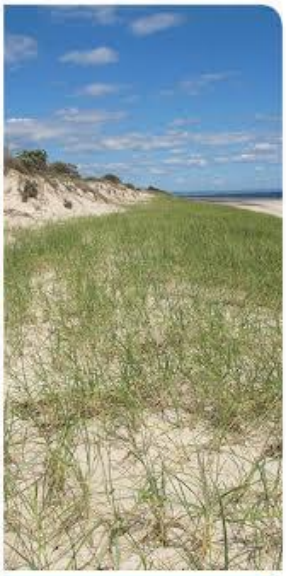
TENNYSON DUNES ON-GROUND WORKS
BIODIVERSITY ACTION PLAN



ecological evaluation

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Ecological Evaluation

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1. Introduction

The purpose of this Biodiversity Action Plan is to assist managers in their efforts to protect and conserve the biodiversity values of Tennyson Dunes. The Plan provides an update of the previous Vegetation Management Plan for Tennyson Dune Reserve (Cordingley and Petherick 2006) and aims to document the key biodiversity values and threats at Tennyson Dunes and to provide prioritised management actions that will enable conservation of the dunes' biodiversity assets over the next five years.

This Biodiversity Action Plan will complement and reinforce activities that have been undertaken at Tennyson Dunes to date, including weed control, introduced animal control, track rationalisation, erosion control and extensive revegetation. On-ground managers include the Adelaide & Mount Lofty Ranges Natural Resource Management Board (AMLR NRMB) and the Tennyson Dunecare Group (TDG), with support from the City of Charles Sturt (CoCS).

The Tennyson Dunes Biodiversity Action Plan is intended to align with, and contribute to, the objectives of the following strategies and plans:

- The *Metropolitan Adelaide and Northern Coastal Action Plan 2009*. 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 *Draft Adelaide and Mount Lofty Ranges Natural Resources Management Plan* (2013) which outlines the Adelaide and Mt Lofty Ranges NRM Board's investment priorities over a three-year period. This includes the establishment of long-term goals and clearly defined targets.
- The *Regional Recovery Plan for Threatened Species and Ecological Communities of Adelaide and the Mount Lofty Ranges 2009-2014.*
- The *Vegetation Management Plan Tennyson Dune Reserve Yaitya Worra (True Indigenous Sand)*, 2006.

This Plan is intended as a guide for specific and prioritised "on-ground" works over the next 5 years, with the aim being to maximise the biodiversity values and resilience of Tennyson Dunes and adjacent coastal areas. Actions have been prioritised to ensure that time, effort and funding is spent appropriately to maximise conservation benefits. The Plan specifically deals with threats to biodiversity within the dunes, however linkages and integration with other land uses and influencing processes along the coast to the north and south are also addressed.

The Plan also considers the strong community interest in Tennyson Dunes and supports the partnered work that the Adelaide and Mount Lofty Ranges Natural Resource Management Board (AMLR NRMB) undertakes with the relevant stakeholders.

The preparation of the 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;
- Assessment of the biodiversity assets;
- Prioritisation of biodiversity threats; and
- Actions required to alleviate threats.

2. Context and background

This Plan seeks to address coastal management issues identified in the following documents:

- Metropolitan Adelaide and Northern Coastal Action Plan (Caton et al, 2009);
- Adelaide Living Beaches strategy; and
- the previous Vegetation Management Plan for Tennyson Dune Reserve (Cordingley & Petherick, 2006).

2.1 Metropolitan Adelaide and Northern Coastal Action Plan

Coastal Action Plans have been completed for the Adelaide and Mount Lofty Ranges Natural Resources Management Board region in partnership with the SA Department of Environment Water and Natural Resources (DEWNR), local coastal councils and experts, with support from the Australian Government.

The Metropolitan Adelaide and Northern Coastal Action Plan (MANCAP) (Caton et al 2009) covers the Adelaide coastline from Sellicks Beach to the Port Wakefield Proof Range and provides a detailed review of the state of natural coastal resources across the region.

A major part of the MANCAP is the description and analysis of cells, including prioritised local management action recommendations. Recommended actions for Tennyson Dunes include:

- extending and intensifying planting of local native species, in tandem with removal of priority weeds (High Priority); and
- sand drift fencing to aid sand accumulation and planting to encourage low foredune face angle and lessen storm damage hazard (Medium Priority).

These recommendations have been incorporated into this Biodiversity Action Plan.

2.2 Vegetation Management Plan Tennyson Dune Reserve, 2006

A vegetation management plan for Tennyson Dune Reserve was produced for the City of Charles Sturt in 2006 (Cordingley, S. & C. Petherick, SA Urban Forest Biodiversity Program, Department Environment, Water & Natural Resources). The purpose of this plan was to provide a “practical, issue specific, management plan to guide the implementation of native vegetation enhancement works within the dune system”. This plan features:

- Provision of background information, including history, current status and possible future sand management strategies;
- Site and vegetation community descriptions, including species lists and aerial vegetation maps;

- A weed control plan that includes a list of priority weed species, weed distribution maps and weed control methodology;
- A revegetation plan detailing a list of suitable species, quantities required and revegetation methodology;
- Recommendations for addressing native vegetation management issues including fire, access and fencing, erosion, introduced fauna and stormwater outfall areas;
- Identification of opportunities for educational activities and signage;
- A timetable for plan implementation with approximate budgets; and
- Detailed appendices which focus on on-ground strategies to guide in the implementation of the management plan recommendations.

2.3 Adelaide's Living Beaches – A strategy for 2005 – 2025

The main component of the strategy for managing Adelaide's beaches from 2005 to 2025 is to continue the program of beach replenishment, to maintain the sandy foreshore, build up dune buffers, and protect coastal infrastructure.

The area of impact has been divided into seven coastal management cells and Tennyson Dunes is situated within 'Cell 4 Henley Beach to West Lakes Shore'.

Benefits of the strategy include:

- the maintenance of sand on Adelaide's metropolitan beaches for both recreation and protection purposes;
- a reduction in the impact of ongoing replenishment work on beach users and coastal residents;
- existing sand supplies are recycled more efficiently; and
- the strategy can be readily adapted to meet changing climatic conditions.

3. Current land management

The area of the Tennyson dune system covered by this Plan comprises the lands currently owned by the South Australian Coast Protection Board and the Crown Lands, Department of Environment Water & Natural Resources (DENR). The location and area boundaries covered by this Plan are shown in Figure 1. It should be noted that the northern and southern carparks have not been considered as part of this plan.

4. Aims and objectives of the plan

It is not the intention of this On-Ground Works Biodiversity Action Plan to reiterate information such as history of the dunes, physical description, general weed control techniques, seed collection techniques and other general background material already provided in the 2006 Vegetation Management Plan.

The aim of this Plan is to review and update relevant management actions, strategies and priorities and thereby provide the information required to continue the restoration and conservation of the coastal ecological values and function of Tennyson Dunes by reducing threats to biodiversity and increasing resilience.

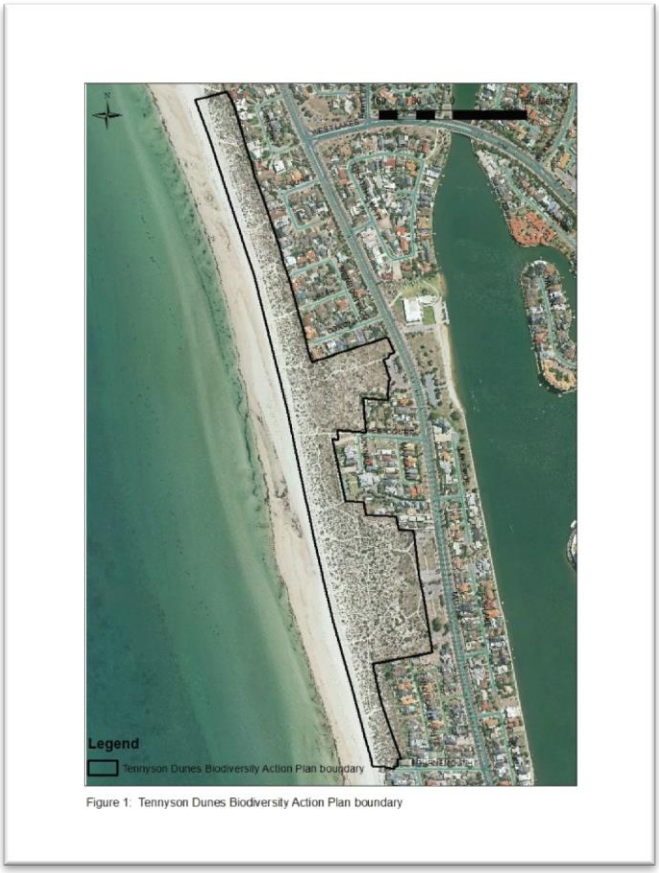


Figure 1: Tennyson Dunes Biodiversity Action Plan boundary

The objectives of the Tennyson Dunes Biodiversity Action Plan are to:

- Provide information needed to address the local management action/s identified in the MANCAP;
- Clearly identify and update priority issues relating to the management of remnant vegetation and landforms within the project area;
- Identify and update priority issues relating to public usage and any actions that are recommended to ensure that human activity is managed in a sustainable manner;
- Identify and address any other relevant natural resource management matters identified within the study area during the course of the project; and
- List actions that are recommended to protect and enhance the conservation value of the area.

It is intended that this Plan will inform the development of a broader management plan for Tennyson which will include all aspects of management of the area.

5. Biodiversity values

The conservation, education, aesthetic, scientific and open space values of Tennyson Dunes are well-documented in the 2006 Vegetation Management Plan which states that "Tennyson Dune Reserve is the most ecologically significant strip of dunes on the Adelaide metropolitan coastline". The mature, well-established native vegetation at Tennyson is one of the last reminders of the original dune system that was once common along the Adelaide metropolitan coastline and the area provides

some connection between Grange to the south and Semaphore Park to the north, with Tennyson Dunes as the hub.

Focal species include *Adriana quadripartita* (both remnant and planted) which is crucial habitat for the rare Bitterbush Blue Butterfly (*Theclinesthes albocincta)* and Hawkweed Picris *(Picris sqarrosa,* the only State conservation rated plant species still known to exist in MANCAP's cell (MA13 Patawalonga to Point Malcolm).

The rare Cynone Grass Skipper (*Anisynta cynone cynone*) has been reported in tussock grass at Tennyson and the dunes provide habitat for a high number of reptile species (Caton et al 2009).

A reptile study of Lefevre Peninsula coastal reserves undertaken by the SA Herpetology Group in 2011 concluded that "Tennyson still provides the best remnant habitat for coastal reptiles along the Adelaide foreshore and is worthy of further conservation efforts….Tennyson alos provides excellent opportunities for additional studies on thermoregulation for Painted Dragons, Coastal Bearded Dragons and other small skinks."[1]

One of Tennyson's greatest values is the Tennyson Dunes Group (TDG), a dedicated volunteer conservation group whose prime objective is to provide a safe sanctuary for native flora and fauna and to improve and share this valuable asset with the community. Their tireless work over the last 20 years has included animal and plant surveys, collection and propagation of locally native plant seed, revegetation, weed and feral animal control and community education through designing interpretive signs and conducting tours and presentations.

Flora species lists for the dunes are included in Appendix 1 and a list of fauna species recorded by members of TDG is included in Appendix 2.

[1] Matetjic, P. 2011. *Reptile study of the Lefevre Peninsula coastal reserves*, South Australian Herpetology Group.

Biodiversity values at Tennyson Dunes – the relationship between Coast Bitterbush (*Adriana quadripartita*) and the Bitter-bush Blue Butterfly (*Theclinesthes albocincta*).

6. Threats to biodiversity (management issues)

The threat analysis for Tennyson Dunes, undertaken as part of the MANCAP, produced a high threat score, with the main contributors identified as stormwater, zoning, land ownership and land use, viewshed and viewscape, vegetation block degradation and weed distribution.

The biodiversity threats or management issues at Tennyson Dunes which were addressed in the 2006 Vegetation Management Plan, included:

- Introduced fauna – in particular rabbits, foxes, cats
- Fragmentation caused by past clearance and exogenous disturbances
- Weed invasion
- Fire
- Access and fencing (dune dissection, public access, sand drift fencing, garden encroachments)
- Erosion

The following sections provide a review of threats, eight years on from the original management plan.

Strategies and recommendations for management of priority threats over the next five years are included in Section 7. Section 8 includes methods for monitoring management progress and success and a biodiversity action plan table is included in Section 9.

6.1 Fragmentation

The Tennyson Dune system occurs within the Reedbeds IBRA Association which has less than 0.1% of its original vegetation remaining[2] and it represents a fragment of remnant vegetation in a highly modified landscape. The following table lists the recommendations made in the 2006 Vegetation Management Plan to address fragmentation issues and what activities have been undertaken to improve the condition, resilience and long term viability of Tennyson Dunes.

Table 1: Activities undertaken since 2006 to address fragmentation issues at Tennyson Dunes

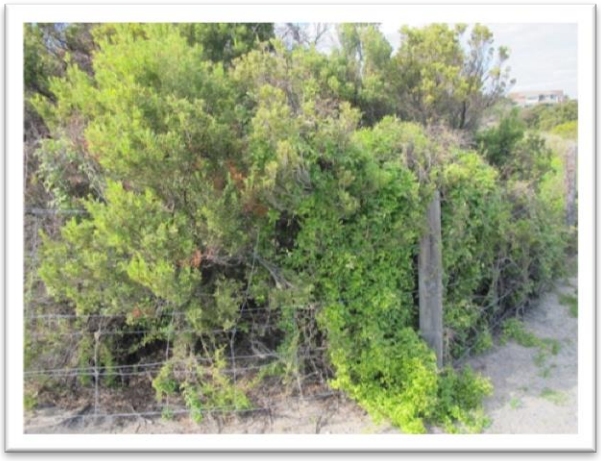
2006 Recommendation	Progress to date (2014)
Strategic vegetation buffers are established utilising indigenous species	Reconstruction of strategic buffers through revegetation has occurred, most notably in the large back dune area abutting the southern carpark – undertaken by AMLR NRM Board. Strategic low-level supplementary planting has also occurred throughout the dunes in tandem with weed control–

[2] Associations within the Interim Biogeographic Regionalisation for Australia (IBRA) hierarchy represent a landscape based approach to classifying the land surface of Australia from a range of continental environmental attributes. The regions have been developed to assess and plan for the protection of biological diversity. The regionalisation forms a hierarchy with State based associations being grouped into sub-regions, which in turn are grouped to form the regions. The associations were initially derived from the Environmental Associations of SA created by the CSIRO in 1977.

	undertaken by AMLR NRM Board and Friends of Tennyson Dunes .
Species richness is increased through reinstatement to reflect the site's original diversity *Numbers of less common species currently existing on site are increased*	The following species have been reinstated at Tennyson: • *Adriana quadripartita* to bring back the Bitterbush Blue Butterfly (*Theclinithes albocincta*) • *Attriples cinerea* – to stabilise the foredune/ dune crest • *Billardiera cymosa* -2014 re-introduction • *Helichrysum leucopsideum* -2014 re-introduction • *Chrysocephalum apiculatum* -2013 & 2014 re-introduction • *Lepidosperma gladiatum* -in the past but not recently • *Leucopogon parviflorus* – in the past 5 years to ensure continuation of this species • *Kunzea pomifera* – good results in last 10 years • *Leucophyta brownii* – restoration/continuation in last 5 years • *Podolepis rugata* ssp*. littoralis* -2013 & 2014 re-introduction • *Spinifex hirsutus* – over last 20 years • *Picris squarrosa* – restoration/continuation in last 5 years (limited success)
Improved management of future seed and vegetative material collected from the site are established on other nearby locations	TDG is looking to establish a seed garden – much of the seed is presently collected from nearby locations (not within the dunes).
Plants grown from seed and vegetative material collected from the site are established in other nearby locations	City of Charles Sturt has recently (2013/14 planting season) planted over 9,000 plants in the area immediately adjoining Tennyson Dunes to the north and further along the coastal strip to Bower Road.
A coastal landscape linkage is established along (and beyond) the City of Charles Sturt coastline, linking sites of significance	

6.2 Weeds

Weeds are a significant threat to biodiversity because they out-compete native plants and degrade habitat. A total of 94 introduced plant species have been recorded at Tennyson Dunes. Some of these species have been deliberately introduced, eg Sea Wheat-grass (*Thinopyrum junceiforme*) and Perennial Veldt Grass (*Ehrharta calycina*) were introduced in the past to stabilise sand dunes. Other species such as *Gazania* sp., Margeurite Daisy (*Argyranthemum frutescens*), Seascape Daisy (*Osteospermum fruticosum*), *Arctotis stoechadifolia* and a range of hardy succulent species such as *Aeonium* sp. and *Agave* sp. have escaped or extended out from adjacent residential gardens or been dumped as waste.



Bridal Creeper (*Asparagus asparagoides*), a weed of national significance, growing on native vegetation at Tennyson Dunes

The 2006 Tennyson Dunes Vegetation Management Plan priority weeds list in Table 2 was developed using weed distribution maps in conjunction with the Weed Risk Assessment (WRA) and Weed Assessment Scoresheet (WAS) developed by the SA Animal and Plant Control Commission (Primary Industries & Resources SA).

Table 2: Priority Weeds List for Tennyson Dune Reserve (2006)

Priority	Scientific Name	Common Name	Importance Score	Weed Risk
1	*Lycium ferocissimum*	African Boxthorn	486.3	Very High
2	*Trachyandra divaricata*	Dune Onion Weed	463.2	Very High
3	*Asparagus asparagoides*	Bridal Creeper	416.8	Very High
4	*Ehrharta calycina*	Perennial Veldt Grass	302.6	Very High
5	*Gazania* sp.	Gazania	263.2	Very High
6	*Acacia cyclops*	Western Coastal Wattle	237.2	Very High
7	*Euphorbia paralias*	Sea Spurge	229.6	Very High
8	*Succulent* spp./ *Cacti* spp.	Succulent & Cacti	202.1	High
9	*Leptospermum laevigatum*	Coast Tea-tree	164.2	High
10	*Argyranthemum frutescens*	Marguerite Daisy	154.4	High
11	*Mesembryanthemum crystallinum*	Common Ice Plant	135.1	High
12	*Euphorbia terracina*	False Caper	126.3	High
13	*Arctotis stoechadifolia*	White Arctotis	110.5	High
14	*Carpobrotus edulis*	Hottentot Fig	95.8	High
15	*Galenia pubescens*	Coastal Galenia	94.7	High
16	*Chondrilla juncea*	Skeleton Weed	89.8	High
17	*Osteospermum fruticosum*	Seascape Daisy	73.7	Medium
18	*Oenothera stricta*	Evening Primrose	55.3	Medium
19	*Olea europaea*	European Olive	50.5	Medium
20	*Cynodon* spp.	Couch	44.2	Medium
21	*Rhamnus alaternus*	Buckthorn	37.9	Medium
22	*Pennisetum clandestinum*	Kikuyu	15.8	Low
23	*Stenotaphrum secundatum*	Buffalo Grass	15.8	Low
24	*Acacia saligna*	Golden Wreath Wattle	11.2	Low
25	*Lupinus consentii*	Blue Lupin	3.5	Low

For this plan a number of resources have been used to prioritise weeds. These resources include:their status (whether Declared[3] or WONS[4]), MANCAP Threat Value[5] and Red Alert Weed Rating[6], combined with control actions to date, and species targeted for control by various on-ground land managers including TDG, AMLR NRM Board and City of Charles Sturt. Table 3 includes the updated priority list.

As noted in the 2006 Plan, several weed species such as Sea Wheat Grass (*Thinopyrum junceiforme*) and Sea Rocket (*Cakile maritima*) currently provide sand stability and habitat and were therefore not included as a high priority for control. These species, as well as False Sow-thistle (*Reichardia tingitana*), are considered to be naturalised in the dunes and therefore unfeasible to remove.

Other woody weed species, such as Western Coastal Wattle (*Acacia cyclops*), Buckthorn (*Rhamnus alaternus*), Athel Pine (*Tamarix aphylla*) and Boxthorn (*Lycium ferocissimum*) have been successfully controlled so that it is now simply a matter of monitoring for/controlling new invasions. These species are therefore an ongoing high priority, as they have the capacity to reinvade and the resources needed to keep them under control should be relatively small in the next five years.

Highly invasive and problematic species such as Bridal Creeper (*Asparagus aspargaoides*), Dune Onion Weed (*Trachyandra divaricata*) and Perennial Veldt Grass (*Ehrharta calycina*) continue to be very high priority target weeds, with much time, effort and money being spent on their control.

[3] Biosecurity SA, 2013
[4] Australian Weeds Committee, 2012
[5] Metropolitan and Northern Coastal Action Plan
[6] Croft et al, 2006

Invasive garden escapes such as Gazania, White Arctotis, Seascape Daisy, Margeurite Daisy and a variety of succulent species (*Aeonium* sp., *Agave* sp., *Aloe* sp.) continue to pose a serious problem, particularly adjacent to housing along the eastern (landward) boundary of the dunes system.

Individual weed control strategies are set out in Section 9 and control techniques are included in Appendix 3.

Invasive garden escapes which have jumped the fence and established within the dunes at the southern end.

Table 3: Priority Weeds List for Tennyson Dunes (2014)

Species	Common Name	Declared	WONS	MANCAP Threat Value	Red Alert Weed Rating	Comments
**Acacia cyclops*	Western Coastal Wattle			7	3	Actively controlled. A few persist, present in northern carpark plantings.
**Aloe sp./Agave sp.*	Century Plant			3	3	Garden escape. Individuals along residential boundary.
**Ammophila arenaria*	Marram Grass			2	3	Declining populations
**Arctotis stoechadifolia*	Arctotis			5	3	Garden escape. Actively controlled and much reduced south of Coronado Court. Still a problem north of Coronado Court.
**Argyranthemum frutescens ssp. foeniculaceum*	Marguerite Daisy			4	3	Garden escape. Actively controlled and much reduced south of Coronado Court. Still a problem north of Coronado Court.
**Asparagus asparagoides*	Bridal Creeper	Y	Y	7	5	Widespread but Rust and active control have reduced the density.
**Asphodelus fistulosus*	Onion Weed			3	2	Limited to disturbed areas, eg. walkways.
**Brassica tournefortii*	Wild Turnip			3	2	Sparsely scattered throughout.
**Carpobrotus edulis ssp. edulis*	Hotentot Fig			3	2	Actively controlled. A few persist.
**Chasmanthe floribunda var. floribunda*	African Corn-flag			-	-	Garden escape. Along residential boundary.
**Chondrilla juncea*	Skeleton Weed	Y		2	2	Sparsely scattered throughout.
**Cotyledon sp.*	Grey succulent			3	-	Garden escape. Individuals along residential boundary.
**Cynodon dactylon*	Couch			3	2	Sparsely scattered – in hind dunes.
**Echium plantagineum*	Salvation Jane	Y		2	2	Only a trace.
**Ehrharta calycina*	Perennial Veldt Grass			6	4	Originally introduced as a sand stabiliser after sand mining activities. Active control has occurred south of Estcourt House.
**Emex australis*	Three-cornered Jack	Y		1	-	Limited to disturbed areas, eg. walkways.
**Euphorbia paralias*	Sea Spurge			5	3	Sparsely scattered in foredune.
**Euphorbia terracina*	False Caper	Y		5	3	Actively controlled south of Coronado Court.
**Galenia pubescens var. pubescens*	Coastal Galenia			5	-	Actively controlled south of Coronado Court.
**Gazania sp.*	Gazania			6	3	Actively controlled south of Coronado Court. Still a problem

Species	Common Name	Declared	WONS	MANCAP Threat Value	Red Alert Weed Rating	Comments
						north of Coronado Court.
**Leptospermum laevigatum*	Coastal Tea-tree			6	3	Actively controlled. A few persist, present in carpark plantings.
**Limonium companyonis*	Sea-lavender			3	2	Sparsely present.
**Lupinus consentii*	WA Blue Lupine			-	-	Actively controlled in rear dunes, very few persist.
**Lycium ferocissium*	African Boxthorn	Y	Y	6	3	Isolated specimens after control program.
**Mesembryanthemum crystallinum*	Common Iceplant			4	-	Actively controlled but individuals persist throughout.
**Oenothera stricta*	Evening Primrose			1	-	Actively controlled but individuals persist throughout.
**Olea europaea ssp. europaea*	Olive			4	4	Isolated specimens after control program.
**Opuntia stricta*	Prickly Pear	Y	Y	1	-	Isolated specimens after control program.
**Osteospermum fruiticosum*	Seascape Daisy			2	-	Garden escape. Actively controlled and much reduced south of Coronado Court. Still a problem north of Coronado Court.
**Oxalis pes-caprae*	Soursob	Y		5	3	Limited to disturbed areas, eg. walkways.
**Pennisetum clandestinum*	Kikuyu			5	3	Possibly introduced via dumped garden clippings.
**Rhamnus alaternus*	Buckthorn			4	3	Isolated specimens after control program.
**Stenotraphrum secundatum*	Buffalo Grass			2	-	Sparsely present in rear dunes.
**Tamarix aphylla*	Athel Pine			1	2	Mature specimen in southern carpark.
**Thinoyrum junceiforme*	Sea Wheat Grass			3	2	Scattered on the seaward slope of foredunes.
**Trachyandra divaricata*	Dune Onion Weed			7	4	Actively controlled. Scattered individuals only persist.

MANCAP Threat Value: The threat value allocation process undertaken as part of the MANCAP identified a total of 187 priority environmental weeds for the Metropolitan Adelaide 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.

6.3 Fire

Tennyson Dunes is still considered to be a low-fire risk area. Fuel loads adjacent to housing appear to be reduced by regular slashing and/or herbicide application by residents.

6.4 Access and fencing

6.4.1 Fencing to control pedestrian access

Fencing of formal access paths has proven to be successful to a point in controlling public access through the sensitive dunes area. Two east-west access tracks have been closed, fenced off and signs erected to discourage people from using them. However, there is still a considerable amount of "undesirable" social behaviour occurring in the dune vegetation and these people have a persistent disregard for fences and signs. A large amount of physical damage to the fragile dune vegetation results from this behaviour, as well as the introduction of weeds such as Three-cornered Jack (*Emex australis*), Coastal Galenia (*Galenia pubescens*) and Iceplant (*Mesembryanthemum crystallinum*) along informal tracks, and the continual littering which occurs. This issue was raised in the 2006 Management Plan, and works to date include sporadic clean-ups of rubbish and tree guards.

6.4.2 Access tracks and signage

As discussed above, several east-west aligned access paths have been closed, however there is further consolidation/rationalisation of informal/local resident access tracks which could occur to reduce dune dissection and fragmentation.

Interpretative signage has been developed by the Tennyson Dunes Group to convey significant information (i.e. *Adriana quadripartita* and the Bitter Bush Butterfly). Such signage can convey information on the conservation values of the site, on current management effort and also on opportunities for the community to contribute to this management effort, including sticking to formalised paths and not wandering at large through the dunes.

The City of Charles Sturt has also placed signs at strategic entry/exit points about dog control, staying on paths and not littering. Several dog waste bag dispensers are also provided on paths throughout the dunes.

Revegetation efforts at Tennyson Dunes to discourage use of an informal access track through a sensitive dune area

6.4.4 Garden encroachments

The use of environmentally inappropriate exotic species within the dune environment can reduce the biodiversity values of ocean front land, be detrimental to the sustainability of the dune environment, and have a negative impact on the aesthetic value of the foreshore[7]. The adjacent urban environment at Tennyson provides a constant source of garden weed incursions which result from dumping of plant debris and other illegal activities such as planting, lawn extensions, landscape structures and irrigation systems within and abutting the dunes.

Recommendations made in the 2006 Plan regarding the encroachment of gardens and other private structures into Tennyson Dunes, particularly at the northern end between Coronado Court and the proposed northern extent of the study area, included:

- Staged removal and rehabilitation using appropriate indigenous species; and
- Investigation of the options for creating clear boundary delineation between beach front properties and the dunes.

This is a complex issue which should be dealt with on a case-by case basis as each individual residence has a different attitude to the adjoining dunes. For example, some frontages are almost completely bare, having been sprayed and/or slashed on an ongoing basis; others are planted with lawn and/or a variety of coast-hardy species, including a number which are considered high priority threat weeds; others have endeavoured to plant indigenous species; whilst some appear to have actively encouraged the remnant vegetation to regenerate and spread.

Garden encroachments - planting of inappropriate species such as *Aeonium* sp. and *Gazania* sp. which then spread throughout the dunes and become a major weed issue

6.4.5 Removal of old fencing

There is a considerable amount of old fencing material (wire, fence posts) present along dis- used tracks, boundaries etc. throughout the dunes. Its removal would improve both the biodiversity and aesthetic values of the dunes and is therefore recommended.

