Marino Conservation Park

Biodiversity Action Plan

June 2021

T&M Ecologists

Document Information	
Client	Green Adelaide
Issue Date	9/6/2021
Version	1.0
Author	Tim Milne
Title	Director

Document History	
Version	**Issue Date**
1.0	9/6/2021

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1 INTRODUCTION

Marino Conservation Park was proclaimed on 2 November 1989 to protect an area of remnant coastal vegetation, including one of the southernmost occurrences of Elegant Wattle (*Acacia victoriae* ssp. *victoriae*)[1]. The park also conserves the last remaining stands of coastal heath vegetation along this part of the Adelaide coastline[2]. It also provides an important coastal refuge for native fauna.

The Park is listed on the Register of the National Estate for its: "Remnant of drier coastal vegetation including species rare in Southern Lofty region. A species of Acacia victoriae occurs in the Park at the southern limit of its range. Orchid species rare in the Southern Lofty Ranges occur in the Park. Part of old Lighthouse Reserve, valuable remnant vegetation."

This Vegetation Management Plan is intended to align with, and contribute to, the objectives of the Metropolitan Adelaide and Northern Coastal Action Plan (MANCAP)[3]. The goal of MANCAP is to understand and facilitate the conservation, protection and maintenance of the region's natural coastal resources and to establish conservation priorities for places and areas within the region. This includes the following key issues and associated actions identified for Marino Conservation Park.

Issue	Proposed Actions
Conservation values within the CP* are concentrated within the western end of the reserve	• Ongoing implementation of the Draft Management Plan to minimise impacts and threats on flora and fauna
Weed invasion and garden escapes	• On-going weed management program. • Continued support for Friends Group. • Education initiative targeting surrounding residents re: common garden species that become 'weeds' and alternatives for planting local native species
Informal paths and damage to vegetation around paths and access points	• Revision of track locations (and related access control), should minimise impact on valuable flora and habitat

The Plan is intended as a guide for specific and prioritised "on-ground" works over the next 5 years, with the aim being to maximise the protection of the biodiversity values of the Park.
The preparation of the Management Plan has involved:

- review of previous biodiversity surveys and related studies;
- stakeholder consultation and ongoing liaison;
- field survey to map and record vegetation associations, plants of conservation significance, weeds and other management issues;
- recording of vertebrate pest evidence;

[1] Department of Environment and Heritage (2010). Hallett Cove and Marino Conservation Parks Management Plan 2010. Department for Environment and Heritage, Adelaide.
[2] https://www.parks.sa.gov.au/parks/marino-conservation-park accessed 2/6/21
[3] Caton B., Fotheringham D., Krahnert E., Pearson J., Royal M. and Sandercock R. 2009. Metropolitan Adelaide and Northern Coastal Action Plan. Prepared for the Adelaide and Mount Lofty Ranges NRM Board and Department forEnvironment and Heritage.

- identification and prioritisation of actions necessary to improve the biodiversity values/environmental assets of the Reserve; and
- identification of appropriate and cost effective monitoring and research requirements.

2 STUDY AREA

Marino Conservation Park lies approximately 16 km south-west of the Adelaide city centre. The area that is the subject of this Biodiversity Action Plan is approximately 30 hectares, comprising the land parcel(s) in Table 1 and shown in Figure 1.

Table 1. Land Parcel details for Marino Conservation Park

Parcel(s)	Title details
D95635 A7000	CR/6168/590

2.1 Current land management

Marino Conservation Park is under the care and control of the Department for Environment and Water. Other bodies that contribute to its upkeep include:

- City of Marion;
- Green Adelaide - statutory authority
- Friends of Marino Conservation Park.

The Friends of Marino Conservation Park formed in 1989, and has played a significant role in improving the biodiversity values in the Park, through actively controlling weeds and revegetation[4].

2.2 Surrounding and historical land use

Pre-European Settlement

The Kaurna people are the traditional custodians of the Adelaide Plains and their country extends from Crystal Brook and the Clare Valley in the north to Cape Jervis at the southern end of the Fleurieu Peninsula[5]. Kaurna families and clans generally moved inland to more sheltered locations in the Mount Lofty Ranges foothills in winter, and spent much of the summer fishing and hunting along the coastline of St Vincent Gulf[6]. For Kaurna the coastal region was a prime traditional camping area, rich in coastal resources and one of the summer camping grounds along the coast of Wongga yerlo Western sea (Gulf St Vincent)[7]. They were a very populous society, with more than twenty clans living in tracts of home country that stretched from the foothills of the Mount Lofty Ranges and across the plains to the coastal beaches, estuaries and wetlands. The coastal streams provided watered access routes across these lands.

[4] http://communitywebs.org/friendsmarinocp/the-park/history/
[5] Australian Cultural Heritage Management (ACHM). Notes on Aboriginal Cultural Heritage of the Mount Lofty Ranges. Unpublished document prepared for the Mt Lofty Ranges World Heritage Bid.
[6] Tindale, NB 1987. Wanderings of Tjibruki: A Tale of the Kaurna People of Adelaide. Records of the South Australian Museum V20: 5-13.
[7] Telfer, K.W. and Malone, G. (2017). Tulukudangga Spring, Kingston Park and the Tjirbruki Munaintya Cultural Mapping. Report prepared for the City of Holdfast Bay Council.

Some Kaurna places are known, including the sites and springs along the Tjilbruke Dreaming track, and the archaeological campsites and burial sites along the coastal cliffs and dunes of the Adelaide coastline, and throughout the Fleurieu Peninsula[5].

Wih regard to the pre-European vegetation of the site, Kraehenbuehl[8] notes that parts of the site would likely have been a *Eucalyptus porosa, Allocasuarina verticillata ± Melaleuca lanceolata* low woodland, with steep areas with shallow soil being *Acacia ligulata, Olearia ramulosa, Pomaderris paniculosa* low shrubland.

Post-European Settlement

On Conservation Park dedication in 1989, the majority of the reserve had been cleared of its overstory vegetation, except the Coastal Low Shrubland on its western side. However, some remnant groundcover remained on rockier sites throughout the park. The Park's dedicated Friends of Marino Conservation Park group have been responsible for extensive revegetation efforts, and have reduced the cover and extent of serious woody weeds in the Park. Due to these efforts, the park is generally in good condition, considering its past agricultural use, and its current position in an urban landscape.

Of note, the remnant *Acacia acinacea* (Wreath Wattle) *Acrotriche patula* (Prickly Ground-berry) *Pomaderris paniculosa* ssp. *paniculosa* (Mallee Pomaderris) Coastal Low Heath of this park and the nearby Hallett Cove CP, and *Eucalyptus porosa* (Mallee Box) Low Woodland are important relics of the district's original native vegetation cover, in an otherwise urbanised setting[9]. The northern section of this coastal heath was more significantly exposed to past grazing than southern sections[10].

[8] Kraehenbuehl, D.K. (1996). Pre-European Vegetation of Adelaide: A Survey from the Gawler River to Hallett Cove. Nature Conservation Society of South Australia, Adelaide.
[9] Croft, S. and Croft, T. (2019). Marino Conservation Park Land Unit Descriptions. Unpublished report prepared for the Department of Environment and Water.
[10] Jerry Smith, pers. comm.

Figure 1a: Location of Marino Conservation Park and the area that is the focus of this Biodiversity Action Plan

Figure 1b: 1949 aerial imagery of the site

3 ENVIRONMENTAL ASSETS

3.1 Vegetation

The following description is an overview of the vegetation in the Park – more extensive descriptions are provided in Section 5.2. Figure 2 shows the vegetation communities present in the site. The steep sloping sections on the western side of the Park, on skeletal soils, contain a highly diverse low heath vegetation, dominated by *Acacia acinacea* (Wreath Wattle) *Acrotriche patula* (Prickly Ground-berry) and *Pomaderris paniculosa* ssp. *paniculosa* (Mallee Pomaderris), over an understorey dominated by *Gahnia lanigera* (Black Grass Saw-sedge) and *Lepidosperma viscidum* (Sticky Sword-sedge) (vegetation types 1,2 and 4, Figure 2)). Over half of this heath was burnt in a bushfire on 4th December 2020. Species of conservation significance recently recorded in this area include the state Rare *Caladenia brumalis* (Winter Spider-orchid) and *Maireana rohrlachii* (Rohrlach's Bluebush), the state Endangered *Ptilotus angustifolius* (Narrow-leaf Yellow-tails) and the nationally Vulnerable *Caladenia bicalliata ssp. bicalliata* (Western Daddy-long-legs). There are several what appear to be remnant *Eucalyptus porosa* (Mallee Box) in gullies within this heath vegetation (vegetation type 3, Figure 2).

Central sections of the Park are dominated by a revegetated woodland (vegetation type 5,8,13, Figure 2), with *Eucalyptus porosa* (Mallee Box) the most abundant tree species, but with *Allocasuarina verticillata* (Drooping She-Oak), *Melaleuca lanceolata* (Dryland Tea-tree) and some non-indigenous Eucalypts in the overstorey, over primarily introduced grasses and herbs. Within the extent of this woodland, there are also sections dominated by *Acacia victoriae ssp.* (Elegant Wattle) (vegetation type 7, Figure 2), and some open areas in shallow, rocky soils where the understorey is dominated by *Austrostipa spp*. (Spear Grass) (vegetation type 6, Figure 2).

Towards the eastern side, there is an area that was formerly a City of Marion waste disposal site, closed in 1989, when the land was dedicated as a Conservation Park. The vegetation in this area is indicative of a high level of disturbance, and is dominated by Rapistrum rugosum (*Turnip Weed*) and Mallow (*Malva sp*.) (vegetation type 9, Figure 2). Towards the eastern side of this vegetation, an area has been sprayed out and recently revegetated with a suite of indigenous species of a variety of lifeforms (vegetation type 10, Figure 2). East of this area, the land slopes upwards, and is initially a disturbed sedgeland/grassland of *Lepidosperma congestum* (Clustered Sword Sedge) and *Themeda triandra* (Kangaroo Grass) (vegetation type 11, Figure 2), then a shrubland dominated by *Acacia victoriae ssp.* (Elegant Wattle) (vegetation type 12, Figure 2) over a mostly introduced grass and herbaceous understorey.

Table 2 provides a list of records from the Biological Database of South Australia for the site. Approximately 150 species have been recorded in the Park, which is considered to be a high species richness for a Park within an urbanised setting. A list of species observed in this study is provided in Appendix 1. Pre-European vegetation mapping shows the area as an *Olearia axillaris ± Leucopogon parviflorus* Shrubland through the western side of the site, with the eastern end mapped as *Eucalyptus porosa + Allocasuarina verticillata + Melaleuca lanceolata* Low Woodland[11].

[11] www.naturemaps.sa.gov.au visited 2/6/21

Figure 2: Topography and vegetation types in Marino Conservation Park

Table 2: List of native plant species recorded in Marino Conservation Park

Species	Common Name	Conservation Status			No. records	Date last record
		AUS[12]	SA[13]	Bioregion [14]		
Acacia acinacea	Wreath Wattle			NT	7	21/11/2019
Acacia cupularis	Cup Wattle			RA	3	21/11/2019
Acacia leiophylla	Coast Golden Wattle				1	21/11/2019
Acacia ligulata	Umbrella Bush			RA	3	21/11/2019
Acacia paradoxa	Kangaroo Thorn			LC	6	21/11/2019
Acacia pycnantha	Golden Wattle			LC	5	21/11/2019
Acacia victoriae ssp. victoriae	Elegant Wattle			VU	5	21/11/2019
Acrotriche patula	Prickly Ground-berry			NT	7	21/11/2019
Adriana quadripartita	Coast Bitter-bush			RA	1	1/01/1960
Allocasuarina muelleriana ssp. muelleriana	Common Oak-bush			LC	4	21/11/2019
Allocasuarina verticillata	Drooping Sheoak			LC	4	21/11/2019
Alyxia buxifolia	Sea Box			RA	1	21/11/2019
Amyema preissii	Wire-leaf Mistletoe			LC	2	21/11/2019
Aristida behriana	Brush Wire-grass			LC	1	21/11/2019
Arthropodium fimbriatum	Nodding Vanilla-lily			LC	2	21/11/2019
Arthropodium strictum	Common Vanilla-lily			LC	4	21/11/2019
Asperula conferta	Common Woodruff			NT	2	1/01/1990
Atriplex semibaccata	Berry Saltbush			LC	2	1/01/1990
Austrostipa blackii	Crested Spear-grass			LC	1	1/01/1990
Austrostipa drummondii	Cottony Spear-grass			NT	3	17/08/1998
Austrostipa elegantissima	Feather Spear-grass			LC	4	21/11/2019
Austrostipa eremophila	Rusty Spear-grass			LC	4	21/11/2019
Austrostipa exilis	Heath Spear-grass			RA	1	21/10/1997
Austrostipa flavescens	Coast Spear-grass			LC	2	1/01/1990
Austrostipa multispiculis	Many-flowered Spear-grass		RA	RA	1	21/10/1997
Austrostipa nodosa	Tall Spear-grass			LC	2	21/11/2019
Beyeria lechenaultii	Pale Turpentine Bush			NT	3	19/08/2004
Boerhavia dominii	Tar-vine				1	21/11/2019
Bulbine bulbosa	Bulbine-lily			LC	3	17/08/1998
Bursaria spinosa ssp. spinosa	Sweet Bursaria			LC	4	21/11/2019
Caesia calliantha	Blue Grass-lily			LC	3	17/08/1998
Caladenia bicalliata ssp. bicalliata	Western Daddy-long-legs		RA	EN	1	26/08/2020
Caladenia brumalis	Winter Spider-orchid	VU	VU	RE	1	25/08/2020
Caladenia latifolia	Pink Caladenia			NT	1	1/01/1990
Caladenia patersonii complex	White Spider-orchid				1	1/01/1990
Calocephalus citreus	Lemon Beauty-heads			NT	4	21/11/2019

[12] Environment Protection and Biodiversity Conservation Act 1999
[13] Schedules of the National Parks and Wildlife Act 1972
[14] Gillam, S. and Urban, R. (2014) *Regional Species Conservation Assessment Project, Phase 1 Report: Regional Species Status Assessments*, Adelaide and Mount Lofty Ranges NRM Region. Department of Environment, Water and Natural Resources, South Australia.

Species	Common Name	Conservation Status			No. records	Date last record
		AUS[12]	SA[13]	Bioregion [14]		
Calostemma purpureum	Pink Garland-lily			LC	3	17/08/1998
Calotis cuneifolia[15]	Purple Burr-daisy				1	21/11/2019
Calytrix tetragona	Common Fringe-myrtle			LC	6	21/11/2019
Cassytha glabella f. dispar	Slender Dodder-laurel			LC	3	21/11/2019
Chamaescilla corymbosa var. corymbosa	Blue Squill			LC	2	1/01/1990
Chamaesyce drummondii (NC)	Caustic Weed				1	1/01/1990
Cheilanthes austrotenuifolia	Annual Rock-fern			LC	3	21/11/2019
Chrysocephalum apiculatum (NC)	Common Everlasting			LC	3	17/08/1998
Chrysocephalum semipapposum	Clustered Everlasting			NT	3	21/11/2019
Comesperma volubile	Love Creeper			RA	5	21/11/2019
Convolvulus angustissimus	Narrow-leaf Bindweed			NT	5	21/11/2019
Crassula decumbens var. decumbens	Spreading Crassula			LC	1	1/01/1960
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop				1	1/01/1960
Cullen australasicum	Tall Scurf-pea			NT	3	17/08/1998
Cymbopogon ambiguus	Lemon-grass			RA	2	10/02/2005
Dianella brevicaulis	Short-stem Flax-lily			NT	4	21/11/2019
Dianella revoluta var. revoluta	Black-anther Flax-lily			LC	5	21/11/2019
Dissocarpus biflorus var. biflorus	Two-horn Saltbush			RA	1	1/01/1990
Diuris palustris	Little Donkey-orchid			EN	1	1/01/1990
Dodonaea viscosa ssp. spatulata	Sticky Hop-bush			LC	7	21/11/2019
Drosera macrantha ssp. planchonii	Climbing Sundew			LC	3	17/08/1998
Drosera whittakeri	Scented Sundew			LC	4	21/11/2019
Einadia nutans ssp. nutans	Climbing Saltbush			LC	1	21/11/2019
Enchylaena tomentosa var. tomentosa	Ruby Saltbush			LC	3	21/11/2019
Enneapogon nigricans	Black-head Grass			LC	6	21/11/2019
Eucalyptus porosa	Mallee Box			NT	7	21/11/2019
Eutaxia microphylla	Common Eutaxia			LC	4	21/11/2019
Exocarpos aphyllus	Leafless Cherry			VU	2	21/11/2019
Gahnia lanigera	Black Grass Saw-sedge			RA	8	21/11/2019
Glycine rubiginosa	Twining Glycine			LC	5	21/11/2019
Gompholobium ecostatum	Dwarf Wedge-pea			NT	1	21/11/2019
Gonocarpus mezianus	Broad-leaf Raspwort			LC	1	1/01/1960
Goodenia albiflora	White Goodenia			RA	1	13/03/1988
Goodenia amplexans	Clasping Goodenia			NT	1	1/01/1960
Goodenia arguta	Toothed Velleia			RA	4	21/11/2019
Goodenia pinnatifida	Cut-leaf Goodenia			NT	5	21/11/2019
Goodenia pusilliflora	Small-flower Goodenia			VU	2	1/01/1990

[15] Considered a possible introduction (Gillam, S. and Urban, R. (2014) Regional Species Conservation Assessment Project, Phase 1 Report: Regional Species Status Assessments, Adelaide and Mount Lofty Ranges NRM Region. Department of Environment, Water and Natural Resources, South Australia.)

Species	Common Name	Conservation Status			No. records	Date last record
		AUS[12]	SA[13]	Bioregion [14]		
Grevillea lavandulacea ssp. lavandulacea	Spider-flower			LC	2	4/10/1995
Hakea rugosa	Dwarf Hakea			NT	6	21/11/2019
Hardenbergia violacea	Native Lilac			LC	2	1/01/1990
Helichrysum leucopsideum	Satin Everlasting			NT	1	1/01/1960
Isoetopsis graminifolia	Grass Cushion			RA	1	1/01/1960
Kennedia prostrata	Scarlet Runner			LC	3	17/08/1998
Lepidosperma congestum	Clustered Sword-sedge			RA	6	21/11/2019
Lepidosperma viscidum	Sticky Sword-sedge			LC	2	21/11/2019
Lomandra collina	Sand Mat-rush			RA	8	21/11/2019
Lomandra densiflora	Soft Tussock Mat-rush			LC	4	21/11/2019
Lomandra effusa	Scented Mat-rush			RA	7	21/11/2019
Lomandra micrantha ssp. micrantha	Small-flower Mat-rush			LC	4	21/11/2019
Lomandra multiflora ssp. dura	Hard Mat-rush			LC	2	1/01/1990
Lotus australis	Austral Trefoil			NT	1	1/01/1960
Lycium australe	Australian Boxthorn			EN	1	4/04/2001
Lysiana sp.	Mistletoe				1	21/11/2019
Maireana appressa[16]	Pale-fruit Bluebush				1	13/03/1988
Maireana brevifolia	Short-leaf Bluebush			LC	3	17/08/1998
Maireana enchylaenoides	Wingless Fissure-plant			LC	3	17/08/1998
Maireana rohrlachii	Rohrlach's Bluebush		RA	RA		Friends
Malva preissiana (NC)	Australian Hollyhock				2	17/08/1998
Melaleuca lanceolata	Dryland Tea-tree			RA	7	21/11/2019
Microseris lanceolata	Yam Daisy			LC	2	1/01/1990
Microtis arenaria	Notched Onion-orchid			LC	2	1/01/1990
Millotia tenuifolia var. tenuifolia	Soft Millotia			LC	1	1/01/1960
Minuria leptophylla	Minnie Daisy			RA	1	1/01/1960
Muehlenbeckia gunnii	Coastal Climbing Lignum			LC	2	21/11/2019
Myoporum montanum	Native Myrtle			VU	1	2/04/2003
Olearia axillaris	Coast Daisy-bush			NT	1	21/11/2019
Olearia ramulosa	Twiggy Daisy-bush			LC	5	21/11/2019
Opercularia turpis	Twiggy Stinkweed			NT	4	21/11/2019
Oxalis perennans	Native Sorrel			LC	6	21/11/2019
Pauridia glabella var. glabella	Tiny Star			LC	2	1/01/1990
Pimelea curviflora ssp. gracilis	Curved Riceflower			RA	3	17/08/1998
Pimelea curviflora var. sericea	Curved Riceflower			RA	2	1/01/1990
Pimelea glauca	Smooth Riceflower			NT	6	21/11/2019
Pimelea micrantha	Silky Riceflower			NT	4	17/08/1998
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower			NT	2	1/01/1990
Pittosporum angustifolium	Native Apricot			NT	6	21/11/2019

[16] Considered wrong identification (Gillam, S. and Urban, R. (2014) Regional Species Conservation Assessment Project, Phase 1 Report: Regional Species Status Assessments, Adelaide and Mount Lofty Ranges NRM Region. Department of Environment, Water and Natural Resources, South Australia.)

