4	CNQ13-04	Crassula prostrate
Geranium solanderi	+		10	(=CQ3R-)	Geranium, dead
Hypochaeris glabra	+		30		Hypochaeris glabra
Lepidosperma longitudinale	+		40		Lepidosperma long
Lysimachia arvensis	+		5		anagalis
Microlaena stipoides var. stipoides	+		30		Microlaena
Rhagodia baccata subsp. baccata	25		180	CNQ13-03	Rhag bac bac
Stellaria media	0.5		3	CNQ13-01	prostrate herb
Trifolium campestre var. campestre	1		10		Trifolium camp
Ursinia anthemoides subsp. anthemoides	+		30		Ursinia

Atlas 2020 Update **Site** CNQ14

Described by KM **Date** 13/10/2020 **Type** Q 10x10

Season E **Uniformity**

Location Access corridor from Munbinea Rd, west side of Atlas survey area

MGA Zone 50 330342 **mE** 6618079 **mN** 115.231095 **E** -30.557627 **S**

Habitat Upper slope of low dune on plain

Soil White sand (brown at depth)

Rock Type na

Vegetation Banksia menziesii, Banksia attenuata, Eucalyptus todtiana Low Woodland over Scholtzia umbellifera, Allocasuarina humilis Open Shrubland over Melaleuca clavifolia, Petrophile macrostachya, Hibbertia hypericoides, Jacksonia nutans Low Open Shrubland over Blancoa canescens, Opercularia vaginata Low Sparse Herbland and Lepidobolus preissianus, Mesomelaena pseudostygia Sparse Sedgeland.

Veg Condition Excellent to Pristine (very few weeds)

Fire Age More than 12 years since fire

Notes Elevation 47m
Autumn revisit 18/05/2021; photo BM107-920 to 922.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia lasiocarpa var. lasiocarpa	+		60	CNQ14-14	Acacia lasio
Acacia sessilis	+		40	CNQ14-13	Acacia sessilis
Alexgeorgea nitens	+		15		
Allocasuarina humilis	1		110		
Amphipogon turbinatus	+			(=CSQ1R-09	
Anigozanthos humilis subsp. humilis	+		30		
Austrostipa compressa	+		20		
Banksia attenuata	10		300		
Banksia menziesii	5		600		
Blancoa canescens	4		15		
Bossiaea eriocarpa	+		60		
Brachyscome bellidioides	+		10	CNQ14-09	Brachys
Cassytha flava	+			CNQ14-12	Cassyth hairy
Conostylis candicans subsp. candicans	1		40	CNQ14-10	Conostylis cand
Conostylis teretifolia subsp. teretifolia	+		10	(=CSQ3R-06	Con setig
Corynotheca micrantha var. micrantha	0.3		30	(=CQ23R-06	Corynotheca micr
Dasypogon obliquifolius	+		40		
Desmocladus asper	1		20	CNQ14-19	Desmocladus asper
Drosera closterostigma	+		1	CNQ14-03	Drosera minut
Drosera drummondii	+			CNQ14-04	Drosera drum
Drosera humilis	+		10	CNQ14-05	Drosera hum
Drosera magna	+		1		Drosera eryth
Eremaea asterocarpa subsp. asterocarpa	0.5		90	CNQ14-20	Eremaea astero
Hibbertia hypericoides	2		70		
Hibbertia sericosepala	+		30		
Hypocalymma xanthopetalum	0.5		40		
Hypochaeris glabra	+		10		
Isolepis marginata	+		3	(=CSQ3R-02	Isolepis marg
Jacksonia nutans	1		90		
Lepidobolus preissianus	2		70	CNQ14-15	Lepid preis; also CNQ14R-03
Leptospermum spinescens	+		50		
Leucopogon sprengelioides	+		50		
Lomandra caespitosa	+		15	CNQ14-16	Lomandra caes
Melaleuca clavifolia	5		80	CNQ14R-01	Melaleuca pink; also CNQ14-02
Mesomelaena pseudostygia	1		60		
Opercularia vaginata	2		20		Also CNQ14R-05
Petrophile linearis	+		40		
Petrophile macrostachya	3		70	CNQ14-11	Petroph macro
Phyllangium divergens	+		5	(=CQ23R-01	Phyllangium
Podotheca angustifolia	+		10		
Poranthera microphylla	+		3		
Rytidosperma occidentale	+		15	CNQ14-17	Rhytid
Scholtzia umbellifera	20		140	CNQ14-01	Scholtzia umbellifera
Stylidium araeophyllum	+		40	CNQ14-07	Styl 'brun'
Stylidium crossocephalum	+		5	CNQ14R-04	Stylid
Stylidium kalbarriense	+		15	CNQ14-08	Stylid divar/rigid
Styphelia conostephioides	+		10	CNQ14-06	leucopogon
Styphelia planifolia	+		40	CNQ14-18	Leucopogon broad; also CNQ14R-02
Thysanotus manglesianus	+				Thysanotus climber unequal
Thysanotus thyrsoideus	+		20		

Trachymene pilosa	+	10
Ursinia anthemoides subsp. anthemoides	+	20

Atlas 2020 Update **Site** CNQ15

Described by BRM **Date** 13/10/2020 **Type** Q 10x10

Season E **Uniformity**

Location Access track from Munbinia Rd to Atlas survey area

MGA Zone 50 330659 **mE** 6618047 **mN** 115.234394 **E** -30.557960 **S**

Habitat Plain

Soil Grey sand

Rock Type na

Vegetation Banksia attenuata, Banksia menziesii, Banksia ilicifolia Low Woodland over Eremaea pauciflora var. lonchophylla, Jacksonia nutans Open Shrubland over Hibbertia hypericoides, Melaleuca clavifolia Low Open Shrubland over Dasypogon obliquifolius, Blancoa canescens Low Sparse Herbland and Mesomelaena pseudostygia, Lyginia imberbis Sparse Sedgeland.

Veg Condition Pristine (no weeds present)

Fire Age More than 12 yrs since fire

Notes Elevation 44m. NB B. ilicifolia very sparsely scattered in general area. Several dead, fallen Adenanthos shrubs on edge of qdt. Euc todtiana in surrounds. Autumn revisit; 18/06/2021; photo BM107-923. No extra sp. during autmn visit; numerous dead Banksias in area, as well as hlthy live ones.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia lasiocarpa var. lasiocarpa	+		60	CNQ15-03	Acacia lasio
Alexgeorgea nitens	+		12		
Amphipogon turbinatus	+		10		
Anigozanthos humilis subsp. humilis	+		10		
Austrostipa compressa	+		20		
Banksia attenuata	12		350		
Banksia ilicifolia	3		450		
Banksia menziesii	2		350		
Blancoa canescens	1.5		15		
Bossiaea eriocarpa	+		20		
Burchardia congesta	+		20		
Calytrix flavescens	+		25	CNQ15-22	Calytrix flav
Cassytha glabella	+		40	(=CQ8R-	Cassytha glab
Chaetospora curvifolia	+		30		
Chordifex sinuosus	+		45	CNQ15-15	Chordifex
Conostephium pendulum	+		50		pointy leaf tip
Conostylis teretifolia subsp. teretifolia	+		15	(=CQ8R-	Conostylis teret/setig
Crassula colorata var. colorata	+		2	CNQ15-16	Cras col
Dasypogon obliquifolius	4		40		
Daviesia physodes	+		40	CNQ15R-30	Daviesia
Daviesia podophylla	1		60	CNQ15-05	Daviesia; also CNQ15R-31
Drosera closterostigma	+		2	CNQ15-18	Drosera pygmy
Drosera drummondii	+		30	CNQ15-14	Drosera drum pk
Drosera magna	+		1		Drosera eryth - 4 leaf
Eremaea asterocarpa subsp. asterocarpa	+		25		
Eremaea pauciflora var. lonchophylla	10		110	CNQ15-01	
Hibbertia aurea	+		25		
Hibbertia hypericoides	10		40		
Hypocalymma xanthopetalum	+		30	CNQ15-20	Hypocalymma xanth
Jacksonia nutans	6		50-120		
Lepidosperma calcicola	+		30	CNQ15-06	Lepidosperma calc
Leucopogon sprengelioides	+		30	CNQ15-19	Leucopogon spreng
Lomandra preissii	+		50	CNQ15-13	Lomandra preis
Lyginia barbata	0.5		60	CNQ15-02	Lyginea imberbis
Melaleuca clavifolia	5		50	CNQ15R-32	Mel pk; also CNQ15-04; CNQ15R-33
Mesomelaena pseudostygia	10		60		
Opercularia vaginata	+		20		
Patersonia occidentalis var. occidentalis	+		60		
Petrophile linearis	+		40		
Philotheca spicata	+		50		
Phlebocarya filifolia	+		45	CNQ15-07	Phlebocarya ?fil
Phyllangium divergens	+		6	(=CQ05R-	Phyllangium
Pterostylis sp.	+		20	CNQ15-17	pterostylis

Stirlingia latifolia	+	35		
Stylidium kalbarriense	+	15	CNQ15-11	Stylid ?rigid
Stylidium schoenoides	+	25	CNQ15-09	Stylid schoen
Styphelia conostephioides	+	30	CNQ15-10	Leucopogon conosteph
Thysanotus arenarius	+	20	CNQ15-21	Tricoryne/arnocrinum
Thysanotus thyrsoideus	+	30		
Trachymene pilosa	+	10		
Xanthorrhoea preissii	+	120		
Xanthosia huegelii	+	20	CNQ15-12	

Atlas 2020 Update — Site CNQ16

Described by KM **Date** 14/10/2020 **Type** Q 10x10
Season E **Uniformity**
Location South side of power line track, north of Wongonderrah Rd
MGA Zone 50 332012 **mE** 6618090 **mN** 115.248502 **E** -30.557763 **S**
Habitat Depression on plain (wetland)
Soil Brown clayey sand
Rock Type Ironstone present
Vegetation Melaleuca rhaphiophylla, Melaleuca teretifolia Tall Shrubland over Petrophile seminuda over Schoenus fascicularis, Leptocarpus coangustatus, Lepidosperma longitudinale Open Sedgeland/Rushland and Conostylis festucacea subsp. festucacea, Opercularia vaginata, Podolepis gracilis Low Sparse Herbland with Vulpia myuros forma myuros Sparse Grassland.
Veg Condition Very Good
Fire Age More than 12 yrs since fire
Notes Elevation 47m. Autumn revisit; 18/06/2021; photo BM107-926, 927.
Not inundated; damp soil, not saturated at surface.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia stenoptera	0.2		60		
Aira cupaniana	+		10	CNQ16-06	Aira
Allocasuarina lehmanniana subsp. lehmanniana	+		260	CNQ16-10	Allocas lehman
Avellinia michelii	+			CNQ16-01B	
Briza minor	+		5		
Bromus diandrus	+		30		
Caladenia longicauda subsp. albella	+		30	CNQ16-21	calad?
Calandrinia corrigioloides	+		5	CNQ16-16	calandrinia
Calandrinia granulifera	+		3	CNQ16-12	Calandrinia
Cassytha glabella	+			(=CQ27R-04	Cassytha glab
Centrolepis polygyna	+		3	CNQ16-07	Centrolepis
Comesperma integerrimum	0.5				
Conostylis festucacea subsp. festucacea	0.5		40	CNQ16-28	Conostylis ?fest
Crassula colorata var. acuminata	+		3	(=CSQ3R-04	Crassula colorat
Daucus glochidiatus	+		20		
Drosera glanduligera	+		3	CNQ16-02	Dros ?glan
Eriochilus dilatatus subsp. multiflorus	+		30	CNQ16-24	orchid
Erodium cicutarium	+		5	CNQ16-19	Erodium sp.
Goodenia micrantha	+		10	CNQ16-23	Good mic
Goodenia trinervis	+		30	CNQ16-22	Vellaea
Hakea obliqua subsp. parviflora	+		220		
Hakea trifurcata	+		220		
Hakea varia	+		90		
Hydrocotyle alata	+		2	CNQ16-20	Hydrocotyl
Hypochaeris glabra	+		20		
Isolepis marginata	+		5	CNQ16-05	Isolepis
Jacksonia hakeoides	+		40		
Juncus capitatus	+		3	CNQ16-09	Juncus ?cap; also CNQ16-14
Lagenophora huegelii	+		20		
Lepidosperma longitudinale	2		40		
Leptocarpus coangustatus	5		90	CNQ16-26	Restio
Lotus subbiflorus	+		5		
Lysimachia arvensis	1		10		
Melaleuca rhaphiophylla	40		240		(dward form to 250cm)
Melaleuca teretifolia	7		280		
Opercularia vaginata	0.5		30	(=CQ23R-05	
Ornithopus compressus	+		30	CNQ16-18	Ornithopsis
Parentucellia latifolia	+		10		

Petrophile seminuda	2	90	CNQ16-29	Petro
Petrorhagia dubia	+	20		
Podolepis gracilis	0.3	40	CNQ16-03	Podolepis
Podotheca angustifolia	+	3		
Quinetia urvillei	+	7		
Schoenus subfascicularis	5	90	CNQ16-27	Schoenus subfasic
Siloxerus humifusus	+	2	(=CNQ18-12	Siloxerus hum
Sonchus oleraceus	+	60		
Stackhousia monogyna	+	35		
Thysanotus manglesianus	+			Thysanotus climber unequal
Trachymene pilosa	+	10		
Trifolium arvense var. arvense	+	10	CNQ16-08	Trifolium
Trifolium campestre var. campestre	+	5		
Triglochin nana	+	3	CNQ16-15	Triglochin; also CNQ16-25
Urospermum picroides	+	30	CNQ16-11	Osteo sp
Ursinia anthemoides subsp. anthemoides	0.5	20		
Vulpia myuros forma myuros	5	10	CNQ16-01	Vulpia; also CNQ16-17
Wahlenbergia capensis	+	20		
Wahlenbergia preissii	+	10	CNQ16-04	Wahlenbergia preis

Atlas 2020 Update — Site CNQ17

Described by BRM **Date** 14/10/2020 **Type** Q 10x10

Season E **Uniformity**

Location South-eastern side of Atlas survey area, north of Wongonderrah Rd

MGA Zone 50 332654 **mE** 6619364 **mN** 115.255399 **E** -30.546362 **S**

Habitat Very gentle, north-facing slope on edge of large flood plain

Soil Yellow-brown sand

Rock Type Scattered lumps of ironestone along edge of firebreak nearby

Vegetation Melaleuca seriata, Banksia telmatiaea, Regelia ciliata, Petrophile seminuda Low Open Shrubland to Low Shrubland over Conostylis aculeata subsp. breviflora, Lomandra micrantha subsp. micrantha Low Sparse Herbland and Desmocladus lateriflorus, Chordifex sinuosus Open Sedgeland/Rushland with Neurachne alopecuroidea Low Sparse Grassland.

Veg Condition Excellent (low weed cover; site 50m west of farm paddocks))

Fire Age More than 12 years since fire

Notes Autumn revisit; 07/06/2021; photo BM107-876. 877.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia dilatata	2		60	CNQ17-29	Acacia delta; CNQ17-50
Aira praecox	+		12	CNQ17-13	Aira
Anarthria laevis	+		25	CNQ17-47	Conostylis juncea
Arctotheca calendula	+		30		
Atriplex prostrata	+		25	CNQ17-41	Atriplex (growing from cow pad)
Austrostipa compressa	+		40		
Brachyscome iberidifolia	+		10	CNQ17-23	Brachyscome
Bromus diandrus	+		30		
Burchardia bairdiae	+		40	CNQ17-05	Burchardia baird
Caladenia flava subsp. flava	+		5	CNQ17-24	Caladenia flava
Caladenia longicauda subsp. albella	+		40	CNQ17-34	Spider orchid
Calandrinia sp. Kenwick (G.J. Keighery 10905)	+		1	CNQ17-15	Calandrinia
Calytrix aff. flavescens	+		30	CNQ17-49	Calytrix flav
Cassytha flava	+		30	CNQ17-39	Cassytha hairy
Caustis dioica	+		35		
Centrolepis aristata	+		5	CNQ17-37	Centrolepis aristata
Centrolepis polygyna	+		3		
Chordifex sinuosus	1		20	CNQ17-19	rush pink sheaths
Conostylis aculeata subsp. breviflora	2		25	CNQ17-20	Conostylis acul brev
Crassula closiana	+		2	CNQ17-14	Crassula decumb
Crassula colorata var. acuminata	+		4	CNQ17-11	Crassula col
Desmocladus lateriflorus	15		25	CNQ17-06	Desmocladus long
Drosera glanduligera	+		3	CNQ17-36	Drosera
Drosera thysanosepala	+		20	CNQ17-04	Drosera menz
Gnephosis drummondii	+		5	CNQ17-08	Gnephosis
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	11		25		n=11
Hypochaeris glabra	+		2		
Isolepis marginata	+		4	CNQ17-12	Isolepis cenua; also CNQ17-45
Jacksonia hakeoides	+		40		

Juncus bufonius	+	3	CNQ17-16	Centrolepis ?drum
Juncus capitatus	+	4	CNQ17-09	Juncus; also CNQ17-21
Leptomeria pauciflora	+	40	CNQ17-31	?Leptomeria - sprdg shrb; CNQ17R-01
Lolium perenne x rigidum	+	30	CNQ17-42	Lolium (growing from cow pad)
Lomandra micrantha subsp. micrantha	0.5	40	CNQ17-18	Lomandra caes
Lomandra suaveolens	+	20	CNQ17-33	Lomandra suav
Lotus subbiflorus	+	10	CNQ17-03	Lotus subbiflorus
Melaleuca seriata	35	60	CNQ17-01	Melaleuca flat lf pk
Neurachne alopecuroidea	1	40		
Parentucellia latifolia	+	10	(=CNQ16-	Parentucellia lat
Petrophile seminuda	1	60	CNQ17-27	Petrophile
Podotheca gnaphalioides	+	15	CNQ17-32	Podotheca
Ptilotus manglesii	+	10	CNQ17-35	Ptilotus mang
Schoenus andrewsii	+	25	CNQ17-38	Schoenus
Schoenus pennisetis	+	10	CNQ17-43	Schoenus ?badius; also CNQ17-17
Schoenus rigens	0.3	20	CNQ17-26	Schoenus red-black
Siloxerus filifolius	+	1	CNQ17-10	Siloxerus
Siloxerus humifusus	+	3	CNQ17-44	Siloxerus hum
Stirlingia simplex	+	20		
Stylidium dichotomum	+	10	CNQ17-22	Stylid on stilts
Thelymitra crinita	+	15	CNQ17-25	Orchid broad
Thysanotus manglesianus	+	60		Thysanotus m/pat - flrs not open
Thysanotus sparteus	+	60	CNQ17-28	Thysanotus ?sparteus
Thysanotus thyrsoideus	+	30	CNQ17-30	Thys thyrsoid - couldn't see leaf
Trachymene pilosa	+	12		
Tribonanthes variabilis	+	25-30	CNQ17-07	Tribonanthes
Ursinia anthemoides subsp. anthemoides	0.3	30		
Verticordia densiflora var. densiflora	+	80	CNQ17-48	Verticordia dens
Vulpia myuros forma myuros	0.5	20	CNQ17-02	Vulpia
Wahlenbergia capensis	+	30		
Wahlenbergia preissii	+	20	CNQ17-40	Wahlenbergia preis

Atlas 2020 Update

Site CNQ18

Described by KM **Date** 14/10/2020 **Type** Q 10x10

Season E **Uniformity**

Location

MGA Zone 50 331482 **mE** 6619777 **mN** 115.243252 **E** -30.542472 **S**

Habitat Edge of small lake bed on flood plain (samphire flat)

Soil White-brown clayey sand

Rock Type na

Vegetation Melaleuca viminea subsp. viminea, (Melaleuca rhaphiophylla) Closed Shrubland over Melaleuca seriata, Petrophile seminuda, Regelia ciliata Low Sparse Shrubland over Leptocarpus coangustatus, Cyperaceae sp1, Lepidosperma longitudinale Open Sedgeland/Rushland with Samolus junceus, Conostylis aculeata subsp. breviflora, Crassula colorata var. acuminata, Centrolepis polygyna, Brachyscome iberidifolia Sparse Herbland and *Vulpia myuros forma myuros Sparse Grassland.

Veg Condition Excellent

Fire Age More than 12 years since fire

Notes Elevation 42m; Autumn revisit; 08/06/2021; photo BM107-897.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Aira cupaniana	+		10	(=CNQ16-06	Aira
Angianthus preissianus	+		1	CNQ18-14	Siloxerus #2; A. ?pygmaeus
Aphelia cyperoides	+		2	CNQ18-25	Aphelia
Brachyscome iberidifolia	0.3		10	CNQ18-03	Brachyscome
Briza maxima	+		10		
Briza minor	+		15		
Burchardia congesta	+		20	CNQ18-06	Burchardia sterile
Calandrinia granulifera	+		3	CNQ18-09	Calandrinia
Callitris pyramidalis	+		40	CNQ18-30	Callitris pyr juv
Centrolepis aristata	+		10	CNQ18-20	Centrolepis aristata
Centrolepis polygyna	0.3		3	CNQ18-07	Centrolepis pol
Conostylis aculeata subsp. breviflora	0.3		30	CNQ18-27	Conostylis acul

Crassula colorata var. acuminata	2	5	(=CSQ3R-03	Crass col
Dampiera coronata	+	20	CNQ18-22	Good
Drosera gigantea	+	40	(=CNQ10R-5	Drosera gigantea
Eryngium pinnatifidum subsp. Palustre (G. J. Keighery 13459)	+	20	CNQ18-18	Eryngium pinn
Frankenia pauciflora var. pauciflora	+	15	CNQ18-15	Frankenia
Gnephosis drummondii	+	5	CNQ18-13	Gnephosis
Goodenia micrantha	0.1	3	(=CQ26R-01	Goodenia pusilla
Hydrocotyle alata	+	2	CNQ18-17	Hydrocotyl
Hypochaeris glabra	+	10		
Isolepis marginata	+	10	CNQ18-04	Isolepis
Juncus kraussii subsp. australiensis	+	60-90	CNQ18AR-01	AUT with flrs; also CNQ18-29; 18R-01
Lepidosperma longitudinale	0.5	40		
Leptocarpus coangustatus	6	90	CNQ18-11	Restio
Lomandra micrantha subsp. micrantha	+	40	CNQ18-28	Gahnia/Lomandra
Lotus subbiflorus	+	3		
Melaleuca rhaphiophylla	1	170		
Melaleuca seriata	1	50	CNQ18-01	Mel sys/seriata
Melaleuca viminea subsp. viminea	70	200	(=CRK02-02	Mel vim
Petrophile seminuda	1	70	(=CNQ16-29	petroph
Philydrella pygmaea subsp. pygmaea	+	3	CNQ18-10	Philydrella
Phyllangium divergens	+	5	CNQ18-16	Phyllangium
Polypogon monspeliensis	+	20	CNQ18-23	round grass
Quinetia urvillei	+	5	(=CQ20R-01	Quinetia urvillei
Regelia ciliata	0.3	70		
Samolus junceus	0.5	50	CNQ18-21	Logania/samolus; also CNQ18R-02
Schoenus plumosus	+	10	CNQ18-24	Schoenus/Juncus
Siloxerus humifusus	+	2	CNQ18-12	Siloxerus hum
Stylidium aceratum	+	3	CNQ18-08	Stylid ?aceratum (n=300)
Stylidium obtusatum	+	3	CNQ18-26	Stylid long/utric (n=100)
Thysanotus manglesianus	+			Thysanotus clmbg unequal
Trachymene pilosa	+	10		
Tribonanthes variabilis	+	30	CNQ18-02	Tribonanthes
Triglochin minutissima	+	3	CNQ18-31	Trigloch min
Ursinia anthemoides subsp. anthemoides	+	30		
Utricularia multifida	+	3	CNQ18-33	Utricularia multi
Vulpia myuros forma myuros	2	20	CNQ18-05	Vulpia

Atlas 2020 Update **Site** CNQ19

Described by BRM **Date** 7/11/2020 **Type** Q 10x10

Season **Uniformity**

Location

MGA Zone 50 331965 **mE** 6619244 **mN** 115.248199 **E** -30.547348 **S**

Habitat Very gentle, west-facing slope on edge of flood plain

Soil Pale (yellow) grey sand

Rock Type na

Vegetation Verticordia densiflora var. densiflora, Babingtonia urbana, Regelia ciliata Sparse Shrubland over Melaleuca seriata, Calytrix aff. flavescens, Jacksonia hakeoides Low Open Shrubland to Low Closed Shrubland.

Veg Condition Pristine (no weeds; some past grazing in area; grid line track nearby)

Fire Age More than 12 years since fire

Notes Autumn revisit 08/06/2021; photo BM107-911.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Austrostipa compressa	+		20		
Babingtonia urbana	1		90-130	CNQ19-15	Babingtonia (n=47)
Banksia nivea subsp. nivea	+		35	CNQ19-18	Dryandra niv
Caladenia flava subsp. flava	+			CNQ19-18B	
Calothamnus sanguineus	+		15		
Calytrix aff. flavescens	2		60	(=CNR06-03	
Calytrix depressa	+		50	CNQ19-19	Calytrix pple
Cassytha flava	+		60	CNQ19-08	Cassytha
Conostylis aculeata subsp. breviflora	+		20	(=	Conostylis acul brev
Conostylis pauciflora subsp. euryrhipis	+		15	CNQ19-13	Conostylis setig?
Crassula colorata var. acuminata	+		2	CNQ19-20	Crassula col
Desmocladus lateriflorus	+		30	CNQ19-02	Desmocladus long
Desmocladus nodatus	+		15		n=2

Drosera closterostigma	+		6	CNQ19-16	Drosera pygmy #2
Drosera glanduligera	+		4	CNQ19-09	Drosera pygmy
Hibbertia aurea	+		35	CNQ19-04	Pimelea glaucous
Hibbertia stellaris	+		25	(=CNR06-04	Hibbertia stellaris
Isolepis marginata	+		2	CNQ19-11	Isolepis
Jacksonia carduacea	+		40	CNQ19-21	Jacksonia dentate leaf shrub
Jacksonia hakeoides	1		80	CNQ19-24	Jacksonia hak
Laxmannia ramosa subsp. ramosa	+		15	CNQ19-01	Laxmannia
Leucopogon sprengelioides	+		60	CNQ19AR-03	AUT21 Leucopogon ?spreng
Levenhookia preissii	+		10	CNQ19-17	Levenhook preis (n=3); also CNQ19-06
Lomandra suaveolens	+		30	CNQ19-05	Lom hermaph
Melaleuca seriata	60		70	(=CNR06-02	Melaleuca setaria
Petrophile seminuda	+		40-70	CNQ19-03	Petrophile ?semi
Regelia ciliata	1		110		
Schoenus pennisetis	+		8	CNQ19-12	Schoenus (n=2)
Schoenus subfascicularis	+		60	CNQ19-07	Schoenus subfas
Siloxerus humifusus	+		2	CNQ19-10	Siloxerus hum
Stylidium dichotomum	+		20	CNQ19-14	Stylidium
Stylidium repens	+		12	CNQ19AR-01	AUT21 Stylidium repens
Trachymene pilosa	+		10		
Verticordia blepharophylla	+		45	CNQ19AR-02	AUT21 Verticordia ?lindleyi
Verticordia densiflora var. densiflora	6		130	CNQ19-23	Verticordia densiflora

Atlas 2020 Update

Site CNQ20

Described by BRM **Date** 7/11/2020 **Type** Q 10x10

Season E **Uniformity**

Location

MGA Zone 50 331861 **mE** 6619442 **mN** 115.247148 **E** -30.545547 **S**

Habitat Very gentle, east-facing lower slope on edge of flood plain

Soil Yellow-grey sand

Rock Type na

Vegetation Verticordia densiflora var. densiflora Sparse Shrubland over Melaleuca seriata, Calytrix aff. flavescens, Babingtonia urbana, Acacia dilatata Low Closed Shrubland.

Veg Condition Excellent (only a few weeds)

Fire Age More than 12 years since fire.

Notes Banksia nivea just outside qdt
Autumn revisit; 08/06/2021; photo BM107-912.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia dilatata	3		30	CNQ20-05	Acacia delta lf
Acacia pulchella var. glaberrima	+		60		Acacia pulchella
Anarthria laevis	+		30	CNQ20-07	Conostylis ?juncus; also CNQ20R-02
Austrostipa compressa	+		20-60		
Babingtonia urbana	4		40	(=CNQ19-15	Babingtonia (n=99)
Burchardia bairdiae	+		40	CNQ20-10	Burchardia congest
Calothamnus hirsutus	+		40	CNQ20-09	Calothamnus sang
Calytrix aff. flavescens	25		60	(=CNR06-03	
Cassytha flava	+		60	(=CNQ19-08	Cassytha
Chaetanthus aristatus	+		45	CNQ20-01	rush, coppery base sheaths
Conostylis aculeata subsp. breviflora	+		20		
Desmocladus nodatus	+		15		n=5
Drosera closterostigma	+		3	(=CNQ19-16	Drosera pygmy
Drosera thysanosepala	+		15	CNQ20-08	Drosera erect
Gompholobium tomentosum	+		30		
Hibbertia stellaris	+		25	(=CNR06-04	Hibbertia stellaris
Hypocalymma angustifolium subsp. Swan Coastal Plain (G.J. Keighery 16777)	+		40	CNQ20-11	Hypocalymma angust
Hypochaeris radicata	+		15		
Isolepis marginata	+		3	CNQ20-13	Isolepis
Isotropis cuneifolia subsp. cuneifolia	+		20	CNQ20-03	Isotropis
Laxmannia ramosa subsp. ramosa	+		15	CNQ20AR-01	AUT21 Laxmannia
Lomandra suaveolens	+		15	CNQ20-04	Lomandra herm

Melaleuca seriata	40	60	(=CNR06-02	Melaleuca seriata flat
Petrophile seminuda	+	60	CNQ20-02	Petrophile; (=CNQ19-03
Schoenus subfascicularis	+	50	CNQ20R-01	Also (=CNQ19-07
Siloxerus humifusus	+	2	(=CNQ19-10	Siloxerus
Stirlingia simplex	+	30	CNQ20-06	Stirlingia fine
Stylidium dichotomum	+	15	CNQ20R-03	Stylidium
Tribonanthes variabilis	+	30	CNQ20-12	Tribonanthes
Ursinia anthemoides subsp. anthemoides	+	20		
Verticordia densiflora var. densiflora	3	110	(=CNQ19-23	Verticordia dens
Vulpia myuros forma myuros	+	12		Vulpia myuros

Atlas 2020 Update — Site CNQ21

Described by BRM **Date** 7/11/2020 **Type** Q 10x10
Season **Uniformity**
Location
MGA Zone 50 331893 **mE** 6619575 **mN** 115.247503 **E** -30.544352 **S**
Habitat Very gentle, west-facing, lower slope on edge of floodplain
Soil Pale grey-brown sand
Rock Type na
Vegetation Melaleuca seriata, Calytrix aff. flavescens, Babingtonia urbana, Verticordia densiflora var. densiflora, Acacia dilatata Low Closed Shrubland.
Veg Condition Excellent to Pristine (a few weeds, but very low weed cover; grid line track 10 south of qdt).
Fire Age More than 12 years since fire
Notes Drosera gigantea nearby
Autumn revisit; 08/06/2021; photo BM107-916, 917.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia dilatata	2		30	(=CNQ20-05	Acacia
Austrostipa compressa	+		40		
Babingtonia urbana	9		80	(=CNQ19-15	Babingtonia (n=93)
Banksia nivea subsp. nivea	+		40	(=CNQ19-18	
Banksia telmatiaea	+		60		
Brachyscome iberidifolia	+		10	CNQ21-01	Brachyscome
Burchardia bairdiae	+		40	(=CNQ20-10	Burchardia ?baird
Caladenia flava subsp. flava	+		20	CNQ21-14	Caladenia
Calytrix aff. flavescens	11		60	(=CNR06-03	
Cassytha flava	+		40	(=CNQ19-08	cassytha
Chaetanthus aristatus	+		30	CNQ21-11	rush
Conostylis aculeata subsp. breviflora	+		20		
Crassula colorata var. acuminata	+		3	CNQ21-13	Crassula col
Desmocladus nodatus	+		15		n=1
Drosera glanduligera	+		20	CNQ21-06	Drosera ?gland
Drosera thysanosepala	+		20	CNQ21-05	Drosera climber
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	1		40		(n=3)
Isolepis marginata	+		4	CNQ21-02	Isolepis
Laxmannia ramosa subsp. ramosa	+		20	(=CNQ19-01	Laxmannia
Lomandra micrantha subsp. micrantha	+		30	CNQ21-10	Lomandra caes
Lomandra suaveolens	+		15	CNQ21-12	lomandra herm
Melaleuca seriata	50		80-90	(=CNR06-02	Melaleuca seriata
Petrophile seminuda	+		40	(=CNQ19-03	Petrophile
Pyrorchis nigricans	+		1		AUT21 Pyr nig
Schoenus sculptus	+		2	CNQ21-04	Centrolepis poly
Siloxerus humifusus	+		2	(=CNQ19-10	Siloxerus hum
Stylidium dichotomum	+		15	(=CNQ19-14	Stylid wte
Thysanotus thyrsoideus	+		30	CNQ21-09	Thysanotus
Tribonanthes variabilis	+		25	(=CNQ20-12	Tribonanthes
Ursinia anthemoides subsp. anthemoides	+		20		
Verticordia densiflora var. densiflora	3		80	(=CNQ19-23	Verticordia desn
Verticordia plumosa var. brachyphylla	+		60		
Vulpia myuros forma myuros	+		20		

Atlas 2020 Update **Site** CNQ22

Described by BRM **Date** 8/11/2020 **Type** Q 10x10

Season **Uniformity**

Location North-west corner of Atlas survey area

MGA Zone 50 331395 **mE** 6620932 **mN** 115.242533 **E** -30.532042 **S**

Habitat Broad, shallow drainage line (Bibby creek)

Soil Grey-brown sandy clay loam

Rock Type

Vegetation Melaleuca rhaphiophylla, Melaleuca viminea subsp. viminea, Melaleuca brevifolia Tall Shrubland to Tall Closed Shrubland (patches) over Bolboschoenus caldwellii, Baumea juncea, Cyperus gymnocaulos Mid-Sedgeland with *Ehrharta longiflora, *Hordeum geniculatum, *Lolium multiflorum Sparse Grassland and *Cotula coronopifolia, *Lotus subbiflorus Low Sparse Herbland.

Veg Condition Good. (vegetation condition over wider surrounding area is 'Good to Degraded')

Fire Age More than 12 years since fire

Notes Elevation 39m. Large areas that are sedge (=CGBM73) closed sedgeland
Autumn revisit; creek site - inundated and inaccessible: not revisited.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Atriplex prostrata	+		30	CNQ22-14	Atriplex
Bolboschoenus caldwellii	40		60	(=CGBM73	sedge multi head; tiangle stem
Cassytha glabella	+		60	CNQ22-12	Cassytha
Cotula coronopifolia	3		20		
Cyperus gymnocaulos	1		50	CNQ22-05	Cyperus gymnocaulis
Ehrharta longiflora	3		120		
Hordeum hystrix	1.5		20	(=CNR01-02	barley grass
Isolepis cernua var. setiformis	1		3	CNQ22-08	Isolepis cenua
Lolium multiflorum	1		60	CNQ22-09	rye grass
Lotus subbiflorus	3		10	CNQ22-13	
Lythrum hyssopifolia	+		20	CNQ22-11	herb
Machaerina juncea	9		60-90	CNQ22-07	Baumea
Melaleuca brevifolia	5		280	CNQ22-03	Melaleuca brev
Melaleuca rhaphiophylla	50		350	CNQ22-01	Melaleuca rhaph
Melaleuca viminea subsp. viminea	6		280	CNQ22-02	Melaleuca vim
Polypogon monspeliensis	+		40	CNQ22-04	Polypogon
Rumex crispus	3		170	CNQ22-06	rumex
Samolus junceus	+		45	CNQ22-20	Samolus
Sonchus oleraceus	+		40		
Sporobolus virginicus	+		15	CNQ22-10	Sporobolis vag

Atlas 2020 Update **Site** CNQ23

Described by BRM **Date** 8/11/2020 **Type** Q 10x10

Season **Uniformity**

Location Mid-western side of Atlas survey area, north of Wongonderrah Rd

MGA Zone 50 331390 **mE** 6619204 **mN** 115.242201 **E** -30.547628 **S**

Habitat Narrow linear habitat unit along base of very gentle slope of broad low rise (sand plain), along edge of flood plain (samphire flat)

Soil Yellow-brown sand

Rock Type na

Vegetation Melaleuca acutifolia Tall Closed Shrubland over Melaleuca cuticularis, Melaleuca brevifolia, Rhagodia baccata subsp. baccata Sparse Shrubland over Gahnia trifida Open Sedgeland and *Vulpia myuros forma myuros, *Ehrharta longiflora Sparse Grassland with Samolus repens var. paucifolius, Angianthus micropodioides, Podotheca gnaphalioides, Cotula cotuloides Low Sparse Herbland.

Veg Condition Very Good (moderate weed cover (high weed cover in patches))

Fire Age More than 12 years since fire

Notes Autumn revisit; 08/06/2021; photo BM107-902, 903 (SE); 904 (NW).

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Aira cupaniana	+		10	CNQ23-20	Aira
Angianthus micropodioides	1.5		5		n=500

Apium prostratum subsp. prostratum var. filiforme	+	20	CNQ23-13	Apium
Briza minor	+	50		
Bromus diandrus	+	30		
Bulbine semibarbata	+	30	CNQ23-04	bulbine
Caladenia flava subsp. flava	+	35	CNQ23-19	orchid
Centaurium tenuiflorum	+	15-20	CNQ23-02	Centaurium
Chaetanthus aristatus	+	30	CNQ23-17	rush
Comesperma integerrimum	+	150		
Cotula coronopifolia	0.5	15-20		Also CNQ23-12
Cotula cotuloides	1	10-15		
Crassula glomerata	+	5		
Dampiera coronata	+	45	CNQ23-15	?Lobelia anceps
Ehrharta longiflora	4	30		
Eryngium pinnatifidum subsp. Palustre (G. J. Keighery 13459)	+	30		Eryngium
Gahnia trifida	14	120		
Hypochaeris glabra	+	30		
Isolepis cernua var. setiformis	+	3	CNQ23-03	Isolepis cenua; alsoCNQ23-06
Juncus bufonius	+	12	CNQ23-23	Juncus; also CNQ23-11
Lachnagrostis filiformis	+	20	CNQ23-09	fine grass
Lotus subbiflorus	+	15		
Lysimachia arvensis	0.5	15		Anagalis
Melaleuca acutifolia	85	350	CNQ23-01	Melaleuca acutifolia
Melaleuca brevifolia	0.5	180	CNQ23-22	Mel brev
Melaleuca cuticularis	7	180		
Pelargonium littorale subsp. littorale	+	20	CNQ23-21	Pelagonium
Podolepis gracilis	+	30		
Podotheca gnaphalioides	1	70	(=CNQ22-	Polypogon
Polypogon tenellus	+	10-12	CNQ23-05	grass
Rhagodia baccata subsp. baccata	1	190	CNQ23-18	Rhagodia
Samolus repens var. paucifolius	1	40	(=CGBM104	Samolus
Silene gallica	+	30	CNQ23-14	Silene
Sonchus oleraceus	+	30		
Tecticornia indica subsp. bidens	+	15	CNQ23-08	Tecticornia ind bid
Trachymene pilosa	+	12		
Trifolium campestre var. campestre	+	6		
Triglochin mucronata	+	5	CNQ23-10	Triglochin cren
Vulpia fasciculata	+		CNQ23-16B	
Vulpia myuros forma myuros	5	20	CNQ23-16	Vulpia

Atlas 2020 Update

Site CNQ24

Described by BRM **Date** 8/11/2020 **Type** Q 10x10

Season **Uniformity**

Location Mid-western side of Atlas survey area, north of Wongonderrah Rd

MGA Zone 50 331471 **mE** 6619093 **mN** 115.243027 **E** -30.548640 **S**

Habitat Narrow linear habitat unit along base of very gentle slope of broad low rise (sand plain), along edge of flood plain (samphire flat)

Soil Dark brown-grey sand

Rock Type Some laterite/ironestone present

Vegetation Melaleuca acutifolia Tall Closed Shrubland over Melaleuca rhaphiophylla, Melaleuca viminea subsp. viminea, Melaleuca cuticularis Sparse Shrubland over Gahnia trifida Sparse Sedgeland.

Veg Condition Excellent

Fire Age More than 12 years since fire

Notes Autumn revisit; 08/06/2021; photo BM107-907.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia stenoptera	+		35	CNQ24-09	?Acacia alata
Aira cupaniana	+		10	(=CNQ23-	Aira
Angianthus micropodioides	+		5		n=100
Austrostipa flavescens	1		100	CNQ24-06	Austrostipa perennial
Brachyscome iberidifolia	+		5	CNQ24-20	Brachyscome
Briza minor	+		20		
Carpobrotus virescens	+		15		
Centaurium tenuiflorum	+		5	(=CNQ23-	Centaurium
Centrolepis polygyna	+		2		
Comesperma integerrimum	+		80	CNQ24-10	Comesperma integ
Crassula colorata var. acuminata	+		3	CNQ24-23	crasula col

Crassula glomerata	+	3		
Cyperaceae sp. 2 ENE	+	50	CNQ24AR-01	AUT21 Lomandra
Daucus glochidiatus	+	4	CNQ24-25	Daucus gloch
Dischisma arenarium	+	15	CNQ24-05	weed herb
Drosera thysanosepala	+	20	CNQ24-08	Drosera erect
Ehrharta longiflora	+	30		
Gahnia trifida	3	110		
Hainardia cylindrica	+	12		cylinder grass ?Hanaria
Hypochaeris glabra	+	1		
Isotoma hypocrateriformis	+	15	CNQ24-07	?Isoloma
Juncus bufonius	+		CNQ24-26B	
Lawrencia squamata	+	30		
Lepidosperma longitudinale	+	50		
Lysimachia arvensis	+	10		Anagalis
Melaleuca acutifolia	75	220	CNQ24-01	Mel acut
Melaleuca cuticularis	1.5	120		
Melaleuca rhaphiophylla	2	160	CNQ24-03	Mel rhaph
Melaleuca viminea subsp. viminea	4	180	CNQ24-02	Mel vim
Parapholis incurva	+	5	CNQ24-13	grass
Parentucellia latifolia	+	15	CNQ24-11	Perentucellia lat
Podolepis gracilis	+	20	CNQ24-21	Podolepis ?grac
Podolepis sp.	+	15	CNQ24-04	Podolepis ylw
Sagina apetala	+	3	CNQ24-15	herb
Samolus junceus	+	60	CNQ24-17	Samolus basal lves
Samolus repens var. paucifolius	+	40	(=CGBM104	Samolus
Senecio glossanthus	+	20	CNQ24-14	daisy ?Senecio
Siemssenia capillaris	+	20		Podolepis candelabra
Tecticornia indica subsp. bidens	+	40	CNQ24-22	Tecticornia
Thysanotus manglesianus	+	40		Thysanotus mang/pat sterile
Trachymene pilosa	+	12		
Triglochin minutissima	+	3	CNQ24-16	Triglochin min tiny frt
Triglochin mucronata	+	10	(=CNQ23-	Triglochin cren
Ursinia anthemoides subsp. anthemoides	+	30		
Vulpia myuros forma myuros	+	15		Vulpia
Wurmbea dioica subsp. alba	+	15	CNQ24-19	Bulbine herb

Atlas 2020 Update — Site CNQ25

Described by BRM **Date** 8/11/2020 **Type** Q 10x10
Season **Uniformity**
Location
MGA Zone 50 332233 **mE** 6619785 **mN** 115.251080 **E** -30.542506 **S**
Habitat Margins of flood plain
Soil Pale yellow-grey sand
Rock Type na
Vegetation Melaleuca brevifolia Shrubland over Tecticornia indica subsp. bidens Sparse Shrubland with *Polypogon monspeliensis Sparse Grassland and *Crassula natans var. minor, *Cotula coronopifolia herbland
Veg Condition Good to Degraded (high weed cover in understorey)
Fire Age More than 12 years since fire
Notes In this vegetation unit (and quadrat), patches of Melaleuca brevifolia shrublnd are on slightly elevated sandy rises. They sit a little higher than surrounding Tecticornia shrublnds where the soil surface is covered by Crassula natans var. minor. Nearby: Mel rhaph (2 shrubs only) and Gahnia trif. Autumn revisit; 08/06/2021; photo BM107-918. lkg Nth to qdrt, inundated. Qdrt could not be visited.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Atriplex prostrata	+		10	(=CNQ21-	Atriplex juv
Briza minor	+		40		
Centaurium tenuiflorum	+		20	(=CNQ23-	Centaurium
Cotula coronopifolia	1		15-20		
Cotula cotuloides	+		15		
Crassula natans var. minor	25		1	CNQ25-02	Crassula prostrate filamentous
Eryngium pinnatifidum subsp. Palustre (G. J. Keighery 13459)	+		30		
Isolepis cernua var. setiformis	0.5		4	CNQ25-07	Isolepis cenua
Lachnagrostis filiformis	+		20	CNQ25-06	?Lachnogrostis
Leptocarpus canus	1		70	CNQ25-05	rush

Lolium multiflorum	+	50	CNQ25-09	rye grass
Melaleuca brevifolia	45	180		
Polypogon monspeliensis	9	45	CNQ25-03	Polypogon
Samolus junceus	+	50	CNQ25-04	Samolus
Tecticornia indica subsp. bidens	9	40-60	CNQ25-01	Tecticornia ind bid
Trifolium campestre var. campestre	+	5		
Triglochin calcitrapa	+	10	CNQ25-08	Triglochin ?sp A

Atlas 2020 Update **Site** CQ1

Described by BRM **Date** 29/10/2011 **Type** Q 10m x10m

Season E **Uniformity**

Location Atlas tenement

MGA Zone 50 332438 **mE** 6616904 **mN** 115.252750 **E** -30.568520 **S**

Habitat Plain.

Soil Grey sand.

Rock Type na

Vegetation Banksia attenuata, Banksia menziessii, Eucalyptus todtiana Low Woodland over Xanthorrhoea preissii Sparse Shrubland over Calytrix fraseri, Melaleuca leuropoma, Bossiaea eriocarpa, Hibbertia hypericoides Low Sparse Shrubland over Patersonia occidentalis var. occidentalis, Dasypogon obliquifolius Low Sparse Herbland.

Veg Condition Pristine (very few weeds)

Fire Age More than 12 years since fire.

Notes Elevation 43m; 5 dead Banksia trees; 2 dead Euc tod trunks.
Autumn 2021 revisit; 07/06/2021; photo 107-85.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia pulchella var. glaberrima	+	<1 %	160	CQ01R-12	Acacia pulchella
Alexgeorgea nitens	+	<1 %	20	CQ01-29	?Alexgeorg nitens copper bark
Allocasuarina lehmanniana subsp. lehmanniana	+	<1 %	25	CQ01-20	Allocasuarina humilis
Amphipogon turbinatus	+	<1 %	5	CQ01-31	Grass
Anigozanthos humilis subsp. humilis	+	<1 %	10	CQ01-12	Anigozanthos humilis
Arctotheca calendula	+	<1 %	10		Arctotheca calendula
Asteridea pulverulenta	+	<1 %	30	CQ01-13	daisy white linear
Austrostipa compressa	+	<1 %	50	CQ01-10	Austrostipa
Banksia attenuata	11	<1 %	450		Banksia attenuata
Banksia menziesii	7	5-10%	400		Banksia menziesii
Bossiaea eriocarpa	1	<1 %	35		Bossiaea eriocarpa
Burchardia congesta	+	<1 %	40		Burchardia congesta
Caladenia flava subsp. flava	+	<1 %	20	CQ01R-04	Caladenia flava; also CQ01R-07
Calytrix flavescens	+	<1 %	20	CQ01-04	Calytrix ?flavescens
Calytrix fraseri	3	1-5%	40	CQ01-03	Calytrix ?fraseri
Centrolepis drummondiana	+	<1 %	4	(=CSQ3R-01	Centrolepis drum; also CQ01-09
Conostephium pendulum	+	<1 %	80	CQ01-11	Conostephium pendulum
Conostylis juncea	+	<1 %	35	CQ01R-05	Conostylis ?juncea
Crassula colorata var. colorata	+	<1 %	4	CQ01-08	Crassula colorata
Dasypogon obliquifolius	1	<1 %	40		Dasypogon bromeliifolius
Daucus glochidiatus	+	<1 %	20		Dorcaus
Drosera closterostigma	+	<1 %	10	CQ01-06	pygme Drosera; also CQ01R-13; CQ01AR-01
Drosera drummondii	+	<1 %	35	CQ01R-01	Drosera drum
Drosera magna	+	<1 %	1		Drosera erythrorhiza
Drosera thysanosepala	+	<1 %	20	CQ01-02	Drosera straggler
Eremaea asterocarpa subsp. asterocarpa	+	<1 %	35	CQ01-28	Eremaea ?
Eucalyptus todtiana	6	<1 %	350		Euc tod
Gompholobium tomentosum	+	<1 %	5	CQ01-27	Gompholobium
Goodenia coerulea	+	<1 %	35	CQ01-16	? Goodeniacea; also CQ01R-17
Hibbertia hypericoides	1	<1 %	40		Hibbertia hypericoides
Hypocalymma xanthopetalum	+	<1 %	20	CQ01-15	Hypocalymma xanth
Hypochaeris glabra	+	<1 %	10		Hypochaeris glabra
Isolepis marginata	+	<1 %	3		Isolepis marginata
Jacksonia hakeoides	+	<1 %	35	(=CSQ02-)	Jacksonia hak
Jacksonia nutans	+	<1 %	35	CQ01-24	Jacksonia
Levenhookia stipitata	+	<1 %	4	CQ01R-02	Levenhookia ?stip
Lomandra hermaphrodita	+	<1 %	12	CQ01-18a	Lomandra suaveolens
Lomandra preissii	+	<1 %	25	CQ01R-08	Lomandra preissii
Lyginia barbata	+	<1 %	30	CQ01-23	Perotis hairy bracts
Lysimachia arvensis	+	<1 %	5		Anagallis arvensis blue
Melaleuca leuropoma	2	1-5%	50	CQ01-05	Melaleuca seriata
Millotia tenuifolia var. tenuifolia	+	<1 %	15	CQ01R-15	Millotia ten
Patersonia occidentalis var. occidentalis	4	1-5%	70		Pat occ
Pelargonium littorale subsp. littorale	+	<1 %	3	CQ01R-11	Pelagonium, juv
Petrophile linearis	+	<1 %	35		Petrophile linearis
Petrophile rigida	+	<1 %	45	CQ01-18	Isopogon
Philotheca spicata	+	<1 %	40	(=CSQ02R-	Philotheca spicata
Phlebocarya filifolia	+	<1 %	30	CQ01-21	Phlebocarya terete
Phyllangium divergens	+	<1 %	3	CQ01-01	Phyllangium; also CQ01R-03

Podotheca angustifolia	+	<1 %	5		Podotheca angustifolia
Poranthera microphylla	+	<1 %	2	CQ01-17	Poranthera; also CQ1-32; CQ01R-16
Rytidosperma occidentale	+	<1 %	35	CQ01R-06	Rytidosperma
Siloxerus humifusus	+	<1 %	1	CQ01-07	Siloxerus
Stylidium araeophyllum	+	<1 %	5	CQ01-30	Stylid (grazed)
Stylidium bicolor	+	<1 %		CQ01R-18	Stylid
Stylidium rigidulum	+	<1 %	10	CQ01-19	Stylidium; also CQ01R-10, CQ1R-15B
Styphelia conostephioides	+	<1 %	12	CQ01-22	Epacrid
Thysanotus thyrsoideus	+	<1 %	45	CQ01-14	Thysanotus sht band lf ?thyrsoideus
Trachymene pilosa	+	<1 %	6		Trachymene pilosa
Ursinia anthemoides subsp. anthemoides	+	<1 %	40		Ursinia ant
Vulpia myuros forma myuros	+	<1 %	15	CQ01R-09	Vulpia
Wahlenbergia capensis	+	<1 %	30		Wahlenbergia capensis
Wahlenbergia preissii	+	<1 %	20	CQ01R-14	Wahlenbergia preis
Xanthorrhoea preissii	4	1-5%	130		Xanthorrhoea preissii
Xanthosia huegelii	+	<1 %	12	CQ01-26	Xanthosia

Atlas 2020 Update — Site CQ2

Described by CH **Date** 29/10/2011 **Type** Q 10m x 10m
Season E **Uniformity**
Location
MGA Zone 50 332700 **mE** 6617826 **mN** 115.255630 **E** -30.560240 **S**
Habitat Depression on plain (wetland)
Soil Dark brown clayey sand (saturated).
Rock Type na
Vegetation Melaleuca rhaphiophylla, Melaleuca teretifolia Tall Closed Shrubland over Rhagodia baccata subsp. baccata Sparse Shrubland over *Polypogon monspeliensis, *Lolium perenne x rigidum, *Ehrharta longiflora exotic Closed Grassland with *Lotus subbiflorus, *Arctotheca calendula, *Cotula coronopifolia exotic Herbland and Comesperma integerrimum Sparse Linanes.
Veg Condition Degraded
Fire Age More than 12 years since fire.
Notes Weeds= 80% cover; No Lepidosperma long in this quadrat, but it is in surrounds. Autumn revisit; 07/06/2021; photo n/a.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes	
Arctotheca calendula	5	5-10%	10		arctotheca cal	
Atriplex prostrata	+	<1 %	10	CQ02R-09	Chenopod	
Bromus diandrus	+	<1 %	30	(=CNQ2R-04	Bromus	
Bromus hordeaceus	+	<1 %	20	CQ02R-05	Bromus 2	
Cassytha racemosa forma racemosa	+	<1 %		CQ02R-01	Cassytha racemosa	
Centaurium tenuiflorum	+	<1 %	40	CQ02-11		
Cerastium glomeratum	+	<1 %	15	CQ02-02	Cerastium glands	
Comesperma integerrimum	2	1-5%		CQ02R-02	Comesperma inte	
Cotula coronopifolia	1	<1 %	25	CQ02-09	Cotula cot	
Crassula natans var. minor	+	<1 %	5	CQ02-01	dead=1%	
Ehrharta longiflora	20	10-25%	35		Ehrharta longiflora	
Galium murale	+	<1 %	5	(=CNQ2R-06	galium	
Geranium solanderi	0.2	<1 %	40	CQ02-06	Geranium malle	
Hordeum hystrix	1	<1 %	30	CQ02-08	Hordeum swamp	
Hypochaeris glabra	+	<1 %	20		Hypochaeris glab	
Isolepis marginata	1	<1 %	5	CQ02R-03	Cyperaceae	
Lolium perenne x rigidum	30	25-33.3%	50	CQ02-10	Lolium swamp	
Lotus subbiflorus	5	5-10%	10	CQ02R-04	Lotus sub	
Lysimachia arvensis	+	<1 %	15		blue flr	
Melaleuca rhaphiophylla	15	10-25%	400	CQ02-07	Mel rhaph	
Melaleuca teretifolia	75	>75%	250		Melaleuca teretifolia	
Ornithopus compressus	+	<1 %	20	(=CNQ2R-05	Ornithop	
Pelargonium littorale subsp. littorale	+	<1 %	10	CQ02R-07	Malvaceae 2	
Polypogon monspeliensis	35	33.3-50%	40	CQ02-05	Phalaris swamp	
Rhagodia baccata subsp. baccata	1	<1 %	150	CQ02-03	Rhagodia baccata	
Solanum aviculare	+	<1 %	20	CQ02R-08	Solanum	
Sonchus oleraceus	1	<1 %	25		Sonchus oleraceus	
Stellaria media	+	<1 %	3		Stellaria media - dead	
Trifolium campestre var. campestre	+	<1 %	3		Trifolium campestre	dead
Trifolium hybridum var. hybridum	+	<1 %	10	CQ02R-10	Trif wheel	
Vulpia myuros forma myuros	1	<1 %	20	CQ02-04	Vulpia myuros	

Atlas 2020 Update **Site** CQ3

Described by CH **Date** 29/10/2011 **Type** Q 10m x 10m

Season E **Uniformity**

Location

MGA Zone 50 332608 **mE** 6617708 **mN** 115.254652 **E** -30.561292 **S**

Habitat Very gentle, east-facing slope on edge of plain, adjacent to wetland.

Soil Grey sand.

Rock Type na

Vegetation Eucalyptus rudis Open Woodland over Melaleuca raphiophylla Tall Shrubland over *Ehrarta longiflora, *Arctotheca calendula, *Brassica tournefortii exotic Herbland and *Ehrharta longiflora exotic Open Grassland.

Veg Condition Degraded (very high weed cover; missing understorey species).

Fire Age More than 12 years since fire.

Notes Quadrat in ecotonal veg between Eucalyptus rudis forest and Melaleuca rhaphiophylla low woodland. Autumn revisit; 07/06/2021; photo 107-868.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Arctotheca calendula	35	33.3-50%	25		Arctotheca calendula
Brassica tournefortii	2	1-5%	50	CQ03-02	Brassica tournefortii
Cassytha racemosa forma racemosa	+	<1 %		CQ03-03	Cassytha racemosa
Clematis linearifolia	+	<1 %	25		Clematis lin
Crassula colorata var. acuminata	+	<1 %	10	CQ03R-04	Crassula col
Crassula decumbens var. decumbens	+	<1 %	3	CQ03R-05	Crassula dec
Ehrharta longiflora	15	10-25%	30		Ehrharta longiflora
Erodium cicutarium	+	<1 %	25	CQ03-05	Erodium fine
Eucalyptus rudis subsp. rudis	7	5-10%	1000	CQ03-01	Eucalyptus rudis
Galium murale	+	<1 %	2	CQ03R-01	Crassula
Geranium solanderi	+	<1 %	25	(=CQ02-06)	Geranium molle; also CQ03R-03
Hypochaeris glabra	0.5	<1 %	35		Hypochaeris glabra
Lolium perenne x rigidum	+	<1 %	35	(=CQ02-10)	Lolium swamp
Melaleuca rhaphiophylla	40	33.3-50%	450	(=CQ02-07)	Melaleuca rhaph
Microlaena stipoides var. stipoides	+	<1 %	30	CQ03-04	Microlaena stipoides
Orobanche minor	+	<1 %	20		Orobanche minor
Polycarpon tetraphyllum	1	<1 %	15	CQ03-06	Cerastium stripes; also CQ03R-02
Ptilotus polystachyus	+	<1 %	45		Ptilotus poly
Ursinia anthemoides subsp. anthemoides	+	<1 %	40		Ursinia ant
Vulpia myuros forma myuros	+	<1 %	20	(=CQ02-04)	Vulpia myuros

Atlas 2020 Update **Site** CQ4

Described by BRM **Date** 29/10/2011 **Type** Q 10m x 10m

Season E **Uniformity**

Location

MGA Zone 50 332299 **mE** 6617556 **mN** 115.251407 **E** -30.562619 **S**

Habitat Flat Plain.

Soil Grey brown sand.

Rock Type na

Vegetation Banksia attenuata, Banksia menziesii Low Woodland over Xanthorrhoea preissii Isolated Shrubs over Hibbertia hypericoides, Bossiaea eriocarpa,Melaleuca seriata, Eremaea pauciflora var. lonchophylla, Acacia pulchella Low Sparse Shrubland over Austrostipa compressa Isolated Clumps of Grasses and Dasypogon obliquifolius, Blancoa canescens Low Sparse Herbland.

Veg Condition Excellent (signs of some general disturbance in area and old track).

Fire Age More than 12 years since fire.

Notes Lot of kangaroo activity - poo, grazing, weeds. Some Banksia deaths, but seedlings present. Autumn revisit; 07/06/2021; photo 107-863.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia pulchella var. glaberrima	1	<1 %	20		Acacia pulchella
Actinotus leucocephalus	+	<1 %	30	(=CBGC01)	White feather flower ?Apiaceae
Adenanthos cygnorum subsp. cygnorum	+	<1 %	300	CQ04-03	Aden cyg: dead in 2020, but seedlg

Alexgeorgea nitens	+	<1 %	15	(=CQ01-29	?Alexgeorgea
Amphipogon turbinatus	+	<1 %	10	CQ04R-04	Amphipogon
Anigozanthos humilis subsp. humilis	0.5	<1 %	25	CQ04-17	Anigozanthos humilis
Arnocrinum preissii	+	<1 %	35	CQ04-28	Agrostocrinum
Austrostipa compressa	0.3	<1 %	45	(=CQ01-10)	Austrostipa
Banksia attenuata	23	<1 %	350		Banksia attenuata
Banksia menziesii	8	<1 %	300		Banksia menziesii
Blancoa canescens	3	1-5%	20	CQ04-01	blanc/conostylis (grey hairy long flowers)
Bossiaea eriocarpa	3	1-5%	30		Bossiaea eriocarpa
Brachyscome iberidifolia	+	<1 %	10		Brachyscome pusil
Burchardia congesta	+	<1 %	30		Burchardia congesta
Caladenia flava subsp. flava	+	<1 %	20	CQ04-23	Pterostylis?
Calytrix flavescens	+		20	(=CQ01-04)	Cal flav
Calytrix fraseri	+	<1 %	40	(=CQ01-03	Calytrix ?fras ?pink
Centrolepis drummondiana	+	<1 %	3	(=CQ01-09	Centrolepis
Conostephium pendulum	+	<1 %	40	(=CQ01-11	Conostephium
Conostylis teretifolia subsp. teretifolia	+	<1 %	5		Lost (=) Conostylis semi-terete long white
Crassula colorata var. colorata	+	<1 %	2	(=CQ01-08	Crassula colorata
Cyanothamnus ramosus subsp. anethifolius	+	<1 %	20	CQ04-18	? Boronia 3 or 4 frt; divided (x3) lves linear
Dasypogon obliquifolius	4	1-5%	35	CQ04-02	Dasypogon
Drosera closterostigma	+	<1 %	10	(=CQ01-06	pygmy Drosera white
Drosera drummondii	+	<1 %	35	CQ04-07	Dros (climbr? Pnk flr; also CQ04R-05
Drosera magna	+	<1 %	1		Drosera erythrorhiza; dessicated
Eremaea asterocarpa subsp. asterocarpa	+	<1 %	60	(=CQ01-28	Eremaea ?astrocarpa
Eremaea pauciflora var. lonchophylla	2	1-5%	70	CQ04-26	Eremaea pauciflora
Goodenia coerulea	+	<1 %	25	CQ04-22	?Goodeniaceae lanceolate lf
Haemodorum spicatum	+	<1 %	120	(=CSQ3R-09	Haemod spic
Hibbertia hypericoides	3	1-5%	35		Hibbertia hyp
Hypocalymma xanthopetalum	+	<1 %	35	(=CQ01-15	Hypocalymma
Isolepis marginata	+	<1 %	3	CQ04-09	Isolepis marg
Isotropis cuneifolia subsp. cuneifolia	+	<1 %	15		Isotropis cun
Jacksonia hakeoides	+	<1 %	70	CQ04R-03	Jack hak
Jacksonia nutans	1	<1 %	40	(=CQ01-24	Jacksonia
Lagenophora huegelii	+	<1 %	30		lagenophora hueg
Lepidosperma calcicola	0.2	<1 %	50	CQ04R-01	Lepidosperma cal/squa
Lomandra caespitosa	+	<1 %	20	CQ04-05	Lomandra linear thin; also CQ04R-02
Lomandra hermaphrodita	+	<1 %	15		Lom herm
Lyginia barbata	+	<1 %	40	(=CQ01-23	rush hairy bract
Melaleuca seriata	1	<1 %	35	CQ04-11	Melaleuca serriata
Melaleuca systena	+	<1 %	45	CQ04-25	shrub
Mesomelaena pseudostygia	+	<1 %	35	CQ04-24	?Mesomelaena ?pseudosty
Opercularia vaginata	+	<1 %	20	CQ04-12	Opercularia vag
Patersonia occidentalis var. occidentalis	1	<1 %	50		Patersonia occidentalis
Petrophile linearis	+	<1 %	35		Petrophile linearis
Petrophile rigida	+	<1 %	40	CQ04-19	Petrophile ylw
Philotheca spicata	+	<1 %	80		Phil spicata
Phyllangium divergens	+	<1 %	3	(=CQ01-01	Phyllangium
Podotheca angustifolia	+	<1 %	5	(=CSQ3R-15	Podotheca angust
Podotheca chrysantha	+	<1 %	25	CQ04-04	Podotheca grac
Poranthera microphylla	+	<1 %	2	CQ04-14	Poranthera
Rytidosperma occidentale	+	<1 %	5	CQ04-10	?Neur alopec (sterile, juv)
Siloxerus humifusus	+	<1 %	2	(=CQ01-07	Siloxerus ?humilis
Sonchus oleraceus	+	<1 %	20		Sonchus oleraceus
Stirlingia latifolia	1	<1 %	45	CQ04-11A	Stirlingia ?lat
Stylidium araeophyllum	+	<1 %	20	(=CQ04-X1)	Stylid glaucous ovate
Stylidium rigidulum	+	<1 %	15	CQ04-13	Stylid linear rosette, long fruits
Thysanotus manglesianus	+	<1 %		(=CQ20R-08	Thysanotus clmbg, unequal
Trachymene pilosa	+	<1 %	10		Trachymene pilosa
Ursinia anthemoides subsp. anthemoides	+	<1 %	20		Urs ant
Vulpia myuros forma myuros	+	<1 %	20	(=	Vulpia sp.; LOST
Wahlenbergia capensis	+	<1 %	6		Wahlenbergia capensis
Xanthorrhoea preissii	1	<1 %	130		Xanthorrhoea ?pries (diamond shape TS; 'snappy')
Xanthosia huegelii	0.2	<1 %	12	CQ04-06	Xanthosia

Atlas 2020 Update **Site** CQ5

Described by BRM **Date** 30/10/2011 **Type** Q 10m x 10m

Season **Uniformity**

Location

MGA Zone 50 331997 **mE** 6617621 **mN** 115.248270 **E** -30.561991 **S**

Habitat Flat Plain.

Soil Grey-brown sand.

Rock Type na

Vegetation Banksia attenuata, Banksia menziesii Low Woodland over Adenanthos cygnorum subsp. cygnorum Tall Isolated Clumps of Shrubs over Xanthorrhoea preissii, Allocasuarina humilis, Acacia pulchella var. glaberrima, Eremaea pauciflora var. lonchophylla, Eremaea asterocarpa subsp. asterocarpa, Jacksonia hakeoides Open Shrubland over Hibbertia hypericoides, Scholtzia involucrata, Melaleuca clavifolia, Calytrix leschenaultii Low Open Shrubland over Mesomelaena pseudostygia Isolated Sedges.

Veg Condition Excellent (disturbance such as old tracks in surrounding area; low weed cover).

Fire Age More than 12 years since fire.

Notes Eucalyptus todtiana sparsely scattered in area. Autumn revisit; 07/06/2021; photo 107-864.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia pulchella var. glaberrima	2	1-5%	150	CQ05R-01	Acacia pulchella
Adenanthos cygnorum subsp. cygnorum	2	1-5%	350	(=CQ04-03	Adenanthos cygnorum
Alexgeorgea nitens	+	<1 %	12	(=CQ01-29	?Alexgeorgea
Allocasuarina humilis	1	<1 %	180	CQ05-18	Alloca humilis
Amphipogon turbinatus	+	<1 %	35	CQ05-19	Amphipogon turbinatus
Anigozanthos humilis subsp. humilis	+	<1 %	20		Anigozanthos hum
Anigozanthos pulcherrimus	+	<1 %	40	CQ05R-15	Anigozanthos ?pulcher
Asteridea pulverulenta	+	<1 %	30		Asteridea pulv
Austrostipa compressa	+	<1 %	30-40	(=CQ01-10	Austrostipa
Banksia attenuata	27	<1 %	400		Banksia attenuata (2020 - 2 dead)
Banksia menziesii	1	<1 %	210		Banksia menziesii
Blancoa canescens	+	<1 %	12	(=CQ04-01	Blancoa grey pillose lf
Bossiaea eriocarpa	1	<1 %	30	CQ05-01	Bossiaea eriocarpa
Burchardia congesta	+	<1 %	45		Burchardia congesta
Caladenia flava subsp. flava	+	<1 %	15	CQ05R-05	Cal flava
Calytrix flavescens	+	<1 %	30		
Calytrix leschenaultii	3	1-5%	60	CQ05-05	?Baeckea/Beauf small ovate
Centrolepis drummondiana	+	<1 %	3	(=CQ01-09	Centrolepis ?drum
Chaetospora curvifolia	+	<1 %	30	CQ05-13	Schoenus curvifolius
Chordifex sinuosus	+	<1 %	20	CQ05R-03	rush
Conostylis juncea	+	<1 %	20	CQ05-14	lily type herb
Conostylis teretifolia subsp. teretifolia	+	<1 %	6	CQ05-08	Conostylis semi terete obtuse white hrs
Crassula colorata var. colorata	+	<1 %	2	(=CQ01-08	Crassula
Cyanothamnus ramosus subsp. anethifolius	+	<1 %	25	(=CQ04-18	Boronia palmate linear
Dasypogon obliquifolius	+	<1 %	40	(=CQ04-02	Dasypogon
Drosera drummondii	+	<1 %	10	CQ05-09	Drosera twinner (dessicated); also CQ05R-02
Drosera magna	+	<1 %	1		drosera eryth 4 or 5 lf
Drosera minutiflora	+	<1 %	10	CQ05-21	Pygmae Drosera
Eremaea asterocarpa subsp. asterocarpa	1	<1 %	130	(=CQ01-28	Eremaea asterocarpa
Eremaea pauciflora var. lonchophylla	2	1-5%	120	(=CQ04-26	Eremaea pauciflora
Gompholobium tomentosum	+	<1 %	50		Gom tom
Goodenia coerulea	+	<1 %	40	CQ05R-15B	?Comesperma
Hibbertia hypericoides	6	<1 %	30		
Hibbertia sericosepala	+	<1 %	30		Hibbert seric (sp Gnangarra)
Hibbertia subvaginata	+	<1 %	30	CQ05-04	Hibbertia ?subvag
Hypocalymma xanthopetalum	+	<1 %	20	(=CQ01-15	Hypocalymma
Isolepis marginata	+	<1 %	4	(=CQ04-09	Isolepis ?marg
Jacksonia hakeoides	1	<1 %	110	CQ05R-09	Jack hak
Jacksonia nutans	+	<1 %	35	CQ05-16	Jacksonia
Laxmannia sp.	+	<1 %	5	CQ05-07	Laxmannia
Levenhookia stipitata	+	<1 %	6	CQ05-17	Levenhookia ?stipitata
Lomandra caespitosa	+	<1 %	25	CQ05R-04	Lom caes
Lomandra hermaphrodita	+	<1 %	20	CQ05-12	Lomandra ?hermaphrodita x 3
Lyginia barbata	+	<1 %	40	CQ05-11	Lyginea, Restio hairy bracts
Melaleuca clavifolia	2	1-5%	50	CQ05R-16	?Melaleuca sys
Melaleuca seriata	+	<1 %	50	CQ05R-14	Melaleuca ?seriata
Melaleuca systena	+	<1 %	50	CQ05-22	Shrub ?Melaleuca ser.

Mesomelaena pseudostygia	+	<1 %	30	CQ05-06	Mesomelaena pseudostygia
Patersonia occidentalis var. occidentalis	2	1-5%	35		Patersonia occidentalis
Pentameris airoides subsp. airoides	+	<1 %	15	CQ05R-13	Aira/Pentameris
Petrophile linearis	+	<1 %	40		
Petrophile rigida	+	<1 %	35	(=CQ04-19	Isopogon/petrophile
Phlebocarya filifolia	+	<1 %	45	CQ05R-07	Phlebo fil
Phyllangium divergens	+	<1 %	10	(=CQ10R-)	Phyllangium
Poranthera microphylla	+	<1 %	3	(=CQ01-17	Poranthera
Pyrorchis nigricans	+	<1 %	2		Not flrg
Rytidosperma occidentale	+	<1 %	35	CQ05-02	Austrodanthonia
Scholtzia involucrata	4	1-5%	45	CQ05R-06	scholtzia invol; also CQ05R-08
Stirlingia latifolia	+	<1 %	40	(=CQ04-11	Stirlingia ?lat; also CQ05R-11
Stylidium araeophyllum	+	<1 %	30	(=CQ04-X1)	Stylid glaucous lanc-ovate, pk flr
Stylidium bicolor	+	<1 %	1	CQ05-10A	Stylid ciliate rosette; also CQ05R-12
Stylidium crossocephalum	+	<1 %	20	CQ05R-10	Stylid crossoceph
Thysanotus manglesianus	+	<1 %	60	CQ05-20	Thysanotus mang/pat; also CQ5-10
Trachymene pilosa	+	<1 %	4		Trachymene pilosa
Wahlenbergia capensis	+	<1 %	30		Wahlenbergia cap
Xanthorrhoea preissii	3	1-5%	120		snappy Ives etc
Xanthosia huegelii	+	<1 %	3	(=CQ04-06	Xanthosia

Atlas 2020 Update — Site CQ6

Described by CH **Date** 30/10/2011 **Type** Q 10m x 10m
Season **Uniformity**
Location
MGA Zone 50 332556 **mE** 6617450 **mN** 115.254068 **E** -30.563611 **S**
Habitat Seasonal dampland flats
Soil Light grey sand (dry)
Rock Type na
Vegetation Banksia telmatiaea, Regelia ciliata, Hakea obliqua subsp. parviflora, Acacia pulchella var. glaberrima Heathland over Rhagodia baccata subsp. baccata Low Sparse Shrubland over Conostylis festucacea subsp. festucacea, Trachymene pilosa Low Open Herbland.
Veg Condition Very Good to Excellent. (General area 'Excellent')
Fire Age Long unbnt - more than 12 yrs since fire.
Notes Autumn revisit; 07/06/2021; photo 107-861, 862.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia pulchella var. glaberrima	1	<1 %	110	CQ06R-06	Acacia pulch
Acacia stenoptera	+	<1 %	35		Acac sten
Arctotheca calendula	+	<1 %	20		
Austrostipa compressa	+	<1 %	35	CQ06-09	Austrostipa flav
Banksia telmatiaea	50	50-75%	150	CQ06-01	Banksia sphaerocarpa
Brassica tournefortii	+	<1 %	90	CQ06R-12	?Brassica tourn
Bromus diandrus	+	<1 %	25		
Chordifex sinuosus	+	<1 %	30	CQ06-11	Restio hairs
Conostylis festucacea subsp. festucacea	12	<1 %	30	CQ06-08	Conostylis clump
Daucus glochidiatus	+	<1 %	35	CQ06-04	Daycus tall
Ehrharta brevifolia var. cuspidata	+	<1 %	15	CQ06R-01	Ehrharta? Grass obtuse glumes
Ehrharta calycina	+	<1 %	130		Ehr calycina
Ehrharta longiflora	+	<1 %	30		Ehr long
Eremaea pauciflora var. lonchophylla	+	<1 %	110	CQ06-07	Eremaeae pauciflora
Geranium solanderi	+	<1 %	15	CQ06R-08	Geranium
Hakea obliqua subsp. parviflora	1	<1 %	170	CQ06-02	Hakea arida
Hypochaeris glabra	1	<1 %	20		Some achens beaked
Hypolaena exsulca	+	<1 %	30	CQ06-05	Hypolaena exsulca
Isolepis marginata	+	<1 %	5	CQ06-14	Isolepis marginata; also CQ06R-03
Lagenophora huegelii	+	<1 %	25	CQ06-06	Lagenophora
Melaleuca seriata	+	<1 %	70	CQ06-12	Melaleuca seriata
Microlaena stipoides var. stipoides	+	<1 %	40	CQ06R-11	?Microlaena
Phlebocarya ciliata	+	<1 %	25	CQ06-10	Patersonia occ
Podotheca gnaphalioides	+	<1 %	15		Podotheca gnaph
Regelia ciliata	2	1-5%	130	CQ06-13	Regelia
Rhagodia baccata subsp. baccata	1	<1 %	50	(=CQ02-03	Rhagodia baccata
Rytidosperma occidentale	+	<1 %	20	CQ06R-07	grass
Schoenus subfascicularis	+	<1 %	60	CQ06R-09	Schoenus subfas; also

					CQ06R-10
Senecio pinnatifolius var. latilobus	+	<1 %	30	CQ06-03	Senecio lautus
Sonchus oleraceus	+	<1 %	20		
Thysanotus manglesianus	+	<1 %		CQ06-16	Thysanotus mang; also CQ06R-05
Trachymene pilosa	2	1-5%	15		
Trifolium arvense var. arvense	+	<1 %	10	CQ06-15	Trifolium arvense
Ursinia anthemoides subsp. anthemoides	3	1-5%	30		
Vulpia myuros forma myuros	+	<1 %	20	CQ06R-02	Vulpia
Wahlenbergia capensis	+	<1 %	30		

Atlas 2020 Update — Site CQ7

Described by BRM **Date** 30/10/2011 **Type** Q 10m x 10m
Season **Uniformity**
Location
MGA Zone 50 331622 **mE** 6617351 **mN** 115.244317 **E** -30.564373 **S**
Habitat Flat plain.
Soil Grey-brown sand.
Rock Type na
Vegetation Banksia attenuata, Banksia menziesii, (Eucalyptus todtiana (sparsely scatttered)) Low Woodland over Xanthorrhoea preissii Isolated Shrubs over Melaleuca seriata Open Shrubland over Eremaea pauciflora var. lonchophylla, Eremaea asterocarpa subsp. asterocarpa, Bossiaea eriocarpa Low Sparse Shrubland over Mesomelaena pseudostygia Sparse Sedgeland and Patersonia occidentalis var. occidentalis Low Sparse Herbland.
Veg Condition Excellent to Pristine (very low weed cover;some grazing; tracks nearby).
Fire Age More than 12 years since fire.
Notes Elevation 49m. Autumn revisit; 07/06/2021; photo 107-858.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Alexgeorgea nitens	+	<1 %	12	(=CQ01-29	?Alexgeorgia
Amphipogon turbinatus	+	<1 %	50		Amph turb
Anigozanthos humilis subsp. humilis	+	<1 %	20	(=CQ04-17	Anigozanthos humilis (both colour)
Banksia attenuata	10	5-10%	350		Banksia attenuata (some dead)
Banksia dallanneyi subsp. dallanneyi var. dallanneyi	1	<1 %	20	CQ07-02	Dryandra prostrate
Banksia menziesii	3	1-5%	400		Banksia menziesii
Blancoa canescens	+	<1 %	70	(=CQ04-01	Blancoa grey ??? Leaves
Bossiaea eriocarpa	2	1-5%	20		
Brachyscome bellidioides	+	<1 %	10	CQ07R-01	Brachyschome
Burchardia congesta	+	<1 %	40		Burchardia congesta
Caladenia flava subsp. flava	+	<1 %	5	CQ07R-02	Caladenia/Elyt
Calytrix flavescens	+	<1 %	20		caly flav
Cassytha flava	+	<1 %	110	CQ07-15	Cassytha hairy
Chaetospora curvifolia	+	<1 %	30	CQ07R-05	Schoenus curv
Conostephium pendulum	0.5	<1 %	35	(=CQ01-11	Conostephium
Conostylis juncea	+	<1 %	20	CQ07-11	Conostylis
Conostylis teretifolia subsp. teretifolia	+	<1 %	10	CQ07-06	Conostylis semi-terete; white hairs
Cyanothamnus ramosus subsp. anethifolius	+	<1 %	20	(=CQ04-18	?Boronia palmate
Dasypogon obliquifolius	+	<1 %	20	(=CQ04-02	Dasypogon
Drosera drummondii	+	<1 %	20	CQ07-07	Drosera twinner; also CQ07R-06, CQ07R-07
Drosera magna	0.2	<1 %	1		Drosera erythrorhiza (desicated)
Drosera minutiflora	+	<1 %	5	CQ07-09	Drosera pygmae
Eremaea asterocarpa subsp. asterocarpa	2	1-5%	60	CQ07-01	Eremaea astero
Eremaea pauciflora var. lonchophylla	4	1-5%	70		Eremaea pauciflora
Gompholobium tomentosum	+	<1 %	5		Gom tom sdlg
Hibbertia aurea	+	<1 %	20-45	CQ07-04	? Hibbertia small plane ovate
Hibbertia hypericoides	+	<1 %	20		
Hypocalymma xanthopetalum	+	<1 %	20	(=CQ01-15	Hypocalymma
Lepidosperma calcicola	0.2	<1 %	70	CQ07R-04	Lepidosperma calc/squam
Leucopogon stenophyllus	+	<1 %	30	CQ07-05	Strge shrub
Lomandra caespitosa	+	<1 %	12	CQ07-03	Lomandra linear flat
Lomandra hermaphrodita	+	<1 %	20	CQ07-10	Lomandra ?hermaphrodita x 7
Lomandra preissii	+	<1 %	60	CQ07-14	Lomandra preissii
Lyginia barbata	0.3	<1 %	80		Lyg barb; hairy hds, running habit
Melaleuca seriata	30	25-33.3%	70-130	CQ07-16	Melaleuca pink flower small rnded lf
Mesomelaena pseudostygia	3	1-5%	35	(=CQ05-06	Mesomelaena pseudostygia

Opercularia vaginata	+	<1 %	15	(=CQ04-12	Operculera vag.
Patersonia occidentalis var. occidentalis	3	1-5%	45	(=CQ05-X7)	Patersonia occid
Petrophile linearis	+	<1 %	35		Petrophile linearis
Petrophile rigida	+	<1 %	35	(=CQ04-19	Isopogon/ Petrophile
Phyllangium divergens	+	<1 %	5	(=CQ23R-01	Phyllangium paradoxum
Pimelea sulphurea	+	<1 %	30	CQ07-08	Pimelea
Poranthera microphylla	+	<1 %	3	(=CQ01-17	Poranthera
Pterostylis orbiculata	+			CQ07AR-01	AUT21 Pterostylis
Pyrorchis nigricans	+	<1 %	7		
Stirlingia latifolia	+	<1 %	40	(=CQ04-11	Stirlingia ?lat
Stylidium dichotomum	+	<1 %	1	CQ07-13	Stylidium
Stylidium rigidulum	+	<1 %	4	(=CQ04-13	Stylid linear leaf rosette
Thysanotus manglesianus	+	<1 %	60		Thysanotus mang/pat
Thysanotus sparteus	+	<1 %	100		Thys spart
Thysanotus thyrsoideus	+	<1 %	25	(=CQ05-X1	Thysanotus upright
Trachymene pilosa	1	<1 %	6		
Wahlenbergia capensis	+	<1 %	20		Wahl cap
Wahlenbergia gracilenta	+	<1 %	20	CQ07R-08	wahl preis
Xanthorrhoea preissii	0.3	<1 %	140		Xanthorrhoea preissii; no trunk
Xanthosia huegelii	+	<1 %	10	(=CQ04-06	Xanthosia

Atlas 2020 Update — Site CQ8

Described by CH **Date** 30/10/2011 **Type** Q 10m x 10m
Season **Uniformity**
Location
MGA Zone 50 330951 **mE** 6617201 **mN** 115.237299 **E** -30.565632 **S**
Habitat Very gentle upper slope, south-facing, of broad low rise (dune) on gently undulating plain.
Soil Light grey-brown sand
Rock Type na
Vegetation Banksia attenuata, Banksia menziessii Low Woodland over Hibbertia hypericoides, Melaleuca clavifolia, Eremaea pauciflora var. lonchophylla, Petrophile rigida Jacksonia nutans Low Shrubland over Dasypogon obliquifolius and Patersonia occidentalis var. occidentalis Low Sparse Herbland.
Veg Condition Pristine (no weeds observed in 2020).
Fire Age Long unburnt (more than 12 years since fire)
Notes Elevation 48m

