Goolwa Dunes & Tokuremoar Reserve Environmental Action Plan 2015

On-ground works action plan for the restoration of the Goolwa Dunes, Tokuremoar Reserve and Fleurieu Regional Waste Depot

GOOLWA TO WELLINGTON LOCAL ACTION PLANNING ASSOCIATION INC

Ngarrindjeri Regional Authority

Government of South Australia

Natural Resources Adelaide and Mt Lofty Ranges

COASTCARE

ALEXANDRINA

Authored by Ben Simon and Sherie Bain, Goolwa to Wellington LAP 2015

Table of Contents

Table of Maps

Table of Tables

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Photographs were taken by Ben Simon and Sherie Bain from the GWLAP unless otherwise credited.

Links to other plans

This plan contributes to the achievement of goals contained in a range of relevant regional and local management plans aimed at improving biodiversity, preserving and highlighting aboriginal cultural heritage and enhancing resource condition including:

- Southern Fleurieu Coastal Action Plan (SFCAP) 2007
- Tokuremoar Reserve Management Plan Part A & B 1998
- Goolwa to Wellington Local Action Planning Association Inc. Strategic Plan 2013-18
- Goolwa to Wellington Local Action Plan 1999
- Ngarrindjeri Nation Yarluwar-Ruwe Plan 2006
- Alexandrina Council Environmental Action Plan 2014-2018
- Alexandrina Coastal Park Concept Plan 2000
- Regional Recovery Plan for Threatened Species and Ecological Communities of Adelaide and the Mount Lofty Ranges, South Australia 2009-2014
- Biodiversity Plan for the South Australian Murray-Darling Basin, Department for Environment and Heritage, South Australia 2001
- Habitat restoration for the Orange Bellied Parrot, Rural Solutions SA, 2004
- Eastern Mount Lofty Ranges (EMLR) Conservation Action Planning 2011
- Adelaide and Mount Lofty Ranges Natural Resource Management Plan 2014-15 to 2023-24
- Surf Life Saving SA `ECOSurf' policy and statements 2013-2015

Many of the above mentioned plans provide valuable information regarding the environmental, cultural and social values and threats of the project plan area but are limited in providing more detailed information regarding the location of key threats and assets and how they can be managed. This document, with particular use of GPS and GIS mapping aims to provide this insight.

1 Introduction

1.1 Management Plan Outline

The requirement for of the Goolwa Dunes and Tokuremoar Reserve Environmental Action Plan was identified by current active stakeholders who agreed there was a need to document the various management actions occurring within the project plan area, and to compile the past, present and future actions in one useful plan for improved coordination and resource sharing between all parties, both present and future.

The plan identifies the key threats to the area and provides direction on how to address these through coordinated on-ground works activities.

Periodic review of the actions in this plan is recommended. This could be facilitated by the continuance of the steering committee convened to guide the development of this plan. Members could consider other areas that are outside the current geographical scope of this plan and reassess the progress of this plan.

1.2 Management Plan Area

This action plan covers the Goolwa Beach Dunes, Tokuremoar Reserve, Newell Avenue Reserve, Middleton Surfers Reserve and the Goolwa Waste and Recycling Depot. Adjoining relevant parcels are referenced to provide landscape context and offer as many opportunities as possible to manage issues of common concern within this landscape.

Map 1: Tokuremoar Action Plan Area and NRM Regions

1.3 Regional Natural Resource Management Targets

Table 1: Aligment of Tokuremoar Action Plan with Regional NRM Targets

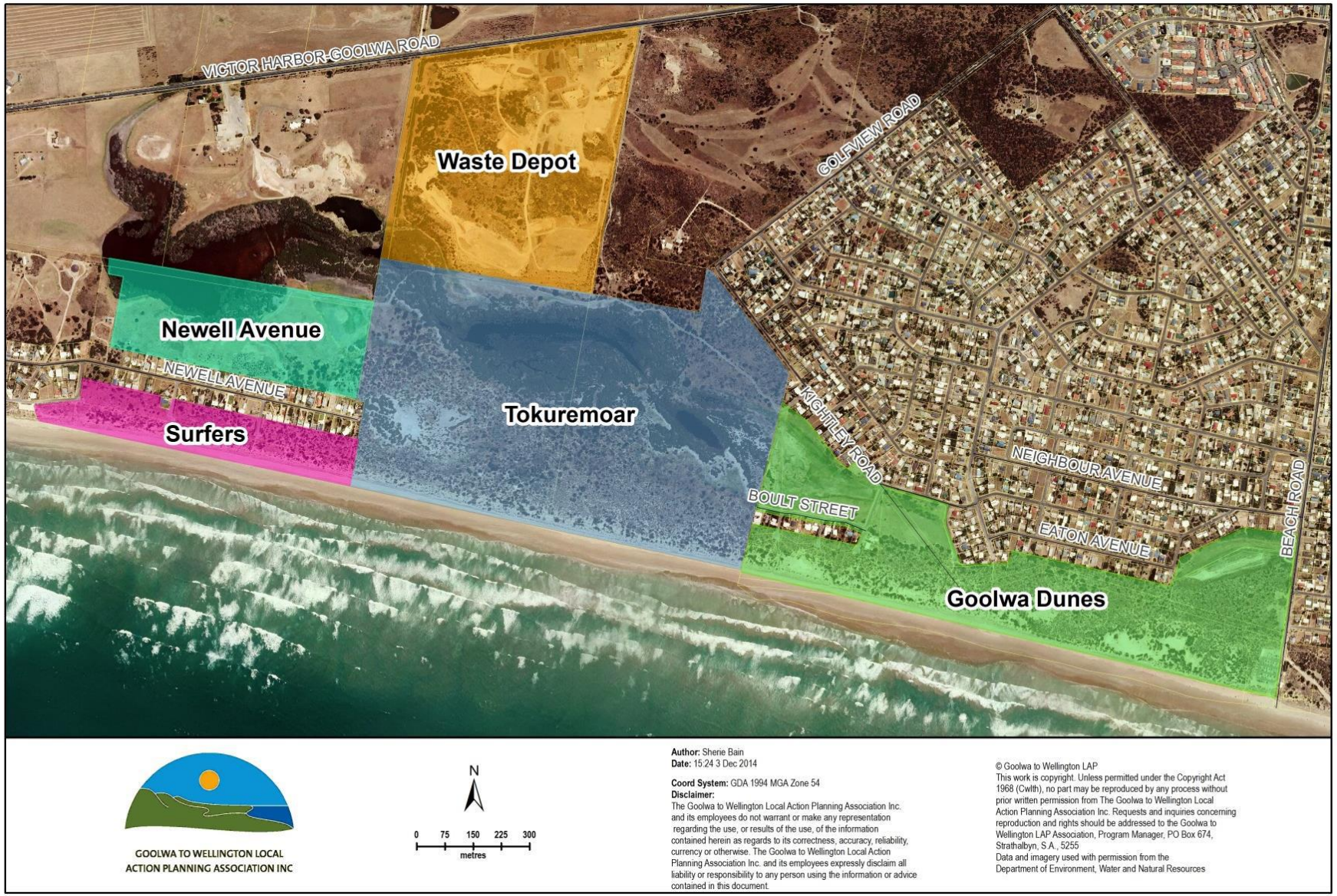
from : - AMLR NRM Plan-Strategic-2014-15-2023-24-Volume-1-part-1_2,
- Natural Resources SA Murray-Darling Basin- NR Management Plan- Volume A | Strategic plan
- Southern Fleurieu Coastal Action Plan 2007

NR AMLR Targets	Key Tokuremoar Action Plan activities that address targets
L-C: Improve the condition of priority biodiversity areas	• Undertake annual targeted bushcare to reduce density and distribution levels of priority Key and Groundcover weeds. • Undertake targeted bushcare to eradicate and reduce density and distribution levels of known priority `Other Weeds' from the project area and allow no new populations to establish. • Prevent juvenile woody weeds from reaching mature seed set via annual threat abatement across the project area. • Annual rabbit control program over key hotspot areas for a decrease in rabbit density levels and total grazing pressure on sites
L-D: Improve the long-term prospects of threatened and declining species and communities	• Undertake annual targeted bushcare to reduce density and distribution levels of priority Key and Groundcover weeds. • Undertake targeted bushcare to eradicate and reduce density and distribution levels of known priority `Other Weeds' from the project area and allow no new populations to establish • Undertake priority threat abatement around known localities of rare and threatened species and habitats. • Continue and expand on-going collaboration between coast and marine managers through regular working group meetings to formulate actions for threatened and rare species and communities. • Translocation of species within revegetation programs for improved long term prospects of species and communities. • Continued management and expansion of the GWLAP coastal seed bank
L-F: Reduce land based impacts on aquatic and marine health through appropriate land management and management of runoff	• Integrated rabbit control programs continued and expanded to the wider catchment by participating partners in the plan area, especially AMLR and SAMDB programs in the area. • Protect and improve all water courses and waterbodies through land management activities involving the restoration and re-establishment of riparian and saltmarsh habitats within the catchments. • Hydrogeological studies undertaken for assisted understanding of local flooding and coastal management threats and opportunities. • Continued engagement of local farmers in revegetation and remnant vegetation management activities.
Southern Fleurieu Coastal Action Plan 2007 Priorities	
Use development controls to protect cliffs and coastal landscapes from population increases and development pressures	• Stakeholders meet regularly to collaborate and disseminate key info on priority activities in the Goolwa coastal area and wider landscape as required • Highlight key coastal landscapes of significance to the local community through awareness raising activities including engaging local community in threat abatement programs.
Increase education and awareness programs for land managers and users of the coastal environment on the	• Engage the community through coast and marine awareness opportunities as a key group. • Assist Alexandrina Council to engage community in adjoining lands management and integration of activities

value of the coastal environment	• Engage with identified potential stakeholders for improved collaboration on issues of common concern.
Protect and rehabilitate priority areas of the southern coast including Tokuremoar reserve	• Undertake annual targeted bushcare to reduce density and distribution levels of priority Key and Groundcover weeds. • Undertake targeted bushcare to eradicate and reduce density and distribution levels of known priority `Other Weeds' from the project area and allow no new populations to establish. • Translocation of species within revegetation programs for improved long term prospects of species and communities
NR SA Murray-Darling Basin Management Plan-Volume A-Strategic plan	
B1: Increase the ecological function and resilience of native ecosystems by 2030	• Undertake annual targeted bushcare to reduce density and distribution levels of priority Key and Groundcover weeds. • Undertake targeted bushcare to eradicate and reduce density and distribution levels of known priority `Other Weeds' from the project area and allow no new populations to establish. • Prevent juvenile woody weeds from reaching mature seed set via annual threat abatement across the project area. • Annual rabbit control program over key hotspot areas for a decrease in rabbit density levels and total grazing pressure on sites
B2: Native species and ecological communities at lower or no greater risk of extinction by 2030	• Undertake annual targeted bushcare to reduce density and distribution levels of priority Key and Groundcover weeds. • Undertake targeted bushcare to eradicate and reduce density and distribution levels of known priority `Other Weeds' from the project area and allow no new populations to establish • Undertake priority threat abatement around known localities of rare and threatened species and habitats. • Continue and expand on-going collaboration between coast and marine managers through regular working group meetings to formulate actions for threatened and rare species and communities. • Translocation of species within revegetation programs for improved long term prospects of species and communities. • Continued management and expansion of the GWLAP coastal seed bank
L1: Protect and improve soil and land to support the productive capacity and natural resources of the region by 2030	• Integrated rabbit control programs continued and expanded to the wider catchment by participating partners in the plan area, especially AMLR and SAMDB programs in the area. • Protect and improve all water courses and waterbodies through land management activities involving the restoration and re-establishment of riparian and saltmarsh habitats within the catchments. • Hydrogeological and geomorphological studies undertaken for assisted understanding of local flooding and coastal management threats and opportunities by stakeholders. • Continued engagement of local farmers in revegetation and remnant vegetation management activities.

2 Overview

Map 2: Tokuremoar Action Plan Areas



2.1 Land Ownership

Table 2: Land Owners, Partners and Conservation Values

Property	Area of Remnant	Owner	Formal Protection Status	Current Active Managers/Stakeholders	Conservation Values; Significant Species, Communities or Habitat
Goolwa Dunes	45.7Ha	Crown Land dedicated to care and control by Alexandrina Council	Community Land	• Alexandrina Council • Coast Protection Board • Goolwa Coastcare Group • GWLAP • Ngarrindjeri • NR SAMDB	• The State vulnerable *Thinornis rubricollis* (Hooded Plover) has considerable potential for breeding within this area (Caton 2007) • The State rare *Haematopus longirostris* (Pied Oystercatcher) and *Neophema elegans* (Elegant Parrot) have been recorded (Caton 2007) • *Rattus lutreolus* (Swamp Rat) is listed as rare and protected under the National Parks and Wildlife Act (South Australia national parks and wildlife act 1972 2011). • Coastal Shrubland dependant *Ctenophorus pictus* (Painted Dragon) is recorded in the dunes (Caton 2007) • One State rated butterfly species (Caton 2007) • Several regionally vulnerable and rare plant species are present in reserve (Caton 2007) • At the junction of:-Cape Borda to Barossa NatureLinks Corridor and the River Murray – South East NatureLinks Corridor • Included in the Coorong and Lakes Alexandrina and Albert Ramsar Wetland

Tokuremoar Reserve	75.9Ha	Minister for Sustainability, Environment & Conservation	Crown Lands Act Reserve	• Alexandrina Council
				• DEWNR
				• DPTI
				• Fleurieu Birdwatchers
				• Goolwa Coastcare Group
				• GWLAP
				• Ngarrindjeri
				• NR AMLR
				• NR SAMDB
					• One nationally endangered and 14 state rated bird species are recorded (Caton 2007)
					  ○ *Rostratula australis* (Australian Painted Snipe) (Nationally endangered)
					  ○ *Neophema elegans* (Elegant Parrot) (State rare)
					  ○ *Cereopsis novaehollandiae* (Cape Barren Goose) (State rare)
					  ○ *Anas rhyncotis* (Australasian Shoveler) (State rare)
					  ○ *Plegadis falcinellus* (Glossy Ibis) (State rare)
					  ○ *Gallinago hardwickii* (Latham's Snipe) (State rare)
					  ○ *Neophema elegans* (Elegant Parrot) (State rare)
					  ○ *Coturnix ypsilophora* (Brown Quail) (State vulnerable)
					  ○ *Cladorhynchus leucocephalus* (Banded Stilt) (State vulnerable)
					  ○ *Thinornis rubricollis* (Hooded Plover) (State vulnerable)
					• One State rated plant species (Caton 2007)

