Two Rocks Beach Access Way

Flora and Vegetation Survey - Detailed and Targeted

Prepared for the City of Wanneroo

NOVEMBER 2020

ONE TREE
BOTANICAL

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Project: P1904: Two Rocks Beach Access Way
Version History:
Draft 1.0 (**Issued**: 02 December 2019) **Prepared by:** KM **Reviewed by:** TW, RH)
Final 2.0 (**Issued**: 6 January 2020 **Prepared by:** KM)
Final 2.1 (**Issued**: 19 November 2020 **Prepared by:** KM Reviewed by TW)

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1. EXECUTIVE SUMMARY

The City of Wanneroo proposes to construct a car park, access road and beach access within the Two Rocks Beach Access Way study area footprint (the 'study area') (Figure 1). The study area is approximately 12 hectares in size and includes portions of foreshore reserve in Two Rocks south of the Marina, bound by the Indian Ocean to its west and Two Rocks Road to its east.

This report presents a botanical assessment that is consistent with Technical Guide Flora and Vegetation Surveys for Environmental Impact Assessment; Targeted and Detailed Surveys (EPA, 2016).

1.1 FLORA

A total of 160 taxa were recorded from the study area, of which 100 or 63% were natives.

A DBCA Threatened Species and Communities Branch species database search did not identify any records of state listed TF or PF as being previously known from within the study area boundaries.

A search of the *EPBC Act* Protected Matters Search Tool (Department of Environment and Energy, 2019) listed nine Threatened Flora (TF) as potentially occurring in the region. None of these species have previously been recorded from within the study area.

No Threatened Flora (TF) species as listed under the *Biodiversity Conservation Act 2016* were recorded during the field survey. No TF under the *Environmental Protection and Biodiversity Conservation Act 1999* were recorded.

Three Priority Flora species were recorded from the study area during the survey. A Priority 1 species *Leucopogon maritimus* and two Priority 3 species *Beyeria cinerea* subsp*. cinerea* and *Stylidium maritimum*.

Leucopogon maritimus (Priority 1) is a low spreading shrub to 40cm tall by 60cm wide from the heath family (Ericaceae). There are 17 collections of this species in the WA Herbarium (Council of Heads of Australasian Herbaria, 2013) known from a small range in a narrow coastal band from Alkimos to north of Two Rocks. During the survey approximately 13 individuals were recorded from the study area (Figure 2). The distribution of this plant in the study area was restricted to Vegetation Type C (Figure 3).

Beyeria cinerea* subsp. *cinerea (Priority 3) is an open, erect to spreading shrub (Plate 3) to 70cm tall from the spurge family (Euphorbiaceae). There are 51 collections of this species in the WA Herbarium (Council of Heads of Australasian Herbaria, 2013) distributed in a narrow near-coastal band between Mandurah and Port Gregory. During the survey 490 individuals were recorded from the study area (Figure 2). The distribution of this plant in the study area was restricted to Vegetation Type C (Figure 3).

Stylidium maritimum (Priority 3) is a perennial herb to 70cm tall, with tufted linear strappy grass-like leaves from the triggerplant family (Stylidiaceae). There are 42 collections of this species in the WA Herbarium (Council of Heads of Australasian Herbaria, 2013) distributed in a narrow near-coastal band between Mandurah and Leeman. During the survey 35 individuals were recorded from the study area (Figure 2). The distribution of this plant in the study area was restricted to Vegetation Type C (Figure 3).

Of the 60 species of weed recorded in the study area, nine were given a High rating for invasiveness and spread as environmental weeds under the Western Australian Environmental Weed Strategy (WAEWS) (Department of Conservation and Land Management, 1999) (Table 16). Thirty weeds recorded in the study area were given a Moderate rating.

1.2 VEGETATION

The study area is in the Interim Biogeographical Regionalisation of Australia (IBRA) region of the Swan Coastal Plan (SCP) in sub-region SWA2: Perth (Thackway and Cresswell, 1995) (Department of Environment and Heritage, 2000).

According to 1:250,000-scale vegetation mapping by Heddle *et al.* (1980), the study area is in vegetation complex 55: Quindalup. The original extent of Quindalup Complex within the IBRA region of Swan Coastal Plain has been calculated as 54,573.87 hectares, of which 33,011.637 hectares or 60.49% remains (Government of Western Australia, 2019a).

Beard (1979) mapped the study area as occurring within Vegetation Association 1007: "Coastal heath and thicket on recent dunes".

Vegetation Association 1007 is described as originally consisting of 30,408 hectares of which 20,691 hectares or 68% remains. Of what remains, 2,755 hectares or 13.31% is protected or proposed for protection (Government of WA, 2019b). The Bush Forever portion of the study area would represent a part of those areas protected or proposed for protection.

With the exception of the northern corner, the study area is within Bush Forever Site 397: "Coastal Strip from Wilbinga to Mindarie". Bush Forever Site 397 is approximately 400 hectares in size in total.

Inferred Floristic Community Types present at Bush Forever Site 397 are listed as:

- Supergroup 2: Seasonal Wetlands:
  - FCT 16: Highly saline seasonal wetlands (*Frankenia pauciflora* on Tamala Limestone Cliffs)
- Supergroup 4: Uplands centred on Quindalup and Spearwood Dunes
  - FCT 29a: Coastal shrublands on shallow sands
  - FCT 29b: *Acacia* shrublands on taller dunes
  - FCT S11: Northern *Acacia rostellifera – Melaleuca systena* shrublands
  - FCT S13: Northern *Olearia axillaris – Scaevola crassifolia* shrublands
  - FCT S14: *Spinifex longifolius* grasslands and low shrublands

Six vegetation types were identified within the study area:

A LOW-LYING PRIMARY DUNES ON UNCONSOLIDATED SAND

A1: Incipient Foredune (younger): Uniform regrowth of Grassland **Thinopyrum distichum*.

A2: Established Foredune (older): Sparse Shrubland *Olearia axillaris* over Grassland *Spinifex longifolius*.

A3: Beach-ridge Plain: Open Shrubland *Olearia axillaris, Rhagodia baccata* subsp. *baccata* and **Pelargonium capitatum* over Sparse Grassland Spinifex longifolius and Sparse Vineland *Cassytha flava* var. *flava*.

B: TALL SECONDARY DUNES ON UNCONSOLIDATED SAND

B1: Shrubland dominated by *Acacia cyclops, Scaevola crassifolia, Spyridium globulosum, Santalum acuminatum, Myoporum insulare, Olearia axillaris, Rhagodia baccata* subsp. *baccata* and *Acanthocarpus preissii*, Sparse Vineland *Hardenbergia comptoniana* and *Cassytha flava* var. *flava*. Over Forbland dominated by *Senecio pinnatifolius* var. *latilobus*.

C: LOW DUNES ON SEMI-CONSOLIDATED SAND

C1: Species rich low Shrubland dominated by *Melaleuca systena* and species rich Forbland dominated by *Lomandra maritima* and Sparse Sedgeland *Lepidosperma calcicola* and Sparse Rushland *Desmocladus asper*.

D: LOW RISES WITH LIMESTONE OUTCROPPING

D1: Closed Shrubland *Melaleuca cardiophylla* with other typical shrubs *Melaleuca huegelii* subsp. *huegelii, Acacia xanthina* and *Dodonaea aptera* with Sparse Vineland *Cassytha aurea* var. *aurea* over Forbland of native and introduced herbs.

E: CLEARED AREAS

E1: Historically cleared areas; informal walking paths, informal vehicular sand tracks (unused and partially overgrown).

See Figure 3 for a map of vegetation type. See Figure 4 for a map of vegetation condition.

No TECs protected under the *BC Act 2016* or the *EPBC Act 1999* were recorded in the study area.

Two Priority 3 PECs were recorded in the study area:

Priority Ecological Community (PEC) SWAN 21: "Coastal shrublands on shallow sands, southern Swan Coastal Plain". Described as heaths on shallow sands over limestone close to the coast, with no single dominant but including *Spyridium globulosum, Rhagodia baccata* and *Olearia axillaris* (DBCA, 2019). Also known as Floristic Community Type (FCT) 29a (Gibson *et al.* 1994). Represented by Vegetation Types A3, B1 and D1 (Figure 3).

Priority Ecological Community (PEC) SWAN 26: "Northern Spearwood shrublands and woodlands". Also known as Floristic Community Type (FCT) 24 (Gibson *et al.* 1994). Described by DBCA (2019) as "Heaths with scattered *Eucalyptus gomphocephala* occurring on deeper soils north from Woodman Point. Most sites occur on the Cottesloe unit of the Spearwood system." This PEC is associated with the Tuart Woodlands TEC however no Tuart was observed within or adjacent to the study area. Likely to represent an unusual subtype, due to its extreme westerly distribution and three Priority Flora forming a substantial component of species assemblage of the vegetation. Represented by Vegetation Type C1 (Figure 3).

The beach ridge plain (Vegetation Type A1-A3) (Figure 3) is possibly interesting from an ecological processes and/or landform perspective. Aerial photography indicates that this area has been deposited in the last 20-30 years. The effect of the Two Rocks Marina on coastal processes is likely to have been the cause of deposition to the south. The vegetation in this area is dynamic and likely to continue to change in condition and composition. While this landform has been created by human activities, State and Federally listed TEC SCP19: "Sedgelands in Holocene dune swales of the southern Swan Coastal Plain" is found in the swales of older beach ridge plains. It is possible given time that more complex vegetation may form that reflects elements of this TEC. It is a relatively rare landform in the Perth region, and the area between Two Rocks and Yanchep is a substantially sized and intact example. Landforms are largely beyond the scope of this study, though the EPA does consider them in EIA (EPA, 2018).

2. PROJECT

The City of Wanneroo proposes to construct a car park, access road and beach access within the Two Rocks Beach Access Way study area footprint (the 'study area') (Figure 1).

The study area includes portions of foreshore reserve in Two Rocks south of the Two Rocks Marina. This area is bound by the Indian Ocean to its west and Two Rocks Road to its east.

The land is owned by the Western Australian Planning Commission (WAPC) and the Crown and includes:

- The entire Lot 8613 of Deposited Plan 213232 (94 Two Rocks Road, Two Rocks);
- Part Lot 8989 of Deposited Plan 213232 owned by the WAPC, located adjacent to Lot 8613; and
- Part Lot 15452 of Deposited Plan 40341 of Foreshore Reserve managed by the City, located adjacent to Lot 8613.

The study area is approximately 12 hectares in size. It encompasses part of Bush Forever Site 397: "Coastal Strip from Wilbinga to Mindarie".

2.1 SCOPE

This report presents the findings of botanical assessment that are consistent with Technical Guide Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016) survey types:

- Targeted Survey; and
- Detailed Survey.

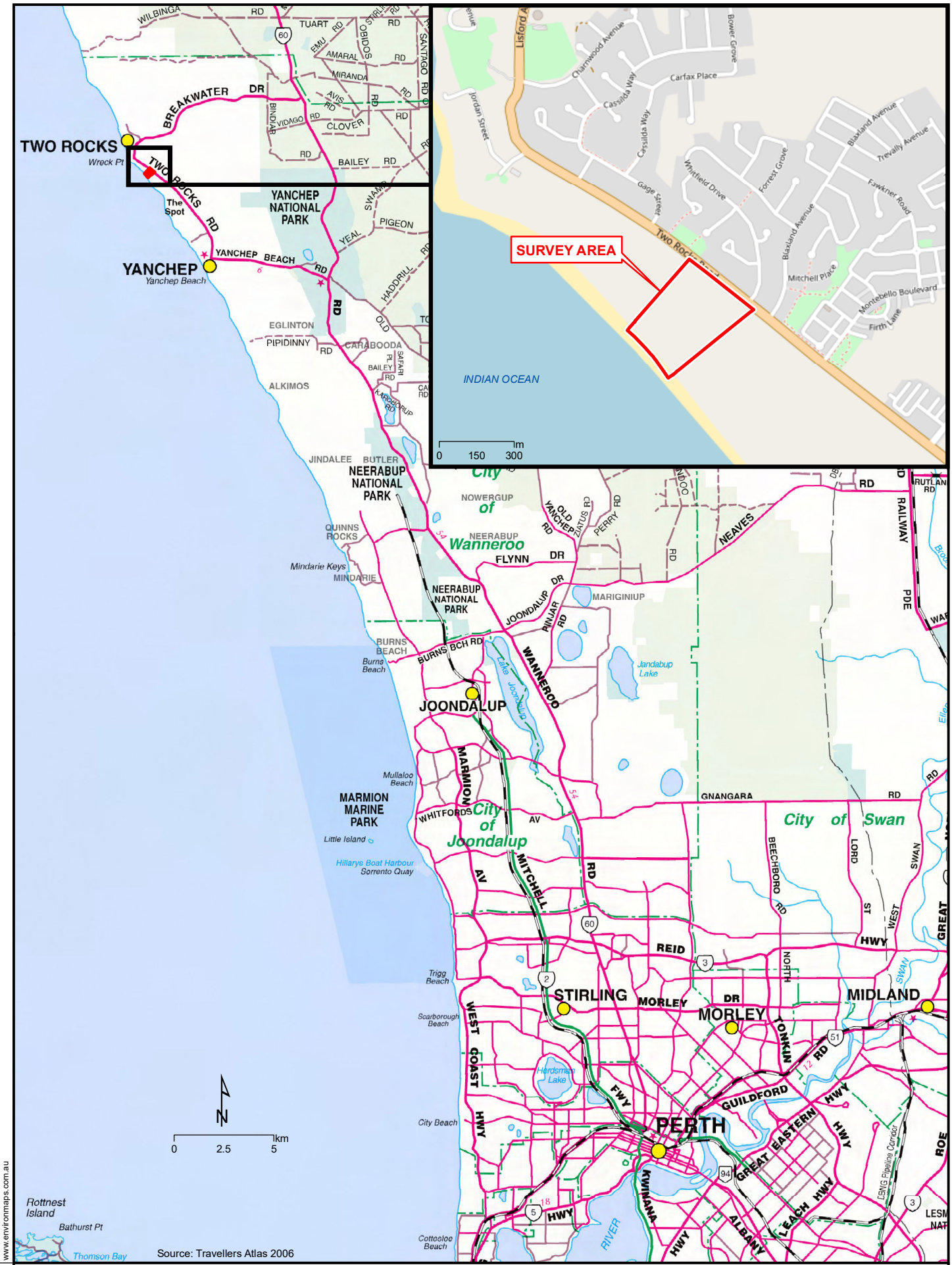

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FIGURE 1

TWO ROCKS BEACH ACCESS WAY LOCALITY MAP

C:\GIS\Jobs\One Tree Botanical\P1904 - City of Wanneroo - Two Rocks\Figures\P1904-2Rocks_F01 Two Rocks Beach Access Way Locality Map_191213.mxd

3. BACKGROUND

3.1 GEOLOGY LANDFORMS AND SOIL

The study area is a part of the Swan Coastal Plain, a sedimentary plain of largely aeolian deposits approximately 20-30km wide between the Darling Scarp in the east and the Indian Ocean in the west. The sedimentation consists of wind-borne sand deposits formed into a series of sand dunes. Churchward and McArthur (1980) describe the dune systems of the Swan Coastal Plain as arranged in an age sequence from east to west. The Bassendean Dunes are the oldest in the east, the Spearwood then the Quindalup the youngest dunes closest to the coast in the west. The study area is in the Quindalup Dunes, which is described as calcareous sands formed into parabolic dunes and beach ridge plains.

Quindalup Dunes can then further be divided into four age profiles. Q4 dunes (Vegetation Type A Figure 3) are the youngest and least extensive of the four phases and occur on the seaward margin of the Quindalup Dunes. Where Q4 consist of low dune systems, further inland Q3 dunes (Vegetation Type B) are taller and steeper. These are less extensive than Q1 and Q2. Both Q3 and Q4 are characterised by unconsolidated sandy soil that has little organic matter. Q3 dunes (Vegetation Type C and D) occur further inland again and extend up to 4km. These and are the most widespread in the Quindalup Dune system. They are taller dunes with consolidated sand at their core, with an organic rich soil profile (Gozzard, 2007). Q1 dunes are the oldest and furthest inland. These sit lower in the landscape and also consist of consolidated sand with an organic rich soil profile.

Gozzard (2007) further describes the coastal landforms as including Tamala Limestone. Extensive but discontinuous pockets of limestone described as “cemented coastal sand dunes” and “calcreted surfaces (beach rock), karstic features (sinkholes, caves), raised beaches, and elevated shoreline platforms”.

It is worth noting what Gozzard (2007) states about beach ridge plains in the Perth region:

> *“The relict cuspate beach-ridge plains dominate the coast south of the Swan River. At Woodman Point and between Kwinana and Mandurah, these plains extend inland beyond the general trend of the coast. Less obvious examples are to be seen north of the river at Whitfords, Burns Beach, Quinns Rock and Two Rocks. In most cases these plains are asymmetric in shape, and abandoned shoreline positions are marked by relict beach ridges.”*

Historical aerial photography indicated that the beach ridge plain dune system between Two Rocks Marina in the north and The Spot in the south, was only deposited in the last 20-30 years. Within the project area approximately 60m of beach ridge plain dune system has been deposited since 2002. Department of Transport (2018) state that the construction of the Two Rocks Marina in 1972 changed coastal processes, causing erosion to the north of the marina and seasonal accretion to the south. These dunes appeared to then have rapidly developed vegetative cover following deposition.

3.2 LAND USE HISTORY

The study area consisted of a relatively intact area of natural vegetation. An old vehicle track was present surrounded by comparatively disturbed vegetation. It is possible that pastoral activities have occurred in the past or the area provided access prior to construction of Two Rocks Road. A corridor had been historically cleared for a powerline. An informal pedestrian track is present from Two Rocks Road to the beachfront. The beachfront is currently utilised for recreational purposes.

The study area is a part of a much larger Unexploded Ordinance (UXO) Area: Yanchep Two Rocks Artillery Range (ID: 1035) (Department of Defence, 2019). After WWII the broader area was used by Armed Forces for target practice. It is unclear whether any activity occurred specifically within the study area. The City of Wanneroo stated that it is within a zone described as having a 'substantial occurrence' of UXO and that they would be conducting searches and undertaking remediation.

3.3 CLIMATE AND SEASONAL CONDITIONS

The closest Bureau of Meteorology (BoM) weather recording station with long term data is Wanneroo (Site No. 009105) (Latitude: 31.73° S, Longitude: 115.79° E). The mean annual rainfall between 1905 and 2018 for Wanneroo is 795.8mm (BoM, 2019). Most rainfall (724.4mm) occurs between the months of April and October.

Rainfall for the months of April to September 2019 leading up to the field survey was 517.2mm. This is compared to 113-year average for Wanneroo over the same period of 677.5mm. This represented a 23% rainfall shortfall from the long-term mean.

3.4 PREVIOUS STUDIES

3.4.1 Interim Biogeographical Regionalisation of Australia (IBRA) Region

The study area is in the Interim Biogeographical Regionalisation of Australia (IBRA) region of the Swan Coastal Plan (SCP) in sub-region SWA2: Perth (Thackway and Cresswell, 1995) (Department of Environment and Heritage, 2000).

3.4.2 Vegetation Complexes (Heddle *et al.*, 1980)

According to 1:250,000-scale vegetation mapping by Heddle *et al.* (1980), the study area is in vegetation complex 55: Quindalup.

The vegetation is described as being restricted to coastal dunes that can be divided into two alliances:

- The foredunes and beach strand which contain *Angianthus cunninghamii, *Trachyandra divaricata, *Arctotheca populifolia, Atriplex isatidea, *Cakile maritima, Leucophyta brownii, Carpobrotus virescens, *Pelargonium capitatum, Senecio lautus, Acites megalocarpus, Spinifex longifolius* and **Tetragonia decumbens* and *T. implexicoma.*
- Mobile and stable dune alliance which contains *Acacia cyclops, Anthocercis littorea, Lepidosperma gladiatum, Myoporum insulare, Nitraria billardierei, Olearia axillaris, Scaevola crassifolia, S. nitida, Spyridium globulosum, Westringia dampieri* and *Wilsonia backhousei,* with the composition depending on the degree of protection from salt laden winds. Other variations include *Eucalyptus foecunda, Santalum, acuminatum, Exocarpos sparteus* and *Acacia rostellifera*. Small localised pockets of *Melaleuca lanceolata* and *Callitris preissii* occur, uncommon but were once more widespread along the coast.

The original extent of Quindalup Complex within the IBRA region of Swan Coastal Plain has been calculated as 54,573.87 hectares, of which 33,011.637 hectares or 60.49 % remains (Government of Western Australia, 2019a).

16.16% of what remains of the Quindalup Complex is located within the City of Wanneroo LGA boundary. Within the City of Wanneroo, the original extent of the Quindalup Complex was 8,818.26 hectares of which 5,352.77 hectares or 60.70% remains (Government of Western Australia, 2019a).

These figures do not take into account fully the condition of the remaining areas or rarer vegetation types that constitute the complex.

Nomenclature and taxonomy used in these descriptions has been updated from that used in the original publication.

3.4.3 Vegetation Survey of Western Australia (Beard, 1979)

Beard (1979) mapped the study area as occurring within Vegetation Association 1007: "Coastal heath and thicket on recent dunes". This is within the Guilderton System, which is the vegetation of the Quindalup Dunes between Fremantle and Green Head.

Beard (1979) describes the narrow beach strand as being colonised by **Cakile maritima* and **Arctotheca calendula*, *Spinifex hirsutus* and *S. longifolius* with **Ammophila arenaria* and **Tetragonia decumbens*. Sheltered hollows behind the foredunes are described as supporting **Tetragonia decumbens*, *Ficinia nodosa, Leucophyta brownii, Carpobrotus* sp. and *Spinifex longifolius*.

On the crests of taller dunes, the vegetation becomes thicker and includes shrubs *Myoporum insulare, Scaevola crassifolia, Olearia axillaris, Acacia cyclops* and *Lepidosperma gladiatum*. Shrubs are wind pruned on the windward side and taller and more luxuriant on the sheltered landward side. Further inland on stable dunes sheltered from the wind are low dense thickets of *Olearia axillaris, Melaleuca systena* and *Acacia lasiocarpa*. Taller thickets to low forests can form, but are frequently destroyed by fire, with taller species including *Callitris preissii* (now uncommon and possibly the apex community) and *Acacia rostellifera* (most common). The latter often occurs with *Melaleuca huegelii, Acacia cyclops, A. cochlearis* and *Dodonaea aptera*. Fire is described as returning the apex community to the *Melaleuca systena/Acacia lasiocarpa* low dense thicket.

Vegetation Association 1007 is described by Government of WA (2019b) as "Mosaic: Shrublands; *Acacia lasiocarpa & Melaleuca acerosa (M. systena)* heath/Shrublands; *Acacia rostellifera* & *Acacia cyclops* thicket".

Vegetation Association 1007 is described as originally consisting of 30,408 hectares of which 20,691 hectares or 68% remains. Of what remains, 2,755 hectares or 13.31% is protected or proposed for protection (Government of WA, 2019b). The Bush Forever portion of the study area would represent a part of those areas protected or proposed for protection.

It is worth noting that while these mapped units are described as 'vegetation associations', they actually represent broader groupings of a number of vegetation associations. Which means that extent remaining figures in that context can be misleading in terms of accurately reflecting how much of an individual vegetation association remains.

Nomenclature and taxonomy used in these descriptions has been updated from that used in the original publication.

3.4.4 Flora of the Quindalup Dunes (Griffin, 1993)

Griffin (1993) surveyed the Quindalup Dunes between the Irwin and Swan Rivers. The methodology used was similar to that used in this study in terms of collecting floristic data within plant communities. While

this current study used 100m^2 bounded quadrats, Griffin (1993) used unmeasured quadrats that approximated 100m^2. They referred to them as relevés (although strictly speaking in vegetation science, a relevé is a measured quadrat).

Griffin described the difficulty in defining vegetation of the Quindalup Dunes in traditional sense. They investigated several methods including analysing presence/absence and cover of relevé data. Their conclusion was that floristic presence/absence was the most useful parameter to use across such a large geographical area.

Table 1 presents perhaps the most contextually useful grouping of relevé data in the context of this study.

Table 1: Four Broad Groupings of Relevés Across Quindalup Dunes Between Irwin and Swan Rivers (Griffin, 1993)

1: Incipient Foredunes	**Mainly on very young land surfaces.** Usually dominated by *Spinifex longifolius* and **Tetragonia decumbens*, but also in places *Spinifex hirsutus, Atriplex isatidea* or *A. cinerea*.
2: Foredunes & Young Beach Ridge Plains	**Mainly on very young land surfaces.** Usually dominated by *Olearia axillaris* and *Scaevola crassifolia* but also important in some were *Myoporum insularis, Rhagodia baccata* and *Acanthocarpus preissii*.
3: Plains	**Variable depending on age and land surface:** **3a:** More or less bare. Important species were variable but included one or several of the following*; Leucophyta brownii, Opercularia vaginata, Hibbertia racemosa* and *Scaevola crassifolia*. **3b:** Very young. Dominance generally was low but main species usually were *Allocasuarina lehmanniana, Spyridium globulosum, Gastrolobium capitatum* or *Banksia sessilis.* **3c:** Young. Similar species to 3b above usually quite dominant but also important were *Acrotriche cordata* or *Acacia truncata*. **3d:** Older. Tended to be dominated by *Melaleuca systena* and *M. huegelii* or *M. cardiophylla* or *Thryptomene baeckeacea* or *Banksia sessilis*.
4: Inland Dunes	**Variable depending partly on age:** **4a:** Younger. Tending to be dominated by *Acacia rostellifera* and in some cases *Melaleuca huegelii* or *M. cardiophylla* tall shrublands, with *Acanthocarpus preissii*; and **4b:** Older. With much less *Acacia rostellifera* but with *Melaleuca systena* usually dominant with combinations of *Desmocladus flexuosus* (would include *D. aspera*) and *Lomandra maritima*.

Nomenclature and taxonomy used in these descriptions has been updated from those used in the original publication.

