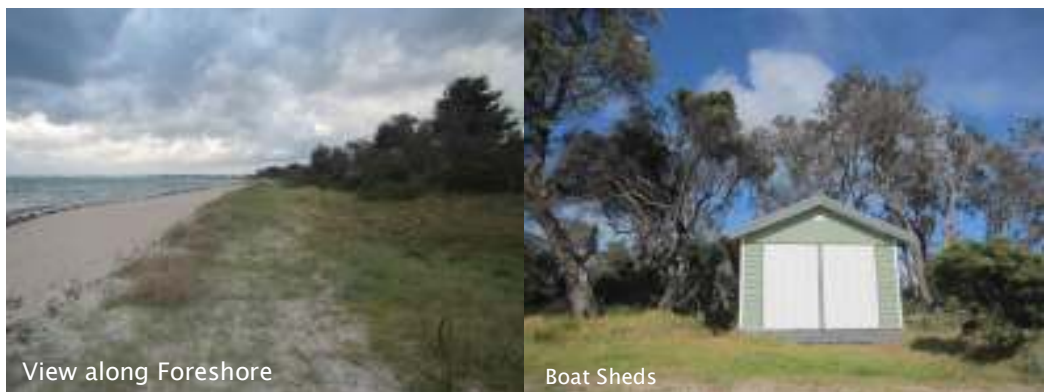


Capel Sound Foreshore

Vegetation Benchmark Mapping 2017– Quality, EVCs and Significant Flora Species



September 2017

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1. INTRODUCTION

Practical Ecology Pty Ltd was commissioned by the Capel Sound Foreshore Committee to undertake a variety of mostly field based works associated with vegetation mapping along the Capel Sound Foreshore. The variety of works included:

- Digitising the previous hand drawn 2007 indigenous vegetation cover mapping data, so that it is a GIS accessible format overlaid on aerial imagery.
- Re-doing the indigenous vegetation cover mapping data via a 20m x 20m grid based system overlaid on aerial imagery, to provide a 10 year update on vegetation condition along the foreshore.
- Mapping the Ecological Vegetation Classes (EVCs) that occur within the Foreshore Reserve, and presenting them in digital format.
- Compiling and mapping an inventory of significant flora species that occur along the foreshore.
- Compiling all the data and presenting it in a brief baseline data report with accompanying maps, including: EVCs, significant species, and the 2007 and 2017 indigenous vegetation cover mapping.
- The provision of basic management recommendations based on observations made whilst undertaking the mapping fieldwork.

1.2 Study Site

The Capel Sound Foreshore extends for approximately 4.2kms from near Shirlow Avenue, Rye eastwards to Chinaman's Creek, Capel Sound. The study area is bound by Chinaman's Creek to the east, the Nepean Highway to the south, the Rye Foreshore Reserve to the west and Port Phillip Bay to the north.

The foreshore comprises a mixture of uses and vegetation conditions including foreshore camping areas, many boatsheds and areas of remnant native vegetation. The foreshore varies from approximately 80 to 120 metres wide and includes both vehicle and pedestrian access tracks, including the shared (pedestrian and bicycle) Bay Trail.

The study area is part of a continuous area of foreshore that extends along the eastern and southern sides of Port Phillip Bay. The study area is concerned with the portion of the foreshore that is managed by the Capel Sound Foreshore Committee from Chinaman's Creek westwards to opposite Shirlow Avenue, Rye.

The Capel Sound foreshore falls within the Gippsland Plains Bioregion (DSE 2005).

Figure 1 below presents an aerial image of the foreshore reserve from Shirlow Avenue, Rye in the west to Chinaman's Creek in the east.



Figure 1. Aerial View of Capel Sound Foreshore

Image sourced from Google Earth Pro

2. METHODS

The main focus of the 2017 vegetation benchmark mapping was to record the vegetation condition, location of significant species and Ecological Vegetation Classes within the foreshore reserve.

In addition, the 2007 hand drawn vegetation condition mapping was digitised and overlaid on aerial imagery, to provide comparative data with the 2017 vegetation condition mapping.

The vegetation mapping fieldwork was undertaken by Gidja Walker and Katherine Smedley on the 25th and 26th July 2017.

The previous report prepared for the study area: *The Capel Foreshore 2007 Vegetation Survey and Management Prescriptions* (Walker G and Douglas I), was utilised extensively throughout the vegetation mapping fieldwork.

The following methods were employed to undertake the vegetation mapping work:

2.1 Flora

Whilst a comprehensive flora survey was not undertaken during the course of the vegetation mapping fieldwork, records were made of significant flora species within the foreshore reserve and observations were made regarding general vegetation management recommendations.

The assessment of significant flora species along the foreshore reserve was undertaken by Gidja Walker based on her detailed knowledge of the Mornington Peninsula and the Capel Sound foreshore, and also utilised previous records from the 2007 *The Capel Foreshore Vegetation Survey and Management Prescriptions* (Walker G and Douglas I) report and accompanying maps.

Plant taxonomy for common and scientific names used in this report are generally in accordance with *A Census of the Vascular Plants of Victoria* (Walsh and Stajsic 2008) and/or from the Victorian Biodiversity Atlas (DEPI 2013).

2.1.1 Significant Flora Species

The significant flora species recorded within this report and its accompanying maps, have been designated as significant based on detailed knowledge of the Mornington Peninsula and Port Phillip Bay foreshore, meaning that some flora species that are commonly recorded across Victoria ie: Swamp Gums *Eucalyptus ovata* and Black Wattles *Acacia mearnsii*, have been recorded as significant as they are in low numbers along the foreshore reserve. The significance ratings are based on extensive local knowledge, rather than the generic significance ratings that are frequently applied across Victoria.

The following categories have been utilised in defining significant flora species:

Category	Significant
EBPC	Conservation status under EPBC Act 1999: EX: Extinct, CR: Critically endangered, EN: Endangered, VU: Vulnerable and CD: Conservation dependant
FFG	Conservation status under FFG Act 1988: L: Listed, N: Nominated, I: Invalid or ineligible, R: Rejected and D: Delisted
VROTs	Conservation status of Threatened Flora in Victoria (DSE 2005) x: Presumed extinct, e: Endangered, v: Vulnerable, r: rare and k: poorly known
R	Regionally Significant
HL	High Local significance/few individuals along foreshore

2.1.2 Limitations of Significant Flora Survey

The following considerations should be made regarding the limitations of the flora survey:

- As the survey was undertaken during winter, some species, particularly orchid, lily and other herbaceous species that can only be observed for a limited period of time may not have been recorded during the assessments
- A one-off seasonal flora survey is never able to ‘capture’ the full suite of indigenous grassy and herbaceous species growing within a foreshore reserve, and

With regard to these limitations, it is still considered that the majority of significant flora species within the foreshore were recorded based on previous surveys, maps and local knowledge.

2.2 Ecological Vegetation Classes

Ecological Vegetation Classes (EVCs) are a method of systematic organisation of plant communities into common types that occur in similar environmental conditions throughout Victoria. Each vegetation type is identified on the basis of its floristic composition (the plant species present), vegetation structure (woodland, grassland, saltmarsh), landform (gully, foothill, plain) and environmental characteristics (soil type, climate).

DEPI EVC mapping (DEPI 2014a) was accessed to assess the EVC likely to occur on the study area. EVCs were then identified in the field according to observable attributes including dominant and characteristic species consistent with the benchmark descriptions (DEPI 2014b).

2.3 Vegetation Quality and Cover Mapping

Vegetation Cover mapping provides indicative data on the indigenous vegetation cover and quality in the mapped area of the foreshore reserve. The mapping assessed and categorised remnant vegetation within the foreshore based on the upper (canopy and shrub) and lower (groundstorey) layers.

Vegetation Cover Mapping provides a useful guide for determining general vegetation management priorities along the foreshore reserve. Vegetation Cover Maps can also be utilised to monitor indigenous ground storey vegetation quality/cover across a reserve over time.

To undertake an assessment, both the indigenous upper and lower vegetation layers within an area are considered. The amount of 'indigenous' versus 'exotic' plant cover is then considered to determine the vegetation quality/cover category. Vegetation Cover Mapping along the Capel Sound Foreshore was based on a three-colour coded rating system as presented in Table 1 below.