Property	Area of Remnant	Owner	Formal Protection Status	Current Active Managers/Stakeholders	Conservation Values; Significant Species, Communities or Habitat
					• One State rated butterfly species and highest rated butterfly habitat in region (Caton 2007) • *Rattus lutreolus* (Swamp Rat) is listed as rare (South Australia national parks and wildlife act 1972 2011). • Numerous regionally vulnerable and rare plant species present in reserve (Caton 2007) • At the junction of:-Cape Borda to Barossa NatureLinks Corridor and the River Murray – South East NatureLinks Corridor • Included in the Coorong and Lakes Alexandrina and Albert Ramsar Wetland • Coastal Shrubland dependant *Ctenophorus pictus* (Painted Dragon) recorded in the dunes (Caton 2007)

Newell Avenue Reserve	15.1Ha	Crown Land dedicated to Alexandrina Council care and control	Community Land	• Alexandrina Council
				• Department of Planning, Transport and Infrastructure
				• Goolwa Coastcare Group
				• Goolwa Primary School
				• GWLAP
				• Investigator College
				• Ngarrindjeri
				• NR AMLR and NR SAMDB (indirectly)
				• Waldorf School Willunga
					• One nationally endangered and 14 state rated bird species are recorded (Caton 2007)
					  ○ *Rostratula australis* (Australian Painted Snipe) (Nationally endangered)
					  ○ *Neophema elegans* (Elegant Parrot) (State rare)
					  ○ *Cereopsis novaehollandiae* (Cape Barren Goose) (State rare)
					  ○ *Anas rhyncotis* (Australasian Shoveler) (State rare)
					  ○ *Plegadis falcinellus* (Glossy Ibis) (State rare)
					  ○ *Gallinago hardwickii* (Latham's Snipe) (State rare)
					  ○ *Neophema elegans* (Elegant Parrot) (State rare)
					  ○ *Coturnix ypsilophora* (Brown Quail) (State vulnerable)
					  ○ *Cladorhynchus leucocephalus* (Banded Stilt) (State vulnerable)
					  ○ *Thinornis rubricollis* (Hooded Plover) (State vulnerable)
					• One state rated plant species, *Acacia dodonaeifolia* (Hop Wattle) (Caton 2007)
					• One state rated butterfly species (Caton 2007)
					• *Rattus lutreolus* (Swamp Rat) is listed as rare (South Australia national parks and wildlife act 1972 2011).
					• Numerous regionally vulnerable and rare plant species present in reserve (Caton 2007)
					• At the junction of:-Cape Borda to Barossa NatureLinks Corridor and the River Murray – South East NatureLinks Corridor
					• Included in Coorong and Lakes Alexandrina and Albert Ramsar Wetland

Property	Area of Remnant	Owner	Formal Protection Status	Current Active Managers/Stakeholders	Conservation Values; Significant Species, Communities or Habitat
Surfers Reserve (Tokuremoar Boundary to 'Cliffs' carpark)	11Ha	Crown Land dedicated to Alexandrina Council care and control	Community Land	• Alexandrina Council • Ngarrindjeri • NR AMLR	• The State vulnerable *Thinornis rubricollis* (Hooded Plover); the state rare *Haematopus longirostris* (Pied Oystercatcher), *Haematopus fuliginosus* (Sooty Oystercatcher) and *Neophema elegans* (Elegant Parrot) have been recorded in this area (Caton 2007) • *Rattus lutreolus* (Swamp Rat) is listed as rare (South Australia national parks and wildlife act 1972 2011). • Locally rare *Lotus australis* (Austral Trefoil) and *Leucophyta brownii* (Coast Cushion Bush) Shrublands (B.Simon pers.obs.) • At the junction of:-Cape Borda to Barossa NatureLinks Corridor and the River Murray – South East NatureLinks Corridor • Included in the Coorong and Lakes Alexandrina and Albert Ramsar Wetland
Goolwa Waste and Recycling Depot	20Ha	Alexandrina Council		• Alexandrina Council • Barbary O'Brien • DEWNR (CLLMM) • Fleurieu Regional Waste • GWLAP (past investor) • Ngarrindjeri • NR AMLR	• One state rated plant species; rare *Acacia dodonaeifolia* (Hop-bush Wattle) (O' Brien & Kirwan 2014) • Remnant patches of *Lomandra effussa* (Scented Mat-rush) Natural Temperate Grassland (Critically endangered EPBC listed) (DEH (in progress) unpublished and provisional list (Originally cited as DEH 2001)) • State rare *Neophema elegans* (Elegant Parrot) has been recorded in this area (B.Simon pers.obs.) • Locally rare *Acacia dodonaeifolia* (Hop-bush Wattle) Shrubland (B.Simon pers.obs.) • Numerous regionally vulnerable and rare plant species present in reserve (B.Simon pers.obs.) • At the junction of:-Cape Borda to Barossa NatureLinks Corridor to the River Murray – South East NatureLinks Corridor
Total hectares	**167.7Ha**				

2.2 Cultural Heritage Values

The dunes along the coast to the west of Goolwa towards Middleton carry a continuous Aboriginal archaeological and cultural record. Goolwa was Ruwe or home country of the Watiindjeri clan of the Ramindjeri people (Draper 1998).

Ngarrindjeri are vital and active participants in Working On Country activities to protect cultural and environmental values in Goolwa and in particular Tokuremoar Reserve. For many years and over recent times Ngarrindjeri have continued on-ground actions in the form of weed control, revegetation, fencing of the Goolwa Dunes and consultation regarding placement of fencing and paths.

Ngarrindjeri have worked closely with the GWLAP and the Alexandrina Council to address issues such as poorly defined access paths through the Goolwa Dunes, negating middens, installing dune fencing, construction and instalment of a Dutch ladder over a midden site, undertaking a jute netting trial on a long-term eroding dune and providing cultural education to the Goolwa Coastcare Group via Camp Coorong and correspondence with the GWLAP.

Ngarrindjeri Ruwe, a contracting arm of the Ngarrindjeri Regional Authority have undertaken significant on-ground works on the Goolwa Dunes since 2008 as contractors for the GWLAP, with learning outcomes occurring for both parties. Aboriginal Learning On Country (ALOC) Raukkan have also undertaken works on Sir Richard Peninsula within an Alexandrina council reserve over several years controlling Gazania, Weeping White-broom, Victorian Tea-tree, Scabiosa, Rhamnus and Boxthorn.

Extensive information exists in *the Tokuremoar Reserve Management Plan (Part A)* (1998) including detailed information regarding cultural significance, relevance to other sites, the Ramindjeri Region, indigenous significance of Tokuremoar, The After Life, Land Ownership Trust and excellent recommendations of management actions that will remain relevant to actions proposed in this action plan.

The *Tokuremoar Reserve Management Plan (Part A)* (1998) has been a key document for guiding active managers of the area and many of the actions suggested in this plan have been undertaken in some form over the past ten years.

The *Ngarrindjeri Nation Yarluwar-Ruwe Plan - Caring for Ngarrindjeri Sea Country and Culture* has been prepared by Ngarrindjeri people to help government agencies, natural resource managers, researchers, industry and the wider Australian community to better understand and recognise the rights of and the responsibilities to our Yarluwar-Ruwe (Sea Country), including the lower Murray River, Lakes, Coorong and adjacent marine and land areas (The Ngarrindjeri Nation Yarluwar-Ruwe Plan - 2007).

The *Ngarrindjeri Nation Yarluwar-Ruwe Plan* outlines a range of key issues and opportunities to work with Ngarrindjeri on the management of areas such as those within this plan and into the wider landscape and should be one of several key documents used in conjunction with this Goolwa Dunes and Tokuremoar Reserve Environmental Action Plan, 2015.

It is highly recommended that collaboration on initiatives and partnerships continue with Ngarrindjeri to address current priorities identified in Ngarrindjeri plans and that key documents are utilised with all on-ground works activities.

Figure 0.1: Goolwa dune fencing

Figure 0.2: Midden Dutch Ladder

Figure 0.3: Jute erosion trial

Figure 0.4: Signage launch

Figure 0.5: Dune theme signage

Figure 0.6: Interpretive post signs on bikeway

2.3 Historical Background

In relatively recent times the area of land known as Tokuremoar Reserve was part of a working farm owned and managed by the Dennis family. Sheep and cattle were the main uses of this area and there are still historical remnants of fencing and some minor timber cutting in the reserve. The Dennis family were responsible for lobbying the crown to acquire this land for declaration as a conservation reserve, essentially saving this area from being sold to developers (K. Dennis pers. comm.).

Tokuremoar Reserve was the site of a brewery in the early 1800s and cereal crops were grown in the cleared low lying areas such as Newell Avenue Reserve and Boult Street Reserve. Following this Tokuremoar Reserve, Newell Avenue Reserve and areas around Boettcher Road were grazed for many years as an active dairy farm. This assists in explaining the large patches of Kikuyu, Couch and scatterings of Phalaris in the low lying areas (K. Dennis pers. comm.).

In the 1960s and 1970s the Goolwa Dunes and Tokuremoar Reserve areas were frequented by dune buggies which caused a lot of damage (K. Dennis pers. comm.). This may explain the existence of old car wrecks still present in Tokuremoar Reserve.

2.4 Current and Potential Stakeholders

The Goolwa coastline and associated reserves have been afforded excellent stakeholder involvement from a wide range of organisations, particularly over the past ten years. Many still remain involved and continue to play a significant role in assisting the management of this area.

Current stakeholders include:

- Goolwa to Wellington Local Action Planning Association
- Natural Resources Adelaide and Mount Lofty Ranges
- Natural Resources South Australian Murray-Darling Basin
- Department for Environment, Water and Natural Resources
- Goolwa Coastcare Group
- Alexandrina Council
- SA Water
- Ngarrindjeri
- Schools (Investigator College, Goolwa Primary, Willunga Waldorf, Port Elliot Primary)

Potential stakeholders that could become involved include, but are not limited to:

- Encounter Bikeway Group
- Goolwa Surf Lifesaving - who are committed to a range of measures to ensure protection of the coastal natural environment under the ECOSURF Policy Statement, Surf Life Saving SA
- Middleton Town and Foreshore Management Group
- Strathalbyn Naturalist Club
- Fleurieu Birdwatchers Group
- Universities
- Friends of Parks
- Other schools not currently involved
- Surfing SA, Surfrider Foundation, Surfers Reserve and various recreation groups
- General public and residents
- SA Tourism Commission

3 Recent On-ground Works

3.1 Achievements

Achievements since 2007, within the Tokuremoar Action Plan area include extensive threat abatement through weed and rabbit control programs, fencing remnant areas, community awareness-raising activities, coastal officers' network meetings, revegetation activities and planning processes. These have been occurring intensively in Tokuremoar Reserve and other adjoining remnants through a range of programs and funding sources. Many of these achievements have been made possible through GWLAP programs funded by the Federal and State Governments as well as a range of corporate investors and grants including Mobile Muster, Barefoot Radler, Natural Resources South Australia Murray Darling Basin (NR SAMDB), Natural Resources Adelaide and Mount Lofty Ranges (NR AMLR), Department of Planning Transport and Infrastructure (DPTI) and Alexandrina Council. Extensive in-kind support for these projects has been provided through on-ground action from the Goolwa Coastcare Group who undertake valuable bushcare, revegetation and community awareness activities.

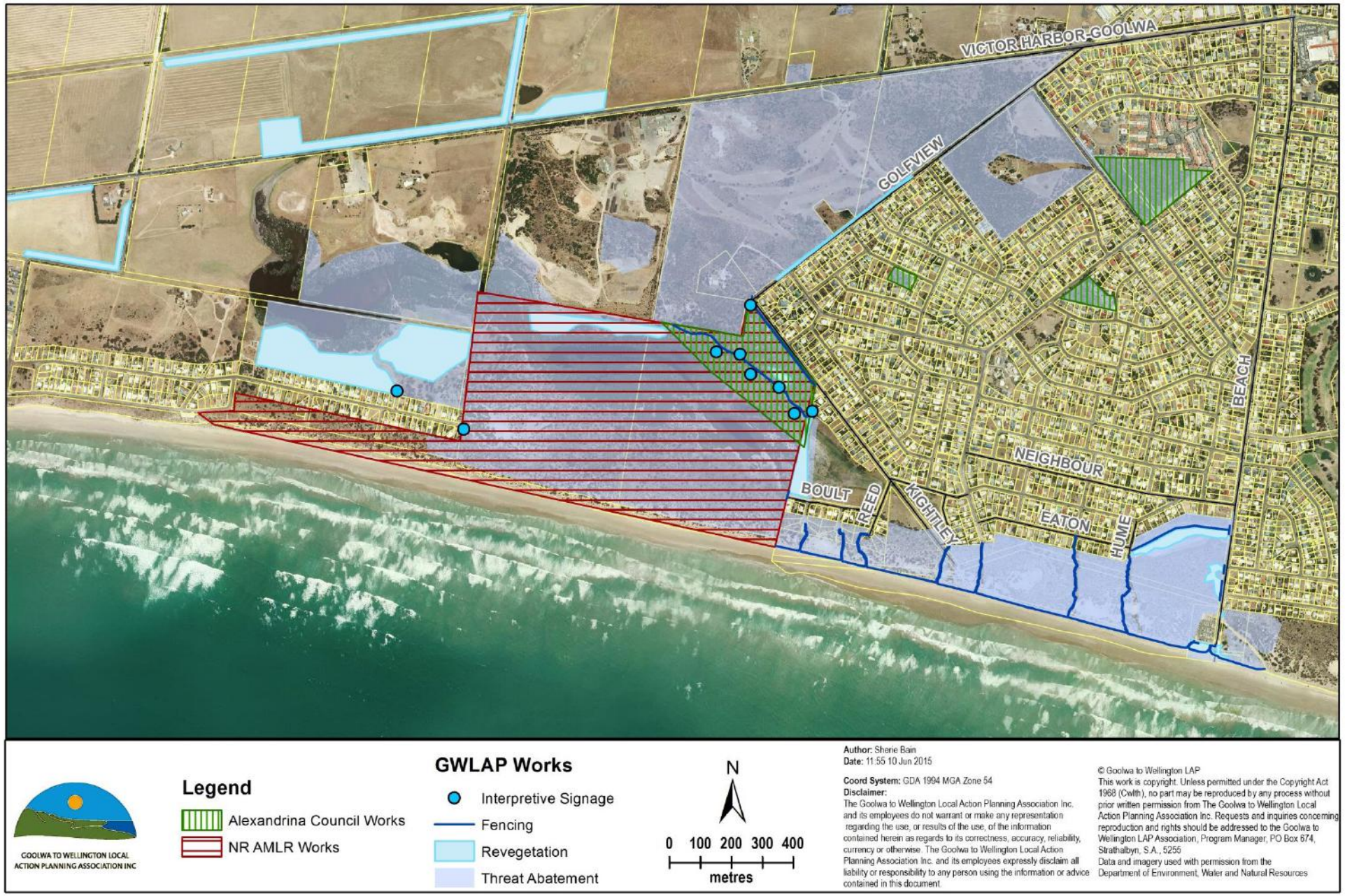
Key partnerships with the Alexandrina Council, NR AMLR, NR SAMDB, landholders, Ngarrindjeri, Goolwa Coastcare Group and other individuals have worked closely to address key priorities in an integrated fashion.