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia sessilis	1	<1 %	25	CQ08-01	Acacia short sharp
Alexgeorgea nitens	+	<1 %	15	(=CQ01-)	?Alexgeorgia
Amphipogon turbinatus	+	<1 %	5		Amph turb (grazed)
Anigozanthos humilis subsp. chrysanthus	+	<1 %	40	(=)	Anigozanthos hum ylw;
Anigozanthos humilis subsp. humilis	+	<1 %	15		Anigozanthos humilis
Austrostipa compressa	+	<1 %	20	(=CQ06-09)	Austrostipa flav
Banksia attenuata	14	<1 %	500		
Banksia menziesii	7	5-10%	500		
Blancoa canescens	2	1-5%	15	CQ08-02	Blancoa mat
Bossiaea eriocarpa	+	<1 %	20		
Burchardia congesta	+	<1 %	30		Burch cong
Calytrix fraseri	+	<1 %	40	CQ08R-12	Calytrix fras
Cassytha glabella	+	<1 %	110	CQ08R-13	Cassytha glab
Centrolepis drummondiana	+	<1 %	2	CQ08R-17	Centrolepis
Conostephium pendulum	1	<1 %	60	(=CQ01-)	Conostephium
Conostylis candicans subsp. candicans	+	<1 %	30	CQ08R-06	Conostylis cand
Conostylis juncea	+	<1 %	30	CQ08R-09	Con ?fest; also CQ08R- 15
Conostylis teretifolia subsp. teretifolia	+	<1 %	5	CQ08R-07	Conostylis ?terete/setiger
Dasypogon obliquifolius	2	1-5%	20	(=CQ01-)	Dasypogon ?brom
Drosera drummondii	+	<1 %	45	CQ08-05	Drosera menziesii; also CQ08R-08
Drosera humilis	+	<1 %	10		Drosera humilis
Drosera magna	+	<1 %	1		Drosera eryth
Drosera minutiflora	+	<1 %	3	CQ08R-01	Drosera ?minutiflora
Eremaea asterocarpa subsp. asterocarpa	+	<1 %	45	(=CQ01-)	Eremaea astrocarpa
Eremaea pauciflora var. lonchophylla	8	<1 %	80	(=CQ01-)	Eremaea pauciflora
Hibbertia aurea	+	<1 %	20	CQ08-07	Hibbertia, soft grey
Hibbertia hypericoides	12	<1 %	40		
Hibbertia sericosepala	1	<1 %	50	CQ08-04	Hibbertia big hyp
Hypocalymma xanthopetalum	+	<1 %	25	(=CQ01-)	H ?xantho; also CQ08AR-01

Hypolaena exsulca	+	<1 %	25	(=CQ01-)	Restio hairy
Jacksonia floribunda	+	<1 %	40	CQ08-09	Jacksonia floribunda
Jacksonia hakeoides	+	<1 %	50	CQ08-10	Jacksonia cross
Jacksonia nutans	3	1-5%	130		Jack nutans
Lepidosperma calcicola	+	<1 %	30	CQ08R-05	Lepidosperma calcicola
Leucopogon sp. Coujinup (M.A. Burgman 1085)	+	<1 %	15	CQ08-06	Leucopogon hyaline
Leucopogon sprengelioides	+	<1 %	40	CQ08-11a	also CQ08R-18
Lomandra caespitosa	+	<1 %	30	CQ08R-10	Lom caespitosa
Lomandra hermaphrodita	+	<1 %	30	CQ08R-11	Lom herm
Lyginia barbata	+	<1 %	20	CQ08R-04	Lyginea sp (grazed)
Melaleuca clavifolia	8	<1 %	90	CQ08-03	Melaleuca linear; also CQ08R-03
Mesomelaena pseudostygia	+	<1 %	70	(=CQ04-)	Mesomelaena ?pseudostygia
Opercularia vaginata	+	<1 %	15		
Petrophile linearis	+	<1 %	50		
Petrophile rigida	4	1-5%	70	(=CQ04-)	Isopogon/ Petrophile yellow
Phlebocarya filifolia	+	<1 %	30	CQ08-11	Phlebocarya terete
Phyllangium divergens	+	<1 %	6	(=)	Phyllangium
Pimelea sulphurea	+	<1 %	35	CQ08-08	Pimelia short nodding
Poranthera microphylla	+	<1 %	5	(=CQ01-)	Poranthera
Pterostylis orbiculata	+		15	(=CQ07AR01	Pterostyis ?sang
Stirlingia latifolia	+	<1 %	50	(=CQ04-)	Stirlingia ?lat (narrow leaves)
Stylidium araeophyllum	+	<1 %	20		Styl arae
Stylidium crossocephalum	+	<1 %	5	CQ08R-14	?Stylid crossoceph
Stylidium kalbarriense	+	<1 %	15	CQ08R-02	Stylidium ?rigid
Styphelia conostephioides	+	<1 %	30	CQ08R-16	Leucopogon consteph
Thysanotus manglesianus	+	<1 %	60		Thys m/p sterile
Thysanotus thyrsoideus	+	<1 %	30		Thysanotus thysoides
Trachymene pilosa	+	<1 %	10		
Vulpia myuros forma myuros	+	<1 %	20	(=CQ02-04)	Vulpia myuros
Xanthosia huegelii	+	<1 %	20		Xanth hueg

Atlas 2020 Update — Site CQ9

Described by CH **Date** 30/10/2011 **Type** Q 10m x 10m
Season **Uniformity**
Location
MGA Zone 50 331658 **mE** 6618268 **mN** 115.244842 **E** -30.556108 **S**
Habitat Seasonal dampland flats
Soil Fine orange/yellow sand.
Rock Type na
Vegetation Banksia telmatiaea, Hakea obliqua subsp. parviflora, Xanthorrhoea preissii, Regelia ciliata Closed Heathland over Melaleuca seriata, Jacksonia hakeoides, Acacia lasiocarpa var. lasiocarpa Low Sparse Shrubland over Lyginia imberbis, Schoenus subfascicularis Sparse Rushland/Sedgeland over Conostylis festucacea subsp. festucacea, Trachymene pilosa Low Sparse Herbland.
Veg Condition Pristine (no weeds)
Fire Age More than 12 years since fire
Notes Autumn revisit; 18/06/2021; photo 107-930, 931.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia lasiocarpa var. lasiocarpa	1	<1 %	60	CQ09R-01	Acacia lasi
Acacia stenoptera	+	<1 %	40	CQ09R-07	Acacia ?sten
Austrostipa compressa	+	<1 %	25	(=CQ06-09)	Austrostipa flav
Banksia platycarpa	+	<1 %	70	CQ09R-02	Banksia
Banksia telmatiaea	50	50-75%	120	(=CQ06-01)	Banksia sphaerocarpa
Caladenia flava subsp. flava	+		3		AUT21 Calfla
Cassytha flava	+	<1 %		CQ09R-09	cassytha hry
Cassytha glabella	+	<1 %		CQ09R-05	cassythy glab
Chordifex reseminans	+	<1 %	30	CQ09R-06	Chordifex (1 plant)
Conospermum stoechadis subsp. stoechadis	+	<1 %	90	CQ09-01	Conospermum stoech
Conostylis festucacea subsp. festucacea	1	<1 %	35	(=CQ06-08)	Conostylis clump
Drosera magna	+	<1 %	1		Dros eryth
Hakea obliqua subsp. parviflora	40	33.3-50%	150	(=CQ06-02)	Hakea arida
Hakea trifurcata	+	<1 %	130		Hakea trifurcata
Hibbertia aurea	+	<1 %	30	CQ09R-10	Hibb
Isolepis marginata	+	<1 %	3	CQ09R-04	Isolepis marg
Jacksonia hakeoides	1	<1 %	40	CQ09-02	Jacksonia short
Lyginia imberbis	3	1-5%	90	CQ09R-03	Baumea

Melaleuca rhaphiophylla	3	<1 %	160	CQ09-03	Melaleuca white stout (dwarf form)
Melaleuca seriata	0.5	<1 %	100	(=CQ06-12)	Mel seriata; also CQ09R-11
Podotheca angustifolia	+	<1 %	15	CQ09-05	Podolepis swamp
Pterostylis orbiculata	+		15	(=CQ11AR01	AUT21 Pterostylis
Regelia ciliata	4	1-5%	110	(=CQ06-13)	Regelia
Schoenus subfascicularis	1	<1 %	35	CQ09-04	Schoenus
Styphelia tortifolia	+	<1 %	25	CQ09-06	Astroloma
Trachymene pilosa	+	<1 %	5		Trachymene pilosa
Xanthorrhoea preissii	2	1-5%	190		Xanthorrhoea preissii

Atlas 2020 Update — Site CQ10

Described by BRM **Date** 30/10/2011 **Type** Q 10m x 10m
Season **Uniformity**
Location
MGA Zone 50 331939 **mE** 6618241 **mN** 115.247766 **E** -30.556391 **S**
Habitat Broad, very gently undulating plain.
Soil Grey (brown) sand.
Rock Type na
Vegetation Eucalyptus todtiana, (Banksia prionotes) Low Open Forest over Jacksonia sternbergiana, Allocasuarina humilis High Sparse Shrubland over Hibbertia hypericoides, Acacia lasiocarpa var. lasiocarpa Low Open Shrubland over Austrostipa compressa scattered grasses.
Veg Condition Excellent (low weed cover).
Fire Age Long unburnt (more than 12 yrs since fire)
Notes This quadrat was recorded in and around a clump of 4 Euc todtiana trees. About 50m south of a Banksia telmatiaea heath. Banksia deaths to west of site. Small area of B. prionotes with larger surrounding area of BaBm woodld. Autumn revisit; 18/06/2021; photo 107-928.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia lasiocarpa var. lasiocarpa	2.5	1-5%	60	CQ10R-04	Acacia lasio; also CQ10-06, 24
Aira cupaniana	+	<1 %	12	CQ10-16	Aira
Allocasuarina humilis	6	<1 %	190	CQ10-01	Allocasuarina humilis; also CQ10-28
Ammothryon grandiflorum	+	<1 %	20	CQ10-20	V leaf
Asteridea pulverulenta	+	<1 %	20	(=CQ01-13	White daisy linear, thin bracts
Austrostipa compressa	+	<1 %	35	CQ10-02	Austrostipa
Banksia attenuata	2	1-5%	160		
Banksia prionotes	5	5-10%	450	CQ10-14	Banksia prionotes (spikey frt
Blancoa canescens	2	1-5%	15	(=CQ04-01)	Blancoa grey lf
Caladenia flava subsp. flava	+	<1 %	20	CQ10-08	Caladenia; also CQ10-31, CQ10R-02
Caladenia nobilis	+	<1 %	30	CQ10-32	Caladenia narrow lf
Calandrinia corrigioloides	+	<1 %	3	CQ10-04	Herb
Conostylis candicans subsp. candicans	+	<1 %	25	CQ10-12	? Conostylis candicans
Corynotheca micrantha var. micrantha	+	<1 %	35	CQ10-10	Divaricate Thys/Coryn
Crassula colorata var. colorata	+	<1 %	4	(=CQ01-08)	Crassula
Daucus glochidiatus	+	<1 %	30	(=CQ06-04)	Daucus tall
Diuris sp.	+	<1 %	50	CQ10R-10	Diuris corymb complex
Drosera drummondii	+	<1 %	45	CQ10-22	Drosera climber
Drosera humilis	+	<1 %	6	(=CQ04-X2)	Drosera upright brchy
Drosera magna	+	<1 %	1		Dros eryth
Drosera pallida	+	<1 %	60	CQ10R-07	Drosera pal climber
Eremaea pauciflora var. lonchophylla	+	<1 %	40	CQ10-29	? Eremaea
Eucalyptus todtiana	40	<1 %	550		
Euchiton sphaericus	+	<1 %	15	CQ10-30	Daisy
Hakea obliqua subsp. parviflora	+	<1 %	350	CQ10-25	?Hakea
Hibbertia hypericoides	21	<1 %	30-45		
Hypocalymma xanthopetalum	+	<1 %	60	CQ10-21	Hypocalymma; also CQ10AR-01
Hypochaeris glabra	+	<1 %	1		
Isolepis marginata	+	<1 %	2	(=CQ04-09)	Isolepis marg
Jacksonia sternbergiana	12	<1 %	240	CQ10-15	Jacksonia sternberg
Lagenophora huegelii	+	<1 %	5		Lagenphora
Lepidobolus preissianus	+	<1 %	60		Lepidob preis
Lepidosperma calcicola	+	<1 %	40	CQ10-23	Lepidosperma; also CQ10R-08
Lomandra micrantha subsp. micrantha	+	<1 %	40	CQ10R-06	Lomandra caes
Lomandra preissii	+		40		AUT21 Lom pre
Lysimachia arvensis	+	<1 %	12		Anagallis arvensis

					blue; in roo poo
Melaleuca clavifolia	+	<1 %	40	CQ10-17	Melaleuca; also CQ10R-09
Mesomelaena pseudostygia	+	<1 %	30	(=CQ05-06)	Mesomelaena
Opercularia vaginata	+	<1 %	40		Operc vag
Petrophile linearis	+	<1 %	40		
Phyllangium divergens	+	<1 %	4	(=CBGC11)	Phyllangium; also CQ10R-03
Podotheca angustifolia	+	<1 %	4	CQ10-07	Podotheca angust
Pterostylis sp.	+	<1 %	20	CQ10R-05	Pterostylis
Quinetia urvillei	+	<1 %	4	(=CNQ04R-	Quen urv
Rytidosperma occidentale	+	<1 %	40	CQ10-18	Austrodanthonia
Scholtzia umbellifera	2	1-5%	90	CQ10-11	Baeckea?
Siloxerus humifusus	+	<1 %	1	CQ10-05	Siloxerus humilis
					dome flower; +CQ10-03
Thysanotus manglesianus	+	<1 %	60	CQ10R-11	Thys mang 3L, 3S
Trachymene coerulea subsp. coerulea	+	<1 %	30	CQ10-13	Apiaceae / flannel flr
Trachymene pilosa	+	<1 %	6		
Ursinia anthemoides subsp. anthemoides	+	<1 %	10		
Vulpia myuros forma myuros	+	<1 %	20	CQ10-19	Vulpia
Wahlenbergia capensis	+	<1 %	30		

Atlas 2020 Update — Site CQ11

Described by CH **Date** 31/10/2011 **Type** Q 10m x 10m
Season **Uniformity**
Location
MGA Zone 50 332164 **mE** 6618594 **mN** 115.250168 **E** -30.553238 **S**
Habitat Very gentle, NW-facing slope between flow line and broad low rise on gently undulating plain
Soil Light yellow sand.
Rock Type na
Vegetation Banksia telmatiaea, Hakea obliqua subsp. parviflora, Regelia ciliata Closed Heathland over Melaleuca seriata, Jacksonia hakeoides, Banksia platycarpa Verticordia densiflora var. densiflora Low Sparse Shrubland over Conostylis aculeata subsp. breviflora, Trachymene pilosa Low Sparse Herbland.
Veg Condition Excellent (low weed cover)
Fire Age Long unburnt (more than 12 years since fire)
Notes Autumn revisit; 18/06/2021; photo BM107-929.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia sessilis	+	<1 %	110	CQ11-08	Acacia short heath
Alexgeorgea nitens	+	<1 %	15		Alexgeorg nit
Amphipogon turbinatus	+	<1 %	5	CQ11R-01	?Amphipogon
Austrostipa compressa	+	<1 %	30	(=CQ06-09)	Austrostipa flav
Banksia platycarpa	2	1-5%	60	CQ11-05	Dryandra heath
Banksia telmatiaea	50	50-75%	110	(=CQ06-01)	Banksia sphae
Caladenia flava subsp. flava	+	<1 %	10	CQ11R-03	Caladenia (lf)
Calothamnus quadrifidus subsp. quadrifidus	+	<1 %	90		Calotham quad
Cassytha glabella	+	<1 %	100	CQ11R-14	Cassytha glab
Caustis dioica	+	<1 %	25	CQ11-02	Caustis
Chaetospora curvifolia	+	<1 %	30	CQ11R-08	Schoenus ?curv
Chordifex sinuosus	+	<1 %	40	CQ11-09	Loxocarya branched
Conospermum stoechadis subsp. stoechadis	+	<1 %	45		conospermum stoech
Conostylis aculeata subsp. breviflora	2	1-5%	25	CQ11-04	Conostylis aculeata
Cyperaceae sp. 2 ENE	+	<1 %	30	CQ11R-05	sedge
Daviesia incrassata subsp. incrassata	+	<1 %	40	CQ11-07	Daviesia dec short
Hakea obliqua subsp. parviflora	30	25-33.3%	150	(=CQ06-02)	Hakea arida
Hypocalymma xanthopetalum	+	<1 %	50	(=CQ01-15)	Hypocalymma ?xanthium
Hypochaeris glabra	+	<1 %	10		
Hypolaena pubescens	+	<1 %	20	CQ11R-15	rush
Isolepis marginata	+	<1 %	4	CQ11R-04	Isolepis marg
Jacksonia hakeoides	1	<1 %	30	(=CQ09-02)	Jacksonia short
Laxmannia ramosa subsp. ramosa	+	<1 %	15	CQ11R-07	Laxmannia
Lomandra suaveolens	+	<1 %	20	CQ11R-06	Lomandra glaucous flat
Machaerina juncea	+	<1 %	40	CQ11-10	? Baumea juncea
Melaleuca seriata	1	<1 %	100	(=CQ06-12)	Mel seriata; also CQ11R-12
Podotheca gnaphalioides	+	<1 %	15	CQ11R-10	Pod angust
Pterostylis orbiculata	+		25	CQ11AR-01	AUT21 Pterostylis; also CQ11R-13

Regelia ciliata	10	5-10%	130	(=CQ06-13)	Regelia
Rytidosperma occidentale	+	<1 %	35	CQ11R-02	Rytidosperma
Scholtzia umbellifera	+	<1 %	40	CQ11-03	Sholtzia heath
Stirlingia latifolia	+	<1 %	30		
Thysanotus sparteus	+	<1 %	80	CQ11R-11	Thysanotus sparteus
Trachymene coerulea subsp. coerulea	+	<1 %	40	CQ11-01	Apium
Trachymene pilosa	2	1-5%	10		
Ursinia anthemoides subsp. anthemoides	+	<1 %	30		
Verticordia densiflora var. densiflora	1	<1 %	80	CQ11-06	Verticordia buds
Wahlenbergia capensis	+	<1 %	20		

Atlas 2020 Update **Site** CQ12

Described by BRM **Date** 31/10/2011 **Type** Q 10m x 10m

Season **Uniformity**

Location

MGA Zone 50 332287 **mE** 6618867 **mN** 115.251494 **E** -30.550793 **S**

Habitat Low lying, very gentle slopes between a shallow flow line and low sandy rise on a broad, very gently undulating plain.

Soil Pale grey-brown sand.

Rock Type na

Vegetation Verticordia densiflora var. densiflora Sparse Shrubland over Banksia telmatiaea, Melaleuca seriata, Regelia ciliata, Callitris pyramidalis Low Closed Heathland over Conostylis aculeata subsp. breviflora Low Sparse Herbland and Desmocladus lateriflorus Low Sparse Rushland.

Veg Condition Excellent (a few weeds; farmland 300m to east; some rabbit/roo grazing).

Fire Age More than 12 years since fire.

Notes Elevation: 42m. Autumn revisit; 07/06/2021; photo 107-870.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Actinotus leucocephalus	+	<1 %	5	CQ12-16	Apiaceae / flannel plat (juv)
Aira cupaniana	+	<1 %	12	CQ12-18	Aira
Arctotheca calendula	+	<1 %	5		cape weed
Austrostipa compressa	+	<1 %	15	CQ12-12	? Microl grass
Banksia nivea subsp. nivea	1	<1 %	35	CQ12-02	Dryandra
Banksia telmatiaea	50	50-75%	35	CQ12-08	Banksia
Burchardia sp.	+	<1 %	20	CQ12-25	Burchardia cong
Caladenia flava subsp. flava	+	<1 %	12	CQ12-20	?Caladenia flava slender lf
Callitris pyramidalis	10	5-10%	60	CQ12-01	Actinostrobus
Centrolepis aristata	+	<1 %	3	CQ12-05	Big red ?Centralepis
Centrolepis mutica	+	<1 %	2	CQ12-09	Centrolepis short
Chordifex sinuosus	+	<1 %	15	CQ12-15	?rush brown bracts
Conostylis aculeata subsp. breviflora	1.5	1-5%	15	CQ12-11	Conostylis ?aculeata
Crassula colorata var. acuminata	0.1	<1 %	3	(=CSQ3R-03	Cras col
Cyperaceae sp. 2 ENE	+	<1 %	70	CQ12R-01	Cyper; also CQ12AR-03
Desmocladus lateriflorus	4	1-5%	40	CQ12R-05	restio; also CQ12AR-05
Drosera closterostigma	+	<1 %	5	CQ12-23	Drosera pygmaea
Drosera gigantea	+	<1 %	30	(=CBGC34)	Drosera gigantic
Haemodorum sp.	+	<1 %	20	CQ12-24	Haemodorum
Hypocalymma xanthopetalum	+	<1 %	30	CQ12-26	Hypocalymma
Hypochaeris glabra	+	<1 %	1		
Isolepis marginata	+	<1 %	2	CQ12-10	Isolepis ?magr
Leucopogon sprengelioides	+	<1 %	40	CQ12R-03	Leuc; also CQ12AR-02
Lomandra hermaphrodita	+	<1 %	15	(=CQ23R-03	Lom herm
Melaleuca seriata	25	25-33.3%	30-35	CQ12-07	Melaleuca pk flwr
Pterostylis orbiculata	+	<1 %	4	CQ12-14	Pterostylis bare; also (=CQ13AR02
Regelia ciliata	10	5-10%	80	CQ12-03	Regelia; also CQ12-27
Restionaceae sp.	+	<1 %	12	CQ12-06	rush hairy nodes
Schoenus badius	+	<1 %	5	CQ12-04	Cyperus small slender
Schoenus clandestinus	+	<1 %	2	CQ12-22	Schoenus ?clandes
Schoenus subfascicularis	+		45	CQ12AR-04	AUT21 Schoenus ubfascicularis
Siloxerus humifusus	+	<1 %	1	(=CQ01-07	Siloxerus ?humi
Stylidium purpureum	+	<1 %	20	CQ12R-02	Styl 'brun'
Trachymene pilosa	+	<1 %	3		
Ursinia anthemoides subsp. anthemoides	+	<1 %	15		Ursinia sp.
Verticordia densiflora var. densiflora	1	<1 %	120	CQ12-13	Verticordia; also CQ12AR-01
Vulpia myuros forma myuros	+	<1 %	20	CQ12-19	Vulpia
Wahlenbergia capensis	+	<1 %	25	CQ12-17	Wahlenbergia

Atlas 2020 Update **Site** CQ13

Described by BRM **Date** 31/10/2011 **Type** Q 10m x 10m

Season **Uniformity**

Location

MGA Zone 50 332429 **mE** 6619035 **mN** 115.253001 **E** -30.549298 **S**

Habitat Broad, flat low sandy rise on very gently undulating plain

Soil Pale grey-brown sand.

Rock Type na

Vegetation Banksia menziesii, Banksia attenuata Low Woodland over Allocasuarina humilis, Hakea ruscifolia Sparse Shrubland over Hibbertia hypericoides, Jacksonia hakeoides, Melaleuca systena Low Open Shrubland over Dasypogon obliquifolius Sparse Herbland with Mesomelaena pseudostygia Sparse Sedges.

Veg Condition Excellent (low weed cover of Ursinia, etc).

Fire Age More than 12 years since fire

Notes No Euc todtiana seen in area of CQ13; 1 dead Banksia in qdrt. Autumn revisit; 07/06/2021; phot 107-869.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Actinotus leucocephalus	+	<1 %	20	CQ13-03	flannel flr
Alexgeorgea nitens	+	<1 %	15	(=CQ01-29	Alexgeorgea
Allocasuarina humilis	3	1-5%	250	CQ13-01	Allocasuarina humilis
Amphipogon turbinatus	+	<1 %	40	CQ13-18	Amphipogon
Anigozanthos humilis subsp. humilis	+	<1 %	30	(=CQ04-17	Anigozanthos humilis; also CQ13R-15
Arctotheca calendula	+	<1 %	10		Capeweed
Asteridea pulverulenta	+	<1 %	30	(=CQ01-13	White daisy linear
Austrostipa compressa	+	<1 %	35	(=CQ01-08	Austrostipa
Austrostipa elegantissima	+	<1 %	60		Austro elegant
Banksia attenuata	20	10-25%	400		
Banksia dallanneyi subsp. dallanneyi var. dallanneyi	+	<1 %	12	CQ13-08	Dryandra lind; also CQ13AR-01
Banksia menziesii	6	<1 %	350		
Briza minor	+	<1 %	20		Briza min
Burchardia congesta	+	<1 %	45		Burchardia congesta
Caladenia flava subsp. flava	+	<1 %	20	CQ13R-12	Cal flav
Caladenia varians	+	<1 %	35	CQ13R-06	Caladenia nrw lf
Calandrinia corrigioloides	+	<1 %	3	CQ13-16	Calandrinia uprt sml ed; CQ13R-01
Calytrix flavescens	+	<1 %	30	(=CQ01-04	Calytrix flav
Caustis dioica	+	<1 %	5		Caustis dioca
Centrolepis drummondiana	+	<1 %	3	(=CQ01-09	Centrolepis; also CQ13R-10
Conostylis festucacea subsp. festucacea	+	<1 %	20	CQ13-09	Conostylis linear flat, no marg brittles
Conostylis teretifolia subsp. teretifolia	+	<1 %	8	(=CQ05-08	Conostylis semi terete wte hrs; CQ13R-08
Corynotheca micrantha var. micrantha	+	<1 %	30	CQ13-02	Corinotheca mic
Crassula colorata var. colorata	+	<1 %	2	(=CQ01-	Crassula
Dasypogon obliquifolius	2	1-5%	20-40	(=CQ04-02	Dasypogon
Drosera drummondii	+	<1 %	40	CQ13-13	Drosera climber; also CQ13R-05
Drosera magna	+	<1 %	1		Drosera erythrorhiza (descicated)
Gompholobium tomentosum	+	<1 %	20		Gom Tom
Haemodorum sp.	+	<1 %	40		Haemodorum sp (basal lf)
Hakea ruscifolia	2	1-5%	160	CQ13-20	Hakea ruscifolia
Hibbertia hypericoides	13	<1 %	90		Hib hyp
Hibbertia sericosepala	+	<1 %	30	CQ13-07	Hibbertia soft long narrow linear recurved
Hypocalymma xanthopetalum	+	<1 %	50		Hypocal xanth
Hypochaeris glabra	+	<1 %	10		
Isolepis marginata	+	<1 %	$		Isolepis marg
Jacksonia hakeoides	8	<1 %	90	CQ13-11	Jacksonia sht phyllode
Jacksonia nutans	+	<1 %	90	CQ13-23	Jacksonia tall long
Lechenaultia floribunda	+	<1 %	5	CQ13R-16	Lechenaultia
Lepidosperma calcicola	+	<1 %	40	CQ13-17	? Lepidosperma; also CQ13R-11
Levenhookia stipitata	+	<1 %	4	(=CQ05-17	Levenhookia ?stip
Lomandra hermaphrodita	+	<1 %	30	CQ13-10	Lomandra ?hermaph x 2
Melaleuca systena	3	1-5%	45	CQ13-06	Melaleuca
Mesomelaena pseudostygia	+	<1 %	30	(=CQ04-24	Mesomelaena pseudostygia
Petrophile linearis	+	<1 %	40		
Phyllangium divergens	+	<1 %	4	(=CBGC11)	Phyllangium; also CQ13R-02
Podotheca angustifolia	+	<1 %	5	CQ13-14	Podotheca angust
Podotheca gnaphalioides	+	<1 %	25	CQ13-15	Podotheca graph
Poranthera microphylla	+	<1 %	3	(=CQ04-14)	Poranthera
Pterochaeta paniculata	+	<1 %	6	CQ13-22	Pterochaeta panceal
Pterostylis orbiculata	+	<1 %	25	CQ13R-13	Pterostylis orbic/vit;

					also CQ13AR-02
Quinetia urvillei	+	<1 %	5		Quin urv
Rytidosperma occidentale	+	<1 %	35	CQ13-24	Austrodanthonia
Scaevola phlebopetala	+	<1 %	10	CQ13-21	Prple? Scaev herb
Schoenus clandestinus	+	<1 %	2	CQ13-04	Schoenus ?clandest
Schoenus pleiostemoneus	+	<1 %	30	CQ13R-14	Schoenus pleist
Siloxerus humifusus	+	<1 %	2	(=CQ01-07	Siloxerus hum?
Sonchus oleraceus	+	<1 %	20		Son ole
Stackhousia monogyna	+	<1 %	35	CQ13-05	Stackhousia monogyna
Stirlingia latifolia	+	<1 %	70	(=CQ04-11	Stirlingia lat; also CQ13R-03
Stylidium rigidulum	+	<1 %	10	(=CQ04-13	Stylid linear mostly long frt
Thysanotus manglesianus	+	<1 %	20		Thysanotus mang/pat no flwrs
Trachymene pilosa	+	<1 %	4-10		
Ursinia anthemoides subsp. anthemoides	+	<1 %	25		Ursinia sp.
Vulpia myuros forma myuros	+	<1 %	20	CQ13R-07	Vulpia; also CQ13R-09
Wahlenbergia capensis	+	<1 %	30		Wahl cap
Wahlenbergia preissii	+	<1 %	20	CQ13-12	Wahlenbergia preissii
Xanthosia huegelii	+	<1 %	5	(=CQ04-06	Xanthosia

Atlas 2020 Update — Site CQ14

Described by CH **Date** 31/10/2011 **Type** Q 10m x 10m
Season **Uniformity**
Location
MGA Zone 50 332175 **mE** 6618968 **mN** 115.250343 **E** -30.549866 **S**
Habitat Flood banks of shallow flow line.
Soil Grey sand (damp).
Rock Type na
Vegetation Melaleuca brevifolia Sparse Shrubland over Tecticornia indica subsp. bidens Low Open Samphire Shrubland over *Lotus subbiflorus, *Cotula coronopifolia, Cotula cotuloides, *Arctotheca calendula, *Ornithopus pinnatus, *Crassula natans var. minor, *Stellaria media Low Herbland and *Polypogon monspeliensis Low Sparse Grassland.
Veg Condition Good to Degraded (high weed cover, but some native herb species under Melaleuca's)
Fire Age More than 12 years since fire.
Notes Melaleuca viminea (3m) in patches nearby; similar veg unit to CNQ05
Autumn revisit 07/06/2021; photo 107-871.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Arctotheca calendula	1	<1 %	15		Arcotheca (capeweed)
Carpobrotus edulis	+	<1 %	15		Carpobrotus edulis (check C.modestus and C.virescens)
Centaurium tenuiflorum	1	<1 %	20		Scroph square stem
Centrolepis polygyna	+	<1 %	2	CQ14-06	Centrolepis drum
Cotula coronopifolia	20	10-25%	10	(=CQ02-09	Cotula cot
Cotula cotuloides	5	5-10%	7	CQ14-09	Cotula narrow
Crassula colorata var. acuminata	+	<1 %	5	CQ14-04	Crassula colo colo
Crassula decumbens var. decumbens	1	<1 %	2	CQ14-08	Crassula natens; also CQ14R-01
Crassula glomerata	+	<1 %	3	CQ14-05	Crassula orange
Crassula natans var. minor	3	1-5%	1	(=CQ05R-08	Crassula natans prostrate
Hordeum hystrix	+	<1 %	12	CQ14R-02	Hordeum
Hypochaeris glabra	+	<1 %	20		Hypochaeris gla
Isolepis cernua var. setiformis	1	<1 %	3	CQ14-07	Isolepis cernua
Juncus capitatus	+	<1 %	3	CQ14-10	Juncus cap
Lolium perenne x rigidum	+	<1 %	30		Lolium per
Lotus subbiflorus	25	25-33.3%	10	CQ14-02	Lotus sub
Lysimachia arvensis	+	<1 %	15		Lysmach (scarlet pimp)
Lythrum hyssopifolia	+	<1 %	12	CQ14R-05	herb
Machaerina juncea	+	<1 %	80	CQ14R-03	Baumea
Melaleuca brevifolia	3	1-5%	150	(=CO-5)	Mel Short yellow
Monopsis debilis var. depressa	+	<1 %	5	(=CO-6)	purple trumpets
Ornithopus pinnatus	2	1-5%	10	(=CNQ04R	Ornothopsis
Polypogon monspeliensis	3	1-5%	20	(=CQ02-05	Phalaris swamp
Sonchus oleraceus	+	<1 %	15		Sonchus loeraceus
Spergularia brevifolia	+	<1 %	2	CQ14-11	Calandrinia tiny
Sporobolus virginicus	+	<1 %	20	CQ14-03	Couch phaloris

Stellaria media	1	<1 %	10	(=CNQ5R-15	chick weed prostrate
Tecticornia indica subsp. bidens	24	<1 %	50	CQ14-01	Tecticornia bidens
Vulpia bromoides	+	<1 %	20	CQ14R-04	Vulpia

Atlas 2020 Update — Site CQ15

Described by CH **Date** 31/10/2011 **Type** Q 10m x 10m
Season **Uniformity**
Location
MGA Zone 50 331089 **mE** 6619030 **mN** 115.239035 **E** -30.549155 **S**
Habitat Low seasonal dampland flat on plain.
Soil Orange-yellow sand (dry).
Rock Type na
Vegetation Banksia telmatiaea, Melaleuca seriata, Regelia ciliata, Hakea obliqua subsp. parviflora, Hakea prostrata, Hakea costata Closed Heathland over Banksia platycarpa Low Sparse Shrubland.
Veg Condition Excellent (low weed cover).
Fire Age Long unburnt - more than 12 years since fire.
Notes Autumn revisit 18/06/2021; photo 107-933, 934.
SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia stenoptera	+	<1 %	30		Acacia stenoptera; also (=CGBM62)
Asteridea pulverulenta	+	<1 %	10	CQ15-02	Daisy whiskers
Austrostipa compressa	+	<1 %	25	(=CQ06-09	Austrostipa flav
Avellinia michelii	+	<1 %		CQ15R-10B	
Banksia nivea subsp. nivea	+	<1 %	25	(=CQ12-02	Dryandra small teeth
Banksia platycarpa	1	<1 %	70	(=CQ11-05)	Dryandra heath
Banksia telmatiaea	30	25-33.3%	130	(=CQ06-01	Banksia sphaer
Caladenia flava subsp. flava	+	<1 %	12	CQ15R-15	Caladenia flava
Cassytha flava	+	<1 %	6	CQ15-01	Dodder hairy
Centaurium tenuiflorum	+	<1 %	10	(=CQ	Scroph square stem
Chaetanthus aristatus	+	<1 %	20	CQ15R-06	rush
Conospermum stoechadis subsp. stoechadis	+	<1 %	40	CQ15R-11	Conosperm stoech
Conostylis aculeata subsp. breviflora	+	<1 %	30	(=CQ11-04	Conostylis aculeata
Conostylis festucacea subsp. festucacea	+	<1 %	30	CQ15R-17	Conostylis marg bristles
Crassula colorata var. acuminata	+	<1 %	3	CQ15R-08	Cras col
Daucus glochidiatus	+	<1 %	15		Daucus
Drosera magna	+		1		AUT21 Drosera magna
Drosera thysanosepala	+	<1 %	10	CQ15R-03	Drosera erect
Hakea costata	1	<1 %	110	(=CBGC27)	Hakea prickly
Hakea obliqua subsp. parviflora	2	1-5%	180	(=CQ06-02	Hakea arida
Hakea prostrata	2	1-5%	180		
Heliophila pusilla	+	<1 %	30		Helio pus
Hibbertia aurea	+	<1 %	20		Hib aurea
Hypochaeris glabra	+	<1 %	1		Hyp gla
Isolepis marginata	+	<1 %	6	CQ15R-14	Isolepis marg
Isopogon panduratus subsp. palustris	+	<1 %	50	CQ15-04	Iso pan (x1)
Jacksonia hakeoides	+	<1 %	20	(=CQ09-02	Jacksonia short
Leptomeria pauciflora	+	<1 %	35	CQ15R-13	Shrub odd fruits
Lomandra caespitosa	+	<1 %	25	CQ15R-16	Lomandra
Lomandra suaveolens	+	<1 %	15	CQ15R-05	Lom suav
Lysimachia arvensis	+	<1 %	5		Anagalis
Melaleuca seriata	30	25-33.3%	140	CQ15R-01	Mel seriata; also (=CQ06-12
Mesomelaena pseudostygia	+	<1 %	40		Meso pseudo
Olearia axillaris	+	<1 %	40		Olearia axil
Opercularia vaginata	+	<1 %	15		Opercularia vaginata
Podolepis gracilis	+	<1 %	10	CQ15-03	Podolepis pink
Podotheca angustifolia	+	<1 %	10	(=CQ01-	Podotheca angust
Prasophyllum gracile	+	<1 %	30	CQ15R-04	Microtis
Regelia ciliata	10	5-10%	130	(=CQ06-13	Regelia
Rytidosperma occidentale	+	<1 %	30	CQ15R-12	Rytidosperma
Trachymene coerulea subsp. coerulea	+	<1 %	4	CQ15R-02	Trachymene coerulea
Trachymene pilosa	+	<1 %	10		
Ursinia anthemoides subsp. anthemoides	+	<1 %	30		Urs ant
Vulpia bromoides	+	<1 %	15		Vulpia bromoides
Vulpia myuros forma myuros	+	<1 %	15	CQ15R-09	Vulpia; also CQ15R-10
Wahlenbergia capensis	+	<1 %	30		

Atlas 2020 Update **Site** CQ16

Described by BRM **Date** 31/10/2011 **Type** Q 10m x 10m

Season **Uniformity**

Location

MGA Zone 50 332250 **mE** 6619238 **mN** 115.251168 **E** -30.547442 **S**

Habitat Very slightly elevated area on flood plain.

Soil Yellow-brown sand.

Rock Type na

Vegetation Melaleuca brevifolia Isolated shrubs over Verticordia plumosa var. brachyphylla, Grevillea sp Coojarloo (B.J. Keighery 28 B), Melaleuca seriata, Frankenia pauciflora var. pauciflora Low Open Shrubland over Centrolepis aristata, Calandrinia granulifera, Drosera menziesii subsp. thysanosepala Low Open Herbland and *Vulpia myuros forma myuros Sparse Grassland.

Veg Condition Very Good to Excellent (grazing and about 1-2% weed cover).

Fire Age More than 12 years since fire

Notes Elevation 45m. Only one of four pegs located for the revisit - corners re-surveyed from four coordinates. Autumn revisit; 07/06/2021; photo 107-874, 875.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Aira cupaniana	+	<1 %	15	CQ16R-07	?Lachnogrostis
Angianthus micropodioides	+	<1 %	6	CQ16-13	Daisy yellow top flower
Arctotheca calendula	+	<1 %	10		Cape Weed
Banksia nivea subsp. nivea	+	<1 %	25	(=CQ12-02	?Dryandra fine leaf clumped
Brachyscome iberidifolia	+	<1 %	10	CQ16-09	Wte daisy
Briza minor	+	<1 %	20		
Burchardia multiflora	+	<1 %	40	(=CNQ10R-4	Burc
Caladenia longicauda subsp. albella	+	<1 %	35	CQ16-04	Caladenia tall
Calandrinia granulifera	1	<1 %	2	CQ16-14	Small flr ?Calind
Calandrinia sp. Kenwick (G.J. Keighery 10905)	+	<1 %	1	CQ16-18	Calandrinia
Carpobrotus virescens	+	<1 %	4	CQ16-26	pigface
Centaurium tenuiflorum	+	<1 %	20	CQ16R-06	Centaur
Centrolepis aristata	4	1-5%	4	(=CQ12-	Centrolepis big red
Centrolepis polygyna	+	<1 %	1	(=CBR02-08	Centrolepis sht
Chaetanthus aristatus	+	<1 %	30	CQ16-24	rush coppery head; also CQ16R-09
Conostylis aculeata subsp. breviflora	+	<1 %	15	CQ16R-04	Conostylis
Cotula coronopifolia	+	<1 %	4		Cotula turbinata
Crassula colorata var. acuminata	0.2	<1 %	6	CQ16R-01	cras col
Drosera heterophylla				CA16AR-01	AUT21 Drosera heterophylla
Drosera thysanosepala	0.5	<1 %	15	CQ16-08	Drosera erec red, not flwrg; +CQ16-33
Eragrostis dielsii	+	<1 %	5	(=CQ20R-18	Erag diels
Frankenia pauciflora var. pauciflora	0.5	<1 %	6	CQ16-21	shrub red stem, opp lvs
Gnephosis drummondii	+	<1 %	3	CQ16-12	Gnephosis
Goodenia micrantha	+	<1 %	5	(=CQ26R-01	Good pusi
Goodenia pulchella subsp. Coastal Plain B (L.W. Sage 2336)	+	<1 %	3	CQ16-19	ylw flr herb; also CQ16-27
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	6	<1 %	45	CQ16-05	Grevillea red flr
Heliophila pusilla	+	<1 %	15	CQ16-37	Branii
Hydrocotyle alata	+	<1 %	2	CQ16-17	Hydrocotyle
Hypochaeris glabra	+	<1 %	10		
Isolepis cernua var. setiformis	+	<1 %	4	CQ16-31	Isolepis
Isolepis marginata	0.2	<1 %	12	CQ16-43	Isolepis slender; also CQ16-44
Juncus bufonius	+	<1 %	10	CQ16-15	red v 'v' head part
Juncus capitatus	+	<1 %	4	CQ16-11	Cyperus multi head; also CQ16-42
Lawrencia squamata	+	<1 %	12	CQ16-20	Grey lanceolate lf shrub, grazed
Lomandra micrantha subsp. micrantha	+	<1 %	60	CQ16R-05	Cyperaceae
Lotus subbiflorus	+	<1 %	5	(=CBR02-02	Lotus
Lysimachia arvensis	0.2	<1 %	10		blue
Melaleuca brevifolia	+	<1 %	120	CQ16-02	Melaleuca ribbed frt
Melaleuca seriata	2	1-5%	30	CQ16-38	Myrtaceae
Melaleuca systena	0.2	<1 %	35	CQ16-03	Melaleuca
Monopsis debilis var. depressa	+	<1 %	5	CQ16-40	mauve ?flr herb
Ornithopus pinnatus	+	<1 %	10	CQ16R-10	Ornithopsis
Parentucellia latifolia	+	<1 %	15	CQ16R-08	Pare lati
Petrophile rigida	+	<1 %	20	CQ16-32	Proteaceae
Podotheca angustifolia	+	<1 %	8	(=CSQ3R-15	Podo angust
Quinetia urvillei	+	<1 %	6	CQ16-39	Urvillea quinetia
Restionaceae sp.	+	<1 %	20	CQ16-46	rush hry nodes
Samolus repens var. paucifolius	+	<1 %	30	CQ16-06	Samolus
Schoenus plumosus	+	<1 %	4	CQ16-45	?Schoenus
Siemssenia capillaris	+	<1 %	12	CQ16-10	Candelabra

Siloxerus humifusus	+	<1 %	2	CQ16-35	Silox ?hum
Sonchus oleraceus	+	<1 %	30		
Stylidium aceratum	+	<1 %	3	CQ16-30	Stylid smll wte
Stylidium longitubum	+	<1 %	3	(=CQ17-13	Stylidium succulent pk 'nude'
Stylidium mimeticum	+	<1 %	3	CQ16-23	Stylid sht pink, white
Stylidium obtusatum	0.1	<1 %	3	CQ16R-03	Styl long
Thysanotus manglesianus	+	<1 %			Thys clmbg; unequal
Thysanotus tenellus	0.2	<1 %	15	CQ16R-02	Thys annual
Trachymene pilosa	+	<1 %	12		
Tribonanthes variabilis	+	<1 %	15-20	(=CBGC45)	Tribonanthes
Triglochin minutissima	+	<1 %	3	CQ16-16	?Triglochin
Triglochin mucronata	+	<1 %	6	CQ16-41	?Triglochin horned 3 carpels
Triglochin sp. A Flora of Australia (G.J. Keighery 2477)	+	<1 %	7	CQ16-28	herb witches hats
Ursinia anthemoides subsp. anthemoides	1	<1 %	20		
Utricularia multifida	+	<1 %	10	CQ16-07	Utricularia pk; also CQ16-22
Utricularia tenella	+	<1 %		CQ16-33B	utricularia
Verticordia plumosa var. brachyphylla	4	1-5%	40	CQ16-01	Verticordia
Vulpia bromoides	0.5	<1 %	20	CQ16-25	grass
Vulpia myuros forma myuros	2	1-5%	40	CQ16-36	?barley grass
Wahlenbergia capensis	+	<1 %	30		

Atlas 2020 Update — Site CQ17

Described by CH **Date** 31/10/2011 **Type** Q 10m x 10m
Season **Uniformity**
Location
MGA Zone 50 331739 **mE** 6619032 **mN** 115.245810 **E** -30.549228 **S**
Habitat Flood plain (near edge)
Soil Grey sand
Rock Type na
Vegetation Melaleuca cuticularis Isolated Shrubs over Tecticornia indica subsp. bidens Low Open Shrubland over *Cotula coronopifolia, Cotula cotuloides, Crassula colorata var. acuminata, Angianthus micropodioides, Angianthus preissianus, Spergularia brevifolia, Apium prostratum subsp. prostratum var. filiforme, Senecio pinnatifolius var. latilobus,Triglochin minutissima, Calandrinia sp. Kenwick (G.J. Keighery 10905) Low Herbland and Polypogon tenellus Open Grassland.
Veg Condition Very Good. (weeds 20% of herb cover)
Fire Age Long unburnt (more than 12 years since fire)
Notes Elevation: 45m. Quadrat is located on edge of samphire community
Autumn revisit; 08/06/2021; photo 107-909.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Angianthus micropodioides	5	5-10%	8	CQ17-10	Angianthus red wire
Angianthus preissianus	5	5-10%	7	CQ17-11	Angianthus flat; A. ?pyg; also CQ17R-06
Apium prostratum subsp. prostratum var. filiforme	1	<1 %	30	CQ17-14	Hydrocotyl erect
Arctotheca calendula	1	<1 %	10		Arctotheca cale
Brachyscome iberidifolia	0.2	<1 %	10	CQ17-08	Brachyscome single
Briza minor	+	<1 %	20		
Calandrinia granulifera	3	1-5%	2	CQ17R-02	Calandrinia 1
Calandrinia sp. Kenwick (G.J. Keighery 10905)	2	1-5%	2	CQ17-07	Calandrinia low red; also CQ17R-03
Carpobrotus edulis	0.2	<1 %	10		Carpobrotus edulis (check C.modestus and C.virescens)
Centaurium tenuiflorum	+	<1 %	10	(=CQ	Scroph square stem
Centrolepis polygyna	+	<1 %	5	(=CQ14-06	Centrolepis drum
Cotula coronopifolia	8	<1 %	15	(=CQ02-09	Cotula cot
Cotula cotuloides	8	<1 %	10	(=CQ14-09	Cotula narrow
Crassula colorata var. acuminata	6	<1 %	10	CQ17R-04	cras col
Crassula decumbens var. decumbens	1	<1 %	5	(=CQ14-08	Crassula natans
Crassula glomerata	+	<1 %	5	(=CQ14-05	Crassula orange
Crassula natans var. minor	2	1-5%	5	CQ17-12	Crassula opposite trumpet
Daucus glochidiatus	+	<1 %	20	CQ17R-13	daucus gloc
Dysphania pumilio				CQ18AR-01	AUT21 herb
Eragrostis dielsii	1	<1 %	1	(=CQ20R-18	Erag diels
Eryngium pinnatifidum subsp. Palustre (G. J. Keighery 13459)	+	<1 %	25	(=CQ	Eryngium
Heliophila pusilla	+	<1 %	10		Heli pusc

Hypochaeris glabra	0.3	<1 %	30		hypo glab
Isolepis cernua var. setiformis	0.5	<1 %	5	(=CQ14-07	Isolepis cernva
Isolepis marginata	+	<1 %	6	CQ17-04	Isolepis marginata
Juncus bufonius	+	<1 %	7	CQ17-09	Juncus branched
Juncus capitatus	+	<1 %	5	(=CQ14-10	Juncus cap
Lawrencia squamata	+	<1 %	15	CQ17-05	Thorny scaly
Liparophyllum capitatum	+	<1 %	20	CQ17-02	Villarsia cap
Lolium perenne x rigidum	+	<1 %	15	(=CQ02-10	Lolium swamp
Lotus subbiflorus	2	1-5%	5		Lotu sub
Lysimachia arvensis	+	<1 %	10		lysm arv
Melaleuca cuticularis	1	<1 %	100		Melaleuca cuticularis
Monopsis debilis var. depressa	+	<1 %	25	(=CQ06-	Purple trumpets; also CQ17R-14
Ornithopus pinnatus	+	<1 %	10	CQ17R-12	vetch
Polypogon monspeliensis	1	<1 %	25	(=CQ02-05	Phalaris swamp
Polypogon tenellus	10	5-10%	12	CQ17-03	Phalaris red; also CQ17R-07
Quinetia urvillei	+	<1 %	10	(=CQ20R-01	Quin urv
Samolus repens var. paucifolius	+	<1 %	20	CQ17-16	Samelus grey
Senecio pinnatifolius var. latilobus	0.5	<1 %	30	(=CQ06-03	Senecio lautus
Siemssenia capillaris	+	<1 %	30		Podo cap
Sonchus asper	+	<1 %	20		
Sonchus oleraceus	+	<1 %	20		
Spergularia brevifolia	3	1-5%	10	CQ17R-01	Spergularia
Sporobolus virginicus	+	<1 %	20	CQ17R-10	Sporobilis native couch
Stellaria media	+	<1 %		CQ17R-09B	
Stylidium longitubum	+	<1 %	5	CQ17-13	Stylidium nude
Tecticornia indica subsp. bidens	20	10-25%	100	(=CQ14-1	Tectiornia bidens
Triglochin calcitrapa	+	<1 %	5	CQ17R-09	Trigloc
Triglochin minutissima	2	1-5%	2	CQ17-01	Triglochin mini
Triglochin mucronata	+	<1 %	15	CQ17-15	Triglochin emex
Viminaria juncea	+	<1 %	15		Vim junc seeddlg
Vulpia fasciculata	+	<1 %	20	CQ17R-08	Vulpia lge
Vulpia myuros forma myuros	+	<1 %	20	CQ17R-05	Vulpia

Atlas 2020 Update — Site CQ18

Described by CH **Date** 1/11/2011 **Type** Q 10m x 10m
Season **Uniformity**
Location
MGA Zone 50 331743 **mE** 6619385 **mN** 115.245909 **E** -30.546045 **S**
Habitat Upper slope to crest of very low rise on broad plain.
Soil Light yellow brown sand
Rock Type na
Vegetation Banksia telmatiaea, Scholtzia umbellifera, Calothamnus quadrifidus subsp. quadrifidus, Hakea obliqua subsp. parviflora, Melaleuca seriata Closed Heathland over Jacksonia hakeoides, Acacia pulchella var. glaberrima Low Sparse Shrubland over Lepidobolus preissianus, Mesomelaena pseudostygia Sparse Sedgeland/Rushland and Neurachne alopecuroidea Low Sparse Grassland.
Veg Condition Excellent (low weed cover, but quite a few species present)
Fire Age More than 12 yrs since fire
Notes Autumn revisit; 08/06/2021; photo 107-901.
SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia pulchella var. glaberrima	0.2	<1 %	60	CQ18R-05	acacia pulch
Allocasuarina humilis	+	<1 %	100	CQ18-02	Allocasuarina humilis
Arctotheca calendula	+	<1 %	2		Arc cal
Austrostipa compressa	+	<1 %	30	(=CQ06-09	Austrostipa flav
Banksia telmatiaea	75	>75%	160	(=CQ06-01	Banksia spaher
Burchardia congesta	+	<1 %	30		Burchardia congesta
Caladenia flava subsp. flava	+	<1 %	10	CQ18R-01	Caladenia/Eryth
Calandrinia corrigioloides	+	<1 %	5	CQ18R-04	Cala corr
Calothamnus quadrifidus subsp. quadrifidus	5	5-10%	180	CQ18-04	Calothamnus quad
Crassula colorata var. acuminata	+	<1 %	3	(=CSQ3R-03	Cras col
Drosera humilis	+	<1 %	6	CQ18-08	Drosera stolon mini
Drosera magna	0.5	<1 %	1		Dros eryth
Hakea obliqua subsp. parviflora	1	<1 %	180	CQ180-5	Hakea arid short
Hypochaeris glabra	+	<1 %	15		Hypo glab
Jacksonia hakeoides	1	<1 %	25	(=CQ09-02	Jacksonia short; also CQ18AR-01

Lepidobolus preissianus	1	<1 %	40	CQ18-03	Lyginia curly
Levenhookia stipitata	0.2	<1 %	5	CQ18-01	Levenhookia maroon; also (=CQ23R-03
Lolium perenne x rigidum	+	<1 %	40		Lolium pere
Lysimachia arvensis	+	<1 %	10		Anagallis arvensis
Melaleuca seriata	+	<1 %	110	(=CQ06-12	Mel seriata
Mesomelaena graciliceps	+	<1 %	30	CQ18R-03	
Mesomelaena pseudostygia	1	<1 %	70		Mesomelaena pseudo
Neurachne alopecuroidea	1.5	1-5%	30		Neurachne alopecuroidea
Phyllangium divergens	+	<1 %	5	(=CQ23R-01	phyl para
Podotheca gnaphalioides	+	<1 %	10	CQ18R-06	Podotheca
Polypogon monspeliensis	+	<1 %	20	CQ18R-02	round grass
Poranthera microphylla	+	<1 %	3		Poranthera mic
Pterostylis orbiculata	+		15	(=CNQ10AR-	AUT21 Pterostylis
Schoenus clandestinus	0.3	<1 %	2	CQ18-07	Schoenus clandestine
Scholtzia umbellifera	5	5-10%	150	(=CQ11-03	Scholtzia heath
Styphelia planifolia	+	<1 %	50	CQ18-06	Leucopogon styphelia
Thysanotus manglesianus	0.3	<1 %	5	(=CQ06-16	Thysanotus mangles
Trachymene pilosa	1	<1 %	10		
Wahlenbergia capensis	+	<1 %	15		wahl cap

Atlas 2020 Update — Site CQ19

Described by BRM **Date** 1/11/2011 **Type** Q 10m x 10m

Season **Uniformity**

Location

MGA Zone 50 331323 **mE** 6619016 **mN** 115.241472 **E** -30.549314 **S**

Habitat Broad low rise on very gently undulating plain

Soil Yellow-brown sand.

Rock Type na

Vegetation Banksia prionotes Low Woodland over Acacia spathulifolia Tall Sparse Shrubland over Allocasuarina humilis Isolated Shrubs over Scholtzia umbellifera, Hibbertia hypericoides, Conospermum stoechadis subsp. stoechadis, Calothamnus quadrifidus subsp. quadrifidus, Melaleuca systena Low Open Shrubland over Lepidobolus preissianus Sparse Sedgeland.

Veg Condition Excellent (low weed cover, track 20m to south).

Fire Age More than 12 years since fire.

Notes Elevation 53m; 1 dead Banksia menz in qdrt; Angianthos hum has typical form and a taller yellow form (as coll at other Banksia sites). Autumn revisit; 18/06/2021; photo 107-935, 936.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia sessilis	+	<1 %	50	CQ19-14	Acacia spikey linear lf
Acacia spathulifolia	5	<1 %	210	CQ19-01	(2020) 5% alive; 5% dead
Adenanthos cygnorum subsp. cygnorum	+	<1 %	5		aden cyg (seedlg) - also present outside
Allocasuarina humilis	1	<1 %	190	CQ19-16	Allocasuarina ?humilis
Amphipogon turbinatus	+		10		AUT21 Amphipogon turbinatus
Anigozanthos humilis subsp. chrysanthus	+	<1 %		(=	Angianthos hum ylw form
Anigozanthos humilis subsp. humilis	0.3	<1 %	20	CQ19-05	Anigozanthos humilis
Asteridea pulverulenta	+	<1 %	20		Aster pulv
Austrostipa compressa	0.5	<1 %	35	CQ19-04	Austrostipa
Banksia prionotes	25	25-33.3%	300	(=CQ10-14	Banksia prionotes (regrowth after fire?)
Burchardia congesta	+	<1 %	30		Burchardia congesta
Calandrinia corrigioloides	+	<1 %	4	CQ19R-05	Calandrinia gran/corr
Calothamnus quadrifidus subsp. quadrifidus	1	<1 %	70	CQ19-19	Calothamnus ?quad
Centrolepis drummondiana	+	<1 %	5	(=CSQ3R-01	Centrolepis drum
Conospermum stoechadis subsp. stoechadis	3	1-5%	45	CQ19-13	Conospermum sterile lf
Conospermum triplinervium	+	<1 %	30	CQ19-12	Conospermum
Conostylis candicans subsp. candicans	+	<1 %	20	(=CQ10-12	Conostylis candicans
Conostylis teretifolia subsp. teretifolia	+	<1 %	6	(=CQ05-08	Conostylis semi terete wte hrs; also (=CSQ3R-06
Crassula colorata var. acuminata	0.1	<1 %	3	(=CSQ3R-06	cras col
Daucus glochidiatus	+	<1 %	20		Dauc gloc (in roo poo)
Daviesia divaricata subsp. divaricata	+	<1 %	60	CQ19-18	Daviesia divaricate
Drosera drummondii	+	<1 %	40	CQ19-03	Drosera climber pk flrs

Drosera humilis	+	<1 %	12	(=CQ04-X2	Drosera upright bchg
Drosera magna	0.2	<1 %	1		Drosera erythrorhiza (descicated)
Eriochilus dilatatus subsp. multiflorus	+	<1 %	10	CQ19-15	Orchid spade leaf
Eucalyptus todtiana	2	1-5%	250		(2020) dead
Hibbertia hypericoides	4	1-5%	30		Hib hyp
Hybanthus calycinus	+	<1 %	20	CQ19R-01	Hyba flor
Hypocalymma xanthopetalum	+	<1 %	40		Hypo aff xanth
Hypochaeris glabra	+	<1 %	10		
Isolepis marginata	+	<1 %	3	(=CQ04-09)	Isolepis marg
Jacksonia nutans	0.3	<1 %	120	CQ19R-03	Jacksonia
Lepidobolus preissianus	2	1-5%	45	CQ19-11	rush
Leptospermum spinescens	+	<1 %	80		Leptospermum spinescens
Lomandra caespitosa	+	<1 %	20	CQ19R-04	Lomandra suav
Lotus subbiflorus	+	<1 %	10		Lotus sub (in roo poo)
Lysimachia arvensis	+	<1 %	6		not flowering
Melaleuca systena	1.5	1-5%	30	CQ19-17	Melaleuca
Mesomelaena pseudostygia	+	<1 %	60		Meso pseudo
Petrophile macrostachya	+	<1 %	30	CQ19-10	Petrophile
Phyllangium divergens	+	<1 %	4	(=CBGC11)	Phyllangium
Podotheca angustifolia	+	<1 %	5	CQ19-08	Podotheca slender
Poranthera microphylla	+	<1 %	5		Por micro
Pterostylis dilatata				CQ19AR-02	AUT21 Pterostylis nana
Pterostylis orbiculata	+		20	CQ19AR-01	AUT21 Pterostylis
Pyrorchis nigricans	+	<1 %	2		Also AUT21 CQ19AR-03
Rytidosperma occidentale	+	<1 %	40	CQ19-06	Austrodanthonia
Schoenus clandestinus	0.2	<1 %	2	CQ19-02	Schoenus clandes
Scholtzia umbellifera	25	25-33.3%	70	CQ19-07	Sholtzia
Sonchus oleraceus	+	<1 %	30		
Stylidium cygnorum	+	<1 %		CQ19R-X1	Styl rhizome
Thysanotus manglesianus	0.2	<1 %			Thysanotus climber unequal
Trachymene coerulea subsp. coerulea	+	<1 %	15	CQ19-09	flannely flr
Trachymene pilosa	0.2	<1 %	10		
Vulpia bromoides	+	<1 %	20	CQ19R-02	Vulpia
Wahlenbergia capensis	+	<1 %	20		Wahl cap
Wahlenbergia preissii	+	<1 %	20		Wahl preissii
Xanthosia huegelii	+	<1 %	20		xanth hueg

Atlas 2020 Update — Site CQ20

Described by CH **Date** 1/11/2011 **Type** Q 10m x 10m
Season **Uniformity**
Location
MGA Zone 50 331892 **mE** 6620649 **mN** 115.247666 **E** -30.534665 **S**
Habitat Very slightly raised ground on flood plain (samphire flats)
Soil Grey clayey sand (moist).
Rock Type na
Vegetation Tecticornia moniliformis, Tecticornia halocnemoides, Tecticornia syncarpa, Tecticornia indica subsp. bidens, Verticordia plumosa var. brachyphylla, Frankenia pauciflora, Lawrencia squamata Low Open Shrubland over Angianthus micropodioides, Brachyscome iberidifolia, Angianthus preissianus, Samolus repens var. paucifolius, Quinetia urvillei, Isotoma scapigera, Apium prostratum subsp. prostratum var. filiforme low open herbland with Chaetanthus aristatus, Gahnia trifida Isolated sedges.
Veg Condition Excellent.
Fire Age More than 12 years since fire
Notes Elevation 52m. Autumn revisity; 06/06/2021; photo 107-886.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Angianthus micropodioides	10	5-10%	10	CQ20R-14	Angianthus ?pygm (~1000 plnts)
Angianthus preissianus	1	<1 %	10	(=CQ17-11	Angianthus flat; A. ?pygmaeus
Apium prostratum subsp. prostratum var. filiforme	0.2	<1 %	10	CQ20R-07	Apium pros recollect
Brachyscome iberidifolia	2	1-5%	10	(=CQ17-08	Brachyscome single
Briza minor	+	<1 %	20		Briza min
Calandrinia granulifera	2	1-5%	2	CQ20-12	Crassula white; also CQ20R-20, CQ20R-21
Carpobrotus sp.	+	<1 %	3	CQ20R-24	Carp sdlg

Centaurium tenuiflorum	+	<1 %	10	CQ20-16	Centaurium
Centrolepis aristata	0.2	<1 %	5		Centrolepis aristata
Centrolepis humillima	+	<1 %	1	CQ20R-10	Centrolep hum
Chaetanthus aristatus	+	<1 %	10	CQ20-17	Restio salt; also CQ20R-15
Crassula colorata var. acuminata	+	<1 %	3	CQ20R-22	Cras salt
Drosera heterophylla	+		15		AUT21 Drosera heterophylla
Drosera thysanosepala	0.3	<1 %	15	CQ20-15	Drosera red salt
Ehrharta longiflora	+	<1 %	20	CQ20R-11	Ehrh long
Eragrostis dielsii	+	<1 %	3	CQ20R-18	Eragrostis diels
Frankenia pauciflora var. pauciflora	2	1-5%	15	CQ20-01	Frankenia
Gahnia trifida	0.3	<1 %	70		
Heliophila pusilla	0.2	<1 %	20	CQ20-10	Irio
Hydrocotyle diantha	+	<1 %	3	CQ20R-19	hydr salt
Hypochaeris glabra	+	<1 %	10		
Isolepis marginata	0.2	<1 %	5	(=CQ17-04	Isolepis marginata; also CQ20R-13
Isotoma scapigera	0.5	<1 %	10	CQ20-11	Lilac radial
Lawrencia squamata	1	<1 %	15	CQ20-05	
Lolium perenne x rigidum	+	<1 %	20	(=CQ02-10	Lolium swamp
Lotus subbiflorus	+	<1 %	2	CQ20R-25	Lotus (growing in roo poo)
Parapholis incurva	+	<1 %	5	CQ20R-02	Para incu
Philydrella pygmaea subsp. pygmaea	0.2	<1 %	10	CQ20-04	Philydrel
Polypogon monspeliensis	+	<1 %	20	CQ20R-06	grass round
Polypogon tenellus	1	<1 %	15	(=CQ17-03	Phaloris red
Quinetia urvillei	1.5	1-5%	10	CQ20-07	Quinetia; also CQ20R-01
Romulea rosea	+	<1 %	20	CQ20R-17	Romulea rose
Sagina apetala	+	<1 %	3	CQ20R-23	'Mollugin'
Samolus junceus	+	<1 %	30	CQ20-02	Samola
Samolus repens var. paucifolius	0.5	<1 %	30	(=CQ17-16	Samolus grey
Schoenus rigens	+	<1 %	3	CQ20R-16	Schoenus mat
Siemssenia capillaris	1	<1 %	15	CQ20-13	Podolepis
Sonchus oleraceus	+	<1 %	3		Sonc ole
Tecticornia halocnemoides	1	<1 %	15	CQ20R-05	Tect low green shiny
Tecticornia indica subsp. bidens	1	<1 %	25	(=CQ14-01	T indica; also CQ20R-12, CQ20AR-01
Tecticornia moniliformis	20	10-25%	70	CQ20R-04	Tecticornia tall blue
Tecticornia syncarpa	1	<1 %	50	CQ20-06	Tecticornia cod
Thysanotus manglesianus	+	<1 %		CQ20R-08	Thys climber unequal
Tribonanthes variabilis	+	<1 %	10	CQ20-14	Tribonanthes
Triglochin centrocarpa	+	<1 %	10	CQ20R-03	Triglochin rubbery
Triglochin mucronata	0.3	<1 %	5	CQ20-08	Triglochin horns
Utricularia multifida	+	<1 %	5	CQ20-03	Utricularia
Verticordia plumosa var. brachyphylla	1	<1 %	30	(=CCR01-02	Verticordia flori
Vulpia bromoides	+	<1 %	15		Vulpia bromoides
Wurmbea dioica subsp. alba	+	<1 %	10	CQ20-09	

Atlas 2020 Update — Site CQ21

Described by BRM **Date** 11/11/2011 **Type** Q 10x10
Season **Uniformity**
Location
MGA Zone 50 331620 **mE** 6620889 **mN** 115.244871 **E** -30.532462 **S**
Habitat Very gently sloping, NW-facing, crest of broad low rise on very gently undulating plain.
Soil Grey brown sand.
Rock Type na
Vegetation Banksia attenuata, Banksia menziesii, (Eucalyptus todtiana) Low Woodland over Xanthorrhoea preissii Sparse Shrubland over Melaleuca systena, Hibbertia hypericoides Low Sparse Shrubland over Dasypogon obliquifolius, Patersonia occidentalis var. occidentalis, Blancoa canescens Low Open Herbland with Lyginia imberbis, Mesomelaena pseudostygia Sparse Sedgeland.
Veg Condition Very Good (very low weed cover,quite a lot of Ursinia).
Fire Age More than 12 years since fire.
Notes NB: Eucalyptus todtiana cover in broader area is scattered (<2%).
3 dead Banksia trees in quadrat in Oct 2020. Juvenile Banksia's present (3xB.att, 3x Bmenz)
Autumn reivist; 08/06/2021; photo 107-889.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Alexgeorgea nitens	+	<1 %	10	(=CQ01-	Alexgeorgea
Amphipogon turbinatus	+	<1 %	45	(=CQ	Amphipogon
Anigozanthos humilis subsp. humilis	+	<1 %	30		Anigozanthos humilis
Arnocrinum preissii	+	<1 %	40	CQ21R-05	Tricoryne?
Austrostipa compressa	+	<1 %	30	(=CQ-	Austrostipa
Banksia attenuata	11	<1 %	400		
Banksia menziesii	3	1-5%	450		
Blancoa canescens	1	<1 %	15	(=CQ	Blancoa
Bossiaea eriocarpa	+	<1 %	35		Bossiaea eriocarpa
Burchardia congesta	+	<1 %	40		Burchardia congesta
Burchardia multiflora	+	<1 %	40	CQ21R-12	Burchardia
Caladenia flava subsp. flava	+	<1 %	20	CQ21R-10	Caladenia flava
Caladenia longicauda subsp. borealis	+	<1 %	40	CQ21-09	Caladenia x 2
Calectasia narragara	+	<1 %	30	CQ21R-06	Calactasia
Calytrix flavescens	+	<1 %	30		Calytrix flavescens
Calytrix fraseri	+	<1 %	30	CQ21-17	Calytrix fras
Cassytha racemosa forma racemosa	+	<1 %	30	CQ21-10	Cassytha
Chaetospora curvifolia	+	<1 %	40	CQ21-28	?Schoenus curvifolius
Chordifex sinuosus	+	<1 %	15	CQ21R-08	rush hairy culm
Conostylis aurea	+	<1 %	20	CQ21-04	Conostylis
Conostylis teretifolia subsp. teretifolia	+	<1 %	10	(=CQ05-	Conostylis semi terete obtuse white hrs
Crassula colorata var. colorata	+	<1 %	3	(=CQ01-	Crassula
Dampiera linearis	+	<1 %	30	(=CBGC61)	Dampiera linearis
Dasypogon obliquifolius	8	<1 %	35	(=CBGC	Dasypogon
Drosera drummondii	+	<1 %	35	CQ21-18	Drosera climber
Drosera magna	+	<1 %	1		Drosera erythrorhiza
Drosera minutiflora	+	<1 %	1	=	Drosera pygmae
Eremaea asterocarpa subsp. asterocarpa	+	<1 %	30		Eremaea asterocarpa
Eucalyptus todtiana	8	<1 %	500		
Gompholobium tomentosum	+	<1 %	40	CQ21-26	Gompholobium; also CQ21-19
Hensmania stoniella	+	<1 %	15	CQ21R-13	Hensmania
Hibbertia hypericoides	1	<1 %	30		Hib hyp (dead plants to 70cm)
Hibbertia sericosepala	+	<1 %	20	(=CQ23-05)	Hibbertia straggly long lvs.
Hypocalymma xanthopetalum	+	<1 %	35	(=CQ	Hypocalymma
Hypochaeris glabra	+	<1 %	10		
Hypolaena exsulca	+	<1 %	20	CQ21-06	Hypolaena exsulca
Isolepis marginata	+	<1 %	3	=CQ04-	Isolepis marg
Jacksonia nutans	1	<1 %	60	CQ21-21	Jacksonia
Lepidosperma calcicola	+	<1 %	40	CQ21-16	Lepidosperma linear flat/
Lomandra caespitosa	+	<1 %	15	CQ21-14	Lomandra linear flat
Lomandra hermaphrodita	+	<1 %	15	CQ21-20	Lomandra hem
Lomandra preissii	+	<1 %	20	CQ21-05	?Lomandra preissii
Lyginia barbata	1	<1 %	20	(=CQ	(?Lyginia)
Lyginia imberbis	7	5-10%	35	CQ21-07	Lygnia
Melaleuca systena	3	1-5%	30	CQ21-25	Melaleuca
Mesomelaena pseudostygia	+	<1 %	35	(=CQ-	Mesomelaena pseudo
Patersonia occidentalis var. occidentalis	2	1-5%	60		Patersonia occidentalis
Petrophile linearis	+	<1 %	30		
Phlebocarya ciliata	+	<1 %	40	CQ21-11	Phlebocarya cil
Platysace xerophila	+	<1 %	30	CQ21-22	Platysace/ Xanthosia
Podotheca angustifolia	+	<1 %	5		Podotheca angust
Podotheca gnaphalioides	+	<1 %	15		Podotheca gnaph
Polypogon monspeliensis	+	<1 %	20	CQ21-24	Lagurus
Poranthera microphylla	+	<1 %	2	=	Poranthera
Rytidosperma occidentale	+	<1 %	12	CQ21R-01	Rytid hry lves; CQ21R- 03, CQ21-27
Schoenus brevisetis	+	<1 %	45	CQ21-23	Schoenus tall; also CQ21-15
Stirlingia latifolia	+	<1 %	45		
Stylidium rigidulum	+	<1 %	20	CQ21R-04	Stylidium rigid
Thelymitra campanulata	+	<1 %	50	CQ21R-11	orchid glabrous
Thysanotus thyrsoideus	+	<1 %	25	(=CQ05-	Thysanotus upright
Trachymene pilosa	+	<1 %	4		
Ursinia anthemoides subsp. anthemoides	+	<1 %	30		
Vulpia myuros forma myuros	+	<1 %	30	CQ21R-02	Vulpia
Wahlenbergia capensis	+	<1 %	25	CQ21R-07	Silene
Xanthorrhoea preissii	4	1-5%	120	CQ21-01	Xanth preis
Xanthosia huegelii	+	<1 %	4	(=CQ04-	Xanthosia

Atlas 2020 Update **Site** CQ22

Described by CH **Date** 1/11/2011 **Type** Q 10m x 10m

Season **Uniformity**

Location NE corner of Atlas 2019/2020 survey area

MGA Zone 50 332284 **mE** 6620778 **mN** 115.251771 **E** -30.533556 **S**

Habitat Very gentle slopes between flood plain and broad low sandy rise

Soil Grey sand.

Rock Type na

Vegetation Regelia ciliata, Banksia telmatiaea, Hakea obliqua subsp. parviflora, Melaleuca seriata Closed Heathland over Jacksonia hakeoides, Hypocalymma xanthopetalum Low Sparse Shrubland over Conostylis aculeata subsp. breviflora Low Sparse Shrubland and Lyginia imberbis, Chordifex sinuosus Sparse Rushland.

Veg Condition Excellent (Ursinia and other weeds present)

Fire Age More than 12 years since fire.

Notes Autumn revisit; 08/06/2021; photo 107-884.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Alexgeorgea nitens	+	<1 %	15		Alexgeorgea; also CQ22R-10
Andersonia heterophylla	+	<1 %	15	CQ22-01	Andersonia white
Arctotheca calendula	+	<1 %	10		
Arnocrinum preissii	+	<1 %	30	CQ22-10	Acting sp.
Austrostipa compressa	+	<1 %	30	(=CQ06-09	Austrostipa flav
Babingtonia urbana	+	<1 %	100	CQ22-09	Verticordia linear (2020: Originally Ided as Astartea; just outside qudt)
Banksia nivea subsp. nivea	+	<1 %	45		Banksia nivea
Banksia telmatiaea	40	33.3-50%	120	(=CQ06-01	Banksia sphaer
Burchardia bairdiae	+	<1 %	30	CQ22R-07	Burchardia short robust
Burchardia congesta	+	<1 %	30		Burchardia congesta
Caladenia flava subsp. flava	+	<1 %	12	CQ22R-04	Caladenia flava
Callitris pyramidalis	+	<1 %	180	CQ22-03	Actinostrobus
Cassytha flava	+	<1 %		(=CQ15-01	Dodder hairy
Chaetanthus aristatus	+		30	CQ22AR-01	AUT21 Chaetanthus
Chordifex reseminans	+	<1 %	30-60	CQ22R-03	rush (n=4); also CQ22R-02, AUT21 rush
Conospermum stoechadis subsp. stoechadis	+	<1 %	80	(=CQ09-01	Conospermum stoech
Conostylis aculeata subsp. breviflora	1	<1 %	25	(=CQ11-04	Conostylis aculeata
Conostylis aurea	+	<1 %	20	CQ22R-01	Patersonia/Coostylis
Conostylis juncea	+	<1 %	20	CQ22-14	Patersonia saw
Cyperaceae sp. 2 ENE	+	<1 %	40	CQ22R-06	sedge
Desmocladus nodatus	+	<1 %	20	CQ22-11	Restio small knobs
Drosera magna	+	<1 %	2	CQ22R-09	Drosera eryth
Hakea obliqua subsp. parviflora	10	5-10%	180	(=CQ06-02	Hakea arida
Hypocalymma xanthopetalum	1	<1 %	30	(=CQ	Hypocalymma ?Xanth
Hypochaeris glabra	+	<1 %	10		beaked achenes
Hypolaena exsulca	+	<1 %	25		
Isolepis marginata	+	<1 %	5	CQ22-12	Isolepis marg2
Isopogon panduratus subsp. palustris	+	<1 %	130	(=CQ15-04	Petrophile bacca
Jacksonia hakeoides	1	<1 %	25	(=CQ09-02	Jacksonia short
Lechenaultia stenosepala	+	<1 %	20	CQ22-16	Scaevola recurved.
Lepidosperma sp.	+	<1 %	20	CQ22-13	Lepidosperma terete
Lomandra suaveolens	+	<1 %	20	CQ22R-08	Lomandra sp.; glaucous
Lyginia imberbis	1	<1 %	40	CQ22-02	Lyginia barbata
Melaleuca seriata	1	<1 %	110		Melaleuca seriata
Mesomelaena pseudostygia	+	<1 %	45		Mesomelaena pseudo
Opercularia vaginata	+	<1 %	20		
Podotheca gnaphalioides	+	<1 %	15	CQ22-15	Podotheca gnaph
Ptilotus manglesii	+	<1 %	10	CQ22-07	Ptilotus manglesii
Regelia ciliata	20	10-25%	140	(=CQ06-13	Regelia
Schoenus rigens	+	<1 %	25	CQ22R-05	?Phlebocarya
Stylidium cygnorum	+	<1 %	15	CQ22-04	Stylidium repens
Trachymene pilosa	+	<1 %	5		Trachymene pilosa
Ursinia anthemoides subsp. anthemoides	+	<1 %	30		
Wahlenbergia capensis	+	<1 %	30		

Atlas 2020 Update **Site** CQ23

Described by BRM **Date** 1/11/2011 **Type** Q 10m x 10m

Season **Uniformity**

Location

MGA Zone 50 332550 **mE** 6620751 **mN** 115.254539 **E** -30.533837 **S**

Habitat Gentle, east-facing upper slope of broad low rise on very gently undulating plain.

Soil Pale, yellow-brown sand.

Rock Type na

Vegetation Banksia attenuata, Banksia menziesii, Eucalyptus todtiana Low Woodland over Jacksonia nutans Sparse Shrubland over Hibbertia hypericoides, Melaleuca systena, Hibbertia sericosepala Low Sparse Shrubland over Dasypogon obliquifolius, Corynotheca micrantha var. micrantha, Patersonia occidentalis var. occidentalis Low Sparse Herbland with Mesomelaena pseudostygia, Lyginia barbata Sparse Sedgeland/Rushland

Veg Condition Excellent (weed cover 0.5%; intensive kangaroo grazing/disturbance observed).

Fire Age More than 12 years since fire.

Notes Elevation 47m. Autumn revisit; 08/06/2021; photo 107-882 (NW), 107-883 (NE).

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Adenanthos cygnorum subsp. cygnorum	+	<1 %	3		Adenanthos cygnorum (seedling)
Alexgeorgea nitens	+	<1 %	20	CQ23R-11	Alexgeorgea lge
Amphipogon turbinatus	0.5	<1 %	40	(=CQ	Amphipogon (grazed)
Anigozanthos humilis subsp. humilis	+	<1 %	25	CQ23-19	Anigozanthos humilis
Austrostipa compressa	+	<1 %	40	(=	Austrostipa
Austrostipa macalpinei	1	<1 %	35	CQ23R-02	Austrostipa maca hry base
Banksia attenuata	9	<1 %	350		seedlings present 15cm
Banksia menziesii	6	<1 %	300		seedlings present 15cm
Blancoa canescens	+	<1 %	10	(=CQ04-	Blancoa
Bossiaea eriocarpa	+	<1 %	30	(=	Bossiaea eriocarpa
Burchardia congesta	+	<1 %	40		Burchardia congesta
Calytrix flavescens	+	<1 %	40	CQ23R-07	Calytrix flav
Centrolepis drummondiana	+	<1 %	5	CSQ3R-01	Centrolepis drum; also CQ23R-10
Chordifex sinuosus	+	<1 %	30	CQ23R-08	Restio
Conostylis juncea	+	<1 %	20	CQ23-16	Conostylis yellow flr
Conostylis teretifolia subsp. teretifolia	+	<1 %	10	(=CSQ3R-06	Conostylis setig
Corynotheca micrantha var. micrantha	1.5	1-5%	30	CQ23R-06	Coryn micr var
Crassula colorata var. colorata	0.5	<1 %	1	(=CQ01-	Crassula
Dasypogon obliquifolius	2	1-5%	35	(=	Dasypogon
Drosera drummondii	+	<1 %		(=CSQ3R-04	Drosera climber dk, glab; also CQ23-18
Drosera magna	+	<1 %	1		Drosera eryth
Eremaea beaufortioides var. beaufortioides	+	<1 %	90	CQ23-08	Eremaea lge nut
Eucalyptus todtiana	4	1-5%	450		(part of multi-trunk trees in quadrat)
Gompholobium tomentosum	+	<1 %	40		Gom tom
Goodenia coerulea	+	<1 %	35	CQ23-17	Goodeniaceae pale
Haemodorum spicatum	+	<1 %	80	(=CBGC	Haemodorum
Hakea obliqua subsp. parviflora	+	<1 %	170	CQ23-20	Hakea long lf long nut
Hakea ruscifolia	+	<1 %	170		
Hibbertia hypericoides	5	5-10%	40		Hib hyp (tops of plants have died back)
Hibbertia sericosepala	+	<1 %	30	CQ23-05	Hibbertia straggler, long dk green lf
Hypocalymma xanthopetalum	+	<1 %	30	(=	Hypocalymma
Hypochaeris glabra	+	<1 %	10		
Isolepis marginata	+	<1 %	3	(=CQ	Isolepis marg
Jacksonia nutans	2	1-5%	110-130	CQ23-02	Jacksonia
Lepidosperma calcicola	+	<1 %	30	CQ23R-09	Lepido calc; grazed; also CQ23-04
Leucopogon sp. Coujinup (M.A. Burgman 1085)	+	<1 %	20	CQ23-01	Epiacrid
Lomandra caespitosa	+	<1 %	20	CQ23-03	Lomandra linear flat; CQ23-10,13
Lomandra hermaphrodita	+	<1 %	20	CQ23R-03	Lomandra herm
Lyginia barbata	1	<1 %	30	(=	Restio hairy bracts (grazed)
Macarthuria australis	0.5	<1 %	50		Macaruriath
Melaleuca systena	1	<1 %	30	(=CQ21-	Melaleuca
Mesomelaena pseudostygia	3	1-5%	50	CQ23-14	Mesomelaena pseudo
Opercularia vaginata	+	<1 %	30	CQ23R-05	operc vag
Patersonia occidentalis var. occidentalis	1	<1 %	60	(=	Patersonia occidentalis
Petrophile linearis	+	<1 %	45		
Phyllangium divergens	0.3	<1 %	10	CQ23R-01	Phyllangia para

Pimelea sulphurea	+	<1 %	35	CQ23-06	Pimelea
Podotheca gnaphalioides	+	<1 %	20	CQ23-09	Podotheca
Poranthera microphylla	+	<1 %	3	(=	Poranthera
Pterostylis aff. vittata	+	<1 %	20	CQ23-11	Pterostylis
Schoenus pleiostemoneus	+	<1 %	15	CQ23-07	Schoenus
Siloxerus humifusus	+	<1 %	2	(=CQ01-	Siloxerus humilis
Stylidium araeophyllum	+	<1 %	20	(=CQ04-	Stylid tall pk glauc
Stylidium kalbarriense	0.5	<1 %	20	CQ23R-04	Stylidium rig/kal
Thysanotus manglesianus	+	<1 %	110		Thysanotus mang/pat (sterile)
Thysanotus thyrsoideus	+	<1 %	30	(=CQ05-	Thysanotus upright
Trachymene pilosa	1	<1 %	5		
Tricoryne elatior	+	<1 %	40	CQ23-12	Tricoryne elatior
Ursinia anthemoides subsp. anthemoides	0.3	<1 %	20		Ursinia sp.
Vulpia myuros forma myuros	0.3	<1 %	20	(=	Vulpia
Wahlenbergia capensis	+	<1 %	35		
Xanthosia huegelii	+	<1 %	15	(=CQ04-	Xanthosia

Atlas 2020 Update — Site CQ24

Described by CH **Date** 2/11/2011 **Type** Q 10m x 10m
Season **Uniformity**
Location
MGA Zone 50 332104 **mE** 6620101 **mN** 115.249786 **E** -30.539637 **S**
Habitat Flood banks of shallow flow line
Soil Brown loamy sand
Rock Type na
Vegetation Melaleuca viminea subsp. viminea, Melaleuca rhaphiophylla Tall Shrubland over Melaleuca brevifolia Sparse Shrubland over Leptocarpus coangustatus Sparse Rushland with *Ehrharta calycina. *Polypogon monspeliensis, *Lolium perenne x rigidum, *Ehrharta longiflora Open Grassland and *Lotus subbiflorus, *Cotula coronopifolia, Samolus repens var. paucifolius Low Closed Herbland.
Veg Condition Degraded (high weed cover; no native understorey)
Fire Age More than 12 years since fire.
Notes 2020: could only find 1 of the four 2011 quadrat pegs.
Autumn revisit 08/06/ 2021; inundated; could not be accessed.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Arctotheca calendula	+	<1 %	40		cape weed
Briza maxima	+	<1 %	40		Briza max
Briza minor	+	<1 %	20		Briza min
Bromus hordeaceus	+	<1 %		CQ24-02	Bromus mad
Cotula coronopifolia	4	1-5%	20		Cot cor
Crassula natans var. minor	+	<1 %	3	CQ24R-07	Crassula natens
Ehrharta calycina	4	1-5%	130		Ehrharta calycina
Ehrharta longiflora	1	<1 %	45	CQ24R-01	Ehrharta sp
Eryngium pinnatifidum subsp. Palustre (G. J. Keighery 13459)	+	<1 %		(=CQ)	Eryngium
Hordeum hystrix	+	<1 %	40	CQ24R-03	Hordeum
Juncus bufonius	+	<1 %	20	CQ24R-06	Juncus
Lepidosperma longitudinale	+	<1 %			Lepidosperma longitud
Leptocarpus coangustatus	1	<1 %		CQ24-03	Meeboldina
Lolium perenne x rigidum	5	5-10%	40		Lolium perenne
Lotus subbiflorus	80	>75%	30		Lotus subiflor
Lysimachia arvensis	+	<1 %			Anagallis arvensis blue
Melaleuca brevifolia	2	1-5%	100	CQ24R-05	Melaleuca brev
Melaleuca rhaphiophylla	4	1-5%	250	CQ24R-04	Melaleuca rhaph
Melaleuca viminea subsp. viminea	40	33.3-50%	400	CQ24-01	Melaleuca viminea
Polypogon monspeliensis	1	<1 %		(=CQ02-05	Phaloris swamp
Samolus repens var. paucifolius	1	<1 %		(=CQ17-16	Samolus grey
Sonchus asper	+	<1 %			
Sonchus oleraceus	+	<1 %	30		Sonchus olerac

Atlas 2020 Update **Site** CQ25

Described by BRM **Date** 2/11/2011 **Type** Q 10m x 10m

Season **Uniformity**

Location

MGA Zone 50 331602 **mE** 6619601 **mN** 115.244474 **E** -30.544077 **S**

Habitat Crest of broad low rise on very gently undulating plain.