3.4.5 Bush Forever

With the exception of the northern corner, the study area is within Bush Forever Site 397: "Coastal Strip from Wilbinga to Mindarie". This site is approximately 400 hectares in size.

No detailed survey was completed for this site (Government of WA, 2000). Multiple part-surveys have been completed. A part-survey by Robinson (1995) of coastal reserves north of Quinns Rocks indicated that there were 83 native flora and 23 weed flora present, representing >60% of the expected flora.

Inferred Floristic Community Types present at Bush Forever Site 397 are listed as:

- Supergroup 2: Seasonal Wetlands:
    - FCT 16: Highly saline seasonal wetlands (*Frankenia pauciflora* on Tamala Limestone Cliffs)

- Supergroup 4: Uplands centred on Quindalup and Spearwood Dunes
  - FCT 29a: Coastal shrublands on shallow sands
  - FCT 29b: Acacia shrublands on taller dunes
  - FCT S11: Northern *Acacia rostellifera – Melaleuca systena* shrublands
  - FCT S13: Northern *Olearia axillaris – Scaevola crassifolia* shrublands
  - FCT S14: *Spinifex longifolius* grasslands and low shrublands

3.5 LEGISLATION AND GUIDELINES

3.5.1 Planning and Development Act 2005

Bush Forever sites have some protection under State Planning Policy 2.8: Bushland Policy for the Perth Metropolitan Region under the *Planning and Development Act 2005*. There are a number of specific requirements for Environmental Impact Assessment (EIA) when a Bush Forever site is involved.

3.5.2 Western Australian *Environmental Protection Act 1986*

The *Environmental Protection (EP) Act 1986* is the guiding legislation for EIA in Western Australia. Formal assessments for projects that are likely to have significant impacts are completed by the Environmental Protection Authority (EPA) under this legislation.

Environmental Protection (Clearing of Native Vegetation) Regulations 2004

The *EP Act* includes the *Clearance of Native Vegetation Regulations 2004* under which clearing permits are required to clear native vegetation. The permit system is administered by either the Western Australian Department of Water and Environmental Regulation (DWER), or for exploration activities, the Department of Mines, Industry Regulation and Safety (DMIRS).

Technical Guidance under the EP Act 1986

The EPA's Technical Guidance for Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016) outlines the supporting information required for botanical assessments under the *EP Act 1996*.

EPA (2016) replaced the EPA's Guidance Statement 51.

3.5.3 Western Australian *Biodiversity Conservation Act 2016*

As of January 1st 2019, the *Biodiversity Conservation (BC) Act 2016* replaced the *Wildlife Conservation Act 1950* in Western Australia.

The *BC Act 2016* introduces the protection of state listed Threatened Ecological Communities (TECs) in addition to Threatened Flora (TF). Threatened Flora were previously known as Declared Rare Flora (DRF).

There are substantially higher and broader ranging fines, up to $500,000 for individuals and $2,500,000 for corporate entities for 'taking' TECs and TF. Additionally, there are substantial fines to individuals and organisations for failing to report matters of environmental significance.

3.5.4 Federal *Environmental Protection Biodiversity Conservation Act 1999*

Threatened Ecological Communities (TECs) as well as Threatened Flora (TF) listed as Matters of National Environmental Significance (MNES) are protected under the Commonwealth *Environmental Protection Biodiversity Conservation (EPBC) Act 1999*.

3.5.5 Flora

All native flora species are protected under the *BC Act 2016*. Flora cannot be taken without a permit.

Threatened Flora (TF) (Western Australia)

Additionally, the Western Australian Minister for Environment can declare any species thought 'rare' an extra level of protection. Species on this list are referred to as Threatened Flora (TF) (Table 2) (previously referred to as DRF or Declared Rare Flora). Each TF species is also given a rank consistent with IUCN Red List criteria.

The TF list is regularly reviewed with updates published in the Government Gazette. The TF status of species is also published on Florabase (WAH, 1998-).

Table 2: Definition of Threatened Species (Flora) (DBCA, 2019a)

T: Threatened species	Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the *Biodiversity Conservation Act 2016* (BC Act). ***Threatened flora*** is that subset of 'Rare Flora' listed under schedules 1 to 3 of the *Wildlife Conservation (Rare Flora) Notice 2018* for Threatened Flora. The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below: **CR: Critically Endangered** 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*". **EN: Endangered** 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*". **VU: Vulnerable** 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*".
X: Presumed extinct species	**EX Extinct species** Species where "*there is no reasonable doubt that the last member of the species has died*", and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act). Published as presumed extinct under schedule 4 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for extinct fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for extinct flora. **EW Extinct in the wild species** Species that *"is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form*", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act).

	Currently there are no threatened fauna or threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.

Priority Flora (PF) (Western Australia)

A supplementary Priority Flora (PF) list is maintained by the Department of Biodiversity Conservation and Attractions (DBCA). Species on the PF list are not specifically protected under current legislation however they are closely considered in environmental impact assessment processes. They are listed in EPA (2016) as flora of 'other' conservation significance.

Priority 1 to 3 flora are species that are awaiting assessment for Threatened Flora (TF) status but which do not currently have enough information to enable that assessment. The three categories represent the order of priority for assessment.

Priority 4 species are those species that are adequately known, rare but not threatened and which require regular monitoring.

The four categories of PF are defined in Table 3. The status of PF are regularly updated and published on Florabase (WAH, 1998-).

Table 3: Priority Flora Conservation Codes and Definitions (DBCA, 2019a)

P1: 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. Such species are in urgent need of further survey.
P2: 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 threat from known threatening processes. Such species are in urgent need of further survey.
P3: 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 several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.
P4: 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.

Threatened Flora (TF) (Federal)

Some flora species have additional protection under the *Commonwealth Environmental Protection Biodiversity Conservation Act, 1999 (EPBC Act).* There is significant overlap in that state-listed TF are largely the same as TF listed under the federal *EPBC Act*.

There are six categories of Threatened Flora under the *EPBC Act* (Table 4).

Table 4: Categories of Threatened Flora Species under the *EPBC Act 1999* (IUCN-Equivalent Status)

EX: Extinct	No reasonable doubt that the last member of the species has died.
EW: Extinct in the Wild	Species known only to survive in cultivation, in captivity or as a naturalised population well outside its past range or it has not been recorded in its known habitat in an appropriate season anywhere in its past range despite exhaustive surveys.
CR: Critically Endangered	Species is considered to be facing an extremely high risk of extinction in the wild.
EN: Endangered	Species is not critically endangered; and it is facing a very high risk of extinction in the wild in the near future
VU: Vulnerable	Species is not critically endangered or endangered; and it is facing a high risk of extinction in the wild in the medium-term future
CD: Conservation Dependent	Species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered.

3.5.6 Vegetation

Threatened Ecological Communities (TECs) (Western Australia)

In Western Australia, Threatened Ecological Communities (TECs) are protected under the *BC Act 2016*. There are four criteria for state listed TECs (Table 5).

Currently there are 69 TECs that have been endorsed by the Western Australian Minister for Environment of which 20 are Critically Endangered, 17 are Endangered, 28 are Vulnerable and 4 Presumed Destroyed (DBCA, 2018).

Table 5: Criteria for Western Australian Threatened Ecological Communities (TECs) (DEC, 2013)

Presumed Totally Destroyed (PD)	An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed, or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future. An ecological community will be listed as presumed totally destroyed if there are no recent records of the community being extant and either of the following applies (A or B): **A)** Records within the last 50 years have not been confirmed despite thorough searches of known or likely habitats; or **B)** All occurrences recorded within the last 50 years have since been destroyed.
Critically Endangered (CR)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored. An ecological community will be listed as Critically Endangered when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future. This will be determined on the basis of the best available information, by it meeting any one or more of the following criteria (A, B or C): **A)** The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 90% and either or both of the following apply (i or ii): i) geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is imminent (within approximately 10 years); or ii) modification throughout its range is continuing such that in the immediate future (within approximately 10 years) the community is unlikely to be capable of being substantially rehabilitated. **B)** Current distribution is limited, and one or more of the following apply (i, ii or iii): i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the immediate future (within approximately 10 years); or ii) there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes; or iii) there may be many occurrences, but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes.

	C) The ecological community exists only as highly modified occurrences that may be capable of being rehabilitated if such work begins in the immediate future (within approximately 10 years).
Endangered (EN)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future. An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. This will be determined on the basis of the best available information by it meeting any one or more of the following criteria (A, B, or C): **A)** The geographic range, and/or total area occupied, and/or number of discrete occurrences have been reduced by at least 70% since European settlement and either or both of the following apply (i or ii): i) the estimated geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is likely in the short-term future (within approximately 20 years); ii) modification throughout its range is continuing such that in the short-term future (within approximately 20 years) the community is unlikely to be capable of being substantially restored or rehabilitated. **B)** Current distribution is limited, and one or more of the following apply (i, ii or iii): i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the short-term future (within approximately 20 years); ii) there are few occurrences, each of which is small and/or isolated and all or most occurrences are very vulnerable to known threatening processes; iii) there may be many occurrences, but total area is small and all or most occurrences are small and/or isolated and very vulnerable to known threatening processes. **C)** The ecological community exists only as very modified occurrences that may be capable of being substantially restored or rehabilitated if such work begins in the short-term future (within approximately 20 years).
Vulnerable (VU)	An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range. An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction or significant modification in the medium (within approximately 50 years) to long-term future. This will be determined on the basis of the best available information by it meeting any one or more of the following criteria (A, B or C): **A)** The ecological community exists largely as modified occurrences that are likely to be capable of being substantially restored or rehabilitated. **B)** The ecological community may already be modified and would be vulnerable to threatening processes, is restricted in area and/or range and/or is only found at a few locations. **C)** The ecological community may be still widespread but is believed likely to move into a category of higher threat in the medium to long-term future because of existing or impending threatening processes.

Priority Ecological Communities (PECs) (Western Australia)

In Western Australia, potential TECs that do not meet criteria or that are not adequately defined or do not have adequate information are added to the Priority Ecological Community (PEC) List as Priority 1, 2 or 3 (Table 6). Communities that are rare but not threatened and are adequately known, or that have been recently removed from the threatened list, are placed in Priority 4 for regular monitoring purposes. Conservation dependent communities are placed in Priority 5 (DEC, 2013).

As of January 2019, there were 393 PECs listed by the DBCA Threatened Species and Communities Branch (DBCA, 2019B).

Table 6: Priority Ecological Communities (PECs) Definitions and Criteria (DEC, 2013)

Priority One: Poorly-known ecological communities	Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤5 occurrences or a total area of ≤100ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.
Priority Two: Poorly-known ecological communities	Communities that are known from few occurrences with a restricted distribution (generally ≤10 occurrences or a total area of ≤200ha). At least some occurrences are not believed to be under immediate threat of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.
Priority Three: Poorly known ecological communities	i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or: ii) Communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat (within approx. 10 years), or; iii) Communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, inappropriate fire regimes, clearing, hydrological change etc. Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.
Priority Four: Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.	i) Rare. Ecological communities known from few occurrences 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 communities are usually represented on conservation lands. ii) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for a higher threat category. iii) Ecological communities that have been removed from the list of threatened communities during the past five years.
Priority Five: Conservation Dependent ecological communities	Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

Threatened Ecological Communities (TECs) (Federal) (EPBC Act)

The *Environmental Protection Biodiversity Conservation Act 1999 (EPBC Act)* provides legislative protection for Threatened Ecological Communities (TECs).

The criteria for listing of TECs under the *EPBC Act* are presented in Table 7.

Table 7: Threatened Ecological Communities (TECs) Definitions and Criteria (EPBC Act Regulations, 2013)

Critically Endangered (CR)	If, at that time, an ecological community is facing an extremely high risk of extinction in the wild in the immediate future (indicative timeframe being the next 10 years).
Endangered (EN)	If, at that time, an ecological community is not critically endangered but is facing a very high risk of extinction in the wild in the near future (indicative timeframe being the next 20 years).
Vulnerable (VU)	If, at that time, an ecological community is not critically endangered or endangered, but is facing a high risk of extinction in the wild in the medium–term future (indicative timeframe being the next 50 years).

3.5.7 Weeds

Environmental Weeds

There is currently no coordinated approach to prioritising and managing environmental weeds in Western Australia.

Under the Western Australian *Conservation and Land Management Act 1984*, the state environmental agency the Department of Biodiversity Conservation and Attractions (DBCA) is required to monitor and manage weeds. As a part of this responsibility, the Western Australian Environmental Weed Strategy (WAEWS) (Department of CALM, 1999) was developed, which presents a list of environmental weeds and gives each a rating (Table 9) depending on its invasiveness, distribution and environmental impact (Table 8).

The purpose of this publication was also to eventually tie into the Weeds of National Significance (WONS) project (CALM, 1999 p58), providing a compatible rating system to be applied to Western Australian environmental weed species. The idea was also to eventually provide a regionally based rating system, using the Interim Biogeographic Regionalisation for Australia (IBRA) (Thackway and Cresswell, 1995) regions. None of this has been completed, and the list is out of date in some respects, however it still provides a good general idea of what serious environmental weeds are present in a study area.

Table 8: Criteria of Weeds under WAEWS (Department of CALM, 1999)

Invasiveness	Ability to invade bushland in good to excellent condition or ability to invade waterways.
Distribution	Wide current or potential distribution including consideration of known history of widespread distribution elsewhere in the world.
Environmental Impact	Ability to change the structure, composition and function of ecosystems, in particular an ability to form a monoculture in a vegetation community.

Table 9: Rating of Weeds under WAEWS (Department of CALM, 1999)

H: High	A weed species that scores 'yes' for all three criteria. Rating a weed species as High would indicate prioritising this weed for control and/or research i.e. prioritising funding to it.
Mo: Moderate	A weed species would have to score 'yes' for two of the above criteria. Control or research effort should be directed to it if funds are available, however it should be monitored (possibly a high level of monitoring).
Mi: Mild	A weed species scoring 'yes' for one of the criteria. A Mild rating would indicate monitoring of the weed and control where appropriate.
L: Low	A weed species would score none of the criteria. A Low ranking would mean that this species would require a low level of monitoring.

Biosecurity and Agriculture Management Act 2007 (BAM Act)

This act replaces amongst other related legislation, the *Agriculture and Related Resources Protection Act 1976*, which legislated for the control of Declared Plants in Western Australia (Sandy Lloyd DAFWA, pers. comm.). The *BAM Act* represents the only legally binding requirement for weed control and/or eradication in Western Australia.

Under the under the *BAM Act* the "Declared Plants" list has been replaced by the Western Australian Organism List (WAOL). The WAOL is administered by the Western Australian Department of Agriculture and Food (Department of Primary Industries and Regional Development, 2019). There are three categories of Declared Pest on the WAOL list (Table 10).

This list is generally more relevant to agricultural than environmental weeds.

Table 10: Categories of Declared Pest under the *BAM Act 2007* (DPIRD, 2019)

The C1 category (Exclusion)	Pests will be assigned to this category if they are not established in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State.
The C2 category (Eradication)	Pests will be assigned to this category if they are present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still a possibility.
The C3 category (Management)	Pests will be assigned to this category if they are established in Western Australia but it is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size or density or moving from an area in which it is established into an area, which currently is free of that pest.

Weeds of National Significance (WONS)

The Weeds of National Significance (WONS) (Department of Environment and Energy, 2019) project is an initiative of the Commonwealth in collaboration with state governments aimed at establishing a national prioritisation process for environmental weeds. Thirty-two species of WONS have currently been prioritised, based on invasiveness, potential for spread and environmental, social and economic impacts. Their ability to be managed was also taken into account. This programme is in the early stages of development and is a work in progress. It only includes an extremely limited subset of environmental weeds.

4. METHODS

4.1 FIELD SURVEY

The field survey consisted of a Detailed Survey and a Targeted Survey (EPA, 2016 p. 5). Sampling techniques consisted of Traverses, Quadrats, Opportunistic Sampling and Vegetation Condition Rating (EPA, 2016 p. 7).

4.1.1 Traverses

A traverse survey was completed on the 27th September 2019.

Traverses were conducted on foot at 20m intervals across all vegetated areas to record:

- Priority, Threatened and other flora of conservation significance (as defined by EPA, 2016);
- Weed species;
- Vegetation type and condition boundaries; and
- Any matters of interest e.g. including but not limited to rubbish, vegetation, condition.

4.1.2 Quadrats

An early spring quadrat survey was conducted on the 13th to 16th September 2019, with a late spring revisit on the 19th October 2019.

Quadrat sizes were 10m x 10m in line with established methodology for the Swan Coastal Plain. An area surrounding the quadrat was also surveyed to record other species typical of the vegetation type.

The information recorded for each quadrat included:

- AMG Coordinates in GDA94 datum (accuracy <3m) for all four corners of quadrat (Appendix D);
- All flora species present (floristics) in each quadrat and their height and cover/density (structure) (Appendix B). Percentage cover refers to the foliage cover (as required by EPA, 2016) of each species within the 100m^2 quadrat (1m^2 cover = 1% cover). Species that overhung the quadrat were included;
- Description of vegetation and documentation of vegetation structure based on the National Vegetation Information System (NVIS) (ESCAVI, 2003) (as required by EPA, 2016);
- Photographs of vegetation (taken from NW corner of quadrat) (Appendix C);
- Habitat information including but not limited to landform, aspect and soil and leaf litter; and
- A condition rating was given according to the condition scale(s) in Table 9.

Quadrats were permanently marked, with all four corners pegged with 25mm by 25mm white-painted jarrah stakes (visible approximately 15cm above the soil surface). The quadrat number is written on top of the stakes (01, 02, 03 etc), with the full quadrat number on the side with the corner reference (TR01NW, TR01SW, TR01SE, TR01NE etc). Please note that the labels will degrade in sunlight over time.

4.1.3 Opportunistic Sampling

Any points of interest were recorded using a GPS with an accuracy of <3m using datum GDA94.

4.1.4 Condition Assessment and Mapping

As requested by the City of Wanneroo the Bush Forever (Government of WA, 2000) condition scale was used. This was to ensure that condition mapping was consistent with historical mapping.

EPA (2016) provides a condition scale to be used in EIA. While it is not referenced, this condition scale originated in Bush Forever.

On comparing the two scales it was found that they are almost identical. This is demonstrated in Table 11. Condition mapping will therefore still also be consistent with the requirements of EPA (2016).

Table 11: Vegetation Condition Rating for the South West Botanical Province (EPA, 2016) and Bush Forever Condition Scale (Keighery, 1994 from Govt. of WA, 2000)

Condition		EPA (2016) Condition Scale	Bush Forever (Govt. of WA, 2000) Condition Scale
P	**Pristine**	Pristine or nearly so, no obvious signs of disturbance or damage caused by human activities since European settlement.	Pristine or nearly so, no obvious signs of disturbance.
E	**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.	Vegetation structure intact, disturbance affecting individual species; weeds are non-aggressive species.
VG	**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.	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.
G	**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 very aggressive weeds, partial clearing, dieback and grazing.	Vegetation structure significantly altered by very obvious signs of multiple disturbance. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing.
D	**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.	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
CD	**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.	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.

The original scale was developed by Bronwen Keighery (Keighery, 1994) which was modified from a scale developed by Malcolm Trudgen (Trudgen, 1991).

4.1.5 Licencing

The survey was completed by botanist Kelli McCreery under Licence for Scientific or Other Prescribed Purposes No. SL012488 and Permit to Take Threatened Flora No. 27-1920.

Written permission to conduct a survey was obtained from land managers, the City of Wanneroo and the WA Planning Commission.

4.2 FLORA IDENTIFICATIONS, TAXONOMY AND NOMENCLATURE

Flora identifications were completed by a survey botanist with 23 years of experience on the Swan Coastal Plain (SCP). Flora were identified using the taxonomic, reference material and other resources of the WA Herbarium.

Priority Flora were confirmed by the duty botanist at the WA Herbarium.

Nomenclature was based on Florabase (Western Australian Herbarium, 1998-). All taxa were cross-referenced against Florabase to ensure that names were current at the time of publication.

4.3 DATA ANALYSIS

Numerical analyses were conducted on quadrat data collected during the survey. Data was analysed using a two-way multivariate analysis run on the programme 'R' (R Development Core Team, 2007). The agglomerative methods used were Bray-Curtis distance and Ward's clustering. Other clustering methods were also run to test possible alternative groupings.

The results were used as a tool to aid in defining the vegetation types present in the study area. Different parameters were tested, presence-absence (floristic) data was compared to foliar cover weighted data (floristics plus structure).

These methods were used in the context of not necessarily providing an absolute result, but as a powerful tool to aid in defining vegetation types present within the study area. Only quadrat data collected in the study area was used in this stage.

4.3.1 Floristic Community Type Analysis

The 15 quadrats recorded as a part of this survey were also then compared to quadrats surveyed as a part of A Floristic Survey of the Southern Swan Coastal Plain (Gibson *et al.,* 1994). Many TECs and PECs were originally defined on the basis of the floristic analysis in Gibson *et al.* (1994). The aim therefore of this methodology was to help quantify the presence or otherwise of TECs and PECs.

Only presence-absence data was used in this analysis as this is the form the original data is in. To ensure the datasets were as compatible as possible the nomenclature and taxonomy of flora was reverted back to what it would have been in 1994. To test for any methodological differences in the parameters set for the multivariate analysis, a test run was completed first, using only the SCP dataset to ensure that the results for the grouping were consistent with the original findings of that study. Then the quadrats recorded in this survey were run one at a time against the SCP dataset. The aim was to see which Gibson *et al.* (1994) quadrats the study area quadrats were most floristically similar to.

This was a floristic analysis based on presence-absence of flora species within a 10m x 10m quadrat.

The agglomerative methods used were Bray-Curtis distance and Ward's clustering as this was found to most closely replicate the results of the original study.

Contextual regional data available in Western Australia is not currently in a form suitable to attempt a more meaningful region-wide contextual analysis.

4.3.2 Vegetation Mapping

Polygons were drawn using a combination aerial photography (Nearmaps orthophoto updated 25 May 2018) and field observations. Some boundaries were defined using GPS coordinates recorded during on-ground surveys.

Simon Crofts from Environmaps provided high resolution field maps and produced the mapping presented in this report.

Vegetation type within each polygon was defined on the basis of a wide range of information. In particular the statistical analysis of quadrat data, previous studies, field observations and generalised post-survey analysis of data. Both structural and floristic characteristics of the vegetation were taken into account. Descriptions of vegetation type used NVIS (ESCAVI, 2003) structural formation terminology as per the requirements of the EPA (2016).

4.4 DESKTOP ASSESSMENT

A search of the Department of Biodiversity Conservation and Attractions (DBCA) Species and Communities Branch database was completed in September 2019. This was to identify any Western Australian listed Threatened (TF) or Priority (PF) Flora previously known from the study area or surrounds. Summary results are presented in Table 14.

A search of the Department of Biodiversity Conservation and Attractions (DBCA) Species and Communities Branch database was completed in September 2019. This was to identify any Threatened (TECs) and/or Priority Ecological Communities (PECs) previously known from the study area or surrounds. Summary results are presented in Table 18.

A search of the *EPBC Act 1999* Protected Matters Search Tool (Department of Environment and Energy, 2017) was also completed in November 2019 to identify any federally listed Threatened Flora (Table 14) or Threatened Ecological Communities (Table 18) likely to occur in the vicinity of the study area.

All searches were based on a search area bounded by the coordinates:

-31.784° 115.732°
-31.762° 115.781°
-31.310° 115.530°
-31.332° 115.478°

The purpose of these searches was not only to identify any matters of significance previously known from the study area, but also to identify any likely to occur based on proximity and habitat preference. As a result this search area covers a much larger area than the study area alone. This search area was designed to capture near-coastal species and communities from the Quindalup and Spearwood Dunes, in a narrow coastal strip between Mullaloo and Guilderton.

A review of previous studies relevant to the study area was completed, including but not limited to those studies summarised in Section 3.4. A variety of resources were accessed as otherwise described in this

report. Naturemap (DBCA, 2019) was used to identify and expected species list ahead of the field survey. NationalMap (Government of Australia, 2019) was used to check planning boundaries and other relevant spatial information.

4.5 CONSERVATION SIGNIFICANCE ASSESSMENT

Conservation significance was assessed based on the following criteria.

4.5.1 Threatened Species and Communities

Assessment of the conservation significance of flora and vegetation recorded during the survey involved cross-referencing all taxa recorded against criteria for significance under state and federal legislation and guidelines (Section 3.5). This included Threatened Flora and Threatened Ecological Communities under the Western Australian *Biodiversity Conservation Act 2016* and the Federal *Environmental Protection Biodiversity Conservation Act 1999*.

4.5.2 Flora of 'Other' Conservation Significance (EPA, 2016)

Species other than those listed under state and federal legislation and guidelines e.g. Threatened Flora, may have conservation significance. These are defined by the EPA (2016) as those species that may include but not be limited to those that have or are:

- Priority flora species;
- Locally endemic or associated with a restricted habitat type;
- New species or anomalous features that indicate a potential new species;
- Representation of a species range (extensions, edges of ranges or an outlier population);
- Unusual species including restricted sub-species, varieties or naturally occurring hybrids; and/or
- Relictual status, representative of taxonomic groups no longer in the broader landscape.

For range implications, the geographic distributions of all flora species recorded were checked using the map-based resources of the Australian Virtual Herbarium (Council of Heads of Australasian Herbaria, 2013) and Florabase (Western Australian Herbarium, 1998-).

4.5.3 Vegetation of 'Other' Conservation Significance (EPA, 2016)

Vegetation other than that listed under state and federal legislation and guidelines e.g. TECs, may have conservation significance. This is defined by the EPA (2016) that which may include but not be limited to vegetation that:

- Represents a Priority Ecological Community (PEC);
- Has a restricted distribution;
- Has implications due to historical impacts;
- Has a role as a refuge; and/or
- Provides a function required to maintain the ecological integrity of a significant ecosystem.

5. RESULTS

5.1 FLORA

5.1.1 Statistics

A total of 160 taxa were recorded from the study area, of which 100 or 63% were natives.