This plan will strengthen this already productive partnership and provide the impetus for continued extensive threat abatement with greater strategic use of resources, including project officer time.

Table 3: Summary of historical on-ground works and key partners

Threat	Key delivery partners	Abatement action taken	Funded and Implemented by
Poorly defined access through the Goolwa Dunes	GWLAP Goolwa Coastcare Group Alexandrina Council Ngarrindjeri SA Water	• Fencing of Goolwa dune front, fencing of key dune path or upgrade of fencing, closing of paths, path name markers installed	GWLAP Alexandrina Council Langhorne Creek vineyards (Materials)
Extensive infestation of woody weeds especially *Acacia cyclops*, Victorian Tea-tree, Boneseed and Boxthorn through the entire Goolwa precinct	Alexandrina Council Ngarrindjeri Goolwa Coastcare Group NR AMLR NR SAMDB Private landholdings	• Extensive woody weeds program has been occurring in various forms with large quantities of initial vegetation treated and removed or mulched	GWLAP Alexandrina Council NR AMLR Goolwa Coastcare Group NR SAMDB
Groundcover weeds (Gazania, Arctotis, Osteospermum, Kikuyu, Couch, Iceplant and Galenia)	GWLAP Goolwa Coastcare Group Alexandrina Council NR AMLR	• Targeted control around Goolwa beach carpark Boardwalk lookout, Hume St, Beach Road swamp area and with residents • Weed fronts pushed back from many areas • Sedgeland manipulation using grass selective herbicides	GWLAP Alexandrina Council NR SAMDB NR AMLR
Lack of understanding and appreciation of the coastal environment	GWLAP Goolwa Coastcare Group Alexandrina Council SA Water AMLR NR SAMDB Ngarrindjeri	• Letter box drops • Coastal gardens booklet • Media articles • Goolwa Coastcare Group – Dunecare brochure • Goolwa Coastcare Group formation, Facebook page and website creation • Wooden boat festivals • Signage including dune care and interpretive	GWLAP NR AMLR Alexandrina Council NR SAMDB
Unclear control protocol for Gazania	GWLAP AMLR Alexandrina Council	• Gazania control trials undertaken and invested in by partners	GWLAP NR AMLR
Poor signage at Beach Road 4WD access track	GWLAP SA Water Alexandrina Council	• Signage was placed along strategic points along track • Awareness risen via media • Update of Coastcare brochure	Alexandrina Council GWLAP SA Water
Rabbits	GWLAP Alexandrina Council NR SAMDB NR AMLR	• Hot-spot baiting program undertaken to reduce total grazing pressure impacts for improved regeneration and decreases in erosion	NR SAMDB, NR AMLR , SA Government and various Federal government programs
Need for greater collaboration between key managers, particularly Alexandrina Council, SA Water, SAMDB and GWLAP	Goolwa Coastcare Group Alexandrina Council SA Water AMLR NR SAMDB Ngarrindjeri	• All stakeholders have met several times with coastal officer meetings and keep in touch through phone and email	All of the above

Map 3: Current and Historic Work Areas by the GWLAP, NR AMLR and Alexandrina Council



3.2 Revegetation areas

3.2.1 Newell Avenue Reserve

Newell Avenue Reserve is a significant Alexandrina Council reserve containing excellent biodiverse remnant vegetation. An area of samphire lagoon (Figure 3.3), contains what appears to be *Ruppia* sp growing near the fenceline (K. Mason pers. comm.), fills with seasonal rains (Figure 3.5) and provides habitat for a diverse range of waterbirds. Bird watching is popular in the reserve and discussions with community are already occurring regarding a desired birdwatching platform in the remnant *Melaleuca hamaturorum* stand. Over 90 bird species were recorded by Barron Environmental, following the recent flooding of the lagoon and surrounding low lying areas. A Brown Quail, rated as vulnerable in the *South Australian National Parks and Wildlife Act 1972* (Revised 2013) has been seen recently near the bikeway revegetation area (Fleurieu Birdwatchers pers. comm.).

There are remnant areas of limestone outcrop with *Acacia cupularis* +/- *Pimelea serpyllifolia ssp. serpyllifolia* +/- *Dianella breicaulis* +/- *Ficinia nodosa* Very Low Shrubland that does not require revegetation.

There is a current management plan for this reserve, with accompanying species list of the planting program, related to DPTI funding for Significant Environmental Benefit (SEB) offset, under the Native Vegetation Act SA (1991). This funding has undertaken restoration works involving weed control and revegetation over the site area and is being implemented by GWLAP.

Revegetation of several large open areas has occurred (Figure 3.4). These were largely dominated by introduced Kikuyu, Couch and Phalaris and seasonally mowed by the Alexandrina Council. The gradual reduction through slashing and spraying of introduced grasses has allowed the native Emu Grass *Distichlis distichophylla* to dominate. Revegetation commenced in 2007 on these open areas by the GWLAP. Over 10,000 seedlings have been planted through the Newell Avenue Reserve since 2007 by the GWLAP. Recently plantings have focused on more sedges, rushes and other ground-storey plants in-fill as required. Planting has occurred with respect to relevant vegetation communities and soil type with a particular emphasis on managing for natural regeneration. Weed control targeting specific broad-leafed weeds and utilising grass selective herbicides has helped manage the site to the current condition maximising native plant dominance such as *Melaleuca halmatuorum* regeneration (Figure 3.1).

Figure 3.1: Melaleuca regeneration following flooding in 2012.

Figure 3.2a and b: Goolwa Coastcare Group planting days

Excellent community involvement exists on this site. Currently five schools, Green Army, GWLAP, Alexandrina Council, local residents, Ngarrindjeri Ruwe and Goolwa Coastcare Group assist in managing the area. NR SAMDB have assisted with a corporate planting day at the site and NR AMLR have a Bushland Condition Monitoring (BCM) site established.

Recommendation: Continue collaborative engagement of current and future stakeholders in restoring this area.

Figure 3.3: Samphire lagoon

Figure 3.4: Large open areas with revegetation

Figure 3.5: Seasonally flooded lagoon

3.2.2 Beach Road revegetation site

This area was previously a weedy patch of highly disturbed and modified ground with thick Couch, Kikuyu and Oxalis (Figure 3.7a) before the GWLAP and Goolwa Coastcare Group undertook on-ground works**.** Prior to revegetation there has been clearance, dumping of varying fills and soils and the introduction of various weeds and, interestingly, native plants such as samphire species. The site was fenced (Figure 3.6a) in 2010 to halt the parking of vehicles in the reserve. Revegetation has been modelled on the existing vegetation community contained in the remaining Goolwa dunes area (Figure 3.6b & 3.7b) and weeding of the site to manage natural regeneration of saltbush species such as *Threkeldia*. The Goolwa Coastcare Group is a key stakeholder in the on-going follow-up and management of this revegetation site. This site has transitioned from being low in native species cover and high in weeds (Figure 3.8a) to good native cover and low weed cover (Figure 3.8b).

In the Beach Road swamp area (Figure 3.9a & b) enhancement revegetation has planted key saltmarsh species present in other nearby samphire areas including *Gahnia filum, Juncus kraussii, Selliera radicans* and *Melaleuca halmaturorum*. Weed control remains the key focus of this site. Full lists of planted species can be arranged on speaking with the GWLAP.

Figure 3.6a: Newly installed fencing and **b:** Revegetation

Figure 3.7a: 2010 Couch and Oxalis and **b:** 2014 revegetation in keeping with existing vegetation

Figure 3.8a: 2009 Low native cover & high level of weeds **Figure 3.8b:** 2014 Re-planted shrubland

Figure 3.9a and b: Beach Road swamp area revegetation

3.2.3 Goolwa Beach carpark

Substantial work has been undertaken by the Goolwa Coastcare Group and GWLAP with Alexandrina Council support to undertake a range of on-ground activities at the Goolwa Beach Carpark including; fencing off dune areas (Figure 3.11 & 3.12), closing off unnecessary paths (Figure 3.13a & b), planting hotspot erosion areas (Figure 3.10 & 3.14), installing signage and significant weed control. Works have even involved actions to see a foot tap placed on the car-park shower for better water savings, bike-racks and improved conditions around horse management. Revegetation has collaborated closely with Bombora Café and plantings undertaken around the adjoining dune area with full support from the café owner.

Figure 3.10: Planting in hotspot erosion area

Figure 3.11: Prior to dune fencing

Figure 3.12: Fenced dune area

Figure 3.13a: Unnecessary access path before works and b: after works

Figure 3.14: Planting in hotspot erosion area

3.2.4 Tokuremoar Reserve

Several degraded areas have been targeted for enhancement revegetation including in the Kightley Triangle area (Figure 3.16), around the area east of the bikeway boardwalk area (Figure 3.15) and along the length of the Encounter Bikeway where required. Areas of large *Acacia cyclops* (Figure 3.17) and Victorian Tea-tree were removed and chipped along the Bikeway and utilised as mulch for planting seedlings into (Figure 3.18). Works have focused on species suitable to those vegetation communities with particular emphasis on bolstering existing populations of plants such as *Gahnia filum* (Figure 3.15). Goolwa Coastcare Group continues to manage these areas through regular working bees.

Figure 3.15: East of Boardwalk area

Figure 3.16: Kightley Triangle revegetation

Figure 3.17: Large *Acacia cyclops* pre-removal

Figure 3.18: Planting in-fill following planting

3.2.5 Surfers Reserve

In-fill revegetation has been undertaken through the surfers reserve area to counter the extensive removal of woody weeds such as large *Acacia cyclops*, *Leptospermum laevigatum* and *Acacia saligna.* Some of the species included in the revegetation *Acacia cupularis, Acacia longifolia ssp. sophorae, Carpobrotus rossii, Dianella brevicaulis, Ficinia nodosa, Lepidosperma gladiatum, Leucophyta brownii, Myoporum insulare, Olearia axillaris, Pelargonium australe, Rhagodia candolleana, Scaevola crassifolia* and *Threkeldia diffusa*.

3.2.6 Jute Blowout Trial

In 2009 a long term eroding dune in the Goolwa Dunes was addressed using brush and Jute netting to provide niches for seedling establishment (Figure 3.22). *Acacia longifolia var sophorae* and *Olearia axillaris* were hand seeded through the site and tubestock of dune species were broadly planted (Figure 3.21). *Carkile maritima* was present on the site and although it is a weed, seed was broadcast over more erosion prone areas**.** The short term survival of *Carkile maritima* assisted to create habitat and provide cover while indigenous seedlings established. Excellent seed germination resulted following initial sowing and has assisted in stabilising the blowout area (Figure 3.20).

Ngarrindjeri Ruwe contracting were engaged to assist throughout project (Figure 3.19). Images from Nearmap Pty Ltd. reveal the changes to the dune between 2009 (Figure 3.23) and 2014 (Figure 3.24).

Figure 3.19: Ngarrindjeri Ruwe contracting spreading brush

Figure 3.20: Stabilised blowout 2013

Figure3.21: Broadly spaced planted tubestock

Figure 3.22: Seed germination in niches created

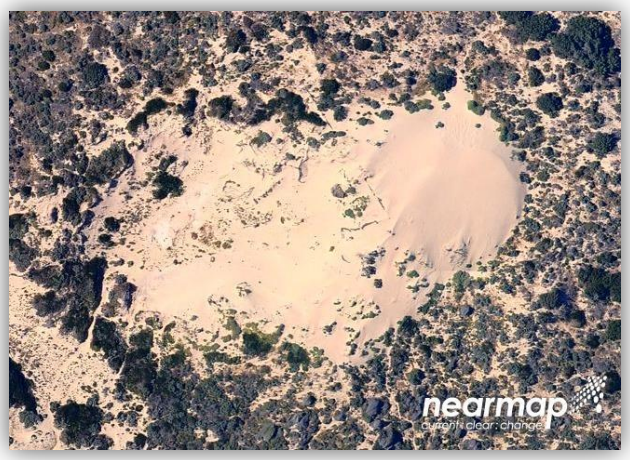


Figure 3.23: Goolwa dune blowout prior to works 2009

Figure 3.24: Goolwa blowout site following jute netting 2014

3.3 Fencing

The Goolwa Dunes is an area of high visitation; pre 2007 paths were not well defined, had old and dangerous fencing (Figure 3.30), outdated signage and required on-going protection and management. The GWLAP worked closely with Alexandrina Council and Ngarrindjeri in addressing these issues and sourced funding to achieve the results.

Fencing works have been undertaken by the GWLAP in Tokuremoar Reserve and Goolwa Dunes, involving the fencing of the foredune from the Beach Road access ramp to the eastern boundary of Tokuremoar Reserve (Figure 3.25). Since fencing was undertaken in the front of Bombora Café the formation of a substantial foredune has established (H. Chittleborough pers. comm.). This fencing was undertaken in consultation with the Alexandrina Council and provided the impetus to complete the remaining area between Beach Road and Tokuremoar Reserve, which was installed by Ngarrindjeri Ruwe contracting.

