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<b>Title</b>	Ecologist
<b>Signature</b>	
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<b>Title</b>	Director
<b>Signature</b>	

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## EXECUTIVE SUMMARY

This Biodiversity Action Plan defines the strategies necessary to manage the ecological values and functions of five Southern Fleurieu Peninsula islands located near Victor Harbor, namely Granite Island, Wright Island, West Island, Pullen Island and Seal Island.

The preparation of this Action Plan has involved:

- Review of previous biodiversity surveys and related studies
- Stakeholder consultation
- Field survey to map and record vegetation associations, plants of conservation significance, weeds and other management issues
- Bird inventory, including results of field surveys and compilation of historical information
- Assessment of the biodiversity assets
- Prioritisation of biodiversity threats and actions required to alleviate these threats
- Identification of appropriate monitoring methodologies

The Islands have a wide variety of contrasting ecological values and threats, ranging from the 24 hectare Granite Island that is extensively vegetated and visited by over 700,000 people per annum, to the 1.2 hectare Seal Island, a tumbled heap of granite boulders with little soil or vegetation development that is seldom visited by people. However the overarching key ecological value across the Islands is the large number and diversity of nesting seabirds – within the last 30 years there has been over 14,000 pairs across 10 species that have bred on the islands.

The following summarises key threats and recommended actions for each of the Islands, with a specific focus on retaining and improving habitat values for seabirds.

### GRANITE ISLAND

THREATS	RECOMMENDED ACTIONS TO ALLEVIATE THREATS
Weed invasion <ul style="list-style-type: none"> <li>• impedes seabird habitat/nesting</li> <li>• compromises biodiversity</li> <li>• compromises revegetation</li> </ul>	Control of priority weeds, in tandem with appropriate revegetation of indigenous species, with focus on: <ul style="list-style-type: none"> <li>• areas where penguins nest</li> <li>• areas around new plantings</li> <li>• scope proposed decoy trial area</li> </ul>
Pest animals <ul style="list-style-type: none"> <li>• Rats predate on penguin chicks/eggs</li> <li>• Foxes, dogs &amp; cats may predate on penguins and other native fauna</li> </ul>	<ul style="list-style-type: none"> <li>• Rat baiting across the island</li> <li>• Ongoing vigilance to ensure that foxes, dogs and cats are excluded from the island, awareness programs for local pet owners</li> </ul>
High people visitation due to easy access, attraction of Little Penguin colony, boardwalks and walking trails, scenery	<ul style="list-style-type: none"> <li>• Increased interpretive signage at strategic locations such as lookouts, along boardwalks, etc</li> <li>• Ongoing maintenance of existing boardwalks and formal paths</li> <li>• Closure and rehabilitation of informal tracks, such as on the southern side of the island</li> </ul>

**WRIGHT ISLAND**

<b>THREATS</b>	<b>RECOMMENDED ACTIONS TO ALLEVIATE THREATS</b>
Boxthorn, Coprosma, Tree Mallow <ul style="list-style-type: none"> <li>impede seabird habitat</li> <li>compromise biodiversity</li> </ul>	Ongoing control, in tandem with appropriate revegetation of indigenous species, with focus on the proposed decoy trial area behind the landing beach
Visitors landing on the island in boats and kayaks, particularly during tern nesting season	<ul style="list-style-type: none"> <li>Erect interpretive/regulatory signage on the landing beach and/or boat ramps to educate visitors about the significance of the island to nesting birds and to inform them that dogs and cats should not be taken to the island</li> <li>Consider fencing off or placing temporary rope fencing and signage around the tern nesting area at the back of the beach</li> <li>Consider prohibiting boats/kayaks from landing during tern breeding times (i.e. December – January). <i>Note: This may be difficult to enforce.</i></li> <li>Consider development of a boating and kayakers guide to islands or a visitors guide to Encounter Bay Marine Park which details information on importance of islands for seabirds and appropriate behaviours</li> </ul>

**WEST ISLAND**

<b>THREATS</b>	<b>RECOMMENDED ACTIONS TO ALLEVIATE THREATS</b>
Boxthorn, Coprosma, Tree Mallow, Kikuyu <ul style="list-style-type: none"> <li>impede seabird habitat/nesting</li> <li>compromise biodiversity</li> </ul>	Continued control, in tandem with appropriate revegetation of indigenous species, with focus on known tern nesting areas and scoping of proposed decoy area

**PULLEN ISLAND**

<b>THREATS</b>	<b>RECOMMENDED ACTIONS TO ALLEVIATE THREATS</b>
Boxthorn, Coprosma, Tree Mallow <ul style="list-style-type: none"> <li>compromise biodiversity</li> <li>may impede seabird nesting areas</li> </ul>	Undertake careful, staged removal control outside of seabird nesting times, in close conjunction with appropriate revegetation of indigenous species

**SEAL ISLAND**

<b>THREATS</b>	<b>RECOMMENDED ACTIONS TO ALLEVIATE THREATS</b>
Visitors	To minimise the impacts of visitors to Seal Island it is recommended that boats and/or kayaks are prohibited from landing during tern and cormorant breeding times (i.e. December – January). This could be explored under existing marine parks legislation for temporary closures.

## 1. INTRODUCTION

The purpose of this biodiversity action plan is to clearly define the strategies necessary to manage the ecological values and functions of five Southern Fleurieu Peninsula islands, namely Granite Island, Wright Island, West Island, Seal Island and Pullen Island.

This Plan documents the key biodiversity values and threats of each island and prioritises the management of the threats for effective biodiversity conservation. The Plan is intended as a guide for management over the next 5 years with actions prioritised to ensure that time, effort and funding is spent appropriately to maximise biodiversity benefits.

The underlying consideration for all recommended on-ground works in this Plan relates to the regional priority of maintaining the value of these islands for seabirds and increasing or maintaining suitable areas for seabird nesting. As such, maintenance or restoration of suitable habitat structure to provide for seabird requirements has been considered, along with potential seabird disturbance from island visitors and contractors.

The Southern Fleurieu Islands Biodiversity Action Plan is intended to align with, and contribute to, the objectives of the following strategies and plans:

- The *Southern Fleurieu Coastal Action Plan and Conservation Priority Study 2007*. The goal of this Plan 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.
- The *Adelaide and Mount Lofty Ranges Natural Resources Management Plan (2013) Volume 1 Strategic Plan 2014-15 to 2023-24* which outlines a range of future priorities for the 'Marine Environment subregion', including a priority to "Protect the islands to ensure their value as seabird breeding sites is maintained".
- The *Encounter Marine Park Management Plan 2012*. All of the Southern Fleurieu islands covered by this plan are overlaid by the Encounter Marine Park.
- *Nearshore Marine Habitats of the Adelaide and Mount Lofty Ranges NRM Region: Values, Threats and Actions, 2013*.

## 2. STUDY AREA

The five small granite islands which are the subject of this Biodiversity Action Plan are situated in Encounter Bay on the southern end of the Fleurieu Peninsula, approximately 85km south of Adelaide, South Australia. They are part of the Encounter Marine Park<sup>1</sup> which provides a habitat protection zone and their location is shown in Figure 1.

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<sup>1</sup> Encounter Marine Park is one of 19 marine parks contributing to the South Australian Representative System of Marine Protected Areas. It includes waters from the southern suburbs of metropolitan Adelaide to Kangaroo Island and the Coorong.

### Granite Island

Granite Island Recreation and Nature Park is 25.9 hectares in area and linked by a causeway (managed by the Department of Planning, Transport and Infrastructure) to the mainland town of Victor Harbor. It is a popular recreation reserve managed by the SA Department of Environment, Water and Natural Resources (DEWNR) and the City of Victor Harbor.

### Wright Island

Wright Island is situated approximately 650m north-east of The Bluff on the western side of Victor Harbor. It is approximately 2.2 hectares in area and is a Public Pleasure Resort under the care, control and management of the City of Victor Harbor.

### West Island

West Island is 14.5 hectares in area and is a Conservation Park managed by DEWNR. It is located to the south of Victor Harbor and approximately 1.5km south-west of The Bluff. The island is an outcrop of Victor Harbor granite and rises to 40m above sea level.

### Pullen Island

Pullen Island is located approximately 500m offshore from the town of Port Elliot in Horseshoe Bay. It covers an area of approximately 2.2 hectares and is also a Conservation Park, managed by DEWNR, and largely composed of granite boulders with little vegetation.

### Seal Island

Seal Island, named for the seals that were once abundant on the island, is approximately 1.2 hectares in area and is a part of West Island Conservation Park. It is located 4km north-east of The Bluff and the whole island is covered by waves in stormy conditions.



### 3. AIM AND OBJECTIVES OF THE PLAN

The aim of this Biodiversity Action Plan is to define the conservation actions necessary to manage the ecological values and functions of five Southern Fleurieu Peninsula islands, namely Granite Island, Wright Island, West Island, Seal Island and Pullen Island.

The Plan is intended as a guide for specific and prioritised “on-ground” works over the next 5 years with the main objectives being to:

- clearly identify priority issues relating to the management of vegetation and landforms on each island, with particular focus on sea/shorebird habitat;
- identify threats to the biodiversity and conservation values of each island; and
- prioritise actions that are recommended to protect and enhance the conservation value of each island.

The preparation of this Action Plan has involved:

- Review of previous biodiversity surveys and related studies
- Stakeholder consultation
- Field survey to map and record vegetation associations, plants of conservation significance, weeds and other management issues
- Bird inventory, including results of field surveys and compilation of historical information
- Assessment of the biodiversity assets
- Prioritisation of biodiversity threats and actions required to alleviate these threats
- Identification of appropriate and cost-effective monitoring and further research recommendations

### 4. IMPORTANCE OF ISLANDS AS SEABIRD HABITAT

The major avian conservation value of the islands in the study area is the relatively large number and diversity of nesting seabirds present in relatively close proximity to Adelaide. Across the five Islands that are the focus of the report, eighty three (83) species of birds have been recorded. Of these, 17 were flying over or in the ocean nearby. Of the remaining 66, 19 have particular conservation or migratory significance. Ten (10) seabird species have bred in the study area, totalling almost 14,000 pairs within the last 30 years. This illustrates the significance of the Islands for seabirds.

Since the 1980’s two breeding seabird species have notably declined in the area, the Fairy Tern and Little Penguin. The Fairy Tern has undergone a widespread decline across the State and is now listed as Endangered at a State level. The Little Penguin declined rapidly after the 1990’s and this decline has been the impetus for NR AMLR to fund further research, monitoring and development of management actions to gain baseline information on populations across the region, increase awareness of conservation issues and to investigate causes of declines.

Conversely, Crested and Caspian Tern numbers have recovered in recent times, due perhaps in part to targeted weed management on some of the islands.

Individual species lists and notes and specific management actions are provided within the details for each Island. The following is a broad overview of the significance of each Island and actions recommended to retain and enhance avian habitat value.

### **Granite Island**

The main avian significance of Granite Island was its accessible Little Penguin population which has declined dramatically over the last decade or more. The population appears to have stabilised to between 38 to 26 individuals between 2012 to 2014.

Existing revegetation works have enhanced the diversity of other bird species present, including regionally significant populations of Brown Quail, Buff-banded Rail and Sooty Oystercatcher. Maintenance of these plantings to retain a diversity of habitat types (eg open grassed areas, patches of dense shrubs) and control of introduced invasive species is supported.

### **Wright Island**

Wright Island has also historically supported tern colonies of State significance. The resurgence of nesting activity in recent years may indicate that the island provides an attractive alternative to West Island. Eradication of invasive shrubs in the sandy area immediately above the beach used by terns in recent years is strongly recommended.

It is also recommended that the island or areas of the island be declared 'no access' when terns are breeding or breeding is imminent. In the longer-term dedication as a 'conservation reserve' under the Crown Lands Act may be appropriate.

### **West Island**

West Island has supported tern colonies of State significance. Due to its size, close proximity to Adelaide and regional significance, the island therefore requires a higher level of management responses. The history of overgrazing by introduced animals and enhanced numbers of nesting Silver Gulls has impacted directly and indirectly on its bird fauna. However, the removal of introduced herbivores and relocation of the Victor Harbor dump promises a reprieve in the medium term.

The invasion of Tree Mallow and, to a lesser extent, Boxthorn and Coprosma has smothered the open areas critical to the terns, while creating suitable cover and nesting material for Silver Gulls. The ongoing control of these weed species, particularly in the areas traditionally used by nesting terns, is strongly supported. Kikuyu has also overgrown historical penguin nesting sites. Penguins avoid nesting in areas that are dominated by Kikuyu, perhaps because they can become entangled and burrow entrances may become blocked. In eastern states Kikuyu has also caused penguin mortalities through entrapment. Resident seabirds such as silver gulls may introduce Kikuyu grass as nesting material to islands<sup>2</sup>.

The remoteness and limited access of the island also benefits the nearby pair of White-bellied Sea-eagles, whose breeding success has been impacted by human disturbance and reduced food availability in recent years. A dead Sea-eagle carcass was recovered from West Island in June 2015. Necropsy and toxicity testing on a range of potential poisons did not determine a cause of death.

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<sup>2</sup> Smith, L.E. and Battam, H., 1998. Five Islands Nature Reserve, Port Kembla New South Wales, A Perspective And View To Future Management, Southern Oceans Seabird Study Association Inc

Since this the remaining bird has paired up and an eaglet successfully fledged in 2016. A 'Fly Neighbourly Advice' (FNA) parameter is in place around the Waitpinga Cliffs (1 June to 31 December, annually). Access to the safe boat landing area on West Island is within a prohibited area of the West Island Aquatic Reserve declared under the Fisheries Mangement Act (2007).

### **Seal Island**

Whilst Seal Island provides important seabird habitat, storm activity may impact on breeding activities. It is a relatively remote island with difficult access and no direct management is needed at this stage.

### **Pullen Island**

Pullen Island supports a significant Crested Tern colony. Its limited access discourages human access but the spread of invasive shrubs (as indicated by comparison of aerial imagery) into the open areas used for nesting requires active management.

Regular seabird surveys of all of the islands in the study area are required to follow trends and determine the outcome of on-ground management actions.

## **5. BIODIVERSITY ACTION PLAN**

The Plan has been divided into five major sections:

SECTION 1: GRANITE ISLAND

SECTION 2: WRIGHT ISLAND

SECTION 3: WEST

SECTION 4: PULLEN ISLAND

SECTION 5: SEAL ISLAND





## SECTION 1: GRANITE ISLAND



## 1. HISTORY

Granite Island (or Kaiki) is of great importance to the local Ngarrindjeri people and the whole of the island is a place of significance as defined by the Aboriginal Heritage Act 1988<sup>3</sup>.

In the early days of the colony, Victor Harbor was a thriving town due to its good harbor and close proximity to the mouth of the River Murray. As part of the town's bid to become the capital city of South Australia, Granite Island's causeway, jetties and breakwater were constructed. The bid was unsuccessful, however shipping continued with products such as wool and wheat travelling down the River Murray by boat, then by steam train to Victor Harbor and across to Granite Island by horse-drawn tram. The goods were loaded onto ships bound for ports around the world. However, by the end of the 18<sup>th</sup> century, the railways were rapidly expanding and the need for shipping was reduced.

In the early nineteenth century, Encounter Bay supported large numbers of whales and seals and whaling stations were built on Granite Island and The Bluff to hunt the Southern Right Whale for whale oil. Encounter Bay was one of the most productive of South Australia's whaling stations until the whale populations crashed as a result of hunting and the industry ceased in 1872.

Formal gardens were established on the northern shores of Granite Island in the late 19<sup>th</sup> century and other exotic planting was carried out across the island. Dama Wallabies (*Macropus eugenii*) were introduced in 1968 for the benefit of visitors and a chair lift was constructed in the 1960's (since removed).

From 1965 to 1989 much of the island was under the care and control of the City of Victor Harbor as a recreation reserve, with small sections (including the jetty and a navigation light) managed by the Marine and Harbors Board (now Dept Planning, Transport & Infrastructure). In 1989 the island was placed under the control of the Granite Island Controlling Authority. In 1994 the Greater Granite Island Development Company undertook developments including a restaurant and penguin centre with facilities leased until recently.

In 1998 the Department of Environment, Heritage and Aboriginal Affairs (now DEWNR) took over management and the island was declared a Recreation and Nature Park

More than 700,000 people visit Granite Island each year, making it the most visited park in South Australia.

## 2. CURRENT MANAGEMENT

Granite Island is managed by the Department of Environment, Water and Natural Resources (DEWNR) and since 2012 the waters surrounding its shores are located within the boundaries of the Encounter Marine Park.

The tourist facilities on the north shore, which were leased to a private operator until early 2015, are now also maintained by DEWNR. These include a cafe, kiosk and souvenir shop (not presently operational) and the Penguin Marine and Environmental Centre which closed in January 2016. The

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<sup>3</sup> Greater Granite Island Development Syndicate and Wildwatch Inc 1989.

company Oceanic Victor is seeking to establish marine tourism operations at the island including a swim with tuna cage, and may use infrastructure on the island.

A small section of the northern side of the island which includes the horse-drawn tram is leased by the City of Victor Harbor.



Aerial shot of Granite Island in 1949



Aerial shot of Granite Island in 2016

Current management activities undertaken include maintenance of roads, walking tracks, fencing, boardwalks and other built structures, weed control, pest animal control and revegetation.

The Friends of Granite Island (FOGI) has been involved with the management of Granite Island for many years. FOGI's vision is to restore and enhance Granite Island's environmental assets with the ultimate aim being to enhance the experience of visitors to the island. The Group works in collaboration with DEWNR and assists with ongoing management activities such as weed and erosion control and revegetation.

Penguin monitoring and research is currently being undertaken by Flinders University with the support of the Adelaide and Mt Lofty Ranges Natural Resources Management Board.

### 3. ENVIRONMENTAL ASSETS

#### 3.1 Landform and soils

Granite Island is composed of medium to coarse grained granite made up of pink and white feldspar, bluish quartz and black biotite mica. A thick layer of soil blankets the granite core above the largely steep, boulder strewn coastline, giving the island a more gently rounded profile. The flattened summit is 34m above sea level<sup>4</sup>. The island is of geological significance due to the types of granite present and the varied nature of the rock inclusions<sup>5</sup>.

#### 3.2 Native vegetation communities

Due to the long and varied history of land use on Granite Island, the vegetation on Granite Island has been substantially modified over time. Revegetation initiatives (both indigenous and non-indigenous plantings) by a number of managers and stakeholders have been undertaken across the island over the years, with planting over the last 20 years focussing on indigenous species. Little is known of the original vegetation cover, much of which was cleared in the early days of European settlement for use in the whaling industry or by grazing.

The following vegetation communities were recorded as part of the field assessment for this survey which was undertaken in 2015 (Figure 1-1).

1. Drooping Sheoak (*Allocasuarina verticillata*) Woodland occurs on more sheltered slopes on the northern side of the island
2. Common Boobialla (*Myoporum insulare*), Coastal Wattle (*Acacia longifolia* var. *sophorae*) +/- Coast Daisy-bush (*Olearia axillaris*) Shrubland occurs on the north-western and western parts of the island.
3. Swamp Paperbark (*Melaleuca halmaturorum*) Very Low Woodland – several patches in the centre of the island.
4. Coast Sword-sedge (*Lepidosperma gladiatum*), Knobby Club-rush (*Ficinia nodosa*), Short-stem Flax-lily (*Dianella brevicaulis*) Sedgeland over Bower Spinach (*Tetragonia implexicoma*), on the southern and western side of the Island, near the steeper edges.

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<sup>4</sup> Robinson et al 1996.

<sup>5</sup> SA Geological Society.

5. Veldt Grass (*\*Ehrharta calycina*), Kangaroo Grass (*Themeda triandra*), Coast Tussock-grass (*Poa poiformis*) Grassland with Short-stem Flax-lily (*Dianella brevicaulis*) and Soft Tussock Mat-rush (*Lomandra densiflora*). Occurs across more central upland parts of the island.
6. The highly modified tourist zone which includes maintained gardens (both indigenous and non-indigenous plantings), lawn, historic formal plantings and a coastal display garden (maintained by FOGI) - occurs on the northern side of the island.
7. *Allocasuarina verticillata*, *\*Ficus macrophylla* Low Woodland – includes an area of recent indigenous plantings on the northern side of the island, adjacent the Causeway. This area was established and is maintained by FOGI.
8. *Rhagodia candolleana*, *Enchylaena tomentosa* Very Open Shrubland with emergent *Allocasuarina verticillata* and *\*Pinus halepensis* - extends outwards from the beach on the western side of the causeway.
9. The low-lying Open Forbland/Shrubland of +/- *Disphyma crassifolium*, *Tetragonia implexicoma*, *Enchylaena tomentosa*, *Leucophyta brownii* which occurs on the steep, upper rocky slopes that 'skirt' the southern side of Granite Island. *\*Coprosma repens* and *Rhagodia candolleana* occur as emergents in this very harsh, wind-swept and salt-sprayed area which is largely inaccessible to humans due to the steep and rocky terrain.

### 3.3 Significant flora species

Eight species of state or national conservation significance have been recorded on Granite Island in the past and/or as part of this study (Table 1-1; Appendix 1 includes a full list of species).

Table 1-1: List of native plant species of conservation significance, Granite Island

Species	Common Name	Conservation Status*			Recorded during this survey (2015)	Recorded - previous surveys/ opportune records
		AUS	SA	ML		
<i>Atriplex australasica</i>			R	VU		Yes
<i>Correa alba</i> var. <i>pannosa</i>	White Correa		R		Yes	Yes
<i>Crassula sieberiana</i>	Sieber's Crassula		E			Yes
<i>Dianella longifolia</i> var. <i>grandis</i>	Pale Flax-lily		R	VU	Yes	Yes
<i>Glycine latrobeana</i>	Clover Glycine	VU	V	VU		Yes
<i>Myoporum parvifolium</i>	Creeping Boobialla		R	LC	Yes	Yes
<i>Olearia pannosa</i> ssp. <i>pannosa</i>	Silver Daisy-bush	VU	V	VU		Yes
<i>Scaevola calendulacea</i>	Dune Fanflower		V			Yes
<p><b>*Conservation Status</b>  <b>AUS = Australia EPBC Act 1999:</b> CR = Critically Endangered, EN = Endangered, VU = Vulnerable  <b>SA = South Australia NPW Act 1972:</b> E = Endangered, V = Vulnerable, R = Rare  <b>ML = Mount Lofty Botanical Region:</b> CR = Critically Endangered, EN=Endangered, NT=Near Threatened, VU=Vulnerable, RA=Rare, LC = Least Concern</p>						



Granite Island Vegetation Communities

- 1 - *Allocasuarina verticillata* Woodland
- 2 - *Myoporum insulare*, *Acacia sophorae* +/- *Olearia axillaris* Shrubland
- 3 - *Melaleuca halmaturorum* Very Low Woodland
- 4 - *Lepidosperma gladiatum*, *Dianella brevicaulis*, *Ficinia nodosa* Sedge
- 5 - \**Ehrharta calycina*, *Themeda triandra*, *Poa poiformis*, *Lomandra densiflora*, *Dianella brevicaulis* Grassland/Sedgeland
- 6 - Modified Tourist Zone/Garden
- 7 - *Allocasuarina verticillata*, \**Ficus macrophylla* Low Woodland
- 8 - *Rhagodia candolleana*, *Enchylaena tomentosa* Very Open Shrubland with emergent *Allocasuarina verticillata*, \**Pinus halepensis*
- 9 - +/- *Disphyma crassifolium*, *Tetragonia implexicoma*, *Enchylaena tomentosa*, *Leucophyta brownii* Open Forbland/Very Low Shrubland



Figure 1-1: Granite Island Vegetation Communities

### 3.4 Birds

Fifty five (55) bird species have been reported from Granite Island, including 33 during the survey (Table 1-2). Most are visitors to the island although 11 species have either been reported, or are suspected, to breed there. Cox (1976) dismissed a further record of a Masked Booby (*Suda dactylatra*) seen from Granite Island in December 1966<sup>6</sup> as an immature Australasian Gannet.

Relatively few seabirds use the island, with the declining colony of Little Penguins the most significant (see below). The sheltered shoreline near the causeway provides roosting sites for cormorant species, Sooty Oystercatcher and feeding habitat for waders, Eastern Reef Egret and Nankeen Night Heron.

Granite Island supports a significant population of Brown Quail (several groups totalling perhaps in excess of 50 birds) which established in the mid 2000s during an irruption of the species into South Australia. They are mostly seen in areas with denser shrub and grass cover on the top and western end of the island. There is also a small population (at least 2 pairs) of Buff-banded Rails, including a relatively tame pair near the kiosk. Both presumably breed on the island.

A pair of Glossy Black-Cockatoos was reported in a planted Drooping Sheoak on the island in January 1965, presumably a visitor from Kangaroo Island<sup>7</sup>. This species is considered vagrant to the Mount Lofty Ranges.

#### Little Penguin

Little Penguins were first reported from Granite Island in July 1943<sup>8</sup>, and several nests were subsequently located in August 1950<sup>9</sup>. About 50 pairs were reported in 1962<sup>10</sup>. The Island's Little Penguin colony soon became a major drawcard for tourists, being the most accessible colony in Australia. Numbers of nests subsequently increased to the 1980s and 90s, with an estimated 500 pairs in 1992<sup>11</sup> and 1,550 birds in 2001. A penguin viewing and interpretation centre formed part of the island's redevelopment in 1994.

Burrows were spread around the edge of the island with a concentration on the northern side. Following concerns that numbers were declining, regular counts (particularly of birds returning to the island in the evening) were conducted by Natalie Gilbert and others from 2001 to 2014<sup>12</sup>. These surveys documented a rapid decline with only 26 individuals in 2012.

The last community population census on Granite Island was conducted over 2 days (12<sup>th</sup> and 19<sup>th</sup> of October 2015) by 34 volunteers and 2 penguin researchers. On the first day, a total of 10 active burrows was detected (mostly along the penguin centre and the tram line side of the island). On the second day, a total of 12 active burrows was detected (again mostly on the tram line side of the island). The two new burrows found on the second day were definitively not active the previous

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<sup>6</sup> van Gessell 1968.

<sup>7</sup> Joseph 1989.

<sup>8</sup> Francis 1944.

<sup>9</sup> Francis & Francis 1951.

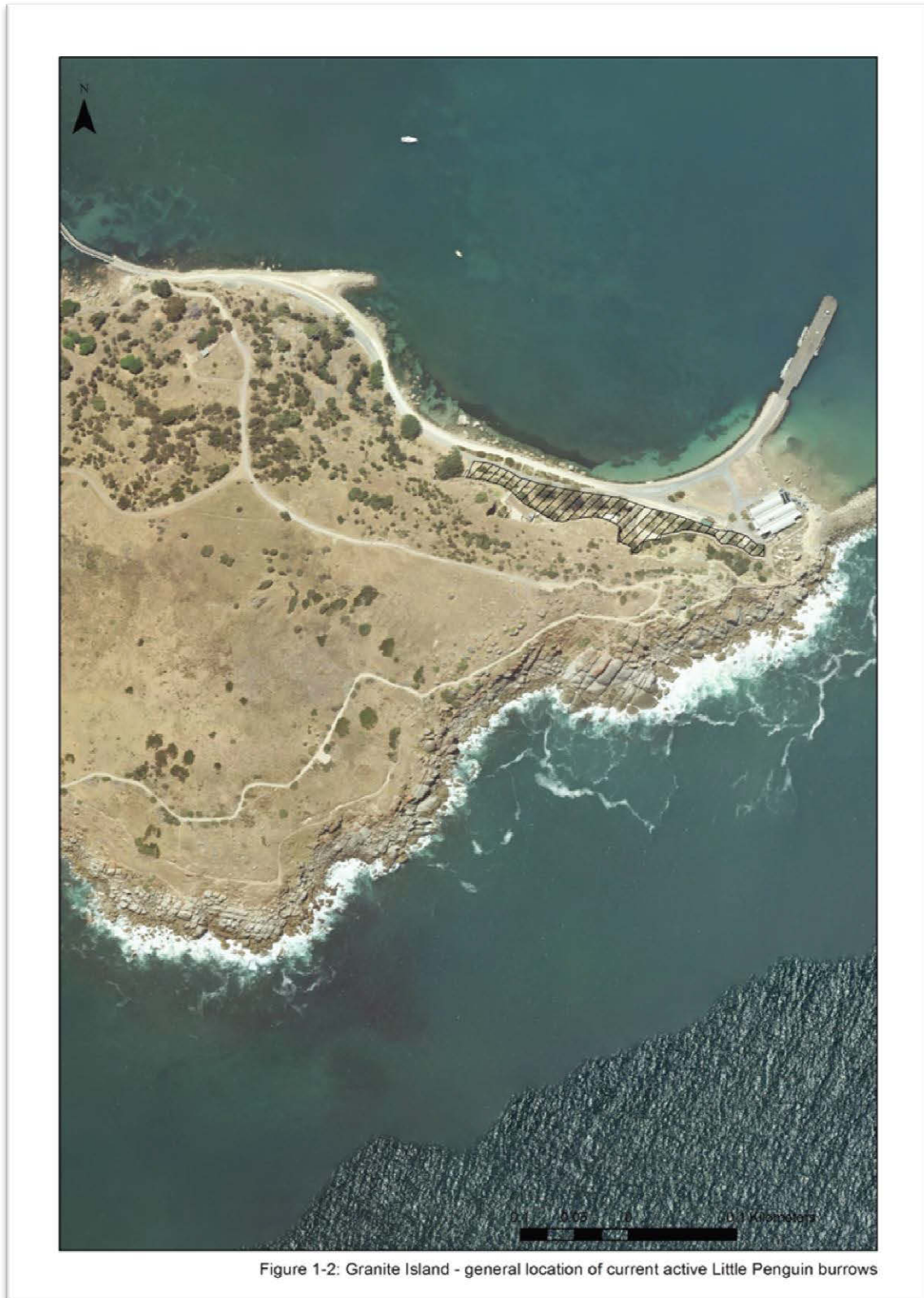
<sup>10</sup> Waterman in Copley 1996.

<sup>11</sup> Copley 1996.

<sup>12</sup> Bool et al 2007, Colombelli-Negrel & Kleindorfer 2014.



week. Therefore, the total estimation for Granite Island is currently 11 active burrows, and 22 penguins<sup>13</sup>. Figure 1-2 shows the general location of current active Little Penguin burrows.



<sup>13</sup> Colombelli-Negrel, D., 2016.

The following table lists birds which have been recorded on Granite Island in the past and/or as part of this study (Appendix 2 includes a full list of species and conservation ratings).

**Table 1-2: Birds species reported from Granite Island**

Common name	Species	#Record	Breeding	Comments	Ref
*Common Blackbird	<i>Turdus merula</i>	s		occasional visitor	
*Common Starling	<i>Sturnus vulgaris</i>	s	yes	few pairs around quarry	
*European Goldfinch	<i>Carduelis carduelis</i>	s		2 in Sep 2015	
*Skylark	<i>Alauda arvensis</i>	s		1 over Sep 2015	
*Spotted Turtledove	<i>Stigmatopelia chinensis</i>	s		2 in Sep 2015	
Arctic Jaeger	<i>Stercorarius parasiticus</i>	x		3+ flying past, Dec-Apr	1
Australasian Gannet	<i>Morus serrator</i>	s		up to 100 flying past Feb-Jul	
Australian Hobby	<i>Falco longipennis</i>	s		occasional visitor	
Australian Magpie	<i>Gymnorhina tibicen</i>	s	yes	1 or 2 pairs	
Australian Pelican	<i>Pelecanus conspicillatus</i>	s		1 in Jun 2015	
Banded Lapwing	<i>Vanellus tricolor</i>	x		2 reported Oct 1994	2
Barn Owl	<i>Tyto delicatula</i>	s		1 in Jun 2015, pellets in SAMuseum	
Black-browed Albatross	<i>Thalassarche melanophris</i>	x		up to 15 flying past, Aug 1983	1
Black-faced Cormorant	<i>Phalacrocorax fuscescens</i>	s		1 or 2 occasional visitors	
Black-shouldered Kite	<i>Elanus axillaris</i>	s		occasional visitor	
Brown Quail	<i>Coturnix ypsilophora</i>	s	probable	1st reported Dec 2005, numerous reports of several gps up to 50 since	3
Brown Skua	<i>Stercorarius antarcticus</i>	x		1 flying past, Jul 1983	1
Buff-banded Rail	<i>Gallirallus philippensis</i>	s	probable	1st reported 2009, 1 or 2 prs resident	4
Cape Barren Goose	<i>Cereopsis novaehollandiae</i>	x		18 over Apr 1986	1
Cape Petrel	<i>Daption capense</i>	x		1 flying past, Jul 1966	5
Caspian Tern	<i>Hydroprogne caspia</i>	s		occasionally flying past	
Common Sandpiper	<i>Actitis hypoleucos</i>	s		occasional visitor	
Crested Pigeon	<i>Ocyphaps lophotes</i>	s		1 or 2 occasional visitors	
Crested Tern	<i>Thalasseus bergii</i>	s		small nos, on breakwater	
Eastern Reef Egret	<i>Egretta sacra</i>	x		occasional visitor	
Elegant Parrot	<i>Neophema elegans</i>	x		1 over May 1983	1
Erect-crested Penguin	<i>Eudyptes sclateri</i>	x		1 in Mar 1965	6
Fiordland Penguin	<i>Eudyptes pachyrhynchus</i>	x		1 in Jan 1995	7
Galah	<i>Eolophus roseicapilla</i>	s		2 in Jun 2015	
Glossy Black-Cockatoo	<i>Calytorhynchus lathami</i>	x		2 in Jan 1965	8
Little Penguin	<i>Eudyptula minor</i>	x	yes	1st reported Jul 1943, 500-1000 nests 1990-2000, none in 2015	9
Little Pied Cormorant	<i>Microcarbo melanoleucos</i>	s		up to 7 on N side	
Little Raven	<i>Corvus mellori</i>	s	yes	up to 5	
Magpielark	<i>Grallina cyanoleuca</i>	x		pr in 2006-2007	10
Masked Lapwing	<i>Vanellus miles</i>	s	yes	up to 3 prs	
Mistletoebird	<i>Dicaeum hirundinaceum</i>	x		1 in Jan 2015	11
Nankeen Kestrel	<i>Falco cenchroides</i>	s	yes	1 pr nesting in quarry	
Nankeen Night Heron	<i>Nycticorax caledonicus</i>	x		occasional summer visitor	12
New Holland Honeyeater	<i>Phylidonyris novaehollandiae</i>	x		NPWS data, no details	12
Pacific Black Duck	<i>Anas superciliosa</i>	s	yes	2 prs nesting in grass	

Common name	Species	#Record	Breeding	Comments	Ref
Pacific Gull	<i>Larus pacificus</i>	s		up to 6, mainly on N side	
Peregrine Falcon	<i>Falco peregrinus</i>	x		occasional visitor	
Pied Cormorant	<i>Phalacrocorax varius</i>	s		up to 5 on N side	
Rainbow Lorikeet	<i>Trichoglossus haematodus</i>	s		2 in 3 visits in 2015	
Silver Gull	<i>Chroicocephalus novaehollandiae</i>	s		up to 50, mainly on N side	
Silveryeye	<i>Zosterops lateralis</i>	s		Up to 10 Jun-Sep 2015	
Singing Honeyeater	<i>Lichenostomus virescens</i>	s	probable	up to 15	
Sooty Oystercatcher	<i>Haematopus fuliginosus</i>	s		occasional visitor	
Southern Boobook	<i>Ninox boobook</i>	s		1 in Jun 2010	13
Southern Giant Petrel	<i>Macronectes giganteus</i>	x		up to 3 flying past, autumn to winter	
Stubble Quail	<i>Coturnix pectoralis</i>	x		NPWS data, no details	12
Swamp Harrier	<i>Circus approximans</i>	x		1 over Dec 1997	1
Welcome Swallow	<i>Hirundo neoxena</i>	s	yes	Up to 5 around quarry and kiosk	
Willie Wagtail	<i>Rhipidura leucophrys</i>	x		NPWS data, no details	12
Wilson's Storm-petrel	<i>Oceanites oceanicus</i>	x		3 off causeway May 2001	14
Yellow-nosed Albatross	<i>Diomedea chlororhynchos</i>	x		up to 10 flying past, Jul 1983	1

**#Record** - s= present survey, x = previous survey

**References**  
 1 - Carpenter pers. obs.; 2 - Kraehenbuehl 1994; 3 - Hicks 2010; 4 - Smith 2009; 5 - McNamara 1966; 6 - Hutchins 1976; 7 - Victor Harbor Times; 8 - Joseph 1989; 9 - Francis 1951, Francis & Francis 1951, Copley 1986, Collombelli & Kleindorfer 2014; 10 - Price 2006, Klau 2007; 11 - Crocker 2015; 12 - NPWS Unpublished; 13 - Gower 2010; 14 - Dyer 2001

### 3.5 Reptiles

Table 1-3 lists the reptile species which have been recorded from Granite Island or are likely to be present. Sleepy lizards are very commonly seen, likely due to the open habitats on the central part of the Island which are preferred by this species<sup>14</sup>.

Table 1-3: Reptile species observed and/or likely to be utilising Granite Island for habitat

Scientific Name	Common Name	Recorded 2015	Previous records	*Rating		Comments <sup>15</sup>
				AUS	SA	
<i>Aprasia striolata</i>	Striated Worm Lizard		Yes			
<i>Dermochelys coriacea</i>	Leatherback Turtle		Yes			Oceanic pelagic species, highly irregular visitor with few records.
<i>Tiliqua rugosa</i>	Sleepy Lizard	✓	Yes			
<i>Hemiergis peroni</i>	Four-toed Earless Skink					Considered likely to be present
<i>Christinus marmoratus</i>	Marbled Gecko					Considered likely to be present
<i>Ctenotus sp. (probably spaldingi)</i>	Eastern Striped Skink	✓				Observed but unable to be captured to confirm species identity. Definitely a <i>Ctenotus</i> species.
<i>Lerista bouganvillii</i>	South-eastern Slider					Considered likely to be

<sup>14</sup> Tim Milne, pers. comm.

<sup>15</sup> Dr Tim Milne, Herpetologist

Scientific Name	Common Name	Recorded 2015	Previous records	*Rating		Comments <sup>15</sup>
				AUS	SA	
						present

### 3.6 Mammals

The following table includes a list of all mammals which have been recorded or are likely to occur on Granite Island.

Table 1-4: Mammal species known or likely to occur on Granite Island or in immediate surrounding waters

Scientific Name	Common Name	2015	Previous records	Rating#	
				AUS	SA
<b>Terrestrial Mammals</b>					
<i>Hydromys chrysogaster</i>	Water-rat		✓		
<i>Macropus eugenii</i> +	Tammar Wallaby		✓	EX	E
<i>Macropus fuliginosus</i> +	Western Grey Kangaroo		✓		
<i>Macropus robustus</i> +	Euro	✓	✓		
* <i>Mus musculus</i>	House Mouse		✓		
* <i>Oryctolagus cuniculus</i>	European Rabbit		✓		
<i>Rattus lutreolus</i>	Swamp Rat		✓		
* <i>Rattus rattus</i>	Black Rat		✓		
<i>Trichosurus vulpecula</i> +	Common Brushtail-possum		✓		R
<b>Marine Mammals</b>					
<i>Arctocephalus forsteri</i>	Long-nosed Fur Seal	✓	✓		R
<i>Delphinus delphis</i>	Short-beaked Common Dolphin		✓		
<i>Eubalaena australis</i>	Southern Right Whale		✓		V
<i>Globicephala macrorhynchus</i>	Long-finned Pilot Whale		✓		
<i>Megaptera novaeangliae</i>	Humpback Whale			V	V
<i>Neophoca cinerea</i>	Australian Sea-lion		✓	V	V
<i>Neophoca cinerea</i>	Australian Sea-lion		✓	V	V
<i>Tursiops aduncus</i>	Indo-Pacific Bottlenose Dolphin		✓		
<b>Bats</b>					
<i>Chalinolobus gouldii</i>	Gould's Wattled Bat				
<i>Chalinolobus morio</i>	Chocolate Wattled Bat				
<i>Mormopterus planiceps</i>	Southern Freetail Bat				
<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat				
<i>Tadarida australis</i>	White-striped Freetail bat				
<i>Vespadelus darlingoni</i>	Large Forest Bat				
<i>Vespadelus regretus</i>	Southern Forest Bat				
<i>Vespadelus vulturnus</i>	Little Forest Bat				
<b>#Conservation rating codes:</b> EX = Extinct, CE = Critically Endangered, E = Endangered, V = Vulnerable, R = Rare, NT = Near Threatened					

\*denotes introduced/pest species

+ denotes species introduced/translocated to Granite Island

Armstrong et al<sup>16</sup> consider there to be 9 resident bat species in the Southern Mount Lofty Ranges. Of these 9 species, eight are commonly observed (Table 1-4). Some of these species are likely to be present on or in the vicinity of Granite Island, however it is recommended that survey work is undertaken to ascertain which bat species are actually present on Granite Island.

## 4. THREATS (MANAGEMENT ISSUES)

Current threats to the biodiversity values of Granite Island include:

- Weed invasion;
- Grazing and predation by pest animals (foxes, cats, rabbits, rats, mice, Brushtail Possums);
- Recreation activities (human disturbance) such as walking and trampling vegetation (off tracks);
- Erosion;
- The possible impact of over-fishing of pilchards and anchovies – an important part of sea bird diet; and
- The possible impact of increasing seal populations on Little Penguins.

### 4.1 Invasive weeds

The diversity and structure of the native vegetation communities on Granite Island have been modified considerably over the last 150 years. Weeds of concern which threaten the current vegetation communities on the island are included in Table 1-6. A full list of weeds recorded is included in Appendix 1.

Table 1-6: List of weeds of concern, Granite Island

Species	Common Name	<sup>17</sup> Declared	<sup>18</sup> WONS	<sup>19</sup> SFCAP Threat Level	<sup>20</sup> Weed invasiveness ranking
* <i>Acacia saligna</i>	Golden Wreath Wattle			5	2
* <i>Alternanthera pungens</i>	Khaki Weed				-
* <i>Arctotheca calendula</i>	Capeweed			1	2
* <i>Asparagus asparagoides</i>	Bridal Creeper	Y	Y	9	5
* <i>Avena barbata</i>	Wild Oat			1	2
* <i>Brassica tournefortii</i>	Wild Turnip			3	2
* <i>Bromus spp.</i>	Brome			1	1
* <i>Carpobrotus edulis ssp. edulis</i>	Hotentot Fig			4	2
* <i>Casuarina glauca</i>	Swamp Oak				2
* <i>Chenopodium album</i>	Fat Hen			1	1

<sup>16</sup> 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.

<sup>17</sup> Biosecurity SA Weeds and Pest Animals. Declared plants in South Australia, October 2012

[http://www.pir.sa.gov.au/biosecuritysa/nrm\\_biosecurity/weeds/declared\\_plants\\_in\\_south\\_australia\\_october\\_2012](http://www.pir.sa.gov.au/biosecuritysa/nrm_biosecurity/weeds/declared_plants_in_south_australia_october_2012)

<sup>18</sup> Australian Weeds Committee (2012), Weeds of National Significance 2012. Department of Agriculture, Fisheries and Forestry, Canberra, ACT <http://www.weeds.org.au/WoNS/>

<sup>19</sup> Caton, et al 2007. Southern Fleurieu Coastal Action Plan and Conservation Priority Study, AMLR Natural Resources Management Board

<sup>20</sup> Refer to Native Vegetation & Biodiversity Management Unit *BushRat Manual for native vegetation*, May 2013.

Species	Common Name	<sup>17</sup> Declared	<sup>18</sup> WONS	<sup>19</sup> SFCAP Threat Level	<sup>20</sup> Weed invasiveness ranking
<i>*Coryza bonariensis</i>	Fleabane			1	2
<i>*Coprosma repens</i>	New Zealand Mirror-bush			4	3
<i>*Cynodon dactylon</i>	Couch			3	2
<i>*Diplotaxis muralis var. muralis</i>	Wall Rocket			3	2
<i>*Dipogon lignosus</i>	Lavatory Creeper			6	4
<i>*Echium plantagineum</i>	Salvation Jane			2	2
<i>*Ehrharta longiflora</i>	Annual Veldt Grass			2	2
<i>*Euphorbia paralias</i>	Sea Spurge			5	3
<i>*Euphorbia terracina</i>	False Caper	Y		5	3
<i>*Hypochaeris radicata</i>	Cat's Ear			1	2
<i>*Lagurus ovatus</i>	Hare's Tail Grass			2	2
<i>*Leptospermum laevigatum</i>	Coastal Tea-tree			6	3
<i>*Lolium loliaceum</i>	Stiff Rye Grass			1	1
<i>*Lycium ferocissium</i>	African Boxthorn	Y	Y	7	3
<i>*Malva arborea</i>	Tree Mallow			3	-
<i>*Malva parviflora</i>	Small-flower Marshmallow			3	1
<i>*Marrubium vulgare</i>	Horehound	Y		4	3
<i>*Olea europaea</i>	Olive	Y		5	4
<i>*Oxalis pes-caprae</i>	Soursob	Y		5	4
<i>*Pennisetum clandestinum</i>	Kikuyu			2	3
<i>*Pinus canariensis</i>	Canary Island Pine				-
<i>*Pinus halepensis</i>	Aleppo Pine	Y		4	3
<i>*Plantago coronopus</i>	Buck's-horn Plantain			3	2
<i>*Romulea spp.</i>	Onion-grass			1	2
<i>*Scabiosa atropurpurea</i>	Scabious			3	2
<i>*Senecio pterophorus</i>	African Daisy			2	3
<i>*Solanum linnaeanum</i>	Apple of Sodom			4	3
<i>*Sonchus oleraceus</i>	Sow-thistle			1	1
<i>*Stenotaphrum secundatum</i>	Buffalo Grass				1
<i>*Tamarix aphylla</i>	Athel Pine			2	2
<i>*Tribulus terrestris</i>	Caltrop				1
<i>*Trifolium sp.</i>	Clover			1	2

**SFCAP Threat Levels:** The threat value allocation process undertaken as part of the Southern Fleurieu Coastal Action Plan identified a total of 85 priority environmental weeds for the Southern Fleurieu coastal region, each featuring a weed threat value between 1 & 9.