Table 1. Indigenous Vegetation Quality Mapping Categories

Colour	Indigenous Vegetation Quality
Red	<p>Less than 30% indigenous vegetation cover</p> <p>Revegetation Area– lowest priority</p> <ul style="list-style-type: none"> • Aim to control weed seed production • May plant in high profile areas or to link higher quality areas • Still may have habitat or buffer values which weeds are providing
Orange	<p>More than 30% indigenous vegetation cover</p> <p>Restoration Area– moderate priority</p> <ul style="list-style-type: none"> • Restore slowly • Aim to control weed population • Possible enrichment planting after allowing time for natural regeneration
Green	<p>Greater than 60% indigenous vegetation cover</p> <p>Retention areas– highest management priority</p> <ul style="list-style-type: none"> • Retain what is left • Aim to eliminate all weeds over time • No planting, allow for natural regeneration/recruitment only • Highly skilled bushland management workforce only to work in these areas– skilled in plant identification and targeted weed control works

A 20m x 20m grid system was overlaid across the entire area of the foreshore reserve to ensure the accuracy of the 2017 mapping, and that each 20m x 20m grid was surveyed. It is envisaged the grid system will continue to be used as a reference in any future mapping undertaken along the foreshore reserve.

Limitations

Issues with vegetation cover mapping include the subjectivity between different assessors and the time of year in which the mapping is undertaken. The amount of recent rainfall can impact upon the extent of indigenous versus exotic groundstorey vegetation cover present–weeds generally prefer higher rainfall, whilst less rainfall can favour indigenous species cover.

3. ECOLOGICAL VEGETATION CLASSES

The EVC information presented within this report was obtained from the 2007 *Capel Foreshore Vegetation Survey and Management Prescriptions* (Walker G and Douglas I) report and accompanying maps, as the 2017 assessment determined that the EVCs were consistent with those that were recorded previously.

The previous 2007 EVC maps have been digitised and overlaid on aerial imagery. They are presented in Appendix 2.

Information on the six EVCs recorded along the Capel Sound Foreshore is provided in Table 2 below. Whilst remnants of these six EVCs were recorded along the foreshore, they were not always recorded as definite patches of one EVC, instead some mosaics of EVCs were recorded in some instances due to the extent of modification/disturbance of the foreshore vegetation.

The Bioregional Conservation Status (BCS) provided for each EVC is based on the significance of each EVC within the Gippsland Plain bioregion.

Table 2. Indigenous Vegetation Quality Mapping Categories

EVC (and BCS)	Benchmark Description (provided by DSE 2004)	Site Description (as Per Walker & Douglas, 2007)
EVC 2: Coast Banksia Woodland (Vulnerable)	Restricted to near coastal localities on secondary or tertiary dunes behind Coastal Dune Scrub. Usually dominated by a woodland overstorey of Coast Banksia <i>Banksia integrifolia</i> to 15 m tall over a medium shrub layer. The understorey consists of a number of herbs and sedges, including scramblers	Forms in the swales behind the dune system. Would have been dominant EVC along foreshore, prior to clearing for camping. Loss of trees/limbs still occurring due to pressure from camping, along with lack of regeneration in lawn/camping areas. Many trees exhibit signs of borer attack as predator (ie: Yellow-tailed Black Cockatoos) are less frequent to Peninsula due to lack of large old trees/hollows for nesting
EVC 53: Swamp Scrub (Endangered)	Closed scrub to 8 m tall at low elevations on alluvial deposits along streams or on poorly drained sites with higher nutrient availability. The EVC is dominated by Swamp Paperbark <i>Melaleuca ericifolia</i> (or sometimes Woolly Tea-tree <i>Leptospermum lanigerum</i>) which often forms a dense thicket, out-competing other species. Occasional emergent eucalypts may be present. Where light penetrates to ground level, a moss/lichen/liverwort or herbaceous ground cover is often present. Dry variants have a grassy/herbaceous ground layer.	Limited to small patch adjacent to Chinaman's Creek at northern end of foreshore/study area. There are a few remnant Swamp Gums along the creek and near the toilet block which may indicate a transition into Swampy Woodland which may have once occurred around Chinaman's Creek (beyond the band of Swamp Scrub) towards to West Rye shops. Chinaman's Creek also supports an in-stream community of Reedy Swamp. (EVC 821: Tall Marsh)
EVC 160: Coastal Dune Scrub (Least Concern)	Closed scrub to 5 m tall with occasional emergents occurring on secondary dunes along ocean and bay beaches and lake shores. Occupies siliceous and calcareous sands that are subject to high levels of saltspray and continuous disturbance from onshore winds	Occurs on the inland side of the primary dune. Vegetation tends to be dense and wind pruned and is able to withstand coastal influences. It forms a buffer for the vegetation growing in the swales behind the dune system- which at Capel Sound is Coast Banksia Woodland and Coastal Alkaline Scrub closer to Rye.

EVC (and BCS)	Benchmark Description (provided by DSE 2004)	Site Description (as Per Walker & Douglas, 2007)
EVC 311: Berm Grassy Shrubland (Endangered)	Low shrubland to 1.5 m tall occurring in sheltered coastal areas where sand deposits have formed as a result of low energy wave action. Contains a number of halophytic species over a ground layer of grasses and herbs.	Occurs on the primary dune facing the Bay, in combination with EVC 160: Coastal Dune Scrub. Primary dunes are typically colonized by indigenous species such as Coast Spinifex, Coast Salt-bush and Salt-grass or the introduced Marram Grass. At Capel Sound, the primary dune has small remnants of both EVC 160 and EVC 311, and is dominated by the introduced Marram Grass and Sea Wheat-grass. As the primary dune is so disturbed, it was hard to determine which of the two EVCs occurred where
EVC 858: Coastal Alkaline Scrub/Coastal Moonah Woodland (Depleted) Listed under the State FFG Act	Near-coastal, deep calcareous (alkaline) and largely stable sand dunes and swales commonly dominated by Moonah <i>Melaleuca lanceolata</i> ssp. <i>lanceolata</i> . It occurs at low elevations of 20–60 m above sea level, average annual rainfall is approximately 550–950 mm, and it occurs on a variety of geologies and soil types. Low woodland or tall shrubland to 8 m tall, typically with a medium shrub layer, small shrub layer and sedges, grasses and herbs in the ground layer.	A large patch at the southern/Rye end of the study area. Indicated by presence of Coast Wirilda and Thyme Rice-flower.
EVC 879: Coastal Dune Grassland (Endangered)	Consists of grasses and halophytes (succulents) that colonise the fore dunes of ocean beaches. Soils are siliceous sands that have a very low humus content.	Occurs on the primary dune facing the Bay, in combination with EVC 160: Coastal Dune Scrub. Primary dunes are typically colonized by indigenous species such as Coast Spinifex, Coast Salt-bush and Salt-grass or the introduced Marram Grass. At Capel Sound, the primary dune has small remnants of EVC 160, EVC 311 and EVC 879, and is dominated by the introduced Marram Grass. As the primary dune is so disturbed, it was hard to determine which of the two EVCs occurred where.

4. SIGNIFICANT FLORA SPECIES

No flora survey was undertaken as a component of the 2017 vegetation mapping. However in 2007, 242 species were recorded in the foreshore-study area; of these 98 were indigenous species (40.5%), whilst 144 were introduced species (59.5%). Refer to the 2007 report for this species list.

Due to 'waves' of plantings that occurred along the foreshore it was not always possible to determine if some of the species (especially trees and/or shrubs) were remnant or whether they have been introduced. Prior to the 1990s it is considered that the origin of any planted species cannot be accurately determined. Now, any planted species are grown from locally sourced indigenous seed stock.

A list of significant flora species recorded in the foreshore/study area is provided in Table 3 below, which combines data from the 2007 and 2017 surveys. Significant species are considered to be those listed as State threatened, plus species growing along the foreshore that are known to be of Regional and High Local significance, based on local knowledge of remnant vegetation within the Mornington Peninsula.

Table 3 lists all flora species from the 2007 and 2017 vegetation surveys that are considered to be significant within the Capel Sound Foreshore, and also provides the following information:

- The significance level of each flora species based on either the Department of Environment, Land, Water and Planning (DELWP) Victorian Register of Threatened Species (VROTS) ratings or local knowledge (Regional/Local),
- Whether a species was recorded in 2007 and/or 2017, and
- Comments.

Table 3 provides a 10 year comparison of significant flora species within the foreshore reserve, including whether a particular flora species still exists, has been 'recorded' since 2007 and comments as to why some species are in decline. A further summary of the data presented in Table 3 is provided at the end of this section of the report.