Species	Common Name	Conservation Status			No. records	Date last record
		AUS[12]	SA[13]	Bioregion [14]		
Podolepis muelleri	Button Podolepis		VU	EN	1	1/01/1990
Pogonolepis muelleriana	Stiff Cup-flower			NT	1	1/01/1960
Pomaderris paniculosa ssp. paniculosa	Mallee Pomaderris			NT	9	21/11/2019
Poranthera triandra	Three-petal Poranthera			VU	1	1/01/1990
Ptilotus angustifolius	Narrow-leaf Yellow-tails		EN	VU	1	21/11/2019
Ptilotus nobilis ssp. nobilis (NC)	Yellow-tails				2	17/08/1998
Ptilotus spathulatus	Pussy-tails			RA	4	21/11/2019
Pultenaea tenuifolia	Narrow-leaf Bush-pea			RA	3	17/08/1998
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush			LC	2	21/11/2019
Rhagodia parabolica	Mealy Saltbush			RA	1	21/11/2019
Roepera glauca	Pale Twinleaf			RA	1	1/01/1960
Rorippa sp.	Watercress/Bitter-cress				1	21/11/2019
Rostellularia sp[17].	(blank)				1	21/11/2019
Rytidosperma caespitosum (NC)	Common Wallaby-grass				5	21/11/2019
Rytidosperma setaceum	Small-flower Wallaby-grass			LC	2	1/01/1990
Salsola australis	Buckbush			LC	3	21/11/2019
Santalum acuminatum	Quandong			RA	2	21/11/2019
Scaevola albida	Pale Fanflower			LC	6	21/11/2019
Schoenus breviculmis	Matted Bog-rush			LC	2	1/01/1990
Scleranthus pungens	Prickly Knawel			RA	2	1/01/1990
Sclerolaena diacantha	Grey Bindyi			RA	3	2/08/2000
Senecio pinnatifolius (NC)	Variable Groundsel				1	1/01/1990
Senna artemisioides ssp. filifolia	Fine-leaf Desert Senna			RA	1	7/06/1995
Setaria constricta	Knotty-butt Paspalidium			NT	4	21/11/2019
Sida corrugata var. corrugata	Corrugated Sida			RA	1	1/01/1990
Stackhousia monogyna	Creamy Candles			NT	5	21/11/2019
Teucrium racemosum	Grey Germander			RA	1	1/01/1960
Themeda triandra	Kangaroo Grass			LC	6	21/11/2019
Thysanotus patersonii	Twining Fringe-lily			LC	4	21/11/2019
Tricoryne tenella	Tufted Yellow Rush-lily			VU	3	21/11/2019
Vittadinia australasica var. australasica	Sticky New Holland Daisy			NT	2	1/01/1990
Vittadinia blackii	Narrow-leaf New Holland Daisy			NT	3	21/11/2019
Vittadinia cuneata var. cuneata	Fuzzy New Holland Daisy			LC	1	17/08/1998

[17] No species of this genus considered indigenous to MLR (Gillam, S. and Urban, R. (2014) Regional Species Conservation Assessment Project, Phase 1 Report: Regional Species Status Assessments, Adelaide and Mount Lofty Ranges NRM Region. Department of Environment, Water and Natural Resources, South Australia.)

Species	Common Name	Conservation Status			No. records	Date last record
		AUS[12]	SA[13]	Bioregion [14]		
Vittadinia gracilis	Woolly New Holland Daisy			LC	1	21/10/1997
Vittadinia megacephala	Giant New Holland Daisy			RA	2	1/01/1990
Wahlenbergia luteola	Yellow-wash Bluebell			RA	2	1/01/1990
Wahlenbergia stricta ssp. stricta	Tall Bluebell			LC	2	1/01/1990
Wurmbea dioica ssp. dioica (NC)	Early Nancy				3	17/08/1998
Zygophyllum aurantiacum/eremaeum	Shrubby Twinleaf				1	21/11/2019

Rating codes: LC= Least Concern, NT = Near Threatened; RA = Rare; VU = Vulnerable; EN=Endangered

3.2 Native vertebrate fauna (including fauna of conservation significance)

3.3.1 Terrestrial vertebrates

The Biological Database of South Australia (BDBSA) has records for three species in the Park – the Eastern Striped Skink (*Ctenotus spaldingi*), Bougainville's Skink (*Lerista bougainvillii*) and the Dwarf Skink (*Menetia greyii*). The area would likely form habitat for a other small skink and gecko species, including the Four-toed Earless Skink (*Hemiergis peronii*), Marbled Gecko (*Christinus marmoratus*), and the Three-toed Earless Skink (*Hemiergis decresiensis*). The larger reptile species Sleepy Lizard (*Tiliqua rugosa*), Eastern Bluetongue (*Tiliqua scincoides*) and Eastern Brown Snake (*Pseudonaja textilis*) have been observed by the Friends of Marino, and the Friends have also heard reports of the Red-bellied Black Snake (*Pseudechis porphyriacus*) in moist gullies on the northern side of the Park.

The Western Grey Kangaroo (*Macropus fuliginosus*) was observed during field survey, and the state Rare Common Brush-tailed Possum (*Trichosurus vulpecula*) was noted as being present in the Park[18].

3.3.2 Birds

A search of the Biological Database of South Australia showed that there have been over 200 bird species recorded from within 5km of the site (Appendix 2). However, this would include historical records of species that are no longer present, and seabirds and ocean-going birds that would not use inland habitat. Table 3 provides a list of bird species that have been recorded in the site. Over 35 different species have been recorded in the Park. It is notable that the species that have been observed in the area utilise a variety of different habitats, such as open grassland areas (eg Stubble Quail), dense shrubland (eg White-browed Scrubwren) and woodlands (eg Weebill). Ensuring the Park retains a diversity of habitats will help maintain the diversity of bird species found in the area.

It is also notable that the Friends of Marino Conservation Park have observed the state Vulnerable Yellow-tailed Black Cockatoo (*Zanda funerea whiteae*) feeding in the heath vegetation at the western end of the site. In the Mount Lofty Ranges, the introduced Aleppo Pine (**Pinus halepensis*) and Radiata Pine (**Pinus radiata*) are the primary food sources for the Yellow-tailed Black

[18] Caton B., Fotheringham D., Krahnert E., Pearson J., Royal M. and Sandercock R. 2009. Metropolitan Adelaide and Northern Coastal Action Plan. Prepared for the Adelaide and Mount Lofty Ranges NRM Board and Department for Environment and Heritage

Cockatoos[19]. Naturally occurring seed plants, such as *Hakea, Banksia, Xanthorrhoea* and *Allocasuarina*, are likely to have reduced in abundance and distribution due to vegetation clearance. It is pleasing that the Yellow-tailed Blacks appear to be feeding in what is likely an original feeding area for the species, and reinforces the significance of this remnant patch of coastal heath vegetation.

Table 3: Birds previously recorded in Marino Conservation Park[20]

Species name	Common name	AUS[21]	SA[22]	Bioregion[23]	Number of records	Most recent sighting
Acanthiza chrysorrhoa	Yellow-rumped Thornbill			NT	4	28/09/2000
Acanthiza nana	Yellow Thornbill			NT	1	21/09/2016
Accipiter cirrocephalus arvensis	Collared Sparrowhawk			LC	1	21/11/2019
Accipiter fasciatus fasciatus	Brown Goshawk			LC	1	14/02/1993
Anthochaera carunculata	Red Wattlebird			LC	7	12/12/2019
Anthus australis	Australian Pipit			RA	7	21/11/2019
Cincloramphus cruralis	Brown Songlark			RA	2	21/11/2019
Colluricincla harmonica	Grey Shrikethrush			LC	2	26/11/2019
Coracina novaehollandiae	Black-faced Cuckooshrike			LC	4	21/11/2019
Corvus mellori	Little Raven			LC	7	21/11/2019
Coturnix pectoralis	Stubble Quail			NT		Friends[24]
Dicaeum hirundinaceum hirundinaceum	Mistletoebird			LC		Friends
Elanus axillaris	Black-shouldered Kite			LC	5	29/11/2019
Eolophus roseicapilla	Galah			LC	4	29/11/2019
Falco berigora	Brown Falcon			LC	1	29/12/1990
Falco cenchroides	Nankeen Kestrel			LC	3	12/12/2019
Falco longipennis	Australian Hobby			LC	1	25/08/1989
Gavicalis virescens	Singing Honeyeater			LC	10	12/12/2019
Glossopsitta concinna	Musk Lorikeet			LC	2	29/04/1994
Grallina cyanoleuca	Magpielark			LC	7	29/11/2019
Gymnorhina tibicen	Australian Magpie			LC	12	12/12/2019
Hirundo neoxena neoxena	Welcome Swallow			LC	5	21/11/2019
Manorina melanocephala	Noisy Miner			LC	3	29/11/2019
Ocyphaps lophotes	Crested Pigeon			LC	9	12/12/2019

[19] Way, S. L. and van Weenen, J. (2008) Eyre Peninsula Yellow-tailed Black-Cockatoo *Calyptorhynchus funereus whitei*) Regional Recovery Plan. Department for Environment and Heritage, South Australia.

[20] Including records from the Biological Database of South Australia, observations from the Friends of Marino Conservation Park, and Croft, S. (2019). Marino Conservation Park Land Unit Descriptions. Unpublished report for the Department of Environment and Water.

[21] Environment Protection and Biodiversity Conservation Act 1999

[22] Schedules of the National Parks and Wildlife Act 1972

[23] Gillam, S. and Urban, R. (2014) *Regional Species Conservation Assessment Project, Phase 1 Report: Regional Species Status Assessments*, Adelaide and Mount Lofty Ranges NRM Region. Department of Environment, Water and Natural Resources, South Australia.

[24] Noted as being present by the Friends of Marino Conservation Park

Pachycephala pectoralis	Golden Whistler				1	21/11/2019
Parvipsitta porphyrocephala	Purple-crowned Lorikeet			NT	4	21/11/2019
Petrochelidon nigricans	Tree Martin				1	21/11/2019
Phaps chalcoptera	Common Bronzewing			LC	3	29/11/2019
Phylidonyris novaehollandiae novaehollandiae	New Holland Honeyeater (mainland SA)			LC	7	21/11/2019
Platycercus elegans	Crimson Rosella				1	21/11/2019
Ptilotula penicillata	White-plumed Honeyeater			LC	5	21/11/2019
Rhipidura leucophrys leucophrys	Willie Wagtail			NT	8	26/11/2019
Sericornis frontalis	White-browed Scrubwren			LC	1	26/11/2019
Smicrornis brevirostris	Weebill			LC	3	12/12/2019
Strepera versicolor	Grey Currawong			LC	2	26/11/2019
Trichoglossus haematodus	Rainbow Lorikeet			LC	5	29/11/2019
Zanda funerea whiteae	Yellow-tailed Black Cockatoo		VU	VU		Friends
Zosterops lateralis	Silvereye			VU	8	21/11/2019

Rating codes: LC= Least Concern, NT = Near Threatened; RA = Rare; VU = Vulnerable; EN=Endangered

3.3.3 Bats

There are eight species of bats that commonly occur in the Mount Lofty Ranges[25], namely Gould's Wattled Bat (*Chalinolobus gouldii*), Chocolate Wattled Bat (*Chalinolobus morio),* Southern Freetail Bat (*Mormopterus planiceps*), Lesser Long-eared Bat (*Nyctophilus geoffroyi*), White-striped Freetail bat (*Austronomus australis*), Large Forest Bat (*Vespadelus darlingtonia*), Southern Forest Bat (*Vespadelus regulus*) and Little Forest Bat (*Vespadelus vulturnus*). However, there is only one record of any bats, for Gould's Wattled Bat, within 5km of the site. This likely represents a lack of survey effort, rather than an absence of these species. It may be worthwhile using echolocation recorders, such as Anabat[26] systems, to inventory the species using Marino Conservation Park, as it is considered likely that there are several species that would be present in the Park.

3.3.4 Invertebrates

The suite of habitats within Marino Conservation Park would provide habitat for a broad array of invertebrate species. However there has been no specific survey for invertebrates in the Park, and no records exist on the Biological Database of South Australia. The area was noted as an important area for butterflies in the Metropoltan Adelaide and Northern Coastal Action Plan[27]. Table 4 provides a list of butterflies that do or may occur in Marino Conservation Park, based upon the known distribution of butterflies and the host plants present in the site.

[25] Armstrong, D.M., Croft, S.J., and Foulkes, J.N. (2003). A biological Survey of the Southern Mount Lofty Ranges, South Australia , 2000-2001. Department for Environment and Heritage, South Australia.

[26] See https://www.titley-scientific.com/au/products/anabat-systems?SID=5nuq5hinfn9t9oos48ukq2db64

[27] Caton B., Fotheringham D., Krahnert E., Pearson J., Royal M. and Sandercock R. 2009. Metropolitan Adelaide and Northern Coastal Action Plan. Prepared for the Adelaide and Mount Lofty Ranges NRM Board and Department for Environment and Heritage

Table 4: Butterflies previously recorded or inferred for Marino Conservation Park[28]

Species Name	Common Name	Food plants	Observed / inferred
**Pieris rapae*	Cabbage white	Wild mustards	Observed
Anisynta cynone	Grass skipper	Native grasses	Inferred
Antipoda atralba	Diamond hedge skipper	*Gahnia lanigera*	Observed
Belenois java teutonia	Caper White	Caper bush, *Capparis mitchellii*	Observed
Candalides acasta	Blotched blue	*Cassytha spp.*	Observed
Candalides heathi	Rayed blue	*Pimelea spp.*; weedy *Plantago spp.*	Observed
Danaus chrysippus	Lesser wanderer	Broad Leaf Cotton Bush (*Gomphocarpos cancellatus*) milkweed	Observed
Danaus plexippus	wanderer		Observed
Eurema smilax	Small grass-yellow	Low *Senna spp.*	Observed
Geitoneura kluggii	Klug's Xenica	Native grasses	Observed
Heteronympha merope	Common brown	Grasses	Observed
Jalmenus icilius	Icilius blue	*Acacia victoriae, A. pycnantha*	Inferred
Junonia/Precis villida	Meadow argus	Weedy *Plantago spp.*	Observed
Lucia limbaria	Grassland copper	*Oxalis perennans*	Inferred
Nacaduba biocellata	Blue-spotted blue-line	*Acacia ligulata; A. victoriae*	Observed
Ocybadistes walkeri hypochlorus	Southern Grass-dart	Native Grases	Observed
Ogyris amaryllis	Satin azure	*Amyema melaleuca*	Observed
Papilio anactus	Dainty Swallowtail	Citris	Observed
Papilio demoleus	Chequered swallowtail	*Psoralea spp.*	Inferred
Theclinesthes miskini		*Acacia pycnantha, A. victoriae*	Observed
Theclinesthes serpentata	Chequered blue	Chenopods	Observed
Vanessa itea	Australian Admiral	Stinging Nettle	Observed
Vanessa kershawi	Painted lady	Helichrysum spp., Cape Weed	Observed
Zizina labradus/otis	Common grass blue	Lotus australis, *Psoralea spp.,* clover	Observed

4 ENVIRONMENTAL THREATS (management issues)

Management issues that are of particular concern in terms of biodiversity conservation in Marino Conservation Park include:

- weed infestation;
- pest animals;
- impacts from adjoining landholders;
- bushfire management;
- erosion;
- stormwater management;
- inappropriate plantings; and
- unmanaged trails.

[28] Table provided by Matt Endacott, Metro Coastal Conservation Officer

4.1 Invasive weeds

Invasive weed species have the potential to dominate the understorey, impact on the overstorey, and reduce habitat values for native fauna, as well as competing with native flora. Table 5 lists the weeds of concern that have been recorded in the area. These are high threat weeds that meet one or more of the following criteria:

- Declared under the *Landscapes South Australia Act 2019;*
- Red Alert weed rating of 3 or more; and/or
- non-indigenous woody and herbaceous species noted to be proliferating in the site.

Table 5: List of Priority Weeds for control in Marino Conservation Park

Species	Common Name	[29]Red Alert	[30]Declared	Lifeform	Notes[31]
Acacia cyclops	Western Coastal Wattle	3		Shrub	Non-indigenous native species originating from sandy environments in western South Australia. Proliferates widely in coastal environments. Formerly widespread but has been the focus of weed control activities and now at very low levels, although there are some scattered large specimens on western slopes, and also present along adacent railway line (see Figure 3).
Acacia saligna	Golden Wreath Wattle	2		Shrub	Non-indigenous Australian native. Formerly abundant but has been the focus of weed control activities and now at very low levels.
Aizoon pubescens	Coastal Galenia	2		Mat plant	Long lived perennial herbaceous plant which forms a dense mat of vegetation on the ground. A weed of highly disturbed sites, waste areas and coastal environs[32]. Generally found in more disturbed central sections of the Park.
Asparagus asparagoides forma	Bridal Creeper	5	Yes	Climber	A winter-growing, summer-dormant climbing perennial. Widespread in South Australia and considered to be a Weed of National Significance. Scattered.
Asteriscus spinosus	Golden Pallensis	2		Forb	Forb to 50cm with characteristic spiny bracts. May spread widely in this site, and able to colonise heathland environments.
Cenchrus clandestinus	Kikuyu	3		Perennial grass	Rhizomatous grass, which can aggressively spread, particularly in moist environments.
Cenchrus sp.	Fountain Grass	3		Perennial grass	Perennial tussock grass, not observed in the Park, but noted in adacent railway line (see Figure 3). May spread widely if it colonises the Park.
Chrysanthemoides monilifera ssp. monilifera	Boneseed	3	Yes	Shrub	A Weed of National Significance (WONS). Introduced from South Africa as an ornamental garden plant, and is now established as a significant weed of native bushland in coastal and inland South Australia[33]. Previously noted in the site, but not observed during field survey.