**Red Alert Weed Categories:**

- 1 – Generally only invade disturbed bushland. Often widespread and abundant but not considered a significant threat to native biodiversity, unless present at very high densities.
- 2 - Generally only invade disturbed bushland, but may spread rapidly. However, generally only a slight potential to reduce native species diversity, unless present at very high densities.
- 3 – Invasive in intact bushland with moderate potential to reduce native species diversity. Rate of spread is slower than Category 4 and 5 weeds but once present will persist and threaten biodiversity. May produce dense stands over a wide area but can be controlled with sustained effort.
- 4 – Highly invasive in either disturbed or intact remnant bushland, with the potential to spread rapidly and produce very dense stands given favourable habitat and/or vectors. High potential to reduce native species diversity and abundance. Can be controlled with sustained effort.
- 5 – Highly invasive in either disturbed or intact bushland, spreads rapidly producing very dense stands and a blanket cover. Potential to eliminate almost all native understorey species. Very difficult to control without outside help.

## 4.2 Pest animals

### Rats

Rats are of particular concern on Granite Island because they may predate on Little Penguins. Studies indicate that introduced Black Rats (*Rattus rattus*) prey principally on small chicks rather than on eggs<sup>21</sup> and predation particularly influenced the number of fledglings produced per pair<sup>22</sup>. A coordinated rat management program has been under way on Granite Island since 1996 and there has been an increase in investment by NR AMLR since 2006. It is recommended that this continue to protect the remaining penguin population.

### Foxes, dogs and cats

It is relatively easy for foxes, cats and dogs to access Granite Island due to the causeway which links it to the mainland. Native fauna, and nesting birds in particular, are at risk of predation by foxes, dogs and cats. Foxes also spread weeds, thereby increasing the risk of introducing weed species not currently present on Granite Island. However, due to constant vigilance by DEWNR staff, foxes and cats have not been an issue on Granite Island in recent times. A report of fox scat on social media in 2015 was followed up by DEWNR staff, the scat is thought to have been a misidentified possum scat. Dogs and cats are not permitted on the island and there are signs which state this at the entry point (near the causeway).

### Brush-tail Possums and Water Rats

Brush-tailed Possums (*Trichosurus vulpecula*) were introduced to Granite Island, and are still present, although they appear to be in poor condition<sup>23</sup>. Possums are known to predate on bird eggs, however whilst possums are observed interacting with penguin burrows, there is no evidence of egg or chick predation on Granite Island. Water Rats (*Hydromys chrysogaster*) are also present. It is not clear at this stage whether either of these species is impacting negatively on Little Penguins<sup>24</sup>.

### Rock Doves and Starlings

Rock Doves (*Columba livia*) fly between the mainland and the islands off Victor Harbor. They are predominantly seed eaters and roost and breed on cliffs and rock ledges. Although numbers on Granite Island are high, it is likely that Rock Doves are not replacing other nesting birds<sup>25</sup>.

Starlings are known vectors of Boxthorn seed, a significant weed on Granite Island, although active control is undertaken.

## 4.3 Recreation activities

Granite Island is a recreation and nature park and attracts thousands of local, interstate and overseas visitors annually. Although, as noted previously, a major tourist drawcard Little Penguin population has seen a decline in numbers (due perhaps in part to human impacts), the island still provides spectacular scenery and geology, walking trails and a horse drawn tram ride. There are a number of boardwalks, formed walking trails and lookouts which are used by most walkers, however there is evidence of trampling, erosion and damage to vegetation due to people walking off-track

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<sup>21</sup> Bool et al, 2007. Colombelli-Négrel, D & Kleindorfer, S, 2014.

<sup>22</sup> Bool et al, 2007.

<sup>23</sup> Seiji Iwao, pers. comm. 2015.

<sup>24</sup> Colombelli-Négrel, D & Kleindorfer, S, 2014.

<sup>25</sup> Graham Carpenter, Ornithologist, pers. comm. 2016.

and across country and several 'informal' tracks have developed, particularly on the southern side of the island.

Signage exists at the entry point to the island, however more interpretive signs on other parts of the island to inform visitors about the biodiversity values of the vegetation and its importance as bird habitat are recommended.

Guided walks are still conducted on Granite Island to view the wild penguin population. These walks inform and educate visitors about the significance of the colony and measures are in place to ensure the least disturbance to the penguins. These include:

- restricting numbers on guided walks to view penguins;
- viewing platforms, fenced walkways and raised boardwalks which restrict public access to the more sensitive areas of colonies; and
- no cameras allowed and guides use red cellophane over torches when observing penguins at night.

The Granite Island Penguin Centre, which operated for 12 years was closed in January 2016. The centre was founded to rescue, rehabilitate and release injured Little Penguins. The last remaining captive penguins were transferred to Adelaide Zoo.

#### 4.4 Erosion

Erosion occurs where visitors have left the formed walking tracks and boardwalks, principally as a result of trampling and damage to vegetation, which then no longer binds the soil. The effect of wind and water on this unbound soil then allows erosion to occur.

Erosion from rainfall events in gullies has impacted on Little Penguin nests. Rehabilitation of nest sites and installation of nest boxes has previously been undertaken, however with population declines the uptake of artificial burrows in these areas has declined and the sites are no longer maintained<sup>26</sup>.

#### 4.5 Impacts of prey and competition

Little Penguins feed largely on small schooling fish, squid and occasionally krill (small shrimps). Anchovies form a significant part of the Little Penguin diet in the Encounter Bay area, however the monitoring of mortalities undertaken in eastern Gulf St Vincent indicates that "it is difficult to assess prey availability adjacent to Little Penguin colonies, and therefore it is difficult to establish a connection between the Little Penguins' body condition and the availability of its main prey"<sup>27</sup>. Wiebkin (2011) noted that anchovies are not harvested in large amounts in the area. Penguins forage near the colony, which suggests there is sufficient food nearby, however ecosystem processes that underpin prey availability are poorly understood. Further investigation and research into the relationship between prey availability and penguin mortality in Gulf St Vincent is required.

Commercial and recreational fishing activities occur within the foraging ranges of Granite Island Little Penguins but by-catch and entanglement risks are not known at this time. A number of incidents of

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<sup>26</sup> Tony Flaherty, pers. comm., 2016.

<sup>27</sup> Tomo, 2014.



fishing line and hook entanglement have been recorded in Gulf St Vincent and Kangaroo Island and four Little Penguins were killed by entanglement in a fishing net in April 2014. These records are from a Penguin Mortality register which was established in 2012 with the SA Museum and supported by the AMLR NRM Board to examine penguin carcasses<sup>28</sup>.

#### 4.6 Increasing fur seal populations

Long-nosed fur seals (*Arctocephalus forsteri*) are native to Australia and New Zealand and are found all along the South Australian coast. Between 1800 and 1830 the species was hunted to near extinction by colonial sealers. Their numbers remained at very low levels for almost 140 years before slowly building up across their former range. The population in South Australian waters is now estimated to be around 100,000 animals.

In South Australia, Long-nosed Fur Seals (*Arctocephalus forsteri*) are known to prey on Little Penguins. Fur Seal numbers are recovering, and penguin remains have been found in 40% of seal scats on Granite Island<sup>29</sup>.

Little Penguins have also been reported in the diet of Australian Sea Lions (*Neophoca cinerea*) although the lack of quantitative dietary studies makes it difficult to assess the extent to which sea lion predation may pose a threat to Little Penguins. However, there is currently no evidence that Sea Lions are impacting substantially on Little Penguin populations in the Gulf St Vincent bioregion<sup>30</sup>.

Wiebkin (2011) recommended that Fur Seal predation as a cause for the decline in Little Penguin populations should not be looked at in isolation of other factors and further assessment and research is required to determine the impact of seals on Little Penguins.

## 5. BIODIVERSITY MANAGEMENT STRATEGIES

### 5.1 Biodiversity management objectives

The biodiversity management objectives for Granite Island are to manage the native vegetation of the island in such a manner as to:

- Prevent any further loss of biodiversity;
- Strengthen the long term viability of the existing biodiversity assets; and
- Maintain and/or secure habitats and resources for seabirds into the future.

In order to monitor whether these objectives are being met, the Bushland Rapid Assessment Technique (BushRAT) was used as part of this project. This methodology, which has been developed by the Native Vegetation Management Unit (SA Dept Environment, Water & Natural Resources), gathers data on bushland condition, including native species diversity, native plant life forms, regeneration, tree health, hollows, fallen timber, weed abundance and threat, grazing pressure, etc. The results of BushRATs undertaken on Granite Island are summarised in Appendix 3.

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<sup>28</sup> Tomo, 2014.

<sup>29</sup> Bool et al., 2007.

<sup>30</sup> Wiebkin, 2014.

## 5.2 Management units

To facilitate the ongoing management of threats to biodiversity on Granite Island (most notably weed and pest animal control), the park has been divided into management units. Delineation of management units or zones is based largely on the type of vegetation present and the condition of the vegetation, as well as tracks and topography. The management units are shown in Figure 1-2 and described in Table 1-7.

**Table 1-7: Management units, Granite Island**

<b>Management Unit</b>	<b>Description</b>	<b>Corresponding BushRAT Site</b>
1	Sheoak woodland areas on the more northern slopes of the island	4
2	Shrubland areas dominated by Boobialla, Coastal Wattle and Coast Daisy-bush	2 & 6
3	Swamp Paperbark area in the centre of the island	5
4	Sedgeland areas on the western and northern sides of the island	4
5	Open grassland areas in the centre of the island	3
6	Modified tourist zone on the north shore, includes building infrastructure, horse-drawn tramline, sealed road and maintained gardens	-
7	Recent indigenous plantings on the northern side of the island	-
8	Exotic grassland with emergent Pines on the northern side of the island	-

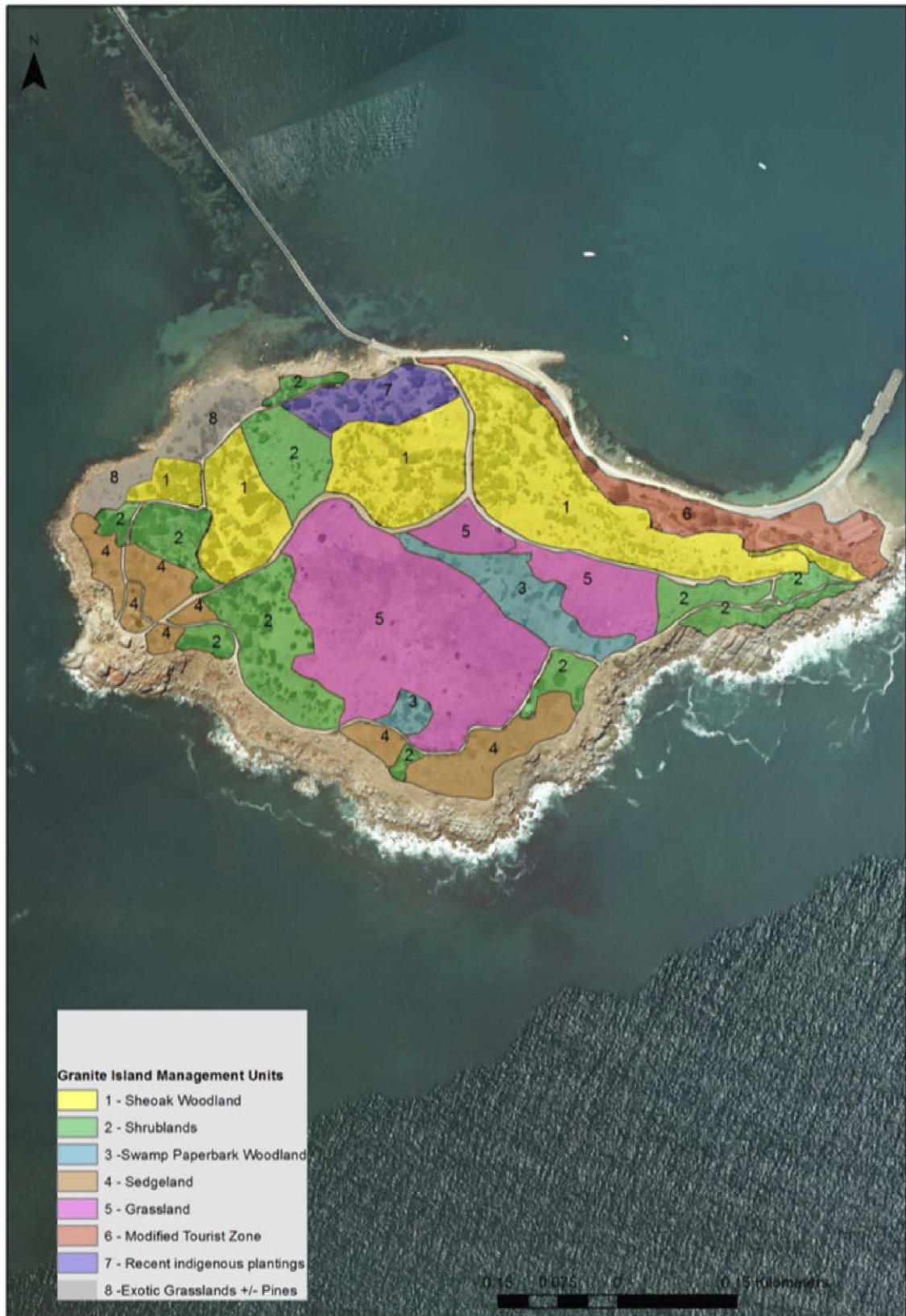


Figure 1-3: Granite Island Management Units

### 5.3 Managing weeds

Sustained weed control programs undertaken by NR AMLR with support from FOGI, in tandem with revegetation, have reduced many woody weed species to manageable levels on Granite Island. Weeds which are currently a focus for control include Boxthorn, Bridal Creeper, Coastal Tea-tree, Euphorbia, Horehound, Hotentot Fig, Kikuyu, Olives, Pines, Scabious, Soursob and Tree Mallow.

Some woody weeds such as Boxthorn, can provide beneficial habitat and shelter for Little Penguins, reducing burrow temperatures and increasing humidity and stabilising soil. Removal of woody weeds in active penguin nesting areas needs to be undertaken carefully and in consultation with penguin ecologists.



*Successful drill and fill of Olive, Granite Island*

A Project Plan has recently been developed by NR AMLR to assist FOGI with targeted and prioritised weed control and this is included in Appendix 6.

See the Action Plan for Granite Island in Section 7 for specific weed control measures in each management unit.

## 5.4 Managing pest animals

A penguin monitoring study undertaken on Granite Island<sup>31</sup> has concluded that the percentage of Little Penguin burrows with suspected predation significantly decreased, while breeding success increased, following extensive rat baiting in 2006.

Presently rats are baited every 1-2 weeks on Granite Island and a coordinated rat management program should continue as a high priority to maintain high penguin breeding performance on the island. Foxes and cats are not seen as an issue on Granite Island, however constant vigilance is still seen as a high priority, due to the impact that these species can have on the range of native fauna species (most notably birds) that rely on Granite Island for habitat.

The Southern Fleurieu Coastal Action Plan (Caton et al, 2007) outlines a proposed high priority action (F11.2) to fence the causeway which links Granite Island to the mainland to prevent access by foxes, dogs and cats, however this may be a cost-prohibitive measure which would need consultation and the present strategy of removing individuals as they occur is probably sufficient.

Security guards and DEWNR staff have maintained a presence on the causeway at peak times such as during the annual 'Schoolies' week to manage access to the island.



*Rat bait, Granite Island*

## 5.5 Managing use conflicts – people and recreation

Management actions should be aimed at reducing the conflicts between the needs of people and biodiversity on the island. It is recommended that additional interpretive and regulatory signage to

<sup>31</sup> Colombelli-Négrel, D & Kleindorfer, S, 2014.

inform visitors about the biodiversity and cultural values of the park be installed at strategic points around the island, especially in areas which are sensitive to foot traffic, soil compaction and erosion.

## 5.6 Revegetation

Revegetation efforts over the past 10-15 years have had several aims, including to improve habitat for Little Penguins and other seabirds. The focus of ongoing revegetation efforts on Granite Island is to supplement existing habitat, using appropriate species for the vegetation community and planting at appropriate (i.e. natural) densities. The requirement for maintenance of open areas where birds such as terns can potentially nest must also be carefully considered when planning revegetation. For example, the grassland area in the centre of the island (Management Unit 5) should be maintained, with only widely scattered plantings of low-medium shrubs. This would also help maintain favourable habitat for other species, such as the Sleepy Lizard *Tiliqua rugosa*<sup>32</sup>.



### *Indigenous plantings, Management Unit 7, Granite Island*

Table 1-8 provides a revegetation plant list which could be used as a guide for ongoing revegetation activities. Revegetation within each management unit should aim to re-create or maintain/secure the following vegetation structures (see Figure 1-2 for locations):

- Management Unit 1 - open woodland structure which comprises a tree canopy cover of 10-30% with a shrubby and herbaceous/grassy understorey canopy cover of 30-70%
- Management Unit 2 –shrubland/open shrubland structure comprising a tall shrub layer cover of 10- 30%, a medium – low shrub layer up to 50% cover and a groundlayer cover of 30-70%

<sup>32</sup> T. Milne pers. comm.

- Management Unit 3 – low open woodland structure which comprises a tree canopy cover of 30-70% with an open shrubby and grassy/herbaceous understorey canopy cover of 30-70%
- Management Unit 4 –sedgeland with emergent medium-low shrubs
- Management Unit 5 – grassland with emergent (<10% total canopy cover) medium-low shrubs
- Management Unit 6 – maintain as a ‘showcase’ for the general public of indigenous plantings for coastal gardens
- Management Unit 7 – maintain indigenous plantings
- Management Unit 8 –shrubland/open shrubland structure comprising a tall shrub layer cover of 10- 30%, a medium – low shrub layer up to 50% cover and a groundlayer cover of 30-70%

Table 7: Revegetation plant list – Granite Island

Scientific name	Common name	Management Unit
<i>Acacia cupularis</i>	Cup Wattle	1, 2, 6
<i>Acacia longifolia var. sophorae</i>	Coastal Wattle	2, 6, 8
<i>Acacia paradoxa</i>	Kangaroo Thorn	1
<i>Acacia pycnantha</i>	Golden Wattle	1
<i>Adriana quadripitarta</i>	Coast Bitterbush	1, 2, 6, 8
<i>Allocasuarina verticillata</i>	Drooping Sheoak	1, 6
<i>Atriplex cinerea</i>	Coast Saltbush	2, 6, 8
<i>Austrostipa spp.</i>	Spear Grass	1, 2, 3, 5, 6, 8
<i>Billardiera cymosa</i>	Sweet Apple-berry	1, 2, 6, 8
<i>Carpobrotus rossii</i>	Pigface	2, 6, 8
<i>Chrysocephalum apiculatum</i>	Common Everlasting	1, 6
<i>Clematis microphylla</i>	Old Man’s Beard	1, 6
<i>Dianella longiflora var. grandis</i>	Pale Flax-lily	4, 6
<i>Dianella brevicaulis</i>	Short-stem Flax-lily	1, 2, 3, 4, 6, 8
<i>Dianella revoluta var. revoluta</i>	Black-anther Flax-lily	1, 2, 3, 4, 6, 8
<i>Disphyma crassifolium</i>	Round-leaf Pigface	2, 6, 8
<i>Dodonaea viscosa ssp. spatulata</i>	Sticky Hop-bush	1, 6
<i>Enchylaena tomentosa</i>	Ruby Saltbush	1, 2, 3, 6, 8
<i>Ficinia nodosa</i>	Knobby Club-rush	1, 2, 3, 4, 6, 8
<i>Helichrysum leucopsidium</i>	Satin Everlasting	1, 6
<i>Kennedia prostrata</i>	Running Postman	1, 6
<i>Kunzea pomifera</i>	Muntries	1, 2, 3, 6, 8
<i>Lepidosperma gladiatum</i>	Coast Sword-sedge	2, 4, 6, 8
<i>Lepidosperma viscidum</i>	Sticky Sword-sedge	4, 6
<i>Leucopyhyta brownii</i>	Coast Cushion Bush	2, 6, 8
<i>Leucopogon parviflorus</i>	Coast Beard-heath	1, 2, 6, 8
<i>Lomandra densiflora</i>	Soft Tussock Mat-rush	1, 6, 8
<i>Lotus australe</i>	Austral Trefoil	2, 6
<i>Muehlenbeckia gunnii</i>	Coastal Climbing Lignum	1, 2, 3, 6, 8
<i>Myoporum insulare</i>	Common Boobialla	1, 2, 3, 6, 8
<i>Myoporum parvifolium</i>	Creeping Boobialla	1, 2, 6, 8
<i>Olearia axillaris</i>	Coast Daisy-bush	1, 2, 6, 8
<i>Pelargonium australe</i>	Australian Pelargonium	2, 6, 8
<i>Pimelea serpyllifolia</i>	Thyme Riceflower	1, 2, 6, 8
<i>Poa poiformis</i>	Coast Tussock-grass	1, 2, 3, 5, 6, 8
<i>Rhagodia candolleana</i>	Sea-berry Saltbush	1, 2, 3, 6, 8
<i>Rytidosperma spp.</i>	Wallaby Grass	1, 2, 3, 5, 6, 8

Scientific name	Common name	Management Unit
<i>Senecio odoratus</i>	Scented Groundsel	2, 6, 8
<i>Scaevola crassifolia</i>	Cushion Fanflower	1, 2, 6, 8
<i>Tetragonia implexicoma</i>	Bower Spinach	1, 2, 3, 6, 8
<i>Themeda triandra</i>	Kangaroo Grass	1, 3, 5, 6
<i>Threlkeldia diffusa</i>	Coast Bonefruit	2, 6, 8

## 5.7 The use of decoys to attract seabirds

There is some evidence to suggest that the use of decoys (bird models or nests) can attract certain bird species that nest colonially for protection to a new site to breed<sup>33</sup>. It is recommended that this option is investigated further in order to attract birds such as Caspian Terns, Crested Terns and Fairy Terns to nest on Granite Island. One possible decoy trial location is within the grassland area in the centre of the island (Management Unit 5). A section of this area could be fenced off to exclude both people and potential predators, and then decoys could be introduced as a trial.

## 5.8 Little Penguins

The decline of Little Penguin populations on Granite Island, West Island and also on Kangaroo Island in recent years has been the impetus for NRM to fund further research, monitoring and development of management actions to gain baseline information on populations, increase awareness of conservation issues and to investigate causes of declines.

Various causes for the rapid decline of Little Penguins in the study area have been proposed including food shortages, predation by increasing numbers of Long-nosed Fur-seals, predation of eggs and chicks by Black Rats, dogs and foxes, entanglement in fishing nets, parasites and disturbance by tourists.

Recent attention has particularly focussed on the role of Long-nosed Fur-seals, a species which has increased in the region in recent years<sup>34</sup>. Also of relevance is the decline of the pilchard population, following a widespread die-off across southern Australia in 1995 and again in 1998<sup>35</sup> and concurrent development of a pilchard fishery off the South Australian gulfs to feed the State's growing tuna industry<sup>36</sup>. In Victoria a large mortality of penguins occurred<sup>37</sup> but the population subsequently recovered by shifting prey species<sup>38</sup>, although suitable alternative prey may not be available in the study area for this prey shifting to occur.

Rat control on Granite Island reduced the loss of penguin eggs and chicks during the 1990's<sup>39</sup> and from 2006 onwards NR AMLR funding was used to increase the intensity of baiting activities. Eradication of all introduced mammals on the islands in the study area would also benefit other ground-nesting bird species.

There is a need to inform and educate visitors to Granite Island that, despite all the threats to their survival, there is still a small population of 'wild' Little Penguins inhabiting the island (see Section

<sup>33</sup> <http://www.conservationevidence.com/actions/586> - Use decoys to attract birds to safe areas.

<sup>34</sup> Shaughnessy *et al* 2014.

<sup>35</sup> Gaut 1999.

<sup>36</sup> Shanks 2005.

<sup>37</sup> Dann *et al* 2010.

<sup>38</sup> Dann in Gaut 1999.

<sup>39</sup> Bool *et al.* 2007.



3.4). Better signage is recommended to ensure that visitor behaviour does not disturb the penguins, particularly at night, and to reinforce the prohibition of dogs on the island.

#### **Future research**

The Southern Fleurieu Coastal Action Plan (Caton et al, 2007) outlines a proposed high priority action (F11.2) to support research to clarify the causes of Little Penguin population decline on Granite Island. In liaison with other NRM Boards, the Adelaide and Mt Lofty Ranges Natural Resources Management Board has developed a set of conservation management priorities for Little Penguin populations in Gulf St Vincent<sup>40</sup>. A range of actions were implemented across the Gulf, with support of the NRM Boards and other funding. This report was undertaken by penguin ecologist Annelise Weibkin and SARDI Aquatic Sciences .

AMLNRMB has been supporting a coordinated penguin conservation program across Gulf St Vincent since 2011. This was originally undertaken by penguin ecologists working with the Friends of Encounter Seabirds. Since 2013 this work has been undertaken by Flinders University with assistance from community volunteers and DEWNR staff. As part of its leasing arrangement the Granite Island Nature Park historically supported a part-time penguin researcher to conduct monitoring on Granite Island.

It is recommended that future research include:

- continuation of the annual Little Penguin census program;
- annual monitoring of Little Penguin breeding success;
- continued monitoring of Little Penguin mortalities and maintenance of the mortality register;
- further research into the causes of Little Penguin population decline, eg parasites and disease, predation, human disturbance, pollution, over-fishing, entanglement in fish nets, fish mortality events, climate change.

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<sup>40</sup> Wiebkin, 2011.



*Signage outside the recently closed Penguin Centre on Granite Island*

## 6 MONITORING

### 6.1 BushRAT

As part of this project, the Bushland Rapid Assessment Technique (BushRAT) was used as a method to monitor the progress and success of management actions over time. BushRAT's were undertaken within each vegetation community on Granite Island where active management is proposed. The results are included in Appendix 3.

BushRAT assessments are useful as they are rapid and can be easily repeated over time to indicate changes in native plant species diversity, weed cover, regeneration, grazing pressure, etc. Use of the protocol not only provides people with a way to show the positive impact they might be having on their bushland's condition but it also raises their awareness of the vital natural processes going on in the bush and how to detect the early warning signs of threatening processes. Data from individual monitoring sites can also be collated on a regional basis with NVC data to provide better information on the condition and trends in native vegetation.

The BushRAT data has been used to set relevant milestones and targets in the Action Plan for Granite Island (see Section 7). It is recommended that BushRATs be repeated on Granite Island every five years to monitor the progress and success of management actions.

### 6.2 Photopoints

Photopoints are very useful for seeing change in the landscape over time, especially when describing what an area looked like before changes occurred. It is much easier to understand a picture than a paragraph of text. Photopoints can be used to monitor the effectiveness of weed control work,

revegetation, regeneration and changes between seasons, i.e. summer versus winter vegetation. Photopoints are simple to establish and further information on photopoint monitoring is provided in Appendix 4.

It is recommended that photopoints be established on Granite Island to help monitor effectiveness of ongoing management activities.

### **6.3 Plan implementation – progress reporting**

Progress reporting helps with the assessment of the time, effort and finances put in to management actions. It is likely that various factors such as weather or control technique may affect outcomes and some efforts will be more successful than others. Example Works Record sheets are included in Appendix 5 and it is recommended that all management activities on Granite Island are recorded.

## 7 GRANITE ISLAND BIODIVERSITY ACTION PLAN

The table below lists the biodiversity management threats/issues for Granite Island Recreation Park, their related objectives, actions already taken to address them, and further actions being proposed. Any weed control, particularly woody weed control in active penguin nesting areas needs to be undertaken in consultation with penguin ecologist and NR AMLR staff (see Figure 1-2 for current locations).

ISSUE/THREAT	5-Yr Objective	Actions to date – what/ who	Proposed actions- what/ where/how	Priority (H, M, L)	Who Responsible
<b>WEEDS</b>					
<b>Management Unit 1 Sheoak Woodlands (BushRAT Site 4)</b>					
African Daisy	Reduce infestations to <1% cover	FOGI - spraying, hand-pulling around plantings	Continue hand-pulling, spraying, in particular around plantings.	M	DEWNR (assisted by FOGI)
Aleppo Pine	Maintain cover at <1% by controlling seedlings	-	Hand-pull or cut seedlings, smaller plants	H	DEWNR (assisted by FOGI)
Boxthorn	Eradicate	Contractor – cutting & swabbing; hand-pulling seedlings with follow up undertaken by FOGI. Previous control has been successful, however vigilance is required.	Cut & swab mature individuals with Garlon. Spread out the cut material so it is not left in dense stands Chainsaw may be required for the larger bushes. Follow-up control may be required. Hand-pull seedlings. Continue patrol of entire area and map/control as necessary	VH	DEWNR (assisted by FOGI) Contractor
Casuarina glauca	Eradicate	Previously controlled, but ongoing vigilance is required.	Cut and swab or basal bark spray.	H	DEWNR (assisted by FOGI)
Coastal Tea-tree	Eradicate	Contractor – cutting & swabbing; hand-pulling seedlings with follow up undertaken by FOGI. Follow-up is required.	Drill and fill mature individuals. Leave mature dead trees standing for habitat. Hand-pull seedlings. Patrol & control emergent seedlings as required (ongoing)	H	DEWNR (assisted by FOGI) Contractor
Olive	Eradicate	Contractor – cutting & swabbing; hand-pulling seedlings with follow up undertaken	Treat Olives with Garlon 600 mixed with diesel 1:30 through cut and swab or drill and fill.	VH	DEWNR (assisted by

ISSUE/THREAT	5-Yr Objective	Actions to date – what/ who	Proposed actions- what/ where/how	Priority (H, M, L)	Who Responsible
		by FOGI. Follow-up is required	Hand-pull seedlings		FOGI) Contractor
Perennial Veldt Grass	Reduce infestations in revegetation areas prior to activities.	Localised spraying in revegetation areas prior to planting.	Continue actions to date and monitor for new emergence	L	DEWNR (assisted by FOGI)
Soursob	Reduce infestations to <25% cover	FOGI – spraying, hand-pulling around plantings	Continue hand-pulling, spraying – particularly in revegetation areas.	H	DEWNR (assisted by FOGI) Contractor
Western Coastal Wattle	Eradicate	Previously controlled, however ongoing vigilance is required.	Cut and swab or basal bark spray.	H	DEWNR (assisted by FOGI)
<b>Management Unit 2 Shrubland/Open shrubland areas (BushRAT Site 2 and Site 6)</b>					
African Daisy	Eradicate	FOGI - spraying, hand-pulling around plantings	Continue hand-pulling, spraying.	M	DEWNR (assisted by FOGI)
Apple of Sodom	Eradicate	-	Spray or grub mature plants, remove from site if seed is present. Hand-pull seedlings.	M	Contractor
Hottentot Fig	Reduce cover to <1%	Contractor –Spraying with Glyphosate 360g/L and Pulse, as well as grubbing, hand-pulling. Follow-up by FOGI	Continue actions to date and monitor for new emergents Bag and remove from site if seed is present	M	DEWNR (assisted by FOGI) Contractor
Kikuyu	Eradicate	Previously controlled by FOGI with focus around areas of revegetation.	Spot spray using grass selective herbicide amongst native vegetation.	VH	DEWNR (assisted by FOGI)
New Zealand Mirror-bush	Eradicate	-	Hand-pull seedlings. Cut and swab, drill and fill or frill larger individuals.	M	DEWNR (assisted by FOGI) Contractor

ISSUE/THREAT	5-Yr Objective	Actions to date – what/ who	Proposed actions- what/ where/how	Priority (H, M, L)	Who Responsible
Perennial Veldt Grass	Reduce infestations in revegetation areas prior to activities.	Localised spraying in revegetation areas prior to planting.	Continue actions to date and monitor for new emergence	L	DEWNR (assisted by FOGI)
Soursob	Reduce infestations to <5% cover	FOGI – spraying, hand-pulling around plantings	Continue hand-pulling, spraying	H	DEWNR (assisted by FOGI)
<b>Management Unit 3 Swamp Paperbark (BushRAT Site 5)</b>					
Bridal Creeper	Eradicate	Only small amounts present and quite manageable at this stage.	In areas clear of native vegetation – spray with Glyphosate 360g/L and Pulse or grub Where Bridal Creeper is growing on/through native vegetation –pull individuals off native plants, cut leafy material back, carefully wipe (Glyphosate 360g/L and Pulse) and place/pin in a location where there will be no off-target damage.	VH	DEWNR (assisted by FOGI) Contractor
Coastal Tea-tree	Eradicate	Previously controlled but scattered individuals remain	Drill and fill mature individuals. Leave mature dead trees standing for habitat. Hand-pull seedlings. Patrol & control emergent seedlings as required	VH	DEWNR (assisted by FOGI) Contractor
Kikuyu	Eradicate	Previously controlled by FOGI with focus around areas of revegetation.	Spot spray using grass selective herbicide amongst native vegetation.	VH	DEWNR (assisted by FOGI)
Olive	Eradicate	Previously controlled, however follow up may be required.	Treat Olives with Garlool 600 mixed with diesel 1:30 through cut and swab or drill and fill. Hand-pull seedlings	VH	DEWNR (assisted by FOGI) Contractor
Perennial Veldt Grass	Reduce infestations in revegetation areas prior to activities.	Localised spraying in revegetation areas prior to planting.	Continue actions to date and monitor for new emergence	L	DEWNR (assisted by FOGI)
Sallow Wattle	Eradicate	Previous control has been successful, however vigilance is required.	Hand-pull seedlings. Cut and swab, drill and fill larger individuals.	VH	DEWNR (assisted by

ISSUE/THREAT	5-Yr Objective	Actions to date – what/ who	Proposed actions- what/ where/how	Priority (H, M, L)	Who Responsible
			Older, mature plants can be cut down as they don't tend to re-shoot. Remove material from site if seed is present		FOGI) Contractor
<b>Management Unit 4 Sedgeland (BushRAT Site 1)</b>					
African Daisy	Eradicate	FOGI - spraying, hand-pulling around plantings	Continue hand-pulling, spraying.	M	DEWNR (assisted by FOGI)
Buffalo Grass	Prevent/contain spread into areas of good vegetation	Previous control.	Continue spot spraying.	H	DEWNR (assisted by FOGI)
Euphorbia	Eradicate	Previously controlled by FOGI with focus around areas of revegetation.	Hand-pull, spot spray.	H	DEWNR (assisted by FOGI)
Hottentot Fig	Eradicate	Contractor –Spraying with Glyphosate 360g/L and Pulse, as well as grubbing, hand-pulling.	Continue actions to date and monitor for new emergents Bag and remove from site if seed is present	H	DEWNR (assisted by FOGI) Contractor
Kikuyu	Eradicate	Previously controlled by FOGI with focus around areas of revegetation.	Spot spray using grass selective herbicide amongst native vegetation.	VH	DEWNR (assisted by FOGI)
New Zealand Mirror-bush	Eradicate	-	Hand-pull seedlings. Cut and swab, drill and fill or frill larger individuals.	M	DEWNR (assisted by FOGI) Contractor
Olive	Eradicate	Previously controlled, however follow up may be required.	Treat Olives with Garlool 600 mixed with diesel 1:30 through cut and swab or drill and fill. Hand-pull seedlings	VH	DEWNR (assisted by FOGI) Contractor
Perennial Veldt Grass	Reduce infestations in revegetation	Localised spraying in revegetation areas prior to planting.	Continue actions to date and monitor for new emergence	L	DEWNR (assisted by FOGI)

ISSUE/THREAT	5-Yr Objective	Actions to date – what/ who	Proposed actions- what/ where/how	Priority (H, M, L)	Who Responsible
	areas prior to activities.				
Pyramid Tree	Eradicate	-	Hand-pull seedlings. Cut and swab, drill and fill larger individuals	L	DEWNR (assisted by FOGI) Contractor
Pincushion (Scabious)	Eradicate	Contained at the moment but has the potential to become a major problem.	Spot spray larger infestations. Manually remove isolated plants	H	DEWNR (assisted by FOGI) Contractor
Soursob	Reduce infestations to <1% cover	FOGI – spraying, hand-pulling around plantings	Continue hand-pulling, spraying	H	DEWNR (assisted by FOGI)
<b>Management Unit 5 Grasslands (BushRAT Site 3)</b>					
African Daisy	Eradicate	FOGI - spraying, hand-pulling around plantings	Continue hand-pulling, spraying.	M	DEWNR (assisted by FOGI)
Apple of Sodom	Eradicate	-	Spray or grub mature plants, remove from site if seed is present. Hand-pull seedlings.	M	Contractor
Bridal Creeper	Eradicate	Only small amounts present and quite manageable at this stage.	In areas clear of native vegetation – spray with Glyphosate 360g/L and Pulse or grub Where Bridal Creeper is growing on/through native vegetation –pull individuals off native plants, cut leafy material back, carefully wipe (Glyphosate 360g/L and Pulse) and place/pin in a location where there will be no off-target damage.	VH	DEWNR (assisted by FOGI) Contractor
Coastal Tea-tree	Eradicate	Previously controlled but scattered individuals remain.	Drill and fill mature individuals. Leave mature dead trees standing for habitat. Hand-pull seedlings. Patrol & control emergent seedlings as required	VH	DEWNR (assisted by FOGI) Contractor
New Zealand	Eradicate	-	Hand-pull seedlings.	M	DEWNR



ISSUE/THREAT	5-Yr Objective	Actions to date – what/ who	Proposed actions- what/ where/how	Priority (H, M, L)	Who Responsible
Mirror-bush			Cut and swab, drill and fill or frill larger individuals.		(assisted by FOGI) Contractor
Perennial Veldt Grass	Reduce infestations in revegetation areas prior to activities.	Localised spraying in revegetation areas prior to planting.	Continue actions to date and monitor for new emergence	L	DEWNR (assisted by FOGI)
Pincushion (Scabious)	Eradicate	Contained at the moment but has the potential to become a major problem.	Spot spray larger infestations. Manually remove isolated plants	H	Contractor
<b>Management Unit 6 Modified tourist zone (no BushRAT)</b>					
Agapanthus, Cape Leeuwin Wattle, Poygala myrtifolia	Remove from gardens as it has the potential to spread to other parts of the island	-	Hand-pull dig out smaller individuals when soil is moist, bag and remove material from site. Cut & swab or drill & fill larger individuals, taking care to remove seed pods and/or bulbs from the site. Any weed control, particularly woody weed control in active penguin nesting areas needs to be undertaken in consultation with penguin ecologist and NR AMLR staff (see Figure 1-2 for current locations).	M	DEWNR (assisted by FOGI)
<b>Management Unit 7 Area of indigenous plantings N side of island (no BushRAT)</b>					
Aleppo Pine	Maintain cover at <1% by controlling seedlings		Hand-pull or cut seedlings, smaller plants	H	DEWNR (assisted by FOGI)
<b>Management Unit 8 Exotic grassland with emergent Pines N side of island (no BushRAT)</b>					
Aleppo Pine	Reduce cover to <1% by controlling seedlings		Hand-pull or cut seedlings, smaller plants	H	FOGI
<b>PEST ANIMALS</b>					
Foxes and cats	No foxes or cats on Granite Island	On-ground managers remove when detected	Ongoing vigilance	VH	NRAML

ISSUE/THREAT	5-Yr Objective	Actions to date – what/ who	Proposed actions- what/ where/how	Priority (H, M, L)	Who Responsible
Rats and mice	No rats or mice on Granite Island	On-ground managers - baiting on a regular basis	Ongoing baiting	VH	NRAMLR
Rabbits	No rabbits on Granite Island	On-ground managers – monitoring to detect presence	Continue to monitor for the presence of rabbits (eg live animals, warrens, dung heaps, scratchings, etc)	L	NRAMLR
<b>RECREATION – Negative impacts on biodiversity (trampling, disturbance to native fauna, erosion, rubbish dumping, etc)</b>					
	Reduce the impact of visitors across the island Reduced number of informal trails through aerial photography analysis.	DEWNR – interpretive signage at entry point to island and in northern ‘tourist zone’ (MU 6).	Install appropriate interpretive/regulatory signage at strategic locations to inform/educate visitors about the values of the Park and the regulations that apply. Close and revegetate informal tracks, particularly on the southern side of the island to discourage walkers and prevent further trampling and erosion.	L	NRAMLR FOGI
<b>EROSION</b>					
	Reduced level of erosion as evidenced by aerial photography analysis.	Trails have been fairly well consolidated but there is still some unconsolidated trail use on the southern side of the island.	Close and revegetate informal tracks, particularly on the southern side of the island to discourage walkers and prevent further trampling and erosion.	M	NRAMLR
<b>REVEGETATION</b>					
	<ul style="list-style-type: none"> <li>Provide/maintain self-sustaining woodland habitat in MU1 and MU3</li> <li>Provide/maintain self-sustaining shrubland habitat in MU2</li> <li>Maintain self-sustaining sedgeland habitat in MU4</li> <li>Maintain open grassland habitat in MU5</li> <li>Continue to provide/maintain indigenous plantings in MU6 &amp; MU7</li> </ul>		Continue revegetation works as appropriate, with densities and species appropriate for the habitat type, with particular focus on providing habitat for Little Penguins and other birds.  See revegetation species list in Table 7	M	FOGI

ISSUE/THREAT	5-Yr Objective	Actions to date – what/ who	Proposed actions- what/ where/how	Priority (H, M, L)	Who Responsible
	<ul style="list-style-type: none"> <li>Establish self-sustaining shrubland habitat in MU8</li> </ul>				
<b>SEABIRD NESTING SITES</b>					
Decoys	Investigate the use of decoys to attract bird species such as terns to nest	-	Establish a trial area, for example with Management Unit 5. Fence off to exclude people and potential predators. Place decoys within the exclusion area (bird models and/or nests). Monitor during tern breeding season.	L	NRAMLR
<b>MONITORING</b>					
All management activities	Monitor progress and success of management activities undertaken	BushRat assessments undertaken in each Management Unit as part of this project (see Appendix 3).	Repeat BushRat assessments every 3-5 years to monitor vegetation condition and levels of weed infestations	L	NRAMLR
		Photopoints established in each Management Unit in 2015.	Repeat photopoints on an annual basis (Use Photopoint data sheet - Appendix 4)	M	NRAMLR
		Management actions	Record details of works as they are undertaken (ensure contractors do the same) - Use works record sheets (Appendix 5)	H	NRAMLR
Little Penguins	Undertake research to clarify the causes of population decline	Annual penguin census	<ul style="list-style-type: none"> <li>Continue the Little Penguin census program on an annual basis.</li> <li>Monitor Little Penguin breeding success on an annual basis</li> <li>Investigate the causes of Little Penguin population decline.</li> </ul>	M	NRAMLR, Universities



## SECTION 2: WRIGHT ISLAND



## 1. HISTORY

Wright Island is a 2.2 hectare island which is located approximately 1km offshore between Granite Island and the prominent rocky headland known as The Bluff. The island is uninhabited and can only be accessed from the water. It was named after William Wright, a prominent person in the whaling industry in the Victor Harbor area in the 1800's<sup>41</sup>.

Rabbits and the occasional fire denuded the island of vegetation in the early years<sup>42</sup>. Rabbits have now been eradicated. In about 1965 the District Council of Encounter Bay poisoned and burnt African Boxthorn across the island<sup>43</sup>.

## 2. CURRENT MANAGEMENT

Wright Island is a Public Pleasure Resort under the care and control of the City of Victor Harbor. Since 2012, the waters surrounding its shores are located within the boundaries of the Encounter Marine Park.

## 2. ENVIRONMENTAL ASSETS

### 2.1 Landform and soils

Wright Island consists largely of granite boulders with some pockets of sandy soil which support low vegetation. It is listed as a geological monument as it is an example of Encounter Bay granite in contact with Kanmantoo Group rocks<sup>44</sup>. It also features a sandy beach suitable for the landing of small boats.

### 2.2 Native vegetation

Due to past disturbances such as heavy rabbit grazing, fires and human visitation, the vegetation on Wright Island is highly modified and dominated by introduced species. The following vegetation community was recorded as part of the Bushland Rapid Assessment Technique (BushRat) assessment undertaken in 2015.

- Boxthorn (*\*Lycium ferocissimum*), Seaberry Saltbush (*Rhagodia candolleana*) Shrubland with Tree Mallow (*\*Malva arborea*) and New Zealand Mirror-bush (*\*Coprosma repens*)

A full list of native plant species recorded is included in Appendix 1.

### 2.3 Birds

Paton & Paton (1977b) surveyed birds of Wright Island, with a focus on breeding seabirds.

A total of 27 bird species have been recorded on the island, including 13 during the current survey (Table 2-1). Nine (9) have either been reported or are suspected to breed there, although the small size of the island limits the range of species that breed. This includes seven species of seabird. Of

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<sup>41</sup> Victor Harbor City Council

<sup>42</sup> Paton & Paton, 1977b.

<sup>43</sup> Brian Doman, City of Victor Harbor, pers. comm., 2015.

<sup>44</sup> SA Geological Society.

regional significance is regular nesting by a pair of Sooty Oystercatchers, including a nest with eggs on the December 2015 survey.

The dense growth of Boxthorn and Coprosma across the island provides a winter roost for thousands of European Starlings<sup>45</sup> and a nesting area for hundreds of Rock Doves.