Soil Yellow-brown sand.

Rock Type

Vegetation Banksia prionotes Low Woodland over Calothamnus quadrifidus subsp. quadrifidus, Hakea obliqua subsp. parviflora Tall Open Shrubland over Scholtzia umbellifera Open Shrubland over Hibbertia hypericoides, Conospermum stoechadis subsp. stoechadis Low Open Shrubland over Lepidobolus preissianus, Mesomelaena pseudostygia Isolated Rushes/Sedges.

Veg Condition Pristine (very low weed cover).

Fire Age More than 12 years since fire.

Notes NB Banksia telematiaea in parts of this Banksia prionotes woodland
Autumn revisit; 08/06/2021; photo 107-898. 899.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia spathulifolia	+	<1 %	210	(=CQ	?Acacia succulent
Actinotus leucocephalus	+	<1 %	10	(=CQ	flannel flr ?daisy whte
Anigozanthos humilis subsp. humilis	+	<1 %	25	(=CQ23-	Anigozanthos humilis
Arnocrinum preissii	+	<1 %	45	(=	Agrostocrinum
Austrostipa compressa	+	<1 %	40	(=	Austrostipa
Banksia dallanneyi subsp. dallanneyi var. dallanneyi	+	<1 %	12	(=CQ04-	Dryandra brchg at grnd lvl
Banksia prionotes	25	25-33.3%	400		Banksia prionotes regrowth after fire?
Brachyscome iberidifolia	+	<1 %	10	CQ25R-06	Brachyscome (in roo poo)
Burchardia congesta	+	<1 %	50		Burchardia congesta
Caladenia flava subsp. flava	+	<1 %	20	CQ25R-03	Caladenia flava; also CQ25R-07
Calothamnus quadrifidus subsp. quadrifidus	12	<1 %	210	CQ25-02	Calothamnus ?quad
Cassytha glabella	+	<1 %	140	CQ25R-02	Cassytha glabrous
Conospermum stoechadis subsp. stoechadis	3	1-5%	80-100	(=CQ	Conospermum terete lf
Conostylis candicans subsp. candicans	+	<1 %	20	CQ25R-11	?Blancoa; also CQ25R-
Conostylis teretifolia subsp. teretifolia	+	<1 %	20	CQ25R-14	Conostylis ?setig
Corynotheca micrantha var. micrantha	+	<1 %	20	(=	Corinotheca
Dasypogon obliquifolius	+	<1 %	20		Dasypogon obliq
Daviesia divaricata subsp. divaricata	+	<1 %	70	CQ25R-12	Divaricate shrub
Drosera humilis	+	<1 %	12		Drosera hum
Drosera magna	+	<1 %	1		Drosera eryth (4 leaf rosette)
Eremaea pauciflora var. lonchophylla	+	<1 %	60	CQ25R-15	Eremaea (no fruit)
Hakea obliqua subsp. parviflora	1	<1 %	250	(=CQ23-	Hakea long lf/ long frt
Hibbertia hypericoides	16	<1 %	45		Extreme dieback of Hib hyp
Hybanthus calycinus	+	<1 %	20	(=CGBM35)	Hybanthus (on edge of qdt)
Lepidobolus preissianus	+	<1 %	50	CQ25R-01	Lepidobolus preis
Melaleuca clavifolia	+	<1 %	50	CQ25R-09	Melaleuca; also CQ25-
Melaleuca systena	+	<1 %	40	(=CQ23-	Melaleuca
Mesomelaena pseudostygia	+	<1 %	30	(=CQ01-	Mesomelaena pseudo
Opercularia vaginata	+	<1 %	30	CQ25-07	Operculum vag
Phyllangium divergens	+	<1 %	6	CQ25R-05	Phyllangium
Poranthera microphylla	+	<1 %	3	(=CQ	Poranthera
Pterostylis orbiculata	+		15	=CNQ10AR-1	AUT21 Pterostylis
Pyrorchis nigricans	+	<1 %	3	CQ25R-04	Pyrorchis
Schoenus clandestinus	+	<1 %	3	CQ25-05	Schoenus clandest
Scholtzia umbellifera	11	<1 %	190	CQ25-01	Sholtzia
Stylidium kalbarriense	+	<1 %	20	CQ25R-10	Stylid rigid
Stylidium rigidulum	+	<1 %	10	(=CQ04-	Stylid linear rosette, long frts
Styphelia planifolia	+	<1 %	35	CQ25-04	Epacrid
Thysanotus manglesianus	+	<1 %			Thysanotus mang/pat 3L3S
Trachymene pilosa	+	<1 %	10		
Xanthosia huegelii	+	<1 %	15	(=CQ	Xanthosia

Atlas 2020 Update **Site** CQ26

Described by CH **Date** 2/11/2011 **Type** Q 10m x 10m

Season **Uniformity**

Location

MGA Zone 50 331837 **mE** 6619542 **mN** 115.246914 **E** -30.544642 **S**

Habitat Flood plain

Soil Brown sand (wet).

Rock Type na

Vegetation Melaleuca brevifolia Sparse Shrubland over Verticordia plumosa var. brachyphylla, Frankenia pauciflora, Tecticornia indica subsp. bidens, Grevillea sp. Coojarloo (B.J. Keighery 28 B) Low Shrubland over Brachyscome iberidifolia, Angianthus micropodioides, Centrolepis aristata, Conostylis aculeata subsp. breviflora, Eryngium pinnatifidum subsp. Palustre (G. J. Keighery 13459) Low Open Herbland.

Veg Condition Excellent. (cows pads present and associated with weeds - since 2011 survey)

Fire Age More than 12 years since fire

Notes Elevation 40m. Site appears to be drier than it was in November 2011, going by comparison with the 2011 species list. Autumn revisit; 08/06/2021; photo 107-913 (NW).

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Angianthus micropodioides	2	1-5%	10	(=CQ17-10	Angianthus red wire
Apium prostratum subsp. prostratum var. filiforme	+	<1 %	3	(=CQ20R-07	Apium pros
Brachyscome iberidifolia	20	10-25%	7	(=CQ17-08	Brachyscome single
Briza minor	+	<1 %	15		
Caladenia longicauda subsp. albella	+	<1 %	20	CQ26-02	Caladenia branched
Calandrinia granulifera	+	<1 %	5	CQ26R-04	Cala not gran
Centaurium tenuiflorum	+	<1 %	10	(=CQ02-11	Scroph square stem
Centrolepis aristata	1	<1 %	5		
Centrolepis mutica	+	<1 %	3	CQ26-04	Centrolepis awnless
Centrolepis polygyna	+	<1 %	3	(=CQ14-06	Centrolepus drum
Cerastium glomeratum	+	<1 %	20	CQ26R-05	Cera glom in cow poo
Conostylis aculeata subsp. breviflora	0.5	<1 %	25	(=CQ11-04	Conostylis aculeata
Cotula cotuloides	+	<1 %	15	(=CQ14-09	Cotula narrow
Crassula colorata var. acuminata	+	<1 %	2	CQ26R-02	Crassula col
Crassula glomerata	+	<1 %	3	CQ26R-08	Cras glom
Drosera thysanosepala	0.3	<1 %	10	(=CQ20-15	Drosera red salt
Eryngium pinnatifidum subsp. Palustre (G. J. Keighery 13459)	0.5	<1 %	25		
Frankenia pauciflora var. pauciflora	10	5-10%	15	(=CQ20-01	Frankenia
Goodenia micrantha	0.2	<1 %	3	CQ26R-01	Good pusi
Goodenia pulchella subsp. Coastal Plain A (M. Hislop 634)	+	<1 %	3	CQ26-09	Goodenia micro
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	2	1-5%	50	CQ26-08	Grevillea low green
Hydrocotyle diantha	0.2	<1 %	3	CQ26R-03	Hydrocotyle
Hypochaeris glabra	0.5	<1 %	15		
Isolepis cernua var. setiformis	1	<1 %	3	(=CQ14-07	Isolepis cernua
Isolepis marginata	+	<1 %	8	CQ26-10	Isolepis big marg
Juncus capitatus	+	<1 %	6	(-CQ14-10	Juncus cap
Lawrencia squamata	+	<1 %	15	(=CQ20-05	Thorny scaly
Leptocarpus canus	+	<1 %	70	CQ26-07	Meeboldina cana
Lolium perenne x rigidum	+	<1 %	20		Lolium pere
Lotus subbiflorus	+	<1 %	5	(=CQ14-02	Lotus sub
Lysimachia arvensis	+	<1 %	15		Anagallis arvensis blue
Melaleuca brevifolia	6	<1 %	140	(=CO-5)	Melaleuca yellow short
Melaleuca seriata	+	<1 %	45	(=CQ06-12	Melaleuca serriata
Monopsis debilis var. depressa	+	<1 %	6	(=CO-6)	purple trumpets
Ornithopus compressus	+	<1 %	5		Ornithopsis comp
Parentucellia latifolia	+	<1 %	10	CQ26-01	Parentucellia lat
Petrophile seminuda	+	<1 %	30	CQ26-12	Petrophile salt
Philydrella pygmaea subsp. pygmaea	+	<1 %	10	(=CQ20-04	Polypompholyx
Polypogon monspeliensis	+	<1 %	20	(=CQ02-05	Phalaris swamp
Polypogon tenellus	+	<1 %	15	(=CQ17-03	Phalaris red
Quinetia urvillei	+	<1 %	6	(=CQ20-07	Quinetia
Schoenus plumosus	+	<1 %	5	CQ26R-07	Schoenus; also CQ26-14
Siloxerus humifusus	+	<1 %	2	CQ26-05	Siloxerus humifusus
Sonchus oleraceus	+	<1 %	10		Sonch ole
Stylidium aceratum	+	<1 %	4	CQ26-06	Stylidium calcaratum (n=3)
Stylidium dichotomum	+	<1 %	15	CQ26-13	Stylidium stilted
Stylidium longitubum	+	<1 %	5	(=CQ17-13	Stylidium nude
Tecticornia indica subsp. bidens	10	5-10%	30	(=CQ14-01	Tecticornia bidens
Thysanotus manglesianus	+	<1 %			Thysanotus climber unequal

Tribonanthes variabilis	+	<1 %	20	(=CQ20-14	Tribonanthes
Trifolium cernuum	+	<1 %	5	CQ26R-06	Trifolium in cow poo
Triglochin minutissima	+	<1 %	4	(=CQ17-01	Triglochin mini
Triglochin sp. A Flora of Australia (G.J. Keighery 2477)	+	<1 %	5	CQ26R-10	Trigloch ?sp A; also CQ26-03
Ursinia anthemoides subsp. anthemoides	+	<1 %	20		Ursin ant
Utricularia multifida	+	<1 %	10	(=CQ20-03	Utricularia
Verticordia densiflora var. densiflora	+	<1 %	40	CQ26-11	Verticordia white
Verticordia plumosa var. brachyphylla	20	10-25%	50	(=CCR01-02	Verticordia flori
Vulpia myuros forma myuros	0.5	<1 %	20		Vulpia myuros

Atlas 2020 Update — Site CQ27

Described by BRM **Date** 20/11/2011 **Type** Q
Season **Uniformity**
Location
MGA Zone 50 332429 **mE** 6619932 **mN** 115.253146 **E** -30.541207 **S**
Habitat Margins of flood plain on very gently undulating plain.
Soil Light, grey brown sand.
Rock Type na
Vegetation Melaleuca seriata, Banksia telmatiaea, Regelia ciliata, Petrophile seminuda Low Open Shrubland over Conostylis aculeata subsp. breviflora, Centrolepis aristida Low Open Herbland and Chaetanthus aristatus Sparse Sedgeland with *Vulpia bromoides Low Sparse Grassland.
Veg Condition Very Good (Low to moderate weed cover (2-3% in 2020)).
Fire Age More than 12 years since fire
Notes Elevation 48m. Autumn revisit; 08/06/2021; photo 107-878.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia saligna	+	<1 %	160		Acacia saligna
Aira cupaniana	+	<1 %	10	CQ27-11	Aira
Aphelia cyperoides	+	<1 %	3	CQ27-15	Aphelia
Austrostipa compressa	+	<1 %	35	CQ27-29	Austrostipa
Babingtonia urbana	+	<1 %	20	CQ27R-08	Babtnia; hvly grzd (n=4); also CQ27-24
Banksia nivea subsp. nivea	+	<1 %	40	(=CQ12-	Dryandra long thin lf (some dying)
Banksia telmatiaea	4	1-5%	60	(=CBR14-02	Banksia ?sphaer (1.5% alive ; 12% dead; numerous juv to 15 cm seen)
Brachyscome iberidifolia	+	<1 %	12	CQ27-44	wte daisy; also CQ27-36
Briza maxima	+	<1 %	30		
Briza minor	+	<1 %	15		
Burchardia bairdiae	+	<1 %	25	CQ27-39	Burchardia bairdiae
Caladenia longicauda subsp. albella	+	<1 %	12	CQ27-41	narrow lf, orchid
Calandrinia granulifera	+	<1 %	3	(=CQ20R-20	Calandrinia gran
Calytrix aff. flavescens	+	<1 %	30	CQ27-43	Calytrix yllw
Cassytha flava	1	<1 %		CQ27R-03	Cassytha hry; also CQ27-02
Cassytha glabella	0.2	<1 %		CQ27R-04	Cassytha glabrous
Centaurium tenuiflorum	+	<1 %	15	(=	Centaurium
Centrolepis aristata	2.5	1-5%	4	CQ27-08	Centrolepus aristida
Centrolepis polygyna	+	<1 %	3	CQ27-20	Centrolepis long awn
Chaetanthus aristatus	2	1-5%	50	CQ27R-07	Chaet arist, grzed; also CQ27-48
Conostylis aculeata subsp. breviflora	15	10-25%	20	CQ27-06	Conostylis
Crassula colorata var. acuminata	+	<1 %	6	CQ27-26	Crassula col
Crassula decumbens var. decumbens	+	<1 %	3	CQ27-49	Crassula #2
Cyperus tenellus	+	<1 %	2	CQ27-17	Cyperus
Drosera closterostigma	+	<1 %	3	CQ27-37	Pygmae Drosera
Drosera glanduligera	+	<1 %	3	(=CNQ10R-1	Drosera glan CNQ10R-16
Drosera thysanosepala	+	<1 %	30	CQ27-31	Drosera climber red; also CQ27-47
Ehrharta calycina	+	<1 %	50		Ehrh calycina
Ehrharta longiflora	0.5	<1 %	30		Ehrh long
Gompholobium tomentosum	+	<1 %	30		Gom tom
Hibbertia stellaris	+	<1 %	20	CQ27-45	Hibbertia ?stellaris
Hypochaeris glabra	0.3	<1 %	2		
Isolepis cernua var. setiformis	+	<1 %	6	CQ27-42	Isolepis c; also CQ27-46
Isolepis marginata	+	<1 %	3	CQ27-35	small sedge
Juncus bufonius	0.3	<1 %	15	CQ27-13	Juncus; also CQ27-27
Juncus capitatus	1	<1 %	3	CQ27-19	triangle head sedge

Lolium temulentum	+	<1 %	20	CQ27-38	cylinder grass (grass)
Lomandra caespitosa	+	<1 %	20	CQ27-05	Lomandra
Lomandra suaveolens	0.2	<1 %	10	CQ27R-01	Lomandra blue curly
Lotus subbiflorus	+	<1 %	4	CQ27-10	hairy lotus
Lysimachia arvensis	+	<1 %	15		Anagallis arvensis blue
Melaleuca seriata	20	10-25%	50	CQ27-03	Melaleuca; also CQ27R-06
Monopsis debilis var. depressa	+	<1 %	4	CQ27-12	purple flower herb
Ornithopus pinnatus	+	<1 %	10	CQ27-07	Lotus yellow flower
Petrophile seminuda	1	<1 %	70	CQ27R-02	Petroph rigi
Pogonolepis stricta	+	<1 %	2	CQ27-16	Blennospora
Polypogon monspeliensis	+	<1 %	20	CQ27-25	Phalaris
Ptilotus manglesii	+	<1 %	12	CQ27-22	shiny lanceolate grn lf
Quinetia urvillei	+	<1 %	5	(=CQ20R-01	Quinetia urv
Regelia ciliata	1.5	1-5%	45	CQ27-30	Regelia
Schoenus plumosus	+	<1 %	5	CQ27-21	pty head herb
Siloxerus humifusus	1	<1 %	2	CQ27-04	Siloxerus
Sonchus oleraceus	+	<1 %	20		
Stirlingia simplex	+	<1 %	30	(=CBGC68)	Stirlingia dentate lf
Stylidium aceratum	+	<1 %	4	CQ27-14	Stylid dentate rear petals; n=1 + 3 outside; also CQ27-23
Tribonanthes variabilis	+	<1 %	30	CQ27-40	? Tribonanthes
Triglochin nana	0.1	<1 %	10	CQ27R-05	Triglochin fine; also CQ27-34
Ursinia anthemoides subsp. anthemoides	0.3	<1 %	20		
Vellereophyton dealbatum	+	<1 %	12	CQ27-18	wte daisy
Verticordia densiflora var. densiflora	+	<1 %	45	CQ27-01	?Verticordia
Vulpia bromoides	2.5	1-5%	20	CQ27-09	Vulpia
Vulpia myuros forma myuros	+	<1 %	35	CQ27-33	Compact head grass
Wahlenbergia capensis	+	<1 %	40		

Atlas 2020 Update — Site CQ28

Described by BRM **Date** 21/11/2011 **Type** Q 10m x 10m
Season **Uniformity**
Location
MGA Zone 50 332406 **mE** 6619635 **mN** 115.252858 **E** -30.543883 **S**
Habitat Flood plain (samphire flats)
Soil Light brown sand.
Rock Type na
Vegetation Tecticornia indica subsp. bidens Low Open Shrubland over Angianthus micropodioides, Quinetia urvillei, Apium prostratum subsp. prostratum var. filiformeopen Open Herbland with *Juncus bufonius Low Sparse Sedgeland.
Veg Condition Excellent (low weed cover).
Fire Age More than 12 years since fire.
Notes Elevation: 43m. Autumn revisit; 08/06/2021; photo 107-919.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Angianthus micropodioides	4	1-5%	5	CQ28-05	yellow top daisy; also CQ28-31
Apium prostratum subsp. prostratum var. filiforme	+	<1 %	20	CQ28R-13	Apium uprgt; also CQ28-01
Arctotheca calendula	+	<1 %	25		Cape weed
Brachyscome iberidifolia	+	<1 %	15	CQ28R-01	Brachyscome
Briza minor	+	<1 %	20		
Calandrinia granulifera	+	<1 %	3	CQ28R-07	Calandrin wte flr, torp lf; also CQ28-25
Centaurium tenuiflorum	+	<1 %	10	(=	Centaurium
Centrolepis aristata	+	<1 %	5	(=CQ27-	Centrolepis aristata
Centrolepis humillima	+	<1 %	2	CQ28R-04	Centrolepis hum
Centrolepis polygyna	+	<1 %	4	(=CQ27-	Centrolepis fine
Cotula coronopifolia	+	<1 %	20		Cotula corono
Cotula cotuloides	+	<1 %	12		Cotula cot
Crassula colorata var. acuminata	+	<1 %	3	CQ28R-10	Crassula col
Drosera thysanosepala	+	<1 %	12	CQ28-30	fine Drosera erect; also CQ28-09
Eragrostis dielsii	+	<1 %	3	CQ28R-14	Eragrostis diels
Frankenia pauciflora var. pauciflora	+	<1 %	15	CQ28-23	?Verticordia red stems
Goodenia pulchella subsp. Coastal Plain A (M. Hislop 634)	+	<1 %	5	CQ28-26	sht Goodeniaceae type hb
Hainardia cylindrica	+	<1 %	30	CQ28-18	grass light hd; also CQ28-35
Hordeum hystrix	+	<1 %	25	CQ28R-19	Hordeum

Hydrocotyle diantha	+	<1 %	20	CQ28R-12	Hydrocotyl
Hypochaeris glabra	+	<1 %	20		
Isolepis cernua var. setiformis	+	<1 %	3	CQ28R-22	Isolepis ?cenua
Isolepis marginata	+	<1 %	8	CQ28R-06	Isolepis; also CQ28-32
Isotoma scapigera	+	<1 %	10	(=CNQ6R-)	Isotoma pple herb; also CQ28-03
Juncus bufonius	3	1-5%	20	CQ28R-21	Juncus
Juncus capitatus	+	<1 %	3	CQ28-34	Cyperus
Lawrencia squamata	+	<1 %	20	CQ28-15	Lanceolate lf
Lysimachia arvensis	+	<1 %	20		Anagallis arvensis blue
Monopsis debilis var. depressa	+	<1 %	12	CQ28R-18	pple tube flr
Philydrella pygmaea subsp. pygmaea	+	<1 %	12	CQ28R-20	Philydrella; also CQ28-16
Polypogon monspeliensis	+	<1 %	20	CQ28-14	?Phellaris grass
Quinetia urvillei	2	1-5%	4	CQ28-06	Urvillei daisy
Sagina apetala	+	<1 %	3	CQ28R-05	herb
Schoenus plumosus	+	<1 %	8	CQ28R-09	red top herb
Senecio glossanthus	+	<1 %	40	CQ28R-16	Senecio
Sonchus oleraceus	+	<1 %	20		
Spergularia brevifolia	+	<1 %	20	CQ28R-08	?Spergula; also CQ28-11,CQ28-27
Stylidium ecorne	+	<1 %	3	CQ28R-15	Stylid ?aceratum
Stylidium obtusatum	+	<1 %	3	CQ28R-11	?Stylid
Tecticornia indica subsp. bidens	25	25-33.3%	15	CQ28R-23	Tecticornia red
Tecticornia syncarpa	+	<1 %	30	CQ28-02	
Tribonanthes variabilis	+	<1 %	20	CQ28R-02	Tribonanthes; also CQ28-10
Triglochin calcitrapa	+	<1 %	12	CQ28R-03	Trigloch sp A boofy
Triglochin centrocarpa	+	<1 %	10	(=CQ9R-)	Trigloch logs
Triglochin mucronata	+	<1 %	20	CQ28R-24	Triglochin crenate; also CQ28-17
Triglochin sp. A Flora of Australia (G.J. Keighery 2477)	+	<1 %	10	CQ28-04	Thiglochin witches hats
Utricularia multifida	+	<1 %	15	CQ28-07	? Goodenia
Vulpia bromoides	+	<1 %	30	CQ28R-25	grass
Vulpia fasciculata	+	<1 %	40	CQ28R-17	?Vulpia
Vulpia myuros forma myuros	+	<1 %	20	CQ28-19	Vulpia
Wurmbea dioica subsp. alba	+	<1 %	5	CQ28-21	Wumbea

Atlas 2020 Update **Site** CSQ01

Described by CH **Date** 24/10/2019 **Type** Q 10x10

Season **Uniformity**

Location South of Wongonderrah Rd

MGA Zone 50 331649 **mE** 6616248 **mN** 115.244420 **E** -30.574326 **S**

Habitat Plain

Soil Grey sand

Rock Type na

Vegetation Banksia attenuata, Banksia menziesii, (Nuytsia floribunda) Low Woodland over Eremaea pauciflora var. lonchophylla, Hibbertia hypericoides, Melaleuca clavifolia, Eremaea asterocarpa subsp. asterocarpa, Jacksonia hakeoides Low Open Shrubland over Dasypogon obliquifolius, Patersonia occidentalis var. occidentalis Open Herbland and Lyginia imberbis Sparse Sedgeland.

Veg Condition Excellent to Pristine

Fire Age More than 12 years since fire.

Notes Elevation 44m. Autumn revisit; 06/06/2021; photo 107-850.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia pulchella var. glaberrima	+	<1 %	45	CSQ01-22	Acacia pulchella
Alexgeorgea nitens	+	<1 %	12		
Amphipogon turbinatus	+	<1 %	40	CSQ01R-04	amph turb
Anigozanthos humilis subsp. humilis	+	<1 %	15		
Austrostipa compressa	+	<1 %	20	CSQ01-12	Austrostypa compressa
Banksia attenuata	4	1-5%	380		seedlgs present
Banksia menziesii	3	1-5%	220		seedlgs present
Blancoa canescens	+	<1 %	10		
Bossiaea eriocarpa	1	<1 %	20		
Calytrix flavescens	0.5	<1 %	15	CSQ01-15	Calytrix summer
Calytrix fraseri	+	<1 %	70	CSQ01R-02	Calytrix fras
Cassytha flava	+	<1 %		CSQ01R-07	cassyrtha hairy
Centrolepis drummondiana	+	<1 %	1	(=CQ23R-10	Centrolepis incon
Chaetospora curvifolia	+	<1 %	10	CSQ01-29	
Conostylis juncea	+	<1 %	30	CSQ01-27	Conostylis juncea
Crassula colorata var. acuminata	0.2	<1 %	2	(=CSQ3R-03	cras col
Cyanothamnus ramosus subsp. anethifolius	+	<1 %	15	CSQ01-14	Boronia ramosa
Dasypogon obliquifolius	10	5-10%	25	CSQ01-19	Dasypogon
Daviesia decurrens subsp. decurrens	+	<1 %	15	CSQ01R-10	Daviesia sdlg
Drosera drummondii	+	<1 %	20	CSQ01-07	Drosera erect climber
Drosera humilis	+	<1 %	15	CSQ01-26	Drosera stolon
Drosera magna	1	<1 %	1	CSQ01-04	Drosera erythro
Drosera minutiflora	+	<1 %	4	CSQ01-05	pygmy Drosera; also CSQ01R-11
Eremaea asterocarpa subsp. asterocarpa	3	1-5%	45	CSQ01-10	
Eremaea pauciflora var. lonchophylla	6	<1 %	80		
Gompholobium tomentosum	+	<1 %	10		
Goodenia coerulea	+	<1 %	40	CSQ01R-08	
Hibbertia aurea	0.5	<1 %	40	CSQ01-17	Hibbertia
Hibbertia hypericoides	4	1-5%	60		
Hibbertia sericosepala	+	<1 %	30	CSQ01-18	Hibbertia long
Hypocalymma xanthopetalum	+	<1 %	25	CSQ01-16	Hypocalymma xanth; also CSQ01AR-35
Hypolaena exsulca	0.3	<1 %	50	CSQ01-25	hairy culms
Isolepis marginata	+	<1 %	3		
Jacksonia hakeoides	2	1-5%	80	CSQ01-30	Jacksonia small; also CSQ01R-03
Jacksonia nutans	+	<1 %	80	CSQ01-01	Jacksonia
Lomandra caespitosa	+	<1 %	15	CSQ01R-09	lom caes
Lomandra hermaphrodita	+	<1 %	20		
Lyginia barbata	+	<1 %	70		grazed
Lyginia imberbis	+	<1 %	60		
Lysinema pentapetalum	+	<1 %	60	CSQ01-21	Lysinema (not collected)
Melaleuca clavifolia	3	1-5%	50	CSQ01-24	Melaleuca terete; also CSQ01R-06
Nuytsia floribunda	4	1-5%	400		
Patersonia occidentalis var. occidentalis	1	<1 %	50		
Petrophile linearis	1	<1 %	40		
Petrophile rigida	+	<1 %	25	CSQ01-13	Isopogon trifurcate
Phlebocarya ciliata	+	<1 %	25	CSQ01-02	Phlebocarya cil
Phlebocarya filifolia	+	<1 %	30	CSQ01-11	Phlebocarya terete
Phyllangium divergens	+	<1 %	3	(=CQ23R-01	Phyllangium paradox

Poranthera microphylla	+	<1 %	3	CSQ01-23	Poranthera microphylla
Stirlingia latifolia	1	<1 %	60		
Stylidium araeophyllum	+	<1 %	30	CSQ01-03	Stylidium 'brun'
Stylidium bicolor	+	<1 %	5	CSQ01-06	Stylidium linear flat lf termnl hair; also CSQ01R-01
Stylidium rigidulum	+	<1 %	10	CSQ01-08	Stylidium long tube
Thysanotus manglesianus	0.1	<1 %		(=CQ20R-08	Thysanotus mang/pat unequal
Thysanotus sparteus	+	<1 %	60	CSQ01-28	Thysanotus sparteus
Thysanotus thyrsoideus	+	<1 %	25		
Trachymene pilosa	+	<1 %	10		
Xanthorrhoea preissii	1	<1 %	80		
Xanthosia huegelii	+	<1 %	15		

Atlas 2020 Update — Site CSQ02

Described by CH **Date** 24/10/2019 **Type** Q 10x10
Season **Uniformity**
Location South of Wongonderrah Rd
MGA Zone 50 331010 **mE** 6616050 **mN** 115.237726 **E** -30.576022 **S**
Habitat Swale on gently undulating plain
Soil Grey sand
Rock Type na
Vegetation Adenanthos cygnorum subsp. cygnorum Isolated Tall Shrubs over Hakea prostrata Isolated shrubs over Eremaea pauciflora var. lonchophylla, Melaleuca seriata, Jacksonia hakeoides, Banksia dallanneyi subsp. dallanneyi Low Shrubland.
Veg Condition Pristine
Fire Age More than 12 years since fire.
Notes Elevation 39m. Autumn revisit; 06/06/2021; photo 107-852

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia lasiocarpa var. lasiocarpa	+	<1 %	30	CSQ02-05	Acacia lasio
Acacia sessilis	+	<1 %	20	CSQ02-07	Acacia sharp
Adenanthos cygnorum subsp. cygnorum	+	<1 %	220		
Alexgeorgea nitens	+	<1 %	15	CSQ02-16	Alexgeorgia nit
Andersonia lehmanniana subsp. lehmanniana	+	<1 %	20	CSQ02-18	Epacrid retro
Anigozanthos humilis subsp. humilis	+	<1 %	20		grazed
Austrostipa compressa	+	<1 %	25	(=CSQ01-12	Austrostypa comp
Banksia dallanneyi subsp. dallanneyi var. dallanneyi	2	1-5%	15	CSQ02-01	Banksia dall; also CSQ02AR-01
Bossiaea eriocarpa	+	<1 %	30		
Brachyscome bellidioides	+	<1 %	8	CSQ02-17	daisy egg; also CSQ02R-03
Burchardia congesta	+	<1 %	40		
Cassytha flava	+	<1 %	6	CSQ02-08	Cassytha pilosa; also CSQ02R-11
Cassytha glabella	+	<1 %	60	CSQ02R-15	cassytha glabrous
Chaetospora curvifolia	+	<1 %	20	CSQ02-13	Schoenus curv; also CSQ02R-05
Chordifex reseminans	+	<1 %	30	CSQ02-11	Loxocarya fine; also CSQ02R-12
Conostylis festucacea subsp. festucacea	+	<1 %	25	CSQ02-14	Conostylis aculeata; also CSQ02R-27
Crassula colorata var. colorata	+	<1 %	4	CSQ02R-14	Crassula
Daviesia decurrens subsp. decurrens	+	<1 %	20	CSQ02R-20	daviesia
Desmocladus virgatus	+	<1 %	20	CSQ02R-22	Desmocladus
Drosera humilis	+	<1 %	15	CSQ02R-23	Drosera hum
Drosera magna	+	<1 %	2	CSQ02R-25	Drosera eryth (dead rosette lves)
Eremaea asterocarpa subsp. asterocarpa	+	<1 %	70		
Eremaea pauciflora var. lonchophylla	40	33.3-50%	80	CSQ02R-02	Eremaea pauc
Hakea prostrata	2	1-5%	170		
Hibbertia aurea	+	<1 %	20	(=CSQ01-17	Hibbertia
Hypocalymma xanthopetalum	+	<1 %	25	(=CSQ01-16	Hypocalymma xanth
Hypochaeris glabra	+	<1 %	15		
Hypolaena exsulca	+	<1 %	40	CSQ02-06	Hypolaena tassel
Isolepis marginata	+	<1 %	4	CSQ02R-01	
Jacksonia hakeoides	3	1-5%	40	CSQ02R-21	Jacksonia hak
Jacksonia nutans	+	<1 %	60	CSQ02-10	Jacksonia trident2; also CSQ02R-26
Lechenaultia floribunda	+	<1 %	25	CSQ02-12	Lechenaultia flor
Lepidosperma calcicola	+	<1 %	40	CSQ02R-10	Lepidosperma
Leucopogon sp. Yanchep (M. Hislop 1986)	+	<1 %	35	CSQ02R-16	Leucopogon sp Yan
Leucopogon sprengelioides	+	<1 %	30	CSQ02-19	Myrt flat wide; also CSQ02R-19

Lomandra hermaphrodita	+	<1 %	10		
Lyginia barbata	+	<1 %	50		
Lysinema pentapetalum	+	<1 %	100	CSQ02-03	Lysinema
Melaleuca clavifolia	1	<1 %	60	(=CSQ1-24	Melaleuca linear
Melaleuca seriata	20	10-25%	100	CSQ02-04	Melaleuca seriata; also CSQ02R-13
Petrophile rigida	+	<1 %	90	(=CSQ01-13	Isopogon trident
Philotheca spicata	+	<1 %	45	CSQ02R-07	Phylotheca spic
Pimelea sulphurea	+	<1 %	15	CSQ02-02	Pimelea short
Podotheca gnaphalioides	+	<1 %	20	CSQ02R-06	Podotheca gnaph
Pyrorchis nigricans	+	<1 %	2		Pyrrhochus nig
Schoenus ? curvifolius	+		30	CSQ02AR-X1	AUT21 ?Schoenus curvifolius
Schoenus brevisetis	+	<1 %	30	CSQ02R-17	Schoenus shiny culms
Schoenus griffinianus	+	<1 %	10	CSQ02R-04	herb
Schoenus laevigatus	+	<1 %	60	CSQ02R-18	Restio shinylght brwn culms
Stylidium araeophyllum	+	<1 %	3	CSQ02R-24	Stylid aerophyl, roserre only
Stylidium cygnorum	+	<1 %	10	CSQ02-15	Stylid stiff
Stylidium rigidulum	+	<1 %	5	CSQ02R-09	Stylid pk linear terete basal rosette ?S rigid
Thysanotus thyrsoideus	+	<1 %	30	CSQ02-09	thysanotus onion
Trachymene pilosa	+	<1 %	5		
Xanthorrhoea preissii	+	<1 %	50		
Xanthosia huegelii	+	<1 %	12	CSQ02R-08	Xanthosia lves in 3s

Atlas 2020 Update — Site CSQ03

Described by BRM **Date** 24/10/2019 **Type** Q 10x10
Season **Uniformity**
Location South of Wongonderrah Rd
MGA Zone 50 330868 **mE** 6616308 **mN** 115.236288 **E** -30.573675 **S**
Habitat Very shallow swale on gently undulating plain.
Soil Grey sand
Rock Type na
Vegetation Banksia attenuata Low Isolated Trees to Low Open Wlldland over Adenanthos cygnorum subsp. cygnorum Isolated Tall Isolated Shrubs over Melaleuca seriata Open Shbld over Eremaea pauciflora var. lonchophylla, Jacksonia nutans, Hibbertia hypericoides, Jacksonia hakeoides, Bossiaea eriocarpa Low Open Shrubland over Dasypogon obliquifolius, Blancoa canescens Sparse Low Herbland.
Veg Condition Excellent
Fire Age More than 12 years since fire.
Notes Quadt in more open area surrounded by Banksia Low Woodland.
Elevation 47m. Autumn revisit; 06/06/2021; photo 107-851.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia sessilis	0.5	<1 %	40	CSQ03-01	Acacia ?sessilis
Adenanthos cygnorum subsp. cygnorum	1.5	1-5%	200		o/hng
Alexgeorgea nitens	+	<1 %	20	CSQ03-14	Alexgeorgia; also CSQ03AR-01
Anigozanthos humilis subsp. humilis	+	<1 %	15		Anigozanthos hum hum; grazed
Austrostipa compressa	+	<1 %	20	(=CSQ01-12	Austrostipa compressa
Banksia attenuata	4	1-5%	350		
Blancoa canescens	0.5	<1 %	20	CSQ03-27	Blanchoa
Bossiaea eriocarpa	1	<1 %	25		
Brachyscome bellidioides	2	1-5%	10	CSQ03-04	?Brachyscome
Calandrinia corrigioloides	+	<1 %	3	CSQ03-05	Calandrinia
Centrolepis drummondiana	+	<1 %	3	CSQ03R-01	Centrolepis drum
Chaetospora curvifolia	+	<1 %	30	(=CSQ01-)	
Chordifex sinuosus	+	<1 %	40	CSQ03R-10	?Hypolaena exsulca
Conostephium pendulum	+	<1 %	50	CSQ03-12	Conostephium
Conostylis juncea	+	<1 %	40	CSQ03-25	Pat occ
Conostylis teretifolia subsp. teretifolia	+	<1 %	10	CSQ03R-06	Conostylis setig
Crassula colorata var. acuminata	+	<1 %	5	CSQ03R-03	Crassula col
Dasypogon obliquifolius	7	5-10%	40	(=CSQ01-)	
Daviesia podophylla	0.5	<1 %	45	CSQ03-19	Daviesia glauc wide lf
Drosera drummondii	+	<1 %	35	CSQ03-13	Drosera climber; also CSQ03R-04
Drosera humilis	+	<1 %	10	CSQ03R-12	Drosera bushy
Drosera magna	+	<1 %	2	(=CSQ01-)	Dros eryth; dead rosette lvs;
Drosera minutiflora	+	<1 %	3	(=CSQ01-05	Drosera pygmy

Eremaea asterocarpa subsp. asterocarpa	+	<1 %	40	(=CSQ01-)	Eremaea astro
Eremaea pauciflora var. lonchophylla	7	5-10%	45		
Haemodorum spicatum	+	<1 %	60	CSQ03R-09	Haemodorum spic
Hibbertia aurea	+	<1 %	20	(=CSQ01-)	Hibbertia glauc sht lf
Hibbertia hypericoides	1.5	1-5%	50		
Hypocalymma xanthopetalum	+	<1 %	40		
Isolepis marginata	0.3	<1 %	3	CSQ03R-02	Isolepis marg
Jacksonia floribunda	+	<1 %		CSQ03R-16	Jacksonia dens
Jacksonia hakeoides	1.5	1-5%	40	CSQ03-18	Jacksonia sht lf
Jacksonia nutans	5	5-10%	70	CSQ03-09	Jacksonia longer lvs
Lepidosperma calcicola	+	<1 %	30	CSQ03-08	Lepidosperma pubi
Lolium perenne x rigidum	+	<1 %	40	CSQ03-11	Lolium rye grass
Lomandra hermaphrodita	+	<1 %	20		
Lyginia imberbis	+	<1 %	40		Lyginea imberbis tussocky; grazed
Macarthuria apetala	+	<1 %	10	CSQ03R-08	Macarthuria apet
Melaleuca seriata	20	10-25%	80-130	CSQ03-29	Melaleuca sht pk flat
Mesomelaena pseudostygia	+	<1 %	40		also CSQ03-16
Petrophile linearis	0.5	<1 %	40		
Philotheca spicata	0.2	<1 %	45		Philotheca spicata
Phlebocarya filifolia	+	<1 %	40	(=CSQ01-)	Phlebocarya terete
Pimelea sulphurea	+	<1 %	20	CSQ03R-07	Pimelea sulph
Podotheca angustifolia	+	<1 %	10	CSQ03R-15	Podotheca angust
Podotheca gnaphalioides	+	<1 %	15	CSQ03-24	
Poranthera microphylla	+	<1 %	4	CSQ03-20	Crassula glom
Rytidosperma occidentale	+	<1 %	30	CSQ03-07	Rytidosperma hry lvs; also CSQ03R-13; 14
Schoenus clandestinus	+	<1 %	3	CSQ03-06	Schoenus cland
Stirlingia latifolia	1	<1 %	45		
Stylidium araeophyllum	+	<1 %	2	(=CSQ01-)	Stylid brun
Stylidium crossocephalum	+	<1 %	30	CSQ03-15	Stylid wte, grey lin rosette, hry tips
Stylidium kalbarriense	+	<1 %	5	CSQ03-28	Stylid long ?tubes
Styphelia conostephioides	+	<1 %	40	CSQ03R-11	Leucopogon spiny
Thysanotus thyrsoideus	+	<1 %	50	CSQ03-17	Thysanotus single terete lf
Trachymene pilosa	1	<1 %	10	CSQ03-02	
Tricoryne sp. Eneabba (E.A. Griffin 1200)	+	<1 %	15	CSQ03-22	Tricoryne hum
Triglochin nana	+	<1 %	10	CSQ03R-05	Trig fine
Ursinia anthemoides subsp. anthemoides	+	<1 %	20		
Vulpia myuros forma myuros	+	<1 %	20	CSQ03-21	Vulpia
Wahlenbergia capensis	+	<1 %	30		wahl cap
Xanthosia huegelii	+	<1 %	10	CSQ03-26	Xanthosia; also CSQ3-23

Atlas 2020 Update — Site CSQ04

Described by CH **Date** 25/10/2019 **Type** Q 10x10
Season **Uniformity**
Location Wongonderrah Rd south
MGA Zone 50 332716 **mE** 6616704 **mN** 115.255616 **E** -30.570362 **S**
Habitat Dampland flat on plain
Soil Brown sand
Rock Type na
Vegetation Allocasuarina lehmanniana subsp. lehmanniana, Xanthorrhoea preissii Tall Sparse Shrubland over Melaleuca rhaphiophylla, Hakea trifurcata, Banksia telmatiaea, Isopogon panduratus subsp. palustris Open to Closed Shrubland over Jacksonia hakeoides, Acacia pulchella var. glaberrima, Banksia dallanneyi subsp. dallanneyi Low Sparse Shrubland over Lepidosperma longitudinale, Schoenus subfascicularis Sparse Sedgeland.
Veg Condition Very Good. A few dead shrubs, some annual weeds.
Fire Age More than 12 years since fire.
Notes A few dead Hakea trifurcata and Melaleuca's (died within last 12 mnths). 2020- a recently dead B prionotes in surrounds. Autumn revisit; 06/06/2021; photo 107-856.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia pulchella var. glaberrima	1	<1 %	40		Acacia pulchella
Acacia stenoptera	+	<1 %	40		
Adenanthos cygnorum subsp. cygnorum	+	<1 %	5		juv

Aira cupaniana	+	<1 %	10	CSQ04-13	Aira cup
Allocasuarina lehmanniana subsp. lehmanniana	2	1-5%	250	CSQ04-01	Allocasuarina swamp
Asteridea pulverulenta	+	<1 %	20	CSQ04-06	daisy wide
Austrostipa compressa	+	<1 %	20		
Banksia dallanneyi subsp. dallanneyi var. dallanneyi	1	<1 %	15	(=CSQ02-)	Banksia dal
Banksia telmatiaea	25	25-33.3%	150	CSQ04-03	Banksia tel
Caladenia discoidea	+	<1 %	10	CSQ04R-04	Caladenia flava
Caladenia sp.	+	<1 %	25	CSQ04R-01	orchid long leaf
Calandrinia corrigioloides	+	<1 %	4	CSQ04R-05	Calandrinia
Calandrinia granulifera	+	<1 %	4	CSQ04R-11	Calandrinia black shiny frts
Conostylis festucacea subsp. festucacea	+	<1 %	25	CSQ04-10	Conostylis long damp
Crassula colorata var. acuminata	+	<1 %	5	CSQ04R-06	Cras col
Daucus glochidiatus	+	<1 %	10		
Drosera magna	+	<1 %	1	CSQ04R-02	Drosera eryth
Gompholobium tomentosum	+	<1 %	130	CSQ04-09	Gom tom tall
Hakea obliqua subsp. parviflora	+	<1 %	150	CSQ04-15	Hakea needles
Hakea trifurcata	4	1-5%	170		some dead
Heliophila pusilla	+	<1 %	5	CSQ04-14	Little Brassica
Hibbertia aurea	+	<1 %	20	(=CSQ01-17	Hibbertia ??closed
Hibbertia subvaginata	1	<1 %	70	CSQ04-04	
Hypochaeris glabra	+	<1 %	10		
Isolepis marginata	+	<1 %	8	CSQ04R-03	Isolepis marg
Isopogon panduratus subsp. palustris	2	1-5%	150		some dead
Jacksonia hakeoides	2	1-5%	60	(=	Jacksonia trident
Jacksonia nutans	+	<1 %	35		Jacksonia nutans
Lechenaultia floribunda	+	<1 %	10	(=CSQ2-12	Lechenaultia flo
Lepidosperma longitudinale	2	1-5%	60		
Lysimachia arvensis	+	<1 %	5		
Melaleuca rhaphiophylla	40	33.3-50%	180	CSQ04-02	Melaleuca uprgt; some dead
Melaleuca seriata	+	<1 %	60	(=CSQ02-04	Melaleuca seriata
Millotia tenuifolia var. tenuifolia	+	<1 %	10-15	CSQ04R-07	Millotia; also CSQ04-
Opercularia vaginata	+	<1 %	25		
Ornithopus compressus	+	<1 %	15	CSQ04R-13	Ornithopsis
Phyllanthus calycinus	+	<1 %	15	CSQ04-16	Phyllanthus
Podotheca angustifolia	+	<1 %	5	CSQ04-12	Podotheca
Pterostylis orbiculata	+		15	CSQ04AR-01	AUT21 Pterostylis
Pyrorchis nigricans	+	<1 %	3		Pyrorchus orchis
Rytidosperma occidentale	+	<1 %	15	CSQ04-05	Danthonia damp
Schoenus clandestinus	+	<1 %	5	CSQ04R-08	Schoenus clandest
Schoenus subfascicularis	1	<1 %	40	CSQ04-08	Schoenus sibfascic
Senecio glossanthus	+	<1 %	30	CSQ04R-15	Senecio
Stylidium rigidulum	+	<1 %	12	CSQ04R-12	Stylid
Trachymene pilosa	+	<1 %	10		
Ursinia anthemoides subsp. anthemoides	+	<1 %	15		
Vulpia myuros forma myuros	+	<1 %	25	CSQ04R-10	Vulpia myuros
Wahlenbergia capensis	+	<1 %	10	CSQ04-11	Wahlenbergia thin
Wahlenbergia preissii	+	<1 %	15	CSQ04R-14	Wahlenbergia preis
Xanthorrhoea preissii	2	1-5%	230		
Xanthosia huegelii	+	<1 %	15	CSQ04-07	Xanthosia damp

Atlas 2020 Update — Site CSQ05

Described by BRM **Date** 25/10/2019 **Type** Q 10x10

Season **Uniformity**

Location Wongonderah Rd south

MGA Zone 50 332691 **mE** 6616403 **mN** 115.255306 **E** -30.573074 **S**

Habitat Flat plain

Soil Grey sand

Rock Type na

Vegetation Banksia attenuata, Banksia menziesii, Eucalyptus todtiana Low Woodland over Adenanthos cygnorum subsp. cygnorum Tall Sparse Shrubland over Xanthorrhoea preissii Isolated Shrubs over Melaleuca clavifolia, Jacksonia nutans, Eremaea asterocarpa subsp. asterocarpa, Jacksonia hakeoides, Bossiaea eriocarpa, Eremaea pauciflora var. lonchophyllaa Low Open Shrubland to Low Shrubland over Patersonia occidentalis var. occidentalis, Blancoa canescens, Dasypogon obliquifolius Low Open Herbland.

Veg Condition Excellent

Fire Age More than 12 years since fire

Notes B attenuata : some yellowing lvs; Appears to be dieback in the area.
2020: no micro-herb layer as elsewhere. Autumn revisit: 06/06/2021; photo 107-853, 854.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Adenanthos cygnorum subsp. cygnorum	2	1-5%	300		1 dead
Alexgeorgea nitens	+	<1 %	15		
Amphipogon turbinatus	+	<1 %	15	CSQ05-09	Amphipogon turbinatus
Anigozanthos humilis subsp. humilis	+	<1 %	15		
Austrostipa compressa	+	<1 %	25		
Banksia attenuata	15	10-25%	400		
Banksia ilicifolia	+	<1 %	40	CSQ05R-03	Banksia illic
Banksia menziesii	3	1-5%	300		
Blancoa canescens	1	<1 %	25	CSQ05-12	Blancoa
Bossiaea eriocarpa	5	5-10%	40		
Burchardia congesta	+	<1 %	50		
Calytrix flavescens	0.2	<1 %	12		
Calytrix fraseri	+	<1 %	30-50	CSQ05-10	?Cal fras
Centrolepis drummondiana	+	<1 %	8	(=CSQ3R-01	Centrolepis drum
Conostylis aculeata subsp. breviflora	+	<1 %	12	CSQ05-17	Conostylis ?setiger; grazed
Conostylis juncea	+	<1 %	25	CSQ05-16	?Conostylis juncea
Conostylis teretifolia subsp. teretifolia	+	<1 %	10	(=CSQ3R-06	Conostylis setig
Cyanothamnus ramosus subsp. anethifolius	0.3	<1 %	40	CSQ05-07	Boronia rac
Dasypogon obliquifolius	0.2	<1 %	30		
Drosera closterostigma	+	<1 %	10	CSQ05R-01	Drosera pygmy
Drosera drummondii	+	<1 %	30	CSQ05-05	Drosera erect climber
Drosera magna	+	<1 %	2	(=CSQ01-	Drosera eryth; dead lvs
Drosera minutiflora	+	<1 %	3	(=CSQ01-	Drosera pygmy
Eremaea asterocarpa subsp. asterocarpa	5	5-10%	70	(=CSQ01-)	
Eremaea pauciflora var. lonchophylla	2.5	1-5%	60		
Eucalyptus todtiana	4	1-5%	500		scattered in general
Gompholobium tomentosum	+	<1 %	5		
Hibbertia aurea	+	<1 %	20	CSQ05-20	Hibbertia glauc
Hibbertia sericosepala	+	<1 %	30	(=CAB09)	Hibbertia sp Gnang
Hibbertia subvaginata	+	<1 %	20		Hibbertia subvaginata
Hypocalymma xanthopetalum	+	<1 %	20-30		
Isolepis marginata	+	<1 %	5	(=CSQ3R-02	
Jacksonia hakeoides	5	5-10%	45	(=CSQ03-18	Jacksonia sht lvs
Jacksonia nutans	6	<1 %	70	(=CSQ03-09	Jacksonia long lf
Lepidosperma calcicola	+	<1 %	20	CSQ05-19	Lepidosperma flat
Lomandra caespitosa	+	<1 %	30	CSQ05-14	Lomandra caes
Lomandra hermaphrodita	+	<1 %	15		
Lyginia barbata	+	<1 %	50		
Melaleuca clavifolia	6	<1 %	50-70	CSQ05-03	Melaleuca terete; also CSQ05R-05
Patersonia occidentalis var. occidentalis	3	1-5%	45	CSQ05-01	
Petrophile linearis	+	<1 %	40		
Petrophile rigida	0.5	<1 %	40	CSQ05-11	Petrophile tri
Phlebocarya ciliata	+	<1 %	30	(=CSQ01-)	
Poranthera microphylla	+	<1 %	3	CSQ05-06	?Poranthera
Stirlingia latifolia	1	<1 %	45		
Stylidium araeophyllum	+	<1 %	50	CSQ05R-04	Stylid 'brun'
Stylidium bicolor	+	<1 %		CSQ05-X1	
Stylidium rigidulum	+	<1 %	10	(=CAB08)	Stylid
Styphelia conostephioides	0.5	<1 %	12	CSQ05-15	?Leucopogon conostephioides
Styphelia xerophylla	+	<1 %	70	CSQ05R-02	Astr lge wte
Thysanotus sparteus	+	<1 %	70	CSQ05-13	Thysanotus sparteus
Thysanotus thyrsoideus	+	<1 %	45	CSQ05-18	Thysanotus tube leaf
Trachymene pilosa	+	<1 %	10		
Xanthorrhoea preissii	1	<1 %	110		
Xanthosia huegelii	+	<1 %	15	CSQ05-04	Xanthosia

Atlas 2020 Update

Site CSQ06

Described by CH **Date** 26/10/2019 **Type** Q 10x10

Season **Uniformity**

Location Wongonderrah Rd south

MGA Zone 50 332182 **mE** 6616445 **mN** 115.250007 **E** -30.572624 **S**
Habitat Small dampland area on plain
Soil Grey sand
Rock Type na
Vegetation Banksia attenuata Low Sparse Woodland over Hakea trifurcata, Banksia telmatiaea Shrubland over Melaleuca seriata, Stirlingia latifolia, Banksia dallanneyi subsp. dallanneyi Low Sparse Shrubland over Conostylis festucacea subsp. festucacea Low Sparse Herbland.
Veg Condition Good to Very Good
Fire Age More than 12 years since fire.
Notes Veg is somewhat mixed - small habitat area and qdt not centred in veg type
Autumn revisit; 06/06/3031; photo n/a.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Aira cupaniana	+	<1 %	15	CSQ06R-17	Pent sp
Anigozanthos pulcherrimus	+	<1 %	20	CSQ06R-11	Anigozanthos; also CSQ06AR-04
Banksia attenuata	8	<1 %	240		
Banksia dallanneyi subsp. dallanneyi var. dallanneyi	2	1-5%	15	(=CSQ2-)	Banksia dall; also CSQ06AR-03
Banksia menziesii	1	<1 %	170		
Banksia telmatiaea	25	25-33.3%	200	CSQ06R-01	Banksia tel - looks a bit dift
Caladenia flava subsp. flava	+	<1 %	10	CSQ06R-10	orchid
Calandrinia corrigioloides	0.5	<1 %	6	CSQ06-04	?Calandrin narrow
Carpobrotus virescens	+	<1 %	10		
Cassytha glabella	+	<1 %		CSQ06R-16	Cassytha glabrous
Centrolepis drummondiana	+	<1 %	3	CSQ06R-21	Centrolepis
Chordifex reseminans	+	<1 %	30	CSQ06R-15	Restio fine
Conostylis festucacea subsp. festucacea	3	1-5%	15	CSQ06-05	Conostylis stolon; also CSQ06AR-02
Crassula colorata var. acuminata	2	1-5%	2	CSQ06-08	Crassula col
Crassula decumbens var. decumbens	+	<1 %	3	CSQ06R-06	Crassula
Cyanothamnus ramosus subsp. anethifolius	+	<1 %	15		seedlg
Daucus glochidiatus	1.5	1-5%	5		
Ehrharta brevifolia var. cuspidata	+	<1 %	30	CSQ06R-09	Ehrh brev
Euchiton sphaericus	+	<1 %	5	CSQ06-03	Pseudonaphalium
Gompholobium tomentosum	0.5	<1 %	70		
Hainardia cylindrica	0.2	<1 %	3	CSQ06R-07	grass prostrate
Hakea trifurcata	30	25-33.3%	180		
Hibbertia subvaginata	+	<1 %	25	(CSQ4-)	
Hypochaeris glabra	+	<1 %	10		
Isolepis cernua var. setiformis	+	<1 %	5	CSQ06R-20	Cyperaceae
Isolepis marginata	+	<1 %	5		
Jacksonia hakeoides	3	1-5%	70	CSQ06R-19	Jacksonia hak
Lechenaultia floribunda	0.2	<1 %	30	CSQ06R-05	Lech flor
Lepidosperma longitudinale	+	<1 %	40		
Melaleuca seriata	1	<1 %	60	CSQ06R-02	Mel seriata
Microlaena stipoides var. stipoides	+	<1 %	30	CSQ06R-13	Microlaena stip
Olearia axillaris	0.5	<1 %	230	CSQ06R-12	Olearia axil
Opercularia vaginata	+	<1 %	20		
Petrophile linearis	0.5	<1 %	40		
Pimelea sulphurea	+	<1 %	30	CSQ06R-18	Pimelea regrth
Podotheca angustifolia	+	<1 %	7	(=CSQ3R-15	Podotheca angustifolia
Pterostylis orbiculata	+		15	CSQ06AR-05	AUT21 Pterostylis ?sang
Pyrorchis nigricans	+		1		AUT21 Pyrorchis
Rytidosperma occidentale	+	<1 %	30	CSQ06R-14	Rytidosperma
Senecio pinnatifolius var. latilobus	1	<1 %	40	CSQ06-09	Senecio; also CSQ06R-
Sonchus oleraceus	+	<1 %	5		
Stirlingia latifolia	1.5	1-5%	90	CSQ06R-03	Stirlingia lat nrw
Stylidium repens	+	<1 %	8	CSQ06-01	Stylid stolon; also CSQ06AR-01
Styphelia xerophylla	+	<1 %	25	CSQ06-02	Styphelia
Trachymene pilosa	10	5-10%	7		
Triglochin sp. A Flora of Australia (G.J. Keighery 2477)	0.7	<1 %	3	CSQ06R-08	Centrolepis
Ursinia anthemoides subsp. anthemoides	+	<1 %	10		
Vulpia myuros forma myuros	+	<1 %	20	CSQ06R-22	Vulpia sp
Wahlenbergia capensis	+	<1 %	8	CSQ06-07	Wahlenbergia hry

Atlas 2020 Update **Site** CSQ07

Described by BRM **Date** 25/10/2019 **Type** Q 10x10

Season **Uniformity**

Location Wongonderrah Rd south

MGA Zone 50 332504 **mE** 6615948 **mN** 115.253284 **E** -30.577152 **S**

Habitat Broad, very low rise on plain

Soil Grey sand

Rock Type na

Vegetation Banksia attenuata, Banksia menziesii Low Woodland over Jacksonia nutans,Sparse Shrubland over Melaleuca clavifolia, Jacksonia hakeoides, Eremaea asterocarpa subsp. asterocarpa, Eremaea pauciflora var. lonchophylla, Stirlingia latifolia Low Shrubland over Patersonia occidentalis var. occidentalis, Blancoa canescens Low Sparse Herbland.

Veg Condition Excellent to Pristine

Fire Age More than 12 years since fire

Notes A few Banksia deaths and yellowing of leaves on numerous trees. ?dieback. 1 old, fallen dead Banksia in qdt (no lvs).
Eucalyptus todtiana scattered in surrounds. Hibbertia hypericoides present in surrounding bush.
Autumn revisit; 06/06/2021; photo 107-855.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Alexgeorgea nitens	+	<1 %	20	CSQ07-12	Restio
Amphipogon turbinatus	+	<1 %	12	(=CSQ05-09	Amphipogon ?turb
Austrostipa compressa	+	<1 %	20		
Banksia attenuata	15	10-25%	500		
Banksia dallanneyi subsp. dallanneyi var. dallanneyi	+	<1 %	20		
Banksia menziesii	3	1-5%	210		
Blancoa canescens	0.5	<1 %	20		Blanchoa
Bossiaea eriocarpa	0.2	<1 %	30		
Calytrix flavescens	+	<1 %	30		
Calytrix fraseri	0.2	<1 %	(12)70	(=CSQ05-10	?Calytrix fraseri
Cassytha glabella	+	<1 %	50	CSQ07R-02	Cassytha glab
Cassytha racemosa forma racemosa	+	<1 %	70	CSQ07-08	Cassytha glab
Chaetospora curvifolia	+	<1 %	30	CSQ07-09	Schoenus curv
Conostephium pendulum	+	<1 %	45	CSQ07-01	Conostephium
Conostylis juncea	+	<1 %	30	CSQ07R-07	?Conostylis
Cyanothamnus ramosus subsp. anethifolius	+	<1 %	20	(=CSQ05-07	Boronia rac
Dasypogon obliquifolius	+	<1 %	15		
Drosera drummondii	+	<1 %	30	CSQ07R-08	Drosera drum
Drosera magna	+	<1 %	2	(=CSQ01-)	Drosera eryth; dead lvs only; 2020 big lf
Drosera minutiflora	+	<1 %	5	(=CSQ01-)	Drosera pyg
Eremaea asterocarpa subsp. asterocarpa	4	1-5%	70		
Eremaea pauciflora var. lonchophylla	4	1-5%	60		
Gompholobium tomentosum	+	<1 %	20		
Hibbertia aurea	0.3	<1 %	30	(=CSQ05-)	Hibbertia glauc; also CSQ01AR-01
Hibbertia sericosepala	+	<1 %	30	(=CSQ01-)	Hib sp gnag
Hibbertia subvaginata	+	<1 %	35		
Hypocalymma xanthopetalum	+	<1 %	60	CSQ07-05	Hypocalymma xanth
Jacksonia hakeoides	5	5-10%	70	(=CSQ05-)	Jacksonia sht lf
Jacksonia nutans	5	5-10%	140	(=CSQ03-)	Jacksonia long
Lomandra caespitosa	+	<1 %	30	CSQ07-10	Lomandra caes
Lomandra hermaphrodita	+	<1 %	20	CSQ07R-03	Lomandra herm
Lomandra preissii	+	<1 %	40	CSQ07R-04	Lom preis
Lyginia imberbis	+	<1 %	50		sterile
Macarthuria apetala	+	<1 %	30	CSQ07-13	Odd herb Platysace
Melaleuca clavifolia	18	<1 %	70-90	CSQ07-02	Melaleuca terete (??M systena)
Nuytsia floribunda	+	<1 %	90		juv
Patersonia occidentalis var. occidentalis	0.5	<1 %	40		Patersonia occ
Persoonia comata	+	<1 %	40	CSQ07-14	Conospermum
Petrophile linearis	+	<1 %	30		
Petrophile rigida	2	1-5%	80	CSQ07-04	Petroph trilobe
Philotheca spicata	0.5	<1 %	50		
Phlebocarya ciliata	+	<1 %	35	CSQ07-06	Phlebocarya cil
Podotheca angustifolia	+	<1 %	10		
Schoenus griffinianus	+	<1 %	2	CSQ07R-06	herb ?Hensmania
Stirlingia latifolia	2	1-5%	20		nrw leaf form
Stylidium araeophyllum	+	<1 %	50	CSQ07R-05	Stylid aero

Stylidium bicolor	+	<1 %	1	CSQ07R-09	Stylid lf tip hrs basal rosette
Stylidium repens	+	<1 %	5	CSQ07-03	Stylid repens
Stylidium rigidulum	+	<1 %	20	CSQ07-11	Stylidium long tube; also CSQ07R-01
Styphelia conostephioides	0.5	<1 %	30-40	(=CSQ05-15	Leuc conostephioides
Thysanotus thyrsoideus	+	<1 %	30	CSQ07-07	Thysanotus single tube
Xanthosia huegelii	+	<1 %	10	(=CSQ05-)	Xanthosia

Atlas 2020 Update — Site CSQ08

Described by BRM **Date** 10/10/2020 **Type** Q 10x10
Season E **Uniformity**
Location South of Wongonderrah Rd
MGA Zone 50 331219 **mE** 6616428 **mN** 115.239967 **E** -30.572642 **S**
Habitat Plain
Soil Grey-brown sand
Rock Type na
Vegetation Banksia attenuata, Banksia menziesii Low Woodland over Xanthorrhoea preissii, Jacksonia floribunda Sparse Shrubland over Hibbertia hypericoides, Melaleuca clavifolia, Eremaea pauciflora var. lonchophylla, Jacksonia nutans, Bossiaea eriocarpa Low Shrubland over Patersonia occidentalis var. occidentalis, Dasypogon obliquifolius Low Sparse Herbland.
Veg Condition Excellent
Fire Age More than 12 yrs since fire
Notes Euc tod scattered in area; some Banksia ilicifolia in area. Autumn revisit; 07/06/2021; photo 107-849.

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Alexgeorgea nitens	+		10		
Amphipogon turbinatus	+		25	CSQ08-02	?Amphipogon with rhizome
Anigozanthos humilis subsp. humilis	+		30		grazed
Austrostipa compressa	+		20		
Banksia attenuata	9		350		
Banksia menziesii	15		400		
Blancoa canescens	+		20		
Bossiaea eriocarpa	1		30		
Caladenia sp.	+		15	CSQ08-20	orchid
Calytrix flavescens	+		20		
Chaetospora curvifolia	+		40		
Conostephium pendulum	+		80		pointy lf tips
Conostylis teretifolia subsp. teretifolia	+		15	(=	Conostylis long white hairs, sterile
Crassula colorata var. colorata	+		3	CSQ08-15	Crassula col
Dasypogon obliquifolius	5		50		
Drosera drummondii	+		35	CSQ08-04	Drosera ?menz
Drosera humilis	+		15		
Drosera magna	+		1	CSQ08-13	Drosera eryth; 4 lge rosette lves
Drosera minutiflora	+		3	CSQ08-14	Drosera pyg; also CSQ08-26
Eremaea asterocarpa subsp. asterocarpa	+		60		
Eremaea pauciflora var. lonchophylla	5		80		
Hibbertia aurea	+		30		
Hibbertia hypericoides	11		70		
Hypocalymma xanthopetalum	+		25		
Isolepis marginata	+		4	(=CSQ4R-	Isolepis marg
Jacksonia floribunda	5		120		
Jacksonia hakeoides	+		70		
Jacksonia nutans	2		70		
Lepidosperma calcicola	+		25	CSQ08-01	
Lomandra caespitosa	+		25	CSQ08-27	Lom caes
Lomandra hermaphrodita	+		20	CSQ08-16	Lom herm
Lomandra preissii	+		50	CSQ08-18	Lom preis
Lyginia barbata	+		50	CSQ08-17	Lyginea barb
Melaleuca clavifolia	5		40-50	CSQ08-09	Melaleuca ?sys; also CSQ08-25
Melaleuca seriata	+		130	CSQ08-21	melaleuca seriata
Mesomelaena pseudostygia	+		60		
Opercularia vaginata	+		30		
Patersonia occidentalis var. occidentalis	1		70		
Petrophile linearis	+		30		
Petrophile rigida	+		45	CSQ08-05	Petroph ?rig

Phlebocarya ciliata	+	70		
Phyllangium divergens	+	6	CSQ08-03	Phyllangium
Pimelea sulphurea	+	25-70	CSQ08-08	Pimelea ?sulpf; also CSQ08-22B
Platysace xerophila	+	45	CSQ08-28	?Platysace
Podotheca gnaphalioides	+	15	CSQ08-22	
Poranthera microphylla	+	3	CSQ08-10	Levenhook puscilla
Pyrorchis nigricans	+	3		
Rytidosperma occidentale	+	40		Rytidosperma occ; in bud
Schoenus griffinianus	+	4	CSQ08-06	?Shcoenus cland
Stirlingia latifolia	1	40	CSQ08-19	Stirlingia lat nrw lf
Stylidium araeophyllum	+	45	CSQ08-12	Stylid aero
Stylidium kalbarriense	+	20	CSQ08-07	Stylid pale apricot; also CSQ08-29
Thysanotus arenarius	+	40	CSQ08-11	Tricoryne/Arnocrinum
Thysanotus thyrsoideus	+	30		single tub lf
Trachymene pilosa	+	10		
Xanthorrhoea preissii	1	110		

APPENDIX NINE. Releve and mapping note descriptions and species lists for the Atlas survey area

Note: these site descriptions do not have a complete species list, but list representative species under 'Associated species'.

RELEVES

(i) Releves initially recorded Spring 2011

Atlas - **Site** CBR2
Described by BM **Date** 30/10/2011; some observations 6/11/2020
Photo: BM100:17-19
AMG: Zone50 332286mE, 6618790mN (WGS84)
Habitat: Low lying flat flood banks of narrow, shallow flow area
Soil: Pale brown sand (saturated)
Rock Type: na
Vegetation: *Melaleuca viminea* subsp. *viminea* (50%), (*Callitris pyramidalis*2-3%) Tall Shrubland over *Melaleuca brevifolia* Isolated Clumps of Shrubs over **Lotus subbiflorus*, **Juncus bufonius*, *Centrolepis polygyna*, **Monopsis debilis*, **Cotula coronopifolia*, **Crassula glomerata*, *Crassula decumbens* var. *decumbens* Herbland/Rushland.
Assoc. species: *Tecticornia indica* subsp. *bidens*, *Gahnia trifida*, *Goodenia trinervis*, **Lythrum hyssopifolia*, *Eryngium pinnatifidum subsp. Palustre (G. J. Keighery 13459)*, *Samolus junceus*.
Veg Condition: Good to Degraded (2020)
Fire Age: (2020) Greater than 12 years since fire.

Atlas - **Site** CBR4
Described by BM **Date** 2/11/2011; some observations 5/11/2020
Photo: BM100
AMG: Zone50 331937mE, 6620190mN (WGS84)
Habitat: Flood plain
Soil: Grey-brown loamy sand (surface).
Rock Type: na
Vegetation: *Tecticornia indica* subsp. *bidens* Open Low Samphire Shrubland over *Angianthus micropodioides*, **Cotula coronopifolia*, **Juncus bufonius*, *Isolepis cernua* var. *setiformis*, **Monopsis debilis*, **Polypogon monspeliensis* Open Herbland/Sedgeland/Rushland.
Assoc. species: *Verticordia plumosa* var. *brachyphylla*, **Hypochaeris glabra*, **Ehrharta longiflora*, **Lolium perenne* x *rigidum*, *Eryngium pinnatifidum subsp. Palustre (G. J. Keighery 13459)*, **Briza minor*, *Lawrencia squamata*, *Samolus repens* var. *paucifolius*, *Tecticornia halocnemoides*.
Veg Condition: 2019: Mostly G, VG in a few patches where less weeds. 2020: General area around site has condition Good to Degraded - has high weed cover.
Fire Age: (2020) Greater than 12 years since last fire (2020).

Atlas - **Site** CBR5
Described by BM **Date** 15/11/2011
AMG: **Zone**50 332713mE, 6617007mN (WGS84)
Habitat: Broad plain
Soil: Grey sand
Rock Type: na
Vegetation: *Banksia attenuata*, *Banksia menziesii*, *Eucalyptus todtiana* Low Woodland to Low Open Forest over *Adenanthos cygnorum* subsp. *cygnorum* High Open Shrubland to High Open Shrubland over *Hibbertia hypericoides* Low Open Shrubland.
Assoc. species: *Burchardia congesta*, *Dasypogon obliquifolius*, *Trachymene pilosa*, *Stirlingia latifolia*, *Bossiaea eriocarpa*, *Patersonia occidentalis* var. *occidentalis*.
Veg Condition: Excellent (very low weed cover)
Fire Age: (2020) Greater than 15 years since last fire.
Notes: NB Very close to the eastern boundary fire break.

Atlas - **Site** CBR6
Described by BM **Date** 16/11/2011
Photo: BM100:11, 12
AMG: **Zone**50 331434mE, 6617352mN (WGS84)
Habitat: Broad, very gently undulating plain.
Soil: Grey-Brown sand.
Rock Type: na
Vegetation: *Banksia attenuata*, *Banksia menziesii*, *Eucalyptus todtiana* Low Woodland over *Adenanthos cygnorum* subsp. *cygnorum* Isolated Tall Shrubs to Sparse Tall Shrubland over *Scholtzia umbellifera* Sparse Mid Shrubland over *Hibbertia hypericoides*, *Eremaea asterocarpa* subsp. *asterocarpa*, *Melaleuca* sp. Low Heathland over *Mesomelaena pseudostygia* Isolated Sedges.
Assoc. species: *Acacia sessilis*, *Calytrix sapphirina* (70cm), *Jacksonia nutans*, *Blancoa canescens*, *Acacia spathulifolia*, *Bossiaea eriocarpa*, *Conostylis candicans* subsp. *candicans*, *Allocasuarina humilis*, *Petrophile linearis*, *Banksia prionotes*.
Veg Condition Excellent to Pristine.
Fire Age: (2020) Greater than 12 years since fire.

Atlas - **Site** CBR7
Described by BM **Date** 16/11/2011 (revisited 14/10/2020)
Photo: BM100:
AMG: **Zone**50 332134mE, 6617483mN (WGS84)
Habitat: Shallow depression (dampland) on very gently undulating plain.
Soil: Light brown sand.
Rock Type: na
Vegetation: *Melaleuca rhaphiophylla* Tall Sparse Shrubland over *Regelia ciliata*, *Banksia telmatiaea* Low Heathland to Low Closed Heathland over *Philotheca spicata* subsp. Moore River National Park (G. & D. Woodman Op 47), *Melaleuca clavifolia* Isolated Low Shrubs over *Lepidosperma longitudinale* Isolated sedges to Sparse Sedgeland.
Assoc. species: *Phyllanthus calycinus*, *Allocasuarina lehmanniana* subsp. *lehmanniana* (280 cm), *Asteridea pulverulenta*, *Trachymene pilosa*, *Melaleuca teretifolia*, *Exocarpos sparteus*, *Olearia axillaris*, *Prasophyllum gracile*.
Veg Condition: Excellent (low weed cover).
Fire Age: (2020) More than 12 years since last fire.

Atlas - **Site** CBR9
Described by BM **Date** 17/11/2011
Photo: BM100:25, 26
AMG: Zone50 331859mE, 6617990mN (WGS84)
Habitat: Gentle, East-facing slope on very gently undulating plain (adjacent to seasonal dampland depression)
Soil: Grey-brown sand.
Rock Type: na
Vegetation: *Eucalyptus todtiana* (2-10%), *Banksia attenuata*, *Banksia menziesii* Low Open Woodland to Low Woodland over *Adenanthos cygnorum* Tall Sparse Shrubland to Tall Open Shrubland over *Jacksonia nutans* Isolated Shrubs over *Melaleuca systena*, *Petrophile rigida*, *Hibbertia hypericoides*, *Eremaea asterocarpa* subsp. *asterocarpa* Low Open Shrubland to Low Shrubland.
Assoc. species:
Veg Condition: Excellent to Pristine (very low weed cover)
Fire Age: (2020) Greater than 12 years since fire.

Atlas - **Site** CBR10
Described by BM **Date** 18/11/2011
Photo: BM100:49, 50
AMG: Zone50 332243mE, 6618491mN (WGS84)
Habitat: Low rise on broad, very gently undulating, plain
Soil: Grey-brown sand
Rock Type: na
Vegetation: *Banksia prionotes* Tall Shrubland (50-60%) over *Hakea obliqua* subsp. *parviflora* Isolated Tall Shrubs over *Banksia telmatiaea* open shrubland over *Melaleuca seriata*, *Hibbertia hypericoides*, *Eremaea pauciflora* var. *lonchophylla* Low Open Shrubland over *Austrostipa compressa* Isolated Grasses.
Assoc. species: *Eucalyptus todtiana*, *Banksia attenuata*, *Banksia menziesii*, *Conostylis festucacea* subsp. *festucacea*.
Veg Condition Excellent (very low weed cover, no disturbance)
Fire Age: (2020) Greater than 15 years since fire.

Atlas - **Site** CBR11
Described by BM **Date** 19/11/2011; some observations 6/11/2020
Photo: BM100:59, 60
AMG: Zone50 332145mE, 6618790mN (WGS84)
Habitat: Broad shallow flow line and flood banks on flood plain.
Soil: Pale brown sand.
Rock Type: na
Vegetation: *Melaleuca rhaphiophylla*, *Melaleuca viminea* subsp. *viminea* Tall Open Shrubland over *Melaleuca brevifolia* Sparse Shrubland over *Regelia ciliata*, *Grevillea* sp. Cooljarloo (B.J. Keighery 28 B) Low Sparse Shrubland over *Gahnia trifida*, *Schoenus subfascicularis* Sparse Sedgeland (patchy) with **Cotula coronopifolia*, *Cotula cotuloides*, *Calandrinia* sp. Kenwick (G.J. Keighery 10905), *Dysphania plantaginella* Open Herbland.
Assoc. species: *Isolepis cernua* var. *setiformis*, *Brachyscome iberidifolia*, *Melaleuca seriata* (40cm), *Petrophile seminuda*, *Senecio pinnatifolius* var. *latilobus*, *Samolus junceus*.
Veg Condition: Good (patches Very Good) (2020: vegetation unit in general area Good to Degraded (high weed cover).
Fire Age: (2020) Greater than 15 years since fire.

Atlas - **Site** CBR12
Described by BM **Date** 19/11/2011
Photo: BM100:61
AMG: Zone50 332104mE, 6619087mN (WGS84)
Habitat: Flood Plain adjacent to flow line.
Soil: Pale brown sand.
Rock Type: na
Vegetation: *Tecticornia indica* subsp. *bidens* Low Open Samphire Shrubland over *Isolepis cernua* var. *setiformis*, **Juncus capitatus*, **Lythrum hyssopifolia*, **Cotula coronopifolia*, **Lotus subbiflorus* Open Herbland/Sedgeland.
Assoc. species: **Monopsis debilis*, **Arctotheca calendula*, **Hypochaeris glabra*, *Centaurium tenuiflorum*, **Lysimachia arvensis*, **Polypogon monspeliensis*, **Crassula glomerata*, *Eryngium pinnatifidum subsp. Palustre (G. J. Keighery 13459)*, **Asphodelus fistulosus*.
Veg Condition: ?Good (quite high weed cover). (2020: surrounding area of this vegetation type Good to Degraded.)

Atlas - **Site** CBR14
Described by BM **Date** 20/11/2011
Photo: BM100:64-66
AMG: Zone50 332092mE, 6619744mN (WGS84)
Habitat: Low rise surrounded by large area of flood plain.
Soil: Yellow sand.
Rock Type: na
Vegetation: *Banksia prionotes*, *Hakea obliqua* subsp. *parviflora* Isolated Tall Shrubs over *Calothamnus quadrifidus* subsp. *quadrifidus*, *Banksia telmatiaea*, *Eremaea pauciflora* var. *lonchophylla* (140cm) Closed Heathland over *Hibbertia hypericoides* Isolated Low Shrubs over *Lepidobolus preissianus* Isolated Rushes.
Assoc. species: *Scholtzia umbellifera*, *Isopogon panduratus* subsp. *palustris*, *Eucalyptus todtiana*, *Conospermum stoechadis* subsp. *stoechadis*, *Thysanotus asper*, *Banksia dallanneyi* var. *dallanneyi*, *Neurachne alopecuroidea*, *Styphelia planifolia* (45cm), *Hakea prostrata*.
Veg Condition: Excellent to Pristine (very low weed cover, track nearby)
Notes: NB Most B prionotes dead suggests marginal environment.

Atlas - **Site** CBR15
Described by BM **Date** 20/11/2011; some observations 6/11/2020
Photo: BM100:68-72
AMG: Zone50 331325mE, 6620026mN (WGS84)
Habitat: Slightly elevated area on flood plain.
Soil: Grey sand with iron stains.
Rock Type: na
Vegetation: *Melaleuca brevifolia*, *Callitris pyramidalis* open heath over *Isolepis cernua* var. *setiformis*, **Juncus capitatus*, **Cotula coronopifolia*, **Lotus subbiflorus* herbland/sedgeland/grassland.
Assoc. species: *Grevillea* sp. Cooljarloo (B.J. Keighery 28 B), *Centaurium tenuiflorum*, **Crassula glomerata*, *Eryngium pinnatifidum subsp. Palustre (G. J. Keighery 13459)*, **Hordeum* sp.
Veg Condition (BF): Very Good (weeds present)
Fire Age: More than 14 years since last fire.

Atlas - **Site** CBR16
Described by BM **Date** 20/11/2011; revisited and re-recorded 5/11/2020
Location: Mount Jetty Creek, north-east part of survey area, adjacent to farm land to east.
Photo: BM100:80, 81 (2011); BM107:159-162 (2020)
AMG: **Zone**50 332587mE, 6620218mN (WGS84)
Habitat: Flow line bed and flood banks (historically excavated to enhance drainage).
Soil: Light brown sand.
Rock Type: na
Vegetation: *Melaleuca rhaphiophylla*, *Melaleuca concreta* Tall Open Shrubland to Tall Closed Shrubland (patchy) over *Melaleuca brevifolia, Regelia ciliata* scattered shrubs to open shrubland over *Grevillea* sp. Cooljarloo (B.J. Keighery 28 B) Isolated Low Shrubs over *Cyperus gymnocaulos*, *Lepidosperma longitudinale* Sedgeland (along floor of drain) and **Lotus subbiflorus*, **Polypogon monspeliensis*, **Hordeum geniculatum* Closed Herbland/Grassland.
Assoc. species: *Acacia saligna*, **Sonchus oleraceus*, *Leptocarpus coangustatus*, **Bromus hordeaceus*, *Schoenus subfascicularis*, *Sporobolus virginicus*, *Cassytha racemosa* forma *racemosa*, **Lolium perenne* x *rigidum*
Veg Condition: Good to Degraded (large areas of banks are herblands of weeds)
Fire Age: More than 14 years since fire.

Atlas - **Site** CCR1
Described by CH **Date** 1/11/2011
Photo: BM100: 0981/87
AMG: **Zone**50 331648mE, 6619268mN (WGS84)
Habitat: Flood plain.
Soil: Brown loamy sand (damp).
Rock Type: na
Vegetation: *Melaleuca brevifolia* Sparse Shrubland over *Tecticornia indica* subsp. *bidens* Low Open Samphire Shrubland over **Cotula coronopifolia*, **Lotus subbiflorus*, **Monopsis debilis*, *Isolepis cernua* var. *setiformis*, *Crassula decumbens* var. *decumbens*, **Vulpia bromoides* Closed Herbland/Sedgeland/Grassland.
Assoc. species: *Lawrencia squamata*, *Epilobium hirtigerum*, *Verticordia plumosa* var. *brachyphylla*, *Angianthus micropodioides*, **Centaurium tenuiflorum*.
Veg Condition: Very Good.
Fire Age: More than 12 years since fire.

Atlas - **Site** CCR2
Described by CH **Date** 2/11/2011; revisited and re-recorded 5/11/2020
Photo: BM100: 0987/93
AMG: **Zone**50 332353mE, 6620205mN (WGS84)
Habitat: Flood banks of flowline
Soil: Brown damp silty sand **Rock Type**: na
Vegetation: *Melaleuca rhaphiophylla*, *Melaleuca concreta* Tall Shrubland to Tall Closed Shrubland over *Melaleuca brevifolia* Isolated Shrubs to Isolated clumps of Shrubs over**Lotus subbiflorus*, **Lolium perenne* x *rigidum*, **Ornithopus pinnatus*, *Podolepis gracilis*, **Ehrharta longiflora* closed herbland/grassland.
Assoc. species: **Aira cupaniana*, *Microtis alboviridis*, *Lepidosperma longitudinale*, **Cotula coronopifolia, Isolepis cernua var. setiformis*, *Cassytha racemosa* forma *racemose*, **Vulpia myuros* forma *myuros*, **Hordeum geniculatum*, **Briza maxima*
Veg Condition: Good
Fire Age: More than 12 years since fire.

(ii) Releves recorded Spring 2020 : MESA

Atlas - **Site** CNR02
Described by BM **Date** 4/11/2020
Location: Northern part of survey area
Photo: BM107:145-147
AMG: Zone50 331649mE, 6620335mN (GDA94)
Habitat: Flood plain
Soil: Grey sand
Rock Type: na
Vegetation: *Melaleuca viminea* subsp. *viminea* (50%) Tall Shrubland over *Melaleuca brevifolia* Sparse Shrubland over *Melaleuca seriata*, *Grevillea* sp. Cooljarloo (B.J. Keighery 28 B) Isolated Low Shrubs over **Holcus setiger*, **Vulpia bromoides* Open Grassland and **Lotus subbiflorus* Open Herbland.
Assoc. species: **Lolium perenne* x *rigidum*, **Cotula coronopifolia*, **Sonchus oleraceus*, *Callitris pyramidalis*, *Tecticornia indica* subsp. *bidens.*
Veg Condition: Good to Degraded (good native sp. shrub cover, but high understorey weed cover of grasses and herbs (80-90%).
Fire Age: More than 12 years since fire

Atlas - **Site** CNR03
Described by BM **Date** 4/11/2020
Location: Northern part of survey area
Photo: BM107: 148, 149
AMG: Zone50 331650mE, 6620051mN (GDA94)
Habitat: Flood plain near flow line.
Soil: Grey sand
Rock Type: na
Vegetation: *Melaleuca viminea* subsp. *viminea*, *Melaleuca rhaphiophylla*, (*Melaleuca concreta*) Tall Open Shrubland to Tall Shrubland over *Melaleuca brevifolia* Sparse Shrubland over *Grevillea* sp. Cooljarloo (B.J. Keighery 28 B) Isolated Low Shrubs over **Hordeum geniculatum* , **Vulpia myuros* forma *myuros* Grassland and **Lotus subbiflorus* Open Herbland.
Assoc. species: *Callitris pyramidalis*; *Tecticornia indica* subsp. *bidens*
Veg Condition: Good to Degraded (high weed cover of herbs, grasses and sedges).
Fire Age: More than 12 years since fire.