[29] Refer to Croft, S.J., J.A. Pedler & T.I. Milne (2005 – 2008) Bushland Condition Monitoring Manual. Nature Conservation Society of SA Inc.
[30] Under the *Landscape South Australia Act 2019*
[31] Specific information on Declared plants sourced through Declared Plant Policies in South Australia: https://pir.sa.gov.au/biosecurity/weeds_and_pest_animals/weeds_in_sa/plant_policies
[32] https://keyserver.lucidcentral.org/weeds/data/media/Html/galenia_pubescens_var._pubescens.htm accessed 3/6/21.
[33] Government of South Australia Declared Plant Policy Boneseed (*Chrysanthemoides monilifera*).

Species	Common Name	[29]Red Alert	[30]Declared	Lifeform	Notes[31]
Echium plantagineum	Salvation Jane	2	Yes	Forb	Short-lived herbaceous plant usually growing 20-60 cm tall, most abundant in disturbed areas.
Euphorbia paralias	Sea Spurge	3		Forb	Long-lived perennial herbaceous plant. Generally colonises the foredunes at the back of the beach, forming dense infestations that stabilise the dunes, preventing natural sand movement inland, and creating a different dune structure to that created by native species. This can also decrease the availability of beach nesting sites for shore birds[34]. Scattered only.
Euphorbia terracina	False Caper	3	Yes	Forb	A perennial native to the coastal sand dunes bordering the Mediterranean, now widespread in South Australia on sandy and coastal soils. Generally low cover.
Gazania linearis	Gazania	4	Y	Forb	A tough, low-growing perennial with brightly coloured daisy flowers, native to South Africa. It invades coastal habitats, and can severely alter the vegetation structure in plant communities by replacing and suppressing native plants[35]. Scattered only.
Gomphocarpus cancellatus	Broad-leaved Cotton-bush	2		Shrub	Shrub to 1.2m high. A common environmental weed of the Adelaide region. Scattered only. Food plant for the Lesser Wanderer (*Danaus chrysippus petilia*) and Wanderer (*Danus plexippus*).
Lycium ferocissimum	African Boxthorn	3	Y	Shrub	African boxthorn is a large spiny shrub, introduced by settlers as a hedge plant and now widespread across South Australia. It invades unimproved grazing land and native vegetation, particularly on coasts and creeklines where it can form dense thickets. Considered a Weed of National Significance. Formerly widespread but has been the focus of weed control activities and now at very low levels.
Olea europaea	Olive	4	Yes	Tree	Olives are evergreen trees that originate from the Mediterranean region. They were first introduced to South Australia in 1836 and have since become naturalised, especially in woodland habitats. Formerly widespread but has been the focus of weed control activities and now at very low levels.
Oxalis pes-caprae	Soursob	4		Bulb/forb	Soursob is a bulbous perennial with conspicuous yellow flowers, and is a widespread weed in gardens, broadacre cropping and pasture. The forms of soursob naturalised in Australia do not produce seed, and so it is spread only as bulbs, which are moved in contaminated soil.
Phalaris aquatica	Phalaris	3		Perennial Grass	Perennial tussock grass, colonising pastures, grasslands, open woodlands, roadsides, waste areas, disturbed sites, creek banks, riparian vegetation, floodplains and wetlands[36]. Scattered only.
Scabiosa atropurpurea	Pincushion	3		Forb	Annual or short lived perennial herb. Prefers coastal soils with free lime[37]. Abundant and widespread through central and western sections of the site.

[34] https://keyserver.lucidcentral.org/weeds/data/media/Html/euphorbia_paralias.htm accessed 26/5/21.
[35] https://keyserver.lucidcentral.org/weeds/data/media/Html/gazania_linearis.htm#:~:text=Gazania%20(Gazania%20linearis) %20is%20regarded,open%20woodlands%20in%20inland%20areas accessed 26/5/21.
[36] https://keyserver.lucidcentral.org/weeds/data/media/Html/phalaris_aquatica.htm accessed 3/6/21.
[37] http://www.herbiguide.com.au/Descriptions/hg_Pincushion.htm accessed 3/6/21.

Figure 3: *Acacia cyclops* and *Cenchrus sp*. (Fountain Grass) (circled) along adjacent railway reserve. Image taken at 272560, 6118134 (Zone 54, WGS 84) on 12/5/21.

4.2 Pest animals

Table 6 lists the introduced animal species that are considered likely to be present in Marino Conservation Park.

Table 6: List of introduced animal species present, or considered likely to be present, at Southport Dunes

Species	Common Name
Mammals	
Felis catus	Feral Cat
Mus musculus	House Mouse
Rattus rattus	Black Rat
Canis familiaris	Dog
Vulpes vulpes	Fox
Oryctolagus cuniculus	Rabbit
Lepus europaeus	Hare
Birds	
Columba livia	Feral Pigeon
Passer domesticus	House Sparrow
Spilopelia chinensis	Spotted Dove
Sturnus vulgaris	Common Starling
Turdus merula	Blackbird

Of these introduced animals, rabbits and hares pose a significant concern due to potential impacts on regeneration of native species, along with potential grazing of revegetation. Feral cats and foxes

that will prey on native fauna are likely to be impacting insect, bird and reptile populations in the Park. Off-leash dogs may also disturb native fauna.

4.3 Recreation activities

Management of pedestrian traffic and inappropriate recreational activities is essential to help prevent unwanted impacts, such as:

- trampling or crushing of vegetation;
- compacting soil, which limits natural regeneration;
- disturbance of soil/erosion, which encourages weeds;
- introduction of weed seed; and
- disturbance/predation on native animals by domestic pets such as dogs.

The Department for Environment and Water consolidated trails in the site during 2020, as shown in Figure 4 (with consolidated trail shown in blue). There are no obvious sections outside this trail network where informal trails appear to be impacting biodiversity values. However, the new trails have disturbed the soil surface, and may provide opportunities for increased prevalence of grassy and herbaceous weeds. Ongoing monitoring of creation of unconsolidated trails should be a priority, especially in the high quality heath areas on the western side of the Park.

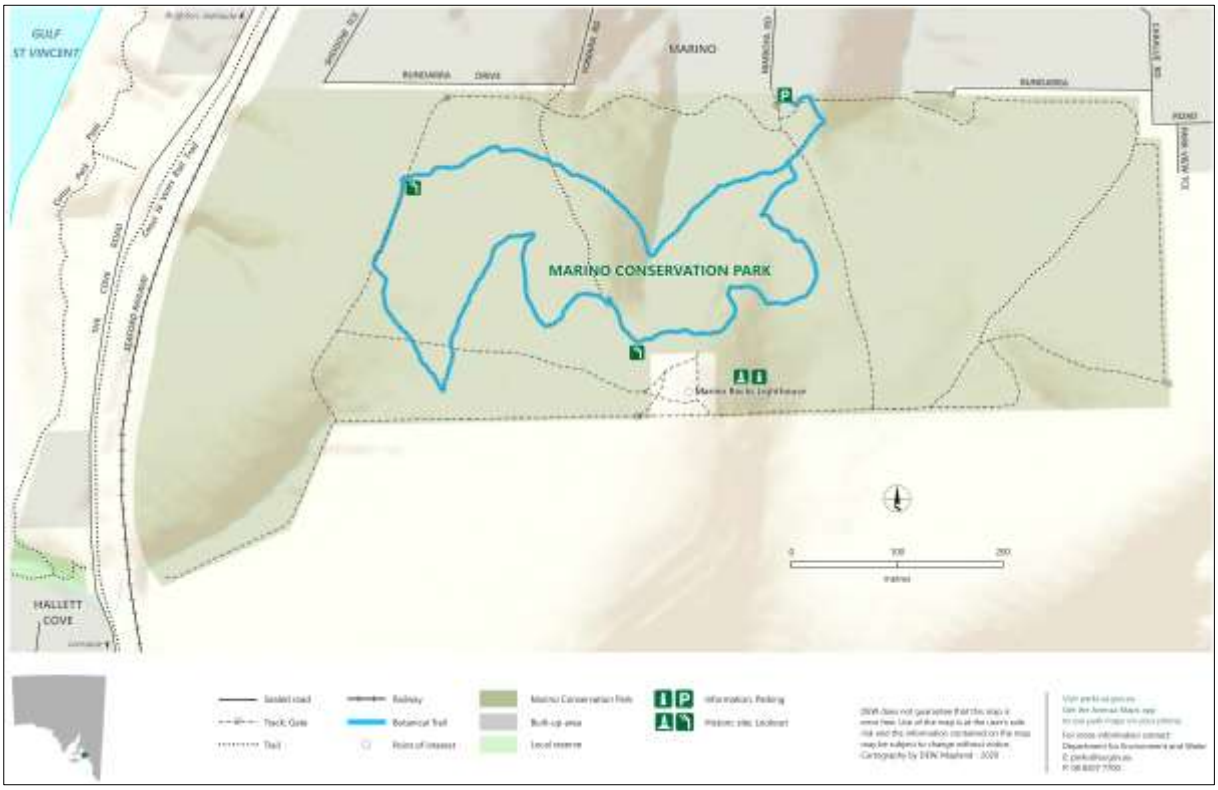

Figure 4: Trail network in Marino Conservation Park.

4.4 Erosion

Vegetation, both native and introduced, can help to reduce erosion as the roots and stems of plants help to bind the soil and reduce soil motility. There are some sections of the Park, especially where plant cover is low and slope is steep, that may be susceptible to erosion, including adjacent to tracks

that are part of the new consolidated trails in the Park (see Figure 5). The recently burnt sections in the heath vegetation on the western side of the Park may also be susceptible to erosion until vegetation regenerates.

Figure 5: Bare soil and steep gully facing south at 273033, 6118294 (Zone 54, WGS84).

4.5 Fire Management

The management of fire in Marino Conservation Park is not a threat *per se*, but is an ongoing management issue. Ecological burns can actually improve the values in remnant vegetation. On 4th of December 2020, a deliberately lit fire burnt through approximately 4 hectares of the coastal heath vegetation on the western side of the site (Figure 6). There is an opportunity to monitor the impacts of this burn on the abundance and diversity of plant species in the coastal heath habitat, to help inform future decisions regarding fire management.

The northern, eastern and southern boundaries of the Park are regularly slashed to create a fire break. The properties that closely abut the Park in the north western corner, at the southern end of Bundarra Drive have an adjoining A Zone, which means this zone needs to be managed to reduce fuel loads. However, given the recent burn of a substantial portion of the nearby heath, from a biodiversity perspective, to ensure there is a mix of burnt and unburnt coastal heath areas, it is recommended that this area is not burnt for several years, or at least until monitoring has been undertaken in the adjoining recently burnt areas.

Figure 6: Extent of 2020 fire in Marino Conservation Park.

4.6 Climate Change

Caton *et al* (2009)[38] provide the following projected conditions in 2030 and 2070 as follows:

a) Sea Level Rise and Storm magnitude

The current mean sea level rise of 3mm/year will accelerate. Sea levels in the region can be expected to be higher in 2030 by + 10cm and in 2070 by + 50cm. Rare intense storms could add a surge height comparable to today's surges of + 0.5m to 1.5m. Although storm frequency may fall, flood heights considered rare to-day will become much more frequent, because of sea level rise.

b) Increasing average temperatures and aridity

Mean annual temperatures are projected to increase to between 0.3 to 0.6°C by 2030 and 1.5 to 2.0°C by 2070. Annual rainfall: changes of -2% to -5% by 2030, and -10% to -20% by 2070 are projected for areas near the coast; greatest decrease is indicated in spring. An increase in potential evapotranspiration of up to 8% adds to the effect of increasing aridity.

c) Run-off regime change

Increasing aridity will be reflected in reduced run off: some seasonal streams will flow for fewer months, others will not flow. The intensity of rare extreme rainfall events will increase, and this will

[38] Caton B., Fotheringham D., Krahnert E., Pearson J., Royal M. and Sandercock R. 2009. Metropolitan Adelaide and Northern Coastal Action Plan. Prepared for the Adelaide and Mount Lofty Ranges NRM Board and Department for Environment and Heritage

be reflected in flash floods in creeks and storm drains. What are now semi arid creeks will behave more as arid land creeks.

d) Gulf waters change

Gulf waters will become more acid with possible detrimental effects on ecosystems, by mid-century. Surface ocean temperatures are projected to rise by 0.30 C to 0.60 C by 2030, and 1.0 to 1.50 C by 2070, although there is great variation between models for the latter date. Wind speed changes are slight; with small average falls.

With regard to dune environments, the following specific threatening processes may occur as a result of climate change:

- Increasing temperatures and aridity will affect the structure and composition of vegetation communities;
- There will be reductions in geographic range of species and ecological communities and increased risk of extinction for species that are already vulnerable;
- Increasing CO_2 concentrations may impact on germination, establishment, growth and regeneration of native species;
- Highly invasive exotic plant and animal species may become more dominant;

This plan recognises these potential impacts, and provides actions that will help provide resilience to ongoing effects of climate change.

5 BIODIVERSITY MANAGEMENT STRATEGIES

5.1 Management objectives for Marino Conservation Park

Management of the Marino Conservation Park needs to consider:

- High quality remnant vegetation
- Flora and fauna habitat values
- Cultural values
- Habitat values for native flora and fauna
- Opportunities for education
- Recreational and amenity values
- The need for cost effective management

The biodiversity management objectives for Marino Conservation Park are to manage the native vegetation in such a manner as to:

- Prevent any further loss of biodiversity; and
- Strengthen the long term viability of the existing biodiversity assets.

whilst remaining cognisant of the recreational, cultural, educational and amenity values of the site.

5.2 Management zones

The area has been divided into management zones, to provide context and simplicity for management actions. These Management Zones are shown in Figure 7, and a description of each of the zones, representative photographs, and notes on key issues and actions for each zone is provided in following sections.

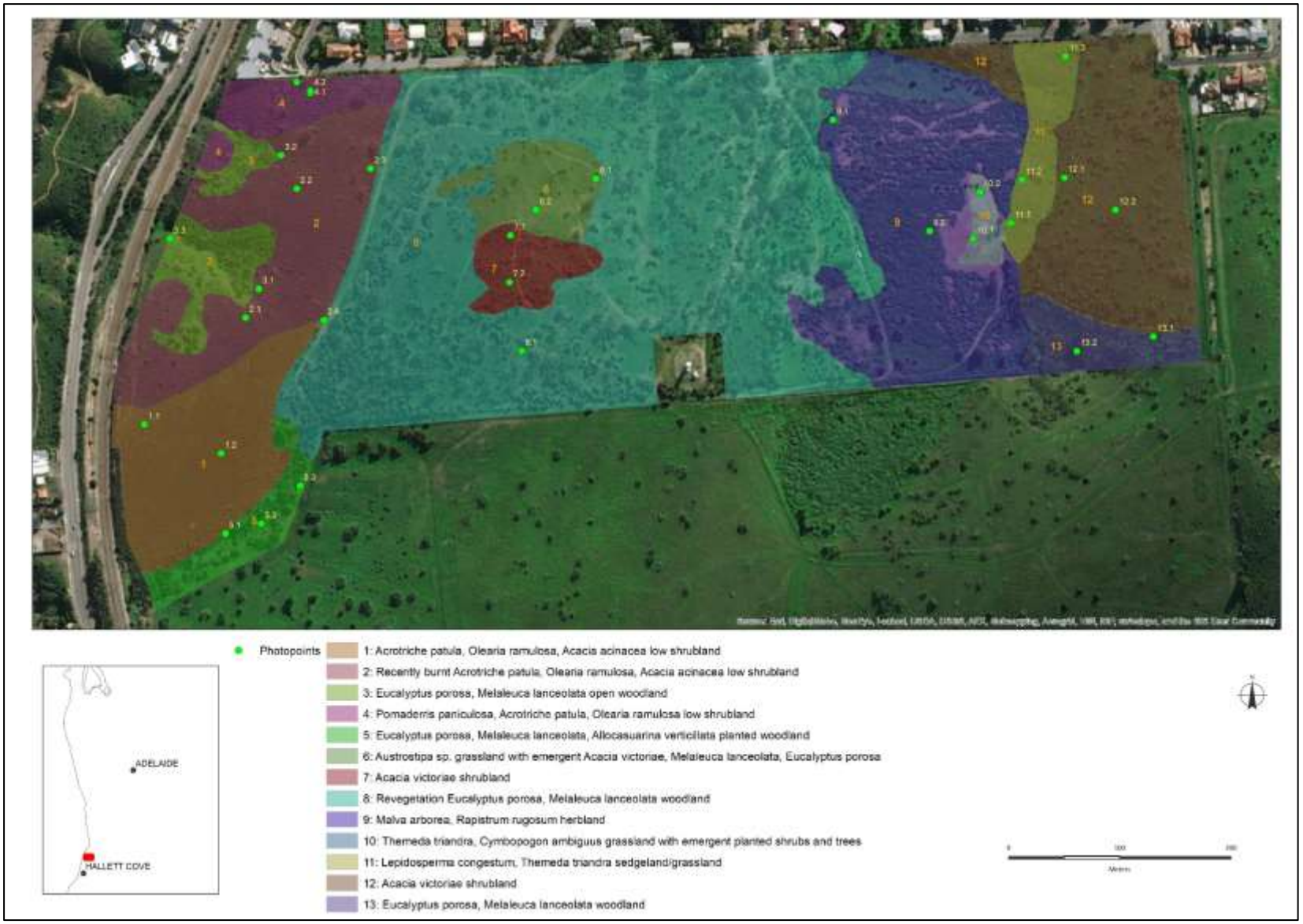

Figure 7: Management Zones for Southport Dunes, including locations of representative photopoints

Management Zone 1

Vegetation Association: *Acrotriche patula, Olearia ramulosa, Acacia acinacea* low shrubland

Photopoint 1.1, in Management Zone 1, facing S at 272578, 6118124 (Zone 54, WGS 84)

Description of this area: This vegetation is the unburnt section of coastal heath in the south-western corner of the site (Figure 7). It is a highly diverse low heath vegetation, dominated by *Acacia acinacea* (Wreath Wattle) *Acrotriche patula* (Prickly Ground-berry) and *Pomaderris paniculosa* ssp. *paniculosa* (Mallee Pomaderris), over an understorey dominated by *Gahnia lanigera* (Black Grass Saw-sedge) and *Lepidosperma viscidum* (Sticky Sword-sedge). Weeds are generally scattered and of low cover.

Key management issues in this Management Zone

- High quality remnant vegetation and species of conservation significance
- Priority weeds

Priority activities in this Management Zone

- Maintenance of high biodiversity values, including threatened flora species

Management Zone 2

Vegetation Association: *Recently burnt Acrotriche patula, Olearia ramulosa, Acacia acinacea* low shrubland

Photopoint 2.1, in Management Zone 2, facing S at 272669, 6118220 (Zone 54, WGS 84)

Description of this area: This vegetation was burnt in December 2020, but would likely to have been similar to Zone 1. At the time of assessment, there was evidence of some native species resprouting, including sedges (*Lepidosperma spp., Gahnia sp., Lomandra spp. Dianella revoluta var. revoluta*) and shrubs (*Hakea rugosa, Acacia acinacea, Pomaderris paniculosa ssp. paniculosa*). At this point in time, weeds were only scattered, including *Carrichtera annua* (Ward's Weed), *Asphodelus fistulosus* (Onion Weed) and *Moraea setifolia* (Thread Iris).