### Little Penguin

Little Penguins were first reported from Wright Island in the 1920's<sup>46</sup>. Rumbelow (1941) noted many penguins there in September 1941 and Barker (1954) in March 1954. Paton & Paton (1977b) recorded 150 nests in the 1970's with similar numbers in the 1990's<sup>47</sup>. By 2013 there were no birds on the island<sup>48</sup>.

### Silver Gull

Rumbelow (1941) reported many gulls on the island in September 1941. Up to 500 pairs bred there from the 1960s – 80s<sup>49</sup>. About 20 adults plus several juveniles (mostly hiding among Boxthorns) were present in the December 2015 survey.

### Caspian Tern

Paton & Paton (1977b) recorded Caspian Terns at Wright Island but with no evidence of breeding. D. Paton (pers. comm.) observed 30-40 in December 2008 and several in December 2009 (both with Crested Terns – see below) and suspected that they were breeding.

### Crested Tern

Paton & Paton (1977b) recorded Crested Terns at Wright Island but with no evidence of breeding. D. Paton (pers. comm.) observed several hundred nests in two colonies in sandy areas above the beach on the western side of the island in December 2008, and a few hundred nests in December 2009 and December 2014. During this survey only a small number were roosting on rocks on the edge of the island.

### Fairy Tern

Fairy Terns bred irregularly on Wright Island between 1964 and 1978, with a maximum of 80 pairs.

**Table 2-1: Birds species reported from Wright Island**

Common name	Species	#Record	Breeding	Comments	Reference
*Common Starling	<i>Sturnus vulgaris</i>	s	probable	Winter roost. c.1500 Jun 2003; 1000 Jun 2015, 1 in Dec 2015.	6
*Rock Dove	<i>Columba livia</i>	s	yes	c. 500 in Dec 2015, incl. sev nests with eggs and young	
Black Falcon	<i>Falco subniger</i>	x		1 in Apr 1972	5
Black-faced Cormorant	<i>Phalacrocorax fuscescens</i>	s		up to 10 roosting in 2015	
Black-shouldered Kite	<i>Elanus axillaris</i>	x		1 over in Jun 2015	
Cape Petrel	<i>Daption capense</i>	x		1 in adj sea, Jul 1923	1
Caspian Tern	<i>Hydroprogne caspia</i>	x	probable	30-40 in Dec 2008, few in Dec	8

<sup>45</sup> Paton *et al* 2005.

<sup>46</sup> Cleland 1924.

<sup>47</sup> Copley 1996.

<sup>48</sup> Colombelli-Negrel & Kleindorfer 2014.

<sup>49</sup> Paton & Paton 1977b, Ottaway *et al* 1988.

Common name	Species	#Record	Breeding	Comments	Reference
				2009	
Crested Tern	<i>Thalasseus bergii</i>	s	yes	100s nests Dec 2008, 2009, 2014; none 2011, 2015	8
Eastern Reef Egret	<i>Egretta sacra</i>	s		1 in Jun 2015	
Elegant Parrot	<i>Neophema elegans</i>	x		sev Feb 1921	9
Fairy Tern	<i>Sternula nereis</i>	x	yes	9 prs in Dec 1975, 50prs in 1978, none in 2015	3
Great Cormorant	<i>Phalacrocorax carbo</i>	x		report in 1976	3
Great Egret	<i>Ardea alba</i>	s		1 in Jun 2015	
Little Black Cormorant	<i>Phalacrocorax sulcirostris</i>	x		report in 1976	3
Little Penguin	<i>Eudyptula minor</i>	x	yes	1st reported 1941, max. c.150 nests 1976, none in 2015	2
Little Pied Cormorant	<i>Microcarbo melanoleucos</i>	s		1 in Jun 2015	
Pacific Gull	<i>Larus pacificus</i>	s		reported 1976, 1 in Dec 2015	
Peregrine Falcon	<i>Falco peregrinus</i>	x		1 in Jun 2003	6
Pied Cormorant	<i>Phalacrocorax varius</i>	x		report in 1976	3
Short-tailed Shearwater	<i>Ardenna tenuirostris</i>	s		dead bird Jun 2015	
Silver Gull	<i>Chroicocephalus novaehollandiae</i>	s	yes	500 nests in 1970s, c. 20 juv in 2015	7
Singing Honeyeater	<i>Lichenostomus virescens</i>	s	probable	2 prs 2015	
Sooty Oystercatcher	<i>Haematopus fuliginosus</i>	s	yes	1 nest in 1966, 1974 & 2015	3
Southern Boobook	<i>Ninox boobook</i>	s		feather Jun 2015	
Spotted Harrier	<i>Circus assimilis</i>	x		1 over in Jul 2013	4
Tree Martin	<i>Petrochelidon nigricans</i>	x		40 over Jan 1923	10
White-faced Heron	<i>Egretta novaehollandiae</i>	x		report in 1976	3
<b>#Record</b> – s = Present survey, x = Previous survey					
<b>References</b>					
1 - Shannon 1923; 2 - Rumbelow 1941, Copley 1996, Collombelli & Kleindorfer 2014; 3 - Paton & Paton 1977; 4 - Crocker 2013; 5 - Lendon 1972; 6 - Paton et al 2005; 7 - Paton & Paton 1977, Copley 1996; 8 - Paton, D. pers comm; 9 - Cleland 1921; 10 - Paton 1973					

## 2.4 Reptiles

Table 2-3 shows the reptile species present, or considered likely to be present, on Wright Island. Due to the relatively small size of the Island, and the limited habitats available, there are relatively few species that would use the Island as habitat. All species are considered to be common.

Table 2-3: Reptile species observed and/or likely to be utilising Wright Island for habitat

Scientific Name	Common Name	Recorded 2015	Previous records	*Rating		Comments <sup>50</sup>
				AUS	SA	
<i>Hemiergis peroni</i>	Four-toed Earless Skink					Observed on the Island in mid 1980s (T. Milne pers. obs.).
<i>Christinus marmoratus</i>	Marbled Gecko					Observed on the Island in mid 1980s (T. Milne pers. obs.).

## 2.5 Mammals

The following table includes a list of all mammals which have been recorded or are likely to occur on Wright Island. Only marine mammals have been recorded to date.

<sup>50</sup> Dr Tim Milne, Herpetologist



Table 2-4: Mammal species known or likely to occur on Wright Island or in immediate surrounding waters

Scientific Name	Common Name	2015	Previous surveys	#Rating		Comments
				AUS	SA	
<b>Marine Mammals</b>						
<i>Arctocephalus forsteri</i>	Long-nosed Fur Seal		✓		R	
<i>Eubalaena australis</i>	Southern Right Whale		✓		V	
<i>Hydrurga leptonyx</i>	Leopard Seal		✓		R	
<i>Megaptera novaeangliae</i>	Humpback Whale		✓	V	V	
<i>Mirounga leonine leonine</i>	South Atlantic Elephant-seal		✓			
<i>Neophoca cinerea</i>	Australian Sea-lion		✓	V	V	
<i>Delphinus delphis</i>	Short-beaked Common Dolphin					
<i>Tursiops aduncus</i>	Indo-Pacific Bottlenose Dolphin					

#Conservation rating codes: EX = Extinct, CE = Critically Endangered, E = Endangered, V = Vulnerable, R = Rare, NT = Near Threatened

## 4. THREATS (MANAGEMENT ISSUES)

Threats to the biodiversity values of Wright Island include:

- Weed invasion
- Predation by pest/pet animals (cats, dogs, rats, mice)
- Recreation activities/human disturbance such as boating and kayaking, in particular during seabird breeding times
- Competition for seabird habitat from over-abundant species such as Silver Gulls, Rock Doves and Starlings

### 3.1 Invasive weeds

The diversity and structure of the native vegetation on Wright Island have been modified considerably over the last 150 years, partly due to large numbers of rabbits in the past<sup>51</sup>. Boxthorn is prevalent on Wright Island and is of concern because the thorny bushes can trap sea bird chicks and the berries provide a food source for over-abundant Silver Gull and Rock Dove populations and Starlings.

Weeds of concern which threaten the current native vegetation communities on the island are included in Table 2-5. A full list of weeds recorded is included in Appendix 1.

A watching brief on kikuyu should be maintained and this weed controlled when present before it reaches problem levels.

<sup>51</sup> Hodge, CR 1991. *Encounter Bay: The miniature Naples of Australia*, Gillingham Printers Adelaide.

Table 2-5: Weeds of concern, Wright Island

Species	Common Name	<sup>52</sup> Declared	<sup>53</sup> WONS	<sup>54</sup> SFCAP Threat Level	<sup>55</sup> Weed invasiveness ranking
* <i>Arctotheca calendula</i>	Capeweed			1	2
* <i>Asparagus asparagoides</i>	Bridal Creeper	Y	Y	9	5
* <i>Coprosma repens</i>	New Zealand Mirror-bush			4	3
* <i>Cynodon dactylon</i>	Couch			3	2
* <i>Euphorbia terracina</i>	False Caper			5	3
* <i>Ehrharta longiflora</i>	Annual Veldt Grass			2	2
* <i>Lycium ferocissium</i>	African Boxthorn	Y	Y	7	3
* <i>Malva arborea</i>	Tree Mallow			3	-
* <i>Oxalis pes-caprae</i>	Soursob	Y		5	4
* <i>Sonchus oleraceus</i>	Sow-thistle			1	1

**SFCAP Threat Levels:** The threat value allocation process undertaken as part of the Southern Fleurieu Coastal Action Plan identified a total of 85 priority environmental weeds for the Southern Fleurieu coastal region, each featuring a weed threat value between 1 and 9.

**Red Alert Weed Categories:**

- 1 – Generally only invade disturbed bushland. Often widespread and abundant but not considered a significant threat to native biodiversity, unless present at very high densities.
- 2 - Generally only invade disturbed bushland, but may spread rapidly. However, generally only a slight potential to reduce native species diversity, unless present at very high densities.
- 3 – Invasive in intact bushland with moderate potential to reduce native species diversity. Rate of spread is slower than Category 4 and 5 weeds but once present will persist and threaten biodiversity. May produce dense stands over a wide area but can be controlled with sustained effort.
- 4 – Highly invasive in either disturbed or intact remnant bushland, with the potential to spread rapidly and produce very dense stands given favourable habitat and/or vectors. High potential to reduce native species diversity and abundance. Can be controlled with sustained effort.
- 5 – Highly invasive in either disturbed or intact bushland, spreads rapidly producing very dense stands and a blanket cover. Potential to eliminate almost all native understorey species. Very difficult to control without outside help.

## 3.2 Pest animals

### Pet dogs and cats

Native fauna, and nesting birds in particular, are at risk of predation by dogs and cats which are occasionally brought to the island by people in boats. It is recommended that a sign be erected on the beach where boats can readily land, as well as signage at the Victor Harbor (Bluff) boat ramp, stating that dogs and cats should not be taken to Wright Island. It is also recommended that the Victor Harbor Council consider the introduction of a by-law prohibiting dogs and cats from the island.

### Rabbits

Rabbits were introduced to Wright Island in 1840<sup>56</sup> but they were eventually eradicated by poisoning, after completely denuding the island. There is presently no evidence of rabbits on Wright

<sup>52</sup>Biosecurity SA Weeds and Pest Animals. Declared plants in South Australia, October 2012

[http://www.pir.sa.gov.au/biosecuritysa/nrm\\_biosecurity/weeds/declared\\_plants\\_in\\_south\\_australia\\_october\\_2012](http://www.pir.sa.gov.au/biosecuritysa/nrm_biosecurity/weeds/declared_plants_in_south_australia_october_2012)

<sup>53</sup> Australian Weeds Committee (2012), Weeds of National Significance 2012. Department of Agriculture, Fisheries and Forestry, Canberra, ACT <http://www.weeds.org.au/WoNS/>

<sup>54</sup> Caton, et al 2007. Southern Fleurieu Coastal Action Plan and Conservation Priority Study, AMLR Natural Resources Management Board

<sup>55</sup> Refer to Native Vegetation & Biodiversity Management Unit *BushRat Manual for native vegetation*, May 2013.

<sup>56</sup> Hodge, CR 1991.

Island, and it is unlikely they will become re-established. Regular monitoring is recommended to ensure that they are detected and then eradicated if they do recolonise.

### **Rock Doves and Starlings**

Rock Doves (*\*Columbia livia*) and Starlings (*Sturnus vulgaris*) fly between the mainland and the islands off Victor Harbor. Doves are predominantly seed eaters and roost and breed on cliffs and rock ledges. Starlings are known vectors of Boxthorn seed, a significant weed on Wright Island.

Although numbers on Wright Island are high at times, it is unlikely that Rock Doves are replacing other nesting birds<sup>57</sup>.

### **Silver Gulls**

Whilst Silver Gulls are a native species, with increased food abundance from human settlements they can become overabundant and may impact on other less abundant seabird species as well as create a nuisance for human residents through scavenging, aggressive behaviour and fouling. Silver Gulls build a nest with sticks etc, usually on the ground in the shelter of a shrub or rock, but also occasionally in a shrub. The spread of invasive woody vegetation has not therefore had the same negative impacts on gulls as it has with terns. Silver Gulls also prey on the eggs and chicks of other seabirds, although it is unknown whether this has occurred and to what extent in the study area.

## **3.3 Recreation activities**

Although Wright Island is uninhabited, it attracts visitors in recreational boats and kayaks who are able to land on the beach on the more sheltered north-western side of the island, particularly in the summer months. This can result in disturbance to breeding sea birds and the deliberate or accidental breakage of eggs.

## **4. BIODIVERSITY MANAGEMENT STRATEGIES**

### **4.1 Biodiversity management objectives**

The biodiversity management objectives for Wright Island are to manage the native vegetation of the reserve in such a manner as to:

- Prevent any further loss of biodiversity; and
- Strengthen the long term viability of the existing biodiversity assets, in particular for sea bird habitat.

In order to monitor whether these objectives are being met, the Bushland Rapid Assessment Technique (BushRAT) was used as part of this project. This methodology, which has been developed by the Native Vegetation Management Unit (SA Dept Environment, Water & Natural Resources), gathers data on bushland condition, including native species diversity, native plant life forms, regeneration, tree health, hollows, fallen timber, weed abundance and threat, grazing pressure, etc. BushRAT assessment results for Wright Island are summarised in Appendix 3.

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<sup>57</sup> Graham Carpenter, Ornithologist, pers. comm. 2016.

## 4.2 Managing weeds

Efforts to control Boxthorn on Wright Island have included an aerial spray in the 1990's by the Fleurieu Animal and Plant Control Board using a helicopter.

The Friends of Wirght Island, which has now disbanded, worked for the past 10-15 years with assistance from the City of Victor Harbor and NR AMLR, to remove woody weeds from the island. This has ben a significant factor in the increase in tern breeding on the island.

Presently the City of Victor Harbor employs contractors annually to undertake weed control on Wright Island. Weeds which are a focus for control include Boxthorn, Mirror Bush and Tree Mallow. It is recommended that this program is continued and that weed control does not occur during the tern breeding season.

In particular, priority should be given to controlling Boxthorn in the sandy areas behind the beach where Crested and Caspian Terns nest and Little Penguins were once abundant (see Figure 2-1 for location).



*Tree Mallow (Malva arborea), Wright Island*



*Boxthorn (Lycium ferocissimum), Wright Island*



Figure 2-1: Priority weed control and management area

### 4.3 Managing use conflicts – people and recreation

Recommended strategies to minimise the impacts of visitors to Wright Island include:

- erecting appropriate signage on the landing beach and/or the Victor Harbor boat ramp to inform visitors of the significance of the island to nesting birds and asking them to move around the island with care to reduce the risk of disturbing birds or breaking eggs;
- consider prohibiting boats from landing during tern breeding times (i.e. December – January); and
- consider fencing off or placing temporary rope fencing and signage around the tern nesting area at the back of the beach.

Any future proposals to facilitate easier access to Wright Island (such as a landing) would need to consider the biodiversity impacts of increased visitation, especially on seabird nesting habitats.

### 4.4 Revegetation

If weeds such as Boxthorn, Mirror Bush and Tree Mallow are to be successfully controlled on Wright Island then a revegetation program should be undertaken in conjunction with weed control. Revegetation efforts should focus upon supplementing existing habitat, using appropriate species for the vegetation type, planting at appropriate (i.e. natural) densities and providing nesting sites. Supplementary planting is essential following weed removal to help stabilise the soil and prevent erosion, so, for example, Native Mallow should be planted to replace Tree Mallow and Boxthorn and Mirror Bush should be replaced with Common Boobialla.

Table 2-6 provides a revegetation plant list which could be used as a guide with the aim being to re-create a shrubland/open shrubland structure comprising a tall shrub layer cover of 10- 30%, a medium – low shrub layer 20-50% cover and a groundlayer cover of 30-70%. In key Tern nesting areas (Figure 2-1) it is recommended to keep cover at the lower end of the scale to maintain suitable open seabird nesting habitat.

**Table: 2-6 Revegetation plant list, Wright Island**

Scientific name	Common name
<i>Acacia longifolia var. sophorae</i>	Coastal Wattle
<i>Atriplex suberecta</i>	Lagoon Saltbush
<i>Austrostipa spp.</i>	Spear Grass
<i>Carpobrotus rossii</i>	Pigface
<i>Dianella brevicaulis</i>	Short-stem Flax-lily
<i>Disphyma crassifolium</i>	Round-leaf Pigface
<i>Enchylaena tomentosa</i>	Ruby Saltbush
<i>Ficinia nodosa</i>	Knobby Club-rush
<i>Muehlenbeckia gunnii</i>	Coastal Climbing Lignum
<i>Myoporum insulare</i>	Common Boobialla
<i>Poa poiformis</i>	Coast Tussock-grass
<i>Rhagodia candolleana</i>	Sea-berry Saltbush
<i>Rytidosperma spp.</i>	Wallaby Grass
<i>Tetragonia implexicoma</i>	Bower Spinach
<i>Themeda triandra</i>	Kangaroo Grass
<i>Threlkeldia diffusa</i>	Coast Bonefruit

## 4.5 The use of decoys to attract seabirds

There is some evidence to suggest that the use of decoys (bird models or nests) can attract certain bird species that nest colonially for protection to a new site to breed<sup>58</sup>. It is recommended that this option is investigated further in order to attract birds such as Caspian Terns, Crested Terns and Fairy Terns back to nest on Wright Island. One possible decoy trial location is within the priority weed control area behind the beach (as shown in Figure 3-1). A section of this area could be fenced off and signed to exclude people (fencing to exclude predators would probably be too cost-prohibitive), with decoys introduced as a trial. Community participation in making decoys (usually cast concrete painted to match the target bird species) and deployment may be a beneficial activity to encourage participation in island conservation and monitoring. Monitoring would be required to ascertain the success or otherwise.

## 5. MONITORING

### 5.1 BushRAT

As part of this project, the Bushland Rapid Assessment Technique (BushRAT) was used as a method to monitor the progress and success of management actions over time. A BushRAT was undertaken on Wright Island and the results are included in Appendix 3.

BushRAT assessments are useful as they are rapid and can be easily repeated over time to indicate changes in native plant species diversity, weed cover, regeneration, grazing pressure, etc. Use of the protocol not only provides people with a way to show the positive impact they might be having on their bushland's condition but it also raises their awareness of the vital natural processes going on in the bush and how to detect the early warning signs of threatening processes. Data from individual monitoring sites can also be collated on a regional basis with NVC data to provide better information on the condition and trends in native vegetation.

The BushRAT data has been used to set relevant milestones and targets in the Action Plan for Wright Island (see Section 6). It is recommended that BushRATs be repeated on Wright Island every five years to monitor the progress and success of management actions.

### 5.2 Photopoints

Photopoints are very useful for seeing change in the landscape over time, especially when describing what an area looked like before changes occurred. It is much easier to understand a picture than a paragraph of text. Photopoints can be used to monitor the effectiveness of weed control work, revegetation, regeneration and changes between seasons, i.e. summer versus winter vegetation. Photopoints are simple to establish and further information on photopoint monitoring is provided in Appendix 4.

It is recommended that photopoints be established on Wright Island to help monitor effectiveness of ongoing management activities.

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<sup>58</sup> <http://www.conservationevidence.com/actions/586> - Use decoys to attract birds to safe areas.

### **6.3 Plan implementation – progress reporting**

Progress reporting helps with the assessment of the time, effort and finances put in to management actions. It is likely that various factors such as weather or control technique may affect outcomes and some efforts will be more successful than others. Example Works Record sheets are included in Appendix 5 and it is recommended that all management activities on W Island are recorded.



## 6. WRIGHT ISLAND BIODIVERSITY ACTION PLAN

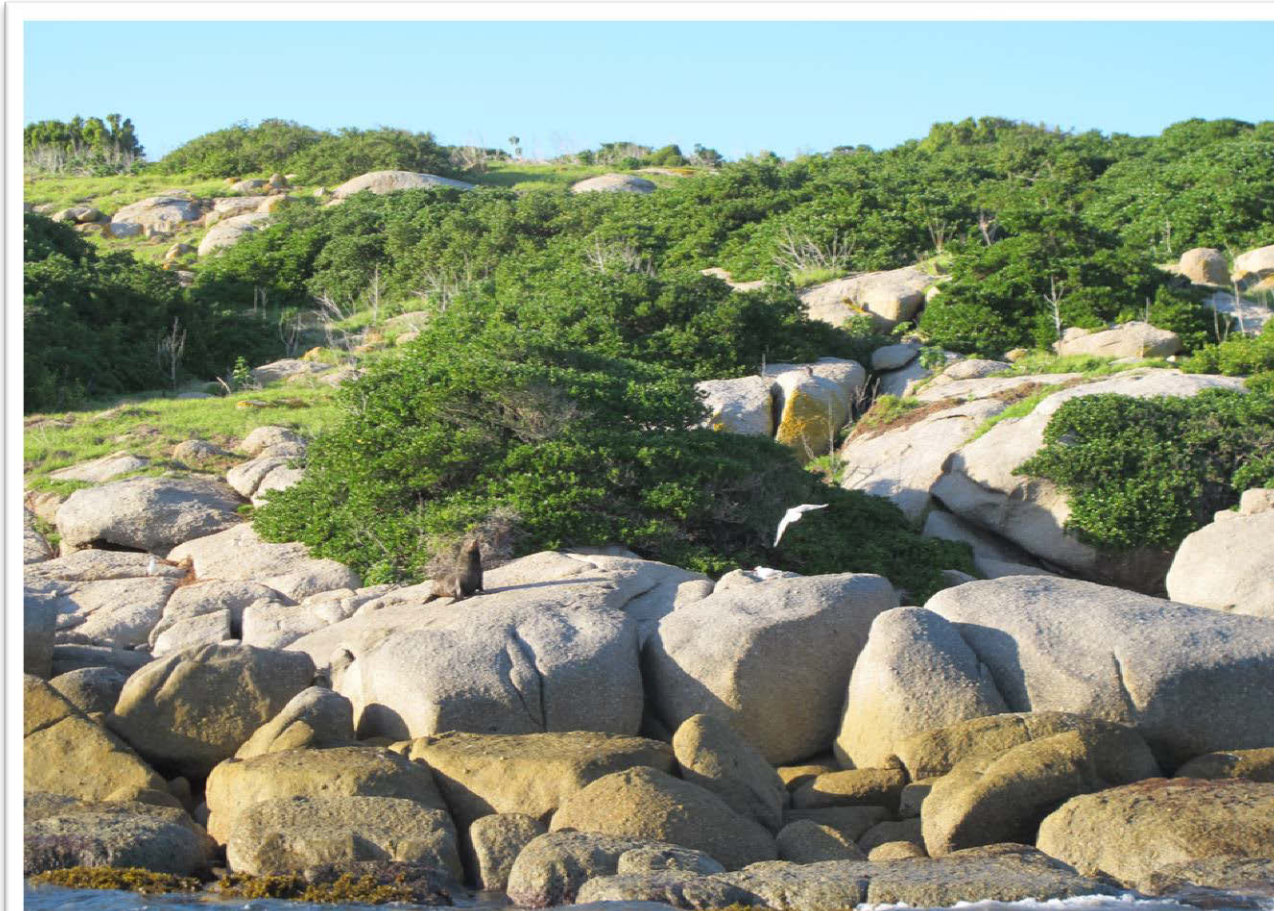
The table below lists the biodiversity management threats/issues for Wright Island, their related objectives, actions already taken to address them, and further actions being proposed.

ISSUE/THREAT	5-Yr Objective	Actions to date – what/ who	Proposed actions- what/ where/how	Priority (H, M, L)	Who responsible
<b>WEEDS</b>					
Boxthorn	Reduce cover to <5% within the priority protection area delineated in Figure 2-1	Contractor – cutting & swabbing; hand-pulling seedlings annually for last 7 years.	<ul style="list-style-type: none"> <li>Establish weed front in sandy areas behind the beach and work outwards from here to other parts of the island</li> <li>Cut &amp; swab or spray mature individuals. Spread out the cut material so it is not left in dense stands. Ideally cut material should be removed from the site. Burning could be considered.</li> <li>Chainsaw may be required for the larger bushes.</li> <li>Hand-pull seedlings.</li> <li>Follow-up control will be required.</li> </ul>	H	Victor Harbor Council / Contractor
New Zealand Mirror-bush	Reduce cover to <5% within the priority protection area delineated in Figure 2-1	Contractor – cutting & swabbing; hand-pulling seedlings annually for last 7 years.	<ul style="list-style-type: none"> <li>Establish weed front in sandy areas behind the beach and work outwards from here to other parts of the island</li> <li>Hand-pull seedlings</li> <li>Cut and swab, drill and fill mature individuals.</li> <li>Follow-up control may be required</li> </ul>	H	Victor Harbor Council / Contractor
Tree Mallow	Reduce cover to <5% within the priority protection area delineated in Figure 2-1	Contractor – cutting & swabbing; hand-pulling seedlings annually for last 7 years.	<ul style="list-style-type: none"> <li>Grub or slash, <b>before seed set.</b></li> </ul>	H	Victor Harbor Council / Contractor
<b>PEST ANIMALS</b>					
Dogs and cats	No dogs or cats on Wright Island		Install appropriate regulatory signage at the back of the landing beach on the north-west side of the island and/or the Victor Harbor (Bluff) boat ramp to inform visitors about the biodiversity values of the island and that dogs and cats should	H	Victor Harbor Council

			not be taken to the island. Consider the introduction of a by-law which prohibits cats and dogs on Wright Island.	M	Victor Harbor Council
Rabbits, foxes and rats	No rabbits, foxes or rats on Wright Island		Continue to monitor for the presence of rabbits, foxes and rats (e.g. live animals, warrens, dung heaps, scratchings, etc.)	M	Victor Harbor Council
<b>REVEGETATION ACTIVITIES</b>					
	Reduce the impact of visitors across the island	-	<ul style="list-style-type: none"> <li>Install appropriate interpretive/regulatory signage at the back of the landing beach on the north-west side of the island to inform/educate visitors about the biodiversity values of the Island and the regulations that apply.</li> <li>Consider prohibiting visitors to the island during tern nesting times.</li> <li>Consider fencing off or placing temporary rope fencing and signage around tern nesting area at the back of the beach</li> </ul>	H  M  M or H?	Victor Harbor Council  Victor Harbor Council Victor Harbor Council/NRAMLR
<b>REVEGETATION</b>					
	Provide self-sustaining native shrubland habitat		Commence revegetation works as appropriate, in close conjunction with weed control, with densities and species appropriate for the habitat type. See revegetation species list in Table 2-6.	M	Victor Harbor Council
<b>SEABIRD NESTING SITES</b>					
Decoys	Investigate the use of decoys to attract bird species such as terns to nest	-	Establish a trial area, for example within the priority weed control area (Figure 3-1). Fence off and sign to exclude people . Place decoys within the exclusion area (bird models and/or nests). Monitor during tern breeding season.	L	NRAMLR
<b>MONITORING</b>					
	Monitor progress and success of management activities undertaken	BushRat assessment undertaken in 2015.	Repeat BushRat assessment and photopoint to monitor vegetation condition and levels of weed infestations	L	NR AMLR
			Record details of works as they are undertaken (ensure contractors do the same) - Use works record sheets (Appendix 5)	M	NR AMLR
		Current and prior surveys	Conduct annual surveys of seabird nesting and breeding	M	NR AMLR



## SECTION 3: WEST ISLAND



## 1. HISTORY

Both West Island and Seal Island are part of the mythology of the Ngarrindjeri people, who would have visited the islands to fish, hunt sea-birds and collect eggs, although few details are known<sup>59</sup>.

Granite was quarried on West Island in the late nineteenth century, some of which was used for the foundations of Parliament House in Adelaide. Two stone huts were built during this period on the northern side of the island, one of which was re-furbished in the 1960's for use by the South Australian Museum as a marine ecology research base. A landing jetty was also constructed at this time<sup>60</sup>.

Rabbits were introduced to West Island in the 1840's and were used by fishermen, along with Little Penguins, for crayfish bait<sup>61</sup>. Goats were introduced in the early 20<sup>th</sup> century but died out. Introductions of Pearson Island Rock Wallabies (*Petrogale lateralis pearsoni*), Tammar Wallabies (*Macropus eugenii*) and Greater Stick nest Rats (*Leporillus conditor*) were also unsuccessful<sup>62</sup>.

In 1960 it was reported that the island was almost completely bare of natural plants<sup>63</sup>. By 1971 all rabbits had been removed and tree planting was undertaken, including Drooping Sheoak (*Allocasuarina verticillata*). A small colony of Pearson Island Rock-wallabies (*Petrogale lateralis pearsoni*) were released on West Island in the 1970's, however there is no evidence of these animals today.

Until about 1964, Army units stationed at Waitpinga used West Island for artillery practice, sometimes causing fires. Between 1964 and 1975 banding studies of Silver Gulls and terns were conducted on West Island and the University of Adelaide has leased a section of the island for the past 10-15 years and conducts research into terrestrial and marine ecology<sup>64</sup>.

In 1966 many of South Australia's off-shore islands (including West Island) were proclaimed as fauna reserves to protect their habitat values. With the introduction of the *National Parks & Wildlife Act* in 1972 West Island was re-proclaimed as a conservation park<sup>65</sup>.

## 2. CURRENT MANAGEMENT

West Island Conservation Park comprises both West Island and Seal Island and is under the care and control of DEWNR. Since 2012, the waters surrounding its shores are located within the boundaries of the Encounter Marine Park.

Volunteers undertake weed control annually, in tandem with DEWNR staff, at organised working bee's on West Island. Contracted weed control is also undertaken by NR AMLR.

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<sup>59</sup> DEP, 1983.

<sup>60</sup> DEP, 1983.

<sup>61</sup> Paton, JB & Paton, DC 1977a.

<sup>62</sup> Robinson et al, 1996.

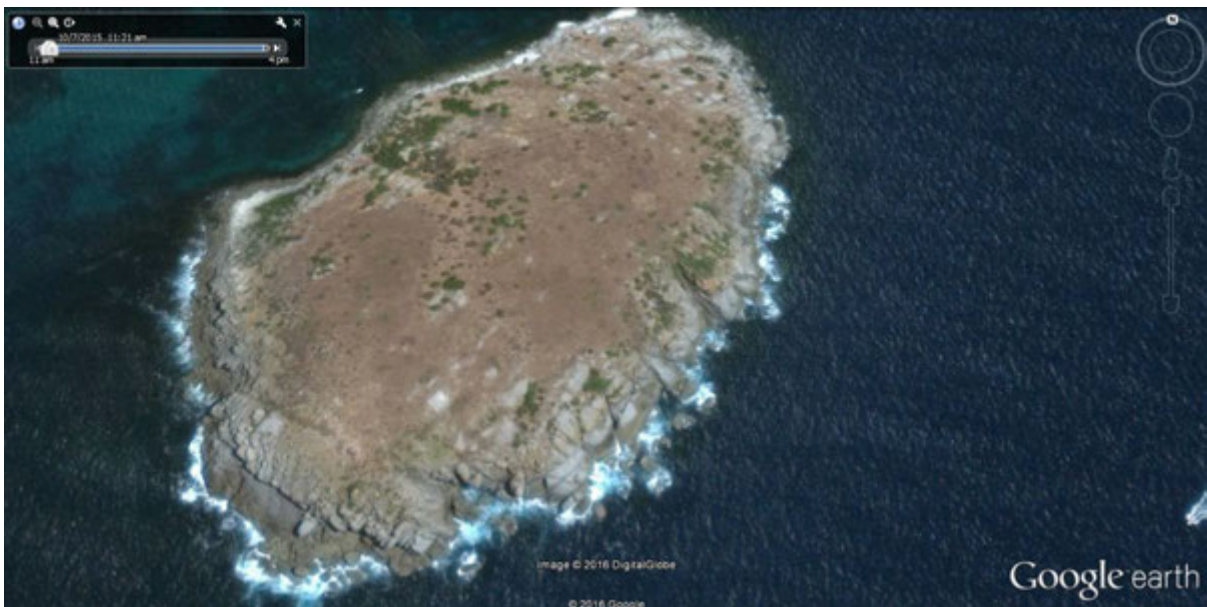
<sup>63</sup> Lothian, N. 1960.

<sup>64</sup> DEH, 2008.

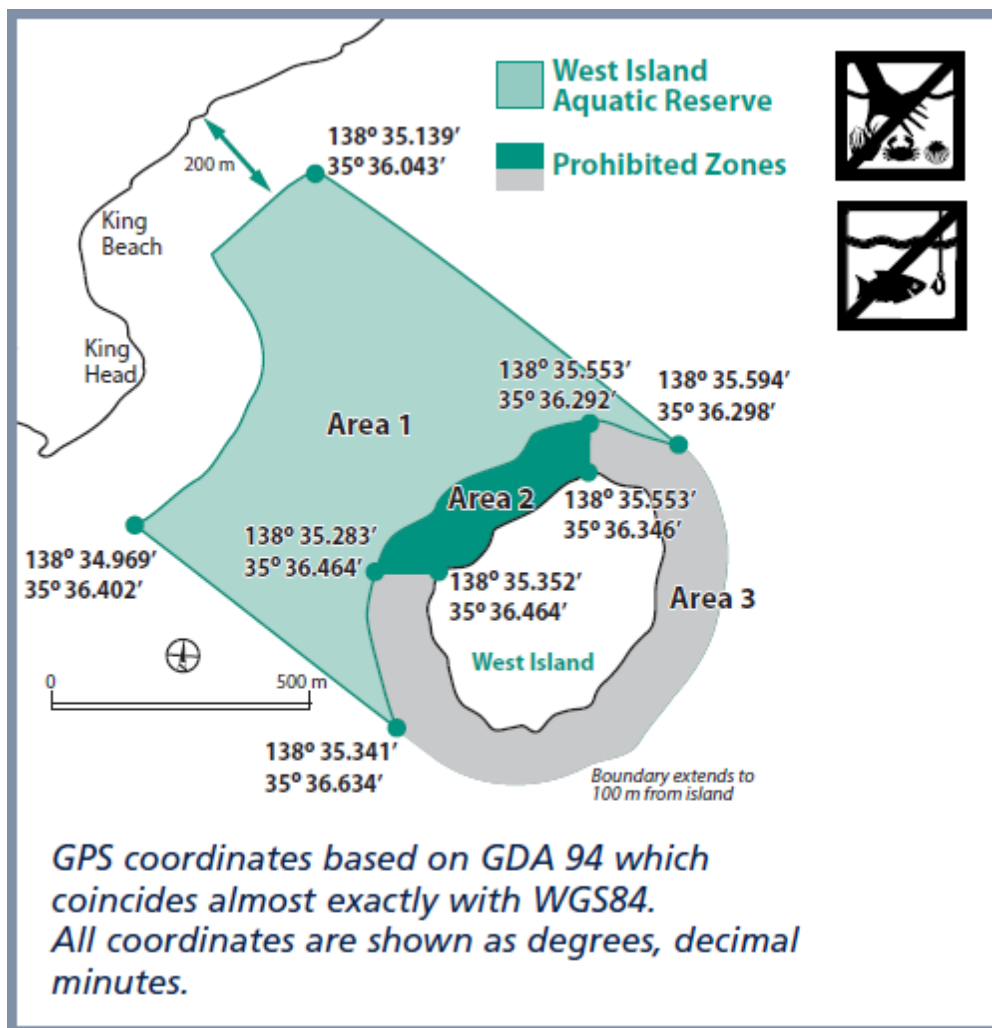
<sup>65</sup> DEP, 1983.



Aerial shot of West Island in 1949



Aerial shot of West Island in 2016



West Island Aquatic Reserve is zoned into two areas – Area 1, and Area 2 (the prohibited zone). In Area 1, diving, swimming and fishing with rod and line or handline are permitted. All public access to Area 2 is prohibited. Fishing and collecting or removing marine organisms from Area 3 is also prohibited.

### 3. ENVIRONMENTAL ASSETS

#### 3.1 Landform and soils

West Island is comprised of Victor Harbor granite and rises 40 metres above sea level. The central part of the island is relatively flat with shallow soil and large areas of exposed granite. Steep cliffs and large angular boulders occur around the coastline. Several gullies on the north-western coastline have deeper soils and some protection from strong winds and salt spray.

#### 3.2 Native vegetation

The following vegetation communities were recorded as part of the Bushland Rapid Assessment Technique (BushRat)<sup>66</sup> assessment undertaken in 2015 (see Figure 3-1).

<sup>66</sup> Bushland Rapid Assessment Technique developed by the Native Vegetation & Biodiversity Management Unit, DEWNR, May 2013.

- The exposed south-western portion of the island supports a Round-leaf Pigface (*Disphyma crassifolium* ssp. *clavellatum*), +/- Ruby Saltbush (*Enchylaena tomentosa* var. *enchylaena*)+/- Bower Spinach (*Teragonia implexicoma*) Low Forbland.
- New Zealand Mirror Bush (*Coprosma repens*) Shrubland occurs mainly around the more exposed rocky perimeters of the island.
- Tree Mallow (*Malva arborea*) Low Shrubland over a range of weedy grasses including *Ehrharta calycina*, *Bromus* spp., *Hordeum marinum* occurs across the flatter top of the island which supports shallow soils.

A full list of native plant species recorded on West Island is included in Appendix 1.



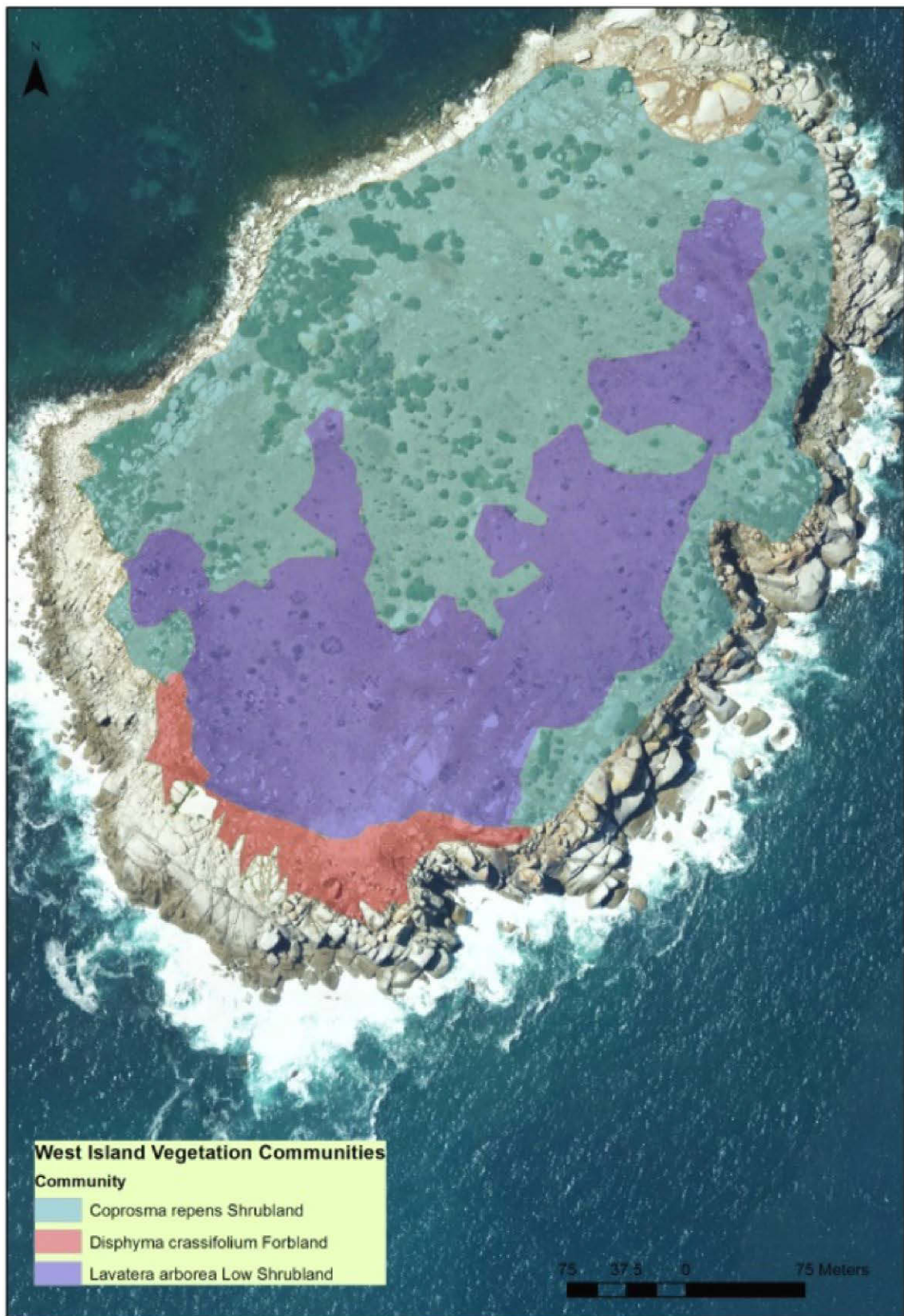


Figure 3-1: West Island Vegetation Communities

### 3.3 Birds

Paton & Paton (1977a) surveyed birds of West Island, with a focus on breeding seabirds. They concluded that West Island had significant breeding colonies of terns. A total of 54 bird species has now been recorded on the island, including 25 during the survey (Table 3-3). Seventeen (17) have either been reported or are suspected to breed there.

Several seabirds have bred on the island (below).

The only pair of White-bellied Sea-Eagles in the region<sup>67</sup> nests on the cliffs at Newland Head and has West Island in its territory. Sea-eagles regularly visit the island to prey on juvenile seabirds or to roost on rocky promontories. Their diet included Little Penguins, whose skins were often found under fencepost roosts on the adjacent mainland<sup>68</sup>.

West Island also supports a significant population of Brown Quail (several groups) which probably established in the mid 2000s. They are widespread across the island, particularly where shrubs such as *Coprosma* provide cover. There is also a small population (at least several birds) of Buff-banded Rails that shelter under the cover of Tree Mallow in winter. Both presumably breed on the island.

Also significant at the regional level is breeding by Sooty Oystercatchers and likely Eastern Reef Egret. The presence of Rock Parrots during summer-autumn also indicates that the island is important for the dispersal of coastal land birds.

#### Little Penguin

Casual visitors to West Island observed large numbers of Little Penguin in the late 1920s<sup>69</sup>. Paton & Paton (1977a) recorded many nests and Brandle (in Copley 1996) estimated 2000 pairs. Numbers declined after the late 1990s with 240 in 2006, 5 in 2013<sup>70</sup> and none in the current survey, indicating a greater decline in numbers than on Granite Island.

#### Silver Gull

Silver Gulls were reported nesting on West Island as far back as 1932 (a few nests)<sup>71</sup>. Many nests were reported in October 1950<sup>72</sup> and in the 1970s<sup>73</sup>. The establishment of a refuse dump in a gully (known locally as Big Gully) opposite West Island in the 1970's provided a reliable and constant source of food to Silver Gulls. During this period 1000-2000 pairs nested each spring-summer<sup>74</sup>. At the same time, and possibly as a result, the woody ephemeral, Tree Mallow (*Malva arborea*) colonised much of the island<sup>75</sup>.

Following the dump's closure in 2012 numbers of Silver Gulls have been much reduced, with only 100 birds seen (not breeding) during the current survey.

#### Pacific Gull

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<sup>67</sup> Dennis *et al* 2011.

<sup>68</sup> G. Carpenter pers. obs.

<sup>69</sup> Anon 1927, Mengersen in Anon. 1929.

<sup>70</sup> Colombelli-Negrel & Kleindorfer 2014.

<sup>71</sup> Paton & Paton 1977.

<sup>72</sup> Anon 1950.

<sup>73</sup> Paton & Paton 1977a, Ottaway *et al* 1988.

<sup>74</sup> Peacock 1989, Copley 1996.

<sup>75</sup> Peacock 1989, Zed *et al* 2006.

Pacific Gulls were reported nesting in November 1988<sup>76</sup>, December 1994<sup>77</sup> and February 2004<sup>78</sup>. T. Croft observed about 15 adults and a few juveniles during the December 2015 survey.

### Caspian Tern

Paton & Paton (1977a) reported up to 200 nests during the period 1964-76, and up to 50 nests to 1984<sup>79</sup>. No breeding was reported in the late 1980s and 1990s. Peacock (1989) reported that Tree Mallow (and to a lesser extent African Boxthorn *Lycium ferrocissimum*) had smothered much of the island, including the open area at the top (southern end) of the island used for nesting by Caspian Terns<sup>80</sup>. He recommended that woody weeds be controlled, particularly in the tern breeding areas. A few pairs were displaying over the island in September 2003<sup>81</sup> and subsequently W. Syson (pers. obs.) reported 50 nests in January 2011. About 100 nests were reported in September 2012<sup>82</sup>. Two pairs were seen during the December 2015 survey and suspected to have young, but were not located.

### Crested Tern

Crested Terns were recorded breeding on West Island after 1968, with up to 2000 nests from 1969 – 1994<sup>83</sup>. Peacock (1989) reported that Tree Mallow (and to a lesser extent Africa Boxthorn *Lycium ferrocissimum*) had smothered much of the island, including an open area at the northern end of the island used for nesting. About 300 nests were subsequently reported in January 2011<sup>84</sup>. Small numbers (up to 50) were roosting near the landing during the current survey, with no evidence of breeding.