Fencing to address breaches in existing paths and renovation of the eastern boundary of the Tokuremoar Reserve fence-line was also undertaken. Tokuremoar Reserve has had fencing installed along the northern side of the Encounter Bikeway (Figure 3.26) to the corner of the adjacent private heritage areas. This was implemented by the GWLAP with funding from the Orange-Bellied Parrot Recovery Program. A second path running from Kightley Road was closed off with the main path being retained. Entrance access points were designed to limit access by dirt-bikes (Figure 3.27).

Figure 3.25: Fencing along foredune, Goolwa Beach

Figure 3.26: Fencing along the Encounter Bikeway

Figure 3.27: Entrance design to limit dirt-bikes

Extensive fencing and/or renovation of existing fencing was also undertaken by the GWLAP along all paths through the dunes from keyhole carparks (Figure 3.28), with several of the unfenced paths running through middens (Figure 3.31). One path was closed and has resulted in natural revegetation of the path, while breaches in existing fencing or areas offering alternative routes through the dunes were also fenced. Much of the existing fencing was very old,

damaged and extremely dangerous (Figure 3.30). Several paths were noted to have Painted Dragon burrows close by that were being impacted by human foot traffic (B. Simon, pers. obs.).

The access path running through the dunes from Hume Street crosses a large shell midden. Consultation and collaboration with Ngarrindjeri resulted in fencing to the edge of the midden and then placing a Dutch Ladder through the midden area (Figure 3.31) to avoid surface disturbance of the culturally significant site. Ngarrindjeri Ruwe contracting designed, built and installed the ladder and it has proven to be very successful at preventing erosion and delineating the pathway.

Figure 3.28: Newly fenced path through the dunes

Figure 3.29: Unfenced path through midden

Figure 3.30: Historic dangerous fencing, Goolwa Dunes

Figure 3.31: Dutch ladder through midden

Fencing has also been undertaken along the Beach Road swamp area (Figure 3.32) edge to limit access from bikes, as well as further delineate and protect the biodiversity value of this area. A fence was also installed along Beach Road in sections, to protect the remnant vegetation from vehicle access, especially 4WD vehicles and horse floats.

Figure 3.32: Beach Road Swamp

4 Vegetation Communities

Map 4: Broad Vegetation Communities

0 75 150 225 300 N

metres

GOOLWA TO WELLINGTON LOCAL ACTION PLANNING ASSOCIATION INC

Legend

- Acacia cupularis +/- Pimelea serpyllifolia spp serpyllifolia +/- Dianella brevicaulis Low Coastal Shrubland
- Acacia dodonaeifolia Tall Open Shrubland with emergent Allocasuarina verticillata
- Acacia longifolia spp sophorae Coastal Shrubland
- Allocasuarina verticillata Low Woodland
- Hakea mitchellii +/- Acacia dodnaeifolia Shrubland
- Lawrencia spp Low Open Shrubland
- Leucophyta brownii +/- Acacia longifolia ssp.sophorae Low Shrubland
- Leucopogon parviflorus +/- Olearia axillaris +/- Acacia sophorae Shrubland
- Lomandra effussa +/- Lepidosperma spp +/- Gahnia spp +/- Imperata cylindrica Sedgeland
- Melaleuca halmatuorum Low Woodland
- Olearia axillaris +/- Acacia cupularis Very Open Shrubland
- Olearia axillaris +/- Acacia longifolia ssp.sophorae +/- Leucopogon parviflorus Low Coastal Shrubland
- Ozothamnus turbinatus Shrubland
- Sarcocornia spp +/- Halosarcia spp Low Shrubland
- Spinifex hirsutus +/- *Euphorbia paralias +/- *Thinopyrum junceiforme Grasslands

Author: Sherie Bain
Date: 14:33 8 Dec 2014

Coord System: GDA 1994 MGA Zone 54

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4.1 Conservation Ratings

Regional Codes: Aus – Australia, **SA** – South Australia

IBRA Regional Zone: Murray Lakes and Coorong.

Sub-regional Status Codes: *Regional Species Conservation Assessments DENR South East Region (2011)*

The Goolwa Dunes and Tokuremoar Reserve are located within the SE region for the current regional assessment of conservation ratings. *Regional ratings as per Gillam, S. and Urban, R. (2011).*

Status Category	Definition / Use
RE Regionally Extinct	A taxon is **Regionally Extinct** when there is no reasonable doubt that the last individual potentially capable of reproduction within the region has died or disappeared from the region, or, in the case of a former visiting taxon, individuals no longer visit the region.
CR Critically Endangered	A taxon is **Critically Endangered** when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered, and it is therefore considered to be facing an extremely high risk of extinction in the wild
EN Endangered	A taxon is **Endangered** when the best available evidence indicates that it meets any of the criteria A to E for Endangered, and it is therefore considered to be facing a very high risk of extinction in the wild.
VU Vulnerable	A taxon is **Vulnerable** when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild.
RA Rare	A taxon is **Rare** if it occurs in small numbers, and the best available evidence indicates that it meets any of the criteria A to D for Rare, and it is at some risk due to low numbers. Taxa in this category are usually localised within restricted geographical areas or are thinly scattered over a more extensive range. This may include taxa which are perceived to be at risk for which there is insufficient information available to assign them any other category, and taxa that are considered to be dependent on ongoing conservation programs to prevent them moving into the Critically Endangered, Endangered or Vulnerable categories.
NT Near Threatened	A taxon is **Near Threatened** when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered, Vulnerable or Rare now, but is close to qualifying for or is likely to qualify for a threatened category in the near future
LC Least Concern	A taxon is **Least Concern** when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable, Rare or Near Threatened. Widespread and abundant taxa are included in this category.
DD Data Deficient	A taxon is **Data Deficient** when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that a threatened classification may be appropriate. It is important to make positive use of whatever data are available. In many cases great care should be taken in choosing between DD and a threatened status. If the range of a taxon is suspected to be relatively restricted, and/or if a considerable period of time has elapsed since the last record of the taxon, threatened status may be well justified.
NE Not Evaluated	A taxon is **Not Evaluated** when it has not been evaluated against the criteria. (Used for flora with taxonomic issues and not rated.)

Other codes

LS - locally significant. For the purpose of adding context to native plant species and community importance in the Fleurieu, this listing of **Locally Significant** has been determined so as to offer local conservation context and is based on the use of local knowledge of the area and related distribution of species and localised threats to them.

Vegetation Communities

Vegetation communities have been broken down into Dune, Low-lying Saline Areas and Inland Areas based on their location in the project area.

4.2 Dune System

4.2.1 Foredune vegetation

Spinifex hirsutus (Rolling Spinifex) +/- **Euphorbia paralias* (Sea Spurge) +/- **Thinopyrum junceiforme* (Sea Wheat-grass) Grasslands form the dominant vegetation community between Beach Road Goolwa and Surfers Parade, Middleton along what is now considered the foredune.

Occasional emergent shrubs of *Atriplex cinerea* occur along the length of the foredune and of note were several that have established since the fencing of the foredune area in 2012 (Figure 4.1 &2).

Figure 4.1: *Atriplex cinerea* (Coast Saltbush)

Figure 4.2: A developing foredune following fencing

Locally and regionally significant native plants in this zone include patches of *Atriplex cinerea* (Coast Saltbush), which are locally uncommon along this section of the coast and the occasional shrub of *Ozothamnus turbinatus* (Coast Bush-everlasting)(LC) and patches of the near threatened *Actites megalocarpa* (Coast Sow-thistle)(NT) scattered along its length.

4.2.2 Primary and Secondary Dune vegetation

Olearia axillaris +/- *Acacia longifolia ssp.sophorae* +/- *Leucopogon parviflorus* Low Coastal Shrubland (Berkinshaw 2009) (Figure 4.3a and b) forms the dominant vegetation community across the current existing primary and secondary dune areas.

Figure 4.3a and b: Example of Low Coastal Shrubland that dominates the Goolwa dune system

Ozothamnus turbinatus (Coast Bush-everlasting) (Figure 4.4) Shrubland (Figure 4.5) covers relatively small areas in the primary dune including a small yet substantial patch just west of the Goolwa Beach Carpark starting near the Surf Life Saving tower. Many of these areas appear to be in the same areas as middens. *Ozothamnus turbinatus* is listed as Least concern (LC) in the plan area but is locally uncommon and generally restricted to one zone of the dunes.

Figure 4.4: Coast Bush-everlasting Shrubland

Figure 4.5: *Ozothamnus* Shrubland, Goolwa dunes

*Leucophyta br*ownii +/- *Acacia longifolia ssp. sophorae* Low Shrubland is most prevalent in the dunes from Tokuremoar Reserve to the Cliffs carpark (Figure 4. 6) and also occurs west of Beach Road on Sir Richard Peninsula. Very degraded areas of this community are found along the Cliffs Carpark area towards Middleton that are currently dominated by *Leucophyta brownii* and **Gazania linearis* (Figure 4.7). There are opportunities to thin out Gazania on several patches of the native vegetation around the cliffs area that offer some potential for recovery of indigenous species dominance.

Figure 4.6: *Leucophyta brownii* Low Shrubland, Tokuremoar

Figure 4.7: The `Cliffs' Middleton.

Locally and regionally significant native plants recorded within this vegetation community include:

- *Acacia cupularis* (Cup Wattle) –(LC) but LS
- *Picris angustifolia ssp. angustifolia* (Coast Picris) (VU)
- *Lotus australis* (Austral Trefoil) (LC) but LS
- *Ozothamnus turbinatus* (Coast Bush-everlasting) (LC) but LS
- *Exocarpos syrticola* (Coast Cherry) (LC) but LS

Lotus australis (Austral Trefoil) has been observed over the past five years as declining at several historical locations and threatened by weed invasion in areas currently infested with Gazania in the Surfers Reserve area, and in the area near Trevalean Street carpark, which is infested with Pyp Grass. *Lotus australis* has been included in revegetation activities on several sites in the Goolwa Beach area by the GWLAP, particularly on the Beach Road

revegetation site (Map 3) to enhance remnant populations. All seed was collected from the Goolwa Dunes and Sir Richard Peninsula.

4.3 Low-lying Saline Areas

Melaleuca halmaturorum (Swamp Paper-bark) Woodland is found in low-lying, often saline parts of the landscape, with the largest stand found in Tokuremoar Reserve. This same patch also extends into Newell Avenue Reserve in two particular sections, with the Newell Avenue Reserve containing a significant patch of saltmarsh which becomes inundated for extended periods (Figure 4.8). This patch also extends north into two other tenures including a small section in the south-western corner of the Goolwa Waste and Recycling Depot and the adjoining western unmade road. The *Melaleuca halmaturorum* Woodland community in the project area contains an understorey which is dominated by various chenopods including *Einadia nutans ssp. nutans* (Climbing saltbush) +/- *Rhagodia candolleana ssp. candolleana* (Sea-berry saltbush) +/- *Tetragonia implexicoma* (Bower spinach) with open areas of *Sarcocornia quinqueflora +/- Halosarcia pergranulata ssp pergranulata* Low Shrubland forming several natural amphitheatres surrounded by *Melaleuca halmaturorum* (Figure 4.9). The age of many existing *Melaleuca halmaturorum* (Figure 4.10) has been estimated by the South Australian Herbarium to be over 500 years old (*Tokuremoar Reserve Management Plan Part A, 1998*). Healthy and diverse saltmarsh vegetation (Figure 4.11) with a range of unique and often rare plants occurs in these open areas, particularly around the fringe of the *Melaleuca halmaturorum* Woodland.

Figure 4.8: Flooded lagoon, Newell Avenue Reserve (Pic P. Barron)

Figure 4.9: Clearings forming natural amphitheatres

Figure 4.10: *Melaleuca halmaturorum*

Figure 4.11: Healthy and diverse saltmarsh vegetation

This vegetation community contains high numbers of rare and threatened plant species for such a relatively small area. Since the flooding of the site in 2013, the understorey dominated by Chenopods such as *Rhagodia candolleneana, Atriplex semmibaccata* and *Tetragonia implexicoma* largely drowned and is now regenerating on the site. There was also a large amount of *Solanum nigrum* (Black Nightshade) that germinated as the water receded (B. Simon pers. obs.). 'This woodland area is the largest and best preserved on the Fleurieu Peninsula and

in South Australia' (*Tokuremoar Reserve Management Plan, Part A 1998*). The area containing this vegetation community has a number of historical fence lines from past farming, including one that has formed an interesting corridor through thick *Melaleuca halmaturorum* (Figure 4.15).

Significant (either regionally or locally) native plants recorded during the survey within this vegetation community include:

- *Apium annuum* (Annual celery) (LC)
- *Gahnia filum* (Thatching grass) (LC) patches fringing the samphire swamp
- *Haloragis aspera* (Rough Raspwort) (RA)
- *Hemichroa pentandra* (Trailing Hemichroa) (LC)
- *Hydrocotyle capillaris* (Thread Pennywort) (LC)
- *Lawrencia glomerata* (Clustered Lawrencia) (RA)
- *Lawrencia spicata* (Salt Lawrencia) (LC) (Figure 4.13)
- *Lawrencia squamata* (Thorny Lawrencia) (RA)
- *Selliera radicans* (Shiny Swamp-mat) (LC)
- *Mimulus repens* (Creeping Monkey-flower) (LC)
- *Triglochin mucronatum* (Prickly arrow-grass) (RA) and
- *Wilsonia rotundifolia* (Round-leafed Wilsonia) (NT) (Fig 4.14)

Notable species include *Senecio spanomerus* that has emerged after the last flooding and a number of patches of *Mimulus repens* (Creeping Monkey Flower) (Figure 4.12a and b) found in the Newell Avenue Reserve saltmarsh lagoon.

Figure 4.12a and b: *Mimulus repens* (Creeping Monkey Flower) in Samphire community, Newell Avenue Reserve.