Key management issues in this Management Zone

- Potential for significant weed proliferation due to bare ground
- Potential for ersosion due to bare ground
- Recovery/regeneration of native species following fire

Priority activities in this Management Zone

- Sensitive weed control
- Monitoring impacts and recovery from fire

Management Zone 3

Vegetation Association: *Eucalyptus porosa, Melaleuca lanceolata* open woodland

Photopoint 3.1, in Management Zone 3, facing SSW at 272681, 6118246 (Zone 54, WGS 84)

Description of this area: This vegetation comprises remnant *Eucalyptus porosa* (Mallee Box) Low Woodland, up to 5m tall, with codominant *Melaleuca lanceolata* (Dryland teatree) over taller shrubs of *Acacia* species. It is associated with westward facing shallow gullies on the sloping cliff to the gulf. Most of this vegetation type was burnt in the December 2020 fire, with both *Eucalyptus porosa* and *Melaleuca lanceolata* regenerating from the base, along with shrubs (*Hakea rugosa, Acacia acinacea*). It was also notable that the state Endangered Ptilotus angustifolius (Narrow-leaf Yellow-tails) was flowering in areas that had been burnt (see Figure 8). Whilst weeds were generally of low cover, there was a diversity of species and lifeforms present, including high threat species (as per Section 4.1) *Acacia saligna, Asparagus asparagoides forma, Asteriscus spinosus, Asphodelus fistulosus, Echium plantagineum* and *Gomphocarpos cancellatus*.

Figure 8: State Endangered *Ptilotus angustifolius* flowering following fire.

Key management issues in this Management Zone

- Potential for significant weed proliferation due to bare ground
- Potential for ersosion due to bare ground
- Recovery/regeneration of native species following fire

Priority activities in this Management Zone

- Sensitive weed control
- Monitoring impacts and recovery from fire

Management Zone 4

Vegetation Association: *Pomaderris paniculosa ssp. paniculosa, Acrotriche patula, Olearia ramulosa* low shrubland

Photopoint 4.1, in Management Zone 4, facing SW at 272727, 6118422 (Zone 54, WGS 84)

Description of this area: This vegetation is in the north-western corner of the site. Whilst similar to Management Zone 1, moderate sized shrubs (1-2m) are more prominent, and grassy and herbaceous weeds are more prominent in the understorey. There is also a shallow cutting into the site where water drains from adjoining properties to the north. This disturbed area, with unnatural water flow, forms a haven for weed species, such as *Phalaris aquatica* (Canary Grass), *Oxalis pes-caprae* (Soursob), *Scabiosa atropurpurea* (Scabious), *Paspalum dilatatum*, *Euphorbia terracina* (False Caper) and *Rapistrum rugosom* (Wild Turnip). The close proximity of properties to the north also means that fire management is an issue in this area.

Key management issues in this Management Zone

- High threat weeds
- Drainage into the site from properties to the north
- Bushfire management

Priority activities in this Management Zone

- Investigate options to reduce runoff from adjacent properties into this area
- Weed control

Management Zone 5

Vegetation Association: *Eucalyptus porosa, Melaleuca lanceolata, Allocasuarina verticillata* planted woodland

Photopoint 5.1, in Management Zone 5, facing S at 272651, 6118026 (Zone 54, WGS 84)

Description of this area: This Management Zone is a narrow strip in the south-western corner of the site. It has been revegetated with *Eucalyptus porosa* (Mallee Box), *Allocasuarina verticillata* (Drooping She-oak) and *Melaleuca lanceolata* (Dryland Tea-tree), but there are scattered remnant species in the understorey, including shrubs, lilies, sedges and native grasses.

Key management issues in this Management Zone

- Buffer zone between high quality heath habitat and adjoining properties
- High threat weeds

Priority activities in this Management Zone

- Potential to expand heath through targeted understorey plantings

Management Zone 6

Vegetation Association: *Austrostipa sp. grassland* with emergent *Acacia victoriae, Melaleuca lanceolata, Eucalyptus porosa*

Photopoint 6.1, in Management Zone 6, facing SW at 272984, 6118345 (Zone 54, WGS 84)

Description of this area: This vegetation is an open area on shallow soils through central parts of the site. The understorey is dominated by *Austrostipa spp*. (Spear Grass), principally *Austrostipa eremophila* (Rusty Spear-grass), with scattered emergent *Acacia victoriae ssp. victoriae* (Elegant Wattle) and *Eucalyptus porosa* (Mallee Box). There are scatted remnant low and medium shrubs, including *Pomaderris paniculosa ssp. paniculosa* (Mallee Pomaderris) and *Pimelea glauca* (Smooth Riceflower) and lilies (*Dianella revoluta ssp., Lomandra spp.*). It is recommended that this area is left as a grassland with emergent overstorey species, to maintain a diversity of habitats in the site.

Key management issues in this Management Zone

- Maintain high cover of native grass understorey
- High threat weeds

Priority activities in this Management Zone

- Weed control

Management Zone 7

Vegetation Association: *Acacia victoriae* shrubland

Photopoint 7.1, in Management Zone 7, facing SW at 272907, 6118294 (Zone 54, WGS 84)

Description of this area: This vegetation is in central parts of the site, and is characterised by a moderate to dense layer of *Acacia victoriae ssp. victoriae* (Elegant Wattle) as the dominant overstorey species, generally around 2 metres in height. The understorey is generally dominated by introduced annual grasses and herbs, such as *Avena* sp. (Wild Oat), *Brachypodium distachyon* (False Brome), and *Bromus diandrus* (Great Brome). The Elegant Wattle has several age classes present, including very young plants, and so may potentially increase in density in this area.

Key management issues in this Management Zone

- Lack of native understorey
- High threat weeds

Priority activities in this Management Zone

- Ongoing management of high threat weeds
- Investigate potential for slashing regime to promote native grass growth

Management Zone 8

Vegetation Association: Revegetation *Eucalyptus porosa, Melaleuca lanceolata* woodland

Photopoint 8.1, in Management Zone 8, facing SE at 272917, 6118190 (Zone 54, WGS 84)

Description of this area: This Management Zone is through most of the central sections of the site. It has been revegetated with various trees and shrubs, mostly locally indigenous species, with *Eucalyptus porosa* (Mallee Box), *Melaleuca lanceolata* (Dryland Tea-tree) and Allocasuarina verticillata (Drooping She-oak) most common. The understorey is generally dominated by introduced annual grasses and herbs, such as *Avena* sp. (Wild Oat), *Brachypodium distachyon* (False Brome), and *Bromus diandrus* (Great Brome), with the herb *Rapistrum rugosum* ssp. *rugosum* (Turnip Weed) prolific in depper soils on drainage lines.

Key management issues in this Management Zone

- Lack of native understorey
- High threat weeds

Priority activities in this Management Zone

- Ongoing management of high threat weeds
- Investigate potential for slashing regime to promote native grass growth
- Reconstruct a low shrub/sedge/lily understorey layer, starting from the western side (ie adjacent to the coastal heath habitat)

Management Zone 9

Vegetation Association: *Malva arborea, Rapistrum rugosum* herbland

Photopoint 9.1, in Management Zone 9, facing SE at 273197, 6118398 (Zone 54, WGS 84)

Description of this area: This Management Zone corresponds to the old City of Marion Dump site, which has been filled with soil of unknown origin. The vegetation in this area is indicative of a high level of disturbance, and is dominated by *Rapistrum rugosum* (Turnip Weed) and *Malva sp* (Mallow), with scattered plantings around the edges.

Key management issues in this Management Zone

- Lack of remnant understorey
- Unstable soils, with rubble and building materials still present
- High cover of weeds

Priority activities in this Management Zone

- Investigate options to improve the biodiversity values and reduce ongoing maintenance in this area, as discussed in Section 5.3

Management Zone 10

Vegetation Association: *Themeda triandra, Cymbopogon ambiguus* grassland with emergent planted shrubs and trees

Photopoint 10.1, in Management Zone 10, facing S at 273323, 6118291 (Zone 54, WGS 84)

Description of this area: This area is recent revegetation in an area where extensive weed control has been undertaken. It would formerly have been part of Management Zone 9. The plantings are of indigenous native species and there is a good diversity of native species present, and survival rates appear to have been moderate to good.

Key management issues in this Management Zone

- Potential for significant weed biomass colonising bare soils
- Maintenance of revegetation, including weed control

Priority activities in this Management Zone

- Ongoing management of revegetatopm

Management Zone 11

Vegetation Association: *Lepidosperma congestum, Themeda triandra* sedgeland/grassland

Photopoint 11.1, in Management Zone 11, facing SE at 273357, 6118305 (Zone 54, WGS 84)

Description of this area: This vegetation is a strip of sedgeland/grassland towards the eastern end of the property, where there is still significant cover of native groundlayer plants, such as *Lepidosperma congestum* (Clustered Sword Sedge) and *Themeda triandra* (Kangaroo Grass). Whilst there is moderate cover of grassy and herbaceous weeds, the understorey is still principally native.

Key management issues in this Management Zone

- Maintain biodiversity values in this Zone
- No further revegetation recommended at this time

Priority activities in this Management Zone

- Protect area from high threat weeds

Management Zone 12

Vegetation Association: *Acacia victoriae* shrubland

Photopoint 12.1, in Management Zone 12, facing SE at 273405, 6118346 (Zone 54, WGS 84)

Description of this area: This vegetation is similar to Management Zone 7, with a moderate to dense layer of *Acacia victoriae ssp. victoriae* (Elegant Wattle) as the dominant overstorey species, generally around 2 metres in height. The understorey is generally dominated by introduced annual grasses and herbs, such as *Avena* sp. (Wild Oat), *Brachypodium distachyon* (False Brome), and *Bromus diandrus* (Great Brome), and *Scabiosa atropurpurea* (Scabious) is also common. The Elegant Wattle has several age classes present, including very young plants, and so may potentially increase in density in this area. Towards the top of the slope, at the eastern end of this Zone, the native shrubs *Pomaderris paniculosa ssp. paniculosa* (Mallee Pomaderris) and *Olearia ramulosa* (Twiggy Diasy Bush) become more prominent.

Key management issues in this Management Zone

- Lack of native understorey
- High threat weeds

Priority activities in this Management Zone

- Ongoing management of high threat weeds
- Investigate potential for slashing regime to promote native grass growth

Management Zone 13

Vegetation Association: *Eucalyptus porosa, Melaleuca lanceolata* woodland

Photopoint 13.1, in Management Zone 13, facing SW at 273485, 6118203 (Zone 54, WGS 84)

Description of this area: This vegetation is similar to Management Zone 8, although some of the *Eucalyptus porosa* (Mallee Box) present in this zone may have regenerated naturally. This Management Zone is a small section near the boundary in the south-eastern corner of the site.

Key management issues in this Management Zone

- Lack of native understorey
- High threat weeds

Priority activities in this Management Zone

- Ongoing management of high threat weeds
- Investigate potential for slashing regime to promote native grass growth

5.3 Revegetation

5.3.1 Revegetation notes by management zone:

Management Zones 1,2,3,4: Coastal Heath and associated woodland

No broad-scale revegetation is required in these Management Zones. These habitats are generally in good condition, with a wide variety of species that will naturally regenerate/recruit. It is however recommended that post-fire recovery in Management Zone 2 is undertaken, using Management Zone 1 as a control (ie gathering data in both areas to track recovery). It should also be noted that the threatened orchids state Rare *Caladenia brumalis* (Winter Spider-orchid) and and the nationally Vulnerable *Caladenia bicalliata ssp. bicalliata* (Western Daddy-long-legs) are being propagated at the South Australian Seed Conservation Centre, and are proposed to be planted in these areas as the extant populations are very small[39].

Management Zones 5,8,13: *Eucalyptus porosa, Melaleuca lanceolata, Allocasuarina verticillata* woodlands

Prior to European settlement, the coastal plateau including the areas around Marino and Hallett Cove Conservation Parks would have supported a *Eucalyptus porosa* (Mallee Box), *Allocasuarina verticillata* (She-oak) Low Woodland. The understorey would have contained a mix of shrubs, but with grasses, herbs and sedges also prominent[40]. Whilst difficult to predict exactly the mix of species that would have occurred in the understorey (due to a lack of surviving coastal woodlands in the region), the following guide is based upon local records of species, along with the density of lifeforms observed in similar extant habitats in other regions of the state.

Species	Common Name	Lifeform	Cover	Notes
Eucalyptus porosa	Mallee Box	Medium tree	20-40%	In most areas, existing revegetation has already reached target cover levels. Any infill planting could use Allocasuarina verticillata, as this does not seem as abundant currently as the other two species.
Allocasuarina verticillata	Drooping She-oak			
Melaleuca lanceolata	Dryland Tea-tree			
Acacia pycnantha	Golden Wattle	Tall Shrubs	Scattered only <5%	Generally only scattered, but *Bursaria spinosa* provides valuable habitat components, such as perches and flower for nectar.
Bursaria spinosa	Sweet Bursaria			
Acacia acinacea	Wreath Wattle	Medium shrubs	10-30%	In this area, a combination of heath, woodland and coast-tolerant species, taking care not to over-plant as should in the 10-30% cover range.
Acacia ligulata	Umbrella Bush			
Allocasuarina muelleriana ssp.	Common Oak-bush			
Calytrix tetragona	Common Fringe-myrtle			
Olearia ramulosa	Twiggy Daisy-bush			
Pomaderris paniculosa ssp. paniculosa	Mallee Pomaderris			
Acrotriche patula	Prickly Ground-berry	Low shrubs		
Enchylaena tomentosa var.	Ruby Saltbush			
Eutaxia microphylla	Common Eutaxia			
Rhagodia candolleana ssp.	Sea-berry Saltbush			
Dianella revoluta var. revoluta	Black-anther Flax-lily	Sedges <1m	10-20% groundcover	Sedges are somewhat problematic to propagate, but would form scattered patches of high cover, and provide
Gahnia lanigera	Black Grass Saw-sedge			

[39] Jerry Smith pers. comm.

[40] Croft, S., Pedler, J. and Milne, T. (2006). Coastal Vegetation Communities of the Southern Mount Lofty Ranges. Nature Conservation Society of SA Inc., Adelaide.

Lepidosperma congestum	Clustered Sword-sedge			valuable habitat and shelter for both flora (e.g. orchids) and fauna (eg butterflies).
Lepidosperma viscidum	Sticky Sword-sedge			
Lomandra collina	Sand Mat-rush			
Lomandra micrantha ssp.	Small-flower Mat-rush			
Arthropodium strictum	Common Vanilla-lily	Herbs/forbs	Abundant, up to 5% cover	Some species, such as *Arthropodium strictum* and *Calostemma purpureum*, appear to already be spreading following replanting of the overstorey. The two orchid species may be an option for revegetation once other species become established.
Caladenia bicalliata ssp. bicalliata	Western Daddy-long-legs			
Caladenia brumalis	Winter Spider-orchid			
Calocephalus citreus	Lemon Beauty-heads			
Chrysocephalum semipapposum	Clustered Everlasting			
Calostemma purpureum	Pink Garland-lily			
Ptilotus angustifolius	Narrow-leaf Yellow-tails			
Ptilotus spathulatus	Pussy-tails			
Vittadinia blackii	Narrow-leaf New Holland Daisy			
Comesperma volubile	Love Creeper	Vines/climbers/twiners	Scattered only <5% cover	Already present, and considered likely to spread over time.
Einadia nutans ssp. nutans	Climbing Saltbush			
Muehlenbeckia gunnii	Coastal Climbing Lignum			
Thysanotus patersonii	Twining Fringe-lily			
Enneapogon nigricans	Black-head Grass	Tussock grasses	Abundant, up to 10% cover	
Austrostipa elegantissima	Feather Spear-grass			
Themeda triandra	Kangaroo Grass			

It is recommended that revegetation/restoration activities focus initially on buffering the heathland (ie focus on Management Zone 5 and the western side of Management Zone 8). This would focus upon weed control, especially *Scabiosa atropurpurea* (Scabious), along with targeted revegetation. It is also recommended that trials of slashing are undertaken in areas where there is spear grass (*Austrostipa spp*.) present, to see if an appropriate slashing regime could help increase cover of Spear Grass. The principle is that introduced annual grasses tend to grow, flower and set seed earlier than native perennial species. Slashing would therefore focus on a late winter slash (August), before introduced annual grasses had set seed, and then re-evaluate early to mid-September as whether to slash again, before then leaving to allow the native species to set seed. There may also be potential for some translocation of species from a nearby site at Trumara Road, where some remnant vegetation may be impacted by housing development[41].

Management Zone 6: *Austrostipa sp.* grassland with emergent *Acacia victoriae, Melaleuca lanceolata, Eucalyptus porosa* and Management Zone 11: *Lepidosperma congestum, Themeda triandra* sedgeland/grassland

These sections have a moderately diverse understorey, and to maintain a diversity of habitat types in the site, it is recommended they are left as a grasslands/sedgelands with only emergent trees and shrubs, with a focus on preventing spread of weeds. At this time, no further revegetation is recommended in these areas.

Management Zones 7, 12: *Acacia victoriae* shrubland.

The understorey under the Acacia victoriae shrubland is generally dominated by introduced grasses and herbs. There are also numerous young plants of this species present, and it is anticipated that the density of plants in this Management Zone will increase over time as these young plants mature. No revegetation recommended at this time, but there may be areas where native grass is more abundant where slashing could help promote native grass abundance (see notes under Management Zone 5 above).

[41] Jerry Smith, pers. comm.

Management Zone 9 : *Malva arborea, Rapistrum rugosum* herbland

This area is problematic, due to loose, friable soil which appears to be of high fertility which is promoting the growth of annual herbaceous species, especially *Malva sp*. and *Rapistrum rugosum*. Given the high levels of cover of both of these species, there would be a substantial seedbank present in the soil. This area is the most disturbed part of the Park, and would currently have little biodiversity value. The management of this area should not detract from the management of the more important zones of the Park. As such, management needs to focus on low cost, low maintenance solutions that provide an increase in the biodiversity values in the area. There are a number of potential options that could be investigated and trialled in limited areas, and expanded if successful:

- Revegetation with native grasses, especially Kangaroo Grass (*Themeda triandra*), but with a mix of other grasses including C3 grasses such as *Austrostipa spp*. and *Rytidosperma spp*. Kangaroo Grass is quite competitive, spreads quickly, and may succeed in the fertile soil. Use of native grasses would allow for sensitive use of broad-leaf herbicides to knock back the broad-leaf weeds[42].
- Slashing the area late winter and early spring. This would help prevent the herbaceous weeds setting seed, and would also be of value to promote native grass growth (especially if revegetation is undertaken). However, it is noted that the area has some safety issues for broad-scale slashing, and so may require mapping of sections that are safe to slash. This mapping would be best undertaken in late autumn, when plant biomass is low and it is easy to see potential obstructions.
- Removing topsoil. Even though the fertility issue is ikely to remain (as high fertility may occur through the soil profile), most of the weed seed is likely to be in the top 5cm of soil[43]. Removal of the topsoil would help reduce the weed seed bank, although it is accepted disposal of this soil may be problematic.
- Patch based revegetation of overstorey species. Plantings of *Allocasuarina verticillata* (Drooping She-oak) and *Eucalyptus porosa* (Mallee Box) may, over time, provide an understorey environment that would reduce the prevalence of herbaceous weeds. However, the significant weed burden already in the area would make broadscale revegetation difficult, as the weeds would grow over the seedling trees, and maintenance would be very costly (as slashing would need to be done by hand to avoid cutting the revegetation). However, planting in patches, with ongoing maintenance to help ensure success, would allow for lower levels of maintenance, and enable broad-scale slashing by a mower. Over time, once initial plantings no longer required intensive maintenance, more patches of trees could be planted and maintained.
- Investigate use of jute matting in revegetation. Use of jute matting may suppress weeds, improving revegetation success.
- Bioweed Ultra. SA Water are currently trialling use of this natural non-selective herbicide, which is based upon pine oil. Bioweed impacts both the weed and the seed, is non-residual, and only effects green parts of plants so can be used up to the base of trees. It may be a

[42] Shaun Kennedy recommends using MCPA 750 in the first year when grasses are young and sensitive, but other broadleaf herbicides, such as Triclopyr, could be used in later years when grasses are more robust.
[43] Shaun Kennedy, pers. comm.

viable option in site preparation for revegetation in this area, or even as a trial alone to see if dominant weeds can be suppressed.