Nesting areas on West Island have been reduced by the spread of woody weeds. It is possible that Crested Terns may now alternate between islands depending on local conditions (e.g. nesting on Pullen but not West or Wright during the survey) but more regular and comprehensive surveys are needed.

### Fairy Tern

Fairy Terns bred irregularly on West Island from 1932 to 1976, with up to 80 pairs<sup>85</sup>. The colony was located in an open area immediately south of the Caspian Terns at the southern end of the island. No breeding has been reported since.

**Table 3-1: Birds species reported from West Island**

Common name	Species	#Record	Breeding	Comments	Reference
*Common Starling	<i>Sturnus vulgaris</i>	s	yes	up to 100	
*Rock Dove	<i>Columba livia</i>	s	yes	Upt to 100 nests	
*Skylark	<i>Alauda arvensis</i>	x		2 in Feb 1982	2
Arctic Jaeger	<i>Stercorarius parasiticus</i>	x		up to 3 flying past,	1

<sup>76</sup> Paton in Carpenter *et al.* 2003.

<sup>77</sup> D. Kraehenbuehl, pers. comm.

<sup>78</sup> NPWS data.

<sup>79</sup> in Copley 1996.

<sup>80</sup> Figure 1, from Peacock 1989.

<sup>81</sup> G. Carpenter pers obs.

<sup>82</sup> NPWS data.

<sup>83</sup> Paton & Paton 1977a, Copley 1996, D. Kraehenbuehl, pers. comm.

<sup>84</sup> W. Syson pers. comm.

<sup>85</sup> Paton & Paton 1977a.

Common name	Species	#Record	Breeding	Comments	Reference
				Nov-Dec	
Australasian Gannet	<i>Morus serrator</i>	s		Flying past autumn-winter	
Australasian Pipit	<i>Anthus novaeseelandiae</i>	x	yes	occasional visitor	3
Australian Hobby	<i>Falco longipennis</i>	x		1 in 1976 and Dec 1978	4
Australian Shelduck	<i>Tadorna tadornoides</i>	x		2 in Aug 2010, 15 over Jan 2011	1
Banded Lapwing	<i>Vanellus tricolor</i>	x	yes	pair + young in Sep 2005	4
Black Falcon	<i>Falco subniger</i>	x		NPWS data, no details.	4
Black-browed Albatross	<i>Thalassarche melanophris</i>	x		Small nos flying past, winter	1
Black-faced Cormorant	<i>Phalacrocorax fuscescens</i>	s		Up to 10	
Brown Falcon	<i>Falco berigora</i>	s		1 in Jun 2015	
Brown Quail	<i>Coturnix ypsilophora</i>	s	Probable	1st reported 2012, sev gps up to 50 birds	5
Buff-banded Rail	<i>Gallirallus philippensis</i>	s	Probable	1st reported 1988 (in Tree Mallow), several since	6
Cape Barren Goose	<i>Cereopsis novaehollandiae</i>	x		1 in Sep 2005	4
Cape Petrel	<i>Daption capense</i>	x		1 flying past Sep 1967	7
Caspian Tern	<i>Hydroprogne caspia</i>	s	yes	up to 200 nests, c. 10 nests in Dec 2015	8
Crested Tern	<i>Thalasseus bergii</i>	s	yes	up to 2000 nests, none in 2015	8
Eastern Reef Egret	<i>Egretta sacra</i>	x	Probable	Pair regular visitors	
Elegant Parrot	<i>Neophema elegans</i>	x		15 in May 2004	9
Fairy Tern	<i>Sternula nereis</i>	x	yes	up to 80 nests in 1970s, none in 2015	3
Fan-tailed Cuckoo	<i>Cacomantis flabelliformis</i>	s		1 in Jun 2015	
Fork-tailed Swift	<i>Apus pacificus</i>	x		NPWS data, no details.	4
Great Cormorant	<i>Phalacrocorax carbo</i>	x		1 or 2 regular visitors, N side	
Little Black Cormorant	<i>Phalacrocorax sulcirostris</i>	s		1 in Dec 2015	
Little Corella	<i>Cacatua sanguinea</i>	x		100 visited Aug 2011	1
Little Penguin	<i>Eudyptula minor</i>	s		1000 in Feb 1927, up to 2000 nests in 1990s, 1 corpse (skin) Jun 2015	10
Little Pied Cormorant	<i>Microcarbo melanoleucos</i>	s		Up to 50 roosting on N side	
Little Raven	<i>Corvus mellori</i>	x	Probable	occasional visitor	
Masked Lapwing	<i>Vanellus miles</i>	s	Probable	occasional visitor	
Mistletoebird	<i>Dicaeum hirundinaceum</i>	s		1 in Jun 2015	
Musk Duck	<i>Biziura lobata</i>	x		1 offshore Oct 2000	1
Nankeen Kestrel	<i>Falco cenchroides</i>	s		Pair in Jun 1982, 1 in Dec 2015	4
Pacific Black Duck	<i>Anas superciliosa</i>	x	yes	pr + young Sep 2005	4
Pacific Gull	<i>Larus pacificus</i>	s	yes	few nests incl 2015	3

Common name	Species	#Record	Breeding	Comments	Reference
Peregrine Falcon	<i>Falco peregrinus</i>	x		1 or 2 occasional visitors	
Pied Cormorant	<i>Phalacrocorax varius</i>	s		1 in Dec 2015	
Pomarine Jaeger	<i>Stercorarius pomarinus</i>	x		1 flying past, May 1999	1
Rock Parrot	<i>Neophema petrophila</i>	s		1 collected Jan 1932, several Dec-June	11
Short-tailed Shearwater	<i>Ardenna tenuirostris</i>	x		1 offshore Dec 1994	12
Shy Albatross	<i>Diomedea cauta</i>	x		Small nos flying past, winter	1
Silver Gull	<i>Chroicocephalus novaehollandiae</i>	s	yes	up to 2500 nests, 100 in Dec 2015	8
Silvereye	<i>Zosterops lateralis</i>	s		15 in Tree Mallows Jun 2015	
Singing Honeyeater	<i>Lichenostomus virescens</i>	s	yes	up to 20	6
Sooty Oystercatcher	<i>Haematopus fuliginosus</i>	x	yes	1-2 pairs regular visitors	3
Southern Giant Petrel	<i>Macronectes giganteus</i>	x		Up to 3 flying past, winter 1983	1
Spiny-cheeked Honeyeater	<i>Acanthagenys rufogularis</i>	s		1 in Coprosma Jun 2015	
Swamp Harrier	<i>Circus approximans</i>	x		1 in Dec 1997 and Mar 2013	1
Tawny-crowned Honeyeater	<i>Gliciphila melanops</i>	s		2 in Tree Mallows Jun 2015	
Wedge-tailed Eagle	<i>Aquila audax</i>	x		1 chased by sea-eagle, May 2015	13
White-bellied Sea-eagle	<i>Haliaeetus leucogaster</i>	s		1 or 2 regular visitors	14
White-faced Heron	<i>Egretta novaehollandiae</i>	x		1 in Dec 1978	15
White-fronted Tern	<i>Sterna striata</i>	x		1 dead, Aug 1968	16
<b>#Record</b> S Present survey; X Previous survey <b>#Reference</b> 1 - Carpenter pers obs; 2 - Paton 1982; 3 - Paton & Paton 1977; 4 - NPWS unpublished; 5 - Iwao 2012; 6 - Peacock 1988; 7 - Paton 1967; 8 - Paton & Paton 1977, Copley 1996; 9 - Syson 2004; 10 - Anon 1927, Paton & Paton 1977, Copley 1996, Collombelli & Kleindorfer 2014; 11 - Paton & Paton 1977, Iwao 2012; 12 - Kraehenbuehl pers obs; 13 - Elizabeth Steele-Collins pers obs; 14 - Lendon 1972; 15 - NPWS 1983; 16 - Paton 1968					

### 3.4 Reptiles

Table 3-3 shows the reptile species that have been recorded on West Island. The Island has been a site for research on reptiles, and so it is considered likely that this list incorporates all of the species that are present on the island.

Table 3-3: Reptile species observed and/or likely to be utilising West Island for habitat

Scientific Name	Common Name	Recorded 2015	Previous records	Comments <sup>86</sup>
<i>Christinus marmoratus</i>	Marbled Gecko	Yes	Yes	
<i>Egernia cunninghamii</i>	Cunningham's Skink	Yes	Yes	Endangered under the

<sup>86</sup> Dr Tim Milne, Herpetologist

Scientific Name	Common Name	Recorded 2015	Previous records	Comments <sup>86</sup>
				Schedules of the National Parks and Wildlife Act.
<i>Liopholis whitii</i>	White's Skink		Yes	
<i>Hemiergis peroni</i>	Four-toed Earless Skink	Yes	Yes	



Cunningham's Skink (*Egernia cunninghamii*), West Island



Marbled Gecko (*Christinus marmoratus*), West Island

Cunningham's Skink (*Egernia cunninghamii*) is considered to be Endangered in South Australia under the Schedules of the National Parks and Wildlife Act. This species is found in high densities on West Island (368 adults/subadults per hectare) and is extremely common in the rockier habitats, but the population is obviously limited by the relatively small size of the Island. The species was not known from the adjacent mainland until recently observed in Newland Head Conservation Park<sup>87</sup>. Much of its diet consists of fruits and seeds, but arthropods and small vertebrates are also eaten. Juveniles feed predominantly on insects and other invertebrates, but the proportion of plant material increases over time with adults being almost entirely herbivorous. The ongoing availability of suitable dietary plant material is likely to be important for the species' ongoing survival on West Island.

### 3.4 Mammals

The following table includes a list of all mammals which have been recorded or are likely to occur on West Island.

Table 3-4: Mammal species known or likely to occur on West Island or in immediate surrounding waters

Scientific Name	Common Name	2015	Previous surveys	Rating		Comments
				AUS	SA	
<b>Marine Mammals</b>						
<i>Arctocephalus forsteri</i>	Long-nosed Fur Seal		✓		R	

<sup>87</sup> Seiji Iwao, pers. comm. 2015.

<i>Delphinus delphis</i>	Short-beaked Common Dolphin		✓			
<i>Eubalaena australis</i>	Southern Right Whale		✓		V	
<i>Globicephala macrorhynchus</i>	Long-finned Pilot Whale		✓			
<i>Megaptera novaeangliae</i>	Humpback Whale		✓	V	V	
<i>Neopheca cinerea</i>	Australian Sea-lion		✓			
<i>Tursiops aduncus</i>	Indo-Pacific Bottlenose Dolphin					
Terrestrial Mammals						
* <i>Mus musculus</i>	House Mouse		✓			
* <i>Oryctolagus cuniculus</i>	European Rabbit		✓			
+ <i>Petrogale lateralis pearsoni</i>	Black-footed Rock-wallaby		✓			

#Conservation rating codes: EX = Extinct, CE = Critically Endangered, E = Endangered, V = Vulnerable, R = Rare, NT = Near Threatened

\*denotes introduced/pest species

+denotes introduced/translocated species – now extinct on West Island

## 4. THREATS (MANAGEMENT ISSUES)

Threats to the biodiversity values of West Island include:

- Weed invasion
- Predation by pest animals
- Recreation activities with visitors potentially disturbing nesting seabirds and/or trampling eggs, however access to the vessel landing area is restricted by an Aquatic Reserve prohibited zone.

### 4.1 Invasive weeds

The diversity and structure of the native vegetation communities on West Island have been modified considerably over the last 150 years, due in part to grazing pressure caused by large numbers of rabbits in the past. Weeds of concern which threaten the current native vegetation communities on the island are included in Table 3-5. A full list of weeds recorded is included in Appendix 1.

Table 3-5: List of weeds of concern, West Island

Species	Common Name	<sup>88</sup> Declared	<sup>89</sup> WONS	<sup>90</sup> SFCAP Threat Level	<sup>91</sup> Weed invasiveness ranking
* <i>Arctotheca calendula</i>	Capeweed			1	2
* <i>Asparagus asparagoides</i>	Bridal Creeper	Y	Y	9	5
* <i>Atriplex prostrata</i>	Creeping Saltbush			1	2
* <i>Avena barbata</i>	Wild Oat			1	2
* <i>Bromus spp.</i>	Brome			1	1

<sup>88</sup>Biosecurity SA Weeds and Pest Animals. Declared plants in South Australia, October 2012

[http://www.pir.sa.gov.au/biosecuritysa/nrm\\_biosecurity/weeds/declared\\_plants\\_in\\_south\\_australia\\_october\\_2012](http://www.pir.sa.gov.au/biosecuritysa/nrm_biosecurity/weeds/declared_plants_in_south_australia_october_2012)

<sup>89</sup> Australian Weeds Committee (2012), Weeds of National Significance 2012. Department of Agriculture, Fisheries and Forestry, Canberra, ACT <http://www.weeds.org.au/WONS/>

<sup>90</sup> Caton, et al 2007. Southern Fleurieu Coastal Action Plan and Conservation Priority Study, AMLR Natural Resources Management Board

<sup>91</sup> Refer to Native Vegetation & Biodiversity Management Unit *BushRat Manual for native vegetation*, May 2013.

Species	Common Name	<sup>88</sup> Declared	<sup>89</sup> WONS	<sup>90</sup> SFCAP Threat Level	<sup>91</sup> Weed invasiveness ranking
<i>*Cenchrus clandestinus</i>				2	3
<i>*Chenopodium album</i>	Fat Hen			1	1
<i>*Coprosmma repens</i>	New Zealand Mirror-bush			4	3
<i>*Cynodon dactylon</i>	Couch			3	2
<i>*Echium plantagineum</i>	Salvation Jane			2	2
<i>*Ehrharta longiflora</i>	Annual Veldt Grass			2	2
<i>*Galenia pubescens</i>	Coastal Galenia			3	2
<i>*Lagurus ovatus</i>	Hare's Tail Grass			2	2
<i>*Leptospermum laevigatum</i>	Coastal Tea-tree			6	3
<i>*Lolium rigidum</i>	Rye Grass			1	1
<i>*Lycium ferocissium</i>	African Boxthorn	Y	Y	7	3
<i>*Malva arborea</i>	Tree Mallow			3	-
<i>*Oxalis pes-caprae</i>	Soursob	Y		5	4
<i>Pennisetum clandestinum</i>	kikuyu grass			2	3
<i>*Plantago coronopus</i>	Buck's-horn Plantain			3	2
<i>*Reichardia tingitana</i>	False Sowthistle			3	2
<i>*Rhamnus alaternus</i>	Blowfly Bush			6	3
<i>*Sonchus oleraceus</i>	Sow-thistle			1	1
<i>*Trifolium sp.</i>	Clover			1	2

**SFCAP Threat Levels:** The threat value allocation process undertaken as part of the Southern Fleurieu Coastal Action Plan identified a total of 85 priority environmental weeds for the Southern Fleurieu coastal region, each featuring a weed threat value between 1 & 9.

**Red Alert Weed Categories:**

- 1 – Generally only invade disturbed bushland. Often widespread and abundant but not considered a significant threat to native biodiversity, unless present at very high densities.
- 2 - Generally only invade disturbed bushland, but may spread rapidly. However, generally only a slight potential to reduce native species diversity, unless present at very high densities.
- 3 – Invasive in intact bushland with moderate potential to reduce native species diversity. Rate of spread is slower than Category 4 and 5 weeds but once present will persist and threaten biodiversity. May produce dense stands over a wide area but can be controlled with sustained effort.
- 4 – Highly invasive in either disturbed or intact remnant bushland, with the potential to spread rapidly and produce very dense stands given favourable habitat and/or vectors. High potential to reduce native species diversity and abundance. Can be controlled with sustained effort.
- 5 – Highly invasive in either disturbed or intact bushland, spreads rapidly producing very dense stands and a blanket cover. Potential to eliminate almost all native understorey species. Very difficult to control without outside help.

## 4.2 Pest animals

### European Starlings and Rock Doves

Large numbers of introduced European Starlings and Rock Doves breed and or roost on the islands. There is concern that Rock Doves (*\*Columba livia*) outcompete Little Penguins for nests on West Island<sup>92</sup>, however it is not clear if the use of penguin nests by pigeons is a cause or a consequence of declining population trends<sup>93</sup>.

Starlings are known vectors of Boxthorn seed, a significant weed on West Island.

<sup>92</sup> Paton and Paton 1977a, DEP 1983.

<sup>93</sup> Wiebkin 2011.



Control of these species is difficult and may be achieved indirectly by eradicating invasive woody plants.

### **Rabbits**

Rabbits were completely eradicated from West Island by 1971 (DEP 1983) and are not considered to be an issue, although ongoing monitoring is recommended.

## **4.3 Visitors**

West Island is difficult to access due to its steep, rocky and high energy coastline. There is a landing jetty, however it has a padlocked gate which prohibits all but managers, weed control contractors and researchers from gaining access. Access to the vessel landing area is restricted by an Aquatic Reserve prohibited zone. Therefore, if visits are timed to avoid sea bird nesting seasons, and visitors take care when undertaking weed control, research activities etc, then human activity on the island should not be a major issue.

## **5. BIODIVERSITY MANAGEMENT STRATEGIES**

### **5.1 Biodiversity management objectives**

The biodiversity management objectives for West Island are to manage the native vegetation of each island in such a manner as to:

- Prevent any further loss of biodiversity; and
- Strengthen the long term viability of the existing biodiversity assets, in particular as they provide habitat and resources for sea birds.

In order to monitor whether these objectives are being met, the Bushland Rapid Assessment Technique (BushRAT) was used as part of this project. This methodology, which has been developed by the Native Vegetation Management Unit (SA Dept Environment, Water & Natural Resources), gathers data on bushland condition, including native species diversity, native plant life forms, regeneration, tree health, hollows, fallen timber, weed abundance and threat, grazing pressure, etc. BushRAT assessment results for West Island are summarised in Appendix 3.

### **5.2 Management units**

To facilitate the ongoing management of threats to biodiversity on West Island (most notably weed control and revegetation), the island has been divided into management units. Delineation of management units or zones is based largely on topography, the type of vegetation present and the condition of the vegetation. The management units are delineated in Figure 3-2 and described below.

**Management Unit 1** – includes the areas favoured by Caspian and Crested Terns for nesting. This part of the island has been a focus of weed control, in particular Tree Mallow, for a number of years now and is therefore a high priority focus area.

**Management Unit 2** – includes areas of moderately dense Tree Mallow on the more central upland areas of the island.

**Management Unit 3** – includes the areas dominated by moderately dense Mirror Bush Shrubland.

**Management Unit 4** – highly degraded areas dominated by **dense** Mirror Bush which occur on steep rocky slopes around the perimeter of the island and in the gully on the northern side. Weed control and revegetation are not considered to be a viable option in these areas due to the amount of time and money resources which would be needed to tackle them.

### 5.3 Managing weeds

The present vegetation patterns on West Island appear to be the result of several long-term impacts, including high levels of rabbit grazing which has created extensive areas of introduced grassland in sheltered, less saline areas. With the removal of rabbits, Tree Mallow has been able to become established on the island and form moderate to dense stands. These impacts have affected the distribution of birds nesting on the island. Sea birds such as Caspian Terns, Crested Terns, Fairy Terns and Silver Gulls all prefer the more open areas, with Little Penguins and terns also favouring the cover afforded by the low spreading shrubs of the forbland at the western end of the island.

Silver Gulls appear to prefer to nest in and around the fringes of the Tree Mallow thickets where there is protection and shelter from the weather<sup>94</sup>. The present higher breeding success of Silver Gulls is therefore aided by the Tree Mallow, and this puts added pressure on the recruitment of other sea birds<sup>95</sup>.

Weeds which are currently a focus for control on West Island include Boxthorn, Tree Mallow and Kikuyu. DEWNR currently runs an annual Tree Mallow control program on West Island<sup>96</sup> and areas have been slashed with the aim being to promote nesting areas for terns. The ongoing control of Tree Mallow is therefore a high priority, particularly within traditional nesting sites, as shown in Figure 3-3 to ensure that further habitat for both open ground and sheltered low shrub associated birds is not lost.

Graslan (herbicide granules) was successfully used to control Boxthorn on West Island in the winter of 2015. Fifty percent of the plants were targeted to reduce any sudden impacts on habitat change. However, native trees and shrubs are very susceptible to residual herbicides such as Graslan and this method is best suited for use away from non-target trees and shrubs, native vegetation or waterways. It is not suitable for use in environmentally sensitive areas, or where revegetation is planned<sup>97</sup>.

Kikuyu control has also been undertaken on West Island. Studies interstate<sup>98</sup> indicate that it can have a significant impact on burrow nesting seabirds such as penguins and shearwaters. Impacts are known to occur to breeding Little Penguins by restricting access to their nesting burrows and birds can become fatally entangled when they try to enter the burrow.

On Montague Island, off the New South Wales coast, targeted removal of Kikuyu has been undertaken by using spraying, intensively managed burns, and replacement with native species. Research indicates regular spraying and burning of the previously sprayed Kikuyu Grass removed the

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<sup>94</sup> DEH, 2008.

<sup>95</sup> Zed et al, 2006.

<sup>96</sup> S. Iwao, pers. comm., 2015.

<sup>97</sup> Noble, MR 2013.

<sup>98</sup> Department of Environment and Climate Change NSW, 2008. Kirkwood, J. and O'Connor, J., 2010.

thick biomass mat and hence removed the threat of seabird entanglement. Winter spraying with Glyphosate was the only method of killing Kikuyu systemically, ensuring penetration into, and death, of the grass's extensive root system.

Burning after spraying removed the thick biomass of dead sprayed Kikuyu, eliminating the threat of entanglement for Little Penguins. Revegetation ensured suitable native plant species to provide cover and protection to nesting Little Penguins and increased competition to minimise regrowth of Kikuyu and other weed species. Revegetation with native species was a key component to the successful control of Kikuyu regrowth.

However, the risks and resource requirements increase when fire is used for weed control on offshore islands. On Montague Island, the use of fire is restricted to only accessible dense Kikuyu grass areas. Burning must be carefully managed to minimise impacts to seabirds and other species. The use of burning may not be suitable on Fleurieu islands due to restricted access and logistical restraints.

Control of pest plants on West Island must also have consideration for the food plants of the State Endangered Cunningham's Skink<sup>99</sup> which eats the berries of the New Zealand Mirror-bush. These weedy bushes should be replaced by similar native species which are likely to provide a source of food for Cunningham's Skink.

There are also several Canary Island Pines towards the more northern end of the island which should be removed before they spread any further (see Figure 3-3).

The Action Plan in Section 7 provides specific weed control measures in each management unit.

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<sup>99</sup> DEH, 2008.

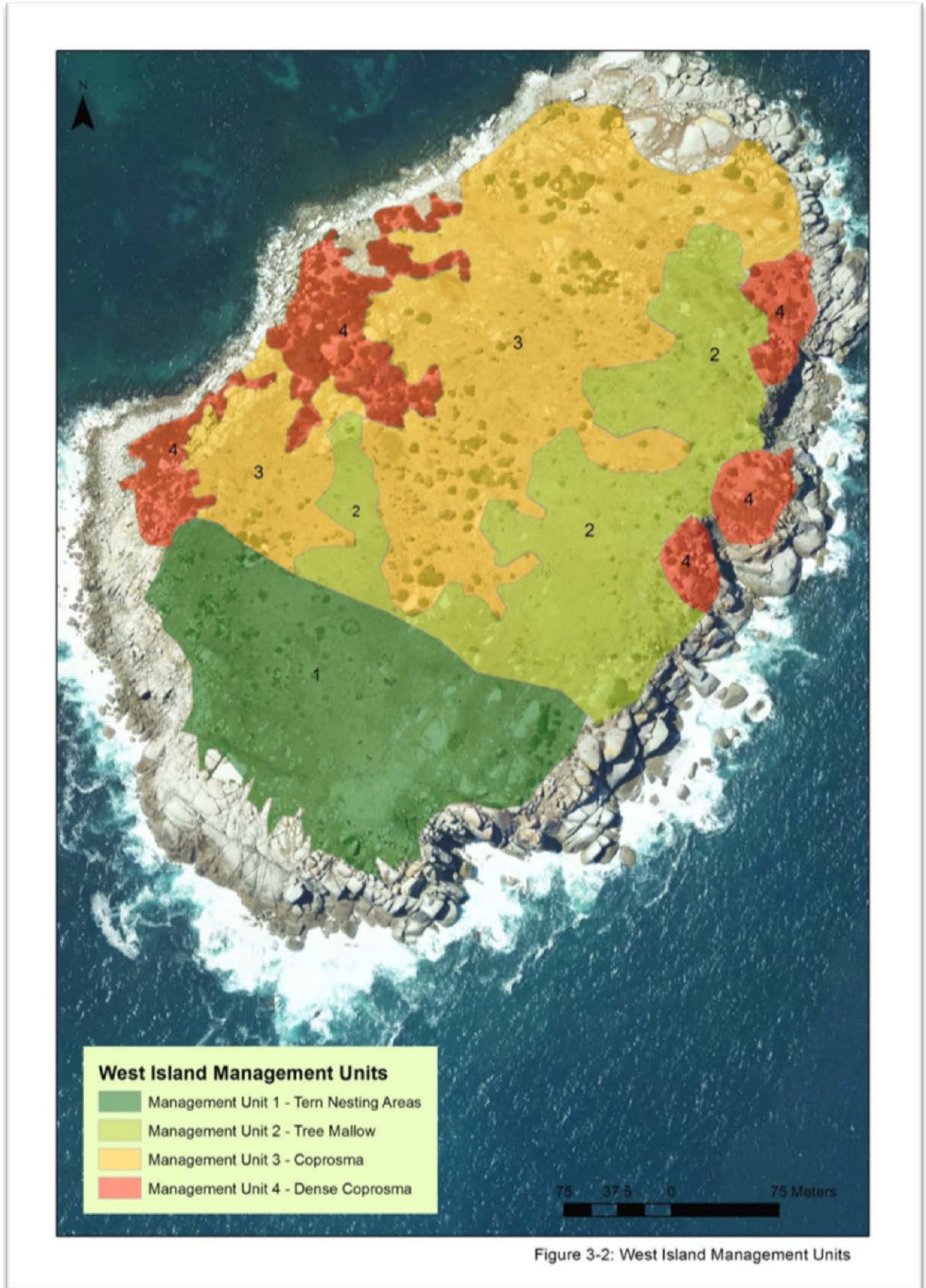


Figure 3-2: West Island Management Units

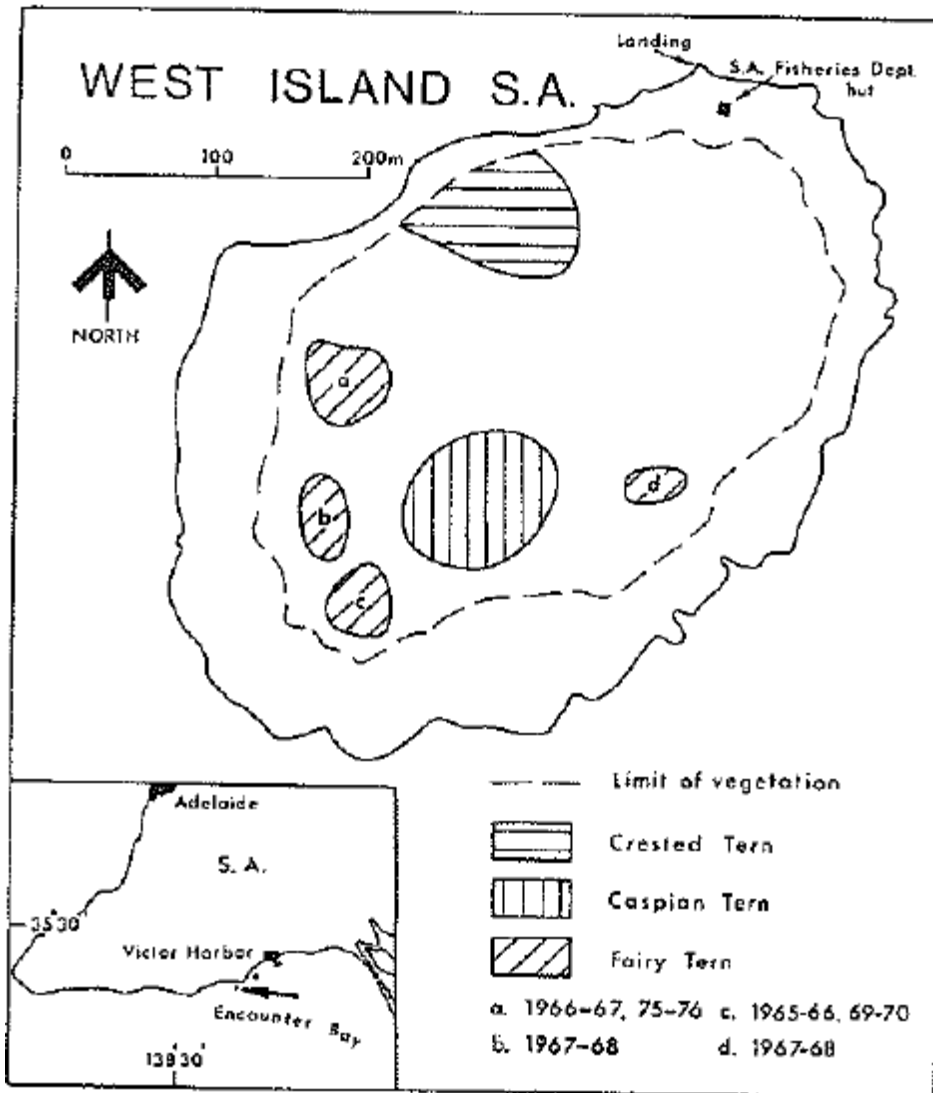


Figure 3-3: 'Traditional' tern nesting areas, West Island (from Paton, J. B. & Paton, D. C. (1977b). Seabird islands, No. 52; Wright Island, South Australia. *Corella* 1, 68-69)

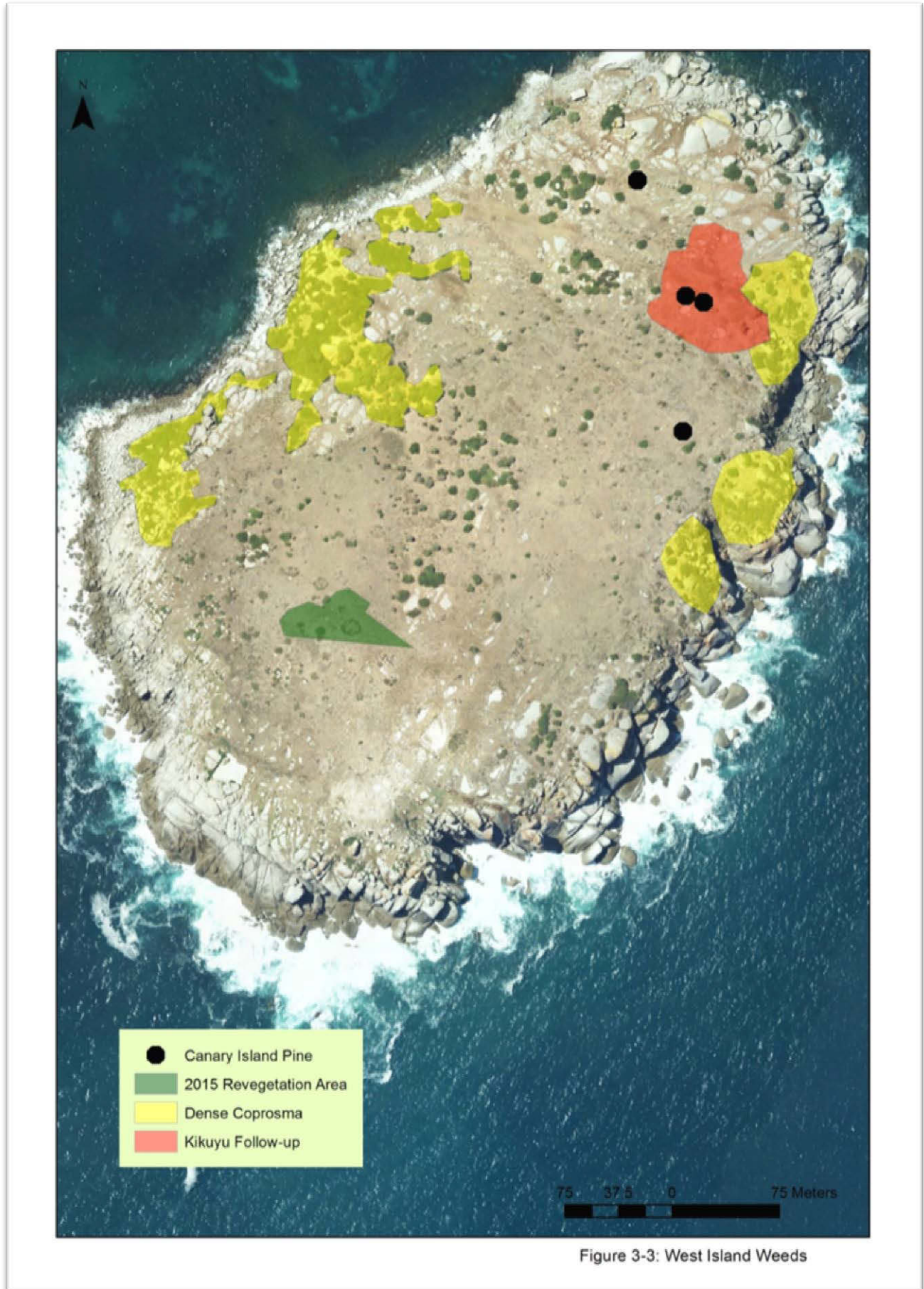


Figure 3-3: West Island Weeds

## 5.4 Managing use conflicts – people and recreation

Management actions should be aimed at reducing the conflicts between the needs of people and biodiversity on West Island. The island receives very few visitors, apart from researchers and DEWNR staff and volunteers, due to the padlocked gate at the end of the landing jetty. However, it is recommended that interpretive and regulatory signage to inform visitors about the biodiversity values of the island be installed at the landing jetty.

## 5.5 Revegetation

Due to the high levels of disturbance and modification to the vegetation of West Island over a long period of time, it is difficult to ascertain what the original vegetation cover would have been. However, revegetation efforts should focus upon supplementing existing habitat for reptiles and sea birds, using appropriate species for the vegetation type and planting at appropriate (i.e. Natural) densities. Supplementary planting is recommended following weed removal, for example planting Native Mallow to replace Tree Mallow and replacing Boxthorn with Common Boobialla. However, whilst revegetation is recommended to minimise weed reinfestation, care should be taken to ensure that open areas are maintained to encourage seabird nesting.

Table 3-6 provides a revegetation plant list which could be used as a guide. It should be noted that at this point in time revegetation is only considered feasible in Management Units 2 and 3. In order to provide suitable seabird nesting habitat, revegetation should aim to re-create an open shrubland structure comprising a tall shrub layer cover of 10- 20%, a medium – low shrub layer 10-20% cover and a groundlayer cover of 30-80%.

**Table 3-6: Revegetation plant list – West Island**

Scientific name	Common name
<i>Acacia longifolia</i> var. <i>sophorae</i>	Coastal Wattle
<i>Atriplex suberecta</i>	Lagoon Saltbush
<i>Austrostipa</i> spp.	Spear Grass
<i>Carpobrotus rossii</i>	Pigface
<i>Dianella brevicaulis</i>	Short-stem Flax-lily
<i>Disphyma crassifolium</i>	Round-leaf Pigface
<i>Enchylaena tomentose</i>	Ruby Saltbush
<i>Ficinia nodosa</i>	Knobby Club-rush
<i>Muehlenbeckia gunnii</i>	Coastal Climbing Lignum
<i>Myoporum insulare</i>	Common Boobialla
<i>Poa poiformis</i>	Coast Tussock-grass
<i>Rhagodia candolleana</i>	Sea-berry Saltbush
<i>Rytidosperma</i> spp.	Wallaby Grass
<i>Tetragonia implexicoma</i>	Bower Spinach
<i>Themeda triandra</i>	Kangaroo Grass
<i>Threlkeldia diffusa</i>	Coast Bonefruit

## 6. MONITORING

### 6.1 BushRat

As part of this project, the Bushland Rapid Assessment Technique (BushRAT) was used as a method to monitor the progress and success of management actions over time. BushRAT's were undertaken

within each vegetation community on West Island where active management is proposed. The results are included in Appendix 3.

BushRAT assessments are useful as they are rapid and can be easily repeated over time to indicate changes in native plant species diversity, weed cover, regeneration, grazing pressure, etc. Use of the protocol not only provides people with a way to show the positive impact they might be having on their bushland's condition but it also raises their awareness of the vital natural processes going on in the bush and how to detect the early warning signs of threatening processes. Data from individual monitoring sites can also be collated on a regional basis with NVC data to provide better information on the condition and trends in native vegetation.

The BushRAT data has been used to set relevant milestones and targets in the Action Plan for West Island (Section 7). It is recommended that BushRATs be repeated on West Island every five years to monitor the progress and success of management actions.

## **6.2 Photopoints**

Photopoints are very useful for seeing change in the landscape over time, especially when describing what an area looked like before changes occurred. It is much easier to understand a picture than a paragraph of text. Photopoints can be used to monitor the effectiveness of weed control work, revegetation, regeneration and changes between seasons, i.e. summer versus winter vegetation. Photopoints are simple to establish and further information on photopoint monitoring is provided in Appendix 4.

It is recommended that photopoints be established on West Island to help monitor effectiveness of ongoing management activities.

## **6.3 Plan implementation – progress reporting**

Progress reporting helps with the assessment of the time, effort and finances put in to management actions. It is likely that various factors such as weather or control technique may affect outcomes and some efforts will be more successful than others. Example Works Record sheets are included in Appendix 5 and it is recommended that all management activities on West Island are recorded.



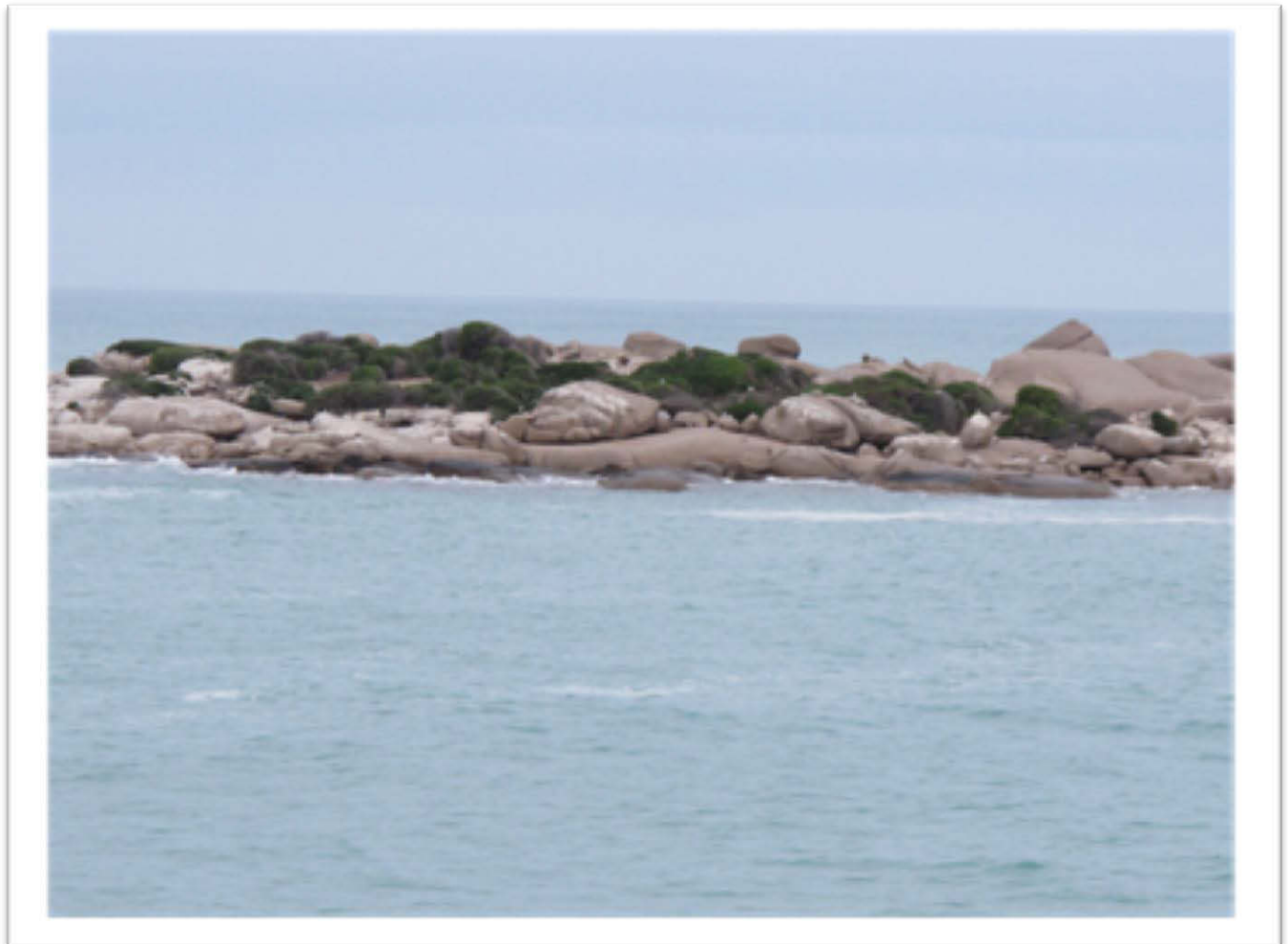
## 7 WEST ISLAND BIODIVERSITY ACTION PLAN

The table below lists the biodiversity management threats/issues for West Island Conservation Park, their related objectives, actions already taken to address them, and further actions being proposed.

ISSUE/THREAT	5-Yr Objective	Actions to date – what/ who	Proposed actions- what/ where/how	Priority (H, M, L)	Who responsible
<b>Weeds</b>					
Boxthorn	Eradicate from MU 1. Reduce cover to <1% in MU 2 and MU 3.	Contractor, DEWNR staff and volunteers – ongoing spraying, cutting & swabbing; hand-pulling seedlings. The focus has been in MU1 (tern nesting areas) and MU2.	Cut & swab or spray mature individuals. Spread out the cut material so it is not left in dense stands Chainsaw may be required for the larger bushes. Follow-up control will be required. Hand-pull seedlings. Continue patrol on a regular basis and map/control as necessary	VH	DEWNR Contractor Volunteers
Tree Mallow	Reduce cover to <1% in MU 1. Reduce infestations in MU2 and MU3 to <5% cover.	Contractor, DEWNR staff and volunteers – grubbing and strategic slashing.	Continue actions to date, <b>slash before seed set</b> . Monitor for new emergents in MU1.	H	DEWNR Contractor Volunteers
New Zealand Mirror-bush	Eradicate from MU 1. Reduce cover to <5% in MU2 and <25% in MU3.	Contractor, DEWNR staff and volunteers – ongoing spraying, cutting & swabbing; hand-pulling seedlings. The focus has been in MU1 (tern nesting areas).	Hand-pull, cut and swab, drill and fill. Investigate options for a broadscale spray in MU4.	H	DEWNR Contractor Volunteers
Canary Island Palm	Remove several individuals in MU2 and MU3.	Nil	Cut down. Treat any reshoots or suckers with Glyphosate	L	DEWNR Contractors
Kikuyu	Reduce cover to <5% at northern end of MU2.	Contractor – spraying.	Continue spraying to encourage penguin habitat.	M	Contractor

ISSUE/THREAT	5-Yr Objective	Actions to date – what/ who	Proposed actions- what/ where/how	Priority (H, M, L)	Who responsible
<b>Recreation – Negative impacts on biodiversity (trampling, disturbance to native fauna, erosion, rubbish dumping, etc)</b>					
	No observable impact of visitors to the island	Locked gate on jetty/landing to deter casual visitors.	Install appropriate interpretive/regulatory signage at the landing jetty to inform/educate visitors about the values of the island and the regulations that apply	H	DEWNR
<b>Revegetation</b>					
	Provide self-sustaining open shrubland habitat in MU1	DEWNR – strategic planting of <i>Myoporum insulare</i> begun in 2015.	Continue revegetation works as appropriate, with densities and species appropriate for the habitat type See revegetation species list in Table 6.	M	DEWNR
<b>Monitoring</b>					
	Monitor progress and success of management activities undertaken	BushRat assessments undertaken in each Management Unit in 2015.	Repeat BushRat assessments to monitor vegetation condition and levels of weed infestations.	L	DEWNR
		Current and prior surveys	Conduct annual surveys of seabird nesting and breeding	M	DEWNR
		Photopoints established in each Management Unit in 2015.	Repeat photopoints on an annual basis (Use Photopoint data sheet - Appendix 4).	M	DEWNR
			Record details of works as they are undertaken (ensure contractors do the same) - Use works record sheets (Appendix 5).	H	DEWNR

## SECTION 4: PULLEN ISLAND



### 1. HISTORY

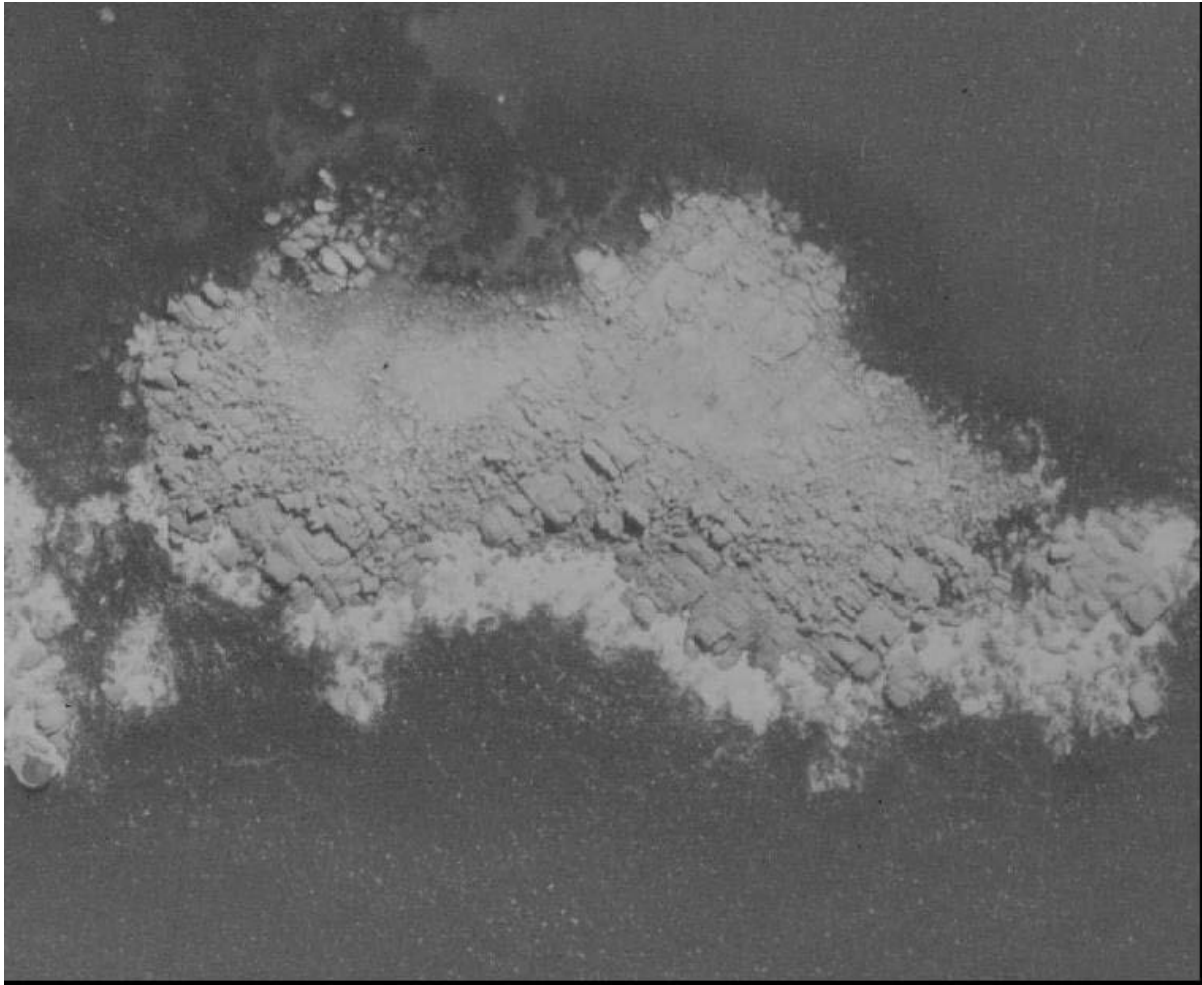
Little is known about the history of Pullen Island, however the **Ngarrindjeri** people who lived on the south coast may have visited Pullen Island regularly to collect sea birds and their eggs, particularly in the summer months<sup>100</sup>.