Atlas - **Site** CNR04
Described by BM **Date** 5/11/2020
Location: Northern part of survey area
Photo: BM107: 163
AMG: Zone50 332094mE, 6620158mN (GDA94)
Habitat: Flood plain
Soil: Yellow-grey sand
Rock Type: na
Vegetation: *Melaleuca brevifolia* (3-4%) Sparse Shrubland over *Tecticornia indica* subsp. *bidens* Open Samphire Shrubland over **Hordeum geniculatum*, **Vulpia* sp. Grassland with **Lotus subbiflorus* , **Arctotheca calendula* (30-50%) Herbland.
Assoc. species: *Ptilotus polystachyus*, *Melaleuca viminea* subsp. *viminea*, **Sonchus oleraceus*, *Samolus repens* var. *paucifolius*, *Frankenia pauciflora* var. *pauciflora*, **Cotula coronopifolia*
Veg Condition: Good to Degraded
Fire Age: More than 12 years since fire.

Atlas - **Site** CNR05
Described by **Date** 5/11/2020
Photo: BM107: 164
AMG: Zone50 332090mE, 6619974mN (GDA94)
Habitat: Margins of flood plain.
Rock Type:
Vegetation: *Melaleuca brevifolia* (15-30%) Open Shrubland over *Banksia telmatiaea*, *Grevillea* sp. Cooljarloo (B.J. Keighery 28 B), *Regelia ciliata* Low Sparse Shrubland over *Gahnia trifida* Isolated Sedges and * *Bromus hordeaceus*, **Hordeum geniculatum* Open Grassland to Grassland and **Lotus subbiflorus* Herbland
Assoc. species: *Melaleuca concreta*, *Melaleuca seriata*, *Melaleuca rhaphiophylla*, **Sonchus oleraceus*, *Acacia pulchella* var. *glaberrima*, **Cotula coronopifolia*, *Eryngium pinnatifidum subsp. Palustre (G. J. Keighery 13459)*.
Veg Condition: Good to Degraded
Fire Age: More than 12 years since fire

Atlas - **Site** CNR07
Described by BM **Date** 8/11/2020
Location:
Photo: BM107: 206,207
AMG: Zone50 331806mE, 6619714mN (GDA94)
Habitat: Bank of clay pan.
Soil: Grey sand.
Rock Type: na
Vegetation: *Melaleuca rhaphiophylla* closed shrubland over *Tecticornia indica* subsp. *bidens* isolated samphire shrubs over *Leptocarpus canus, Leptocarpus coangustatus* Open Rushland with **Vulpia myuros* forma *myuros* Open Grassland
Assoc. species: **Lolium perenne* x *rigidum*, **Lotus subbiflorus*, *Sporobolis virginicus*, **Ehrharta longiflora*, *Eryngium pinnatifidum subsp. Palustre (G. J. Keighery 13459)*, **Briza minor; Trachymene pilosa, Burchardia bairdiae, Caladenia longicauda subsp. albella, *Holcus setiger, Samolus junceus, Angianthus micropodioides* (n=100)*, *Cotula coronopifolia*, *Senecio glossanthus*; *Apium prostratum* subsp. *prostratum* var. *filiforme*; *Comesperma integerrimum*.
Veg Condition: Good (high weed cover)
Fire Age: More than 15 years since fire.

Atlas - **Site** CRK01
Described by KBM **Date** 5/10/2020
Location: northern part of survey area.
Photo: KBM 715
AMG: Zone50 331478mE, 6620416mN (GDA94)
Habitat: Wet saline claypan
Soil:
Rock Type:
Vegetation: *Tecticornia syncarpa*, (*Tecticornia indica* subsp. *bidens*) Low Samphire Shrubland **Crassula natans* var. *minor* (acquatic), (**Cotula coronopifolia*) Closed Herbland.
Assoc. species: *Liparophyllum capitatum*, *Triglochin* sp. A Flora of Australia (G.J. Keighery 2477), *Cycnogeton lineare*, *Isolepis cernua* var. *setiformis*, *Sporobolus virginicus*
Veg Condition: Very Good to Excellent
Notes: On gently sloping sandy banks along clay pan high water mark, there is: *Melaleuca viminea* subsp. *viminea*, (*Melaleuca rhaphiophylla*) Sparse Shrubland to Open Shrubland;
Assoc. species: *Triglochin minutissima*, *Baumea juncea*, *Eryngium pinnatifidum subsp. Palustre (G. J. Keighery 13459)*, *Stylidium longitubum*, **Juncus bufonius*, *Bolboschoenus caldwellii*

Atlas - **Site** CRK02
Described by KBM **Date** 7/10/2020
Location: northern part of survey area, near western boundary
Photo: KBM727-732
AMG: Zone50 331317mE, 6619690mN (GDA94)
Habitat: Gently sloping banks of brackish lake
Soil:
Rock Type:
Vegetation: *Melaleuca cuticularis* (north, east and south side of clay pan), *Melaleuca viminea* subsp. *viminea* (west side), *Melaleuca brevifolia* (upslope), (*Melaleuca rhaphiophylla*) Open Shrubland over *Salicornia blackiana*, (*Tecticornia indica* subsp. *bidens*) Samphire Shrubland to Closed Samphire Shrubland and **Crassula natans* var. *minor* aquatic annual Sparse Herbland to Open Herbland.
Assoc. species: **Cotula coronopifolia*, *Sporobolus virginicus*, *Eryngium pinnatifidum subsp. Palustre (G. J. Keighery 13459)*, **Briza minor*, *Isolepis cernua* var. *setiformis*, *Cycnogeton lineare*.
Veg Condition: Very Good to Excellent (patchy)

(ii) Releves recorded Spring 2021 : EISA and MESA (AIRB04 and AIRB05 recorded on farmland in MESA)

Atlas Infrastructure - **Site** AIRB01
Described by BM **Date** 21/09/2021
Location: Nambung Station Bore
Photo: BM108-70,71
AMG: Zone50 330799mE, 6615381mN (GDA94)
Habitat: Depression on plain
Soil: Dark brown loamy sand
Rock Type: n/a
Vegetation: *Eucalyptus decipiens*, *Melaleuca preissiana* Low Woodland over *Spyridium globulosum*, *Acacia cyclops* Isolated Tall Shrubs to Tall Sparse Shrubland over *Gahnia trifida* Tall Isoplated Clumps of Sedges and *Lepidosperma longitudinale* Sedgeland (patches) and **Ehrharta longiflora* Grassland.
Assoc. species: **Moraea flaccida*, **Arcotheca calendula*, **Lysimachia arvensis*, **Hypochaeris glabra*, *Austropstipa macalpinei.*
Veg Condition (BF): Degraded (very weedy; species depauperate)
Fire Age: More than 10 years since last fire

Atlas Infrastructure - **Site** AIRB03
Described by BM **Date** 23/09/2021
Location: Nambung Road Corridor (East – West)
Photo: BM108-79. 80, 81
AMG: Zone50 326561mE, 6622972mN (GDA94)
Habitat: Plain at base of dune.
Soil: Yellow sand.
Rock Type: n/a
Vegetation: *Acacia rostellifera* (65%) Tall Shrubland to Closed Shrubland over **Ehrharta longiflora* (80%), **Bromus diandrus* Closed Grassland with **Hypochaeris glabra* (3%), **Arctotheca calendula* (3%) Sparse Forbland.
Assoc. species: **Trifolium hirtum*, **Lupinus cosentinii*
Veg Condition (BF): Degraded
Fire Age: More than 10 years since last fire
Notes: Cow pads present

Atlas Infrastructure - **Site** AIRB04
Described by BM **Date** 28/9/2021
Location: Cockram's farm
Photo: BM108-116, 117, 118
AMG: Zone50 331655mE, 6621978mN (GDA94)
Habitat: Plain (farm paddock), low-lying area
Soil: Grey sand
Rock Type: n/a
Vegetation: *Cyperus gymnocaulos* Open Sedgeland (15%, patchy) over *Isolepis cernua var. setiformis, Isolepis marginata, *Juncus bufonius* (3-5%; patchy) low open sedgeland with **Cynodon dactylon* open grassland, with **Lotus subiflorus, *Romulea rosea *Arcotheca calendula, *Monopsis debilis* Open Forbland.
Assoc. species: **Crassula glomerata, Drosera ramellosa, *Cotula coronopifolia, *Lolium perenne* x

rigidum, *Crassula decumbens* var. *decumbens*.
Veg Condition (BF): Completely Degraded. High weed cover; tree and shrub strata cleared. Old mounding in paddocks.
Fire Age: more than 10 years since last fire

Atlas Infrastructure - **Site** AIRB05
Described by BM **Date** 29/09/2021
Location: Cockram's farm
Photo: BM108-123, 124
AMG: Zone50 332639mE, 6621416mN (GDA94)
Habitat: Low rise (dune) on plain
Soil: Grey-brown sand
Rock Type: n/a
Vegetation: *Banksia menziesii*, *Banksia attenuata*, *Eucalyptus todtiana* Low Open Woodland (remnant) over *Daviesia divaricata* Isolated Shrubs to Open Shrubland over *Hibbertia hypericoides* Low Sparse Shrubland over *Dasypogon obliquifolius* Open Forbland and *Mesomelaena pseudostygia* Isolated Clumps of Sedges.
Assoc. species: *Podotheca gnaphalioides*, *Alexgeorgea nitens*, *Austrostipa compressa*, *Hybanthus calycinus*, *Trachymene pilosa*, **Arcotheca calendula*, **Dischisma arenarium*, **Ehrharta calycina*, **Briza maxima*, *Corynotheca micrantha*, *Jacksonia nutans*.
Veg Condition (BF): Good (part clearing, grazing; still quite a few species
Fire Age: more than 10 years since last fire

MAPPING NOTES

(i) Mapping notes initially recorded Spring 2011

Cervantes - **Site** CBM1
Described by BM **Date** 15/11/2011
Photo: BM100:
AMG: Zone50 332056mE, 6617089mN (WGS84)
Habitat: Flat plain
Soil: Grey-brown sand
Vegetation: *Banksia attenuata*, *Banksia menziesii*, *Eucalyptus todtiana* Low Woodland (lots of small Banksia's (regrowth) ~ 150-250cm) over *Adenanthos cygnorum* subsp. *cygnorum* Tall Open Shrubland over *Melaleuca clavifolia* Low Shrubland over *Hibbertia sericosepala*, *Hypocalymma xanthopetalum* Isolated Low Shrubs.
Assoc. species: *Nuytsia floribunda*, *Anigozanthos humilis* subsp. *humilis*, *Xanthosia huegelii*, *Conostylis teretifolia* subsp. *teretifolia*, *Petrophile linearis*
Veg Condition: Excellent
Fire Age: More than 12 years since fire.

Cervantes - **Site** CBM4
Described by BM **Date** 18/11/2011
AMG: Zone50 331822mE, 6618427mN (WGS84)
Habitat: Low rise on very gently undulating plain.
Soil: Yellow sand.
Rock Type: na
Vegetation: *Banksia prionotes* Tall Closed Shrubland over *Adenanthos cygnorum* subsp. *cygnorum*, *Jacksonia sternbergiana* Isolated Tall Shrubs over *Acacia sessilis*, *Conospermum stoechadis* subsp. *stoechadis* Open Shrubland over *Eremaea pauciflora* var. *lonchophylla*, *Hibbertia hypericoides* Isolated Low Shrubs.
Assoc. species: *Calothamnus quadrifidus* subsp. *quadrifidus*, *Eucalyptus todtiana*.
Veg Condition: Excellent to Pristine.
Notes: Elevation of 41m

Cervantes - **Site** CBM5
Described by BM **Date** 19/11/2011; some observations 6/11/2020
Photo: BM100:56
AMG: Zone50 332566mE, 6618630mN (WGS84)
Habitat: Gently sloping flood banks of narrow, shallow creekline.
Soil: Brown sand
Vegetation: *Acacia saligna* Isolated Tall Shrubs over *Melaleuca brevifolia*, *Melaleuca viminea* subsp. *viminea* Tall Open Shrubland to Tall Shrubland over *Grevillea* sp. Cooljarloo (B.J. Keighery 28 B) Isolated Low Shrubs over *Tecticornia indica* subsp. *bidens* low shrubland over *Isolepis cernua* var. *setiformis*, **Juncus capitatus*, **Lythrum hyssopifolia*, **Cotula coronopifolia*, **Lotus subbiflorus* Herbland/Sedgeland.
Assoc. species:
Veg Condition: Good to Degraded (very weedy herb layer).

Cervantes - **Site** CBM6
Described by BM **Date** 19/11/2011; revisited and re-recorded 5/11/2020
Photo: BM100:63
AMG: Zone50 332633mE, 6619368mN (WGS84)
Habitat: Very slight depression on broad plain.
Soil: Pale brown sand (crusty).
Vegetation: *Melaleuca brevifolia* Shrubland over *Calytrix flavescens*, *Grevillea* sp. Cooljarloo (B.J. Keighery 28 B), *Verticordia densiflora* var. *densiflora* Isolated Low Shrubs over **Vulpia myuros* forma *myuros* Sparse grassland and *Gahnia trifida* Isolated Sedges.
Assoc. species: *Comesperma* sp., *Ptilotus manglesii*, *Austrostipa elegantissima*, *Pimelea imbricata* var. *piligera*, *Burchardia bairdiae*, *Quinetia urvillei*, ***Briza maxima*, ***Ursinia anthemoides* subsp. *anthemoides*, *Tribonanthes* sp., *Conostylis teretifolia* subsp. *teretifolia*
Veg Condition: Very Good

Cervantes - **Site** CBM7
Described by BM **Date** 20/11/2011; revisited and re-recorded 5/11/2020
Photo: BM100:67
AMG: Zone50 332045mE, 6620031mN (WGS84)
Habitat: Flood banks of flow line on flood plain.
Soil: Light brown sand
Vegetation: *Melaleuca viminea* subsp. *viminea,* (*Melaleuca concreta*) Tall Open Shrubland to Tall Shrubland (patchy) over *Melaleuca brevifolia* Isolated shrubs to Sparse Shrubland over *Grevillea* sp. Cooljarloo (B.J. Keighery 28 B) scattered low shrubs over *Tecticornia indica* subsp. *bidens* low shrubland over **Cotula coronopifolia*, *Angianthus micropodioides*, **Lotus subbiflorus*, *Isolepis cernua* var. *setiformis*, **Juncus capitatus, *Arctotheca calendula* Closed herbland/sedgeland and **Hordeum geniculatum, *Lolium perenne x rigidum* Open Grassland.
Veg Condition: Good to Degraded (lot of weed cover in understorey layer).
Fire Age: More than 15years since fire.

(ii) Mapping notes recorded Spring 2020 :MESA

Atlas - **Site** MBN01
Described by BM **Date** 4/11/2020
Photo: BM107: 153
AMG: Zone50 331717mE, 6619928mN (GDA94)
Habitat: Area with slight elevation on margins of flood plain
Rock Type: na
Vegetation: *Melaleuca brevifolia*, *Verticordia densiflora* var. *densiflora*, *Melaleuca seriata* Low Shrubland.
Assoc. species: *Conostylis aculeata* subsp. *breviflora*, *Grevillea* sp. Cooljarloo (B.J. Keighery 28 B), *Acacia dilatata*, *Verticordia plumose* var. *brachyphylla*.
Veg Condition: Excellent

Atlas - **Site** MBN02
Described by BM **Date** 4/11/2020
Photo: BM107: 154,155
AMG: Zone50 331689mE, 6619800mN (GDA94)
Habitat: Margins of flood plain
Soil: Grey sand
Rock Type: na
Vegetation: *Melaleuca rhaphiophylla*, *Melaleuca viminea* subsp. *viminea* Tall Shrubland over *Leptocarpus coangustatus* Sedgeland.
Assoc. species: *Tecticornia indica* subsp. *bidens*, *Angianthus preissianus*, **Briza minor*, **Ursinia anthemoides* subsp. *anthemoides.*
Veg Condition: Excellent

Atlas - **Site** MBN03
Described by BM **Date** 5/11/2020
AMG: Zone50 331375mE, 6620276mN (GDA94)
Habitat: Flood plain
Vegetation: *Melaleuca viminea* subsp. *viminea* Shrubland over *Melaleuca brevifolia* Isolated shrubs to Sparse Shrubland over **Lotus subbiflorus* Open Herbland and **Hordeum geniculatum, *Lolium perenne x rigidum* Grassland.
Veg Condition: Degraded

Atlas - **Site** MBN04
Described by BM **Date** 5/11/2020
Photo: BM107:156,157
AMG: Zone50 331982mE, 6620805mN (GDA94)
Habitat: Margins of flood plain
Vegetation: *Melaleuca brevifolia*, *Melaleuca acutifolia* (20%) Open Shrubland over *Banksia telmatiaea*, *Grevillea* sp. Cooljarloo (B.J. Keighery 28 B) Low Sparse Shrubland over *Gahnia trifida*, *Chaetanthus aristatus* Sparse Sedgeland/Rushland with **Vulpia myuros* forma *myuros* Open Grassland.
Assoc. species: *Patersonia occidentalis* var *occidentalis*, *Isopogon panduratus* subsp. *palustris*, *Austrostipa compressa*, *Acacia saligna*, *Allocasuarina lehmanniana* subsp. *lehmanniana*, *Burchardia bairdiae*, *Conostylis aculeata* subsp. *breviflora*, *Frankenia pauciflora* var. *pauciflora.*
Veg Condition: Very Good
Fire Age: More than 12 years since fire.
Notes: This represents ecotonal *Melaleuca brevifolia* Shrubland vegetation.

Atlas - **Site** MNK01
Described by KBM **Date** 5/10/2020
Location: Northern survey area
Photo: KBM703
AMG: Zone50 331816mE, 6620617mN (GDA94)
Habitat: Wet saline claypan
Soil:
Rock Type: na
Vegetation: *Tecticornia halocnemoides*, *Tecticornia syncarpa* Low Open Shrubland with *Ruppia polycarpa* Herbland
Assoc. species: *Triglochin mucronata*, * *Cotula coronopifolia*, *Triglochin minutissima*, *Tecticornia indica* subsp. *bidens* (along edge of claypan banks only)
Veg Condition: Excellent

(iii) Mapping notes recorded Spring 2021: EISA and MESA (farmland)

Atlas Infrastructure - **Site** AIMB02
Described by BM **Date** 24/09/2021
Location: Nambung Road corridor – farm – North-South
Photo: BM108-099
AMG: Zone50 326889mE, 6622206mN (GDA94)
Habitat: Flow area, dampland
Soil: Grey sand
Rock Type: n/a
Vegetation: *Melaleuca rhaphiophylla* Low Woodland over **Ehrharta longiflora*, **Hordeum* sp. Grassland to Closed Grassland with **Arcotheca calendula*, **Hypochaeris glabra*, **Trifolium campestre* Open Forbland.
Assoc. species: *Acacia rostellifera*, *Comesperma integerrimum*, *Eucalyptus rudis*.
Veg Condition (BF): Degraded
Fire Age: more than 10 years since last fire

Atlas Infrastructure - **Site** AIMB03
Described by BM **Date** 32/09/2021
Location: Nambung Road corridor – farm – North-South
Photo: BM108-89
AMG: Zone50 326893mE, 6621551mN (GDA94)
Habitat: Low rise
Soil: Grey sand
Vegetation: Pasture paddock with Tagasaste (**Chamaecytisus palmensis*) shrubs (including many dead Tagasaste shrubs).
Veg Condition (BF): Completely degraded
Notes: **goats** in area

Atlas Infrastructure - **Site** AIMB04
Described by BM **Date** 23/09/2021
Location: Nambung Road corridor
Photo: BM108-98
AMG: Zone50 328314 to 328350mE, 6621350mN (GDA94)
Habitat: Man-made drain; old borrow pit (past excavation)
Vegetation: *Melaleuca viminea*, *Acacia saligna* Tall Open Shrubland over *Melaleuca teretifolia* Isolated Shrubs over *Lepidosperma longitudinale* Open Sedgeland..
Assoc. species: *Pelargonium littorale* subsp. *littorale*, *Daucus* sp., *Ranunculus pumilio*, *Rhodanthe citrina*, *Melaleuca rhaphiophylla*.
Veg Condition (BF): (Regrowth) Good to Degraded

Atlas Infrastructure - **Site** AIMB06
Described by BM **Date** 28/09/2021
Location: Cockram farm Study Area
Photo: BM108-119
AMG: Zone50 331880mE, 6621938mN (GDA94)
Habitat: Plain
Soil: Grey sand
Rock Type: n/a
Vegetation: *Eucalyptus todtiana* (3%) Isolated Low Trees to Low Open Woodland (isolated patch) over *Dasypogon obliquifolius* (1%) Isolated Clumps of Forbes over *Isolepis marginata*, **Cyperus tenellus*, **Juncus bufonius* Open Sedgeland/Rushland with **Lotus subifolius*, **Hypocharis glabra*, **Romulea* sp. Open Forbland.
Assoc. species: **Ursinia anthemoides*, *Drosera glanduligera* **Erodium botrys*
Veg Condition (BF): Degraded to Completely Degraded (grazing)
Fire Age: More than 10 years since last fire.

Atlas Infrastructure - **Site** AIMB07
Described by BM **Date** 28/09/2021
Location: Cockram farm Study Area
Photo: BM108-121
AMG: Zone50 332354mE, 6621233mN (GDA94)
Habitat: Plain, low-lying
Vegetation: *Machaerina juncea* open sedgeland over *Isolepis marginata*, **Cyperus tenellus*, Low Open Sedgeland with **Ursinia anthemoides*, **Lotus subifolius*, **Arcotheca calendula* Sparse Forbland.
Assoc. species: **Ehrharta calycina*, *Drosera ramellosa*
Veg Condition (BF): Degraded to Completely Degraded (regrowth after grazing/clearing)

Atlas Infrastructure - **Site** AIMB08
Described by BM **Date** 29/09/2021
Location: Cockram's farm Study Area
Photo: BM108-125
AMG: Zone50 332212mE, 6621331mN (GDA94)
Habitat: Low rise on plain
Soil: Pale grey sand
Rock Type: n/a

Vegetation: (*Eucalyptus todtiana* Isolated Low Trees) over *Dasypogon obliquifolius* Open Forbland with *Mesomelaena pseudostygia* Isolated Sedges with **Vulpia* sp., **Ehrharta* spp. Open Grassland (grazed) and **Hypochaeris glabra* Sparse land.
Assoc. species: *Hibbertia hypericoides*, *Jacksonia nutans*, *Patersonia occidentalis* var. *occidentalis*, *Anigozanthus humilis* subsp. *humilis*, *Podotheca gnaphalioides*, *Austrostipa compressa*, *Corynotheca micrantha*, *Alexgeorgea nitens*, *Hibbertia sericosepala*, *Hypocalymma xanthopetalum*, *Burchardia congesta*, *Schoenus curvifolius*, *Trachymene pilosa*.
Veg Condition (BF): Good to Degraded (regrowth after past clearing/grazing)
Fire Age: More than 10 years since last fire.
Notes: Area cleared in past; several dead *Banksia* trees grouped with *Eucalyptus todtiana*; mostly open vegetation with open areas weedy.

Atlas Infrastructure - **Site** AIMB09
Described by BM **Date** 29/09/2021
Location: Cockram's farm Study Area
Photo: BM108-130 to 132
AMG: Zone50 331809mE, 6621260mN (GDA94)
Habitat: Broad drainage line in paddock
Soil: Dark grey loam
Rock Type: n/a
Vegetation: *Melaleuca rhaphiophylla* Low Open Woodland (patches) over *Cyperus gymnocaulos*, *Machaerina juncea* Open Sedgeland with **Lotus subifolius*, **Arcotheca calendula*, **Cotula coronopifolia* Forbland and **Juncus bufonius*, *Isolepis cernua* var. *setiformis* Sparse Low Sedgeland and **Ehrharta longiflora* Sparse Grassland.
Assoc. species: **Romulea rosea*, *Crassula decumbens*, *Schoenus subfascicularis*, **Moraea flaccida*, **Poa annua*, **Cynodon dactylon*.
Veg Condition (BF): Degraded to Completely Degraded (grazing and clearing).
Fire Age: More than 10 years since last fire.

Atlas Infrastructure - **Site** AIMB10
Described by BM **Date** 29/09/2021
Location: Creek, Cockram farm south, Study Area (infrastructure corridor)
Photo: BM108-136, 137
AMG: Zone50 330769mE, 6621037mN (GDA94)
Habitat: Drainage line.
Soil: Yellow sand.
Rock Type: n/a
Vegetation: (*Melaleuca rhaphiophylla* Isolated Low Trees) over *Typha* sp. (not flowering) rushland (along main channel) with *Ficinia nodosa*, *Lepidosperma longitudinale*, **Juncus acutus* subsp. acutus, *Cyperus gymnocaulos* Sedgeland and **Lotus subifolius*, **Arcotheca calendula*, **Romulea rosea*, **Cotula coronopifolia* Forbland.
Assoc. species: *Caladenia longicauda*
Veg Condition (BF): Degraded (in pasture paddock; past grazing and clearing).
Fire Age: More than 10 years since last fire.

Atlas Infrastructure - **Site** AIMB11
Described by BM **Date** 29/09/2021
Location: Cockram farm, Study Area (infrastructure corridor)
Photo: BM108-138. 139
AMG: Zone50 332290mE, 6622397mN (GDA94)
Habitat: Low lying plain
Soil: Grey-brown sand
Rock Type: n/a
Vegetation: *Schoenus subfascicularis* (patches), *Cyperus gymnocaulos*, *Machaerina juncea* Open Sedgeland with **Cyperus tenellus*, *Isolepis marginata*, **Juncus bufonius* Sparse Low Sedgeland with **Lotus subiflorus*, **Arcotheca calendula*, **Romulea* sp, *Crassula decumbens* var. *decumbens* Forbland.
Assoc. species: *Drosera menziesii, Triglochin* sp., *Centrolepis aristata*, **Monopsis debilis*, **Lupinus cosentinii*, **Ehrharta calycina*.
Veg Condition (BF): Degraded (high weed cover, cleared paddock)
Fire Age: More than 10 years since last fire.

Atlas Infrastructure - **Site** AIMB12
Described by BM **Date** 29/09/2021
Location: Cockram farm, Study Area
Photo: BM108-140
AMG: Zone50 332339mE, 6622380mN (GDA94)
Habitat: Shallow depression on plain
Soil: Grey sand
Rock Type: n/a
Vegetation: (Small patches of) *Lawrencia squamata* Low Sparse Shrubland over *Triglochin* sp. A Flora of Australia (G.J.Keighery 2477), *Triglochin mucronata*, *Triglochin minutissima*, *Crassula decumbens* var. *decumbens* Low Open Forbland with *Isolepis marginata*, *Isolepis cernua* var. *setiformis* Low Sparse Sedgeland and **Arcotheca calendula*, **Cotula coronopifolia*, **Lotus subiflorus* Sparse Exotic Sparse Forbland.
Assoc. species: **Crassula glomerata*, *Sporobolus virginicus*, **Wahlenbergia capensis*, **Hordeum hystrix, Spergularia brevifolia*.
Veg Condition (BF): ?Degraded (in paddock, grazing)
Fire Age: More than 10 years since last fire.

Atlas Infrastructure - **Site** AIMB13
Described by BM **Date** 29/09/2021
Location: Cockram farm central north, Study area
Photo: BM108-141 to 143
AMG: Zone50 332194mE, 6623061mN (GDA94)
Habitat: Depression on plain (inundated ?drains)
Soil: Dark grey sandy loam
Rock Type: n/a
Vegetation: *Typha* sp. Tall Rushland (inundated area) with surrounding banks of **Juncus acutus* subsp. *acutus* Tall Sparse Sedgeland over *Cyperus gymnocaulos* Sparse Sedgeland and **Cotula coronopifolia*, **Lotus subiflorus* Closed Exotic Forbland.
Veg Condition (BF): Degraded
Fire Age: More than 10 years since last fire.

APPENDIX TEN. Results of PATN analysis

I. Recipe for the PATN analysis

a) PATN analysis recipe for combined dataset of the 78 Atlas survey area quadrats with the 'Native and Weed florta of the Southern SCP 2005 dataset (Keighery, B. *et al*., 2012)

Analysis based on rows -
Association Measure: Two-step
Classification Strategy: Agglomerative Hierarchical Fusion
Technique: Flexible UPGMA
Beta: -0.1000
Number of groups to produce: 43
Ordination Method: SSH
CutOff = 0.900
3 Dimensions
Number of random starts: 10
Max iterations: 50
Random Seed Value: 1235

Analysis based on columns -
Association Measure: Bray Curtis
Classification Strategy: Agglomerative Hierarchical Fusion
Technique: Flexible UPGMA
Beta: -0.1000
Number of groups to produce: 35

b) PATN analysis recipe for single site insertions of Atlas survey area quadrat data with the 'Native and Weed florta of the Southern SCP 2005 dataset (Keighery, B. *et al*., 2012)

Analysis based on rows -
Association Measure: Two-step
Classification Strategy: Agglomerative Hierarchical Fusion
Technique: Flexible UPGMA
Beta: -0.1000
Number of groups to produce: 42
Ordination Method: SSH
CutOff = 0.900
3 Dimensions
Number of random starts: 10
Max iterations: 50
Random Seed Value: 1235

Analysis based on columns -
Association Measure: Bray Curtis
Classification Strategy: Agglomerative Hierarchical Fusion
Technique: Flexible UPGMA
Beta: -0.1000
Number of groups to produce: 34

II. Species reconciliation table between species of the Atlas survey area quadrats and species in the 'Native and Weed florta of the Southern SCP 2005 dataset (Keighery, B. *et al*., 2012)

From Atlas Name	2005 SCP&Supp dataset Name/Nearest Name	To Analysis Name	Comments
Acacia dilatata		Acacia dilatata	Not in 2005 dataset. Distribution from Atlas, north
Acacia spathulifolia		Acacia spathulifolia	Not in 2005 dataset. Distribution from Atlas, north
Aira cupaniana	Aira cupaniana	Aira caryophyllea/Aira cupaniana	
	Aira caryophyllea	Aira caryophyllea/Aira cupaniana	
Alexgeorgea subterranean		Alexgeorgea subterranean	Not in 2005 dataset. Not recorded south of Cataby.
Ammothryon grandiflorum	Schoenus grandiflorus	Schoenus grandiflorus	
Anigozanthos humilis subsp. chrysanthus		Anigozanthos humilis subsp. humilis	DELETED : only at one Atlas quadrat. y.
Apium prostratum subsp. prostratum var. filiforme	Apium prostratum ssp. prostratum var. prostratum	Apium prostratum	
Babingtonia urbana	Baeckea tenuifolia	Baeckea tenuifolia	
Banksia nivea subsp. nivea		Dryandra nivea subsp. nivea	Not in 2005 dataset. Dryandra nivea subsp. uliginosa in database -it occurs on SCP near Busselton.
B dallanneyi subsp. dallanneyi	Dryandra lindleyana	Dryandra lindleyana	
Banksia platycarpa	Dryandra platycarpa	Dryandra platycarpa	
Caladenia longicauda subsp. borealis			DELETED : at 1 Atlas qdt; not in WNF dataset.
Caladenia nobilis			DELETED : at 1 Atlas qdt; not in WNF dataset.
Caladenia varians	Caladenia vulgata	Caladenia vulgata	
Calandrinia sp. Kenwick (G.J. Keighery 10905)	Calandrinia corrigioloides	Calandrinia corrigioloides	
Callitris pyramidalis	Actinostrobus pyramidalis	Actinostrobus pyramidalis	
Calothamnus quadrifidus subsp. quadrifidus	Calothamnus quadrifidus	Calothamnus quadrifidus	
Calytrix aff. flavescens	Calytrix flavescens	Calytrix flavescens	Calytrix aff. flavescens not a published entity, so combined into C. flavescens
Centaurium tenuiflorum	Centaurium erythraea	Centaurium erythraea	
Chaetospora curvifolia	Schoenus curvifolius	Schoenus curvifolius	

Chordifex reseminans		Chordifex reseminans	Not in 2005 dataset. C. reseminans occurs north of the Moore River.
Crassula colorata var. acuminata	Crassula colorata var. colorata	Crassula colorata	
Crassula decumbens var. decumbens	Crassula decumbens	Crassula decumbens	
Crassula natans var. minor	Crassula natans var. minus	Crassula natans var. minus	
Cryptandra arbutiflora			DELETED : only at 1 Atlas qdt.
Cycnogeton lineare	Triglochin linearis	Triglochin linearis	
Cyperaceae sp. 2 ENE			DELETED.
Cyperaceae sp1 ENE			DELETED
Cyperus gymnocaulos			DELETED : singleton at 1 Atlas qdt; not in SCP dataset.
Darwinia pinifolia		Darwinia pinifolia	Not in the SCP dataset. Previously known as Darwinia rhadinophylla.
Desmocladus lateriflorus	Harperia lateriflora	Harperia lateriflora	
Desmocladus nodatus		Desmocladus nodatus	Not in 2005 dataset. North of Moore River.
Desmocladus virgatus		Desmocladus virgatus	Not in 2005 dataset. At 2 Atlas sites.
Diuris sp.			DELETED
Drosera closterostigma		Drosera closterostigma	Not in 2005 dataset. Only records on SCP north of Moore River.
Drosera drummondii	Drosera menziesii subsp. penicillaris	Drosera menziesii subsp. penicillaris	
Drosera menziesii	Drosera menziesii subsp. menziesii	Drosera menziesii subsp. menziesii	
Drosera humilis	Drosera stolonifera subsp. humilis	Drosera stolonifera subsp. humilis	
Drosera magna	Drosera erythrorhiza subsp. magna	Drosera erythrorhiza subsp. magna	
Drosera minutiflora	Drosera parvula	Drosera parvula	
Drosera porrecta	Drosera stolonifera subsp. porrecta	Drosera stolonifera subsp. porrecta	
Drosera thysanosepala		Drosera thysanosepala	Not in 2005 dataset. North of Moore River.
Eragrostis dielsii		Eragrostis dielsii	Not in 2005 dataset. Only a few records on SCP
Eremaea pauciflora var. lonchophylla		Eremaea pauciflora var. lonchophylla	Not in 2005 dataset; form north of Moore River.
Frankenia pauciflora var. pauciflora	Frankenia pauciflora	Frankenia pauciflora	
Goodenia coerulea	Goodenia caerulea	Goodenia caerulea	Goodenia coerulea is current name
Goodenia pulchella subsp. Coastal Plain A (M. Hislop 634)	Goodenia pulchella	Goodenia pulchella	

Goodenia pulchella subsp. Coastal Plain B (L.W. Sage 2336)	Goodenia pulchella	Goodenia pulchella	
Goodenia trinervis	Velleia trinervis	Velleia trinervis	
Grevillea sp. Cooljarloo (B.J. Keighery 28 B)		Grevillea sp. Cooljarloo (B.J. Keighery 28 B)	Not in 2005 dataset. North of Moore River.
Hakea obliqua subsp. parviflora	Hakea obliqua subsp. obliqua	Hakea obliqua	
Hensmania stoniella			DELETED : at 1 Atlas qdt- singleton. Not in 2005 SCP dataset. Only occurs nth of Moore River.
Hibbertia sericosepala	Hibbertia aff. helianthemoides (Northern) (EA Griffin 6801)	Hibbertia aff. helianthemoides (Northern) (EA Griffin 6801)	
H angustifolium subsp. Swan Coastal Plain (G.J. Keighery 16777)	Hypocalymma angustifolium	Hypocalymma angustifolium	
Hypochaeris radicata			DELETED (only 1 site). Not in 2005 dataset.
Isolepis cernua var. cernua	Isolepis cernua	Isolepis cernua	
Isolepis cernua var. setiformis	Isolepis cernua	Isolepis cernua	
Isopogon panduratus subsp. palustris		Isopogon panduratus subsp. palustris	Not in 2005 dataset. Restricted to Atlas region (abundant).
Jacksonia carduacea			DELETED : at 1 Atlas qdt; - singleton. Not in 2005 dataset. Only occurs nth of Moore River.
Lepidosperma calcicola	Lepidosperma squamatum	Lepidosperma squamatum	
Leptocarpus canus	Meeboldina cana	Meeboldina cana	
Leptocarpus coangustatus	Meeboldina coangustata	Meeboldina coangustata	
Lepyrodia curvescens			DELETED (only 1 Atlas site - singleton). Not in 2005 dataset.
Leucopogon sp. Coujinup (M.A. Burgman 1085)		Leucopogon sp. Coujinup (M.A. Burgman 1085)	Not in 2005 dataset. Only recorded on SCP in Atlas area.
Leucopogon sp. Yanchep (M. Hislop 1986)			DELETED (only 1 Atlas site - singleton). Formerly L. sp. Pth Flora. Not in 2005 dataset.
Leucopogon stenophyllus			DELETED (only 1 Atlas site - singleton). Only found on SCP in Atlas area. Not in 2005 dataset.
Levenhookia preissii			DELETED (only 1 Atlas site - singleton).
Liparophyllum capitatum	Villarsia capitata	Villarsia capitata	
Lobelia anceps	Lobelia alata	Lobelia alata	
Lolium perenne x rigidum	Lolium rigidum	Lolium rigidum	Annual rye grass
Lolium temulentum			DELETED (only 1 site).

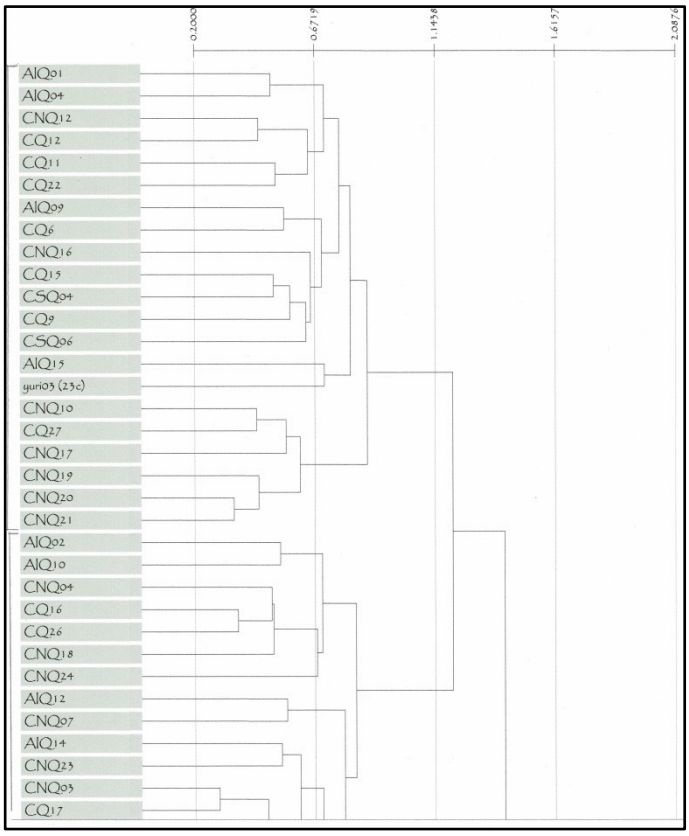
Lysimachia arvensis	Anagallis arvensis	Anagallis arvensis	
	Anagallis arvensis var. arvensis	Anagallis arvensis	
	Anagallis arvensis var. caerulea	Anagallis arvensis	
Lyginia barbata	Lyginia barbata	Lyginia barbata/Lyginia imberbis	
Lyginia imberbis	Lyginia barbata	Lyginia barbata/Lyginia imberbis	
Lysinema pentapetalum	Lysinema ciliatum	Lysinema ciliatum	
Machaerina juncea	Baumea juncea	Baumea juncea	
Macropidia fuliginosa			Not in 2005 dataset. A few on east SCP; otherwise north of SCP.
Melaleuca acutifolia	Melaleuca lateriflora subsp. acutifolia	Melaleuca lateriflora subsp. acutifolia	
Melaleuca clavifolia		Melaleuca clavifolia	Not in 2005 dataset; north of Moore R
Melaleuca concreta	Melaleuca uncinata	Melaleuca uncinata	
Melaleuca leuropoma			DELETED (only at 1 Atlas site - singleton). Not in 2005 dataset.
Microlaena stipoides var. stipoides	Microlaena stipoides	Microlaena stipoides	
Microtis media subsp. media	Microtis media	Microtis media	
Patersonia occidentalis var. occidentalis	Patersonia occidentalis	Patersonia occidentalis	
Pentameris airoides subsp. airoides	Pentaschistis airoides	Pentaschistis airoides	
Petrophile brevifolia	Petrophile brevifolia subsp. brevifolia	Petrophile brevifolia	
Phyllangium divergens	Phyllangium paradoxum	Phyllangium paradoxum	
Plantago coronopus subsp. commutata			DELETED (only at 1 Atlas Infrastructure site - singleton). Not in 2005 dataset
Podolepis sp.			DELETED.
Polycarpon tetraphyllum			DELETED (only 1 Atlas site - singleton).
Prasophyllum gracile			DELETED (only 1 Atlas site - singleton). Not in 2005 dataset.
Pterostylis orbiculata	Pterostylis sanguinea	Pterostylis sanguinea	
Pterostylis ?vittata			DELETED.
Ptilotus polystachyus	Ptilotus polystachyus var. polystachyus	Ptilotus polystachyus	
Romulea rosea	Romulea rosea var. australis	Romulea rosea var. australis	
Rytidosperma occidentale	Austrodanthonia occidentalis	Austrodanthonia occidentalis	

Salicornia blackiana		Salicornia blackiana	Not in 2005 dataset. Previously Sarcocornia blackiana. At two Atlas sites.
Samolus repens var. paucifolius	Samolus repens	Samolus repens	
Schoenus badius	Schoenus pennisetis	Schoenus pennisetis	Probably incorrect ID. Probably Schoenus pennisetis.
Schoenus fascicularis	Schoenus subfascicularis	Schoenus subfascicularis	
Schoenus laevigatus		Schoenus laevigatus	Not in 2005 dataset. Recorded in 1 Atlas site and 3 Atlas Infrastructure sites.
Schoenus pleiostemoneus		Schoenus pleiostemoneus	Not in 2005 dataset. Mostly from north of Moore River
Scholtzia umbellifera		Scholtzia umbellifera	Not in 2005 dataset. Occurs north from Atlas area.
Senecio glossanthus		Senecio glossanthus	Not in 2005 dataset.
Senecio pinnatifolius var. latilobus	Senecio lautus subsp. dissectifolius	Senecio lautus	
	Senecio lautus subsp. maritimus	Senecio lautus	
Solanum aviculare			DELETED (only 1 Atlas site - singleton).
Sonchus asper	Sonchus asper subsp. glaucescens	Sonchus asper	
Spergularia brevifolia	Spergularia diandra	Spergularia diandra	
Stenanthemum pomaderroides			DELETED (only 1 Atlas site – singleton. ID needs confirmation.
Stylidium aceratum	Stylidium calcaratum	??Stylidium calcaratum	Formerley part of S. calcaratum complex.
Stylidium araeophyllum	Stylidium brunonianum subsp. brunonianum	Stylidium brunonianum subsp. brunonianum	
Stylidium bicolor	Stylidium piliferum subsp piliferum	Stylidium piliferum	Mostly north of Moore R; formerley Stylidium piliferum var. bicolor
Stylidium hymenocraspedum			DELETED (only 1 Atlas site - singleton). Not in 2005 dataset.
Stylidium kalbarriense	Stylidium kalbarriense	Stylidium kalbarriense	Not in 2005 dataset. Recorded north from northern SCP.
Stylidium obtusatum	Stylidium obtusatum var. obtusatum	Stylidium obtusatum var. obtusatum	
Stylidium purpureum	Stylidium brunonianum subsp. brunonianum	Stylidium brunonianum subsp. brunonianum	
Stylidium rigidulum	Stylidium macrocarpum	Stylidium macrocarpum	
Styphelia conostephioides	Leucopogon conostephioides	Leucopogon conostephioides	
Styphelia planifolia		Styphelia planifolia	Not in 2005 dataset. Formerly Leucopogon planifolius; Doesn't occur south of Moore River

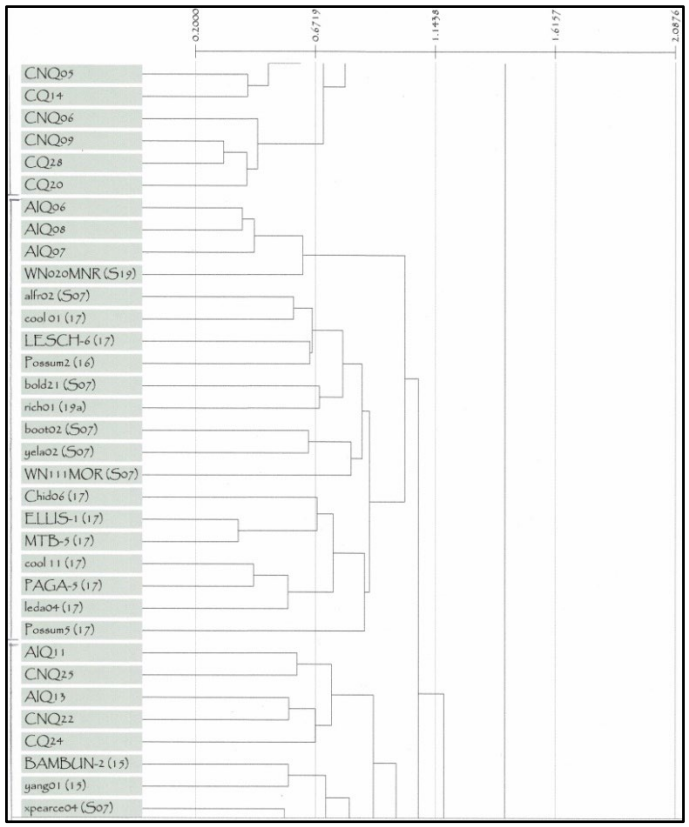
Styphelia tortifolia	Astroloma glaucescens	Astroloma glaucescens	
Styphelia xerophylla	Astroloma xerophyllum	Astroloma xerophyllum	
Tecticornia halocnemoides	Halosarcia halocnemoides subsp. halocnemoides	Halosarcia halocnemoides subsp. halocnemoides	
Tecticornia indica subsp. bidens	Halosarcia indica subsp. bidens	Halosarcia indica subsp. bidens	
Tecticornia moniliformis		Tecticornia moniliformis	Not in 2005 dataset. Formerly Sclerostegia moniliformis
Tecticornia syncarpa		Tecticornia syncarpa	Not in 2005 dataset. Formerley Halosarcia syncarpa. Not in 2005 SCP dataset.
Thysanotus manglesianus	Thysanotus manglesianus/patersonii complex	Thysanotus manglesianus/patersonii complex	
	Thysanotus manglesianus	Thysanotus manglesianus/patersonii complex	
Tribonanthes variabilis	Tribonanthes australis	Tribonanthes australis	
Tribonanthes monantha	Tribonanthes australis	Tribonanthes australis	DELETED: only one specimen in Atlas data. Not in 2005 dataset.
Tricoryne sp. Eneabba (E.A. Griffin 1200)		Tricoryne sp. Eneabba (E.A. Griffin 1200)	Not in 2005 dataset. Tricoryne robusta is a synonym. Mostly nth of Moore River.
Tricostularia neesii	Tricostularia neesii var. neesii	Tricostularia neesii var. neesii	
Trifolium hybridum var. hybridum			DELETED (only 1 Atlas site - singleton). Not in 2005 dataset.
Triglochin centrocarpa	Triglochin centrocarpum	Triglochin centrocarpum	
Triglochin calcitrapa		Triglochin calcitrapa	Not in 2005 dataset.
Triglochin sp. A Flora of Australia (G.J. Keighery 2477)		incl in Triglochin calcitrapa	
Triglochin nana	Triglochin centrocarpum	incl in Triglochin centrocarpum	
Ursinia anthemoides subsp. anthemoides	Ursinia anthemoides	Ursinia anthemoides	
Vulpia fasciculata			DELETED. Only at 2 Atlas sites.
Vulpia myuros forma myuros	Vulpia myuros	Vulpia myuros	
Wahlenbergia gracilenta			DELETED (only 1 Atlas site - singleton).
Xanthosia huegelii	Xanthosia huegelii subsp. huegelii	Xanthosia huegelii subsp. huegelii	

III. Extracts from the the PATN analyses dendrograms

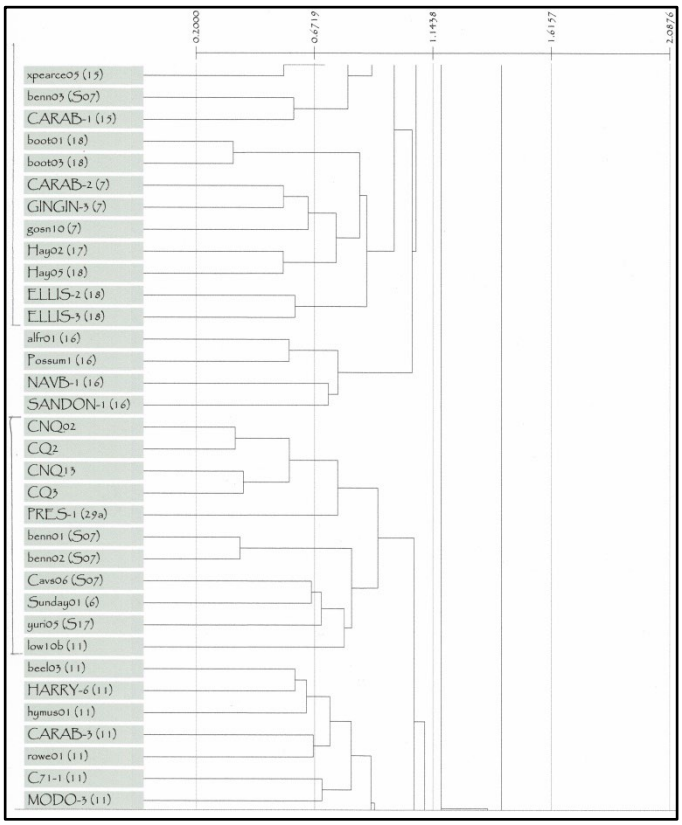
i) 'All Sites' Analysis : Weed and Native Flora (WNF) for the SCP 2005 dataset with all Atlas quadrat data (78 quadrats) - extracts from dendrogram



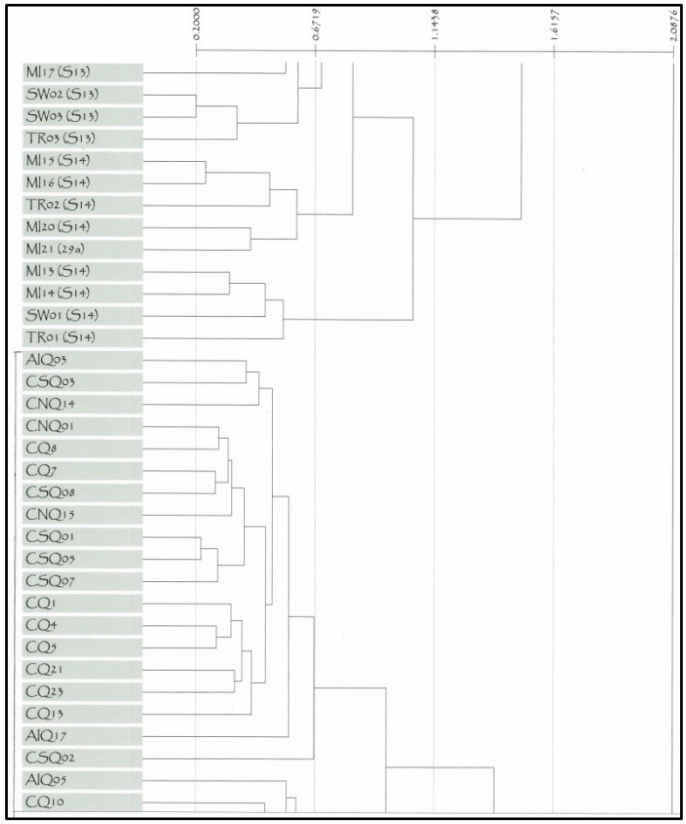
All Atlas sites (78) and WNF SCP 2005 dataset – Page 1



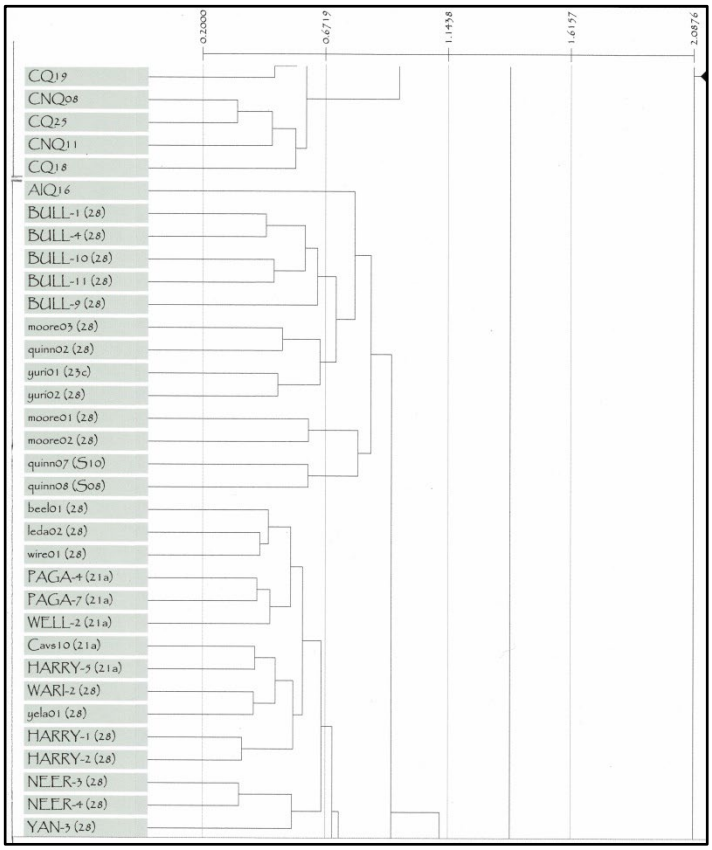
All Atlas sites (78) and WNF SCP 2005 dataset – Page 2



All Atlas sites (78) and WNF SCP 2005 dataset – Page 3

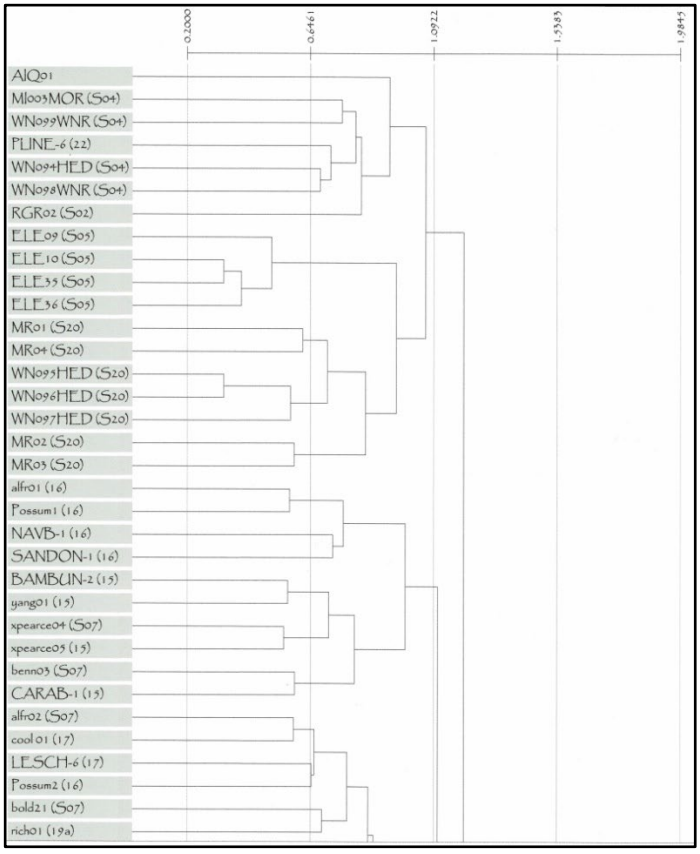


All Atlas sites (78) and WNF SCP 2005 dataset – Page21

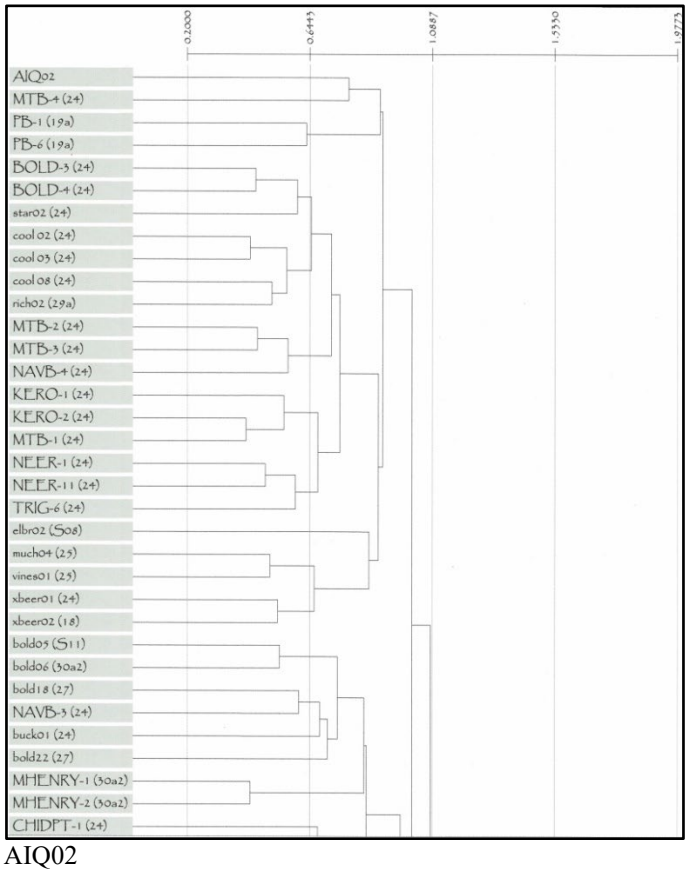


All Atlas sites (78) and WNF SCP 2005 dataset – Page 22

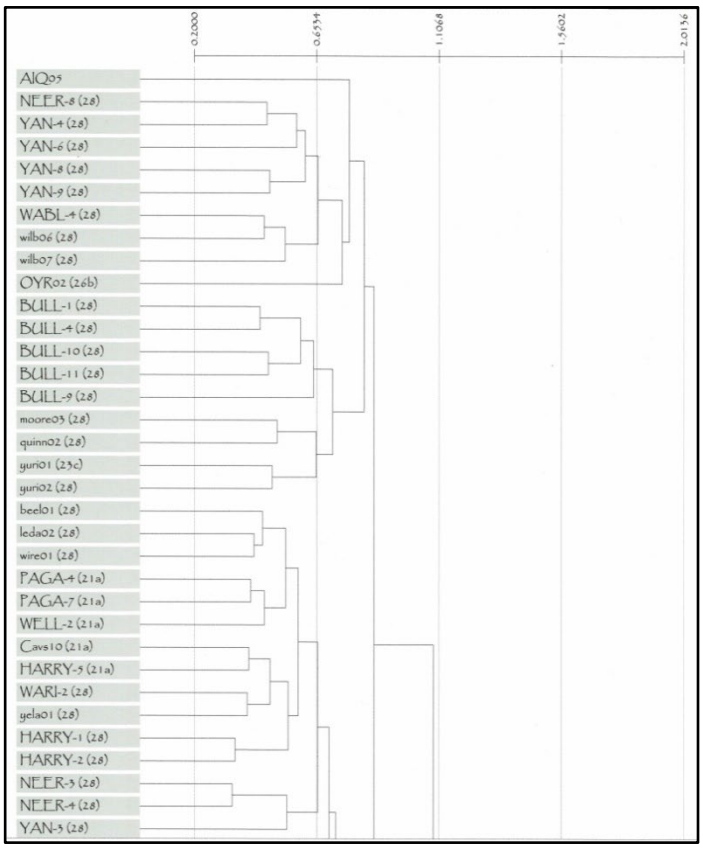
ii) Single Site Insertion Analyses



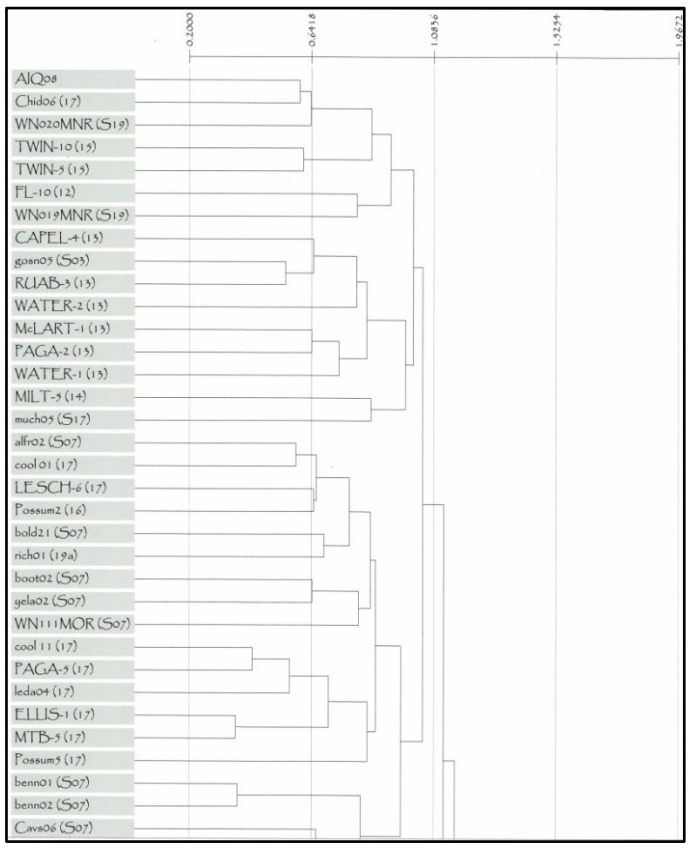
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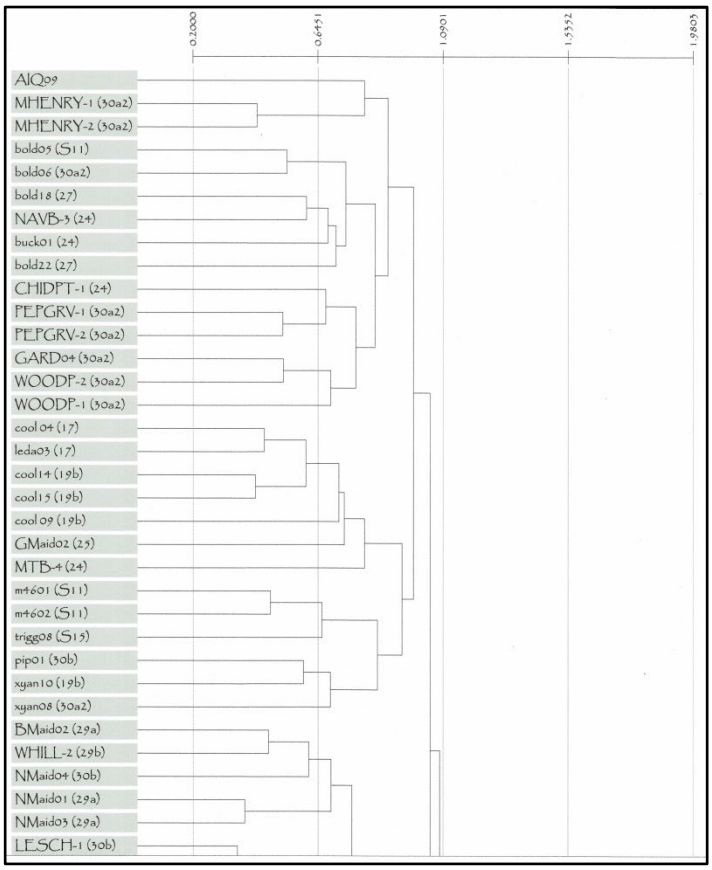
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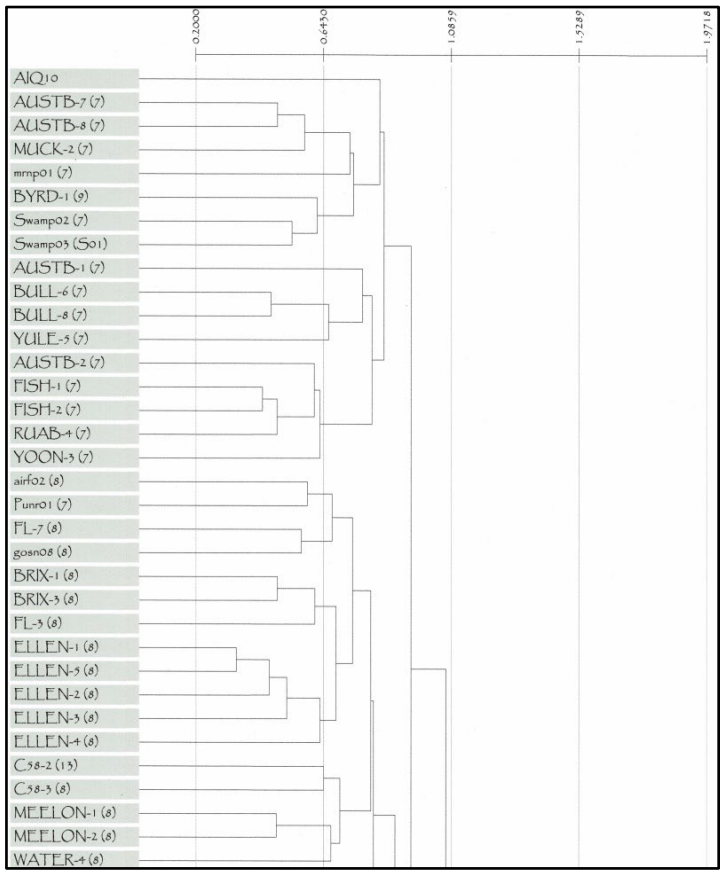
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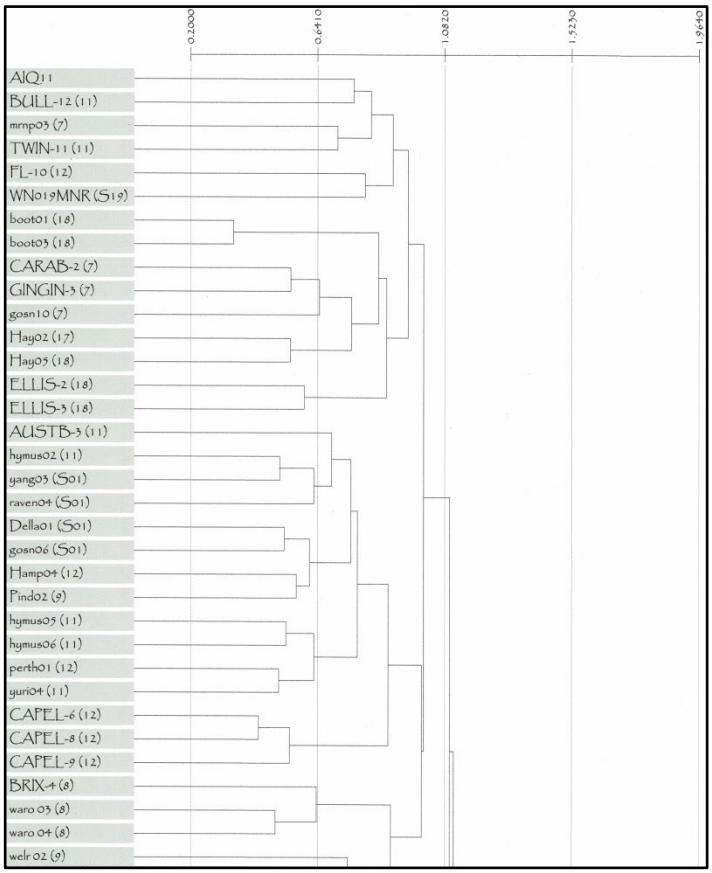
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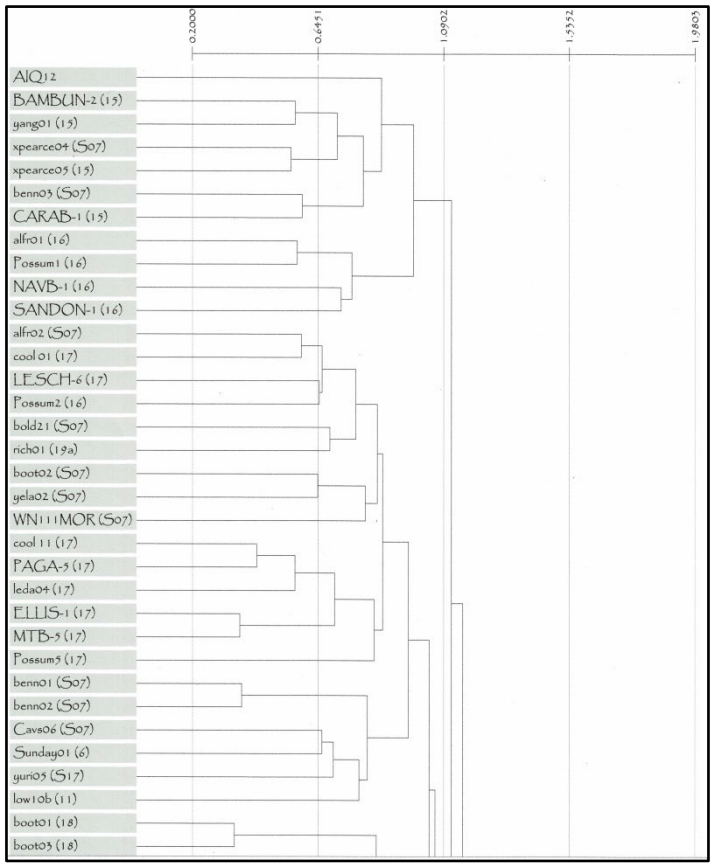
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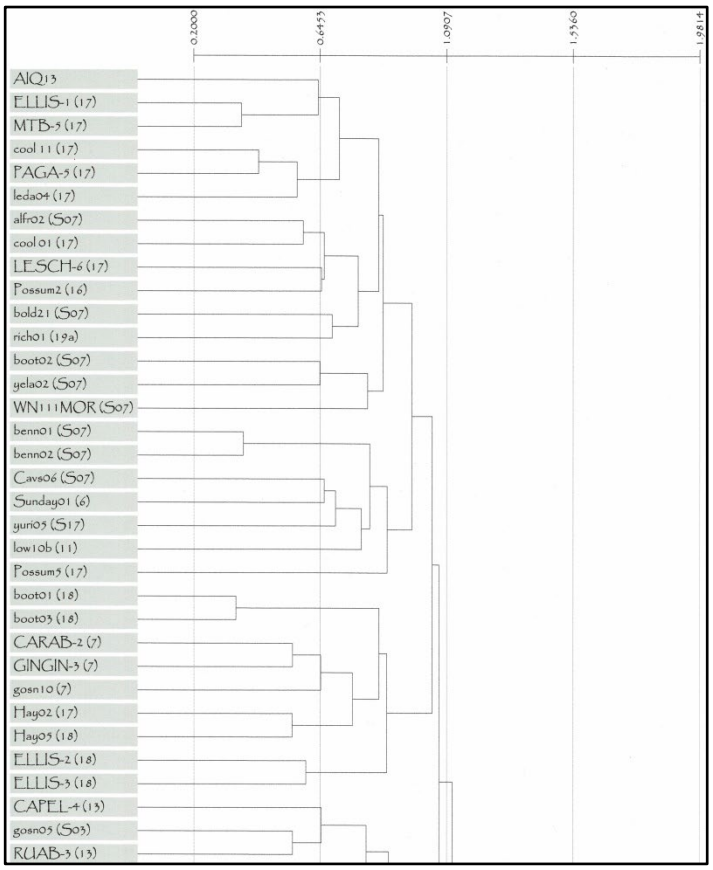
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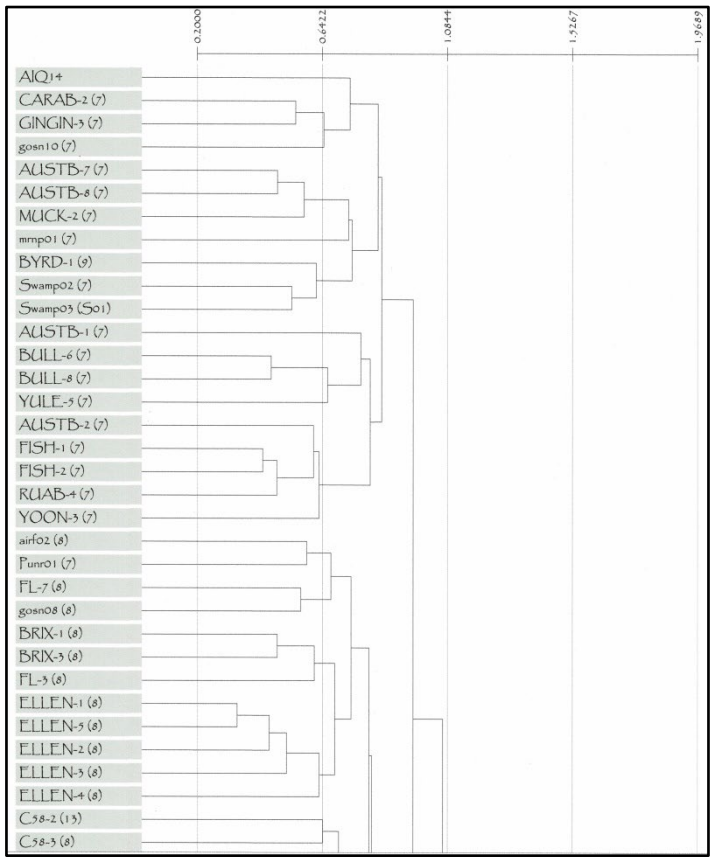
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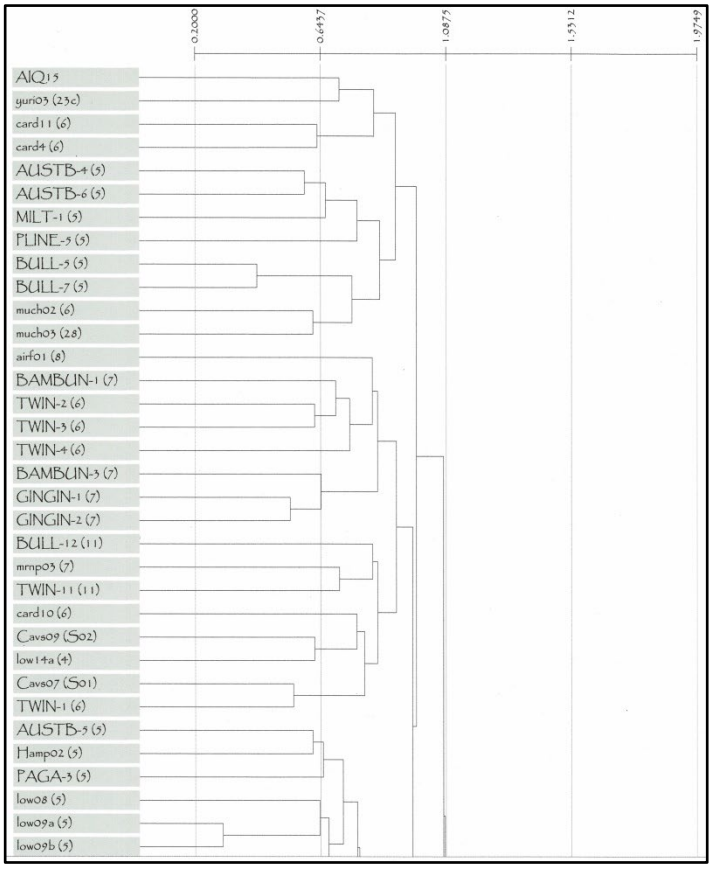
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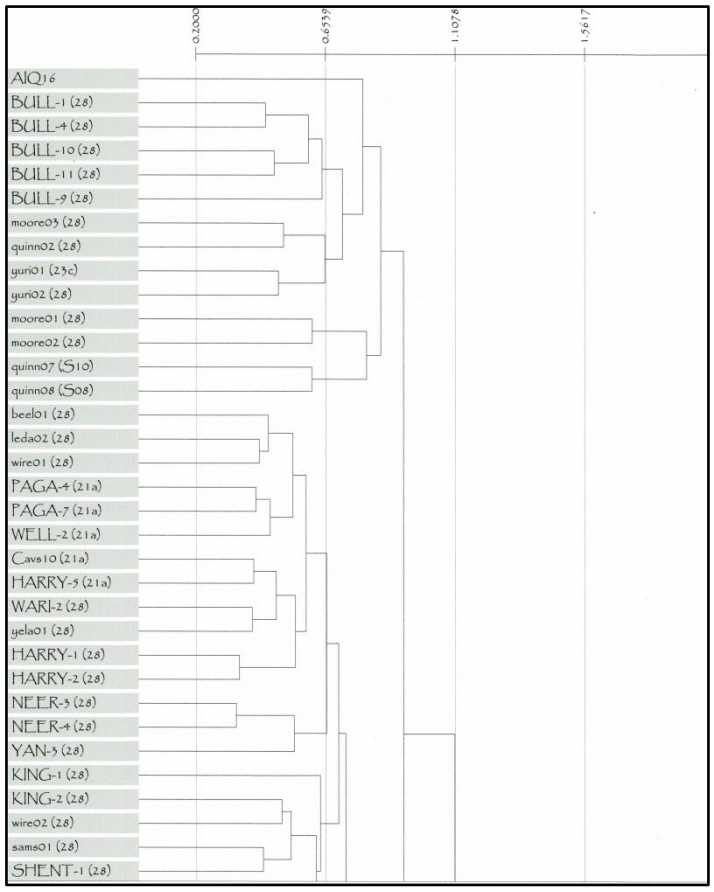
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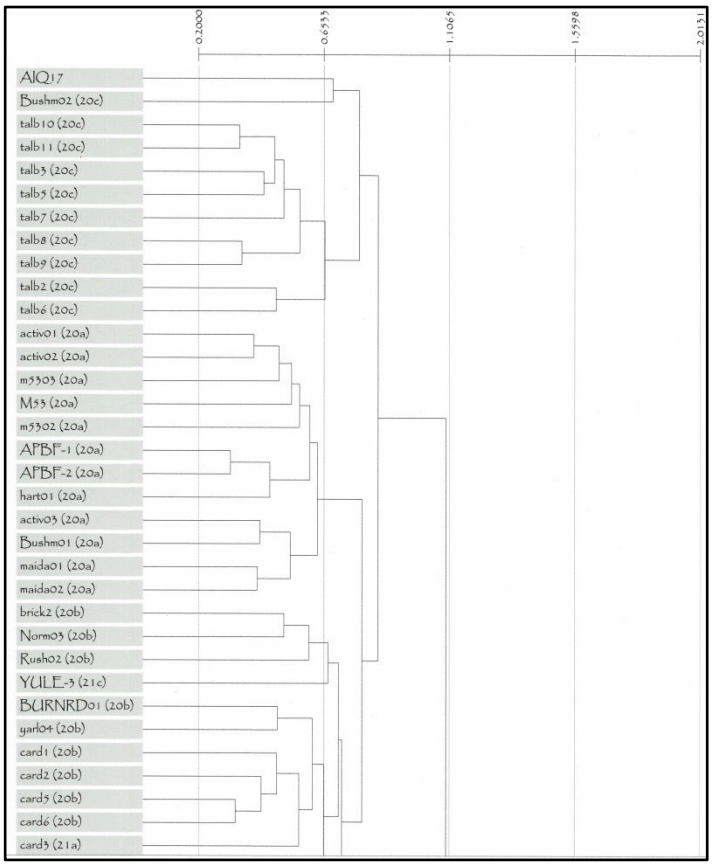
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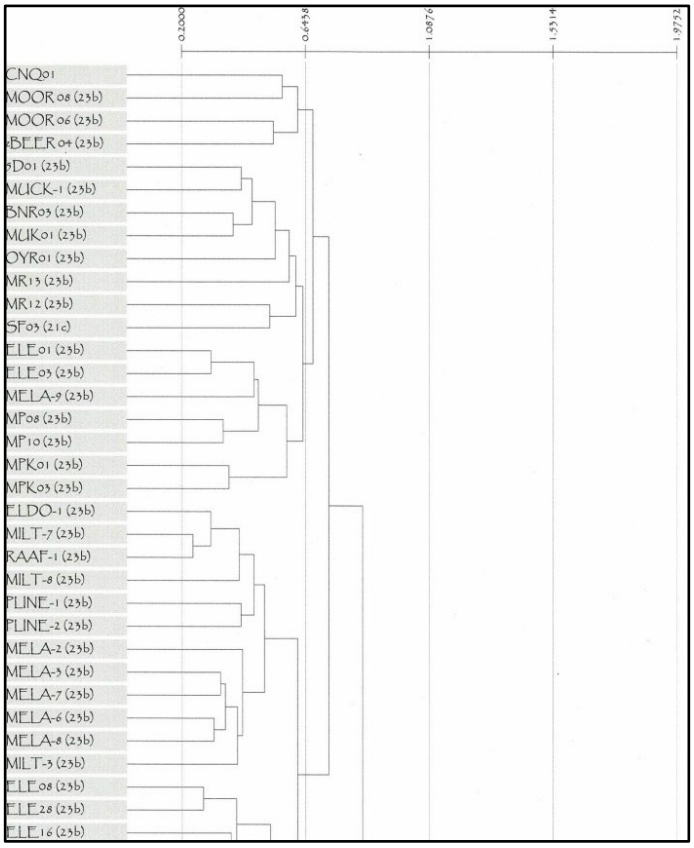


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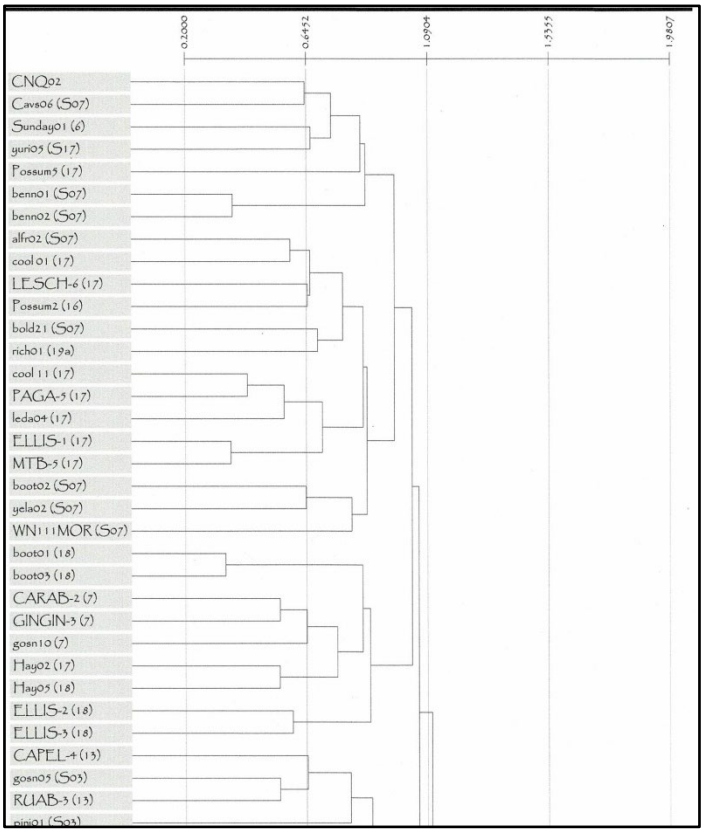