Figure 4.13: *Lawrencia spicata* (Salt Lawrencia)

Figure 4.14: *Wilsonia rotundifolia* (Round-leaf Wilsonia)

Figure 4.15: A corridor of tea-tree following an old fence line, Tokuremoar Reserve

Sarcocornia quinqueflora +/- *Halosarcia pergranulata ssp pergranulata* Shrubland is found on four sites within this project area including Newell Avenue Reserve (Figure 4.18), Tokuremoar Reserve (Figure 4.19), a small area on the Goolwa Waste and Recycling Depot and at the Beach Road swamp area (Figure 4.20). These areas were once connected, extending from Tokuremoar Reserve, east behind the dunes, through the now South Lakes Golfcourse to the Murray River Channel. "The Golfcourse had a small creek-line running through to the South Lakes Golfcourse known as Aggies Creek and there are still relics of this community found on the Goolwa South Lakes Golfcourse, which was previously a salt paperbark swamp" (G .Lundstrom pers. comm.). Several patches have plants not found elsewhere and form important insights into the wider diversity of this community that once extended along much of the backdune low-lying areas.

Significant native plants recorded during the survey within this vegetation community largely include all the plants listed under the *Melaleuca halmaturorum* woodland community however; the following notable species were also recorded at the Beach Road swamp area:

- *Angianthus pressianus* (Salt Angianthus) (LC) (Figure 4.17)- LS
- *Hemichroa pentandra* (Trailing Hemichroa) (LC) (Figure 4.16) -LS

- *Triglochin sp* (Arrow Grass) –LS
- *Wilsonia humilis* (Silky Wilsonia) (NT) and LS

Figure 4.16: *Hemichroa pentandra*

Figure 4.17: *Angianthus press*ianus

Figure 4.18: Newell Avenue Reserve

Figure 4.19: Tokuremoar Reserve

Figure 4.20: Beach Road swamp area

Lawrencia squamata +/- Sarcocornia quinqueflora +/- Halosarcia pergranulata ssp pergranulata Low Shrubland (Figure 4.21) forms a distinct community in Tokuremoar Reserve on a low-lying saline flat over a relatively small area. *Lawrencia* spicata and *Lawrencia glomerata* were observed more in small patches or single plants within the saltmarsh swamp areas within the *Melaleuca halmaturorum* Woodland areas. *Lawrencia squamata* in Tokuremoar Reserve was inundated for several weeks in 2012 and resulted in the death and or dieback of much of the *Lawrencia* and samphire, but is returning as new seedlings or fresh growth on the site (Figure 4.22).

Figure 4.21: Lawrencia squamata +/- Sarcocornia shrubland

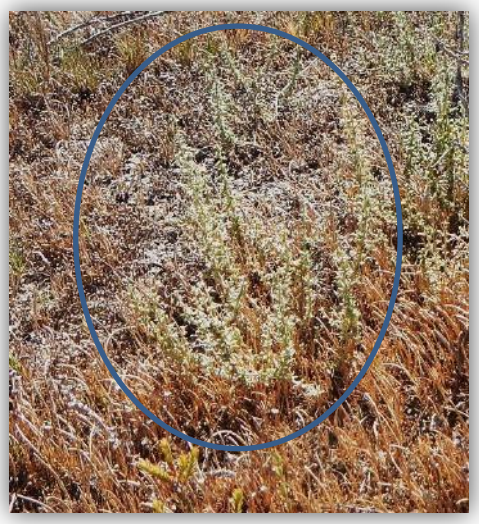


Figure 4.22: *Lawrencia* seedling

Olearia axillaris +/- Acacia cupularis Very Open Shrubland (Figure 4.23) is a distinct area of vegetation occuring in the south-western corner of Tokuremoar Reserve on an area of sand on calcrete (Figure 4.25). This low-lying area supports emergent *Melaleuca halmaturorum* and areas *of Juncus kraussii, Ficinia nodosa*, *Kunzea pomifera*, *Samolus repens* and *Selliera radicans. Acacia cupularis* was mostly observed growing prostrate or procumbent on the shallow sands (Figure 4.24).

Pultenaea tenuifolia has been observed on several occasions over the past five years occurring in this area but appears to have been lost (perhaps temporarily) following the flooding in 2012 that occurred in this low-lying area of Tokuremoar Reserve. There are no other patches of this plant in Tokuremoar Reserve, with the nearest populations being found on the private heritage blocks at Goolwa. It should be considered locally significant (LS)

Significant numbers of *Pultenaea tenuifolia* have been propagated and planted in revegetation sites in Newell Avenue Reserve, Golfview Road and sites on adjoining private property. Seed was collected as part of the GWLAP seedbank project and was also provided to the CLLMM Recovery Program for nearby project planting sites.

Figure 4.23: *Olearia axillaris +/- Acacia cupularis* Very Open Shrubland

Figure 4.24: Prostrate *Acacia cupularis*

Figure 4.25: Shallow sand on calcrete

Significant plant species recorded in this vegetation community include:

- *Acacia cupularis* (Cup Wattle) (LC) but LS
- *Sellaria radicans* (Shiny Swamp-mat) (LC) but LS
- *Samolus repens* (Creeping Monkey-flower) (LC) but LS
- *Kunzea pomifera* (Muntries) (LC) but LS and
- *Spergularia marina* (Salt Sand-spurrey) (NT)
- *Triglochin mucronata* (Prickly Arrowgrass) (RA)

Recommendation: manage key threats to this community such as rabbits, Sea Lavender, Wild Gladiolus and invasive grasses such as Couch, Kikuyu and *Sporobolus africanus* (Rat-tail Grass)

4.4 Inland Areas

Allocasuarina verticillata (Drooping Sheoak) Low Woodland in Goolwa occurs slightly inland from the coastal dune systems on both sand and sand over limestone sites. It occurs in a small area of Tokuremoar Reserve (Figure 4.26) and a significant patch can be found in the Goolwa Waste and Recycling Depot (Figure 4.27). This vegetation community is locally significant, with only few examples of this community remaining in the Alexandrina Council area.

Important patches of this community adjoin these sites and form a substantial portion of private land being actively managed for conservation with formal protection afforded via heritage agreements. Other notable areas of this vegetation community occur as various plant associations on other Alexandrina council reserves in Goolwa including:

- Slaughter Reserve – Main Road Goolwa, has high native plant species diversity including species not found in other Sheoak patches in Goolwa such as *Hardenbergia violacea* (Native Lilac). This site is currently receiving weed control via GWLAP
- Walter Newell Reserve (formerly Ferguson Reserve) - being actively managed via Alexandrina Council and Trees For Life
- Bradford Reserve –This reserve has a mid-storey of *Dodonea viscosa spp spatulata* which is not well represented in other Sheoak Woodland reserves in Goolwa. This site is currently receiving weed control via GWLAP
- Wilmett Reserve – houses several rare plants and offers opportunities to link with Walter Newell Reserve via revegetation in the cleared areas
- Pitt Street Reserve – has high species diversity and several rare plants for such a small area. This site is being actively managed by the Alexandrina Council, Bush For Life and the GWLAP.

Significant native plants recorded during surveys within this vegetation community include:

- *Acacia cupularis* (Coast Umbrella-bush) (LC) but LS
- *Acacia dodonaeifolia* (Hop-bush Wattle) (RA)
- *Adriana quadripartita* (Coast Bitter-bush) (LC) but LS
- *Caladenia latifolia (*Pink Caladenia) in Tokuremoar Reserve. LS
- *Comesperma volubile* (Love Creeper) (LC) but LS
- *Gahnia deusta* (Limestone Saw-sedge) (NT)
- *Gahnia lanigera* (Black Grass Saw-sedge) (NT)
- *Hakea mitchelii* (Heath Needlebush) (LC) but LS
- *Hakea vittata* (Limestone Needlebush)-(LC) but LS
- *Lomandra collina* (Sand Mat-rush) (RA)
- *Lomandra effusa* (Scented Mat-rush) (LC) but LS
- *Lomandra juncea* (Desert Mat-rush) (NT)
- *Lomandra leucocephala* (Wooly Mat-rush) (NT)
- *Lomandra sororia* Sword Mat-rush) (RA)
- *Wahlenbergia littoricola* (Coast Bluebell) (NT) (Figure 4.28)

Figure 4.26: Sheoak woodland at Tokuremoar

Figure 4.27: Goolwa Waste Depot

Figure 4.28: *Wahlenbergia littoricola*

Hakea mitchellii +/- Acacia dodonaeifolia Shrubland (Figure 4.29) was observed in the Goolwa Waste and Recycling Depot in a small area currently marked as a conservation zone. The patch is under severe pressure from edge effects due it its small patch size. *Hakea mitchellii* is one plant that appears to be disappearing from some of the remnant areas around Goolwa. Anecdotal reports indicate that *Rattus lutreolus* (Swamp Rats) have undermined large shrubs, often causing them to fall over or disturbing the sensitive proteaceous root system and drying out the top soil profile. *Calyptorhynchus funereus* (Yellow-tailed Black Cockatoos) have also been observed severely damaging some shrubs whilst seeking out seed pods, causing concerns over a lack of opportunities for natural succession (K. Dennis pers. comm.).

A hybrid between *Acacia paradoxa* (Kangaroo Thorn) and *Acacia dodonaeifolia* (Hop-bush Wattle) was also recorded in this patch of vegetation and has been seen on several occasions on the neighbouring heritage agreement properties.

Acacia pycnantha (Golden Wattle) was recorded in this patch of vegetation and was not common in the other areas (Figure 4.30).

Figure 4.29: *Hakea mitchellii* in foreground

Figure 4.30: *Acacia pycnantha*

Lomandra effusa +/- Lepidosperma spp +/- Gahnia spp +/- Imperata cylindrica Low Sedgeland was observed on the Goolwa Waste and Recycling Depot (Figure 4.31a and b) and had excellent species diversity, including five *Lomandra* species being recorded on this site. This vegetation community is likely to be endangered locally, possibly fitting under the definition of Iron-grass Natural Temperate Grassland of South Australia due to the dominance of *Lomandra* and sedge species in this site and high prevalence of *Lomandra effusa*. Whilst *Imperata cylindrica* (Blady Grass), in itself, is rare in the sub-region, the large stand found in the Goolwa Waste and Recycling Depot is of a particularly rare occurrence on the Fleurieu Peninsula. There are also small, good quality examples of this vegetation community on the western unmade road reserve adjoining the Goolwa Waste and Recycling Depot.

An almost continual connection exists between this remnant vegetation community and the communities found in the private heritage areas east of the Goolwa Waste and Recycling Depot, see Map 4.

Quality areas of this community currently have some overstorey consisting of Aleppo Pine (Figure 4.32) and Victorian Tea-tree. The area could be vastly improved through the cutting and chipping of these weeds and the site offers good access for appliances to use low impact machinery.

Figure 4.31a & 4.31b: Grassland/Sedgeland on the Goolwa Waste and Recycling Depot

Figure 4-32: Quality Sedgeland with Aleppo Pine

Significant native plants recorded during surveys within this vegetation community include:

- *Acacia cupularis* (Coast Umbrella-bush) (LC) but LS
- *Acacia dodonaeifolia* (Hop-bush Wattle) (RA)
- *Adriana quadripartita* (Coast Bitter-bush) (LC) but LS
- *Acacia spinescens* (Spiny Wattle) (LC) but LS
- *Imperata cylindrical* (Blady Grass) (RA)
- *Gahnia deusta* (Limestone Saw-sedge) (NT)
- *Gahnia lanigera* (Black Grass Saw-sedge) (NT)
- *Hakea vittata* (Limestone Needlebush) (LC) but LS
- *Lomandra collina* (Sand Mat-rush) (RA)
- *Lomandra effusa* (Scented Mat-rush) (LC) but LS
- *Lomandra juncea* (Desert Mat-rush) (NT)
- *Lomandra leucocephala ssp. robusta* (Wooly Mat-rush) (NT)
- *Lomandra sororia* (Sword Mat-rush) (RA)

Acacia dodonaeifolia Open Shrubland occurs as a dominant species in areas on the Goolwa Waste and Recycling Depot where it grows over *Kunzea pomifera +/- Imperata cylindrica +/- Ficinia nodosa*. This vegetation community is found in adjoining private heritage agreement properties to the East where it has been described as an *Acacia dodonaeifolia* Open Shrubland with emergent *Allocasuarina verticillata* (B. New & J. Edwards pers. comm.).

Acacia dodonaeifolia (Figure 4.36c) is a state rare species of wattle and is also regionally significant in both the SAMDB and AMLR regions.