### 2. CURRENT MANAGEMENT

Pullen Island was declared a closed area to protect birds in 1948 and was proclaimed a Fauna Conservation Reserve in 1967. In 1972 the island became a Conservation Park under the National Parks and Wildlife Act, managed by DEWNR. Since 2012, the waters surrounding its shores are located within the boundaries of the Encounter Marine Park.

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<sup>100</sup> DEP, 1983.



Aerial shot of Pullen Island in 1949



Aerial shot of Pullen Island in 2016

### 3. ENVIRONMENTAL ASSETS

#### 3.1 Landform and soils

Pullen Island is comprised of Victor Harbor granite and reaches a height of approximately 8 metres above sea level towards its eastern end<sup>101</sup>. The island is predominantly granite boulders, with some sand accumulation on the northern side. Boulder heaps at the eastern and western ends of Pullen Island are continuously washed by the sea. There is also a sandy patch on the north-central shore which provides a landing place for small boats in calm weather.

#### 3.2 Native vegetation

Vegetation is restricted to a small patch on the north eastern portion (Figure 4-1), and consists of a *Coprosma repens*, *Lycium ferocissimum*, *Malva arborea* Shrubland with small amounts of the native shrub Common Boobialla (*Myoporum insulare*).

A full list of native plant species recorded on Pullen Island is included in Appendix 1.

#### 3.3 Birds

Given its proximity to Port Elliott, the birds of Pullen Island are surprisingly poorly documented. Large numbers of Crested Terns nested from October 1923 to February 1924<sup>102</sup>. NPWS (1983) details observations of this species during a visit to the island in November 1978.

A total of 19 bird species has been recorded on the island, including 13 during the survey (Table 4-1). Six (6) have either been reported or are suspected to breed there, although the small size of the island limits the range of species. A Kelp Gull was observed on the island in 1999. This species is slowly colonising south-eastern Australia and is now relatively common in the South East, but rarely reported in the Adelaide region. Large numbers of Rock Doves have nested on the island, at least since 1978.

Figure 4-1, Birds from Pullen Island

Common name	Species	#Record	Breeding	Comments	Reference
*Common Starling	<i>Sturnus vulgaris</i>	s	probable	100 in Nov 1978, 20 in Sep 2015	2
*Rock Dove	<i>Columba livia</i>	s	yes	5000 in Nov 1978, c. 500 in Sep 2015, 400 & 30+ nests in Feb 2016	2
Australasian Gannet	<i>Morus serrator</i>	x		2 over sea Jun 2014	1
Black-faced Cormorant	<i>Phalacrocorax fuscescens</i>	s	yes	c. 10 nests Jun 2015, 100 + 20 juv Sep 2015	
Black-shouldered Kite	<i>Elanus axillaris</i>	s		1 over Jun 2015	
Cape Barren Goose	<i>Cereopsis novaehollandiae</i>	x		10 over Oct 2015	1
Crested Tern	<i>Thalasseus bergii</i>	s	yes	large nos in 1924, 300+ nests Jan 2016	3
Great Cormorant	<i>Phalacrocorax carbo</i>	x		few Nov 1978	2
Kelp Gull	<i>Larus dominicanus</i>	x		1 in Jan & Oct 1999	4

<sup>101</sup> <http://spatialwebapps.environment.sa.gov.au/naturemaps/?locale=en-us&viewer=naturemaps> accessed 10/1/2016.

<sup>102</sup> Anon. 1924.

Common name	Species	#Record	Breeding	Comments	Reference
Little Black Cormorant	<i>Phalacrocorax sulcirostris</i>	s		200 Jun 2015, 1 in Feb 2016	
Little Penguin	<i>Eudyptula minor</i>	x	yes	many nests 1978, 1984; 2 in 2013, none in 2015	5
Little Pied Cormorant	<i>Microcarbo melanoleucos</i>	s		30 in Nov 1978, 1 in 2015	2
Pacific Gull	<i>Larus pacificus</i>	s		2 in 2015 & 2016	
Peregrine Falcon	<i>Falco peregrinus</i>	s		1 feeding on Rock Dove Jan 2016	
Pied Cormorant	<i>Phalacrocorax varius</i>	x		3 in Jun 2014	1
Silver Gull	<i>Chroicocephalus novaehollandiae</i>	s	yes	4000 in Nov 1978, 300 + sev juv Sep 2015	6
Singing Honeyeater	<i>Lichenostomus virescens</i>	s	possible	2 in Sep 2015	
Sooty Oystercatcher	<i>Haematopus fuliginosus</i>	s	possible	8 in Jun 2015	
Willie Wagtail	<i>Rhipidura leucophrys</i>	s		1 in Jun 2015	
<b>#Record</b> s Present survey; x Previous survey					
<b>References</b> 1 Carpenter pers obs; 2 NPWS 1983; 3 Anon.1924, NPWS 1983, Copley 1996; 4 Murfet 1999, Cheshire 2000; 5 Copley 1996, Collombelli & Kleindorfer 2014; 6 NPWS 1983, Copley 1996					

### Little Penguin

Large numbers were recorded in November 1978<sup>103</sup>. Colombelli-Negrel & Kleindorfer (2014) reported 2 nests in 2013. No evidence of nests was found during the February 2016 survey, with many suitable sites occupied by nesting Rock Doves.

### Black-faced Cormorant

At least 10 nests, some in construction (birds bringing in seaweed), were observed during the survey in June 2015. By September there were about 100 adults and 20 juveniles.

### Silver Gull

About 4,000 pairs were nesting in November 1978<sup>104</sup>. During the survey about 300 birds and several chicks were observed from the mainland in September 2015.

### Crested Tern

Large numbers of Crested Terns nested from October 1923 to February 1924<sup>105</sup>. During the survey about 500 pairs had eggs and chicks in January 2016, with most fledged by February. A small area which is sheltered from all sides appears to be the preferred nesting area (Pictures, Figure 4-1). This area has a fragile crust of bird droppings in which nesting holes have been excavated. Frequent visitation could possibly damage this area.

<sup>103</sup> NPWS 1983.

<sup>104</sup> NPWS 1983.

<sup>105</sup> Anon. 1924.



*Tern nesting area, Pullen Island*



*Birds on Pullen Island*

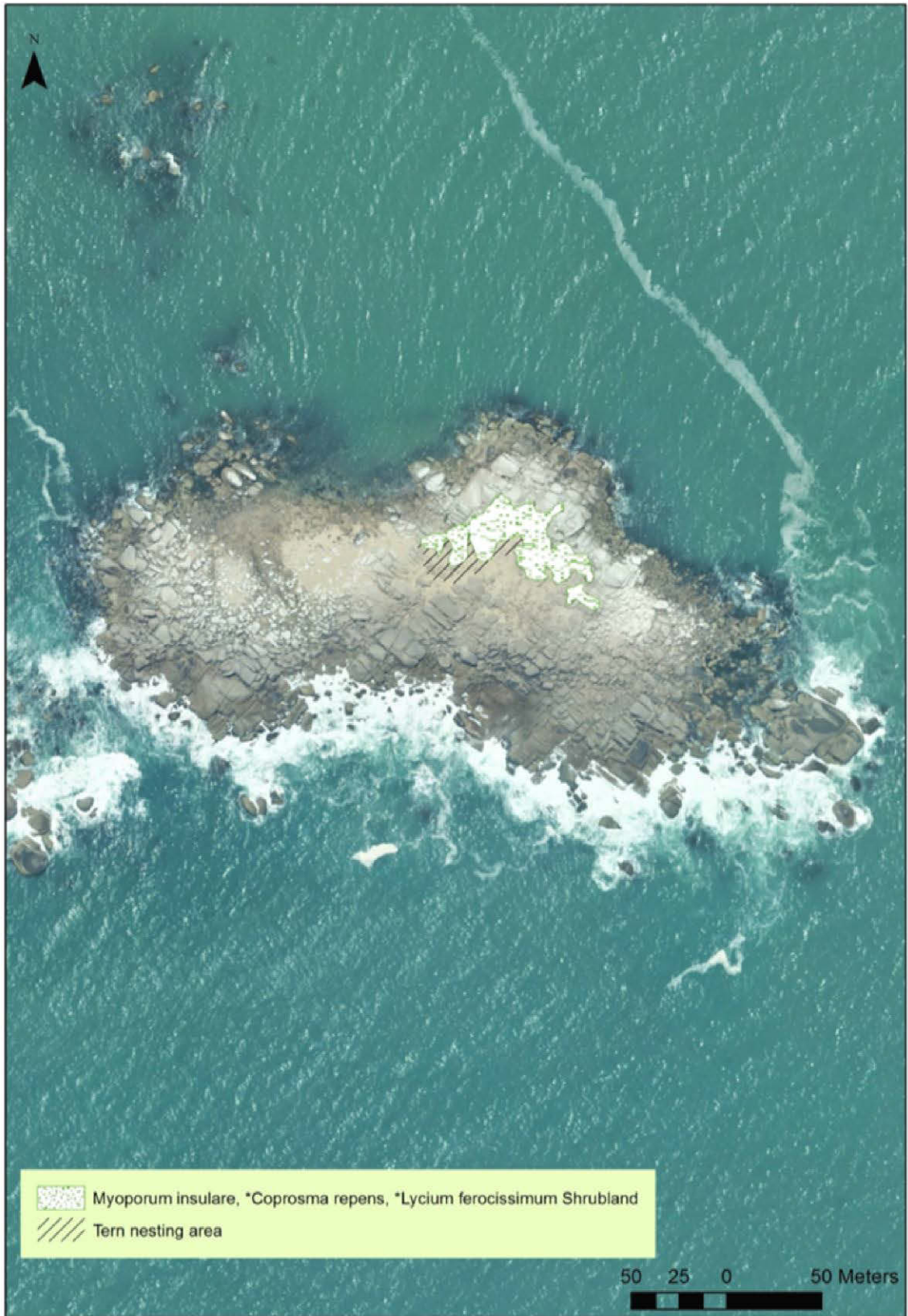


Figure 4-1: Pullen Island



### 3.4 Reptiles

Table 4-2 shows the reptile species present, or considered likely to be present, on Pullen Island. Due to the relatively small size of the Island, and the limited habitats available, there are relatively few species that would use the Island as habitat. All species are considered to be common.

Table 4-2: Reptile species observed and/or likely to be utilising Pullen Island for habitat

Scientific Name	Common Name	Recorded 2015	Previous records	*Rating		Comments <sup>106</sup>
				AUS	SA	
<i>Lerista bouganvillii</i>	South-eastern Slider		Yes			
<i>Christinus marmoratus</i>	Marbled Gecko					Considered likely to be present
<i>Hemiergis peroni</i>	Lowlands Earless Skink					Considered possibly present

### 3.5 Mammals

The following table includes a list of all mammals which have been recorded or are likely to occur on Pullen Island. Only marine mammals have been recorded to date.

Table 4-3: Mammal species known or likely to occur on Pullen Island or in immediate surrounding waters

Scientific Name	Common Name	2015	Previous surveys	#Rating		Comments
				AUS	SA	
<b>Marine Mammals</b>						
<i>Delphinus delphis</i>	Short-beaked Common Dolphin		✓			
<i>Arctocephalus tropicalis</i>	Sub-Antarctic Fur Seal		✓			
<i>Eubalaena australis</i>	Southern Right Whale		✓		V	
<i>Megaptera novaeangliae</i>	Humpback Whale		✓	V	V	
<i>Arctocephalus forsteri</i>	Long-nosed Fur Seal					Likely to occur at times
<i>Neophoca cinerea</i>	Australian Sea-lion					Likely to occur at times
<i>Tursiops aduncus</i>	Indo-Pacific Bottlenose Dolphin					
<b>Terrestrial Mammals</b>						

#Conservation rating codes: EX = Extinct, CE = Critically Endangered, E = Endangered, V = Vulnerable, R = Rare, NT = Near Threatened

## 4. THREATS (MANAGEMENT ISSUES)

Threats to the biodiversity values of Pullen Island include:

- Weed invasion
- Predation by pest/pet animals (dogs, cats)
- Recreation activities such as boating and kayaking with visitors potentially disturbing nesting seabirds and/or trampling eggs

### 4.1 Invasive weeds

Weeds of concern on Pullen Island are included in the following table.

<sup>106</sup> Dr Tim Milne, Herpetologist

Table 4-4: List of weeds of concern, Pullen Island

Species	Common Name	<sup>107</sup> Declared	<sup>108</sup> WONS	<sup>109</sup> SFCAP Threat Level	<sup>110</sup> Weed invasiveness ranking
* <i>Coprosma repens</i>	New Zealand Mirror-bush			4	3
* <i>Lycium ferocissium</i>	African Boxthorn	Y	Y	7	3
* <i>Malva arborea</i>	Tree Mallow			3	-

**SFCAP Threat Levels:** The threat value allocation process undertaken as part of the Southern Fleurieu Coastal Action Plan identified a total of 85 priority environmental weeds for the Southern Fleurieu coastal region, each featuring a weed threat value between 1 & 9.

**Red Alert Weed Categories:**

1 – Generally only invade disturbed bushland. Often widespread and abundant but not considered a significant threat to native biodiversity, unless present at very high densities.

2 - Generally only invade disturbed bushland, but may spread rapidly. However, generally only a slight potential to reduce native species diversity, unless present at very high densities.

3 – Invasive in intact bushland with moderate potential to reduce native species diversity. Rate of spread is slower than Category 4 and 5 weeds but once present will persist and threaten biodiversity. May produce dense stands over a wide area but can be controlled with sustained effort.

4 – Highly invasive in either disturbed or intact remnant bushland, with the potential to spread rapidly and produce very dense stands given favourable habitat and/or vectors. High potential to reduce native species diversity and abundance. Can be controlled with sustained effort.

5 – Highly invasive in either disturbed or intact bushland, spreads rapidly producing very dense stands and a blanket cover. Potential to eliminate almost all native understorey species. Very difficult to control without outside help.

## 4.2 Pest animals

Large numbers of introduced European Starlings and Rock Doves breed and or roost on the islands. There is concern that Rock Doves (*\*Columba livia*) outcompete Little Penguins for nests on Pullen Island<sup>111</sup>, however it is not clear if the use of penguin nests by pigeons is a cause or a consequence of declining population trends<sup>112</sup>.

Control of these species is difficult and may be achieved indirectly by eradicating invasive woody plants.

## 4.3 People and recreation

Pullen Island, whilst located in close proximity to the popular tourist destinations of Port Elliott and Horseshoe Bay, is unlikely to receive high levels of visitation, due to difficulty landing as a result of both the strong swell and surge in the area, and the lack of a clear sandy beach for landing. Notwithstanding this low likelihood of visitation, it is a priority that visitation should be minimised to protect the valuable nesting habitats present, and the fragile soils where much of the nesting seems to occur.

<sup>107</sup>Biosecurity SA Weeds and Pest Animals. Declared plants in South Australia, October 2012

[http://www.pir.sa.gov.au/biosecuritysa/nrm\\_biosecurity/weeds/declared\\_plants\\_in\\_south\\_australia,\\_october\\_2012](http://www.pir.sa.gov.au/biosecuritysa/nrm_biosecurity/weeds/declared_plants_in_south_australia,_october_2012)

<sup>108</sup> Australian Weeds Committee (2012), Weeds of National Significance 2012. Department of Agriculture, Fisheries and Forestry, Canberra, ACT <http://www.weeds.org.au/WoNS/>

<sup>109</sup> Caton, et al 2007. Southern Fleurieu Coastal Action Plan and Conservation Priority Study, AMLR Natural Resources Management Board

<sup>110</sup> Refer to Native Vegetation & Biodiversity Management Unit *BushRat Manual for native vegetation*, May 2013.

<sup>111</sup> Paton and Paton 1977a, DEP 1983.

<sup>112</sup> Wiebkin 2011.

## 5. BIODIVERSITY MANAGEMENT STRATEGIES

### 5.1 Biodiversity management objectives

The biodiversity management objectives for Pullen Island are to:

- Prevent any further loss of biodiversity; and
- Strengthen the long term viability of the existing biodiversity assets, in particular as they provide habitat and resources for sea birds.

In order to monitor whether these objectives are being met, the Bushland Rapid Assessment Technique (BushRAT) was used as part of this project. This methodology, which has been developed by the Native Vegetation Management Unit (SA Dept Environment, Water & Natural Resources), gathers data on bushland condition, including native species diversity, native plant life forms, regeneration, tree health, hollows, fallen timber, weed abundance and threat, grazing pressure, etc. BushRAT assessment results for Pullen Island are summarised in Appendix 3.

### 5.2 Managing weeds

The weedy nature of the vegetation on Pullen Island could potentially spread and reduce the preferred open habitats of nesting terns. However, it is likely that the shrubby weeds that are present, notably Mirror Bush and Boxthorn, are providing a degree of shelter/protection to adjoining open areas in which terns are nesting immediately to the south and west. As such it is recommended that weed control is undertaken slowly, in a staged manner and in close conjunction with revegetation. Weed control should not occur during the tern breeding season.

Mature Boxthorn and Mirror Bushes should be sprayed or drilled & filled and left in situ to provide protective cover for birds, whilst revegetation becomes established.

### 5.3 Managing use conflicts – people and recreation

To minimise the impacts of visitors to Pullen Island it is recommended that boats and/or kayaks are prohibited from landing during tern and cormorant breeding times (i.e. December – January).

### 5.4 Revegetation

Whilst there is little indigenous vegetation present on Pullen Island, it is recommended that revegetation is undertaken in a carefully staged manner and in close conjunction with weed control. Care should be taken to minimise disturbance to fragile soils and nesting birds. The open sandy habitats that terns prefer should be retained.

Recommended species for revegetation at this stage is Common Boobialla (*Myoporum insulare*) which is fast-growing and will replace the shrubby structure of the introduced Mirror Bush and Boxthorn. However care must be undertaken that revegetation does not restrict the open areas available for seabird nesting.

## 6. MONITORING

### 6.1 BushRAT

As part of this project, the Bushland Rapid Assessment Technique (BushRAT) was used as a method to monitor the progress and success of management actions over time. BushRAT was undertaken on Pullen Island and the results are included in Appendix 3.

BushRAT assessments are useful as they are rapid and can be easily repeated over time to indicate changes in native plant species diversity, weed cover, regeneration, grazing pressure, etc. Use of the protocol not only provides people with a way to show the positive impact they might be having on their bushland's condition but it also raises their awareness of the vital natural processes going on in the bush and how to detect the early warning signs of threatening processes. Data from individual monitoring sites can also be collated on a regional basis with NVC data to provide better information on the condition and trends in native vegetation.

The BushRAT data has been used to set relevant milestones and targets in the Action Plan for Pullen Island (see Section 7). It is recommended that BushRATs be repeated on Pullen Island every five years to monitor the progress and success of management actions.

### 6.2 Photopoints

Photopoints are very useful for seeing change in the landscape over time, especially when describing what an area looked like before changes occurred. It is much easier to understand a picture than a paragraph of text. Photopoints can be used to monitor the effectiveness of weed control work, revegetation, regeneration and changes between seasons, i.e. summer versus winter vegetation. Photopoints are simple to establish and further information on photopoint monitoring is provided in Appendix 4.

It is recommended that photopoints be established on Pullen Island to help monitor effectiveness of ongoing management activities.

### 6.3 Plan implementation – progress reporting

Progress reporting helps with the assessment of the time, effort and finances put in to management actions. It is likely that various factors such as weather or control technique may affect outcomes and some efforts will be more successful than others. Example Works Record sheets are included in Appendix 5 and it is recommended that all management activities on Pullen Island are recorded.

## 7 PULLEN ISLAND BIODIVERSITY ACTION PLAN

The table below lists the biodiversity management threats/issues for Pullen Island Conservation Park, their related objectives, actions already taken to address them, and further actions being proposed.

ISSUE/THREAT	5-Yr Objective	Actions to date – what/ who	Proposed actions- what/ where/how	Priority (H, M, L)	Who responsible
Woody weeds	Decrease cover to <5%	-	Hand-pull seedlings. Drill and fill or spray mature individuals and leave dead bushes in-situ	H	NR AMLR
	No spread of woody weeds (see Figure 4-1)	-	Monitor the current extent of Mirror Bush, Boxthorn and Tree Mallow.  Careful and staged removal of woody weeds, outside of tern and cormorant breeding times.	H	NR AMLR
Revegetation	Increase the canopy cover of Common Boobialla to 5-25%				NR AMLR
Rock Doves	Decrease woody weed cover to <5%		Refer above.		NR AMLR
<b>Monitoring</b>					
	Monitor progress and success of management activities undertaken	BushRat assessment undertaken in 2015.	Repeat BushRat assessment to monitor vegetation condition and levels of weed infestations. Repeat photopoints on an annual basis (Use Photopoint data sheet - Appendix 4). Record details of any works as they are undertaken (ensure contractors do the same) - Use works record sheets (Appendix 5).	L	NR AMLR
		Current and prior surveys	Conduct annual surveys of seabird nesting and breeding	M	NR AMLR

## SECTION 5: SEAL ISLAND



### 1. HISTORY

Both West Island and Seal Island are part of the mythology of the Ngarrindjeri people, who would have visited the islands to fish, hunt sea-birds and collect eggs, although little details are known<sup>113</sup>.

### 2. CURRENT MANAGEMENT

Since 1979, Seal Island has been part of the West Island Conservation Park. Since 2012, the waters surrounding its shores are located within the boundaries of the Encounter Marine Park.

### 3. ENVIRONMENTAL ASSETS

#### 3.1 Landform and soils

Seal Island is little more than a tumbled heap of granite boulders with little or no soil development. The entire islet is covered by waves in very rough weather.

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<sup>113</sup> DEP, 1983.

### 3.2 Native vegetation

Seal Island supports several battered and weather-worn Boxthorn (*Lycium fercossimum*) and one individual specimen of Sea Pearlwort (*Sagina maritima*), was recorded as part of this project.

### 3.3 Birds

Due to its distance from the mainland and windswept location the birds of Seal Island are less well documented. Seal Island was described as the abode of 'seagulls and shags' when the artillery practiced bombing the island in 1896<sup>114</sup>. White (1944) reported Silver Gulls nesting in August 1944. Observation from Granite Island has revealed various oceanic species passing the island during winter.

A total of 17 bird species has been recorded on the island, including 11 during the survey (Table 5-1). Six (6) have either been reported or are suspected to breed there, although the small size of the island limits the range of species.

Small numbers of Black-faced and Pied Cormorants breed on the island in winter. Four Fairy Terns flew past the island during the February 2016 survey, which is the first report in the survey area for several years.

#### Little Penguin

Colombelli-Negrel & Kleindorfer (2014) reported 15 inactive burrows during a visit on 25 November 2013. This was the only record traced – the report from 'Seal Island' in Robinson *et al* (1996), as listed in Wiebkin (2011), refers to another Seal Island. A flipper was found on the February 2016 survey.

#### Black-faced Cormorant

C. Halstead (pers. comm.) reported small numbers nesting during winter in the 1990s.

#### Pied Cormorant

Five (5) birds and at least 2 juveniles were observed by telescope from Granite Island on 11 June 2015. The boat survey later in June confirmed the identity of the adults (3 seen) but no juveniles were seen.

#### Silver Gull

Silver Gulls were reported nesting in August 1944<sup>115</sup>. About 50 were seen during the survey but there was no evidence of nesting.

#### Crested Tern

About 30 immatures were being fed small fish by adults on the north side of the island during the February 2016 survey. The land-based survey indicated that these had not nested locally, so were presumed to have come from Pullen Island.

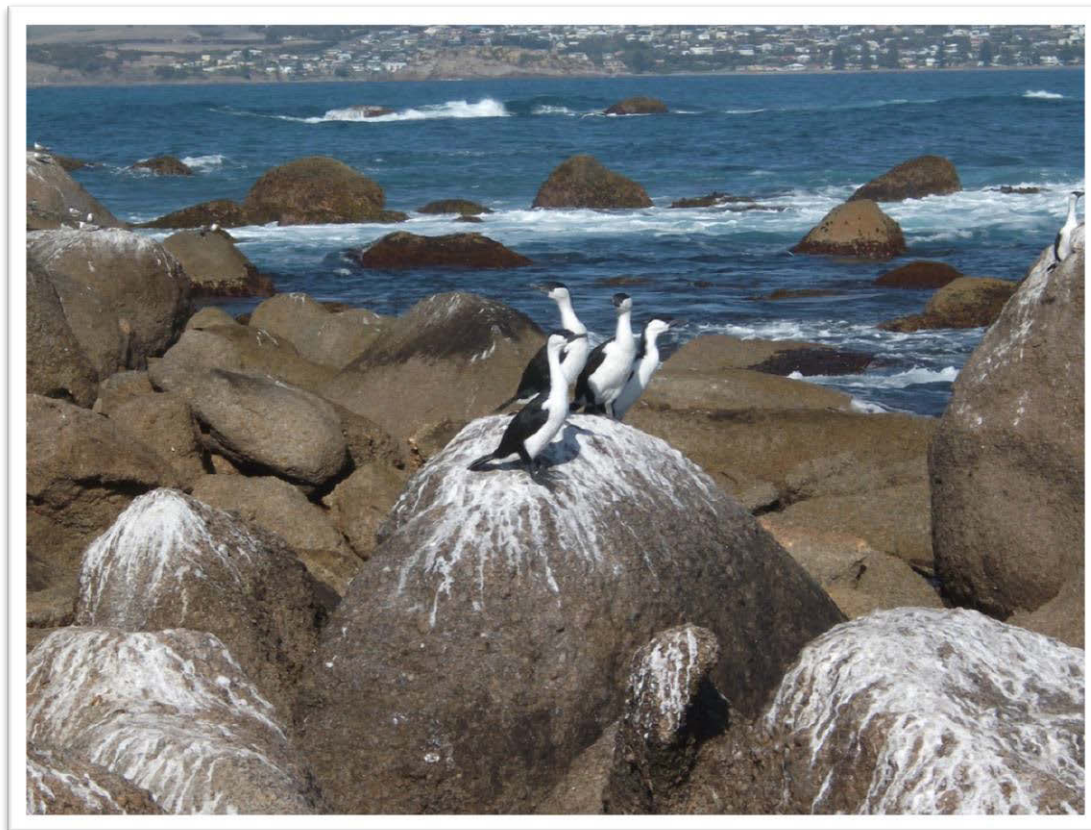
Table 5-1: Birds recorded from Seal Island

Common name	Species	Record	Breeding	Comments
*Rock Dove	<i>Columba livia</i>	s	probable	30 in Jun 2015, 10 in Sep 2015, 100 in Feb 2016
Arctic Jaeger	<i>Stercorarius parasiticus</i>	x		3 over Apr 1983
Australasian Gannet	<i>Morus serrator</i>	s		100 over sea Jul 1983, 3 in Jul 2015

<sup>114</sup> Anon 1896.

<sup>115</sup> White 1944.

Common name	Species	Record	Breeding	Comments
Black-browed Albatross	<i>Thalassarche melanophris</i>	x		5 over sea Jul 1983
Black-faced Cormorant	<i>Phalacrocorax fuscescens</i>	s	yes	"shags" reported 1896, nesting in winter 1990s, 5 in Jul 2015 & Feb 2016
Brown Skua	<i>Stercorarius antarcticus</i>	x		1 over sea Jul 1983
Crested Tern	<i>Thalasseus bergii</i>	s	possible	150 in Jun 2015
Eastern Reef Egret	<i>Egretta sacra</i>	s		1 flying past in Feb 2016
Fairy Tern	<i>Sternula nereis</i>	s		4 flying past in Feb 2016
Fluttering Shearwater	<i>Puffinus gavia</i>	x		100s over sea Jul 1983
Little Penguin	<i>Eudyptula minor</i>	x	yes	15 nests in 2013, remains (flipper) in Feb 2016
Little Pied Cormorant	<i>Microcarbo melanoleucos</i>	s		2 in Jul 2015
Pacific Gull	<i>Larus pacificus</i>	s		2 in Jun, Sep 2015
Pied Cormorant	<i>Phalacrocorax varius</i>	s	yes	5+juv in Jun 2015
Silver Gull	<i>Chroicocephalus novaehollandiae</i>	s	yes	reported 1896, 1905 (young), 1944 (nesting); 100 in Jun 2015
Southern Giant Petrel	<i>Macronectes giganteus</i>	s		1 over sea Jun 2015
Yellow-nosed Albatross	<i>Diomedea chlororhynchos</i>	x		2 over sea Jul 1983



*Black-faced Cormorants, Seal Island*



### 3.6 Reptiles

Table 2 shows the reptile species present, or considered likely to be present, on Seal Island. Due to the relatively small size of the Island, and the limited habitats available, there are relatively few species that would use the Island as habitat. All species are considered to be common.

Table 2: Reptile species observed and/or likely to be utilising Seal Island for habitat

Scientific Name	Common Name	Recorded 2015	Previous records	*Rating		Comments <sup>116</sup>
				AUS	SA	
<i>Christinus marmoratus</i>	Marbled Gecko		Yes			Based on site visit, considered unlikely to be present <sup>117</sup> .
<i>Hemiergis peroni</i>	Lowlands Earless Skink		Yes			Based on site visit considered unlikely to be present

### 3.7 Mammals

The following table includes a list of all mammals which have been recorded or are likely to occur on Seal Island.

Table 3: Mammal species known or likely to occur on Seal Island or in immediate surrounding waters

Scientific Name	Common Name	2015	Previous surveys	Rating		Comments
				AUS	SA	
<b>Marine Mammals</b>						
<i>Arctocephalus forsteri</i>	Long-nosed Fur Seal	✓	✓		R	
<i>Neophoca cinerea</i>	Australian Sea-lion	✓				
<i>Delphinus delphis</i>	Short-beaked Common Dolphin		✓			
<i>Eubalaena australis</i>	Southern Right Whale		✓		V	
<i>Megaptera novaeangliae</i>	Humpback Whale			V	V	
<i>Tursiops aduncus</i>	Indo-Pacific Bottlenose Dolphin					

#Conservation rating codes: EX = Extinct, CE = Critically Endangered, E = Endangered, V = Vulnerable, R = Rare, NT = Near Threatened

## 4. THREATS (MANAGEMENT ISSUES)

Threats to the biodiversity values of Seal Island include:

- Weeds; and
- Recreation activities.

### 4.1 Weeds

Seal Island supports several battered and weather-worn Boxthorn (*Lycium ferocissimum*). Due to the highly exposed nature of Seal Rock, these individuals are considered unlikely to spread, however to ensure that they do not provide a seed source for spread to other nearby islands it is recommended that they are removed.

<sup>116</sup> Dr Tim Milne, Herpetologist

<sup>117</sup> T. Milne pers. comm.

## 4.2 Visitors

Seal Island does not receive high levels of visitation, due to difficulty landing as a result of both the strong swell and surge in the area, and the lack of a safe landing area. Notwithstanding this low likelihood of visitation, it is a priority that visitation should be minimised to protect the valuable nesting habitats present.

## 5. BIODIVERSITY MANAGEMENT STRATEGIES

### 5.1 Biodiversity management objectives

The biodiversity management objectives for Seal Island are to:

- Prevent any further loss of biodiversity; and
- Strengthen the long term viability of the existing biodiversity assets, in particular as they provide habitat and resources for sea birds.

The Bushland Rapid Assessment Technique (BushRAT) was not undertaken on Seal Island due to the presence of very little vegetation.

### 5.2 Managing use conflicts – people and recreation

To minimise the impacts of visitors to Seal Island it is recommended that boats and/or kayaks are prohibited from landing during tern and cormorant breeding times (i.e. December – January).

### 5.3 Revegetation

Revegetation is not considered to be a viable management option as there is little or no soil on Seal Island and waves regularly break over the entire island.

### 5.4 Photopoints

Opportunities for photo points are limited.

## 5. SEAL ISLAND BIODIVERSITY ACTION PLAN

The table below lists the biodiversity management threats/issues for Pullen Island Conservation Park, their related objectives, actions already taken to address them, and further actions being proposed.

ISSUE/THREAT	5-Yr Objective	Actions to date – what/ who	Proposed actions- what/ where/how	Priority (H, M, L)	Who responsible
Woody weeds	Remove woody weeds	Remove the small number of Boxthorn on the island.	Drill and fill or spray mature individuals and leave dead bushes in-situ Undertake outside of seabird breeding times.	L	NR AMLR
			Monitor the island for woody weed incursion.	M	NR AMLR
Revegetation	Do not undertake planting	Limited soil and exposed conditions not conducive to revegetation.			
<b>Monitoring</b>					
	Limited vegetation to undertake BushRat monitoring.	Monitor island opportunistically to ensure woody weed cover does not increase. This could be done by telescope observation of island from Granite Island.	Do not undertake BushRat assessment to monitor vegetation condition and levels of weed infestations. Establishment of photopoints is difficult due to limited soil, consider taking photos from same location opportunistically when seabird surveys are undertaken. Record details of any works as they are undertaken (ensure contractors do the same) - Use works record sheets (Appendix 5).		
		Current and prior surveys	Conduct annual surveys of seabird nesting and breeding	M	NR AMLR

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## **Appendix 1: Plant species list**



## Fleurieu Islands Plant Species List

The following lists have been collated from several sources including:

- The current project's field survey
- Ron Taylor, Field Botanist
- SA National Parks & Wildlife

Species Name	Common Name	Conservation Status#			Island				
		AUS	SA	ML	Granite	Wright	West	Pullen	Seal
<i>Acacia cupularis</i>	Cup Wattle			RA	✓				
<i>Acacia ligulata</i>	Umbrella Bush			RA	✓				
<i>Acacia longifolia ssp. sophorae</i>	Coastal Wattle				✓		✓		
<i>Acacia myrtifolia</i>	Myrtle Wattle				✓				
<i>Acacia paradoxa</i>	Kangaroo Thorn				✓				
<i>Acacia pycnantha</i>	Golden Wattle				✓				
<i>Acacia retinodes</i>	Wirilda			RA	✓				
<i>Acaena novae-zelandiae</i>	Biddy biddy				✓				
<i>Adriana quadripartita</i>	Coast Bitter-bush			RA	✓				
<i>Allocasuarina verticillata</i>	Drooping Sheoak				✓				
<i>Alyxia buxifolia</i>	Sea Box				✓				
<i>Apium annuum</i>	Annual Celery			VU	✓		✓		
<i>Apium prostratum ssp. prostratum</i>	Native Celery			NT	✓				
<i>Arthropodium strictum</i>	Chocolate Lily				✓				
<i>Atriplex australasica</i>				EN	✓				
<i>Atriplex cinerea</i>	Coast Saltbush				✓				
<i>Atriplex semibaccata</i>	Berry Saltbush				✓				
<i>Atriplex suberecta</i>	Lagoon Saltbush			NT	✓		✓		
<i>Austrostipa flavescens</i>	Coast Spear-grass				✓				
<i>Austrostipa nodosa</i>	Tall Spear-grass								
<i>Austrostipa sp.</i>	Spear-grass				✓				
<i>Bulbine bulbosa</i>	Bulbine-lily			NT	✓				
<i>Calandrinia sp.</i>	Purslane				✓		✓		
<i>Callitris gracilis</i>	Southern Cypress Pine				✓				
<i>Calostemma purpureum</i>	Pink Garland-lily				✓				
<i>Carpobrotus rossii</i>	Native Pigface				✓		✓		
<i>Cassinia uncata</i>	Sticky Cassinia				✓				
<i>Centrolepis cephaloformis ssp. cephaloformis</i>	Cushion Centrolepis		R						
<i>Centrolepis polygyna</i>	Wiry Centrolepis								
<i>Cheilanthes austrotenuifolia</i>	Annual Rockfern				✓				
<i>Chloris truncata</i>	Windmill Grass				✓				
<i>Chrysocephalum apiculatum</i>	Common Everlasting				✓				
<i>Clematis microphylla var. microphylla</i>	Old Man's Beard				✓				
<i>Compositae sp.</i>	Daisy Family								
<i>Convolvulus angustissimus</i>	Australian Bindweed				✓				
<i>Convolvulus erubescens</i>	Australian Bindweed				✓				
<i>Convolvulus remotus</i>	Grassy Bindweed				✓				
<i>Correa alba var. pannosa</i>	White Correa			VU	✓				

Species Name	Common Name	Conservation Status#			Island				
		AUS	SA	ML	Granite	Wright	West	Pullen	Seal
<i>Correa pulchella</i>	Salmon Correa			RA	✓				
<i>Cotula australis</i>	Common Cotula						✓		
<i>Crassula colligata ssp. lamprosperma</i>	Australian Stonecrop				✓				
<i>Crassula decumbens</i>	Spreading Crassula						✓		
<i>Crassula sieberiana ssp. tetramera</i>	Australian Stonecrop			VU	✓				
<i>Crassula sp.</i>	Crassula					✓	✓		
<i>Cullen australasicum</i>	Tall Scurf-pea			RA	✓				
<i>Dianella brevicaulis</i>	Short-stem Flax-lily			NT	✓	✓	✓		
<i>Dianella longifolia var. grandis</i>	Pale Flax-lily			VU	✓				
<i>Dianella revoluta var. revoluta</i>	Black-anther Flax Lily				✓				
<i>Dichondra repens</i>	Kidney Weed				✓		✓		
<i>Disphyma crassifolium ssp. clavellatum</i>	Round-leaf Pigface				✓		✓		
<i>Distichlis distichophylla</i>	Emu Grass				✓				
<i>Dodonaea viscosa ssp. angustissima</i>	Narrow-leaf Hop-bush			RA	✓				
<i>Einadia nutans</i>	Climbing Saltbush				✓	✓	✓		
<i>Enchylaena tomentosa var. tomentosa</i>	Ruby Saltbush				✓	✓	✓	✓	
<i>Enneapogon nigricans</i>	Black-head Grass				✓				
<i>Epilobium billardierianum ssp. intermedium</i>	Variable Willow-herb			NT	✓				
<i>Erodium crinitum</i>	Blue Heron's-bill			NT	✓				
<i>Eucalyptus cosmophylla</i>	Cup Gum				✓				
<i>Eucalyptus leucoxylon ssp. leucoxylon</i>	SA Blue Gum			NT	✓				
<i>Ficinia nodosa</i>	Knobby Club-rush				✓				
<i>Frankenia pauciflora</i>	Sea-heath				✓				
<i>Geranium potentilloides</i>	Downy Geranium				✓				
<i>Glycine latrobeana</i>			V	RA	✓				
<i>Glycine rubiginosa</i>	Twining Glycine				✓				
<i>Gonocarpus mezianus</i>	Broad-leaf Raspwort				✓				
<i>Goodenia amplexans</i>	Clasping Goodenia				✓				
<i>Goodenia varia</i>	Sticky Goodenia			NT	✓				
<i>Hakea rugosa</i>	Dwarf Hakea			RA	✓				
<i>Hardenbergia violacea</i>	Native Lilac			NT	✓				
<i>Juncus subsecundus</i>	Finger Rush				✓				
<i>Kennedia prostrata</i>	Scarlet Runner				✓				
<i>Kunzea pomifera</i>	Muntries				✓				
<i>Lachnagrostis billardierei ssp. billardierei</i>	Coast Blown-grass			RA	✓				
<i>Lasiopetalum discolour</i>	Coast Velvet-bush				✓				
<i>Leiocarpa supina</i>	Coast Plover-daisy			RA	✓		✓		
<i>Lepidosperma concavum</i>	Sand-hill Sword Sedge			VU	✓				
<i>Lepidosperma gladiatum</i>	Coast Sword-sedge			RA	✓				
<i>Lepidosperma viscidum</i>	Sticky Sword Sedge			NT	✓				
<i>Leucophyta brownii</i>	Coast Cushion Bush			NT	✓				
<i>Leucopogon parviflorus</i>	Coast Beard Heath			NT	✓				

Species Name	Common Name	Conservation Status#			Island				
		AUS	SA	ML	Granite	Wright	West	Pullen	Seal
<i>Lomandra densiflora</i>	Soft Tussock Mat-rush				✓				
<i>Lomandra effusa</i>	Scented Mat-rush			NT	✓				
<i>Lomandra multiflora ssp. dura</i>	Hard Mat-rush				✓				
<i>Lomandra nana</i>	Small Mat-rush				✓				
<i>Lotus australis</i>	Austral Trefoil			NT	✓				
<i>Malva preissiana</i>	Australian Hollyhock					✓	✓		
<i>Melaleuca halmaturorum</i>	Swamp Paper-bark			EN	✓		✓		
<i>Melaleuca lanceolata</i>	Dryland Tea-tree			RA	✓				
<i>Muehlenbeckia gunnii</i>	Coastal Climbing Lignum				✓	✓	✓		
<i>Myoporum insulare</i>	Common Boobialla			NT	✓		✓	✓	
<i>Myoporum parvifolium</i>	Creeping Boobiall			VU	✓				
<i>Nicotiana maritima</i>	Coast Tobacco			RA	✓		✓		
<i>Nitraria billardierei</i>	Nitre-bush								
<i>Olearia axillaris</i>	Coast Daisy-bush			NT	✓				
<i>Olearia pannosa ssp. pannosa</i>	Silver-leaved Daisy-bush			EN	✓				
<i>Olearia ramulosa</i>	Twiggy Daisy-bush				✓				
<i>Oxalis perennans</i>	Native Sorrel				✓		✓		
<i>Panicum effusum var. effusum</i>	Hairy Panic			NT	✓				
<i>Parietaria cardiostegia</i>	Mallee Smooth-nettle					✓	✓		
<i>Pelargonium australe</i>	Australian Pelargonium			RA	✓				
<i>Pimelea glauca</i>	Smooth Riceflower			NT	✓				
<i>Pimelea serpyllifolia ssp. serpyllifolia</i>	Thyme Riceflower			NT					
<i>Pimelea stricta</i>	Erect Riceflower				✓				
<i>Poa labillardieri var. labillardieri</i>	Common Tussock-grass			NT	✓				
<i>Poa poiformis var. poiformis</i>	Coast Tussock-grass				✓				
<i>Portulaca oleracea</i>	Common Purslane						✓		
<i>Pseudonaphalum luteoalbum</i>	Jersey Cudweed				✓				
<i>Rhagodia candolleana ssp. candolleana</i>	Sea-berry Saltbush				✓	✓	✓		
<i>Rytidosperma caespitosum</i>	Common Wallaby-grass				✓				
<i>Rytidosperma duttonianum</i>	Brown-black Wallaby-grass			RA	✓				
<i>Rytidosperma erianthum</i>	Wallaby Wallaby-grass			NT	✓				
<i>Rytidosperma sp.</i>	Wallaby-grass				✓				
<i>Sagina maritima</i>	Sea Pearlwort								✓
<i>Salsola australis</i>	Buckbush				✓				
<i>Samolus repens</i>	Creeping Brookweed			NT	✓				
<i>Sarcocornia blackiana</i>	Thick-headed Samphire			RA	✓		✓		
<i>Scaevola albida</i>	Pale Fanflower				✓				
<i>Scaevola angustata</i>	Coast Fanflower			EN	✓				
<i>Scaevola calendulacea</i>	Dune Fanflower			CR	✓				