The 160 taxa represented 53 different plant families and 130 plant genera. The families represented by the largest number of species are shown in Table 12. The genera represented by the largest number of species are shown in Table 13.

See Appendix A for a full list of species recorded for the study area.

Table 12: Dominant Vascular Plant Families Recorded in the Study Area

Family	Common Name	Native	Introduced	Total
POACEAE	Grasses	5	17	**22**
ASTERACEAE	Daisies	8	8	**16**
FABACEAE	Peas, Wattles	9	4	**13**
CYPERACEAE	Sedges	5	1	**6**
ERICACEAE	Heath	5	0	**5**
ORCHIDACEAE	Orchids	5	0	**5**
CARYOPHYLLACEAE	Pink family	0	5	**5**

Table 13: Dominant Vascular Plant Genera Recorded in the Study Area

Genus	Common Name	Native	Introduced	Total
Acacia	Wattles	4	0	**4**
Cassytha	Dodder Laurels	4	0	**4**
Crassula	Stonecrops	1	3	**4**
Euphorbia	Spurges	0	3	**3**
Leucopogon	Beard Heaths	3	0	**3**
Melaleuca	Paperbark, Teatree, Bottlebrush	3	0	**3**

5.1.2 Threatened and Priority Flora Database Search Results

The DBCA Threatened Species and Communities Branch species database search did not identify any records of state listed TF or PF as being previously known from within the study area boundaries.

A search of the *EPBC Act* Protected Matters Search Tool (Department of Environment and Energy, 2019) listed nine Threatened Flora (TF) as potentially occurring in the region. None of these species have previously been recorded from within the study area.

Table 14 summarises the results from both the DBCA Threatened Species and Communities Branch flora database search and the *EPBC Act* Protected Matters Report and identifies the likelihood of each occurring within the study area.

Table 14: Threatened and Priority Flora Database Search Results (DBCA and EPBC Act Protected Matters Databases)

WESTERN AUSTRALIA	CONSERVATION STATUS*			OCCURRENCE (Known/Likely/Possible/Unlikely)
	Rating	WA	EPBC	
Chorizema varium	T	EN	EN	Possible, habitat present (sand over limestone) but known from further N.
Diuris micrantha	T	VU	EN	Unlikely. Known from wetland habitats.
Diuris purdiei	T	EN	EN	Unlikely. Known from wetland habitats further S and E.
Drakaea elastica	T	CR	VU	Unlikely. Known from areas adjacent to wetlands, mostly further S and inland.
Drakaea micrantha	T	EN	VU	Unlikely. Known from further S and/or more inland.
Eleocharis keigheryi	T	VU	VU	Unlikely. Known from wetlands.
Eucalyptus argutifolia	T	VU	VU	Possible, within known distribution and habitat present (sand over limestone). Not recorded.
Marianthus paralius	T	EN	EN	Possible, within known distribution and habitat present (sand over limestone). Not recorded.
Melaleuca sp. Wanneroo (G.J. Keighery 16705)	T	EN	EN	Possible but unlikely, assumed distribution to SE.
Baeckea sp. Limestone (N. Gibson & M.N. Lyons 1425)	P1			Possible but unlikely, limestone ridges further inland. P1 are not well understood species.
Grevillea sp. Ocean Reef (D. Pike Joon 4)	P1			Possible. Further N than recorded but habitat present (sand over limestone). Not recorded.
Haloragis sp. Parrot Ridge (G.J. Keighery 11563)	P1			Possible but unlikely, distribution limestone ridges further inland. P1 are poorly understood.
Leucopogon maritimus	P1			**Recorded during this survey.**
Acacia benthamii	P2			Possible. Not recorded.
Fabronia hampeana	P2			Moss. Outside scope of study.
Hakea oligoneura	P2			Possible. Not recorded.
Lecania turicensis var. *turicensis*	P2			Lichen. Outside scope of study.
Austrostipa mundula	P3			Possible but unlikely. Known distribution further inland and to S.
Beyeria cinerea subsp. cinerea	P3			**Recorded during this survey.**
Calandrinia oraria	P3			Possible. Coastal dunes. Not recorded.
Conostylis bracteata	P3			Possible. Not recorded.
Hibbertia spicata subsp. *leptotheca*	P3			Possible. Known from sand over limestone. Not recorded.
Lasiopetalum membranaceum	P3			Possible but unlikely. Habitat sand over limestone. Known distribution further inland.
Leucopogon sp. Yanchep (M. Hislop 1986)	P3			Possible. Within known distribution. Various coastal habitats, sand and limestone. Not recorded.
Pimelea calcicola	P3			Possible. Within known distribution. Coastal limestone ridges. Not recorded.
Sarcozona bicarinata	P3			Possible. Within known distribution. Coastal sand. Not recorded.
Sphaerolobium calcicola	P3			Tall dunes, winter-wet flats, interdunal swamps, low-lying areas
Stylidium maritimum	P3			**Recorded during this survey.**
Stylidium paludicola	P3			Unlikely. Wetland habitat.
Caladenia speciosa	P4			Possible. Known from sand over limestone. Within known distribution. Not recorded.
Conostylis pauciflora subsp. *euryrhipis*	P4			Possible. Within distribution, coastal dune habitat present. Not recorded.
Conostylis pauciflora subsp. *pauciflora*	P4			Possible. Within distribution, coastal dune habitat present. Not recorded.
Dodonaea hackettiana	P4			Possible. Not recorded.
Jacksonia sericea	P4			Possible but unlikely. A fairly common species but further N than known distribution. Not recorded.
Lepidium pseudotasmanicum	P4			Possible. Known from area on sand. Not recorded.

** See Section 3.5.5 for definitions of conservation status codes. Habitat preference information from WAH (1998-) and DBCA database search results.*

5.1.3 Conservation Significant Flora

Threatened Flora

No Threatened Flora (TF) species as listed under the *Biodiversity Conservation Act 2016* were recorded during the field survey.

No TF under the *Environmental Protection and Biodiversity Conservation Act 1999* were recorded.

Three Priority Flora species were recorded from the study area. A Priority 1 species (*Leucopogon maritimus*) and two Priority 3 species (*Beyeria cinerea* subsp*. cinerea* and *Stylidium maritimum*).

Leucopogon maritimus (Priority 1 Flora)

This plant is a low spreading shrub to 40cm tall by 60cm wide (Plate 1) from the heath family (Ericaceae). It has a fire sensitive rootstock. Flowers are small and white and clustered at the end of the branchlets (Plate 2). The flowers are white-hairy on the inside as is typical of *Leucopogon*. Flowering is documented as occurring between November and August, with the peak likely to be between April and June (Hislop, 2011). During the survey, plants were in flower in early September but had finished by the end of the month. It is an inconspicuous shrub when not in flower.

There are 17 collections of this species in the WA Herbarium (Council of Heads of Australasian Herbaria, 2013) known from a small range in a narrow coastal band from Alkimos to north of Two Rocks. During the survey approximately 13 individuals were recorded from the study area (Figure 2). The distribution of this plant in the study area was restricted to Vegetation Type C (Figure 3).

Priority 1 Flora are those flora species that are poorly known, from fewer than five populations and that are potentially under threat. Such species are in urgent need of further survey to enable assessment for Threatened status. See Section 3.5.5 for more detail.

Plate 1 *Leucopogon maritimus* Priority 1 Flora. Habit.

Plate 2 *Leucopogon maritimus* Priority 1 Flora. Flowering in early September 2019.

Beyeria cinerea* subsp. *cinerea (Priority 3 Flora)

This plant is an open, erect to spreading shrub (Plate 3) to 70cm tall from the spurge family (Euphorbiaceae). Its flowers are fairly inconspicuous (Plate 4) with flowering recorded in July and from September to November. It is known from coastal heath and shrublands on sandy soil over limestone. It is differentiated from the more common *Beyeria cinerea* subsp*. borealis* by having truncate (blunt) to

cuneate (wedge-shaped) rather than cordate (heart shaped) leaf bases as well as a more southerly distribution (Halford and Henderson, 2008).

There are 51 collections of this species in the WA Herbarium (Council of Heads of Australasian Herbaria, 2013) distributed in a narrow near-coastal band between Mandurah and Port Gregory. During the survey 490 individuals were recorded from the study area (Figure 2). The distribution of this plant in the study area was restricted to Vegetation Type C (Figure 3).

Priority 3 Flora are those flora species that are known from several locations, and does not appear to be under immediate threat. Can be comparatively well known but still not meet survey requirements for assessment for Threatened Flora status. See Section 3.5.5 for more detail.

Plate 3 *Beyeria cinerea* subsp. *cinerea* Priority 3 Flora. Habit.

Plate 4 *Beyeria cinerea* subsp. *cinerea* Priority 3 Flora. Flowers.

Stylidium maritimum (Priority 3 Flora)

This plant is a perennial herb to 70cm tall, with tufted linear strappy grass-like leaves (Plate 5) 10-40cm long to 5.5cm wide from the triggerplant family (Stylidiaceae). Flowers are showy, in panicles on long stems, large white to purple but commonly pink triggerplant-shaped flowers (Plate 6), with flowering in September to November. Grows on sand over limestone, dunes, coastal heath and/or Banksia woodland (WA Herbarium, 1998-).

There are 42 collections of this species in the WA Herbarium (Council of Heads of Australasian Herbaria, 2013) distributed in a narrow near-coastal band between Mandurah and Leeman. During the survey 35 individuals were recorded from the study area (Figure 2). The distribution of this plant in the study area was restricted to Vegetation Type C (Figure 3).

Priority 3 Flora are those flora species that are known from several locations, and does not appear to be under immediate threat. Can be comparatively well known but still not meet survey requirements for assessment for Threatened Flora status. See Section 3.5.5 for more detail.

Plate 5 *Stylidium maritimum* Priority 3 Flora. Habit.

Plate 6 *Stylidium maritimum* Priority 3 Flora. Flowers.

Species of 'Other' Conservation Significance

See Section 4.5.2 for a definition of species of 'other' conservation significance.

Due to the study area being located on the western coastline of the continent, most species recorded are at the western most extent of their known range.

Only those species that have extra range implications over and above westerly extent have been listed here. Table 15 presents those species with range implications

Table 15: Species of 'Other Conservation Significance' as Defined by EPA (2016)

Species	Significance
Cassytha aurea var. *aurea*	S extent known range. 20km range extension (closest collection from Guilderton).
Melaleuca cardiophylla	Close to S extent of known range.
Stylidium hesperium	Poorly collected, only 2 records in WAH. Possibly a database error.
Leucopogon maritimus (P1)	Short range endemic <50km. Endemic to SCP.

There is no further action required for these particular species. Any plant specimen material collected will be forwarded to the WA Herbarium. This will ensure that there is a verifiable record of the extended range for each species.

ENVIRONMAPS | 0466 590 006
Environmental Mapping Solutions | www.environmaps.com.au

ONE TREE BOTANICAL

Client: City of Wanneroo
Job: P1904 - Two Rocks
Date: 17/12/2019
E: kelli@onetreebotanical.com.au
P: (08) 9371 9491
M: 0407 423 928

N

0 12.5 25 50 75 100 m

Scale: 1:2,000 @ A3
GDA 1994 MGA Zone 50

FIGURE 2

TWO ROCKS BEACH ACCESS WAY SIGNIFICANT FLORA LOCATIONS MAP

C:\GIS\Jobs\One Tree Botanical\P1904 - City of Wanneroo - Two Rocks\Figures\P1904-2\Rocks_F02 Two Rocks Beach Access Way Significant Flora Locations Map_191217.mxd

5.1.4 Weeds

Environmental Weeds

Of the 60 species of weed recorded in the study area, nine were given a High rating for invasiveness and spread as environmental weeds under the Western Australian Environmental Weed Strategy (WAEWS) (Department of Conservation and Land Management, 1999) (Table 16). Thirty weeds recorded in the study area were given a Moderate rating. See Section 3.5.7 for more detail on these criteria.

Table 16: Environmental Weeds High to Moderate Rating (CALM, 1999) recorded in the Study area

Species	Common Name	**Rating** (CALM, 1999)
**Brassica tournefortii*	Mediterranean Turnip	High
**Bromus diandrus*	Great Brome	High
**Eragrostis curvula*	African Love Grass	High
**Euphorbia terracina*	Geraldton Carnation Weed	High
**Hyparrhenia hirta*	Tambookie Grass	High
**Lagurus ovatus*	Hare's Tail Grass	High
**Lupinus cosentinii*	Blue Lupin	High
**Pelargonium capitatum*	Rose Pelargonium	High
**Romulea rosea*	Guildford Grass	High
**Aira cupaniana*	Silvery Hair Grass	Moderate
**Arctotheca calendula*	Cape Weed	Moderate
**Arctotheca populifolia*	Dune Arctotheca	Moderate
**Avena barbata*	Wild Oats	Moderate
**Bellardia trixago*	Bellardia	Moderate
**Briza maxima*	Blowfly Grass	Moderate
**Briza minor*	Shivery Grass	Moderate
**Cakile maritima*	Sea Rocket	Moderate
**Crassula glomerata*	(stonecrops)	Moderate
**Cuscuta planiflora*	Dodder	Moderate
**Cynodon dactylon*	Couch Grass	Moderate
**Dischisma arenarium*	-	Moderate
**Ehrharta brevifolia* var. *cuspidata*	-	Moderate
**Ehrharta longiflora*	Annual Veldt Grass	Moderate
**Euphorbia paralias*	Sea Spurge	Moderate
**Euphorbia peplus*	Petty Spurge	Moderate
**Galium murale*	Small Goosegrass	Moderate
**Gladiolus caryophyllaceus*	Pink Gladiolus	Moderate
**Heliophila pusilla*	-	Moderate
**Hypochaeris glabra*	Flatweed	Moderate
**Lysimachia arvensis*	Pimpernel	Moderate
**Melilotus indicus*	Indian Sweet-clover	Moderate
**Parentucellia latifolia*	Common Bartsia	Moderate
**Rostraria cristata*	Mediterranean Hairgrass	Moderate
**Schinus terebinthifolia*	Japanese Pepper Tree	Moderate
**Sonchus oleraceus*	Common Sowthistle	Moderate
**Tetragonia decumbens*	Sea Spinach	Moderate
**Thinopyrum distichum*	Sea Wheatgrass	Moderate
**Trifolium campestre* var. *campestre*	Hop Clover	Moderate
**Vulpia myuros* forma *megaleura*	Rat's Tail Fescue	Moderate

Declared Pest Plants (BAM Act 2007)

There are 920 declared pest plant species on the WA Organism List (WAOL) under the *Biosecurity and Agriculture Management Act* 2007 for the City of Wanneroo. None of the weed species recorded in the study area were listed as a declared pest under this legislation.

See Section 3.5.7 for more information on Declared Pests.

Weeds of National Significance

No Weeds of National Significance (WONS) were recorded in the study area.

See Section 3.5.7 for more information on WONS.

5.2 VEGETATION

5.2.1 Vegetation Type Summary

A LOW-LYING PRIMARY DUNES ON UNCONSOLIDATED SAND

A1: **Incipient Foredune (younger):** Uniform regrowth of Grassland **Thinopyrum distichum*.

A2: **Established Foredune (older):** Sparse Shrubland *Olearia axillaris* over Grassland *Spinifex longifolius*.

A3: **Beach-ridge Plain:** Open Shrubland *Olearia axillaris, Rhagodia baccata* subsp. *baccata* and **Pelargonium capitatum* over Sparse Grassland *Spinifex longifolius* and Sparse Vineland *Cassytha flava* var. *flava*.

B: TALL SECONDARY DUNES ON UNCONSOLIDATED SAND

B1: Shrubland dominated by *Acacia cyclops, Scaevola crassifolia, Spyridium globulosum, Santalum acuminatum, Myoporum insulare, Olearia axillaris, Rhagodia baccata* subsp. *baccata* and *Acanthocarpus preissii*, Sparse Vineland *Hardenbergia comptoniana* and *Cassytha flava* var. *flava*. Over Forbland dominated by *Senecio pinnatifolius* var. *latilobus*.

C: LOW DUNES ON SEMI-CONSOLIDATED SAND

C1: Species rich low Shrubland dominated by *Melaleuca systena* and species rich Forbland dominated by *Lomandra maritima* and Sparse Sedgeland *Lepidosperma calcicola* and Sparse Rushland *Desmocladus asper*.

D: LOW RISES WITH LIMESTONE OUTCROPPING

D1: Closed Shrubland *Melaleuca cardiophylla* with other typical shrubs *Melaleuca huegelii* subsp. *huegelii, Acacia xanthina* and *Dodonaea aptera* with Sparse Vineland *Cassytha aurea* var. *aurea* over Forbland of native and introduced herbs.

E: CLEARED AREAS

E1: Historically cleared areas; informal walking paths, informal vehicular sand tracks (unused and partially overgrown).

See Figure 3 for a vegetation type mapping. See Figure 4 for vegetation condition mapping.

5.2.2 Detailed Vegetation Type Descriptions

A LOW-LYING PRIMARY DUNES ON UNCONSOLIDATED SAND

Plant communities A1 to A3 were a continuum across a beach ridge plain system (Plate 10), young dunes that had been sequentially deposited and gradually vegetated. With the exception of the youngest dune vegetation was typified by the dominance of Grassland of *Spinifex longifolius*, the shrub *Olearia axillaris* and the introduced forb **Pelargonium capitatum*. Species richness increased west to east.

A1: Incipient Foredune (youngest): Uniform regrowth of Grassland **Thinopyrum distichum* (Plate 7).

This plant community was on a recently deposited foredune, likely to have been deposited within the two years prior. Plant growth was only very recent and was dominated by a Grassland of Sea Wheatgrass **Thinopyrum distichum*. Other scattered species included *Spinifex hirsutus, *Cakile maritima, Atriplex isatidea* and **Arctotheca populifolia*.

There were two quadrats in this vegetation (TR04 and TR15) with an average species richness of 3.

This vegetation was in Degraded condition at the time of the survey. With the ongoing deposition of a beach ridge plain system, succession occurs on the incipient foredunes and they become more stable and established dunes. It appears that the vegetation condition on these new dunes improved with maturity. Succession is likely to mean that with time these more mature dunes reflect vegetation types A2 and/or A3.

This vegetation was in Very Good condition due to low weed invasion at the time of the survey.

A2: Established Foredune (older): Sparse Shrubland *Olearia axillaris* over Grassland *Spinifex longifolius* (Plate 8).

Sparse Shrubland *Olearia axillaris* over Grassland *Spinifex longifolius* with Sparse Forbland of weeds **Pelargonium capitatum, *Trachyandra divaricata, *Euphorbia paralias, *Crassula glomerata.* Other scattered shrubs include *Rhagodia baccata* subsp*. baccata.* Scattered weedy grasses included **Ehrharta brevifolia* subsp*. cuspidata, *Thinopyrum distichum* and **Bromus diandrus.* Occasional sedge *Ficinia nodosa.*

There were two quadrats in this vegetation (TR01 and TR05) with an average species richness of 10.

This vegetation is equivalent to S14: *Spinifex longifolius* grasslands and low shrublands (Griffin, 1993 from Government of WA, 2000).

This vegetation was in Good to Very Good condition. Species richness was moderate for dune systems and weed cover was low to moderate at the time of the survey. These dunes are relatively young and there has been a process of rapid vegetation succession.

Plate 7 Vegetation Type A1: Young foredune with Grassland of **Thinopyrum distichum.*

Plate 8 Vegetation Type A2: Established foredune with Sparse Shrubland *Olearia axillaris* over Grassland *Spinifex longifolius*.

A3: Beach-ridge Plain: Open Shrubland *Olearia axillaris, Rhagodia baccata* subsp. *baccata* and **Pelargonium capitatum* over Sparse Grassland *Spinifex longifolius* and Sparse Vineland *Cassytha flava* var. *flava* (Plate 9).

Other typical shrubs included *Leptomeria preissiana* and towards the eastern boundary of the community *Acacia cyclops, Myoporum insulare, Acanthocarpus preissii* and *Spyridium globulosum* started to appear. This progression can be seen in Plate 10. There was a weed dominated Forbland of **Pelargonium capitatum* but also typically included other forbs **Trachyandra divaricata, Senecio pinnatifolius* var. *latilobus, Calandrinia brevipedata, Carpobrotus virescens, Crassula colorata* var. *colorata, *C. glomerata* and **Dischisma arenarium*. A Sparse to Open Vineland of *Cassytha aurea* var. *aurea* was a notable feature of this vegetation, forming often robust tangles. Grass **Ehrharta brevifolia* var. *cuspidata* and tiny annual sedge **Isolepis marginata* were typical of the vegetation but at low cover.

There were two quadrats in this vegetation (TR02 and TR03) with an average species richness of 20.

This vegetation is equivalent to state listed Priority Ecological Community (PEC) SWAN 21: "Coastal shrublands on shallow sands, southern Swan Coastal Plain". Described as heaths on shallow sands over limestone close to the coast, with no single dominant but including *Spyridium globulosum, Rhagodia baccata* and *Olearia axillaris* (DBCA, 2019b). Also known as Floristic Community Type (FCT) 29a (Gibson *et al.* 1994). Floristically this vegetation type ended up being more similar to Vegetation Type B than the other quadrats in Vegetation Type A. Structurally and in terms of species richness however they were very different.

This vegetation was generally in Good to Very Good condition. There was a relatively high cover of **Pelargonium capitatum* present at the time of the survey. Species richness was moderate for dune systems. These dunes are relatively young and there has been a process of rapid vegetation succession.

Plate 9 Vegetation Type A3: Beach ridge plain with Open Shrubland *Olearia axillaris* and **Pelargonium capitatum* over Sparse Grassland *Spinifex longifolius*.

Plate 10 Vegetation Types A1-A3: Overview showing series of low dunes that consitute a beach ridge plain.

B: TALL SECONDARY DUNES ON UNCONSOLIDATED SAND

B1: Shrubland dominated by *Acacia cyclops, Scaevola crassifolia, Spyridium globulosum, Santalum acuminatum, Myoporum insulare, Olearia axillaris, Rhagodia baccata* subsp. *baccata* and *Acanthocarpus preissii*, Sparse Vineland *Hardenbergia comptoniana* and *Cassytha flava* var. *flava*. Over Forbland dominated by *Senecio pinnatifolius* var. *latilobus* (Plates 11 and 12).

Other forbs typically included *Parietaria debilis, Calandrinia brevipedata, Carpobrotus virescens, Crassula colorata* var. *colorata, Conostylis candicans* subsp. *calcicola* and scattered weeds **Stellaria media, *Pelargonium capitatum, *Dischisma arenarium, *Brassica tournefortii* and **Crassula glomerata*. There was also a Sparse Tussock Grassland of *Poa porphyroclados*, occasional *Spinifex longifolius* and weeds **Ehrharta brevifolia* var*. cuspidata, *Lagurus ovatus* and **Bromus diandrus*. While *Cassytha flava* var. *flava* was the dominant vine, *C. glabella* forma *casuarinae* and *C. racemosa* forma. *racemosa* were also typical. Isolated Clumps of Sedges *Ficinia nodosa* and *Lepidosperma gladiatum* occurred across the community. On the western or windward slopes exposed to the sea breeze, wind and salt-pruning meant that vegetation was denser and shorter. On the eastern or leeward slopes, vegetation was taller and more open.

There were four quadrats in this vegetation (TR07, TR08, TR09 and TR14) which had an average species richness of 32.3 $\pm$ 3.1.

This vegetation is equivalent to state listed Priority Ecological Community (PEC) SWAN 21: "Coastal shrublands on shallow sands, southern Swan Coastal Plain". Described as heaths on shallow sands over limestone close to the coast, with no single dominant but including *Spyridium globulosum, Rhagodia baccata* and *Olearia axillaris* (DBCA, 2019). Also known as Floristic Community Type (FCT) 29a (Gibson *et al.* 1994).

This vegetation was in Very Good condition. Weeds varied between 1-5% cover, with localised patches of higher cover, particularly adjacent to tracks and towards the eastern extremity of the plant community.

Plate 11 Vegetation Type B1: Secondary Dune with Shrubland dominated by *Acacia cyclops, Scaevola crassifolium, Spyridium globulosum, Santalum acuminatum, Myoporum insulare, Olearia axillaris, Rhagodia baccata* subsp. *baccata* and *Acanthocarpus preissii.*

Plate 12 Vegetation Type B1: Secondary Dune with Shrubland dominated by *Acacia cyclops, Scaevola crassifolium, Spyridium globulosum, Santalum acuminatum, Myoporum insulare, Olearia axillaris, Rhagodia baccata* subsp. *baccata* and *Acanthocarpus preissii.*

C: LOW DUNES ON SEMI-CONSOLIDATED SAND

C1: Species rich low Shrubland dominated by *Melaleuca systena* and species rich Forbland dominated by *Lomandra maritima* and Sparse Sedgeland *Lepidosperma calcicola* and Sparse Rushland *Desmocladus asper* (Plates 13 and 14).

Taller shrubs were variably present as Isolated Clumps of Shrubs and included *Olearia axillaris, Acacia cyclops, Santalum acuminatum, Spyridium globulosum, Leucopogon parviflorus, Templetonia retusa* and *Leptomeria preissiana*. Other low shrubs typical of the species-rich low Shrubland included *Acacia lasiocarpa* var. *lasiocarpa, Beyeria cinerea* subsp. *cinerea* (P3), *Leucopogon maritimus* (P1), *L. insularis, Cryptandra mutila, Phyllanthus calycinus, Pimelea ferruginea, Hemiandra glabra, Gastrolobium nervosum* and *Gompholobium tomentosum*. The species-rich Forbland also typically included *Stylidium maritimum* (P4), *Opercularia vaginata, Conostylis candicans* subsp. *calcicola, Conostylis candicans* subsp. candicans, *Daucus glochidiatus, Dianella revoluta* var. *divaricata*, *Acanthocarpus preissii*, orchids *Cyrtostylis huegelii* and *Eriochilus dilatatus* subsp. *dilatatus* and scattered but typical weeds **Crassula glomerata, *Minuartia mediterranea, *Lysimachia arvensis, *Galium murale* and **Romulea rosea*. There was a relatively species-rich Sparse Tussock Grassland of *Poa porphyroclados, Rytidosperma occidentale* and *Austrostipa flavescens* and scattered weeds **Catapodium rigidum, *Vulpia muralis, *Ehrharta brevifolia* var. *cuspidata* and **Bromus diandrus*.