Table 3. Significant Flora Species

Botanical Name	Common Name	Significance		Recorded 2007 (X- Yes)	Recorded 2017	Comments
		VROTS	Regional/ Local			
<i>Acacia mearnsii</i>	Black Wattle		HL	X	X	
<i>Acacia melanoxylon</i>	Blackwood		HL	X	X	
<i>Acacia paradoxa</i>	Hedge Wattle		HL	X	X	Some planted?
<i>Acacia uncifolia</i>	Wirilda Wattle	r		X	X	Growing at Rye end of reserve
<i>Acianthus spp</i>	Mosquito-orchid		HL	X	X	
<i>Actites megalocarpa</i>	Dune Thistle		R		X	
<i>Allocasuarina verticillata</i>	Drooping Sheoak		HL	X	X	Natural and planted
<i>Alyxia buxifolia</i>	Sea Box		R	X	X	Some quite old individuals
<i>Austrostipa flavescens</i>	Coast Spear-grass		R	X	X	
<i>Banksia integrifolia</i> (regeneration)	Coast Banksia		R		X	Mapped patches of regeneration as there are

Botanical Name	Common Name	Significance		Recorded 2007 (X- Yes)	Recorded 2017	Comments
		VROTS	Regional/ Local			
						many large old Banksia's with limited regeneration
<i>Battarea stevenii</i>	Mallee Drumstick		R		X	
<i>Bursaria spinosa</i>	Sweet Bursaria		HL	X	X	
<i>Carpobrotus rossii</i>	Karkalla		R	X	X	
<i>Cladium procerum</i>	Leafy Twig-sedge	r		X	X	In Chinaman's Creek
<i>Comesperma volubile</i>	Love Creeper		HL	X		Area now mulched and planted
<i>Correa alba</i>	White Correa		HL	X	X	Some planted?
<i>Correa reflexa</i>	Common Correa		HL	X	X	Some Planted?
<i>Corybas spp</i>	Helmet-orchid		R?	X	X	
<i>Crassula sieberiana s.l.</i>	Sieber Crassula		R	X		Too early in the season to detect (2017)
<i>Cynoglossum australe</i>	Australian Hound's- tongue		R	X	X	
<i>Cyrtostylis reniformis</i>	Small Gnat-orchid		R	X		
<i>Cyrtostylis spp.</i>	Gnat-orchid		R	X	X	
<i>Daucus glochidiatus</i>	Australian Carrot		R	X	X	Declining due to mulch use
<i>Dianella sp. aff revoluta</i> (Coastal)	Coastal Flax-lily		HL	X	X	
<i>Eucalyptus ovata var. ovata</i>	Swamp Gum		HL	X	X	Some planted? Those growing near Chinaman's creek are remnant
<i>Eucalyptus viminalis subsp.</i> <i>pryoriana</i>	Manna Gum		HL	X		
<i>Gahnia trifida</i>	Coast Saw-sedge		HL	X		
<i>Hypoxis spp</i>	Hypoxis		HL	X		Area were formerly located now mulched
<i>Lachnagrostis billardierei</i> <i>subsp. billardierei</i>	Coast Blown-grass		R	X	X	
<i>Lachnagrostis filiformis</i> <i>var. 1 or 2</i>	Common or Wetland Blown-grass	k?	HL	X		
<i>Lagenophora stipitata</i>	Coast Bottle-daisy		HL	X	X	
<i>Lepidosperma gladiatum</i>	Coast Sword-sedge		R	X	X	
<i>Leucophyta brownii</i>	Cushion Bush		R	X	X	
<i>Melaleuca lanceolata</i> <i>subsp. lanceolata</i>	Moonah		R	X	X	
<i>Microtis spp</i>	Onion-orchid		R	X	X	
<i>Muehlenbeckia adpressa</i>	Climbing Lignum		R	X	X	
<i>Muellerina eucalyptoides</i>	Creeping Mistletoe		HL	X	X	Only one growing along foreshore
<i>Olearia glutinosa</i>	Sticky Daisy-bush		R	X	X	Some planted?
<i>Olearia sp2 Morn pen</i>	Peninsula Daisy-bush	r			X	?Planted
<i>Oxalis rubens</i>	Dune Wood-sorrel	r	HL	X	X	
<i>Pelargonium australe</i>	Austral Stork's-bill		R	X	X	Some planted?
<i>Pimelea serpyllifolia subsp.</i> <i>serpyllifolia</i>	Thyme Rice-flower		R	X	X	
<i>Poa halmaturina</i>	Dune Poa	r		X		Planted? Formerly <i>Poa</i> <i>poiformis var. ramifer</i>
<i>Pomaderris paniculosa</i> <i>subsp. paralia</i>	Coast Pomaderris		R	X	X	Some Planted?
<i>Pterostylis pedunculata</i>	Maroonhood		R	X	X	
<i>Pultenaea tenuifolia</i>	Slender Bush-pea		R	X		
<i>Ranunculus sessiliflorus</i>	Annual Buttercup		R	X	X	Declining with mulch use

Botanical Name	Common Name	Significance		Recorded 2007 (X- Yes)	Recorded 2017	Comments
		VROTS	Regional/ Local			
<i>Ranunculus spp</i>	Buttercup		HL?	X		
<i>Rubus parvifolius</i>	Small-leaf Bramble		HL	X	X	
<i>Sambucus gaudichaudiana</i>	White Elderberry				X	
<i>Senecio spathulatus s.l. (?)</i>	Dune Groundsel		R	X		
<i>Salsola tragus subsp. pontica</i>	Coast saltwort	r			X	
<i>Sonchus hydrophilis</i>	Native Sow-thistle		R		?	
<i>Spinifex sericeus</i>	Hairy Spinifex		HL	X	X	
<i>Stellaria pungens</i>	Prickly Starwort		HL	X		
<i>Swainsona lessertiifolia</i>	Coast Swainson-pea		R	X	X	
<i>Thelymitra spp.</i>	Sun-orchid		HL	X	X	
<i>Threlkeldia diffusa</i>	Coast Bonefruit		R	X	X	
R- Regionally Significant		Conservation status of Threatened Flora in Victoria (DELWP formerly DSE 2005)- VROTS x: Presumed extinct, e: Endangered, v: Vulnerable, r: rare and k: poorly known Definitions of Conservation Status Codes are found on DELWP website under Advisory List of Rare or Threatened Plants				
HL- High Local significance/few individuals growing on foreshore						

Summary of Significant Flora Species (2007 and 2017)

Both in 2007 and now in 2017, all local species growing on the foreshore are considered to be significant due to depletion of the remnant coastal vegetation along Port Phillip Bay, the on-going pressures from competing land use interests along the foreshore and on-going urban development on the opposite side of the foreshore reserve/Nepean Highway.

In 2007, up to five flora species of State significance were recorded, along with at least 24 species of Regional significance. Species of High Local significance are those for which only a few individuals are known locally along the surveyed area of the foreshore reserve.

In 2017, five flora species of State significance were also recorded, plus 25 species of Regional significance. Whilst mostly the same significant species were recorded in both 2007 and 2017, there are some differences as presented in Table 3. The differences are mainly due to the season of survey- some annual species recorded in 2007 were not evident in winter 2017

5. MAPPING

As outlined previously, the main focus of the 2017 project was to undertake current mapping (or digitise the hand drawn 2007 Mapping) of:

- Vegetation Quality (presented in Maps 1a to 1f)
- Ecological Vegetation Classes (presented in Maps 2a to 2f), and
- Significant Flora Species (presented in Maps 3a to 3f).

In addition, information regarding weed species has been repeated from the 2007 report, with the additions of several new species recorded during the 2017 vegetation assessment.

These three sets of maps are presented at the back of this report. A weed prioritisation system is presented in Appendix 1.

The aim of digitising and/or re-doing mapping for these three aspects of indigenous vegetation along the foreshore was to provide comparative data, to determine if there had been any changes in vegetation cover and quality, cover and abundance of significant species and the area of each Ecological Vegetation Class over the 10 year assessment period; following 10 years of on-going foreshore bushland management works.

A brief discussion of each of these three areas of vegetation mapping, based on an analysis of the maps is provided below:

5.1 2007/2017 Vegetation Quality Mapping

Visual comparisons between the 2007 and 2017 vegetation quality mapping depicts that there has been changes in vegetation quality across the foreshore, with direct comparisons across Maps 1a to 1f between the 2017 and 2007 maps depicting many changes in vegetation quality and the extent of patches.

However an analysis in hectares of the three vegetation quality categories from the digitised (2007) and GIS (2017) data reveals that there has actually been very little change in area covered (in hectares) between the three vegetation quality categories over the 10 year period. Refer to Table 4 below for the area in hectares of each mapped vegetation category in 2007 and 2017.

Table 4. Extent of Mapped Vegetation Cover

Year of Vegetation Quality Mapping	Vegetation Quality Category			Total Hectares Mapped
	0–30% indigenous vegetation cover (red)	30–60% indigenous vegetation cover (orange)	>60% indigenous vegetation cover (green)	
2007	9.07ha	5.399ha	10.279ha	24.748ha
2017	8.77ha	6.267ha	9.56ha	24.597ha
Difference between 2007 and 2017	-0.3ha	+0.868ha	-0.719ha	-0.151ha

Comparisons between 2007 & 2017 Vegetation Quality Mapping

Whilst visual comparisons between the 2007 and 2017 vegetation quality mapping (refer to Maps 1a to 1f), suggest there has been many changes in vegetation quality along the foreshore reserve, the data analysis presented in Table 4 indicates that the changes are minimal.