Species Name	Common Name	Conservation Status#			Island				
		AUS	SA	ML	Granite	Wright	West	Pullen	Seal
<i>Scaevola crassifolia</i>	Cushion Fanflower			VU	✓				
<i>Senecio odoratus</i>	Broad-leaf Scented Groundsel			NT	✓				
<i>Senecio pinnatifolius</i>	Variable Groundsel			NT	✓		✓		
<i>Setaria constricta</i>	Knotty-butt Paspalidium			NT	✓				
<i>Spergularia marina</i>	Salt Sand-spurrey				✓		✓		
<i>Spinifex hirsutus</i>	Rolling Spinifex					✓			
<i>Sporobolus virginicus</i>	Salt Couch				✓				
<i>Suaeda australis</i>	Austral Seablite								
<i>Tetragonia implexicoma</i>	Bower Spinach				✓	✓	✓	✓	
<i>Tetragonia tetragioides</i>	New Zealand Spinach						✓		
<i>Themeda triandra</i>	Kangaroo Grass				✓				
<i>Threlkeldia diffusa</i>	Coast Bonefruit			NT	✓	✓		✓	
<i>Vittadinia cuneata</i>	Fuzzy New Holland Daisy								
<i>Vittadinia sp.</i>	New Holland Daisy								
<i>Wahlenbergia sp.</i>	Bluebell				✓				
<i>Wilsonia humilis var. humilis</i>	Silky Wilsonia								
<i>Wilsonia rotundifolia</i>	Round-leaf Wilsonia								

### #Conservation Status

**AUS = Australia EPBC Act 1999:** CR = Critically Endangered, EN = Endangered, VU = Vulnerable

**SA = South Australia NPW Act 1972:** E = Endangered, V = Vulnerable, R = Rare

**ML = Mount Lofty Botanical Region:** EN=Endangered, VU=Vulnerable, RA=Rare, NT= Near Threatened

### Weeds

Species Name	Common Name		Island				
			Granite	Wright	West	Pullen	Seal
* <i>Acacia cyclops</i>	Western Coastal Wattle		✓				
* <i>Acacia longifolia</i>	Coastal Wattle				✓		
* <i>Acacia nematophylla</i>	Coast Wallowa		✓				
* <i>Acacia saligna</i>	Golden Wreath Wattle		✓				
* <i>Acetosella vulgaris</i>	Sorrel		✓				
* <i>Agapanthus sp.</i>	Agapanthus		✓				
* <i>Aira asp.</i>			✓				
* <i>Allocasuarina striata</i>					✓		
* <i>Alternanthera pungens</i>	Khaki Weed		✓				
* <i>Amaryllis belladonna</i>	Belladonna Lily		✓				
* <i>Anagallis arvensis</i>	Pimpernel				✓		
* <i>Arctotheca calendula</i>	Cape Weed		✓	✓	✓		
* <i>Asparagus asparagoides</i>	Bridal Creeper	Declared	✓				
* <i>Asphodelus fistulosus</i>	Onion Weed						
* <i>Atriplex semibaccata</i>	Berry Saltbush				✓		
* <i>Avena barbata</i>	Bearded Oat		✓		✓		
* <i>Avena sativa</i>	Cultivated Oat						
* <i>Brassica tournefortii</i>	Wild Turnip		✓				
* <i>Bromus catharticus</i>	Prairie Grass				✓		
* <i>Bromus diandrus</i>	Great Brome		✓	✓	✓		
* <i>Bromus hordaceus</i>	Soft Brome		✓				

Species Name	Common Name		Island				
			Granite	Wright	West	Pullen	Seal
* <i>Bromus madritensis</i>	Compact Brome						
* <i>Bromus rubens</i>	Red Brome						
* <i>Budleja davidi</i>	Butterfly Bush		✓				
* <i>Cakile maritima ssp. maritima</i>	Two-horned Sea Rocket		✓	✓			
* <i>Callistemon sp.</i>			✓				
* <i>Cardamine flexuosa</i>	Wood Bitter-cress		✓				
* <i>Carpobrotus chilensis</i>	Angled Pigface						
* <i>Carpobrotus edulis</i>	Hottentot Fig		✓				
* <i>Casuarina glauca</i>	Swamp Oak		✓				
* <i>Cenchrus clandestinus</i>	Kikuyu		✓		✓		
* <i>Chenopodium album</i>	Fat Hen		✓	✓	✓		
* <i>Chenopodium glaucum</i>	Glaucous Goosefoot		✓				
* <i>Chenopodium murale</i>	Nettle-leaf Goosefoot		✓	✓	✓		
* <i>Chondrilla juncea</i>	Skeleton Weed				✓		
* <i>Cirsium vulgare</i>	Spear Thistle	Declared	✓				
* <i>Citrullus lanatus</i>	Wild Melon				✓		
* <i>Conyza bonariensis</i>	Flax-leaf Fleabane		✓				
* <i>Coprosma repens</i>	Mirror Bush		✓	✓	✓	✓	
* <i>Correa alba</i>	White Correa (Vic)				✓		
* <i>Cucumis myriocarus</i>	Paddy Melon				✓		
* <i>Cynodon dactylon</i>	Couch		✓				
* <i>Diosma sp.</i>	Diosma		✓				
* <i>Dipogon lignosus</i>	Lavatory Creeper		✓				
* <i>Diplotaxis muralis var. muralis</i>	Wall Rocket		✓				
* <i>Echium plantagineum</i>	Salvation Jane	Declared	✓		✓		
* <i>Ehrharta calycina</i>	Perennial Veldt Grass		✓				
* <i>Ehrharta longiflora</i>	Annual Veldt Grass		✓	✓	✓		
* <i>Emex australis</i>	Three-cornered Jack						
* <i>Erodium cicutarium</i>	Cut-leaf Heron's-bill			✓	✓		
* <i>Eucalyptus cladocalyx</i>	Sugar Gum		✓				
* <i>Eucalyptus gomphocephala</i>	Tuart Gum		✓		✓		
* <i>Eucalyptus landsdowneana</i>	Port Lincoln Mallee		✓				
* <i>Eucalyptus platypus</i>	Variable-leaf Mort		✓				
* <i>Euphorbia paralias</i>	Sea Spurge		✓	✓			
* <i>Euphorbia terracina</i>	False Caper	Declared	✓	✓			
* <i>Ficus macrophylla</i>	Morton Bay Fig		✓				
* <i>Foeniculum vulgare</i>	Fennel		✓				
* <i>Fumaria capreolata</i>	White-flower Fumitory			✓	✓		
* <i>Galenia pubescens var. pubescens</i>	Coastal Galenia				✓		
* <i>Galenia secunda</i>	Galenia						
* <i>Gomphocarpus cancellatus</i>	Broad-leaf Cotton-bush						
* <i>Gramineae sp.</i>				✓	✓		
* <i>Hakea drupacea</i>	Sweet Hakea		✓				
* <i>Hedypnois rhagadioloides</i>			✓				
* <i>Heliotropium europaeum</i>	Potato Weed		✓				
* <i>Hordeum leporinum</i>	Wall Barley-grass		✓		✓		
* <i>Hordeum marinum</i>	Sea Barley-grass		✓		✓		



Species Name	Common Name		Island					
			Granite	Wright	West	Pullen	Seal	
* <i>Hordeum sp.</i>	Barley-grass			✓				
* <i>Hypochaeris glabra</i>	Smooth Cat's Ear							
* <i>Hypochaeris radicata</i>	Rough Cat's Ear		✓					
* <i>Juncus acutus</i>	Sharp Rush				✓			
* <i>Lactuca serriola</i>	Prickly Lettuce		✓					
* <i>Lagunaria patersonii</i>	Pyramid Tree		✓		✓			
* <i>Lagurus ovatus</i>	Hare's Tail Grass		✓		✓			
* <i>Lepidium africanum</i>	Common Peppergrass		✓					
* <i>Leptospermum "Jervis Bay"</i>	Cultivar		✓					
* <i>Leptospermum laevigatum</i>	Coast Tea-tree		✓		✓			
* <i>Limonium companyonis</i>	Sea-lavender		✓					
* <i>Lolium loliaceum</i>	Rigid Ryegrass		✓					
* <i>Lolium sp.</i>	Ryegrass				✓			
* <i>Lycium ferocissimum</i>	African Boxthorn	Declared	✓	✓	✓	✓	✓	✓
* <i>Malva arborea</i>	Tree Mallow		✓	✓	✓	✓		
* <i>Malva parviflora</i>	Small-flower Marshmallow		✓		✓			
* <i>Marrubium vulgare</i>	Horehound		✓					
* <i>Medicago sp.</i>	Medic		✓					
* <i>Melaleuca nesophilla</i>	Showy Honey-myrtle		✓					
* <i>Mesembryanthemum crystallinum</i>	Common Iceplant			✓	✓			
* <i>Mesembryanthemum nodiflorum</i>	Slender Iceplant							
* <i>Moenchia erecta</i>	Erect Chickweed							
* <i>Moraea setifolia</i>	Thread Iris							
* <i>Nicotiana glauca</i>	Tree Tobacco							
* <i>Oenothera stricta ssp. stricta</i>	Common Evening Primrose							
* <i>Olea europaea</i>	Olive	Declared	✓					
* <i>Oxalis pes-caprae</i>	Soursob	Declared	✓	✓	✓			
* <i>Parapholis incurva</i>	Curly Ryegrass		✓		✓			
* <i>Paraserianthes lophantha</i>	Cape Leeuwin Wattle		✓					
* <i>Paspalum dilatatum</i>	Paspalum		✓					
* <i>Phoenix canariensis</i>	Canary Island Palm		✓		✓			
* <i>Pinus halepensis</i>	Aleppo Pine	Declared	✓					
* <i>Pinus sp.</i>	Pine		✓					
* <i>Piptathrum miliaceum</i>	Rice Millet		✓					
* <i>Plantago coronopus ssp. coronopus</i>	Bucks-horn Plantain		✓		✓			
* <i>Plantago lanceolata</i>	Ribwort		✓					
* <i>Poa annua</i>	Winter Grass				✓			
* <i>Polycarpon tetraphyllum</i>	Four-leaf Allseed		✓					
* <i>Polygala myrtifolia</i>	Myrtle-leaf Milkwort		✓					
* <i>Polygonum aviculare</i>	Wireweed		✓					
* <i>Polypogon monspeliensis</i>	Annual Beard-grass							
* <i>Populus alba</i>	White Poplar		✓					
* <i>Rapistrum rugosum</i>	Short-fruited Wild Turnip				✓			
* <i>Reichardia tingitana</i>	False Sowthistle		✓		✓			
* <i>Rhamnus alaternus</i>	Buckthorn		✓		✓			
* <i>Romulea minutiflora</i>	Small-flower Onion-grass		✓					

Species Name	Common Name	Island				
		Granite	Wright	West	Pullen	Seal
<i>*Romulea rosea var. australis</i>	Common Onion-grass	✓				
<i>*Sagina maritima</i>	Sea Pearlwort			✓		
<i>*Scabiosa atropurpurea</i>	Scabious	✓				
<i>*Senecio pterophorus</i>	African Daisy	✓				
<i>*Sisymbrium orientale</i>	Indian Hedge Mustard	✓				
<i>*Solanum linnaeanum</i>	Apple of Sodom	✓				
<i>*Solanum nigrum</i>	Black Nightshade	✓	✓			
<i>*Sonchus asper ssp. asper</i>	Rough Sow-thistle	✓				
<i>*Sonchus oleraceus</i>	Common Sow-thistle	✓	✓	✓		
<i>*Sporobolus africanus</i>	Rat's-tail Grass	✓				
<i>*Stellaria media</i>	Chickweed		✓			
<i>*Stenotaphrum secundatum</i>	Buffalo Grass	✓				
<i>*Tamarix aphylla</i>	Athel Tree	✓				
<i>*Tribulus terrestris</i>	Caltrop	✓				
<i>*Trifolium angustifolium</i>	Narrow-leaf Clover	✓				
<i>*Trifolium arvense</i>	Hare's-foot Clover	✓				
<i>*Trifolium campestre</i>	Hop Clover	✓		✓		
<i>*Trifolium sp.</i>	Clover			✓		
<i>*Urtica urens</i>	Small Nettle	✓	✓	✓		
<i>*Vicia sp.</i>	Vetch		✓			
<i>*Vulpia sp.</i>	Fescue	✓				
<i>*Yucca sp.</i>	Yucca	✓				



## **Appendix 2: Bird species list**



## Southern Fleurieu Islands, Bird Species Lists

Common name	Species	*Conservation Status			#Island					Flying past or in adjacent sea only	Total max. breeding pairs
		Aust	SA	MLR	Granite	Wright	West	Seal	Pullen		
*Common Blackbird	<i>Turdus merula</i>				s						
*Common Starling	<i>Sturnus vulgaris</i>				s	s	s		s		
*European Goldfinch	<i>Carduelis</i>				s						
*Rock Dove	<i>Columba livia</i>					s	s	s	s		
*Skylark	<i>Alauda arvensis</i>				s		x				
*Spotted Turtle dove	<i>Stigmatopelia chinensis</i>				s						
Arctic Jaeger	<i>Stercorarius parasiticus</i>	<b>M</b>			x		x	x		x	
Australasian Gannet	<i>Morus serrator</i>				s		s	s	x	x	
Australasian Pipit	<i>Anthus novaeseelandiae</i>						x				
Australian Hobby	<i>Falco longipennis</i>		<b>U</b>	<b>U</b>	s		x				
Australian Magpie	<i>Gymnorhina tibicen</i>				s						
Australian Pelican	<i>Pelecanus conspicillatus</i>				s						
Australian Shelduck	<i>Tadorna tadornoides</i>						x			x	
Banded Lapwing	<i>Vanellus tricolor</i>				x		x				
Barn Owl	<i>Tyto delicatula</i>				s						
Black Falcon	<i>Falco subniger</i>			<b>U</b>		x	x				
Black-browed Albatross	<i>Thalassarche melanophris</i>				x		x	x		x	
Black-faced Cormorant	<i>Phalacrocorax fuscescens</i>				s	s	s	s	s		50
Black-shouldered Kite	<i>Elanus axillaris</i>				s	x			s		
Brown Falcon	<i>Falco berigora</i>						s				
Brown Quail	<i>Coturnix ypsilophora</i>		<b>V</b>	<b>V</b>	s		s				
Brown Skua	<i>Stercorarius antarcticus</i>	<b>M</b>			x			x		x	
Buff-banded Rail	<i>Gallirallus philippensis</i>		<b>U</b>	<b>V</b>	s		s				
Cape Barren Goose	<i>Cereopsis novaehollandiae</i>		<b>R</b>	<b>R</b>	x		x		x		
Cape Petrel	<i>Daption capense</i>				x	x	x			x	
Caspian Tern	<i>Hydroprogne caspia</i>	<b>M</b>			s	x	s				200
Common Sandpiper	<i>Actitis hypoleucos</i>	<b>M</b>	<b>R</b>	<b>R</b>	s						
Crested Pigeon	<i>Ocyphaps lophotes</i>				s						

Common name	Species	*Conservation Status			#Island					Flying past or in adjacent sea only	Total max.breeding pairs
		Aust	SA	MLR	Granite	Wright	West	Seal	Pullen		
Crested Tern	<i>Thalasseus bergii</i>	M			s	s	s	s	s		2500
Eastern Reef Egret	<i>Egretta sacra</i>	M	R	V	x	s	x	s			1
Elegant Parrot	<i>Neophema elegans</i>		R	K	x	x	x				
Erect-crested Penguin	<i>Eudyptes sclateri</i>				x						
Fairy Tern	<i>Sternula nereis</i>		E	E		x	x	s			100
Fan-tailed Cuckoo	<i>Cacomantis flabelliformis</i>						s				
Fiordland Penguin	<i>Eudyptes pachyrhynchus</i>				x						
Fluttering Shearwater	<i>Puffinus gavia</i>							x		x	
Fork-tailed Swift	<i>Apus pacificus</i>	M					x			x	
Galah	<i>Eolophus roseicapilla</i>				s						
Glossy Black-Cockatoo	<i>Calytorhynchus lathami</i>	E	E	E	x						
Great Cormorant	<i>Phalacrocorax carbo</i>					x	x		x		
Great Egret	<i>Ardea alba</i>	M				s					
Kelp Gull	<i>Larus dominicanus</i>		R	R					x		
Little Black Cormorant	<i>Phalacrocorax sulcirostris</i>					x	s		s		
Little Corella	<i>Cacatua sanguinea</i>						x			x	
Little Penguin	<i>Eudyptula minor</i>				x	x	s	s	x		3300
Little Pied Cormorant	<i>Microcarbo melanoleucos</i>				s	s	s	s	s		
Little Raven	<i>Corvus mellori</i>				s		x				
Magpielark	<i>Grallina cyanoleuca</i>				x						
Masked Lapwing	<i>Vanellus miles</i>				s		s				
Mistletoebird	<i>Dicaeum hirundinaceum</i>				x		s				
Musk Duck	<i>Biziura lobata</i>		R	R			x			x	
Nankeen Kestrel	<i>Falco cenchroides</i>				s		s				
Nankeen Night Heron	<i>Nycticorax caledonicus</i>			U	x						
New Holland Honeyeater	<i>Phylidonyris novaehollandiae</i>				x						
Pacific Black Duck	<i>Anas superciliosa</i>				s		x				
Pacific Gull	<i>Larus pacificus</i>				s	s	s	s	s		10
Peregrine Falcon	<i>Falco peregrinus</i>		R	R	x	x	x		s		

Common name	Species	*Conservation Status			#Island					Flying past or in adjacent sea only	Total max. breeding pairs
		Aust	SA	MLR	Granite	Wright	West	Seal	Pullen		
Pied Cormorant	<i>Phalacrocorax varius</i>				s	x	s	s	x		10
Pomarine Jaeger	<i>Stercorarius pomarinus</i>	M					x			x	
Rainbow Lorikeet	<i>Trichoglossus haematodus</i>				s						
Rock Parrot	<i>Neophema petrophila</i>		R	R			s				
Short-tailed Shearwater	<i>Ardenna tenuirostris</i>	M				s	x			x	
Shy Albatross	<i>Diomedea cauta</i>						x			x	
Silver Gull	<i>Chroicocephalus novaehollandiae</i>				s	s	s	s	s		7200
Silvereye	<i>Zosterops lateralis</i>				s		s				
Singing Honeyeater	<i>Lichenostomus virescens</i>				s	s	s		s		
Sooty Oystercatcher	<i>Haematopus fuliginosus</i>		R	V	s	s	x		s		2
Southern Boobook	<i>Ninox boobook</i>				s	s					
Southern Giant Petrel	<i>Macronectes giganteus</i>	E			x		x	s		x	
Spiny-cheeked Honeyeater	<i>Acanthagenys rufogularis</i>						s				
Spotted Harrier	<i>Circus assimilis</i>					x					
Stubble Quail	<i>Coturnix pectoralis</i>				x						
Swamp Harrier	<i>Circus approximans</i>				x		x				
Tawny-crowned Honeyeater	<i>Gliciphila melanops</i>						s				
Tree Martin	<i>Petrochelidon nigricans</i>					x					
Wedge-tailed Eagle	<i>Aquila audax</i>						x				
Welcome Swallow	<i>Hirundo neoxena</i>				s						
White-bellied Sea-eagle	<i>Haliaeetus leucogaster</i>	M	V	E			s				
White-faced Heron	<i>Egretta novaehollandiae</i>					x	x				
White-fronted Tern	<i>Sterna striata</i>						x			?	
Willie Wagtail	<i>Rhipidura leucophrys</i>				x				s		
Wilson's Storm-petrel	<i>Oceanites oceanicus</i>				x					x	
Yellow-nosed Albatross	<i>Diomedea chlororhynchos</i>				x			x		x	
<b>TOTAL SPECIES</b>		<b>75</b>	<b>13</b>	<b>15</b>	<b>17</b>	<b>53</b>	<b>26</b>	<b>51</b>	<b>17</b>	<b>19</b>	<b>13373</b>
<b>*Conservation Status</b>											
U = Uncommon ; R = Rare; V = Vulnerable; E = Endangered; M = Migratory											



Common name	Species	*Conservation Status			#Island					Flying past or in adjacent sea only	Total max. breeding pairs
		Aust	SA	MLR	Granite	Wright	West	Seal	Pullen		
<b>#Island</b> s= present survey; x = previous survey											

## Survey methodology

Published and unpublished records were compiled, including newspaper reports. Unpublished records were sourced from several observers, including those of G. Carpenter since the 1980s, and lists uploaded by various observers to the Birdpedia and Eremaea birding websites.

Islands were surveyed at least twice during the survey period (Table 1). The surveys aimed in particular to detect breeding seabirds, for which further details are provided. T. Croft undertook the 9 December 2015 survey of West Island.

**Table 1: Bird surveys undertaken during the project, 2015-16.**

Site	Date	Type
Granite Island	19 Apr 2015	Land
Granite Island	11 Jun 2015	Land
Granite Island	17 Jul 2015	Land
Granite Island	11 Sep 2015	Land
Granite Island	3 Dec 2015	Land
Wright Island	29 Jun 2015	Land
Wright Island	3 Dec 2015	Land
West Island	3 Jun 2015	Land
West Island	9 Dec 2015	Land
Seal Rock	11 Jun 2015	Scope from Granite Is
Seal Rock	29 Jun 2015	Observation from boat
Seal Rock	17 Jul 2015	Scope from Granite Is

Site	Date	Type
Seal Rock	11 Sep 2015	Scope from Granite Is
Seal Rock	10 Feb 2016	Land
Pullen Island	11 Jun 2015	Scope from mainland
Pullen Island	29 Jun 2015	Scope from mainland
Pullen Island	11 Sep 2015	Scope from mainland
Pullen Island	3 Dec 2015	Scope from mainland
Pullen Island	10 Jan 2016	Land
Pullen Island	10 Feb 2016	Land

The term 'seabirds' is applied to birds that depend on the sea for part of their life, as adopted by Ross *et al* (1996). Copley (1996) includes an important review chapter on the status of South Australian species. Robinson *et al.* (1989) provided a description and a summary of fauna for islands across South Australia, including those in the study area.

This survey aims to provide further details of past bird records, plus new data on surveys conducted in 2015-16.



## **Appendix 3: BushRAT assessment results**



## BushRAT

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)<sup>118</sup>. The following is a simple overview of the contribution of different scoring components to the BushRAT overall score. Note: A low score indicates poor condition for that attribute, a high score indicates good condition. Thus a very high weed score means there are very few weeds, and a very low weed score means there is a profusion of threatening weeds.

### Vegetation Condition Scores (/80)

Vegetation condition component	Overview description
Native Plant Species Diversity (15)	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 (15)	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 (10)	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 (8)	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 (10)	The percentage of the total <i>vegetative biomass</i> of shrubs and groundcover plants < 2m high that is native is noted. This is then allocated a score from 0-10.
Bare Ground (3)	The percentage of the grounds surface that is truly bare is noted and allocated a score from 0-3.
Tree Health (5)	Average overall overstorey canopy health is allocated to a category, and then a score from 0-5. NOTE: NOT SCORED FOR COASTAL SHRUBLAND VEGETATION.
Tree Hollows (5)	This score relates to the number of small and large tree hollows present, with a rating of 0-5. NOTE: NOT SCORED FOR COASTAL SHRUBLAND VEGETATION.
Fallen timber (5)	This score relates to the amount of branch and trunk sized logs present, with a rating of 0-5. NOTE: NOT SCORED FOR COASTAL SHRUBLAND VEGETATION.
Grazing Evidence (4)	This score relates to evidence of grazing pressure, including pugging, compacting and chewing. The score is from 0-4.

### Weed cover ratings

Cover Rating	
not many, cover <1%	<b>1</b>
Plentiful, cover <1%	<b>1a</b>
Covering 1 - 5%	<b>2</b>
Covering 5 – 25%	<b>3</b>
Covering 26 –50%	<b>4</b>
Covering 51 – 75%	<b>5</b>
Covering > 75%	<b>6</b>

<sup>118</sup> DEWNR (2012) NVBMU BushRAT assessment and scoring Manual. Unpublished document, Department for Environment, Water and Natural Resources, Waite.

**Granite Island Site 1: *Dianella brevicaulis*, *Lepidosperma gladiatum*, *Ficinia nodosa* Open Sedgeland over *\*Bromus diandrus*, *\*Lagurus ovatus*, *Tetragonia implexicoma***

**Date of assessment:** 11/6/15 & 3/12/15

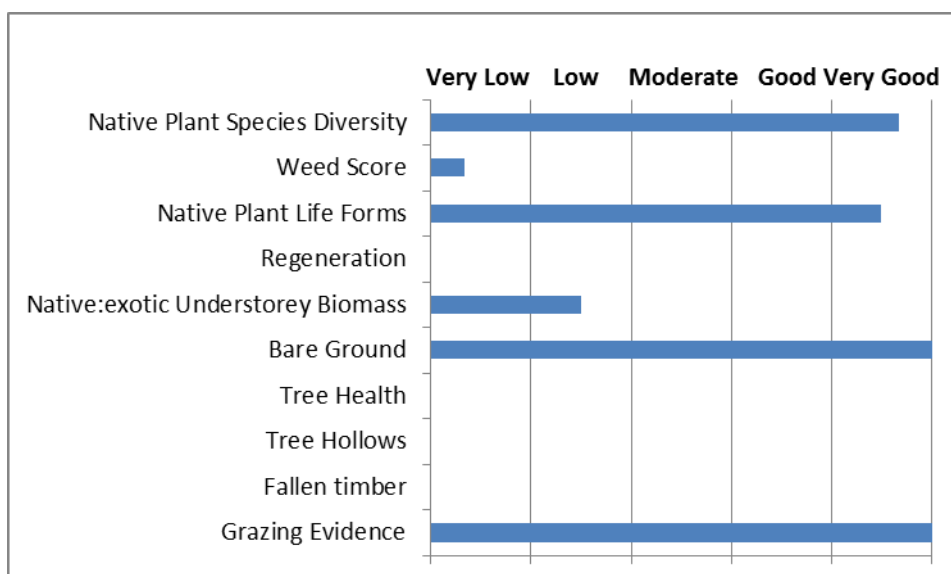
**GPS Location of Photograph:** 285302 6061627 **Direction:** West

**Benchmark Vegetation Community Type:** SMLR Co 7.2 Coastal Shrublands and Tall Shrublands

**Site photograph:**



**Scores for Individual BushRAT Components:**



**BushRAT score sheet**

<b>SITE: Granite Island Community 1</b>	
<b>DESCRIPTION: Dianella brevicaulis, Lepidosperma gladiatum, Ficinia nodosa Open Sedgeland over Bromus diandrus, Lagurus ovatus, Tetragonia implexicoma</b>	
<b>VEGETATION CONDITION SCORE</b> (max. in	<b>score</b>
Native Plant Species Diversity (15)	14
Weed Score (15)	1
Native Plant Life Forms (10)	9
Regeneration (8)	0
Native:exotic Understorey Biomass (10)	3
Bare Ground (3)	3
Tree Health (5)	0
Hollow-bearing trees (5)	0
Fallen timber/debris (5)	0
Grazing Evidence (4)	4
<b>TOTAL (ADD UP ALL POINTS)</b>	<b>34</b>
If community is naturally treeless x TOTAL by 1.23	41.82
If community is not benchmarked for regen x 1.11	
<b>ADJUSTED TOTAL SCORE</b>	<b>41.82</b>

**Native Plant Species List**

Species Name	Common Name	Conservation Status		
		AUS	SA	AMLR
<i>Atriplex cinerea</i>	Coast Saltbush			
<i>Austrostipa flavescens</i>	Coast Spear-grass			
<i>Austrostipa sp.</i>				
<i>Calostemma purpureum</i>	Pink Garland-lily			
<i>Carpobrotus rossii</i>	Native Pigface			
<i>Dianella brevicaulis</i>	Short-stem Flax-lily			NT
<i>Dichondra repens</i>	Kidney Weed			
<i>Disphyma crassifolium ssp. clavellatum</i>	Round-leaf Pigface			
<i>Distichlis distichophylla</i>	Emu-grass			
<i>Dodonaea viscosa ssp. angustissima</i>	Narrow-leaf Hop-bush			RA
<i>Einadia nutans ssp. nutans</i>	Climbing Saltbush			
<i>Enchylaena tomentosa var. tomentosa</i>	Ruby Saltbush			
<i>Ficinia nodosa</i>	Knobby Club-rush			
<i>Geranium sp.</i>	Austral Geranium			
<i>Goodenia amplexans</i>	Clasping Goodenia			
<i>Kennedia prostrata</i>	Scarlet Runner			
<i>Leiocarpa supina</i>	Coast Plover-daisy			RA
<i>Lepidosperma congestum</i>				NT



Species Name	Common Name	Conservation Status		
		AUS	SA	AMLR
<i>Lepidosperma gladiatum</i>	Coast Sword-sedge			RA
<i>Lepidosperma viscidum</i>	Sticky Sword-sedge			NT
<i>Leucophyta brownii</i>	Coast Cushion Bush			NT
<i>Muehlenbeckia gunnii</i>	Coastal Climbing Lignum			
<i>Myoporum insulare</i>	Common Boobialla			NT
<i>Olearia axillaris</i>	Coast Daisy-bush			NT
<i>Pimelea serpyllifolia ssp. serpyllifolia</i>	Thyme Riceflower			NT
<i>Poa poiformis var. poiformis</i>	Coast Tussock-grass			
<i>Rhagodia candolleana ssp. candolleana</i>	Sea-berry Saltbush			
<i>Senecio odoratus</i>	Scented Groundsel			NT
<i>Tetragonia implexicoma</i>	Bower Spinach			

**Weed List:**

Species Name	Common Name	Cover
<i>Avena barbata</i>	Bearded Oat	1a
<i>Brassica tournefortii</i>	Wild Turnip	2
<i>Bromus diandrus</i>	Great Brome	4
<i>Carpobrotus edulis ssp. edulis</i>	Hottentot Fig	1a
<i>Coprosma repens</i>	New Zealand Mirro-bush	1
<i>Ehrharta calycina</i>	Perennial Veldt Grass	3
<i>Ehrharta longiflora</i>	Annual Veldt Grass	1a
<i>Euphorbia terracina</i>	False Caper	3
<i>Lagunaria patersonii</i>	Pyramid Tree	1
<i>Lagurus ovatus</i>	Hare's Tail Grass	3
<i>Leontodon rhagadioloides</i>	Cretan Weed	1
<i>Lepidium africanum</i>	Common Peppercross	1a
<i>Lolium sp.</i>	Perennial Ryegrass	1a
<i>Malva parviflora</i>	Small-flower Marshmallow	1
<i>Medicago sp.</i>		1a
<i>Olea europeae</i>	Olive	1
<i>Oxalis pes-caprae</i>	Soursob	2
<i>Plantago coronopus ssp. coronopus</i>	Bucks-horn Plantain	2
<i>Senecio pterophorus</i>	African Daisy	1a
<i>Sonchus oleraceus</i>	Common Sow-thistle	1a
<i>Stenotaphrum secundatum</i>	Buffalo Grass	4
<i>Trifolium campestre</i>	Hop Clover	1a

**Granite Island Site 2: *Myoporum insulare*, *Acacia sophorae* +/- *Olearia axillaris* Tall Open Shrubland**

**Date of assessment:** 11/6/15 & 3/12/15

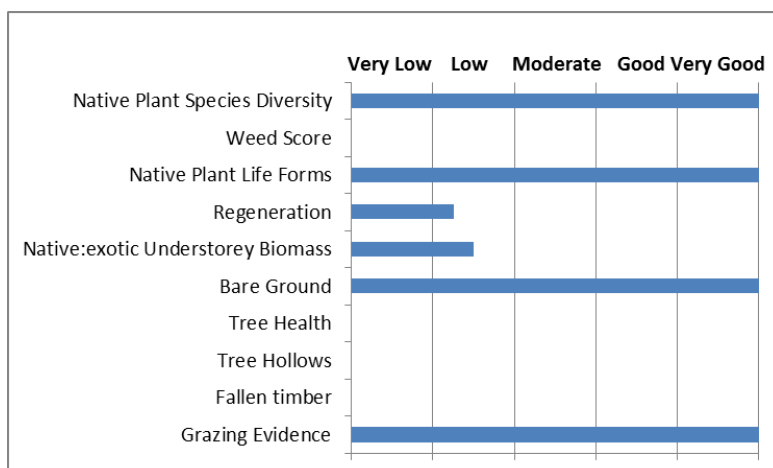
**GPS Location of Photograph:** 284986 6061760 **Direction:** South-east

**Benchmark Vegetation Community Type:** SMLR Co 7.2 Coastal Shrublands and Tall Shrublands

**Site photograph:**



**Scores for Individual BushRAT Components:**



## BushRAT score sheet

<b>SITE: Granite Island Community 2</b>	
<b>DESCRIPTION: Myoporum insulare, Acacia sophorae +/- Olearia axillaris Tall Open Shrubland</b>	
<b>VEGETATION CONDITION SCORE</b> (max. in	<b>score</b>
Native Plant Species Diversity (15)	15
Weed Score (15)	0
Native Plant Life Forms (10)	10
Regeneration (8)	2
Native:exotic Understorey Biomass (10)	3
Bare Ground (3)	3
Tree Health (5)	0
Hollow-bearing trees (5)	0
Fallen timber/debris (5)	0
Grazing Evidence (4)	4
<b>TOTAL (ADD UP ALL POINTS)</b>	<b>37</b>
If community is naturally treeless x TOTAL by 1.23	47.36
If community is not benchmarked for regen x 1.11	
<b>ADJUSTED TOTAL SCORE</b>	<b>47.36</b>

## Native Plant Species List

Species Name	Common Name	Conservation Status		
		AUS	SA	AMLR
<i>Acacia longifolia ssp. sophorae</i>	Coastal Wattle			
<i>Allocasuarina verticillata</i>	Drooping Sheoak			
<i>Atriplex cinerea</i>	Coast Saltbush			
<i>Atriplex semibaccata</i>	Berry Saltbush			
<i>Austrostipa flavescens</i>	Coast Spear-grass			
<i>Austrostipa sp.</i>				
<i>Calostemma purpureum</i>	Pink Garland-lily			
<i>Carpobrotus rossii</i>	Native Pigface			
<i>Correa alba var. pannosa</i>	White Correa		Rare	VU
<i>Dianella brevicaulis</i>	Short-stem Flax-lily			NT
<i>Dichondra repens</i>	Kidney Weed			
<i>Disphyma crassifolium ssp. clavellatum</i>	Round-leaf Pigface			
<i>Distichlis distichophylla</i>	Emu-grass			
<i>Einadia nutans ssp. nutans</i>	Climbing Saltbush			
<i>Enchylaena tomentosa var. tomentosa</i>	Ruby Saltbush			
<i>Ficinia nodosa</i>	Knobby Club-rush			
<i>Goodenia amplexans</i>	Clasping Goodenia			
<i>Goodenia varia</i>	Sticky Goodenia			NT
<i>Hakea rugosa</i>	Dwarf Hakea			RA

Species Name	Common Name	Conservation Status		
		AUS	SA	AMLR
<i>Kunzea pomifera</i>	Muntries			
<i>Leiocarpa supina</i>	Coast Plover-daisy			RA
<i>Lepidosperma gladiatum</i>	Coast Sword-sedge			RA
<i>Lepidosperma viscidum</i>	Sticky Sword-sedge			NT
<i>Leucophyta brownii</i>	Coast Cushion Bush			NT
<i>Melaleuca halmaturorum</i>	Swamp Paper-bark			EN
<i>Myoporum insulare</i>	Common Boobialla			NT
<i>Olearia axillaris</i>	Coast Daisy-bush			NT
<i>Poa poiformis</i> var. <i>poiformis</i>	Coast Tussock-grass			
<i>Rhagodia candolleana</i> ssp. <i>candolleana</i>	Sea-berry Saltbush			
<i>Salsola australis</i>	Buckbush			
<i>Senecio odoratus</i>	Scented Groundsel			NT
<i>Sporobolus virginicus</i>	Salt Couch			
<i>Tetragonia implexicoma</i>	Bower Spinach			

**Weed List:**

Species Name	Common Name	Cover
<i>Arctotheca calendula</i>	Cape Weed	1a
<i>Avena barbata</i>	Bearded Oat	3
<i>Brassica tournefortii</i>	Wild Turnip	1a
<i>Bromus diandrus</i>	Great Brome	2
<i>Carpobrotus edulis</i> ssp. <i>edulis</i>	Hottentot Fig	2
<i>Cenchrus clandestinum</i>	Kikuyu	2
<i>Coprosma repens</i>	New Zealand Mirror-bush	1
<i>Ehrharta calycina</i>	Perennial Veldt Grass	4
<i>Ehrharta longiflora</i>	Annual Veldt Grass	1a
<i>Euphorbia terracina</i>	False Caper	1a
<i>Lagurus ovatus</i>	Hare's Tail Grass	2
<i>Leontodon rhagadioloides</i>	Cretan Weed	1a
<i>Medicago</i> sp.		1a
<i>Oxalis pes-caprae</i>	Soursob	3
<i>Plantago coronopus</i> ssp. <i>coronopus</i>	Bucks-horn Plantain	1a
<i>Reichardia tingitana</i>	False Sowthistle	1
<i>Romulea rosea</i> var. <i>australis</i>	Common Onion-grass	1a
<i>Scabiosa atropurpurea</i>	Pincushion	1a
<i>Senecio pterophorus</i>	African Daisy	1a
<i>Solanum linnaeanum</i>	Apple Of Sodom	1
<i>Solanum nigrum</i>	Black Nightshade	1
<i>Sonchus oleraceus</i>	Common Sow-thistle	1
<i>Stenotaphrum secundatum</i>	Buffalo Grass	2

<b>Species Name</b>	<b>Common Name</b>	<b>Cover</b>
<i>Trifolium angustifolium</i>	Narrow-leaf Clover	1a
<i>Trifolium arvense var. arvense</i>	Hare's-foot Clover	1a
<i>Trifolium campestre</i>	Hop Clover	1a
<i>Vulpia sp.</i>	Wall Fescue	1

**Granite Island Site 3: *Ehrharta calycina*, *Themeda triandra*, *Poa poiformis*, *Lomandra densiflora* Grassland**

**Date of assessment:** 11/6/15 & 3/12/15

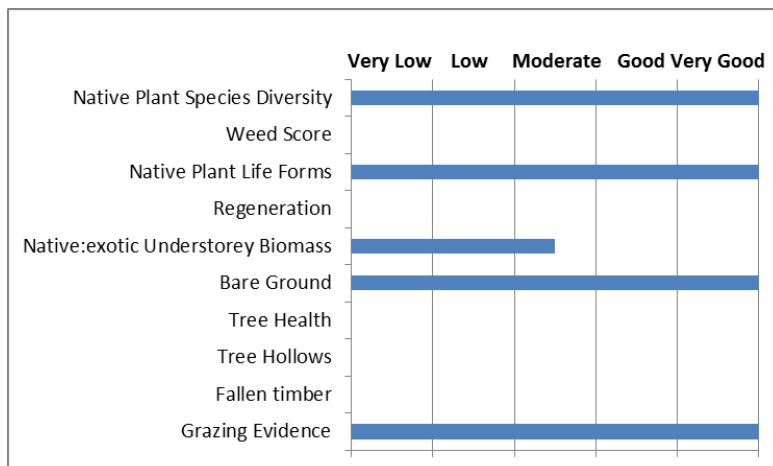
**GPS Location of Photograph:** 285349 606179 **Direction:** East

**Benchmark Vegetation Community Type:** SMLR Co 7.1 Coastal Tussock Grasslands

**Site photograph:**



**Scores for Individual BushRAT Components:**



**BushRAT score sheet**

<b>SITE: Granite Island Community 3</b>	
<b>DESCRIPTION: Ehrharta calycina, Themeda triandra, Poa poiformis, Lomandra densiflora Grassland</b>	
<b>VEGETATION CONDITION SCORE</b> (max. in	<b>score</b>
<b>Native Plant Species Diversity (15)</b>	15
<b>Weed Score (15)</b>	0
<b>Native Plant Life Forms (10)</b>	10
<b>Regeneration (8)</b>	0
Native:exotic Understorey Biomass (10)	5
Bare Ground (3)	3
Tree Health (5)	0
Hollow-bearing trees (5)	0
Fallen timber/debris (5)	0
Grazing Evidence (4)	4
<b>TOTAL (ADD UP ALL POINTS)</b>	<b>37</b>
If community is naturally treeless x TOTAL by 1.23	45.51
If community is not benchmarked for regen x 1.11	
<b>ADJUSTED TOTAL SCORE</b>	<b>45.51</b>

**Native Plant Species List**

Species Name	Common Name	Conservation Status		
		AUS	SA	AMLR
<i>Acacia longifolia ssp. sophorae</i>	Coastal Wattle			
<i>Acaena sp.</i>				
<i>Allocasuarina verticillata</i>	Drooping Sheoak			
<i>Arthropodium strictum</i>	Common Vanilla-lily			
<i>Austrostipa sp.</i>				
<i>Calostemma purpureum</i>	Pink Garland-lily			
<i>Cheilanthes austrotenuifolia</i>	Annual Rock-fern			
<i>Chrysocephalum apiculatum</i>	Common Everlasting			
<i>Dianella brevicaulis</i>	Short-stem Flax-lily			NT
<i>Distichlis distichophylla</i>	Emu-grass			
<i>Einadia nutans ssp. nutans</i>	Climbing Saltbush			
<i>Enchylaena tomentosa var. tomentosa</i>	Ruby Saltbush			
<i>Ficinia nodosa</i>	Knobby Club-rush			
<i>Geranium sp.</i>	Austral Geranium			
<i>Juncus subsecundus</i>	Finger Rush			NT
<i>Lepidosperma congestum</i>				NT
<i>Lepidosperma gladiatum</i>	Coast Sword-sedge			RA
<i>Lepidosperma viscidum</i>	Sticky Sword-sedge			NT
<i>Lomandra densiflora</i>	Soft Tussock Mat-rush			

Species Name	Common Name	Conservation Status		
		AUS	SA	AMLR
<i>Lotus australis</i>	Austral Trefoil			NT
<i>Muehlenbeckia gunnii</i>	Coastal Climbing Lignum			
<i>Myoporum insulare</i>	Common Boobialla			NT
<i>Olearia axillaris</i>	Coast Daisy-bush			NT
<i>Pimelea humilis</i>	Low Riceflower			
<i>Poa poiformis</i> var. <i>poiformis</i>	Coast Tussock-grass			
<i>Sporobolus virginicus</i>	Salt Couch			
<i>Tetragonia implexicoma</i>	Bower Spinach			
<i>Themeda triandra</i>	Kangaroo Grass			
<i>Wahlenbergia</i> sp.				