There were three quadrats in this vegetation (TR10, TR12 and TR13) with an average species richness of 48 ± 8.9.

The statistical analysis indicated that this vegetation most closely grouped with FCT24 (Gibson *et al.*, 1994), with some influence from FCT29a. This was likely due to the small patch size of this community and the proximity to FCT29a vegetation types. FCT29a and FCT24 are both state listed Priority Ecological Communities (PECs). FCT24 is equivalent to state listed Priority Ecological Community (PEC) SWAN 26: Northern Spearwood shrublands and woodlands ('floristic community type 24') occurring on deeper soils north from Woodman Point. Most known occurrences occur on the Cottesloe unit of the Spearwood system (DBCA, 2019). Three species of Priority Flora formed a significant component of the structure of

this vegetation, which indicates a possibility of a degree of uniqueness. Please see Section 6.2 for further discussion.

This vegetation was in Very Good to Excellent condition (Figure 4) in the eastern extent (Plate 13). The western extent was in Good condition (Plate 14) due to disturbance and higher cover of weed species.

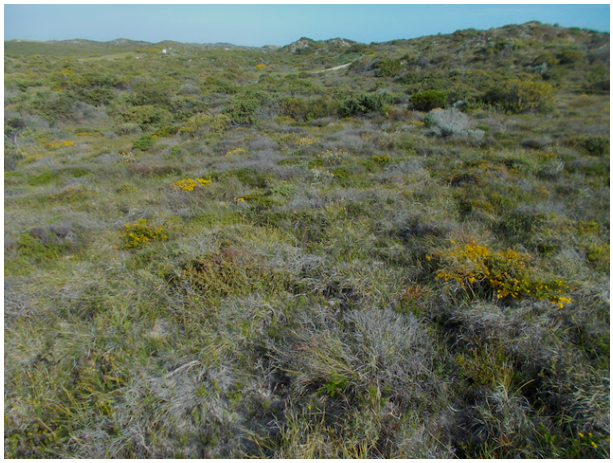


Plate 13 Vegetation Type C1: Species rich low Shrubland dominated by *Melaleuca systena* and species rich Forbland dominated by *Lomandra maritima*. Portion in Very Good to Excellent condition. Weed cover 1-2%.

Plate 14 Vegetation Type C1: Species rich low Shrubland dominated by *Melaleuca systena* and species rich Forbland dominated by *Lomandra maritima*. Portion in Good condition. Weed cover 10- 50%.

D: LOW RISES WITH LIMESTONE OUTCROPPING

D1: Closed Shrubland *Melaleuca cardiophylla* with other typical shrubs *Melaleuca huegelii* subsp. *huegelii, Acacia xanthina* and *Dodonaea aptera* with Sparse Vineland *Cassytha aurea* var. *aurea* over Forbland of native and introduced herbs (Plates 15 and 16).

Other typical shrubs included *Leucopogon parviflorus, L. insularis, Rhagodia baccata* subsp. *baccata*, *Spyridium globulosum, Westringia dampieri, Trymalium ledifolium* var. *ledifolium, Guichenotia ledifolia, Templetonia retusa* and/or *Leptomeria preissiana*. Forbs included *Dianella revoluta* var. divaricata*, Poranthera microphylla, Calandrinia brevipedata, Parietaria debilis, Wurmbea monantha*, orchids *Cyrtostylis huegelii* and *Caladenia latifolia*, native carrots *Trachymene pilosa, Hydrocotyle hispidula* and *Daucus glochidiatus*. Weeds had high cover in the forb strata, dominated by **Galium murale, *Crassula glomerata, *Stellaria media, *Minuartia mediterranea* and **Lysimachia arvensis*. There was a Sparse Tussock Grassland of *Austrostipa flavescens* and *Poa porphyroclados* and grass weeds **Vulpia muralis, *Catapodium rigidum, *Ehrharta longiflora* and **Bromus diandrus*.

There were two quadrats in this vegetation (TR06 and TR11) which had an average species richness of 51 ± 1.4.

This vegetation is equivalent to state listed Priority Ecological Community (PEC) SWAN 21: "Coastal shrublands on shallow sands, southern Swan Coastal Plain". Described as heaths on shallow sands over limestone close to the coast, with no single dominant but including *Spyridium globulosum, Rhagodia baccata* and *Olearia axillaris* (DBCA, 2019b). Equivalent to Floristic Community Type (FCT) 29a (Gibson *et al.* 1994).

This vegetation was mostly in Very Good condition with Degraded to Good areas (Figure 4) along the powerline and tracks, where clearing and regrowth had occurred historically.

Plate 15 Vegetation Type D1: Low rises with limestone outcropping with Closed Shrubland *Melaleuca cardiophylla*. Northern end of study area.

Plate 16 Vegetation Type D1: Low rises with limestone outcropping with Closed Shrubland *Melaleuca cardiophylla.* Southern end of study area.

E: CLEARED AREAS

E1: Historically cleared areas; informal walking paths, informal vehicular sand tracks (unused and partially overgrown (Plates 17 and 18).

There was very little recent clearing in the study area.

The main walking track E to W from Two Rocks Road to the beach was very narrow, with a couple of disturbed patches along its length.

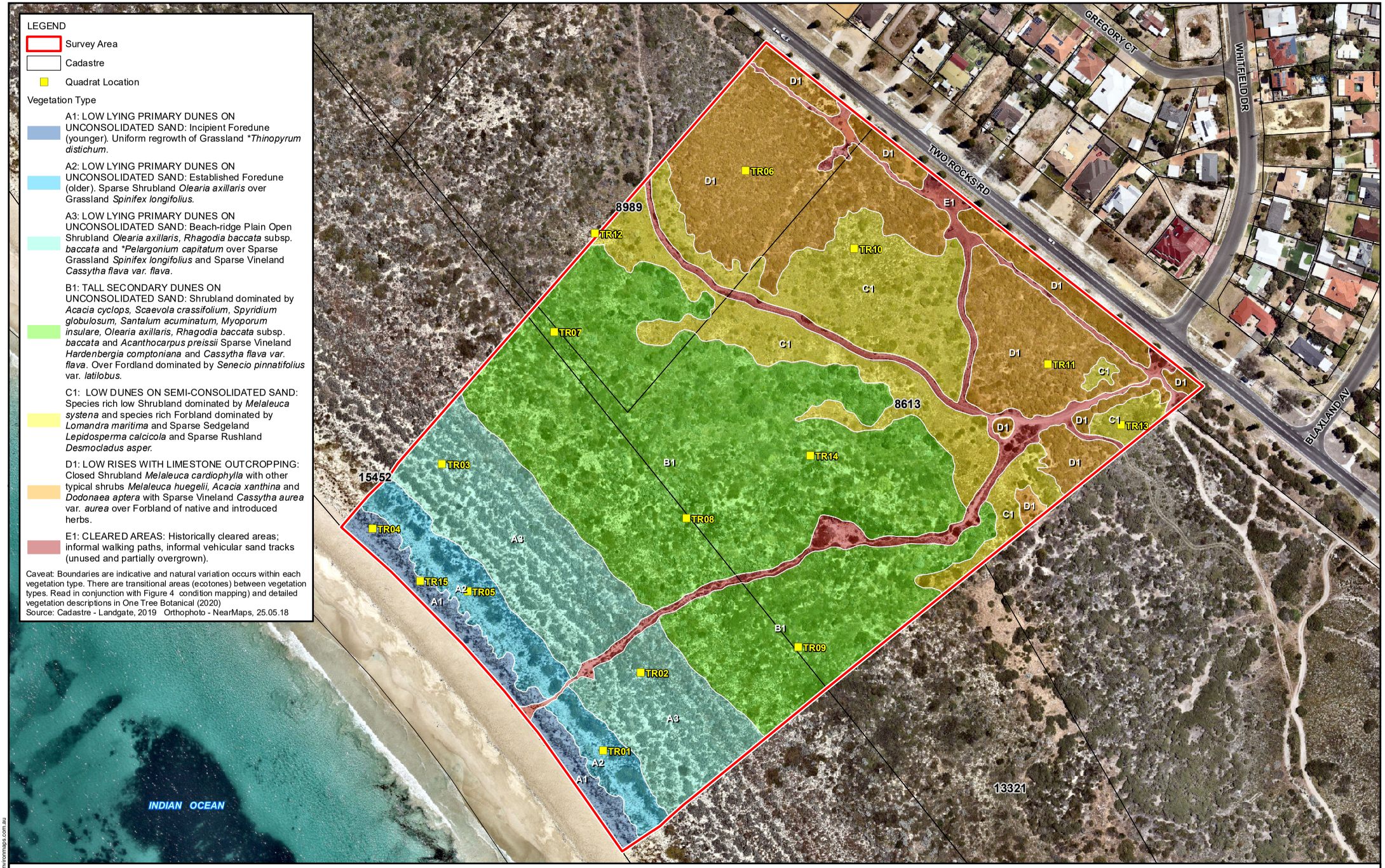
An old vehicular track runs N-S through the centre of the study area. This was largely overgrown, but the track and areas adjacent showed a legacy of some kind of disturbance, either historical grazing or clearing. Weeds were dominant in this area.

The powerline corridor was cleared at some point. The vegetation in this area was old regrowth, particularly between the powerline and Two Rocks Road. A track remained under the powerline (Plate 18). Weeds were dominant along this track and under and adjacent to regrowth areas.

Common track weeds included but were not limited to grasses **Bromus diandrus, *Ehrharta longiflora, *Lagurus ovatus, *Avena barbata* and *Lolium perenne and herbs **Euphorbia terracina, *E. peplus, *Brassica tournefortii, *Trachyandra divaricata, *Pelargonium capitatum* and **Gazania linearis*.

Plate 17 Vegetation Type E1: Main pedestrian track (informal) from Two Rocks Road to beach. Weeds mainly confined to track edges.

Plate 18 Vegetation Type E1: Historically cleared areas along powerline corridor showing regrowth of vegetation and weeds along an informal pedestrian track.



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ONE TREE BOTANICAL

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M: 0407 423 928

N

0 12.5 25 50 75 100 m

Scale: 1:2,000 @ A3
GDA 1994 MGA Zone 50

FIGURE 3

TWO ROCKS BEACH ACCESS WAY VEGETATION TYPE MAP

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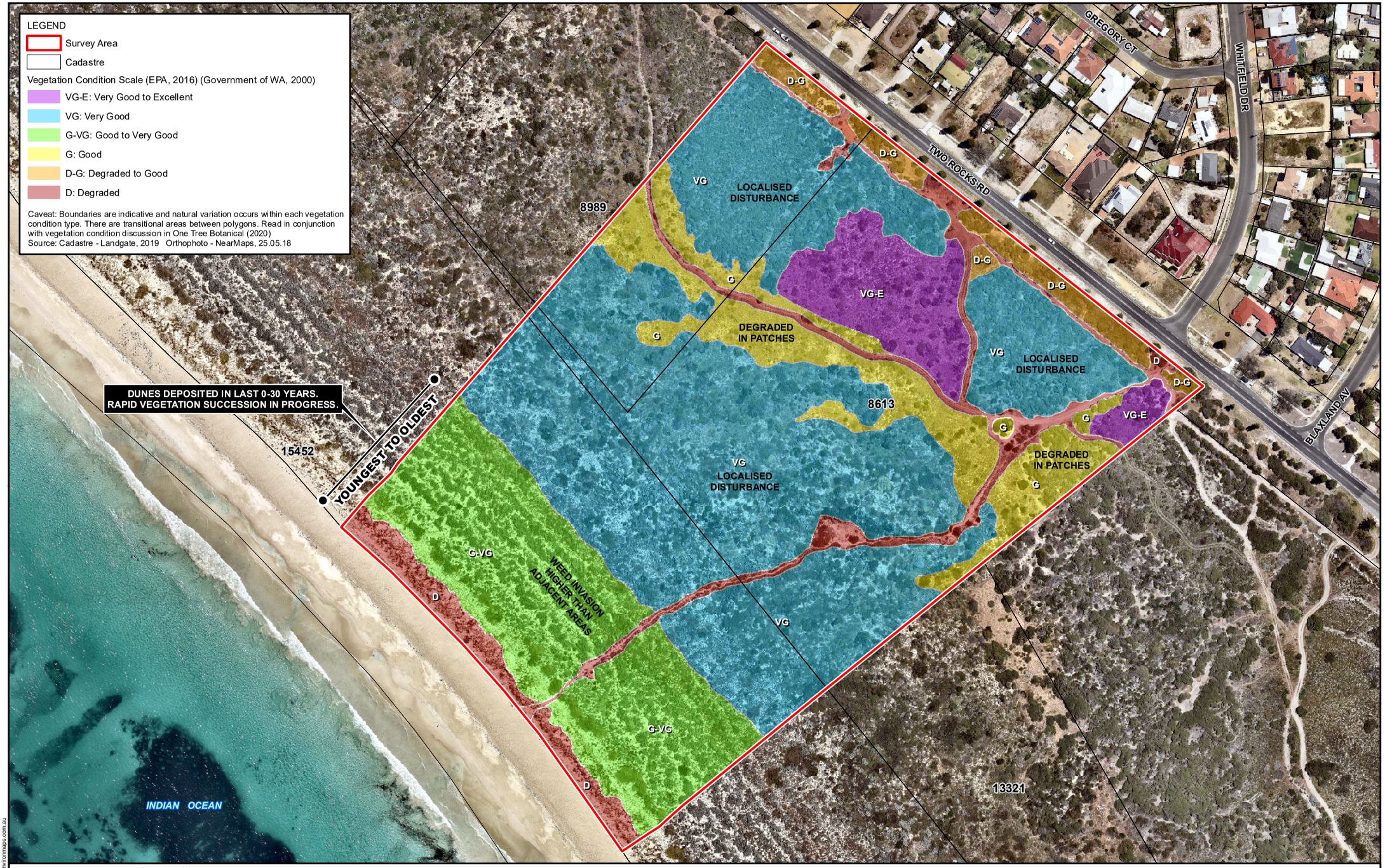

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N

0 12.5 25 50 75 100 m

Scale: 1:2,000 @ A3
GDA 1994 MGA Zone 50

C:\GIS\Jobs\One Tree Botanical\P1904 - City of Wanneroo - Two Rocks\Figures\P1904-2Rocks_F04 Two Rocks Beach Access Way Vegetation Condition Map_201117.mxd

FIGURE 4

TWO ROCKS BEACH ACCESS WAY VEGETATION CONDITION MAP

5.2.4 Statistical Analysis of Vegetation

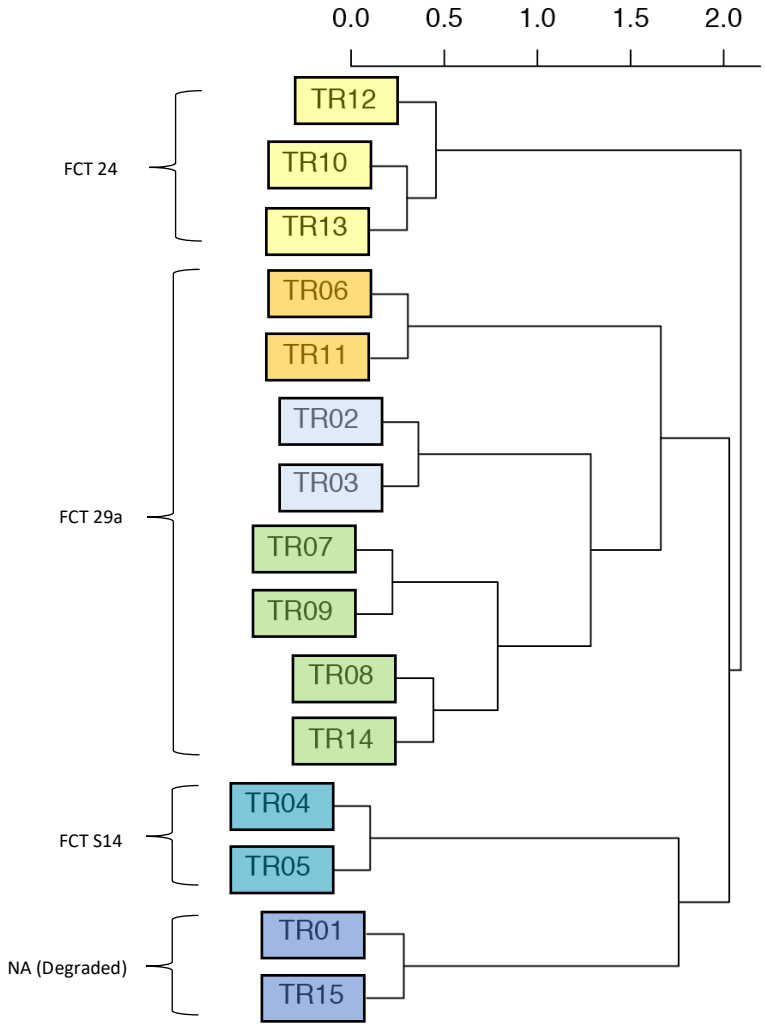
Numerical Analysis of Study Area Quadrats

A numerical analysis (multivariate) of quadrat data incorporating both floristics and structure (foliar cover %) was used to help characterise the vegetation present in the study area. The results are presented in Figure 5.

The quadrats were clustered into three broad groups (Figure 5). These corresponded more or less to the Floristic Community Type (FCT) analysis as described in the next section. A fourth group represented the incipient foredune vegetation which was in Degraded condition at the time of the survey and therefore did not represent any FCT.

The results were relatively tidy however there was one result that requires explanation. Quadrats TR02 and TR03 rather than group with other Vegetation Type A quadrats (TR01, TR04, TR05 and TR15), grouped closer to Vegetation Type B quadrats (TR07, TR08, TR09 and TR14). Those two quadrats were geographically close to the boundary between the two types. Vegetation boundaries are a continuum. There is a lot of floristic overlap between those two vegetation types. The FCT analysis against Gibson *et al.* (1994) is not overly strong where near-coastal vegetation is concerned. All these factors are at play in this instance. The most notable feature of the results in terms of Vegetation Types A and B, is that grouping strongly correlated to a west to east succession of vegetation types. A decision was made to define and map TR02 and TR03 as Vegetation Type A. They were significantly less species rich, dense and complex than Vegetation Type B. They were also clearly associated with the beach ridge plain landform, while Vegetation Type B was on tall steep dunes.

Figure 5: Statistical Analysis of Study Area Quadrat Data (Bray-Ward) (floristics, foliar cover)



Corresponding Vegetation Types:

A1: Incipient Foredune (younger): Uniform regrowth of Grassland **Thinopyrum distichum.*

A2: Established Foredune (older): Sparse Shrubland *Olearia axillaris* over Grassland *Spinifex longifolius*

A3: Beach-ridge Plain: Open Shrubland *Olearia axillaris, Rhagodia b.* subsp. *baccata* and **Pelargonium capitatum* over Sparse Grassland *Spinifex longifolius* and Sparse Vineland *Cassytha f.* var. *flava*.

B1: Shrubland dominated by *Acacia cyclops, Scaevola crassifolia, Spyridium globulosum, Santalum acuminatum, Myoporum insulare, Olearia axillaris, Rhagodia b.* subsp. *baccata* and *Acanthocarpus preissii*, Sparse Vineland *Hardenbergia comptoniana* and *Cassytha f.* var. *flava*. Over Forbland dominated by *Senecio pinnatifolius* var. *latilobus*.

C1: Species rich low Shrubland dominated by *Melaleuca systena* and species rich Forbland dominated by *Lomandra maritima* and Sparse Sedgeland *Lepidosperma calcicola* and Sparse Rushland *Desmocladus asper.*

D1: Closed Shrubland *Melaleuca cardiophylla* with other typical shrubs *Melaleuca huegelii, Acacia xanthina* and *Dodonaea aptera* with Sparse Vineland *Cassytha a.* var. *aurea* over Forbland of native and introduced herbs.

Floristic Analysis Gibson et al. (1994)

The results of the statistical analysis comparing the survey quadrats to Gibson *et al.* (1994) were slightly ambiguous in places. This is likely to be due to the lack of Quindalup and near-coastal data in the Gibson *et al.* (1994) dataset.

Supplementary relevé data from the Quindalup Dunes between the Irwin and Swan Rivers was sourced from Griffin (1993) to attempt to remedy this. The methodology however used in that study was slightly different, in that quadrats were not measured. There were differences in survey effort which raised the statistical challenge of comparing apples with oranges. This data was however used to infer Floristic Community Types (FCTs) where these were obvious.

A summary of the results incorporating both inferred conclusions and an interpretation of the results of the statistical analysis is presented in Table 17.

See Section 6.2.2 for a discussion on the relationship between FCT29a and S13.

Table 17: Floristic Community Type (FCT) Analysis Summary

Quadrat (Fig 3)	Gibson *et al.* (1994) Quadrats	Griffin (1993) Relevés	Geographical Distribution	Floristic Community Type
TR01	Analysis results not reliable due to lack of near-coastal quadrat data.	MI10, MI13, MI14, MI15, MI16, MI20, TR01, TR02.	Mindarie, Trigg.	**S14:** *Spinifex longifolius* grasslands and low shrublands.
TR02	GARDEN2, TRIG2, PRES1, NAVB2, BURN1, BURN2, SEAB8 (FCT29a). SEAB1 (FCT30c).	SW02, SW03, SW04, TR03 (S13).	Garden Island, Trigg, Burns Beach, Seabird, Preston.	**FCT29a:** Coastal Shrublands on Shallow Sands. **S13:** Northern *Olearia axillaris-Scaevola crassifolia* shrublands.
TR03	GARDEN2, TRIG2, PRES1, NAVB2, BURN1, SEAB8, BURN2 (FCT29a). SEAB1 (FCT30c).	SW02, SW03, SW04, TR03 (S13).	Garden Island, Trigg, Burns Beach, Seabird, Preston.	**FCT29a:** Coastal Shrublands on Shallow Sands. **S13:** Northern *Olearia axillaris-Scaevola crassifolia* shrublands.
TR04	-	-	-	**NA.** Vegetation degraded at time of survey and does not represent any FCT.
TR05	Analysis results not reliable due to lack of near-coastal quadrat data.	MI10, MI13, MI14, MI15, MI16, MI20, TR01, TR02.	Mindarie, Trigg.	**S14:** *Spinifex longifolius* grasslands and low shrublands.
TR06	GARDEN2, TRIG2, PRES1, BURN1, BURN2, SEAB8 (FCT29a). SEAB1 (FCT30c).	BU01, BU02, BU04 (FCT29a).	Garden Island, Trigg, Burns Beach, Seabird, Preston.	**FCT29a:** Coastal Shrublands on Shallow Sands.
TR07	BURN2, PRES1, GARDEN2, TRIG2 (FCT29a). SEAB1 (FCT30c).	SW02, SW03, SW04, TR03 (S13).	Garden Island, Preston, Trigg, Burns Beach, Seabird, Swanbourne.	**FCT29a:** Coastal Shrublands on Shallow Sands. **S13:** Northern *Olearia axillaris-Scaevola crassifolia* shrublands.
TR08	GARDEN2, TRIG2, BURN1, BURN2, PRES1, NAVB2, SEAB8 (FCT29a).	SW02, SW03, SW04, TR03 (S13).	Garden Island, Trigg, Burns Beach, Preston, Kwinana, Seabird.	**FCT29a:** Coastal Shrublands on Shallow Sands. **S13:** Northern *Olearia axillaris-Scaevola crassifolia* shrublands.
TR09	BURN1, BURN2, TRIG2, GARDEN2, PRES1, NAVB2, SEAB8 (FCT29a).	SW02, SW03, SW04, TR03 (S13).	Garden Island, Trigg, Burns Beach, Preston, Kwinana, Seabird.	**FCT29a:** Coastal Shrublands on Shallow Sands.

Quadrat (Fig 3)	Gibson *et al.* (1994) Quadrats	Griffin (1993) Relevés	Geographical Distribution	Floristic Community Type
	SEAB1 (FCT30c).			**S13:** Northern *Olearia axillaris-Scaevola crassifolia* shrublands.
TR10	NAVB3, CHIDPT1, BOLD3, BOLD4 (FCT24). TRIG1 (FCT29b).	MI23 (FCT24).	Kwinana, Chidley Point Mosman Park, Bold Park, Mindarie. Trigg.	**FCT24:** Northern Spearwood Shrublands and Woodlands. *(Possibly an unusual sub-type, usually known from Spearwood Dunes although MI23 is a near-coastal occurrence).*
TR11	GARDEN2, TRIG2, PRES1, BURN1, BURN2, SEAB8 (FCT29a). SEAB1 (FCT30c).	BU01, BU02, BU04.	Garden Island, Trigg, Preston, Burns Beach, Seabird.	**FCT29a:** Coastal Shrublands on Shallow Sands.
TR12	GARDEN2, TRIG2, PRES1, BURN1, BURN2, SEAB8 (FCT29a). SEAB1 (FCT30c).	SW02, SW03, SW04, TR03 (S13).	Garden Island, Trigg, Preston, Burns Beach, Seabird.	**FCT29a:** Coastal Shrublands on Shallow Sands. **S13:** Northern *Olearia axillaris-Scaevola crassifolia* shrublands.
TR13	NAVB3, CHIDPT1, BOLD3, BOLD4 (FCT24). TRIG1 (FCT29b).	MI23 (FCT24).	Kwinana, Chidley Point Mosman Park, Bold Park, Mindarie.	**FCT24:** Northern Spearwood Shrublands and Woodlands. *(Possibly an unusual sub-type, usually known from Spearwood Dunes although MI23 is a near-coastal occurrence).*
TR14	GARDEN2, TRIG2, BURN1, BURN2, PRES1, NAVB2, SEAB8 (FCT29a) SEAB1 (FCT30c).	SW02, SW03, SW04, TR03 (S13).	Garden Island, Trigg, Burns Beach, Preston, Kwinana, Seabird.	**FCT29a:** Coastal Shrublands on Shallow Sands. **S13:** Northern *Olearia axillaris-Scaevola crassifolia* shrublands.
TR15	-	-	-	**NA.** Vegetation degraded at time of survey and does not represent any FCT.