As the 2007 data was mapped by hand and covered 'hard surfaces' such as the boat sheds, shared trails and access roads within the foreshore reserve, and was then digitised in 2017 by directly overlaying the hand mapped data on aerial photography, it is likely there were some errors in 'digitising' the data. In 2017, due to the advances in mapping technology and aerial imagery it was possible to excise the boat sheds, pedestrian/bicycle trails and many of the internal access roads from the mapped areas, which accounts for the decrease in mapped area shown on the 'Total Hectares Mapped' column of Table 4.

A 20m x 20m grid system was also overlaid across the foreshore reserve as a component of the 2017 mapping, which can be viewed in Appendix 1. It is envisaged that the grid system will continue to be utilised in any future mapping along the foreshore, as it establishes a repeatable grid system that can be utilised to easily locate any future monitoring plots/photo points, etc.

It is likely that the minimal changes between the 2007 and 2017 data may account for any errors in digitising the data, as it was expected that with 10 years of bushland/vegetation management and weed control works that there would be a noticeable increase in the areas of the reserve with 30–60% and greater than 60% indigenous vegetation cover.

Very little change was expected in the area of 0–30% indigenous vegetation cover as this area mostly covers the camping grounds, which have not changed in area since 2007. In the longer term, it is expected that with an increase in revegetation/planted areas within the camping grounds (ie: between sites and around facilities) that there will be incremental increases in the 30–60% and greater than 60% indigenous vegetation cover areas, over the years.

If there was some management focus on managing the large old remnant trees within the camping grounds as small habitat/biodiversity areas, then this would also incrementally increase the area of higher indigenous vegetation cover along the foreshore reserve.

5.2 2007/2017 EVC Mapping

The EVC mapping was primarily undertaken in 2007, with visual confirmation of the areas mapped in 2017. The 2007 hand drawn EVC mapping was also digitised and overlaid on aerial imagery of the foreshore reserve in 2017. The EVC mapping is provided in Maps 2a to 2f.

With regard to the foreshore reserve, it should be noted that the sea/land boundary is artificially constructed and that it provides a connection between the adjacent marine environment within Port Phillip Bay, and it also provides some connection to Tootgarook

Swamp, primarily via Chinaman's Creek, which is located to the east of the foreshore reserve.

In mapping the EVC's, due to the extent of modification along the foreshore reserve, indicator species were used to determine the original EVC's that are likely to have occurred in what is now a disturbed landscape. This is especially the case for the original EVCs that would have occurred along the fore dunes which are now dominated by the introduced Marram Grass.

With regard to biodiversity values within the foreshore reserve, the ecotone between EVC's is where biodiversity values are highest, and that where a number of ecotones interconnect is where the nodes of highest biodiversity values exist.

5.3 2007/2017 Significant Flora Species Mapping

Mapping the location of significant flora species was first undertaken in 2007. The 2017 vegetation mapping included comparing the 2007 hand drawn locations of significant species and determining whether these species were still growing in their previously mapped locations, plus also adding any new additions to the mapping.

The 2017 mapping is a digital mapping layer that can now be utilised as an on-going mapping tool that can be added to over time if new locations/specimens of significant flora species are recorded. As outlined in Section 4 and Table 3, there have been some additions/decreases in significant species and their locations along the foreshore reserve. Table 4 provides comparative data between the significant flora species recorded in 2007 and 2017. The 2017 maps (Appendix 3) do not show the 2007 significant flora species data.

Due to time constraints a systematic survey of the foreshore reserve for all the entire significant flora species listed was not undertaken.

In addition, the significant flora species maps also depict the location of high threat weed species/infestations and the location of potential midden sites.

5.4 Weed Control within the Foreshore Reserve

146 introduced flora species have been recorded along the Capel Sound foreshore, most of which were originally recorded in the 2007 assessment, along with a few additional species that have been added to the weed species list in 2017.

Of the 146 weed species, 42 species are classified as S1 species which are generally small patches that are a priority for immediate removal, 45 species are classified as S2 weeds which should be removed, but are not as high a priority as S1 weeds. Six species are Keystone weed species which will need a long term management approach to manage, with the emphasis being on working from high quality (green) areas outwards. The remaining 50 weed species are considered to be ubiquitous; that is they are difficult to control and are not really a priority except in the green mapped areas.

Weeds vary in their ability to invade and dominate indigenous vegetation. Some will disappear if the disturbance or threatening process is removed or management regimes are changed. Others have been growing in the foreshore reserve for a long time and will require a long term management approach. Others are new arrivals of varying risk but are the easiest to eliminate before they spread. Considerations in undertaking weed control are:

- Whether a particular plant is actually a weed?
 - Correct identification is an essential first step.
 - If you are not sure, then don't remove it.

The second consideration is:

- How long has it been there and whether it is serving a function within the ecosystem?
- Is it providing habitat for fauna, shade for groundstorey ecosystems or erosion control on a primary dune system?

The responses to these questions may then determine the type of weed control required, and may help guide weed control programs. Appendix 1 provides an example of a weed prioritisation system that can be utilised to assist in planning and prioritising weed management programs.

The following lists of weeds species within the foreshore reserve have been copied from the 2007 report (Walker and Douglas); with the addition of several new weed species recorded in 2017. The risk/status column is explained in Appendix 1.

Essentially the risk/status of these weed species has not altered since 2007, as weed invasion is one of the greatest management threats to indigenous vegetation and it requires an on-going management commitment.

INTRODUCED SPECIES AND METHODS OF CONTROL

Botanical Name	Common Name	risk/status
<i>Acacia longifolia</i> subsp. <i>longifolia</i>	Sellow Wattle	S1
<i>Acacia saligna</i>	Golden Wreath Wattle	S1
<i>Acacia</i> spp. (planted and naturalized)	Watties	S2
<i>Acanthus mollis</i>	Bear's Breach	S2
<i>Acetosa sagittata</i>	Rambling Dock	S1
<i>Agapanthus praecox</i> subsp. <i>orientalis</i>	Agapanthus	S2
<i>Agonis flexuosa</i> (planted and naturalized)	Willow Myrtle	S2
<i>Agrostis capillaris</i>	Brown-top Bent	S2
<i>Agrostis ?gigantea</i>	Red-top Bent	U
<i>Aira</i> spp.	Hair Grass	U
<i>Allium triquetrum</i>	Three-corner Garlic/Angled Onion	S1
<i>Ammophila arenaria</i>	Marram Grass	K
<i>Anchusa arvensis</i>	Bugloss	S2/U
<i>Arctotheca calendula</i>	Cape Weed	U
<i>Asparagus densiflorus</i>	Sprengerl Fern	S1
<i>Asparagus asparagoides</i>	Bridal Creeper	K
<i>Asparagus scandens</i>	Asparagus Fern	S1
<i>Aster subulatus</i>	Aster-weed	U
<i>Avena barbata</i>	Bearded Oat	U