[7] Gold Coast City, Queensland (undated). *Management of Coastal Dune Areas – Policy*.

6.5 Erosion

Sand drift fencing installed in the past by the City of Charles Sturt, in conjunction with sand replenishment, undertaken as part of the Adelaide Living Beaches strategy, has proven to be successful in aiding the recovery and protection of dunes along the Tennyson coastal strip. The area is measured annually by the Coast Protection Board and recommendations for sand replenishment are made as required.

6.6 Pest animals

Rabbits

Rabbits are a recurring problem at Tennyson Dunes and their control is seen to be a very high priority by all on-ground managers due to the high levels of grazing pressure and subsequent lack of recruitment of native plant species. As stated in the AMLR NRM Board Fact Sheet – *Controlling Rabbits in Urban Areas*, "Controlling rabbits in an urban setting can be difficult as the range of options available is limited. The aim should be to remove the rabbits from the environment and also to modify that environment so that it is less attractive to rabbits in the future".

In the past the City of Charles Sturt has undertaken control works along the coast, including removal of large succulent infestations known to harbour pest animals, warren closure and treatment with phostoxin tablets.

Foxes

As on all parts of the Adelaide metropolitan coastline, foxes continue to be a problem at Tennyson, with several large, active fox dens situated at the northern end of the study area. Appendix 4 includes a map which shows the distribution and density of rabbit and fox activity, as mapped in 2014. Control of rabbits and foxes needs to occur at the same time so as to reduce adverse effects, for example

Cats

Domestic cats, which are also a threat to native fauna, are present in the area and it is likely that some of the cats at Tennyson Dunes are pets that have been dumped. Control by customary methods such as baiting or sterilisation is not viable in an urban environment such as Tennyson. Public education programs, backed by Local Government by-laws such as cat curfews and/or registration may be the way forward and it is recommended that this issue is addressed by DEWNR with assistance from the City of Charles Sturt.

Dogs

Formalisation of access paths has anecdotally reduced the number of dogs off leads and roaming at will through the dune vegetation. As mentioned previously, there are numerous council signs throughout the dunes regarding dog control and several dog waste bag dispensers are also provided on paths throughout the dunes.

The 2006 Management Plan recommended that Council By-Laws be adjusted to state that dogs should be on leash at all times within the dunes. Currently signs state that dogs must be on leash 10am – 8pm during daylight saving and under effective control at all other times. "Effective control" means under voice control, in close proximity and in sight or on leash. This should be tightened up

to “Dogs on leash at ALL times” and Council should consider updating signs at entry and exit points to the dunes to state this, with effective penalties applying for non-compliance.

Sign at Tennyson Dunes regarding control of dogs and including a dog waste bag dispenser

Other

Mice are also likely to be present and introduced bird species are common (see Appendix 2 for a full list).

7. Biodiversity management strategies

7.1 Biodiversity management objectives

The biodiversity management objectives for Tennyson Dunes over the next five years are to manage the native flora and fauna of the area and associated pests/threats in such a manner as to:

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

7.2 Management zones

To facilitate the ongoing management of threats to biodiversity at Tennyson Dunes (most notably weed control, rabbit control, revegetation and controlling people access), the dunes have been divided into management units (see Figures 2 & 3). Delineation of management units or zones is based largely on the type of vegetation present and the condition of the vegetation, and have been adapted and modified from those described and mapped in the 2006 Vegetation Management Plan. The management units and current priority management issues and strategies specific to each zone are described below. More detail on management actions is included in Section 9.

7.2.1 Management Zone 1 – Foredune

***Thinopyrum junceiforme, Spinifex hirsutus* Tussock Grassland**

Foredune communities naturally have a low species diversity and low plant life form diversity with a high proportion of herbs and grasses, a lack of tall shrubs and a relatively high percentage of bare ground (Croft et al, 2006).

The foredune (or primary dune) at Tennyson is dominated by the introduced Sea Wheat-grass (**Thinopyrum junceiforme*) with the native *Spinifex hirsutus* sparsely scattered throughout (approximately 1-5% projective foliage cover overall).

The removal of Sea Wheat-grass is considered unfeasible and is not a high priority as it has become naturalised in the dunes (Cordingley & Petherick, 2006) and it assists in decreasing the frequency and severity of blowout development (Hilton et al, 2006) along the foredune. Similarly, Sea Rocket (*Cakile maritima*) has become naturalised and currently provides sand stability and habitat and is therefore not a high priority species for control

Priority management issues – Management Zone 1

- Dune Onion Weed has been previously recorded in the foredune, and ongoing patrol and vigilance is required to ensure no new outbreaks occur.
- Sea Spurge (*Euphorbia paralias)* occurs as scattered individuals and could be readily controlled by hand-pulling.
- The recommended long-term strategy is to plant relatively low numbers of the following species to assist in binding the sand and slow the rate of erosion, and to improve habitat value:
  - *Atriplex cinerea* (TDG has been planting)
  - *Carpobrotus rossii*
  - *Ficinia nodosa*
  - *Leucophyta brownii*
  - *Olearia axillaris*
  - *Spinifex hirsutus*
- Sand drift fencing should continue to be utilised as an effective erosion management technique, as and where required (this is monitored annually as part of the Adelaide Living Beaches strategy).

7.2.2 Management Zone 2 – Interdune swale

***Olearia axillaris, Rhagodia candolleana* ssp. *candolleana* Open shrubland**

The interdune swale at Tennyson supports a high diversity of plant species for a coastal shrubland community, including species which are now considered to be rare on the Adelaide coastline, such as *Adriana quadripartita*, *Kunzea pomifera* and *Lotus australis*. Targeted and sensitive weed control is ongoing in the swale.

Management Zone 2 has been divided into 'Zone 2 North' and 'Zone 2 South', essentially based on the successful and ongoing control of Perennial Veldt Grass, Bridal Creeper, Coastal Galenia and False Caper which has occurred in Zone 2 South, with the strategy being to shift the weed front northwards over time (into Zone 2 North).

As noted in the 2006 Vegetation Management Plan, if whole of reserve management issues such as rabbit control and fragmentation are addressed, "Little further action should be necessary besides

allowing for natural regeneration with low scale supplementary plantings of structural and rarer species"(P 46).

Priority management issues – Management Zone 2

- Monitor for and control new outbreaks of Dune Onion Weed
- Contain the spread of Bridal Creeper
- Undertake careful follow-up control of Perennial Veldt Grass south of Estcourt House, while continuing to push the front northward
- Control/eradicate Coastal Galenia, Evening Primrose, Arctotis and False Caper.
- Ongoing patrol for new outbreaks of Boxthorn and Buckthorn and Seascape Daisy.
- Soursobs form dense patches within the swale. Soursob is an aggressive and persistent species which has a severe impact on native groundcover species with dense infestations eradicating most smaller plants. It can be very difficult to eradicate unless controls are well timed and persistent over several years (Muyt, 2007). Targeted control in significant areas such as around rarer native plants and plantings is recommended.

7.2.3 Management Zones 3– Hind Dune Seaward Face

***Olearia axillaris* Open shrubland**

Management Zone 3 supports a high diversity of native plant species. It should be noted that this zone was divided into 3a (more intact) and 3b (rehabilitation) in the 2006 Management Plan. As part of this project, the previous Management Zone 3b has been incorporated into a 'new' Management Zone 7 – "Garden encroachments/weedy edges", in an attempt to better manage and alleviate the pressures of adjacent housing development and associated garden encroachments.

Management Zone 3 has now been divided into 'Zone 3 North' and 'Zone 3 South', essentially based on the successful and ongoing control of Perennial Veldt Grass, Bridal Creeper, Coastal Galenia and False Caper which has occurred in Zone 3 South, with the strategy being to shift the weed front northwards over time (into Zone 3 North).

As with Management Zone 2, the primary focus should be on management of whole of reserve issues such as rabbit control, sensitive weed control, controlling people access, and low scale supplementary plantings of structural and rarer species.

Priority management issues – Management Zone 3

- Monitor for and control new outbreaks of Dune Onion Weed
- Contain the spread of Bridal Creeper
- Ongoing patrol for Boxthorn, Buckthorn and other woody weeds
- Undertake careful follow-up control of Perennial Veldt Grass south of Estcourt House, while continuing to push the front northward
- Control/eradicate Coastal Galenia, Evening Primrose, Arctotis and False Caper
- Ongoing patrol for new outbreaks of garden escapes such as *Seascape Daisy*, *Aeonium*, *Agave* sp. and *Geranium* sp.
- Targeted control of Soursob in significant areas such as around rarer native plants and plantings

7.2.4 Management Zone 4 - Hind Dune Ridge

***Leucopogon parviflorus, Olearia axillaris, Acacia longifolia* var. *sophorae* +/- *Myoporum insulare* Shrubland**

The dominant overstorey species on the Hind Dune Ridge are *Leucopogon parviflorus* and *Olearia axillaris*, with the occasional *Melaleuca lanceolata*.

It should be noted that this zone was subdivided into 4a (more intact) and 4b (rehabilitation) in the 2006 Management Plan. Due to revegetation and weed control efforts, particularly in the vicinity of the southern carpark, this area is no longer deemed to be as degraded or in need of large-scale rehabilitation. The previously mapped Zone 4b near the northern carpark has now been incorporated into Management Zone 5b and a broadscale revegetation program is recommended in this area (see Section 7.5 for details).

As with Management Zones 2 and 3, the primary focus in Management Zone 4 should be on management of whole of reserve issues such as rabbit control, sensitive weed removal and track rationalisation, with low scale supplementary plantings of structural and rarer species as required.

Priority management issues – Management Zone 4

- Monitor for and control new outbreaks of Dune Onion Weed
- Contain the spread of Bridal Creeper
- Ongoing patrol for new outbreaks of woody weeds such as Boxthorn, Buckthorn, *Acacia cyclops*, Coastal Tea Tree and Tamarisk.
- Careful follow up control of Perennial Veldt Grass has working from south to north.

7.2.5 Management Zone 5a – Rehabilitation

***Allocasuarina verticillata, Callitris gracilis* Very low Woodland (back dune adjacent southern carpark)**

The structure and diversity of this area, which abuts the southern car park, has changed markedly since the 2006 Vegetation Management Plan due to several broad-scale revegetation projects, most recently in 2014. The site now supports an open cover of Sheoak (*Allocasuarina verticilata*), Native Pine (*Callitris gracilis*) and Dryland Tea-tree (*Melaleuca lanceolata*) over a range of small shrubs and groundcovers including *Senecio pinnatifolius, Scaevola crassifolia, Tetragonia implexicoma, Threlkeldia diffusa* and *Rhagodia candolleana*. Of note, is the presence of *Lomandra leucocephala* ssp. *robusta* and *Kunzea pomifera*, both of which are regenerating well.

Plantings in 2014 follow the mapping undertaken by the Coast Protection Board, DEWNR and have been divided into three sub-units:

- *Melaleuca lanceolata* Open low woodland + *Tetragonia implexicoma*
- *Scaevola crassifolia* Shrubland
- *Allocasuarina verticillata* Low open woodland

Details of these plantings are included in Appendix 5.

Priority management issues – Management Zone 5a

- Monitor for and control new outbreaks of Dune Onion Weed

- Contain the spread of Bridal Creeper
- Ongoing patrol for new outbreaks of woody weeds such as Boxthorn, Buckthorn, *Acacia cyclops*, Coastal Tea Tree and Tamarisk.
- The control of Perennial Veldt Grass should focus on preventing its spread into neighbouring areas of more intact vegetation.
- It is recommended that future revegetation efforts be directed at small-scale infill planting to supplement the plantings which have already occurred.

7.2.6 Management Zone 5b – Rehabilitation

***Olearia axillaris* Open shrubland with emergent *Allocasuarina verticilllata* (back dune adjacent northern carpark)**

Management Zone 5b, abutting the northern carpark, supports only scattered remnant vegetation and scattered plantings throughout. Perennial Veldt Grass dominates with over 50% projective foliage cover.

It is recommended that a revegetation program is developed for Management Zone 5b, with efforts over the next five years aiming to replicate an *Allocasuarina verticillata, Melaleuca lanceolata* Low woodland formation. This would provide a significant buffer to the main dunes system.

Priority management issues – Management Zone 5b

- Monitor for and control new outbreaks of Dune Onion Weed
- Contain the spread of Bridal Creeper
- Ongoing patrol for new outbreaks of woody weeds such as Boxthorn, Buckthorn, *Acacia cyclops*, Coastal Tea Tree and Tamarisk.
- The control of Perennial Veldt Grass should focus on preventing its spread into neighbouring areas of more intact vegetation.
- Broadscale revegetation of the site to establish an *Allocasuarina verticilllata, Melaleuca lanceolata Low woodland*. See Section 7.5 for a list of species recommended for planting and their densities.

7.2.7 Management Zone 6

Interdune swale and remnant patches of hind-dune vegetation north of Coronado Court

This zone occurs between the foredune and the narrow north-south walking track north of Coronado Court, and also includes small patches of moderately intact hind-dune vegetation which persist between the areas of garden encroachments, abutting the houses on the eastern boundary of the zone.

This zone has not been a focus of active management in the past few years, but it is recommended that, with the potential incorporation of this area into the conservation reserve, it should be a high priority for weed control and supplementary planting over the next five years in order to improve its biodiversity value.

Priority management issues – Management Zone 6

- Monitor for and control new outbreaks of Dune Onion Weed
- Contain the spread of Bridal Creeper

- Control Perennial Veldt Grass
- Control/eradicate Gazania, Coastal Galenia, False Caper, Evening Primrose, *Aeonium* sp., Marguerite Daisy, other garden escapes
- Consider the consolidation of informal east-west walking tracks which presently provide beach access to local residents.

7.2.8 Management Zone 7

Areas of garden encroachments and weedy edges

Garden encroachments occur most notably north of Coronado Court, but also in other areas where houses abut the eastern dunes boundary. They are a significant problem and a high priority management issue at Tennyson because they:

- are a source of high threat weed species;
- cause erosion;
- alter soil chemistry and composition;
- provide potential harbours for pest animals such as rabbits;
- fragment and degrade the dune vegetation and its habitat values for native birds and reptiles;
- create an atmosphere of implied ownership by private residents upon public land; and
- detract from the aesthetic values of the area (i.e. the dunes provide a 'natural' buffer between the beach and houses).

It is recommended that the problem of garden encroachments is addressed with individual landholders, on a case by case basis, to resolve the following issues:

- where the boundary between the dunes and private property occurs;
- the planting/dumping of inappropriate garden species within the dunes; and
- private beach access paths through the dunes.

Priority management issues – Management Zone 7

- Monitor for and control new outbreaks of Dune Onion Weed
- Contain the spread of Bridal Creeper
- Control Perennial Veldt Grass
- Control/eradicate Gazania, Coastal Galenia, False Caper, Evening Primrose, *Aeonium* sp., Marguerite Daisy, other garden escapes
- Supplementary planting with indigenous plant species following weed removal (see Table 5 for species recommended for planting)
- Consider the consolidation of informal east-west walking tracks which presently provide beach access to local residents.

7.2 Managing weeds

On-ground weed control work to date has been undertaken by TDG, AMLR NRM Board and the City of Charles Sturt and has focussed largely on areas to the south of Estcourt House. Targeted weeds over the past 5-10 years include Bridal Creeper, Perennial Veldt Grass (particularly south of Estcourt

House), Galenia, Arctotis, Boxthorn, Aloes, Evening Primrose, False Caper and Lupines with densities of many of these weeds having been significantly reduced.

Further work is required to ensure that gains made are not lost and to encourage natural regeneration wherever possible. Weed control should be undertaken using minimum impact management techniques (see Appendix 3), starting from areas of highest biodiversity and working

Figure 2: Tennyson Dunes Management Zones - Northern section

Figure 3: Tennyson Dunes Management Zones - Southern section

outwards. On-going mapping (with the aid of a GPS) of new high priority weed infestations should also be undertaken as part of the routine weed control program.

The Biodiversity Action Plan in Section 9 details weed control strategies and priorities over the next 5 years.

7.3 Managing rabbits and foxes

Implementation of a rabbit control program is seen as a high priority, due to the pressure that excessive grazing is having on natural regeneration and on revegetation efforts. Foxes are also a big problem as they negatively impact on native bird and reptile species that rely on Tennyson Dunes for habitat.

A fox den and rabbit warren fumigation program is planned for spring 2014, with a follow-up fenced rabbit baiting program in February/March 2015. These programs will be coordinated and closely monitored by the City of Charles Sturt and DEWNR.

A rabbit monitoring program at Tennyson is recommended to monitor the success or otherwise of control activities. A methodology which involves rabbit dung counts to determine rabbit densities is described in Appendix 4. Dung counts were undertaken in September 2014, prior to the fumigation program, to establish a benchmark of rabbit abundance. It is recommended that this is repeated after the control program is finished to determine whether rabbit numbers have decreased.

7.4 Managing access to sensitive off-track dunes areas

Management actions should be aimed at reducing the conflicts between the needs of people and biodiversity within the dunes. Interpretive and regulatory signage is present at many strategic access points and other locations to inform visitors about the biodiversity and cultural values of the dunes, and the importance of staying on designated pathways.

The undesirable activity that occurs in more secluded areas of the dunes is not only a social problem but is creating serious natural resource management challenges. Problems include soil compaction, erosion, littering, spread of weeds and physical damage to plants.

It is recognised that this is a high priority management issue and it is recommended that it be dealt with in detail as part of the broader management plan to be developed for Tennyson Dunes.

Possible management strategies which could be considered in the short-term include:

- closure of informal access tracks in conjunction with more ‘secure’ fencing in certain areas, i.e. mesh inside a strainer fence;
- locking the access gates to both the northern and southern carparks at night to discourage undesirable activity; and
- increased policing of the area, both during the day and at night.

Installation of floodlights in the carparks at night should only be considered if the above strategies do not lead to a decrease in undesirable activity, as artificial lighting may create other biodiversity issues.

A forum which includes representatives from DEWNR, CoCS, SA Police, TDG, concerned residents and other relevant community groups should be organised to determine the specifics of managing this problem.

7.5 Revegetation

Revegetation efforts at Tennyson can be divided into two categories:

- Strategic vegetation buffers – more broadscale plantings to re-instate coastal dune communities, provide resilience for the main dune system and address issues of fragmentation and erosion; and
- Supplementary planting – more localised low-level plantings which include re-introductions of rarer species.

7.5.1 Vegetation buffers

As mentioned previously, extensive revegetation efforts have occurred in Management Zones 4 (Hind Dune Ridge) and 5a (the southern back dune area). A full list of species planted is included in Appendix 5.

In addition, the City of Charles Sturt has contributed to coastal linkages by planting over 9,000 plants to date in the area immediately adjoining Tennyson Dunes to the north and continuing along the coastal strip to Bower Road, Semaphore Park.

It is recommended that further buffer planting is undertaken, in particular the revegetation of Management Zone 5b (the northern back dune area) to reinstate an *Allocasuarina verticilllata, Melaleuca lanceolata Low woodland.* Recommended species and quantities required are detailed in Table 4. These species are based on pre-European vegetation communities (Kraenenbuehl 1996 and Specht 1972), current vegetation associations and environmental conditions within Management Zone 5b. Also included are coastal species whose populations have declined or become locally extinct. As stated in the 2006 management plan, "The re-introduction of species recorded as existing historically but now locally extinct within Tennyson Dune Reserve is considered reasonable…. provided the integrity of the main dune system is maintained".

Seed to be used in revegetation projects should be sourced from nearby locations. The quantities of plants required are based on a combination of Management Zone size (approximately 1.7ha) and spacings needed for each individual species.

Table 4: Revegetation plant list – Management Zone 5b (southern back dune area)

Species	No. plants	Planting scheme	Distance apart (m)	Comment
Acacia cupularis	70		6-10	
Acacia longifolia ssp. sophorae	50		10+	
Acacia pycnantha	70		6-10	
Adriana quadripartita	30		10+	Plant more male than female plants as the Bitterbush Blue Butterfly prefers to lay its eggs on the male plant.
Allocasuarina verticillata	50	Scattered & loose colonies (3-5 plants/ colony)	6-10	Allow moderate buffer

Species	No. plants	Planting scheme	Distance apart (m)	Comment
Austrostipa flavescens	120	Clumps & scattered in sheltered areas	1 – 5	Build seed bank – support natural regeneration – wind driven
Austrostipa scabra ssp. falcata	120	Clumps & scattered in sheltered areas	1 – 5	Build seed bank – support natural regeneration – wind driven
Baumea juncea	35	Scattered	6-10	
Carpobrotus rossii	35	Scattered	3+	Use as fill in
Cassytha pubescens	3		10+	
Clematis microphylla	100	Scattered	10+	Build seed bank – support natural regeneration – wind driven – plant near other shrubs for physical support. Has male and female plants.
Dianella brevicaulis	55	Loose clumps & scattered	0.6 – 5	Build seed bank – support natural regeneration – bird driven
Distichlis distichophylla	140		10+	
Enchylaena tomentosa var. tomentosa	40		6-10	
Ficinia nodosa	55	Loose clumps & scattered	1 – 5	Use as fill in
Geranium potentilloides var. potentilloides	70		1-5	Sheltered & stable locations
Helichrysum leucopsideum	35	Dense clumps & scattered	1 – 5	Sheltered & stable locations
Kennedia prostrata	35	Scattered individuals	5+	Sheltered & stable locations
Kunzea pomifera	35	Scattered individuals	20+	Allow small buffer – give some shelter
Lepidosperma gladiatum	50	Clumps & scattered stands	3 – 10	Rhizome driven
Leucophyta brownii	10	Loose clumps & scattered	0.5 – 5	
Leucopogon parviflorus	100	Scattered & loose colonies	7+	Allow moderate buffer
Lomandra leucocephala ssp. robusta	40	Loose clumps & scattered individuals	2 - 10	
Lotus australis	70			
Melaleuca lanceolata	50	Clumping colony & scattered individuals (3-5 plants / colony)	20+	Allow large buffer
Muehlenbeckia gunnii	100	Scattered – use support of brush	10+	Build seed bank – support natural regeneration – bird driven – plant near other shrubs for physical support
Myoporum insulare	70	Scattered individuals	20+	Allow large buffer
Nitraria billardierei	20	Scattered individuals	25+	Allow large buffer
Olearia axillaris	150	Clumping & widely scattered	2 - 7	Allow moderate buffer
Pelargonium australe	150	Clumps & scattered	0.6 – 5	Build seed bank – support natural regeneration – wind driven.
Pimelea serpyllifolia ssp. serpyllifolia	30	Loose colonies	1 - 10	
Poa poiformis var. poiformis	120	Clumps & scattered stands	0.5 - 5	
Rhagodia candolleana ssp. candolleana	100	Scattered – use support of brush	5+	Build seed bank – support natural regeneration – wind driven

Species	No. plants	Planting scheme	Distance apart (m)	Comment
Rytidosperma caespitosum	120	Clustered colonies in sheltered areas	0.5 – 5	Build seed bank – support natural regeneration – wind driven
Salsola kali	10			
Scaevola crassifolia	70	Colonies (5 plants/ colony)	5+	Allow moderate buffer
Spinifex hirsutus	30	Scattered	0.5 – 5	Long stem planting – use as fill in
Tetragonia implexicoma	240	Scattered	5+	Build seed bank – support natural regeneration – bird driven – give establishing plant physical support
Threlkeldia diffusa	55	Scattered	5+	Build seed bank – support natural regeneration – bird driven – give establishing plant physical support.

7.6.2 Supplementary planting

Future revegetation efforts in all other management zones should focus upon supplementing existing habitat, using appropriate species for the vegetation type and planting at appropriate (natural) densities. In particular, a concerted effort is required in Management Zone 7 where garden encroachments are a major issue (see Section 7.6).

If rabbits are successfully controlled in the next few years then it is likely that the need for revegetation will be lessened, in particular in more intact dune vegetation where natural regeneration is likely to occur, for example Management Zones 2 and 3.

Supplementary planting following weed removal, for example the replacement of the introduced Coastal Galenia (*Galenia pubescens*) and White Arctotis (*Arctotis stoechadifolia*) with the native groundcovers Muntries (*Kunzea pomifera*) and Pigface (*Carpobrotus rossii*), has resulted in a good cover of these species in some parts of the dunes and the need for further planting in these areas has been greatly reduced.

Table 5 provides an indication of species richness which should be aimed for when planning supplementary planting programs within each of the management zones at Tennyson.

Table 5: Target species richness by management zone

	Management zone							
Species	**1**	**2**	**3**	**4**	**5a**	**5b**	**6**	**7**
Acacia cupularis		✓	✓	✓	✓	✓	✓	✓
Acacia longifolia ssp. sophorae		✓	✓	✓	✓	✓	✓	✓
Adriana quadripartita		✓	✓	✓	✓	✓		
Allocasuarina verticillata					✓	✓		
Alyxia buxifolia		✓	✓	✓			✓	✓

	Management zone							
Species	**1**	**2**	**3**	**4**	**5a**	**5b**	**6**	**7**
Atriplex cinerea	✓							
Austrostipa flavescens		✓	✓	✓	✓	✓	✓	✓
Austrostipa scabra ssp. falcata		✓	✓	✓	✓	✓	✓	✓
Baumea juncea				✓	✓	✓		
Calandrinia eremaea		✓					✓	
Callitris gracilis				✓	✓	✓		
Carpobrotus rossii	✓	✓	✓	✓	✓	✓	✓	✓
Cassytha pubescens				✓	✓	✓		
Clematis microphylla			✓	✓	✓	✓		
Crassula closiana		✓	✓				✓	
Daucus glochidiatus		✓	✓				✓	
Dianella brevicaulis		✓	✓	✓	✓	✓	✓	✓
Distichlis distichophylla					✓	✓		
Dodonaea viscosa ssp. spatulata		✓	✓	✓				
Enchylaena tomentosa var. tomentosa		✓	✓	✓	✓	✓	✓	✓
Ficinia nodosa	✓	✓	✓	✓	✓	✓	✓	✓
Geranium potentilloides var. potentilloides		✓	✓	✓	✓	✓	✓	
Helichrysum leucopsideum		✓	✓	✓	✓	✓	✓	
Kennedia prostrata			✓	✓	✓	✓	✓	✓
Kunzea pomifera		✓	✓	✓	✓	✓	✓	✓
Lepidosperma gladiatum		✓	✓	✓	✓	✓	✓	✓
Leucophyta brownii	✓		✓	✓	✓	✓		
Leucopogon parviflorus		✓	✓	✓	✓	✓	✓	✓

	Management zone							
Species	**1**	**2**	**3**	**4**	**5a**	**5b**	**6**	**7**
Lomandra leucocephala ssp. robusta				✓	✓	✓		
Lotus australis		✓		✓	✓	✓	✓	✓
Melaleuca lanceolata				✓	✓	✓		
Muehlenbeckia gunnii		✓	✓	✓	✓	✓	✓	✓
Myoporum insulare		✓	✓	✓	✓	✓	✓	✓
Nitraria billardierei			✓		✓	✓	✓	
Olearia axillaris	✓	✓	✓	✓	✓	✓	✓	✓
Pelargonium australe		✓	✓	✓	✓	✓	✓	✓
Picris squarrosa		✓	✓				✓	
Pimelea serpyllifolia ssp. serpyllifolia		✓	✓	✓	✓	✓	✓	✓
Poa poiformis var. poiformis		✓	✓	✓	✓	✓	✓	✓
Rhagodia candolleana ssp. candolleana		✓	✓	✓	✓	✓	✓	✓
Rytidosperma caespitosum				✓	✓	✓		
Scaevola crassifolia		✓	✓	✓	✓	✓	✓	✓
Senecio pinnatifolius var. pinnatifolius		✓	✓	✓	✓	✓	✓	✓
Spinifex hirsutus	✓	✓	✓	✓	✓	✓	✓	✓
Tetragonia implexicoma		✓	✓	✓	✓	✓	✓	✓
Threlkeldia diffusa		✓	✓	✓	✓	✓	✓	✓
TOTAL	**6**	**35**	**35**	**38**	**39**	**39**	**35**	**26**

Table 6 provides target densities or cover ratings for less common plant species at Tennyson which should be aimed for with supplementary planting within each management zone.