5.2.5 Threatened and Priority Ecological Community Search Results

The DBCA Threatened Species and Communities Branch species database search did not identify any records of state listed TECs or PECs as being previously known from within the study area boundaries.

A search of the *EPBC Act* Protected Matters Search Tool (Department of Environment and Energy, 2019) listed five TECs as potentially occurring in the region. None of these species have previously been recorded from within the study area.

Table 18 summarises the results from the database searches and identifies the likelihood of each occurring within the study area.

Table 18: Threatened and Priority Ecological Communities Database Search Results (DBCA PEC and TEC Databases and EPBC Protected Matters Database)

WESTERN AUSTRALIA	COMMONWEALTH EQUIVALENT *(EPBC Act 1999)*	CONSERVATION STATUS*			OCCURRENCE Known/Likely/Possible/Unlikely
		DBCA	*BC Act*	*EPBC Act*	
Banksia Dominated Woodlands of the Swan Coastal Plain (SCP) IBRA Region	Banksia Woodlands of the SCP.	P3		EN	Unlikely. Study area is close to the coast.
SCP20a: *Banksia attenuata* woodlands over species rich dense shrublands	Sub-type of above.		EN	EN	Unlikely. Study area is close to the coast.
Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the SCP.	Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the SCP.	P3		CR	Unlikely. FCT24 and FCT29a can be associated with this TEC, however no Tuart was recorded in or seen adjacent to the study area.
SCP25: Southern *Eucalyptus gomphocephala-Agonis flexuosa* woodlands	Sub-type of above.	P3		CR	Unlikely. Known from further south.
SCP24: Northern Spearwood shrublands and woodlands		P3			**Probable occurrence recorded during current study.** Non-typical, some affiliation with 29b, further W than generally known, may be a atypical subtype.
SCP29a: Coastal shrublands on shallow sands		P3			**Recorded during current study.**
SCP29b: Acacia shrublands on taller dunes		P3			Possible. However statistical analysis indicated that FCT29a is present rather than FCT29b.
SCP26a: *Melaleuca huegelii - Melaleuca systena* shrublands on limestone ridges (FCT 26a as originally described in Gibson *et al.* (1994))			EN		Unlikely. Related to FCT24 but generally known from Spearwood Dunes which are usually further inland.
SCP30a: *Callitris preissii* (or *Melaleuca lanceolata*) forests and woodlands, SCP.			VU		Unlikely. Known distribution further S. Thought to be an apex community within for example FCT29-type communities.
SCP19b: Woodlands over sedgelands in Holocene dune swales of the southern Swan Coastal Plain (original description; Gibson *et al.* (1994).	Sedgelands in Holocene dune swales of the southern SCP.		CR	EN	Beach ridge plain (Vegetation Type 1A-1C) may represent a pre-cursor potential habitat for this ecological community. See Section 6.2 for further discussion.
CAVES SCP01: Aquatic Root Mat Community Number 1 of Caves of the SCP.	Aquatic Root Mat Community in Caves of the SCP.		CR	EN	Unlikely. Subterranean ecology outside the scope of this assessment.

WESTERN AUSTRALIA	COMMONWEALTH EQUIVALENT *(EPBC Act 1999)*	CONSERVATION STATUS*			OCCURRENCE Known/Likely/Possible/Unlikely
		DBCA	*BC Act*	*EPBC Act*	
Coastal Saltmarsh	Subtropical and Temperate Coastal Saltmarsh			VU	Unlikely. An estuarine ecological community.

** See Section 0 for definitions of conservation status codes.*

No TECs listed under the *BC Act 2016* or the *EPBC Act 1999* were recorded in the study area.

Two Priority 3 PECs were recorded in the study area:

Priority Ecological Community (PEC) SWAN 21: "Coastal shrublands on shallow sands, southern Swan Coastal Plain". Described as heaths on shallow sands over limestone close to the coast, with no single dominant but including *Spyridium globulosum, Rhagodia baccata* and *Olearia axillaris* (DBCA, 2019). Also known as Floristic Community Type (FCT) 29a (Gibson *et al.* 1994). Represented in Vegetation Types A3, B1 and D1 (Figure 3).

Priority Ecological Community (PEC) SWAN 26: "Northern Spearwood shrublands and woodlands". Also known as Floristic Community Type (FCT) 24 (Gibson *et al.* 1994). Described by DBCA (2019) as "Heaths with scattered *Eucalyptus gomphocephala* occurring on deeper soils north from Woodman Point. Most sites occur on the Cottesloe unit of the Spearwood system." This PEC is associated with the Tuart Woodlands TEC however no Tuart was observed within or adjacent to the study area. Likely to represent an unusual subtype, due to its extreme westerly distribution and three Priority Flora forming a substantial component of species assemblage of the vegetation. Represented in Vegetation Type C1 (Figure 3).

Please see Section 6.2 for further discussion on these results.

6. DISCUSSION

6.1 FLORA

A total of 160 taxa were recorded from the study area, of which 100 or 63% were natives. Near-coastal areas are usually very species poor. For a study area 12 hectares in size on the coast, this is a relatively high species diversity. This was due to the diversity of vegetation types and habitats present, which is also relatively uncommon on near-coastal areas.

No Threatened Flora listed under the Western Australian *BC Act 2016* or the Federal *EPBC Act 1999* were recorded in the study area.

Three Priority Flora were recorded from across the study area. This is an unusually high number for a very small 12 hectare near-coastal area. Additionally these three species were dominants within a small area of a single vegetation type (Vegetation Type C)(Figure 2)(Figure 3).

6.2 VEGETATION

No Threatened Ecological Communities (TECs) listed under the Western Australian *BC Act 2016* or the Federal *EPBC Act 1999* were recorded in the study area.

As alluded to throughout the report, there were challenges to assessing vegetation. The lack of a proper regional dataset of quadrat data in Western Australia is the major underlying problem.

The quadrat data from this study was compared to the Gibson *et al.* (1994) dataset, which provided useful but not unequivocal insight into the Floristic Community Types (FCTs) likely to be present. These results were then used to assess the likely presence or otherwise of TECs and Priority Ecological Communities (PECs) in the study area.

Some of the ambiguity in results was likely to have been due to a lack of quadrat data in the Gibson *et al.* (1994) dataset from near-coastal and Quindalup Dune areas. Extra Quindalup Dune relevé data from Griffin (1993) was sourced, however due to methodological differences, no statistical analysis was completed using this data.

The vegetation in WA is much less well understood and documented than the flora and fauna is. There are many undocumented ecological communities. This lack of research is reflected in listings. No vegetation has been added to the WA TEC since around the time the list was established in 2002 for example. Gibson *et al.* (1994) is 25 years old and little subsequent work has been completed to further refine and build on this study. The TECs and PECs derived from it have been treated as an end point, when ongoing studies and further listings should have occurred. In this context, there will be plant communities that do not neatly fit documented vegetation types. This creates inherent difficulties in assessing the conservation significance of vegetation for EIA.

Based on the information available however, it is likely that two PECs or variants of, occur in the study area; **PEC SWAN 26:** "Northern Spearwood shrublands and woodlands" (FCT24)(Vegetation Type C) and woodlands and **PEC SWAN 21:** "Coastal shrublands on shallow sands, southern Swan Coastal Plain" (FCT29a) (Vegetation Types B1 and D1).

6.2.1 PEC SWAN 26: Northern Spearwood shrublands and woodlands (Vegetation Type C)

The occurrence of PEC SWAN 26: Northern Spearwood shrublands and woodlands (FCT24 in Gibson *et al.,* 1994) (Vegetation Type C) (Figure 3) is likely to be an uncommon subtype of this PEC/FCT. It is closer to the coast than it usually occurs, it is usually more typical of Spearwood Dunes further inland.

Three Priority Flora are dominant species within this vegetation type. Three geographically restricted species that may or may not co-occur elsewhere and which being in high enough densities to represent dominant components within a plant community, would indicate a high probability that the vegetation is unique or at least highly restricted. Priority Flora species are not common in near coastal areas, and three co-occurring within a single small area of near-coastal vegetation type is unusual.

Due to a combination of these factors, the portion of Vegetation Type C (Figure 3) that is in Very Good to Excellent condition (Figure 4) is likely to be highly conservation significant.

The portion of Vegetation Type C that is in Good condition (Figure 3) (Figure 4) has comparatively less significance. 'Good' on the condition scale was called 'Poor' in the past. It was changed as it was thought it created a perception that vegetation in 'Poor' condition had no value. However now the opposite problem occurs in that 'Good' condition vegetation is afforded more value than is perhaps justified. Vegetation in Good condition is unlikely to be viable in the long term, the resources required to manage weeds alone would have practical challenges. Even though some *Beyeria cinerea* subsp. *cinerea* (Priority 3 Flora) (Figure 2) occur in this area, the condition of the vegetation means that the long-term viability of both these flora and the vegetation is in question. Some areas in Good condition may have value as providing a buffer however, to protect areas in Very Good to Excellent condition from future edge-effects.

6.2.2 PEC SWAN 21: "Coastal shrublands on shallow sands, southern Swan Coastal Plain"

Quadrats from Vegetation Types B1 and D1 in the study area came out strongly aligned to FCT29a (Gibson *et al.* 1994) (Vegetation Types B1 and D1) (Figure 3) in the statistical analysis (Table 17). Which correlates to Priority Ecological Community (PEC) Swan 21: "Coastal shrublands on shallow sands, southern Swan Coastal Plain".

However particularly Vegetation Type B1 had similarities to S13: Northern *Olearia axillaris- Scaevola crassifolia* shrublands, which is an informal FCT defined from other studies and/or datasets (Government of WA, 2000) (Griffin, 1993). These appear to have not been taken into account in state listings of TECs and PECs. It appears through informal analysis, that S13 may have been a sub-type of FCT29. This is a grey area that can only be resolved by the government agencies responsible. Correspondence with Val English from DBCA Species and Communities confirmed that no formal assessment of the FCTs referenced in Bush Forever has been undertaken and that the original Gibson *et al.* (1994) FCTs should take precedence.

In terms of this assessment Vegetation Type B1 and D1 should therefore be treated as PEC Swan 21.

6.2.3 Other

The beach ridge plain (Vegetation Type A1-A3) (Figure 3) is possibly interesting from an ecological processes and/or landform perspective. Aerial photography indicates that this area has been deposited in the last 20-30 years. The Two Rocks Marina was built in 1972 and the effect of this on coastal processes is likely to have been the cause of this deposition south of the marina.

Vegetation has colonised the new dune system rapidly. This then has been followed by a process of succession, where the vegetation is in flux over time and as the older dunes stabilise and new dunes continue to form. These areas remain highly dynamic and are likely to continue to change over time in condition and composition.

State and Federally listed TEC SCP19: "Sedgelands in Holocene dune swales of the southern Swan Coastal Plain" is found in the swales of older beach ridge plains. This ecological community forms in older beach ridge plains systems, while the example in the study area is young and still forming. It is possible however that given time, a more complex vegetation representing this TEC may form. It is a relatively rare landform in the Perth region, and the area between Two Rocks and Yanchep is a substantial sized and intact example of it. Landforms are largely beyond the scope of this study, though the EPA does consider them in EIA (EPA, 2018). In the context of this study however, no firm conclusions can be drawn. It is perhaps something that could be taken into consideration in design and in the ongoing management of the area.

6.2.4 Vegetation Condition

The condition of the study area has been discussed at length in the body of this report. However, it is evident that the site is very fragile in terms of its resistance to soil disturbance and weed invasion. Areas such as the foredunes are currently in remarkably good condition compared to other urban beach areas, likely due to low levels of fragmentation and activity. With increased access to these areas as well as fragmentation from the proposed infrastructure, the condition is likely to decline. It would be worthwhile considering this in project design.

6.3 LIMITATIONS

EPA (2016) provides a framework for identifying the limitations that may arise during a survey. These have been presented and discussed in Table 19.

Table 19: Limitations of the Assessment (EPA, 2016)

Limitation	Comment
Availability of contextual information at a regional and local scale.	Appropriate scale and up to date regional information particularly for vegetation is poor across Western Australia. To adequately assess vegetation a comprehensive consolidated and curated regional quadrat/plot database is required to complete a proper regional assessment in line with the full expectations of EPA, 2016. This is a significant limitation for all detailed vegetation surveys. Broad scale contextual information was available such as vegetation type, vegetation complex mapping etc.
Competency/experience of the team carrying out the survey, including experience in the bioregion surveyed.	A botanist with 23 years of experience in completing botanical surveys on the SCP for EIA, completed all aspects of the assessment from planning, field work, flora identifications, data analysis and reporting. The duty botanist at the WA Herbarium confirmed identifications of Priority flora species.
Proportion of flora recorded and/or collected, any identification issues.	Always difficult to estimate on a percentage value. Estimate >70% of the flora would have been recorded. A total of 158 taxa were recorded from the study area, of which 99 or 63% were natives. This is high for a small 13 hectare near-coastal study area.

Limitation	Comment
	Coverage of study area was intensive with a two-season quadrat survey and 20m traverses spread over three surveys over the peak flowering period (Sept-Oct). All vascular flora encountered at the time of the survey were recorded including weeds. Species accumulation curves are not a useful catch-all measure of overall expected species present and they weren't used. The duty botanist at the WA Herbarium confirmed identifications of Priority flora species.
Was the appropriate area fully surveyed (effort and extent)?	Coverage of study area was intensive with a two-season quadrat survey and 20m traverses spread over three surveys over the peak flowering period (Sept-Oct). Survey effort consisted of approximately 70 person hours over 13 hectares.
Access restrictions within the study area.	No access issues.
Survey timing, rainfall, season of survey.	Survey spread over three visits over the peak flowering period (Sept-Oct). Rainfall for the months of April to September 2019 leading up to the field survey was 517.2mm compared to 113-year average for Wanneroo over the same period of 677.5mm. This represented a 23% rainfall shortfall from the long-term mean.
Disturbance that may have affected the results of survey such as fire, flood or clearing.	There were disturbed areas where some extrapolation was required, but no significant barriers to assessment of site were present. The near-coastal beach ridge plain (Vegetation Types A1-A3) represented new landforms. The vegetation in this area was undergoing rapid succession. It is likely that vegetation type and condition will continue to change relatively rapidly for the near future.

7. ACKNOWLEDGEMENTS

Several people kindly provided information and advice on a number of matters:

- Frank Obbens (Calandrinia taxonomist and consultant) identified Calandrinia.
- Mike Hislop (WA Herbarium) for confirmation of Priority Flora species.
- Greg and Bronwen Keighery for providing supplementary releve/quadrat data from Griffin (1993), DEP and System 6 surveys on the Quindalup Dunes.
- Val English (DBCA) provided advice on PECs and TECs.
- Tenaha Wilson, Danielle Garrett and Andrew Hawthorne provided important onsite information.

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Appendix A: Field Survey Species List – Flora

* = Indicates weed flora.

FAMILY			SPECIES
080	LAURACEAE		*Cassytha aurea* var. *aurea*
			Cassytha flava
			Cassytha glabella forma. *casuarinae*
			Cassytha racemosa forma. *racemosa*
089	JUNCAGINACEAE		*Triglochin isingiana*
			Triglochin nana
109	COLCHICACEAE		*Wurmbea monantha*
115	ORCHIDACEAE		*Caladenia latifolia*
			Cyrtostylis huegelii
			Eriochilus dilatatus subsp. *dilatatus*
			Leptoceras menziesii
			Microtis media subsp. *media*
124	IRIDACEAE	*	*Gladiolus caryophyllaceus*
		*	*Romulea rosea*
128	ASPARAGACEAE		*Acanthocarpus preissii*
			Lomandra maritima
			Thysanotus manglesianus
129	ASPHODELACEAE	*	*Trachyandra divaricata*
130	HEMEROCALLIDACEAE		*Dianella revoluta* var. *divaricata*
			Tricoryne elatior
138	HAEMODORACEAE		*Conostylis candicans* subsp. *calcicola*
			Conostylis candicans subsp. *candicans*
156	CYPERACEAE		*Carex thecata*
			Ficinia nodosa
		*	*Isolepis marginata*
			Lepidosperma calcicola
			Lepidosperma gladiatum
			Schoenus lanatus
159	RESTIONACEAE		*Desmocladus asper*
163	POACEAE	*	*Aira cupaniana*
			Austrostipa flavescens
		*	*Avena barbata*
		*	*Briza maxima*
		*	*Briza minor*
		*	*Bromus diandrus*
		*	*Catapodium rigidum*
		*	*Cynodon dactylon*
		*	*Ehrharta brevifolia* var. *cuspidata*
		*	*Ehrharta longiflora*
		*	*Eragrostis curvula*
		*	*Hyparrhenia hirta*
		*	*Lagurus ovatus*
		*	*Lolium perenne*
		*	*Rostraria cristata*
			Rytidosperma occidentale

FAMILY			SPECIES
			Spinifex hirsutus
			Spinifex longifolius
		*	*Thinopyrum distichum*
		*	*Vulpia muralis*
		*	*Vulpia myuros* forma *megaleura*
171	RANUNCULACEAE		*Clematis linearifolia*
192	CRASSULACEAE		*Crassula colorata* var. *colorata*
		*	*Crassula decumbens* var. *decumbens*
		*	*Crassula glomerata*
		*	*Crassula thunbergiana* subsp. *thunbergiana*
201	FABACEAE		*Acacia cyclops*
			Acacia lasiocarpa var. *lasiocarpa*
			Acacia rostellifera
			Acacia xanthina
			Gastrolobium nervosum
			Gompholobium tomentosum
			Hardenbergia comptoniana
			Kennedia prostrata
		*	*Lupinus cosentinii*
		*	*Medicago polymorpha*
		*	*Medicago polymorpha*
		*	*Melilotus indicus*
			Templetonia retusa
		*	*Trifolium campestre* var. *campestre*
203	POLYGALACEAE		*Comesperma confertum*
			Comesperma integerrimum
208	RHAMNACEAE		*Cryptandra mutila*
			Spyridium globulosum
			Trymalium ledifolium var. *ledifolium*
212	URTICACEAE		*Parietaria debilis*
217	CASUARINACEAE		*Allocasuarina lehmanniana* subsp. *lehmanniana*
242	EUPHORBIACEAE		*Beyeria cinerea* subsp. *cinerea* (P3)
		*	*Euphorbia paralias*
		*	*Euphorbia peplus*
		*	*Euphorbia terracina*
247	PHYLLANTHACEAE		*Phyllanthus calycinus*
			Poranthera microphylla
274	GERANIACEAE	*	*Pelargonium capitatum*
			Pelargonium littorale
281	MYRTACEAE		*Melaleuca cardiophylla*
			Melaleuca huegelii subsp. *huegelii*
			Melaleuca systena
298	ANACARDIACEAE	*	*Schinus terebinthifolia*
299	SAPINDACEAE		*Dodonaea aptera*
309	MALVACEAE		*Guichenotia ledifolia*
			Thomasia triphylla
311	THYMELACEAE		*Pimelea ferruginea*
332	BRASSICACEAE	*	*Brassica tournefortii*
		*	*Cakile maritima*
		*	*Heliophila pusilla*

FAMILY			SPECIES
336	OLACACEAE		*Olax benthamiana*
338	SANTALACEAE		*Exocarpos sparteus*
			Leptomeria preissiana
			Santalum acuminatum
346	DROSERACEAE		*Drosera macrantha*
			Drosera ?ramellosa (sterile, immat.)
355	CARYOPHYLLACEAE	*	*Cerastium glomeratum*
		*	*Minuartia mediterranea*
		*	*Petrorhagia dubia*
		*	*Silene gallica* var. *gallica*
		*	*Stellaria media*
358	CHENOPODIACEAE		*Atriplex isatidea*
			Rhagodia baccata subsp. *baccata*
			Salsola australis
			Threlkeldia diffusa
364	AIZOACEAE		*Carpobrotus virescens*
		*	*Tetragonia decumbens*
374	MONTIACEAE		*Calandrinia brevipedata*
392	PRIMULACEAE	*	*Lysimachia arvensis*
403	ERICACEAE		*Acrotriche cordata*
			Leucopogon insularis
			Leucopogon maritimus (P1)
			Leucopogon parviflorus
			Lysinema pentapetalum
409	RUBIACEAE	*	*Galium murale*
			Opercularia vaginata
410	GENTIANACEAE		*Schenkia australis*
411	LOGANIACEAE		*Phyllangium divergens*
416	CONVOLVULACEAE	*	*Cuscuta planiflora*
427	PLANTAGINACEAE	*	*Plantago lanceolata*
428	SCROPHULARIACEAE	*	*Bellardia trixago*
		*	*Dischisma arenarium*
			Eremophila glabra subsp. *albicans*
			Myoporum insulare
432	LAMIACEAE		*Hemiandra glabra*
			Westringia dampieri
435	OROBANCHACEAE	*	*Parentucellia latifolia*
450	CAMPANULACEAE		*Isotoma hypocrateriformis*
452	STYLIDIACEAE		*Stylidium hesperium*
			Stylidium maritimum (P3)
458	GOODENIACEAE		*Scaevola crassifolia*
			Scaevola thesioides subsp. *thesioides*
460	ASTERACEAE	*	*Arctotheca calendula*
		*	*Arctotheca populifolia*
		*	*Gazania linearis*
			Hyalosperma cotula
		*	*Hypochaeris glabra*
			Leptorhynchos scaber
			Millotia myosotidifolia
			Olearia axillaris

FAMILY			SPECIES
		*	*Osteospermum ecklonis*
			Pithocarpa cordata
			Podotheca gnaphalioides
		*	*Reichardia tingitiana*
			Rhodanthe citrina
			Senecio pinnatifolius var. *latilobus*
		*	*Senecio vulgaris*
		*	*Sonchus oleraceus*
467	CAPRIFOLIACEAE	*	*Scabiosa atropurpurea*
472	ARALIACEAE		*Trachymene pilosa*
474	APIACEAE		*Daucus glochidiatus*
		*	*Foeniculum vulgare*
			Hydrocotyle hispidula
			Hydrocotyle pilifera var. *glabrata*
	AGAVACEAE	*	*Yukka aloeifolia* (Garden escape)

Appendix B: Flora and Vegetation Species by Site Table

H = Height (cm); C = Cover (% of quadrat area); X = outside quadrat but within 10m of quadrat boundary; CR = creeper; * = introduced flora.