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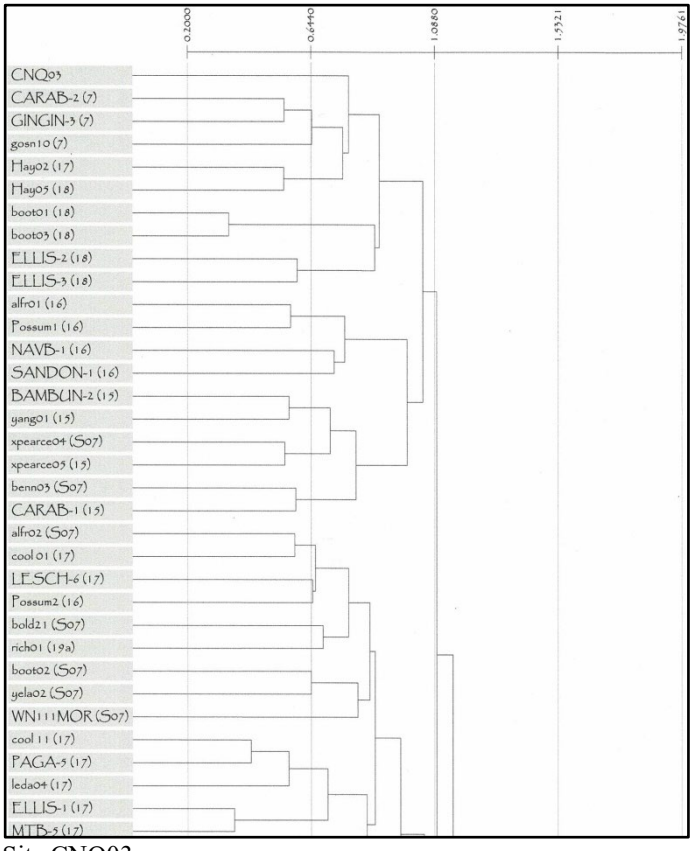

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talb5 (20c)
talb7 (20c)
talb8 (20c)
talb9 (20c)
talb2 (20c)
talb6 (20c)
activ01 (20a)
activ02 (20a)
m5303 (20a)
M53 (20a)
m5302 (20a)
AFBF-1 (20a)
AFBF-2 (20a)
hart01 (20a)
activ03 (20a)
Bushm01 (20a)
maida01 (20a)
maida02 (20a)
brick2 (20b)
Norm03 (20b)
Rush02 (20b)
YULE-3 (21c)
BURNRD01 (20b)
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AIQ17



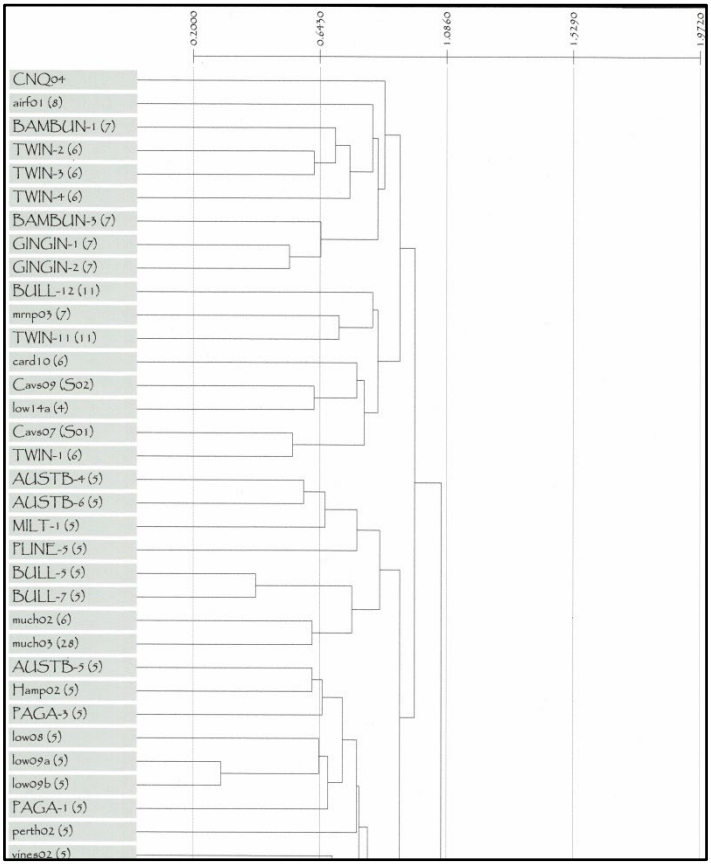
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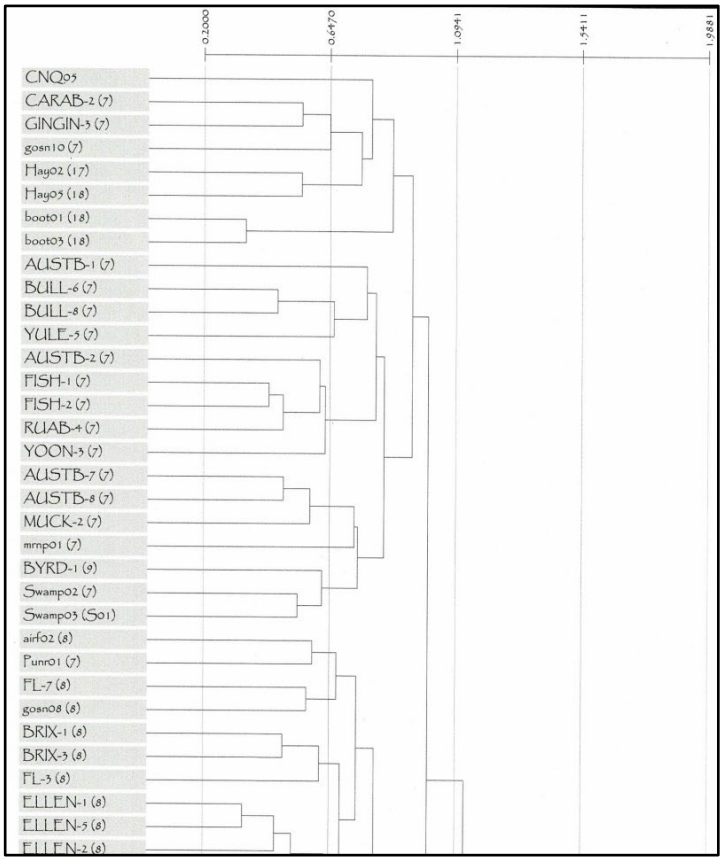
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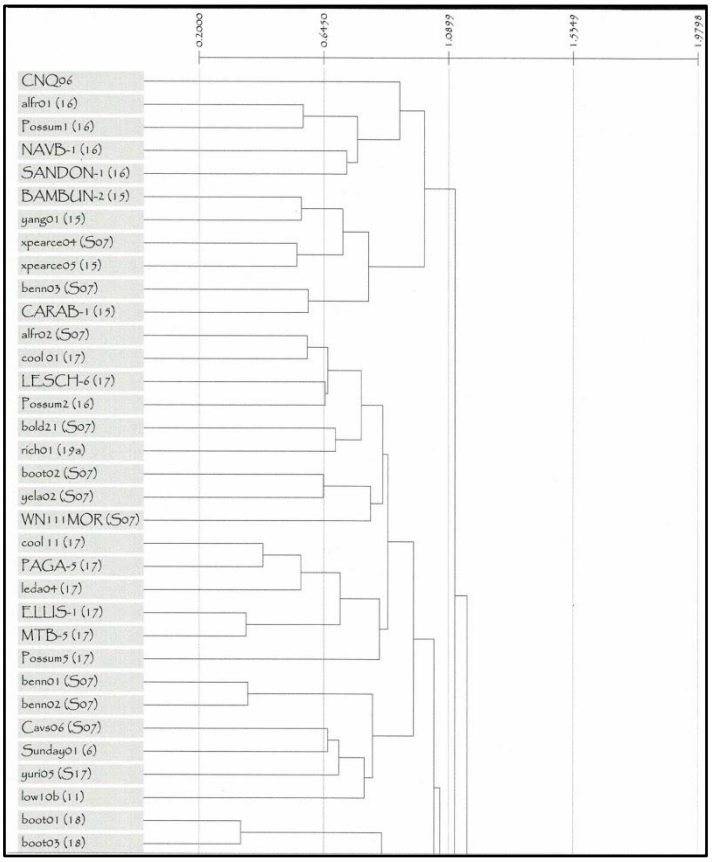
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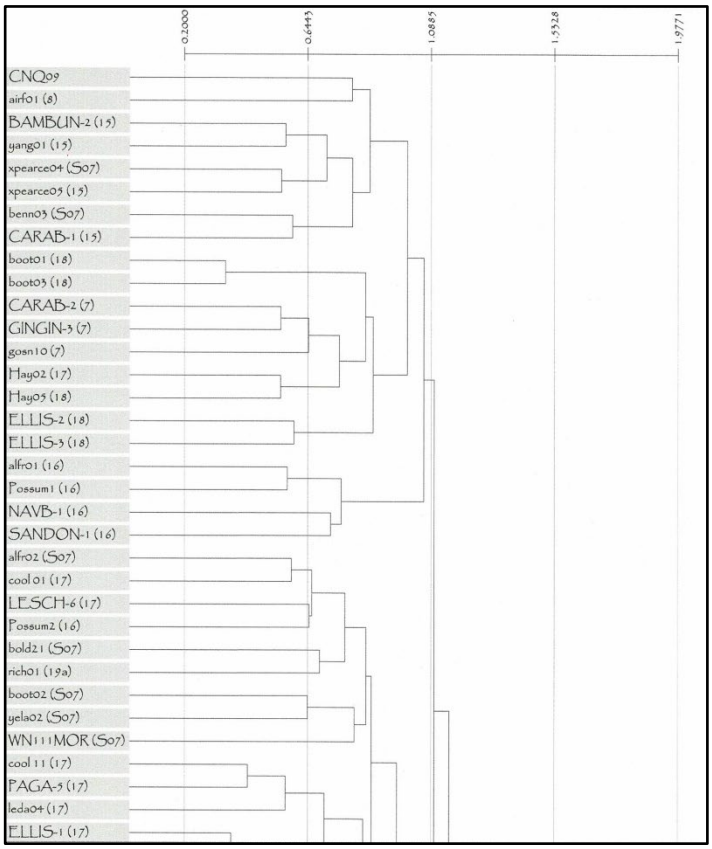
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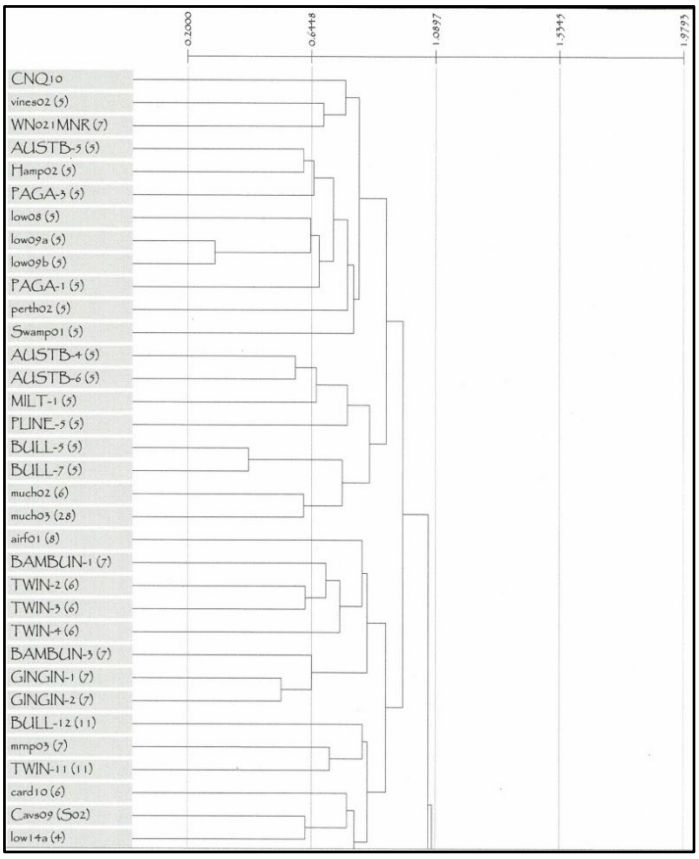
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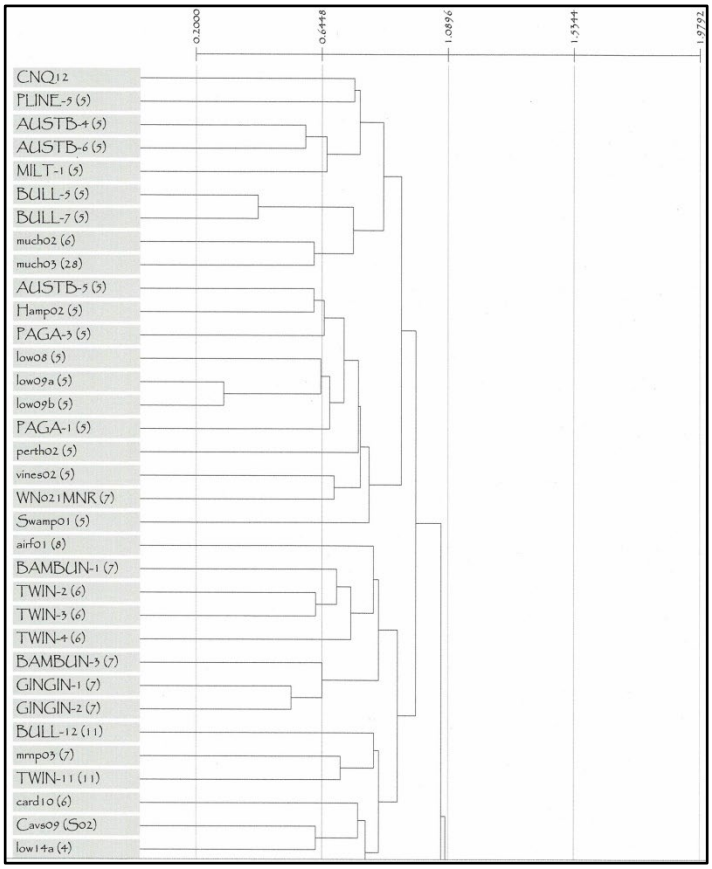
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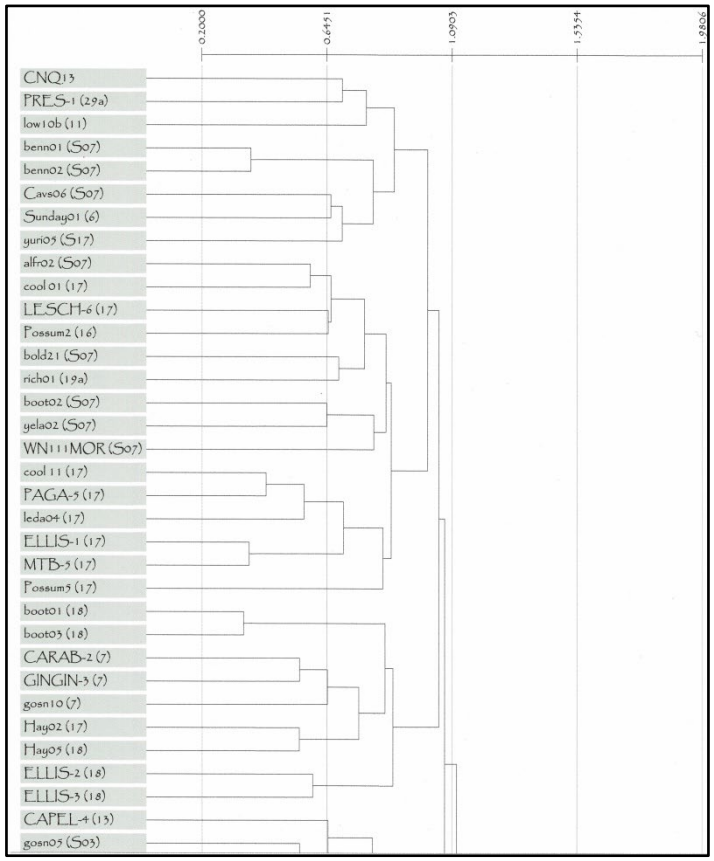
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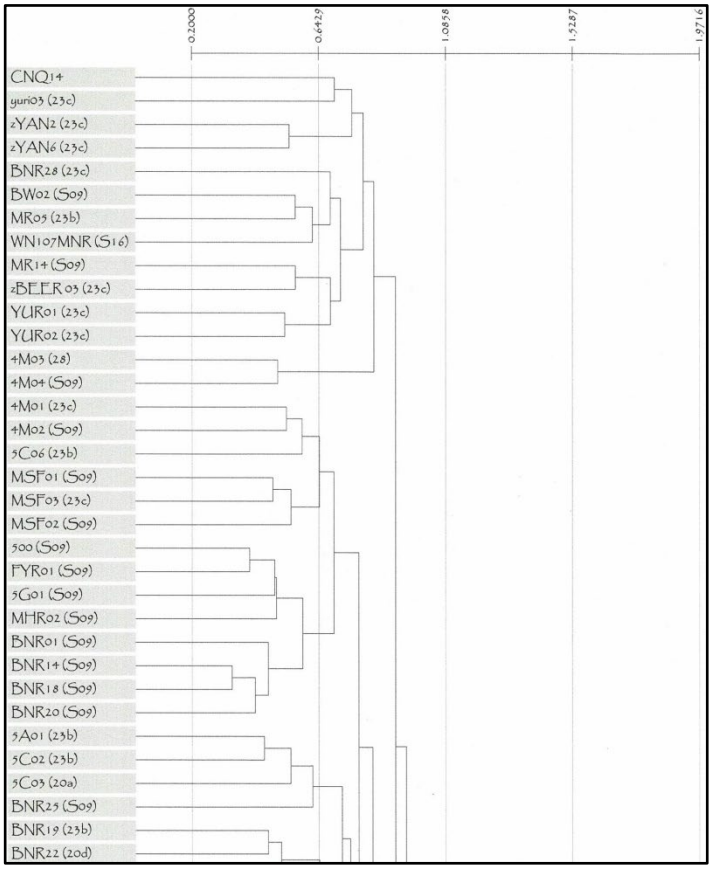
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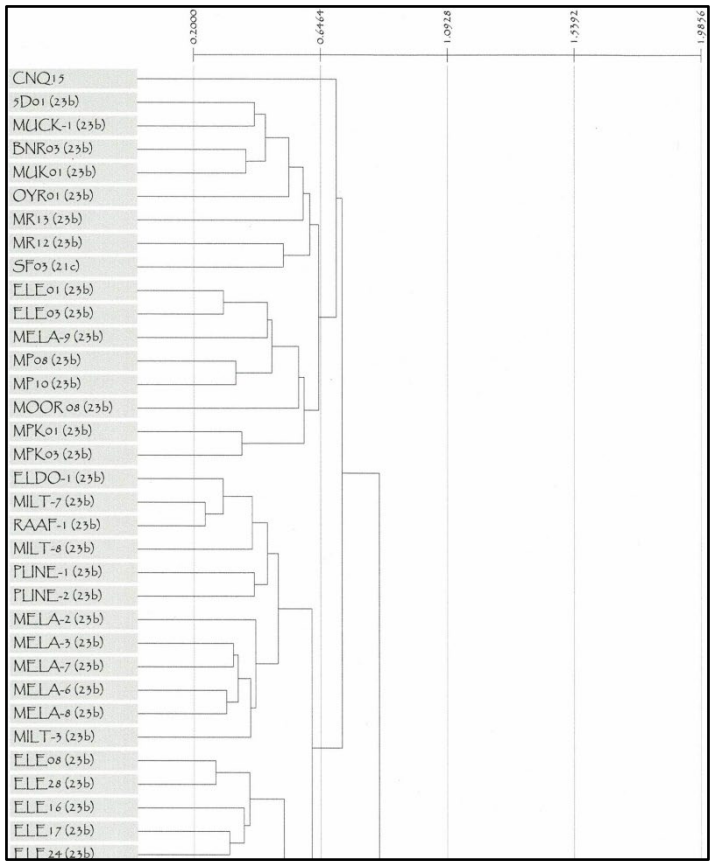
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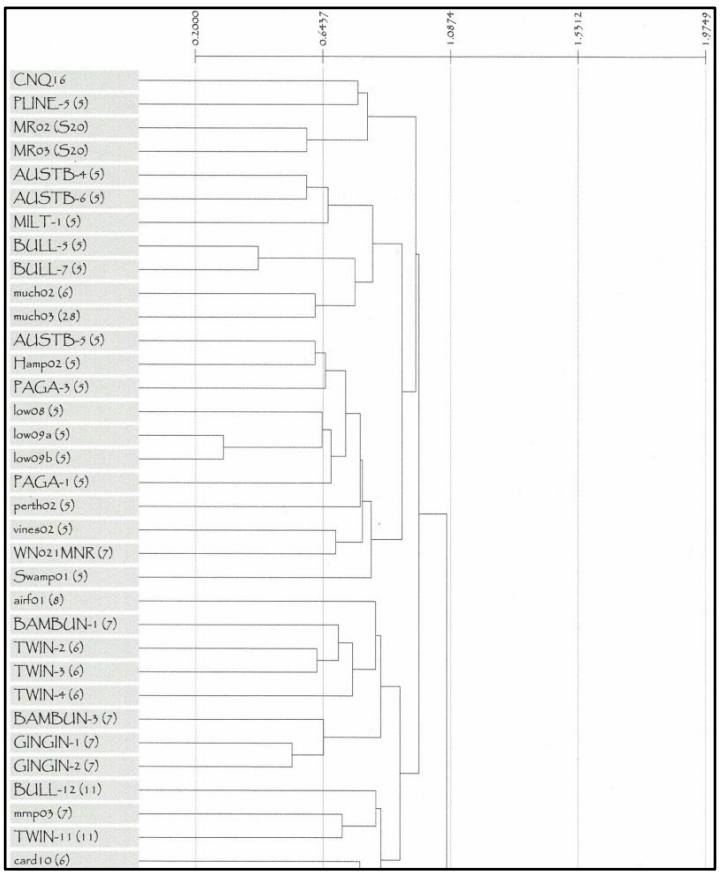
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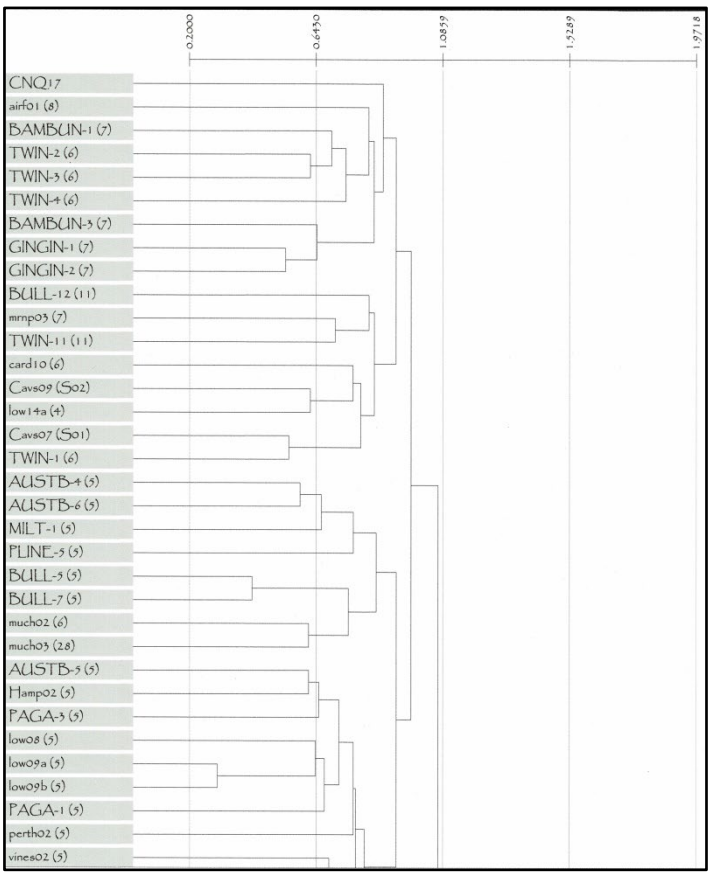
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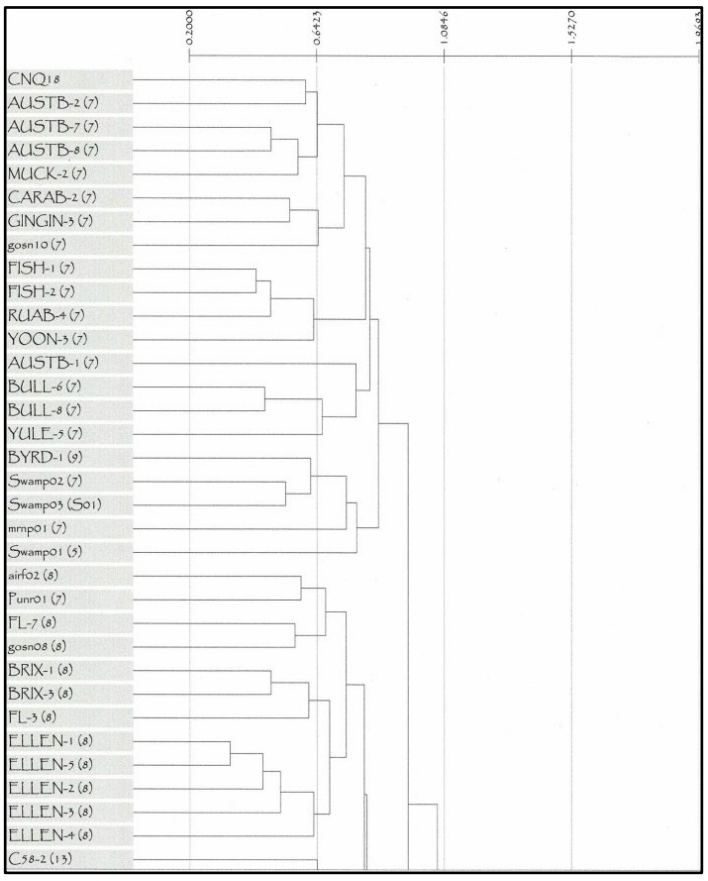
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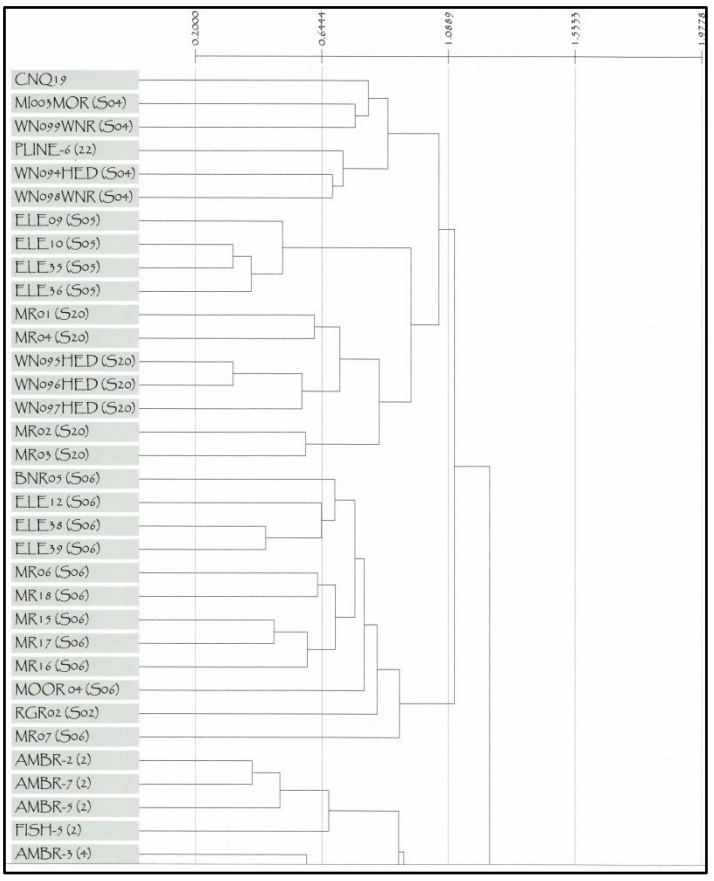
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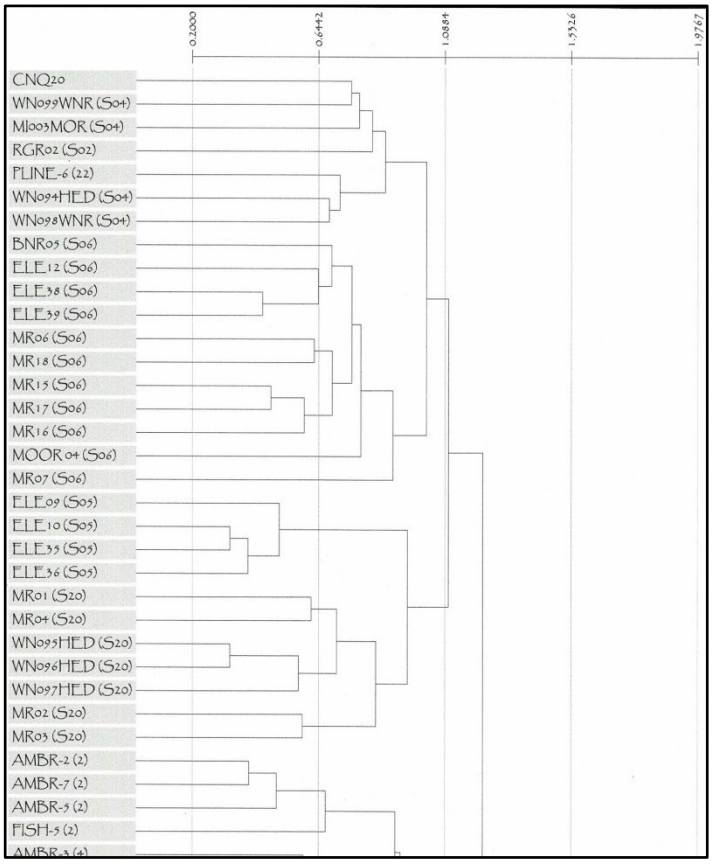
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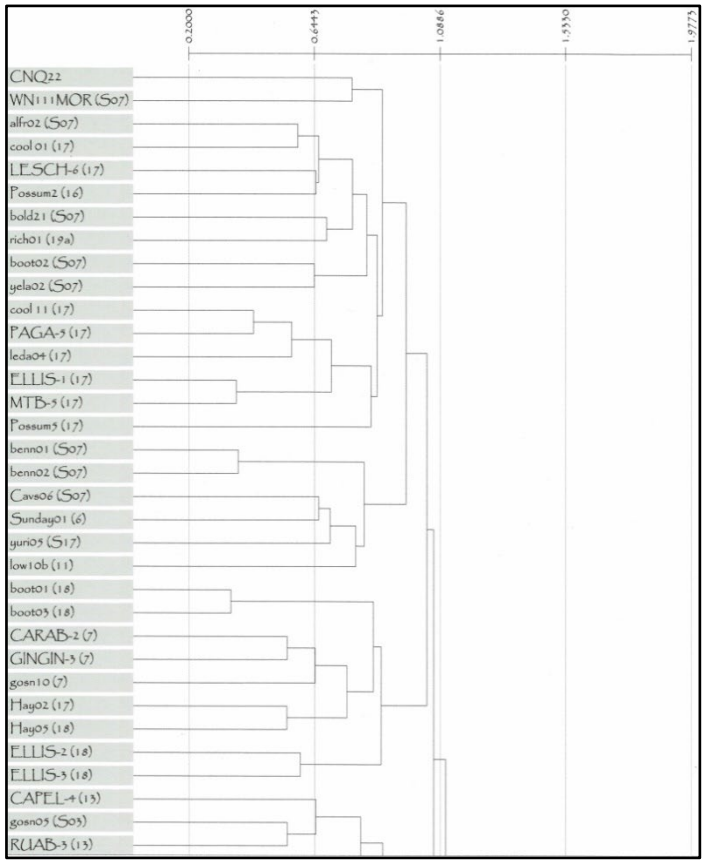
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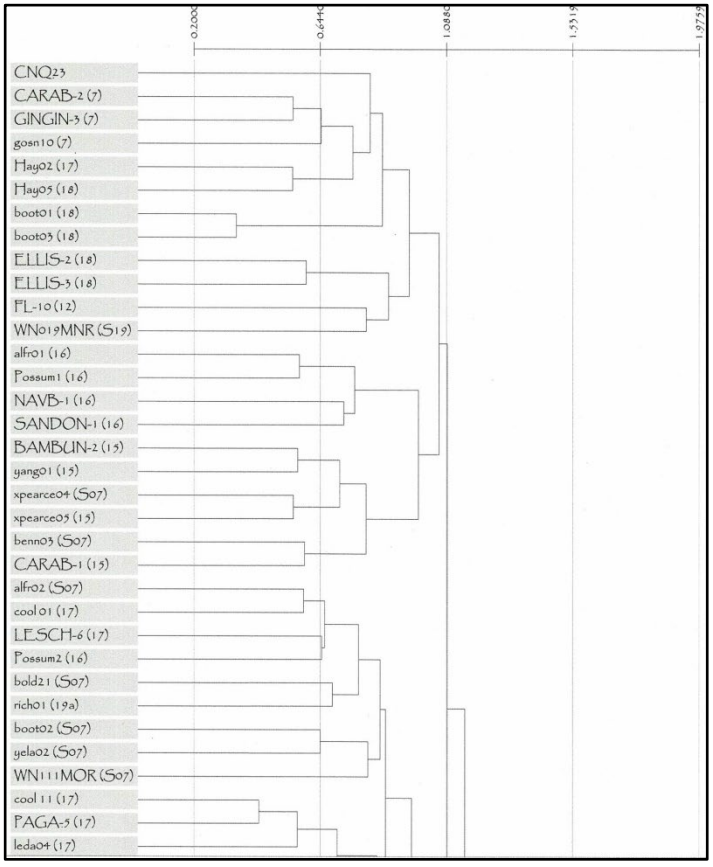
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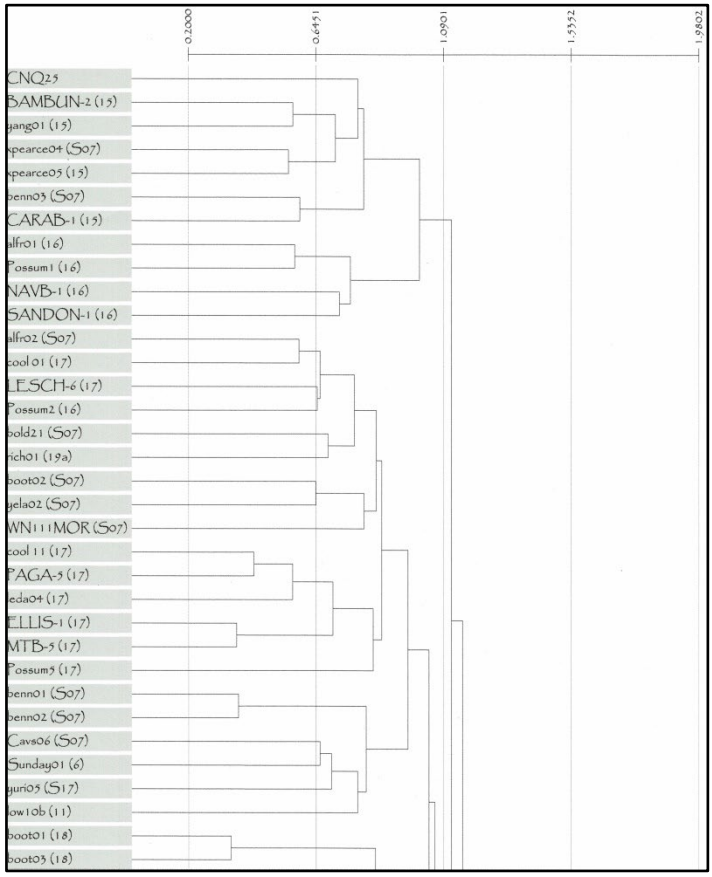
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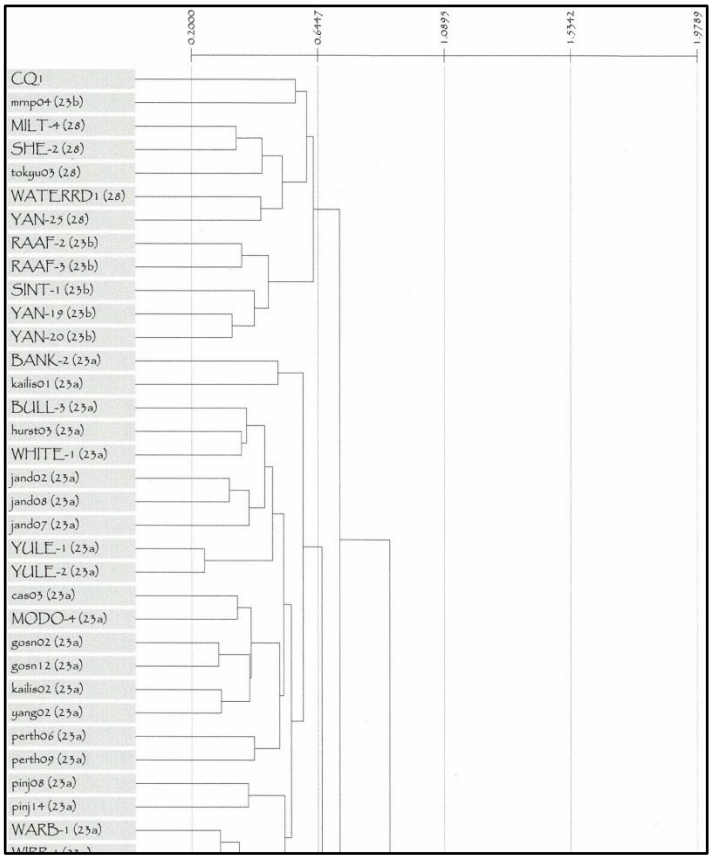
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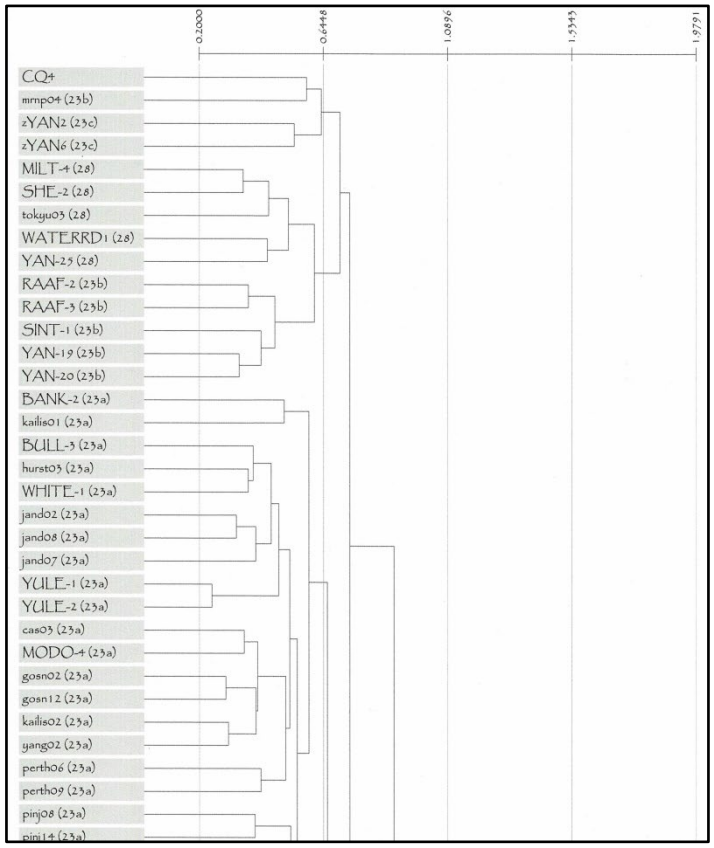
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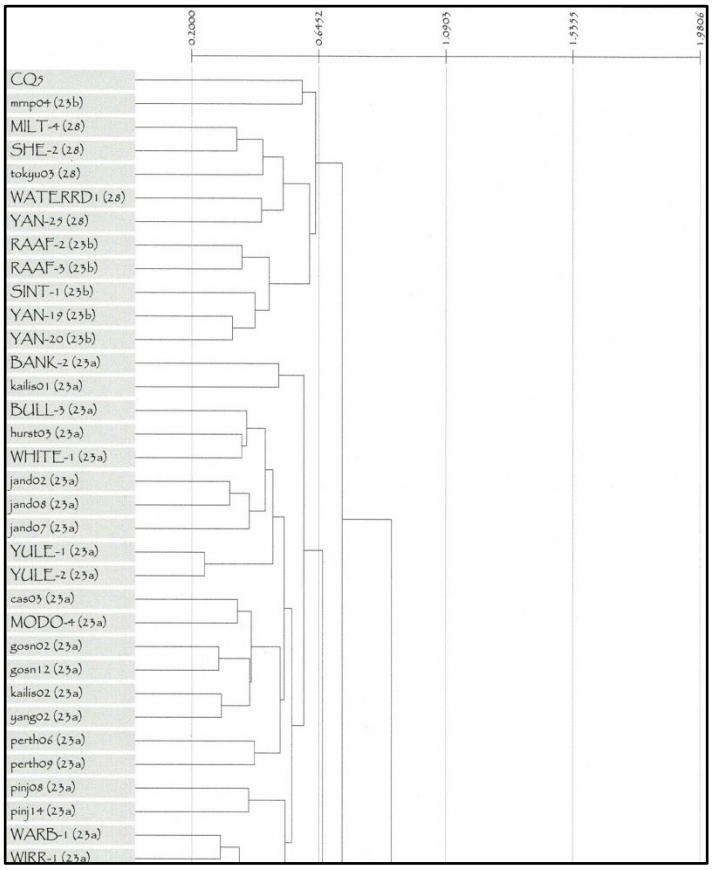
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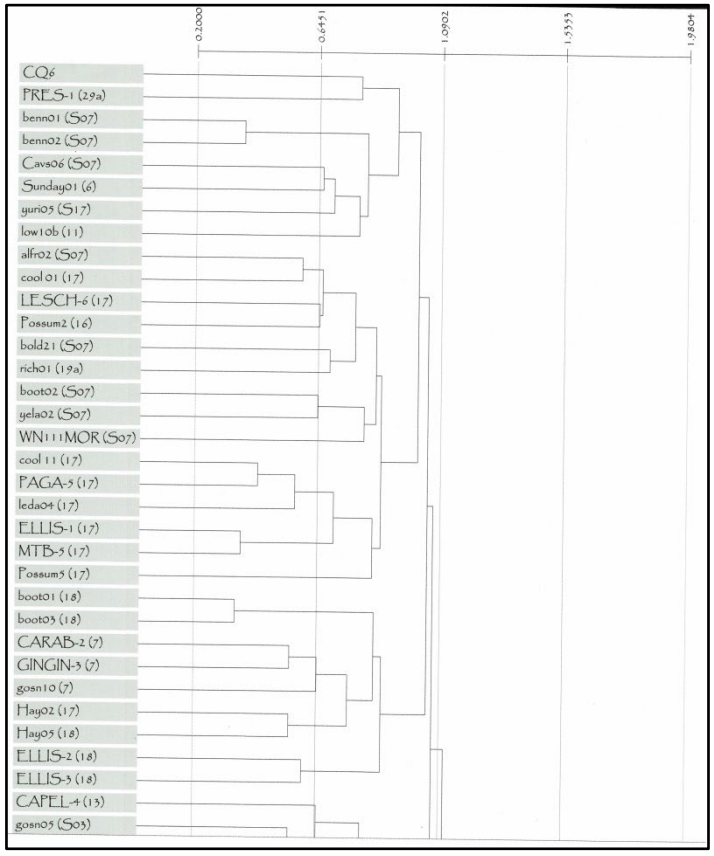
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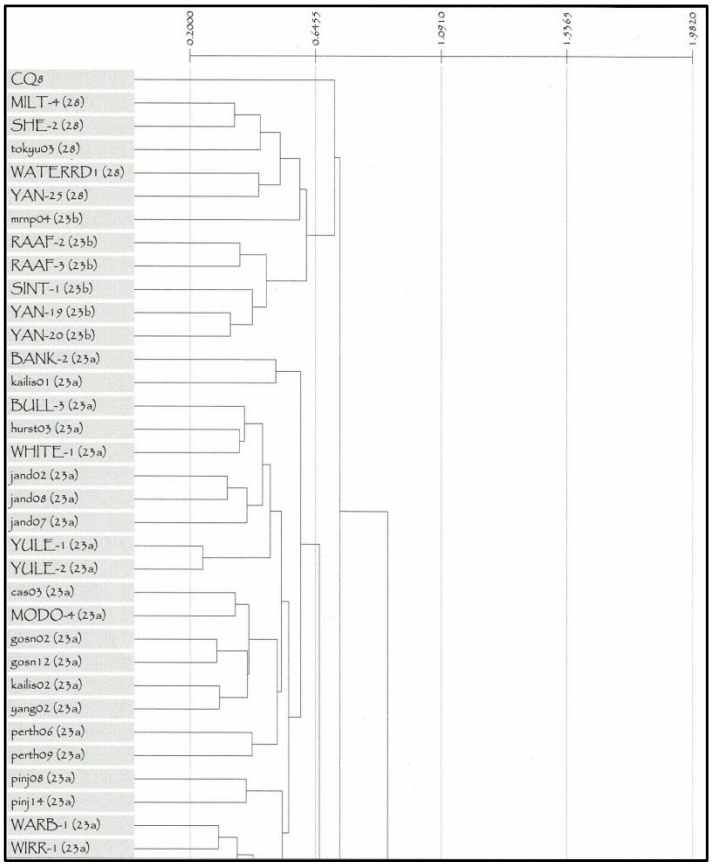
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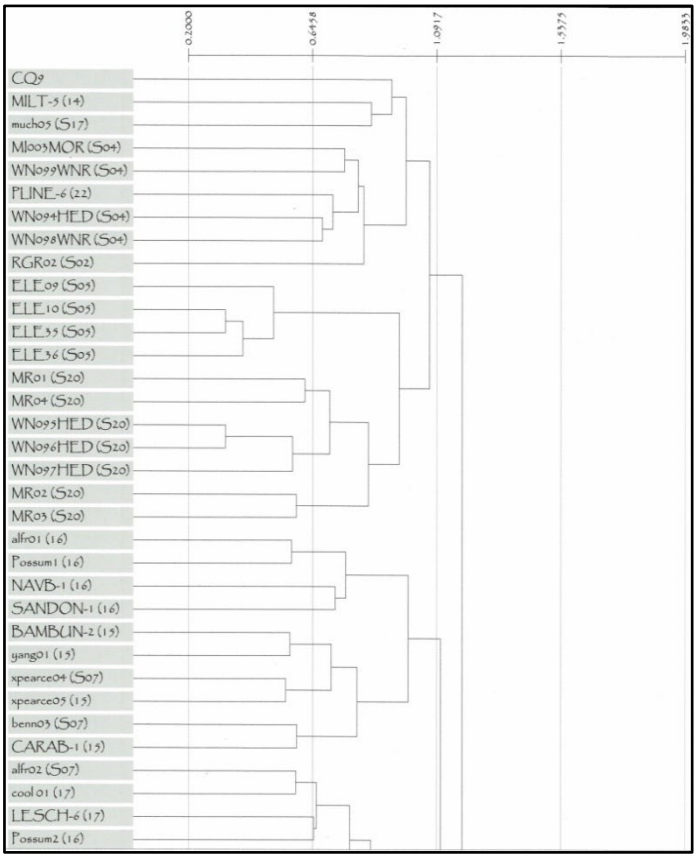
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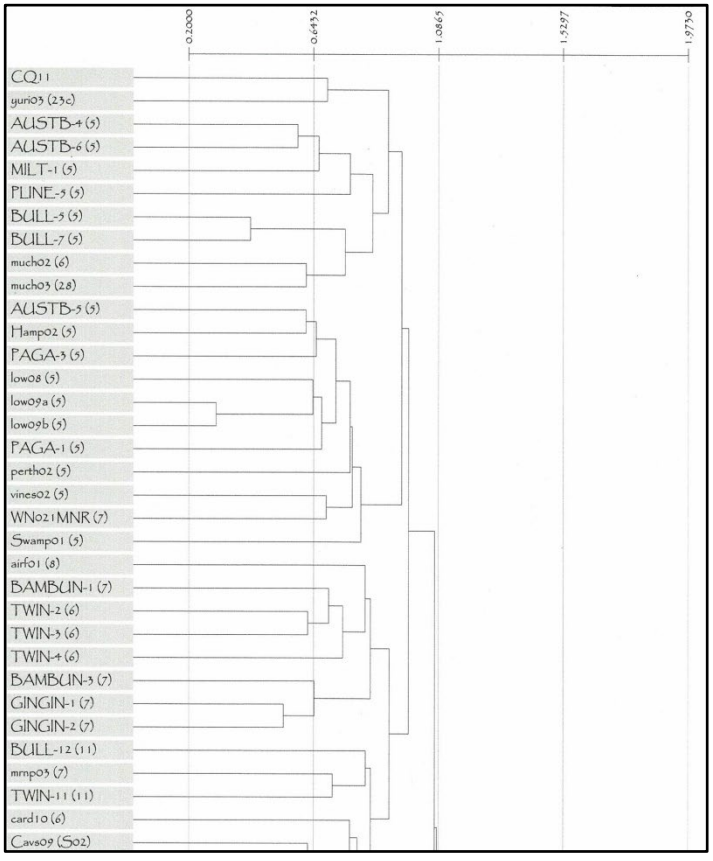
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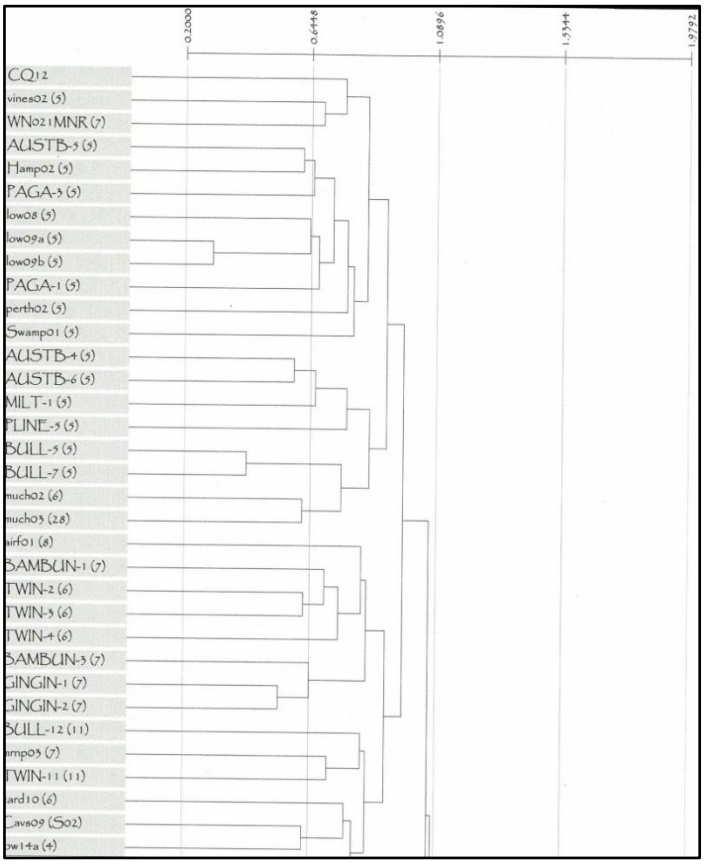
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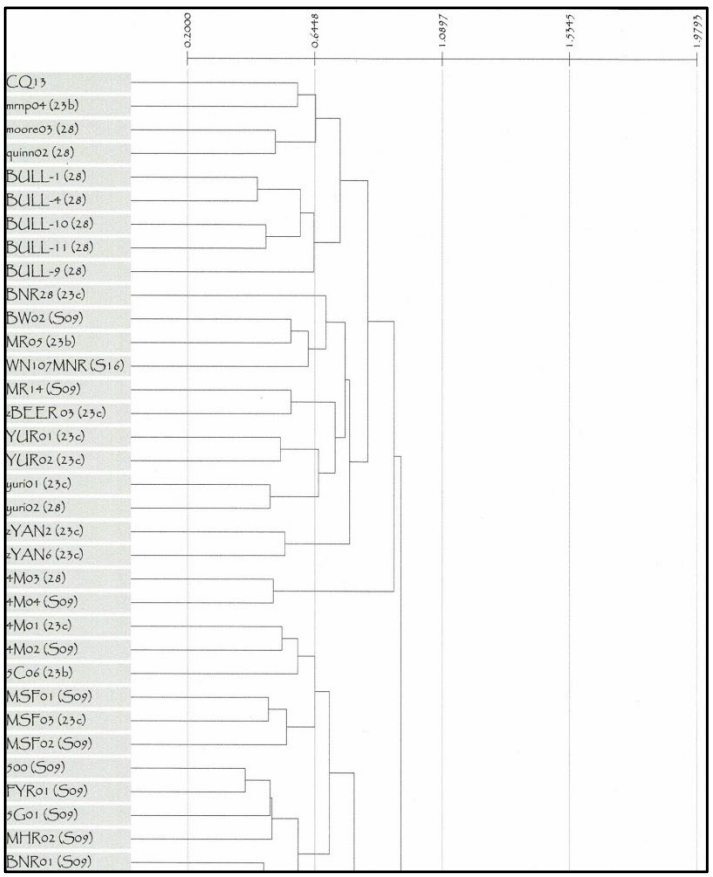
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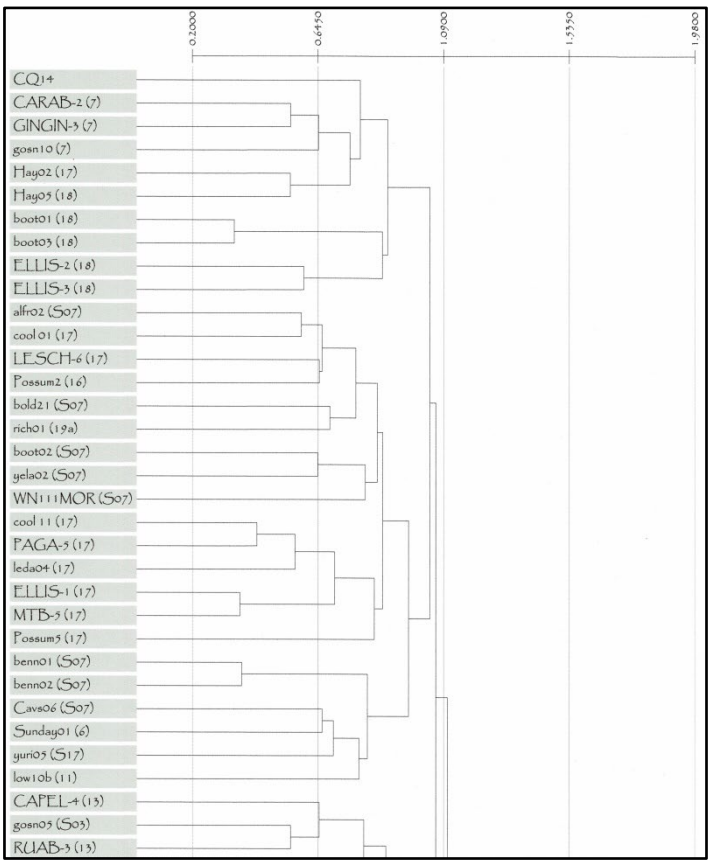
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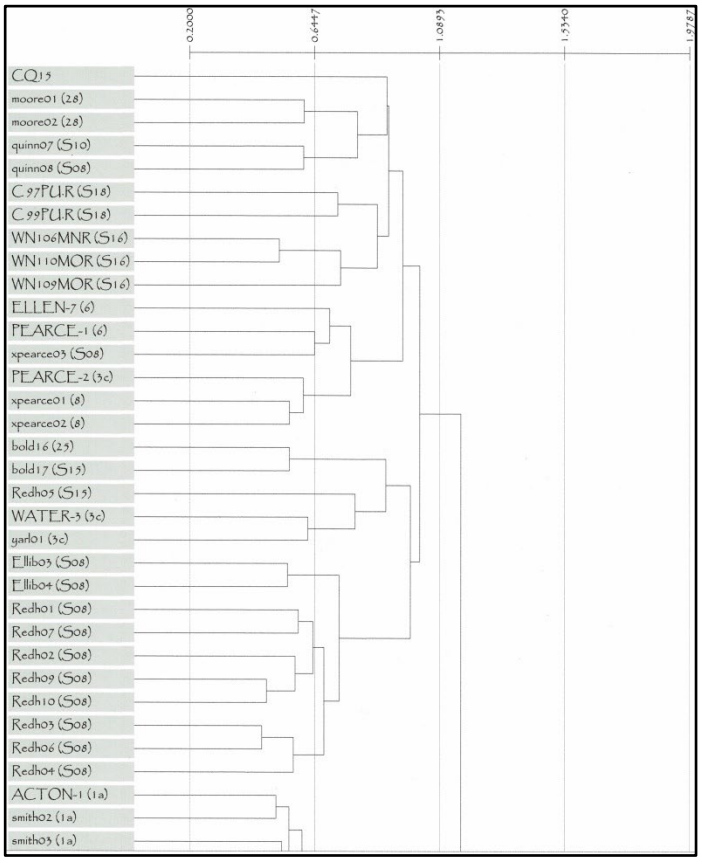
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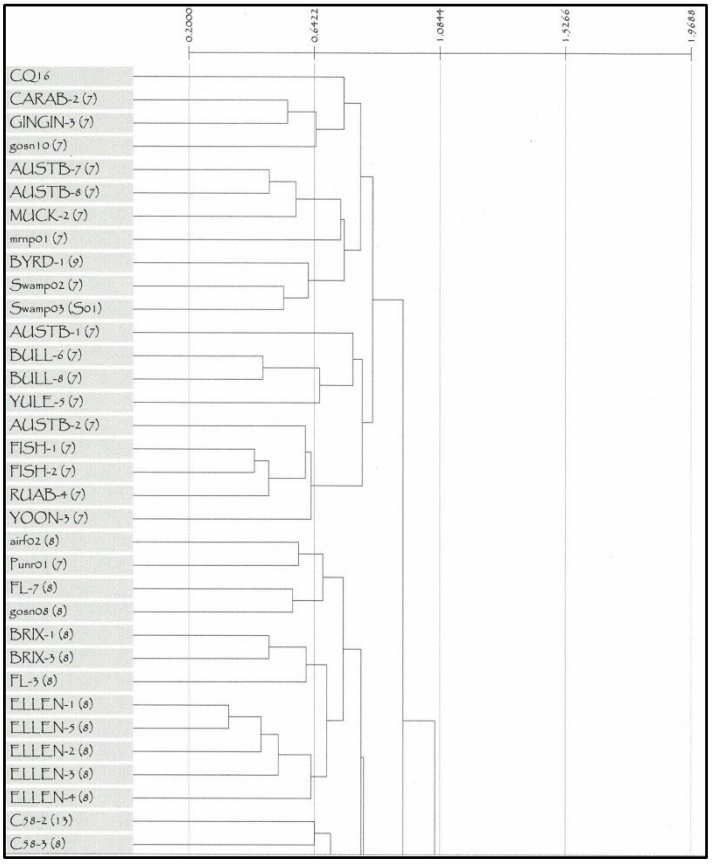
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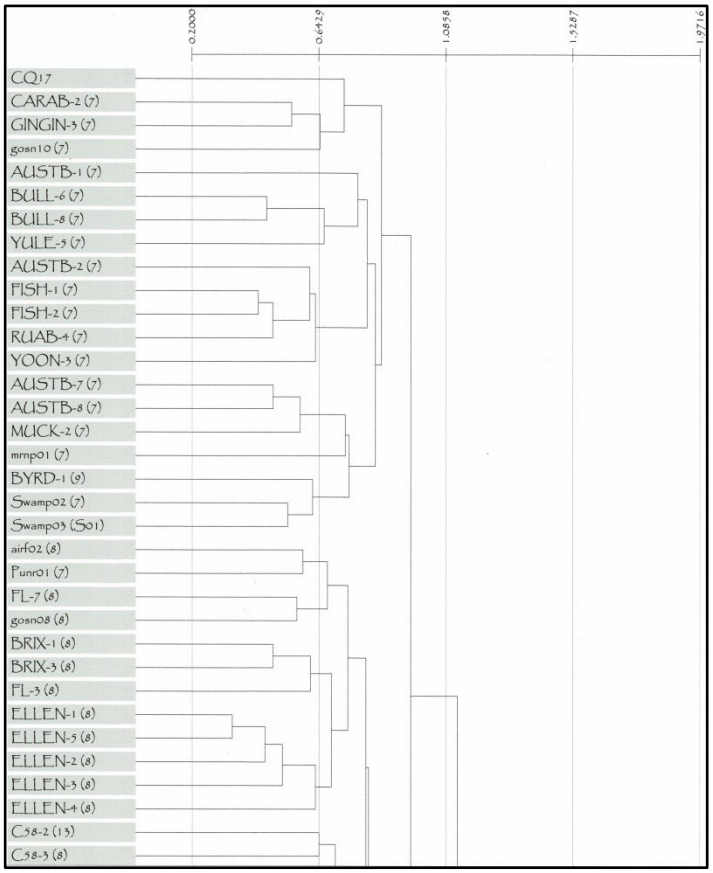
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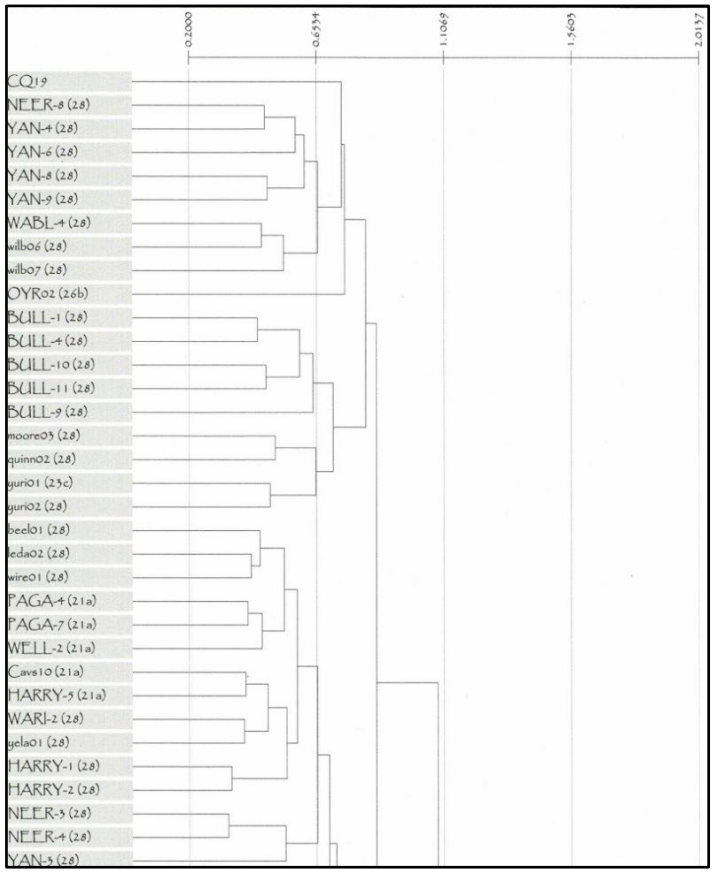
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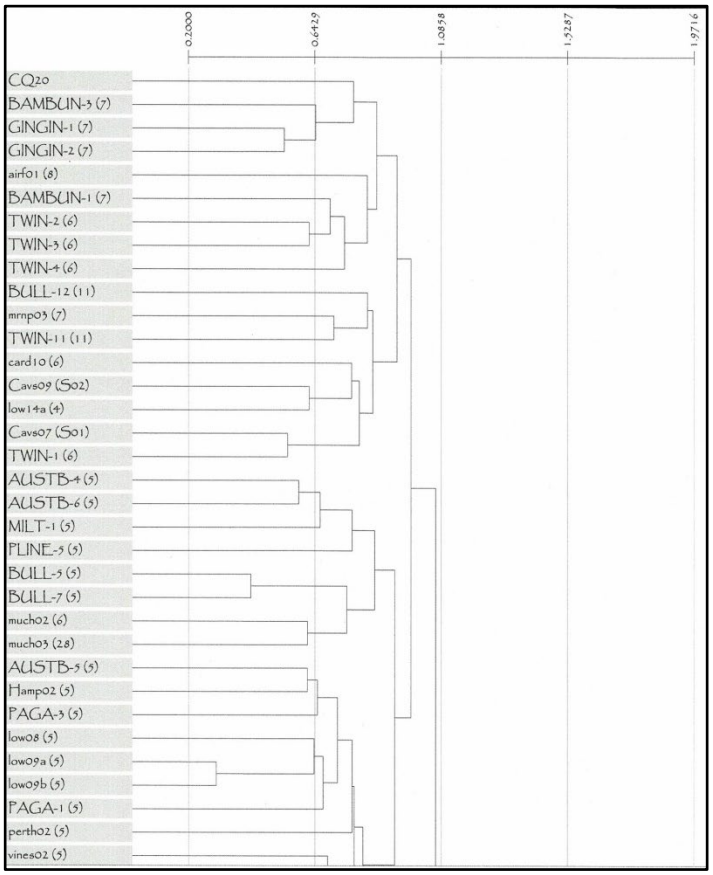
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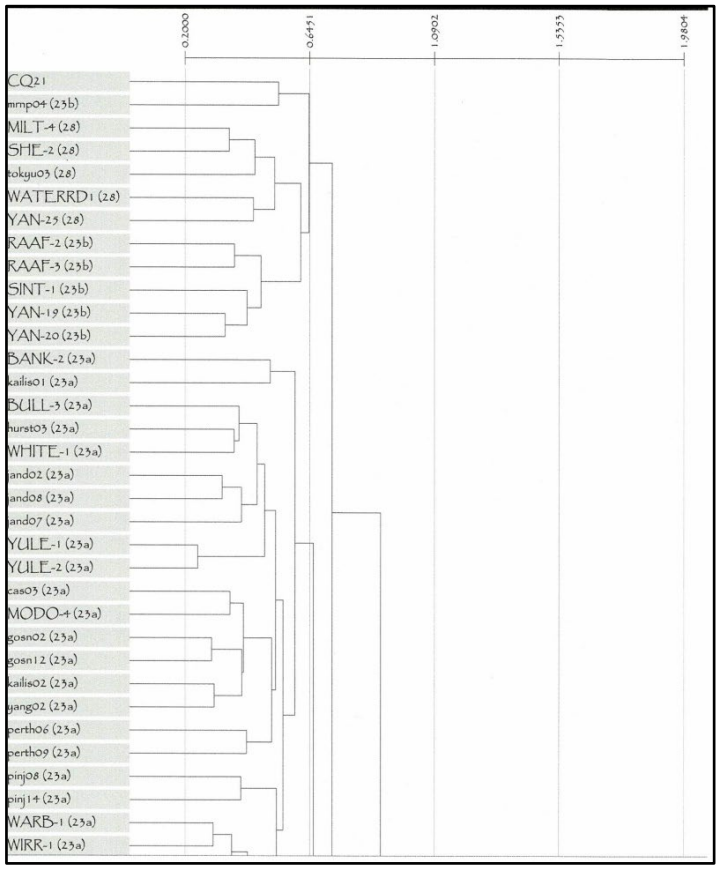
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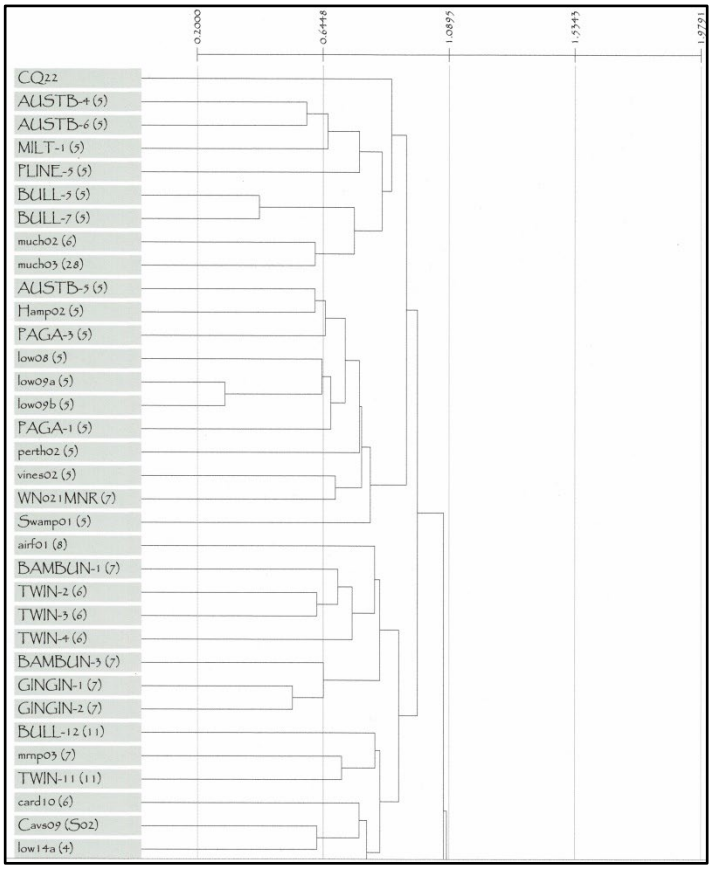
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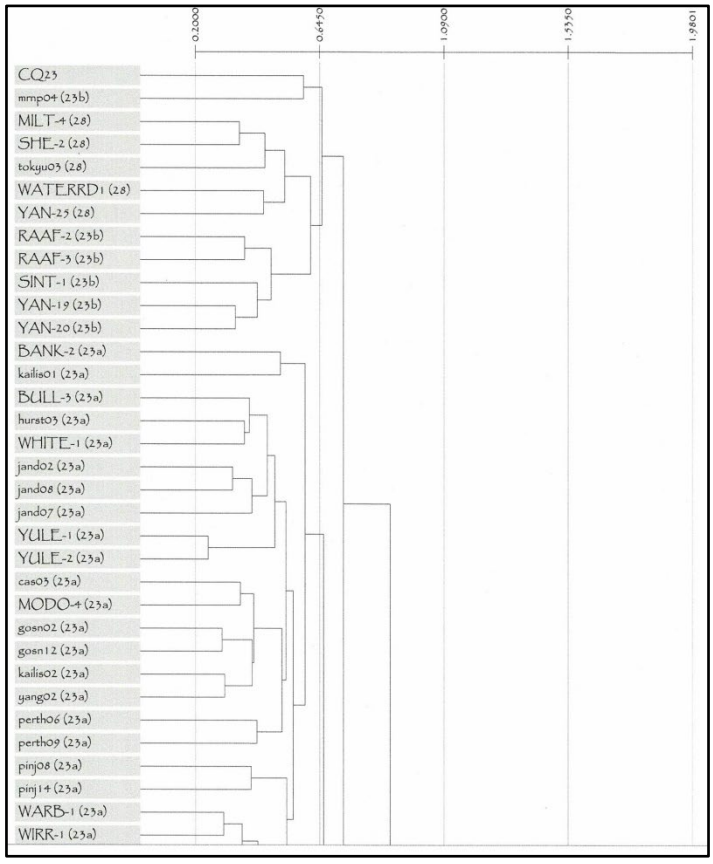
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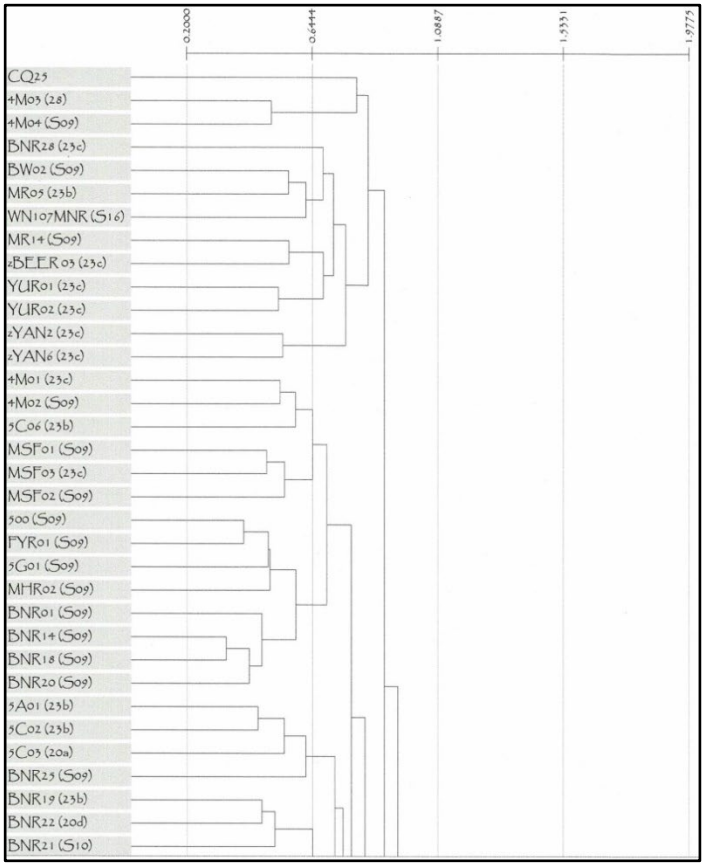
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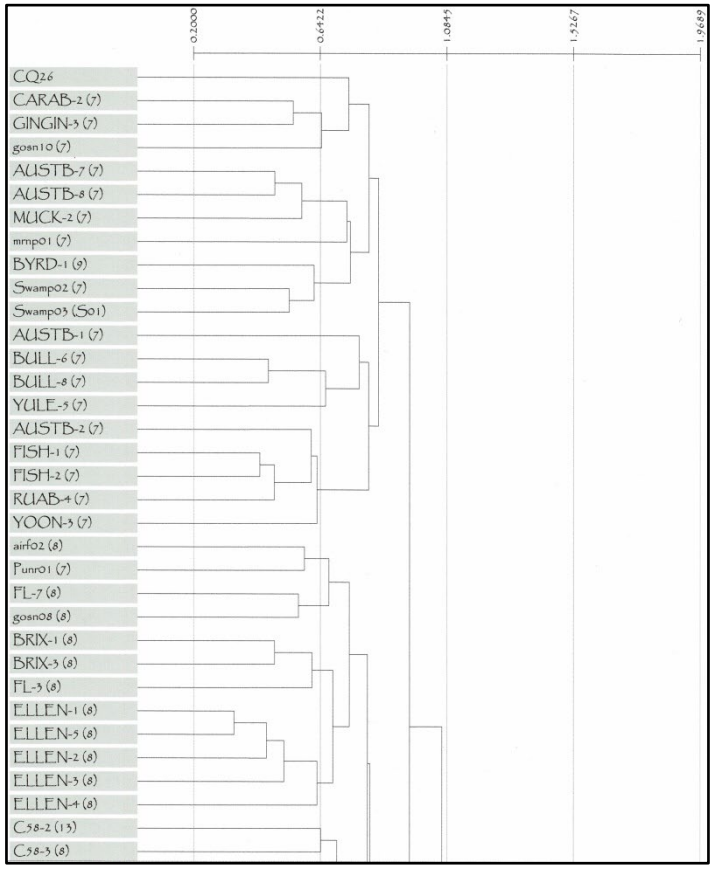
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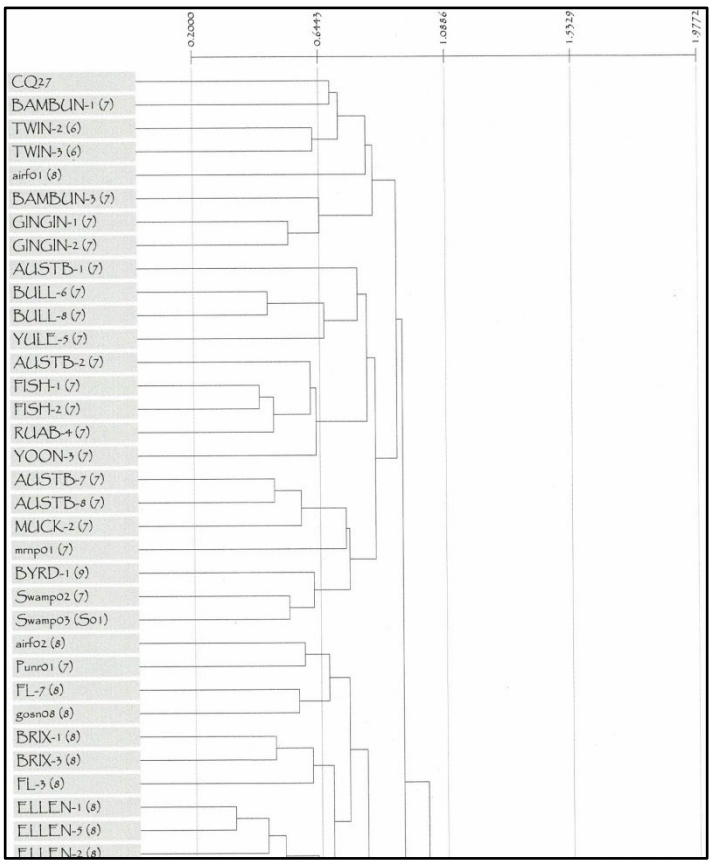
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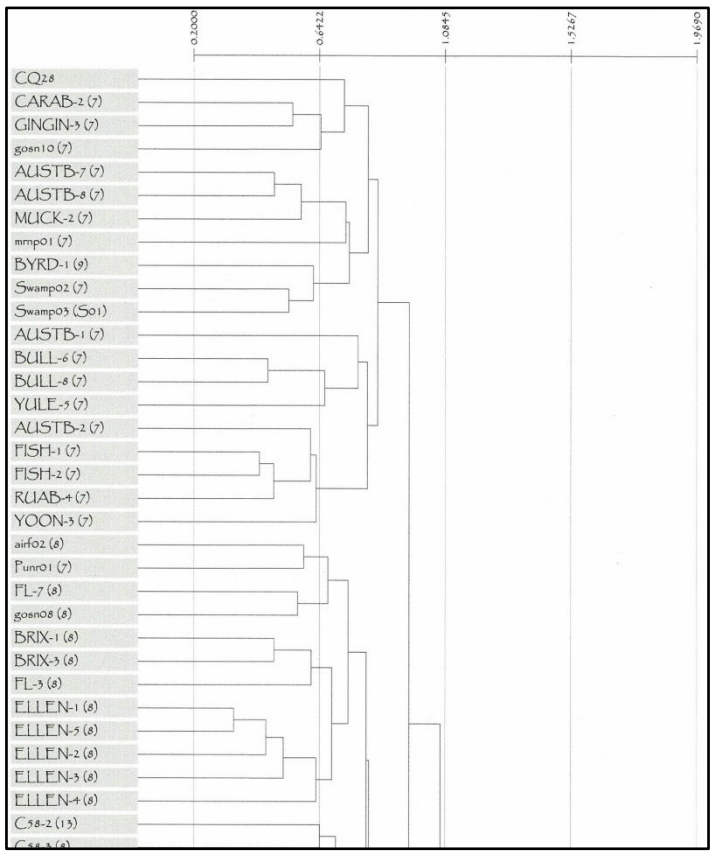


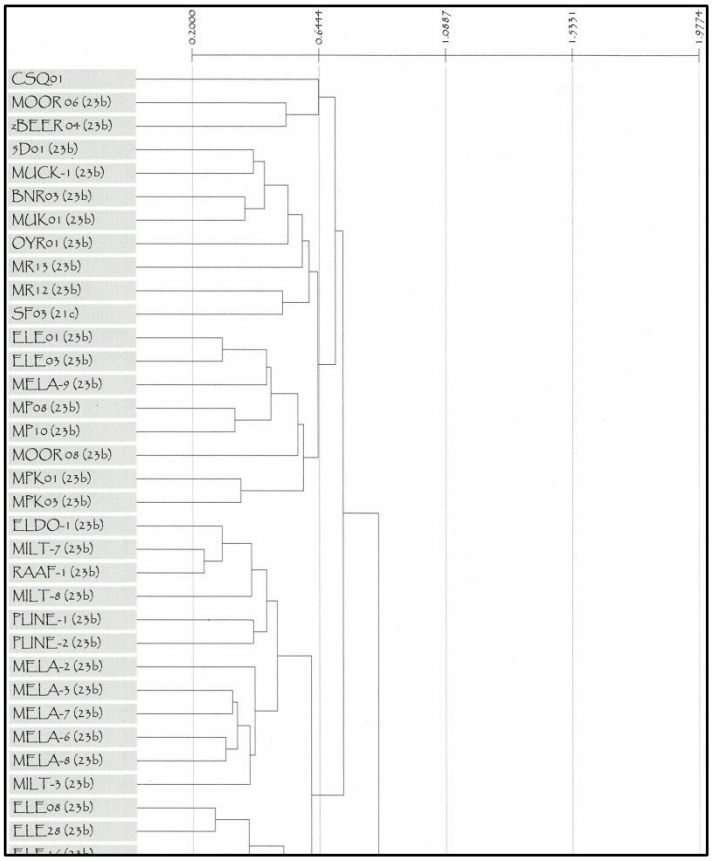
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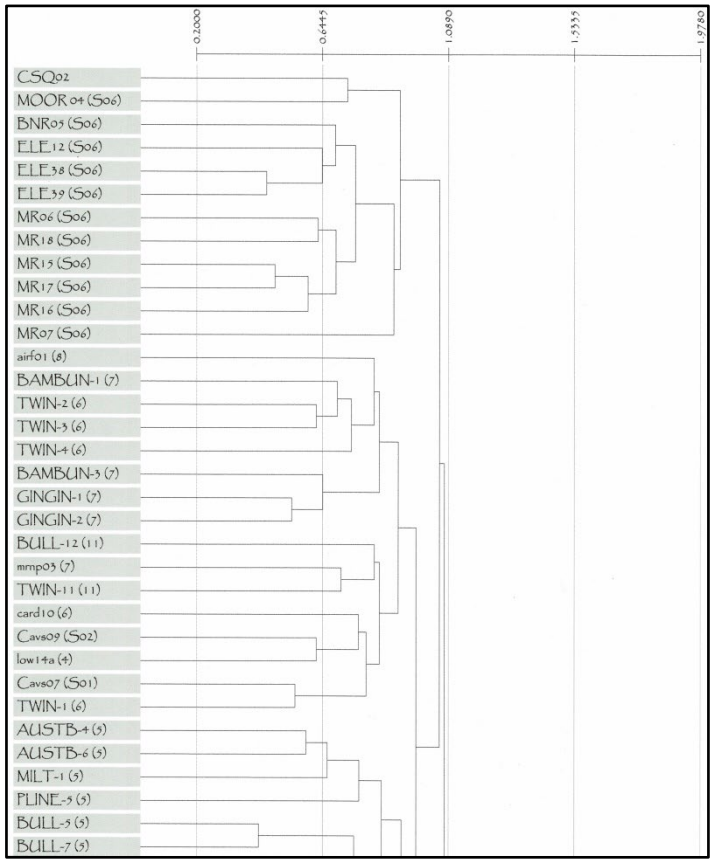
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CQ27
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TWIN-2 (6)
TWIN-3 (6)
airf01 (8)
BAMBUN-3 (7)
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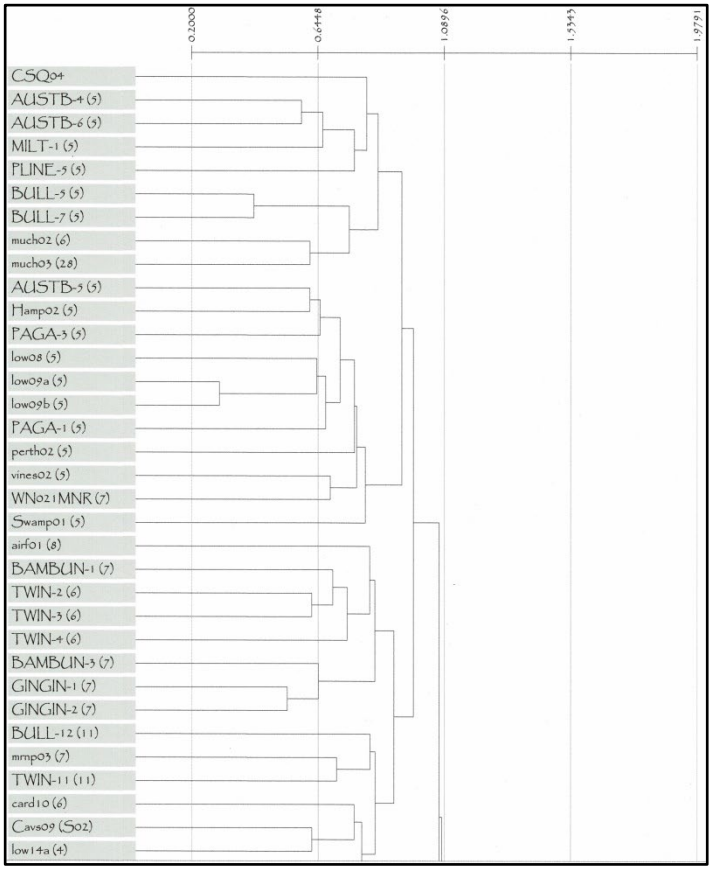