Significant native plants recorded during surveys within this vegetation community include:

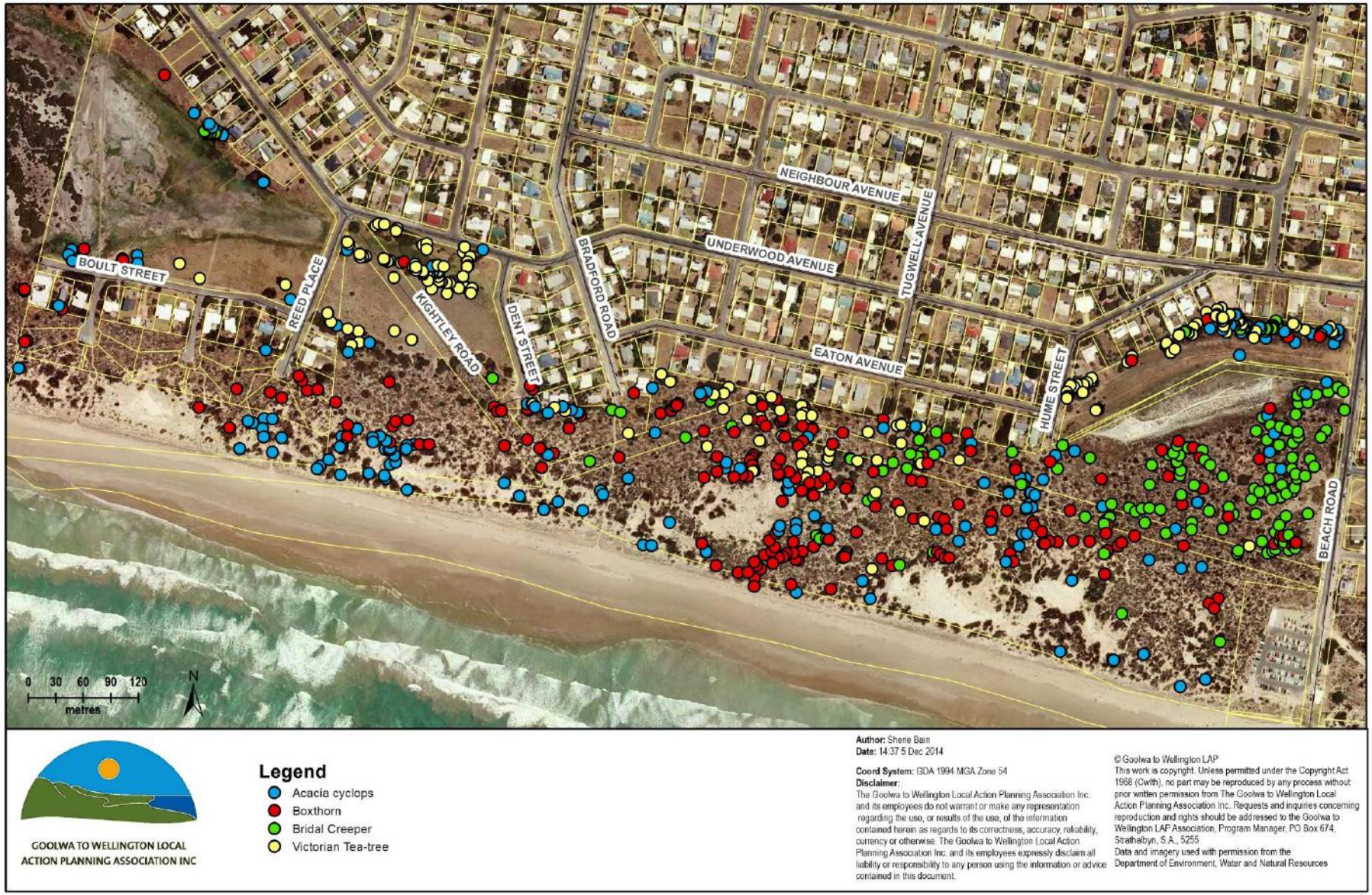
- *Imperata cylindrica* (Blady Grass) (RA)
- *Acacia cupularis* (Coast Umbrella-bush*)* (LC) but LS
- *Acacia dodonaeifolia* (Hop-bush Wattle) (RA)
- *Hakea mitchellii* (Heath Needlebush) (LC) but LS
- *Lomandra leucocephala ssp robusta* (Woolly Mat-rush) (NT)
- *Lomandra juncea* (Desert Mat-rush) (NT)

Figure 4.32a and b: *Acacia dodonaeifolia* Open Shrubland on Goolwa Waste and Recycling Depot

Figure 4.36: *Acacia dodonaeifolia*

5 Goolwa Beach Dunes – (Beach Road to Tokuremoar Reserve boundary)

Map 5: Key weeds



5.1 Key Weeds

The following four plants have been grouped together as Key Weeds as they were those most commonly encountered, have a negative effect on the structural component of existing remnants and are considered listed as 'red alert' weeds in the Goolwa area (Caton. et al 2007). There are several other weeds that have a serious effect on the structure of native vegetation (e.g. Boneseed), but due to the very low numbers (a result of targeted control work over the past seven years) they have been combined under another composite group called Other Weeds, see maps 7 and 8.

***Acacia cyclops* (Western Coastal Wattle)** was recorded as being fairly scattered through the Goolwa Dunes. Most of the records are of smaller plants, however there are still some large plants present closer to the ocean that are procumbent in nature due to the windier conditions (Figure 5.2). These large shrubs would be best sprayed in-situ with Triclopyr (Garlon©), as many of the stems are buried in sand and are time-consuming to cut and swab effectively (Macpherson Horticulture pers. comm.). The spraying in-situ approach was trialled in 2013 in order to offer a more cost and time-effective control method.

Other remaining large *Acacia cyclops* are found in greatest density along the southern border of properties to the south of Neighbour Avenue and some to the east of Hume Street.

Since 2009, the GWLAP has undertaken control works on *Acacia cyclops* throughout the Goolwa Dunes. In particular, the widest portion of the dunes from Beach Road to Hume Street was targeted. Victorian Tea-trees were treated at the same time and has resulted in good regeneration of colonising natives such as *Senecio pinnatifolius* (Figure 5.1). Most of the existing mapped *Acacia cyclops* and Victorian Tea-tree within this area are small to medium shrubs that were either missed or have grown since this control work.

In 2013 the boundary of Tokuremoar Reserve to Bradford Road was treated with the remaining mapped points also being either missed, large procumbent shrubs or small remaining seedlings. It appears there has been minimal subsequent germination of seedlings in most of the areas already treated, see Map 5.

Figure 5.1: Regenerating *Senecio pinnatifolius* following Acacia and Victorian Tea-tree removal

Large *Acacia cyclops* were recorded along the northern and southern boundary of the Boult Street and Dent to Reed Street Reserves, where there are also several valuable patches of native plants. Controlling these woody weeds would integrate well with fuel reduction activities around urban council areas and address outliers not currently receiving any treatment.

Recommendation: Follow-up work required on areas first treated to ensure new seedlings are removed. Goolwa Coastcare Group and contractors have commenced this work. Ideally, the eradication of *Acacia cyclops* on adjoining residential properties and roadsides need to be addressed through community education and consultation. Continue annual scout for *Acacia cyclops* across the Goolwa dunes.

Figure 5.2: Large procumbent *Acacia cyclops* close to foredune

***Asparagus asparagoides* (Bridal Creeper)** was most prevalent in the lower-lying protected area of the Goolwa Dunes, particularly in the north-eastern corner of the reserve. This area is afforded better protection from salt-spray and winds, retains moisture and therefore provides favourable conditions for Bridal Creeper, unlike the exposed sites closer to the ocean or on north-facing dunes. Most plants are observed amongst large dead or living wattles (Figure 5.3).

Bridal Creeper Rust was observed on some of the infestations and appears most effective in the lower-lying areas. Despite rust presence, it was observed as possibly having a limited effect on flowering as many plants were observed with abundant fruit.

Recommendation: Consideration should be given to having Bridal Creeper sprayed out using skilled contractors. Good results have been recorded using Triclopyr (Garlon®) or Mestsolphuron Methyl (Ally) at a rate of 0.2 grams per 15 L of water and pulse (K. Brewer pers. comm.). Alternatively, options to improve rust prevalence and performance on the site may be worthwhile. Repeated application of rust has been successful in the Newland Head Conservation Park using aerial application with aircraft (C. Taylor pers. comm.).

Figure 5.3: Typical Bridal Creeper habit in Goolwa dune swales where it was often found in dead or dying open shrubs

***Lycium ferocissimum* (Boxthorn)** was recorded where the plant was found still alive, including any recently treated plants with new re-growth requiring follow-up. As Map 5 - Key Weeds indicates, Boxthorn is most prevalent between Hume Street and Bradford Road. Amongst other large woody weeds, there are several very large Boxthorn along the northern boundary that have been left untreated due to their proximity to residential properties (Figure 5.4).

Works have occurred in the Goolwa Dunes since 2007 to manage Boxthorn by the GWLAP and prior to this by the Alexandrina Council. Treatment via basal bark application of Access (or Triclopyr) and diesel has shown to be effective at treating most plants through current activities on this site. This method does not perform well on old large examples which are best cut and swabbed with follow-up spraying of re-growth or basal bark treatment. Hand pulling small seedlings can be effective if soil is moist or in deep sand.

Recommendation: Consultation needs to be undertaken with adjacent neighbours along the entire length of the Goolwa Dunes to raise awareness of woody weeds. Prioritised Boxthorn control should be continued, working on recently treated areas, such as Trevalean Street to Bradford Road, last. Annual patrol for boxthorn required

Figure 5.4: Large boxthorn on northern boundary

Leptospermum laevigatum **(Victorian Tea-tree)** was recorded in highest density between Hume Street and Bradford Road with many being either small to medium-sized or treated plants which are still alive. Several very large shrubs have been left along the northern boundary due to proximity to residential properties. Extensive works have occurred on this species since 2007 by the GWLAP and are scheduled for further works in the coming year.

There are still several large Victorian Tea-trees in the Beach Road swamp area closer to Neighbour Avenue's residential boundaries and on adjoining roadsides.

Figure 5.5: Before Tea-tree removal works

Figure 5.6: After Tea-tree removal works, Goolwa Dunes by GWLAP

Map 6: Groundcover Weeds

5.2 Groundcover Weeds

This section covers the most prevalent groundcover weeds across the target area. Groundcover weeds were generally found affecting the ground-layer and can climb and cover areas such as fencing and shrubs. *Asparagus asparagoides* (Bridal Creeper), a prevalent groundcover in the eastern half of the Goolwa Dunes, has been covered under 5.1 Key Weeds.

***Arctotis stoechadifolia* (Arctotis)** was most prevalent between Hume Street and Bradford Road where it forms several large patches through the dunes. This common garden escapee appears to persist in any of the dune zones including the foredune and has the potential to move at medium pace through the dune system. It spreads vegetatively and we presume by seed given it has returned to some previously treated areas (Macpherson Horticulture pers. comm.). This patch extends north into a private residential block where it is believed to be re-infesting the dunes. Extensive initial control work has occurred on this patch (Figure 5.7 and 5.8), which extended over twice the mapped area and further works are scheduled for 2014/15 financial year with the GWLAP in conjunction with Goolwa Coastcare Group.

Recommendation: Use only selective herbicide where there are patches of *Baumea juncea* (Blue twig-rush) present such as near the Hume Street carpark (Figure 5.9). Joint works with owners of the adjoining private properties would greatly decrease re-infestation of Goolwa Dunes. Follow up via annual patrols for seedlings and runners.

Figure 5.7: Prior to works 2009

Figure 5.8: After control works 2014

Figure 5.9: *Baumea juncea* amongst *Arctotis*

Crassulaceae weeds have been grouped to include several closely related species in the *Crassulaceae* family. *Aeonium arboretum* (Figure 5.10), *Aeonium haworthii* (Figure 5.11) and *Cotyledon orbiculata* all have very similar habitats and are all largely found within the same area of the Goolwa Dunes. The treatment for these species is likely to be similar. It is likely that hand pulling and removal of plant material from the site is one of the most feasible control options. It is worth noting that these weeds have infested very large areas of Sir Richard Peninsula where it now presents an almost insurmountable task.

Recommendation: The removal of this weed from the Goolwa Dunes can occur in conjunction with Goolwa Coastcare Group and other volunteer groups over the next three years via hand pulling and bagging of plants. Educate adjacent residents about risks associated with planting succulents in gardens

Figure 5.10: *Aeonium arboretum*

Figure 5.11: *Aeonium hawthornii*

***Galenia pubescens* (Coastal Galenia)** is considered of high priority for control due to its ability to form large blankets of cover (Figure 5.12), inhabit saline environments and the relatively difficult means of control. Only two populations were recorded within the mapped areas and should be dealt with as soon as possible.

It is worth noting that this weed is present on several adjoining parcels of land including vacant blocks, parks and significant large patches in the Goolwa Waste and Recycling Depot.

The highest priority patch is the area of open reserve between Redcliff and Boult Street where there has been control works undertaken in the past. Since this area was flooded in 2012 Galenia has recolonised and. There are now over 50 individual plants.

Recommendation: Follow-up all known historical localities and hand pull or spot spray larger patches with Triclopyr/Picloram (Grazon©) as required. Be aware of residual chemical build-up on repeat treated areas.

Figure 5.12: Large blankets *Galenia pubescens*

***Gazania linearis* (Gazania)** was one of the most commonly encountered groundcover species mapped in the Goolwa Dunes. Gazania is one of the highest threats to native vegetation ground-layer structural health in the Goolwa Dunes system. Given its ability to outcompete with most understorey species, the control of this species will be a high priority activity for continued works. This species is still considered controllable at its current density in the dunes.

Work undertaken between Beach Road and Hume Street since 2007 shows promising results from several years of spot spraying through GWLAP funded programs. Long-line spraying coupled with follow-up hand pulling by the Goolwa Coastcare Group has proven an effective approach to date. NR AMLR have been undertaking control in the Surfers Reserve area to push back weed-fronts which appears to have successfully thinned out the infestation.

Significant point source areas for attention (to ensure that treated areas are not continually re-infested) include the northern boundary of the Goolwa Dunes Reserve, Beach Road, Dent Street Reserve and Boult Street Reserve where there are still several large patches on the road verge and vacant land.

Key roadsides could be targeted for more 'remove and replace' programs as they are contributing to continual incurrences into managed bushland areas. Target areas include:

- Beach Road from the Carpark to Goolwa - Victor Harbour Road
- Dent Street
- Boult Reserve
- Vacant house blocks backing onto reserves

Consideration could be given to investigating a `Gazania Barrier' along edges of weed fronts (Figure 5.13) using high grade fine mesh to lessen seed incurrences into the better quality areas, particularly wind borne seed. This could be useful where Gazania on vacant land is continually infesting reserves in this Tokuremoar Action Plan area.

The GWLAP and the NR AMLR have invested in chemical control trials for Gazania to determine most effective and species selective options. Creation Care Pty Ltd has had some success with controlling Gazania using a boom-spray unit for large open areas in Goolwa. Hand pulling of this species has occurred on several sites by the Goolwa

Coastcare Group over the past seven years and has focused on those plants that are intertwined with native vegetation.

Recommendation: Consideration could be given to investigating a `Gazania Barrier' along edges of weed fronts. Continue treating outlier patches and individual plants. Undertake more awareness raising with community regarding this weed. Consider boom spraying large areas. Hand chipping low density patches is worthwhile.

Figure 5.13: Large patches of Gazania off Dent Street

Figure 5.14: Typical higher density Gazania close to path

Mesemryanthemum cristallinum **(Iceplant)** (Figure 5.15) was recorded in only a handful of locations in the Goolwa Dunes. All of the sites where it was observed had suffered some form of soil disturbance in the past, and several sites have been long-term persistent sites requiring regular monitoring and control. Prevalence of Iceplant has increased along the northern boundary of the Goolwa Beach Carpark where horse manure has been carelessly dumped into the reserve and suspect that the manure has brought in ice-plant.