SPECIES	TR01		TR02		TR03		TR04		TR05		TR06		TR07		TR08		TR09		TR10		TR11		TR12		TR13		TR14		TR15		OPPORTUNISTIC
	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	
Acacia cyclops			X	X									X	X	120	3	70	1	100	2					300	0.1	160	5			Primary Dune
Acacia l. var. *lasiocarpa*																			30	3			X	X	40	3					
Acacia rostellifera																							X	X							
Acacia xanthina											140	1									100	1	X	X	X	X	X	X			Powerline 15% cover
Acanthocarpus preissii					40	0.1							50	10	50	10	50	10	30	0.1	X	X	30	5			50	5			Primary dune, Powerline
Acrotriche cordata																															50J 366609 6513503
**Aira cupaniana*																															50J 366533 6513515
Allocasuarina l. subsp. *lehmanniana*																															50J 366614 6513504
**Arctotheca calendula*																															Powerline, Main Path
**Arctotheca populifolia*							20	0.1																					X	X	Primary Dune
Atriplex isatidea							X	X																					X	X	Primary Dune
Austrostipa flavescens											60	0.3			X	X	X	X	70	1	90	1	60	2	50	1					Powerline
**Avena barbata*											70	0.1									70	0.1	60	0.1	70	0.1					Powerline, Main Path
**Bellardia trixago*																									2	0.1					
Beyeria c. subsp. *cinerea* (P3)																			30	12			40	3	20	2					
**Brassica tournefortii*													20	0.1	30	0.2	20	0.1	20	0.1					20	0.1					Powerline, Main Path
**Briza maxima*											30	0.1									X	X									Powerline
**Briza minor*											10	0.1													10	0.1					Powerline 0-3% cover
**Bromus diandrus*	30	0.1	20	0.1							40	0.1	30	0.5	30	1	30	0.2			30	0.2	30	3	30	0.3	40	1			Powerline, Main Path
**Cakile maritima*	20	0.1					20	1																					30	0.5	Primary Dune
Caladenia latifolia											10	0.1									2	0.1									
Calandrinia brevipedata			3	0.1	2	0.2					5	0.1	3	0.5	3	1	10	1			3	0.1	5	0.1							Secondary Dune
Carex thecata																					30	0.1									
Carpobrotus virescens			20	0.1	10	1							20	1	20	1	20	2					20	1			30	1			Primary Dune 2
Cassytha aurea var. *aurea*			CR	5	CR	4					CR	2	CR	5	CR	4	CR	3	CR	1	CR	4					CR	2			Primary Dune 2, Powerline
Cassytha flava																							CR	0.1	CR	0.1					
Cassytha glabella forma. *casuarinae*													CR	2			CR	0.1							CR	1					
Cassytha r. forma. *racemosa*													CR	2													CR	3			
**Catapodium rigidum*											10	0.2			10	0.2			10	0.2	5	0.1	20	0.1	10	0.1					
**Cerastium glomeratum*																	5	0.1													
Clematis linearifolia											X	X									CR	0.1									Powerline
Comesperma confertum																			20	0.1											
Comesperma integerrimum											X	X									CR	0.1									
Conostylis candicans subsp. *calcicola*																	30	0.5	30	2					20	0.1	20	0.5			

SPECIES	TR01		TR02		TR03		TR04		TR05		TR06		TR07		TR08		TR09		TR10		TR11		TR12		TR13		TR14		TR15		OPPORTUNISTIC
	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	
Conostylis c. subsp. *candicans*																							40	3							
Crassula c. var. *colorata*			2	0.2	2	0.1									2	0.1					2	0.1	3	0.1			3	0.1			Primary Dune 2
**Crassula d.* var. *decumbens*															3	0.3	3	0.1													
**Crassula glomerata*	3	0.1	3	0.2	3	1			3	0.1	3	0.1	3	0.2					3	0.1	3	0.5	3	0.1	3	0.1	3	2			Powerline, Main Path
**Crassula t.* subsp. *thunbergiana*																	3	0.5					3	0.1							
Cryptandra mutila																			30	3					30	1					
**Cuscuta planiflora*																							X	X							Primary Dune, Main Path
**Cynodon dactylon*																															Road, Main Path
Cyrtostylis huegelii											10	2							1	0.1	0	0.1			1	0.1					
Daucus glochidiatus											10	3			5	0.1			10	0.1	3	1			10	0.1					
Desmocladus asper																			15	10	15	1	10	4	15	8					
Dianella revoluta var. *divaricata*											50	0.5							40	0.2	70	0.1	60	0.1	X	X	50	0.5			Powerline
**Dischisma arenarium*			10	0.2	5	1			5	0.1			5	0.2	3	0.5	5	0.1			5	0.1	5	0.5			5	0.1			Primary Dune, Main Path
Dodonaea aptera											120	4									90	10			X	X					Powerline
Drosera ?ramellosa (sterile)																									1	0.1					
Drosera macrantha																			CR	0.1					CR	0.1					
**Ehrharta brevifolia* var. *cuspidata*			20	0.3	30	0.3			20	0.1			20	0.1	30	2	20	0.1					20	0.1			20	0.1			Main Path
**Ehrharta longiflora*											20	0.1	40	0.1	20	0.1					10	0.5	40	0.1	30	0.2	30	3			Powerline
**Eragrostis curvula*																															Access Track, Powerline
Eremophila glabra subsp. *albicans*																			X	X											
Eriochilus d. subsp. *dilatatus*																			5	0.1											
**Euphorbia paralias*	20	2							20	0.1																					
**Euphorbia peplus*																					10	0.5			10	0.1					Powerline, Main Path
**Euphorbia terracina*																					20	0.1									Main Path
Exocarpos sparteus																											X	X			Primary Dune, Powerline
Ficinia nodosa									40	0.1			70	0.5	50	0.1	20	0.1									X	X			Primary, Secondary Dune
**Foeniculum vulgare*																															Road, 366667 6513487
**Galium murale*											3	10	3	0.1					5	0.1	3	6			3	2					Powerline 0-10%
Gastrolobium nervosum																			30	1					20	0.1					
**Gazania linearis*																															Powerline, Main Path
**Gladiolus caryophyllaceus*																															Access Track
Gompholobium tomentosum																			30	2			30	0.1	30	2					
Guichenotia ledifolia																					100	0.1									Powerline.
Hardenbergia comptoniana													CR	8	CR	2	CR	8					CR	1			CR	1			Powerline
**Heliophila pusilla*											10	0.1							15	0.1											
Hemiandra glabra													60	0.1					30	1			20	3							
Hyalosperma cotula																			10	0.2											50J 366609 6513503
Hydrocotyle hispidula											2	0.2									3	0.2									
Hydrocotyle pilifera var. *glabrata*																									3	0.1					
**Hyparrhenia hirta*																															Main Path, 366716 6513327
**Hypochaeris glabra*																															Main Path

SPECIES	TR01		TR02		TR03		TR04		TR05		TR06		TR07		TR08		TR09		TR10		TR11		TR12		TR13		TR14		TR15		OPPORTUNISTIC
	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	
**Isolepis marginata*			5	0.1	5	2					5	0.1					3	0.1														Secondary, Primary Dune
Isotoma hypocrateriformis																			20	0.1	X	X									
Kennedia prostrata																							X	X							
**Lagurus ovatus*					20	0.1					20	0.1	10	0.1	30	0.1	10	0.1			20	0.2	10	0.5							Powerline, Main Path
Lepidosperma calcicola																			15	5	30	0.1	20	2	30	5					Powerline
Lepidosperma gladiatum																	80	1													
Leptoceras menziesii											1	0.1																			
Leptomeria preissiana					90	1					100	2	X	X					100	1	X	X	100	1							Primary Dune
Leptorhynchos scaber											10	0.1							20	0.3											50J 366517 6513414
Leucopogon insularis											70	2							40	3	40	0.1			50	3					
Leucopogon maritimus (P1)																			20	1					30	1					50J 366603 6513478
Leucopogon parviflorus											50	0.1					X	X	50	0.1	70	1	X	X	50	0.1					
**Lolium perenne*													15	0.1									20	1.5	30	0.1					Main Path
Lomandra maritima																			30	25	30	0.1	40	30	30	40					50J 366651 6513235
**Lupinus cosentinii*																															Main Path
**Lysimachia arvensis*											10	0.1							2	0.1	10	1			10	0.2					Powerline, Main Path
Lysinema pentapetalum																			X	X					40	0.5					50J 366605 6513501
**Medicago polymorpha*																															Powerline, Main Path
Melaleuca cardiophylla											150	75									200	25									Powerline.
Melaleuca h. subsp. *huegelii*											70	1									150	4									Powerline 0-2% cover.
Melaleuca systena																			30	8	40	0.1	40	10	40	15					
**Melilotus indicus*											20	1																			
Microtis m. subsp. *media*																					50	0.1									
Millotia myosotidifolia																															50J 366523 6513482
**Minuartia mediterranea*											3	2							3	0.1	3	0.5			5	0.1					
Moss					1	2					3	10					3	5			3	5					3	2			Secondary Dune
Myoporum insulare					70	0.1					X	X	10	0.1	70	8	X	X									200	3			Secondary Dune
Olax benthamiana																			X	X											
Olearia axillaris	40	1	120	15	130	35			70	3	20	0.1	120	10	70	5	70	4	60	0.1			100	1	X	X	180	8			
Opercularia vaginata																			30	2			30	2	20	0.1					
**Osteospermum ecklonis*																															Powerline, 366801 6513362
**Parentucellia latifolia*											10	0.1																			50J 366523 6513482
Parietaria debilis													10	0.2	10	0.2	10	0.2			10	0.1					5	0.1			Secondary, Primary Dune
**Pelargonium capitatum*	40	2	30	20	30	12			30	3			40	1	70	2	50	1									20	0.1			Main Path
Pelargonium littorale											5	0.1																			
**Petrorhagia dubia*																															Powerline
Phyllangium divergens											3	0.1																			50J 366533 6513515
Phyllanthus calycinus																			20	0.1					20	1					
Pimelea ferruginea																			30	0.2					30	0.1					
Pithocarpa cordata			X	X							X	X	10	0.1	50	1	X	X									X	X			Primary Dune
**Plantago lanceolata*																															Road

SPECIES	TR01		TR02		TR03		TR04		TR05		TR06		TR07		TR08		TR09		TR10		TR11		TR12		TR13		TR14		TR15		OPPORTUNISTIC
	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	
Poa porphyroclados											40	0.3	40	2	40	0.1	20	1	50	0.1			40	2	40	1	40	1			
Podotheca gnaphalioides																															50J 366515 6513501
Poranthera microphylla											3	0.1									3	0.1									Powerline
**Reichardia tingitiana*																									10	0.1					
Rhagodia b. subsp. *baccata*			30	2	40	1			30	0.1	70	1	70	3	50	5	50	4			100	2	20	2			70	1			Primary Dune, Powerline
Rhodanthe citrina																															50J 366523 6513482
**Romulea rosea*											15	0.1							15	3	15	0.2	20	2	20	2					Powerline, Main Path
**Rostraria cristata*																									10	0.1					
Rytidosperma occidentale																			40	0.1					70	0.2					Main Path Weeds
Salsola australis																															Primary Dune.
Santalum acuminatum											X	X	120	2	70	1	50	0.5	120	3	X	X	X	X	50	2	70	0.1			Powerline 0-5%
**Scabiosa atropurpurea*																															Road 366628 6513516
Scaevola crassifolia									X	X			70	50	50	7	70	40					X	X			60	4			Primary Dune, Powerline
Scaevola t. subsp. *thesioides*																			30	0.1											
Schenkia australis																			X	X	3	0.1			3	0.1					
**Schinus terebinthifolia*																															Road, 366656 6513491
Schoenus lanatus																			20	0.1					20	0.1					
Senecio pinnatifolius var. *latilobus*			30	0.5	30	0.2							30	8	40	3	30	4					20	0.1			20	0.1			
**Senecio vulgaris*											10	0.1																			
**Silene gallica* var. *gallica*											10	0.1																			
**Sonchus oleraceus*	30	0.1	10	0.1					5	0.1	10	0.1	5	0.1					5	0.1	10	0.1	5	0.1	5	0.1					
Spinifex hirsutus																													40	1	
Spinifex longifolius	70	35	60	1	70	1			70	35			90	1	X	X											X	X			
Spyridium globulosum					100	0.1					70	1	50	3	70	8	70	2	110	2	200	4	120	1	100	2	100	4			Powerline 15% cover
**Stellaria media*					10	0.1					5	0.2	10	0.2	10	0.1					10	0.2					10	0.1			
Stylidium hesperium																			X	X											
Stylidium maritimum (P3)																			30	1					30	1					
Templetonia retusa																			30	0.1	70	0.1			90	2					
**Tetragonia decumbens*													X	X																	
**Thinopyrum distichum*	XX	XX					40	35	XX	XX																			50	55	
Thomasia triphylla											X	X																			
Threlkeldia diffusa					20	0.1							40	1	50	1	20	0.1					30	0.1			40	1			
Thysanotus manglesianus											CR	0.1					CR	0.1			X	X	CR	0.1							50J 366404 6513387
**Trachyandra divaricata*	30	1	30	2	30	1			20	0.2			20	0.5	40	1	40	2					30	0.5			30	2			Primary Dune, Main Path
Trachymene pilosa											10	0.2									3	0.1			10	0.1					50J 366533 6513515
Tricoryne elatior																															Powerline
**Trifolium c.* var. *campestre*																															Powerline
Triglochin isingiana																	3	0.1													
Triglochin nana																			6	0.1					3	0.1					
Trymalium l. var. *ledifolium*																					100	1									
**Vulpia muralis*					20	0.1					10	2	5	0.2	20	0.1	5	0.1	10	0.5	5	1			10	0.1					

SPECIES	TR01		TR02		TR03		TR04		TR05		TR06		TR07		TR08		TR09		TR10		TR11		TR12		TR13		TR14		TR15		OPPORTUNISTIC
	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	
**Vulpia myuros* forma *megaleura*			5	0.1																											50J 366533 6513515
Westringia dampieri											90	2							X	X	100	1	X	X	90	1					Powerline 1%
Wurmbea monantha											10	0.1									10	0.1									
**Yukka aloeifolia*																															Access Track

Appendix C: Vegetation Detailed Site Quadrat Data

SITE: TR01

Survey Date 1:	13 September 2019			**Surveyor:**	Kelli McCreery
Survey Date 2:	19 October 2019			**Quadrat**	10m X 10m (100m^2)
Quadrat Location:	NW	50J 384244	6492066	**Datum**	GDA94
	NE	50J 384255	6492068	**Accuracy**	±3m
	SE	50J 384255	6492061	**Aspect:**	SE
	SW	50J 384247	6492059	**Altitude:**	7m
Landform:	Primary dune, beach ridge plain. Successional.			**Soil:**	White sand (unconsolidated)
Leaf Litter:	10% cover; 1 – 10 cm depth.			**Fire History:**	>10 years
Condition:	Very Good			**Details:**	Weeds 6%, coastal cosmopolitan.

Vegetation NVIS:	**Stratum**	**Form**	**Cover**	**Dominant Species**
	G1	Grass 0.5-1m	30-70%	*Spinifex longifolius.*
	G2	Shrubs <0.5m	0.25-5%	*Olearia axillaris, *Pelargonium capitatum.*
	G3	Forbs <0.5m	0.25-5%	**Trachyandra divaricata, *Euphorbia paralias.*

Species: **Bromus diandrus, *Cakile maritima, *Crassula glomerata, *Euphorbia paralias, Olearia axillaris, *Pelargonium capitatum, *Sonchus oleraceus, Spinifex longifolius, *Trachyandra divaricata.*

Photo (NW Corner):

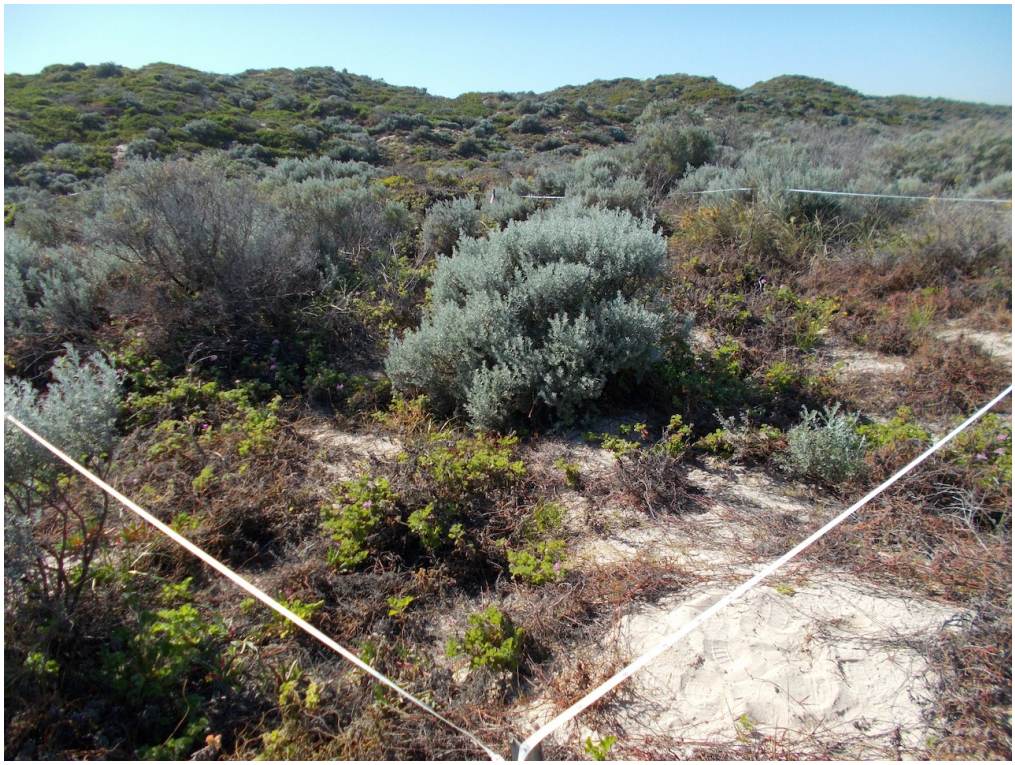
SITE: TR02

Survey Date 1:	13 September 2019			**Surveyor:**	Kelli McCreery
Survey Date 2:	19 October 2019			**Quadrat**	10m X 10m (100m^2)
Quadrat Location:	NW	50J 384244	6492066	**Datum**	GDA94
	NE	50J 384255	6492068	**Accuracy**	±3m
	SE	50J 384255	6492061	**Aspect:**	SE
	SW	50J 384247	6492059	**Altitude:**	9m
Landform:	Primary dune, beach ridge plain. Successional.			**Soil:**	White sand (unconsolidated)
Leaf Litter:	20% cover; 0-5cm depth.			**Fire History:**	>10 years
Condition:	Good			**Details:**	Weeds 23%, coastal cosmopolitan.

Vegetation NVIS:	**Stratum**	**Form**	**Cover**	**Dominant Species**
	M1	Shrub 1-2m	10-30%	*Olearia axillaris.*
	G1	Shrubs <0.5m	10-30%	**Pelargonium capitatum, Rhagodia baccata* subsp. *baccata.*
	G2	Grass 0.5-1m	0.25-5%	*Spinifex longifolius.*
	G3	Vine <0.5m	5-10%	*Cassytha aurea* var. *aurea.*

Species: **Bromus diandrus, Calandrinia brevipedata, Carpobrotus virescens, *Isolepis marginata, *Sonchus oleraceus, *Vulpia myuros* forma *megaleura, Crassula colorata* var. *colorata, *Crassula glomerata, *Dischisma arenarium, *Ehrharta brevifolia* var. *cuspidata, Senecio pinnatifolius* var. *latilobus, Spinifex longifolius, Rhagodia baccata* subsp. *baccata, *Trachyandra divaricata, Cassytha aurea* var. *aurea, Olearia axillaris, *Pelargonium capitatum.*

Photo (NW Corner):



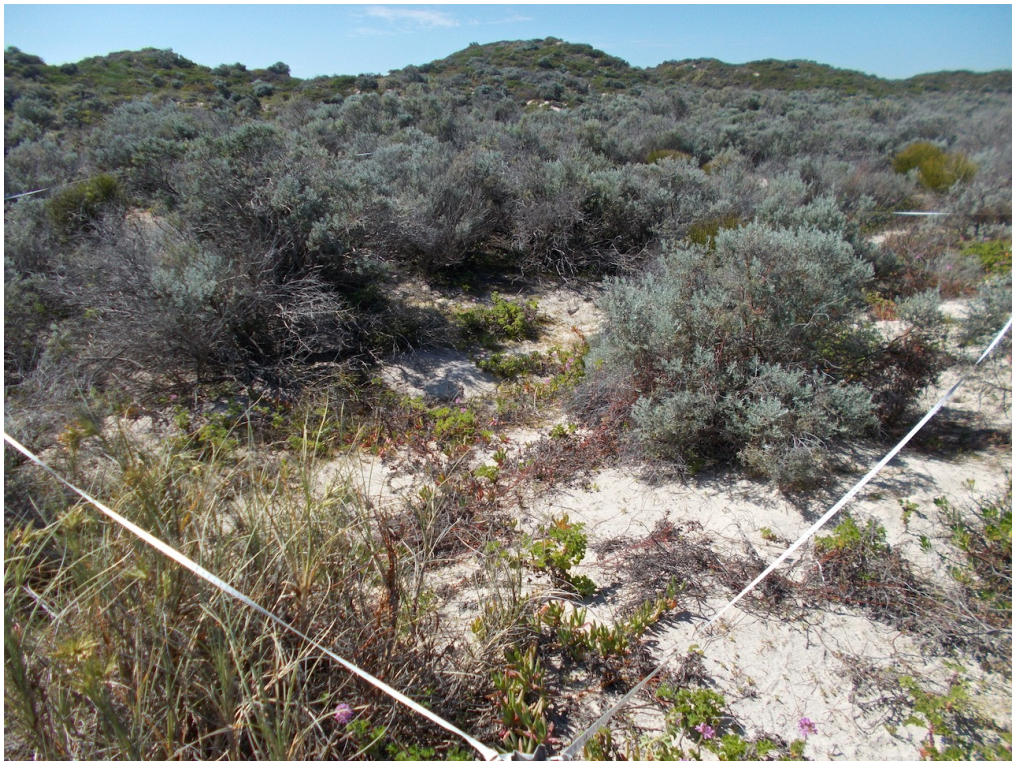
SITE: TR03

Survey Date 1:	13 September 2019			**Surveyor:**	Kelli McCreery
Survey Date 2:	19 October 2019			**Quadrat**	10m X 10m (100m^2)
Quadrat Location:	NW	50J 384244	6492066	**Datum**	GDA94
	NE	50J 384255	6492068	**Accuracy**	±3m
	SE	50J 384255	6492061	**Aspect:**	Basin
	SW	50J 384247	6492059	**Altitude:**	9m
Landform:	Primary dune, beach ridge plain. Successional.			**Soil:**	White sand
Leaf Litter:	15% cover; 0 – 5 cm depth.			**Fire History:**	>10 years
Condition:	Good			**Details:**	Weeds 15%, coastal cosmopolitan.

Vegetation NVIS:	**Stratum**	**Form**	**Cover**	**Dominant Species**
	M1	Shrub 1-2m	30-70%	*Olearia axillaris.*
	G1	Forbs <0.5m	10-30%	**Pelargonium capitatum.*
	G2	Vine <0.5m	0.25-5%	*Cassytha aurea* var. *aurea.*

Species: *Acanthocarpus preissii, Calandrinia brevipedata, Carpobrotus virescens, Cassytha aurea* var. *aurea, Crassula colorata* var. *colorata, *Crassula glomerata, *Dischisma arenarium, *Ehrharta brevifolia* var. *cuspidata, *Isolepis marginata, *Lagurus ovatus, Leptomeria preissiana,* Moss*, Myoporum insulare, Olearia axillaris, *Pelargonium capitatum, Rhagodia baccata* subsp. *baccata, Senecio pinnatifolius* var. *latilobus, Spinifex longifolius, Spyridium globulosum, *Stellaria media, Threlkeldia diffusa, *Trachyandra divaricata, *Vulpia muralis.*

Photo (NW Corner):



SITE: TR04

Survey Date 1:	13 September 2019			**Surveyor:**	Kelli McCreery
Survey Date 2:	19 October 2019			**Quadrat**	10m X 10m (100m^2)
Quadrat Location:	NW	50J 384244	6492066	**Datum**	GDA94
	NE	50J 384255	6492068	**Accuracy**	±3m
	SE	50J 384255	6492061	**Aspect:**	Undulating
	SW	50J 384247	6492059	**Altitude:**	7m
Landform:	Primary dune, very young. Successional.			**Soil:**	White sand (unconsolidated)
Leaf Litter:	10% cover; 1 – 10 cm depth.			**Fire History:**	>10 years
Condition:	VG			**Details:**	Weeds 6%, coastal cosmopolitan.

Vegetation NVIS:	**Stratum**	**Form**	**Cover**	**Dominant Species**
	G1	Grass <0.5m	30-70%	**Thinopyrum distichum.*
	G2	Forbs <0.5m	0.25-5%	**Cakile maritima*

Species:	**Arctotheca populifolia, *Cakile maritima, *Thinopyrum distchum.*
Photo (NW Corner):	

SITE: TR05

Survey Date 1:	13 September 2019			**Surveyor:**	Kelli McCreery
Survey Date 2:	19 October 2019			**Quadrat**	10m X 10m (100m^2)
Quadrat Location:	NW	50J 384244	6492066	**Datum**	GDA94
	NE	50J 384255	6492068	**Accuracy**	±3m
	SE	50J 384255	6492061	**Aspect:**	N-S Dune ridge.
	SW	50J 384247	6492059	**Altitude:**	6m
Landform:	Primary dune, beach ridge plain.			**Soil:**	White sand
Leaf Litter:	20% cover; 0 – 5 cm depth.			**Fire History:**	>10 years
Condition:	Good to Very Good. Successional.			**Details:**	Weeds 4%, coastal cosmopolitan.

Vegetation NVIS:	**Stratum**	**Form**	**Cover**	**Dominant Species**
	G1	Shrubs 0.5-1m	0.25-5%	*Olearia axillaris,*
	G2	Grass 0.5-1m	30-70%	*Spinifex longifolius.*
	G3	Forbs <0.5m	0.25-5%	**Pelargonium capitatum*

Species: **Crassula glomerata, *Dischisma arenarium, *Ehrharta brevifolia* var. *cuspidata, *Euphorbia paralias, Ficinia nodosa, Olearia axillaris, *Pelargonium capitatum, Rhagodia baccata* subsp. *baccata, *Sonchus oleraceus, Spinifex longifolius, *Trachyandra divaricata.*

Photo (NW Corner):

SITE: TR06

Survey Date 1:	13 September 2019			**Surveyor:**	Kelli McCreery
Survey Date 2:	21 October 2019			**Quadrat**	10m X 10m (100m^2)
Quadrat Location:	NW	50J 384244	6492066	**Datum**	GDA94
	NE	50J 384255	6492068	**Accuracy**	±3m
	SE	50J 384255	6492061	**Aspect:**	SE
	SW	50J 384247	6492059	**Altitude:**	19m
Landform:	Low hill with limestone outcrop (5%).			**Soil:**	Brown loamy sand.
Leaf Litter:	20% cover; 0 – 3 cm depth.			**Fire History:**	>10 years
Condition:	Very Good			**Details:**	Weeds 5-15%.