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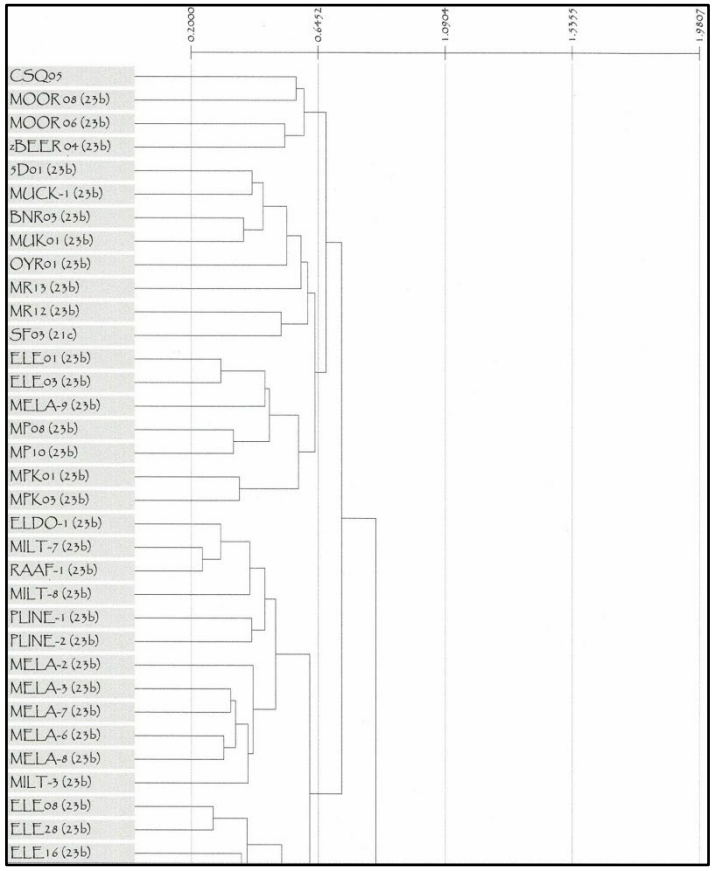
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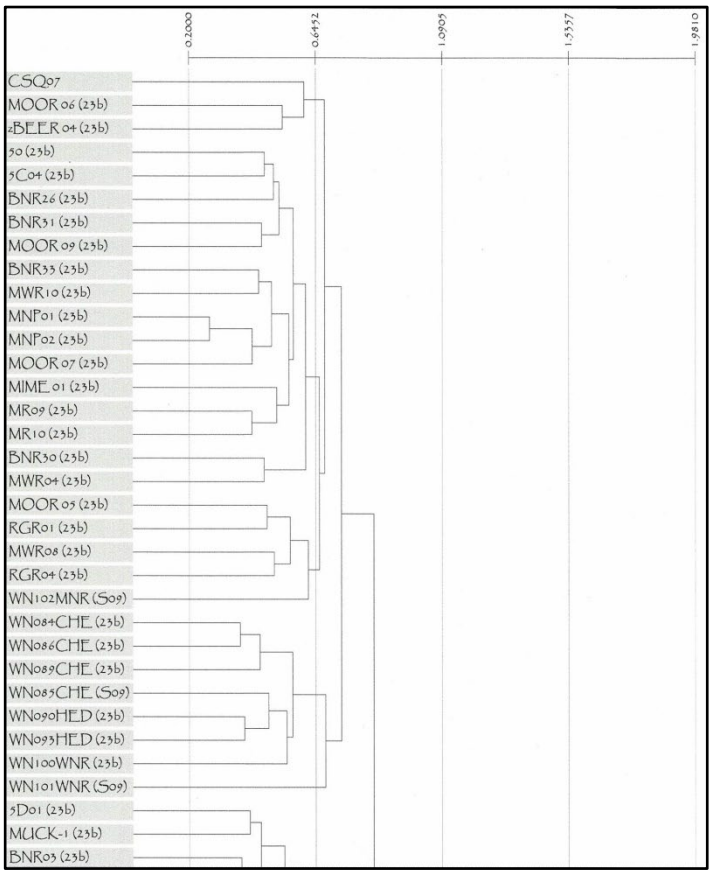
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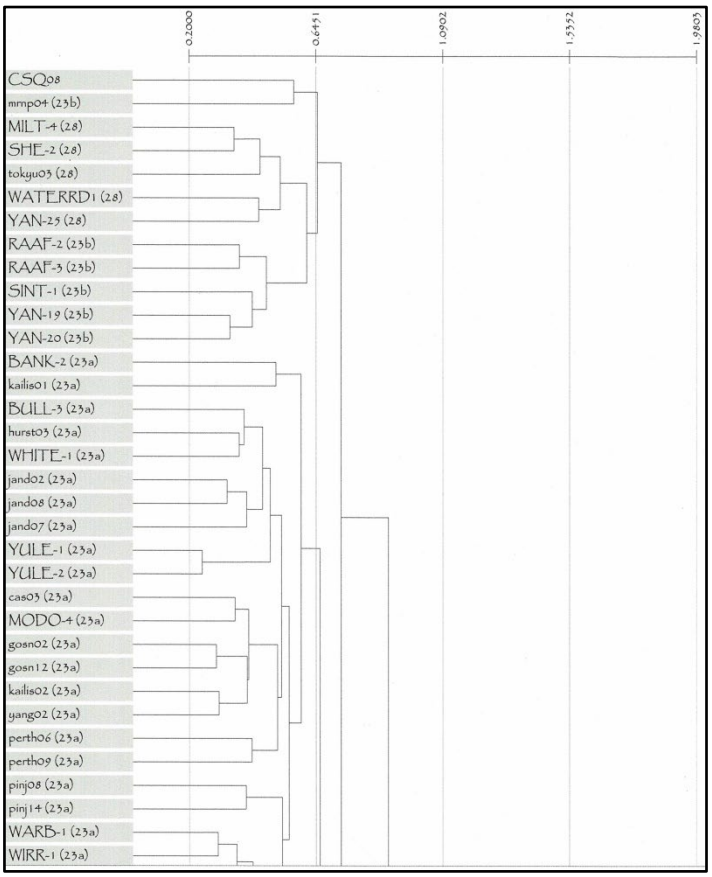
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perth09 (23a)
pinj08 (23a)
pinj14 (23a)
WARB-1 (23a)
WIRR-1 (23a)

CSQ08

IV. Nearest Neighbour analyses summary table

Quadrt	Atlas Vegetation Unit	Nearest Neighbour	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10
AIQ01	BtRc	SCP Site	MOOR 05 (23b)	ELE04 (21a)	star03 (28)	BNR30 (23b)	ELE21 (S09)	ELE24 (23b)	ELE25 (21c)	MHR01 (23b)	ELE32 (4)	ELE08 (23b)
AIQ01	BtRc	Dissim Indx	0.7808	0.7966	0.7975	0.8	0.8	0.8	0.8	0.8065	0.8077	0.8133
AIQ02	BtRc	SCP Site	YAN-11 (26b)	AUSTB-6 (5)	TWIN-3 (6)	YAN-10 (26b)	much02 (6)	WHILL-5 (26b)	CLIFT03 (26a)	TWIN-4 (6)	CARAB-2 (7)	YAN-1 (26b)
AIQ02	BtRc	Dissim Indx	0.7429	0.75	0.7534	0.759	0.7662	0.7674	0.7714	0.7736	0.775	0.7805
AIQ05	Bp	SCP Site	NWIL-2 (26b)	NEER-20 (28)	NEER-6 (28)	wilb07 (28)	WABL-4 (28)	SHE-2 (28)	NEER-2 (28)	wilb06 (28)	SEAB-6 (28)	Kens01 (23a)
AIQ05	Bp	Dissim Indx	0.6444	0.6458	0.6591	0.6627	0.6735	0.678	0.6854	0.6923	0.6964	0.7117
AIQ08	MrMtSl	SCP Site	Chid06 (17)	WN020MNR (S19)	MTB-5 (17)	WN095HED (S20)	TWIN-10 (15)	ELLIS-1 (17)	PAGA-5 (17)	Hay02 (17)	cool 01 (17)	ELE37 (S17)
AIQ08	MrMtSl	Dissim Indx	0.6	0.625	0.7143	0.7333	0.7778	0.7895	0.7895	0.7931	0.8	0.8
AIQ09	BtRc	SCP Site	MHENRY-1 (30a2)	tokyu01 (25)	ELE11 (21a)	PLINE-7 (21c)	Guild09 (26b)	SHE-5 (26a)	Guild06 (29b)	wilb05 (27)	YAN-2 (26a)	bold18 (27)
AIQ09	BtRc	Dissim Indx	0.7333	0.7667	0.7818	0.7818	0.7966	0.7971	0.8	0.8	0.8025	0.8033
AIQ10	CpBt	SCP Site	AUSTB-7 (7)	BULL-6 (7)	gosn08 (8)	CARAB-2 (7)	Swamp03 (S01)	FL-7 (8)	MUCK-2 (7)	WELL-1 (21a)	WN021MNR (7)	CLIFT03 (26a)
AIQ10	CpBt	Dissim Indx	0.732	0.7368	0.7465	0.7528	0.76	0.7612	0.7634	0.7701	0.7714	0.7722
AIQ11	MrMvMco	SCP Site	MTB-5 (17)	Hay02 (17)	BAMBUN-2 (15)	cool 01 (17)	boot02 (S07)	TWIN-11 (11)	Possum2 (16)	TWIN-4 (6)	xpearce04 (S07)	alfr02 (S07)
AIQ11	MrMvMco	Dissim Indx	0.68	0.7	0.7368	0.7419	0.7447	0.75	0.7561	0.7561	0.7619	0.7647
AIQ12	Ti	SCP Site	rott04 (S12)	Possum1 (16)	BAMBUN-2 (15)	SANDON-1 (16)	xpearce04 (S07)	gosn10 (7)	CARAB-2 (7)	CARAB-1 (15)	Hay05 (18)	benn03 (S07)
AIQ12	Ti	Dissim Indx	0.7419	0.76	0.7778	0.7857	0.8	0.8049	0.8182	0.8235	0.8298	0.8378
AIQ13	MrMvBc	SCP Site	ELLIS-1 (17)	MTB-5 (17)	cool 01 (17)	leda04 (17)	cool 04 (17)	Possum2 (16)	PAGA-5 (17)	CARAB-2 (7)	benn03 (S07)	Hay02 (17)
AIQ13	MrMvBc	Dissim Indx	0.6129	0.6154	0.625	0.6471	0.6667	0.6667	0.6774	0.6812	0.7	0.7073
AIQ14	MbGcVp	SCP Site	CARAB-2 (7)	BULL-6 (7)	Hay05 (18)	GINGIN-3 (7)	boot02 (S07)	leda04 (17)	Punr01 (7)	benn03 (S07)	Hay02 (17)	yuri05 (S17)
AIQ14	MbGcVp	Dissim Indx	0.6235	0.7222	0.7273	0.7436	0.75	0.76	0.7802	0.7857	0.7895	0.791
AIQ15	BtRc	SCP Site	yuri03 (23c)	much02 (6)	much01 (28)	low07 (21c)	hurst03 (23a)	Ravs01 (4)	TWIN-8 (21c)	MR16 (S06)	TWIN-3 (6)	Light01 (23a)
AIQ15	BtRc	Dissim Indx	0.7101	0.76	0.7619	0.7681	0.7684	0.7692	0.7714	0.7736	0.7746	0.7778
AIQ16	AhAcc	SCP Site	Bushm01 (20a)	yuri01 (23c)	Kens01 (23a)	MOOR 01 (S09)	quinn02 (28)	MOOR 02 (S09)	moore03 (28)	NEER-8 (28)	CH057ASH (S10)	much01 (28)
AIQ16	AhAcc	Dissim Indx	0.6503	0.662	0.6667	0.6753	0.6806	0.6828	0.6857	0.6866	0.6975	0.7054
AIQ17	BaBm	SCP Site	hurst03 (23a)	perth08 (23a)	Light01 (23a)	Cresw01 (23a)	activ02 (20a)	perth06 (23a)	gnan03 (23a)	cas03 (23a)	WIRR-1 (23a)	WHITE-1 (23a)
AIQ17	BaBm	Dissim Indx	0.5484	0.5575	0.5781	0.5826	0.5882	0.5932	0.5935	0.5965	0.597	0.6
CNQ01	BaBm	SCP Site	hurst03 (23a)	ELDO-1 (23b)	BULL-3 (23a)	SINT-1 (23b)	MELA-9 (23b)	SF01 (23b)	jand07 (23a)	gosn12 (23a)	perth06 (23a)	gosn02 (23a)
CNQ01	BaBm	Dissim Indx	0.4833	0.514	0.5246	0.5263	0.5273	0.5319	0.5398	0.5429	0.5439	0.5472
CNQ02	MrMt	SCP Site	Cavs06 (S07)	Guild09 (26b)	WOODP-2 (30a2)	PRES-1 (29a)	MI02 (29b)	MTB-1 (24)	cool 02 (24)	tokyu01 (25)	GARD04 (30a2)	MINN-1 (25)
CNQ02	MrMt	Dissim Indx	0.64	0.6716	0.6897	0.6981	0.7	0.7037	0.7049	0.7059	0.7083	0.7215
CNQ03	Ti	SCP Site	Hay05 (18)	CARAB-2 (7)	GINGIN-3 (7)	gosn10 (7)	FISH-1 (7)	YOON-3 (7)	BULL-6 (7)	benn03 (S07)	hymus05 (11)	hymus02 (11)
CNQ03	Ti	Dissim Indx	0.7015	0.7209	0.7215	0.7705	0.7708	0.7778	0.7808	0.7895	0.7941	0.7966
CNQ04	MbGcVp	SCP Site	gosn08 (8)	CLIFT03 (26a)	MR03 (S20)	AUSTB-7 (7)	GUTHR-4 (5)	BULL-6 (7)	YALG-6 (26b)	YAN-11 (26b)	CAPEL-8 (12)	MR16 (S06)
CNQ04	MbGcVp	Dissim Indx	0.7105	0.7381	0.7419	0.7451	0.75	0.7531	0.7615	0.7619	0.7674	0.7681
CNQ05	MvMb	SCP Site	WELL-1 (21a)	FL-7 (8)	NEER-20 (28)	NEER-22 (28)	CLIFT03 (26a)	CARAB-2 (7)	GINGIN-3 (7)	BULL-6 (7)	Hay05 (18)	AUSTB-7 (7)
CNQ05	MvMb	Dissim Indx	0.6774	0.6986	0.703	0.7172	0.7176	0.7263	0.7273	0.7317	0.7368	0.7476
CNQ06	TmThTs	SCP Site	GINGIN-3 (7)	Hay05 (18)	YULE-5 (7)	AUSTB-7 (7)	RUAB-4 (7)	benn03 (S07)	NAVB-1 (16)	CARAB-2 (7)	AUSTB-2 (7)	SANDON-1 (16)
CNQ06	TmThTs	Dissim Indx	0.8056	0.8333	0.8333	0.8391	0.8391	0.84	0.8462	0.8481	0.8507	0.8537
CNQ09	TmThTs	SCP Site	GINGIN-3 (7)	YOON-3 (7)	benn03 (S07)	Hay05 (18)	CARAB-2 (7)	FISH-1 (7)	GINGIN-1 (7)	rott04 (S12)	BULL-6 (7)	AUSTB-2 (7)
CNQ09	TmThTs	Dissim Indx	0.7381	0.7403	0.7419	0.75	0.7582	0.7624	0.7634	0.7857	0.7949	0.7975
CNQ10	CpBt	SCP Site	gosn03 (4)	AUSTB-7 (7)	low09a (5)	low09b (5)	PAGA-1 (5)	gosn08 (8)	NEER-20 (28)	MR16 (S06)	AUSTB-6 (5)	ELE38 (S06)
CNQ10	CpBt	Dissim Indx	0.7117	0.7143	0.717	0.7292	0.7407	0.7442	0.7455	0.7468	0.75	0.7526
CNQ12	CpBt	SCP Site	Mill01 (5)	MR16 (S06)	ELE11 (21a)	AUSTB-6 (5)	WN103MNR (S16)	PLINE-5 (5)	WN106MNR (S16)	AUSTB-4 (5)	low08 (5)	MILT-1 (5)
CNQ12	CpBt	Dissim Indx	0.6962	0.7091	0.7143	0.75	0.7568	0.76	0.76	0.7627	0.7647	0.7647
CNQ13	Er	SCP Site	Cavs06 (S07)	PRES-1 (29a)	CARAB-3 (11)	star02 (24)	Guild09 (26b)	MI03 (29b)	low10b (11)	MI02 (29b)	NAVB-4 (24)	LESCH-5 (30b)
CNQ13	Er	Dissim Indx	0.6757	0.7	0.72	0.7255	0.7407	0.7419	0.7447	0.7447	0.7455	0.746

CNQ14	BaBm	SCP Site	BULL-11 (28)	SHE-2 (28)	mrnp04 (23b)	PLINE-1 (23b)	SEAB-6 (28)	BANK-2 (23a)	hurst03 (23a)	4M03 (28)	zYAN6 (23c)	YULE-1 (23a)
CNQ14	BaBm	Dissim Indx	0.6396	0.6462	0.6557	0.6596	0.6613	0.6637	0.6639	0.6667	0.6694	0.6697
CNQ15	BaBm	SCP Site	MR10 (23b)	hurst03 (23a)	ELDO-1 (23b)	50 (23b)	MILT-7 (23b)	YAN-20 (23b)	MELA-9 (23b)	5D01 (23b)	MNP01 (23b)	gosn02 (23a)
CNQ15	BaBm	Dissim Indx	0.5556	0.5593	0.5619	0.567	0.58	0.5826	0.5926	0.5955	0.5957	0.5962
CNQ16	MrMt	SCP Site	NEER-22 (28)	NEER-20 (28)	Guild09 (26b)	AUSTB-7 (7)	pinj10 (10a)	MILT-1 (5)	NEER-21 (28)	PAGA-7 (21a)	vines02 (5)	ELLIS-2 (18)
CNQ16	MrMt	Dissim Indx	0.6757	0.6814	0.7021	0.7043	0.7174	0.7263	0.7273	0.728	0.7282	0.7297
CNQ17	Ms	SCP Site	Mill01 (5)	TWIN-3 (6)	GUTHR-1 (4)	PEARCE-2 (3c)	WHITE-2 (4)	YULE-1 (23a)	MILT-1 (5)	zYAN6 (23c)	yuri03 (23c)	WN021MNR (7)
CNQ17	Ms	Dissim Indx	0.7431	0.767	0.7876	0.7895	0.7917	0.7949	0.7959	0.7984	0.802	0.8022
CNQ18	MrMv	SCP Site	AUSTB-7 (7)	AUSTB-2 (7)	Swamp03 (S01)	MUCK-2 (7)	low09a (5)	BULL-7 (5)	WN021MNR (7)	BULL-5 (5)	RUAB-4 (7)	GINGIN-1 (7)
CNQ18	MrMv	Dissim Indx	0.581	0.6	0.6386	0.6436	0.6566	0.6634	0.6667	0.6744	0.6762	0.6768
CNQ19	MsVdCaf	SCP Site	WN099WNR (S04)	MI003MOR (S04)	MR16 (S06)	hurst01 (23a)	TWIN-3 (6)	ELE12 (S06)	ELE01 (23b)	YULE-1 (23a)	jand04 (23a)	NEER-8 (28)
CNQ19	MsVdCaf	Dissim Indx	0.8	0.8077	0.8182	0.8333	0.8356	0.8361	0.8378	0.8391	0.8421	0.8462
CNQ20	MsVdCaf	SCP Site	WN099WNR (S04)	ELE05 (S02)	MR15 (S06)	ELE12 (S06)	MI003MOR (S04)	TWIN-3 (6)	BULL-7 (5)	WN110MOR (S16)	MR06 (S06)	MR16 (S06)
CNQ20	MsVdCaf	Dissim Indx	0.76	0.7879	0.8	0.8033	0.8077	0.8082	0.8095	0.8125	0.8182	0.8182
CNQ22	MrMvBc	SCP Site	Possum2 (16)	MTB-5 (17)	benn03 (S07)	alfr02 (S07)	PAGA-5 (17)	Hay02 (17)	Hay05 (18)	leda04 (17)	xpearce04 (S07)	cool 11 (17)
CNQ22	MrMvBc	Dissim Indx	0.6585	0.68	0.6923	0.7059	0.7333	0.75	0.7551	0.7576	0.7619	0.7647
CNQ23	MaMcu	SCP Site	CARAB-2 (7)	MTB-1 (24)	BULL-6 (7)	Guild09 (26b)	Hay05 (18)	WELL-1 (21a)	Punr01 (7)	MI02 (29b)	xbeer01 (24)	Guild06 (29b)
CNQ23	MaMcu	Dissim Indx	0.7303	0.7333	0.7368	0.7368	0.7429	0.7471	0.7474	0.7681	0.7681	0.7701
CNQ25	MbTi	SCP Site	BAMBUN-2 (15)	Hay05 (18)	xpearce04 (S07)	xpearce05 (15)	Possum1 (16)	CARAB-1 (15)	BULL-6 (7)	BULL-8 (7)	hymus06 (11)	hymus02 (11)
CNQ25	MbTi	Dissim Indx	0.7297	0.75	0.7561	0.7576	0.7692	0.7714	0.7778	0.7931	0.7959	0.8
CQ1	BaBm	SCP Site	hurst03 (23a)	WHITE-1 (23a)	jand02 (23a)	pinj14 (23a)	YULE-1 (23a)	Light01 (23a)	ELDO-1 (23b)	MELA-9 (23b)	hurst02 (23a)	YULE-2 (23a)
CQ1	BaBm	Dissim Indx	0.4504	0.4754	0.4769	0.4833	0.4876	0.5111	0.5254	0.5372	0.542	0.5537
CQ4	BaBm	SCP Site	Light01 (23a)	BANK-2 (23a)	hurst03 (23a)	SHE-2 (28)	MR09 (23b)	zYAN6 (23c)	WATERRD1 (28)	YULE-1 (23a)	WHITE-1 (23a)	talb3 (20c)
CQ4	BaBm	Dissim Indx	0.5294	0.5397	0.5455	0.5524	0.5596	0.5672	0.5735	0.5738	0.5772	0.5781
CQ5	BaBm	SCP Site	hurst03 (23a)	jand08 (23a)	WHITE-1 (23a)	MELA-8 (23b)	YULE-1 (23a)	ELDO-1 (23b)	MILT-4 (28)	YAN-20 (23b)	WARB-3 (23a)	jand02 (23a)
CQ5	BaBm	Dissim Indx	0.5038	0.5259	0.5323	0.542	0.5447	0.55	0.551	0.5538	0.5603	0.5606
CQ6	BtRc	SCP Site	PLINE-7 (21c)	Guild09 (26b)	WARI-1 (28)	DRAIN-1 (21a)	Cavs01 (21a)	GMaid01 (25)	jand04 (23a)	LESCH-2 (30b)	WOODV-2 (28)	tokyu01 (25)
CQ6	BtRc	Dissim Indx	0.6812	0.6986	0.7297	0.7474	0.7561	0.7561	0.7561	0.7561	0.7561	0.7568
CQ8	BaBm	SCP Site	RAAF-3 (23b)	perth08 (23a)	BULL-3 (23a)	hurst03 (23a)	SHE-2 (28)	YAN-20 (23b)	ELDO-1 (23b)	WARB-3 (23a)	Light01 (23a)	SINT-1 (23b)
CQ8	BaBm	Dissim Indx	0.5645	0.5752	0.5873	0.5968	0.6	0.6033	0.6036	0.6061	0.6094	0.6102
CQ9	BtRc	SCP Site	RGR05 (S09)	jand04 (23a)	WN114MOR (S16)	MOOR 08 (23b)	MOOR 04 (S06)	WN103MNR (S16)	MI003MOR (S04)	BNR30 (23b)	Guild02 (29b)	ELE25 (21c)
CQ9	BtRc	Dissim Indx	0.8	0.8028	0.8056	0.814	0.8205	0.8261	0.8298	0.8305	0.8305	0.8367
CQ11	BtRc	SCP Site	yuri03 (23c)	WN104MNR (S16)	WN103MNR (S16)	BULL-10 (28)	ELE04 (21a)	zYAN6 (23c)	WN115MOR (S09)	moore02 (28)	yela01 (28)	perth07 (20a)
CQ11	BtRc	Dissim Indx	0.6923	0.7333	0.7531	0.7708	0.7714	0.7736	0.7778	0.7831	0.7843	0.7849
CQ12	BtRc	SCP Site	MILT-1 (5)	MR16 (S06)	YULE-1 (23a)	ELE38 (S06)	GUTHR-1 (4)	WN021MNR (7)	Ravs01 (4)	YAN-11 (26b)	Mill01 (5)	yuri03 (23c)
CQ12	BtRc	Dissim Indx	0.7143	0.7193	0.7303	0.7333	0.7412	0.746	0.75	0.75	0.7531	0.7534
CQ13	BaBm	SCP Site	NEER-8 (28)	HARRY-2 (28)	mrnp04 (23b)	Light01 (23a)	SHE-2 (28)	Norm03 (20b)	Light02 (23a)	quinn02 (28)	jand02 (23a)	BANK-2 (23a)
CQ13	BaBm	Dissim Indx	0.5714	0.5748	0.5852	0.5882	0.5944	0.5965	0.6029	0.6029	0.6031	0.6032
CQ14	MvMb	SCP Site	GINGIN-3 (7)	hymus06 (11)	CARAB-2 (7)	Hay05 (18)	PB-6 (19a)	NAVB-2 (29a)	hymus05 (11)	leda04 (17)	xpearce04 (S07)	FL-7 (8)
CQ14	MvMb	Dissim Indx	0.6944	0.7049	0.7215	0.7333	0.7627	0.7692	0.7705	0.7727	0.7736	0.7895
CQ15	BtRc	SCP Site	wilb04 (26b)	SEAB-6 (28)	WN103MNR (S16)	YAN-2 (26a)	WARI-1 (28)	Guild06 (29b)	NEER-20 (28)	NWIL-2 (26b)	YAN-5 (26b)	YALG-2 (26b)
CQ15	BtRc	Dissim Indx	0.7053	0.7241	0.7273	0.7282	0.7311	0.7391	0.74	0.7447	0.7447	0.7479
CQ16	MbGcVp	SCP Site	CARAB-2 (7)	KOOLJ-6 (10a)	BULL-6 (7)	gosn08 (8)	GINGIN-3 (7)	ELLEN-1 (8)	ELLEN-5 (8)	MUCK-2 (7)	AUSTB-7 (7)	Swamp02 (7)
CQ16	MbGcVp	Dissim Indx	0.6807	0.6911	0.6981	0.703	0.7143	0.7168	0.7168	0.7236	0.7323	0.7358
CQ17	Ti	SCP Site	CARAB-2 (7)	GINGIN-3 (7)	Hay05 (18)	AUSTB-3 (11)	FISH-1 (7)	hymus05 (11)	hymus06 (11)	NAVB-2 (29a)	airf02 (8)	ELLIS-2 (18)
CQ17	Ti	Dissim Indx	0.6471	0.7053	0.7108	0.7468	0.75	0.7619	0.7619	0.7624	0.7634	0.7736
CQ19	Bp	SCP Site	SHE-3 (26b)	wilb06 (28)	wilb07 (28)	SHE-1 (26b)	NEER-5 (28)	WABL-4 (28)	NEER-20 (28)	wilb04 (26b)	Light01 (23a)	quinn02 (28)
CQ19	Bp	Dissim Indx	0.6106	0.6271	0.6289	0.6296	0.6596	0.6607	0.6727	0.6762	0.68	0.68

CQ20	TmThTs	SCP Site	GINGIN-2 (7)	YULE-5 (7)	FISH-1 (7)	AUSTB-2 (7)	Hay05 (18)	GINGIN-3 (7)	GINGIN-1 (7)	ELLEN-1 (8)	ELLEN-5 (8)	KOOLJ-6 (10a)
CQ20	TmThTs	Dissim Indx	0.6957	0.7	0.7248	0.7471	0.75	0.7609	0.7624	0.7634	0.7634	0.767
CQ21	BaBm	SCP Site	MILT-4 (28)	hurst03 (23a)	mrnp04 (23b)	WHITE-1 (23a)	ELDO-1 (23b)	BULL-3 (23a)	pinj14 (23a)	Light01 (23a)	SHE-2 (28)	perth08 (23a)
CQ21	BaBm	Dissim Indx	0.5	0.5077	0.5338	0.5372	0.5385	0.5455	0.5462	0.5522	0.5603	0.563
CQ22	BtRc	SCP Site	ELE04 (21a)	Light01 (23a)	yuri03 (23c)	gnan03 (23a)	TWIN-8 (21c)	talb5 (20c)	500 (S09)	50 (23b)	Mill01 (5)	yuri02 (28)
CQ22	BtRc	Dissim Indx	0.7333	0.7522	0.759	0.7593	0.7619	0.767	0.7708	0.7727	0.7802	0.7818
CQ23	BaBm	SCP Site	hurst03 (23a)	SHE-2 (28)	YULE-1 (23a)	Light01 (23a)	MILT-4 (28)	mrnp04 (23b)	WATERRD1 (28)	WHITE-1 (23a)	BANK-2 (23a)	SINT-1 (23b)
CQ23	BaBm	Dissim Indx	0.5313	0.554	0.5593	0.5606	0.5775	0.5878	0.5909	0.5966	0.6066	0.6066
CQ25	Bp	SCP Site	quinn02 (28)	NWIL-2 (26b)	wilb06 (28)	SHE-3 (26b)	YAN-8 (28)	WN107MNR (S16)	Norm03 (20b)	wilb07 (28)	star03 (28)	4M03 (28)
CQ25	Bp	Dissim Indx	0.6396	0.6889	0.6923	0.7172	0.7204	0.7215	0.7303	0.7349	0.7419	0.75
CQ26	MbGcVp	SCP Site	CARAB-2 (7)	AUSTB-7 (7)	GINGIN-3 (7)	ELLEN-2 (8)	ELLEN-1 (8)	ELLEN-5 (8)	AUSTB-2 (7)	pinj10 (10a)	FL-7 (8)	GINGIN-1 (7)
CQ26	MbGcVp	Dissim Indx	0.6852	0.6897	0.703	0.7168	0.7255	0.7255	0.7292	0.7419	0.7442	0.7455
CQ27	Ms	SCP Site	gosn08 (8)	GINGIN-3 (7)	TWIN-3 (6)	BAMBUN-1 (7)	vines02 (5)	FL-7 (8)	KOOLJ-6 (10a)	CARAB-2 (7)	BULL-6 (7)	Mill01 (5)
CQ27	Ms	Dissim Indx	0.6383	0.6571	0.6571	0.6842	0.6852	0.6889	0.6897	0.6964	0.697	0.7117
CQ28	Ti	SCP Site	GINGIN-3 (7)	CARAB-2 (7)	KOOLJ-6 (10a)	GINGIN-2 (7)	BULL-6 (7)	FISH-1 (7)	Hay05 (18)	MEELON-1 (8)	AUSTB-7 (7)	GINGIN-1 (7)
CQ28	Ti	Dissim Indx	0.6304	0.6768	0.7087	0.7174	0.7209	0.7248	0.725	0.7302	0.7383	0.7426
CSQ01	BaBm	SCP Site	MELA-8 (23b)	RAAF-3 (23b)	hurst03 (23a)	MILT-4 (28)	BNR03 (23b)	MILT-7 (23b)	ELDO-1 (23b)	BULL-3 (23a)	zBEER 04 (23b)	MELA-6 (23b)
CSQ01	BaBm	Dissim Indx	0.5285	0.552	0.568	0.5683	0.5876	0.5888	0.5893	0.5906	0.5922	0.5962
CSQ02	BaBm	SCP Site	YAN-19 (23b)	MOOR 08 (23b)	mrnp04 (23b)	MELA-8 (23b)	ELDO-1 (23b)	RAAF-3 (23b)	SINT-1 (23b)	white06 (23a)	MILT-4 (28)	5D01 (23b)
CSQ02	BaBm	Dissim Indx	0.6471	0.6637	0.6721	0.6752	0.6792	0.6807	0.6814	0.6822	0.6842	0.6889
CSQ04	MrHtBt	SCP Site	SHE-1 (26b)	NEER-20 (28)	WARI-1 (28)	YAN-11 (26b)	NEER-21 (28)	YAN-25 (28)	SHE-4 (26a)	NWIL-2 (26b)	YAN-5 (26b)	wilb06 (28)
CSQ04	MrHtBt	Dissim Indx	0.6731	0.6792	0.68	0.6889	0.6893	0.6952	0.6989	0.7	0.7	0.7018
CSQ05	BaBm	SCP Site	ELDO-1 (23b)	WHITE-1 (23a)	hurst03 (23a)	MPK03 (23b)	5D01 (23b)	5C04 (23b)	MELA-7 (23b)	RAAF-3 (23b)	ELE03 (23b)	MELA-8 (23b)
CSQ05	BaBm	Dissim Indx	0.5229	0.5398	0.541	0.5455	0.5484	0.5556	0.5556	0.5574	0.566	0.5667
CSQ07	BaBm	SCP Site	ELDO-1 (23b)	MILT-7 (23b)	MR10 (23b)	5C04 (23b)	RAAF-1 (23b)	BULL-3 (23a)	5D01 (23b)	MELA-8 (23b)	hurst03 (23a)	WHITE-1 (23a)
CSQ07	BaBm	Dissim Indx	0.5094	0.5248	0.5385	0.5417	0.5534	0.5537	0.5556	0.5556	0.563	0.5636
CSQ08	BaBm	SCP Site	hurst03 (23a)	ELDO-1 (23b)	YAN-20 (23b)	mrnp04 (23b)	SINT-1 (23b)	MILT-4 (28)	MR10 (23b)	MELA-8 (23b)	RAAF-3 (23b)	MILT-7 (23b)
CSQ08	BaBm	Dissim Indx	0.541	0.5596	0.563	0.568	0.569	0.5735	0.5745	0.5833	0.5902	0.5962

APPENDIX ELEVEN. Additional regional comparisons for Atlas sites

i) Primer cluster analysis and SIMPROF test for significance of clusters for select Atlas sites and the 2005 SCP dataset.

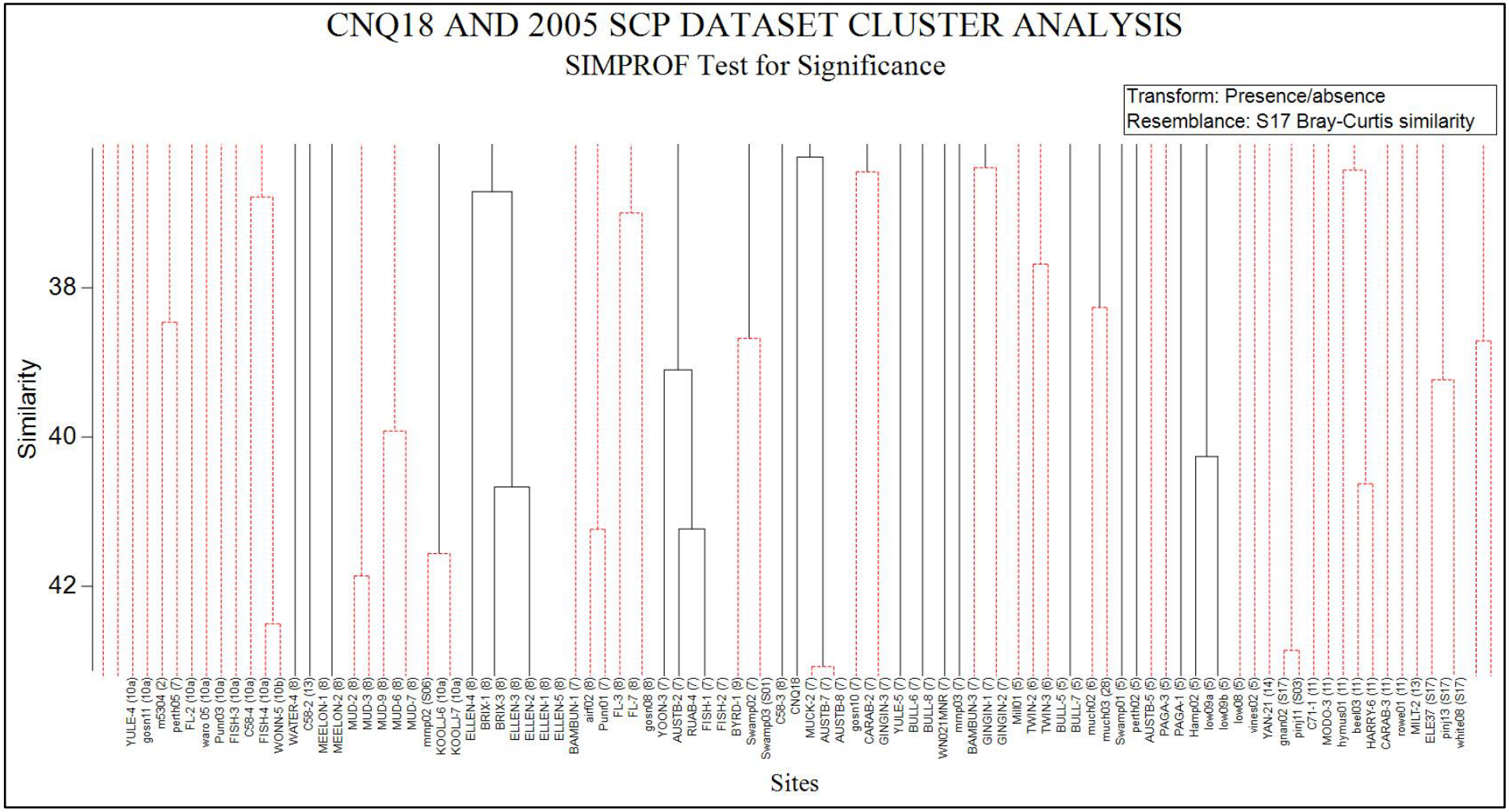


Figure A11-01a. Extract from the dendrogram for Atlas site CNQ18 and the 2005 SCP dataset cluster analysis (with SIMPROF test). This extract shows CNQ18 as a significantly different floristic group (single site group) from the other SCP sites (SIMPROF test) and fusing with SCP FCT 7 sites AUSTB-7, AUSTB-8 and MUCK-2 at about 36% similarity level. (Black, entire lines indicate significant clusters at the 5% significance level).

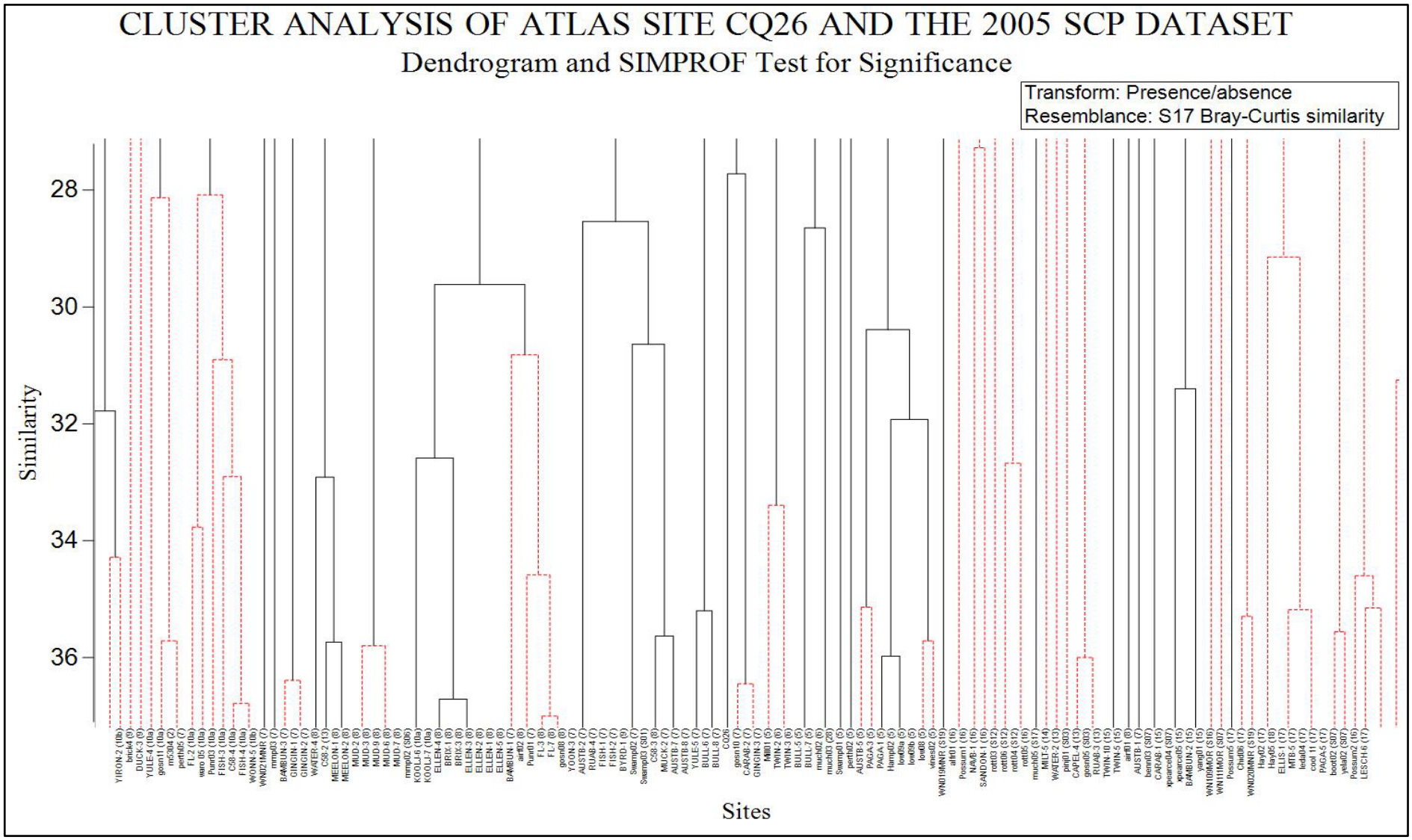


Figure A11-01b. Extract from the dendrogram from the Atlas site CQ26 and the 2005 SCP dataset cluster analysis (with SIMPROF test). This extract shows CQ26 grouping with three FCT7 sites (fusing at a bit less than 28%similarity).

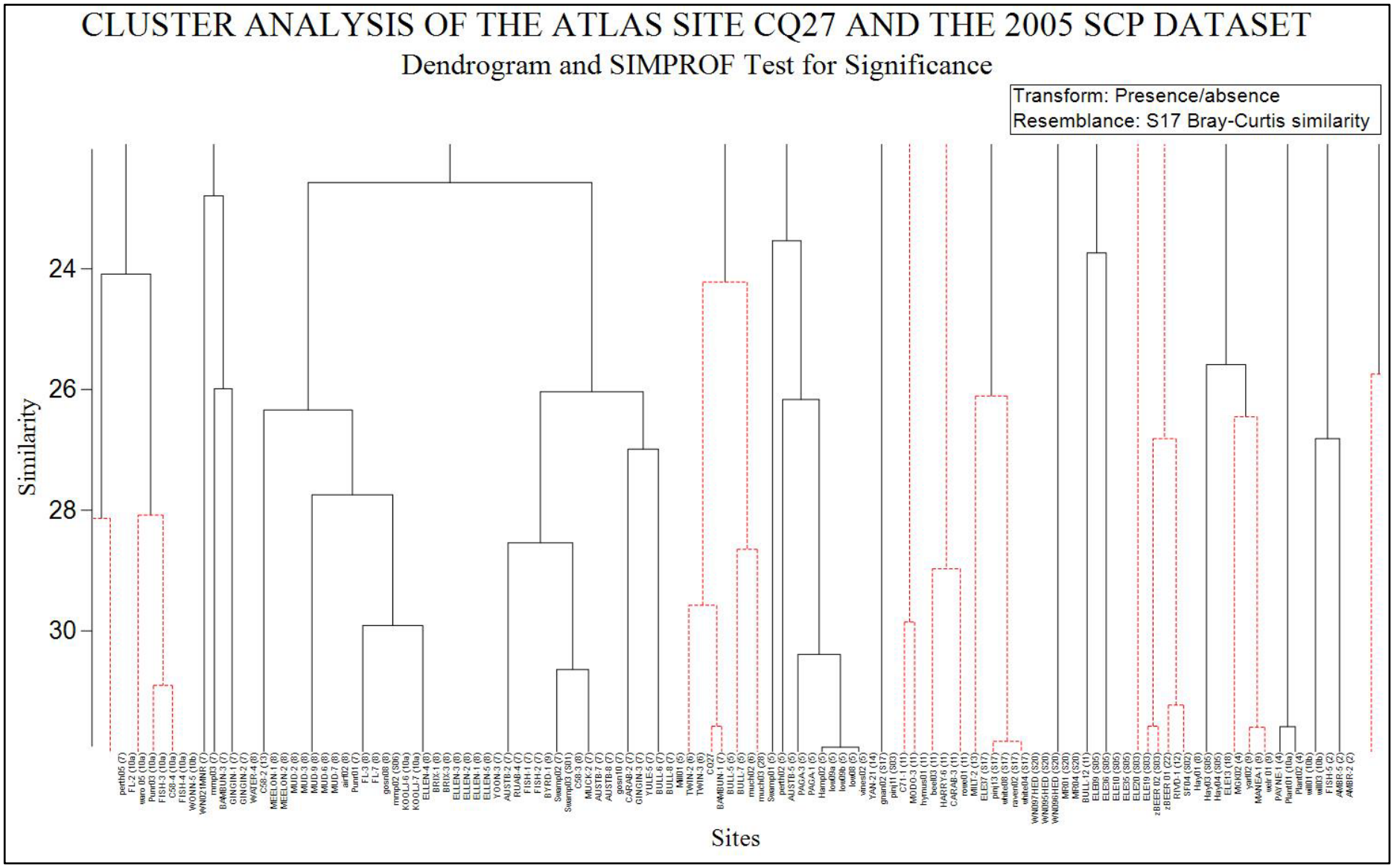


Figure A11-01c. Extract from the dendrogram for Atlas site CQ27 and the 2005 SCP dataset cluster analysis (with SIMPROF test). This extract shows CQ27 within a group of one FCT7 site ('BAMBUN-1; fusing at about 31.6 similarity) and three FCT5 and three FCT6 sites and one FCT28 site.

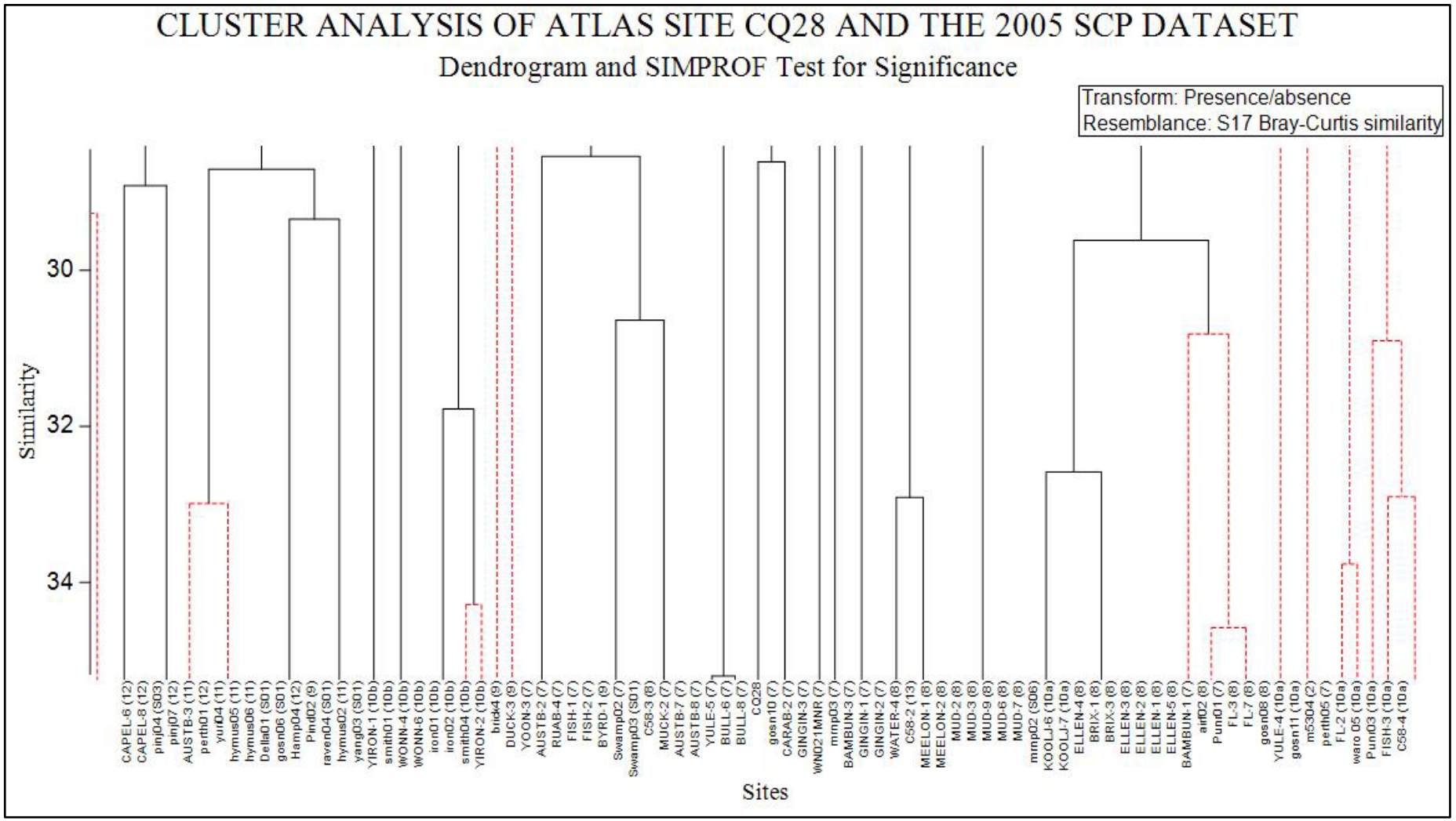


Figure A11-01d. Extract from the dendrogram for Atlas site CQ28 and the 2005 SCP dataset cluster analysis (with SIMPROF test). This extract shows CQ28 as a significantly different cluster (single site) and fusing with three FCT7 sites at about 31.6% similarity.

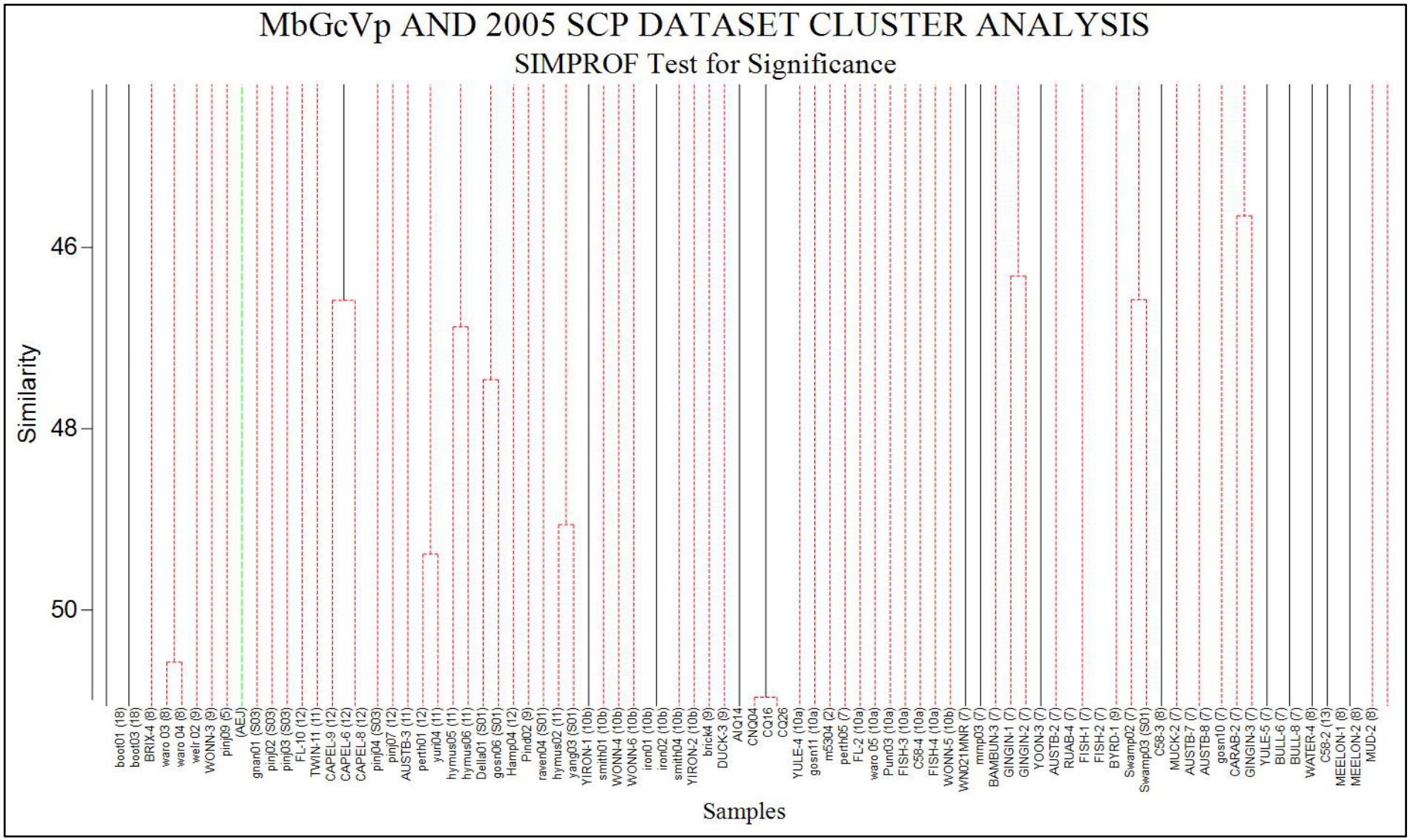


Figure A11-02. Extract from the dendrogram for Atlas 'MbGcVp' sites and the 2005 SCP dataset cluster analysis (with SIMPROF test). This extract shows AIQ14 as a significantly different group to the other Atlas sites CNQ04, CQ16 and CQ26 (they fuse at about 29% similarity (not shown in this extract)). The 4 Atlas sites fuse with the SCP dataset sites at about 16% similarity (not shown in this dendrogram extract).

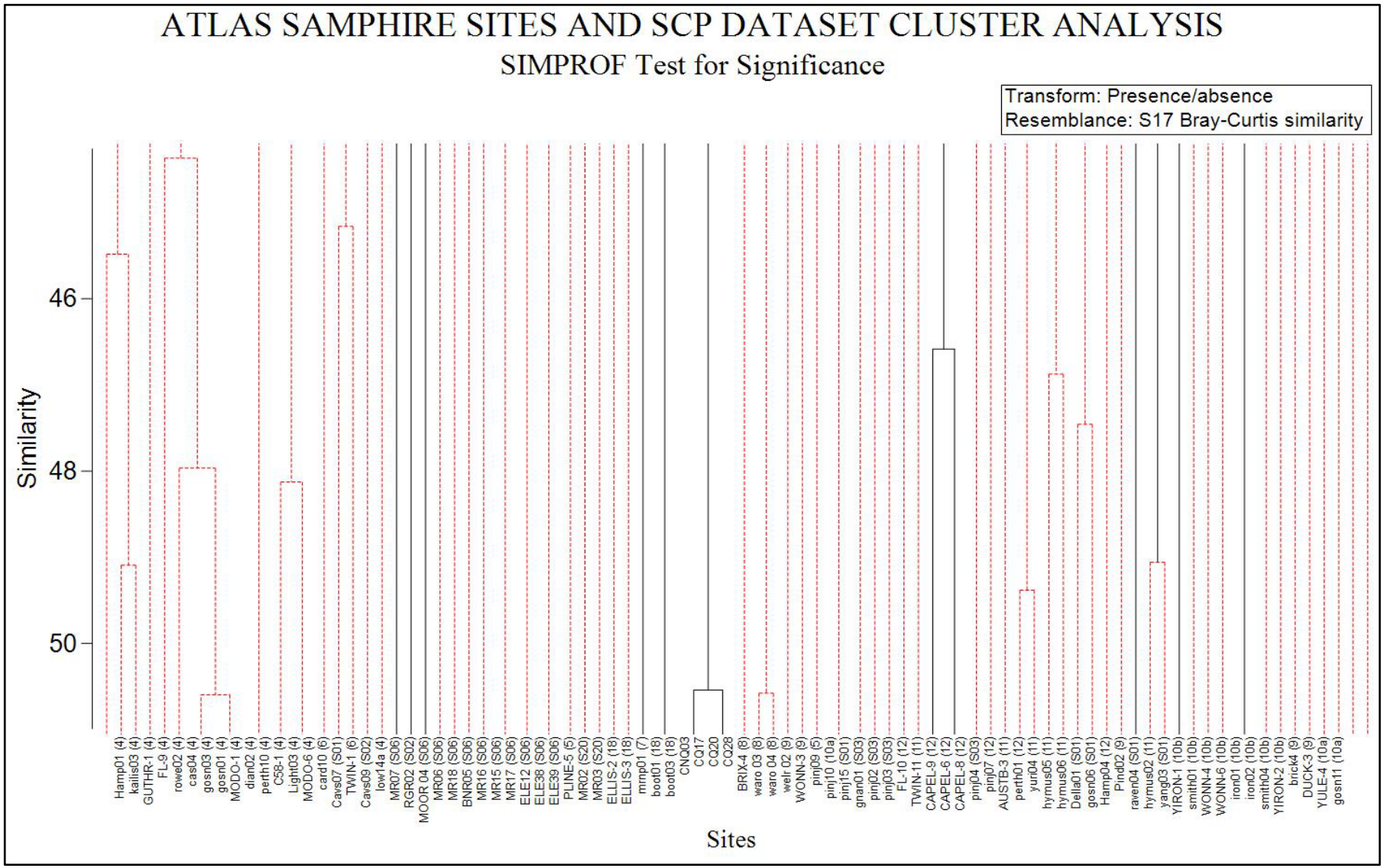


Figure A11-03. Extract from the dendrogram for the Atlas samphire sites CNQ03, CQ17, CQ28 ('Ti') and CQ20 ('TmThTs') and the 2005 SCP dataset (with SIMPROF test - dark, entire lines indicate significant groups at 5% significance level**).** The extract shows the Atlas sites fusing at about 50% similarity and being a significantly different group from the SCP sites, which they fuse with at about 12% similarity (not shown in this extract).

ii) Multivariate analysis of 14 Atlas floodplain and related sites and the 2005 SCP FCT 7 sites

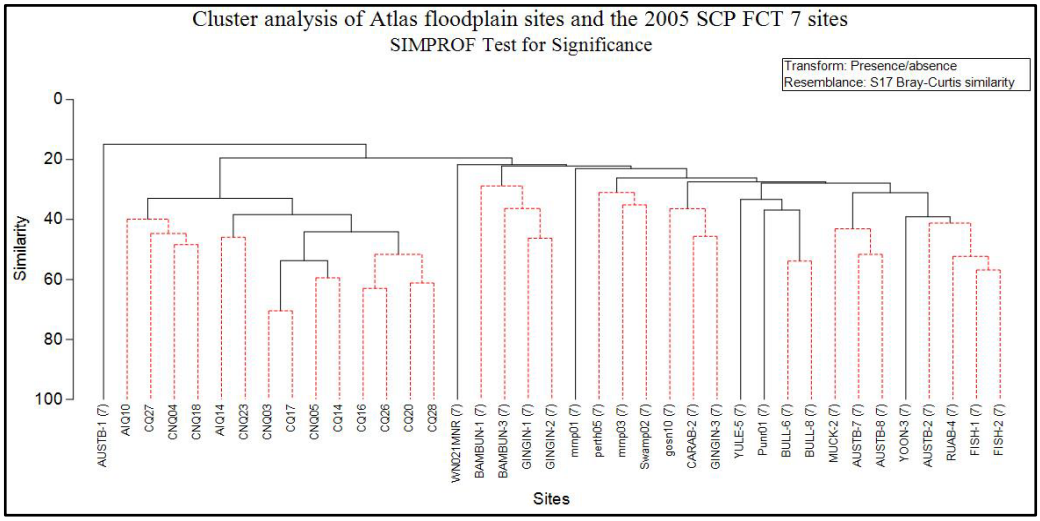


Figure A11-04a. Cluster analysis of fourteen Atlas sites and the 2005 SCP FCT 7 sites (with SIMPROF test for significance).

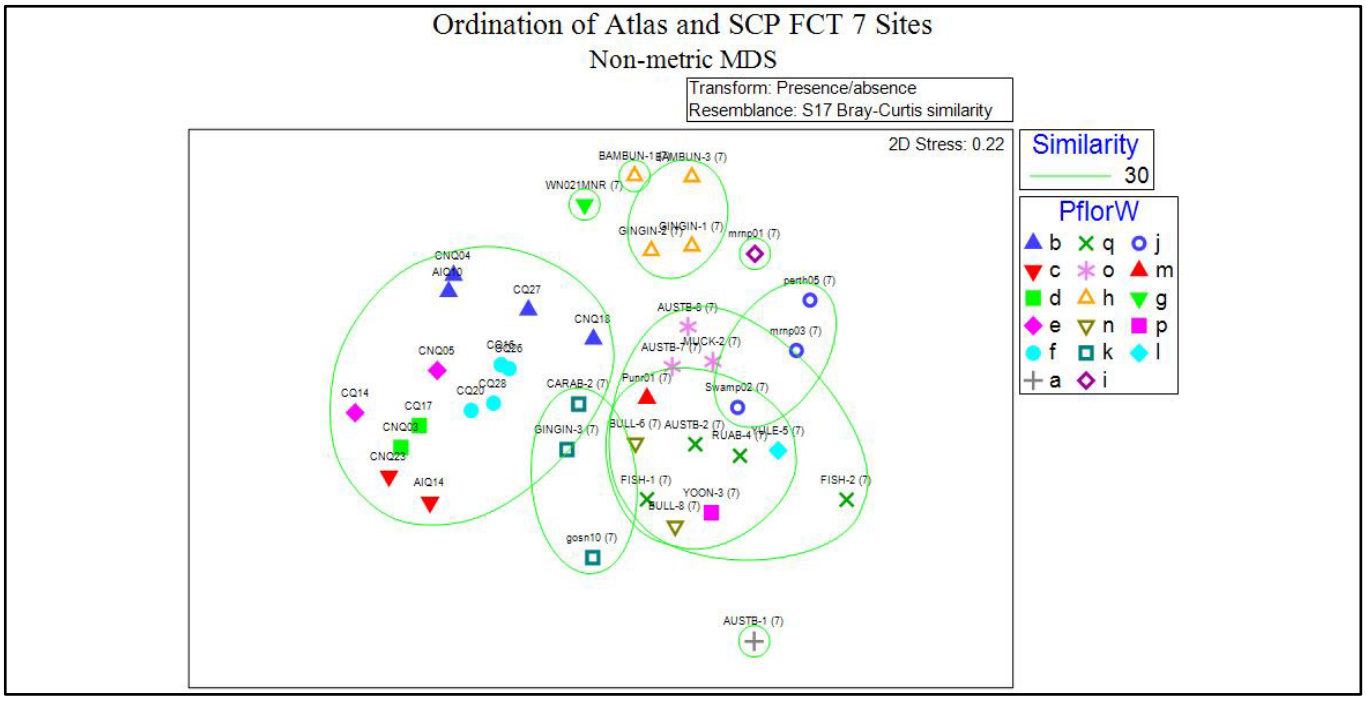


Figure A11-04b. Ordination of 14 Atlas sites and the 2005 SCP FCT 7 sites (showing cluster groups at the 30% similarity level). The Atlas sites have clustered together on the left side of the SCP FCT7 sites in this figure.

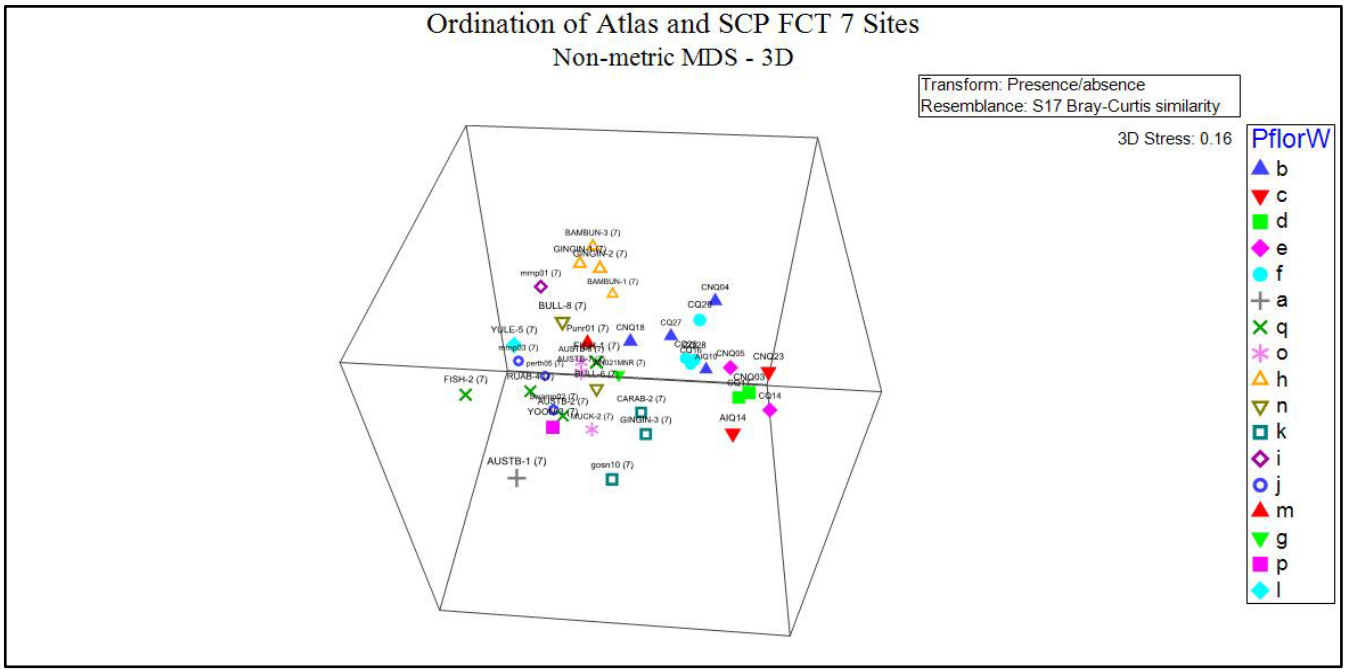


Figure A11-04c. Ordination (non-metric MDS, 3D) of fourteen Atlas sites and the 2005 SCP FCT 7 sites. The fourteen Atlas sites cluster on the right side of this ordination map.

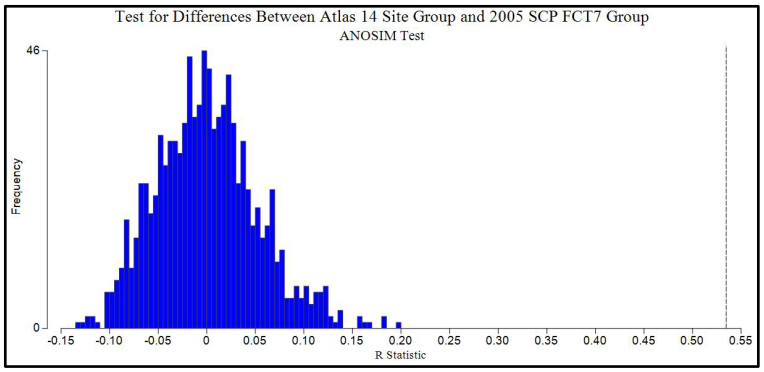


Figure A11-04d. The R statistic distribution for the ANOSIM test for differences between the Atlas site group (14 sites) and the SCP FCT 7 site group (25 sites) (R value 0.535).

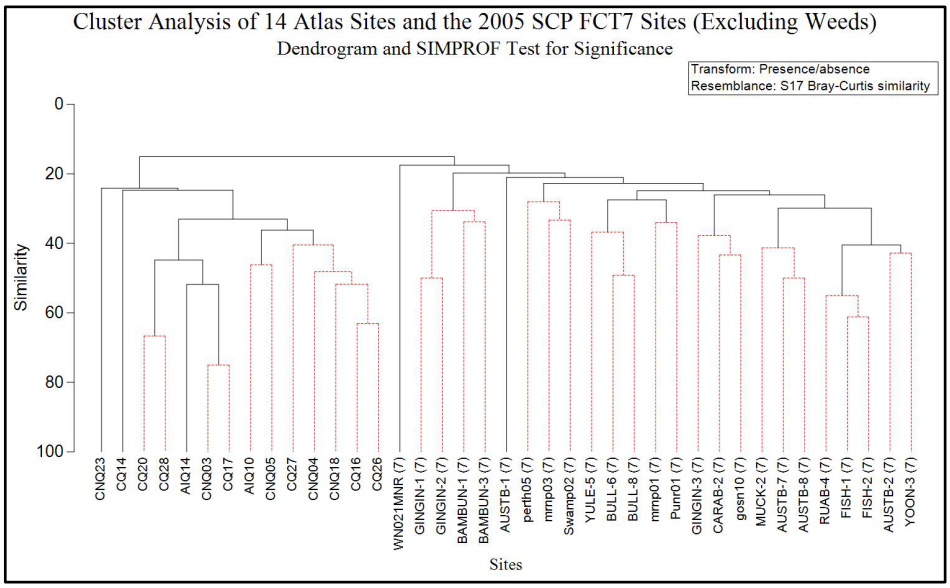


Figure A11-04e. Cluster analysis of fourteen Atlas sites and the 2005 SCP FCT 7 sites (excluding weeds) (with SIMPROF test for significance).

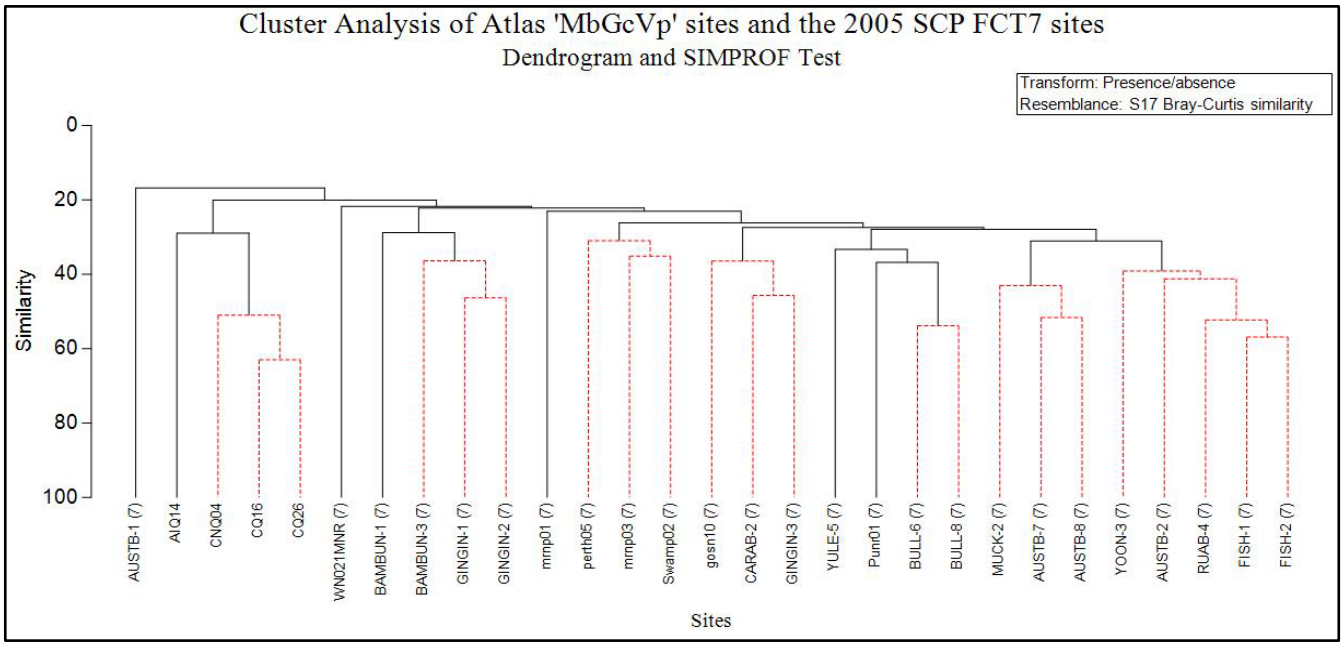


Figure A11-05a. Cluster analysis of four Atlas 'MbGcVp' sites and the 2005 SCP FCT 7 sites (with SIMPROF test for significance).

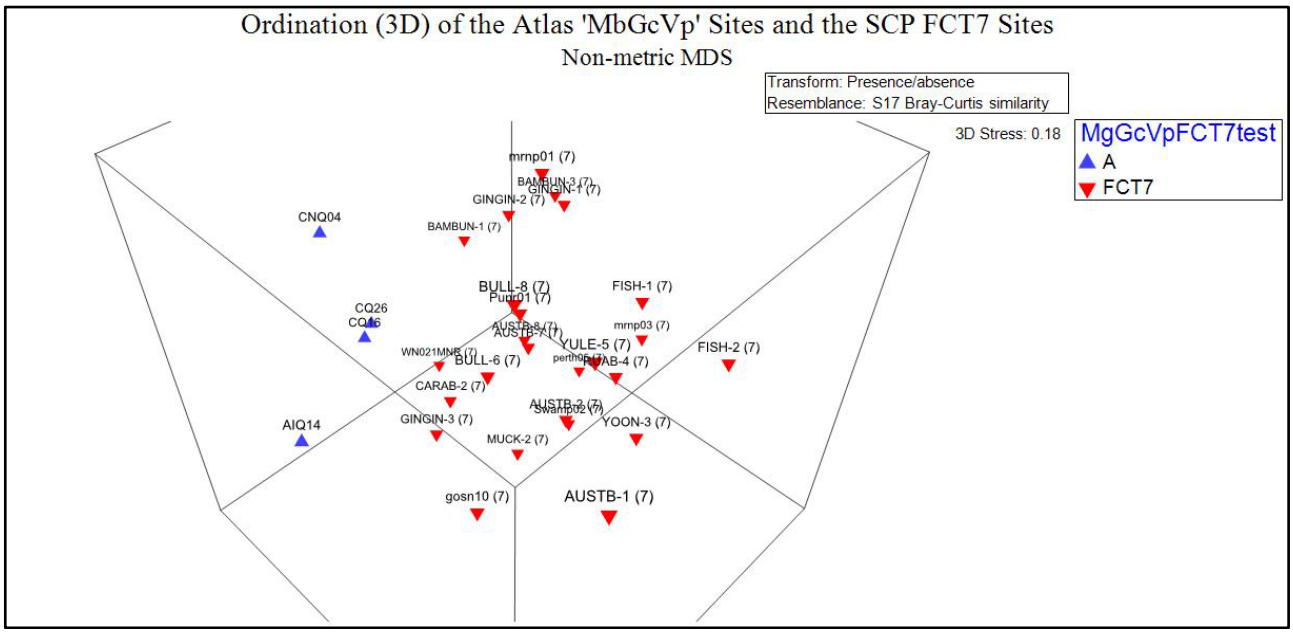


Figure A11-05b. Ordination (non-metric MDS, 3D) of four 'MbGcVp' Atlas sites and the 2005 SCP FCT 7 sites. The Atlas sites have clustered together on the left side of the SCP FCT7 sites in this figure.

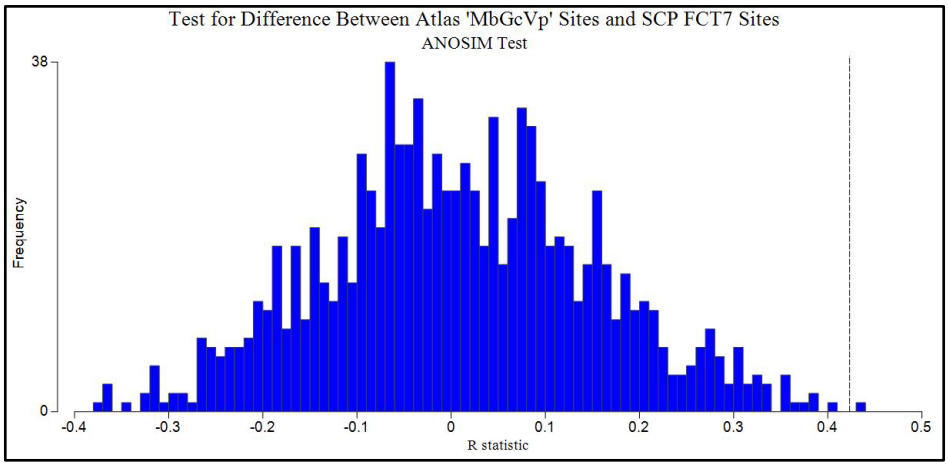


Figure A11-05c. The R statistic distribution and test R value (0.423; significance level 0.2%) for the ANOSIM test for differences between the Atlas 'MbGcVp' group (4 sites) and the SCP FCT 7 site group (25 sites).

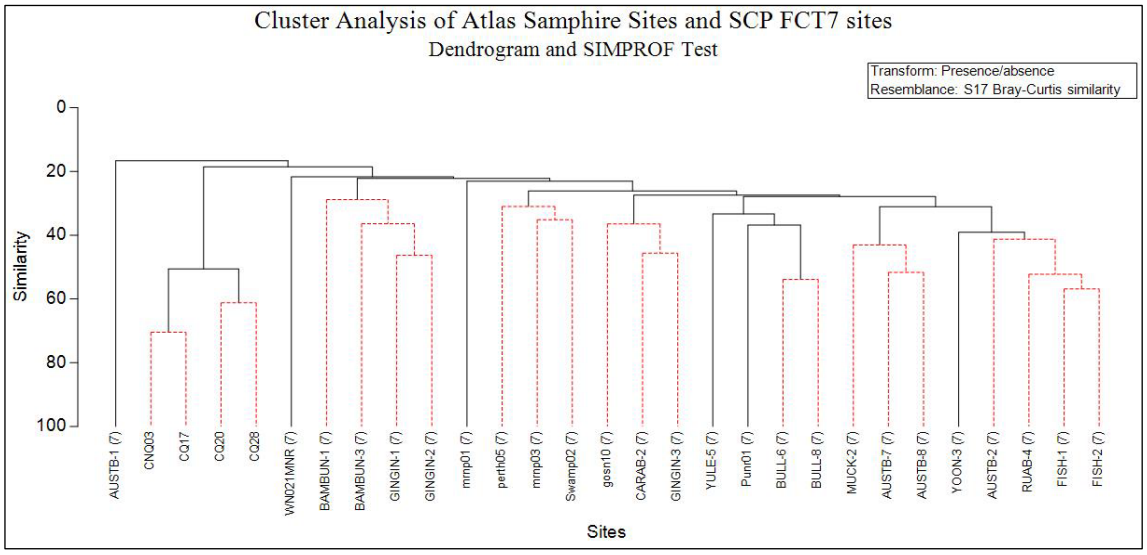


Figure A11-06a. Cluster analysis of four Atlas Samphire sites and the 2005 SCP FCT 7 sites.

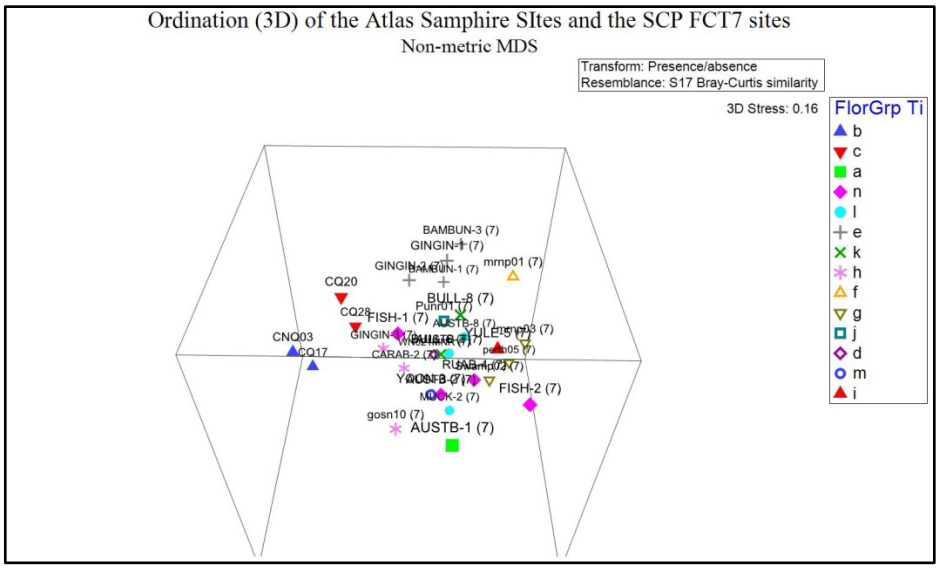


Figure A11-06b. Ordination (non-metric MDS, 3D) of four Atlas Samphire sites (CNQ03, CQ17, CQ20 and CQ28) and the 2005 SCP FCT 7 sites. The Atlas sites have clustered together on the left side of the SCP FCT7 sites in this figure.

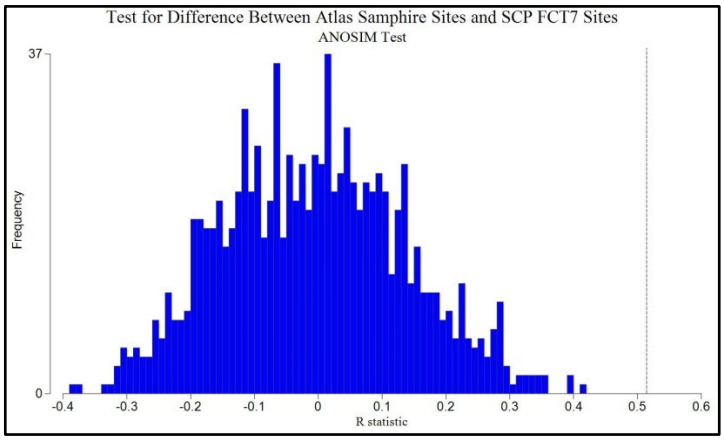


Figure A11-06c. The R statistic distribution and R-value for the ANOSIM test for differences between the Atlas samphire site group (4 sites) and the SCP FCT 7 site group (25 sites) (R value 0.514; significance level of R statistic 0.1%).

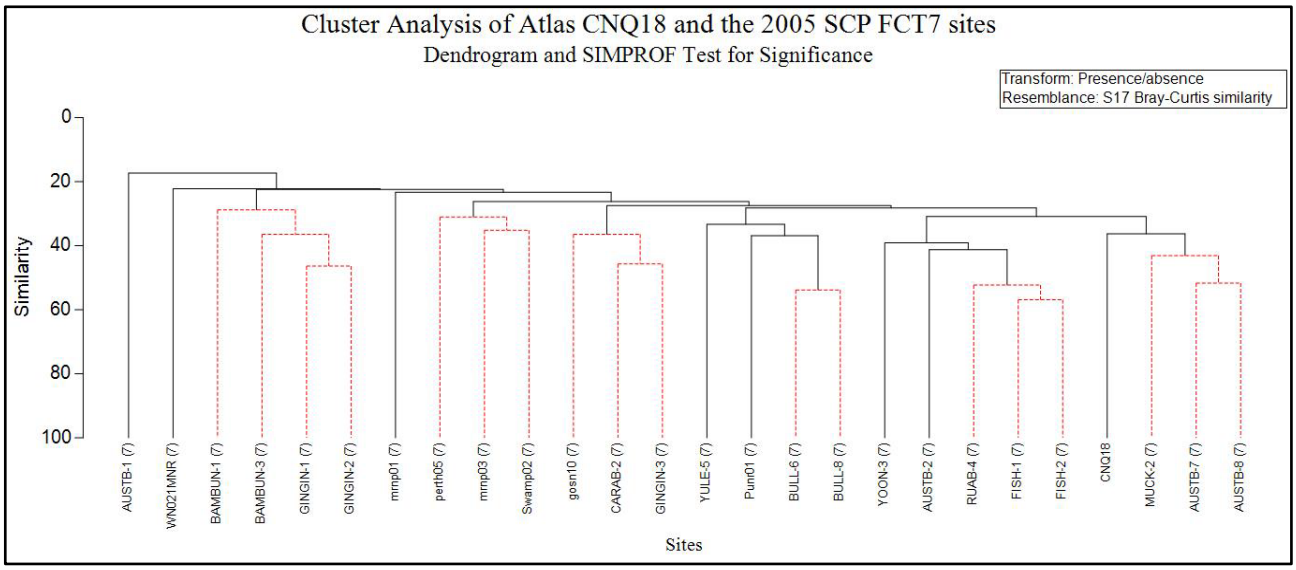


Figure A11-07a. Cluster analysis of Atlas site CNQ18 (fourth site from RHS) and the 2005 SCP FCT 7 sites.