Table 6: Target densities (cover ratings) of less common species currently existing on site (remnant or planted)

Species	**Target cover rating*by management zone**

	1	2	3	4	5a	5b	6	7
Adriana quadripartita	-	2	2	2	-	-	2	2
Atriplex cinerea	2		-	-	-	-		
Billardiera cymosa	-			1	1	1		
Chrysocephalum apiculatum	-			1	1	1		
Geranium potentilloides	-	2		1	1	1	2	2
Helichrysum leucopsidium	-	2		1	1	1	2	2
Kunzea pomifera	-	2	2	2	2	2	2	2
Lepidosperma gladiatum	-	3	2	2	2	2	3	2
Leucophyta brownii	2	2	2	2	2	2	2	2
Leucopogon parviflorus	-	3	3	3	2	2	3	3
Lomandra leucocephala ssp. robusta	-			2	2	2	1a	1a
Lotus australis	-	1a		1a	1a	1a	1a	1a
Picris squarrosa		1						
Pimelea serpyllifolia	-	2	2	1a	1a	1a	2	2
Podolepis rugata ssp. *littoralis*	-	1		1			1	1
Spinifex hirsutus	3	3	2	2	2	2	2	2

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

7.6 Managing garden encroachments

This is an issue which is of particular concern in the area north of Coronado Court, but also adjacent to Estcourt House and other areas where the dunes abut housing (Management Zone 7).

To address this issue will require a concerted effort from all on-ground managers at Tennyson (DEWNR, TDG), as well as assistance from CoCS in educating local residents and informing them of their rights and responsibilities. In the long-term, the ideal approach is to build community

understanding of the significance of the dunes, not only for biodiversity conservation but also for the benefits that result for both local residents and the broader community.

For example, by trapping windblown sand native vegetation forms barriers that protect hind-dune areas from sand inundation, salt spray and sand blast. Consequently, the sand reserves held in dunes replenish beaches that have been eroded by wave attack. Also, hardy salt tolerant non-native plant species can often displace native dune species due to their ability to grow aggressively, smother native species, and compete for available nutrients. When the dune areas are stressed through erosion, non - native plant species can quickly die, leaving bare sand which can be prone to wind erosion.

Suggested long-term strategies for building awareness and changing behaviours include:

- coastal gardens workshops – what should and shouldn't be planted in gardens abutting the dunes;
- community dune care events; and
- development of a brochure on the importance of maintaining a healthy coastal dune system at Tennyson.

In the short –term (the next 5 years), in order to protect remnant dune vegetation and build resilience, it is recommended that the following management actions are undertaken as a high priority for Management Zone 7:

- develop a clear policy and action plan for staged removal of garden incursions/ encroachments north of Coronado Court;
- develop a supplementary indigenous planting; and
- ensure that no new garden encroachments and/or new garden escape weed species are allowed to establish.

8 Monitoring

8.1 Bushland Rapid Assessment Technique (BushRAT)

The Bushland Rapid Assessment Technique (BushRAT) is a method developed by the Native Vegetation Management Unit of the Department of Environment, Water and Natural Resources (DEWNR), in conjunction with the Nature Conservation Society of South Australia (NCSSA) to assess the biodiversity value of patches of native vegetation. BushRAT is designed for use in the agricultural regions of SA and it separately scores a variety of attributes including vegetation condition, conservation value and landscape context and then weights these attributes according to their importance.

Benchmark vegetation communities, based on those developed by the NCSSA for its Bushland Condition Monitoring (BCM) method, have been identified for South Australia. The benchmarks represent each vegetation community in a relatively undisturbed state. When a site is assessed using BushRAT, the condition attribute scores are assessed against the scores from the benchmark communities.

As part of this project, BushRAT's were undertaken within each management zone at Tennyson and the results are included in Appendix 6. 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. The BushRAT data has been used to set relevant milestones and targets in the Action Plan for the Dunes (see Section 9).

It is recommended that BushRATs be repeated at Tennyson every two years to monitor the progress and success of management actions.

8.2 Bushland Condition Monitoring

Two (2) Bushland Condition Monitoring (BCM)[8] sites have been established at Tennyson Dunes (see Table 7 for GPS coordinates). These 30m x 30m quadrats aim to show the change in vegetation structure, cover and condition over time as a result of weed control works and revegetation efforts and may assist with grant application success in the future.

These sites were established in 2006 and re-monitored in 2009. Of interest is the change in weed abundance which occurred over this 3 year period due to control activities. For example at Site GRA-CLCL-T-1 which occurs within Management Zone 3 (south) the cover of Arctotis was reduced from 30% in 2006 to 0.5% in 2009, while at Site GRA-CLCL-T-2 which is within Management Zone5b the cover of Perennial Veldt Grass increased markedly from 9% in 2006 to 35% in 2009, indicating that no active management of this weed occurred in this area.

Table 7: GPS coordinates – BCM sites, Tennyson Dunes

BCM Site	Easting	Northing
GRA-CLCL-T-1	269995	6137349
GRA-CLCL-T-2	269907	6137823

8.3 Plan implementation – progress reporting

Progress reporting helps with the assessment of the effort put in to management actions. It is recommended that a full review of all objectives and targets is completed at the end of the 5 year period, including regathering BushRAT data. Until that time, it is recommended that an annual review of the Action table from section 9 is undertaken with the asssistance of the TDG and staff from the Adelaide and Mount Lofty Ranges NRM Board. This review could reflect upon progress towards the Objectives in Table 7 against simple broad criteria e.g. satisfactory progress, unsatisfactory progress, no progress. Works undertaken could also be recorded - example Works Record sheets are included in Appendix 7.

[8] Methodology developed by the Nature Conservation Society of SA

9. Biodiversity action plan

The following table lists the biodiversity management threats/issues for Tennyson Dunes, their related 5 year objectives or milestones, actions already taken to address them, and further actions proposed and prioritised. Table 8 sets out management action priorities per management zone.

Table 7: Tennyson Dunes Biodiversity Action Plan

ISSUE/THREAT	5-Yr Objective / Milestone	Actions to date – what/ who	Proposed actions - what/ where/how	Priority*	Who Responsible
Fragmentation	Establishment of a strategic vegetation buffer in Management Zone 5b.	Extensive revegetation efforts across Management Zone 5a (similar to what is required in Zone 5b) (contractors, AMLRNRM Board, City of Charles Sturt) have re-instated an *Allocasuarina verticillata, Callitris gracilis* Low Woodland	Establish an *Allocasuarina verticillata, Melaleuca lanceolata* Low woodland in Management Zone 5b (see species list and densities in Section 7.5.1).	H	DEWNR
	Increased species richness through reinstatement to reflect the site's original diversity. See Table 5 for target species richness by management zone. Increased numbers of less common species currently existing	Strategic plantings undertaken by TDG of the following less common species (south of Coronado Court): • *Adriana quadripartita* • *Attriples cinerea* • *Billardiera cymosa* • *Chrysocephalum apiculatum* • *Geranium potentilloides* • *Helichrysum leucopsidium* • *Kunzea pomifera* • *Lepidosperma gladiatum* • *Leucophyta brownii* • *Leucopogon parviflorus* • *Lotus australis* • *Picris squarrosa* • *Pimelea serpyllifolia*	Continue supplementary plantings of less common species as and where required throughout the dunes Continue small-scale, localised planting in tandem with weed control, eg replace Galenia with fast-growing and easy to establish species such as *Rhagodia candolleana* and *Acacia longifolia* var. *sophorae*..	H	DEWNR TDG

ISSUE/THREAT	5-Yr Objective / Milestone	Actions to date – what/ who	Proposed actions - what/ where/how	Priority*	Who Responsible
	on site. See Table 6 for target densities.	• *Podolepis rugata* ssp. *littoralis* • *Spinifex hirsutus*			
	Establish a seed garden	To date much of the seed used for revegetation has been collected from nearby locations (not within Tennyson Dunes).	Establish a seed garden	M	TDG
	Establish plants grown from seed and vegetative material collected from the site in other nearby locations. Establish a coastal landscape linkage along the City of Charles Sturt coastline, linking sites of significance	City of Charles Sturt has recently (last planting season) planted over 9,000 plants in the area immediately adjoining Tennyson Dunes to the north and along the coastal strip to Bower Road. Weed control also undertaken in these areas to strengthen the biodiversity of coastal linkages.	Continue efforts to restore coastal dune communities north and south of Tennyson Dunes.	M	DEWNR CoCS
Priority weeds for control					
Perennial Veldt Grass	Reduce or contain infestations to following target cover:	Targeted control by contractors (AMLR NRM Board) and TDG within Zones 2(south), 3(south), 4 and 5a.	• Continue targeted control by contractors (DEWNR) and TDG within Zones 2 (south), 3(south), 4 and 5a, continuing weed front from west to east, with particular focus around revegetation and rare plant species.	VH	DEWNR

ISSUE/THREAT	5-Yr Objective / Milestone	Actions to date – what/ who	Proposed actions - what/ where/how	Priority*	Who Responsible
See Figure 4 for current cover densities	- Management Zones 2 (south), 3(south), 4, 5a, 6 & 7 = <1% - Management Zones 2 (north) & 3 (north) = 1-5% - Management Zone 5b = 5-25%		• Push the weed front to the north of Estcourt House into Zones 2 (north) & 3 (north). • Contain infestations within Zone 5b. Method: Slash and follow-up spray using glyphosate in areas where there is no potential for off-target damage and fusillade where there is. Where the veldt grass is small it should be sprayed (no slashing required). Follow-up in areas previously treated may require careful cut & swab.		
Bridal Creeper	Reduce or contain infestations to following target cover: **All Management Zones** = < 1%	Rust fungus released approximately 10 years ago – with some success. Careful spot spraying, grubbing throughout Zones 2, 3 & 4	Continue targeted control. In areas clear of native vegetation – spray with Glyphosate 360g/L and Pulse or grub (if no Rust is present). Where Bridal Creeper is growing on/through native vegetation (and doesn't already have Rust on it) –spray with Rust. Small seedlings growing in amongst native vegetation to be grubbed (if possible)	VH	DEWNR
Dune Onion Weed	Eradicate from Tennyson Dunes	Targeted for control by TDG and City of Charles Sturt with high levels of success due to constant vigilance.	Continue patrol of dunes and remove plants immediately upon discovery. GPS locations for future monitoring. Method: Dig out the entire plant, including its root system, preferably before it has a chance to set seed.	VH	DEWNR TDG

ISSUE/THREAT	5-Yr Objective / Milestone	Actions to date – what/ who	Proposed actions - what/ where/how	Priority*	Who Responsible
			Any seed heads should be securely bagged and removed from the Dunes. Careful herbicides application either by wiping or spraying onto the plants may also be an effective form of control.		
Acacia saligna, Buckthorn, Boxthorn, Acacia cyclops, Coastal Tea-tree, Olive	Eradicate from Tennyson Dunes	An ongoing control program by DEWNR and TDG has resulted in infestations being reduced to the occasional scattered juvenile or seedling	Continue patrol of dunes and remove plants immediately upon discovery – grub, cut & swab. GPS locations for future monitoring.	H	DEWNR TDG
Coastal Galenia	Reduce or contain infestations to following target cover: - Management Zones 2, 3, 4, 5a, 5b, 6 = <1% - Management Zones 7 & 5b = <5%	Targeted for control by DEWNR and TDG	Continue targeted removal, in tandem with strategic revegetation to replace with indigenous species such as Pigface. Bag and remove from site if seed is present.	H	DEWNR TDG
False Caper	Reduce or contain infestations to following target	Targeted for control by DEWNR and TDG in Zones 2, 3, 4 & 5a.	Continue actions to date and monitor for new emergent Hand-pull	H	DEWNR TDG

ISSUE/THREAT	5-Yr Objective / Milestone	Actions to date – what/ who	Proposed actions - what/ where/how	Priority*	Who Responsible
	cover: **All Management Zones** = < 1%		Remove seed heads, slash & spray regrowth.		
Evening Primrose	Reduce or contain infestations to following target cover: **All Management Zones** = < 1%	Targeted for control by DEWNR and TDG throughout dunes	Continue actions to date and monitor for new emergent Grub, ensuring all roots are removed from the site and destroyed.	H	DEWNR TDG
Buffalo Grass	Reduce or contain infestations to following target cover: **All Management Zones** = < 1%	Targeted for control by DEWNR and TDG throughout dunes	Continue actions to date and monitor for new emergent. Hand pull Spray in summer when plant is active	M	DEWNR TDG
Garden escapes (Arctotis, Margeurite Daisy, Seascape Daisy, Gazania, Agapanthus, Aloe, Cacti, Aeonium, etci)	Reduce infestations along house frontages north of Coronado Court (Management Zone 7) to <5% cover	Limited actions to date.	All garden escapes to be removed in stages, followed by rehabilitation using appropriate indigenous species. Council investigate the possibilities of placing an encumbrance on dune frontage properties with regard to what species may or may not be planted in gardens abutting the dunes.	H	DEWNR TDG (with support from CoCS)

ISSUE/THREAT	5-Yr Objective / Milestone	Actions to date – what/ who	Proposed actions - what/ where/how	Priority*	Who Responsible
Soursob	Reduce infestations in Management Zone 2 to <5%.	-	Careful spot-spraying just prior to or early in flowering period. Repeat applications over a 2-5 year period may be necessary	M	DEWNR TDG
Access and fencing					
Fencing and access tracks	No evidence of informal track usage and no new informal tracks.	Closure of several access tracks and installation of fencing across closed tracks. Installation of signage indicating conservation area and please stay on designated paths and walkways. Maintenance of fencing along main pathways by Council.	The landholders/managers, in conjunction with the relevant State Government agencies, investigate the options for effective policing of Tennyson Dunes to discourage undesirable behaviour. Consider locking of <u>all</u> car park gates each night and/or the installation of floodlights to discourage undesirable behaviour. Review the current number of formal access paths and the type of fencing at strategic locations to discourage/prevent informal access into the dunes. Organise a forum which includes all relevant parties to determine the specifics of managing this problem.	M	DEWNR TDG (with support / assistance from CoCS where appropriate)
	Removal of all old fence line materials from the site.	-		L	DEWNR
Garden encroachments	No new weedy garden escape species in	-	Repeat BushRAT assessment in Management Zone 7 to ascertain that no new garden escape species have	H	DEWNR

ISSUE/THREAT	5-Yr Objective / Milestone	Actions to date – what/ who	Proposed actions - what/ where/how	Priority*	Who Responsible
	Management Zone 7 No new garden encroachments Development of a clear policy and action plan for staged removal of garden incursions/ encroachments north of Coronado Court		occured. Compare aerial photography over time to ascertain whether the extent of garden encroachments has increased. Investigate options for: • creating clear boundary delineation between properties with dune frontage and the dunes to discourage goat tracks and the encroachment of alien garden species, irrigation and landscaping. • addressing local resident access in the area between Coronado Court and Shore Court. Suggested long-term strategies for building awareness and changing behaviours include: • coastal gardens workshops; • community dune care events; and • development of a brochure on the importance of maintaining a healthy coastal dune system at Tennyson.	M	DEWNR DEWNR TDG (with support & assistance from CoCS)
Pest animals					
Rabbits	Reduce rabbit numbers/density to	City of Charles Sturt has undertaken control works along the coast, including removal of large succulent infestations known to harbour pest animals, warren closure and	A rabbit warren fumigation program is planned for spring 2014, with a follow-up fenced rabbit baiting program in February/March 2015. These programs will	VH	DEWNR

ISSUE/THREAT	5-Yr Objective / Milestone	Actions to date – what/ who	Proposed actions - what/ where/how	Priority*	Who Responsible
	< 0.5 per hectare	treatment with phostoxin tablets. Mapping of rabbit warrens/activity in 2014 (Appendix 4)	be coordinated and closely monitored by the City of Charles Sturt and DEWNR.		CoCS
Foxes	No active fox dens.	Mapping of fox dens in 2014 (Appendix 4)	A fox den fumigation program is planned for spring 2014, with a follow-up fenced fenced rabbit baiting program. Continue mapping of new fox dens	H	TDG CoCS
Stray and domestic cats	Anecdotal evidence suggests that cat numbers have reduced	-	Managers investigate options for effective control, i.e. signage, cat curfews, registration, fines	M	DEWNR - with assistance from CoCS
Dogs	Adjustment of Council By-Laws to state that dogs should be on leash at all times within the conservation area and appropriate penalties applied.	Signage re control of dogs in the dunes has been placed at strategic locations throughout the dunes. Several dog litter stations installed at strategic locations throughout the dunes.	Installation of signs which include why dogs need to be on leash at all times, fines apply. .	M	DEWNR CoCS - with assistance from CoCS
Erosion					

ISSUE/THREAT	5-Yr Objective / Milestone	Actions to date – what/ who	Proposed actions - what/ where/how	Priority*	Who Responsible
	Sand erosion is monitored on an annual basis.	Dune forming fences have been constructed as required, in conjunction with the Coast Protection Board. Sand replenishment in conjunction with Adelaide Living Beach's sand replenishment program, as required.	Continue annual monitoring and undertake further works as required.	H	DEWNR - with assistance from CoCS
Revegetation					
	Provide self-sustaining shrubland habitat in Management Zone 5b. Target plant community is established (*Allocasuarina verticilllata, Melaleuca lanceolata Low woodland)*.	Scattered, ad-hoc planting has occurred in this area.	See revegetation species list and suggested densities in Table 4.	H	DEWNR
	Target plant species richness per management zone is reached (see Tables 5 & 6)	Supplementary planting undertaken on an ongoing basis by TDG, as necessary.	Continue supplementary planting, with densities and species appropriate for the habitat type.	M	DEWNR TDG

ISSUE/THREAT	5-Yr Objective / Milestone	Actions to date – what/ who	Proposed actions - what/ where/how	Priority*	Who Responsible
Monitoring					
	Progress and success of works undertaken is monitored on an ongoing and regular basis.	BushRATs undertaken in each Management Zone as part of this project (see Appendix 6)	Re-do BushRATs in each Management Zone every 3-5 years	L	DEWNR TDG
		Two Bushland Condition Monitoring (BCM) sites established in Management Zone 3a and Management Zone 4b (see Appendix 8)	Repeat BCM sites (including photopoints) previously established every 3-5 years	M	DEWNR TDG
		Rabbit monitoring undertaken in September 2014 as part of this project	Repeat rabbit monitoring annually	H	All landholders, managers, contractors
		Management actions	Record details of works as they are undertaken (ensure contractors do the same) - Use works record sheets (Appendix 7)		

*Priority: VH = Very High, H = High, M = Moderate, L = Low, VL = Very Low

Table 8: Tennyson Dunes management action priorities per Management Zone

Management Zone	Zone-specific Management action priorities										
	Veldt Grass control	Bridal Creeper control	Coastal Galenia control	False Caper control	Evening Primrose control	Garden escapes control	Woody Weed control	Soursob control	Buffer plantings/ revegetati	Supplementary planting	Garden encroachments
1	-	-	-	-	-	-	-	-	-	H	-
2S	VH	VH	VH	VH	VH	VH	H	VH	-	L	-
2N	H	H	H	H	H	H	H	H	-	M	-
3S	VH	VH	VH	VH	VH	VH	H	VH	-	L	-
3N	H	H	H	H	H	H	H	H	-	M	-
4	VH	H	H	H	H	H	H	M	-	M	-
5a	H	H	H	H	H	H	H	L	-	M	-
5b	M	M	M	M	M	M	H	L	VH	L	-
6	H	H	H	H	H	H	H	L	-	H	VH
7	M	M	M	M	M	M	H	L	M	M	VH

Figure 4: Tennyson Dunes - Perennial Veldt Grass Cover 2014

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Appendix 1: Plant species lists

Tennyson Dunes Plant Species List

Species Name	Common Name	Conservation Status#			Source##		
		AUS	SA	SL	Veg MP 2006	TDG 2008	EAC 2014
Acacia cupularis	Coast Umbrella-bush				✓	✓	
Acacia ligulata	Dune Wattle			K	✓	✓	✓
Acacia longifolia ssp. sophorae	Coastal Wattle				✓	✓	✓
Actites megalocarpus	Dune Thistle						✓
Adriana quadripartita	Coast Bitter-bush			U	✓	✓	✓
Allocasuarina verticillata	Drooping Sheoak				✓	✓	✓
Alyxia buxifolia	Dysentery Bush			R	✓	✓	✓
Atriplex cinerea	Grey Saltbush				✓	✓	✓
Austrostipa flavescens	Coast Spear-grass				✓	✓	
Austrostipa scabra ssp. falcata	Rough Spear-grass				✓	✓	
Baumea juncea	Blue Twig-rush				✓	✓	✓
Calandrinia eremaea	Small Purslane				✓	✓	
Callitris gracilis	Native Pine			U	✓	✓	✓
Carpobrotus rossii	Karkalla				✓	✓	✓
Cassytha pubescens	Downy Dodder-laurel				✓	✓	
Cerastium sp.						✓	
Clematis microphylla	Small-leaf Clematis				✓	✓	✓
Cotula australis	Carrot Weed				✓	✓	
Crassula closiana	Red Crassula				✓		✓
Crassula colligata ssp. lamprosperma					✓	✓	
Crassula colorata var. colorata	Dense Stonecrop					✓	
Crassula decumbens var. decumbens	Spreading Stonecrop					✓	
Daucus glochidiatus	Australian Carrot				✓	✓	✓
Dianella brevicaulis	Coast Flax-lily				✓	✓	✓
Distichlis distichophylla	Australian Salt-grass				✓	✓	
Enchylaena tomentosa var. tomentosa	Barrier Saltbush				✓	✓	✓
Ficinia nodosa	Knobby Club-sedge				✓	✓	✓
Geranium potentilloides var. potentilloides	Cinquefoil Crane's-bill				✓	✓	✓
Helichrysum leucopsideum	Coast Everlasting				✓	✓	
Kennedia prostrata	Running Postman				✓	✓	
Kunzea pomifera	Pink Buttons			U	✓	✓	✓
Lepidosperma gladiatum	Sword Rush			U	✓	✓	✓
Leucophyta brownii	Cushion Bush				✓	✓	✓
Leucopogon parviflorus	Coast Beard-heath				✓	✓	✓
Lomandra leucocephala ssp. robusta	Woolly-head Mat-rush			R	✓	✓	✓
Lotus australis	Australian Trefoil			U	✓	✓	✓
Melaleuca lanceolata	Black Tea-tree			U	✓	✓	✓
Muehlenbeckia gunnii	Native Sarsparilla				✓	✓	✓
Myoporum insulare	Native Juniper				✓	✓	✓
Nitraria billardierei	Dillon Bush				✓	✓	✓
Olearia axillaris	Coast Daisy-bush				✓	✓	✓
Parietaria debilis	Shade Pellitory				✓	✓	

Species Name	Common Name	Conservation Status#			Source##		
		AUS	SA	SL	Veg MP 2006	TDG 2008	EAC 2014
Pelargonium australe	Australian Pelargonium			U	✓	✓	✓
Pelargonium sp.					✓	✓	
Picris squarrosa	Hawkweed Picris		R		✓	✓	
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower				✓	✓	✓
Poa poiformis var. poiformis	Blue Tussock-grass				✓	✓	✓
Portulaca oleracea	Munyeroo				✓		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush				✓	✓	✓
Rytidosperma caespitosum	White-top				✓	✓	
Salsola australis	Tumbleweed				✓	✓	
Scaevola crassifolia	Cushion Fanflower			R	✓	✓	✓
Senecio pinnatifolius var. pinnatifolius					✓	✓	✓
Spinifex hirsutus	Coast Spinifex				✓	✓	✓
Tetragonia implexicoma	Bower Spinach				✓	✓	✓
Threlkeldia diffusa	Coast Bonefruit				✓	✓	✓
Triglochin trichophora					✓	✓	
Introduced Species							
Acacia cyclops	Western Coastal Wattle				✓	✓	✓
Acacia saligna	Golden Wreath Wattle				✓		✓
Aeonium sp.					✓		✓
Agapanthus sp.					✓		✓
Agave sp.	Century Plant						✓
Aloe sp.						✓	
Ammophila arenaria	Marram Grass				✓	✓	
Anagallis arvensis	Blue/Scarlet Pimpernel				✓	✓	
Arctotheca calendula	Cape Dandelion				✓	✓	✓
Arctotis stoechadifolia	White Arctotis				✓	✓	✓
Argyranthemum frutescens ssp. foeniculaceum	Teneriffe Daisy				✓	✓	✓
Artemisia arborescens	Silver Wormwood				✓		
Arundo donax	Spanish Reed					✓	✓
Asparagus asparagoides f. asparagoides	Smilax Asparagus				✓	✓	✓
Asphodelus fistulosus	Wild Onion					✓	✓
Avena barbata	Bearded Oat				✓	✓	✓
Brachypodium distachyon	Qualis Grass					✓	✓
Brassica tournefortii	Mediterranean Turnip					✓	✓
Briza maxima	Blowfly Grass				✓	✓	
Bromus diandrus	Kingston Grass				✓	✓	✓
Cakile maritima ssp. maritima	Beach Rocket				✓	✓	✓
Carpobrotus edulis ssp. edulis	Hottentot Fig				✓	✓	
Catapodium rigidum	Fern Grass					✓	
Chasmanthe floribunda	Madflower					✓	
Chondrilla juncea	Naked Weed				✓	✓	
Coprosma repens	Looking-glass Bush				✓		
Cotyledon sp.					✓	✓	
Cynodon dactylon var. dactylon	Bermuda Grass				✓	✓	✓

Species Name	Common Name	Conservation Status#			Source##		
		AUS	SA	SL	Veg MP 2006	TDG 2008	EAC 2014
Dimorphotheca pluvialis	Namaqualand Daisy				✓		
Drosanthemum candens	Rodondo Creeper				✓		
Echium plantagineum	Paterson's Curse					✓	
Ehrharta calycina	Perennial Veldt Grass				✓	✓	✓
Ehrharta longiflora	Annual Veldt Grass						✓
Emex australis	Spiny Emex					✓	✓
Erodium moschatum	Musky Stork's-bill					✓	
Euphorbia paralias	Sea Spurge				✓	✓	✓
Euphorbia terracina	Terracina Spurge				✓	✓	✓
Fumaria capreolata	Climbing Fumitory				✓		
Galenia pubescens var. pubescens	Galenia				✓	✓	✓
Gazania sp.					✓	✓	✓
Geranium sp.(garden escape)							✓
Hordeum glaucum	Northern Barley-grass					✓	
Hordeum leporinum	Common Fox-tail					✓	
Hypochaeris glabra	Smooth Cat's Ear				✓	✓	
Iris germanica	German Iris					✓	
Lagurus ovatus	Hare's Tail Grass				✓	✓	✓
Leptospermum laevigatum	Coast Tea-tree				✓	✓	
Limonium companyonis	Sea-lavender				✓	✓	✓
Lobularia maritime	Sweet Alison				✓		
Lolium perenne	Perennial Ryegrass				✓	✓	
Lupinus cosentinii	Western Australian Blue Lupin				✓	✓	✓
Lycium ferocissimum	African Boxthorn				✓	✓	✓
Malva parviflora	Marshmallow					✓	
Medicago polymorpha var. polymorpha	Toothed Medic				✓	✓	✓
Medicago truncatula	Caltrop Medic				✓		
Melia azedarach	Kooribill				✓		
Melilotus indicus	Sweet Melilot				✓	✓	
Mesembryanthemum crystallinum	Iceplant				✓	✓	✓
Moraea setifolia	Thread Iris				✓	✓	
Narcissus jonquilla	Jonquill					✓	
Oenothera stricta ssp. stricta	Sweet-scented Evening Primrose				✓	✓	✓
Olea europaea ssp. europaea	Olive				✓	✓	
Opuntia stricta	Common Prickly Pear					✓	
Osteocarpum fruticosum	Seascape Daisy						✓
Oxalis pes-caprae	Soursob				✓	✓	✓
Parapholis incurve	Coast Barb-grass				✓	✓	
Pennisetum clandestinum	Kikuyu				✓		✓
Phoenix canariensis							✓
Plantago coronopus ssp. coronopus	Bucks-horn Plantain					✓	
Plantago lanceolata var. lanceolata	Ribgrass				✓		
Poa annua	Annual Meadow-grass					✓	

Species Name	Common Name	Conservation Status#			Source##		
		AUS	SA	SL	Veg MP 2006	TDG 2008	EAC 2014
Reichardia tingitana	Reichardia				✓	✓	✓
Rhamnus alaternus	Buckthorn				✓	✓	✓
Romulea rosea	Guildford Grass						✓
Rosmarinus officinalis	Rosemary				✓		
Rostraria cristata	Annual Cat's-tail					✓	
Sagina maritime	Sea Pearlwort					✓	
Scabiosa atropurpurea	Scabious				✓		
Schismus barbatus	Mulga Grass					✓	
Sedum sediforme	Stonecrop					✓	
Senecio pterophorus	South African Daisy					✓	
Silene nocturna	Mediterranean Catchfly					✓	
Sisymbrium officinale	Hedge Mustard				✓	✓	
Sonchus asper ssp. asper	Prickly Sow-thistle				✓		
Sonchus oleraceus	Milk Thistle				✓	✓	✓
Stellaria media	Common Chickweed					✓	✓
Stenotaphrum secundatum	Buffalo Grass				✓	✓	
Tamarix aphylla	Tamarisk				✓		✓
Tamarix ramosissima						✓	
Taraxacum officinale	Dandelion				✓		
Thinopyrum junceiforme	Sand Couch-grass				✓	✓	✓
Trachyandra divaricata					✓	✓	✓
Tropaeolum majus	Nasturtium				✓		
Urtica urens	Stinging Nettle					✓	
Vicia monantha ssp. monantha	One-flower Vetch				✓	✓	✓
Vulpia myuros f. myuros	Silver Grass				✓	✓	
					68		45

#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

SL = Southern Lofty Botanical Region:[9] E=Endangered, T=Threatened, V=Vulnerable, R=Rare, K=status uncertain, but considered likely to be either rare, vulnerable or endangered, U=Uncommon, Q=Not yet assessed but flagged as being of possible significance, N=Common

##Source

Veg MP 2006 – Cordingley, S & Petherick, C (2006). Vegetation Management Plan Tennyson Dune Reserve Yaitya Worra (True Indigenous Sand).