Management Zone 10: *Themeda triandra, Cymbopogon ambiguus* grassland with emergent planted shrubs and trees

This area was sprayed out and revegetated in 2020/2021 with a good variety of native species. Ongoing maintenance will need to focus upon hervbaceous weeds that will proliferate in bare areas, and infill planting as required depending on survival of initial plantings.

6 MONITORING

A series of photopoints were established as part of the assessment process, and these images and associated location data are provided in Appendix 3. The location of these photopoints is shown in Figure 7. Bushland Assessments were also undertaken in each Management Zone – these can be used to provide a broad overview of change over time. In addition, a series of targets have been established as part of the Biodiversity Action Plan and are provided in Table 6. These targets can be used to track change, and progress towards the desired goal.

7 BIODIVERSITY ACTION PLAN

Table 6 lists the biodiversity management threats/issues for Marino Conservation Park, their related objectives, and further actions being proposed, as well as prioritising of these actions. Note that weeds that have been targeted for control over the next 5 years are based on the priority weeds as described in Section 4.1.

5.1.1 Note regarding prioritising and developing actions and targets for weed species

Specific actions and targets for each weed are based upon factors such as the risk posed by that particular species, as well as its current distribution in the Park and associated feasibility of containment. This approach has been adopted by many regional Landscape Management Regions in South Australia[44], and is based upon the methodology of Virtue, 2008[45]. This helps to ensure resources are invested efficiently and effectively. For example, weeds that are currently at low levels, but are high risk, are targeted for eradication to ensure the species does not proliferate and become a much larger (and more costly) problem in the future. Widespread weeds of high risk are specifically targeted where they pose a risk to an asset, such as the coastal heath.

With regard to this Management Plan, Management Zones 1,2 and 4 are considered to represent the vegetation in best condition or of highest value, followed by zones 3,6 and 11, then zones 5,7,8,12 and 13, with Zone 9 in the poorest condition. Table 7 summarises the broad approach which has been taken to setting actions and targets for priority weeds.

[44] Adelaide and Mount Lofty Ranges Natural Resources Management Board (2009). *Pest Prioritisation Management Actions*. AMLRNRM, Adelaide
Anderson, N., Drew, J. and Virtue, J. (2005). *South East Weed Risk Assessment*. Lacepede Tatiara Robe Animal & Plant Control Board. For the South East Natural Resource Consultative Committee.
[45] Virtue, J. (2008). SA Weed Risk Management Guide, February 2008. Department of Water, Land and Biodiversity Conservation, Adelaide.

Table 7: Approach taken to management strategies and targets, based upon risk and feasibility of containment

Weed Risk *	Feasibility of Containment (based upon available resources and current distribution)		
	Low	**Medium**	**High**
Low/Moderate	Monitor and implement new management strategies if significant spread occurs		
High	Protect significant sites (such as areas of remnant vegetation in best condition)	Contain weed spread	Destroy infestations and (if possible) eradicate weed
Extreme	Implement whole of Park management strategies to reduce level of weed		

Table 6: Biodiversity Action Plan summary table for Marino Conservation Park

ISSUE/THREAT	5-Yr Objective / Milestone	Proposed actions - what/ where/how	Management Zone(s)	Priority*
High threat woody weeds: *Acacia saligna* (Golden Wreath Wattle) *Acacia cyclops* (Western Coastal Wattle) *Chrysanthemoides monilifera* (Boneseed) *Lycium ferocissimum* (African Boxthorn) *Olea europaea* (Olive)	Eradicate these species from Marino Conservation Park.	Annually patrol, mark all specimens, and hand pull or cut and swab as required.	1-4 5-13	E VH
High threat forb and herbaceous weeds: *Aizoon pubescens* (Galenia) *Asparagus asparagoides* (Bridal Creeper) *Asteriscus spinosus* (Golden pallensis) *Echium plantagineum* (Salvation Jane) *Euphorbia spp.* (Capers) *Gazania linearis* (Gazania) *Oxalis pes-caprae* (Soursob) *Scabiosa atropurpurea* (Scabious)	Eradicate these species from high priority coastal heath habitats (Zones 1,2,4). Reduce to scattered, <1% cover in Zones 3,6 and 11.	Annually patrol and spot spray / hand pull if observed. Ensure all work is bushcare sensitive (ie no off target damage).	1,2,4 3,6,11	E VH
High threat weed: *Gomphocarpos cancellatus* (Broad-leaf Cotton bush)	Not present in better condition vegetation (Zones 1-6,11) but present as scattered individuals in other areas to provide butterfly habitat.	Patrol high priority areas and handpull or grub as required.	1,2,4 3,6,11	E H
Proliferation of forb and grass weeds following fire	No increase in forb and grass weeds in burnt areas.	Survey through burnt area in late winter/spring in 2021 to monitor for emergence/proliferation of grass and herbaceous weeds. Spot spray / hand pull as required.	2	E
Weed species, notably *Acacia cyclops* and *Cenchrus sp*. along railway reserve that abuts the western side of the Park	*Acacia cyclops* and *Cenchrus sp*. eradicated from adjoining rail reserve.	Friends of Marino/DEW to write to Keolis Downer to make them aware of the issue, and to ask for the species to be removed.	1-4	VH

ISSUE/THREAT	5-Yr Objective / Milestone	Proposed actions - what/ where/how	Management Zone(s)	Priority*
Lack of understanding of fire management	Increased understanding of impacts of fire on coastal heath habitat from monitoring recovery in burnt areas and comparison with unburnt areas.	In spring 2021, consider using adapted methods from the "Flora monitoring protocol for planned burning: a user's guide[46]", including the following for each vegetation type: • **Vital attributes assessment**. Gather data for each perennial species on the percentage of individuals within life-stage classes and mode of regeneration. • **Overall species assessment**. Base this upon "**Flora Indicator Species Assessment**" but incorporate all species within assessment plots.	1,2	H
Success of recent revegetation	Improvement in following Bushland Assessment components: Native species richness Native plant lifeforms score Weed score Native:exotic understorey biomass score Revegetation reaching maturity, flowering and setting seed.	Patrol and spot-spray or handpull emerging weeds. Annually evaluate success of revegetation, before ordering new seedlings.	10	H
Proliferation of annual grassy weeds and low cover of native perennial grasses	Improvement of cover of native grasses in trial areas.	Mark out sites in spring 2020 where there is currently moderate cover of native perennial grasses. Trial a late winter slash (August), before introduced annual grasses have set seed, and then re-evaluate early to mid-September as whether to slash again, before then leaving to allow the native grass species to set seed.	7,8,12,13	H
Significant flora species	Increase in abundance of threatened orchids: *Caladenia brumalis* (Winter Spider-orchid) and *Caladenia bicalliata ssp. bicalliata* (Western Daddy-long-legs)	Ongoing monitoring of existing populations, and planting of propagated individuals of each species.	1,2,4	H

[46] Cawson, J. and Muir, A. (2008). Flora monitoring protocol for planned burning: a user's guide. State of Victoria Department of Sustainability and Environment

ISSUE/THREAT	5-Yr Objective / Milestone	Proposed actions - what/ where/how	Management Zone(s)	Priority*
Drainage into site introducing weeds and reducing habitat quality	Drainage from adjoining properties improved. Photopoint 4.3 shows trench removed and improvement in condition	Investigate options for directing water away from site.	4	H
Lack of understorey species and high weed biomass	Improvement in following Bushland Assessment components: Native species richness Native plant lifeforms score Weed score Native:exotic understorey biomass score	Revegetation and rehabilitation of woodlands adjacent to the coastal heath, focussing on weed control with targeted revegetation (see Section 5.3.1).	5,8	H
High threat forb and herbaceous weeds: *Aizoon pubescens* (Galenia) *Asparagus asparagoides* (Bridal Creeper) *Asteriscus spinosus* (Golden Pallensis) *Echium plantagineum* (Salvation Jane) *Euphorbia spp.* (Capers) *Gazania linearis* (Gazania) *Oxalis pes-caprae* (Soursob) *Scabiosa atropurpurea* (Scabious)	No increase from 2021 levels (as paer Appendix 1).	Initial focus on potential areas for revegetation. Consider a summer spray with Brush-off for *Scabiosa atropurpurea*, as that has proved effective for this species at other sites in the City of Marion[47].	5,7,8,12,13	M
Low habitat values of old dump site	Improved biodiversity values, including: Native species richness Native plant lifeforms score Weed score Native:exotic understorey biomass score	Investigate/trial potential options for this area, including:	9	M
Lack of adaptive management	Progress and success of works undertaken is monitored on an ongoing and regular basis, and actions modified to suit. Plan reviewed on this basis at end of 5 years.	Track progress against 5 year objectives	All	M
		Repeat photopoints every 2 years	All	M

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*E = extreme, VH = very high, H = high, M = medium, L = low

Appendix 1: Native Plant and Weed Lists for Marino Conservation Park

Table A1: Native plant lists for the site (including records from the Biological Database of South Australia[48].)

Species	Common Name	Conservation Status			Management Zone												
		AUS[49]	SA[50]	Bioregion[51]	1	2	3	4	5	6	7	8	9	10	11	12	13
Acacia acinacea	Wreath Wattle			NT	O	O	X					X	X	X	X		X
Acacia cupularis	Cup Wattle			RA	E			X	X								
Acacia leiophylla	Coast Golden Wattle																
Acacia ligulata	Umbrella Bush			RA				X				R					
Acacia paradoxa	Kangaroo Thorn			LC			R		R	E,R	O,R	R		X		X	
Acacia pycnantha	Golden Wattle			LC									X	X		X	R
Acacia victoriae ssp. victoriae	Elegant Wattle			VU	E		X			E,R	O,R	R	R		R	O,R	R
Acrotriche patula	Prickly Ground-berry			NT	O,R			O			X				X		
Adriana quadripartita	Coast Bitter-bush			RA													
Allocasuarina muelleriana ssp. muelleriana	Common Oak-bush			LC				X				X		X			
Allocasuarina verticillata	Drooping Sheoak			LC	R				O,R							X	X
Alyxia buxifolia	Sea Box			RA												X	
Amyema preissii	Wire-leaf Mistletoe			LC								X			X	X	X
Aristida behriana	Brush Wire-grass			LC													
Arthropodium fimbriatum	Nodding Vanilla-lily			LC													
Arthropodium strictum	Common Vanilla-lily			LC	X	X											
Asperula conferta	Common Woodruff			NT													
Atriplex semibaccata	Berry Saltbush			LC													
Austrostipa blackii	Crested Spear-grass			LC													
Austrostipa drummondii	Cottony Spear-grass			NT													
Austrostipa elegantissima	Feather Spear-grass			LC	X			X					X				
Austrostipa eremophila	Rusty Spear-grass			LC													
Austrostipa exilis	Heath Spear-grass			RA													
Austrostipa flavescens	Coast Spear-grass			LC													

[48] These data have been sourced from the South Australian Department for Environment and Water Biological Database of SA. Recordset number DEWNRBDBSA210601-1

[49] Environment Protection and Biodiversity Conservation Act 1999

[50] Schedules of the National Parks and Wildlife Act 1972

[51] Gillam, S. and Urban, R. (2014) *Regional Species Conservation Assessment Project, Phase 1 Report: Regional Species Status Assessments*, Adelaide and Mount Lofty Ranges NRM Region. Department of Environment, Water and Natural Resources, South Australia.

Species	Common Name	Conservation Status			Management Zone											
		AUS[49]	SA[50]	Bioregion[51]	1	2	3	4	5	6	7	8	9	10	11	12	13
Austrostipa multispiculis	Many-flowered Spear-grass		RA	RA													
Austrostipa nodosa	Tall Spear-grass			LC													
Austrostipa sp.	Spear-grass				X	X	X	X	X	O	X	X	X	X	X	X	X
Beyeria lechenaultii	Pale Turpentine Bush			NT													
Boerhavia dominii	Tar-vine												X				
Bulbine bulbosa	Bulbine-lily			LC													
Bursaria spinosa ssp. spinosa	Sweet Bursaria			LC	X			X	X								
Caesia calliantha	Blue Grass-lily			LC													
Caladenia bicalliata ssp. bicalliata	Western Daddy-long-legs		RA	EN													
Caladenia brumalis	Winter Spider-orchid	VU	VU	RE													
Caladenia latifolia	Pink Caladenia			NT													
Caladenia patersonii complex	White Spider-orchid																
Calocephalus citreus	Lemon Beauty-heads			NT													
Calostemma purpureum	Pink Garland-lily			LC	X	X	X										
Calotis cuneifolia	Purple Burr-daisy			Considered a possible introduction													
Calytrix tetragona	Common Fringe-myrtle			LC	X								X		X	X	
Cassytha glabella f. dispar	Slender Dodder-laurel			LC	X												
Chamaescilla corymbosa var. corymbosa	Blue Squill			LC													
Chamaesyce drummondii (NC)	Caustic Weed						X										
Cheilanthes austrotenuifolia	Annual Rock-fern			LC													
Chloris truncata	Windmill Grass			LC										X			
Chrysocephalum apiculatum (NC)	Common Everlasting			LC													
Chrysocephalum semipapposum	Clustered Everlasting			NT													
Comesperma volubile	Love Creeper			RA				X									
Convolvulus angustissimus	Narrow-leaf Bindweed			NT													
Convolvulus sp.							X										
Crassula decumbens var. decumbens	Spreading Crassula			LC													
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop																
Cullen australasicum	Tall Scurf-pea			NT													
Cymbopogon ambiguus	Lemon-grass			RA			X							X			
Dianella brevicaulis	Short-stem Flax-lily			NT				X		X	X	X					

Species	Common Name	Conservation Status			Management Zone												
		AUS[49]	SA[50]	Bioregion[51]	1	2	3	4	5	6	7	8	9	10	11	12	13
Dianella revoluta var. revoluta	Black-anther Flax-lily			LC	X	X	X	X	X	X		X		X	X		
Dissocarpus biflorus var. biflorus	Two-horn Saltbush			RA													
Diuris palustris	Little Donkey-orchid			EN													
Dodonaea viscosa ssp. spatulata	Sticky Hop-bush			LC	X		R	X		X		U,R	X	X	X	X	X
Drosera macrantha ssp. planchonii	Climbing Sundew			LC													
Drosera whittakeri	Scented Sundew			LC													
Einadia nutans ssp. nutans	Climbing Saltbush			LC													
Enchylaena tomentosa var. tomentosa	Ruby Saltbush			LC			X		X			X			X	X	X
Enneapogon nigricans	Black-head Grass			LC			X							X			
Eucalyptus porosa	Mallee Box			NT			O		E,R			X	R				O
Eutaxia microphylla	Common Eutaxia			LC								X					X
Exocarpos aphyllus	Leafless Cherry			VU													
Gahnia lanigera	Black Grass Saw-sedge			RA	U	X		U	X						U		
Glycine rubiginosa	Twining Glycine			LC													
Gompholobium ecostatum	Dwarf Wedge-pea			NT													
Gonocarpus mezianus	Broad-leaf Raspwort			LC													
Goodenia albiflora	White Goodenia			RA												X	
Goodenia amplexans	Clasping Goodenia			NT													
Goodenia arguta	Toothed Velleia			RA													
Goodenia pinnatifida	Cut-leaf Goodenia			NT													
Goodenia pusilliflora	Small-flower Goodenia			VU													
Goodenia sp.	Goodenia							X									
Grevillea lavandulacea ssp. lavandulacea	Spider-flower			LC													
Hakea rugosa	Dwarf Hakea			NT	X	X	X					X				X	X
Hardenbergia violacea	Native Lilac			LC													
Helichrysum leucopsideum	Satin Everlasting			NT													
Isoetopsis graminifolia	Grass Cushion			RA													
Kennedia prostrata	Scarlet Runner			LC													
Lepidosperma congestum	Clustered Sword-sedge			RA	U	X		U	X		X				O		
Lepidosperma viscidum	Sticky Sword-sedge			LC	X			X									
Lomandra collina	Sand Mat-rush			RA	X	X		X		X					X		
Lomandra densiflora	Soft Tussock Mat-rush			LC					X						X		
Lomandra effusa	Scented Mat-rush			RA				U	U			X			X		

Species	Common Name	Conservation Status			Management Zone												
		AUS[49]	SA[50]	Bioregion[51]	1	2	3	4	5	6	7	8	9	10	11	12	13
Lomandra micrantha ssp. micrantha	Small-flower Mat-rush			LC	X												
Lomandra multiflora ssp. dura	Hard Mat-rush			LC													
Lotus australis	Austral Trefoil			NT													
Lycium australe	Australian Boxthorn			EN													
Lysiana sp.	Mistletoe										X						
Maireana appressa	Pale-fruit Bluebush			Considered wrong identification													
Maireana brevifolia	Short-leaf Bluebush			LC													
Maireana enchylaenoides	Wingless Fissure-plant			LC	X		X										
Maireana rohrlachii	Rohrlach's Bluebush		RA	RA			X										
Malva preissiana (NC)	Australian Hollyhock																
Melaleuca lanceolata	Dryland Tea-tree			RA			X		O	X		O	X	X			O
Microseris lanceolata	Yam Daisy			LC													
Microtis arenaria	Notched Onion-orchid			LC													
Millotia tenuifolia var. tenuifolia	Soft Millotia			LC													
Minuria leptophylla	Minnie Daisy			RA													
Muehlenbeckia gunnii	Coastal Climbing Lignum			LC							X						
Myoporum montanum	Native Myrtle			VU													
Olearia axillaris	Coast Daisy-bush			NT													
Olearia ramulosa	Twiggy Daisy-bush			LC	O,R			O	X	X	X		X		E	X	X
Opercularia turpis	Twiggy Stinkweed			NT	X												
Oxalis perennans	Native Sorrel			LC	X												
Pauridia glabella var. glabella	Tiny Star			LC													
Pimelea curviflora ssp. gracilis	Curved Riceflower			RA													
Pimelea curviflora var. sericea	Curved Riceflower			RA													
Pimelea glauca	Smooth Riceflower			NT	X					X	X	X					
Pimelea micrantha	Silky Riceflower			NT											X		
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower			NT													
Pittosporum angustifolium	Native Apricot			NT		X		E	X			X					X
Podolepis muelleri	Button Podolepis		VU	EN													
Pogonolepis muelleriana	Stiff Cup-flower			NT													
Pomaderris paniculosa ssp. paniculosa	Mallee Pomaderris			NT	R	O		O,R		X		X			X	X	X

Species	Common Name	Conservation Status			Management Zone												
		AUS[49]	SA[50]	Bioregion[51]	1	2	3	4	5	6	7	8	9	10	11	12	13
Poranthera triandra	Three-petal Poranthera			VU													
Ptilotus angustifolius	Narrow-leaf Yellow-tails		EN	VU			X	X									
Ptilotus nobilis ssp. nobilis (NC)	Yellow-tails																
Ptilotus spathulatus	Pussy-tails			RA													
Pultenaea tenuifolia	Narrow-leaf Bush-pea			RA	X												
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush			LC										X			
Rhagodia parabolica	Mealy Saltbush			RA											X		
Roepera glauca	Pale Twinleaf			RA													
Rorippa sp.	Watercress/Bitter-cress																
Rytidosperma caespitosum (NC)	Common Wallaby-grass																
Rytidosperma setaceum	Small-flower Wallaby-grass			LC													
Rytidosperma sp.	Wallaby-grass				X			X	X	X		X					X
Salsola australis	Buckbush			LC			X	X	X								
Santalum acuminatum	Quandong			RA		R		X		X	X						
Scaevola albida	Pale Fanflower			LC										X	X	X	
Schoenus breviculmis	Matted Bog-rush			LC													
Scleranthus pungens	Prickly Knawel			RA													
Sclerolaena diacantha	Grey Bindyi			RA			X										
Senecio pinnatifolius (NC)	Variable Groundsel																
Senna artemisioides ssp. filifolia	Fine-leaf Desert Senna			RA													
Setaria constricta	Knotty-butt Paspalidium			NT			X										
Sida corrugata var. corrugata	Corrugated Sida			RA					X								
Stackhousia monogyna	Creamy Candles			NT													
Teucrium racemosum	Grey Germander			RA													
Themeda triandra	Kangaroo Grass			LC	X			X						X	X		X
Thysanotus patersonii	Twining Fringe-lily			LC	X	X	X										
Tricoryne tenella	Tufted Yellow Rush-lily			VU		X											
Vittadinia australasica var. australasica	Sticky New Holland Daisy			NT													
Vittadinia blackii	Narrow-leaf New Holland Daisy			NT						X				X	X		
Vittadinia cuneata var. cuneata	Fuzzy New Holland Daisy			LC													
Vittadinia gracilis	Woolly New Holland Daisy			LC										X			
Vittadinia megacephala	Giant New Holland Daisy			RA													
Wahlenbergia luteola	Yellow-wash Bluebell			RA													

Species	Common Name	Conservation Status			Management Zone												
		AUS[49]	SA[50]	Bioregion[51]	1	2	3	4	5	6	7	8	9	10	11	12	13
Wahlenbergia stricta ssp. stricta	Tall Bluebell			LC													
Wurmbea dioica ssp. dioica (NC)	Early Nancy																
Zygophyllum aurantiacum/eremaeum	Shrubby Twinleaf																

Key to codes: X = present, R = present and noted to be regenerating/recruiting, O= Overstorey dominant, U = understorey dominant, E = emergent species, LC= Least Concern, NT = Near Threatened; RA = Rare; VU = Vulnerable; EN=Endangered.