**Weed List:**

Species Name	Common Name	Cover
<i>Aira cupaniana</i>	Small Hair-grass	1
<i>Arctotheca calendula</i>	Cape Weed	1a
<i>Asparagus asparagoides</i> f. <i>asparagoides</i>	Bridal Creeper	1
<i>Avena barbata</i>	Bearded Oat	2
<i>Brassica tournefortii</i>	Wild Turnip	1a
<i>Cirsium vulgare</i>	Spear Thistle	1a
<i>Conyza bonariensis</i>	Flax-leaf Fleabane	2
<i>Coprosma repens</i>	New Zealand Mirro-bush	1
<i>Ehrharta calycina</i>	Perennial Veldt Grass	4
<i>Ehrharta erecta</i>	Panic Veldt Grass	1a
<i>Euphorbia terracina</i>	False Caper	2
<i>Hypochaeris radicata</i>	Rough Cat's Ear	1
<i>Lagurus ovatus</i>	Hare's Tail Grass	1a
<i>Leontodon rhagadioloides</i>	Cretan Weed	1
<i>Leptospermum laevigatum</i>	Coast Tea-tree	1a
<i>Oxalis pes-caprae</i>	Soursob	1a
<i>Scabiosa atropurpurea</i>	Pincushion	1a
<i>Senecio pterophorus</i>	African Daisy	1a
<i>Solanum linnaeanum</i>	Apple of Sodom	1
<i>Trifolium</i> sp.	Clover	1a



**Granite Island Site 4: *Allocasuarina verticillata* Woodland**

**Date of assessment:** 11/6/15 & 3/12/15

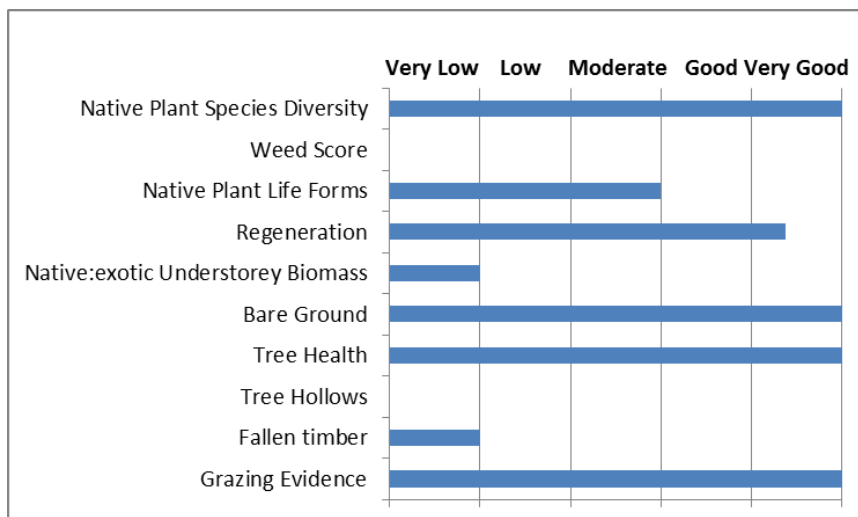
**GPS Location of Photograph:** 285153 6061930 **Direction:** East

**Benchmark Vegetation Community Type:** SMLR Co 7.31 Non-eucalypt Coastal Low Woodlands

**Site photograph:**



**Scores for Individual BushRAT Components:**



**BushRAT score sheet**

<b>SITE: Granite Island Community 4</b>	
<b>DESCRIPTION: Allocasuarina verticillata Woodland</b>	
<b>VEGETATION CONDITION SCORE</b> (max. in	<b>score</b>
<b>Native Plant Species Diversity (15)</b>	15
<b>Weed Score (15)</b>	0
<b>Native Plant Life Forms (10)</b>	6
<b>Regeneration (8)</b>	7
Native:exotic Understorey Biomass (10)	2
Bare Ground (3)	3
Tree Health (5)	5
Hollow-bearing trees (5)	0
Fallen timber/debris (5)	1
Grazing Evidence (4)	4
<b>TOTAL (ADD UP ALL POINTS)</b>	43
If community is naturally treeless x TOTAL by 1.23	
If community is not benchmarked for regen x 1.11	
<b>ADJUSTED TOTAL SCORE</b>	43

**Native Plant Species List**

Species Name	Common Name	Conservation Status		
		AUS	SA	AMLR
<i>Acacia longifolia ssp. sophorae</i>	Coastal Wattle			
<i>Acacia paradoxa</i>	Kangaroo Thorn			
<i>Allocasuarina verticillata</i>	Drooping Sheoak			
<i>Atriplex cinerea</i>	Coast Saltbush			
<i>Austrostipa curticaoma</i>	Short-crest Spear-grass			
<i>Austrostipa sp.</i>				
<i>Calostemma purpureum</i>	Pink Garland-lily			
<i>Chrysocephalum apiculatum</i>	Common Everlasting			
<i>Correa alba var. pannosa</i>	White Correa		Rare	VU
<i>Dianella brevicaulis</i>	Short-stem Flax-lily			NT
<i>Dodonaea viscosa ssp. angustissima</i>	Narrow-leaf Hop-bush			RA
<i>Enchylaena tomentosa var. tomentosa</i>	Ruby Saltbush			
<i>Eucalyptus cosmophylla</i>	Cup Gum			
<i>Eucalyptus leucoxylon ssp. leucoxylon</i>	South Australian Blue Gum			NT
<i>Goodenia amplexans</i>	Clasping Goodenia			
<i>Lepidosperma viscidum</i>	Sticky Sword-sedge			NT
<i>Leucophyta brownii</i>	Coast Cushion Bush			NT
<i>Lomandra densiflora</i>	Soft Tussock Mat-rush			
<i>Myoporum insulare</i>	Common Boobiolla			NT
<i>Olearia axillaris</i>	Coast Daisy-bush			NT

Species Name	Common Name	Conservation Status		
		AUS	SA	AMLR
<i>Poa poiformis</i> var. <i>poiformis</i>	Coast Tussock-grass			
<i>Rhagodia candolleana</i> ssp. <i>candolleana</i>	Sea-berry Saltbush			
<i>Rytidosperma setaceum</i>	Small-flower Wallaby-grass			
<i>Scaevola albida</i>	Pale Fanflower			
<i>Setaria constricta</i>	Knotty-butt Paspalidium			NT
<i>Sporobolus virginicus</i>	Salt Couch			
<i>Tetragonia implexicoma</i>	Bower Spinach			

**Weed List:**

Species Name	Common Name	Cover
<i>Acacia cyclops</i>	Western Coastal Wattle	1
<i>Amaryllis belladonna</i>	Belladonna Lily	1
<i>Arctotheca calendula</i>	Cape Weed	1a
<i>Avena barbata</i>	Bearded Oat	2
<i>Brassica tournefortii</i>	Wild Turnip	1a
<i>Bromus diandrus</i>	Great Brome	2
<i>Cenchrus clandestinus</i>	Kikuyu	1a
<i>Diosma</i> sp.	Diosma	1
<i>Ehrharta calycina</i>	Perennial Veldt Grass	4
<i>Ehrharta longiflora</i>	Annual Veldt Grass	1a
<i>Eucalyptus</i> sp.		1a
<i>Ficus macrophylla</i>	Morton Bay Fig	1a
<i>Hordeum leporinum</i>	Wall Barley-grass	1a
<i>Lagurus ovatus</i>	Hare's Tail Grass	3
<i>Leptospermum laevigatum</i>	Coastal Tea-tree	1
<i>Lycium ferocissimum</i>	Boxthorn	1
<i>Melaleuca nesophila</i>		1
<i>Moraea setifolia</i>	Thread Iris	1a
<i>Olea europaea</i>	Olive	1
<i>Oxalis pes-caprae</i>	Soursob	4
<i>Paspalum dilatatum</i>	Paspalum	1a
<i>Pinus halepensis</i>	Aleppo Pine	1
<i>Senecio pterophorus</i>	African Daisy	2
<i>Solanum nigrum</i>	Black Nightshade	1
<i>Stenotaphrum secundatum</i>	Buffalo Grass	1a
<i>Trifolium campestre</i>	Hop Clover	1a
<i>Vulpia</i> sp.	Wall Fescue	3
<i>Podalyria sericea</i>	Cape Satin Bush	1

**Granite Island Site 5: *Melaleuca halmaturorum* Very Low Woodland**

**Date of assessment:** 11/6/15 & 3/12/15

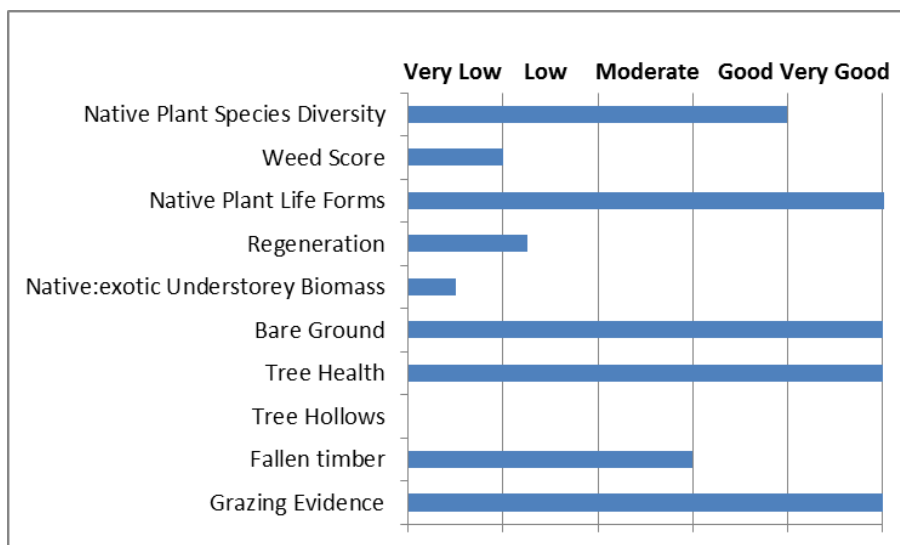
**GPS Location of Photograph:** 285281 6061791 **Direction:** West

**Benchmark Vegetation Community Type:** SMLR Co 7.31 Non-eucalypt Coastal Low Woodlands

**Site photograph:**



**Scores for Individual BushRAT Components:**



**BushRAT score sheet**

<b>SITE: Granite Island Community 5</b>	
<b>DESCRIPTION: Melaleuca halmaturorum Very Low Woodland</b>	
<b>VEGETATION CONDITION SCORE</b> (max. in	<b>score</b>
<b>Native Plant Species Diversity (15)</b>	12
<b>Weed Score (15)</b>	2
<b>Native Plant Life Forms (10)</b>	11
<b>Regeneration (8)</b>	2
Native:exotic Understorey Biomass (10)	1
Bare Ground (3)	3
Tree Health (5)	5
Hollow-bearing trees (5)	0
Fallen timber/debris (5)	3
Grazing Evidence (4)	4
<b>TOTAL (ADD UP ALL POINTS)</b>	<b>43</b>
If community is naturally treeless x TOTAL by 1.23	
If community is not benchmarked for regen x 1.11	
<b>ADJUSTED TOTAL SCORE</b>	<b>43</b>

**Native Plant Species List**

Species Name	Common Name	Conservation Status		
		AUS	SA	AMLR
<i>Acacia longifolia ssp. sophorae</i>	Coastal Wattle			
<i>Allocasuarina verticillata</i>	Drooping Sheoak			
<i>Dianella brevicaulis</i>	Short-stem Flax-lily			NT
<i>Dianella longifolia var. grandis</i>	Pale Flax-lily		Rare	VU
<i>Enchylaena tomentosa var. tomentosa</i>	Ruby Saltbush			
<i>Lomandra densiflora</i>	Soft Tussock Mat-rush			
<i>Melaleuca halmaturorum</i>	Swamp Paper-bark			EN
<i>Poa poiformis var. poiformis</i>	Coast Tussock-grass			
<i>Rhagodia candolleana ssp. candolleana</i>	Sea-berry Saltbush			
<i>Rytidosperma racemosum var. racemosum</i>	Slender Wallaby-grass			
<i>Tetragonia implexicoma</i>	Bower Spinach			

**Weed List**

Species Name	Common Name	Cover
<i>Acacia saligna</i>	Sallow Wattle	1
<i>Aira cupaniana</i>	Small Hair-grass	1a
<i>Asparagus asparagoides</i>	Bridal Creeper	1a
<i>Bromus diandrus</i>	Great Brome	1a
<i>Ehrharta calycina</i>	Perennial Veldt Grass	5

<b>Species Name</b>	<b>Common Name</b>	<b>Cover</b>
<i>Ehrharta longiflora</i>	Annual Veldt Grass	1a
<i>Euphorbia sp.</i>		1
<i>Hypochaeris radicata</i>	Rough Cat's Ear	1a
<i>Lagurus ovatus</i>	Hare's Tail Grass	1a
<i>Leptospermum laevigatum</i>	Coastal Tea-tree	1
<i>Olea europaea</i>	Olive	1
<i>Senecio pterophorus</i>	African Daisy	1a
<i>Trifolium angustifolium</i>	Narrow-leaf Clover	1a
<i>Trifolium arvense var. arvense</i>	Hare's-foot Clover	1a
<i>Vulpia sp.</i>	Wall Fescue	2

**Granite Island Site 6: *Myoporum insulare*, *Atriplex cinerea*, *Leucophyta brownii* Low Open Shrubland on exposed boulder-strewn south facing slope**

**Date of assessment:** 11/6/15 & 3/12/15

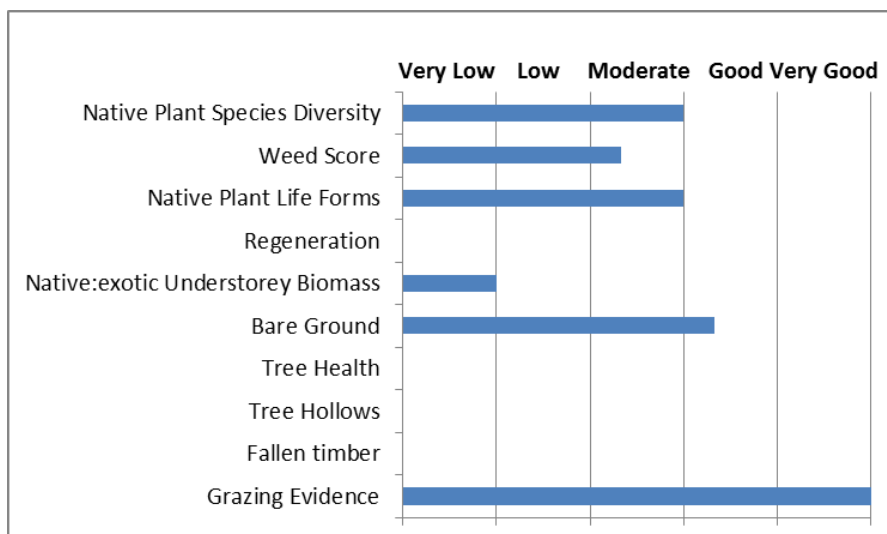
**GPS Location of Photograph:** 285461 6061783 **Direction:** East

**Benchmark Vegetation Community Type:** SMLR Co 7.2 Coastal Shrublands and Tall Shrublands

**Site photograph:**



**Scores for Individual BushRAT Components:**



**BushRAT score sheet**

<b>SITE: Granite Island Community 6</b>	
<b>DESCRIPTION: Myoporum insulare, Atriplex cinerea, Leucophyta brownii Low Open Shrubland on exposed boulder-strewn south facing slope</b>	
<b>VEGETATION CONDITION SCORE</b> (max. in	<b>score</b>
Native Plant Species Diversity (15)	9
Weed Score (15)	7
Native Plant Life Forms (10)	6
Regeneration (8)	0
Native:exotic Understorey Biomass (10)	2
Bare Ground (3)	2
Tree Health (5)	0
Hollow-bearing trees (5)	0
Fallen timber/debris (5)	0
Grazing Evidence (4)	4
<b>TOTAL (ADD UP ALL POINTS)</b>	30
If community is naturally treeless x TOTAL by 1.23	36.9
If community is not benchmarked for regen x 1.11	
<b>ADJUSTED TOTAL SCORE</b>	36.9

**Native Plant Species List**

Species Name	Common Name	Conservation Status		
		AUS	SA	AMLR
<i>Atriplex cinerea</i>	Coast Saltbush			
<i>Dianella brevicaulis</i>	Short-stem Flax-lily			NT
<i>Disphyma crassifolium ssp. clavellatum</i>	Round-leaf Pigface			
<i>Distichlis distichophylla</i>	Emu-grass			
<i>Enchylaena tomentosa var. tomentosa</i>	Ruby Saltbush			
<i>Ficinia nodosa</i>	Knobby Club-rush			
<i>Leiocarpa supina</i>	Coast Plover-daisy			RA
<i>Leucophyta brownii</i>	Coast Cushion Bush			NT
<i>Myoporum insulare</i>	Common Boobialla			NT
<i>Olearia axillaris</i>	Coast Daisy-bush			NT
<i>Poa poiformis var. poiformis</i>	Coast Tussock-grass			
<i>Rhagodia candolleana ssp. candolleana</i>	Sea-berry Saltbush			
<i>Rytidosperma racemosum var. racemosum</i>	Slender Wallaby-grass			
<i>Tetragonia implexicoma</i>	Bower Spinach			

**Weed List:**

Species Name	Common Name	Cover



<b>Species Name</b>	<b>Common Name</b>	<b>Cover</b>
<i>Bromus diandrus</i>	Great Brome	2
<i>Coprosma repens</i>	New Zealand Mirror-bush	1a
<i>Lagurus ovatus</i>	Hare's Tail Grass	2
<i>Plantago coronopus ssp. coronopus</i>	Bucks-horn Plantain	2
<i>Sonchus oleraceus</i>	Common Sow-thistle	1
<i>Stenotaphrum secundatum</i>	Buffalo Grass	2
<i>Trifolium angustifolium</i>	Narrow-leaf Clover	2
<i>Vulpia sp.</i>	Wall Fescue	2

**Granite Island Site 7: *Allocasuarina verticillata*, *\*Ficus macrophylla* Low Woodland**

**Date of assessment:** 10/2/2016

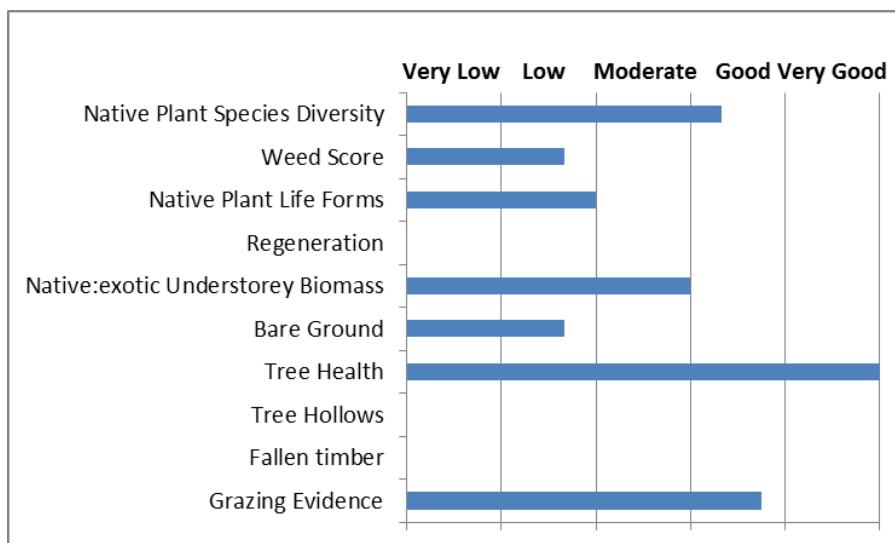
**GPS Location of Photograph:** 285151 6061987 **Direction:** South

**Benchmark Vegetation Community Type:** SMLR Co 7.31 Non-eucalypt Coastal Low Woodlands

**Site photograph:**



**Scores for Individual BushRAT Components:**



**BushRAT score sheet**

<b>SITE: Granite Island Community 7</b>	
<b>DESCRIPTION: Allocasuarina verticillata, *Ficus macrophylla Low Woodland</b>	
<b>VEGETATION CONDITION SCORE</b> (max. in	<b>score</b>
<b>Native Plant Species Diversity (15)</b>	10
<b>Weed Score (15)</b>	5
<b>Native Plant Life Forms (10)</b>	4
<b>Regeneration (8)</b>	0
Native:exotic Understorey Biomass (10)	6
Bare Ground (3)	1
Tree Health (5)	5
Hollow-bearing trees (5)	0
Fallen timber/debris (5)	0
Grazing Evidence (4)	3
<b>TOTAL (ADD UP ALL POINTS)</b>	34
If community is naturally treeless x TOTAL by 1.23	
If community is not benchmarked for regen x 1.11	
<b>ADJUSTED TOTAL SCORE</b>	34

**Native Plant Species List**

Species Name	Common Name	Conservation Status		
		AUS	SA	AMLR
<i>Acacia longifolia</i> var. <i>sophorae</i>	Coastal Wattle			
<i>Acacia paradoxa</i>	Kangaroo Thorn			
<i>Allocasuarina verticillata</i>	Drooping Sheoak			
<i>Atriplex cinerea</i>	Coast Saltbush			
<i>Calostemma purpureum</i>	Pink Garland-lily			
<i>Carpobrotus rossii</i>	Pigface			
<i>Dianella brevicaulis</i>	Short-stem Flax-lily			NT
<i>Distichlis distichophylla</i>	Emu-grass			
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	Ruby Saltbush			
<i>Ficinia nodosa</i>	Knobby Club-rush			
<i>Goodenia varia</i>	Sticky Goodenia			NT
<i>Kennedia prostrata</i>	Running Postman			
<i>Leucophyta brownii</i>	Coast Cushion Bush			NT
<i>Myoporum insulare</i>	Common Boobialla			NT
<i>Olearia axillaris</i>	Coast Daisy-bush			NT
<i>Poa poiformis</i> var. <i>poiformis</i>	Coast Tussock-grass			
<i>Rhagodia candolleana</i> ssp. <i>candolleana</i>	Sea-berry Saltbush			
<i>Scaevola crassifolia</i>	Cushion Fanflower			

**Weed List**

<b>Species Name</b>	<b>Common Name</b>	<b>Cover</b>
<i>Avena barbata</i>	Wild Oat	1a
<i>Conyza bonariensis</i>	Flax-leaf Fleabane	1a
<i>Cynodon dactylon var. dactylon</i>	Couch	1a
<i>Ehrharta calycina</i>	Perennial Veldt Grass	2
<i>Ehrharta longifolia</i>	Annual Veldt Grass	1
<i>Ficus macrophylla</i>	Moreton Bay Fig	3
<i>Eucalyptus sp.</i>		2
<i>Lagurus ovatus</i>	Hare's Tail Grass	1a
<i>Marrubium vulgare</i>	Horehound	1
<i>Oxalis pes-caprae</i>	Soursob	1
<i>Solanum nigrum</i>	Black Nighshade	1
<i>Senecio pterophorus</i>	African Daisy	1
<i>Vulpia sp.</i>	Wall Fescue	1a

**Granite Island Site 8: *Rhagodia candolleana*, *Enchylaena tomentosa* Open Shrubland with emergent *Allocasuarina verticillata*, \**Pinus halepensis***

**Date of assessment:** 10/2/2016

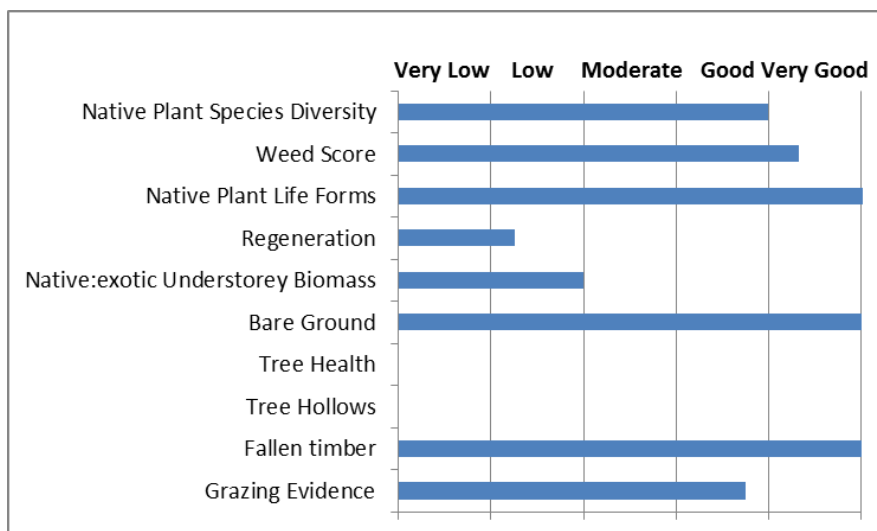
**GPS Location of Photograph:** 284973 6061966 **Direction:** East

**Benchmark Vegetation Community Type:** SMLR Co 7.2 Coastal Shrublands and Tall Shrublands

**Site photograph:**



**Scores for Individual BushRAT Components:**



**BushRAT score sheet**

<b>SITE: Granite Island Community 8</b>	
<b>DESCRIPTION: Rhagodia candolleana, Enchylaena tomentosa Open Shrubland with emergent Allocasuarina verticillata, *Pinus halepensis</b>	
<b>VEGETATION CONDITION SCORE</b> (max. in	<b>score</b>
Native Plant Species Diversity (15)	12
Weed Score (15)	13
Native Plant Life Forms (10)	15
Regeneration (8)	2
Native:exotic Understorey Biomass (10)	4
Bare Ground (3)	3
Tree Health (5)	0
Hollow-bearing trees (5)	0
Fallen timber/debris (5)	5
Grazing Evidence (4)	3
<b>TOTAL (ADD UP ALL POINTS)</b>	<b>57</b>
If community is naturally treeless x TOTAL by 1.23	
If community is not benchmarked for regen x 1.11	
<b>ADJUSTED TOTAL SCORE</b>	<b>70.11</b>

**Native Plant Species List**

Species Name	Common Name	Conservation Status		
		AUS	SA	AMLR
<i>Acacia longifolia</i> var. <i>sophorae</i>	Coastal Wattle			
<i>Allocasuarina verticillata</i>	Drooping Sheoak			
<i>Atriplex cinerea</i>	Coast Saltbush			
<i>Atriplex semibaccata</i>	Berry Saltbush			
<i>Austrostpa</i> sp.	Spear-grass			
<i>Calostemma purpureum</i>	Pink Garland-lily			
<i>Carpobrotus rossii</i>	Pigface			
<i>Chloris truncata</i>	Windmill Grass			
<i>Dianella brevicaulis</i>	Short-stem Flax-lily			NT
<i>Distichlis distichophylla</i>	Emu-grass			
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	Ruby Saltbush			
<i>Ficinia nodosa</i>	Knobby Club-rush			
<i>Leucophyta brownii</i>	Coast Cushion Bush			NT
<i>Myoporum insulare</i>	Common Boobialla			NT
<i>Olearia axillaris</i>	Coast Daisy-bush			NT
<i>Poa poiformis</i> var. <i>poiformis</i>	Coast Tussock-grass			
<i>Rhagodia candolleana</i> ssp. <i>candolleana</i>	Sea-berry Saltbush			
<i>Rytidosperma caespitosum</i>	Common Wallaby-grass			

Species Name	Common Name	Conservation Status		
		AUS	SA	AMLR
<i>Setaria constricta</i>	Knotty-butt Paspalidium			NT
<i>Tetragonia implexicoma</i>	Bower Spinach			

### Weed List

Species Name	Common Name	Cover
<i>Avena barbata</i>	Wild Oat	2
<i>Brassica tournefortii</i>	Wild Turnip	1a
<i>Bromus hordaceus</i> (?)	Soft Brome	2
<i>Chondrilla juncea</i>	Skeleton Weed	1a
<i>Conyza bonariensis</i>	Flax-leaf Fleabane	1
<i>Ehrharta calycina</i>	Perennial Veldt Grass	2
<i>Ehrharta longifolia</i>	Annual Veldt Grass	2
<i>Euphorbia paralias</i>	Sea Spurge	1
<i>Lagurus ovatus</i>	Hare's Tail Grass	1a
<i>Leptospermum laevigatum</i>	Coast Tea-tree	1
<i>Limonium companyonis</i>	Sea-lavender	1
<i>Lolium sp.</i>	Ryegrass	1a
<i>Lycium ferocissimum</i>	Boxthorn	1
<i>Malva arborea</i>	Tree Mallow	1
<i>Pentameris pallida</i>	Pussy Tail	1
<i>Pinus halepensis</i>	Aleppo Pine	2
<i>Solanum nigrum</i>	Black Nighshade	1
<i>Vulpia sp.</i>	Wall Fescue	2

**Wright Island: \**Lycium ferocissimum*, *Rhagodia candolleana* Shrubland**

**Date of assessment:** 29/6/2015 & 3/12/2015

**GPS Location of Photograph:** 283329 6059716 **Direction:** West

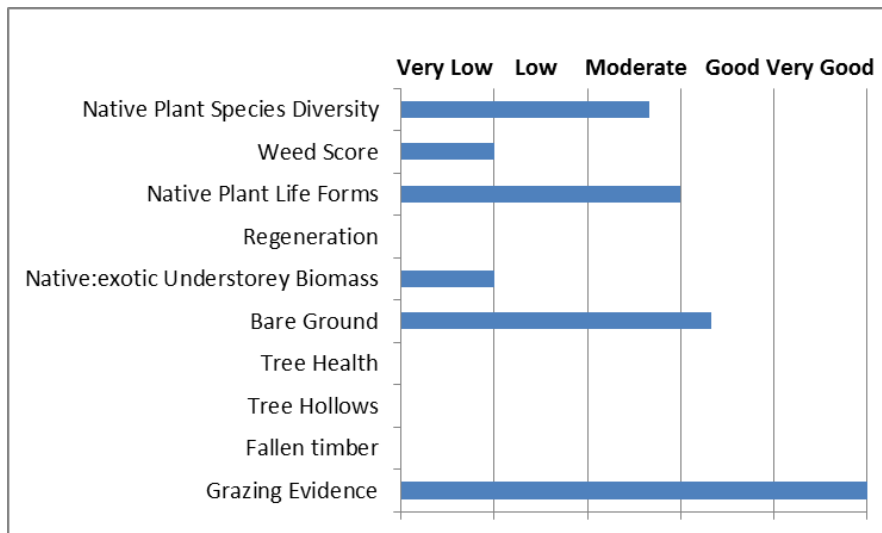
**Benchmark Vegetation Community Type:** SMLR Co 7.2 Coastal Shrublands and Tall Shrublands

**Site photograph:**



**Scores for Individual BushRAT Components:**





### BushRAT score sheet

<b>SITE: Wright Island Community 1</b>
<b>DESCRIPTION: Lycium ferocissimum, Rhagodia candolleana Shrubland</b>

VEGETATION CONDITION SCORE (max. in brackets)	score
<b>Native Plant Species Diversity (15)</b>	8
<b>Weed Score (15)</b>	3
<b>Native Plant Life Forms (10)</b>	6
<b>Regeneration (8)</b>	0
Native:exotic Understorey Biomass (10)	2
Bare Ground (3)	2
Tree Health (5)	0
Hollow-bearing trees (5)	0
Fallen timber/debris (5)	0
Grazing Evidence (4)	4
<b>TOTAL (ADD UP ALL POINTS)</b>	25
If community is naturally treeless x TOTAL by 1.23	30.75
If community is not benchmarked for regen x 1.11	
<b>ADJUSTED TOTAL SCORE</b>	30.75

### Native Plant Species List

Species Name	Common Name	Conservation Status		
		AUS	SA	AMLR
<i>Chenopodium desertorum ssp. desertorum</i>	Frosted Goosefoot			RA
<i>Crassula sp.</i>	Crassula			

<i>Dianella brevicaulis</i>	Short-stem Flax-lily			NT
<i>Einadia nutans ssp. nutans</i>	Climbing Saltbush			
<i>Enchylaena tomentosa var. tomentosa</i>	Ruby Saltbush			
<i>Malva preissiana</i>	Australian Hollyhock			NT
<i>Muehlenbeckia gunnii</i>	Coastal Climbing Lignum			
<i>Parietaria cardiostegia</i>	Mallee Smooth-nettle			
<i>Rhagodia candolleana ssp. candolleana</i>	Sea-berry Saltbush			
<i>Spinifex hirsutus</i>	Rolling Spinifex			
<i>Tetragonia implexicoma</i>	Bower Spinach			
<i>Threlkeldia diffusa</i>	Coast Bonefruit			NT

### Weed List

Species Name	Common Name	Cover
<i>Arctotheca calendula</i>	Cape Weed	1a
<i>Bromus diandrus</i>	Great Brome	2
<i>Cakile maritima ssp. maritima</i>	Two-horned Sea Rocket	1a
<i>Chenopodium murale</i>	Nettle-leaf Goosefoot	1a
<i>Coprosma repens</i>	New Zealand Mirror-bush	3
<i>Ehrharta longiflora</i>	Annual Veldt Grass	3
<i>Erodium cicutarium</i>	Cut-leaf Heron's-bill	1a
<i>Euphorbia terracina</i>	False Caper	1a
<i>Fumaria capreolata</i>	White-flower Fumitory	1
<i>Gramineae sp.</i>		1a
<i>Hordeum sp.</i>		1a
<i>Lycium ferocissimum</i>	African Boxthorn	3
<i>Malva arborea</i>	Tree Mallow	4
<i>Mesembryanthemum crystallinum</i>	Common Iceplant	2
<i>Oxalis pes-caprae</i>	Soursob	1a
<i>Solanum nigrum</i>	Black Nightshade	1
<i>Sonchus oleraceus</i>	Common Sow-thistle	1a
<i>Stellaria media</i>	Chickweed	1a
<i>Urtica urens</i>	Small Nettle	2
<i>Vicia sp.</i>		1

**West Island Site 1: *Disphyma crassifolium* Forbland +/- *Enchylaena tomentosa* +/- *Tetratonia implexicoma* Forbland**

**Date of assessment:** 3/6/2015 & 9/12/15

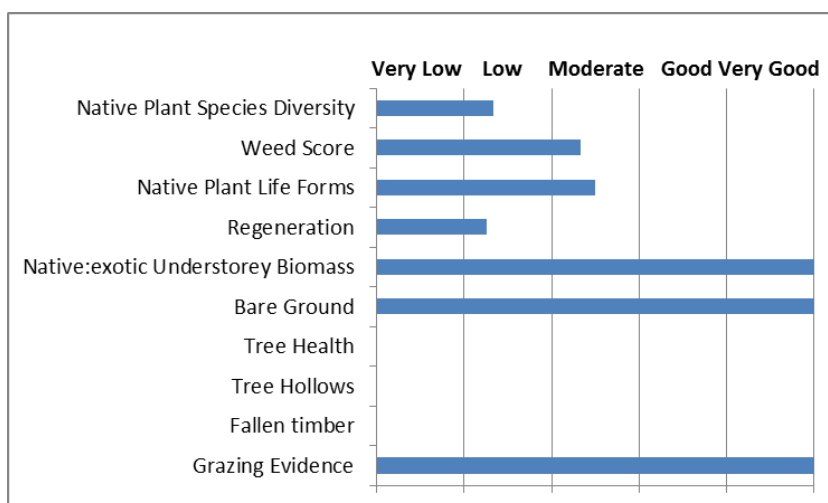
**GPS Location of Photograph: Direction:** South

**Benchmark Vegetation Community Type:** SMLR Co 7.4 Coastal Cliff Low Shrublands, Hummock Grasslands and Very Low Open Woodlands

**Site photograph:**



**Scores for Individual BushRAT Components:**



**BushRAT score sheet**

<b>SITE: West Island Community 1</b>	
<b>DESCRIPTION: Disphyma crassifolium Forbland +/- Enchylaena tomentosa +/- Tetratonia implexicoma Forbland</b>	
<b>VEGETATION CONDITION SCORE</b> (max. in	<b>score</b>
Native Plant Species Diversity (15)	4
Weed Score (15)	7
Native Plant Life Forms (10)	5
Regeneration (8)	2
Native:exotic Understorey Biomass (10)	10
Bare Ground (3)	3
Tree Health (5)	0
Hollow-bearing trees (5)	0
Fallen timber/debris (5)	0
Grazing Evidence (4)	4
<b>TOTAL (ADD UP ALL POINTS)</b>	35
If community is naturally treeless x TOTAL by 1.23	43.05
If community is not benchmarked for regen x 1.11	
<b>ADJUSTED TOTAL SCORE</b>	43.05

**Native Plant Species List**

Species Name	Common Name	Conservation Status		
		AUS	SA	AMLR
<i>Apium annuum</i>	Annual Celery			VU
<i>Atriplex suberecta</i>	Lagoon Saltbush			NT
<i>Disphyma crassifolium ssp. clavellatum</i>	Round-leaf Pigface			
<i>Enchylaena tomentosa var. tomentosa</i>	Ruby Saltbush			
<i>Malva preissiana</i>	Australian Hollyhock			NT
<i>Muehlenbeckia gunnii</i>	Coastal Climbing Lignum			
<i>Senecio pinnatifolius var. pinnatifolius</i>				NT
<i>Tetragonia implexicoma</i>	Bower Spinach			

**Weed List**

Species Name	Common Name	Cover
<i>Coprosma repens</i>	New Zealand Mirror-bush	2
<i>Fumaria capreolata</i>	White-flower Fumitory	1
<i>Gramineae sp.</i>		1a
<i>Lycium ferocissimum</i>	African Boxthorn	1
<i>Malva arborea</i>	Tree Mallow	1a
<i>Mesembryanthemum crystallinum</i>	Common Iceplant	1a
<i>Sagina maritima</i>	Sea Pearlwort	1

**West Island Site 2: \**Malva arborea* Low Shrubland**

**Date of assessment:** 3/6/2015 & 9/12/15

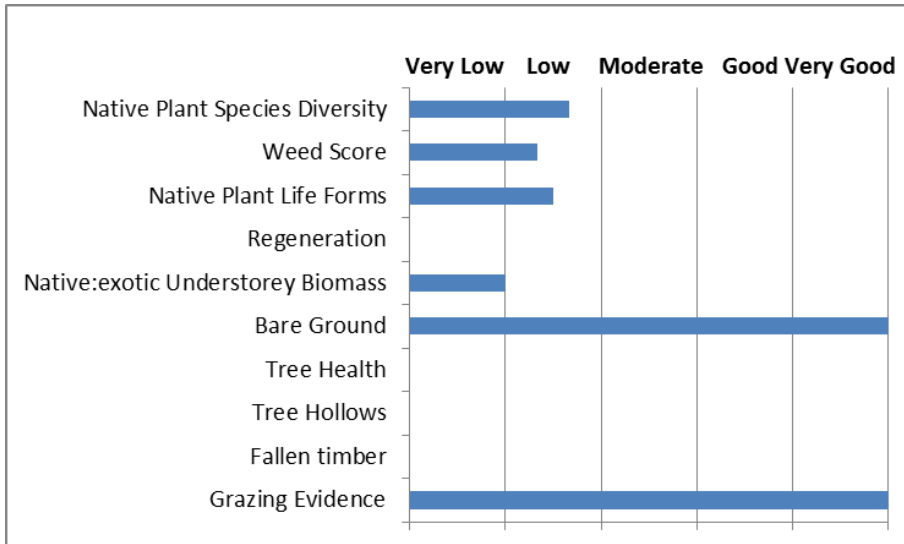
**GPS Location of Photograph:**    **Direction:** North

**Benchmark Vegetation Community Type:** SMR Co 7.2 Coastal Shrublands and Tall Shrublands

**Site photograph:**



**Scores for Individual BushRAT Components:**



**BushRAT score sheet**

<b>SITE: West Island Community 2</b>	
<b>DESCRIPTION: Malva arborea Low Shrubland</b>	
<b>VEGETATION CONDITION SCORE</b> (max. in	<b>score</b>
Native Plant Species Diversity (15)	5
Weed Score (15)	4
Native Plant Life Forms (10)	3
Regeneration (8)	0
Native:exotic Understorey Biomass (10)	2
Bare Ground (3)	3
Tree Health (5)	0
Hollow-bearing trees (5)	0
Fallen timber/debris (5)	0
Grazing Evidence (4)	4
<b>TOTAL (ADD UP ALL POINTS)</b>	<b>21</b>
If community is naturally treeless x TOTAL by 1.23	25.83
If community is not benchmarked for regen x 1.11	
<b>ADJUSTED TOTAL SCORE</b>	<b>25.83</b>

**Native Plant Species List**

Species Name	Common Name	Conservation Status		
		AUS	SA	AMLR
<i>Dichondra repens</i>	Kidney Weed			
<i>Disphyma crassifolium ssp. clavellatum</i>	Round-leaf Pigface			

<i>Einadia nutans ssp. nutans</i>	Climbing Saltbush			
<i>Enchylaena tomentosa var. tomentosa</i>	Ruby Saltbush			
<i>Malva preissiana</i>	Australian Hollyhock			NT
<i>Muehlenbeckia gunnii</i>	Coastal Climbing Lignum			
<i>Oxalis perennans</i>	Native Sorrel			
<i>Rhagodia candolleana ssp. candolleana</i>	Sea-berry Saltbush			
<i>Tetragonia implexicoma</i>	Bower Spinach			

### Weed List

Species Name	Common Name	Cover
<i>Anagallis arvensis</i>	Pimpernel	1a
<i>Avena barbata</i>	Bearded Oat	2
<i>Coprosma repens</i>	New Zealand Mirror-bush	2
<i>Ehrharta longiflora</i>	Annual Veldt Grass	5
<i>Gramineae sp.</i>		3
<i>Hordeum marinum</i>	Sea Barley-grass	1a
<i>Lagurus ovatus</i>	Hare's Tail Grass	1a
<i>Lolium sp.</i>	Perennial Ryegrass	2
<i>Lycium ferocissimum</i>	African Boxthorn	1a
<i>Malva arborea</i>	Tree Mallow	3
<i>Oxalis pes-caprae</i>	Soursob	1a
<i>Reichardia tingitana</i>	False Sowthistle	1
<i>Sonchus oleraceus</i>	Common Sow-thistle	1a
<i>Trifolium campestre</i>	Clover	2

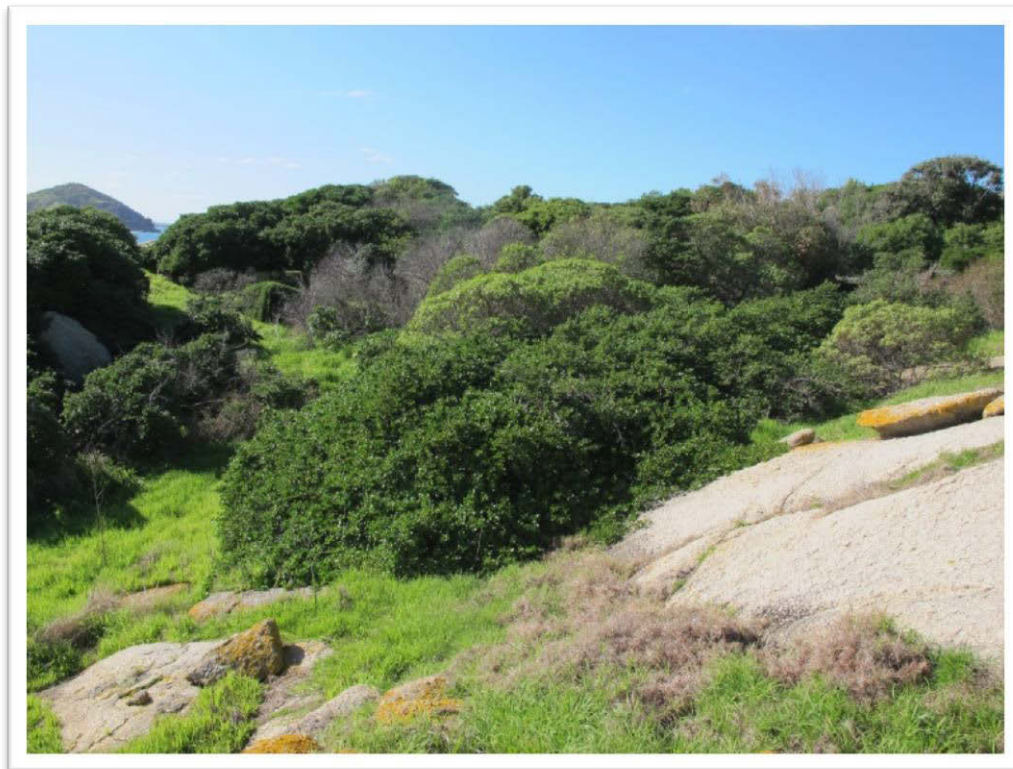
**West Island Site 3: \**Coprosma repens* Tall Shrubland**

**Date of assessment:** 3/6/2015 & 9/12/15

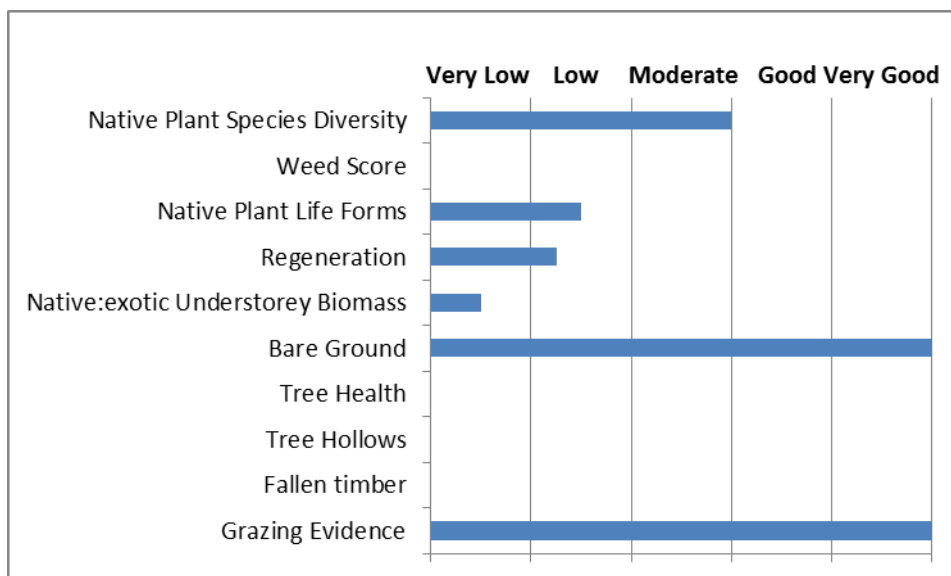
**GPS Location of Photograph: Direction:** North-east

**Benchmark Vegetation Community Type:** SMR Co 7.2 Coastal Shrublands and Tall Shrublands

**Site photograph:**



**Scores for Individual BushRAT Components:**





**BushRAT score sheet**

<b>SITE: West Island Community 3</b>	
<b>DESCRIPTION: *Coprosmia repens Tall Shrubland</b>	
<b>VEGETATION CONDITION SCORE</b> (max. in	<b>score</b>
<b>Native Plant Species Diversity (15)</b>	9
<b>Weed Score (15)</b>	0
<b>Native Plant Life Forms (10)</b>	3
<b>Regeneration (8)</b>	2
Native:exotic Understorey Biomass (10)	1
Bare Ground (3)	3
Tree Health (5)	0
Hollow-bearing trees (5)	0
Fallen timber/debris (5)	0
Grazing Evidence (4)	4
<b>TOTAL (ADD UP ALL POINTS)</b>	22
If community is naturally treeless x TOTAL by 1.23	27.06
If community is not benchmarked for regen x 1.11	
<b>ADJUSTED TOTAL SCORE</b>	27.06

**Native Plant Species List**

Species Name	Common Name	Conservation Status		
		AUS	SA	AMLR
<i>Crassula colligata ssp. colligata</i>				
<i>Dianella brevicaulis</i>	Short-stem Flax-lily			N T
<i>Disphyma crassifolium ssp. clavellatum</i>	Round-leaf Pigface			
<i>Einadia nutans ssp. nutans</i>	Climbing Saltbush			
<i>Enchylaena tomentosa var. tomentosa</i>	Ruby Saltbush			
<i>Leiocarpa supina</i>	Coast Plover-daisy			R A
<i>Malva preissiana</i>	Australian Hollyhock			N T
<i>Muehlenbeckia gunnii</i>	Coastal Climbing Lignum			
<i>Myoporum insulare</i>	Common Boobialla			N T
<i>Nicotiana maritima</i>	Coast Tobacco			R A
<i>Parietaria cardiostegia</i>	Mallee Smooth-nettle			
<i>Rhagodia candolleana ssp. candolleana</i>	Sea-berry Saltbush			
<i>Senecio pinnatifolius var. pinnatifolius</i>				N T
<i>Tetragonia implexicoma</i>	Bower Spinach			

**Weed List**

Species Name	Common Name	Cover
<i>Avena barbata</i>	Bearded Oat	3
<i>Bromus diandrus</i>	Great Brome	2
<i>Cenchrus clandestinus</i>	Kikuyu	1a
<i>Chenopodium album</i>	Fat Hen	1
<i>Chondrilla juncea</i>	Skeleton Weed	1
<i>Coprosma repens</i>	New Zealand Mirror-bush	4
<i>Ehrharta longiflora</i>	Annual Veldt Grass	5
<i>Galenia pubescens var. pubescens</i>	Coastal Galenia	1a
<i>Hordeum marinum</i>	Sea Barley-grass	1a
<i>Lagunaria patersonii</i>	Pyramid Tree	1
<i>Lolium sp.</i>	Perennial Ryegrass	2
<i>Lycium ferocissimum</i>	African Boxthorn	2
<i>Malva arborea</i>	Tree Mallow	3
<i>Melaleuca halmaturorum</i>	Swamp Paper-bark	1
<i>Mesembryanthemum crystallinum</i>	Common Iceplant	1a
<i>Oxalis pes-caprae</i>	Soursob	2
<i>Solanum nigrum</i>	Black Nightshade	1a
<i>Sonchus oleraceus</i>	Common Sow-thistle	1a
<i>Urtica urens</i>	Small Nettle	1

**Pullen Island: *Myoporum insulare*, \**Coprosma repens*, \**Lycium ferocissimum* Shrubland**

**Date of assessment:** 10/2/2016

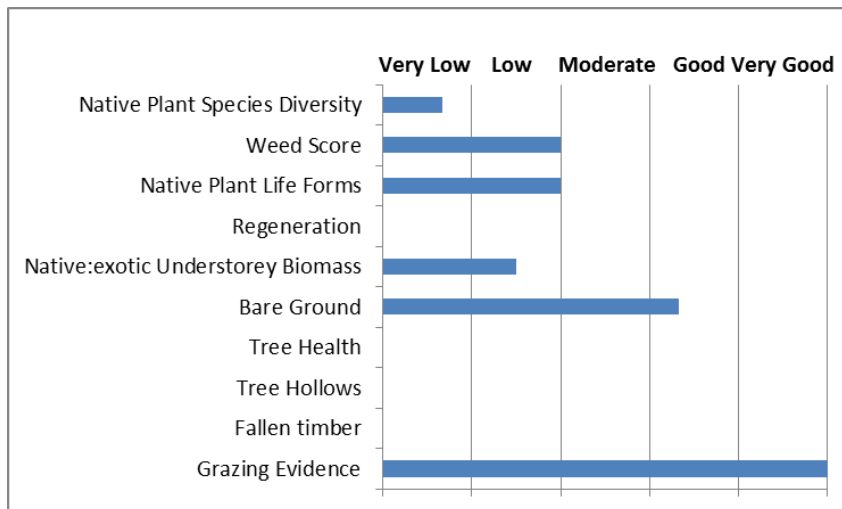
**GPS Location of Photograph:** 290736 6064867 **Direction:** North North-east

**Benchmark Vegetation Community Type:** SMR Co 7.2 Coastal Shrublands and Tall Shrublands

**Site photograph:**



**Scores for Individual BushRAT Components:**



### BushRAT score sheet

SITE: Pullen Island Community 1	
DESCRIPTION: <i>Myoporum insulare</i> , * <i>Coprosma repens</i> , * <i>Lycium ferocissimum</i> Shrubland	
<b>VEGETATION CONDITION SCORE</b> (max. in	<b>score</b>
Native Plant Species Diversity (15)	2
Weed Score (15)	6
Native Plant Life Forms (10)	4
Regeneration (8)	0
Native:exotic Understorey Biomass (10)	3
Bare Ground (3)	2
Tree Health (5)	0
Hollow-bearing trees (5)	0
Fallen timber/debris (5)	0
Grazing Evidence (4)	4
<b>TOTAL (ADD UP ALL POINTS)</b>	<b>21</b>
If community is naturally treeless x TOTAL by 1.23	
If community is not benchmarked for regen x 1.11	
<b>ADJUSTED TOTAL SCORE</b>	<b>25.83</b>

### Native Plant Species List

Species Name	Common Name	Conservation Status		
		AUS	SA	AMLR
<i>Myoporum insulare</i>	Common Boobialla			N T
<i>Tetragonia implexicoma</i>	Bower Spinach			
<i>Threlkeldia diffusa</i>	Coast Bonefruit			

**Weed List**

<b>Species Name</b>	<b>Common Name</b>	<b>Cover</b>
<i>Coprosma repens</i>	New Zealand Mirror-bush	3
<i>Lycium ferocissimum</i>	African Boxthorn	3
<i>Malva arborea</i>	Tree Mallow	2



## **Appendix 4: Photopoint monitoring**





## Photopoint Monitoring (adapted from DEWNR's Native Vegetation & Biodiversity Unit – BushRAT methodology)

### 1. PHOTOPOINT RECORD SHEET - instructions

- Your photopoint locations may have already been established for you – however, if they are not permanently marked with a stake you will need to relocate them using a GPS unit and a combination of the photo that was taken and the recorded photo direction. You can then permanently mark them if you wish.
- If not yet established, select at least one site per Vegetation Association, preferably at locations where you will expect to observe significant changes, either in the short term (e.g. through woody weed removal) or longer term (e.g. through revegetation).
- The “camera point” is where you take the photo from, the “target point” is where you aim the camera. Either or both can be marked 10m apart with a survey peg, or could be a designated tree, fence post or other permanent feature. You could also mark the site (approximately) on one of the maps in your Management Plan
- Record details in the table below.
- Take photos a minimum of once each year, preferably at the same time(s) each year.
- Photos should be accompanied by notes that will provide further information, such as the names of plants in the photographs (as these may not be able to be determined from the photos alone) and possible explanations for why a photo differs from the last one (e.g. drought year). Enter these additional details/observations into the table. Other observations that could be recorded to help document and/or explain changes occurring at the site may include things like:
  - Improved condition of the native vegetation compared to that shown in the original photos.
  - Natural regeneration of native plant species eg. native grasses and wattle seedlings.
  - The appearance (natural regeneration) of plant species not previously recorded.
  - Accumulation of leaf litter and fallen timber which show signs of increased insect activity and decomposition.
  - Re-establishment of a moss or lichen crust.