TDG 2008 – Tennyson Dune plants. Provisional species list as at September 2008: Tennyson Dunes Group

EAC 2014 – Survey undertaken by EAC – Ecological Evaluation as part of the development of the current management plan

[9] Definitions based on regional ratings obtained from Lang, P.J. & Kraehenbuehl, D.N. (2008). *Plants of Particular Conservation Significance in South Australia's Agricultural Regions*. July 2008 update of unpublished database. Department for Environment and Heritage.

Appendix 2. Fauna species lists – Tennyson Dunes and surrounding areas

YAITYA WORRA – TENNYSON DUNES
FAUNA SPECIES LISTS - Opportunistic observations to July 2011

Reptiles

Scientific Name	Common Name	Observer	Location	Frequency Seen
Lerista bougainvillii	Bougainville's Skink	Nick Crouch	leaf litter	infrequent
Menetia greyii	Dwarf Skink	Nick Crouch	leaf litter	infrequent
Pogona barbata	Eastern Bearded Dragon	Ron Sandercock		regular
Tiliqua scincoides	Eastern Blue-tongue	Christopher Naylor		infrequent
Psuedonaja textilis	Eastern Brown Snake	Ron Sandercock		regular
	??? Legless Lizard	Ron Sandercock	Arctotis	infrequent
Christinus marmoratus	Marbled Gecko	Ron Sandercock	leaf litter	infrequent
Ctenophorus pictus	Painted Dragon	Ron Sandercock		regular
Tiliqua rugosa	Sleepy Lizard	Ron Sandercock		regular
Lerista dorsalis	Southern Four-toed Slider	Nick Crouch	leaf litter	infrequent
Gehyra variegata	Tree Dtella	Nick Crouch		infrequent
Morethia adelaidensis		SA Herp Group		infrequent
Hemiergis peronii		SA Herp Group		infrequent

Birds

Scientific Name	Common Name	Observer	Location	Frequency
Morus serrator	Australasian Gannet	Derek Carter		rarely
	Australian Hobby falcon	Nick Crouch		infrequent
Falco cenchroides	Australian Kestrel	Ron Sandercock		regular
Pelecanus conspicillatus	Australian Pelican	Ron Sandercock	beach	regular
Corvus coronoides	Australian Raven	Nick Crouch		infrequent
Gymnorhina tibicen hypoleuca	Aust White-backed Magpie	Ron Sandercock		regular
*Turdus merula**	Blackbird	Derek Carter		regular
Phalacrocorax fuscescens	Black Faced Cormorant	Christopher Naylor	beach	rarely
Elanus axillaris	Black Shouldered Kite	Ron Sandercock		infrequent
Cygnus atratus	Black Swan	Christopher Naylor	beach	rarely

Gallinula ventralis	Black-tailed Native Hen	Nick Crouch	urban fringe	rarely
Ninox novaeseelandiae	Boobook Owl	Mel Rees	fence post near edge	rarely
Accipiter fasciatus	Brown Goshawk	Nick Crouch	urban fringe	rarely
Sterna caspia	Caspian Tern	Derek Carter	beach	rarely
*Sturnus vulgaris**	Common Starling	Ron Sandercock		regular
Ocyphaps lophotes	Crested Pigeon	Ron Sandercock		regular
Platycercus elegans	Crimson Rosella	Derek Carter	urban fringe	rarely
*Carduelis carduelis**	European Goldfinch	Derek Carter	urban fringe	rarely
Sterna nereis	Fairy Tern	Christopher Naylor	beach	infrequent
*Columa livia**	Feral Pigeon	Ron Sandercock		infrequent
Cacatua roseicapilla	Galah	Ron Sandercock		infrequent
Falco hypoleucos	Grey Falcon	Ron Sandercock		rarely
Rhipidura albiscapa	Grey Fantail	Ron Sandercock	Tamarix	rarely
Colluricincla harmonica	Grey Shrike-Thrush	Derek Carter		rarely
Thinornis rubricollis	Hooded Plover	Nick Crouch	beach	infrequent
*Passer domesticus**	House Sparrow	Nick Crouch		regular
Dacelo novaeguineae	Laughing Kookaburra	Christopher Naylor	urban fringe	rarely
Phalacrocorax sulcirostris	Little Black Cormorant	Derek Carter		rarely
Eudyptula minor	Little Penguin	Christopher Naylor	beach	rarely
Phalacrocorax melanoleucos	Little Pied Cormorant	Ron Sandercock	beach	regular
Corvus mellori	Little Raven	Ron Sandercock		infrequent
Anthochaera chrysoptera	Little Wattlebird	Derek Carter	urban fringe	infrequent
Grallina cyanoleuca	Magpie Lark	Derek Carter		regular
Vanellus miles	Masked Lapwing	Ron Sandercock	beach/urban fringe	infrequent
Anas superciliosa	Pacific Black Duck	Nick Crouch	urban fringe	regular
Larus pacificus	Pacific Gull	Ron Sandercock	beach	regular
Falco peregrinus	Peregrine Falcon	Roger Packer		rarely
Phalacrocorax varius	Pied Cormorant	Ron Sandercock	beach	regular
Nycticorax caledonicus	Nankeen Night Heron	Christopher Naylor	urban fringe	rarely
Phylodonyris albifrons	New Holland Honeyeater	Ron Sandercock	urban fringe	infrequent
Trichoglossus haematodus	Rainbow Lorikeet	Derek Carter	urban fringe	infrequent
Charadrius ruficapillus	Red-capped Plover	Val Wales	beach/Semaphore foredune	regular
Calidris ruficollis	Red Necked Stint	Mel Rees	beach	rarely

Anthochaera carunculata	Red Wattlebird	Ron Sandercock	urban fringe	infrequent
Neophema petrophila	Rock Parrot	Ron Sandercock	Leucopogon	rarely
Threskiornis molucca	Sacred Ibis	Nick Crouch	flying over	rarely
Zosterops lateralis	Silvereye	Derek Carter		infrequent
Larus novaehollandiae	Silver Gull	Ron Sandercock	beach	regular
Lichenostomus virescens	Singing Honeyeater	Ron Sandercock		regular
*Streptopelia chinensis**	Spotted Turtle Dove	Ron Sandercock		regular
Pardalotus striatus	Striated Pardalote	Nick Crouch	urban fringe	rarely
	??? Tern	Ron Sandercock	beach	regular
Hirundo neoxena	Welcome Swallow	Ron Sandercock		regular
Egretta novaehollandiae	White Faced Heron	Christopher Naylor	urban fringe	regular
Lichenostomus penicillatus	White Plumed Honeyeater	Ron Sandercock	urban fringe	infrequent
	White Bellied Sea Eagle	Judy Packer	flying over	rarely
Rhipidura leucophrys	Willie Wagtail	Ron Sandercock		regular
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	Derek Carter		infrequent

Mammals

Scientific Name	Common Name	Observer	Location	Frequency
*Rattus rattus**	Black Rat	Nick Crouch	urban fringe	regular
Pseudocheirus peregrinus peregrinus	Common Ringtail Possum	Paul Meegan	Sthn hinddune	one dead specimen
*Felis catus**	Domestic/Feral Cat	Ron Sandercock		regular
*Canis familiaris**	Domestic/Feral Dog	Ron Sandercock		regular
*Oryctolagus cuniculus**	European Rabbit	Ron Sandercock		regular
*Vulpes vulpes**	European Red Fox	Ron Sandercock		regular
*Mus musculus**	House Mouse	Ron Sandercock		infrequent

Amphibians

Scientific Name	Common Name	Observer	Location	Frequency

* introduced species

Bird species list compiled by Derek Carter (Tennyson Dunes Group)

Date	*Time*	*Common Name*	*Number*	*Region*	*Locality*	*Comments*
5-Dec-94		Australian Kestrel	1	AP	34 52 53S 138 29 06E	
27-Jan-95		Australian Kestrel	1	AP		
27-Jan-95		Grey Fantail	1			in tamarisks in southern carpark
3-Feb-95		Black-shouldered Kite	1	AP		hovering over dunes
3-Feb-95		Rock Parrot	1			feeding on Coastal Beard-heath
21-Mar-95		Masked Lapwing	h	AP		calling on beach
21-Mar-95		Spotted Turtle-Dove	4			
21-Mar-95		Feral Pigeon	2			flew over
21-Mar-95		Crested Pigeon	3			
21-Mar-95		Rainbow Lorikeet	2			flew over
21-Mar-95		White-plumed Honeyeater	2			
21-Mar-95		New Holland Honeyeater	2			
21-Mar-95		Australian Magpie	h			
22-Mar-95		Welcome Swallow	10<	AP		
22-Mar-95		Willie Wagtail	2			
22-Mar-95		Yellow-rumped Thornbill	h			
22-Mar-95		Red Wattlebird	h			
22-Mar-95		Singing Honeyeater	3			
22-Mar-95		White-plumed Honeyeater	1			
22-Mar-95		New Holland Honeyeater	5			
24-Mar-95		Australian Kestrel	1	AP		
24-Mar-95		Blackbird	1			
24-Mar-95		Red Wattlebird	2			
9-Apr-95		Australian Pelican	5	AP		flew over
9-Apr-95		Black-shouldered Kite	2			
9-Apr-95		Masked Lapwing	2			in southern carpark
9-Apr-95		Feral Pigeon	4			
9-Apr-95		Blackbird	1			
9-Apr-95		Australian Magpie	2			
28-Jun-95		Australian Kestrel	1	AP		
2-Jul-95		Australian	1	AP		flew over

Date	*Time*	*Common Name*	*Number*	*Region*	*Locality*	*Comments*
		Pelican				
2-Jul-95		Australian Kestrel	1			
2-Jul-95		Masked Lapwing	2			flew over
2-Jul-95		Feral Pigeon	2			
2-Jul-95		Welcome Swallow	20<			
2-Jul-95		Blackbird	1			
2-Jul-95		Singing Honeyeater	h			
2-Jul-95		Silvereye	2			flew over
2-Jul-95		Australian Magpie	h			
16-Jan-98		Silvereye	5to10	AP		
16-Jan-98		Australian Kestrel	1			
20-May-00		Welcome Swallow	>10	AP		
20-May-00		Singing Honeyeater	>1			
20-May-00		Australian Kestrel	1			harassing Black-shouldered Kite, flew to chimney
20-May-00		Black-shouldered Kite	1			flew south, harassed by kestrel
20-May-00		Masked Lapwing	1			flew to carpark, landed under sheoaks
20-May-00		European Goldfinch	1			sitting on fence post near southern car park
18-Jun-00		Black-shouldered Kite	1	AP		
18-Jun-00		Australian Kestrel	1			mobbed by Magpie-larks
18-Jun-00		Magpie-lark	2			mobbed kestrel
18-Jun-00		Welcome Swallow	>10			
18-Jun-00		Singing Honeyeater	>5			
18-Jun-00		Little Raven	1			
20-Aug-00		Brush Wattlebird	2	AP		
20-Aug-00		Willie Wagtail	2			
20-Aug-00		Common Starling	>30			
20-Aug-00		Magpie-lark	1			in sheoaks in car park
20-Aug-00		Blackbird	1			
20-Aug-00		Black-shouldered Kite	1			
20-Aug-00		Silvereye	1			in sheoaks in car park
20-Aug-00		Galah	3			flew over
20-Aug-00		Masked Lapwing	1			in southern carpark
20-Aug-00		Silver Gull	>50			flew over
20-Aug-00		Spotted Turtle-Dove	3			

Date	*Time*	*Common Name*	*Number*	*Region*	*Locality*	*Comments*
20-Aug-00		Welcome Swallow	>5			
20-Aug-00		New Holland Honeyeater	2			
20-Aug-00		Singing Honeyeater	>5			
20-Aug-00		Crested Pigeon	3			
20-Aug-00		Australian Kestrel	2			sitting on chimney of Escourt House
20-Aug-00		Australian Pelican	2			one flying along edge of beach, other over lake
20-Aug-00		Feral Pigeon	4			flew over
20-Aug-00		Caspian Tern	1			in breeding plumage, orange/red bill, flew over
17-Jun-01	10:05 - 10:25am	Spotted Turtle-Dove	>5	AP		
17-Jun-01		Silver Gull	>15			flew over
17-Jun-01		Crested Pigeon	4			
17-Jun-01		New Holland Honeyeater	>5			
17-Jun-01		Welcome Swallow	>20			
17-Jun-01		Little Raven	2			in southern carpark
17-Jun-01		Magpie-lark	2			
17-Jun-01		Willie Wagtail	2			
17-Jun-01		Blackbird	2			
17-Jun-01		House Sparrow	5<			in large shrubs in southern car park
17-Jun-01		Singing Honeyeater	>5			
17-Jun-01		Australian Kestrel	1			flew over
17-Jun-01		Australian Pelican	1			flew over
17-Jun-01		Red Wattlebird	2			large wattles, shrubs south end southern car park
15-Jul-01	10:00am - 12:15pm	Black-shouldered Kite	1	AP		harassed by kestrel, continually dove on it
15-Jul-01		Australian Kestrel	1			continually dove on kite, forced it low and north
15-Jul-01		White-plumed Honeyeater	3			
15-Jul-01		Feral Pigeon	1			in southern carpark
15-Jul-01		Magpie-lark	2			in southern carpark
15-Jul-01		Silver Gull	>5			flew over
15-Jul-01		House Sparrow	h			by houses north end of southern car park
15-Jul-01		Singing	4			

Date	*Time*	*Common Name*	*Number*	*Region*	*Locality*	*Comments*
		Honeyeater				
15-Jul-01		Welcome Swallow	>20			
15-Jul-01		Crested Pigeon	>5			
15-Jul-01		New Holland Honeyeater	h			
15-Jul-01		Common Starling	2			sitting on fence posts
15-Jul-01		Willie Wagtail	1			flitting around in dunes
15-Jul-01		Galah	12			flew over
15-Jul-01		Little Raven	2			sitting on Escourt House roof
15-Jul-01		Spotted Turtle-Dove	h			
16-Jun-02	10:00am - 12:15pm	Little Raven	1	AP		
16-Jun-02		Singing Honeyeater	1			
16-Jun-02		Magpie-lark	5			
16-Jun-02		Welcome Swallow	>10			
16-Jun-02		New Holland Honeyeater	5			
16-Jun-02		House Sparrow	1			
16-Jun-02		Blackbird	1			
16-Jun-02		Silver Gull	>5			
16-Jun-02		Spotted Turtle-Dove	2			
16-Jun-02		Crested Pigeon	2			
16-Jun-02		Grey Shrike-thrush	h			
16-Jun-02		Australian Magpie	1			
16-Jun-02		Australian Kestrel	1			
16-Jun-02		European Goldfinch	1			
21-Jul-02	10:00am - 12:00pm	Silver Gull	<10	AP		
21-Jul-02		Red Wattlebird	h			
21-Jul-02		New Holland Honeyeater	h			
21-Jul-02		Welcome Swallow	<5			
21-Jul-02		Black-shouldered Kite	1			
21-Jul-02		Australian Kestrel	1			
21-Jul-02		Crested Pigeon	<5			
13-Mar-07	9:05 -	Little Raven	4	AP		in southern carpark

Date	*Time*	*Common Name*	*Number*	*Region*	*Locality*	*Comments*
	9:35am					
13-Mar-07		Silver Gull	20			
13-Mar-07		Crested Pigeon	5			
13-Mar-07		Red Wattlebird	1			in southern carpark
13-Mar-07		Spotted Turtle-Dove	4			
13-Mar-07		Common Starling	5			
13-Mar-07		Brush Wattlebird	5			in southern carpark
13-Mar-07		Singing Honeyeater	3			
13-Mar-07		Little Black Cormorant	1			flying along coast
13-Mar-07		Willie Wagtail	1			
13-Mar-07		Magpie-lark	4			
13-Mar-07		White-plumed Honeyeater	2			
13-Mar-07		Australian Magpie	3			
13-Mar-07		Blackbird	2			
13-Mar-07		New Holland Honeyeater	12			
12-Jun-07	11:15 - 11:30am	Willie Wagtail	1	AP		
12-Jun-07		Welcome Swallow	>10			
12-Jun-07		Singing Honeyeater	h1			
12-Jun-07		White-plumed Honeyeater	h1			
12-Jun-07		New Holland Honeyeater	>5			
12-Jun-07		Magpie-lark	h			
12-Jun-07		Australian Magpie	h			
12-Jun-07		Silver Gull	>10			
12-Jun-07		Silvereye	h			
12-Jun-07		House Sparrow	h			
16-Aug-09	10:00am - 12:30pm	European Goldfinch	<5	AP		
16-Aug-09		Magpie-lark	1			
16-Aug-09		Masked Lapwing	1			
16-Aug-09		Common Starling	11			
16-Aug-09		House Sparrow	3			
16-Aug-09		Red Wattlebird	2			
16-Aug-09		Crested Pigeon	5			
16-Aug-09		Spotted Turtle-Dove	3			
16-Aug-09		Singing	<5			

Date	*Time*	*Common Name*	*Number*	*Region*	*Locality*	*Comments*
		Honeyeater				
16-Aug-09		White-plumed Honeyeater	<5			
16-Aug-09		New Holland Honeyeater	<5			
16-Aug-09		Silver Gull	>10f/o			
16-Aug-09		Little Raven	1			
16-Aug-09		Australian Pelican	12f/o			
16-Aug-09		Australasian Gannet	1f/o			
22-Aug-10	10:00am - 12:00pm	Australian Kestrel	1	AP		
22-Aug-10		Crimson Rosella	h		lake side of main road	
22-Aug-10		Singing Honeyeater	h1			
22-Aug-10		Spotted Turtle-Dove	2			
22-Aug-10		Silver Gull	h			
22-Aug-10		Welcome Swallow	1			
19-Sep-10	10:00am - 12:00pm	Silver Gull	>5	AP		
19-Sep-10		Magpie-lark	2			
19-Sep-10		Little Raven	2			
19-Sep-10		Welcome Swallow	3			
19-Sep-10		Black-shouldered Kite	1			
19-Sep-10		Spotted Turtle-Dove	2			
19-Sep-10		Singing Honeyeater	2			
19-Sep-10		White-plumed Honeyeater	2			
19-Sep-10		New Holland Honeyeater	>5			
19-Sep-10		Willie Wagtail	1			
19-Sep-10		Crimson Rosella	1			
19-Sep-10		Rainbow Lorikeet	2			
19-Sep-10		Common Starling	5			
19-Sep-10		House Sparrow	<5			
19-Sep-10		Red Wattlebird	<5			
19-Sep-10		Brush Wattlebird	<5			
19-Sep-10		Blackbird	1			

Fort Glanville Conservation Park.

Observations by Kym Murphy.

Australian Native Birds.

Short-tailed shearwater.	*(Puffinus tenuirostris.)*	*Rarely seen.*
Fluttering shearwater.	*(Puffinus gavia.)*	*Rarely seen.*
Common diving petrel.	*(Pelicanoides urinary.)*	*Rarely seen.*
Black cormorant.	*(Phalacrocorax carbo.)*	*Common.*
Pied cormorant.	*(Phalacrocorax varius.)*	*Common.*
Australian pelican.	*(Pelicanus conspicillatus.)*	*Common.*
Black swan.	*(Cygnus atratus.)*	*Occasionally seen.*
Cape barren goose.	*(Cereopsis novaehollandiae.)*	*Rarely seen.*
Mountain duck.	*(Tadorna tadornoide.)*	*Occasionally seen.*
Black duck.	*(Anus superciliosa.)*	*Rarely seen.*
Grey teal.	*(Anas gibberifrons.)*	*Rarely seen.*
Little egret.	*(Egretta garzetta.)*	*Rarely seen.*
White-brested sea eagle.	*(Haliaeetus leucogaster.)*	*Rarely seen.*
Brown gohawk.	*(Acipiter fasciatus.)*	*Rarely seen.*
Collared sparrow-hawk.	*(Acipiter cirrocephalus.)*	*Rarely seen.*
Square-tailed kite.	*(Lophoictinia isura.)*	*Rarely seen.*
Black-shouldered kite.	*(Elanus notates.)*	*Occasionally seen.*
Black falcon.	*(Falco subniger.)*	*Rarely seen.*
Pereguine falcon.	*(Falco peregrinus.)*	*Rarely seen.*
Little falcon.	*(Falco longipennis.)*	*Common.*
Nankeen kestrel.	*(Falco cenchroides.)*	*Common.*
Brown falcon.	*(Falco berigora.)*	*Rarely seen.*
Pacific gull.	*(Larus pacificus.)*	*Common.*
Silver gull.	*(Larus novaehollandiae.)*	*Common.*
Caspian tern.	*(Hydroprogne caspia.)*	*Common.*
Common tern.	*(Sterna hirundo.)*	*Common.*
Crested tern.	*(Sterna bergii.)*	*Occasionally seen.*
Whiskered tern.	*(Chlidonias hybrida.)*	*Occasionally seen.*
Brown quail.	*(Synoicus austrralis.)*	*Rarely seen.*
Little button quail.	*(Turnix velox.)*	*Rarely seen.*
Black-tailed native hen.	*(Tribonyx ventralis.)*	*Rarely seen.*
Pied oystercatcher.	*(Haematopus ostalegus.)*	*Occasionally seen.*
Sooty oystercatcher.	*(Haematopus fuliginous.)*	*Occasionally seen.*
Masked plover.	*(Vanellus miles.)*	*Occasionally seen.*
White ibis.	*(Threskiornis mulucca.)*	*Occasionally seen.*
Crested pigeon.	*(Ocyphaps loopholes.)*	*Common.*
Rainbow lorikeet.	*(Trichoglossus haematodus.)*	*Common.*
Musk lorikeet.	*(Glossopsitta concinna.)*	*Occasionally seen.*
Galah.	*(Cacatoua rosicaoilla.)*	*Common.*
Little corella.	*(Cacatoua sanquinea.)*	*Occasionally seen.*
Port Lincoln parrot.	*(Barnardius zonarius.)*	*Rarely seen.*
Adelaide Rosella.	*(Playcercus elegans.)*	*Common.*
Elegant parrot.	*(Neophema elegans.)*	*Rarely seen.*
Boobook owl.	*(Ninox novaeseelandiae.)*	*Rarely seen.*
Barn owl.	*(Ninox connivens.)*	*Rarely seen.*
Fork-tailed swift.	*(Apus pacificus.)* *migrant.*	*Rarely seen.*
Fairy martin.	*(Cecropis ariel.)*	*Occasionally seen.*
Welcome swallow.	*(Hirundo neoxena.)*	*Common.*
Rainbow bee-eater.	*(Merops ornate.)*	*Rarely seen.*
Sacred kingfisher.	*(Halcyon sancta.)*	*Rarely seen.*
Willie wagtail.	*(Rhipidura leucophrys.)*	*Common.*
Grey fantail.	*(Rhipidura fuliginous.)*	*Rarely seen.*
Noisy miner.	*(Manorena melanocephala.)*	*Common.*
Red wattlebird.	*(Anthochaera carbuncular.)*	*Common.*
Little wattlebird.	*(Anthochaera chrysoptera.)*	*Common.*
Singing honeyeater.	*(Lichenostomus virescens.)*	*Common.*
White-plumed honeyeater.	*(Lichenostomus penecillatus.)*	*Common.*
New Holland honeyeater.	*(Phylidonyris novaehollandiae.)*	*Common.*
Tawny-crowned honeyeater.	*(Phylidonyris melanops.)*	*Rarely seen.*
Grey-brested silvereye.	*(Zosterops lateralis.)*	*Rarely seen.*
Black-faced cuckoo-shrike.	*(Coracena novaehollandiae.)*	*Occasionally seen.*
Australian magpie-lark.	*(Grallina cyanoleuca.)*	*Common.*
Australian white-backed magpie.	*(Gymnorhina tibisan.)*	*Common.*

Little raven.	*(Corvus melloi.)*	*Common.*
Brown song lark.	*(Cinclorhamphus cruralis.)*	*Occasionally seen.*

Australian Native Reptiles.

Common brown snake.	*(Pseudonaja textillis textillis.)*	*Occasionally seen.*
Common death adder	*(Acanthophis antarcticus.)*	*Rarely seen.*
Shingle-backed lizard.	*(Trchysaurus rugosus.)*	*Common.*
Blue-tounged lizard.		*Occasionally seen.*
Coastal bearded-dragon.	*(Amphibolurus barbatus.)*	*Common.*
Painted-dragon.	*(Amphibolurus pictus.)*	*Common.*
Drop-tail skink.		*Occasionally seen.*
Gecho.		*Common.*

Introduced Bird Species.*

Spotted turtle dove.	*(Streptopelia chinensis.)*	*Common.*
House sparrow.	*(Passer domesticus.)*	*Common.*
Common starling.	*(Sturnus vulgaris.)*	*Common.*
European blackbird.	*(Turdus merula.)*	*Common.*
Domestic pigeon.	*(Columbia livia.)*	*Common.*
English song lark.	*(Alauda arvensis.)*	*Rarely seen.*

Introduced mammals.

Fox.		*Common.*
Rabbit.		*Common.*
Mouse.		*Occasionally seen.*

Possible Bird Sightings.

Australian gannet.	*(Morus serrator.)*	*Seen after storm.*
Whistling kite.	*(Haliastur sphenurus.)*	
Osprey.	*(Pandion Haliaetus.)*	
Purple-crowned lorikeet.	*(Glossopsitta porphyrocephala.)*	
*European green finch.**	*(Carduclis chloris.)*	

Appendix 3. Weed control techniques

The information in the following table has been adapted and updated from the 2006 Vegetation Management Plan for Tennyson Dune Reserve (Cordingley, S. and Petherick, C.).