Vegetation NVIS:	**Stratum**	**Form**	**Cover**	**Dominant Species**
	M1	Shrubs 1-2m	70-100%	*Melaleuca cardiophylla.*
	G1	Shrubs 0.5-1m	5-10%	*Dodonaea aptera, Leptomeria preissiana, Leucopogon insularis, Westringia dampieri*
	G2	Forbs <0.5m	10-30%	**Galium murale, *Minuartia mediterranea, Daucus glochidiatus.*
	G3	Grass <0.5m	0.25-5%	**Vulpia muralis, Austrostipa flavescens, Poa porphyroclados*
	G4	Vine <0.5-1m	0.25-5%	*Cassytha aurea* var. *aurea.*

Species: *Acacia xanthina, Austrostipa flavescens, Avena barbata, *Briza maxima, *Briza minor, *Bromus diandrus, Caladenia latifolia, Calandrinia brevipedata, Cassytha aurea* var. *aurea, *Catapodium rigidum, *Crassula glomerata, Cyrtostylis huegelii, Daucus glochidiatus, Dianella revoluta* var. *divaricata, Dodonaea aptera, *Ehrharta longiflora, *Galium murale, *Heliophila pusilla, Hydrocotyle hispidula, *Isolepis marginata, *Lagurus ovatus, Leptoceras menziesii, Leptomeria preissiana, Leptorhynchos scaber, Leucopogon insularis, Leucopogon parviflorus, *Lysimachia arvensis, Melaleuca cardiophylla, Melaleuca huegelii, *Melilotus indicus, *Minuartia mediterranea, Moss, Olearia axillaris, *Parentucellia latifolia, Pelargonium littorale, Phyllangium divergens, Poranthera microphylla, Rhagodia baccata* subsp. *baccata, Romulea rosea, *Senecio vulgaris, Silene gallica, Sonchus oleraceus, Spyridium globulosum, *Stellaria media, Thysanotus manglesianus, Trachymene pilosa, *Vulpia muralis, Westringia dampieri, Wurmbea monantha.*

Photo (NW Corner):

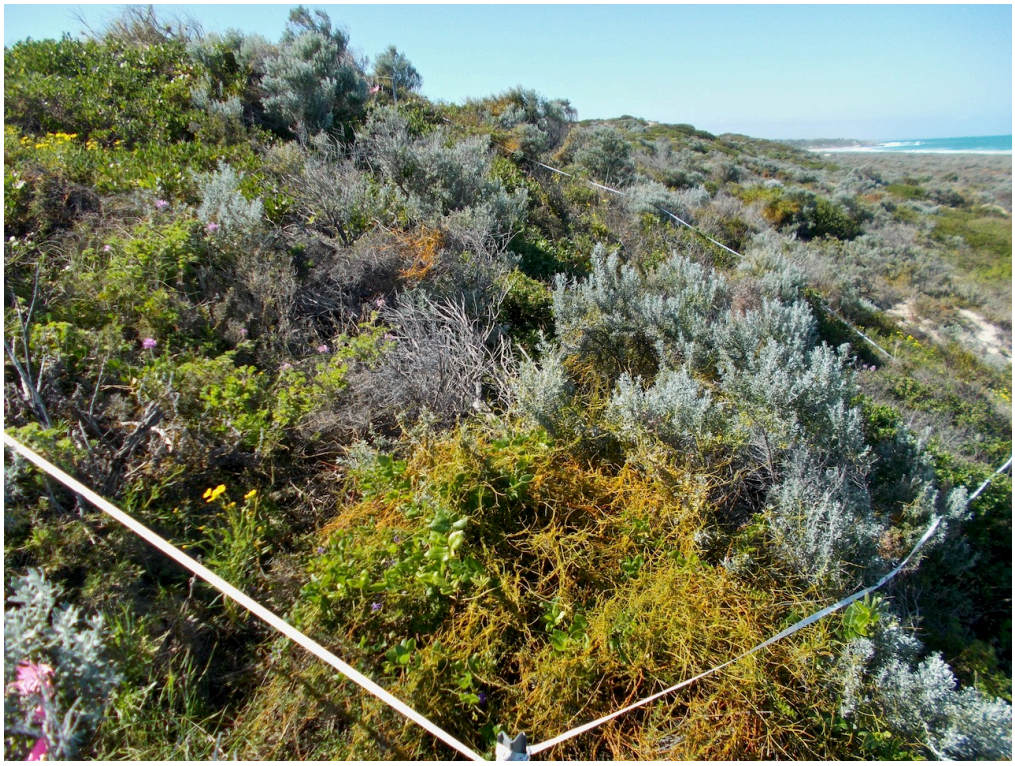
SITE: TR07

Survey Date 1:	15 September 2019			**Surveyor:**	Kelli McCreery
Survey Date 2:	19 October 2019			**Quadrat**	10m X 10m (100m^2)
Quadrat Location:	NW	50J 384244	6492066	**Datum**	GDA94
	NE	50J 384255	6492068	**Accuracy**	±3m
	SE	50J 384255	6492061	**Aspect:**	W (steep)
	SW	50J 384247	6492059	**Altitude:**	19m
Landform:	Secondary dune			**Soil:**	White sand (unconsolidated)
Leaf Litter:	60% cover; 0 – 5 cm depth.			**Fire History:**	>10 years
Condition:	Very Good			**Details:**	Weeds 2%. Localised weedy.

Vegetation NVIS:	**Stratum**	**Form**	**Cover**	**Dominant Species**
	M1	Shrubs 1-2m	10-30%	*Olearia axillaris, Santalum acuminatum.*
	G1	Shrubs 0.5-1m	30-70%	*Scaevola crassifolia, Spyridium globulosum.*
	G2	Vine 0.5-1m	10-30%	*Cassytha* spp., *Hardenbergia comptoniana.*
	G3	Forbs <0.5m	5-10%	*Senecio pinnatifolius* var. *latilobus.*
	G4	Grass <0.5m	0.25-5%	*Poa porphyroclados.*

Species: *Acanthocarpus preissii, *Brassica tournefortii, *Bromus diandrus, Calandrinia brevipedata, Carpobrotus virescens, Cassytha aurea* var. *aurea, Cassytha glabella* forma. *casuarinae, Cassytha racemosa forma. racemosa, *Crassula glomerata, *Dischisma arenarium, *Ehrharta brevifolia* var. *cuspidata, *Ehrharta longiflora, Ficinia nodosa, *Galium murale, Hardenbergia comptoniana, Hemiandra glabra, *Lagurus ovatus, *Lolium perenne, Myoporum insulare, Olearia axillaris, Parietaria debilis, *Pelargonium capitatum, Pithocarpa cordata, Poa porphyroclados, Rhagodia baccata* subsp. *baccata, Santalum acuminatum, Scaevola crassifolia, Senecio pinnatifolius* var. *latilobus, *Sonchus oleraceus, Spinifex longifolius, Spyridium globulosum, *Stellaria media, Threlkeldia diffusa, *Trachyandra divaricata, *Vulpia muralis.*

Photo (NW Corner):



SITE: TR08

Survey Date 1:	15 September 2019			**Surveyor:**	Kelli McCreery
Survey Date 2:	19 October 2019			**Quadrat Size:**	10m X 10m (100m^2)
Quadrat Location:	NW	50J 384244	6492066	**Datum**	GDA94
	NE	50J 384255	6492068	**Accuracy**	±3m
	SE	50J 384255	6492061	**Aspect:**	W (steep)
	SW	50J 384247	6492059	**Altitude:**	21m
Landform:	Secondary dune			**Soil:**	White sand
Leaf Litter:	30% cover; 0-3cm depth.			**Fire History:**	>10 years
Condition:	Very Good to Excellent (patchy)			**Details:**	Weeds 2-5%, patchy. Localised G.

Vegetation NVIS:	**Stratum**	**Form**	**Cover**	**Dominant Species**
	M1	Shrubs 1-2m	0.25-5%	*Acacia cyclops.*
	G1	Shrubs 0.5-1m	30-70%	*Scaevola crassifolia, Spyridium globulosum, Olearia axillaris, Myoporum insulare, Santalum acuminatum.*
	G2	Shrubs <0.5m	10-30%	*Acanthocarpus preissii, Rhagodia baccata.*
	G3	Forbs <0.5m	10-30%	*Senecio pinnatifolius* var. *latilobus, *Pelargonium capitatum, Parietaria debilis, Calandrinia brevipedata.*
	G4	Grasses <0.5m	0.25-5%	*Poa porphyroclados, *Ehrharta brevifolia* var. *cuspidata*.

Species: *Acacia cyclops, Acanthocarpus preissii, *Brassica tournefortii, *Bromus diandrus, Calandrinia brevipedata, Carpobrotus virescens, Cassytha aurea* var. *aurea, *Catapodium rigidum, Crassula colorata* var. *colorata, *Crassula decumbens* var. *decumbens, Daucus glochidiatus, *Dischisma arenarium, *Ehrharta brevifolia* var. *cuspidata, *Ehrharta longiflora, Ficinia nodosa, Hardenbergia comptoniana, *Lagurus ovatus, Myoporum insulare, Olearia axillaris, Parietaria debilis, *Pelargonium capitatum, Pithocarpa cordata, Poa porphyroclados, Rhagodia baccata* subsp. *baccata, Santalum acuminatum, Scaevola crassifolia, Senecio pinnatifolius* var. *latilobus, Spyridium globulosum, *Stellaria media, Threlkeldia diffusa, *Trachyandra divaricata, *Vulpia muralis.*

Photo (NW Corner):

SITE: TR09

Survey Date 1:	15 September 2019			**Surveyor:**	Kelli McCreery
Survey Date 2:	19 October 2019			**Quadrat**	10m X 10m (100m^2)
Quadrat Location:	NW	50J 384244	6492066	**Datum**	GDA94
	NE	50J 384255	6492068	**Accuracy**	±3m
	SE	50J 384255	6492061	**Aspect:**	W (moderate slope)
	SW	50J 384247	6492059	**Altitude:**	22m
Landform:	Secondary dune.			**Soil:**	White sand (consolidated).
Leaf Litter:	35% cover; 0-3cm depth.			**Fire History:**	>10 years
Condition:	Very Good to Excellent.			**Details:**	Weeds 2%. Patchy, Good in patches.

Vegetation NVIS:	**Stratum**	**Form**	**Cover**	**Dominant Species**
	G1	Shrub 0.5-1m	30-70%	*Scaevola crassifolia, Olearia axillaris, Acacia cyclops, Spyridium globulosum.*
	G2	Shrubs <0.5m	10-30%	*Acanthocarpus preissii, Rhagodia baccata* subsp. *baccata, Santalum acuminatum.*
	G3	Forbs <0.5m	10-30%	*Senecio pinnatifolius* var. *latilobus, Calandrinia brevipedata, Carpobrotus virescens.*
	G4	Sedge 0.5-1m	0.25-5%	*Lepidosperma gladiatum.*
	G5	Grass <0.5m	0.25-5%	*Poa porphyroclados.*
	G6	Vine <0.5m	5-10%	*Cassytha aurea* var. *aurea*, *Hardenbergia comptoniana*.

Species: *Acacia cyclops, Acanthocarpus preissii, *Brassica tournefortii, *Bromus diandrus, Calandrinia brevipedata, Carpobrotus virescens, Cassytha aurea* var. *aurea, Cassytha glabella* forma. *casuarinae, *Cerastium glomeratum, Conostylis candicans* subsp. *calcicola, *Crassula decumbens* var. *decumbens, *Crassula thunbergiana* subsp. *thunbergiana, *Dischisma arenarium, *Ehrharta brevifolia* var. *cuspidata, Ficinia nodosa, Hardenbergia comptoniana, *Isolepis marginata, *Lagurus ovatus, Lepidosperma gladiatum,* Moss, *Olearia axillaris, Parietaria debilis, *Pelargonium capitatum, Poa porphyroclados, Rhagodia baccata* subsp. *baccata, Santalum acuminatum, Scaevola crassifolia, Senecio pinnatifolius* var. *latilobus, Spyridium globulosum, Threlkeldia diffusa, Thysanotus manglesianus, *Trachyandra divaricata, Triglochin isingiana, *Vulpia muralis*

Photo (NW Corner):

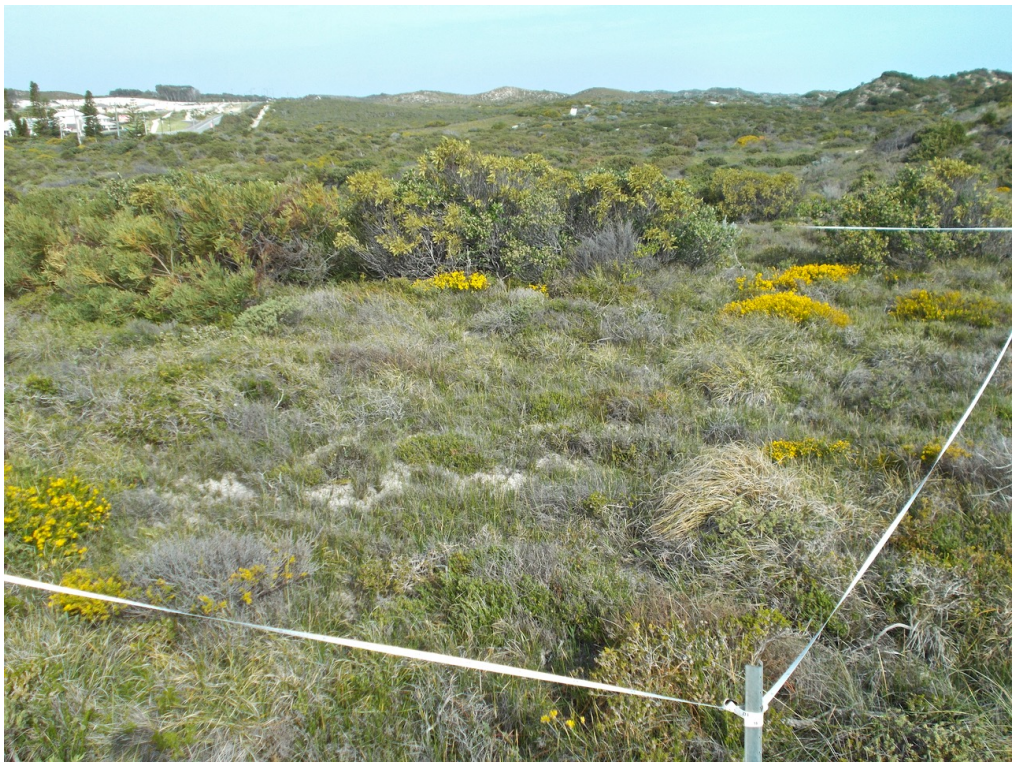
SITE: TR10

Survey Date 1:	15 September 2019			**Surveyor:**	Kelli McCreery
Survey Date 2:	21 October 2019			**Quadrat**	10m X 10m (100m^2)
Quadrat Location:	NW	50J 384244	6492066	**Datum**	GDA94
	NE	50J 384255	6492068	**Accuracy**	±3m
	SE	50J 384255	6492061	**Aspect:**	SE
	SW	50J 384247	6492059	**Altitude:**	20m
Landform:	Low Dune.			**Soil:**	White sand (consolidated)
Leaf Litter:	10% cover; 0-3cm depth.			**Fire History:**	>10 years
Condition:	Very Good to Excellent.			**Details:**	Weeds 2%.

Vegetation NVIS:	**Stratum**	**Form**	**Cover**	**Dominant Species**
	M1	Shrub 1-2m	0.25-5%	*Acacia cyclops, Spyridium globulosum, Santalum acuminatum.*
	G1	Shrubs <0.5m	30-70%	*Melaleuca systena, Acacia lasiocarpa* var. *lasiocarpa, Leucopogon insularis, Beyeria cinerea* subsp. *cinerea (P3), Cryptandra mutila.*
	G2	Forbs <0.5m	30-70%	*Lomandra maritima, Conostylis candicans, Opercularia vaginata.*
	G3	Rush <0.5m	5-10%	*Desmocladus asper.*
	G4	Sedge <0.5m	5-10%	*Lepidosperma calcicola.*
	G5	Grass 0.5-1m	0.25-5%	*Austrostipa flavescens, Poa porphyroclados.*

Species: *Acacia cyclops, Acacia lasiocarpa* var. *lasiocarpa, Acanthocarpus preissii, Austrostipa flavescens, Beyeria cinerea* subsp. *cinerea* (P3), **Brassica tournefortii, Cassytha aurea* var. *aurea, *Catapodium rigidum, Comesperma confertum, Conostylis candicans* subsp. *calcicola, *Crassula glomerata, Cryptandra mutila, Cyrtostylis huegelii, Daucus glochidiatus, Desmocladus asper, Dianella revoluta* var. *divaricata, Drosera macrantha, Eriochilus dilatatus* subsp. *dilatatus, *Galium murale, Gastrolobium nervosum, Gompholobium tomentosum, *Heliophila pusilla, Hemiandra glabra, Hyalosperma cotula, Isotoma hypocrateriformis, Lepidosperma calcicola, Leptomeria preissiana, Leptorhynchos scaber, Leucopogon insularis, Leucopogon maritimus* (P1), *Leucopogon parviflorus, Lomandra maritima, *Lysimachia arvensis, Melaleuca systena, *Minuartia mediterranea, Olearia axillaris, Opercularia vaginata, Phyllanthus calycinus, Pimelea ferruginea, Poa porphyroclados, *Romulea rosea, Rytidosperma occidentale, Santalum acuminatum, Scaevola thesioides* subsp. *thesioides, Schoenus lanatus, *Sonchus oleraceus, Spyridium globulosum, Stylidium maritimum* (P3), *Templetonia retusa, Triglochin nana, *Vulpia muralis.*

Photo (NW Corner):



SITE: TR11

Survey Date 1:	16 September 2019			**Surveyor:**	Kelli McCreery
Survey Date 2:	21 October 2019			**Quadrat**	10m X 10m (100m^2)
Quadrat Location:	NW	50J 384244	6492066	**Datum**	GDA94
	NE	50J 384255	6492068	**Accuracy**	±3m
	SE	50J 384255	6492061	**Aspect:**	SW
	SW	50J 384247	6492059	**Altitude:**	10m
Landform:	Low dune with limestone outcrops.			**Soil:**	Brown loamy sand (with organic matter)
Leaf Litter:	25% cover; 0-2cm depth.			**Fire History:**	>10 years
Condition:	Very Good.			**Details:**	Weeds 3-5%. Higher under thickets.

Vegetation NVIS:	**Stratum**	**Form**	**Cover**	**Dominant Species**
	M1	Shrub >2m	30-70%	*Melaleuca cardiophylla.*
	M2	Shrub 1-2m	0.25-5%	*Melaleuca huegelii.*
	M3	Vine 1-2m	0.25-5%	*Cassytha aurea* var. *aurea.*
	G1	Shrubs 0.5-1m	10-30%	*Dodonaea aptera, Trymalium ledifolium* var. *ledifolium, Westringia dampieri.*
	G2	Forbs <0.5m	30-70%	*Daucus glochidiatus, Hydrocotyle hispidula, *Galium murale, *Minuartia mediterranea, *Euphorbia peplus.*
	G3	Grass <0.5m	10-30%	*Austrostipa flavescens, Poa porphyroclados.*

Species: *Acacia xanthina, Austrostipa flavescens, *Avena barbata, *Bromus diandrus, Caladenia latifolia, Calandrinia brevipedata, Carex thecata, Cassytha aurea* var. *aurea, *Catapodium rigidum, Clematis linearifolia, Comesperma integerrimum, Crassula colorata* var. *colorata, *Crassula glomerata, Cyrtostylis huegelii, Daucus glochidiatus, Desmocladus asper, Dianella revoluta* var. *divaricata, *Dischisma arenarium, Dodonaea aptera, *Ehrharta longiflora, *Euphorbia peplus, *Euphorbia terracina, *Galium murale, Guichenotia ledifolia, Hydrocotyle hispidula, *Lagurus ovatus, Lepidosperma calcicola, Leucopogon insularis, Leucopogon parviflorus, Lomandra maritima, *Lysimachia arvensis, Melaleuca cardiophylla, Melaleuca huegelii, Melaleuca systena, Microtis media* subsp. *media, *Minuartia mediterranea,* Moss*, Parietaria debilis, Poa porphyroclados, Poranthera microphylla, Rhagodia baccata* subsp. *baccata, *Romulea rosea, Schenkia australis, *Sonchus oleraceus, Spyridium globulosum, *Stellaria media, Templetonia retusa, Trachymene pilosa, Trymalium ledifolium* var. *ledifolium, *Vulpia muralis, Westringia dampieri, Wurmbea monantha*

Photo (NW Corner):

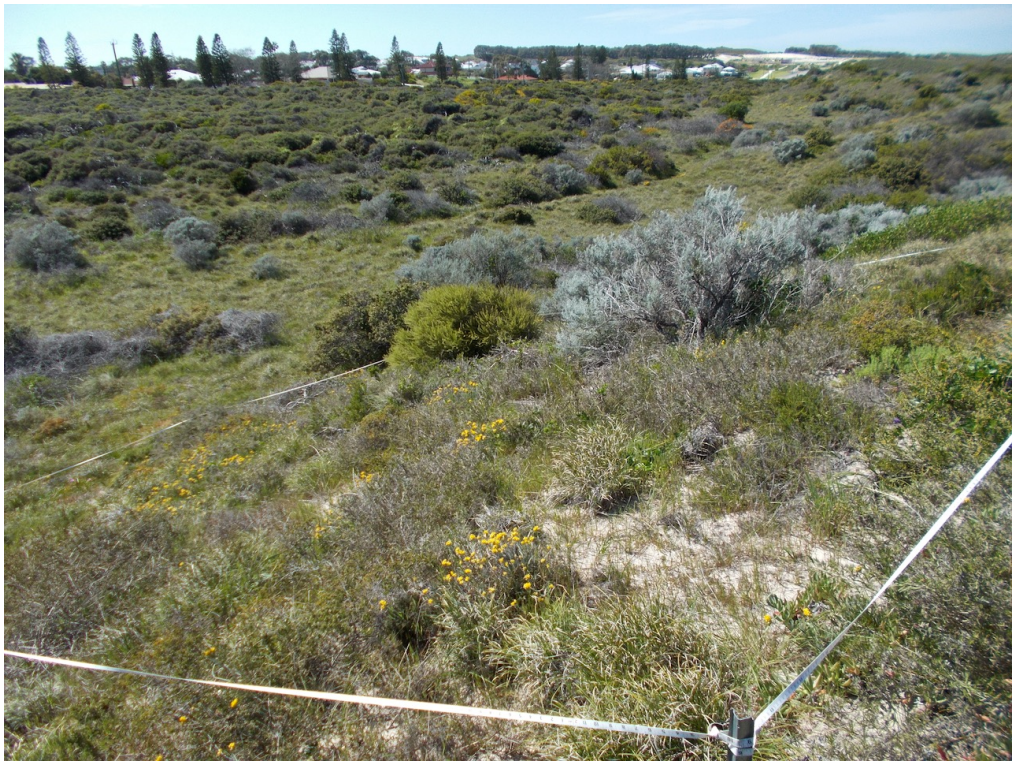
SITE: TR12

Survey Date 1:	16 September 2019			**Surveyor:**	Kelli McCreery
Survey Date 2:	19 October 2019			**Quadrat**	10m X 10m (100m^2)
Quadrat Location:	NW	50J 384244	6492066	**Datum**	GDA94
	NE	50J 384255	6492068	**Accuracy**	±3m
	SE	50J 384255	6492061	**Aspect:**	E
	SW	50J 384247	6492059	**Altitude:**	14m
Landform:	Low Dune.			**Soil:**	White sand (semi-consolidated)
Leaf Litter:	20% cover; 0-2cm depth.			**Fire History:**	>10 years
Condition:	Good.			**Details:**	Weeds 10%.

Vegetation NVIS:	**Stratum**	**Form**	**Cover**	**Dominant Species**
	G1	Shrubs 0.5-1m	0.25-5%	*Olearia axillaris, Leptomeria preissiana.*
	G2	Shrubs <0.5m	30-70%	*Melaleuca systena, Acanthocarpus preissii, Beyeria cinerea* subsp. *cinerea* (P3), *Hemiandra glabra, Rhagodia baccata* subsp. *baccata.*
	G3	Forbs <0.5m	30-70%	*Lomandra maritima, Conostylis candicans* subsp. *candicans, Opercularia vaginata.*
	G4	Rush <0.5m	0.25-5%	*Desmocladus asper.*
	G5	Sedge <0.5m	0.25-5%	*Lepidosperma calcicola.*
	G6	Grass <0.5m	5-10%	*Austrostipa flavescens, Poa porphyroclados*.

Species: *Acanthocarpus preissii, Austrostipa flavescens, *Avena barbata, Beyeria cinerea* subsp. *cinerea* (P3), **Bromus diandrus, Calandrinia brevipedata, Carpobrotus virescens, Cassytha flava, *Catapodium rigidum, Conostylis candicans* subsp. *candicans, Crassula colorata* var. *colorata, *Crassula glomerata, *Crassula thunbergiana* subsp. *thunbergiana, Desmocladus asper, Dianella revoluta* var. *divaricata, *Dischisma arenarium, *Ehrharta brevifolia* var. *cuspidata, *Ehrharta longiflora, Gompholobium tomentosum, Hardenbergia comptoniana, Hemiandra glabra, *Lagurus ovatus, Lepidosperma calcicola, Leptomeria preissiana, *Lolium perenne, Lomandra maritima, Melaleuca systena, Olearia axillaris, Opercularia vaginata, Poa porphyroclados, Rhagodia baccata* subsp. *baccata, *Romulea rosea, Senecio pinnatifolius* var. *latilobus, *Sonchus oleraceus, Spyridium globulosum, Threlkeldia diffusa, Thysanotus manglesianus, *Trachyandra divaricata.*

Photo (NW Corner):



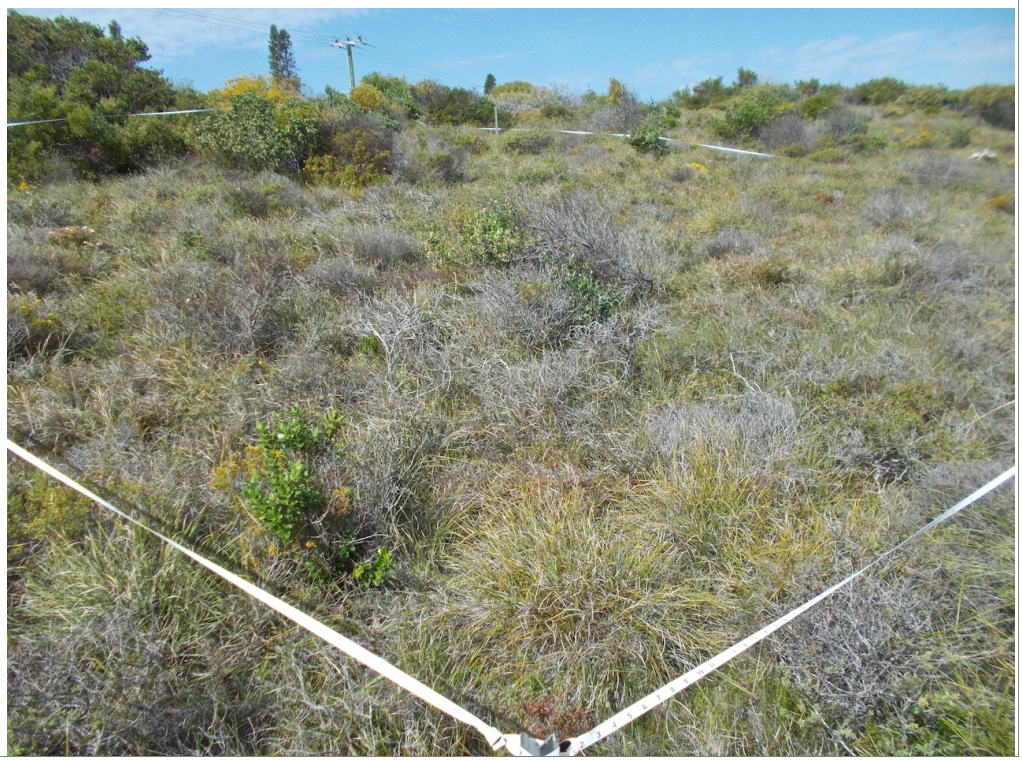
SITE: TR13

Survey Date 1:	16 September 2019			**Surveyor:**	Kelli McCreery
Survey Date 2:	19 October 2019			**Quadrat**	10m X 10m (100m^2)
Quadrat Location:	NW	50J 384244	6492066	**Datum**	GDA94
	NE	50J 384255	6492068	**Accuracy**	±3m
	SE	50J 384255	6492061	**Aspect:**	W
	SW	50J 384247	6492059	**Altitude:**	20m
Landform:	Low Dune.			**Soil:**	Off-white sand (consolidated)
Leaf Litter:	50% cover; 0-3cm depth.			**Fire History:**	>10 years
Condition:	Very Good to Excellent.			**Details:**	Weeds 1%.