<i>Berkheya rigida</i>	African Thistle	U
<i>Briza maxima</i>	Large Quaking-grass	S1
<i>Briza minor</i>	Lesser Quaking-grass	S2
<i>Bromus catharticus</i>	Prairie Grass	U
<i>Bromus diandrus</i>	Great Brome	S2
<i>Bromus hordeaceus</i> subsp. <i>hordeaceus</i>	Soft Brome	S2
<i>Bromus</i> spp.	Brome	S2
<i>Cakile ?edentula</i>	American Sea Rocket	U
<i>Cakile maritima</i> ssp. <i>maritima</i>	Sea Rocket	U
<i>Cardamine hirsuta</i> s.l.	Common Bitter-cress	U
<i>Carpobrotus edulis</i>	Hottentot Fig	S1
<i>Carpobrotus</i> spp.	Pigface	S1
<i>Catapodium rigidum</i>	Fern Grass	U
<i>Centranthus ruber</i>	Red Valerian	S2
<i>Cerastium</i> spp.	Mouse-ear Chickweed	U
<i>Chamaecytisus palmensis</i>	Tree Lucerne	S1
<i>Chasmanthe floribunda</i>	African Cornflag	S1
<i>Chenopodium album</i>	Fat Hen	U
<i>Chlorophytum comosum</i>	Spider-plant	S2
<i>Chrysanthemoides monilifera</i> subsp. <i>monilifera</i>	African Boneseed	S1
<i>Cirsium vulgare</i>	Spear Thistle	S1
<i>Coryza</i> spp.	Fleabane	U
<i>Coprosma repens</i>	Mirror Bush	S1
<i>Cordyline australis</i>	New Zealand Cabbage-tree	S2
<i>Cotoneaster franchettii</i>	Grey Cotoneaster	S1
<i>Cotoneaster glaucophyllus</i> var. <i>serotinus</i>	Large-leaf Cotoneaster	S1
<i>Cotoneaster</i> spp.	Cotoneaster	S1
<i>Crassula multicava</i> subsp. <i>multicava</i>	Shade Crassula	S2
<i>Crassula tetragona</i> subsp. <i>robusta</i>	Shrubby Crassula	S2
<i>Crococsmia</i> X <i>crococsmiiflora</i>	Montbretia	S1
<i>Cupressus macrocarpa</i>	Monterey Cypress (planted)	S2
<i>Cynodon dactylon</i> var. <i>dactylon</i>	Couch	U/S2
<i>Cynosurus echinatus</i>	Rough Dog's-tail	U
<i>Dactylis glomerata</i>	Cocksfoot	S2
<i>Delairea odorata</i>	Cape Ivy	S2
<i>Diplotaxis tenuifolia</i>	Sand Rocket	S2
<i>Dipogon lignosus</i>	Common Dipogon	S1
<i>Ehrharta erecta</i> var. <i>erecta</i>	Panic Veldt-grass	K
<i>Ehrharta longiflora</i>	Annual Veldt-grass	S2
<i>Erigeron karvinskianus</i>	Seaside Daisy	S2
<i>Eucalyptus leucoxylon</i> (planted)	Yellow Gum (planted)	S3
<i>Euphorbia paralias</i>	Sea Spurge	S1
<i>Euphorbia peplus</i>	Petty Spurge	U
<i>Euphorbia</i> spp.	Spurge	S2
<i>Foeniculum vulgare</i>	Fennel	S1
<i>Fraxinus</i> spp (planted and naturalized)	Ash	S2
<i>Freesia alba</i> x <i>Freesia leichtlinii</i>	Freesia	S2
<i>Fumaria</i> spp.	Fumitory	U
<i>Galium aparine</i>	Cleavers	S2
<i>Galium murale</i>	Small Goosegrass	U
<i>Gazania rigens</i>	Trailing Gazania	S1
<i>Genista linifolia</i>	Flax-leaf Broom	S1
<i>Genista monspessulana</i>	Montpellier Broom	S1

<i>Geranium mole</i> var. <i>mole</i>	Dovesfoot	U
<i>Geranium</i> sp.	<i>Geranium</i>	S2
<i>Gladolus</i> spp (? <i>tristis</i> / <i>undulatus</i>)	<i>Gladolus</i>	S1
<i>Hakea laurina</i> (planted)	Pincushion <i>Hakea</i> (planted)	S2
<i>Hakea suaveolens</i> (planted)	Sweet <i>Hakea</i> (planted)	S2
<i>Hedera helix</i>	English Ivy	S1
<i>Hibiscus</i> sp. (planted)	<i>Hibiscus</i>	S3
<i>Holcus lanatus</i>	Yorkshire Fog	S2
<i>Homeria flaccida</i>	One-leaf Cape-tulip	S1
<i>Hordeum vulgare</i> s.l.	Barley	U
<i>Hydrocotyle</i> ? <i>bonariensis</i>	American Pennywort	?
<i>Hypochoeris glabra</i>	Smooth Cat's-ear	U
<i>Hypochoeris radicata</i>	Cat's Ear	U
<i>Lagurus ovatus</i>	Hare's-tail Grass	U
<i>Leontodon taraxacoides</i> subsp. <i>taraxacoides</i>	Hairy Hawkbit	U
<i>Lepidium africanum</i>	Common Peppergrass	U
<i>Lolium rigidum</i>	Wimmera Rye-grass	U
<i>Lolium</i> spp.	Rye Grass	U
<i>Lotus subbiflorus</i>	Hairy Bird's-foot Trefoil	U
<i>Lycium ferocissimum</i>	African Box-thorn	S1
<i>Medicago laciniata</i>	Medic	U
<i>Melaleuca arillaris</i> subsp. <i>arillaris</i> (planted)	Giant Honey-myrtle (planted)	S1
<i>Melaleuca nesophila</i> (planted)	Showy Myrtle (planted)	?S2
<i>Melanthus major</i>	Cape Honey-flower	S2
<i>Melilotus albus</i>	Melilot	U/S2
<i>Melilotus indicus</i>	Sweet Melilot	U/S2
<i>Minuartia mediterranea</i>	Fine-leaved Sandwort	U
<i>Narcissus</i> spp.	Jonquil	S2
<i>Oxalis articulata</i>	Sourgrass	S1
<i>Oxalis incarnata</i>	Pale Wood-sorrel	S1
<i>Oxalis pes-caprae</i>	Soursob	S1
<i>Oxalis purpurea</i>	Large-flower Wood-sorrel	S1
<i>Paraserianthes lophantha</i> subsp. <i>lophantha</i>	Cape Wattle	S1
<i>Pelargonium X domesticum</i>	Regal Pelargonium	S2
<i>Pennisetum clandestinum</i>	Kikuyu	K/S2
<i>Petrorhagia</i> sp.	Childing Pink	U
<i>Phalaris aquatica</i>	Toowoomba Canary-grass	S2
<i>Physalis peruviana</i>	Cape Gooseberry	S2
<i>Pinus nigra</i> var. <i>corsicana</i>	Corsican Pine (planted)	S2
<i>Pinus radiata</i>	Radiata Pine (planted)	K/S2
<i>Pittosporum crassifolium</i>	Karo	S2
<i>Pittosporum undulatum</i>	Sweet Pittosporum	S1
<i>Plantago coronopus</i> subsp. <i>coronopus</i>	Buck's-horn Plantain	U
<i>Plantago lanceolata</i>	Ribwort	U
<i>Poa annua</i>	Annual Meadow-grass	U
<i>Poa bulbosa</i>	Bulbous Meadow-grass	U
<i>Polycarpon tetraphyllum</i>	Four-leaved Ailseed	U
<i>Polygala myrtifolia</i> var. <i>myrtifolia</i>	Myrtle-leaf Milkwort	S1
<i>Polypogon</i> spp.	Beard-grass	U
<i>Rhamnus alaternus</i>	Italian Buckthorn	S1
<i>Romulea</i> sp.	Onion Weed	U
<i>Rorippa nasturtium-aquatica</i>	Water Cress	S2
<i>Rubus discolor</i>	Blackberry	S1
<i>Rumex conglomeratus</i>	Clustered Dock	S2
<i>Sherardia arvensis</i>	Field Madder	U
<i>Silene nocturna</i>	Mediterranean Catchfly	U
<i>Silene vulgaris</i>	Bladder Campion	S1
<i>Solanum douglasii</i>	Douglas' Nightshade	U/S2
<i>Solanum nigrum</i> s.s.	Black Nightshade	S2
<i>Solanum</i> spp.	Nightshade	S2
<i>Soliva</i> spp.	Jo Jo/bindii	U

Sonchus asper s.l.	Rough Sow-thistle	U
Sonchus oleraceus	Common Sow-thistle	U
Sporobolus africanus	Rat-tail Grass	S1/S2
Stenotaphrum secundatum	Buffalo Grass	K/S2
Taraxacum spp.	Dandelion	U
Thinopyrum junceiforme	Sea Wheat-grass	K
Trifolium dubium	Suckling Clover	U
Vicia hirsuta	Tiny Vetch	U
Vicia sativa subsp. nigra	Narrow-leaf Vetch	U
Vinca major	Blue Periwinkle	S2
Vulpia spp.	Fescue	S2/U

Additional Weed Species recorded in 2017

Botanical Name	Common Name	Risk/Status
<i>Moraea miniata</i>	Two-leaved Cape Tulip	S1
<i>Lotus creticus</i>	Cretan Trefoil	S1

6. MANAGEMENT RECOMMENDATIONS

In conjunction with the vegetation mapping, observations were made along the foreshore of vegetation management concerns and/or issues. Many of these observations also correlate with the *Capel Sound Foreshore Environmental Priorities List* which was generated on 5th August 2017.

These management issues/concerns are presented below, with a brief discussion/management recommendations provided below each topic:

6.1 Spinifex versus Marram Grass

The primary dune facing the Bay along the length of the foreshore is dominated by the introduced invasive Marram Grass. Whilst Marram Grass stabilise dunes and provides habitat, it does displace indigenous dune grassland species. During the fieldwork, only a small patch of the indigenous Spinifex was recorded near the southern (Rye) end of the foreshore reserve. This patch should be managed to encourage the spread of the Spinifex.

Recommendations

- Manage mapped patch of Spinifex to encourage its' spread
- Consider planting Spinifex in areas along the foreshore and manage planted areas to increase the extent of Spinifex and slowly reduce the extent of Marram Grass

6.2 Photo points/Monitoring

To capture data on the management of certain areas along the foreshore the introduction of basic monitoring is recommended via the use of photo points and potentially collecting basic cover/abundance data at the photo points. Ideally data should be collected seasonally, or at least annually in the same season/month. To ensure consistent data capture a capped star picket should be installed in the corner of each photo point and the same camera utilised to capture the photo point, which should also be taken at the same height (at the top of the star picket) and angle.