Priority weed species	Control method	Chemical	Rate	Mix	Comments
Acacia cyclops	Spray (new seedlings)	Glyphosate	1:100	Water	Ensure correct identification for small plants
	Hand pull				
	Cut	Cut off at base as low to the ground as possible making sure no leaves are visible. Remove all seed bearing branches from the site and dispose of.			Plants provide habitat and soil stability. Remove in a staged fashion.
Acacia saligna	Cut & swab	Triclopyr	1:30	Diesel	Replace with appropriate indigenous species, eg. *Acacia cupularis*. Monitor for new seedling growth.
		Glyphosate	1:10	Water	
	Hand pull				Ensure correct identification for small plants
Arctotis stoechadifolia	Spot spray in md winter to early spring. Follow-up.	Glyphosate	1:100	Water	Add surfactant (refer to label).
	Hand-pull throughout the year				Revegetate with local species eg. *Carpobrotus rossii, Threlkeldia diffusa, Enchylaena tomentosa*
Argyranthemum frutescens	Hand pull smaller plants				Ensure minimal disturbance to sand
	Cut & swab larger plants	Glyphosate	1:10	Water	
	Spray smaller plants	Glyphosate	1:100	water	
Asparagus asparagoides	Hand pull	Ensure all rhizomes, stems and fruit are bagged, removed from site and burnt to prevent reinfestation. Hand weeding is useful for small individual plants or as follow-up technique after herbicide control of larger infestations.			
	Spray	Glyphosate			Add Pulse penetrant
	Biological control	Rust Fungus			
Carpobrotus edulis	Hand pull	Mark plants in spring, whilst in flower. Remove in winter. Ensure all plant parts are removed from the dunes.			
	Spot spray	Glyphosate and Pulse			
Chondrilla juncea	Hand pull	May be difficult to control by hand, particularly after the rosette stage, due to its deep taproot and vigorous growth. Remove plants when juvenile.			
Cynodon dactylon	Spray in summer while plant is active	Glyphosate	1:100	Water	Add surfactant
Ehrharta calycina	Hand weed	Roots and rhizomes are shallow and easy to dig out. Cut and bag mature seedheads before removal. Ensure all rhizomes are bagged and removed from site.			
	Strategic slashing, followed immediately by spraying or wiping	Glyphosate	1:100	Water	Spray in late winter-early spring before flowring stems lengthen
Euphorbia paralias	Spot spray	Glyphosate	1:100	Water	Add surfactant (refer to label). Monitor for

Priority weed species	Control method	Chemical	Rate	Mix	Comments
					regeneration
	Hand pull	Use gloves as sap may cause dermatitis reaction. Bag and remove flowering plants from the dunes to prevent regeneration.			
Euphorbia terracina	Hand pull	Use gloves as sap may cause dermatitis reaction. Bag and remove flowering plants from the dunes to prevent regeneration.			
	Slash	Remove seed heads beforehand. Spray regrowth.			
	Spray	Glyphosate	1:100	Water	Add surfactant (refer to label).
Galena pubescens	Hand pull	Replace with indigenous groundcover species			
	Spray	Glyphosate	1:100	Water	Add surfactant (refer to label).
	Cut & swab	Glyphosate	1:100	Water	
Gazania sp.	Hand pull or trowel smaller plants	Ensure root system is removed, bagged and disposed of carefully.			
	Slashing	Repeat treatments necessary.			
	Spot spray	Glyphosate	1:100	Water	Add penetrant
		Metsulfuron	5-7g/ 100ml	Water	
Leptospermum laevigatum	Hand pull smaller plants				
	Prune	Remove seed bearing branches and remove from site over several years. Replace with indigenous species. Monitor for regrowth and regeneration.			
	Spot spray small plants	Glyphosate	1:80	Water	
	Cut	Cut off at base as low to the ground as possible making sure no leaves are visible. Remove all seed bearing branches from the site and dispose of.			Plants provide habitat and soil stability. Remove in a staged fashion.
Lupinus consentii	Hand pull	Shallow rooted and easy to remove by hand. Ensure weeding occurs before seed set. Bag and remove seed heads from the site.			
Lycium ferocossimum	Hand pull seedlings				Monitor over several years for regrowth and regeneration. Re-treat if necessary.
	Cut & swab	Triclopyr	1:30	Diesel	
		Glyphosate	1:10	Water	
	Spot spray smaller plants	Glyphosate	1:100	water	
Mesembryanthemum crystallinum	Hand pull				Ensure all plant fragments are carefully removed. Monitor for re-infestation.
	Spot spray	Glyphosate	1:100	Water	Add surfactant (refer to label).
Oenothera stricta	Hand pull	Difficult to control by hand as it tends to break off at the root and regrow. Use a weed fork and ensure all roots are bagged and removed from site and destroyed.			
Olea europaea	Hand pull small plants				Replace with indigenous vegetation that will fulfil similar habitat roles.
	Cut & swab	Triclopyr	1:30	Diesel	
		Glyphosate	Neat		
	Spray seedlings	Glyphosate	1:80	Water	Add penetrant
Osteospermum fruticosum	Hand pull				Ensure root system is removed. Dispose of carefully.
	Spray	Glyphosate	1:80	Water	Add surfactant (refer to label).

Priority weed species	Control method	Chemical	Rate	Mix	Comments
Oxalis pes-caprae	Careful spot spray just prior to or early in flowering period	Glyphosate			Repeat applications over a 2-5 year period may be necessary
Pennisetum clandestinum	Hand pull				Ensure whole plant (including roots) is removed).
	Spray in summer while plant is active	Glyphosate	1:100	Water (add surfactant)	Follow-up revegetation using indigenous groundcovers. Monitor for regrowth.
Rhamnus alaternus	Hand pull small plants				
	Cut & swab large plants	Triclopyr	1:30	Diesel	Replace with indigenous vegetation that will fulfil similar habitat roles.
		Glyphosate	1:10	Water	
Stenotaphrum secundatum	Hand pull				Ensure whole plant (including roots) is removed.
	Spray	Glyphosate	1:100	Water	Spray in summer while plant is active. Follow-up revegetation using indigenous groundcovers. Monitor for regrowth.
Succulents/ Cacti spp.	Removal techniques will vary with plant species				It is important to ensure all material is bagged and removed from the dunes as succulents and cacti reproduce vegetatively.
Trachyandra divaricata	Wick blanket or sponge glove application in winter or spring (prior to flowering) when plants are actively growing	Glyphosate	1:2	Water (add 2.5ml wetting agent)	Apply in sensitive areas.
	Hand pull smaller plants. Larger plants will require a fork or trowel to loosen sand.				Ensure roots and seed heads are removed and disposed off site.

Weeding calendar for Tennyson Dunes (adapted and updated from (Cordingley, S. and Petherick, C, 2006. *Vegetation Management Plan for Tennyson Dune Reserve*.).

Weed	**Control method**	**Month**											
		Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Acacia cyclops	Hand pull												
	Cut/swab												
Acacia saligna	Cut swab												
	Frill												
Arctotis stoechadifolia	Spray												
	Grub												
Argyranthemum frutescens	Hand pull												
	Cut/swab												
	Spray												
Asparagus asparagoides	Rust fungus												
	Spray												
	Grub												
Carpobrotus rossii	Grub												
Chondrilla juncea	Grub												
Cynodon dactylon	Spray												
Ehrharta calycina	Spray												
	Cut/swab												
Euphorbia paralias	Hand pull												
	Spray												
	Slash												
Euphorbia terracina	Hand pull												
	Spray												
	Slash												
Galenia pubescens	Spray												

	Grub												
Gazania sp.	Spray												
	Slash												
	Grub												
Leptospermum laevigatum	Hand pull												
	Cut/swab												
	Trim & revegetate												
	Frill & remove seeds												
Lupinus cosentii	Hand pull												
	spray												
Lyceum ferocissimum	Drill & fill												
	Cut/swab												
Mesembryanthemum crystallinum	Hand pull												
	Spot spray												
Oenothera stricta	Hand pull												
Olea europaea	Hand pull												
	Spot spray												
	Frill												
Osteospermum fruticosum	Spray												
	Slash												
	Hand pull												
Oxalis pes-caprae	Spot spray												
Pennisetum clandestinum	Spray												
Rhamnus alaternus	Cut/swab												
	Hand pull												

	Spot spray												
Stenotaphrum secundatum	Spray												
Succulent spp./Cacti spp.	Spray												
	Grub												
Trachyandra divaricata	Sponge/wick wipe												
	Spray												
	Grub												

Bushland weeding code

From: Robertson, M., Grant, I., Craigie, A.I. (2005) *Stop Bushland Weeds: A Guide to Successful Weeding in South Australia's Bushland*. Nature Conservation Society of South Australia.

- Look before you weed—know where the native plants are.
- Choose the most effective and selective weeding technique for the plant and the location.
- Disturb soil as little as possible. Replace any disturbed soil, press it down and replace plant litter.
- Adapt to the season and weather conditions. Don't pull or grub weeds when the soil is dry and roots break off when pulled, or tramp through when soil is so soft that your feet damage plants at each step.
- Minimise the amount of trampling over the site and scatter the team of workers so that they do not form a new trail. Wear soft soled shoes and clothes which do not carry weed seeds or drag on foliage. Wear gloves.
- Before you pull, grub or poison large weeds, pull the small weeds which are growing underneath them.
- Avoid damage to native plants. Don't drop or fell large weeds onto native plants or drag boughs through the bush.
- Remove from the bush any parts of weeds which could regrow: ripe fruits, seed heads, bulbs, rhizomes and runners. Break up the rest into small pieces and leave them scattered to form mulch, especially over the spots where weeds have been removed.
- Do follow up work before moving on to weed a new area.
- Remove weed seeds or bulbils which could scatter into the weeded zone.
- Where native plants are regenerating among dense weeds, clear them some growing space but do not create large openings.

With specific reference to Tennyson, it is important that weed control spraying not be undertaken when it is windy.

The following information has been adapted from a draft Management Action Plan Guide, originally produced by the Bush Management Advisors, SA Department for Environment and Heritage.

Weed Control Information

CONTENTS:

1 Weed Control – a Summary of Control Methods

Always think about weed control as a long term project. Numerous follow-up treatments will be required before weeds are fully eradicated.

To promote the replacement of weeds by native plants ensure you minimise the disturbance to existing native plants and to the soil as you control the weeds.

Always start weed control work from the area of good bush and work towards the more degraded areas.

Where native animals are using the weed infestations as habitat, for instance the Southern Brown Bandicoot often survives because of the protection afforded by dense thickets of Blackberry, remove those weeds slowly so that the habitat can be replaced by native species. You don't want to remove all of your native animals as you remove the weeds from your property.

Consider the future of the site as the weeds are removed, in relation to soil erosion and slope stability.

Many weed control options involve the use of herbicides. Keep yourself, other people and your property safe. Use herbicides only in accordance with the relevant recommendations (label, permits etc) and only treat weeds when they are actively growing. Always use the recommended safety equipment and have water available for washing should there be any herbicide contact with your skin.

Hand Pull	Tools and Equipment:	Gloves
	Safety Equipment :	None
	Especially good for soft annual weeds and seedlings of woody weeds. Firmly grip the stem of the weed near ground level and pull the root out of the ground. Beware of back injury. Care must be taken to minimise soil disturbance by for example putting one foot	

	on the ground on either side of the weed to keep the surrounding soil from lifting up and/or waiting until after rain when the soil is wet so the plant comes up more easily.

Digging or Grubbing	Tools and Equipment :	Narrow trowel, small grubbing tool (like a small mattock)
	Safety Equipment :	None
	Especially useful for weeds with underground storage organs (lignotubers, bulbs etc) and individual weeds in bushland areas. Dig out the underground part of the weed and remove it from the site. The draw backs with this method include the amount of soil disturbance which can promote the establishment of other weeds at the site (this can be minimised by replacing the dislodged soil and leaf litter after the weed is removed), and if not all of the underground parts are removed the weed may resprout.	

Cut and Swab	Tools and Equipment :	Cut using secateurs, loppers, a handsaw or chainsaw depending on weed size. Herbicide application using a sponge-topped plastic bottle similar to a shoe polish bottle.
	Safety Equipment :	Safety glasses, strong rubber gloves, water for washing
	Especially useful for woody weeds. Cut the stem(s) close to or at ground level. Keep the applicator sponge clean as contact with the soil may inactivate the herbicide. Apply the herbicide to the cut stump as soon as possible after cutting and definitely within 30 seconds. Systemic herbicides are used in this method which move to and kill the roots of the weed. **Stem Scape and Swab :** If the underground parts of the weed are extensive, more herbicide will be needed to kill it. In this case cut the stems higher above the ground and after cutting, scrape off the outer layer (skin) of the remaining part of the stem and apply herbicide to this area as well as to the cut.	

Ringbark	Tools and Equipment :	Hatchet, machete, hand saw or chainsaw.
	Safety Equipment :	Safety glasses, gloves
	Especially useful for pine trees. As close to the ground as possible chop out a 2-5cm wide section of the bark and sap wood, exposing the heart wood, to form a disk that completely encircles the tree. For pines, no herbicide need be applied. For other weeds apply herbicide as per the Cut and Swab information above. Ensure that when the tree dies and eventually falls that it will fall into safe place.	

Wipe On	Tools and Equipment :	Wick-wand, or 'Tongs of Death' and plastic squeeze bottle with a long narrow tube coming out of the lid
	Safety Equipment :	Safety glasses, strong rubber gloves, water for washing
	Especially useful for strap-leaf species such as Watsonia in areas where they are surrounded by native plants. The herbicide is applied to the wick-wand or Tongs of Death (kitchen tongs with sponges securely attached), and then the leaves of the weed are wiped. Both sides of the leaf should be coated with herbicide.	

Drill and Fill	Tools and Equipment :	Cordless/battery drill with 6mm drill bit. Plastic squeeze bottle with a long narrow tube coming out of the lid.
	Safety Equipment :	Safety glasses, strong rubber gloves, water for washing
	Especially useful for larger woody weeds. The weed is left standing after the treatment, minimising the control effort required and maximising the habitat value. Clear any low branches away to allow good access to the base of the weed. Clear soil and leaf litter away from the base of the stem. Drill a series of holes 5 – 10mm deep at a 45^{o} angle (or steeper if possible) into the base of the stem, or into the lignotuber if it is visible. A lignotuber is a swollen part of the lower stem which is a type of storage organ. The holes should be drilled 2 - 4cm apart around the base. Fill the holes with herbicide as soon as possible after drilling. Before leaving to start on another plant check the holes and refill them with herbicide. **Frill and Fill**: A variation of the Drill and Fill method where a hatchet or machete is used to make lots of horizontal cuts all around the base of the stem so that each cut can hold the herbicide. Apply the herbicide as soon as possible after cutting.	

Spot Spray	Tools and Equipment :	Hand-held spray bottle, backpack spray unit or vehicle mounted spray unit
	Safety Equipment :	Safety glasses, mask or ventilator, strong rubber gloves, water for washing, other equipment as specified on the herbicide label.
	Especially useful for large infestations and/or where off target damage to native species (eg spray drift) is unlikely. It is very important to ensure you mix the herbicide to the correct dilution for the target weed, as per the label instruction, or in some cases the Off-label Permit instructions. Check on the label to see if a surfactant (also known as a wetting agent) or penetrant is recommended. The weed must be in an active growing stage for the herbicide to work effectively. Ensure a good cover of the herbicide on both sides of the leaves. To minimise off-target damage from spray drift, adjust the nozzle to get droplets of the correct size to cover the leaf (not too small to blow away between the nozzle and the leaf and not too big to dribble off the leaf once it hits), use a shield over the spray nozzle and don't spray on windy days. Don't spray when rain is expected (refer to the label for more details)	

	There are several issues when considering the spot spraying option. It is relatively easy to kill large areas of weeds using this method. If you are working on a slope make sure you are not going significantly increase soil erosion or instability. If there are native animals using the weeds as habitat, what will happen to them? If the weeds are left standing, particularly for dense prickly infestations, how will you get into them later to do the follow up work? How much off-target damage is acceptable?

2 Herbicides

Herbicides are chemicals designed to kill plants. They can be a very effective weed control tool but they must be used at the right concentration and carefully. The safety of people and of the environment must be the main consideration when using them.

Before using herbicides it is recommended that you complete a basic Chemical Handling training session.

Always read the label on the herbicide container. It is a legal requirement that you act in accordance with the instructions and information on the label, or in some cases, in accordance with the Off-label Permit for that herbicide as issued by the Australian Pesticide and Veterinary Medicines Authority. Further information about a herbicide can be found on it's Material Data Safety Sheet, which is available at the point of sale or via the internet.

You must always follow the safety instructions closely and wear the recommended protective equipment when mixing or using herbicides. Only use the herbicide at the dilution rate recommended for a particular species. Only mix up the amount of herbicide that you will use in each weeding session.

2.1 Terms to Become Familiar With

Residual	Remains active in the soil (anywhere from several weeks to 12 months or more) and is absorbed into the plant via the root system. Herbicides that have long residual times in the soil are generally not used for bushland weed control.
Toxicity	The strength of a herbicide, and hence the level of risk involved in its use.
Systemic	The herbicide is transported around the plant to the roots, which it kills, causing the whole plant to die.
Non-systemic	The herbicide only kills the part of the plant that it contacts. Also known as 'Knockdown' herbicides. Useful for the control of annual weeds.
Selective	The herbicide kills some groups of plants but has little or no effect on others. Common examples are 'broad-leaf selective' herbicides and 'grass selective' herbicides.
Non-selective	The herbicide can kill all groups of plants.

Active Ingredient	The ingredient in the herbicide that actually kills the plant. Don't confuse this with the brand name of a herbicide. The label on every brand of herbicide will show what active ingredient(s) are present and in what concentrations.
Surfactant	A herbicide additive like a strong detergent which assists the herbicide to stick onto the plant thereby increasing the uptake of the active ingredient by the plant. Some brands of herbicide already have a surfactant mixed in or will recommend that one be included with the herbicide for use on a particular species. This information will be shown on the label.
Penetrant	A herbicide additive which assists the active ingredient to move into the plant. Some brands of herbicide already have a penetrant mixed in or will recommend that one be included with the herbicide for use on a particular species. This information will be shown on the label. In most cases the use of additional penetrants is not recommended for bushland weed control and should only be used with great care.

2.2 Active Ingredients for Bushland Weed Control

Most herbicide use recommended for bushland weed control is based around one or the other of two active ingredients, Glyphosate and Triclopyr.

Glyphosate

- Low toxicity
- Residual (in some cases)
- Systemic
- Non-selective
  However some plants are more sensitive than others depending upon the concentration, method of application, growth stage and vigour of the plant, and the presence of surfactants.
- Where the use of the active ingredient Glyphosate is recommended in this plan, use a herbicide brand where Glyphosate is the only active ingredient and is present at a concentration of 360 grams / litre.

Triclopyr

- Moderate toxicity
- Residual in the soil for up to six weeks
- Systemic
- Broad-leaf selective – (it does not effect grasses).
- Where the use of the active ingredient Triclopry is recommended in this plan, use a herbicide brand where Triclopyr is the only active ingredient and is present at a concentration of 600 grams / litre.

- The use of Triclopyr diluted with diesel for Cut and Swab application in bushland is allowed by way of a Permit issued by the Australian Pesticide and Veterinary Medicines Authority – Permit Number PER8897, for the herbicide brand Garlon 600. The permit is valid until 30 May 2011.
- Due to its toxicity level and residual effect, it is recommended that landowners either get licensed contractors to complete treatments using Triclopyr, or complete a Chemical Handling training course themselves before using it.

Appendix 4. Rabbit monitoring

Rabbit dung counts methodology

The following method has been derived from Mutze *et al*[10, 11]. The number of rabbit dung within a 0.1m^2 (31.6cm x 31.6cm) quadrat were counted. Quadrats of were dropped at intervals of 5 paces along a series of linear transects walked across each site to give an approximately even distribution throughout the survey area. The survey areas was 0.5 hectares (100m by 50m). To avoid bias, we stayed as close to the chosen line of walk as the vegetation permitted and took care not to look down and select the position relative to dung density. Once dropped, the quadrat was adjusted to free it from vegetation that held it above the soil surface without changing its lateral position. Areas underneath dense low shrubs were not included. Each quadrat was thoroughly searched, and the total number of dung pellets per species for the quadrat was counted. Where dung counts were 40 or more the quadrat was recorded as a latrine.

Dung Count Data Analysis

Dung counts were converted to estimated rabbit densities per hectare using the treatments and conversions described by Mutze *et al* 2014. Whilst the full description of the underpinning reasoning for the data treatment is provided in that paper, the relevant formulae have been reproduced below:

Rabbit density (Den) can be estimated from the mean density outside of latrines (DO, pellets quadrat^{-1}) as:

Equation 1: $Den = -0.0008 \times DO^3 + 0.0565 \times DO^2 + 0.86 \times DO$

Site location

Data was gathered in one half hectare area, at GPS location 270058 6137237 (GDA 94). The site spanned 100 metres to the north and 50 metres to the west from this point (refer Figure 1). This area was chosen as it contains some of the heaviest observed impacts of rabbit grazing.

Results

Table 3: Rabbit density in the Tennyson Dunes

Site Number	Date	Average dung density outside latrines (DO)	Estimated rabbit density
Site 1	15/9/2014	2.43	2.41

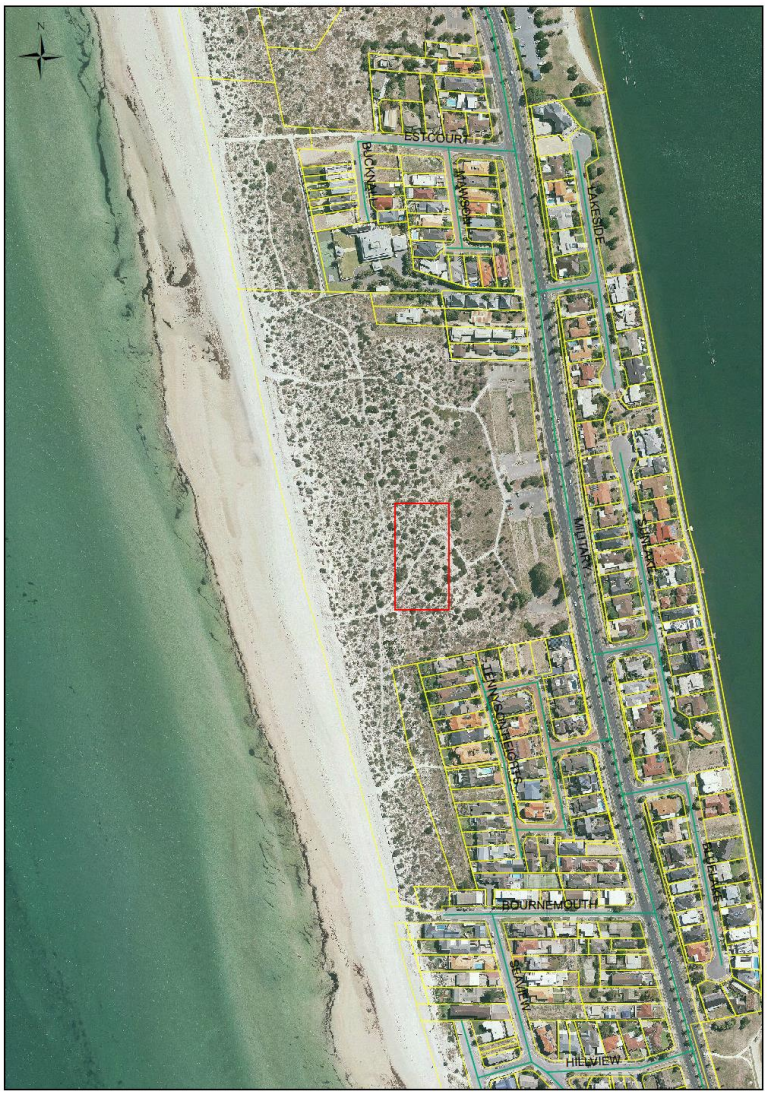
[10] Mutze, G., Cooke, B., Lethbridge, M. and Jennings, S. (2014). A rapid survey method for estimating population density of European rabbits living in native vegetation. The Rangelands Journal 36, 239-247.
[11] Mutze, G., Cooke, B. and Jennings, S. (in prep.). Demonstrating relationships between density of European rabbits and damage to Australian native vegetation.

Discussion

Estimated rabbit density in the area surveyed was 2.41 rabbits per hectare. Mutze et al (in prep) [12] noted recruitment failure in semi-arid areas, as exemplified by missing cohorts of intermediate size/age plants, was evident for highly palatable species at approximately 0.5 rabbits ha^{-1}, and for moderately palatable species at approximately 1-2 rabbits ha^{-1}. As such, this site may be under significant pressure from rabbit grazing, and ongoing control is recommended.

It is recommended that the monitoring is repeated each year, to enable progress towards a target to be measured. Whilst eradication is unlikely (as rabbits will recolonise the area), a suggested target of <0.5 rabbit per hectare would be appropriate.

Tennyson Dunes - Rabbit monitoring area September 2014



Legend

Rabbit monitoring area

[12] Mutze, G., Cooke, B. and Jennings, S. (in prep.). Demonstrating relationships between density of European rabbits and damage to Australian native vegetation.

Rabbit and fox activity mapping, undertaken in 2014 by Paul Meegan (Nick Crouch, Tennyson Dunes Group, pers. comm.).

Appendix 5: Revegetation details – Management Zone 5a

The following information is details of the revegetation works which were undertaken by contractors in Management Zone 5a in 2014.

***Scaevola crassifolia* SHRUBLAND**

Species	# Plants	Planting scheme	Distance apart (m)	Comment
Shrub				
Leucopogon parviflorus	**5**	Scattered and loose colonies	7+	Allow moderate buffer
Nitraria billardierei	**5**	Scattered individuals	25+	Allow large buffer
Olearia axillaris	**5**	Clumping and widely scattered	2 to 7	Allow moderate buffer
Scaevola crassifolia	**25**	Colonies (5 plants per colony)	5+	Allow moderate buffer
Under shrub				
Leucophyta brownii	**5**	Loose clumps and scattered	0.5 to 5	
Rhagodia candolleana ssp *candolleana*	**10**	Scattered use support of brush	5+	Build seed bank - allow natural regeneration - bird driven
Senecio pinnatifolius	**25**	Tight colonies and scattered - use as fill in	0.25 to 5	Build seed bank - support natural regeneration - wind driven
Threlkeldia diffusa	**10**	Scattered	5+	Build seed bank - support natural regeneration - bird driven - give establishing plant physical support
Herb				
Pelargonium australe	**20**	Clumps and scattered	0.6 to 5	Build seed bank - support natural regeneration - wind driven
Mat				
Carpobrotus rossii	**20**	Scattered	3+	Use as fill in
Kennedia prostrata	**5**	scattered individuals	5+	Sheltered and stable locations
Kunzea pomifera	**5**	scattered individuals	20+	Allow small buffer - give some shelter
Vine				
Clematis decipiens	**5**	Scattered	10+	Build seed bank - support natural regeneration - wind driven - give establishing plant physical support
Muehlenbeckia gunnii	**5**	Scattered use support of brush	10+	Build seed bank - support natural regeneration - bird driven - give establishing plant physical support
Tetragonia implexicoma	**20**	Scattered	5+	Build seed bank - support natural regeneration - bird driven - give establishing plant physical support
Sedge				
Dianella brevicaulis	**20**	Loose clumps and scattered	0.6 to 5	Build seed bank - support natural regeneration - bird driven

Ficinia nodosa	**20**	Loose clumps and scattered	1 to 5	Use as fill in
Lepidosperma gladiatum	**5**	Clumps and scattered stands	3 to 10	Rhizome driven
Lomandra leucocephala ssp robusta	**5**	Loose clumps and scattered individuals	2 to 10	
Grass				
Poa poiformis	**20**	Clumps and scattered stands	0.5 to 5	
Spinifex hirsutus	**20**	Scattered	0.5 to 5	Long stem planting - use as fill in
TOTAL	**260**			