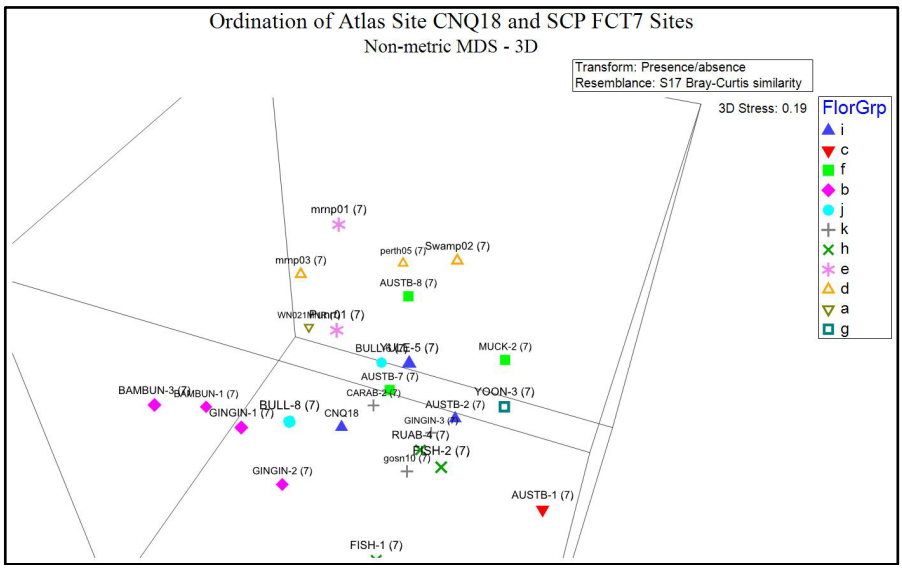


Figure A11-07b. Ordination of Atlas site CNQ18 (lower central) and the 2005 SCP FCT 7 sites. Atlas site CNQ18 is surrounded by SCP FCT7 sites in this ordination map.

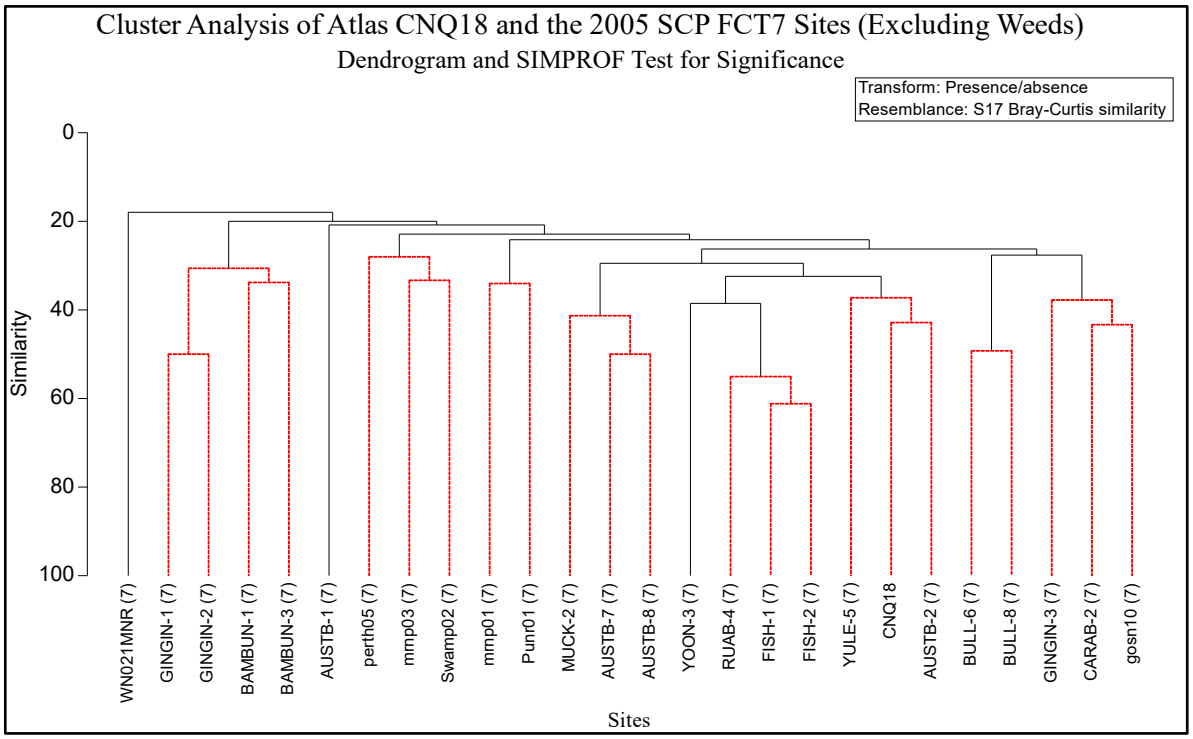


Figure A11-07c. Cluster analysis of Atlas site CNQ18 and the 2005 SCP FCT 7 sites (excluding weeds).

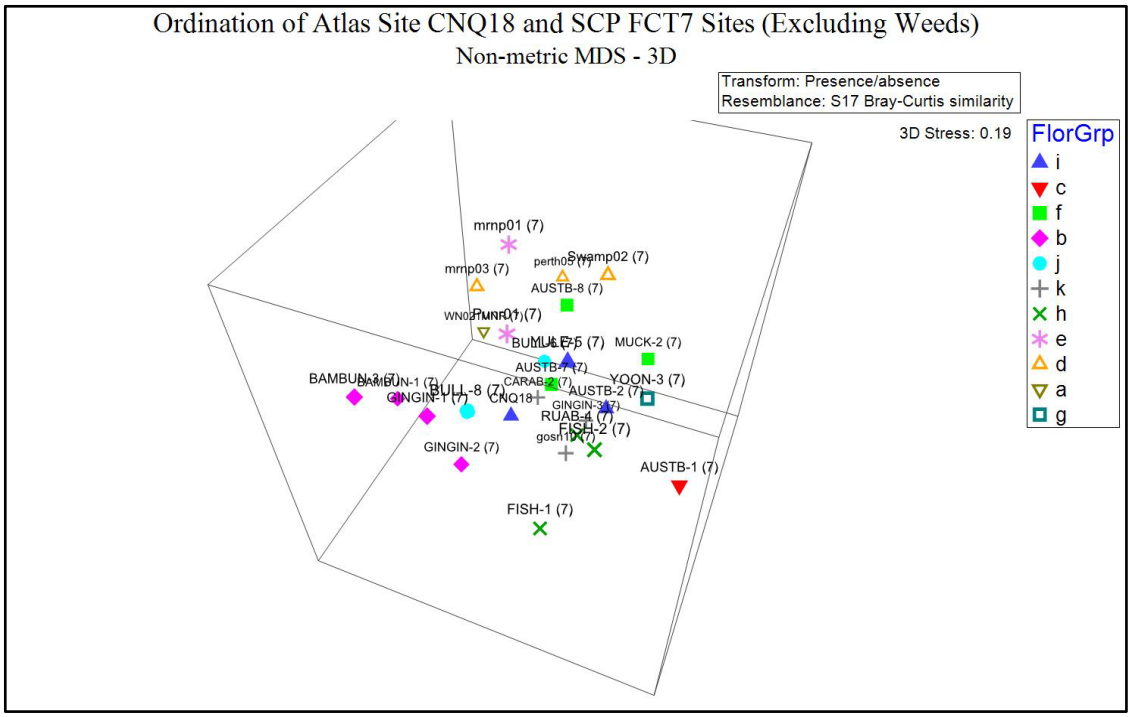


Figure A11-07d. Ordination of Atlas site CNQ18 (lower central) and the 2005 SCP FCT 7 sites (excluding weeds). Atlas site CNQ18 is surrounded by SCP FCT7 sites in this ordination map.

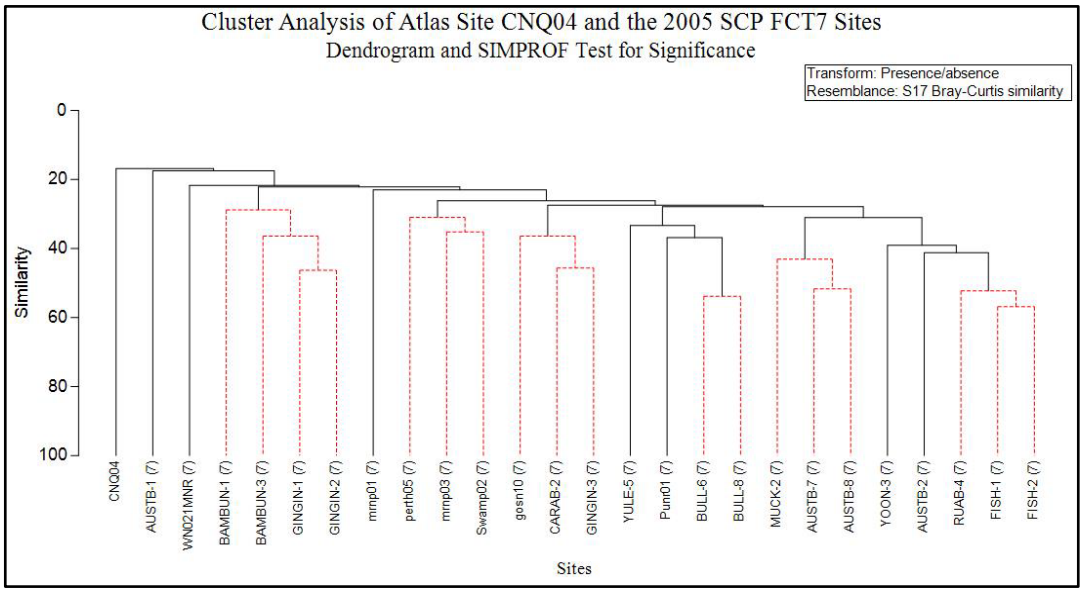


Figure A11-08a. Cluster analysis of Atlas site CNQ04 and the 2005 SCP FCT 7 sites (with SIMPROF test for significance).

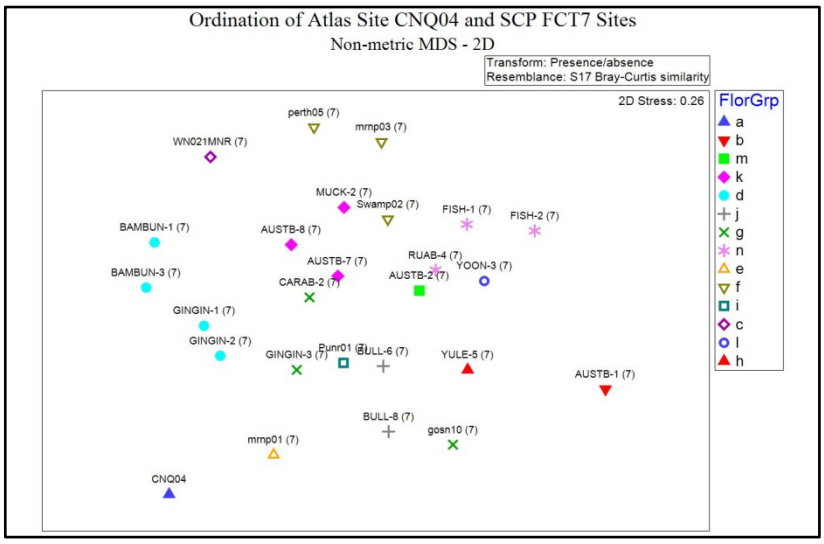


Figure A11-08b. Ordination of Atlas site CNQ04 and the 2005 SCP FCT 7 sites.

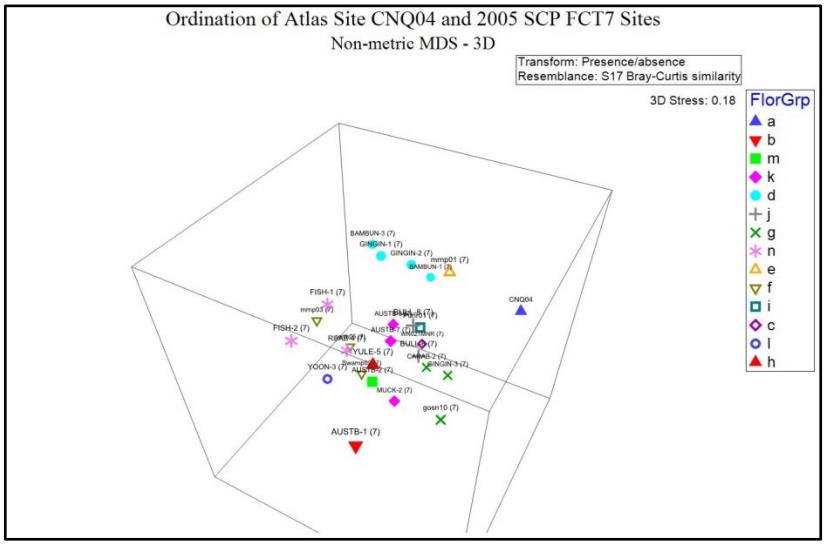


Figure A11-08c. Ordination of Atlas site CNQ04 and the 2005 SCP FCT 7 sites.

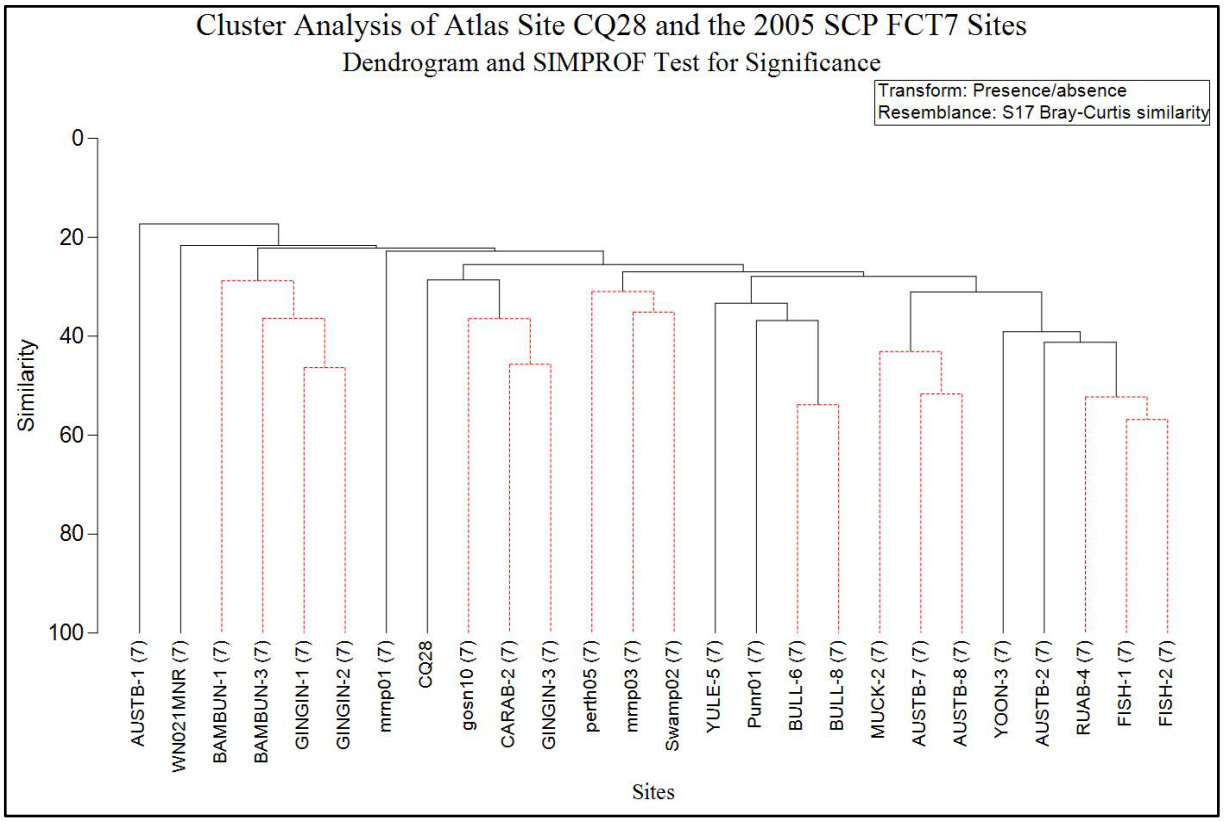


Figure A11-9a. Cluster analysis of Atlas site CQ28 and the 2005 SCP FCT 7 sites (with SIMPROF test for significance).

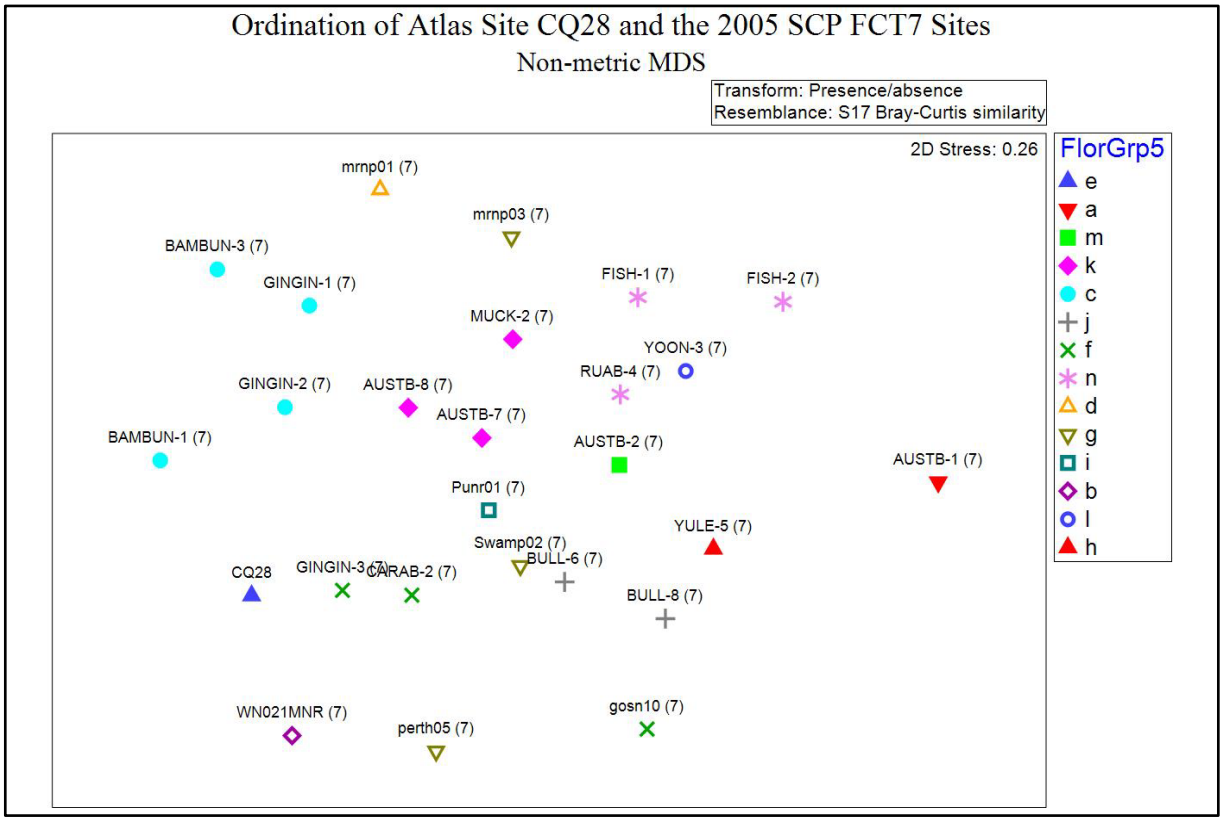


Figure A11-9b. Ordination of Atlas site CQ28 and the SCP FCT 7 sites.

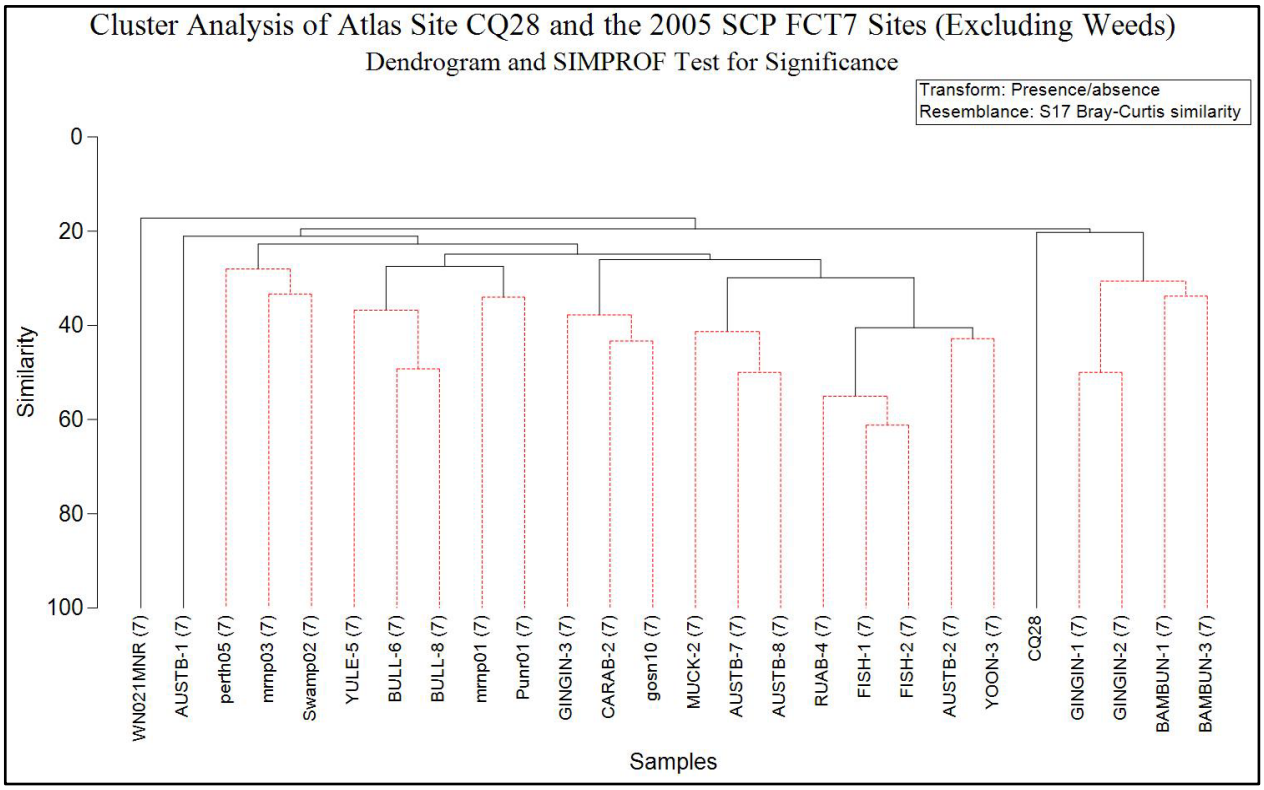


Figure A11-9c. Cluster analysis of Atlas site CQ28 and the 2005 SCP FCT 7 sites (excluding. weeds).

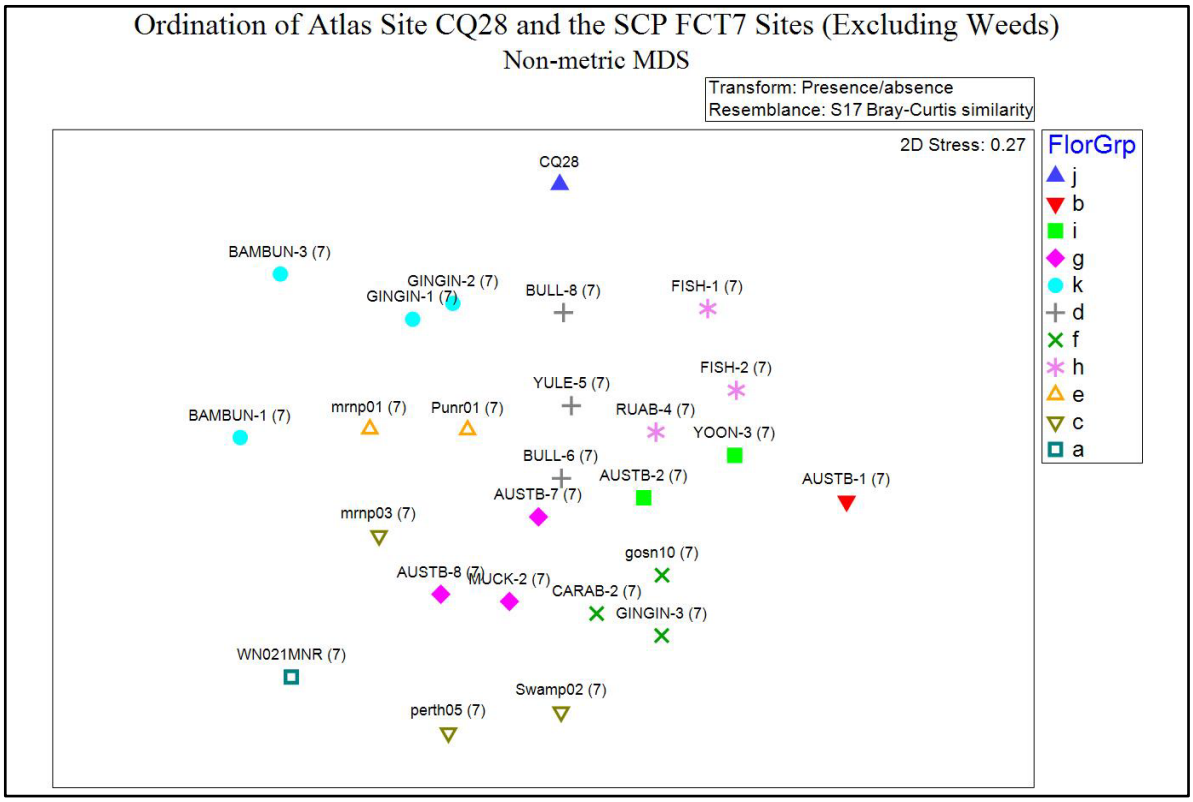


Figure A11-9d. Ordination of Atlas site CQ28 and the SCP FCT 7 sites (excluding. weeds).

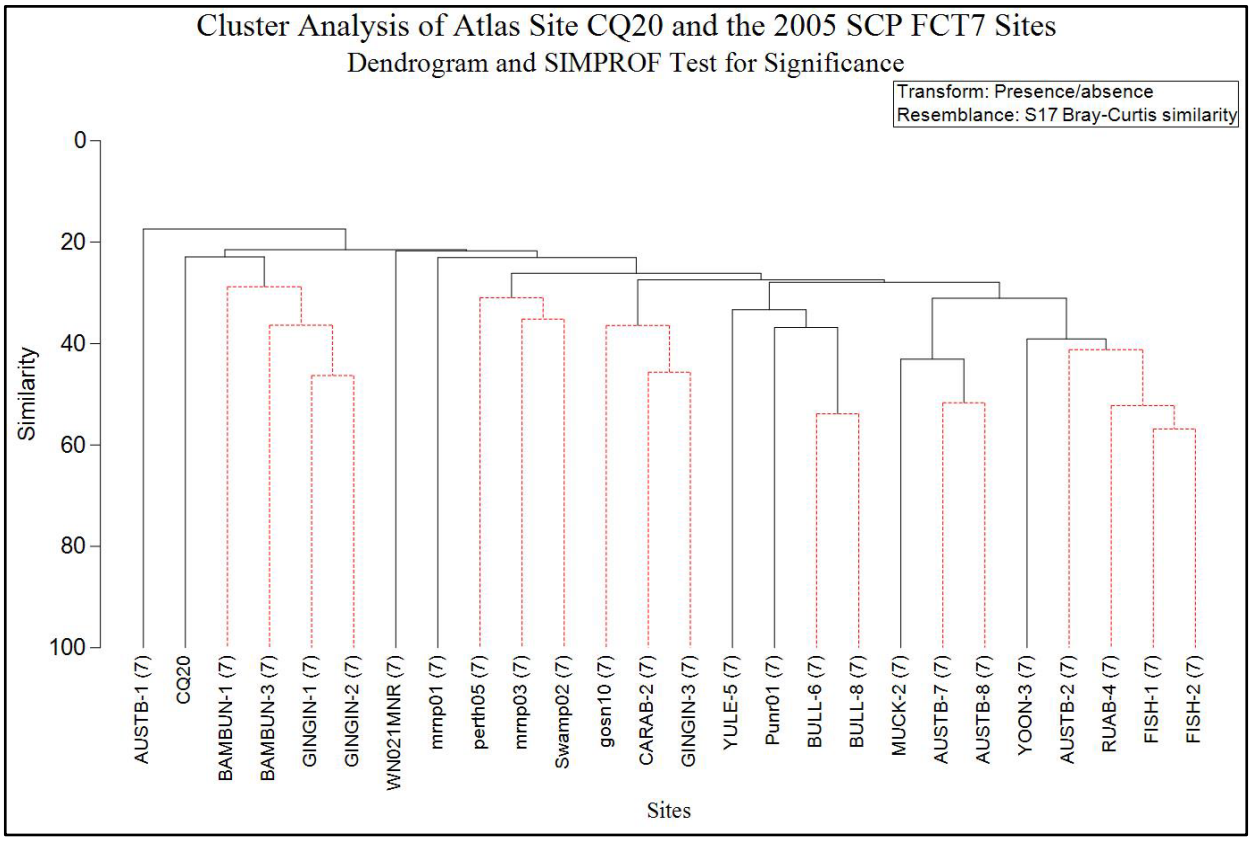


Figure A11-10a. Cluster analysis of Atlas site CQ20 and the 2005 SCP FCT 7 sites.

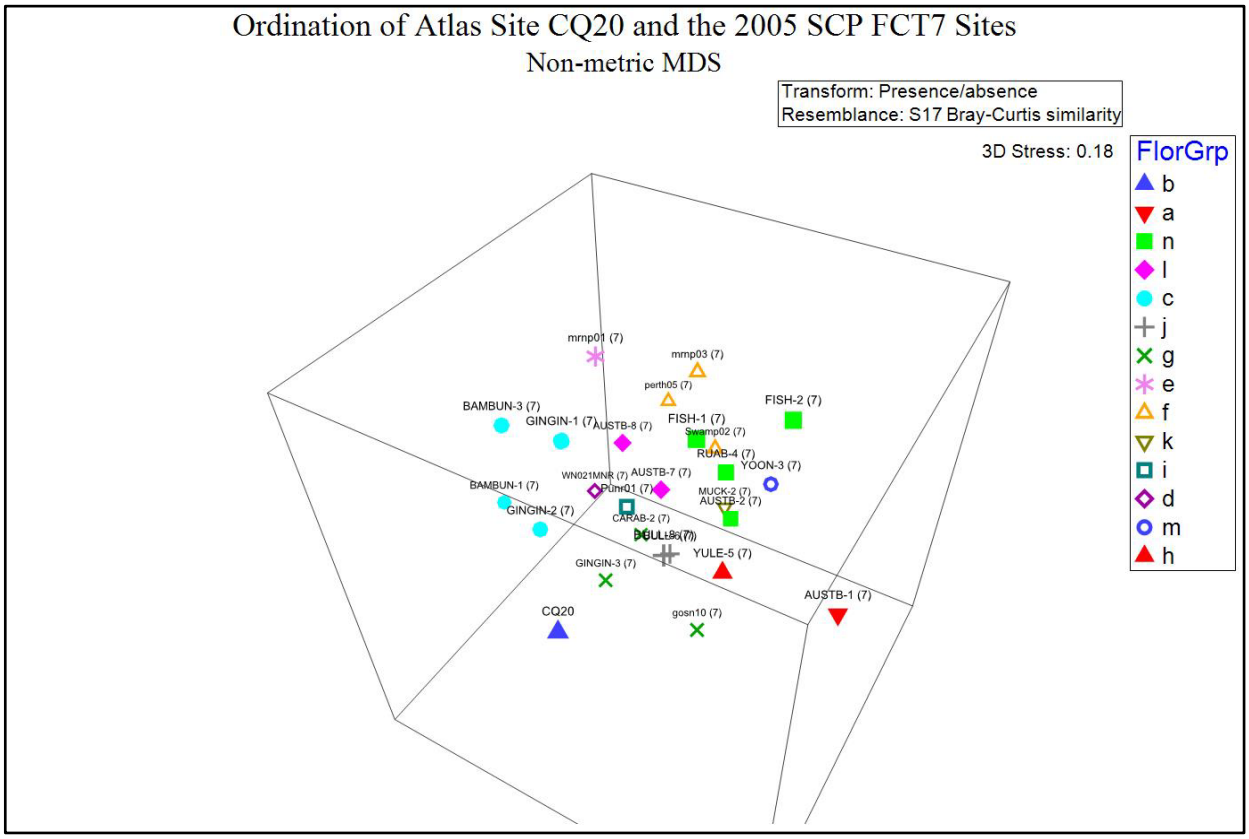


Figure A11-10b. Ordination of Atlas site CQ20 and the SCP FCT 7 sites.

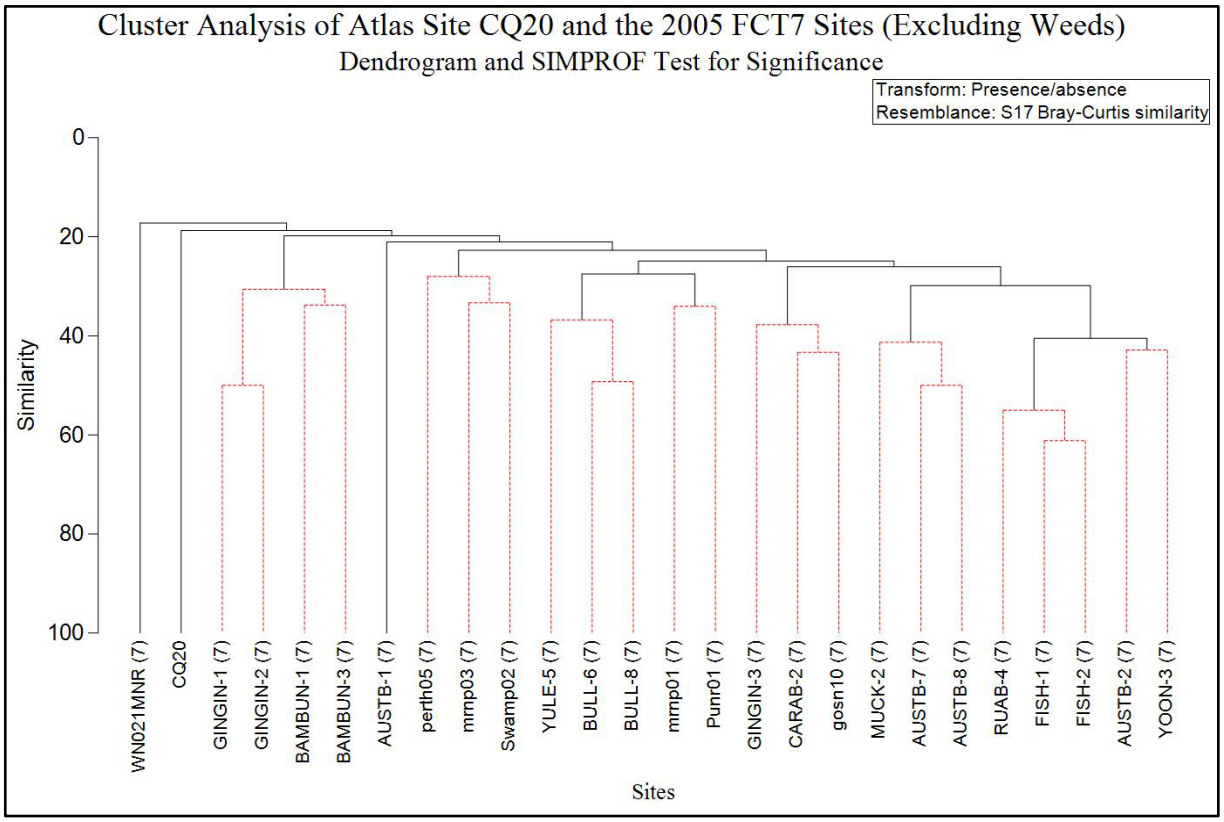


Figure A11-10c. Cluster analysis of Atlas site CQ20 and the 2005 SCP FCT 7 sites (excluding weeds).

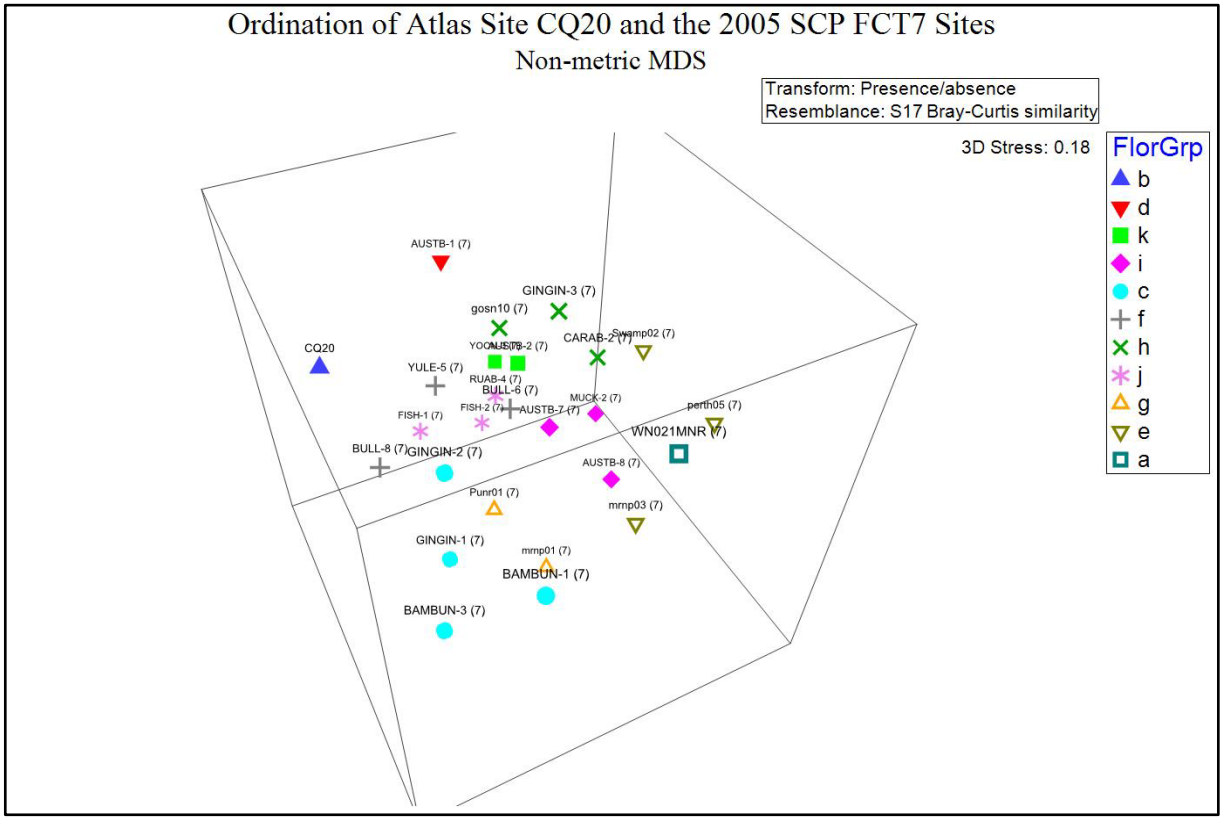


Figure A11-10d. Ordination of Atlas site CQ20 and the SCP FCT 7 sites (excluding weeds).

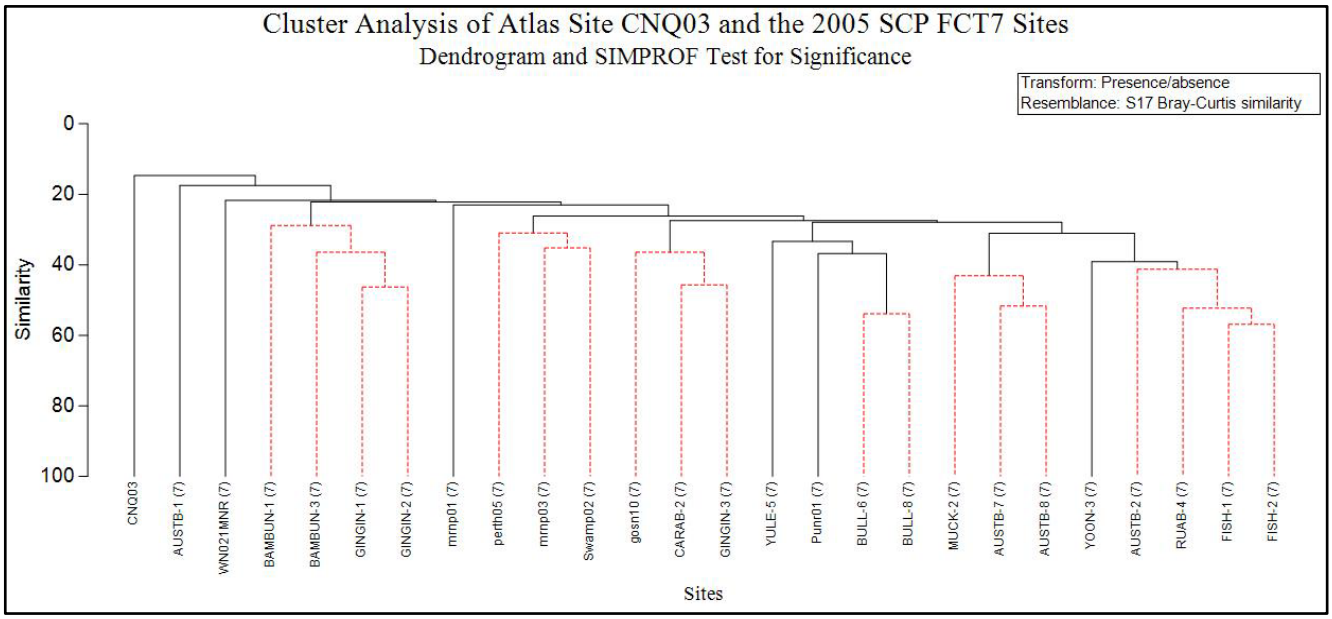


Figure A11-11a. Cluster analysis of Atlas site CNQ03 and the 2005 SCP FCT 7 sites.

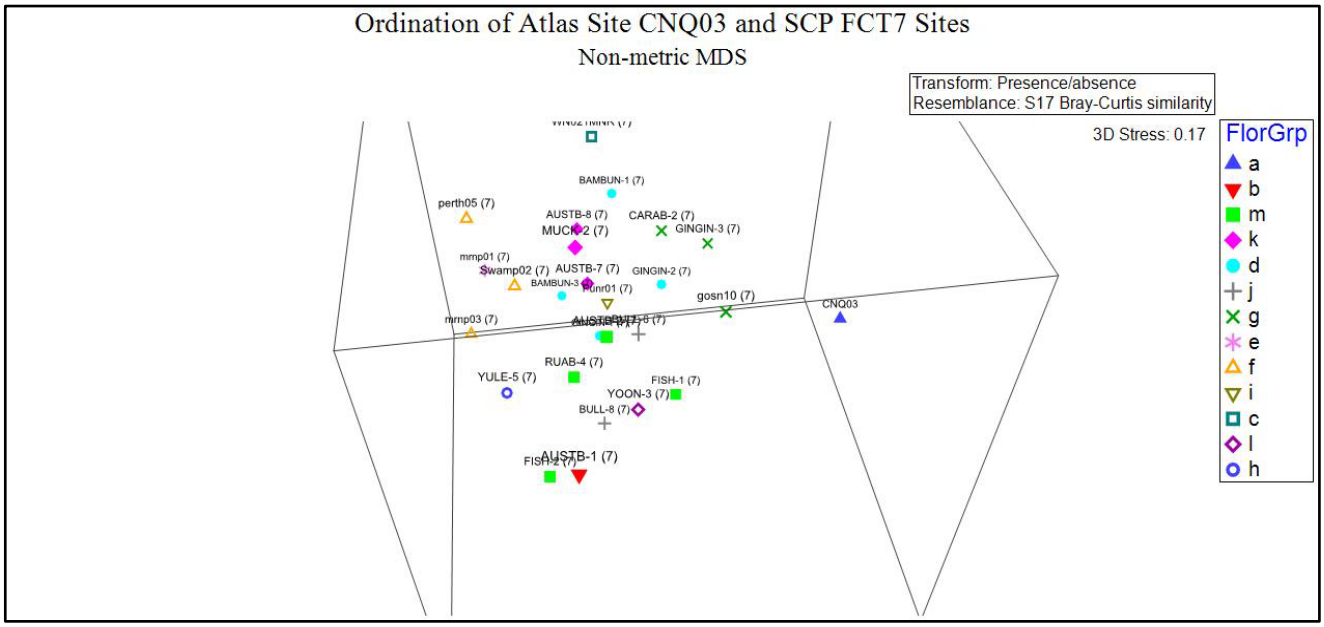


Figure A11-11b. Ordination of Atlas site CNQ03 and the SCP FCT 7 sites.

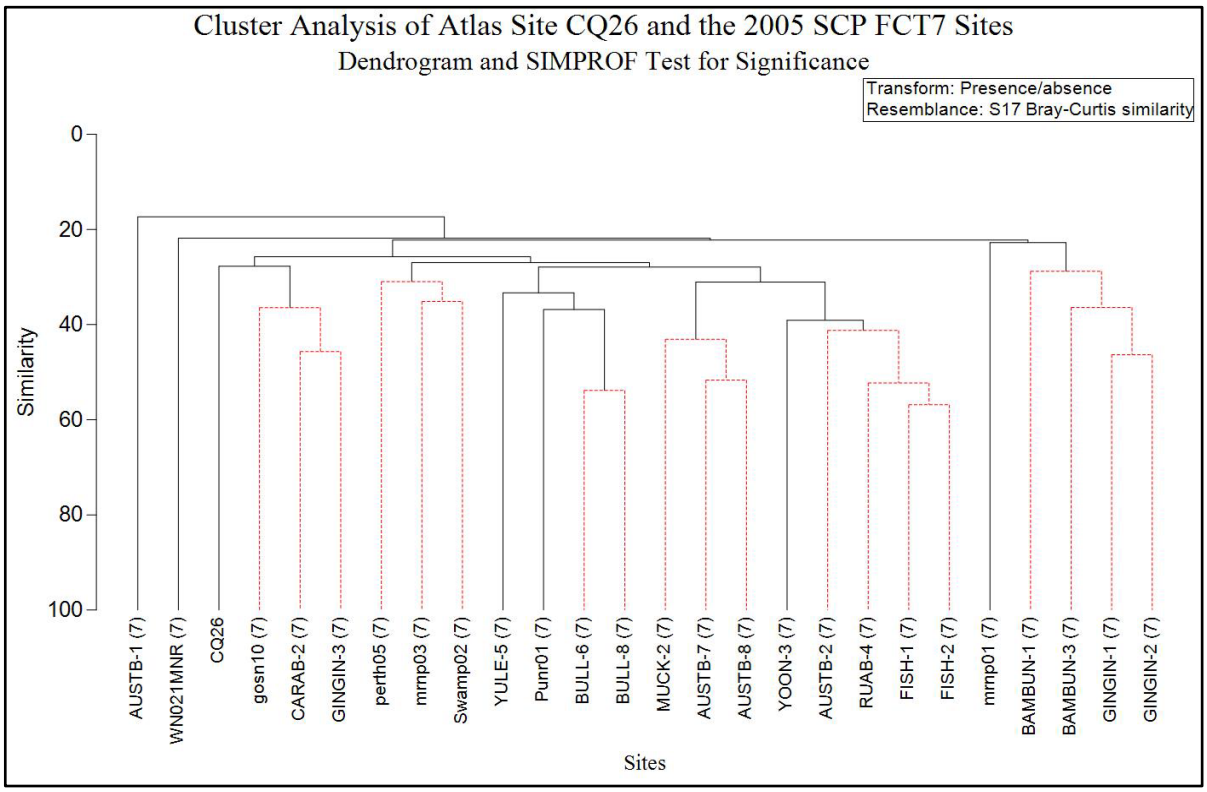


Figure A11-12a. Cluster analysis of Atlas site CQ26 and the 2005 SCP FCT 7 sites (with SIMPROF test for significance).

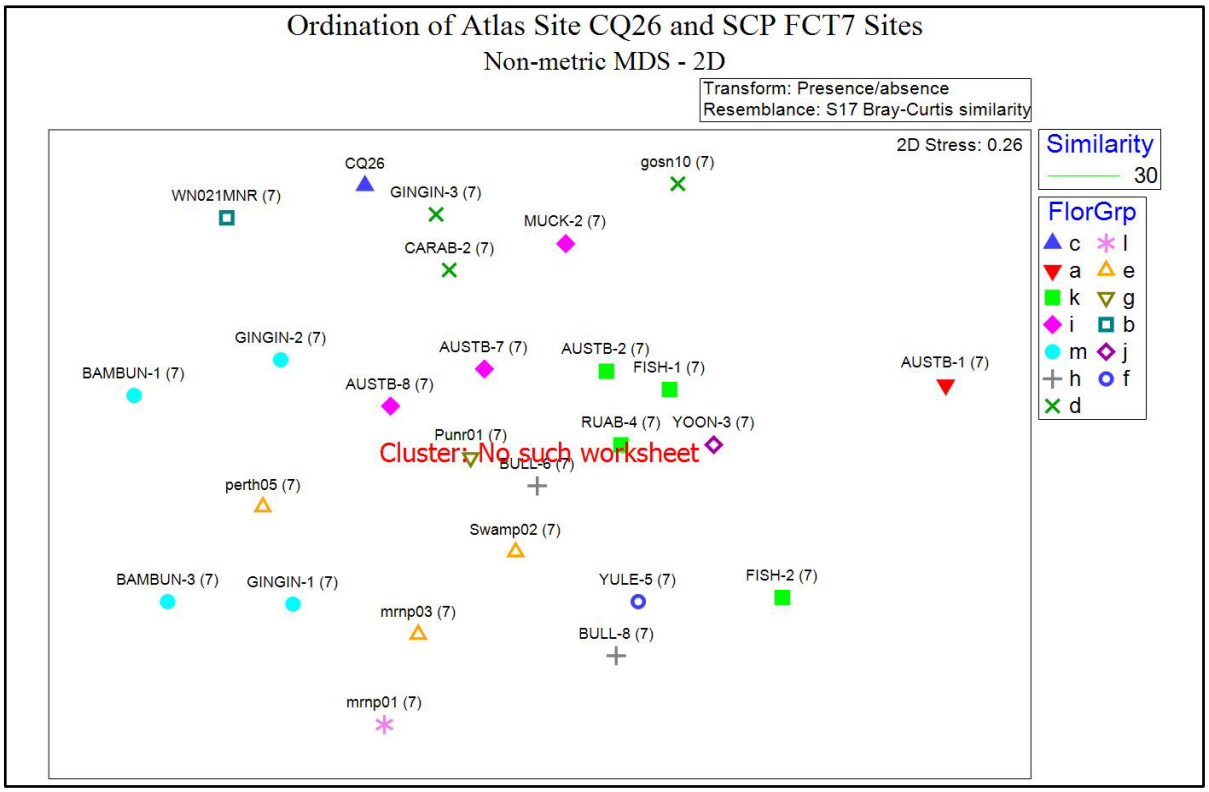


Figure A11-12b. Ordination of Atlas site CQ26 and the SCP FCT 7 sites.

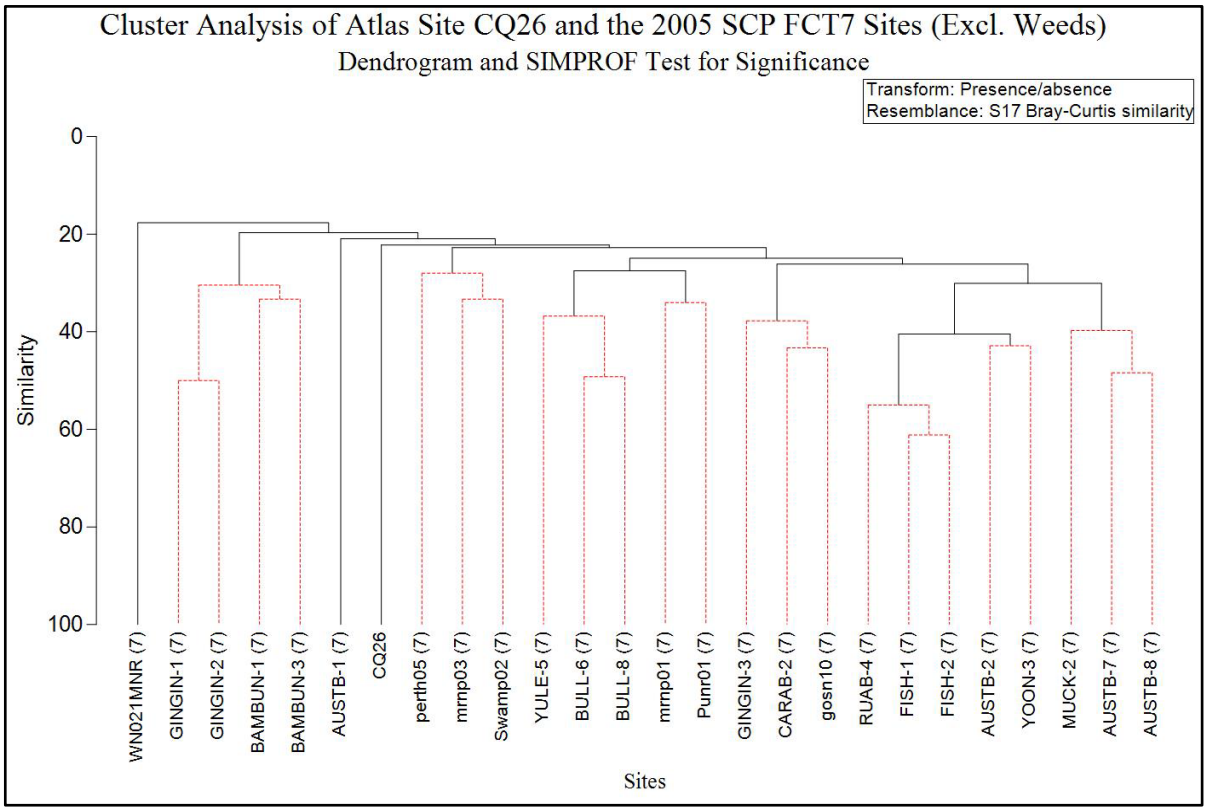


Figure A11-12c. Cluster analysis of Atlas site CQ26 and the 2005 SCP FCT 7 sites (excluding weeds) (with SIMPROF test for significance).

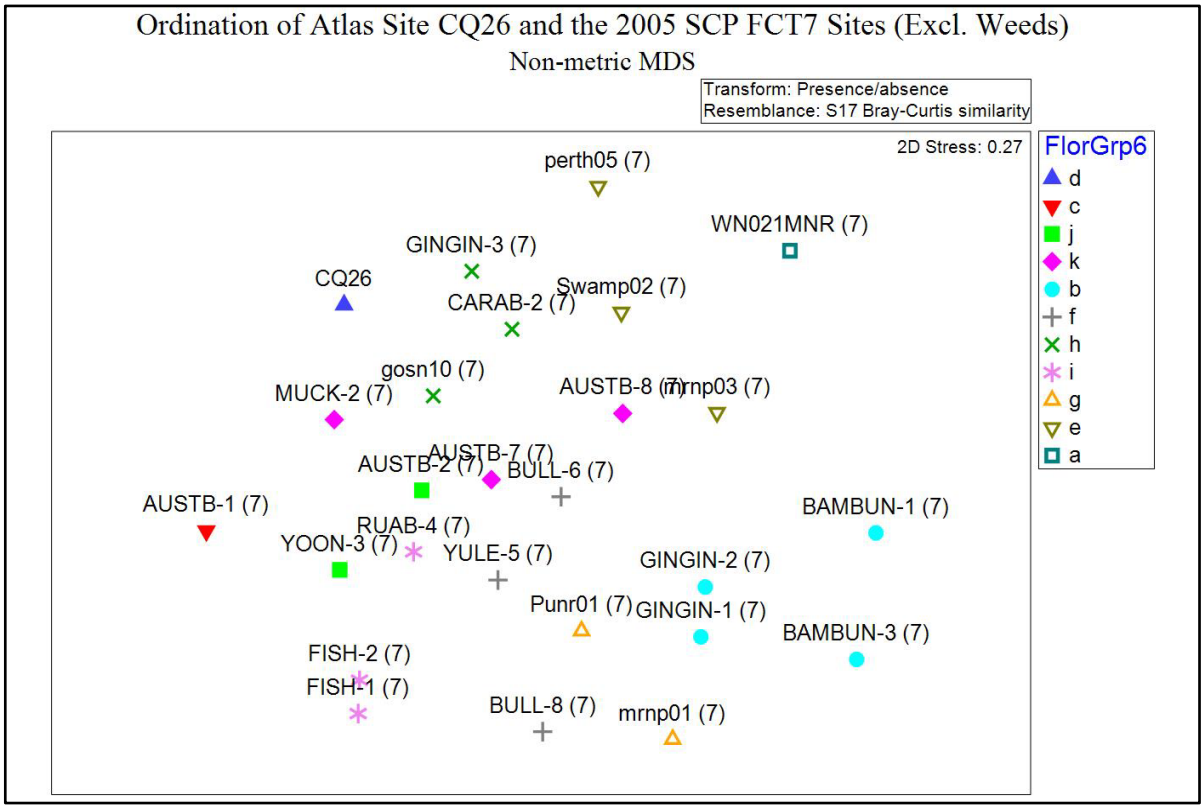


Figure A11-12d. Ordination of Atlas site CQ26 and the SCP FCT 7 sites (excluding weeds).

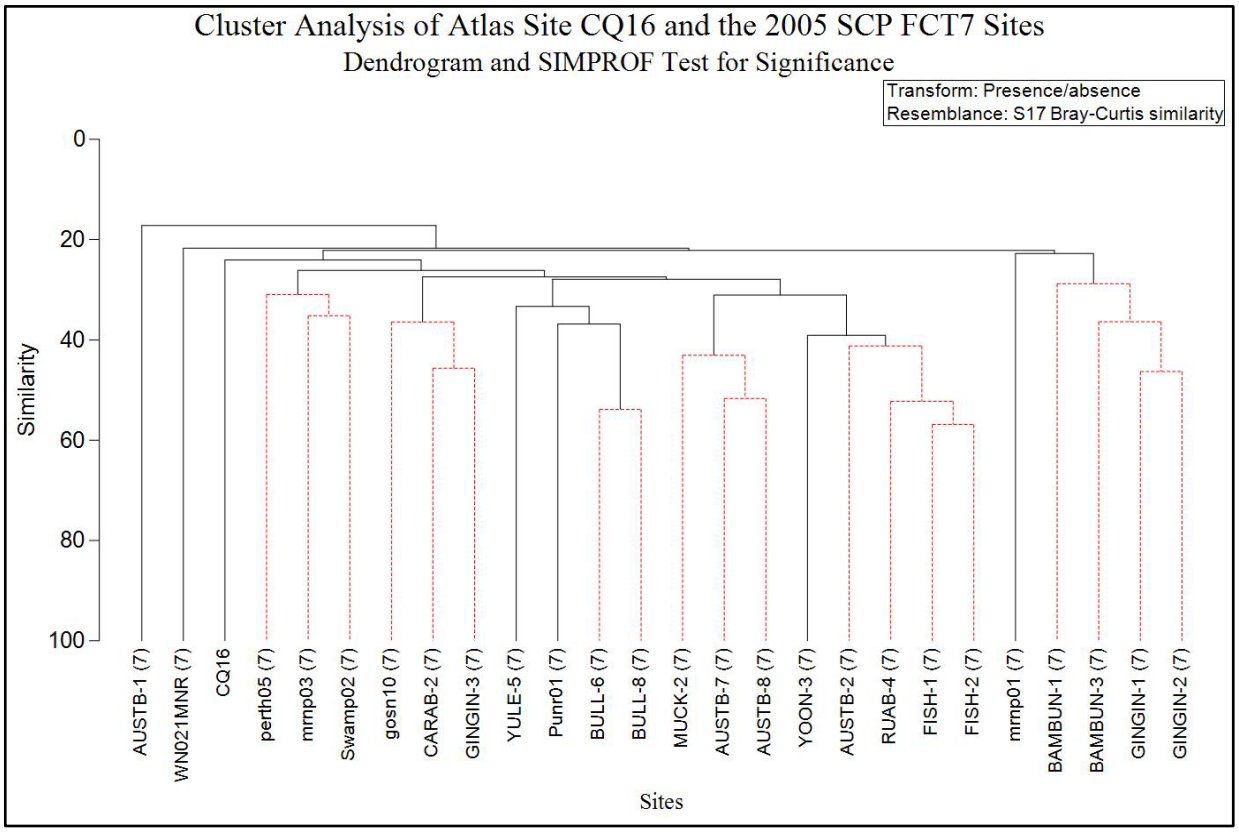


Figure A11-13a. Cluster analysis of Atlas site CQ16 and the 2005 SCP FCT 7 sites.

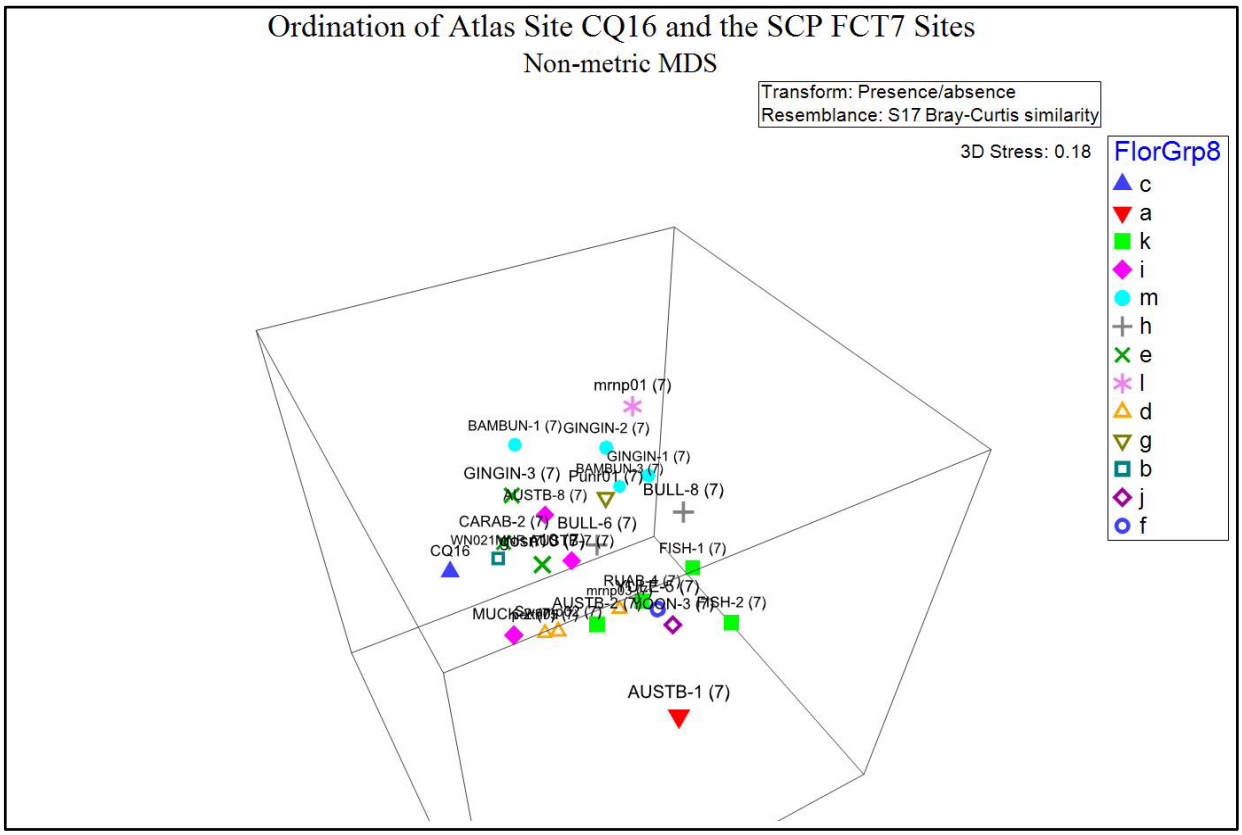


Figure A11-13b. Ordination of Atlas site CQ16 and the SCP FCT 7 sites.

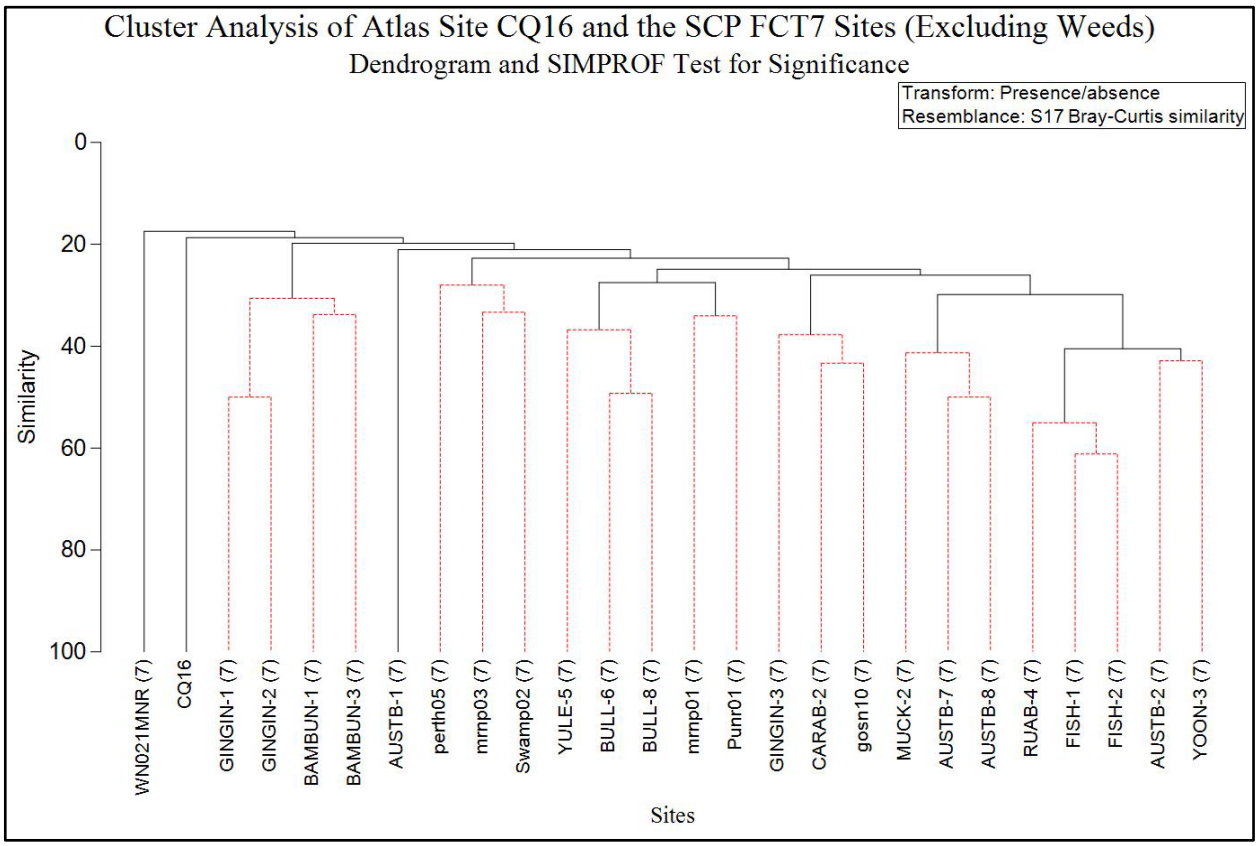


Figure A11-13c. Cluster analysis of Atlas site CQ16 and the 2005 SCP FCT 7 sites (excluding weeds).

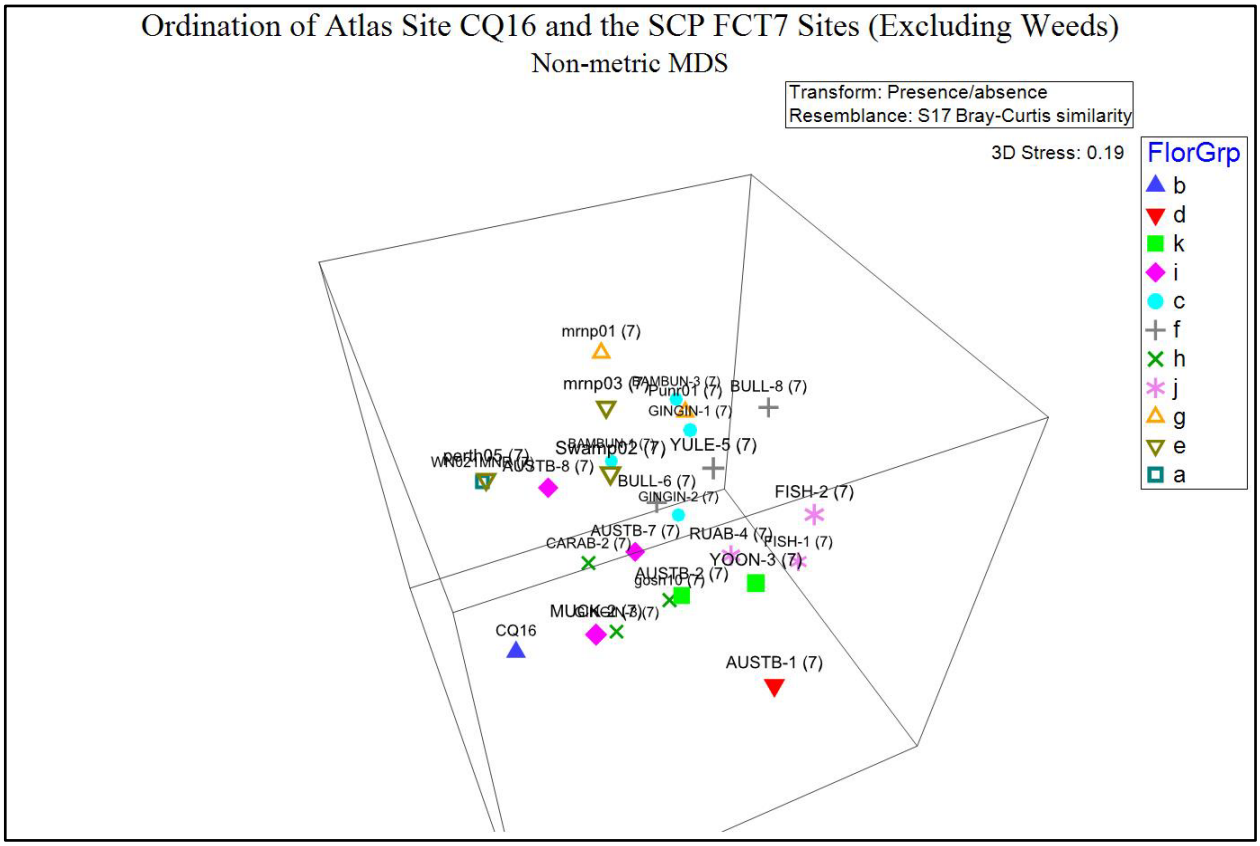


Figure A11-13d. Ordination of Atlas site CQ16 and the SCP FCT 7 sites (excluding weeds).

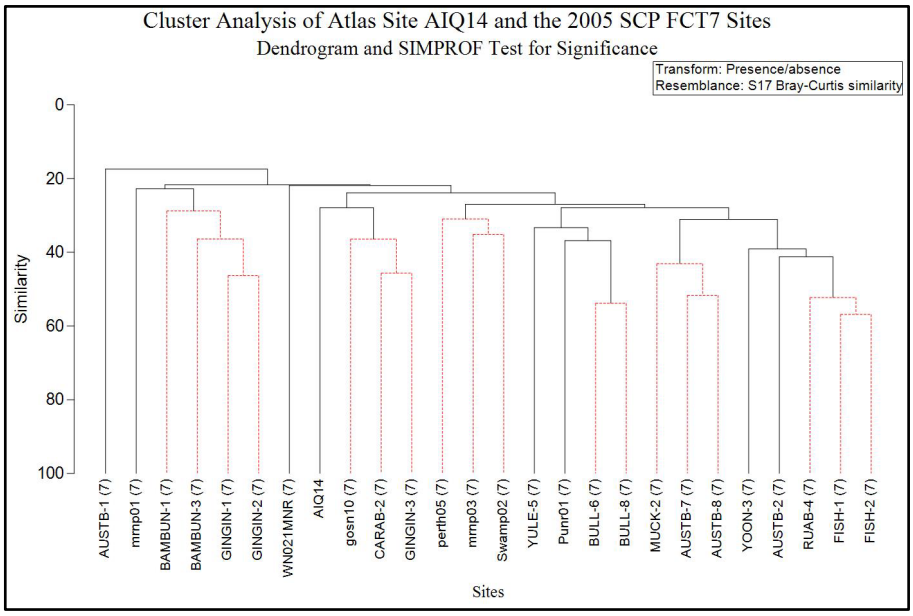


Figure A11-14a. Cluster analysis of Atlas site AIQ14 and the 2005 SCP FCT 7 sites.

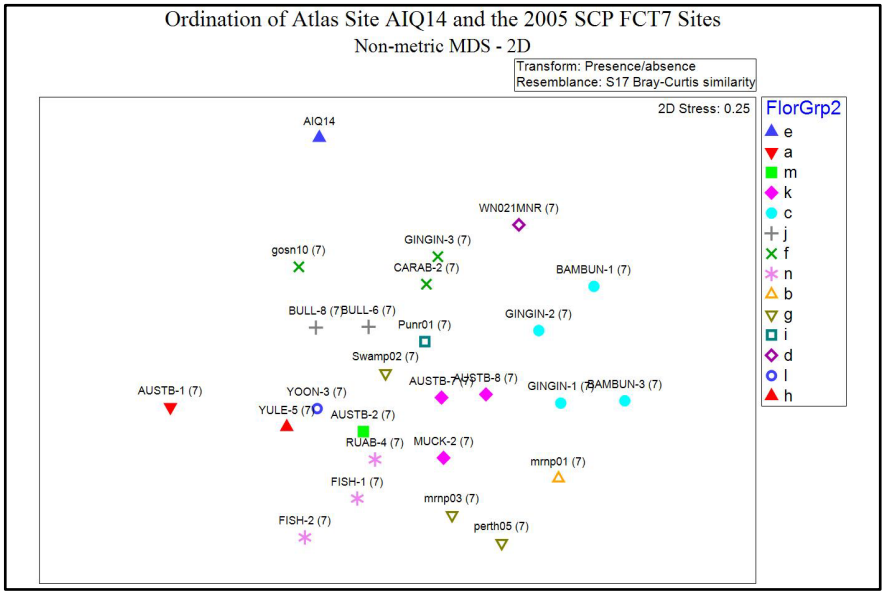


Figure A11-14b. Ordination of Atlas site AIQ14 and the SCP FCT 7 sites.

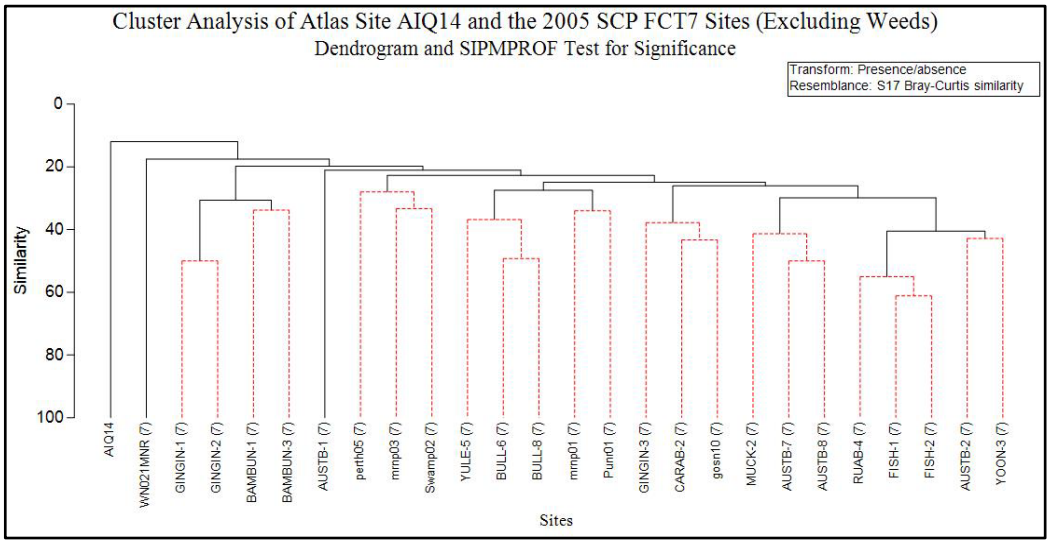


Figure A11-14c. Cluster analysis of Atlas site AIQ14 and the 2005 SCP FCT 7 sites (excl. weeds).

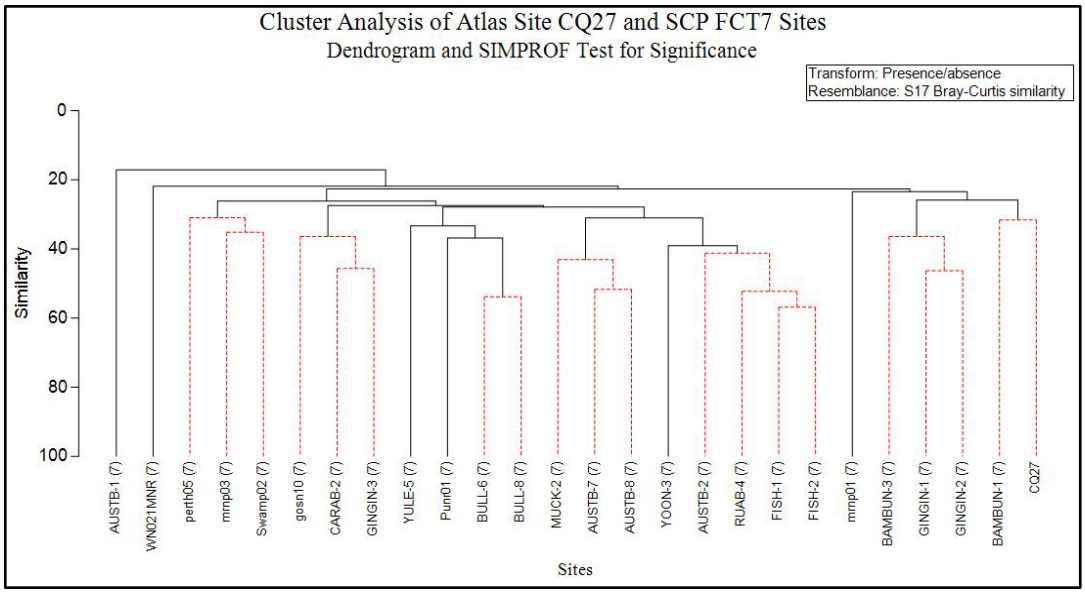


Figure A11-15a. Cluster analysis of Atlas site CQ27 and the 2005 SCP FCT 7 sites.

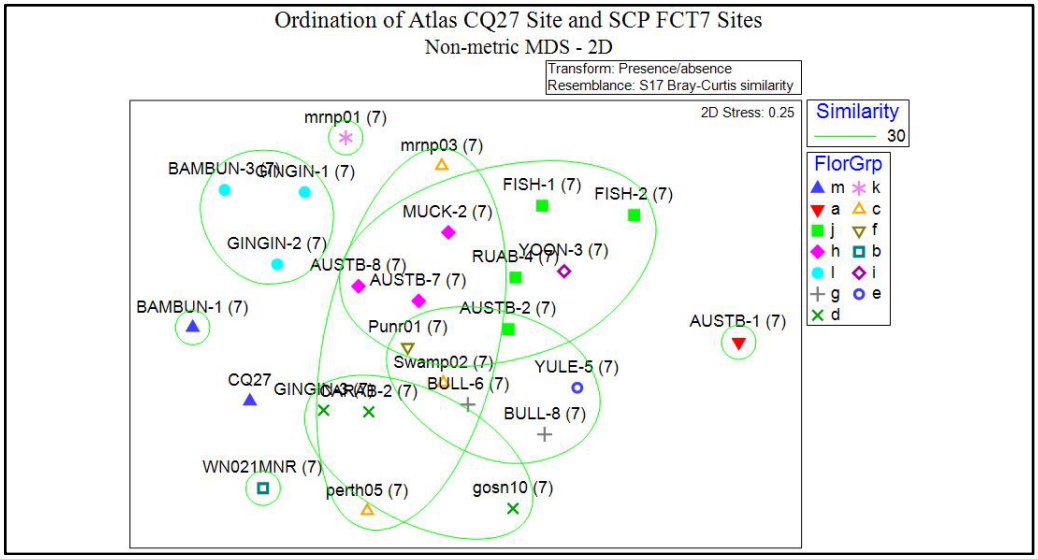


Figure A11-15b. Ordination of Atlas site CQ27 and the SCP FCT 7 sites.

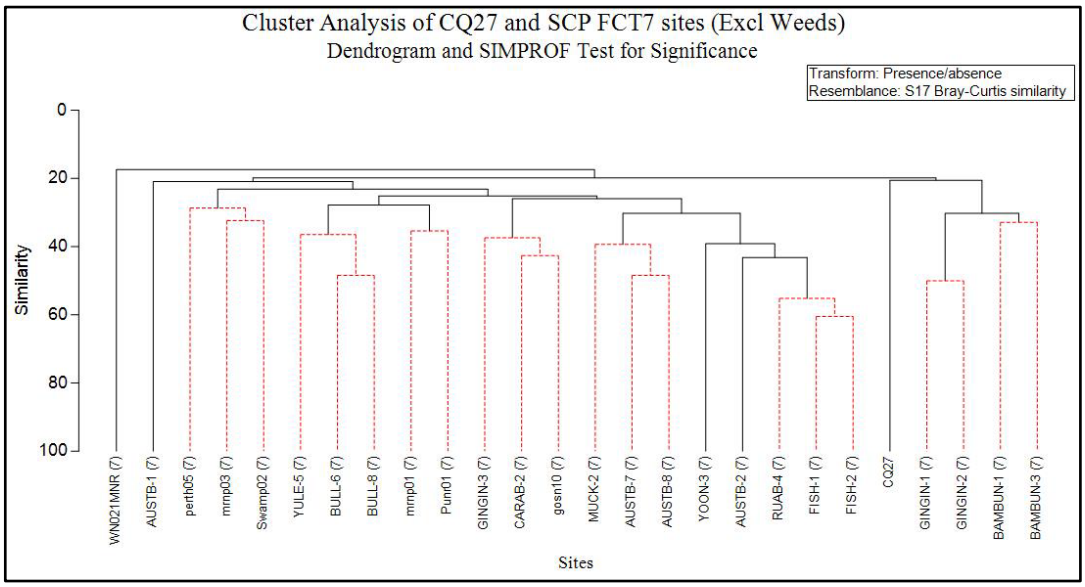


Figure A11-15c. Cluster analysis of Atlas site CQ27 and the SCP FCT 7 sites (excluding weeds).