A useful spread of photos points would be six photo points distributed along the foreshore in the three vegetation quality categories.

Recommendations

- Utilise the vegetation quality mapping and grid system (refer to Appendix 1) to determine appropriate areas to undertake vegetation monitoring.
- Install a capped star picket at one corner of the monitoring plot (align with a corner of a grid to provide a repeatable monitoring area) and utilise the star picket as the photo point and to delineate a corner of the monitoring plot

6.3 Training Sessions

To facilitate the use and development of the vegetation data provided in this report, a couple of workshops on suitable methods of weed control and the use of the vegetation maps and overlays is recommended for the Foreshore Committee, in-house and/or contracted bushland managers and volunteers.

Recommendations

- Investigate running 1–2 workshops to cover the purpose and data contained within this report so that it can be utilised as a ‘living’ document/mapping layer that can be added to over time
- Undertake 1–2 weed removal techniques workshops, which also introduce the vegetation mapping and the areas of higher versus lower vegetation quality, for weed/bushland managers/contractors employed to undertake work within the foreshore reserve.

6.4 Information Brochure Boat Shed Owners

During the fieldwork it was noted that there was a variety of vegetation management treatments around the boat sheds located within the foreshore reserve. Some owners did not appear to ‘touch’ the surrounding vegetation whilst others owners were actively spraying and killing the vegetation surrounding their sheds. It was noted that generally the higher the level of owner intervention towards the vegetation surrounding the boat sheds, the higher the level of weed invasion, the lower the surrounding mapped vegetation quality and the greater the risk of fore dune erosion during storm surge events

Recommendations

- Liaise with Council and the Boat shed Owners Association regarding the development of a vegetation management policy surrounding the boat sheds
- Produce a brief brochure that clearly describes and demonstrates appropriate vegetation management
- Utilise visual imagery to clearly depict ‘good’ versus ‘bad’ vegetation management practices surrounding the boat sheds

6.5 Tree Killing/Vandalism along Foreshore

There are several areas along the foreshore reserve where the overstorey layer (predominantly Coast Banksia’s) has been removed/poisoned due to vandalism. This is a common occurrence along many vegetated foreshores with housing along the opposite side of the road.

Recommendations

- Liaise with the local Council regarding developing an appropriate policy response for tree vandalism
- Responses could include installing large signs in the areas where trees have been vandalised or undertaking an integrated planting response of suitable local prickly shrub and overstorey species so that future tree vandalism would be more difficult.

6.6 Division of Annual Vegetation Management Budgets

The vegetation quality mapping clearly divides the foreshore into three vegetation management areas:

- Green– highest quality remnant, where the priority is to retain and increase the existing indigenous vegetation quality. Minimal to no planting works.
- Orange– a mixture of regeneration and revegetation areas. Priority is to retain and increase the existing indigenous vegetation quality, and to selectively re-introduce ‘missing’ indigenous species to increase overall habitat and biodiversity values. Weed infestations should be mapped, prioritised according to the system (table/appendix) and managed to reduce the weed cover and increase the indigenous vegetation cover.
- Red– predominantly the revegetation beds and camping areas. In these areas the main management focus is recreation, so the biodiversity priority is the management of the existing large old trees. The large old trees should be managed to conserve the trees and to provide areas for the trees to recruit into.

With regard to the annual vegetation management budget, it should be divided to adequately manage the biodiversity values in these three areas and to ensure at a minimum that all of the existing biodiversity values are conserved within these three areas.

Management objectives for each of the three vegetation quality categories have been defined above, however these objectives then need to be applied along the foreshore reserve for each mapped ‘zone/area’ (or groups of similar areas– ie: similar EVCs, vegetation quality and species present), which can then be utilised to guide future management decisions.

Obviously local conditions and the presence of any significant flora species and/or habitat also need to be considered, along with any other management functions of any specific foreshore area.

6.7 Management of Large Old Trees In Camping Areas

There are many large old remnant Coast Banksia's, a few Drooping Sheoaks and one Swamp Gum scattered within the camping areas. Currently mowing/slashing is occurring around the base of these trees, which is not ideal for longer-term tree health.

Recommendations

- Install mulch around the base of all large old Banksia's and Drooping Sheoaks (and the one Swamp Gum) in the red mapped areas (vegetation quality maps) in the camping areas only.

6.8 Use of Mulch in Revegetation and Regeneration Areas

Mulch is being applied to the revegetation areas/beds along the foreshore and often around remnant vegetation amongst the camping areas. It was noted that in many of the mulched remnant areas that previously had mapped significant species (such as Love Creeper, Dune Wood-sorrel, Coast Swainson-pea and Austral Stork's-bill), that these species were no longer evident due to the mulch. In addition, it was also noted that the invasive Soursob **Oxalis pes-caprae*, was being introduced into some areas via mulching.

Recommendations

- Develop management guidelines for revegetation beds versus remnant areas (especially those with remnant groundstorey vegetation) in the camping area
 - Only apply mulch to the revegetation/planting beds or around bases of old trees where there is no existing indigenous vegetation
 - Do not mulch around/within remnant patches with groundstorey vegetation
 - If identification of remnant groundstorey vegetation is difficult- be cautious and do not mulch the area
 - Undertake training of staff/contractors undertaking management works along the foreshore in plant identification skills
 - Do not store mulch in areas where Soursob occurs

6.9 Weed Management

On-going weed management will always be required in the foreshore reserve and will require an annual budget. From an ecological perspective the priorities for weed control are:

- In the green mapped/highest quality areas
- Of the S1 weed species (green and orange mapped areas)
- Implementing integrated weed control and habitat replacement programs for the keystone species (green and orange areas)

- Continuing to monitor for any new weed infestations and controlling them before they can spread (green, orange and red mapped areas).

Recommendations

- Prepare a weed management and prioritisation plan for the foreshore reserve considering the vegetation quality categories, the presence of any significant flora species, the use of the area (ie: recreation and/or conservation) and the types of weed species present and their potential impacts on the surrounding vegetation.

6.10 Potential Midden Sites

During the fieldwork it was noted that there were several potential midden sites along the foreshore reserve. The location of many of these is provided in the significant flora species maps (Appendix 3– Maps 3a to 3f).

Recommendations

- Investigate undertaking a cultural heritage assessment of the foreshore and preparing a Cultural Heritage Management Plan (CHMP) to identify, conserve and manage cultural heritage values along the foreshore reserve.

6.11 Marking of Orchid Patches along Bay Trail

For management purposes, it would assist volunteers and bushland workers/contractors if the location of significant vegetation areas/species/patches (ie: orchid species) was discretely defined on the ground, as locating these areas is difficult just with maps and/or GPS references.

Recommendations

- Install discrete markers (ie: yellow lines) along the Bay Trail to define the location of significant flora species/patches to ensure bushland managers/workers are aware of the 'sensitivity' of these areas, especially in the seasons when these species are not evident (ie: summer when orchid species are dormant).

6.12 Recommendation for the Pine and Cypress Trees

There are approximately 800 large Pine and Cypress trees planted along the foreshore. Most were planted around 1945 and many are potentially reaching the 'end of their life' from an arboricultural perspective.

The presence of these trees is complex from a biodiversity perspective and they are an iconic species along the foreshore. Some of the many issues to consider include:

- Do native animals utilise these trees for habitat?
- If their staged removal is considered, how should it proceed in the three vegetation quality areas? Obviously there would be a higher impact on the surrounding vegetation in the higher versus lower quality areas. Although there may also be a good seed bank in those areas just waiting for their removal
- What other benefits do these trees provide from an ecological perspective? Do they inhibit growth underneath them (of both weedy and indigenous species)?
- They do provide shade in summer, and how will that be replaced, especially if their loss causes people to intrude into the remnant vegetation to seek shade.
- Most of the Mallee Drumstick Fungus has been observed growing underneath mature Cypress and Pines and in a landscape that has historically had all the Sheoaks removed. Are these trees providing a similar substrate to that which was originally provided by the Drooping Sheoaks?

Without undertaking further research into the ecological and landscape function of these trees it is difficult to provide recommendations on their removal and/or retention. For ease of management, decisions on their removal/retention should be based on their location with regard to the three vegetation quality categories, and the management objectives for each

Recommendations

- Consider fauna surveys of the Pine/Cypress trees
- Map the location of all trees along the foreshore in conjunction with the vegetation quality mapping
- Develop removal policies (if applicable) that detail removal protocols in the three vegetation quality categories (ie: consider sensitive hand removal versus machine removal, etc).
- Ensure the policy minimises impacts to surrounding vegetation in all three vegetation quality categories.
- Develop complementary revegetation/planting programs utilising suitable indigenous canopy species to replace habitat/landscape/shade values particularly the use of Drooping Sheoaks

- Develop a staged removal program (if applicable) that integrates replacement and/or habitat planting to ensure minimal loss of biodiversity/landscape/shade values along the foreshore in general. If it is envisaged any removal/replacement program would be staged over a 20 year period, to ensure a slow and staggered removal and replacement process.
- Do not remove the Cypress/Pine trees growing located within a 20m radius of the Mallee Drumstick fungus.