Melaleuca lanceolata OPEN LOW WOODLAND +- *Tetragonia implexicoma*

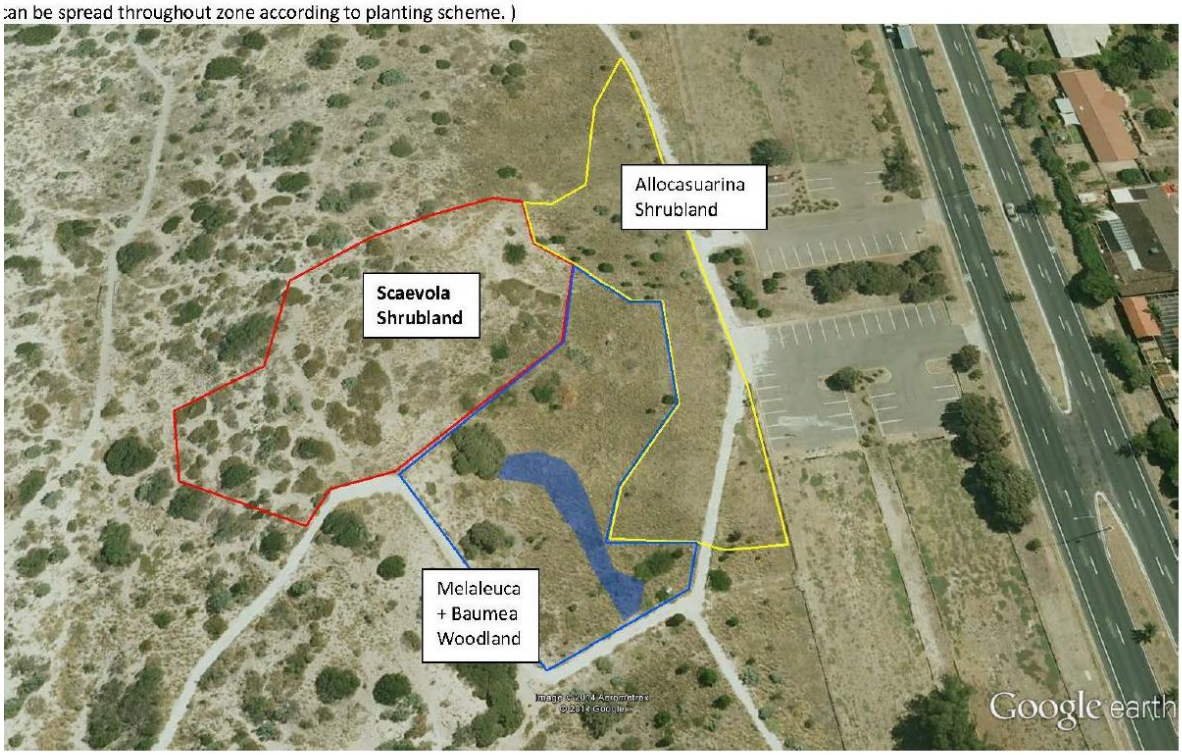
Species	**# plants**	**Planting Scheme**	**Distance apart**	**Comment**
Tree				
Melaleuca lanceolata	**10**	Clumping colonies and scattered individuals (3 to 5 plants per colony). **ALSO SEE semi-circle planting as per map**	20+	Allow large buffer
Allocasuarina verticillata	**15**	Scattered and loose colonies (3 to 5 plants per colony).	6 to 10	Allow moderate buffer
Shrub				
Olearia axillaris	**30**	Clumping and widely scattered	2 to 7	Allow moderate buffer
Nitraria billardierei	**10**	Scattered individuals	25+	Allow large buffer
Scaevola crassifolia	**50**	Colonies	5+	Allow moderate buffer
Leucopogon pauciflorus	**10**	Scattered and loose colonies	7+	Allow moderate buffer
Acacia longifolia ssp sophorae	**15**	Scattered and loose colonies	5 to 15	Allow moderate buffer
Myoporum insulare	**5**	Scattered individuals	20+	Allow large buffer
Under shrub				
Rhagodia candolleana	**50**	Scattered use support of brush	5+	Build seed bank - allow natural regeneration - bird driven

ssp. *candolleana*				
Threlkeldia diffusa	**50**	Scattered	5+	Build seed bank - support natural regeneration - bird driven - give establishing plant physical support
Enchylaena tomentosa var. *tomentosa*	**5**	Scattered		
Pimelea serpyllifolia		Loose colonies	1 to 10	Unlikely to be available
Herb				
Senecio pinnatifolius	**50**	Tight colonies and scattered - use as fill in	0.25 to 5	Build seed bank - support natural regeneration - wind driven
Pelargonium australe	**200**	Clumps and scattered	0.6 to 5	Build seed bank - support natural regeneration - wind driven
Mat				
Carpobrotus rossii	**100**	Scattered	3+	Use as fill in
Helichrysum leucopsideum	**20**	Dense clumps and scattered	1 to 5	Sheltered and stable locations
Kunzea pomifera	**10**	scattered individuals	20+	Allow small buffer - give some shelter
Kennedia prostrata	**10**	scattered individuals	5+	Sheltered and stable locations
Vine				
Tetragonia implexicoma	**50**	Scattered	5+	Build seed bank - support natural regeneration - bird driven - give establishing plant physical support
Muehlenbeckia gunnii	**25**	Scattered use support of brush	10+	Build seed bank - support natural regeneration - bird driven - give establishing plant physical support
Clematis decipiens	**25**	Scattered	10+	Build seed bank - support natural regeneration - wind driven - give establishing plant physical support
Sedge				
Dianella brevicaulis	**50**	Loose clumps and scattered	0.6 to 5	Build seed bank - support natural regeneration - bird driven
Lepidosperma gladiatum	**25**	Clumps and scattered stands	3 to 10	Rhizome driven
Ficinia nodosa	**100**	Loose clumps and scattered	1 to 5	Use as fill in
Grass				
Austrostipa flavescens	**25**	Clumps and scattered	1 to 5	Build seed bank - support natural regeneration - wind driven
Austrodanthonia ceaspitosa	**25**	Clustered colonies	0.5 to 5	Build seed bank - support natural regeneration - wind driven
Poa poiformis	**50**	Clumps and scattered stands	0.5 to 5	
TOTAL	**1015**			

Allocasuarina verticillata OPEN LOW WOODLAND

Species	# plants	Planting scheme	Distance apart (m)	Comment
Tree				
Allocasuarina verticillata	**30**	Scattered and loose colonies (3 to 5 plants per colony)	6 to 10	Allow moderate buffer
Shrub				
Leucopogon parviflorus	**5**	Scattered and loose colonies	7+	Allow moderate buffer
Olearia axillaris	**5**	Clumping and widely scattered	2 to 7	Allow moderate buffer
Scaevola crassifolia	**5**	Colonies	5+	Allow moderate buffer
Under shrub				
Rhagodia candolleana	**30**	Scattered use support of brush	5+	Build seed bank - allow natural regeneration - bird driven
Senecio pinnatifolius	**25**	Tight colonies and scattered - use as fill in	0.25 to 5	Build seed bank - support natural regeneration - wind driven
Herb				
Pelargonium australe	**10**	Clumps and scattered	0.6 to 5	Build seed bank - support natural regeneration - wind driven
Mat				
Carpobrotus rossii	**30**	Scattered	3+	Use as fill in
Kunzea pomifera	**10**	scattered individuals	20+	Allow small buffer - give some shelter
Vine				
Tetragonia implexicoma	**10**	Scattered	5+	Build seed bank - support natural regeneration - bird driven - give establishing plant physical support
Sedge				
Dianella brevicaulis	**25**	Loose clumps and scattered	0.6 to 5	Build seed bank - support natural regeneration - bird driven
Ficinia nodosa	**25**	Loose clumps and scattered	1 to 5	Use as fill in
Lepidosperma gladiatum	**10**	Clumps and scattered stands	3 to 10	Rhizome driven
Grass				
Austrostipa sp	**50**	Clumps and scattered	1 to 5	Build seed bank - support natural regeneration - wind driven
Poa poiformis	**50**	Clumps and scattered stands	0.5 to 5	
TOTAL	**320**			

Tennyson dunes reveg June 2014. (Pls note: "Semi-circle" of Melaleuca lanceolata (blue shaded area) in Melaleuca + Baumea Woodland. Also can be spread throughout zone according to planting scheme.)



Appendix 6: BushRAT assessments

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)[13]. The following is a simple overview of the contribution of different scoring components to the BushRAT overall score.

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 *vegetative biomass* of shrubs and groundcover plants < 2m high that is native is noted. This is then allocated a score from 0-10.
Bare Ground (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

[13] DEWNR (2012) NVBMU BushRAT assessment and scoring Manual. Unpublished document, Department for Environment, Water and Natural Resources, Waite.

	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.

Management Zone 1 – Foredune

Description of Vegetation Association: **Thinopyrum junceiforme, Spinifex hirsutus* Tussock Grassland

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

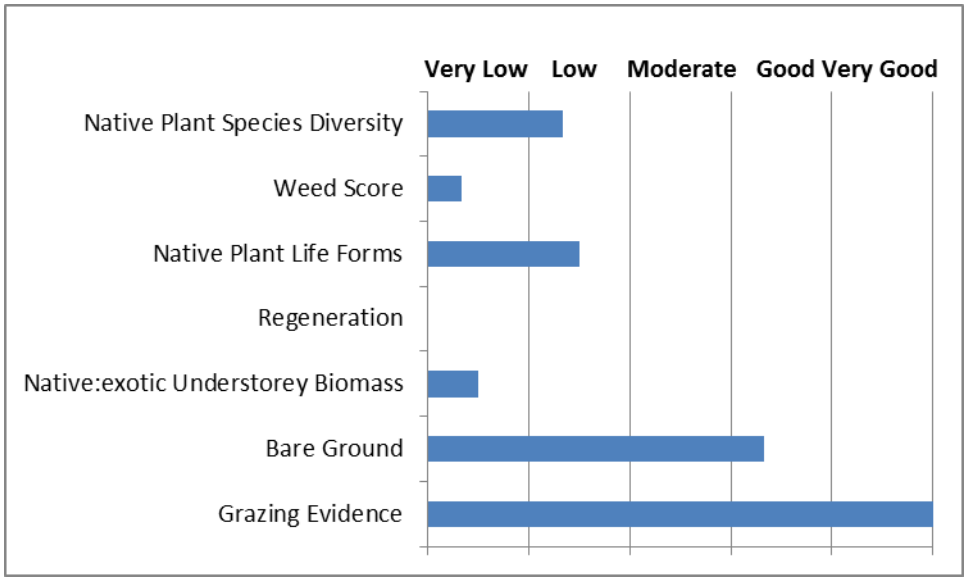
Nationally (EPBC) rated ecosystems present: Nil

State (provisional DEWNR) rated ecosystems present: Nil

National or State threatened flora species present: Nil

Site is considered habitat for following threatened fauna species: Nil

Scores for Individual BushRAT Components:



Site photograph – Management Zone 1

Native Plant Species List

Species Name	Common Name	Conservation Status			Comment
		AUS	SA	SL	
Atriplex cinerea	Grey Saltbush				
Spinifex hirsutus	Coast Spinifex				

Weed List

Species Name	Common Name	Cover	Comment
Cakile maritima ssp. maritima	Beach Rocket	1a	
Euphorbia paralias	Sea Spurge	2	
Thinopyrum junceiforme	Sea Wheat-grass	4	

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

BushRAT score sheets – Management Zone 1

NVBMU Biodiversity Rapid Assessment Summary Scoresheet

SITE: Management Zone 1 - Foredune	RECORDER: ST DATE: 5/9/14
DESCRIPTION: **Thinopyrum junceiforme, Spinifex hirsutus* Tussock Grassland	BCM CODE: SMLR Co 7.1 - Coastal Tussock Grasslands

VEGETATION CONDITION SCORE (max. in	score
Native Plant Species Diversity (15)	4
Weed Score (15)	1
Native Plant Life Forms (10)	3
Regeneration (8)	0
Native:exotic Understorey Biomass (10)	1
Bare Ground (3)	2
Tree Health (5)	0
Tree Hollows (5)	0
Fallen timber (5)	0
Grazing Evidence (4)	4
TOTAL (ADD UP ALL POINTS)	15
If community is naturally treeless x TOTAL by 1.23	18.45
If community is not benchmarked for regen x 1.11	20.5
ADJUSTED TOTAL SCORE	20.5

CONSERVATION SIGNIFICANCE SCORE:	score
2 pts for each State-R, 4 pts for each State-V,	
6 pts for each State-E or Nationally-V, 8 pts for	
each Nationally-E ecosystem/ecological	0
2 pts for each State-R, 4 pts for each State-V,	
6 pts for each State-E or Nationally-V, 8 pts for	
each Nationally-E plant species present[2].	0
1 pt for each State-R, 2 pts for each State-V,	
3 pts for each State-E or Nationally-V, 4 pts	
for each Nationally-E fauna species for which	
suitable habitat is present. Double points for a	
sighting. [3]	0
% native vegetation remaining in IBRA Assoc.	
0-2% = 5 pts; >2-5% = 4 pts; >5-10% = 3 pts;	
>10-20%= 2 pts; >20-50%= 1 pt; >50% = 0 pts	5
1 pt if Site contains a riparian zone,	
2 pts if contains swamp/wetland (+/- riparian zone)	0
CONSERVATION SIGNIFICANCE SCORE	**5**

LANDSCAPE CONTEXT SCORE	score
2 pts if site is the only substantial	
connection between 2 or more remnants[1]	
>20 ha, 1 pt if site is degraded	
(scattered trees in part, fragmented etc)	1
Site Shape Score	
3 pts if Cleared perimeter:Area (km/km^2)<6,	
2 pts if P:A 6 to<12, 1pt if P:A 12 to <18	0
Size of remnant[1] patch (incl. native	
veg on adjacent properties) score	
Patch size less than 2 ha 0 pts	
Patch size 2-5 ha 1 pt	
Patch size 5-10 ha 2 pts	
Patch size 10-20 ha 3 pts	
Patch size 20-100 ha 4 pts	
Patch size 100-500 ha 5 pts	
Patch size >500 ha 6 pts	4
Distance to remnant area of more than	
50 hectares score	
>3km 0 pts	
1-3km 1 pt	
<1km 2 pts	
contiguous 3 pts	0
LANDSCAPE CONTEXT SCORE	**5**

Sum **adjusted Vegetation Condition, Conservation significance** and **Landscape Context Scores** for the

UNIT BIODIVERSITY SCORE 30.5

Total Biodiversity Score (UBS x size 39.65

Cleared perimeter(m)	Size(ha)	P:A Ratio
1200	1.3	92.31
Total no. native species	**Adjust for Spring**[4]	**Environmental Association**
2		Reedbeds

Weed species (Top 5 Cover x Invasiveness, annuals in bold)	Cover (max. 6)	Invasive Threat Category (max. 5)	C x I
Thinopyrum junceiforme	4	4	16
Euphorbia paralias	2	3	6
Cakile maritima	1	2	2
			0
			0
		Total Cover x Threat Invasion	24

Management Zone 2 – Interdune Swale

Description of Vegetation Association: *Olearia axillaris, Rhagodia candolleana* ssp. *candolleana* Open shrubland

Benchmark Vegetation Community Type: SMLR Co 7.2 - Coastal Shrublands & Tall Shrublands

Nationally (EPBC) rated ecosystems present: Nil

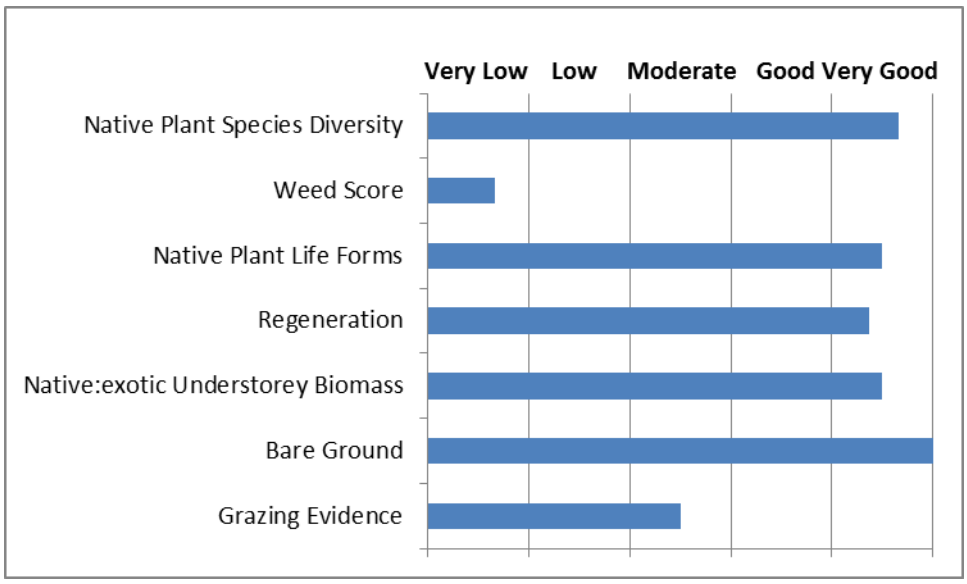
State (provisional DEWNR) rated ecosystems present: Nil

National or State threatened flora species present: *Picris sqarrosa* (Hawkweed Picris) – Rare in SA

Site is considered habitat for following threatened fauna species:

COMMON NAME	SCIENTIFIC NAME	EPBC	NP2008	SMLR
Painted Dragon	*Ctenophorus pictus*			U
Eastern Bearded Dragon	*Pogona barbata*			V
Grey Falcon	*Falco hypoleucos*		**R**	
Rock Parrot	*Neophema petrophila*		**R**	

Scores for Individual BushRAT Components:



Site photograph – Management Zone 2

Native Plant Species List

Species Name	Common Name	Conservation Status			Comment
		AUS	SA	SL	
Acacia ligulata	Dune Wattle				
Acacia longifolia ssp. sophorae	False Boobialla				
Adriana quadripartita	Coast Bitter-bush				
Alyxia buxifolia	Dysentery Bush				
Atriplex cinerea	Grey Saltbush				
Carpobrotus rossii	Karkalla				
Crassula closiana	Red Crassula				
Daucus glochidiatus	Australian Carrot				
Dianella brevicaulis	Coast Flax-lily				
Dodonaea viscosa ssp. spatulata	Spoon-leaf Hop-bush				
Enchylaena tomentosa var. tomentose	Barrier Saltbush				
Ficinia nodosa	Knobby Club-sedge				
Helichrysum leucopsidium	Satin Everlasting				
Kunzea pomifera	Pink Buttons				
Lepidosperma gladiatum	Sword Rush				
Leucopogon parviflorus	Coast Beard-heath				
Lotus australis	Australian Trefoil				

Species Name	Common Name	Conservation Status			Comment
		AUS	SA	SL	
Muehlenbeckia gunnii	Native Sarsparilla				
Myoporum insulare	Native Juniper				
Olearia axillaris	Coast Daisy-bush				
Pelargonium australe	Aust. Pelargonium				
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower				
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush				
Scaevola crassifolia	Cushion Fanflower				
Senecio pinnatifolius var. pinnatifolius					
Spinifex hirsutus	Coast Spinifex				
Tetragonia implexicoma	Bower Spinach				
Threlkeldia diffusa	Coast Bonefruit				

Weed List

Species Name	Common Name	Cover	Comment
Asparagus asparagoides f. asparagoides	Bridal Creeper	1a	
Asphodelus fistulosus	Onion Weed	1	
Avena barbata	Bearded Oat	1	
Brassica tournefortii	Mediterranean Turnip	1a	
Cakile maritima ssp. maritima	Beach Rocket	1	
Cynodon dactylon var. dactylon	Couch	1a	Mainly on track edges
Ehrharta calycina	Perennial Veldt Grass	2	
Euphorbia terracina	False Caper	1a	
Galenia pubescens var. pubescens	Coastal Galenia	1a	
Lagurus ovatus	Hare's Tail Grass	1a	
Medicago polymorpha var. polymorpha	Toothed Medic	2	Mainly on track edges
Osteospermum fruticosum	Seascape Daisy	1a	
Oxalis pes-caprae	Soursob	3	
Reichardia tingitana	Reichardia	1a	
Rhamnus alaternus	Buckthorn	1	

BushRAT score sheet – Management Zone 2 North

NVBMU Biodiversity Rapid Assessment Summary Scoresheet

SITE: Management Zone 2 North - Interdune Swale	**RECORDER: ST DATE: 2/9/14**
DESCRIPTION: *Olearia axillaris, Rhagodia candolleana* ssp. *candolleana* Open shrubland	**BCM CODE: SMLR Co 7.2 - Coastal Shrublands & Tall Shrublands**

VEGETATION CONDITION SCORE (max. in	score
Native Plant Species Diversity (15)	14
Weed Score (15)	2
Native Plant Life Forms (10)	9
Regeneration (8)	7
Native:exotic Understorey Biomass (10)	9
Bare Ground (3)	3
Tree Health (5)	0
Tree Hollows (5)	0
Fallen timber (5)	0
Grazing Evidence (4)	2
TOTAL (ADD UP ALL POINTS)	46
If community is naturally treeless x TOTAL by 1.23	55.35
If community is not benchmarked for regen x 1.11	
ADJUSTED TOTAL SCORE	55.35

CONSERVATION SIGNIFICANCE SCORE:	score
2 pts for each State-R, 4 pts for each State-V, 6 pts for each State-E or Nationally-V, 8 pts for each Nationally-E ecosystem/ecological	0
2 pts for each State-R, 4 pts for each State-V, 6 pts for each State-E or Nationally-V, 8 pts for each Nationally-E plant species present[2].	2
1 pt for each State-R, 2 pts for each State-V, 3 pts for each State-E or Nationally-V, 4 pts for each Nationally-E fauna species for which suitable habitat is present. Double points for a sighting. [3]	2
% native vegetation remaining in IBRA Assoc. 0-2% = 5 pts; >2-5% = 4 pts; >5-10% = 3 pts; >10-20%= 2 pts; >20-50%= 1 pt; >50% = 0 pts	5
1 pt if Site contains a riparian zone, 2 pts if contains swamp/wetland (+/- riparian zone)	0
CONSERVATION SIGNIFICANCE SCORE	**9**

LANDSCAPE CONTEXT SCORE	score
2 pts if site is the only substantial **connection** between 2 or more remnants[1] >20 ha, 1 pt if site is degraded (scattered trees in part, fragmented etc)	2
Site Shape Score 3 pts if Cleared perimeter:Area (km/km^2)<6, 2 pts if P:A 6 to<12, 1pt if P:A 12 to <18	3
Size of remnant[1] patch (incl. native veg on adjacent properties) score	
Patch size less than 2 ha 0 pts	
Patch size 2-5 ha 1 pt	
Patch size 5-10 ha 2 pts	
Patch size 10-20 ha 3 pts	
Patch size 20-100 ha 4 pts	
Patch size 100-500 ha 5 pts	
Patch size >500 ha 6 pts	4
Distance to remnant area of more than 50 hectares score	
>3km 0 pts	
1-3km 1 pt	
<1km 2 pts	
contiguous 3 pts	0
LANDSCAPE CONTEXT SCORE	**9**

Sum **adjusted Vegetation Condition, Conservation significance** and **Landscape Context Scores** for the

UNIT BIODIVERSITY SCORE 73.35

Total Biodiversity Score (UBS x size 220.1

Cleared perimeter(m)	Size(ha)	P:A Ratio
0	3	0.00
Total no. native species	**Adjust for Spring[4]**	**Environmental Association**
27		Reedbeds

Weed species (Top 5 Cover x Invasiveness, annuals in bold)	**Cover** (max. 6)	**Invasive Threat Category** (max. 5)	**C x I**
Ehrharta calycina	3	4	12
Oxalis pes caprae	3	4	12
Asparagus asparagoides	1	5	5
Medicago polymorpha	2	2	4
Cakile maritima	1	2	2
		Total Cover x Threat Invasion	35

BushRAT score sheet – Management Zone 2 South

NVBMU Biodiversity Rapid Assessment Summary Scoresheet

SITE: Management Zone 2 South- Interdune Swale	**RECORDER: ST DATE: 2/9/14**
DESCRIPTION: *Olearia axillaris, Rhagodia candolleana* ssp. *candolleana* Open shrubland	**BCM CODE: SMLR Co 7.2 - Coastal Shrublands & Tall Shrublands**

VEGETATION CONDITION SCORE (max. in	**score**
Native Plant Species Diversity (15)	14
Weed Score (15)	3
Native Plant Life Forms (10)	9
Regeneration (8)	7
Native:exotic Understorey Biomass (10)	9
Bare Ground (3)	3
Tree Health (5)	0
Tree Hollows (5)	0
Fallen timber (5)	0
Grazing Evidence (4)	2
TOTAL (ADD UP ALL POINTS)	47
If community is naturally treeless x TOTAL by 1.23	57.8
If community is not benchmarked for regen x 1.11	
ADJUSTED TOTAL SCORE	57.8

CONSERVATION SIGNIFICANCE SCORE:	**score**
2 pts for each State-R, 4 pts for each State-V,	
6 pts for each State-E or Nationally-V, 8 pts for	
each Nationally-E ecosystem/ecological	0
2 pts for each State-R, 4 pts for each State-V,	
6 pts for each State-E or Nationally-V, 8 pts for	
each Nationally-E plant species present[2].	2
1 pt for each State-R, 2 pts for each State-V,	
3 pts for each State-E or Nationally-V, 4 pts	
for each Nationally-E fauna species for which	
suitable habitat is present. Double points for a	
sighting. [3]	2
% native vegetation remaining in IBRA Assoc.	
0-2% = 5 pts; >2-5% = 4 pts; >5-10% = 3 pts;	
>10-20%= 2 pts; >20-50%= 1 pt; >50% = 0 pts	5
1 pt if Site contains a riparian zone,	
2 pts if contains swamp/wetland (+/- riparian zone)	0
CONSERVATION SIGNIFICANCE SCORE	**9**

LANDSCAPE CONTEXT SCORE	**score**
2 pts if site is the only substantial	
connection between 2 or more remnants[1]	
>20 ha, 1 pt if site is degraded	
(scattered trees in part, fragmented etc)	2
Site Shape Score	
3 pts if Cleared perimeter:Area (km/km^2)<6,	
2 pts if P:A 6 to<12, 1pt if P:A 12 to <18	3
Size of remnant[1] patch (incl. native	
veg on adjacent properties) score	
Patch size less than 2 ha 0 pts	
Patch size 2-5 ha 1 pt	
Patch size 5-10 ha 2 pts	
Patch size 10-20 ha 3 pts	
Patch size 20-100 ha 4 pts	
Patch size 100-500 ha 5 pts	
Patch size >500 ha 6 pts	4
Distance to remnant area of more than	
50 hectares score	
>3km 0 pts	
1-3km 1 pt	
<1km 2 pts	
contiguous 3 pts	0
LANDSCAPE CONTEXT SCORE	**9**

Sum **adjusted Vegetation Condition, Conservation significance** and **Landscape Context Scores** for the

UNIT BIODIVERSITY SCORE 75.8

Total Biodiversity Score (UBS x siz 227.4

Cleared perimeter(m)	**Size(ha)**	**P:A Ratio**	
0	3	0.00	
Total no. native species	**Adjust for Spring**[4]	**Environmental Association**	
27		Reedbeds	
Weed species (Top 5 Cover x Invasiveness, annuals in bold)	**Cover** (max. 6)	**Invasive Threat Category** (max. 5)	**C x I**
Ehrharta calycina	2	4	8
Oxalis pes caprae	3	4	12
Asparagus asparagoides	1	5	5
Medicago polymorpha	2	2	4
Cakile maritima	1	2	2
		Total Cover x Threat Invasion	31

Management Zone 3 (north) – Hind Dune Seaward Face

Description of Vegetation Association: *Olearia axillaris* Open shrubland

Benchmark Vegetation Community Type: SMLR Co 7.2 - Coastal Shrublands & Tall Shrublands

Nationally (EPBC) rated ecosystems present: Nil

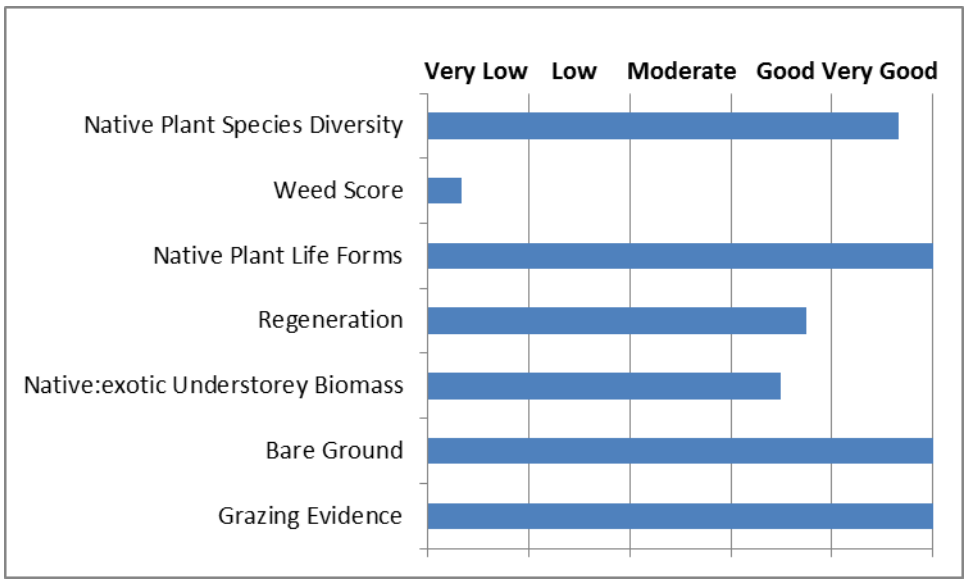
State (provisional DEWNR) rated ecosystems present: Nil

National or State threatened flora species present: Nil

Site is considered habitat for following threatened fauna species:

COMMON NAME	SCIENTIFIC NAME	EPBC	NP2008	SMLR
Painted Dragon	*Ctenophorus pictus*			U
Eastern Bearded Dragon	*Pogona barbata*			V
Grey Falcon	*Falco hypoleucos*		**R**	
Rock Parrot	*Neophema petrophila*		**R**	

Scores for Individual BushRAT Components:



Site photograph – Management Zone 3 (north)

Native Plant Species List

Species Name	Common Name	Conservation Status		
		AUS	SA	SL
Acacia ligulata	Dune Wattle			K
Acacia longifolia ssp. sophorae	False Boobialla			
Allocasuarina verticillata	Drooping Sheoak			
Alyxia buxifolia	Dysentery Bush			R
Carpobrotus rossii	Karkalla			
Clematis microphylla	Old Man's Beard			
Crassula closiana	Red Crassula			
Daucus glochidiatus	Australian Carrot			
Dianella brevicaulis	Coast Flax-lily			
Enchylaena tomentosa var. tomentosa	Barrier Saltbush			
Ficinia nodosa	Knobby Club-sedge			
Kunzea pomifera	Pink Buttons			U
Lepidosperma gladiatum	Sword Rush			U
Leucophyta brownii	Cushion Bush			
Leucopogon parviflorus	Coast Beard-heath			
Muehlenbeckia gunnii	Native Sarsparilla			
Myoporum insulare	Native Juniper			