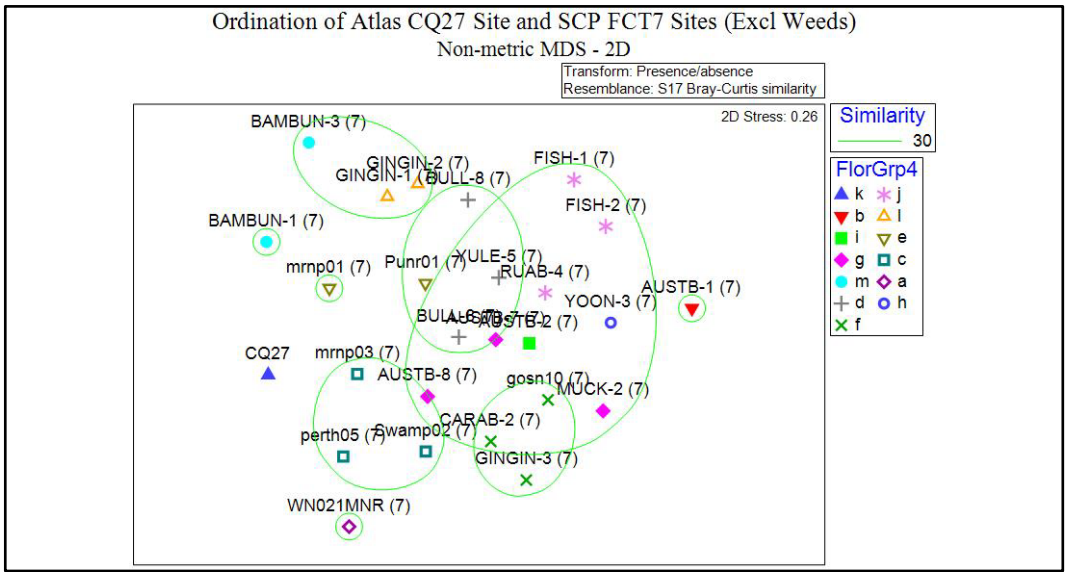


Figure A11-15d. Ordination of Atlas site CQ27 and the SCP FCT 7 sites (excluding weeds).

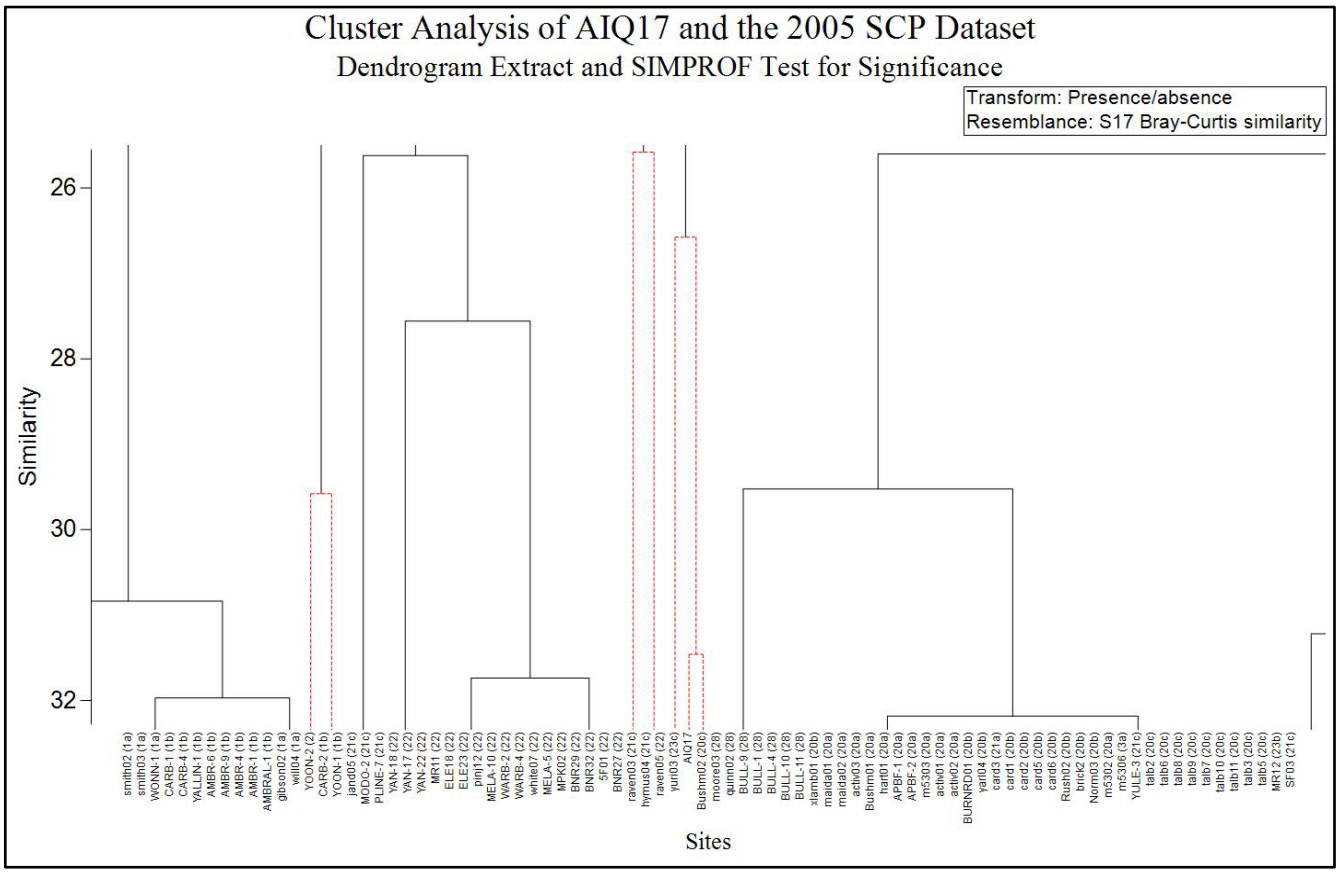


Figure A11-16. Extract of dendrogram from the cluster analysis of Atlas site AIQ17 and the 2005 SCP dataset. AIQ17 site is central on the bottom axis in the figure.

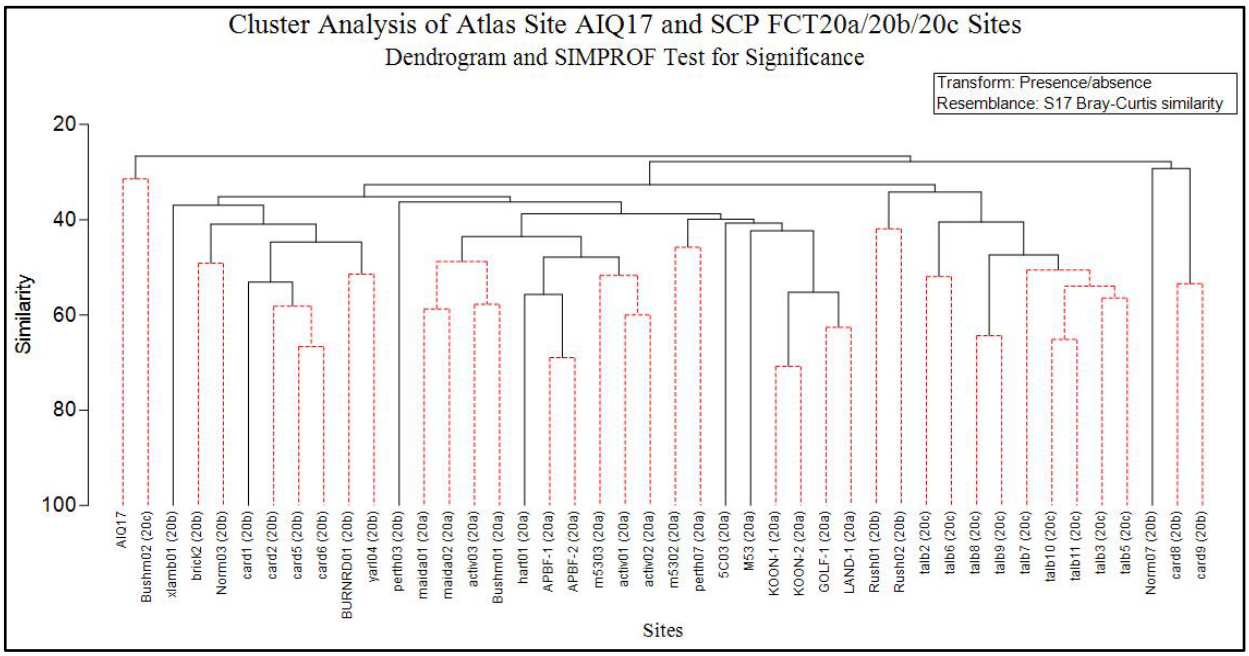


Figure A11-17a. Dendrogram from the cluster analysis of Atlas site AIQ17 and the FCT20a/20b/20c sitesfrom the 2005 SCP dataset.

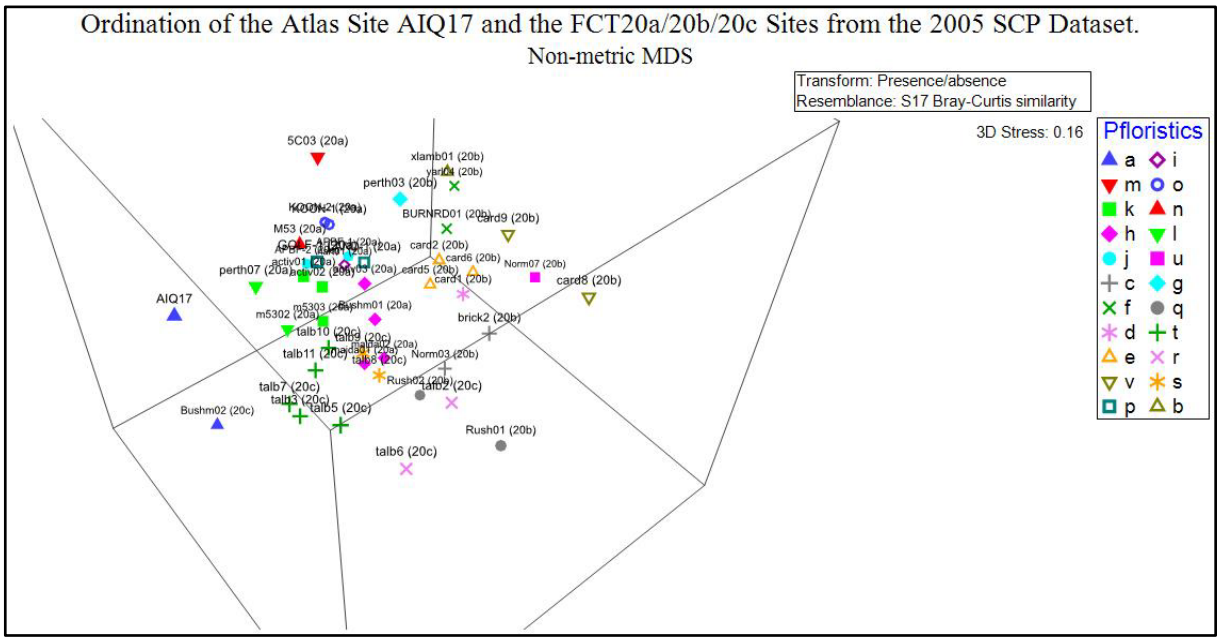


Figure A11-17b. Ordination of Atlas site AIQ17 and the FCT20a/20b/20c sites from the 2005 SCP dataset.

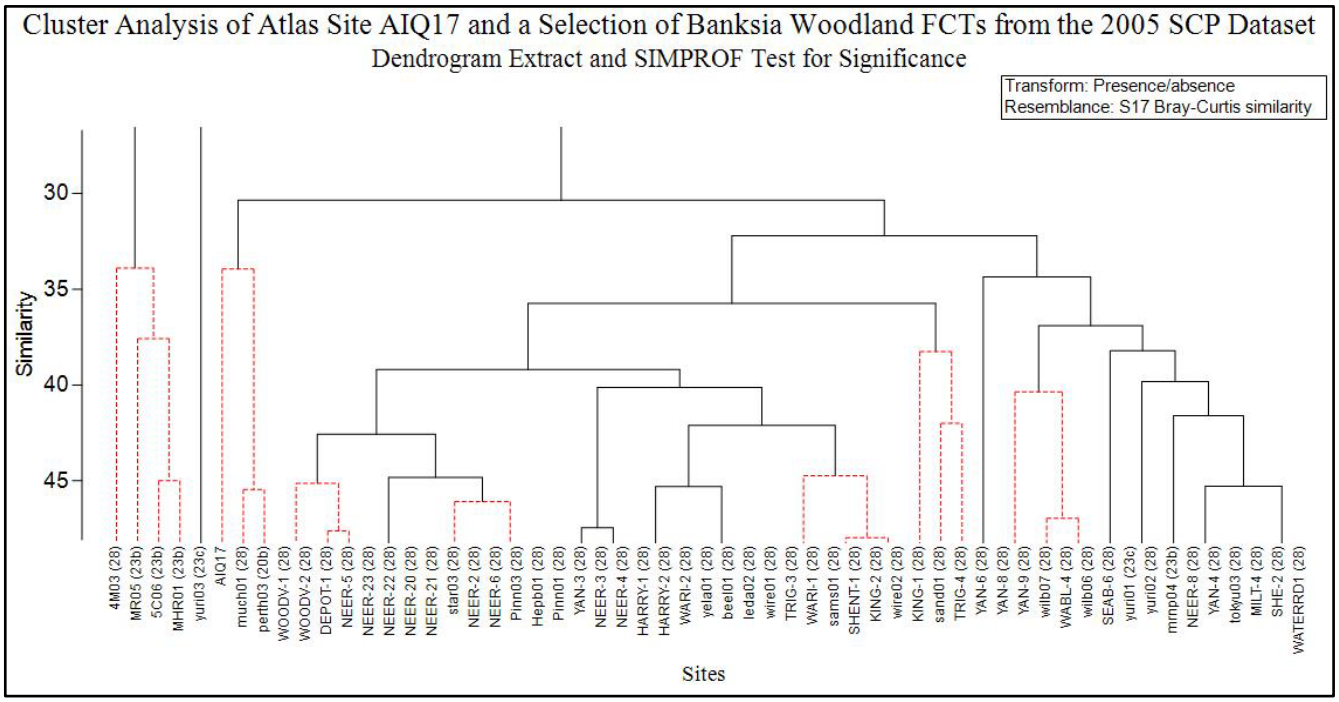


Figure A11-18a. Extract of dendrogram from the cluster analysis of Atlas site AIQ17 and a selection of *Banksia* woodland FCTs from the 2005 SCP dataset.

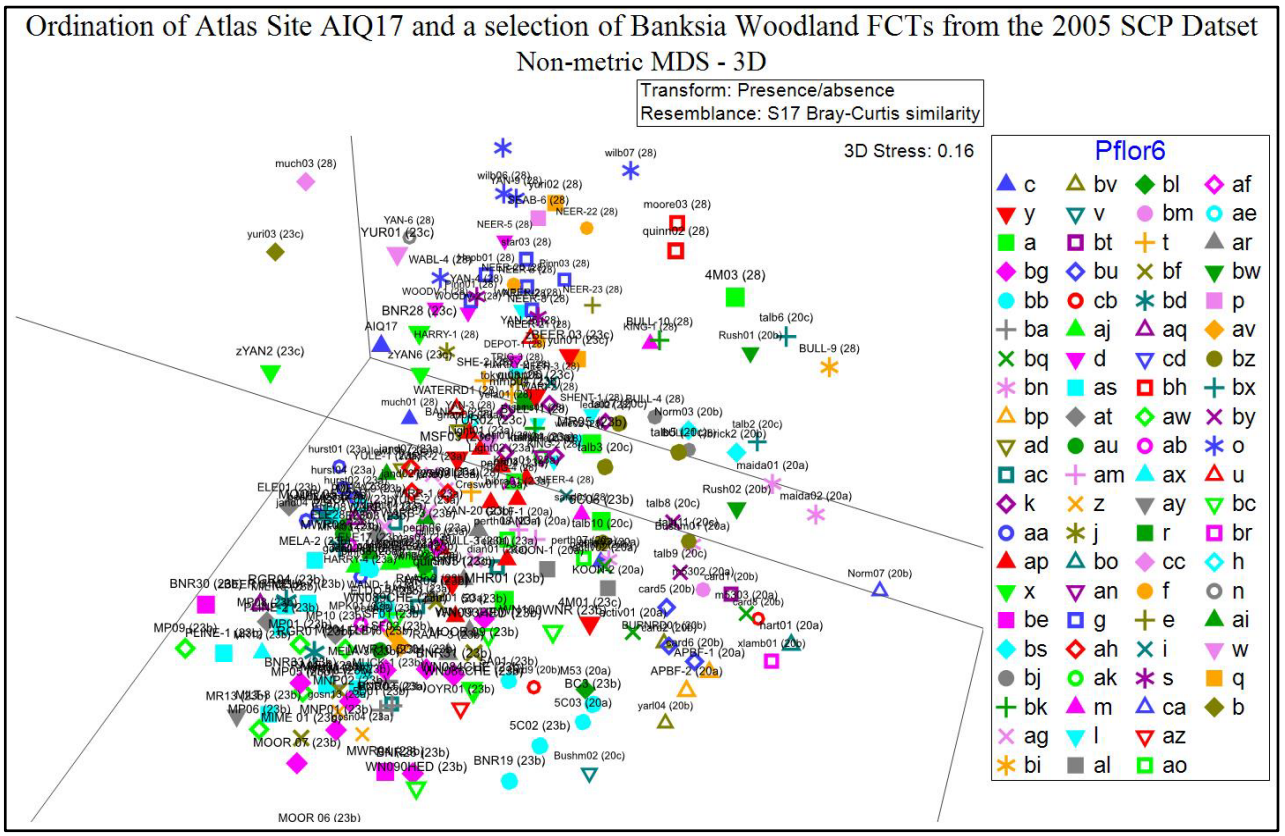


Figure A11-18b. Ordination of Atlas site AIQ17 and a selection of *Banksia* woodland FCTs from the 2005 SCP dataset.

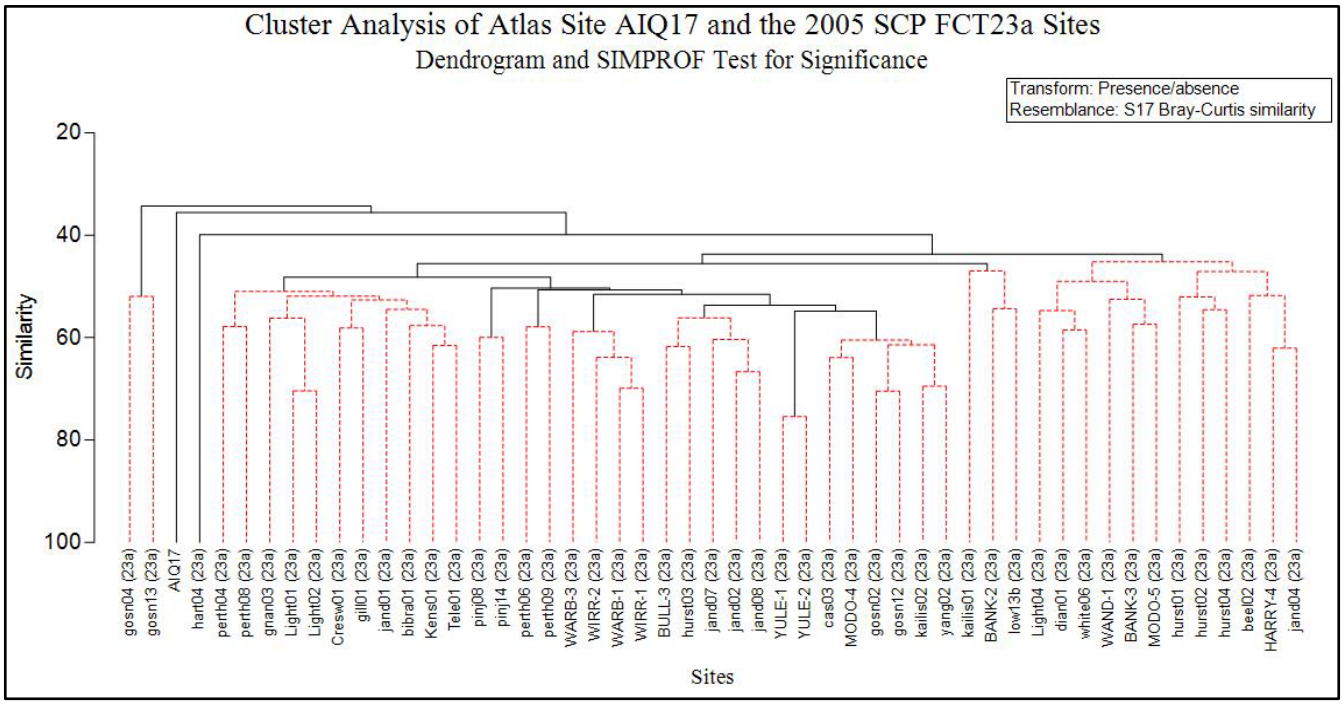


Figure A11-19a. Dendrogram from the cluster analysis of Atlas site AIQ17 and the 2005 SCP FCT23a sites.

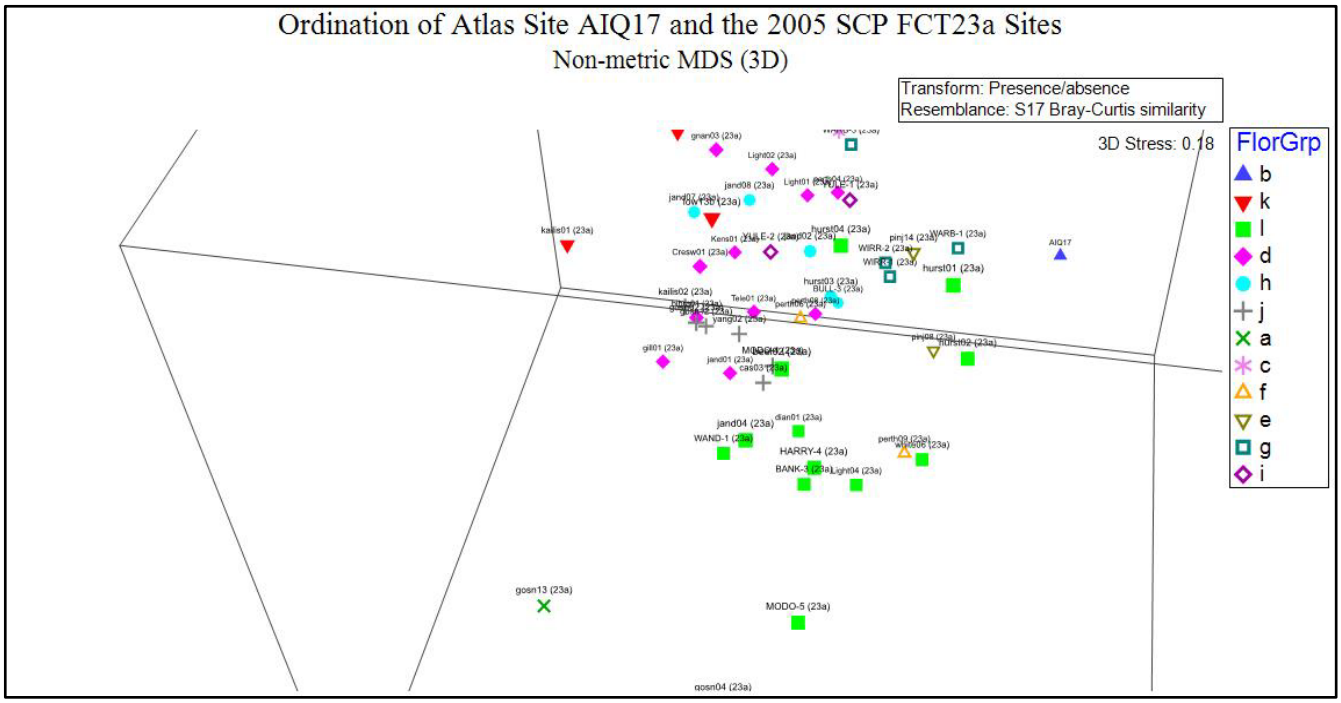


Figure A11-19b. Ordination (3D) of Atlas site AIQ17 and the 2005 SCP FCT23a sites.

APPENDIX TWELVE. PRIMER v7 SIMPER Analysis

12.1 SIMPER analysis and species contributing to similarities/dissimilarities of Atlas site CNQ18 with SCP FCT7 sites.

12.1.1 Similarity between CNQ18 and FCT7 sites (excluding weeds): AUSTB-2, YULE-5, AUSTB-7, AUSTB-8 and MUCK-2

(see dendrogram, Figure A11-07c, Appendix 11)

SIMPER

Similarity Percentages - species contributions

One-Way Analysis

Data worksheet
Name: Data3
Data type: Other
Sample selection: All
Variable selection: All

Parameters
Resemblance: S17 Bray-Curtis similarity
Cut off for low contributions: 90.00%

Factor Groups

Sample	Pflor18FCT7
CNQ18	A
AUSTB-2 (7)	A
AUSTB-1 (7)	FCT7
AUSTB-7 (7)	FCT7
AUSTB-8 (7)	FCT7
BAMBUN-1 (7)	FCT7
BAMBUN-3 (7)	FCT7
BULL-6 (7)	FCT7
BULL-8 (7)	FCT7
CARAB-2 (7)	FCT7
FISH-1 (7)	FCT7
FISH-2 (7)	FCT7
GINGIN-1 (7)	FCT7
GINGIN-2 (7)	FCT7
GINGIN-3 (7)	FCT7
gosn10 (7)	FCT7
mrnp01 (7)	FCT7
mrnp03 (7)	FCT7
MUCK-2 (7)	FCT7
perth05 (7)	FCT7
Punr01 (7)	FCT7
RUAB-4 (7)	FCT7
Swamp02 (7)	FCT7
WN021MNR (7)	FCT7
YOON-3 (7)	FCT7
YULE-5 (7)	FCT7

Group A CNQ18 & AUSTB-2
Average similarity: 42.86

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Angianthus preissianus	1.00	2.86	SD=0!	6.67	6.67
Aphelia cyperoides	1.00	2.86	SD=0!	6.67	13.33
Calandrinia granulifera	1.00	2.86	SD=0!	6.67	20.00
Centrolepis aristata	1.00	2.86	SD=0!	6.67	26.67
Centrolepis polygyna	1.00	2.86	SD=0!	6.67	33.33
Drosera gigantea subsp. gigantea	1.00	2.86	SD=0!	6.67	40.00
Goodenia micrantha	1.00	2.86	SD=0!	6.67	46.67

Hydrocotyle alata	1.00	2.86	SD=0!	6.67	53.33
Isolepis marginata	1.00	2.86	SD=0!	6.67	60.00
Philydrella pygmaea subsp. pygmaea	1.00	2.86	SD=0!	6.67	66.67
Phyllangium paradoxum	1.00	2.86	SD=0!	6.67	73.33
Samolus junceus	1.00	2.86	SD=0!	6.67	80.00
Schoenus plumosus	1.00	2.86	SD=0!	6.67	86.67
Siloxerus humifusus	1.00	2.86	SD=0!	6.67	93.33

SIMPER

Similarity Percentages - species contributions

One-Way Analysis

Data worksheet
Name: Data2
Data type: Other
Sample selection: All
Variable selection: All

Parameters
Resemblance: S17 Bray-Curtis similarity
Cut off for low contributions: 90.00%

Factor Groups

Sample	YULE5
CNQ18	A
YULE-5 (7)	A
AUSTB-1 (7)	FCT7
AUSTB-2 (7)	FCT7
AUSTB-7 (7)	FCT7
AUSTB-8 (7)	FCT7
BAMBUN-1 (7)	FCT7
BAMBUN-3 (7)	FCT7
BULL-6 (7)	FCT7
BULL-8 (7)	FCT7
CARAB-2 (7)	FCT7
FISH-1 (7)	FCT7
FISH-2 (7)	FCT7
GINGIN-1 (7)	FCT7
GINGIN-2 (7)	FCT7
GINGIN-3 (7)	FCT7
gosn10 (7)	FCT7
mrnp01 (7)	FCT7
mrnp03 (7)	FCT7
MUCK-2 (7)	FCT7
perth05 (7)	FCT7
Punr01 (7)	FCT7
RUAB-4 (7)	FCT7
Swamp02 (7)	FCT7
WN021MNR (7)	FCT7
YOON-3 (7)	FCT7

Group A
Average similarity: 31.88

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Aphelia cyperoides	1.00	2.90	SD=0!	9.09	9.09
Calandrinia granulifera	1.00	2.90	SD=0!	9.09	18.18
Centrolepis aristata	1.00	2.90	SD=0!	9.09	27.27
Drosera gigantea subsp. gigantea	1.00	2.90	SD=0!	9.09	36.36
Goodenia micrantha	1.00	2.90	SD=0!	9.09	45.45
Philydrella pygmaea subsp. pygmaea	1.00	2.90	SD=0!	9.09	54.55
Samolus junceus	1.00	2.90	SD=0!	9.09	63.64
Siloxerus humifusus	1.00	2.90	SD=0!	9.09	72.73

Stylidium calcaratum	1.00	2.90	SD=0!	9.09	81.82
Tribonanthes australis	1.00	2.90	SD=0!	9.09	90.91

SIMPER

Similarity Percentages - species contributions

One-Way Analysis

Data worksheet
Name: Data3
Data type: Other
Sample selection: All
Variable selection: All

Parameters
Resemblance: S17 Bray-Curtis similarity
Cut off for low contributions: 90.00%

Factor Groups

Sample	Pflor18FCT7
CNQ18	A
AUSTB-7 (7)	A
AUSTB-1 (7)	FCT7
AUSTB-2 (7)	FCT7
AUSTB-8 (7)	FCT7
BAMBUN-1 (7)	FCT7
BAMBUN-3 (7)	FCT7
BULL-6 (7)	FCT7
BULL-8 (7)	FCT7
CARAB-2 (7)	FCT7
FISH-1 (7)	FCT7
FISH-2 (7)	FCT7
GINGIN-1 (7)	FCT7
GINGIN-2 (7)	FCT7
GINGIN-3 (7)	FCT7
gosn10 (7)	FCT7
mrnp01 (7)	FCT7
mrnp03 (7)	FCT7
MUCK-2 (7)	FCT7
perth05 (7)	FCT7
Punr01 (7)	FCT7
RUAB-4 (7)	FCT7
Swamp02 (7)	FCT7
WN021MNR (7)	FCT7
YOON-3 (7)	FCT7
YULE-5 (7)	FCT7

Group A (CNQ18 & AUSTB-7)
Average similarity: 39.08

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Actinostrobus pyramidalis	1.00	2.30	SD=0!	5.88	5.88
Angianthus preissianus	1.00	2.30	SD=0!	5.88	11.76
Calandrinia granulifera	1.00	2.30	SD=0!	5.88	17.65
Centrolepis aristata	1.00	2.30	SD=0!	5.88	23.53
Centrolepis polygyna	1.00	2.30	SD=0!	5.88	29.41
Goodenia micrantha	1.00	2.30	SD=0!	5.88	35.29
Hydrocotyle alata	1.00	2.30	SD=0!	5.88	41.18
Isolepis marginata	1.00	2.30	SD=0!	5.88	47.06
Lepidosperma longitudinale	1.00	2.30	SD=0!	5.88	52.94
Melaleuca viminea subsp. viminea	1.00	2.30	SD=0!	5.88	58.82
Philydrella pygmaea subsp. pygmaea	1.00	2.30	SD=0!	5.88	64.71
Phyllangium paradoxum	1.00	2.30	SD=0!	5.88	70.59
Quinetia urvillei	1.00	2.30	SD=0!	5.88	76.47
Schoenus plumosus	1.00	2.30	SD=0!	5.88	82.35
Siloxerus humifusus	1.00	2.30	SD=0!	5.88	88.24

Trachymene pilosa	1.00	2.30	SD=0!	5.88	94.12

SIMPER

Similarity Percentages - species contributions

One-Way Analysis

Data worksheet
Name: Data3
Data type: Other
Sample selection: All
Variable selection: All

Parameters
Resemblance: S17 Bray-Curtis similarity
Cut off for low contributions: 90.00%

Factor Groups

Sample	Pflor18FCT7
CNQ18	A
AUSTB-8 (7)	A
AUSTB-1 (7)	FCT7
AUSTB-2 (7)	FCT7
AUSTB-7 (7)	FCT7
BAMBUN-1 (7)	FCT7
BAMBUN-3 (7)	FCT7
BULL-6 (7)	FCT7
BULL-8 (7)	FCT7
CARAB-2 (7)	FCT7
FISH-1 (7)	FCT7
FISH-2 (7)	FCT7
GINGIN-1 (7)	FCT7
GINGIN-2 (7)	FCT7
GINGIN-3 (7)	FCT7
gosn10 (7)	FCT7
mrnp01 (7)	FCT7
mrnp03 (7)	FCT7
MUCK-2 (7)	FCT7
perth05 (7)	FCT7
Punr01 (7)	FCT7
RUAB-4 (7)	FCT7
Swamp02 (7)	FCT7
WN021MNR (7)	FCT7
YOON-3 (7)	FCT7
YULE-5 (7)	FCT7

Group A (CNQ18 & AUSTB-8)
Average similarity: 27.59

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Aphelia cyperoides	1.00	2.30	SD=0!	8.33	8.33
Centrolepis aristata	1.00	2.30	SD=0!	8.33	16.67
Hydrocotyle alata	1.00	2.30	SD=0!	8.33	25.00
Isolepis marginata	1.00	2.30	SD=0!	8.33	33.33
Lepidosperma longitudinale	1.00	2.30	SD=0!	8.33	41.67
Melaleuca viminea subsp. viminea	1.00	2.30	SD=0!	8.33	50.00
Philydrella pygmaea subsp. pygmaea	1.00	2.30	SD=0!	8.33	58.33
Phyllangium paradoxum	1.00	2.30	SD=0!	8.33	66.67
Schoenus plumosus	1.00	2.30	SD=0!	8.33	75.00
Siloxerus humifusus	1.00	2.30	SD=0!	8.33	83.33
Thysanotus manglesianus/patersonii complex	1.00	2.30	SD=0!	8.33	91.67

SIMPER
Similarity Percentages - species contributions

One-Way Analysis

Data worksheet
Name: Data3
Data type: Other
Sample selection: All
Variable selection: All

Parameters
Resemblance: S17 Bray-Curtis similarity
Cut off for low contributions: 90.00%

Factor Groups

Sample	Pflor18FCT7
CNQ18	A
MUCK-2 (7)	A
AUSTB-1 (7)	FCT7
AUSTB-2 (7)	FCT7
AUSTB-7 (7)	FCT7
AUSTB-8 (7)	FCT7
BAMBUN-1 (7)	FCT7
BAMBUN-3 (7)	FCT7
BULL-6 (7)	FCT7
BULL-8 (7)	FCT7
CARAB-2 (7)	FCT7
FISH-1 (7)	FCT7
FISH-2 (7)	FCT7
GINGIN-1 (7)	FCT7
GINGIN-2 (7)	FCT7
GINGIN-3 (7)	FCT7
gosn10 (7)	FCT7
mrnp01 (7)	FCT7
mrnp03 (7)	FCT7
perth05 (7)	FCT7
Punr01 (7)	FCT7
RUAB-4 (7)	FCT7
Swamp02 (7)	FCT7
WN021MNR (7)	FCT7
YOON-3 (7)	FCT7
YULE-5 (7)	FCT7

Group A (CNQ18 & MUCK-2)
Average similarity: 33.73

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Calandrinia granulifera	1.00	2.41	SD=0!	7.14	7.14
Centrolepis aristata	1.00	2.41	SD=0!	7.14	14.29
Centrolepis polygyna	1.00	2.41	SD=0!	7.14	21.43
Gnephosis drummondii	1.00	2.41	SD=0!	7.14	28.57
Goodenia micrantha	1.00	2.41	SD=0!	7.14	35.71
Hydrocotyle alata	1.00	2.41	SD=0!	7.14	42.86
Melaleuca rhaphiophylla	1.00	2.41	SD=0!	7.14	50.00
Melaleuca viminea subsp. viminea	1.00	2.41	SD=0!	7.14	57.14
Philydrella pygmaea subsp. pygmaea	1.00	2.41	SD=0!	7.14	64.29
Phyllangium paradoxum	1.00	2.41	SD=0!	7.14	71.43
Schoenus plumosus	1.00	2.41	SD=0!	7.14	78.57
Siloxerus humifusus	1.00	2.41	SD=0!	7.14	85.71
Trachymene pilosa	1.00	2.41	SD=0!	7.14	92.86

12.1.2 Dissimilarity between CNQ18 and FCT7 group 'i' (AUSTB-2, YULE-5) and group 'f' (AUSTB-7, AUSTB-8 and MUCK-2)

SIMPER

Similarity Percentages - species contributions

One-Way Analysis

Data worksheet
Name: Data3
Data type: Other
Sample selection: All
Variable selection: All

Parameters
Resemblance: S17 Bray-Curtis similarity
Cut off for low contributions: 80.00%

Factor Groups

Sample	Pflor18
CNQ18	18A
AUSTB-1 (7)	c
AUSTB-2 (7)	i
YULE-5 (7)	i
AUSTB-7 (7)	f
AUSTB-8 (7)	f
MUCK-2 (7)	f
BAMBUN-1 (7)	b
BAMBUN-3 (7)	b
GINGIN-1 (7)	b
GINGIN-2 (7)	b
BULL-6 (7)	j
BULL-8 (7)	j
CARAB-2 (7)	k
GINGIN-3 (7)	k
gosn10 (7)	k
FISH-1 (7)	h
FISH-2 (7)	h
RUAB-4 (7)	h
mrnp01 (7)	e
Punr01 (7)	e
mrnp03 (7)	d
perth05 (7)	d
Swamp02 (7)	d
WN021MNR (7)	a
YOON-3 (7)	g

EXTRACT:

Groups 18A & i
Average dissimilarity = 62.63

Species	Group 18A Av.Abund	Group i Av.Abund	Av.Diss	Diss/SD	Contrib%	Cum.%
Actinostrobus pyramidalis	1.00	0.00	1.44	98.29	2.30	2.30
Brachyscome iberidifolia	1.00	0.00	1.44	98.29	2.30	4.60
Burchardia congesta	1.00	0.00	1.44	98.29	2.30	6.89
Chaetanthus aristatus	0.00	1.00	1.44	98.29	2.30	9.19
Conostylis aculeata subsp. breviflora	1.00	0.00	1.44	98.29	2.30	11.49
Crassula colorata	1.00	0.00	1.44	98.29	2.30	13.79
Dampiera coronata	1.00	0.00	1.44	98.29	2.30	16.08
Eryngium pinnatifidum subsp. pinnatifidum	1.00	0.00	1.44	98.29	2.30	18.38
Frankenia pauciflora	1.00	0.00	1.44	98.29	2.30	20.68
Gnephosis drummondii	1.00	0.00	1.44	98.29	2.30	22.98
Isolepis oldfieldiana	0.00	1.00	1.44	98.29	2.30	25.27
Lepidosperma longitudinale	1.00	0.00	1.44	98.29	2.30	27.57
Lomandra micrantha subsp. micrantha	1.00	0.00	1.44	98.29	2.30	29.87
Meeboldina coangustata	1.00	0.00	1.44	98.29	2.30	32.17
Melaleuca rhaphiophylla	1.00	0.00	1.44	98.29	2.30	34.46
Melaleuca seriata	1.00	0.00	1.44	98.29	2.30	36.76
Melaleuca viminea subsp. viminea	1.00	0.00	1.44	98.29	2.30	39.06
Petrophile seminuda	1.00	0.00	1.44	98.29	2.30	41.36
Polypogon tenellus	0.00	1.00	1.44	98.29	2.30	43.65
Quinetia urvillei	1.00	0.00	1.44	98.29	2.30	45.95
Regelia ciliata	1.00	0.00	1.44	98.29	2.30	48.25
Schoenus odontocarpus	0.00	1.00	1.44	98.29	2.30	50.55
Stylidium obtusatum var. obtusatum	1.00	0.00	1.44	98.29	2.30	52.84
Thysanotus manglesianus/patersonii complex	1.00	0.00	1.44	98.29	2.30	55.14
Trachymene pilosa	1.00	0.00	1.44	98.29	2.30	57.44
Triglochin minutissima	1.00	0.00	1.44	98.29	2.30	59.74
Angianthus preissianus	1.00	0.50	0.72	0.71	1.16	60.89
Calandrinia liniflora	0.00	0.50	0.72	0.71	1.16	62.05
Centrolepis drummondiana	0.00	0.50	0.72	0.71	1.16	63.21
Centrolepis polygyna	1.00	0.50	0.72	0.71	1.16	64.36
Diuris laxiflora	0.00	0.50	0.72	0.71	1.16	65.52
Drosera erythrorhiza subsp. erythrorhiza	0.00	0.50	0.72	0.71	1.16	66.68
Drosera menziesii subsp. menziesii	0.00	0.50	0.72	0.71	1.16	67.83
Halosarcia halocnemoides subsp. halocnemoides	0.00	0.50	0.72	0.71	1.16	68.99
Hydrocotyle alata	1.00	0.50	0.72	0.71	1.16	70.15
Hydrocotyle diantha	0.00	0.50	0.72	0.71	1.16	71.31
Hypocalymma angustifolium	0.00	0.50	0.72	0.71	1.16	72.46
Isolepis marginata	1.00	0.50	0.72	0.71	1.16	73.62
Phyllangium paradoxum	1.00	0.50	0.72	0.71	1.16	74.78
Pogonolepis stricta	0.00	0.50	0.72	0.71	1.16	75.93
Prasophyllum "plurifera" scps	0.00	0.50	0.72	0.71	1.16	77.09

Schoenus humilis	0.00	0.50	0.72	0.71	1.16	78.25
Schoenus plumosus	1.00	0.50	0.72	0.71	1.16	79.40
Stylidium divaricatum	0.00	0.50	0.72	0.71	1.16	80.56

Groups 18A & f

Average dissimilarity = 66.53

Species	Group 18A Av.Abund	Group f Av.Abund	Av.Diss	Diss/SD	Contrib%	Cum.%
Aphelia nutans	0.00	1.00	1.17	36.52	1.76	1.76
Bartsia trixago	0.00	1.00	1.17	36.52	1.76	3.51
Brachyscome iberidifolia	1.00	0.00	1.17	36.52	1.76	5.27
Burchardia congesta	1.00	0.00	1.17	36.52	1.76	7.02
Centrolepis mutica	0.00	1.00	1.17	36.52	1.76	8.78
Conostylis aculeata subsp. breviflora	1.00	0.00	1.17	36.52	1.76	10.53
Crassula colorata	1.00	0.00	1.17	36.52	1.76	12.29
Dampiera coronata	1.00	0.00	1.17	36.52	1.76	14.04
Drosera gigantea subsp. gigantea	1.00	0.00	1.17	36.52	1.76	15.80
Eryngium pinnatifidum subsp. pinnatifidum	1.00	0.00	1.17	36.52	1.76	17.55
Frankenia pauciflora	1.00	0.00	1.17	36.52	1.76	19.31
Lomandra micrantha subsp. micrantha	1.00	0.00	1.17	36.52	1.76	21.06
Meeboldina coangustata	1.00	0.00	1.17	36.52	1.76	22.82
Melaleuca seriata	1.00	0.00	1.17	36.52	1.76	24.58
Petrophile seminuda	1.00	0.00	1.17	36.52	1.76	26.33
Regelia ciliata	1.00	0.00	1.17	36.52	1.76	28.09
Samolus junceus	1.00	0.00	1.17	36.52	1.76	29.84
Schoenus odontocarpus	0.00	1.00	1.17	36.52	1.76	31.60
Stylidium calcaratum	1.00	0.00	1.17	36.52	1.76	33.35
Stylidium inundatum	0.00	1.00	1.17	36.52	1.76	35.11
Stylidium obtusatum var. obtusatum	1.00	0.00	1.17	36.52	1.76	36.86
Tribonanthes australis	1.00	0.00	1.17	36.52	1.76	38.62
Triglochin minutissima	1.00	0.00	1.17	36.52	1.76	40.37
Actinostrobus pyramidalis	1.00	0.33	0.78	1.15	1.18	41.55
Angianthus preissianus	1.00	0.33	0.78	1.15	1.18	42.73
Aphelia cyperoides	1.00	0.33	0.78	1.15	1.18	43.91
Blennospora doliiformis	0.00	0.67	0.78	1.15	1.18	45.09
Drosera rosulata	0.00	0.67	0.78	1.15	1.18	46.27
Melaleuca lateriflora subsp. acutifolia	0.00	0.67	0.78	1.15	1.18	47.45
Melaleuca lateritia	0.00	0.67	0.78	1.15	1.18	48.63
Polypogon tenellus	0.00	0.67	0.78	1.15	1.18	49.81
Quinetia urvillei	1.00	0.33	0.78	1.15	1.18	50.99
Stylidium mimeticum	0.00	0.67	0.78	1.15	1.18	52.17
Thysanotus manglesianus/patersonii complex	1.00	0.33	0.78	1.15	1.18	53.35
Thysanotus patersonii	0.00	0.67	0.78	1.15	1.18	54.53

Triglochin centrocarpum	0.00	0.67	0.78	1.15	1.18	55.71
Brachyscome bellidioides	0.00	0.67	0.77	1.15	1.15	56.86
Chamaescilla corymbosa var. corymbosa	0.00	0.67	0.77	1.15	1.15	58.01
Drosera glanduligera	0.00	0.67	0.77	1.15	1.15	59.16
Drosera menziesii subsp. menziesii	0.00	0.67	0.77	1.15	1.15	60.31
Gnephosis drummondii	1.00	0.33	0.77	1.15	1.15	61.47
Levenhookia pusilla	0.00	0.67	0.77	1.15	1.15	62.62
Melaleuca rhaphiophylla	1.00	0.33	0.77	1.15	1.15	63.77
Melaleuca uncinata	0.00	0.67	0.77	1.15	1.15	64.92
Pterostylis sp. Slender Snail Orchid (G.J. Keighery 14516)	0.00	0.67	0.77	1.15	1.15	66.07
Schoenus discifer	0.00	0.67	0.77	1.15	1.15	67.22
Selaginella gracillima	0.00	0.67	0.77	1.15	1.15	68.38
Agrostis plebeia	0.00	0.33	0.40	0.58	0.60	68.98
Astartea affinis	0.00	0.33	0.40	0.58	0.60	69.58
Baumea acuta	0.00	0.33	0.40	0.58	0.60	70.19
Chorizandra enodis	0.00	0.33	0.40	0.58	0.60	70.79
Cyanicula deformis	0.00	0.33	0.40	0.58	0.60	71.39
Glossostigma diandrum	0.00	0.33	0.40	0.58	0.60	72.00
Gratiola pubescens	0.00	0.33	0.40	0.58	0.60	72.60
Haemodorum simplex	0.00	0.33	0.40	0.58	0.60	73.20
Isolepis marginata	1.00	0.67	0.40	0.58	0.60	73.81
Lepidosperma longitudinale	1.00	0.67	0.40	0.58	0.60	74.41
Lobelia tenuior	0.00	0.33	0.40	0.58	0.60	75.02
Millotia tenuifolia var. tenuifolia	0.00	0.33	0.40	0.58	0.60	75.62
Myriocephalus helichrysoides	0.00	0.33	0.40	0.58	0.60	76.22
Poa annua	0.00	0.33	0.40	0.58	0.60	76.83
Schoenus natans	0.00	0.33	0.40	0.58	0.60	77.43
Stylidium bulbiferum	0.00	0.33	0.40	0.58	0.60	78.03
Stylidium roseoalatum	0.00	0.33	0.40	0.58	0.60	78.64
Tribonanthes longipetala	0.00	0.33	0.40	0.58	0.60	79.24
Villarsia capitata	0.00	0.33	0.40	0.58	0.60	79.84
Acacia lasiocarpa var. bracteolata long peduncle variant (G.J. Keighery 5026)	0.00	0.33	0.38	0.58	0.58	80.42

12.1.3 Dissimilarity between CNQ18 and each FCT7 of AUSTB-2, YULE-5, AUSTB-7, AUSTB-8 and MUCK-2

SIMPER

Similarity Percentages - species contributions

One-Way Analysis

Data worksheet
Name: Data3
Data type: Other
Sample selection: All
Variable selection: All

Parameters
Resemblance: S17 Bray-Curtis similarity
Cut off for low contributions: 80.00%

Factor Groups

Sample	Pflor18Ind
CNQ18	i1 CNQ18
AUSTB-1 (7)	c
AUSTB-2 (7)	i2 AUSTB2
AUSTB-7 (7)	f1 AUSTB7
AUSTB-8 (7)	f2 AUSTB8
BAMBUN-1 (7)	b
BAMBUN-3 (7)	b
GINGIN-1 (7)	b
GINGIN-2 (7)	b
BULL-6 (7)	j
BULL-8 (7)	j
CARAB-2 (7)	k
GINGIN-3 (7)	k
gosn10 (7)	k
FISH-1 (7)	h1 FISH1
FISH-2 (7)	h2 FISH2
mrnp01 (7)	e
Punr01 (7)	e
mrnp03 (7)	d
perth05 (7)	d
Swamp02 (7)	d
MUCK-2 (7)	f3 MUCK2
RUAB-4 (7)	h3 RUAB4
WN021MNR (7)	a
YOON-3 (7)	g
YULE-5 (7)	i3 YULE5

Extracts from SIMPER analysis:

Groups i1 CNQ18 & i2 AUSTB2
Average dissimilarity = 57.14

Species	Group i1 CNQ18 Av.Abund	Group i2 AUSTB2 Av.Abund	Av.Diss	Diss/SD	Contrib%	Cum.%
Actinostrobus pyramidalis	1.00	0.00	1.43	Undefined!	2.50	2.50
Blennospora doliiformis	0.00	1.00	1.43	Undefined!	2.50	5.00
Brachyscome bellidioides	0.00	1.00	1.43	Undefined!	2.50	7.50
Brachyscome iberidifolia	1.00	0.00	1.43	Undefined!	2.50	10.00
Burchardia congesta	1.00	0.00	1.43	Undefined!	2.50	12.50
Centrolepis alepyroides	0.00	1.00	1.43	Undefined!	2.50	15.00
Chaetanthus aristatus	0.00	1.00	1.43	Undefined!	2.50	17.50
Conostylis aculeata subsp. breviflora	1.00	0.00	1.43	Undefined!	2.50	20.00
Crassula colorata	1.00	0.00	1.43	Undefined!	2.50	22.50
Dampiera coronata	1.00	0.00	1.43	Undefined!	2.50	25.00
Drosera glanduligera	0.00	1.00	1.43	Undefined!	2.50	27.50
Drosera stolonifera subsp. porrecta	0.00	1.00	1.43	Undefined!	2.50	30.00
Eryngium pinnatifidum subsp. pinnatifidum	1.00	0.00	1.43	Undefined!	2.50	32.50
Frankenia pauciflora	1.00	0.00	1.43	Undefined!	2.50	35.00
Gnephosis drummondii	1.00	0.00	1.43	Undefined!	2.50	37.50
Isolepis oldfieldiana	0.00	1.00	1.43	Undefined!	2.50	40.00
Lepidosperma longitudinale	1.00	0.00	1.43	Undefined!	2.50	42.50
Lomandra micrantha subsp. micrantha	1.00	0.00	1.43	Undefined!	2.50	45.00
Meeboldina coangustata	1.00	0.00	1.43	Undefined!	2.50	47.50
Melaleuca cuticularis	0.00	1.00	1.43	Undefined!	2.50	50.00
Melaleuca rhaphiophylla	1.00	0.00	1.43	Undefined!	2.50	52.50
Melaleuca seriata	1.00	0.00	1.43	Undefined!	2.50	55.00
Melaleuca viminea subsp. viminea	1.00	0.00	1.43	Undefined!	2.50	57.50
Petrophile seminuda	1.00	0.00	1.43	Undefined!	2.50	60.00
Polypogon tenellus	0.00	1.00	1.43	Undefined!	2.50	62.50
Quinetia urvillei	1.00	0.00	1.43	Undefined!	2.50	65.00
Regelia ciliata	1.00	0.00	1.43	Undefined!	2.50	67.50
Schoenus odontocarpus	0.00	1.00	1.43	Undefined!	2.50	70.00
Stylidium calcaratum	1.00	0.00	1.43	Undefined!	2.50	72.50
Stylidium obtusatum var. obtusatum	1.00	0.00	1.43	Undefined!	2.50	75.00
Stylidium periscelianthum	0.00	1.00	1.43	Undefined!	2.50	77.50
Stylidium roseoalatum	0.00	1.00	1.43	Undefined!	2.50	80.00
Thysanotus manglesianus/patersonii complex	1.00	0.00	1.43	Undefined!	2.50	82.50

Groups i1 CNQ18 & i3 YULE5
Average dissimilarity = 68.12

Species	Group i1 CNQ18 Av.Abund	Group i3 YULE5 Av.Abund	Av.Diss	Diss/SD	Contrib%	Cum.%
Actinostrobus pyramidalis	1.00	0.00	1.45	Undefined!	2.13	2.13
Angianthus preissianus	1.00	0.00	1.45	Undefined!	2.13	4.26
Brachyscome iberidifolia	1.00	0.00	1.45	Undefined!	2.13	6.38
Burchardia congesta	1.00	0.00	1.45	Undefined!	2.13	8.51
Calandrinia liniflora	0.00	1.00	1.45	Undefined!	2.13	10.64
Centrolepis drummondiana	0.00	1.00	1.45	Undefined!	2.13	12.77
Centrolepis polygyna	1.00	0.00	1.45	Undefined!	2.13	14.89
Chaetanthus aristatus	0.00	1.00	1.45	Undefined!	2.13	17.02
Conostylis aculeata subsp. breviflora	1.00	0.00	1.45	Undefined!	2.13	19.15
Crassula colorata	1.00	0.00	1.45	Undefined!	2.13	21.28
Dampiera coronata	1.00	0.00	1.45	Undefined!	2.13	23.40
Diuris laxiflora	0.00	1.00	1.45	Undefined!	2.13	25.53
Drosera erythrorhiza subsp. erythrorhiza	0.00	1.00	1.45	Undefined!	2.13	27.66
Drosera menziesii subsp. menziesii	0.00	1.00	1.45	Undefined!	2.13	29.79
Eryngium pinnatifidum subsp. pinnatifidum	1.00	0.00	1.45	Undefined!	2.13	31.91
Frankenia pauciflora	1.00	0.00	1.45	Undefined!	2.13	34.04
Gnephosis drummondii	1.00	0.00	1.45	Undefined!	2.13	36.17
Halosarcia halocnemoides subsp. halocnemoides	0.00	1.00	1.45	Undefined!	2.13	38.30
Hydrocotyle alata	1.00	0.00	1.45	Undefined!	2.13	40.43
Hydrocotyle diantha	0.00	1.00	1.45	Undefined!	2.13	42.55
Hypocalymma angustifolium	0.00	1.00	1.45	Undefined!	2.13	44.68
Isolepis marginata	1.00	0.00	1.45	Undefined!	2.13	46.81
Isolepis oldfieldiana	0.00	1.00	1.45	Undefined!	2.13	48.94
Lepidosperma longitudinale	1.00	0.00	1.45	Undefined!	2.13	51.06
Lomandra micrantha subsp. micrantha	1.00	0.00	1.45	Undefined!	2.13	53.19
Meeboldina coangustata	1.00	0.00	1.45	Undefined!	2.13	55.32
Melaleuca rhaphiophylla	1.00	0.00	1.45	Undefined!	2.13	57.45
Melaleuca seriata	1.00	0.00	1.45	Undefined!	2.13	59.57
Melaleuca viminea subsp. viminea	1.00	0.00	1.45	Undefined!	2.13	61.70
Petrophile seminuda	1.00	0.00	1.45	Undefined!	2.13	63.83
Phyllangium paradoxum	1.00	0.00	1.45	Undefined!	2.13	65.96
Pogonolepis stricta	0.00	1.00	1.45	Undefined!	2.13	68.09
Polypogon tenellus	0.00	1.00	1.45	Undefined!	2.13	70.21
Prasophyllum "plurifera" scps	0.00	1.00	1.45	Undefined!	2.13	72.34
Quinetia urvillei	1.00	0.00	1.45	Undefined!	2.13	74.47
Regelia ciliata	1.00	0.00	1.45	Undefined!	2.13	76.60
Schoenus humilis	0.00	1.00	1.45	Undefined!	2.13	78.72
Schoenus odontocarpus	0.00	1.00	1.45	Undefined!	2.13	80.85

Groups i1 CNQ18 & f1 AUSTB7
Average dissimilarity = 60.92

Species	Group i1 CNQ18 Av.Abund	Group f1 AUSTB7 Av.Abund	Av.Diss	Diss/SD	Contrib%	Cum.%
Amphipogon debilis	0.00	1.00	1.15	Undefined!	1.89	1.89
Aphelia cyperoides	1.00	0.00	1.15	Undefined!	1.89	3.77
Aphelia nutans	0.00	1.00	1.15	Undefined!	1.89	5.66
Bartsia trixago	0.00	1.00	1.15	Undefined!	1.89	7.55
Baumea juncea	0.00	1.00	1.15	Undefined!	1.89	9.43
Blennospora doliiformis	0.00	1.00	1.15	Undefined!	1.89	11.32
Borya scirpoidea	0.00	1.00	1.15	Undefined!	1.89	13.21
Brachyscome bellidioides	0.00	1.00	1.15	Undefined!	1.89	15.09
Brachyscome iberidifolia	1.00	0.00	1.15	Undefined!	1.89	16.98
Burchardia congesta	1.00	0.00	1.15	Undefined!	1.89	18.87
Casuarina obesa	0.00	1.00	1.15	Undefined!	1.89	20.75
Centrolepis mutica	0.00	1.00	1.15	Undefined!	1.89	22.64
Chamaescilla corymbosa var. corymbosa	0.00	1.00	1.15	Undefined!	1.89	24.53
Conostylis aculeata subsp. breviflora	1.00	0.00	1.15	Undefined!	1.89	26.42
Crassula colorata	1.00	0.00	1.15	Undefined!	1.89	28.30
Dampiera coronata	1.00	0.00	1.15	Undefined!	1.89	30.19
Drosera gigantea subsp. gigantea	1.00	0.00	1.15	Undefined!	1.89	32.08
Drosera glanduligera	0.00	1.00	1.15	Undefined!	1.89	33.96
Drosera menziesii subsp. menziesii	0.00	1.00	1.15	Undefined!	1.89	35.85
Eryngium pinnatifidum subsp. pinnatifidum	1.00	0.00	1.15	Undefined!	1.89	37.74
Frankenia pauciflora	1.00	0.00	1.15	Undefined!	1.89	39.62
Gnephosis drummondii	1.00	0.00	1.15	Undefined!	1.89	41.51
Homalosciadium homalocarpum	0.00	1.00	1.15	Undefined!	1.89	43.40
Hypoxis glabella var. glabella	0.00	1.00	1.15	Undefined!	1.89	45.28
Levenhookia pusilla	0.00	1.00	1.15	Undefined!	1.89	47.17
Lomandra micrantha subsp. micrantha	1.00	0.00	1.15	Undefined!	1.89	49.06
Meeboldina cana	0.00	1.00	1.15	Undefined!	1.89	50.94
Meeboldina coangustata	1.00	0.00	1.15	Undefined!	1.89	52.83
Melaleuca rhaphiophylla	1.00	0.00	1.15	Undefined!	1.89	54.72
Melaleuca seriata	1.00	0.00	1.15	Undefined!	1.89	56.60
Melaleuca uncinata	0.00	1.00	1.15	Undefined!	1.89	58.49
Myriophyllum echinatum	0.00	1.00	1.15	Undefined!	1.89	60.38
Petrophile seminuda	1.00	0.00	1.15	Undefined!	1.89	62.26
Pogonolepis stricta	0.00	1.00	1.15	Undefined!	1.89	64.15
Polypogon tenellus	0.00	1.00	1.15	Undefined!	1.89	66.04
Poranthera microphylla	0.00	1.00	1.15	Undefined!	1.89	67.92
Pterostylis sp. Slender Snail Orchid (G.J. Keighery 14516)	0.00	1.00	1.15	Undefined!	1.89	69.81
Regelia ciliata	1.00	0.00	1.15	Undefined!	1.89	71.70
Samolus junceus	1.00	0.00	1.15	Undefined!	1.89	73.58
Schoenus discifer	0.00	1.00	1.15	Undefined!	1.89	75.47
Schoenus odontocarpus	0.00	1.00	1.15	Undefined!	1.89	77.36
Selaginella gracillima	0.00	1.00	1.15	Undefined!	1.89	79.25

Stylidium calcaratum	1.00	0.00	1.15	Undefined!	1.89	81.13

Groups i1 CNQ18 & f2 AUSTB8
Average dissimilarity = 72.41

Species	Group i1 CNQ18 Av.Abund	Group f2 AUSTB8 Av.Abund	Av.Diss	Diss/SD	Contrib%	Cum.%
Acacia lasiocarpa var. bracteolata long peduncle variant (G.J. Keighery 5026)	0.00	1.00	1.15	Undefined!	1.59	1.59
Actinostrobus pyramidalis	1.00	0.00	1.15	Undefined!	1.59	3.17
Angianthus preissianus	1.00	0.00	1.15	Undefined!	1.59	4.76
Aphelia nutans	0.00	1.00	1.15	Undefined!	1.59	6.35
Bartsia trixago	0.00	1.00	1.15	Undefined!	1.59	7.94
Brachyscome bellidioides	0.00	1.00	1.15	Undefined!	1.59	9.52
Brachyscome iberidifolia	1.00	0.00	1.15	Undefined!	1.59	11.11
Burchardia congesta	1.00	0.00	1.15	Undefined!	1.59	12.70
Caladenia flava subsp. flava	0.00	1.00	1.15	Undefined!	1.59	14.29
Caladenia radiata	0.00	1.00	1.15	Undefined!	1.59	15.87
Calandrinia granulifera	1.00	0.00	1.15	Undefined!	1.59	17.46
Cassytha racemosa	0.00	1.00	1.15	Undefined!	1.59	19.05
Centrolepis mutica	0.00	1.00	1.15	Undefined!	1.59	20.63
Centrolepis polygyna	1.00	0.00	1.15	Undefined!	1.59	22.22
Chamaescilla corymbosa var. corymbosa	0.00	1.00	1.15	Undefined!	1.59	23.81
Conostylis aculeata subsp. breviflora	1.00	0.00	1.15	Undefined!	1.59	25.40
Crassula colorata	1.00	0.00	1.15	Undefined!	1.59	26.98
Dampiera coronata	1.00	0.00	1.15	Undefined!	1.59	28.57
Dampiera linearis	0.00	1.00	1.15	Undefined!	1.59	30.16
Drosera gigantea subsp. gigantea	1.00	0.00	1.15	Undefined!	1.59	31.75
Drosera glanduligera	0.00	1.00	1.15	Undefined!	1.59	33.33
Drosera macrantha subsp. macrantha	0.00	1.00	1.15	Undefined!	1.59	34.92
Drosera menziesii subsp. menziesii	0.00	1.00	1.15	Undefined!	1.59	36.51
Drosera menziesii subsp. penicillaris	0.00	1.00	1.15	Undefined!	1.59	38.10
Drosera rosulata	0.00	1.00	1.15	Undefined!	1.59	39.68
Eryngium pinnatifidum subsp. pinnatifidum	1.00	0.00	1.15	Undefined!	1.59	41.27
Eutaxia virgata	0.00	1.00	1.15	Undefined!	1.59	42.86
Frankenia pauciflora	1.00	0.00	1.15	Undefined!	1.59	44.44
Gnephosis drummondii	1.00	0.00	1.15	Undefined!	1.59	46.03
Goodenia micrantha	1.00	0.00	1.15	Undefined!	1.59	47.62
Hydrocotyle callicarpa	0.00	1.00	1.15	Undefined!	1.59	49.21
Isolepis cernua	0.00	1.00	1.15	Undefined!	1.59	50.79
Lepyrodia glauca	0.00	1.00	1.15	Undefined!	1.59	52.38
Levenhookia pusilla	0.00	1.00	1.15	Undefined!	1.59	53.97
Lomandra micrantha subsp. micrantha	1.00	0.00	1.15	Undefined!	1.59	55.56
Meeboldina coangustata	1.00	0.00	1.15	Undefined!	1.59	57.14
Meeboldina roycei	0.00	1.00	1.15	Undefined!	1.59	58.73
Melaleuca incana subsp. incana	0.00	1.00	1.15	Undefined!	1.59	60.32

Melaleuca lateriflora subsp. acutifolia	0.00	1.00	1.15	Undefined!	1.59	61.90
Melaleuca lateritia	0.00	1.00	1.15	Undefined!	1.59	63.49
Melaleuca pauciflora	0.00	1.00	1.15	Undefined!	1.59	65.08
Melaleuca rhaphiophylla	1.00	0.00	1.15	Undefined!	1.59	66.67
Melaleuca seriata	1.00	0.00	1.15	Undefined!	1.59	68.25
Melaleuca uncinata	0.00	1.00	1.15	Undefined!	1.59	69.84
Microtis media	0.00	1.00	1.15	Undefined!	1.59	71.43
Petrophile seminuda	1.00	0.00	1.15	Undefined!	1.59	73.02
Phylloglossum drummondii	0.00	1.00	1.15	Undefined!	1.59	74.60
Pterostylis sp. Slender Snail Orchid (G.J. Keighery 14516)	0.00	1.00	1.15	Undefined!	1.59	76.19
Quinetia urvillei	1.00	0.00	1.15	Undefined!	1.59	77.78
Regelia ciliata	1.00	0.00	1.15	Undefined!	1.59	79.37
Samolus junceus	1.00	0.00	1.15	Undefined!	1.59	80.95

Groups i1 CNQ18 & f3 MUCK2

Average dissimilarity = 66.27

Species	Group i1 CNQ18 Av.Abund	Group f3 MUCK2 Av.Abund	Av.Diss	Diss/SD	Contrib%	Cum.%
Actinostrobus pyramidalis	1.00	0.00	1.20	Undefined!	1.82	1.82
Agrostis plebeia	0.00	1.00	1.20	Undefined!	1.82	3.64
Angianthus preissianus	1.00	0.00	1.20	Undefined!	1.82	5.45
Aphelia cyperoides	1.00	0.00	1.20	Undefined!	1.82	7.27
Aphelia nutans	0.00	1.00	1.20	Undefined!	1.82	9.09
Astartea affinis	0.00	1.00	1.20	Undefined!	1.82	10.91
Bartsia trixago	0.00	1.00	1.20	Undefined!	1.82	12.73
Baumea acuta	0.00	1.00	1.20	Undefined!	1.82	14.55
Blennospora doliiformis	0.00	1.00	1.20	Undefined!	1.82	16.36
Brachyscome iberidifolia	1.00	0.00	1.20	Undefined!	1.82	18.18
Burchardia congesta	1.00	0.00	1.20	Undefined!	1.82	20.00
Centrolepis mutica	0.00	1.00	1.20	Undefined!	1.82	21.82
Chorizandra enodis	0.00	1.00	1.20	Undefined!	1.82	23.64
Conostylis aculeata subsp. breviflora	1.00	0.00	1.20	Undefined!	1.82	25.45
Crassula colorata	1.00	0.00	1.20	Undefined!	1.82	27.27
Cyanicula deformis	0.00	1.00	1.20	Undefined!	1.82	29.09
Dampiera coronata	1.00	0.00	1.20	Undefined!	1.82	30.91
Drosera gigantea subsp. gigantea	1.00	0.00	1.20	Undefined!	1.82	32.73
Drosera rosulata	0.00	1.00	1.20	Undefined!	1.82	34.55
Eryngium pinnatifidum subsp. pinnatifidum	1.00	0.00	1.20	Undefined!	1.82	36.36
Frankenia pauciflora	1.00	0.00	1.20	Undefined!	1.82	38.18
Glossostigma diandrum	0.00	1.00	1.20	Undefined!	1.82	40.00
Gratiola pubescens	0.00	1.00	1.20	Undefined!	1.82	41.82
Haemodorum simplex	0.00	1.00	1.20	Undefined!	1.82	43.64
Isolepis marginata	1.00	0.00	1.20	Undefined!	1.82	45.45
Lepidosperma longitudinale	1.00	0.00	1.20	Undefined!	1.82	47.27
Lobelia tenuior	0.00	1.00	1.20	Undefined!	1.82	49.09

Lomandra micrantha subsp. micrantha	1.00	0.00	1.20	Undefined!	1.82	50.91
Meeboldina coangustata	1.00	0.00	1.20	Undefined!	1.82	52.73
Melaleuca lateriflora subsp. acutifolia	0.00	1.00	1.20	Undefined!	1.82	54.55
Melaleuca lateritia	0.00	1.00	1.20	Undefined!	1.82	56.36
Melaleuca seriata	1.00	0.00	1.20	Undefined!	1.82	58.18
Millotia tenuifolia var. tenuifolia	0.00	1.00	1.20	Undefined!	1.82	60.00
Myriocephalus helichrysoides	0.00	1.00	1.20	Undefined!	1.82	61.82
Petrophile seminuda	1.00	0.00	1.20	Undefined!	1.82	63.64
Poa annua	0.00	1.00	1.20	Undefined!	1.82	65.45
Polypogon tenellus	0.00	1.00	1.20	Undefined!	1.82	67.27
Quinetia urvillei	1.00	0.00	1.20	Undefined!	1.82	69.09
Regelia ciliata	1.00	0.00	1.20	Undefined!	1.82	70.91
Samolus junceus	1.00	0.00	1.20	Undefined!	1.82	72.73
Schoenus natans	0.00	1.00	1.20	Undefined!	1.82	74.55
Schoenus odontocarpus	0.00	1.00	1.20	Undefined!	1.82	76.36
Stylidium bulbiferum	0.00	1.00	1.20	Undefined!	1.82	78.18
Stylidium calcaratum	1.00	0.00	1.20	Undefined!	1.82	80.00

12.2 SIMPER Analysis and Atlas site AIQ17

12.2.1 SIMPER analysis for AIQ17 and FCT20a,b,c dataset where AIQ17 fuses with FCT20c bushm02 site - similarities between AIQ17 and FCT20c bushm02

SIMPER

Similarity Percentages - species contributions

One-Way Analysis

Data worksheet
Name: Data1
Data type: Other
Sample selection: All
Variable selection: All

Parameters
Resemblance: S17 Bray-Curtis similarity
Cut off for low contributions: 90.00%

Factor Groups

Sample	FCTGrp 3
AIQ17	A
Bushm02 (20c)	A
5C03 (20a)	FCT20a
activ01 (20a)	FCT20a
activ02 (20a)	FCT20a
activ03 (20a)	FCT20a
APBF-1 (20a)	FCT20a
APBF-2 (20a)	FCT20a
Bushm01 (20a)	FCT20a
GOLF-1 (20a)	FCT20a
hart01 (20a)	FCT20a
KOON-1 (20a)	FCT20a
KOON-2 (20a)	FCT20a
LAND-1 (20a)	FCT20a
M53 (20a)	FCT20a
m5302 (20a)	FCT20a
m5303 (20a)	FCT20a
maida01 (20a)	FCT20a
maida02 (20a)	FCT20a
perth07 (20a)	FCT20a
brick2 (20b)	FCT20b
BURNRD01 (20b)	FCT20b
card1 (20b)	FCT20b
card2 (20b)	FCT20b
card5 (20b)	FCT20b
card6 (20b)	FCT20b
card8 (20b)	FCT20b
card9 (20b)	FCT20b
Norm03 (20b)	FCT20b
Norm07 (20b)	FCT20b
perth03 (20b)	FCT20b
Rush01 (20b)	FCT20b
Rush02 (20b)	FCT20b
xlamb01 (20b)	FCT20b
yarl04 (20b)	FCT20b
talb10 (20c)	FCT20c
talb11 (20c)	FCT20c
talb2 (20c)	FCT20c
talb3 (20c)	FCT20c
talb5 (20c)	FCT20c
talb6 (20c)	FCT20c
talb7 (20c)	FCT20c
talb8 (20c)	FCT20c
talb9 (20c)	FCT20c

Group A
Average similarity: 31.46

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Adenanthos cygnorum subsp. cygnorum	1.00	2.25	SD=0!	7.14	7.14
Anigozanthos humilis subsp. humilis	1.00	2.25	SD=0!	7.14	14.29
Banksia attenuata	1.00	2.25	SD=0!	7.14	21.43
Banksia menziesii	1.00	2.25	SD=0!	7.14	28.57
Caladenia flava subsp. flava	1.00	2.25	SD=0!	7.14	35.71
Conostylis aurea	1.00	2.25	SD=0!	7.14	42.86
Conostylis juncea	1.00	2.25	SD=0!	7.14	50.00
Dasypogon obliquifolius	1.00	2.25	SD=0!	7.14	57.14
Drosera stolonifera subsp. porrecta	1.00	2.25	SD=0!	7.14	64.29
Lyginia barbata/Lyginia imberbis	1.00	2.25	SD=0!	7.14	71.43
Mesomelaena pseudostygia	1.00	2.25	SD=0!	7.14	78.57
Thysanotus thyrsoideus	1.00	2.25	SD=0!	7.14	85.71
Trachymene pilosa	1.00	2.25	SD=0!	7.14	92.86

12.2.2 SIMPER analysis (extract) for AIQ17 and FCT20a,b,c dataset where AIQ17 and FCT20c bushm02 sites are allocated to singleton factor groups - dissimilarities of AIQ17 and FCT20c bushm02

SIMPER
Similarity Percentages - species contributions

One-Way Analysis

Data worksheet
Name: Data1
Data type: Other
Sample selection: All
Variable selection: All

Parameters
Resemblance: S17 Bray-Curtis similarity
Cut off for low contributions: 80.00%

Factor Groups

Sample	FCTGrp 2
AIQ17	A
5C03 (20a)	FCT20a
activ01 (20a)	FCT20a
activ02 (20a)	FCT20a
activ03 (20a)	FCT20a
APBF-1 (20a)	FCT20a
APBF-2 (20a)	FCT20a
Bushm01 (20a)	FCT20a
GOLF-1 (20a)	FCT20a
hart01 (20a)	FCT20a
KOON-1 (20a)	FCT20a
KOON-2 (20a)	FCT20a
LAND-1 (20a)	FCT20a
M53 (20a)	FCT20a
m5302 (20a)	FCT20a
m5303 (20a)	FCT20a
maida01 (20a)	FCT20a
maida02 (20a)	FCT20a
perth07 (20a)	FCT20a
brick2 (20b)	FCT20b
BURNRD01 (20b)	FCT20b
card1 (20b)	FCT20b
card2 (20b)	FCT20b

card5 (20b)	FCT20b
card6 (20b)	FCT20b
card8 (20b)	FCT20b
card9 (20b)	FCT20b
Norm03 (20b)	FCT20b
Norm07 (20b)	FCT20b
perth03 (20b)	FCT20b
Rush01 (20b)	FCT20b
Rush02 (20b)	FCT20b
xlamb01 (20b)	FCT20b
yarl04 (20b)	FCT20b
Bushm02 (20c)	FCT20cBushm02
talb10 (20c)	FCT20c
talb11 (20c)	FCT20c
talb2 (20c)	FCT20c
talb3 (20c)	FCT20c
talb5 (20c)	FCT20c
talb6 (20c)	FCT20c
talb7 (20c)	FCT20c
talb8 (20c)	FCT20c
talb9 (20c)	FCT20c

Group FCT20a
Average similarity: 42.38

Group FCT20b
Average similarity: 37.23

*Group FCT20c (*excl. FCT20c site *bushm02)*
Average similarity: 47.14

Groups A & FCT20cBushm02
Average dissimilarity = 68.54

Species	Group A Av.Abund	Group FCT20cBushm02 Av.Abund	Av.Diss	Diss/SD	Contrib%	Cum.%
Alexgeorgea nitens	1.00	0.00	1.12	Undefined!	1.64	1.64
Alexgeorgea subterranean	1.00	0.00	1.12	Undefined!	1.64	3.28
Allocasuarina fraseriana	0.00	1.00	1.12	Undefined!	1.64	4.92
Amphipogon turbinatus	1.00	0.00	1.12	Undefined!	1.64	6.56
Astroloma stomarrhena	0.00	1.00	1.12	Undefined!	1.64	8.20
Austrostipa compressa	1.00	0.00	1.12	Undefined!	1.64	9.84
Blancoa canescens	1.00	0.00	1.12	Undefined!	1.64	11.48
Bossiaea eriocarpa	1.00	0.00	1.12	Undefined!	1.64	13.11
Briza maxima	1.00	0.00	1.12	Undefined!	1.64	14.75
Burchardia congesta	0.00	1.00	1.12	Undefined!	1.64	16.39
Caustis dioica	0.00	1.00	1.12	Undefined!	1.64	18.03
Conostephium pendulum	1.00	0.00	1.12	Undefined!	1.64	19.67
Conostylis setosa	0.00	1.00	1.12	Undefined!	1.64	21.31
Conostylis teretifolia subsp. teretifolia	1.00	0.00	1.12	Undefined!	1.64	22.95
Crassula closiana	1.00	0.00	1.12	Undefined!	1.64	24.59
Dampiera linearis	1.00	0.00	1.12	Undefined!	1.64	26.23
Dasypogon bromeliifolius	0.00	1.00	1.12	Undefined!	1.64	27.87
Desmocladus flexuosus	1.00	0.00	1.12	Undefined!	1.64	29.51
Drosera erythrorhiza subsp. magna	1.00	0.00	1.12	Undefined!	1.64	31.15
Drosera menziesii subsp. penicillaris	1.00	0.00	1.12	Undefined!	1.64	32.79
Ehrharta calycina	1.00	0.00	1.12	Undefined!	1.64	34.43
Eremaea asterocarpa subsp. asterocarpa	1.00	0.00	1.12	Undefined!	1.64	36.07
Eremaea pauciflora var. lonchophylla	1.00	0.00	1.12	Undefined!	1.64	37.70
Gladiolus caryophyllaceus	0.00	1.00	1.12	Undefined!	1.64	39.34
Gompholobium tomentosum	1.00	0.00	1.12	Undefined!	1.64	40.98
Haemodorum spicatum	1.00	0.00	1.12	Undefined!	1.64	42.62
Hibbertia aff. helianthemoides (Northern) (EA Griffin 6801)	1.00	0.00	1.12	Undefined!	1.64	44.26
Hibbertia huegelii	0.00	1.00	1.12	Undefined!	1.64	45.90
Hibbertia hypericoides	1.00	0.00	1.12	Undefined!	1.64	47.54
Hypochaeris glabra	1.00	0.00	1.12	Undefined!	1.64	49.18
Isotropis cuneifolia subsp. cuneifolia	1.00	0.00	1.12	Undefined!	1.64	50.82
Jacksonia furcellata	1.00	0.00	1.12	Undefined!	1.64	52.46
Jacksonia restioides	0.00	1.00	1.12	Undefined!	1.64	54.10
Johnsonia pubescens subsp. pubescens	0.00	1.00	1.12	Undefined!	1.64	55.74
Laxmannia ramosa subsp. ramosa	1.00	0.00	1.12	Undefined!	1.64	57.38
Lepidosperma sp. (Eastern terete) (BJ Keighery and N Gibson 232)	0.00	1.00	1.12	Undefined!	1.64	59.02
Lepidosperma squamatum	1.00	0.00	1.12	Undefined!	1.64	60.66
Leucopogon sp. Coujinup (M.A. Burgman 1085)	1.00	0.00	1.12	Undefined!	1.64	62.30
Lomandra caespitosa	1.00	0.00	1.12	Undefined!	1.64	63.93
Lomandra hermaphrodita	0.00	1.00	1.12	Undefined!	1.64	65.57
Lomandra preissii	1.00	0.00	1.12	Undefined!	1.64	67.21
Melaleuca clavifolia	1.00	0.00	1.12	Undefined!	1.64	68.85

Neurachne alopecuroidea	0.00	1.00	1.12	Undefined!	1.64	70.49
Opercularia vaginata	1.00	0.00	1.12	Undefined!	1.64	72.13
Patersonia occidentalis	0.00	1.00	1.12	Undefined!	1.64	73.77
Petrophile linearis	1.00	0.00	1.12	Undefined!	1.64	75.41
Pileanthus filifolius	1.00	0.00	1.12	Undefined!	1.64	77.05
Podotheca angustifolia	1.00	0.00	1.12	Undefined!	1.64	78.69
Pterostylis recurva	0.00	1.00	1.12	Undefined!	1.64	80.33

12.2.3 SIMPER analysis for AIQ17 and FCT20a,b,c dataset where AIQ17 is treated as a singleton factor – dissimilarity levels between AIQ17 and FCT's 20a, 20b and 20c

Similarity Percentages - species contributions

One-Way Analysis

Data worksheet
Name: Data1
Data type: Other
Sample selection: All
Variable selection: All

Parameters
Resemblance: S17 Bray-Curtis similarity
Cut off for low contributions: 80.00%

Factor Groups

Sample	FCTGrp
AIQ17	A
5C03 (20a)	FCT20a
activ01 (20a)	FCT20a
activ02 (20a)	FCT20a
activ03 (20a)	FCT20a
APBF-1 (20a)	FCT20a
APBF-2 (20a)	FCT20a
Bushm01 (20a)	FCT20a
GOLF-1 (20a)	FCT20a
hart01 (20a)	FCT20a
KOON-1 (20a)	FCT20a
KOON-2 (20a)	FCT20a
LAND-1 (20a)	FCT20a
M53 (20a)	FCT20a
m5302 (20a)	FCT20a
m5303 (20a)	FCT20a
maida01 (20a)	FCT20a
maida02 (20a)	FCT20a
perth07 (20a)	FCT20a
brick2 (20b)	FCT20b
BURNRD01 (20b)	FCT20b
card1 (20b)	FCT20b
card2 (20b)	FCT20b
card5 (20b)	FCT20b
card6 (20b)	FCT20b
card8 (20b)	FCT20b
card9 (20b)	FCT20b
Norm03 (20b)	FCT20b
Norm07 (20b)	FCT20b
perth03 (20b)	FCT20b
Rush01 (20b)	FCT20b
Rush02 (20b)	FCT20b
xlamb01 (20b)	FCT20b
yarl04 (20b)	FCT20b
Bushm02 (20c)	FCT20c
talb10 (20c)	FCT20c
talb11 (20c)	FCT20c
talb2 (20c)	FCT20c
talb3 (20c)	FCT20c
talb5 (20c)	FCT20c
talb6 (20c)	FCT20c
talb7 (20c)	FCT20c
talb8 (20c)	FCT20c
talb9 (20c)	FCT20c

Group FCT20a
Average similarity: 42.38

Group FCT20b
Average similarity: 37.23

Group FCT20c
Average similarity: 43.33

Groups A & FCT20a
Average dissimilarity = 70.34

Groups A & FCT20b
Average dissimilarity = 78.38

Groups A & FCT20c
Average dissimilarity = 68.29

12.2.4 SIMPER analysis for AIQ17 and FCT23a dataset – dissimilarity levels between AIQ17 and FCT23a floristic groups

Similarity Percentages - species contributions
One-Way Analysis

Data worksheet
Name: Data1
Data type: Other
Sample selection: All
Variable selection: All

Parameters
Resemblance: S17 Bray-Curtis similarity
Cut off for low contributions: 70.00%

Factor Groups

Sample	FlorGrp
AIQ17	b
BANK-2 (23a)	k
kailis01 (23a)	k
low13b (23a)	k
BANK-3 (23a)	l
beel02 (23a)	l
dian01 (23a)	l
HARRY-4 (23a)	l
hurst01 (23a)	l
hurst02 (23a)	l
hurst04 (23a)	l
jand04 (23a)	l
Light04 (23a)	l
MODO-5 (23a)	l
WAND-1 (23a)	l
white06 (23a)	l
bibra01 (23a)	d
Cresw01 (23a)	d
gill01 (23a)	d
gnan03 (23a)	d

```
jand01 (23a)    d
Kens01 (23a)    d
Light01 (23a)   d
Light02 (23a)   d
perth04 (23a)   d
perth08 (23a)   d
Tele01 (23a)    d
BULL-3 (23a)    h
hurst03 (23a)   h
jand02 (23a)    h
jand07 (23a)    h
jand08 (23a)    h
cas03 (23a)     j
gosn02 (23a)    j
gosn12 (23a)    j
kailis02 (23a)  j
MODO-4 (23a)    j
yang02 (23a)    j
gosn04 (23a)    a
gosn13 (23a)    a
hart04 (23a)    c
perth06 (23a)   f
perth09 (23a)   f
pinj08 (23a)    e
pinj14 (23a)    e
WARB-1 (23a)    g
WARB-3 (23a)    g
WIRR-1 (23a)    g
WIRR-2 (23a)    g
YULE-1 (23a)    i
YULE-2 (23a)    i
```

Groups b & k
Average dissimilarity = 65.34

Groups b & l
Average dissimilarity = 69.57

Groups b & d
Average dissimilarity = 62.22

Groups b & h
Average dissimilarity = 61.70

Groups b & j
Average dissimilarity = 63.72

Groups b & a
Average dissimilarity = 76.02

Groups b & c
Average dissimilarity = 64.23

Groups b & f
Average dissimilarity = 60.57

Groups b & e
Average dissimilarity = 64.31

Groups b & g
Average dissimilarity = 62.30

Groups b & i
Average dissimilarity = 61.40