Table A2: Weed plant lists for the site (including records from the Biological Database of South Australia[52] and Croft and Croft (2019)[53])

Species name	Common name	Source	Declared[54]	Weed threat rating[55]	Cover by Management Zone												
					1	2	3	4	5	6	7	8	9	10	11	12	13
Acacia cyclops	Western Coastal Wattle	2		3								1			1		1
Acacia saligna	Golden Wreath Wattle	1		2			1						1			1	
Aira sp.	Hair-grass	1		1													
Aizoon pubescens	Coastal Galenia	2		2									1a	1			
Aizoon sp.	Galenia	1		2													
Amaranthus muricatus	Rough-fruit Amaranth	1															
Asparagus asparagoides forma	Bridal Creeper		Yes	5			1		1		1						
Asphodelus fistulosus	Onion Weed	1,2		2		1	1		1a			1	1a	1	1		1
Asteriscus spinosus	Golden Pallensis	1,2		2			1	1	1a	1a	1a					2	
Avellinia festucoides	Avellinia	1		1													
Avena barbata	Bearded Oat	1		2													
Avena sp.	Wild Oat	1,2		2	1a			2	4	3	3	3	1a	1a	1a	3	3
Brachypodium distachyon	False Brome	1,2		2	1a			3	3	4	3	3			3	4	4
Briza maxima	Large Quaking-grass	1,2		2				2									
Briza minor	Lesser Quaking-grass	1,2		2													
Bromus diandrus	Great Brome	1,2		1					3								1a
Carrichtera annua	Ward's Weed	1,2		2	1a	1											
Carthamus lanatus	Saffron Thistle			2													1a
Catapodium rigidum	Rigid Fescue	1		2													
Cenchrus clandestinus	Kikuyu	1,2		3									1a	1			
Cenchrus sp.	Fountain Grass			3													
Chrysanthemoides monilifera ssp. monilifera	Boneseed	1,2	Yes	3													
Cynodon dactylon	Couch			2									1a				

[52] These data have been sourced from the South Australian Department for Environment and Water Biological Database of SA. Recordset number DEWNRBDBSA210601-1

[53] Croft, S. and Croft, T. (2019). Marino Conservation Park Land Unit Descriptions. Unpublished report prepared for the Department of Environment and Water.

[54] Under the *Landscapes Act 2019*

[55] As per Department for Environment and Water (2019). Bushland Assessment Manual. Unpublished document.

Species name	Common name	Source	Declared[54]	Weed threat rating[55]	Cover by Management Zone												
					1	2	3	4	5	6	7	8	9	10	11	12	13
Echium plantagineum	Salvation Jane	1,2	Yes	2			1						2				
Ehrharta longiflora	Annual Veldt Grass			2			1a										
Euphorbia paralias	Sea Spurge			3								1					
Euphorbia peplus	Petty Spurge	1,2		2													
Euphorbia terracina	False Caper	1	Yes	3	1		1	1			1		1a				
Gazania linearis	Gazania	1	Yes	3													
Gazania rigens	Gazania	1	Yes	3													
Gomphocarpus cancellatus	Broad-leaved Cotton-bush	1,2		2			1				1				1	1	
Heliotropeum europaeum	Common Heliotrope			1									3				
Hypochaeris glabra	Smooth Cat's Ear	1		1													
Limonium hyblaeum	Sea Lavender	1		2													
Linum strictum ssp. strictum	Upright Yellow Flax	1,2		1													
Linum trigynum	French Flax	1		1													
Lolium sp.	Ryegrass	1,2		1													
Lycium ferocissimum	African Boxthorn	1	Yes	3													
Lysimachia arvensis	Pimpernel	1,2		1													
Malva sp.	Mallow	1,2		2									5	1a			
Medicago minima	Little Medic	1		2													
Moraea setifolia	Thread Iris	1		2		1a	1a										
Olea europaea ssp. europaea	Olive	1,2	Yes	4	1						1	1					1
Oxalis brasiliensis	Brazil Wood-sorrel	1															
Oxalis compressa	(blank)	1															
Oxalis pes-caprae	Soursob	1,2		4			1a	1a	2			1a		1a			1a
Panicum capillare var. brevifolium	Witch-grass	1															
Phalaris aquatica	Phalaris	1,2		3													
Phoenix dactylifera	Date Palm	1,2											1				
Piptatherum miliaceum	Rice Millet	1,2		2								1				1	
Plantago lanceolata var. lanceolata	Ribwort	1,2		2			1		1a						1		1a
Rapistrum rugosum ssp. rugosum	Turnip Weed	1,2		2		1	1a	1		2	1a	1a	5	2	1a	2	2

Species name	Common name	Source	Declared[54]	Weed threat rating[55]	Cover by Management Zone												
					1	2	3	4	5	6	7	8	9	10	11	12	13
Reichardia tingitana	False Sowthistle			2				1					1a				
Romulea rosea var. australis	Common Onion-grass	1		2													
Romulea sp.	Onion-grass	1		2													
Salvia verbenaca	Wild Sage			2						1						1a	
Scabiosa atropurpurea	Pincushion	1,2		3			1a	1	2	2	2	3			1	3	3
Schinus molle	Pepper Tree			2							1						
Silene sp.	Catchfly	1,2		1	1a			1a							1a		
Solanum nigrum	Black Nightshade			2			1										
Soliva sp.	Jo Jo	1															
Sonchus oleraceus	Common Sow-thistle	1,2		1									1a	1			
Trifolium angustifolium	Clover			2	1a												
Trifolium campestre	Hop Clover	1,2		2													
Vulpia sp.	Fescue	1,2		2				2	2	2	2	2			2	2	

Cover categories: 1 = few individuals, <1%, 1a = plentiful <1%, 2 = 1-5%, 3 = 5-25%, 4 = 26-50%. Source: 1 = Biological Database of South Australia, 2 = Croft and Croft (2019).

Appendix 2: Fauna records from within 5km of the site

Records from within 5km of Marino Conservation Park, from Biological Database of South Australia incorporating BirdLife Australia data[56].

Class	Species name	Common name	AUS	SA	Number of records	Date last sighting
AMPHIBIA	*Crinia signifera*	Common Froglet			106	4/07/2018
AMPHIBIA	*Limnodynastes dumerilii*	Banjo Frog			5	23/09/2004
AMPHIBIA	*Limnodynastes tasmaniensis*	Spotted Marsh Frog			38	20/09/2005
AMPHIBIA	*Litoria ewingii*	Brown Tree Frog			1	22/09/2001
AVES	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill			41	29/08/2011
AVES	*Acanthiza lineata*	Striated Thornbill			3	22/01/2010
AVES	*Acanthiza nana*	Yellow Thornbill			5	21/09/2016
AVES	*Acanthiza reguloides australis*	Buff-rumped Thornbill			1	5/12/2019
AVES	*Acanthiza sp.*	thornbills			2	4/11/2007
AVES	*Acanthiza uropygialis*	Chestnut-rumped Thornbill			2	10/08/2015
AVES	*Acanthorhynchus tenuirostris*	Eastern Spinebill			7	22/10/2020
AVES	*Accipiter cirrocephalus cirrocephalus*	Collared Sparrowhawk			15	10/12/2019
AVES	*Accipiter fasciatus fasciatus*	Brown Goshawk			6	26/09/2012
AVES	*Acridotheres tristis tristis*	Common Myna			1	4/07/2018
AVES	*Acrocephalus australis australis*	Australian Reed Warbler			9	5/12/2019
AVES	*Alauda arvensis arvensis*	Eurasian Skylark			145	29/08/2011
AVES	*Anas gracilis gracilis*	Grey Teal			7	4/10/2020
AVES	*Anas platyrhynchos platyrhynchos*	Mallard			18	14/03/2010
AVES	*Anas superciliosa*	Pacific Black Duck			30	4/10/2020
AVES	*Anas superciliosa x platyrhynchos*	Pacific Black Duck x Mallard hybrid			9	14/03/2010
AVES	*Anhinga novaehollandiae novaehollandiae*	Australasian Darter		R	3	18/06/2009
AVES	*Anthochaera carunculata*	Red Wattlebird			489	22/10/2020
AVES	*Anthochaera chrysoptera*	Little Wattlebird			10	22/10/2020
AVES	*Anthochaera chrysoptera chrysoptera*	Little Wattlebird (mainland SA)			1	8/09/1985
AVES	*Anthus australis*	Australian Pipit			64	29/12/2019
AVES	*Aphrodroma brevirostris*	Kerguelen Petrel			4	5/08/1994
AVES	*Apus pacificus pacificus*	Pacific Swift			1	22/03/1998
AVES	*Aquila audax audax*	Wedge-tailed Eagle			6	5/12/2019
AVES	*Ardea alba modesta*	Great Egret			5	10/06/2009

[56] These data have been sourced from the South Australian Department for Environment and Water Biological Database of SA. Recordset number DEWNRBDBSA210601-1

Class	Species name	Common name	AUS	SA	Number of records	Date last sighting
AVES	*Ardea pacifica*	White-necked Heron			1	15/07/2002
AVES	*Ardenna carneipes*	Flesh-footed Shearwater		R	4	2/12/1973
AVES	*Ardenna grisea*	Sooty Shearwater			1	26/10/1975
AVES	*Ardenna tenuirostris*	Short-tailed Shearwater			57	11/05/2020
AVES	*Artamus cyanopterus*	Dusky Woodswallow			7	19/05/2007
AVES	*Artamus personatus*	Masked Woodswallow			1	26/09/1999
AVES	*Aythya australis*	Hardhead			7	4/10/2020
AVES	*Biziura lobata menziesi*	Musk Duck		R	2	7/09/2000
AVES	*Cacatua galerita*	Sulphur-crested Cockatoo			29	22/10/2020
AVES	*Cacatua sanguinea sanguinea*	Little Corella			10	22/10/2020
AVES	*Cacatua tenuirostris*	Long-billed Corella			2	22/10/2012
AVES	*Cacomantis flabelliformis flabelliformis*	Fan-tailed Cuckoo			6	19/07/2015
AVES	*Cacomantis pallidus*	Pallid Cuckoo			1	21/09/2000
AVES	*Cairina moschata*	Muscovy Duck			1	22/02/2004
AVES	*Caligavis chrysops*	Yellow-faced Honeyeater			1	22/01/2010
AVES	*Carduelis carduelis britannica*	European Goldfinch			115	14/10/2018
AVES	*Cereopsis novaehollandiae novaehollandiae*	Cape Barren Goose		R	2	15/11/1985
AVES	*Chalcites basalis*	Horsfield's Bronze Cuckoo			16	21/12/2011
AVES	*Chalcites lucidus*	Shining Bronze Cuckoo			1	23/06/2001
AVES	*Charadrius ruficapillus*	Red-capped Plover			3	19/07/1916
AVES	*Chenonetta jubata*	Maned Duck			23	27/09/2020
AVES	*Cheramoeca leucosterna*	White-backed Swallow			1	6/06/2000
AVES	*Chloris chloris*	European (Common) Greenfinch			71	27/03/2011
AVES	*Chroicocephalus novaehollandiae novaehollandiae*	Silver Gull			147	2/10/2020
AVES	*Cincloramphus cruralis*	Brown Songlark			16	28/08/2011
AVES	*Cincloramphus mathewsi*	Rufous Songlark			2	3/10/2009
AVES	*Climacteris picumnus picumnus*	Brown Treecreeper			1	7/03/1999
AVES	*Colluricincla harmonica*	Grey Shrikethrush			49	22/10/2020
AVES	*Columba livia*	Feral Pigeon			196	4/10/2020
AVES	*Coracina novaehollandiae*	Black-faced Cuckooshrike			40	22/10/2020
AVES	*Cormobates leucophaea*	White-throated Treecreeper			1	22/01/2010
AVES	*Corvus coronoides*	Australian Raven			8	1/02/2001
AVES	*Corvus mellori*	Little Raven			204	22/10/2020
AVES	*Corvus sp.*	Crows			8	11/04/2018
AVES	*Coturnix pectoralis*	Stubble Quail			12	29/11/2010

Class	Species name	Common name	AUS	SA	Number of records	Date last sighting
AVES	*Coturnix ypsilophora australis*	Brown Quail		V	3	11/08/2011
AVES	*Cygnus atratus*	Black Swan			1	21/09/2015
AVES	*Dacelo novaeguineae*	Laughing Kookaburra			11	22/10/2020
AVES	*Daption capense*	Cape Petrel			3	8/08/1973
AVES	*Dicaeum hirundinaceum hirundinaceum*	Mistletoebird			11	23/06/2015
AVES	*Diomedea exulans complex*	Wandering Albatross	ssp	ssp	1	8/11/1951
AVES	*Egretta novaehollandiae*	White-faced Heron			47	4/10/2020
AVES	*Egretta sacra sacra*	Pacific Reef Heron		R	5	20/05/2015
AVES	*Elanus axillaris*	Black-shouldered Kite			53	29/11/2019
AVES	*Eolophus roseicapilla*	Galah			109	22/10/2020
AVES	*Epthianura albifrons*	White-fronted Chat			4	13/01/2014
AVES	*Eudyptula minor novaehollandiae*	Little Penguin			6	8/08/1939
AVES	*Falco berigora*	Brown Falcon			43	28/08/2011
AVES	*Falco cenchroides*	Nankeen Kestrel			136	22/10/2020
AVES	*Falco longipennis*	Australian Hobby			12	3/10/2010
AVES	*Falco peregrinus macropus*	Peregrine Falcon		R	9	24/05/2020
AVES	*Falco subniger*	Black Falcon		R	4	7/04/2013
AVES	*Falcunculus frontatus frontatus*	Eastern Shriketit		R	1	18/11/2012
AVES	*Fulica atra*	Eurasian Coot			26	4/10/2020
AVES	*Gallinula tenebrosa*	Dusky Moorhen			37	4/10/2020
AVES	*Gavicalis virescens*	Singing Honeyeater			249	26/09/2020
AVES	*Geopelia placida placida*	Peaceful Dove			2	20/08/2000
AVES	*Gliciphila melanops*	Tawny-crowned Honeyeater			1	1/01/1900
AVES	*Glossopsitta concinna*	Musk Lorikeet			47	4/10/2020
AVES	*Grallina cyanoleuca*	Magpielark			180	24/10/2020
AVES	*Gymnorhina tibicen*	Australian Magpie			311	25/10/2020
AVES	*Haematopus fuliginosus fuliginosus*	Sooty Oystercatcher		R	6	2/10/2020
AVES	*Haliaeetus leucogaster*	White-bellied Sea Eagle		E	1	6/03/1983
AVES	*Haliastur sphenurus*	Whistling Kite			2	1/02/2020
AVES	*Halobaena caerulea*	Blue Petrel	VU		2	24/09/1991
AVES	*Himantopus leucocephalus*	White-headed Stilt			1	27/10/2009
AVES	*Hirundo neoxena neoxena*	Welcome Swallow			130	22/10/2020
AVES	*Hydroprogne caspia*	Caspian Tern			29	7/07/2020
AVES	*Hylacola pyrrhopygia parkeri*	Chestnut-rumped Heathwren (Mount Lofty Ranges)	EN	E	2	4/08/1991
AVES	*Lalage tricolor*	White-winged Triller			3	18/09/2009

Class	Species name	Common name	AUS	SA	Number of records	Date last sighting
AVES	*Larus dominicanus dominicanus*	Kelp Gull		R	1	10/06/2009
AVES	*Larus pacificus*	Pacific Gull			53	9/08/2020
AVES	*Lichenostomus cratitius*	Purple-gaped Honeyeater		ssp	1	18/08/1998
AVES	*Macronectes giganteus*	Southern Giant Petrel	EN	V	13	7/07/1974
AVES	*Macronectes sp.*	(blank)			1	7/07/1974
AVES	*Malurus cyaneus*	Superb Fairywren			84	22/10/2020
AVES	*Malurus cyaneus leggei*	Superb Fairywren (Mainland SA)			1	14/02/1993
AVES	*Malurus sp.*	fairywrens			1	11/04/2018
AVES	*Manorina flavigula*	Yellow-throated Miner	ssp	ssp	1	3/10/2009
AVES	*Manorina melanocephala*	Noisy Miner			79	24/10/2020
AVES	*Melithreptus gularis*	Black-chinned Honeyeater		ssp	7	1/09/2012
AVES	*Melithreptus lunatus*	White-naped Honeyeater			1	22/01/2010
AVES	*Melopsittacus undulatus*	Budgerigar			3	2/11/2007
AVES	*Microcarbo melanoleucos melanoleucos*	Little Pied Cormorant			81	2/10/2020
AVES	*Milvus migrans migrans*	Black Kite			1	22/09/2007
AVES	*Morus serrator*	Australasian Gannet			37	21/09/2015
AVES	*Neochmia temporalis temporalis*	Red-browed Finch			6	27/09/2020
AVES	*Neophema elegans elegans*	Elegant Parrot		R	2	15/11/2007
AVES	*Nesoptilotis leucotis*	White-eared Honeyeater			1	14/03/2016
AVES	*Ninox boobook*	Australian Boobook			4	7/11/2012
AVES	*Nycticorax caledonicus*	Nankeen Night Heron			3	6/09/2014
AVES	*Nymphicus hollandicus*	Cockatiel			1	26/12/1984
AVES	*Oceanites oceanites exasperatus*	Wilson's Storm Petrel			1	2/04/1974
AVES	*Ocyphaps lophotes*	Crested Pigeon			228	22/10/2020
AVES	*Onychoprion fuscatus serratus*	Sooty Tern			1	29/03/1937
AVES	*Pachycephala pectoralis*	Australian Golden Whistler			10	11/04/2018
AVES	*Pachycephala rufiventris rufiventris*	Rufous Whistler			10	6/09/2014
AVES	*Pachyptila belcheri*	Slender-billed Prion			4	15/07/1947
AVES	*Pachyptila desolata*	Antarctic Prion			33	19/07/1992
AVES	*Pachyptila salvini*	Salvin's Prion			9	23/09/1980
AVES	*Pachyptila sp.*	prions			1	29/05/1944
AVES	*Pachyptila turtur*	Fairy Prion			2	11/08/1968
AVES	*Pandion haliaetus cristatus*	Eastern Osprey		E	4	25/07/1998
AVES	*Pardalotus punctatus*	Spotted Pardalote			10	30/11/2008
AVES	*Pardalotus striatus*	Striated Pardalote			3	22/10/2020