Species Name	Common Name	Conservation Status		
		AUS	SA	SL
Nitraria billardierei	Dillon Bush			
Olearia axillaris	Coast Daisy-bush			
Pelargonium australe	Aust. Pelargonium			U
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower			
Poa poiformis var. poiformis	Blue Tussock-grass			
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush			
Scaevola crassifolia	Cushion Fanflower			R
Senecio pinnatifolius var. pinnatifolius				
Spinifex hirsutus	Coast Spinifex			
Tetragonia implexicoma	Bower Spinach			
Threlkeldia diffusa	Coast Bonefruit			

Weed List

Species Name	Common Name	Cover	Comment
Asparagus asparagoides f. asparagoides	Bridal Creeper	1a	
Avena barbata	Bearded Oat	1a	
Brassica tournefortii	Mediterranean Turnip	1a	
Cakile maritima ssp. maritima	Beach Rocket	1	
Ehrharta calycina	Perennial Veldt Grass	4	
Gazania sp.		1	At very northern end
Medicago polymorpha var. polymorpha	Toothed Medic	1	On track edges
Oxalis pes-caprae	Soursob	1a	
Reichardia tingitana	Reichardia	1a	
Thinopyrum junceiforme	Sea Wheat-grass	2	

BushRAT score sheet – Management Zone 3 North

NVBMU Biodiversity Rapid Assessment Summary Scoresheet

SITE: Management Zone 3N - Hind Dune Seaward Face	RECORDER: ST TM DATE: 7/8/14
DESCRIPTION: *Olearia axillaris* Open shrubland	BCM CODE: SMLR Co 7.2 - Coastal Shrublands & Tall Shrublands

VEGETATION CONDITION SCORE (max. in	score
Native Plant Species Diversity (15)	14
Weed Score (15)	1
Native Plant Life Forms (10)	10
Regeneration (8)	6
Native:exotic Understorey Biomass (10)	7
Bare Ground (3)	3
Tree Health (5)	0
Tree Hollows (5)	0
Fallen timber (5)	0
Grazing Evidence (4)	4
TOTAL (ADD UP ALL POINTS)	45
If community is naturally treeless x TOTAL by 1.23	55.35
If community is not benchmarked for regen x 1.11	
ADJUSTED TOTAL SCORE	55.35

CONSERVATION SIGNIFICANCE SCORE:	score
2 pts for each State-R, 4 pts for each State-V,	
6 pts for each State-E or Nationally-V, 8 pts for	
each Nationally-E ecosystem/ecological	0
2 pts for each State-R, 4 pts for each State-V,	
6 pts for each State-E or Nationally-V, 8 pts for	
each Nationally-E plant species present[2].	0
1 pt for each State-R, 2 pts for each State-V,	
3 pts for each State-E or Nationally-V, 4 pts	
for each Nationally-E fauna species for which	
suitable habitat is present. Double points for a	
sighting. [3]	2
% native vegetation remaining in IBRA Assoc.	
0-2% = 5 pts; >2-5% = 4 pts; >5-10% = 3 pts;	
>10-20%= 2 pts; >20-50%= 1 pt; >50% = 0 pts	5
1 pt if Site contains a riparian zone,	
2 pts if contains swamp/wetland (+/- riparian zone)	0
CONSERVATION SIGNIFICANCE SCORE	**7**

LANDSCAPE CONTEXT SCORE	score
2 pts if site is the only substantial	
connection between 2 or more remnants[1]	
>20 ha, 1 pt if site is degraded	
(scattered trees in part, fragmented etc)	2
Site Shape Score	
3 pts if Cleared perimeter:Area (km/km^2)<6,	
2 pts if P:A 6 to<12, 1pt if P:A 12 to <18	3
Size of remnant[1] patch (incl. native	
veg on adjacent properties) score	
Patch size less than 2 ha 0 pts	
Patch size 2-5 ha 1 pt	
Patch size 5-10 ha 2 pts	
Patch size 10-20 ha 3 pts	
Patch size 20-100 ha 4 pts	
Patch size 100-500 ha 5 pts	
Patch size >500 ha 6 pts	4
Distance to remnant area of more than	
50 hectares score	
>3km 0 pts	
1-3km 1 pt	
<1km 2 pts	
contiguous 3 pts	55.35
LANDSCAPE CONTEXT SCORE	**64.35**

Sum **adjusted Vegetation Condition, Conservation significance** and **Landscape Context Scores** for the

UNIT BIODIVERSITY SCORE 126.7

Total Biodiversity Score (UBS x size 164.7

Cleared perimeter(m)	Size(ha)	P:A Ratio
1200	1.3	92.31
Total no. native species	**Adjust for Spring**	**Environmental Association**
27		St Vincent

Weed species (Top 5 Cover x Invasiveness, annuals in bold)	Cover (max. 6)	Invasive Threat Category (max. 5)	C x I
Ehrharta calycina	4	4	16
Thinopyrum junceiforme	2	4	8
Asparagus asparagoides	1	5	5
Gazania sp.	1	3	3
Oxalis pes caprae	1	4	4
		Total Cover x Threat Invasion	36

Management Zone 3 (south) – Hind Dune Seaward Face

Description of Vegetation Association: *Olearia axillaris* Open shrubland

Benchmark Vegetation Community Type: SMLR Co 7.2 - Coastal Shrublands & Tall Shrublands

Nationally (EPBC) rated ecosystems present: Nil

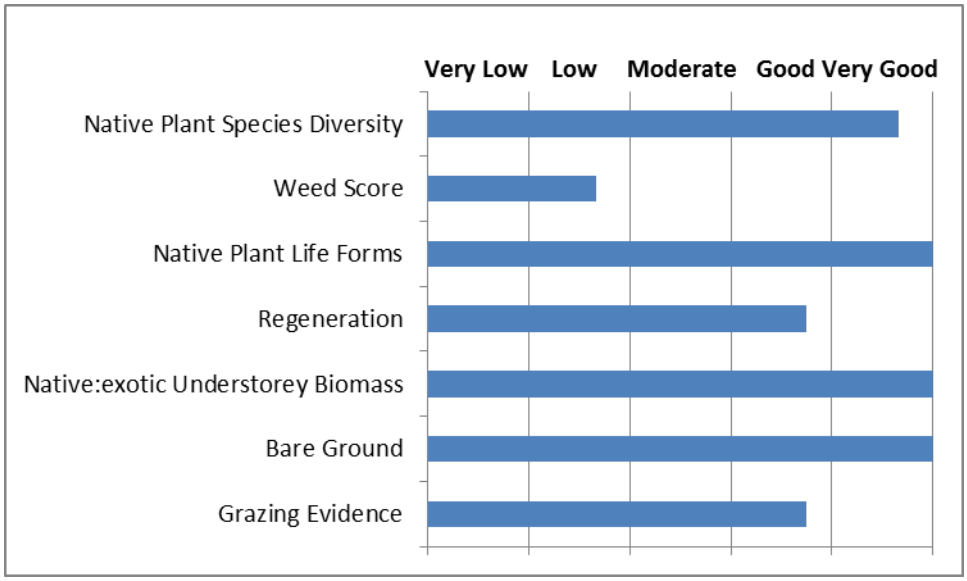
State (provisional DEWNR) rated ecosystems present: Nil

National or State threatened flora species present: Nil

Site is considered habitat for following threatened fauna species:

COMMON NAME	SCIENTIFIC NAME	EPBC	NP2008	SMLR
Painted Dragon	*Ctenophorus pictus*			U
Eastern Bearded Dragon	*Pogona barbata*			V
Grey Falcon	*Falco hypoleucos*		**R**	
Rock Parrot	*Neophema petrophila*		**R**	

Scores for Individual BushRAT Components:



Site photograph – Management Zone 3 (south)

Native Plant Species List

Species Name	Common Name	Conservation Status		
		AUS	SA	SL
Acacia ligulata	Dune Wattle			K
Acacia longifolia ssp. sophorae	False Boobialla			
Allocasuarina verticillata	Drooping Sheoak			
Alyxia buxifolia	Dysentery Bush			R
Carpobrotus rossii	Karkalla			
Crassula closiana	Red Crassula			
Daucus glochidiatus	Australian Carrot			
Dianella brevicaulis	Coast Flax-lily			
Enchylaena tomentosa var. tomentose	Barrier Saltbush			
Ficinia nodosa	Knobby Club-sedge			
Kunzea pomifera	Pink Buttons			U
Lepidosperma gladiatum	Sword Rush			U
Leucophyta brownii	Cushion Bush			
Leucopogon parviflorus	Coast Beard-heath			
Muehlenbeckia gunnii	Native Sarsparilla			
Myoporum insulare	Native Juniper			
Nitraria billardierei	Dillon Bush			

Species Name	Common Name	Conservation Status		
		AUS	SA	SL
Olearia axillaris	Coast Daisy-bush			
Pelargonium australe	Aust. Pelargonium			U
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower			
Poa poiformis var. poiformis	Blue Tussock-grass			
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush			
Scaevola crassifolia	Cushion Fanflower			R
Senecio pinnatifolius var. pinnatifolius				
Spinifex hirsutus	Coast Spinifex			
Tetragonia implexicoma	Bower Spinach			
Threlkeldia diffusa	Coast Bonefruit			

Weed List

Species Name	Common Name	Cover	Comment
Arctotheca calendula	Cape Dandelion	1	
Asparagus asparagoides f. asparagoides	Bridal Creeper	1	
Cakile maritima ssp. maritima	Beach Rocket	1	
Ehrharta calycina	Perennial Veldt Grass	1	
Euphorbia terracina	False Caper	1a	
Oenothera stricta ssp. stricta	Sweet-scented Evening Primrose	1	
Oxalis pes-caprae	Soursob	2	
Thinopyrum junceiforme	Sea Wheat-grass	1	

BushRAT score sheet Management Zone 3 (south)

NVBMU Biodiversity Rapid Assessment Summary Scoresheet

SITE: Management Zone 3 South - Hind Dune Seaward Face	**RECORDER: ST TM DATE: 7/8/14**
DESCRIPTION: *Olearia axillaris* Open shrubland	**BCM CODE: SMLR Co 7.2 - Coastal Shrublands & Tall Shrublands**

VEGETATION CONDITION SCORE (max. in	**score**
Native Plant Species Diversity (15)	14
Weed Score (15)	5
Native Plant Life Forms (10)	10
Regeneration (8)	6
Native:exotic Understorey Biomass (10)	10
Bare Ground (3)	3
Tree Health (5)	0
Tree Hollows (5)	0
Fallen timber (5)	0
Grazing Evidence (4)	3
TOTAL (ADD UP ALL POINTS)	51
If community is naturally treeless x TOTAL by 1.23	60.27
If community is not benchmarked for regen x 1.11	
ADJUSTED TOTAL SCORE	60.27

CONSERVATION SIGNIFICANCE SCORE:	**score**
2 pts for each State-R, 4 pts for each State-V,	
6 pts for each State-E or Nationally-V, 8 pts for	
each Nationally-E ecosystem/ecological	0
2 pts for each State-R, 4 pts for each State-V,	
6 pts for each State-E or Nationally-V, 8 pts for	
each Nationally-E plant species present[2].	0
1 pt for each State-R, 2 pts for each State-V,	
3 pts for each State-E or Nationally-V, 4 pts	
for each Nationally-E fauna species for which	
suitable habitat is present. Double points for a	
sighting. [3]	2
% native vegetation remaining in IBRA Assoc.	
0-2% = 5 pts; >2-5% = 4 pts; >5-10% = 3 pts;	
>10-20%= 2 pts; >20-50%= 1 pt; >50% = 0 pts	5
1 pt if Site contains a riparian zone,	
2 pts if contains swamp/wetland (+/- riparian zone)	0
CONSERVATION SIGNIFICANCE SCORE	**7**

LANDSCAPE CONTEXT SCORE	**score**
2 pts if site is the only substantial	
connection between 2 or more remnants[1]	
>20 ha, 1 pt if site is degraded	
(scattered trees in part, fragmented etc)	2
Site Shape Score	
3 pts if Cleared perimeter:Area (km/km^2)<6,	
2 pts if P:A 6 to<12, 1pt if P:A 12 to <18	3
Size of remnant[1] patch (incl. native	
veg on adjacent properties) score	
Patch size less than 2 ha 0 pts	
Patch size 2-5 ha 1 pt	
Patch size 5-10 ha 2 pts	
Patch size 10-20 ha 3 pts	
Patch size 20-100 ha 4 pts	
Patch size 100-500 ha 5 pts	
Patch size >500 ha 6 pts	4
Distance to remnant area of more than	
50 hectares score	
>3km 0 pts	
1-3km 1 pt	
<1km 2 pts	
contiguous 3 pts	0
LANDSCAPE CONTEXT SCORE	**9**

Sum **adjusted Vegetation Condition, Conservation significance** and **Landscape Context Scores** for the

UNIT BIODIVERSITY SCORE	76.27
Total Biodiversity Score (UBS x size	228.8

Cleared perimeter(m)	**Size(ha)**	**P:A Ratio**	
5	3	0.17	
Total no. native species	**Adjust for Spring[4]**	**Environmental Association**	
27		Reedbeds	
Weed species (Top 5 Cover x Invasiveness, annuals in bold)	**Cover** (max. 6)	**Invasive Threat Category** (max. 5)	**C x I**
Oxalis pes caprae	2	4	8
Thinopyrum junceiforme	1	4	4
Ehrharta calycina	1	4	4
Asparagus asparagoides	1	5	5
Euphorbia terracina	1	3	3
		Total Cover x Threat Invasion	24

Management Zone 4 – Hind Dune Ridge

Description of Vegetation Association: *Leucopogon parviflorus, Olearia axillaris, Acacia longifolia* var. *sophorae* +/- *Myoporum insulare* Shrubland

Benchmark Vegetation Community Type: SMLR Co 7.2 - Coastal Shrublands & Tall Shrublands

Nationally (EPBC) rated ecosystems present: Nil

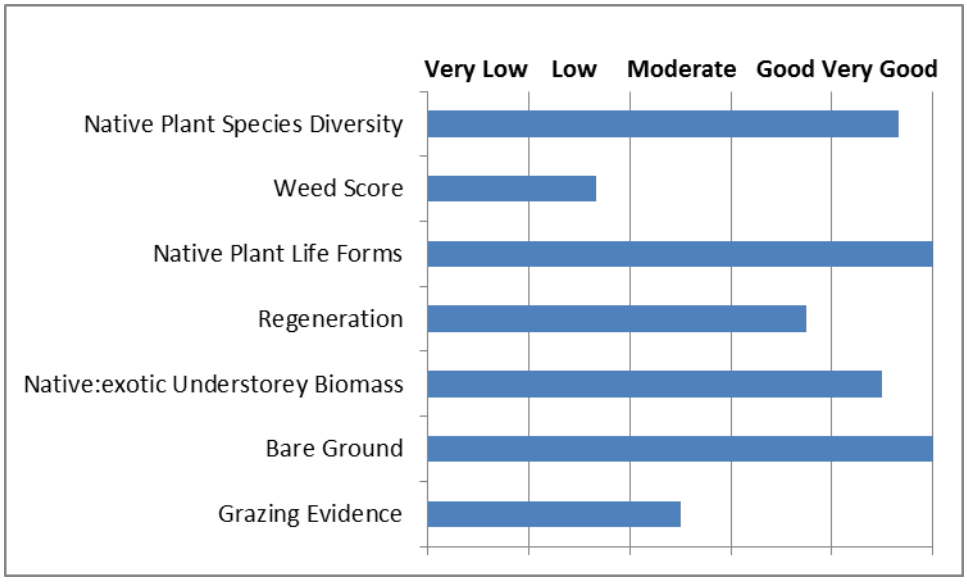
State (provisional DEWNR) rated ecosystems present: Nil

National or State threatened flora species present: Nil

Site is considered habitat for following threatened fauna species:

COMMON NAME	SCIENTIFIC NAME	EPBC	NP2008	SMLR
Painted Dragon	*Ctenophorus pictus*			U
Eastern Bearded Dragon	*Pogona barbata*			V
Grey Falcon	*Falco hypoleucos*		**R**	
Rock Parrot	*Neophema petrophila*		**R**	

Scores for Individual BushRAT Components



Site photograph – Management Zone 4

Native Plant Species List

Species Name	Common Name	Conservation Status		
		AUS	SA	SL
Acacia ligulata	Dune Wattle			K
Acacia longifolia ssp. sophorae	False Boobialla			
Adriana quadripartita	Coast Bitter-bush			U
Alyxia buxifolia	Dysentery Bush			R
Austrostipa flavescens	Spear Grass			
Baumea juncea	Blue Twig-rush			
Callitris gracilis	Southern Cypress-pine			U
Carpobrotus rossii	Karkalla			
Dianella brevicaulis	Coast Flax-lily			
Ficinia nodosa	Knobby Club-sedge			
Kunzea pomifera	Pink Buttons			U
Lepidosperma gladiatum	Sword Rush			U
Leucophyta brownii	Cushion Bush			
Leucopogon parviflorus	Coast Beard-heath			
Lomandra leucocephala ssp. robusta	Woolly-head Mat-rush			
Lotus australis	Australian Trefoil			U

Melaleuca lanceolata	Dryland Tea-tree			U
Muehlenbeckia gunnii	Native Sarsparilla			
Myoporum insulare	Native Juniper			
Olearia axillaris	Coast Daisy-bush			
Pelargonium australe	Australian Pelargonium			U
Poa poiformis var. poiformis	Blue Tussock-grass			
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush			
Rytidosperma sp.				
Scaevola crassifolia	Cushion Fanflower			R
Senecio pinnatifolius var. pinnatifolius				
Spinifex hirsutus	Coast Spinifex			
Tetragonia implexicoma	Bower Spinach			
Threlkeldia diffusa	Coast Bonefruit			

Weed List

Species Name	Common Name	Cover	Comment
Asparagus asparagoides f. asparagoides	Bridal Creeper	1a	
Cakile maritima ssp. maritima	Beach Rocket	1	
Ehrharta calycina	Perennial Veldt Grass	1a	
Euphorbia terracina	False Caper	1a	
Galenia pubescens var. pubescens	Coastal Galenia	1	
Mesembryanthemum crystallinum	Iceplant	1	
Oxalis pes-caprae	Soursob	2	

Bushrat Scoresheet – Management Zone 4

NVBMU Biodiversity Rapid Assessment Summary Scoresheet

SITE: Management Zone 4 - Hind Dune Ridge	**RECORDER: ST TM DATE: 7/8/14**
DESCRIPTION: *Leucopogon parviflorus, Olearia axillaris, Acacia longifolia* var. *sophorae* +/- *Myoporum insulare* Shrubland	**BCM CODE: SMLR Co 7.2 - Coastal Shrublands & Tall Shrublands**

VEGETATION CONDITION SCORE (max. in	**score**
Native Plant Species Diversity (15)	14
Weed Score (15)	5
Native Plant Life Forms (10)	10
Regeneration (8)	6
Native:exotic Understorey Biomass (10)	9
Bare Ground (3)	3
Tree Health (5)	0
Tree Hollows (5)	0
Fallen timber (5)	0
Grazing Evidence (4)	2
TOTAL (ADD UP ALL POINTS)	49
If community is naturally treeless x TOTAL by 1.23	60.27
If community is not benchmarked for regen x 1.11	
ADJUSTED TOTAL SCORE	60.27

CONSERVATION SIGNIFICANCE SCORE:	**score**
2 pts for each State-R, 4 pts for each State-V,	
6 pts for each State-E or Nationally-V, 8 pts for	
each Nationally-E ecosystem/ecological	0
2 pts for each State-R, 4 pts for each State-V,	
6 pts for each State-E or Nationally-V, 8 pts for	
each Nationally-E plant species present[2].	0
1 pt for each State-R, 2 pts for each State-V,	
3 pts for each State-E or Nationally-V, 4 pts	
for each Nationally-E fauna species for which	
suitable habitat is present. Double points for a	
sighting. [3]	2
% native vegetation remaining in IBRA Assoc.	
0-2% = 5 pts; >2-5% = 4 pts; >5-10% = 3 pts;	
>10-20%= 2 pts; >20-50%= 1 pt; >50% = 0 pts	5
1 pt if Site contains a riparian zone,	
2 pts if contains swamp/wetland (+/- riparian zone)	0
CONSERVATION SIGNIFICANCE SCORE	**7**

LANDSCAPE CONTEXT SCORE	**score**
2 pts if site is the only substantial	
connection between 2 or more remnants[1]	
>20 ha, 1 pt if site is degraded	
(scattered trees in part, fragmented etc)	2
Site Shape Score	
3 pts if Cleared perimeter:Area (km/km^2)<6,	
2 pts if P:A 6 to<12, 1pt if P:A 12 to <18	3
Size of remnant[1] patch (incl. native	
veg on adjacent properties) score	
Patch size less than 2 ha 0 pts	
Patch size 2-5 ha 1 pt	
Patch size 5-10 ha 2 pts	
Patch size 10-20 ha 3 pts	
Patch size 20-100 ha 4 pts	
Patch size 100-500 ha 5 pts	
Patch size >500 ha 6 pts	4
Distance to remnant area of more than	
50 hectares score	
>3km 0 pts	
1-3km 1 pt	
<1km 2 pts	
contiguous 3 pts	0
LANDSCAPE CONTEXT SCORE	**9**

Sum **adjusted Vegetation Condition, Conservation significance** and **Landscape Context Scores** for the

UNIT BIODIVERSITY SCORE 76.27

Total Biodiversity Score (UBS x size 93.81

Cleared perimeter(m)	**Size(ha)**	**P:A Ratio**	
20	1.23	1.63	
Total no. native species	**Adjust for Spring[4]**	**Environmental Association**	
29		Reedbeds	
Weed species (Top 5 Cover x Invasiveness, annuals in bold)	**Cover** (max. 6)	**Invasive Threat Category** (max. 5)	**C x I**
Ehrharta calycina	1	4	4
Asparagus asparagoides	1	5	5
Oxalis pes caprae	2	4	8
Mesembryanthemum crystallinum	1	2	2
Cakile maritima	1	3	3
		Total Cover x Threat Invasion	22

Management Zone 5a – Rehabilitation

Description of Vegetation Association: *Allocasuarina verticillata, Callitris gracilis* Very low Woodland

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

Nationally (EPBC) rated ecosystems present: Nil

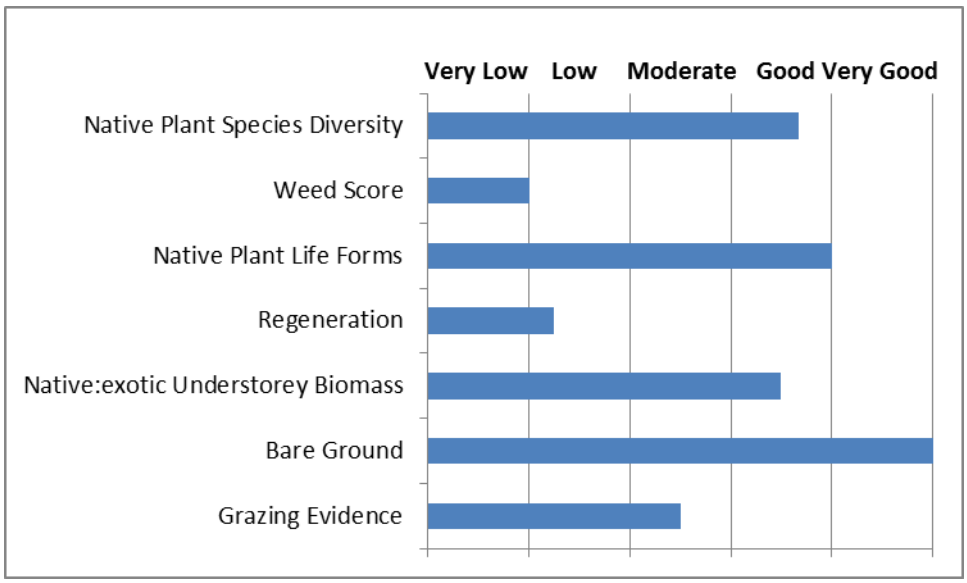
State (provisional DEWNR) rated ecosystems present: Nil

National or State threatened flora species present: Nil

Site is considered habitat for following threatened fauna species:

COMMON NAME	SCIENTIFIC NAME	EPBC	NP2008	SMLR
Painted Dragon	*Ctenophorus pictus*			U
Eastern Bearded Dragon	*Pogona barbata*			V
Grey Falcon	*Falco hypoleucos*		**R**	
Rock Parrot	*Neophema petrophila*		**R**	

Scores for Individual BushRAT Components



Site photograph – Management Zone 5a

Native Plant Species List

Species Name	Common Name	Conservation Status		
		AUS	SA	SL
Acacia ligulata	Dune Wattle			K
Acacia longifolia ssp. sophorae	False Boobialla			
Allocasuarina verticillata	Drooping Sheoak			
Atriplex cinerea	Grey Saltbush			
Baumea juncea	Blue Twig-rush			
Callitris gracilis	Native Pine			
Carpobrotus rossii	Karkalla			
Dianella brevicaulis	Coast Flax-lily			
Enchylaena tomentosa var. tomentosa	Barrier Saltbush			
Ficinia nodosa	Knobby Club-sedge			
Kunzea pomifera	Pink Buttons			U
Lomandra leucocephala ssp. robusta	Woolly-head Mat-rush			
Melaleuca lanceolata	Dryland Tea-tree			U
Muehlenbeckia gunnii	Native Sarsparilla			
Myoporum insulare	Native Juniper			
Olearia axillaris	Coast Daisy-bush			

Pelargonium australe	Australian Pelargonium			U
Poa poiformis var. poiformis	Blue Tussock-grass			
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush			
Scaevola crassifolia	Cushion Fanflower			R
Senecio pinnatifolius var. pinnatifolius				
Tetragonia implexicoma	Bower Spinach			
Threlkeldia diffusa	Coast Bonefruit			

Weed List

Species Name	Common Name	Cover	Comment
Asparagus asparagoides f. asparagoides	Bridal Creeper	1	
Avena barbata	Bearded Oat	1a	
Brassica tournefortii	Mediterranean Turnip	2	
Cynodon dactylon var. dactylon	Couch	1a	
Ehrharta calycina	Perennial Veldt Grass	2	
Euphorbia terracina	False Caper	2	
Galenia pubescens var. pubescens	Coastal Galenia	2	
Lagurus ovatus	Hare's Tail Grass	1	
Mesembryanthemum crystallinum	Iceplant	1	
Oxalis pes-caprae	Soursob	2	
Reichardia tingitana	Reichardia	1a	
Sonchus oleraceus	Milk Thistle	1a	
Tamarix aphylla	Tamarisk	1	
Vicia monantha ssp. monantha	One-flower Vetch	1	

BushRAT Scoresheet – Management Zone 5a

NVBMU Biodiversity Rapid Assessment Summary Scoresheet

SITE: Management Zone 5a - Rehabilitation	**RECORDER: ST DATE: 2/9/14**
DESCRIPTION: *Allocasuarina verticillata, Callitris gracilis* Very low Woodland	**BCM CODE: SMLR Co 7.31 - Non-eucalypt Coastal Low Woodlands**

VEGETATION CONDITION SCORE (max. in	score
Native Plant Species Diversity (15)	11
Weed Score (15)	3
Native Plant Life Forms (10)	8
Regeneration (8)	2
Native:exotic Understorey Biomass (10)	7
Bare Ground (3)	3
Tree Health (5)	5
Tree Hollows (5)	0
Fallen timber (5)	0
Grazing Evidence (4)	2
TOTAL (ADD UP ALL POINTS)	41
If community is naturally treeless x TOTAL by 1.23	
If community is not benchmarked for regen x 1.11	
ADJUSTED TOTAL SCORE	41

CONSERVATION SIGNIFICANCE SCORE:	score
2 pts for each State-R, 4 pts for each State-V,	
6 pts for each State-E or Nationally-V, 8 pts for	
each Nationally-E ecosystem/ecological	0
2 pts for each State-R, 4 pts for each State-V,	
6 pts for each State-E or Nationally-V, 8 pts for	
each Nationally-E plant species present[2].	0
1 pt for each State-R, 2 pts for each State-V,	
3 pts for each State-E or Nationally-V, 4 pts	
for each Nationally-E fauna species for which	
suitable habitat is present. Double points for a	
sighting. [3]	2
% native vegetation remaining in IBRA Assoc.	
0-2% = 5 pts; >2-5% = 4 pts; >5-10% = 3 pts;	
>10-20%= 2 pts; >20-50%= 1 pt; >50% = 0 pts	5
1 pt if Site contains a riparian zone,	
2 pts if contains swamp/wetland (+/- riparian zone)	0
CONSERVATION SIGNIFICANCE SCORE	**7**