Figure 5.15: Iceplant (*Mesemryanthemum cristallinum*)

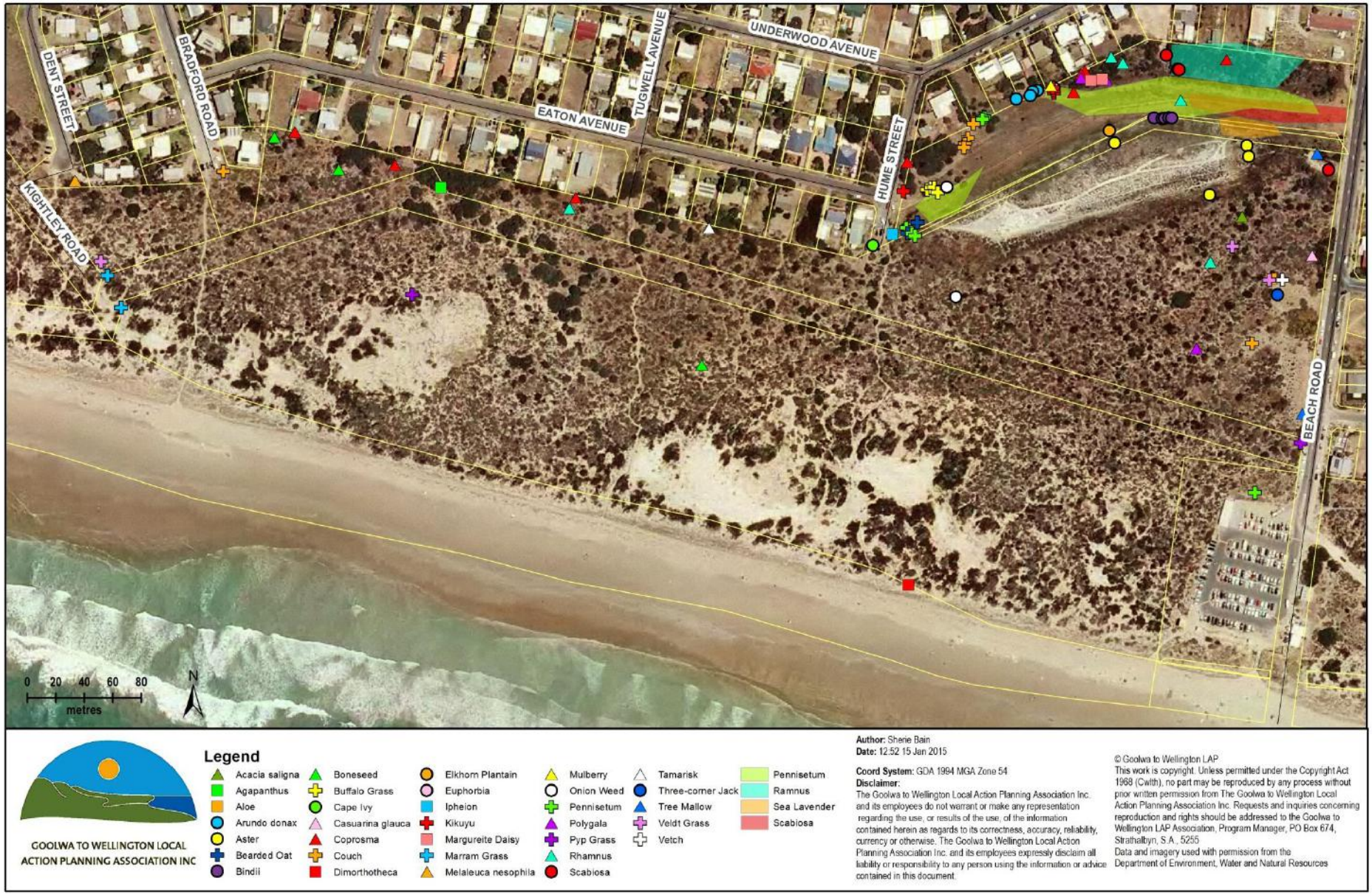
Recommendation: It is recommended that all known locations continue to be monitored and treated regularly.

Osteospermum fruiticosum **(Seascape Daisy)** (Figure 5.15), a common garden escapee, was recorded in four distinct clusters in the Goolwa Dunes. This weed should be considered a high priority as it tends to produce prodigious amounts of seed and seedlings that require follow-up for several years after the parent plant has been removed. Earlier works undertaken by the GWLAP using foliar application has proved effective (Figure 5.17a &b).

Figure 5.16: Seascape Daisy near Goolwa Beach carpark

Figure 5.17a and b: Seascape Daisy in Tokuremoar Reserve pre-treatment and post-treatment with Triclopyr (Garlon©)

Map 7: Goolwa Beach Dunes East – Other Weeds



Map 8: Goolwa Beach Dunes West – Other Weeds


NEIGHBOUR AVENUE
UNDERWOOD AVENUE
TUGWELL AVENUE
EATON AVENUE
BOULT STREET
REED PLACE
KIGHTLEY ROAD
DENT STREET
BRADFORD ROAD
0 20 40 60 80
metres
N
GOOLWA TO WELLINGTON LOCAL ACTION PLANNING ASSOCIATION INC
Legend
Agapanthus
Boneseed
Buffalo Grass
Caltrop
Cape Weed
Carpobriotus edulus
Cocksfoot
Coprosma
Couch
Gladioli
Kikuyu
Marram Grass
Melaleuca nesophila
NZ Christmas Bush
Old Man Salt Bush
Olive
Phalaris
Picris
Plantain
Pyp Grass
Sage
Scabiosa
Dwarf Sea-lavender
Veldt Grass
Weedy Geranium
Pyp grass
Scabiosa
Coprosma
Author: Sherie Bain
Date: 13 01 15 Jan 2015
Coord System: GDA 1994 MGA Zone 54
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5.3 Other weeds

There were many weeds recorded during the mapping undertaken for this project, however many were in small numbers, patches or even single plants which made it hard to present the total of all weeds recorded on one map without crowding. Therefore, east and west maps were generated; see Maps 7 and 8.

Polygala myrtifolia **(Myrtle-leaf Milkwort)** (Figure 5.18) was recorded in four locations and is considered a high priority for continued follow-up in these areas. Polygala can grow in good quality native vegetation and can withstand shade. In most cases it was recorded near boundaries close to housing. However there have been populations found some distance from housing which may suggest the seed is spread by birds and/or foxes. Polygala has recently been declared.

All populations were either pulled when mapped or have been treated since the commencement of this plan, by a contractor and Goolwa Coastcare Group, to halt seed pod formation.

Recommendation: Continual follow-up is recommended for all locations. Hand-pull where possible. Cut and swab larger plants with Triclopyr and diesel. Community needs to be made more aware of its weed risk via engagement.

Figure 5.18: Polygala, Goolwa Beach Dunes

Figure 5.19: Dense Pyp Grass off Reed Place

Ehrharta villosa var. maxima **(Pyp Grass)** was recorded and mapped in the Goolwa Dunes and is a high priority for containment. One significant patch between the boundary of Tokuremoar Reserve and Reed Place has formed a dense thatch (Fig 5.19). An obvious weed front follows the southern boundary and it is recommended that this be pushed north in order to maintain the better quality dune swales and middens existing here. Although it will require a long-term commitment through funded control works, it is conceivable that this patch could be contained and contracted to a smaller area via slashing and spraying.

Within this patch of Pyp Grass several plants of *Lotus australis* were observed near Reed Place by Ben Simon in 2011. These plants were unable to be located again during this survey and it is believed that they have since been overtaken by Pyp Grass (B. Simon pers. obs.).

Another important outlier patch, that is currently only small, was recorded near the Jute blowout trial between the paths through the dunes at Tugwell Street and Bradford Road. A point has been marked near the Beach Road Carpark where there has been historical control works occurring to prevent the further migration of Pyp Grass into the Goolwa Dunes. It is vital that follow-up remains a high priority for this area. Several isolated patches occur further along Beach Road which should be included in control works.

Note: there are large areas of Pyp Grass to the east of Beach Road in Sir Richard Peninsula; however this area is beyond the scope of this Plan.

Recommendation: No new patches of Pyp Grass to establish in the Goolwa Dunes, whilst focussing on the eradication of the two existing isolated patches. Containment of Pyp Grass is essential for the Reed Place patch and consideration should be given to undertaking works to push the weed-front back from the southern and western extents of the infestation.

***Ammophila arenaria* (Marram Grass)** has been recorded as being planted through the Goolwa Dunes, dating back to 1903 (The Advertiser, 1 August 1904) and as part of an initiative called the `Red scheme' in the 1970s (G. Lundstrom pers. comm.). Marram Grass was planted to assist in mitigating erosion and still appears to be serving a purpose in assisting to bind relatively sensitive areas. Despite this, it was observed to be causing some erosion from swirling of winds around isolated tussocks (Figure 5.20). During this survey, Marram Grass was recorded near historical drift net areas and midden sites which would suggest that it was planted in these locations. The few locations recorded on Maps 7 and 8 indicate groups of tussocks.

Figure 5.20: Swirling effect around a tussock of Marram Grass

Recommendation: Outliers should be removed via hand pulling or cut and swab where low erosion risks occur. Monitor spread of larger patches.

***Ehrharta calycina* (Veldt Grass)** was only recorded where there were patches that could be easily controlled due to their small size. Larger infestations in other parts of the coast such as Tokuremoar Reserve did not have the perimeter mapped due to their size and patchiness.

Recommendation: Outlier patches should be removed via spot spraying with glyphosate or chipping out before they become an insurmountable problem.

***Rhamnus alaternus* (Blow-fly bush)** was recorded and most prevalent in the reserve backing onto Neighbour Avenue and was scattered in medium density throughout much of the area. Rhamnus is predominantly spread by birds and possibly foxes and should be considered a high priority for control as it can form large thickets and is long lived. Rhamnus has been subject to targeted control in the Goolwa private heritage areas for the past ten years through GWLAP funding to reduce the density to low levels.

Recommendation: Control via cutting and swabbing with Triclopyr (Garlon©) and Diesel mix and hand pulling of small seedlings. Large Rhamnus is best controlled using frilling, drilling and filling or basal bark application and left in-situ. Collaboration with neighbouring landholders on the eradication of this weed would be valuable.

Couch, Kikuyu and Buffalo Grass (Fig 5.21) have been recorded where they appeared as outliers and offered opportunity for practical control. Patches extend out from reserve boundaries or exist on disturbed sites, such as the Beach Road revegetation site (Map 3), where it appears to have been brought in by contaminated fill.

Figure 5.21: Buffalo Grass

Recommendation: Push areas back toward reserve boundaries using foliar spraying with appropriate chemicals for the situation.

Coprosma repens **(New Zealand Mirror-bush)** was recorded often and generally located close to housing. It is spread most readily by birds and grows rapidly to out-compete natives. It should be considered a high priority for control and early intervention.

Figure 5.22: Coprosma growing within Coastal wattle

Recommendation: Work with residents and council to target control works on private blocks. Cut and swab with glyphosate or hand pull.

Malva dendromorpha **(Tree mallow)** was recorded in the Beach Road revegetation site (Map 3) is believed to have been brought in by contaminated fill.

Recommendation: Germination in this revegetation site needs to be continually monitored and controlled. Hand pull or cut and swab with glyphosate.

Scabiosa atropurpurea **(Pincushions)** has not yet become well established in the Goolwa Dunes. It was mostly recorded in the low-lying vegetation near the Beach Road swamp area (Map 7) and is a high priority for control before it dominates. This area is subject to future Encounter Bikeway extensions and it will be important to ensure there are resources to follow-up control of this weed following the disturbance that earthworks and surface laying create. Excellent results have been obtained from using broad-leaf selective herbicides such as clopyralid (Lontrel©) or glyphosate where low off-target risk allow.

Recommendation: Manage existing populations through spraying, slashing and hand pulling, especially in the Beach Road swamp area. Eradicate outlier populations when found.

Asphodelus fistulosus **(Onion weed)** was scattered in a few small to medium patches and should be targeted for control when undertaking Gazania works where possible.

Recommendation: Control of this weed, through hand pulling and bagging, is often a good activity for volunteers.

Euphorbia paralias **(Euphorbia)** was observed as being well established across most of the Goolwa Dunes and as such it was generally only recorded if an outlier patch (Figure 5.23) was noted. More detailed mapping of this weed may be worthwhile in the future. Hand pulling has been undertaken over medium sized areas in various sites within the Tokuremoar Action Plan area.

Recommendation: Focussed control works pushing south from the edge of the samphire area near Beach Road would be worthwhile. Control outlier patches and manage better quality areas of native vegetation through hand-pulling the Euphorbia. Spot spraying using appropriate chemical for the situation.

Figure 5.23: Outlier patch of Euphorbia

Chrysanthemoides monilifera ssp. monilifera **(Boneseed)** was only recorded twice in the Goolwa Dunes with both outlier patches (Figure 5.25) being areas previously treated, with seedlings returning. These were hand pulled on the day of mapping as some were forming seed. Significant work has been undertaken since 2007 by the GWLAP to remove several patches of boneseed from the dunes. Of concern was a residential block off Boult Street that had approximately five medium sized plants flowering and setting seed (Figure 5.24).

Figure 5.24: Residential block with Boneseed

Figure 5.25: Goolwa Dunes outliers **of** Boneseed

Recommendation: Patches of residential blocks need targeting for control. Follow-up historical sites annually. Council and Natural Resources to write to landowners

Annual grasses were extremely prevalent in all areas of the Goolwa Dunes and included *Ehrharta longifolia* (Annual Veldt), *Lagurus ovatus* (Hare's tail grass*), Avena spp* and *Bromus spp* and were not mapped as part of this project due to their common and widespread nature and the associated practicalities around control.

Oxalis pes-caprae **(Sour-sob)** was scattered throughout the Goolwa Dunes and was not mapped given its abundance and the extremely low likelihood of controlling it through the dunes due to the off-target risks from herbicide. Outlier patches were rare but could be the subject of more targeted mapping in the future (Figure 5.26).

Figure 5.26: Occasional outlier patches of soursob like this one were rare

Figure 5.27: Wild Gladiolus hand pulled from Goolwa Dunes

Recommendation: Consider more detailed mapping of patches. Control outlier patches using Metsolfuron-methyl (Brush-off©) when flowering and to be undertaken by a contractor skilled in detailed work within native vegetation.