Vegetation NVIS:	**Stratum**	**Form**	**Cover**	**Dominant Species**
	G1	Shrubs 0.5-1m	0.25-5%	*Spyridium globulosum, Templetonia retusa, Santalum acuminatum, Westringia dampieri.*
	G2	Shrubs <0.5m	30-70%	*Melaleuca systena, Acacia lasiocarpa, Leucopogon insularis, Gompholobium tomentosum, Beyeria cinerea* subsp. *cinerea* (P3), *Leucopogon maritimus* (P1), *Phyllanthus calycinus,*
	G3	Forbs <0.5m	30-70%	*Lomandra maritima, Stylidium maritimum* (P3), **Romulea rosea, *Galium murale,*
	G4	Rush <0.5m	5-10%	*Desmocladus asper.*
	G5	Sedge <0.5m	5-10%	*Lepidosperma calcicola.*
	G6	Grass 0.5-1m	0.25-5%	*Austrostipa flavescens, Poa porphyroclados.*

Species: *Acacia cyclops, Acacia lasiocarpa* var. *lasiocarpa, Austrostipa flavescens, *Avena barbata, *Bellardia trixago, Beyeria cinerea* subsp. *cinerea* (P3), **Brassica tournefortii, *Briza minor, *Bromus diandrus, Cassytha flava, Cassytha glabella* forma. *casuarinae, *Catapodium rigidum, Conostylis candicans* subsp. *calcicola, *Crassula glomerata, Cryptandra mutila, Cyrtostylis huegelii, Daucus glochidiatus, Desmocladus asper, Drosera ?ramellosa* (sterile), *Drosera macrantha, *Ehrharta longiflora, *Euphorbia peplus, *Galium murale, Gastrolobium nervosum, Gompholobium tomentosum, Hydrocotyle pilifera* var. *glabrata, Lepidosperma calcicola, Leucopogon insularis, Leucopogon maritimus* (P1), *Leucopogon parviflorus, *Lolium perenne, Lomandra maritima, Lysinema pentapetalum, *Lysimachia arvensis, Melaleuca systena, *Minuartia mediterranea, Opercularia vaginata, Phyllanthus calycinus, Pimelea ferruginea, Poa porphyroclados, *Reichardia tingitiana, *Romulea rosea, *Rostraria cristata, Rytidosperma occidentale, Santalum acuminatum, Schenkia australis, Schoenus lanatus, *Sonchus oleraceus, Spyridium globulosum, Stylidium maritimum* (P3), *Templetonia retusa, Trachymene pilosa, Triglochin nana, *Vulpia muralis, Westringia dampieri.*

Photo (NW Corner):



SITE: TR14

Survey Date 1:	16 September 2019			**Surveyor:**	Kelli McCreery
Survey Date 2:	19 October 2019			**Quadrat**	10m X 10m (100m^2)
Quadrat Location:	NW	50J 384244	6492066	**Datum**	GDA94
	NE	50J 384255	6492068	**Accuracy**	±3m
	SE	50J 384255	6492061	**Aspect:**	SE
	SW	50J 384247	6492059	**Altitude:**	20m
Landform:	Low Dune.			**Soil:**	White sand (unconsolidated)
Leaf Litter:	50% cover; 0-3cm depth.			**Fire History:**	>10 years
Condition:	Very Good.			**Details:**	Weeds 5%.

Vegetation NVIS:	**Stratum**	**Form**	**Cover**	**Dominant Species**
	M1	Shrub 1-2m	10-30%	*Acacia cyclops, Myoporum insulare, Spyridium globulosum, Olearia axillaris.*
	G1	Shrubs 0.5-1m	10-30%	*Acanthocarpus preissii, Rhagodia baccata* subsp. *baccata, Scaevola crassifolia.*
	G2	Vine <0.5m	5-10%	*Cassytha aurea* var. *aurea, Cassytha racemosa* forma. *racemosa*, *Hardenbergia comptoniana*.
	G3	Forbs <0.5m	10-30%	*Conostylis candicans* subsp. *calcicola, Senecio pinnatifolius* var. *latilobus, *Crassula glomerata, *Trachyandra divaricata.*
	G4	Grass 0.5-1m	0.25-5%	*Poa porphyroclados,*Ehrharta* spp., *Bromus diandrus.*

Species: *Acacia cyclops, Acanthocarpus preissii, *Bromus diandrus, Carpobrotus virescens, Cassytha aurea* var. *aurea, Cassytha racemosa* forma. *racemosa, Conostylis candicans* subsp. *calcicola, Crassula colorata* var. *colorata, *Crassula glomerata, Dianella revoluta* var. *divaricata, *Dischisma arenarium, *Ehrharta brevifolia* var. *cuspidata, *Ehrharta longiflora, Hardenbergia comptoniana,* Moss, *Myoporum insulare, Olearia axillaris, Parietaria debilis, *Pelargonium capitatum, Poa porphyroclados, Rhagodia baccata* subsp. *baccata, Santalum acuminatum, Scaevola crassifolia, Senecio pinnatifolius* var. *latilobus, Spyridium globulosum, *Stellaria media, Threlkeldia diffusa, *Trachyandra divaricata.*

Photo (NW Corner):

SITE: TR15

Survey Date 1:	19 October 2019			**Surveyor:**	Kelli McCreery
Survey Date 2:	-			**Quadrat**	10m X 10m (100m^2)
Quadrat Location:	NW	50J 384244	6492066	**Datum**	GDA94
	NE	50J 384255	6492068	**Accuracy**	±3m
	SE	50J 384255	6492061	**Aspect:**	Crest.
	SW	50J 384247	6492059	**Altitude:**	9m
Landform:	Primary Dune. Very young.			**Soil:**	White sand (consolidated)
Leaf Litter:	<1% cover; 0-1cm depth.			**Fire History:**	>10 years
Condition:	Very Good.			**Details:**	Weeds 2%.

Vegetation NVIS:	**Stratum**	**Form**	**Cover**	**Dominant Species**
	G1	Grass <0.5m	30-70%	**Thinopyrum distchum, Spinifex hirsutus.*
	G2	Forbs <0.5m	0.25-5%	**Cakile maritima.*

Species: **Cakile maritima, Spinifex hirsutus, *Thinopyrum distchum.*

Photo (NW Corner):

Appendix D: Flora and Vegetation Location Data

CATEGORY	FEATURE	COORDINATE (GDA94)
Quadrat Location	TR01NE	50J 366475 6513152
Quadrat Location	TR01NW	50J 366468 6513148
Quadrat Location	TR01SE	50J 366480 6513145
Quadrat Location	TR01SW	50J 366471 6513141
Quadrat Location	TR02NE	50J 366498 6513198
Quadrat Location	TR02NW	50J 366490 6513194
Quadrat Location	TR02SE	50J 366503 6513190
Quadrat Location	TR02SW	50J 366495 6513184
Quadrat Location	TR03NE	50J 366379 6513324
Quadrat Location	TR03NW	50J 366373 6513317
Quadrat Location	TR03SE	50J 366388 6513318
Quadrat Location	TR03SE	50J 366380 6513311
Quadrat Location	TR04NE	50J 366342 6513279
Quadrat Location	TR04NW	50J 366332 6513279
Quadrat Location	TR04SE	50J 366342 6513270
Quadrat Location	TR04SW	50J 366332 6513270
Quadrat Location	TR05NE	50J 366395 6513247
Quadrat Location	TR05NW	50J 366388 6513242
Quadrat Location	TR05SE	50J 366401 6513237
Quadrat Location	TR05SW	50J 366392 6513233
Quadrat Location	TR06NE	50J 366561 6513489
Quadrat Location	TR06NW	50J 366552 6513490
Quadrat Location	TR06SE	50J 366564 6513480
Quadrat Location	TR06SW	50J 366552 6513480
Quadrat Location	TR07NE	50J 366448 6513398
Quadrat Location	TR07NW	50J 366439 6513395
Quadrat Location	TR07SE	50J 366452 6513387
Quadrat Location	TR07SW	50J 366443 6513385
Quadrat Location	TR08NE	50J 366526 6513292
Quadrat Location	TR08NW	50J 366517 6513285
Quadrat Location	TR08SE	50J 366532 6513283
Quadrat Location	TR08SW	50J 366523 6513278
Quadrat Location	TR09NE	50J 366590 6513218
Quadrat Location	TR09NW	50J 366583 6513209
Quadrat Location	TR09SE	50J 366595 6513212
Quadrat Location	TR09SW	50J 366590 6513204
Quadrat Location	TR10NE	50J 366625 6513449
Quadrat Location	TR10NW	50J 366616 6513444
Quadrat Location	TR10SE	50J 366627 6513442
Quadrat Location	TR10SW	50J 366619 6513438
Quadrat Location	TR11NE	50J 366739 6513377
Quadrat Location	TR11NW	50J 366730 6513376
Quadrat Location	TR11SE	50J 366739 6513366
Quadrat Location	TR11SW	50J 366731 6513367
Quadrat Location	TR12NE	50J 366468 6513461
Quadrat Location	TR12NW	50J 366463 6513453
Quadrat Location	TR12SW	50J 366470 6513447
Quadrat Location	TR13NE	50J 366781 6513348
Quadrat Location	TR13NW	50J 366773 6513340
Quadrat Location	TR13SE	50J 366784 6513338

CATEGORY	FEATURE	COORDINATE (GDA94)
Quadrat Location	TR13SW	50J 366777 6513333
Quadrat Location	TR14NE	50J 366596 6513328
Quadrat Location	TR14NW	50J 366590 6513322
Quadrat Location	TR14SE	50J 366603 6513321
Quadrat Location	TR15NE	50J 366368 6513254
Quadrat Location	TR15NW	50J 366360 6513248
Quadrat Location	TR15SE	50J 366372 6513246
Quadrat Location	TR15SW	50J 366365 6513239
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366473 6513456
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366473 6513454
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366473 6513453
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366473 6513452
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366475 6513452
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366476 6513452
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366478 6513446
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366477 6513444
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366476 6513438
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366482 6513435
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366485 6513437
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366487 6513439
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366489 6513438
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366483 6513433
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366483 6513432
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366482 6513430
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366480 6513429
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366482 6513428
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366502 6513427
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366515 6513425
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366474 6513473
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366472 6513471
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366532 6513419
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366534 6513414
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366561 6513409
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366562 6513407
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366574 6513404
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366575 6513403
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366578 6513403
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366582 6513400
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366582 6513398
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366582 6513398
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366582 6513412
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366581 6513416
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366567 6513421
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366556 6513424
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366581 6513442
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366580 6513439
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366589 6513437
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366589 6513440
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366606 6513475
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366605 6513475
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366610 6513479
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366610 6513480
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366618 6513485

CATEGORY	FEATURE	COORDINATE (GDA94)
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366631 6513454
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366634 6513451
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366636 6513451
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366639 6513452
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366640 6513451
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366641 6513450
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366642 6513450
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366642 6513450
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366644 6513449
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366667 6513433
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366665 6513433
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366663 6513432
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366664 6513430
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366664 6513428
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366668 6513425
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366672 6513424
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366678 6513424
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366691 6513431
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366688 6513426
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366686 6513426
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366682 6513422
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366682 6513419
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366683 6513418
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366685 6513417
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366686 6513416
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366686 6513415
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366685 6513414
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366684 6513413
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366684 6513412
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366681 6513413
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366680 6513410
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366696 6513368
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366646 6513386
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366634 6513392
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366634 6513392
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366634 6513394
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366633 6513395
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366631 6513394
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366630 6513394
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366628 6513394
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366628 6513395
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366625 6513396
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366623 6513398
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366621 6513400
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366621 6513401
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366621 6513401
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366617 6513401
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366616 6513399
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366614 6513397
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366611 6513402
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366611 6513409
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366612 6513409
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366610 6513410

CATEGORY	FEATURE	COORDINATE (GDA94)
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366609 6513411
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366610 6513412
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366604 6513411
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366602 6513411
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366600 6513413
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366600 6513416
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366601 6513418
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366598 6513424
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366596 6513425
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366594 6513427
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366592 6513425
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366597 6513430
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366607 6513431
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366608 6513433
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366609 6513449
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366608 6513453
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366607 6513455
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366606 6513457
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366609 6513464
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366608 6513464
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366607 6513468
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366605 6513469
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366605 6513469
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366607 6513461
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366613 6513450
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366613 6513453
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366612 6513456
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366611 6513460
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366612 6513464
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366612 6513467
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366627 6513454
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366628 6513451
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366629 6513451
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366630 6513449
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366631 6513449
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366633 6513447
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366633 6513445
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366626 6513444
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366624 6513446
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366622 6513446
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366620 6513447
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366619 6513444
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366615 6513442
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366617 6513441
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366621 6513440
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366623 6513442
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366625 6513441
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366625 6513442
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366624 6513443
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366616 6513453
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366611 6513449
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366612 6513444
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366615 6513439

CATEGORY	FEATURE	COORDINATE (GDA94)
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366616 6513436
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366614 6513434
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366616 6513432
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366617 6513430
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366617 6513426
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366618 6513422
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366615 6513421
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366614 6513422
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366609 6513423
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366608 6513425
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366619 6513414
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366621 6513414
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366620 6513412
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366621 6513410
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366625 6513410
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366628 6513407
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366630 6513406
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366631 6513405
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366631 6513403
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366639 6513403
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366640 6513402
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366641 6513404
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366642 6513405
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366644 6513400
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366652 6513407
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366652 6513408
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366654 6513409
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366651 6513414
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366652 6513415
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366653 6513414
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366655 6513415
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366654 6513422
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366659 6513427
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366657 6513431
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366654 6513430
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366647 6513429
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366646 6513433
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366644 6513433
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366643 6513435
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366639 6513439
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366638 6513440
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366634 6513437
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366633 6513435
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366632 6513434
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366630 6513434
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366630 6513434
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366629 6513433
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366629 6513435
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366628 6513437
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366627 6513438
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366625 6513436
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366622 6513433
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366622 6513434

CATEGORY	FEATURE	COORDINATE (GDA94)
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366620 6513433
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366625 6513428
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366627 6513427
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366629 6513427
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366631 6513427
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366635 6513429
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366635 6513427
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366636 6513425
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366634 6513423
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366635 6513422
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366635 6513420
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366635 6513418
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366635 6513417
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366628 6513421
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366626 6513421
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366630 6513415
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366631 6513414
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366633 6513413
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366645 6513415
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366646 6513417
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366647 6513419
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366647 6513423
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366644 6513426
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366781 6513325
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366789 6513339
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366785 6513341
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366782 6513339
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366778 6513332
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366777 6513336
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366772 6513344
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366779 6513351
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366772 6513340
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366751 6513368
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366762 6513366
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366764 6513364
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366764 6513364
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366764 6513371
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366756 6513368
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366757 6513367
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366758 6513366
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366757 6513365
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366473 6513456
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366473 6513454
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366473 6513453
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366473 6513452
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366475 6513452
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366476 6513452
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366478 6513446
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366477 6513444
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366476 6513438
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366482 6513435
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366485 6513437
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366487 6513439

CATEGORY	FEATURE	COORDINATE (GDA94)
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366489 6513438
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366483 6513433
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366483 6513432
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366482 6513430
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366480 6513429
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366482 6513428
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366502 6513427
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366515 6513425
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366474 6513473
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366472 6513471
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366532 6513419
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366534 6513414
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366561 6513409
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366562 6513407
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366574 6513404
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366575 6513403
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366578 6513403
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366582 6513400
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366582 6513398
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366582 6513398
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366582 6513412
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366581 6513416
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366567 6513421
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366556 6513424
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366581 6513442
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366580 6513439
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366589 6513437
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366589 6513440
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366606 6513475
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366605 6513475
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366610 6513479
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366610 6513480
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366618 6513485
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366631 6513454
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366634 6513451
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366636 6513451
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366639 6513452
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366640 6513451
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366641 6513450
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366642 6513450
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366642 6513450
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366644 6513449
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366667 6513433
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366665 6513433
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366663 6513432
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366664 6513430
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366664 6513428
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366668 6513425
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366672 6513424
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366678 6513424
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366691 6513431
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366688 6513426
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366686 6513426

CATEGORY	FEATURE	COORDINATE (GDA94)
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366682 6513422
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366682 6513419
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366683 6513418
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366685 6513417
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366686 6513416
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366686 6513415
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366685 6513414
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366684 6513413
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366684 6513412
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366681 6513413
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366680 6513410
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366696 6513368
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366646 6513386
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366634 6513392
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366634 6513392
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366634 6513394
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366633 6513395
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366631 6513394
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366630 6513394
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366628 6513394
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366628 6513395
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366625 6513396
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366623 6513398
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366621 6513400
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366621 6513401
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366621 6513401
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366617 6513401
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366616 6513399
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366614 6513397
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366611 6513402
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366611 6513409
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366612 6513409
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366610 6513410
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366609 6513411
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366610 6513412
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366604 6513411
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366602 6513411
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366600 6513413
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366600 6513416
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366601 6513418
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366598 6513424
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366596 6513425
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366594 6513427
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366592 6513425
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366597 6513430
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366607 6513431
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366608 6513433
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366609 6513449
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366608 6513453
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366607 6513455
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366606 6513457
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366609 6513464
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366608 6513464

CATEGORY	FEATURE	COORDINATE (GDA94)
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366607 6513468
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366605 6513469
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366605 6513469
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366607 6513461
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366613 6513450
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366613 6513453
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366612 6513456
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366611 6513460
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366612 6513464
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366612 6513467
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366627 6513454
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366628 6513451
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366629 6513451
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366630 6513449
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366631 6513449
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366633 6513447
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366633 6513445
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366626 6513444
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366624 6513446
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366622 6513446
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366620 6513447
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366619 6513444
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366615 6513442
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366617 6513441
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366621 6513440
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366623 6513442
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366625 6513441
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366625 6513442
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366624 6513443
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366616 6513453
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366611 6513449
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366612 6513444
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366615 6513439
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366616 6513436
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366614 6513434
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366616 6513432
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366617 6513430
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366617 6513426
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366618 6513422
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366615 6513421
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366614 6513422
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366609 6513423
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366608 6513425
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366619 6513414
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366621 6513414
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366620 6513412
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366621 6513410
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366625 6513410
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366628 6513407
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366630 6513406
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366631 6513405
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366631 6513403
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366639 6513403

CATEGORY	FEATURE	COORDINATE (GDA94)
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366640 6513402
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366641 6513404
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366642 6513405
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366644 6513400
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366652 6513407
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366652 6513408
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366654 6513409
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366651 6513414
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366652 6513415
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366653 6513414
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366655 6513415
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366654 6513422
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366659 6513427
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366657 6513431
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366654 6513430
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366647 6513429
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366646 6513433
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366644 6513433
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366643 6513435
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366639 6513439
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366638 6513440
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366634 6513437
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366633 6513435
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366632 6513434
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366630 6513434
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366630 6513434
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366629 6513433
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366629 6513435
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366628 6513437
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366627 6513438
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366625 6513436
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366622 6513433
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366622 6513434
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366620 6513433
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366625 6513428
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366627 6513427
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366629 6513427
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366631 6513427
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366635 6513429
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366635 6513427
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366636 6513425
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366634 6513423
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366635 6513422
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366635 6513420
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366635 6513418
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366635 6513417
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366628 6513421
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366626 6513421
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366630 6513415
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366631 6513414
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366633 6513413
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366645 6513415
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366646 6513417

CATEGORY	FEATURE	COORDINATE (GDA94)
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366647 6513419
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366647 6513423
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366644 6513426
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366781 6513325
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366789 6513339
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366785 6513341
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366782 6513339
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366778 6513332
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366777 6513336
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366772 6513344
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366779 6513351
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366772 6513340
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366751 6513368
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366762 6513366
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366764 6513364
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366764 6513364
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366764 6513371
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366756 6513368
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366757 6513367
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366758 6513366
Priority Flora	Beyeria cinerea subsp. cinerea (P3)	50J 366757 6513365
Priority Flora	Leucopogon maritimus (P1)	50J 366621 6513445
Priority Flora	Leucopogon maritimus (P1)	50J 366603 6513478
Priority Flora	Leucopogon maritimus (P1)	50J 366631 6513443
Priority Flora	Leucopogon maritimus (P1)	50J 366605 6513475
Priority Flora	Leucopogon maritimus (P1)	50J 366667 6513433
Priority Flora	Leucopogon maritimus (P1)	50J 366665 6513433
Priority Flora	Leucopogon maritimus (P1)	50J 366668 6513425
Priority Flora	Leucopogon maritimus (P1)	50J 366607 6513468
Priority Flora	Leucopogon maritimus (P1)	50J 366623 6513442
Priority Flora	Leucopogon maritimus (P1)	50J 366616 6513453
Priority Flora	Leucopogon maritimus (P1)	50J 366775 6513344
Priority Flora	Leucopogon maritimus (P1)	50J 366777 6513344
Priority Flora	Leucopogon maritimus (P1)	50J 366775 6513344
Priority Flora	Stylidium maritimum (P3)	50J 366629 6513437
Priority Flora	Stylidium maritimum (P3)	50J 366631 6513438
Priority Flora	Stylidium maritimum (P3)	50J 366626 6513440
Priority Flora	Stylidium maritimum (P3)	50J 366626 6513438
Priority Flora	Stylidium maritimum (P3)	50J 366625 6513437
Priority Flora	Stylidium maritimum (P3)	50J 366615 6513436
Priority Flora	Stylidium maritimum (P3)	50J 366617 6513427
Priority Flora	Stylidium maritimum (P3)	50J 366625 6513442
Priority Flora	Stylidium maritimum (P3)	50J 366612 6513452
Priority Flora	Stylidium maritimum (P3)	50J 366606 6513467
Priority Flora	Stylidium maritimum (P3)	50J 366781 6513345
Priority Flora	Stylidium maritimum (P3)	50J 366780 6513346
Priority Flora	Stylidium maritimum (P3)	50J 366782 6513346
Priority Flora	Stylidium maritimum (P3)	50J 366782 6513347
Priority Flora	Stylidium maritimum (P3)	50J 366780 6513350
Priority Flora	Stylidium maritimum (P3)	50J 366776 6513347
Priority Flora	Stylidium maritimum (P3)	50J 366604 6513472
Priority Flora	Stylidium maritimum (P3)	50J 366605 6513475
Priority Flora	Stylidium maritimum (P3)	50J 366634 6513451

CATEGORY	FEATURE	COORDINATE (GDA94)
Priority Flora	Stylidium maritimum (P3)	50J 366644 6513449
Priority Flora	Stylidium maritimum (P3)	50J 366671 6513424
Priority Flora	Stylidium maritimum (P3)	50J 366673 6513422
Priority Flora	Stylidium maritimum (P3)	50J 366674 6513425
Priority Flora	Stylidium maritimum (P3)	50J 366606 6513457
Priority Flora	Stylidium maritimum (P3)	50J 366612 6513456
Priority Flora	Stylidium maritimum (P3)	50J 366611 6513460
Priority Flora	Stylidium maritimum (P3)	50J 366619 6513444
Priority Flora	Stylidium maritimum (P3)	50J 366615 6513442
Priority Flora	Stylidium maritimum (P3)	50J 366617 6513441
Priority Flora	Stylidium maritimum (P3)	50J 366621 6513440
Priority Flora	Stylidium maritimum (P3)	50J 366627 6513438
Priority Flora	Stylidium maritimum (P3)	50J 366773 6513321
Priority Flora	Stylidium maritimum (P3)	50J 366786 6513334
Priority Flora	Stylidium maritimum (P3)	50J 366777 6513335
Priority Flora	Stylidium maritimum (P3)	50J 366762 6513369
Range Extension	Cassytha aurea var. aurea	50J 366490 6513194
Range Extension	Cassytha aurea var. aurea	50J 366373 6513317
Range Extension	Cassytha aurea var. aurea	50J 366552 6513490
Range Extension	Cassytha aurea var. aurea	50J 366439 6513395
Range Extension	Cassytha aurea var. aurea	50J 366517 6513285
Range Extension	Cassytha aurea var. aurea	50J 366583 6513209
Range Extension	Cassytha aurea var. aurea	50J 366625 6513449
Range Extension	Cassytha aurea var. aurea	50J 366730 6513376
Range Extension	Cassytha aurea var. aurea	50J 366596 6513328
Near S Extent Range	Melaleuca cardiophylla	50J 366552 6513490
Near S Extent Range	Melaleuca cardiophylla	50J 366730 6513376
Poorly Collected	Stylidium hesperium	50J 366625 6513449
Sleeper Weeds	*Eragrostis curvula	50J 366716 6513327
Sleeper Weeds	*Eragrostis curvula	50J 366697 6513455
Sleeper Weeds	*Hyparrhenia hirta	50J 366716 6513327
Sleeper Weeds	*Schinus terebinthifolia	50J 366656 6513491