LANDSCAPE CONTEXT SCORE	score
2 pts if site is the only substantial	
connection between 2 or more remnants[1]	
>20 ha, 1 pt if site is degraded	
(scattered trees in part, fragmented etc)	2
Site Shape Score	
3 pts if Cleared perimeter:Area (km/km^2)<6,	
2 pts if P:A 6 to<12, 1pt if P:A 12 to <18	0
Size of remnant[1] patch (incl. native	
veg on adjacent properties) score	
Patch size less than 2 ha 0 pts	
Patch size 2-5 ha 1 pt	
Patch size 5-10 ha 2 pts	
Patch size 10-20 ha 3 pts	
Patch size 20-100 ha 4 pts	
Patch size 100-500 ha 5 pts	
Patch size >500 ha 6 pts	4
Distance to remnant area of more than	
50 hectares score	
>3km 0 pts	
1-3km 1 pt	
<1km 2 pts	
contiguous 3 pts	0
LANDSCAPE CONTEXT SCORE	**6**

Sum **adjusted Vegetation Condition, Conservation significance** and **Landscape Context Scores** for the

UNIT BIODIVERSITY SCORE	54
Total Biodiversity Score (UBS x size	64.8

Cleared perimeter(m)	Size(ha)	P:A Ratio	
800	1.2	66.67	
Total no. native species	**Adjust for Spring[4]**	**Environmental Association**	
23		Reedbeds	
Weed species (Top 5 Cover x Invasiveness, annuals in bold)	**Cover** (max. 6)	**Invasive Threat Category** (max. 5)	**C x I**
Asparagus asparagoides	1	5	5
Ehrharta calycina	2	4	8
Euphorbia terracina	2	3	6
Oxalis pes caprae	2	4	8
Galenia pubescens	2	2	4
		Total Cover x Threat Invasion	31

Management Zone 5b – Rehabilitation

Description of Vegetation Association: *Olearia axillaris* Open shrubland with emergent *Allocasuarina verticilllata*

Benchmark Vegetation Community Type: SMLR Co 7.2 - Coastal Shrublands & Tall Shrublands

Nationally (EPBC) rated ecosystems present: Nil

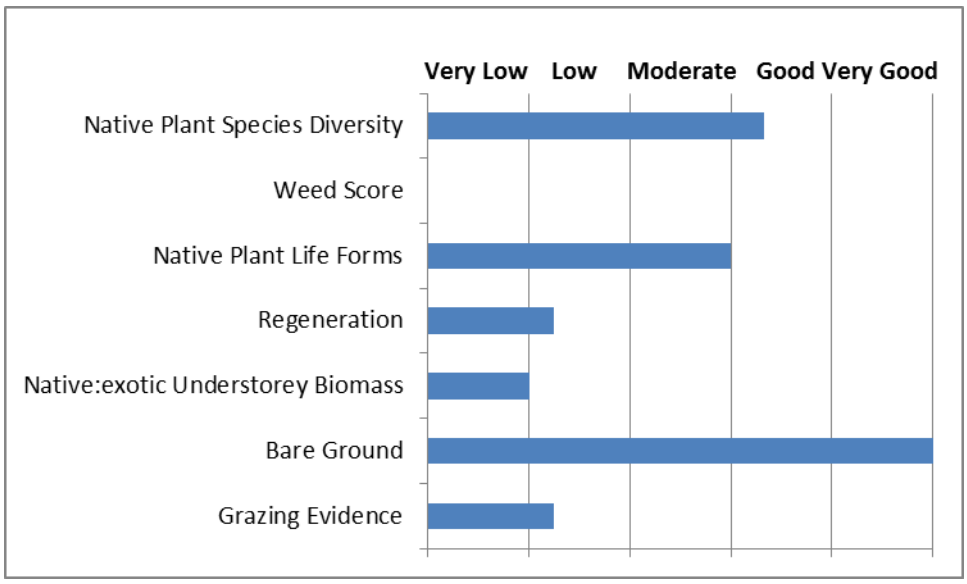
State (provisional DEWNR) rated ecosystems present: Nil

National or State threatened flora species present: Nil

Site is considered habitat for following threatened fauna species:

COMMON NAME	SCIENTIFIC NAME	EPBC	NP2008	SMLR
Painted Dragon	*Ctenophorus pictus*			U
Eastern Bearded Dragon	*Pogona barbata*			V
Grey Falcon	*Falco hypoleucos*		**R**	
Rock Parrot	*Neophema petrophila*		**R**	

Scores for Individual BushRAT Components



Site photograph – Management Zone 5b

Native Plant Species List

Species Name	Common Name	Conservation Status		
		AUS	SA	SL
Acacia longifolia ssp. sophorae	False Boobialla			
Allocasuarina verticillata	Drooping Sheoak			
Callitris gracilis	Southern Cypress-pine			U
Carpobrotus rossii	Karkalla			
Ficinia nodosa	Knobby Club-sedge			
Kunzea pomifera	Muntries			
Lepidosperma gladiatum	Sword Rush			U
Leucopogon parviflorus	Coast Beard-heath			
Muehlenbeckia gunnii	Native Sarsparilla			
Nitraria billardierei	Dillon Bush			
Olearia axillaris	Coast Daisy-bush			
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush			
Scaevola crassifolia	Cushion Fanflower			R
Senecio pinnatifolius var. pinnatifolius				
Spinifex hirsutus	Coast Spinifex			
Threlkeldia diffusa	Coast Bonefruit			

Weed List

Species Name	Common Name	Cover	Comment
Agapanthus praecox ssp. orientalis		1	
Agave sp.		1	
Asparagus asparagoides f. asparagoides	Bridal Creeper	1	
Avena barbata	Bearded Oat	1a	
Brassica tournefortii	Mediterranean Turnip	1a	
Ehrharta calycina	Perennial Veldt Grass	5	
Ehrharta longiflora	Annual Veldt Grass	1	
Euphorbia terracina	False Caper	1a	
Galenia pubescens var. pubescens	Coastal Galenia	1a	
Lagurus ovatus	Hare's Tail Grass	1a	
Oxalis pes-caprae	Soursob	3	
Reichardia tingitana	Reichardia	1a	
Sonchus oleraceus	Milk Thistle	1	
Stellaria media	Common Chickweed	1	

BushRAT Scoresheet – Management Zone 5b

NVBMU Biodiversity Rapid Assessment Summary Scoresheet

SITE: Management Zone 5b - Rehabilitation	**RECORDER: ST TM DATE: 7/8/14**
DESCRIPTION: *Olearia axillaris* Open shrubland with emergent *Allocasuarina verticilllata*	**BCM CODE: SMLR Co 7.2 - Coastal Shrublands & Tall Shrublands**

VEGETATION CONDITION SCORE (max. in	score
Native Plant Species Diversity (15)	10
Weed Score (15)	0
Native Plant Life Forms (10)	6
Regeneration (8)	2
Native:exotic Understorey Biomass (10)	2
Bare Ground (3)	3
Tree Health (5)	0
Tree Hollows (5)	0
Fallen timber (5)	0
Grazing Evidence (4)	1
TOTAL (ADD UP ALL POINTS)	24
If community is naturally treeless x TOTAL by 1.23	28.29
If community is not benchmarked for regen x 1.11	
ADJUSTED TOTAL SCORE	28.29

CONSERVATION SIGNIFICANCE SCORE:	score
2 pts for each State-R, 4 pts for each State-V,	
6 pts for each State-E or Nationally-V, 8 pts for	
each Nationally-E ecosystem/ecological	0
2 pts for each State-R, 4 pts for each State-V,	
6 pts for each State-E or Nationally-V, 8 pts for	
each Nationally-E plant species present[2].	0
1 pt for each State-R, 2 pts for each State-V,	
3 pts for each State-E or Nationally-V, 4 pts	
for each Nationally-E fauna species for which	
suitable habitat is present. Double points for a	
sighting. [3]	2
% native vegetation remaining in IBRA Assoc.	
0-2% = 5 pts; >2-5% = 4 pts; >5-10% = 3 pts;	
>10-20%= 2 pts; >20-50%= 1 pt; >50% = 0 pts	5
1 pt if Site contains a riparian zone,	
2 pts if contains swamp/wetland (+/- riparian zone)	0
CONSERVATION SIGNIFICANCE SCORE	**7**

LANDSCAPE CONTEXT SCORE	score
2 pts if site is the only substantial	
connection between 2 or more remnants[1]	
>20 ha, 1 pt if site is degraded	
(scattered trees in part, fragmented etc)	1
Site Shape Score	
3 pts if Cleared perimeter:Area (km/km^2)<6,	
2 pts if P:A 6 to<12, 1pt if P:A 12 to <18	0
Size of remnant[1] patch (incl. native	
veg on adjacent properties) score	
Patch size less than 2 ha 0 pts	
Patch size 2-5 ha 1 pt	
Patch size 5-10 ha 2 pts	
Patch size 10-20 ha 3 pts	
Patch size 20-100 ha 4 pts	
Patch size 100-500 ha 5 pts	
Patch size >500 ha 6 pts	4
Distance to remnant area of more than	
50 hectares score	
>3km 0 pts	
1-3km 1 pt	
<1km 2 pts	
contiguous 3 pts	0
LANDSCAPE CONTEXT SCORE	**5**

Sum **adjusted Vegetation Condition, Conservation significance** and **Landscape Context Scores** for the

UNIT BIODIVERSITY SCORE 40.29

Total Biodiversity Score (UBS x siz 28.2

Cleared perimeter(m)	Size(ha)	P:A Ratio
400	0.7	57.14
Total no. native species	**Adjust for Spring**	**Environmental Association**
14		Reedbeds

Weed species (Top 5 Cover x Invasiveness, annuals in bold)	Cover (max. 6)	Invasive Threat Category (max. 5)	C x I
Oxalis pes caprae	3	4	12
Agave sp.	1	3	3
Euphorbia terracina	1	3	3
Ehrharta calycina	5	4	20
Agapanthus sp.	1	3	3
		Total Cover x Threat Invasion	41

Management Zone 6 – Interdune swale and remnant patches of hind-dune vegetation north of Coronado Court

Description of Vegetation Association: *Olearia axillaris* Shrubland

Benchmark Vegetation Community Type: SMLR Co 7.2 - Coastal Shrublands & Tall Shrublands

Nationally (EPBC) rated ecosystems present: Nil

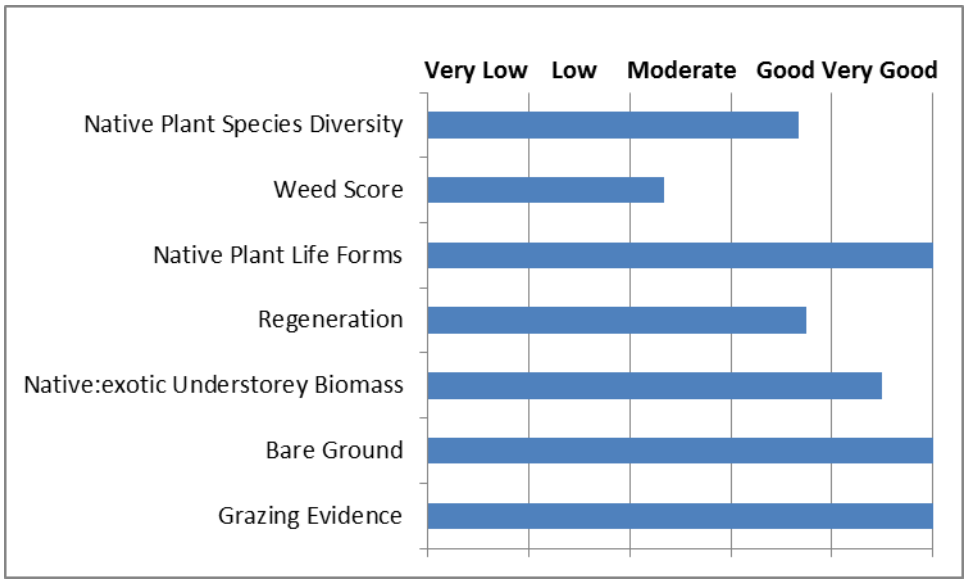
State (provisional DEWNR) rated ecosystems present: Nil

National or State threatened flora species present: Nil

Site is considered habitat for following threatened fauna species:

COMMON NAME	SCIENTIFIC NAME	EPBC	NP2008	SMLR
Painted Dragon	*Ctenophorus pictus*			U
Eastern Bearded Dragon	*Pogona barbata*			V
Grey Falcon	*Falco hypoleucos*		**R**	
Pacific Gull	*Larus pacificus*			U
Rock Parrot	*Neophema petrophila*		**R**	

Scores for Individual BushRAT Components



Site photograph – Management Zone 6

Native Plant Species List

Species Name	Common Name	Conservation Status		
		AUS	SA	SL
Acacia longifolia ssp. sophorae	False Boobialla			
Atriplex cinerea	Grey Saltbush			
Carpobrotus rossii	Karkalla			
Crassula closiana	Red Crassula			
Daucus glochidiatus	Australian Carrot			
Dianella brevicaulis	Coast Flax-lily			
Enchylaena tomentosa var. tomentosa	Barrier Saltbush			
Ficinia nodosa	Knobby Club-sedge			
Lepidosperma gladiatum	Sword Rush			U
Nitraria billardierei	Dillon Bush			
Olearia axillaris	Coast Daisy-bush			
Pelargonium australe	Australian Pelargonium			U
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush			
Scaevola crassifolia	Cushion Fanflower			R
Senecio pinnatifolius var. pinnatifolius				
Spinifex hirsutus	Coast Spinifex			
Tetragonia implexicoma	Bower Spinach			

Species Name	Common Name	Conservation Status		
		AUS	SA	SL
Threlkeldia diffusa	Coast Bonefruit			

Weed List

Species Name	Common Name	Cover
Aeonium sp.	Succulent garden escape	1a
Agapanthus praecox ssp. orientalis		1
Agave sp.	Century Plan	1
Arctotis stoechadifolia	Arctotis	1a
Argyranthemum frutescens ssp. foeniculaceum	Marguerite Daisy	1
Asparagus asparagoides f. asparagoides	Bridal Creeper	1
Avena barbata	Bearded Oat	1a
Brassica tournefortii	Mediterranean Turnip	1a
Bromus rubens	Red Brome	1a
Cakile maritima ssp. maritima	Beach Rocket	1a
Cotyledon sp.	Succulent garden escape	1
Ehrharta calycina	Perennial Veldt Grass	1a
Euphorbia paralias	Sea Spurge	1
Euphorbia terracina	False Caper	1a
Gazania sp.	Gazania	1a
Lagurus ovatus	Hare's Tail Grass	1a
Lycium ferocissimum	African Boxthorn	1
Medicago polymorpha var. polymorpha	Toothed Medic	1a
Osteocarpum fruticosum	Seascape Daisy	1a
Oxalis pes-caprae	Soursob	1a
Reichardia tingitana	Reichardia	1a
Thinopyrum junceiforme	Sea Wheat-grass	1a

BushRAT Scoresheet – Management Zone 6

NVBMU Biodiversity Rapid Assessment Summary Scoresheet

SITE: Management Zone 6 - North of Coronado Court	**RECORDER: ST TM DATE: 15/9/14**
DESCRIPTION: *Olearia axillaris* Shrubland	**BCM CODE: SMLR Co 7.2 - Coastal Shrublands & Tall Shrublands**

VEGETATION CONDITION SCORE (max. in	**score**
Native Plant Species Diversity (15)	11
Weed Score (15)	7
Native Plant Life Forms (10)	10
Regeneration (8)	6
Native:exotic Understorey Biomass (10)	9
Bare Ground (3)	3
Tree Health (5)	0
Tree Hollows (5)	0
Fallen timber (5)	0
Grazing Evidence (4)	4
TOTAL (ADD UP ALL POINTS)	50
If community is naturally treeless x TOTAL by 1.23	60.27
If community is not benchmarked for regen x 1.11	
ADJUSTED TOTAL SCORE	60.27

CONSERVATION SIGNIFICANCE SCORE:	**score**
2 pts for each State-R, 4 pts for each State-V,	
6 pts for each State-E or Nationally-V, 8 pts for	
each Nationally-E ecosystem/ecological	0
2 pts for each State-R, 4 pts for each State-V,	
6 pts for each State-E or Nationally-V, 8 pts for	
each Nationally-E plant species present[2].	0
1 pt for each State-R, 2 pts for each State-V,	
3 pts for each State-E or Nationally-V, 4 pts	
for each Nationally-E fauna species for which	
suitable habitat is present. Double points for a	
sighting. [3]	2
% native vegetation remaining in IBRA Assoc.	
0-2% = 5 pts; >2-5% = 4 pts; >5-10% = 3 pts;	
>10-20%= 2 pts; >20-50%= 1 pt; >50% = 0 pts	5
1 pt if Site contains a riparian zone,	
2 pts if contains swamp/wetland (+/- riparian zone)	0
CONSERVATION SIGNIFICANCE SCORE	**7**

LANDSCAPE CONTEXT SCORE	**score**
2 pts if site is the only substantial	
connection between 2 or more remnants[1]	
>20 ha, 1 pt if site is degraded	
(scattered trees in part, fragmented etc)	0
Site Shape Score	
3 pts if Cleared perimeter:Area (km/km^2)<6,	
2 pts if P:A 6 to<12, 1pt if P:A 12 to <18	0
Size of remnant[1] patch (incl. native	
veg on adjacent properties) score	
Patch size less than 2 ha 0 pts	
Patch size 2-5 ha 1 pt	
Patch size 5-10 ha 2 pts	
Patch size 10-20 ha 3 pts	
Patch size 20-100 ha 4 pts	
Patch size 100-500 ha 5 pts	
Patch size >500 ha 6 pts	4
Distance to remnant area of more than	
50 hectares score	
>3km 0 pts	
1-3km 1 pt	
<1km 2 pts	
contiguous 3 pts	0
LANDSCAPE CONTEXT SCORE	**4**

Sum **adjusted Vegetation Condition, Conservation significance** and **Landscape Context Scores** for the

UNIT BIODIVERSITY SCORE 71.27

Total Biodiversity Score (UBS x size 35.64

Cleared perimeter(m)	**Size(ha)**	**P:A Ratio**	
1000	0.5	200.00	
Total no. native species	**Adjust for Spring[4]**	**Environmental Association**	
17		Reedbeds	
Weed species (Top 5 Cover x Invasiveness, annuals in bold)	**Cover** (max. 6)	**Invasive Threat Category** (max. 5)	**C x I**
Euphorbia terracina	1	3	3
Arctotis stoechdifolia	1	3	3
Oteospermum fruticosum	1	3	3
Oxalis pes-caprae	1	4	4
Thinopyrum juceiforme	1	4	4
		Total Cover x Threat Invasion	17

Management Zone 7 – Areas of garden encroachments north of Coronado Court

Description of Vegetation Association: *Olearia axillaris* Very open Shrubland

Benchmark Vegetation Community Type: SMLR Co 7.2 - Coastal Shrublands & Tall Shrublands

Nationally (EPBC) rated ecosystems present: Nil

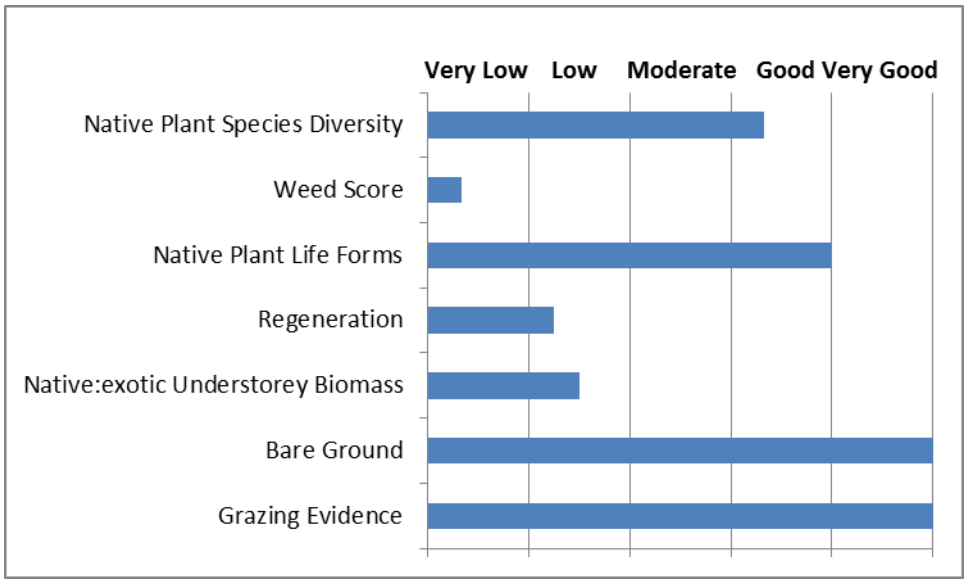
State (provisional DEWNR) rated ecosystems present: Nil

National or State threatened flora species present: Nil

Site is considered habitat for following threatened fauna species:

COMMON NAME	SCIENTIFIC NAME	EPBC	NP2008	SMLR
Painted Dragon	*Ctenophorus pictus*			U
Eastern Bearded Dragon	*Pogona barbata*			V
Grey Falcon	*Falco hypoleucos*		**R**	
Pacific Gull	*Larus pacificus*			U
Rock Parrot	*Neophema petrophila*		**R**	

Scores for Individual BushRAT Components



Site photograph – Management Zone 7

Native Plant Species List

Species Name	Common Name	Conservation Status		
		AUS	SA	SL
Acacia longifolia ssp. sophorae	False Boobialla			
Atriplex cinerea	Grey Saltbush			
Carpobrotus rossii	Karkalla			
Dianella brevicaulis	Coast Flax-lily			
Enchylaena tomentosa var. tomentosa	Barrier Saltbush			
Ficinia nodosa	Knobby Club-sedge			
Lepidosperma gladiatum	Sword Rush			U
Leucopogon parviflorus	Coast Beard-heath			
Myoporum insulare	Native Juniper			
Olearia axillaris	Coast Daisy-bush			
Pelargonium australe	Australian Pelargonium			U
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush			
Scaevola crassifolia	Cushion Fanflower			R
Senecio pinnatifolius var. pinnatifolius				
Spinifex hirsutus	Coast Spinifex			
Tetragonia implexicoma	Bower Spinach			
Threlkeldia diffusa	Coast Bonefruit			

Weed List

Species Name	Common Name	Cover
Acacia cyclops	Western Coastal Wattle	**1**
Aeonium sp.	Succulent garden escape	3
Agapanthus praecox ssp. orientalis		1
Agave sp.	Century Plan	1
Arctotheca calendula	Cape Dandelion	1a
Arctotis stoechadifolia	Arctotis	3
Argyranthemum frutescens ssp. foeniculaceum	Marguerite Daisy	1a
Asparagus asparagoides f. asparagoides	Bridal Creeper	1a
Avena barbata	Bearded Oat	1a
Brassica tournefortii	Mediterranean Turnip	1a
Bromus rubens	Red Brome	1a
Cakile maritima ssp. maritima	Beach Rocket	1a
Cotyledon sp.	Succulent garden escape	1a
Dietes iridoides	Dietes	1
Ehrharta calycina	Perennial Veldt Grass	1a
Euphorbia terracina	False Caper	1a
Gazania sp.	Gazania	3
Hordeum leporinum	Common Fox-tail	1
Lagurus ovatus	Hare's Tail Grass	2
Lycium ferocissimum	African Boxthorn	1
Medicago polymorpha var. polymorpha	Toothed Medic	1a
Mesembryanthemum crystallinum	Iceplant	1
Osteocarpum fruticosum	Seascape Daisy	2
Oxalis pes-caprae	Soursob	2
Reichardia tingitana	Reichardia	2
Romulea rosea var. australis	Guildford Grass	1a
Sonchus oleraceus	Milk Thistle	1a

BushRAT Scoresheet – Management Zone 7

NVBMU Biodiversity Rapid Assessment Summary Scoresheet

SITE: Management Zone 7 - Garden encroachments/weedy edges	**RECORDER: ST TM DATE: 15/9/14**
DESCRIPTION: *Olearia axillaris* Very open shrubland	**BCM CODE: SMLR Co 7.2 - Coastal Shrublands & Tall Shrublands**

VEGETATION CONDITION SCORE (max. in	**score**
Native Plant Species Diversity (15)	10
Weed Score (15)	1
Native Plant Life Forms (10)	8
Regeneration (8)	2
Native:exotic Understorey Biomass (10)	3
Bare Ground (3)	3
Tree Health (5)	0
Tree Hollows (5)	0
Fallen timber (5)	0
Grazing Evidence (4)	4
TOTAL (ADD UP ALL POINTS)	31
If community is naturally treeless x TOTAL by 1.23	35.67
If community is not benchmarked for regen x 1.11	
ADJUSTED TOTAL SCORE	35.7

CONSERVATION SIGNIFICANCE SCORE:	**score**
2 pts for each State-R, 4 pts for each State-V,	
6 pts for each State-E or Nationally-V, 8 pts for	
each Nationally-E ecosystem/ecological	0
2 pts for each State-R, 4 pts for each State-V,	
6 pts for each State-E or Nationally-V, 8 pts for	
each Nationally-E plant species present[2].	0
1 pt for each State-R, 2 pts for each State-V,	
3 pts for each State-E or Nationally-V, 4 pts	
for each Nationally-E fauna species for which	
suitable habitat is present. Double points for a	
sighting. [3]	0
% native vegetation remaining in IBRA Assoc.	
0-2% = 5 pts; >2-5% = 4 pts; >5-10% = 3 pts;	
>10-20%= 2 pts; >20-50%= 1 pt; >50% = 0 pts	5
1 pt if Site contains a riparian zone,	
2 pts if contains swamp/wetland (+/- riparian zone)	0
CONSERVATION SIGNIFICANCE SCORE	**5**

LANDSCAPE CONTEXT SCORE	**score**
2 pts if site is the only substantial	
connection between 2 or more remnants[1]	
>20 ha, 1 pt if site is degraded	
(scattered trees in part, fragmented etc)	0
Site Shape Score	
3 pts if Cleared perimeter:Area (km/km^2)<6,	
2 pts if P:A 6 to<12, 1pt if P:A 12 to <18	0
Size of remnant[1] patch (incl. native	
veg on adjacent properties) score	
Patch size less than 2 ha 0 pts	
Patch size 2-5 ha 1 pt	
Patch size 5-10 ha 2 pts	
Patch size 10-20 ha 3 pts	
Patch size 20-100 ha 4 pts	
Patch size 100-500 ha 5 pts	
Patch size >500 ha 6 pts	1
Distance to remnant area of more than	
50 hectares score	
>3km 0 pts	
1-3km 1 pt	
<1km 2 pts	
contiguous 3 pts	0
LANDSCAPE CONTEXT SCORE	**1**

Sum **adjusted Vegetation Condition, Conservation significance** and **Landscape Context Scores** for the

UNIT BIODIVERSITY SCORE	41.7
Total Biodiversity Score (UBS x siz	29.19

Cleared perimeter(m)	**Size(ha)**	**P:A Ratio**	
1000	0.7	142.86	
Total no. native species	**Adjust for Spring[4]**	**Environmental Association**	
17		Reedbeds	
Weed species (Top 5 Cover x Invasiveness, annuals in bold)	**Cover** (max. 6)	**Invasive Threat Category** (max. 5)	**C x I**
Aeonium sp.	3	2	6
Gazania sp.	3	3	9
Arctotis stoechadifolia	2	3	6
Osteospermum fruticosum	3	3	9
Oxalis pes caprae	2	4	8
		Total Cover x Threat Invasion	38

Appendix 7: Works record sheets

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

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. **If you did not propose any actions for this Management Issue this year, write N/A.**	**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

Pest threat or issue	**Actions undertaken this calendar year** These may or may not correspond with the actions you proposed at the start of the year. **If you did not propose any actions for this Management Issue this year, write N/A.**	**Status of pest issue** 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.	**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?
Foxes	Fumigated all dens using ….. It took us 2 full adys with 2 people.		

VEGETATION REGENERATION/ REVEGETATION

Type of regeneration/revegetation issue	**Actions undertaken this calendar year** These may or may not correspond with the actions you proposed at the start of the year. **If you did not propose any actions for this Management Issue this year, write N/A.**	**Status of regeneration/ revegetation issue** Describe the current extent/status/of the issue. Has it improved since last 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 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.