MANAGEMENT UNIT: \_\_\_\_\_

Year: \_\_\_\_\_

Vegetation Association/Site	Photopoint Location	Photo taken by:	Direction camera point to target point	Distance camera point to target point	Date	Notes/Observations

**2. PHOTOGRAPHS (or submit hard copies)**

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## **Appendix 5: Works record sheets**



**WORKS RECORD** (adapted from DEWNR’s Native Vegetation & Biodiversity Unit – BushRAT methodology)

All Threats/Management Issues identified as requiring action (as per the Biodiversity Action Table) are listed below. Only some of these will have had actions proposed for this past year. Please fill in the table for these actions and write N/A next to those that did not require action in this past 12-month period.

Management Unit \_\_\_\_\_ Year \_\_\_\_\_ Date that you are filling in this form \_\_\_\_\_

**WEEDS**

Common Name	Actions undertaken this calendar year  These may or may not correspond with the actions you proposed at the start of the year. <b>If you did not propose any actions for this Management Issue this year, write N/A.</b>	Status of infestation(s)  State whether the infestations have increased significantly, increased slightly, decreased significantly, decreased slightly, or remained the same since this time last year. State this for all weeds, including those that you did not work on this past year.	Changes to the vegetation, fauna or other features  Have you noticed any changes to the vegetation, fauna or other features of the site in the vicinity of your works? This may include an increase in regeneration of plants, new bird species seen in the area, increase in leaf litter, etc., Do you think these changes are a result of your works or other environmental factors?
Bridal Creeper infestation	Spot-sprayed using glyphosate 360g/L at 1:100. It took us 4 hours (2 people x 2 hrs).	All Bridal Creeper populations in Management Unit 2 appear to have remained at the same level. The sprayed population will hopefully have decreased in extent/vigour.	There was good regeneration of Golden Wattles this year, despite the Bridal Creeper. This was possibly a response to last year's hot Summer followed by good rains leading to good seed germination.

### PEST ANIMALS

<b>Pest threat or issue</b>	<b>Actions undertaken this calendar year</b>  These may or may not correspond with the actions you proposed at the start of the year. <b>If you did not propose any actions for this Management Issue this year, write N/A.</b>	<b>Status of pest issue</b>  State whether the pest species or erosion area has increased significantly, increased slightly, decreased significantly, decreased slightly, or remained the same since this time last year. State this for all pests/erosion issues, including those that you did not work on this past year.	<b>Changes to the vegetation, fauna or other features</b>  Have you noticed any changes to the vegetation, fauna or other features of the site in the vicinity of your works? This may include an increase in regeneration of plants, new bird species seen in the area, increase in leaf litter, etc., Do you think these changes are a result of your works or other environmental factors?
Foxes	Fumigated all dens using ..... It took us 2 full adys with 2 people.		



## VEGETATION REGENERATION/ REVEGETATION

<b>Type of regeneration/revegetation issue</b>	<b>Actions undertaken this calendar year</b>  These may or may not correspond with the actions you proposed at the start of the year. <b>If you did not propose any actions for this Management Issue this year, write N/A.</b>	<b>Status of regeneration/revegetation issue</b>  Describe the current extent/status/of the issue. Has it improved since last year?	<b>Changes to the vegetation, fauna or other features</b>  Have you noticed any changes to the vegetation, fauna or other features of the site in the areas where this threat/issue occurs? This may include an increase in regeneration of plants, increase in tree dieback, new bird species seen in the area, increase in leaf litter, etc., and does not have to be a result of your works.
Poor vegetation structure (lack of groundcover plants)	We fenced and removed grazing stock as required in our clearance Decision Notification. The constructed fence is 2.3km long and is a post and dropper, 5 wire (2 barb) fence).	Vegetation structure has improved, but we are yet to clarify how much of this new growth is native. It would seem that the fencing has already led to positive changes since last year.	As already mentioned, there have been changes to the vegetation structure. It also seems that there are different types of plants emerging. We have seen new species of birds in the site (Red-browed Finch, Red-rumped Parrot) that are eating the grass seeds of the new plants.



**Appendix 6: Friends of Granite Island Recreation Park Project Plan  
July 2014 - June 2017**

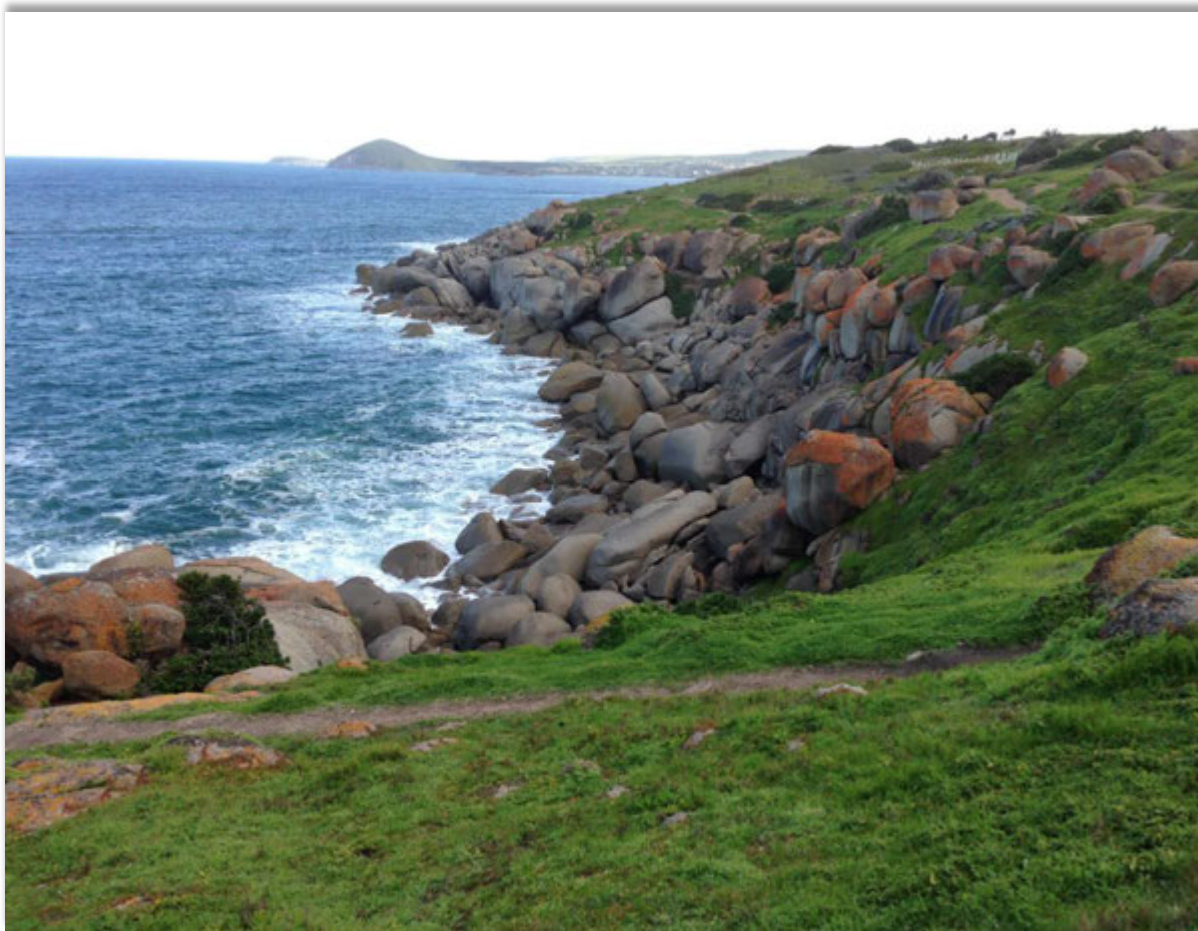




Government of South Australia  
Adelaide and Mount Lofty Ranges  
Natural Resources Management Board

# Friends of Granite Island Recreation Park

Project Plan July 2014 - June 2017



Community Group Action Program



## Document History

### File Details:

<b>File Location</b>	«trimNo»
----------------------	----------

### Document Revision Status

<b>Version</b>	<b>Date</b>	<b>Section No.</b>	<b>Summary of Changes</b>	<b>Author/Editor</b>
«version»	«date»	«sectionNo»	«changes»	«author»

### For further information please contact:

Your Project Officer: Jodie Woof

Phone: 8550 3426 0603

Mobile: 0488 952 026

Email: [jodie.woof@sa.gov.au](mailto:jodie.woof@sa.gov.au)

Adelaide & Mount Lofty Ranges Natural Resources Management Board

5 Aldinga Road Willunga SA 5172

Online information available at:

<http://www.naturalresources.sa.gov.au/adelaidemtloftyranges>



**Government of South Australia**

Adelaide and Mount Lofty Ranges  
Natural Resources Management Board



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**2.1. Project Purpose**

The Friends of Granite Island (FOGI) comprises of a dedicated group of approx 10 volunteers whose main focus is on restoration of remnant vegetation for habitat of coastal fauna, including the population of Little Penguins across Granite Island. They reformed into a new group in 2013, after the original friends group came to an end in 2008.

The main purpose of this plan is to support FOGI to revegetate the island to increase habitat for the Little Penguin and other local fauna, recreating as close as possible to pre-European vegetation types by using similar sites as reference such as the Bluff and other coastal sites including Newland Head. The FOGI also have a keen focus on eco-tourism and enhancing the visitor experience for the thousands of local, national and international visitors coming to Granite Island Recreation Park annually.

The group are currently engaging in weed control, seed collecting, propagating local native species and replanting the coastal display garden bed on the northern side and planting to infill and extend the existing revegetated areas on the southern side of the island.

**2.2. Project Title**

Friends of Granite Island Recreation Park

**2.3. Strategic Alignment****DEWNR Corporate Plan 2014 - 2015**

Goal 1: Ensure the management of natural resources is sustainable

Goal 8: Enhance visitor experiences at parks and places

**South Australia's Strategic Plan**

Target 24. Volunteering: Maintain a high level of formal and informal volunteering in South Australia at 70% participation rate or higher.

Target 72. Nature conservation: Increase participation in nature conservation activities by 25% by 2015.

**Our Place. Our Future. SA State NRM Plan 2012 - 2017**

Target 2. Involve more people in the sustainable management of natural resources.

Target 8. Increase extent and improve condition of native vegetation.

Target 13. Limit the establishment of pests and diseases and reduce the impacts of existing pests.

**Adelaide and Mount Lofty Ranges Natural Resource Management Board. Regional NRM Plan 20 Year Targets**

Target 7: Condition and function of ecosystems recovered from current levels

Target 9: Improvement in conservation prospects of native species (terrestrial, aquatic and marine) from current levels

Target 13: Increase participation in Natural Resource Management activities by 20%

**Adelaide and Mount Lofty Ranges NRM Board subregional priorities**

Coastal specific - protect and rehabilitate priority areas of the southern coast including beaches, lower slopes, cliff and cliff tops

**2.4. Project Outcomes**

This project aims to achieve a reduction in the weed species on the island, increase species diversity and habitat for the Little Penguin and other local fauna.

The project also aims to provide a naturally diverse coastal environment to enhance visitor experience, as well as to create awareness and engage with the local, national and international visitors.

## 2.1. Site Description

Granite Island is approx. 24Ha and is located approx. 500m off the coast of Victor Harbor accessed via a causeway. It is a very popular tourist destination and also used by the local's for recreation. The causeway creates easy walking access to the island and the council operates a horse drawn tram attraction that transport people to the island daily.

The island is refuge for the population of Little Penguins which have shown to be decreasing in number.

The island has varying vegetation structures including Open Woodland of *Acacia pycnantha*, *Allocasuarina verticillata* over +/- *Olearia axillaris*, *Myoporum insulare*, *Rhagodia candolleana* ssp. *candolleana*, *Dianella brevicaulis*, *Enchylaena tomentosa*, *Leucophyta brownii* for the northern aspect, Open Grassland and Closed Sedgeland in the centre of the island and Open Herbland of +/- *Dianella brevicaulis*, *Disphyma crassifolium* ssp. *clavellatum*, *Goodenia amplexans*, *Leucophyta brownii*, *Rhagodia candolleana* ssp. *candolleana*, *Tetragonia implexicoma* for the southern aspect.

Granite Island has had many uses including whaling stations from 1830-1860, quarrying the northern face in the late 1800's, breakwater construction to safe harbour boats in 1882, and the creation of formal gardens by the harbor master in 1901. The island has a considerable inheritance of imported exotic plants and species native to other areas of Australia from past centuries of previous plantings.

Remnant species are present along with the more recent re-veg plantings in the last 10-20 years of local provenience coastal species.

The key areas and main priorities of the Friends of Granite Island are:

- (a) Zone 1 – Southern site. Maintain weed control and in-fill plantings within the existing revegetation, extend plantings along the seaward side of the path south-westerly.
- (b) Zone 2 – Kikuyu site. Follow up spot-spraying to control kikuyu in between contractor engagement. In-fill plantings to increase level of ground-cover. Possible extension of plantings in this site.
- (c) Zone 5 - Fig Tree site. Maintain existing revegetation plantings at entrance and along the board-walk, in-fill plantings to assist in stabilising the steep slope. Install soaker hose to establish reveg in non-wetting soil. Monitoring of plant survival rates due to past predation by rats and possums. Possible extension of plantings in this site.
- (d) Zone 6 – Coastal demonstration gardens - Maintain the plantings and weed control to increase penguin habitat. Extension of site through grant funding.
- (e) Propagation of indigenous plant species, seed collection of local coastal native plants.

## 2.2. Regional Context

Granite Island Recreation Park has more than 700,000 visitors annually making it the most visited park in South Australia. The Southern Fleurieu Coastal Action Plan (SFCAP) rates Granite Island as a medium conservation priority area with a high weed threat. Recommendations are to target priority weeds and research Penguin population decline.

Due to significant changes to the islands original vegetation reference sites for the revegetation program have been used at - Newland Head Conservation Park is 7km south west, Kings Head is 6km south west, West Island is 5.5km south west and the Bluff is 3.5km south west. The Bluff has been used as a bench mark for species according to aspect as it is almost an island by being surrounded by water on the

eastern, southern and western side.

Ron Taylor local botanist has providing advice and assistance to the Friends of Granite Island over the last few years. Ron has been working and volunteering in conservation of the area for over 27 years.

### **2.3. Previous Works**

In 2013, with funding from the Community NRM Action Grant Supplementary Scheme 2012-13, FoGI planted approximately 1,200 seedlings at Zone 1 & 5 sites. Work at Zone 5 aimed at improving the appearance of the area around the end of the causeway (Zone 5) as this is where all visitors first encounter the island. Work at Zone 1 was to “salvage” the earlier plantings at this site in 2012 that had been neglected and were subsequently threatened through competition from weeds.

Some of these grant funds were used to purchase some of the equipment and materials necessary for the establishment and ongoing operations of a nursery that would provide FoGI with the capacity and capability to produce the tubestock required (approximately 1,000) for planting on the island each year. This nursery has been established within the existing Community Nursery operated by the Encounter Centre in Victor Harbor. Currently, there are a total of 15 species of native plants in varying stages of propagation, with at least 850 tubestock that will be available for planting in 2015.

In 2014, FoGI used funding from the Community NRM Action Grant 2013-14 to restore and create the coastal gardens demonstration site on the north side of the island near the Kiosk area, showcasing the diverse coastal flora endemic to the area. More recently FOGI worked with the Penguin Centre to rehabilitate one to the coastal gardens that has man-made penguin burrows, by careful clearing and replanting in March, April, May 2015 it has been reported that the penguins have commenced using this nesting site, 8 penguins had been counted.

FoGI working bees are every 2nd Wednesday from 8:00 to 11:00 AM, with approx. 10 volunteers.

DEWNR Senior Ranger has been successfully controlling hundreds of Khaki Weed plants over the past 4 years, with only 1 plant found this year. CMW's do regular weed control, fire management slashing and boardwalk stairway maintenance.

NRM levy funded Coastal Seascapes program has been implementing the Southern Fleurieu Coastal Action Plan since 2007 on this site. A focus on targeting Red Alert identified weeds in the plan including Western Coastal Wattle, Coastal Tea Tree, Olive and Hottentot Fig. Penguin nesting habitat has been improved through the control of invasive grasses (Kikuyu and Buffalo Grass) in Zone 1 and 2. Revegetation has replaced controlled grasses in these zones to further improve penguin nesting areas. This has been undertaken by the friends group, Whale Centre volunteers and local school students.

The project plan will be reviewed and amended to meet changed conditions or objectives during the project's life span.

### 3.1 Location of Works

Physical Address	Granite Island, accessed via the causeway and Victor Harbor foreshore		
Local Gov Area	Victor Harbor	Property Area (Ha)	24Ha
Reference Documents	Southern Fleurieu Coastal Action Plan		

### 3.2 Project Partners

Landholder Details					
Landholder Name	DEWNR				
Contact Person	Seiji Iwao				
Telephone		Work	08 8552 0303	Mobile	0419 863 597
Fax		Email	<a href="mailto:seiji.iwao@sa.gov.au">seiji.iwao@sa.gov.au</a>		
Landholder Postal Address	3 Eyre Terrace Victor Harbor SA 5211			Postcode	5211

Volunteer Group Details (Project Partner)					
Group Name	Friends of Granite Island				
Contact Person	John Biggins				
Position in group	Chairman				
Telephone – Home	08 8552 4811	Work		Mobile	0408 800 453
Fax		Email	<a href="mailto:fogi@bigpond.com">fogi@bigpond.com</a>		
Group Postal Address	PO Box 123 Victor Harbor SA 5211			Postcode	5211
Notes					

Adelaide & Mount Lofty Ranges NRM Board- Community Group Action					
Project Officer	Jodie Woof				
Postal Address	5 Aldinga Road Willunga			Postcode	5172
Telephone – Work	8550 3426	Mobile	0488 952 026		
Fax		Email	<a href="mailto:Jodie.woof@sa.gov.au">Jodie.woof@sa.gov.au</a>		

Adelaide & Mount Lofty Ranges NRM Board – Seascapes Program					
Project Officer	Corey Jackson				
Postal Address	PO Box 9 Yankalilla			Postcode	5203
Telephone - Work	8558 0220	Mobile	0438 846 488		
Fax		Email	<a href="mailto:coreyj@yankalilla.sa.gov.au">coreyj@yankalilla.sa.gov.au</a>		

# Friends of Granite Island map 2014

## 3.3 Map of Project Site



- AMLR NRM Region
- CGA-Project Area 14/15 "update details"
- CGA-Project Zones 14/15

**Zone 1 –**  
Previous plantings & nest box area

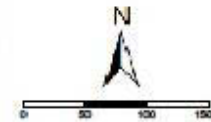
**Zone 2 –**  
Previous plantings & kikuyu control area

**Zone 3 –**  
Native grass area plus weeds buffalo grass & Carpobrotus edulis

**Zone 4 –**  
Casaurina glauca control area

**Zone 5 –**  
Fig tree plantings area

**Zone 6 –**  
Coastal Display Gardens area



Produced by: Natural Resources-Adelaide and Mt. Lofty Ranges-DEWNR  
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#### 4.1 Management Actions Year 1- 2014 - 15

Task No. <sup>1</sup>	Description & Technique <sup>2</sup>	Zone <sup>3</sup>	Responsible Party	Quantity (Area, No., Length)	Contribution (Ex GST)			Timing Start & finish dates
					NRM Board	Volunteer Group	Landholder	
1	<p><b>Weed Control</b>  <b>Herbaceous</b> - Hand grubbing, dabbing/swabbing, weed wands  <b>Grasses</b> - Kikuyu, Buffalo - Spot spray around plantings  <b>Woody weeds</b> - Monitor sites for African boxthorn, Acacia cyclops, Casuarina glauca hand pull or cut &amp; swab seedlings</p> <p>Working bee's 2nd and 4th Wednesday of the month plus a few volunteers do additional days during the month</p>	N/A	Volunteer Group	N/A	\$0	\$10000	\$0	Jul.2014 - Jun.2015
2	<p><b>Weed Control &amp; Fire Management</b>  Works by Senior Ranger and DEWNR works crew</p>	N/A	Landholder	N/A	\$0	\$0	\$5000	Jul.2014 - Jun.2015
3	<p><b>Personal protective clothing</b>  Printing of FOGI onto volunteer hi-vis vests</p>	N/A	NRM Board	10(#)	\$136.36	\$0	\$0	Sep.2014 Sep.2014
4	<p><b>Herbicide supply</b>  Glyphosate 20L Wipeout 450  Envirodye Red 5L</p>	N/A	NRM Board	1(#)	\$276.36	\$0	\$0	Sep.2014 Sep.2014
5	<p><b>First Aid Kits</b></p>	N/A	NRM Board	1(#)	\$260.43	\$0	\$0	Sep.2014 Sep.2014
6	<p><b>Reveg Tubestock</b></p>	N/A	Volunteer	N/A	\$0	\$4500	\$0	Nov.2014

Task No. <sup>1</sup>	Description & Technique <sup>2</sup>	Zone <sup>3</sup>	Responsible Party	Quantity (Area, No., Length)	Contribution (Ex GST)			Timing Start & finish dates
					NRM Board	Volunteer Group	Landholder	
	Volunteer group to propagate 850 tubestock from locally collected seed for planting in Zone 1, 2 & 5		Group					- May.2015
7	<b>Personal protective clothing</b> 2 x Respirator Kits plus additional filters - \$136.98 ex Anti-vibration gloves for brushcutter use - \$111.44 ex Printing of FOGI onto volunteer Hi-Vis vest - \$109.12 ex Total - \$357.54 ex	N/A	NRM Board	1(#)	\$357.54	\$0	\$0	Dec.2014 - Jan.2015
8	<b>Plant &amp; equipment maintenance</b> Brushcutter Service - Stihl FS90	N/A	Volunteer Group	1(#)	\$59.09	\$0	\$0	Jan.2015 -Jan.2015
9	<b>Weed Control</b> Funded by NRM Community Group Action Zone 2 - control Kikuyu across site, use grass selective amongst native veg ie Ficinia nodosa. Focus on previously controlled areas, extending outwards. Control olive seedlings and other red alert weeds Zone 1 - brushcut and spot spray weeds amongst revegetation, Euphorbia, Scabious and introduced grasses. Control in Autumn and again after opening rains site prep for planting in June. Follow up Victorian Coastal Tea Tree in Zone 1 and north of Zone 1.	N/A	NRM Board	N/A	\$2000	\$0	\$0	Mar.2015 - May.2015
10	<b>Tools/equipment</b>	N/A	NRM Board	1(#)	\$157.5	\$0	\$0	Mar.2015 -

Task No. <sup>1</sup>	Description & Technique <sup>2</sup>	Zone <sup>3</sup>	Responsible Party	Quantity (Area, No., Length)	Contribution (Ex GST)			Timing Start & finish dates
					NRM Board	Volunteer Group	Landholder	
	Anti-siphon soaker hose for irrigation of reveg plantings							Mar.2015
11	<b>Weed Control - funded by NRM Seascapes</b> Zone 4 - Casuarina glauca cut & swab or basal bark spray plus Victorian Coastal Tea Tree and Acacia cyclops Zone 3 - Carpobrotus edulis spot spray and/or grub, Buffalo grass and other weed control in areas of good remnant veg	N/A	NRM Board	N/A	\$2,000  Seascapes Program	\$0	\$0	Mar.2015 - May.2015
12	<b>Training/workshop</b> Contractor to train volunteers when onsite undertaking weed control in : -Weed control techniques -Spot spraying around natives -Chemical usage rates	N/A	NRM Board	N/A	\$500	\$0	\$0	Mar.2015 - May.2015
13	<b>Reveg Pre-planting sundries</b> 1400 x recycled corflute guards to be provided by NRM Seascapes	N/A	NRM Board	1400(#)	\$0	\$0	\$0	May.2015 - May.2015
14	<b>Reveg Pre-planting sundries</b> 600 x wooden stakes	N/A	NRM Board	600(#)	\$264	\$0	\$0	May.2015 - May.2015
15	<b>Reveg Tubestock</b> Purchase 530 native tubestock for Zone 1 & 2 Southern side Zone 5 - Fig Tree site & 6 - Coastal Garden beds (new	N/A	NRM Board	530(#)	\$771	\$0	\$0	Jun.2015 - Jun.2015



Task No. <sup>1</sup>	Description & Technique <sup>2</sup>	Zone <sup>3</sup>	Responsible Party	Quantity (Area, No., Length)	Contribution (Ex GST)			Timing Start & finish dates
					NRM Board	Volunteer Group	Landholder	
	Penguin habitat garden bed)							
16	<b>Reveg Planting</b> Planting days through out June Volunteers to plant out propagated and purchased tubestock into Zones 1, 2 & 5 Approx 1250 tubestock	N/A	Volunteer Group	N/A	\$0	\$5350	\$0	Jun.2015 - Jun.2015
17	<b>Personal protective clothing</b> Stihl Chaps for use with Brushcutter	N/A	NRM Board	1(#)	\$244.55	\$0	\$0	Jun.2015 -Jun.2015
<b>Contributions sub-total 2014 - 15</b>					<b>\$7026.83</b>	<b>\$19850</b>	<b>\$5000</b>	

#### 4.2 Management Actions Year 2- 2015 - 16

Task No. <sup>1</sup>	Description & Technique <sup>2</sup>	Zone <sup>3</sup>	Responsible Party	Quantity (Area, No., Length)	Contribution (Ex GST)			Timing Start & finish dates
					NRM Board	Volunteer Group	Landholder	
18	<b>Weed Control &amp; Ongoing Maintenance</b> <b>Herbaceous</b> - Hand grubbing, dabbing/swabbing, weed wands <b>Grasses</b> - Kikuyu, Buffalo - Spot spray around plantings  Working bee's 2nd and 4th Wednesday of the month plus a few volunteers do additional days during the	N/A	Volunteer Group	N/A	\$0	\$10000	\$0	Jul.2015 - Jun.2016

Task No. <sup>1</sup>	Description & Technique <sup>2</sup>	Zone <sup>3</sup>	Responsible Party	Quantity (Area, No., Length)	Contribution (Ex GST)			Timing Start & finish dates
					NRM Board	Volunteer Group	Landholder	
	month							
19	<b>Weed Control &amp; Fire Management</b> Works by Senior Ranger and DEWNR works crew	N/A	Landholder	N/A	\$0	\$0	\$5000	Jul.2015 - Jun.2016
20	<b>Personal protective clothing</b> Gloves, and other items to be reviewed	N/A	NRM Board	N/A	\$200	\$0	\$0	Jul.2015 - Jun.2016
21	<b>Tools/equipment</b> Anti-siphon soaker hose for irrigation of reveg plantings x 2 1 supplied by VPU \$170 each Zone 5 Free Tree site above boardwalk	N/A	NRM Board	1(#)	\$170.91	\$0	\$170	Jul.2015 - Jun.2016
22	<b>Weed Control</b> Funded by NRM Community Group Action <b>Zone 1</b> - spot spray weed grass amongst native ground covers using grass selective herbicide <b>Zone 2</b> - control Kikuyu across site, use grass selective amongst native veg ie Ficinia nodosa. Focus on previously controlled areas, extending outwards. Control olive seedlings and other red alert weeds	N/A	NRM Board	N/A	\$1000	\$0	\$0	Oct.2015 - Nov.2015
23	<b>Reveg Tubestock</b> Volunteer group to propagate 700 tubestock from locally collected seed for planting in Zone 1,2,5,6	N/A	Volunteer Group	1(#)	\$0	\$4500	\$0	Nov.2015 - Jun.2016
24	<b>Herbicide supply</b> Glyphosate 20L Wipeout 450	N/A	NRM Board	1(#)	\$600	\$0	\$0	Jan.2016 -

Task No. <sup>1</sup>	Description & Technique <sup>2</sup>	Zone <sup>3</sup>	Responsible Party	Quantity (Area, No., Length)	Contribution (Ex GST)			Timing Start & finish dates
					NRM Board	Volunteer Group	Landholder	
	Envirodye Red 5L Spray Tech Oil							Jan.2016
25	<b>Plant &amp; equipment maintenance</b> Brushcutter Service - Stihl FS90	N/A	NRM Board	1(#)	\$70	\$0	\$0	Jan.2016 - Jan.2016
26	<b>Weed Control</b> Funded by NRM Community Group Action <b>Zone 1</b> - brushcut and spot spray weeds amongst revegetation, Euphorbia, Scabious and introduced grasses (use grass selective where necessary). Control in Autumn and again after opening rains site prep spot spray for planting in June. <b>Zone 2</b> - follow up control Kikuyu across site, use grass selective amongst native veg ie Ficinia nodosa. Focus on previously controlled areas, extending outwards. Control olive seedlings and other red alert weeds	N/A	NRM Board	N/A	\$1500	\$0	\$0	Mar.2016 - Jun.2016
27	<b>Weed Control - funded by NRM Seascapes</b> Zone 4 - Casuarina glauca cut & swab or basal bark spray plus Victorian Coastal Tea Tree and Acacia cyclops Zone 3 - Carpobrotus edulis spot spray and/or grub, Buffalo grass and other weed control in areas of good remnant veg	N/A	NRM Board	N/A	\$2,000	\$0	\$0	Mar.2016 - May.2016

Task No. <sup>1</sup>	Description & Technique <sup>2</sup>	Zone <sup>3</sup>	Responsible Party	Quantity (Area, No., Length)	Contribution (Ex GST)			Timing Start & finish dates
					NRM Board	Volunteer Group	Landholder	
28	<b>Reveg Pre-planting sundries</b> 1400 x recycled corflute guards to be provided by NRM Seascapes if not possibly from Onkaparinga NP guard removal or FOGI do have plastic & bamboo	N/A	NRM Board	1400(#)	\$0	\$0	\$0	May.2016 - May.2016
29	<b>Reveg Pre-planting sundries</b> 1400 x wooden stakes	N/A	NRM Board	1(#)	\$800	\$0	\$0	May.2016 - May.2016
30	<b>Reveg Tubestock</b> Purchase 500 native tubestock for Zone 1, 2, 5, 6	N/A	NRM Board	500(#)	\$700	\$0	\$0	Jun.2016 -Jun.2016
31	<b>Reveg Planting</b> Planting days through out June - FOGI would welcome community planting event Volunteers to plant out propagated and purchased tubestock into Zones 1, 2, 5, 6 Approx 1200 tubestock	N/A	Volunteer Group	N/A	\$0	\$5350	\$0	Jun.2016 - Jun.2016
<b>Contributions sub-total 2015 - 16</b>					<b>\$7040.91</b>	<b>\$19850</b>	<b>\$5170</b>	

#### 4.3 Management Actions Year 3- 2016 - 17

Task No. <sup>1</sup>	Description & Technique <sup>2</sup>	Zone <sup>3</sup>	Responsible Party	Quantity (Area, No., Length)	Contribution (Ex GST)			Timing Start & finish dates
					NRM Board	Volunteer Group	Landholder	
32	<b>Weed Control &amp; Ongoing Maintenance</b> <b>Herbaceous</b> - Hand grubbing, dabbing/swabbing, weed wands <b>Grasses</b> - Kikuyu, Buffalo - Spot spray around plantings Working bee's 2nd and 4th Wednesday of the month plus a few volunteers do additional days during the month	N/A	Volunteer Group	N/A	\$0	\$10000	\$0	Jul.2016 - Jun.2017
33	<b>Weed Control &amp; Fire Management</b> Works by Senior Ranger and DEWNR works crew	N/A	Landholder	N/A	\$0	\$0	\$5000	Jul.2016 - Jun.2017
34	<b>Personal protective clothing</b> Gloves, and other items to be reviewed	N/A	NRM Board	1(#)	\$200	\$0	\$0	Jul.2016 - Jun.2017
35	<b>Tools/equipment</b> Review volunteer tools and equipment needs	N/A	NRM Board	1(#)	\$200	\$0	\$0	Jul.2016 - Jun.2017
36	<b>Weed Control</b> Funded by NRM Community Group Action <b>Zone 1</b> - spot spray weed grass amongst native ground covers using grass selective herbicide <b>Zone 2</b> - control Kikuyu across site, use grass selective amongst native veg ie Ficinia nodosa. Focus on previously controlled areas, extending outwards. Control olive seedlings and other red alert weeds	N/A	NRM Board	N/A	\$1000	\$0	\$0	Oct.2016 - Nov.2016

Task No. <sup>1</sup>	Description & Technique <sup>2</sup>	Zone <sup>3</sup>	Responsible Party	Quantity (Area, No., Length)	Contribution (Ex GST)			Timing Start & finish dates
					NRM Board	Volunteer Group	Landholder	
37	<b>Reveg Tubestock</b> Volunteer group to propagate 700 tubestock from locally collected seed for planting in Zone 1,2,5,6	N/A	Volunteer Group	1(#)	\$0	\$4500	\$0	Nov.2016 - Jun.2017
38	<b>Herbicide supply</b> Glyphosate 20L Wipeout 450 Envirodye Red 5L Spray Tech Oil	N/A	NRM Board	1(#)	\$700	\$0	\$0	Jan.2017 - Jun.2017
39	<b>Plant &amp; equipment maintenance</b> Brushcutter Service - Stihl FS90	N/A	NRM Board	1(#)	\$70	\$0	\$0	Jan.2017 - Jan.2017
40	<b>Weed Control</b> Funded by NRM Community Group Action <b>Zone 1-</b> brushcut and spot spray weeds amongst revegetation, Euphorbia, Scabious and introduced grasses (use grass selective where necessary). Control in Autumn and again after opening rains site prep spot spray for planting in June. <b>Zone 2-</b> follow up control Kikuyu across site, use grass selective amongst native veg ie Ficinia nodosa. Focus on previously controlled areas, extending outwards. Control olive seedlings and other red alert weeds	N/A	NRM Board	N/A	\$1500	\$0	\$0	Mar.2017 - Jun.2017
41	<b>Reveg Pre-planting sundries</b> 1400 x wooden stakes Receycled corflute guards to be provided by NRM	N/A	NRM Board	1(#)	\$800	\$0	\$0	May.2017 -

Task No. <sup>1</sup>	Description & Technique <sup>2</sup>	Zone <sup>3</sup>	Responsible Party	Quantity (Area, No., Length)	Contribution (Ex GST)			Timing Start & finish dates
					NRM Board	Volunteer Group	Landholder	
	Seascapes							May.2017
42	<b>Reveg Tubestock</b> Purchase 500 native tubestock for Zone 1, 2, 5, 6	N/A	NRM Board	400(#)	\$700	\$0	\$0	Jun.2017 - Jun.2017
43	<b>Reveg Planting</b> Planting days through out June - FOGI would welcome community planting event Volunteers to plant out propagated and purchased tubestock into Zones 1, 2, 5, 6 Approx 1200 tubestock	N/A	Volunteer Group	N/A	\$0	\$5350	\$0	Jun.2017 - Jun.2017
<b>Contributions sub-total 2016 - 17</b>					<b>\$5170</b>	<b>\$19850</b>	<b>\$5000</b>	
Total NRM Board Contribution					<b>\$19237.74</b>			
Total Volunteer Contribution						<b>\$59550</b>		
Total Landholder Contribution							<b>\$15170</b>	

<sup>1</sup> The actual work to be undertaken in subsequent years is subject to review and will be based upon completion of previous year's works by the Board, Volunteer Group and the Landholder.

<sup>2</sup> All persons carrying out tasks identified above should have the correct skills and accreditations to do so legally and within WHS requirements.

<sup>3</sup> For “Zone”, please refer to the project site map in Section 3.3



### 5.1 Volunteer Training Needs

Key Skills/Topics	Reason	Timing	Number of group members
Brushcutter training	Increase skills and number of volunteers able to use equipment	2015/16	2

## Standard Conditions of Receiving NRM Board Funding

The Adelaide & Mount Lofty Ranges Natural Resources Management Board (Board) invests public money in environmental projects undertaken by landholders and the community (including volunteer groups) that contribute to targets in the regional [Natural Resources Management Plan](#). For this reason, the Board is required to ensure that its investment is secure. To achieve this, the Board places the following conditions on landholders and volunteer groups receiving Board assistance through this project plan:

- All works undertaken by the landholder will be done entirely at the landholder's own risk. The Board will not be liable for any loss or damage to property, or injury or death of persons arising from or associated with the landholder's own works.
- The volunteer group identified in this Project Plan must have the appropriate insurance cover in place for the duration of this Project Plan.
- The project partners identified in this Project Plan must adhere to relevant Work Health and Safety procedures when undertaking tasks identified in the Project Plan. This includes complying with the Volunteer Management Framework.
- The landholder and volunteer group will undertake the tasks identified as the "landholder" or "volunteer group" responsibility shown in Section 4 of the Project Plan, and do so within the time period indicated.
- Responsibility for the ongoing care and maintenance of the land remains with the landholder, including all normal statutory obligations under the *Natural Resources Management Act 2004*.
- Any major variation to activities or contributions in Section 4 will require agreement by all signatories. The Project Plan must be amended to reflect the variation and be resigned by all signatories.

As the representative for a contributor to this Project Plan, I/we accept the scope of project. By signing below I/we accept and agree to undertake the tasks listed as being the responsibility of the NRM Board/volunteer group/landholder and acknowledge that I/we have also read the "Standard Conditions of Receiving NRM Board Funding" as outlined in Section 6 above.

**SIGNED by:**

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1. Signed for and on behalf of the DEWNR

**Name:** Seiji Iwao

**Position:** Senior Ranger

**Signature:**

**Date:**

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2. Signed for and on behalf of the Friends of Granite Island

**Name:** John Biggins

**Position:** Chairman

**Signature:**

**Date:**

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3. Signed for and on behalf of the ***Adelaide and Mount Lofty Ranges Natural Resources Management Board***

**Name:** Andy Raymond

**Position:** Volunteer Program Coordinator

**Signature:**

**Date:**

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## **Appendix 7: Historical information on Little Penguins**



***The following information was compiled by Graham Carpenter, Ornithologist as part of this project.***

The Little Penguin colony on Granite Island was the most accessible in Australia. Data from Philip Island in Victoria testify that penguin tourism also contributes substantially to the economy.

Although not the role of this report, some historical information is provided on Little Penguins in the study area. More exhaustive research is recommended.

The first report was of two penguins found in the stomach of a large sea-lion shot near Yilki in August 1904 (Anon. 1904). In the 1920s large numbers were observed on West Island (Anon 1927, Mengersen in Anon. 1929), while Cleland (1924) noted that dead bodies were often washed up, and living specimens were occasionally seen at Rosetta Head and on Wright's Island. The first reports from Granite Island were not until the 1940s (Francis 1944). Little Penguins were reported to be in large numbers on Pullen Island in 1978 (NPWS 1983). Its former status on Seal Rock is unknown but was unlikely to have supported many nests due to its small size.

It is of interest to note that the penguin was not listed in the vocabulary of the Narrinyeri people of the Encounter Bay district provided by Wyatt in Woods (1879), nor were they mentioned by Long (1894) in his reminiscences of whaling on Granite Island. The nearest early report of penguins were those seen by Angas (1847) in the sea off Cape Jervis, and were not noted in the Encounter Bay area (other than The Pages) in a discussion of seabirds by Anon. (1900).

It is clear that Little Penguins reached their maximum numbers in the region in the 1970s-90s, when over 3500 pairs were present (Hinsliff 1991, Copley 1996). Since that time numbers have declined rapidly across the survey area, and are currently probably extinct as a breeding species. Subsequently many burrows have been used as nesting sites by Rock Doves (this survey).