Class	Species name	Common name	AUS	SA	Number of records	Date last sighting
AVES	*Pardalotus striatus substriatus*	Striated Pardalote			26	15/05/2019
AVES	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet			16	6/08/2001
AVES	*Passer domesticus domesticus*	House Sparrow			183	25/10/2020
AVES	*Pelagodroma marina dulciae*	White-faced Storm Petrel			3	5/10/1928
AVES	*Pelecanoides urinatrix*	Common Diving Petrel			2	7/10/1979
AVES	*Pelecanus conspicillatus*	Australian Pelican			33	29/12/2019
AVES	*Petrochelidon ariel*	Fairy Martin			5	13/01/2014
AVES	*Petrochelidon nigricans*	Tree Martin			3	29/12/2019
AVES	*Phalacrocorax carbo*	Great Cormorant			10	12/07/2015
AVES	*Phalacrocorax fuscescens*	Black-faced Cormorant			26	11/05/2020
AVES	*Phalacrocorax sulcirostris*	Little Black Cormorant			17	10/07/2020
AVES	*Phalacrocorax varius*	Great Pied Cormorant			96	2/10/2020
AVES	*Phaps chalcoptera*	Common Bronzewing			6	26/09/2020
AVES	*Phaps elegans*	Brush Bronzewing			1	1/02/2001
AVES	*Phoebetria palpebrata*	Light-mantled Albatross		V	1	18/09/1991
AVES	*Phylidonyris novaehollandiae*	New Holland Honeyeater			351	25/10/2020
AVES	*Phylidonyris novaehollandiae novaehollandiae*	New Holland Honeyeater (mainland SA)			36	8/04/2010
AVES	*Phylidonyris pyrrhopterus*	Crescent Honeyeater			2	22/01/2010
AVES	*Platalea regia*	Royal Spoonbill			2	29/12/2019
AVES	*Platycercus elegans*	Crimson Rosella			85	22/10/2020
AVES	*Platycercus eximius*	Eastern Rosella			17	24/09/2020
AVES	*Platycercus eximius eximius*	Eastern Rosella			1	3/11/2007
AVES	*Platycercus sp.*	rosellas			2	29/08/2011
AVES	*Podargus strigoides*	Tawny Frogmouth			5	27/09/2016
AVES	*Podiceps cristatus australis*	Great Crested Grebe		R	1	18/06/1917
AVES	*Poliocephalus poliocephalus*	Hoary-headed Grebe			3	19/07/2015
AVES	*Pomatostomus superciliosus*	White-browed Babbler			3	1/02/2001
AVES	*Poodytes gramineus goulburni*	Little Grassbird			3	6/09/2014
AVES	*Porphyrio melanotus melanotus*	Australasian Swamphen			23	24/04/2018
AVES	*Psephotus haematonotus*	Red-rumped Parrot			7	29/12/2015
AVES	*Psephotus haematonotus haematonotus*	Red-rumped Parrot (eastern SA except NE)			8	1/10/1985
AVES	*Pterodroma lessonii*	White-headed Petrel			2	2/04/1974
AVES	*Pterodroma macroptera (NC)*	Great-winged Petrel			1	20/08/1917
AVES	*Ptilotula penicillata*	White-plumed Honeyeater			96	22/10/2020
AVES	*Puffinus gavia*	Fluttering Shearwater			14	22/07/1998

Class	Species name	Common name	AUS	SA	Number of records	Date last sighting
AVES	*Pycnonotus jocosus*	Red-whiskered Bulbul			1	5/02/1985
AVES	*Rhipidura albiscapa*	Grey Fantail			9	27/09/2020
AVES	*Rhipidura leucophrys leucophrys*	Willie Wagtail			169	22/10/2020
AVES	*Sericornis frontalis*	White-browed Scrubwren			3	22/10/2020
AVES	*Sericornis frontalis (NC)*	White-browed Scrubwren			1	8/04/2010
AVES	*Smicrornis brevirostris*	Weebill			89	22/10/2020
AVES	*Spilopelia chinensis*	Spotted Dove			209	25/10/2020
AVES	*Stagonopleura guttata*	Diamond Firetail		V	1	19/10/1921
AVES	*Stercorarius antarcticus lonnbergi*	Brown Skua		V	26	12/06/1993
AVES	*Stercorarius parasiticus*	Parasitic Jaeger (Arctic Jaeger)			38	23/09/1974
AVES	*Stercorarius pomarinus*	Pomarine Jaeger			2	2/12/1973
AVES	*Sterna dougallii*	Roseate Tern			1	1/11/1923
AVES	*Sterna hirundo longipennis*	Common Tern		R	1	18/08/1998
AVES	*Strepera versicolor*	Grey Currawong		ssp	26	22/10/2020
AVES	*Streptopelia risoria*	Barbary Dove			22	19/07/2015
AVES	*Sturnus vulgaris vulgaris*	Common Starling			234	22/10/2020
AVES	*Tachybaptus novaehollandiae*	Australasian Grebe			5	4/10/2020
AVES	*Tadorna tadornoides*	Australian Shelduck			3	4/10/2020
AVES	*Taeniopygia guttata castanotis*	Zebra Finch			3	3/06/1918
AVES	*Thalassarche carteri*	Indian Yellow-nosed Albatross	VU	E	11	26/09/1973
AVES	*Thalassarche cauta cauta*	Shy Albatross	VU	V	1	27/07/1977
AVES	*Thalassarche chrysostoma*	Grey-headed Albatross	EN	V	2	28/06/1977
AVES	*Thalassarche melanophris*	Black-browed Albatross	VU	ssp	5	3/06/1968
AVES	*Thalasseus bergii cristatus*	Greater Crested Tern			81	2/10/2020
AVES	*Threskiornis molucca molucca*	Australian White Ibis			9	29/12/2019
AVES	*Threskiornis spinicollis*	Straw-necked Ibis			1	4/10/2020
AVES	*Todiramphus sanctus*	Sacred Kingfisher			2	27/02/2013
AVES	*Tribonyx ventralis*	Black-tailed Nativehen			6	1/10/1985
AVES	*Trichoglossus haematodus*	Rainbow Lorikeet			187	22/10/2020
AVES	*Tringa nebularia*	Common Greenshank			2	3/01/2001
AVES	*Turdus merula merula*	Common Blackbird			215	22/10/2020
AVES	*Turnix velox*	Little Buttonquail			3	23/10/2001
AVES	*Tyto javanica delicatula*	Eastern Barn Owl			3	22/08/2010
AVES	*Vanellus miles*	Masked Lapwing			31	22/10/2020
AVES	*Zanda funerea whiteae*	Yellow-tailed Black Cockatoo		V	26	25/10/2020

Class	Species name	Common name	AUS	SA	Number of records	Date last sighting
AVES	*Zosterops lateralis*	Silvereye			105	22/10/2020
MAMMALIA	*Antechinus flavipes*	Yellow-footed Antechinus		V	1	9/12/1924
MAMMALIA	*Arctocephalus forsteri*	Long-nosed Fur Seal (New Zealand Fur Seal)			2	21/09/2006
MAMMALIA	*Balaenoptera edeni*	Bryde's Whale		R	1	1/12/1985
MAMMALIA	*Cercartetus concinnus*	Western Pygmy-possum			1	14/09/1925
MAMMALIA	*Chalinolobus gouldii*	Gould's Wattled Bat			1	29/03/1995
MAMMALIA	*Delphinus delphis*	Short-beaked Common Dolphin			6	28/12/2005
MAMMALIA	*Felis catus*	Domestic Cat (Feral Cat)			2	4/07/2018
MAMMALIA	*Hydromys chrysogaster*	Water Rat			1	1/01/1943
MAMMALIA	*Kogia breviceps*	Pygmy Sperm Whale		R	2	31/07/2010
MAMMALIA	*Lepus europaeus*	European Brown Hare			7	2/05/2010
MAMMALIA	*Macropus fuliginosus*	Western Grey Kangaroo			3	20/07/2020
MAMMALIA	*Neophoca cinerea*	Australian Sea Lion	EN	V	1	2/05/1983
MAMMALIA	*Phascolarctos cinereus*	Koala			1	9/03/2009
MAMMALIA	*Pteropus poliocephalus*	Grey-headed Flying-fox	VU	R	470	21/03/2020
MAMMALIA	*Trichosurus vulpecula*	Common Brushtail Possum		R	3	6/05/1997
MAMMALIA	*Tursiops aduncus*	Indo-Pacific Bottlenose Dolphin			3	11/12/2000
MAMMALIA	*Vulpes vulpes*	Fox (Red Fox)			3	9/03/2009
MAMMALIA	*Wallabia bicolor*	Swamp Wallaby			1	1/08/2013
REPTILIA	*Acanthophis antarcticus*	Common Death Adder			1	1/01/1950
REPTILIA	*Ctenophorus pictus*	Painted Dragon			1	1/01/1950
REPTILIA	*Ctenotus spaldingi*	Eastern Striped Skink			5	19/10/2014
REPTILIA	*Delma molleri*	Gulfs Delma			4	10/09/1997
REPTILIA	*Dermochelys coriacea*	Leatherback Turtle	EN	V	2	27/01/1994
REPTILIA	*Eulamprus quoyii*	Eastern Water Skink			1	6/09/1981
REPTILIA	*Lerista bougainvillii*	Bougainville's Skink			5	3/11/1999
REPTILIA	*Lerista dorsalis*	Southern Four-toed Slider			1	11/10/1950
REPTILIA	*Menetia greyii*	Dwarf Skink			9	19/10/2014
REPTILIA	*Pogona barbata*	Eastern Bearded Dragon			1	27/03/2011
REPTILIA	*Pseudechis porphyriacus*	Red-bellied Black Snake			1	5/12/1980
REPTILIA	*Pseudonaja textilis*	Eastern Brown Snake			7	31/10/1993
REPTILIA	*Suta flagellum*	Little Whip Snake			1	1/01/1950
REPTILIA	*Tiliqua rugosa*	Sleepy Lizard			1	19/10/2014
REPTILIA	*Tiliqua scincoides*	Eastern Bluetongue			3	19/10/2014

Appendix 3: Photopoints established in the site

(note photopoints are additional to those shown in Section 5.2)

Photopoint 1.2, in Management Zone 1, facing SW at 272647, 6118098 (Zone 54, WGS 84)

Photopoint 2.2, in Management Zone 2, facing S at 272715, 6118336 (Zone 54, WGS 84)

Photopoint 2.3, in Management Zone 2, facing S at 272781, 6118354 (Zone 54, WGS 84)

Photopoint 2.4, in Management Zone 2, facing SW at 272739, 6118218 (Zone 54, WGS 84)

Photopoint 3.2, in Management Zone 3, facing SSW at 272701, 6118366 (Zone 54, WGS 84)

Photopoint 3.3, in Management Zone 3, facing W at 272601, 6118291 (Zone 54, WGS 84)

Photopoint 4.2, in Management Zone 4, facing SE at 272727, 6118424 (Zone 54, WGS 84)

Photopoint 4.3, in Management Zone 4, facing SW at 272715, 6118432 (Zone 54, WGS 84)

Photopoint 5.2, in Management Zone 5, facing SW at 272683, 6118035 (Zone 54, WGS 84)

Photopoint 5.3, in Management Zone 5, facing W at 272718, 6118069 (Zone 54, WGS 84)

Photopoint 6.2, in Management Zone 6, facing SW at 272930, 6118317 (Zone 54, WGS 84)

Photopoint 7.2, in Management Zone 7, facing SW at 272906, 6118252 (Zone 54, WGS 84)

Photopoint 9.2, in Management Zone 9, facing SW at 273284, 6118298 (Zone 54, WGS 84)

Photopoint 10.2, in Management Zone 10, facing S at 273329, 6118333 (Zone 54, WGS 84)

Photopoint 11.2, in Management Zone 11, facing SE at 273367, 6118344 (Zone 54, WGS 84)

Photopoint 11.3, in Management Zone 11, facing SSW at 273406, 6118455 (Zone 54, WGS 84)

Photopoint 12.2, in Management Zone 12, facing SSE at 273451, 6118317 (Zone 54, WGS 84)

Photopoint 13.2 in Management Zone 13, facing SW at 273416, 6118190 (Zone 54, WGS 84)

Appendix 4: Bushland Assessment data for the site

T&M Ecologists divided the site into assessment areas based largely on the type of vegetation present and the condition of the vegetation. In each of these Management Zones an assessment was undertaken using the "BushRAT" technique developed by the SA Department for Environment, Water and Natural Resources. Eight areas were assessed on 19th June 2020, and an additional area , Management Zone 1.1, was assessed on 30th April 2021. The assessment areas are shown in Figure 3.

The BushRAT technique is derived from the Nature Conservation Society of South Australia's 'Bushland Condition Monitoring' (BCM) methodology, including a Rapid Assessment version (Croft et al, 2005), however it assesses an area of vegetation of one hectare of consistent condition rather than the 30m x 30m quadrats used in the BCM methodology. At least one photopoint was installed in each assessment area, with additional photopoints shown on Figure 3. Details of additional photopoints are provided in Appendix 1.

Three 'components' of the biodiversity value of the site are measured and scored:

- vegetation condition;
- conservation value; and
- landscape context.

For the purposes of this study, only vegetation condition has been scored.

It should be noted that the DEWNR BushRAT system was updated in 2017, and again in early 2019 and re-named "Native Vegetation Bushland Assessment"[57]. This update includes modifications to the scoring sheet and methodology for calculating vegetation condition, conservation significance and landscape context. However, this report has continued to use the BushRAT system as per DEWNR 2012[58], to retain compatibility with data that has previously been collected in coastal sites.

Scoring Components in the BushRAT metric

It is not the intent of this report to provide an extensive overview of the use and application of the BushRAT methodology. A full description of the method and its application can be found within DEWNR (2012)[59]. For this project, only the vegetation condition components of the BushRAT metric were scored (as these are the components that would be expected to change over time with management intervention). The Vegetation Condition Score is from a total of 80 points, or 65 points where the community is a treeless community type (such as coastal shrubland). Table 1 describes the scoring components for Vegetation Condition.

[57] Native Vegetation Management Unit (2017). Native Vegetation Council (NVC) Bushland Assessment Manual. Department for Environment, Water and Natural Resources, Adelaide.
[58] DEWNR (2012) NVBMU BushRAT assessment and scoring Manual. Unpublished document, Department for Environment, Water and Natural Resources, Waite.
[59] DEWNR (2012) NVBMU BushRAT assessment and scoring Manual. Unpublished document, Department for Environment, Water and Natural Resources, Waite.

Table A4.1: Scoring components for the BushRAT metric

Vegetation condition component	Overview description
Native Plant Species Diversity	A count of the number of species present is compared to a "benchmark" value for that vegetation type. This is then allocated a score from 0-15.
Weed Score	The cover and abundance of all weed species present is recorded. The 5 weeds with the highest product of threat rating and cover are summed to provide a score. This is then compared to a "benchmark" value for that vegetation type, and allocated a score from 0-15.
Native Plant Life Forms	The cover of different native plant life forms is compared to a "benchmark" value for that vegetation type. This is then allocated a score from 0-10.
Regeneration	The total number of woody native species in juvenile or seedling form is recorded and compared to a "benchmark" value for that vegetation type. This is then allocated a score from 0-8.
Native:exotic Understorey Biomass	The percentage of the total *vegetative biomass* of shrubs and groundcover plants < 2m high that is native is noted. This is then allocated a score from 0-10.
Bare Ground	The percentage of the grounds surface that is truly bare is noted and allocated a score from 0-3.
Tree Health	Average overall overstorey canopy health is allocated to a category, and then a score from 0-5. Scored only where trees are an expected component of the vegetation community.
Tree Hollows	This score relates to the number of small and large tree hollows present, with a rating of 0-5. Scored only where trees are an expected component of the vegetation community.
Fallen timber	This score relates to the amount of branch and trunk sized logs present, with a rating of 0-5. Scored only where trees are an expected component of the vegetation community.
Grazing Evidence	This score relates to evidence of grazing pressure, including pugging, compacting and chewing. The score is from 0-4.

The following pages provide Bushland Assessment data gathered in the site during field assessment.