6.13 Fencing of Remnant Areas

During the fieldwork, it was noted (especially at the northern (Rosebud) end of the foreshore reserve, that the remnant vegetation was of higher quality between the camping areas and beach where it was fenced off and access points were defined.

Recommendations

- Continue fencing of remnant patches (orange and green) located within the camping areas and between the camping areas and the beach.

6.14 Planting Programme Recommendation

As outlined for the three vegetation quality categories, some planting should be undertaken in the red and orange areas, dependent on indigenous species present, the groundstorey vegetation quality and if there are key 'missing' species in that EVC which should be re-introduced.

Some suitable species for re-introduction in the orange areas or planting in the red areas include:

- *Atriplex cinerea* (Coast Salt Bush)
- *Acacia longifolia subsp. Sophorae* (Coast Wattle)
- *Allocasuarina verticillata* (Drooping Sheoak)
- *Banksia integrifolia* (Coast Banksia)
- *Spinifex sericea*

In areas where Hakeas and *Melaleuca armillaris* are to be removed, they should gradually be replaced with Hedge Wattle *Acacia paradoxa*, Black Wattle and Drooping Sheoak.

All tubestock planted within the foreshore reserve should be sourced from local provenance seed stock.

Appendix 1. Weed Prioritisation

STATUS / RISK	CHARACTERISTICS	MANAGEMENT STRATEGY	EXAMPLES	PRIORITY	MEASURE OF SUCCESS	WORKPLAN NEEDS
Keystone weeds						
K	historical-introduced a long time ago = dominates both structurally & floristically	work slowly and systematically from high quality areas out	Polygala at Pt Nepean: habitat for bandicoots & buffer against grassy weed invasion. Pine, Pittosporum	Long-term management required - consider Biocontrol	%population contained (no propagules produced)males or young still present	vegetation quality mapping overlaid with weed distribution map to help prioritise site
	has potentially become habitat for indigenous species	maintain habitat and buffer areas remove mature fruiting individuals first (females)			% area eliminated (some seedling regeneration)	calendar of works based on species life cycle, site, control methods & skills/resources
					% area eliminated (no/little seedling regeneration)	Skilled supervision required for high quality areas
Small Patch Weeds – Of variable risk but easiest to eliminate						
S1 – HIGH	High Risk weeds	Eliminate across the site	Dolichos pea, Bridal Creeper	Highest Priority –	Number of high risk species eliminated from the site	GIS of weed distributions & densities/size of population
	Weeds that hybridise and pollute genepools		Karamu, Mahogany, Wattles, Pigface			
	Weeds that are known to be difficult to eradicate once established		Oxalis, Gladiolus MPSC control of Chilean Needle Grass			
	Weeds that are directly hazardous to wildlife on site (&/or stock in eg Landcare situation)		Ox-tongue lethal for frogs			
	Weeds that are alleopathic (ie produce chemicals which inhibit other species)		Vulpia spp Pittosporum			
S2 – Mod	Weeds that spread vegetatively	Eliminate from high quality areas first	Kikuyu (except in grasslands) Succulents; Ivy; Wandering Trad	moderate risk, moderate priority in high quality sites	Species contained and cover reducing on high quality retention sites	skilled supervision required for high quality sites Vegetation quality map
S3 – Low	Species that are long lived few if any seedlings observed May have been planted in the past	Lowest priority no action needed	West Australian Flowering Gum	Lowest priority		
Ubiquitous Weeds	Scattered Weeds of disturbed areas	Hardest to eliminate / look at management regime to reduce seed production	Many from Daisy Family eg Sow Thistle, Cat's Ear, some annual grasses	Low priority except in the highest quality retention sites or to protect threatened species	Highest quality and threatened species sites maintained weed free	Need to be able to identify disturbance regenerated indigenous species some of which are our rarest species eg Bitterbush, Hollyhock Roly Poly
		Eliminate in High quality retention sites- low priority else where		ongoing management of eg track edges	Management regimes adapted to reduce weed seed production	Calendar of works based on understanding of ubiquitous species life cycle
KEY: K=Keystone weeds; S=Small Patch Weeds of variable risk S1=High Risk, S2=Moderate Risk, S4=Low Risk; U=Ubiquitous Weeds						
Copyright 2017 Gidja Walker May 2017						

Vegetation Quality Mapping - 2017







Map 1A - Vegetation Quality Mapping

Capel Sound Foreshore Reserve

Legend

Percentage of Native Vegetation Cover

-  Less than 30%
-  30-60%
-  > 60%
-  Survey Grids (20 x 20m)

Vegetation Quality Mapping - 2007



Details

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0 20 40 60 m

Scale 1:2,400 (Page size A3)

Vegetation Quality Mapping - 2017







Map 1B - Vegetation Quality Mapping

Capel Sound Foreshore Reserve

Legend

Percentage of Native Vegetation Cover

-  Less than 30%
-  30-60%
-  > 60%
-  Survey Grids (20 x 20m)

Vegetation Quality Mapping - 2007



Details

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Vegetation Quality Mapping - 2017







Map 1C - Vegetation Quality Mapping

Capel Sound Foreshore Reserve

Legend

Percentage of Native Vegetation Cover

-  Less than 30%
-  30-60%
-  > 60%
-  Survey Grids (20 x 20m)

Vegetation Quality Mapping - 2007




Details

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Vegetation Quality Mapping - 2017







Map 1D - Vegetation Quality Mapping

Capel Sound Foreshore Reserve

Legend

Percentage of Native Vegetation Cover

-  Less than 30%
-  30-60%
-  > 60%
-  Survey Grids (20 x 20m)

Vegetation Quality Mapping - 2007




Details

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Vegetation Quality Mapping - 2017



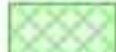



Map 1E - Vegetation Quality Mapping

Capel Sound Foreshore Reserve

Legend

Percentage of Native Vegetation Cover

-  Less than 30%
-  30-60%
-  > 60%
-  Survey Grids (20 x 20m)

Vegetation Quality Mapping - 2007



Details

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Vegetation Quality Mapping - 2017







Map 1F - Vegetation Quality Mapping

Capel Sound Foreshore Reserve

Legend

Percentage of Native Vegetation Cover

-  Less than 30%
-  30-60%
-  > 60%
-  Survey Grids (20 x 20m)

Vegetation Quality Mapping - 2007



Details

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Legend

EVC 2017

-  Coast Dune Scrub
-  Coastal Alkaline Scrub - Coastal Banksia Woodland (Mosaic)
-  CAS CBW (Mosaic)

-  Coast Banksia Woodland
-  Swamp Scrub
-  Survey Grids (20 x 20m)

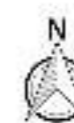
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Date: 10 December 2017
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Aerial Photography from Near-Map

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Map 2A - Extant Ecological Vegetation Classes




Capel Sound Foreshore Reserve



Legend

EVC 2017

-  Coast Dune Scrub
-  Coastal Alkaline Scrub - Coastal Banksia Woodland (Mosaic)
-  CAS CBW (Mosaic)

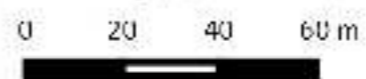
-  Coast Banksia Woodland
-  Swamp Scrub
-  Survey Grids (20 x 20m)



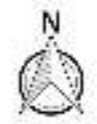
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Date: 10 December 2017
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Map 2B- Extant Ecological Vegetation Classes



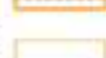
Capel Sound Foreshore Reserve



Legend

EVC 2017

-  Coast Dune Scrub
-  Coastal Alkaline Scrub - Coastal Banksia Woodland (Mosaic)
-  CAS CBW (Mosaic)

-  Coast Banksia Woodland
-  Swamp Scrub
-  Survey Grids (20 x 20m)

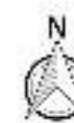
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Date: 10 December 2017
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Aerial Photography from Near-Map

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Map 2C - Extant Ecological Vegetation Classes




Capel Sound Foreshore Reserve



Legend

EVC 2017

-  Coast Dune Scrub
-  Coastal Alkaline Scrub - Coastal Banksia Woodland (Mosaic)
-  CAS CBW (Mosaic)

-  Coast Banksia Woodland
-  Swamp Scrub
-  Survey Grids (20 x 20m)

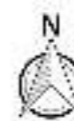
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Date: 10 December 2017
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Map 2D - Extant Ecological Vegetation Classes