Marino Conservation Park Assessment Area: 1 **Date:** May 12, 2021

Vegetation Association: 1: *Acrotriche patula, Olearia ramulosa, Acacia acinacea* low shrubland

Benchmark Vegetation Community: SMLR Co 7.4 - Coastal Cliff Low Shrublands, Hummock Grasslands & Very Low Open Woodlands

BushRAT assessment data:

Native understorey biomass: 91+%	Native Understorey Biomass Score (/10):	10
Native Plant species count: 30	Native Plant Species benchmark score (/15):	15
Native Plant Lifeform Cover Score: 15	Native Plant Lifeform benchmark score (/10):	8
Weed abundance and Threat Score: 13	Weed abundance/threat benchmark score (/15):	7
Regeneration score: 4	Regeneration benchmark score (/8)	6
	Grazing Evidence score (/4)	4
	Bare Ground Score (/3)	3
	TOTAL (/65)	**53**

Structural Diversity Plant Lifeforms data:

Lifeform	Cover	Lifeform	Cover	Lifeform	Cover
Trees >15 m		Shrubs 0.5–2m	2	'Sedges' > 1m	
Trees 5 – 15 m		Shrubs < 0.5 m	4	'Sedges' ≤ 1m	4
Trees < 5m	1	Herbs	1a	Hummock grass	
Mallee > 5m		Mat Plants		Vines,scramblers	1
Mallee ≤ 5m		Grasses >0.2m	1a	Mistletoe	
Shrubs > 2 m		Grasses ≤ 0.2m	1a	Ferns	

Cover categories: 1 = not many, cover <1%, 1a = plentiful but low cover (<1%), 2 = covers 1-5%, 3 = covers 6-25%, 4 = covers 26-50%

Marino Conservation Park Assessment Area: 2 **Date:** May 12, 2021

Vegetation Association: *2: Recently burnt Acrotriche patula, Olearia ramulosa, Acacia acinacea* low shrubland

Benchmark Vegetation Community: SMLR Co 7.4 - Coastal Cliff Low Shrublands, Hummock Grasslands & Very Low Open Woodlands

BushRAT assessment data:

Native understorey biomass: 91+%	Native Understorey Biomass Score (/10):	10
Native Plant species count: 14	Native Plant Species benchmark score (/15):	8
Native Plant Lifeform Cover Score: 6	Native Plant Lifeform benchmark score (/10):	3
Weed abundance and Threat Score: 8	Weed abundance/threat benchmark score (/15):	10
Regeneration score: 1	Regeneration benchmark score (/8)	2
	Grazing Evidence score (/4)	4
	Bare Ground Score (/3)	2
	TOTAL (/65)	**39**

Structural Diversity Plant Lifeforms data:

Lifeform	Cover	Lifeform	Cover	Lifeform	Cover
Trees >15 m		Shrubs 0.5–2m		'Sedges' > 1m	
Trees 5 – 15 m		Shrubs < 0.5 m	1a	'Sedges' ≤ 1m	1a
Trees < 5m		Herbs	1a	Hummock grass	
Mallee > 5m		Mat Plants	1	Vines,scramblers	1a
Mallee ≤ 5m		Grasses >0.2m		Mistletoe	
Shrubs > 2 m		Grasses ≤ 0.2m	1	Ferns	

Cover categories: 1 = not many, cover <1%, 1a = plentiful but low cover (<1%), 2 = covers 1-5%, 3 = covers 6-25%, 4 = covers 26-50%

Marino Conservation Park Assessment Area: 3 **Date:** May 12, 2021

Vegetation Association: 3: *Eucalyptus porosa, Melaleuca lanceolata* open woodland

Benchmark Vegetation Community: SMLR Co Community 2 - Forests & Woodlands with an Open Sclerophyll Shrub Understorey

BushRAT assessment data:

Native understorey biomass: 81-90%		Native Understorey Biomass Score (/10):	9
Native Plant species count: 22		Native Plant Species benchmark score (/15):	9
Native Plant Lifeform Cover Score: 9		Native Plant Lifeform benchmark score (/10):	4
Weed abundance and Threat Score: 17		Weed abundance/threat benchmark score (/15):	9
Regeneration score: 2		Regeneration benchmark score (/8)	2
		Tree Health Score (/5)	1
		Tree Hollows Score (/5)	0
		Fallen Timber Score (/5)	1
		Grazing Evidence score (/4)	4
		Bare Ground Score (/3)	2
		TOTAL (/80)	**41**

Structural Diversity Plant Lifeforms data:

Lifeform	Cover	Lifeform	Cover	Lifeform	Cover
Trees >15 m		Shrubs 0.5–2m		'Sedges' > 1m	
Trees 5 – 15 m	2	Shrubs < 0.5 m	1a	'Sedges' ≤ 1m	1a
Trees < 5m	2	Herbs	1a	Hummock grass	
Mallee > 5m		Mat Plants	1a	Vines,scramblers	
Mallee ≤ 5m		Grasses >0.2m		Mistletoe	
Shrubs > 2 m		Grasses ≤ 0.2m	1a	Ferns	

Cover categories: 1 = not many, cover <1%, 1a = plentiful but low cover (<1%), 2 = covers 1-5%, 3 = covers 6-25%, 4 = covers 26-50%

Marino Conservation Park Assessment Area: 4 **Date:** May 12, 2021

Vegetation Association: 4: *Pomaderris paniculosa, Acrotriche patula, Olearia ramulosa* low shrubland

Benchmark Vegetation Community: SMLR Co 7.4 - Coastal Cliff Low Shrublands, Hummock Grasslands & Very Low Open Woodlands

BushRAT assessment data:

Native understorey biomass: 61-70%		Native Understorey Biomass Score (/10):	7
Native Plant species count: 25		Native Plant Species benchmark score (/15):	13
Native Plant Lifeform Cover Score: 16		Native Plant Lifeform benchmark score (/10):	9
Weed abundance and Threat Score: 22		Weed abundance/threat benchmark score (/15):	4
Regeneration score: 1		Regeneration benchmark score (/8)	2
		Grazing Evidence score (/4)	4
		Bare Ground Score (/3)	1
		TOTAL (/65)	**40**

Structural Diversity Plant Lifeforms data:

Lifeform	Cover	Lifeform	Cover	Lifeform	Cover
Trees >15 m		Shrubs 0.5–2m	3	'Sedges' > 1m	
Trees 5 – 15 m		Shrubs < 0.5 m	4	'Sedges' ≤ 1m	3
Trees < 5m	1	Herbs	1a	Hummock grass	
Mallee > 5m		Mat Plants		Vines,scramblers	1
Mallee ≤ 5m		Grasses >0.2m	1a	Mistletoe	
Shrubs > 2 m	1	Grasses ≤ 0.2m	1a	Ferns	

Cover categories: 1 = not many, cover <1%, 1a = plentiful but low cover (<1%), 2 = covers 1-5%, 3 = covers 6-25%, 4 = covers 26-50%

Marino Conservation Park Assessment Area: 5 **Date:** May 12, 2021

Vegetation Association: 5: *Eucalyptus porosa, Melaleuca lanceolata, Allocasuarina verticillata* planted woodland

Benchmark Vegetation Community: SMLR Co Community 2 - Forests & Woodlands with an Open Sclerophyll Shrub Understorey

BushRAT assessment data:

Native understorey biomass: 11-20%		Native Understorey Biomass Score (/10):	2
Native Plant species count: 18		Native Plant Species benchmark score (/15):	8
Native Plant Lifeform Cover Score: 9		Native Plant Lifeform benchmark score (/10):	4
Weed abundance and Threat Score: 33		Weed abundance/threat benchmark score (/15):	4
Regeneration score: 3		Regeneration benchmark score (/8)	3
		Tree Health Score (/5)	4
		Tree Hollows Score (/5)	0
		Fallen Timber Score (/5)	1
		Grazing Evidence score (/4)	4
		Bare Ground Score (/3)	3
		TOTAL (/80)	**33**

Structural Diversity Plant Lifeforms data:

Lifeform	Cover	Lifeform	Cover	Lifeform	Cover
Trees >15 m		Shrubs 0.5–2m	1	'Sedges' > 1m	
Trees 5 – 15 m		Shrubs < 0.5 m	1a	'Sedges' ≤ 1m	1a
Trees < 5m	3	Herbs		Hummock grass	
Mallee > 5m		Mat Plants		Vines,scramblers	
Mallee ≤ 5m		Grasses >0.2m	1	Mistletoe	
Shrubs > 2 m	1a	Grasses ≤ 0.2m	1	Ferns	

Cover categories: 1 = not many, cover <1%, 1a = plentiful but low cover (<1%), 2 = covers 1-5%, 3 = covers 6-25%, 4 = covers 26-50%

Marino Conservation Park Assessment Area: 6 **Date:** May 12, 2021

Vegetation Association: 6: *Austrostipa sp.* grassland with emergent *Acacia victoriae, Melaleuca lanceolata, Eucalyptus porosa*

Benchmark Vegetation Community: SMLR Co Community 2 - Forests & Woodlands with an Open Sclerophyll Shrub Understorey

BushRAT assessment data:

Native understorey biomass: 31-40%		Native Understorey Biomass Score (/10):	4
Native Plant species count: 14		Native Plant Species benchmark score (/15):	6
Native Plant Lifeform Cover Score: 14		Native Plant Lifeform benchmark score (/10):	6
Weed abundance and Threat Score: 28		Weed abundance/threat benchmark score (/15):	5
Regeneration score: 2		Regeneration benchmark score (/8)	2
		Tree Health Score (/5)	4
		Tree Hollows Score (/5)	0
		Fallen Timber Score (/5)	1
		Grazing Evidence score (/4)	4
		Bare Ground Score (/3)	3
		TOTAL (/80)	**35**

Structural Diversity Plant Lifeforms data:

Lifeform	Cover	Lifeform	Cover	Lifeform	Cover
Trees >15 m		Shrubs 0.5–2m	2	'Sedges' > 1m	
Trees 5 – 15 m		Shrubs < 0.5 m	2	'Sedges' ≤ 1m	1a
Trees < 5m	1	Herbs	1	Hummock grass	
Mallee > 5m		Mat Plants	1a	Vines,scramblers	
Mallee ≤ 5m		Grasses >0.2m	3	Mistletoe	
Shrubs > 2 m	2	Grasses ≤ 0.2m	1a	Ferns	

Cover categories: 1 = not many, cover <1%, 1a = plentiful but low cover (<1%), 2 = covers 1-5%, 3 = covers 6-25%, 4 = covers 26-50%

Marino Conservation Park Assessment Area: 7 **Date:** May 12, 2021

Vegetation Association: 7: *Acacia victoriae* shrubland

Benchmark Vegetation Community: SMLR Co Community 2 - Forests & Woodlands with an Open Sclerophyll Shrub Understorey

BushRAT assessment data:

Native understorey biomass: 0-10%	Native Understorey Biomass Score (/10):	1
Native Plant species count: 11	Native Plant Species benchmark score (/15):	5
Native Plant Lifeform Cover Score: 15	Native Plant Lifeform benchmark score (/10):	6
Weed abundance and Threat Score: 27	Weed abundance/threat benchmark score (/15):	5
Regeneration score: 2	Regeneration benchmark score (/8)	2
	Tree Health Score (/5)	4
	Tree Hollows Score (/5)	0
	Fallen Timber Score (/5)	1
	Grazing Evidence score (/4)	4
	Bare Ground Score (/3)	1
	TOTAL (/80)	**29**

Structural Diversity Plant Lifeforms data:

Lifeform	Cover	Lifeform	Cover	Lifeform	Cover
Trees >15 m		Shrubs 0.5–2m	3	'Sedges' > 1m	
Trees 5 – 15 m		Shrubs < 0.5 m	3	'Sedges' ≤ 1m	1a
Trees < 5m		Herbs	1	Hummock grass	
Mallee > 5m		Mat Plants	2	Vines,scramblers	1
Mallee ≤ 5m		Grasses >0.2m	1a	Mistletoe	
Shrubs > 2 m	3	Grasses ≤ 0.2m		Ferns	

Cover categories: 1 = not many, cover <1%, 1a = plentiful but low cover (<1%), 2 = covers 1-5%, 3 = covers 6-25%, 4 = covers 26-50%

Marino Conservation Park Assessment Area: 8 **Date:** May 12, 2021

Vegetation Association: *8: Revegetation Eucalyptus porosa, Melaleuca lanceolata* woodland

Benchmark Vegetation Community: SMLR Co Community 2 - Forests & Woodlands with an Open Sclerophyll Shrub Understorey

BushRAT assessment data:

Native understorey biomass: 0-10%	Native Understorey Biomass Score (/10):	1
Native Plant species count: 20	Native Plant Species benchmark score (/15):	8
Native Plant Lifeform Cover Score: 12	Native Plant Lifeform benchmark score (/10):	5
Weed abundance and Threat Score: 29	Weed abundance/threat benchmark score (/15):	5
Regeneration score: 4	Regeneration benchmark score (/8)	4
	Tree Health Score (/5)	4
	Tree Hollows Score (/5)	1
	Fallen Timber Score (/5)	3
	Grazing Evidence score (/4)	4
	Bare Ground Score (/3)	1
	TOTAL (/80)	**36**

Structural Diversity Plant Lifeforms data:

Lifeform	Cover	Lifeform	Cover	Lifeform	Cover
Trees >15 m		Shrubs 0.5–2m	1a	'Sedges' > 1m	
Trees 5 – 15 m		Shrubs < 0.5 m	1a	'Sedges' ≤ 1m	1a
Trees < 5m	3	Herbs	1	Hummock grass	
Mallee > 5m		Mat Plants	1	Vines,scramblers	
Mallee ≤ 5m		Grasses >0.2m	1a	Mistletoe	
Shrubs > 2 m	2	Grasses ≤ 0.2m	1a	Ferns	

Cover categories: 1 = not many, cover <1%, 1a = plentiful but low cover (<1%), 2 = covers 1-5%, 3 = covers 6-25%, 4 = covers 26-50%

Marino Conservation Park Assessment Area: 9 **Date:** May 14, 2021

Vegetation Association: 9: *Malva arborea, Rapistrum rugosum* herbland

Benchmark Vegetation Community: SMLR Co Community 2 - Forests & Woodlands with an Open Sclerophyll Shrub Understorey

BushRAT assessment data:

Native understorey biomass: 0-10%		Native Understorey Biomass Score (/10):	0
Native Plant species count: 11		Native Plant Species benchmark score (/15):	5
Native Plant Lifeform Cover Score: 6		Native Plant Lifeform benchmark score (/10):	2
Weed abundance and Threat Score: 30		Weed abundance/threat benchmark score (/15):	4
Regeneration score: 2		Regeneration benchmark score (/8)	2
		Tree Health Score (/5)	0
		Tree Hollows Score (/5)	0
		Fallen Timber Score (/5)	0
		Grazing Evidence score (/4)	4
		Bare Ground Score (/3)	3
		TOTAL (/80)	**20**

Structural Diversity Plant Lifeforms data:

Lifeform	Cover	Lifeform	Cover	Lifeform	Cover
Trees >15 m		Shrubs 0.5–2m	1	'Sedges' > 1m	
Trees 5 – 15 m		Shrubs < 0.5 m	1	'Sedges' ≤ 1m	
Trees < 5m	1	Herbs		Hummock grass	
Mallee > 5m		Mat Plants	1	Vines,scramblers	
Mallee ≤ 5m		Grasses >0.2m		Mistletoe	
Shrubs > 2 m	1	Grasses ≤ 0.2m	1	Ferns	

Cover categories: 1 = not many, cover <1%, 1a = plentiful but low cover (<1%), 2 = covers 1-5%, 3 = covers 6-25%, 4 = covers 26-50%

Marino Conservation Park Assessment Area: 10 **Date:** May 14, 2021

Vegetation Association: *10: Themeda triandra, Cymbopogon ambiguus grassland* with emergent planted shrubs and trees

Benchmark Vegetation Community: SMLR Co Community 2 - Forests & Woodlands with an Open Sclerophyll Shrub Understorey

BushRAT assessment data:

Native understorey biomass: 51-60%		Native Understorey Biomass Score (/10):	6
Native Plant species count: 16		Native Plant Species benchmark score (/15):	7
Native Plant Lifeform Cover Score: 8		Native Plant Lifeform benchmark score (/10):	3
Weed abundance and Threat Score: 15		Weed abundance/threat benchmark score (/15):	9
Regeneration score: 0		Regeneration benchmark score (/8)	0
		Tree Health Score (/5)	5
		Tree Hollows Score (/5)	0
		Fallen Timber Score (/5)	0
		Grazing Evidence score (/4)	2
		Bare Ground Score (/3)	2
		TOTAL (/80)	**34**

Structural Diversity Plant Lifeforms data:

Lifeform	Cover	Lifeform	Cover	Lifeform	Cover
Trees >15 m		Shrubs 0.5–2m	1	'Sedges' > 1m	
Trees 5 – 15 m		Shrubs < 0.5 m	2	'Sedges' ≤ 1m	
Trees < 5m	0	Herbs	2	Hummock grass	
Mallee > 5m		Mat Plants		Vines,scramblers	
Mallee ≤ 5m		Grasses >0.2m	2	Mistletoe	
Shrubs > 2 m		Grasses ≤ 0.2m		Ferns	

Cover categories: 1 = not many, cover <1%, 1a = plentiful but low cover (<1%), 2 = covers 1-5%, 3 = covers 6-25%, 4 = covers 26-50%

Marino Conservation Park Assessment Area: 11 **Date:** May 14, 2021

Vegetation Association: 11: *Lepidosperma congestum, Themeda triandra* sedgeland/grassland

Benchmark Vegetation Community: SMLR Co 7.4 - Coastal Cliff Low Shrublands, Hummock Grasslands & Very Low Open Woodlands

BushRAT assessment data:

Native understorey biomass: 51-60%	Native Understorey Biomass Score (/10):	6
Native Plant species count: 21	Native Plant Species benchmark score (/15):	12
Native Plant Lifeform Cover Score: 14	Native Plant Lifeform benchmark score (/10):	8
Weed abundance and Threat Score: 18	Weed abundance/threat benchmark score (/15):	5
Regeneration score: 1	Regeneration benchmark score (/8)	1
	Grazing Evidence score (/4)	4
	Bare Ground Score (/3)	1
	TOTAL (/65)	**37**

Structural Diversity Plant Lifeforms data:

Lifeform	Cover	Lifeform	Cover	Lifeform	Cover
Trees >15 m		Shrubs 0.5–2m	2	'Sedges' > 1m	
Trees 5 – 15 m		Shrubs < 0.5 m	2	'Sedges' ≤ 1m	3
Trees < 5m		Herbs	1	Hummock grass	
Mallee > 5m		Mat Plants		Vines,scramblers	
Mallee ≤ 5m		Grasses >0.2m	3	Mistletoe	1
Shrubs > 2 m	1	Grasses ≤ 0.2m	1	Ferns	

Cover categories: 1 = not many, cover <1%, 1a = plentiful but low cover (<1%), 2 = covers 1-5%, 3 = covers 6-25%, 4 = covers 26-50%

Marino Conservation Park Assessment Area: 12 **Date:** May 14, 2021

Vegetation Association: 12: *Acacia victoriae* shrubland

Benchmark Vegetation Community: SMLR Co Community 2 - Forests & Woodlands with an Open Sclerophyll Shrub Understorey

BushRAT assessment data:

Native understorey biomass: 0-10%	Native Understorey Biomass Score (/10):	1
Native Plant species count: 15	Native Plant Species benchmark score (/15):	6
Native Plant Lifeform Cover Score: 9	Native Plant Lifeform benchmark score (/10):	4
Weed abundance and Threat Score: 31	Weed abundance/threat benchmark score (/15):	4
Regeneration score: 1	Regeneration benchmark score (/8)	1
	Tree Health Score (/5)	4
	Tree Hollows Score (/5)	0
	Fallen Timber Score (/5)	1
	Grazing Evidence score (/4)	4
	Bare Ground Score (/3)	1
	TOTAL (/80)	**26**

Structural Diversity Plant Lifeforms data:

Lifeform	Cover	Lifeform	Cover	Lifeform	Cover
Trees >15 m		Shrubs 0.5–2m	2	'Sedges' > 1m	
Trees 5 – 15 m		Shrubs < 0.5 m	2	'Sedges' ≤ 1m	
Trees < 5m	1	Herbs		Hummock grass	
Mallee > 5m		Mat Plants		Vines,scramblers	
Mallee ≤ 5m		Grasses >0.2m	1	Mistletoe	1
Shrubs > 2 m	3	Grasses ≤ 0.2m		Ferns	

Cover categories: 1 = not many, cover <1%, 1a = plentiful but low cover (<1%), 2 = covers 1-5%, 3 = covers 6-25%, 4 = covers 26-50%

Marino Conservation Park Assessment Area: 13 **Date:** May 14, 2021

Vegetation Association: 13: *Eucalyptus porosa, Melaleuca lanceolata* woodland

Benchmark Vegetation Community: SMLR Co Community 2 - Forests & Woodlands with an Open Sclerophyll Shrub Understorey

BushRAT assessment data:

Native understorey biomass: 0-10%	Native Understorey Biomass Score (/10):	1
Native Plant species count: 17	Native Plant Species benchmark score (/15):	7
Native Plant Lifeform Cover Score: 10	Native Plant Lifeform benchmark score (/10):	4
Weed abundance and Threat Score: 31	Weed abundance/threat benchmark score (/15):	4
Regeneration score: 2	Regeneration benchmark score (/8)	2
	Tree Health Score (/5)	4
	Tree Hollows Score (/5)	1
	Fallen Timber Score (/5)	3
	Grazing Evidence score (/4)	3
	Bare Ground Score (/3)	1
	TOTAL (/80)	**30**

Structural Diversity Plant Lifeforms data:

Lifeform	Cover	Lifeform	Cover	Lifeform	Cover
Trees >15 m		Shrubs 0.5–2m	2	'Sedges' > 1m	
Trees 5 – 15 m	1	Shrubs < 0.5 m	1a	'Sedges' ≤ 1m	1
Trees < 5m	2	Herbs		Hummock grass	
Mallee > 5m		Mat Plants		Vines,scramblers	
Mallee ≤ 5m		Grasses >0.2m	1	Mistletoe	1
Shrubs > 2 m	2	Grasses ≤ 0.2m	1	Ferns	

Cover categories: 1 = not many, cover <1%, 1a = plentiful but low cover (<1%), 2 = covers 1-5%, 3 = covers 6-25%, 4 = covers 26-50%