Capel Sound Foreshore Reserve



Legend

EVC 2017

-  Coast Dune Scrub
-  Coastal Alkaline Scrub - Coastal Banksia Woodland (Mosaic)
-  CAS CBW (Mosaic)

-  Coast Banksia Woodland
-  Swamp Scrub
-  Survey Grids (20 x 20m)

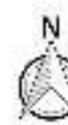
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Aerial Photography from Near-Map

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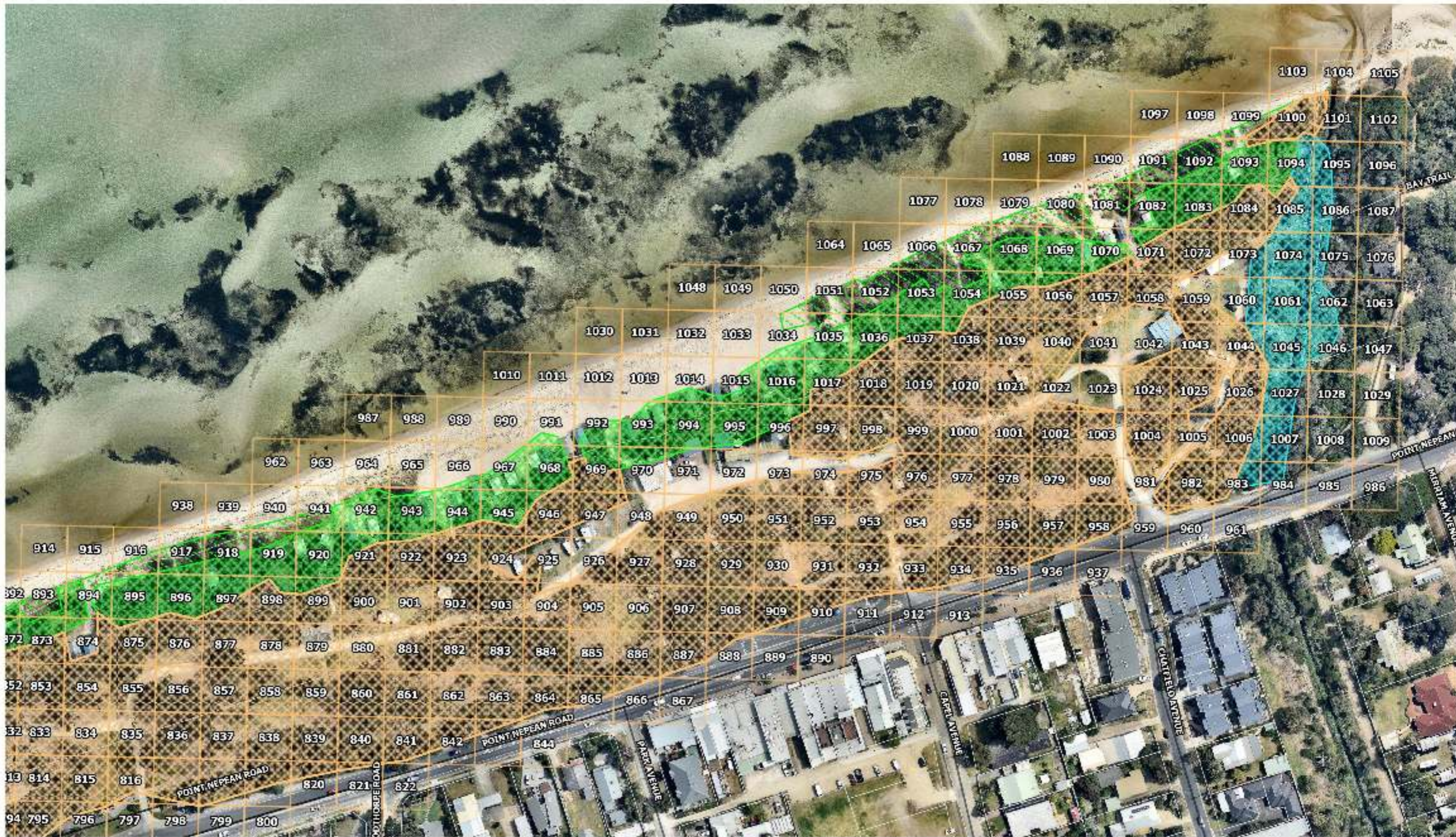
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Map 2E - Extant Ecological Vegetation Classes

Capel Sound Foreshore Reserve





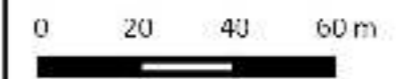
Legend

- EVC 2017**
-  Coast Dune Scrub
 -  Coast Dune Grassland
 -  Swamp Scrub
 -  Coast Banksia Woodland
 -  Survey Grids (20 x 20m)

Details

Date: 19 December 2017
 Created by: Greg James and Katharine Smedley

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Map 2F - Extant Ecological Vegetation Classes

Capel Sound Foreshore Reserve

Significant Flora and Possible Middens - 2017



Map 3A - EVCs, Significant Flora, Weeds and Possible Middens

Capel Sound Foreshore Reserve

Significant Flora

- Coast Saltwort
- Hairy Spinifex
- Wirilca/Coast Wattle hybrid
- Native Elderberry?
- Wirilca

Significant Weeds

- Gazania
- Italian Buckthorn source
- Italian Buckthorn

Significant Weeds - 2017



* CAS-CBW - Coastal Alkaline Scrub/Coast Banksia Woodland
 CDS - Coastal Dune Scrub
 CDG - Coastal Dune Grassland
 SS - Swamp Scrub

Details

Date: 19 December 2017
 Created by: Greg James and Katherine Smedley



Aerial Photography from Near Map

0 20 40 60 m

Scale 1:2,500 (Page size A3)






Significant Flora and Possible Middens - 2017



Map 3B - EVCs, Significant Flora, Weeds and Possible Middens

Capel Sound Foreshore Reserve

Significant Flora

-  Coast Flax-lily
-  Coast Swainson-pea
-  EVC 2017*

Significant Weeds - 2017



- * CAS-CBW - Coastal Alkaline Scrub/Coast Banksia Woodland
- CDS - Coastal Dune Scrub
- CDG - Coastal Dune Grassland
- SS - Swamp Scrub

Details

Date: 19 December 2017
 Created by: Greg James and Katherine Smedley



Aerial Photography from NearMap

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Scale 1:2,500 (Page size A3)



Significant Flora and Possible Middens - 2017



Map 3C - EVCs, Significant Flora, Weeds and Possible Middens

Capel Sound Foreshore Reserve

EVC 2017*

Significant Weeds

- Gazania
- ★ Storm water pipe

Significant Weeds - 2017



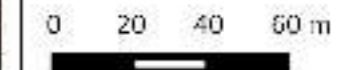
* CAS-CBW - Coastal Alkaline Scrub/Coast Banksia Woodland
 CDS - Coastal Dune Scrub
 CDG - Coastal Dune Grassland
 SS - Swamp Scrub

Details

Date: 19 December 2017
 Created by: Greg James and Katherine Smedley



Aerial Photography from NearMap



Scale 1:2,500 (Page size A3)



Significant Flora and Possible Middens - 2017



Map 3D - EVCs, Significant Flora, Weeds and Possible Middens

Capel Sound Foreshore Reserve

Significant Flora

- Creeping Mistletoe
- Mallee Drumstick
- Swamp Gum
- EVC 2017*

Significant Weeds

- Cape Tulip

Significant Weeds - 2017



* CAS-CBW - Coastal Alkaline Scrub/Coast Banksia Woodland
 CDS - Coastal Dune Scrub
 CDG - Coastal Dune Grassland
 SS - Swamp Scrub

Details

Date: 19 December 2017
 Created by: Greg James and Katherine Smedley



Aerial Photography from NearMap

0 20 40 60 m



Scale 1:2,500 (Page size A3)



Significant Flora and Possible Middens - 2017



Map 3E- EVCs, Significant Flora, Weeds and Possible Middens

Capel Sound Foreshore Reserve

EVC 2017*

Significant Weeds

- Euphorbia sp
- Gazania

Significant Weeds - 2017



* CAS-CBW - Coastal Alkaline Scrub/Coast Banksia Woodland
 CDS - Coastal Dune Scrub
 CDG - Coastal Dune Grassland
 SS - Swamp Scrub

Details

Date: 19 December 2017
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Significant Flora and Possible Middens - 2017



Map 3F - EVCs, Significant Flora, Weeds and Possible Middens

Capel Sound Foreshore Reserve

EVC 2017*

Significant Weeds - 2017



* CAS-CBW - Coastal Alkaline Scrub/Coast Banksia Woodland
 CDS - Coastal Dune Scrub
 CDG - Coastal Dune Grassland
 SS - Swamp Scrub

Details

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