Pennisetum villosum **(Feather-top)** was largely recorded in two areas of the dunes, the Beach Road swamp area and an area near the path from Tugwell Street through the dunes. This grass is quite invasive and should be considered a high priority for control.

Recommendation: Control using appropriate chemical for the situation. Eradicate from Tugwell locality, control and contain patch in Beach Road swamp area.

Gladiolus undulates **(Wild Gladiolus)** was recorded in two location and should be considered a high priority. The patches were very small and isolated, thus increasing the potential for the successful eradication of this weed from the Tokuremoar Action Plan area. The patch in the Goolwa Dunes was hand pulled after it was recorded (Figure 5.27).

Recommendation: Requires annual follow-up at Reed Place locality via hand pulling and bagging of bulbs.

Geranium sp. **(Geranium)** (Figure 5.29) was recorded next to the Trevalean Place carpark. This patch was close to flowering and has been treated in late 2014. Follow-up control will be required to ensure it is eradicated. This plant appears to have a high likelihood of hybridising with the local Geranium which was growing adjacent (Figure 5.28).

Figure 5.28: Native and weedy Geranium growing together

Figure 5.29: Weedy Geranium

Recommendation: Parent plants have been removed. Monitoring of locality required to ensure eradication. Hand pull seedlings if seen.

Limonium binervosum **(Dwarf Sea-lavender)** (Figure 5.30) was found on the foredune in the Goolwa Dunes in relatively low numbers, in the Beach Road swamp area and some isolated individuals in Boult Street Reserve. The foredune patch should be dealt with as medium priority. Specimens in the samphire patch in the Beach Road swamp area could also be considered for gradual control via regular hand pulling and chipping out. This weed was also growing in Tokuremoar Reserve amongst the rare *Selliera radicans* (Figure 5.31).

Figure 5.30: Dwarf Sea Lavendar (K. Bartley)

Figure 5.31: Sea Lavender amongst *Selliera radicans*

Recommendation: hand pull and remove from site if seed bearing. Fore-dune patch highest priority

***Senecio angulatus* (Cape Ivy)** is found in three locations in the project area with two being next to the northern boundary of the Goolwa Dunes Reserve. This plant needs to be dealt with as high priority. A large patch has been controlled over several years in Tokuremoar Reserve.

Recommendation: Follow-up all current and historical sites via spot spraying with Triclopyr (Garlon©) and penetrant.

***Carpobrotus edulis* (Hottentot Fig),** substantial work has been undertaken to control this weed in the Goolwa Dunes and in particular through Tokuremoar Reserve. It has been observed hybridising with the local *Carpobrotus rossii* (Figure 5.32) and is a high priority for control.

Recommendation: Follow-up all current and historical sites and hand pull if seen.

Figure 5.32: Hybridisation of *Carpobrotus edulis* and *Carpobrotus rossii.*

***Dimorthotheca pluvialis* (Cape Marigold)** (Figure 5.33a and b) was recorded in three locations in the dunes between Goolwa and Middleton. The two isolated populations found in the Goolwa and Tokuremoar Dunes were near the foredune and small in numbers. This annual daisy has the ability to invade the dune area if not dealt with quickly.

Figure 5.33a and b: *Dimorthotheca pluvialis*

Recommendation: Hand pull and bag all plants and monitor localities annually.

***Olea europea* (Olive)** was recorded in the Goolwa Dunes area as a handful of small plants in the Boult Street Reserve area. As they don't appear to be fruiting, they should be dealt with as a medium priority. Large olives in the Goolwa Dunes, Tokuremoar and Newell Avenue Reserve have been successfully treated. Olives are also present in large numbers along the Goolwa to Middleton Road which will continue to infest surrounding land if not adequately controlled.

Recommendation: There are several large olives in the Goolwa Waste and Recycling Depot that need to be considered for control due to their proximity to Tokuremoar Reserve and the Goolwa Dunes. Control small plants in Boult Street reserve via drill and fill with Glyphosate or Triclopyr and Diesel.

***Aster subulatus* (Wild Aster)** (Figure 5.34) was recorded in the low-lying areas of the Tokuremoar Action Plan area, particularly in the Goolwa Beach swamp area, and is quite invasive.

Recommendation: Control outlier plants via hand pulling. Consider slashing large areas to limit seed production.

Figure 5.34: Wild Aster

Figure 5.35: Giant Reed, Goolwa Waste and Recycling Depot

***Arundo donax* (Giant Reed)** was recorded in the Beach Road swamp area and also at the Goolwa Waste and Recycling Depot (Figure 5.35 above). Works on this species has been undertaken over several years in the private heritage areas near the Tokuremoar boundary where it has been cut and swabbed with Diesel and Triclopyr (Garlon®). Successful eradication has been achieved through continued follow-up for several years.

Recommendation: Cut and Swab with Diesel and Triclopyr (Garlon®) and contain in current area.

Map 9: Notable Indigenous Plants

GOOLWA TO WELLINGTON LOCAL ACTION PLANNING ASSOCIATION INC

Legend

- Adriana
- Beaumea juncea
- Carpobriotus
- Cyperus
- Downy Geranium
- Exocarpus
- Frankenia
- Gahnia lanigerum
- Juncus krausi
- Kennedia
- Lachnogrostis
- Lotus
- Melaleuca regeneration
- Poa labillardierei
- Salt Angianthus
- Samoluos
- Samphire
- Sonchus sp.
- Trailing Hemichroa
- Triglocin sp
- Wilsonia humilis
- Wilsonia rotundifolia

Author: Sherie Bain
Date: 13:10 15 Jan 2015

Coord System: GDA 1994 MGA Zone 54
Disclaimer:
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5.4 Notable Native Plants

Species of particular note within the Tokuremoar Action Plan area were recorded if they were uncommon, rare or unique to the site. Some of these species were recorded as they were also seen as potential seed sources for propagation or may be under threat from future development. While the entire vegetation community over the Tokuremoar Action Plan area is important, Map 9 identifies some species outside of the more dominant species in the areas. Holistic management of the vegetation community still remains the highest priority.

***Acacia cupularis* (Cup Wattle)** (LC) was not common in the Goolwa Dunes but found in small groups near the Bradford Road path and a few other occasional individual plants were recorded.

***Adriana quadripartita* (Coast bitter-bush)** (LC) was recorded around Bradford Road path and is an important plant currently isolated to a small number of patches in the Goolwa area. Several patches on vacant land and roadsides in the Goolwa have been cleared over the past few years (B. Simon pers. comm.).

***Angianthus pressianus* (Salt Angianthus)** (LC) was also recorded in the Beach Road swamp area and was not recorded in other samphire patches within the plan area.

***Baumea juncea* (Blue Twig-rush)** (LC) was recorded in several places in the dunes, largely on the northern edge near Hume Street and was also prevalent in the Beach Road swamp area fringing the samphire vegetation, extending up into the *Leucopogon* Shrubland area (Map 4).

***Exocarpus syrticola* (Coast Cherry)** (LC) was recorded once in the Goolwa Dunes, however it is quite prevalent in the dunes in Tokuremoar and Surfers Reserves.

***Hemichroa pentandra* (Trailing Hemichroa)** (LC) was recorded in several patches in the Beach Road swamp area.

***Kennedia prostrata* (Running Postman)** (LC) is relatively common in Goolwa through the heritage agreement areas and a number of council reserves where grassy and broad-leafed weeds have not yet dominated. It was recorded on Map 9 as the location has many plants present offering a good seed source for revegetation projects.

***Lotus australis* (Austral trefoil)** (LC) was recorded once in the Goolwa Dunes, with historically known patches not being detected during this survey. It appears it is under threat from Pyp Grass as there were once several plants growing near Reed Place carpark (B. Simon pers. comm.).

***Myoporum insulare* (Common Boobialla)** (LC) was recorded twice in the Goolwa Dunes but is more common on the low lying areas in Goolwa.

***Samolus repens* (Creeping Brookweed)** (LC) is relatively common in all of the samphire areas in the Tokuremoar Action Plan area, however it is only restricted to areas of inundation and this is likely why it is listed as 'Uncommon' in the Southern Lofty herbarium region.

***Wilsonia humilis* (Silky Wilsonia)** (NT) was recorded in the Beach Road swamp area and is not known in any of the other samphire areas within this plan. It is listed as uncommon but perhaps could be considered as locally rare.

***Wilsonia rotundifolia* (Round-leaf Wilsonia)** (NT) was recorded in the Boult Street Reserve coming in through the boundary between Tokuremoar Reserve. This patch is threatened by Couch invasion at present. This plant is listed as vulnerable in the Southern Lofty herbarium region.

Other native plants, some relatively common, have been highlighted as they are in highly degraded areas that may be subject to various threats, such as slashing and clearance, eg. Carpobrotus rossii in the Boult Street Reserve. It was seen as important to highlight these areas to allow for them to be retained in the event that works were undertaken in the area (e.g. Bikeway extensions) and in some cases to allow for seed to be sourced.

Other important indigenous plants found in the Goolwa Dunes

***Frankenia pauciflora* (Southern Sea-heath)** (LC) is not well represented in Tokuremoar Reserve low lying areas and was recorded as there are substantial patches on the east side of the Beach Road swamp area, offering a good source of seed and or cuttings for local revegetation projects.

***Geranium solanderi var. solanderi* (Austral Geranium)** (LC) was recorded near the Beach Road swamp area and was only seen sporadically across the project area and should be considered locally significant.

***Picris angustifolia ssp. angustifolia* (Coast Picris)** (VU) is found throughout the Goolwa and Tokuremoar Dunes and has been propagated and planted in areas such as the Jute netting erosion area.

***Sonchus hydrophilus* (Native Sow-thistle)** (LC) was recorded in the Beach Road swamp area.

5.5 Weed Control Actions

Table 4: Weed Control Actions Table for the Goolwa Dunes. (D)=Declared Plant

	Priority Level	Present Density	Distribution	Cost Level	Desired outcome of action	Additional comments
Key Weeds						
Acacia cyclops	High	Low-Medium	Widespread	Medium	Remove all mature seeding plants from site to maintain condition of remnant shrublands and maintain low density	Engage residents in control program Foliar spray procumbent shrubs in dune with Triclopyr (Garlon®). Follow-up work on areas first treated to ensure new seedlings and saplings are removed.
Boxthorn (D)	High	Medium	Widespread	Medium	Limit juvenile recruitment and reduce infestation to low density	Engage residents in control program. Foliar spray if possible to retain habitat value. Cut and swab or basal treat smaller plants using Triclopyr (Garlon®) and diesel.
Bridal Creeper (D)	High	Medium	Defined	Medium-High	Push weed front to Hume Street from Beach Road targeting outliers to reduce to low density and defined area	Presence of rust should not cancel out chemical control options which can be very effective at destroying plants. Consider using brush-off for foliar spraying using recommended low rate.
Victorian Tea-tree	Medium	Low-Medium	Scattered	Medium	Remove all mature seeding plants from site to reach low density across the area	Engage residents in control program via Council. Encourage nurseries to not stock this weed and offer suitable alternatives (E.g. Melaleuca lanceolata). Hand pull seedlings. Cut and swab with Glyphosate.
Groundcover Weeds						
Arctotis	High	Low	Defined	Low-Medium	Eradication from the Goolwa Dunes	Engage residents in control program where it occurs on residential blocks. Selective control required around *Baumea juncea* on Northern Boundary.
Crassula sp	Low	Low	Isolated	Low	Eradication from the Goolwa Dunes	Ideal for volunteer programs via hand pulling and removal from site
Galenia	High	Medium	Defined	Medium	Eradication from Goolwa Dunes and reduction to low density in Boult and Dent Reserve	Several other patches in Goolwa need addressing such as Goolwa Waste and Recycling Depot and inland reserves. Spray with Triclopyr/Picloram (Grazon©) and hand pull small seedlings.
Gazania (D) - Goolwa Dunes	High	Medium	Widespread	High	Actively controlled to low density for better native	Engage residents in control program. Hand chip outlier patches. Spot spray as required using

	Priority Level	Present Density	Distribution	Cost Level	Desired outcome of action	Additional comments
					vegetation condition	appropriate chemical.
Gazania (D) - Open reserves	Low	Very High	Widespread	High	Contained and reduced point source infestations and increase biodiversity	Gazania barrier trial may be a useful containment option. Boom spraying using a broadleaf herbicide may be worth consideration.
Iceplant	High	Low	Isolated	Low	All existing plants are treated and no new populations established	Observe soil hygiene practices and consider hand pulling and bagging this plant where practical Spot spray using Glyphosate and penetrant
Osteospermum	Medium	Low	Isolated	Medium	All existing plants are treated and no new populations established	Annual follow-up required. Engage residents in control programs. Foliar spray using Triclopyr and penetrant.
Other Weeds						
Acacia saligna	High	Low	Isolated	Low	All existing plants are treated and no new populations established	Follow up all treated areas. Cut and swab small to medium plants with Diesel and Triclopyr mix. Drill and fill mature trees/shrubs
Agapanthus	Medium	Low	Isolated	Low	Eradication from Goolwa Dunes	On Eastern Boundary near Kightley Ave. Hand dig and remove from site
Aloe	Low	Low	Isolated	Low	Eradication from Goolwa Dunes	Initial treatment has occurred. Re-visit location annually for any new plants.
Arundo donax	Low	Low	Isolated	Medium	Containment of existing clump and no new infestations	Adjacent neighbours to be engaged in control program as it extends into private property. Cut and swab with Glyphosate 20ml/litre with pulse
Aster	Medium	Medium	Isolated	Medium	Containment of existing patch and no further expansion of density	A suitable activity for volunteers to hand pull. Additional watering from stormwater may exacerbate the patch in Beach Road Swamp
Bearded Oat	High	Low	Isolated	Medium	Eradication from Goolwa Dunes	Small patch near Hume street carpark should be slashed and spot sprayed with Glyphosate
Bindii	Low	High	Scattered	High	Treatment of isolated patches	Small isolated patches in Beach Road swamp area needs site and season specific control approaches
Boneseed (D)	High	Low	Isolated	Low	Eradication from Goolwa Dunes	All mature plants treated via cut and swab with Glyphosate. Annual patrol in September when flowering. Hand- pull small plants where able. House blocks off Boult St need addressing.
Buffalo Grass	Low	High	Isolated	High	Reduce density to low	Mostly near Beach Road Reserve edges

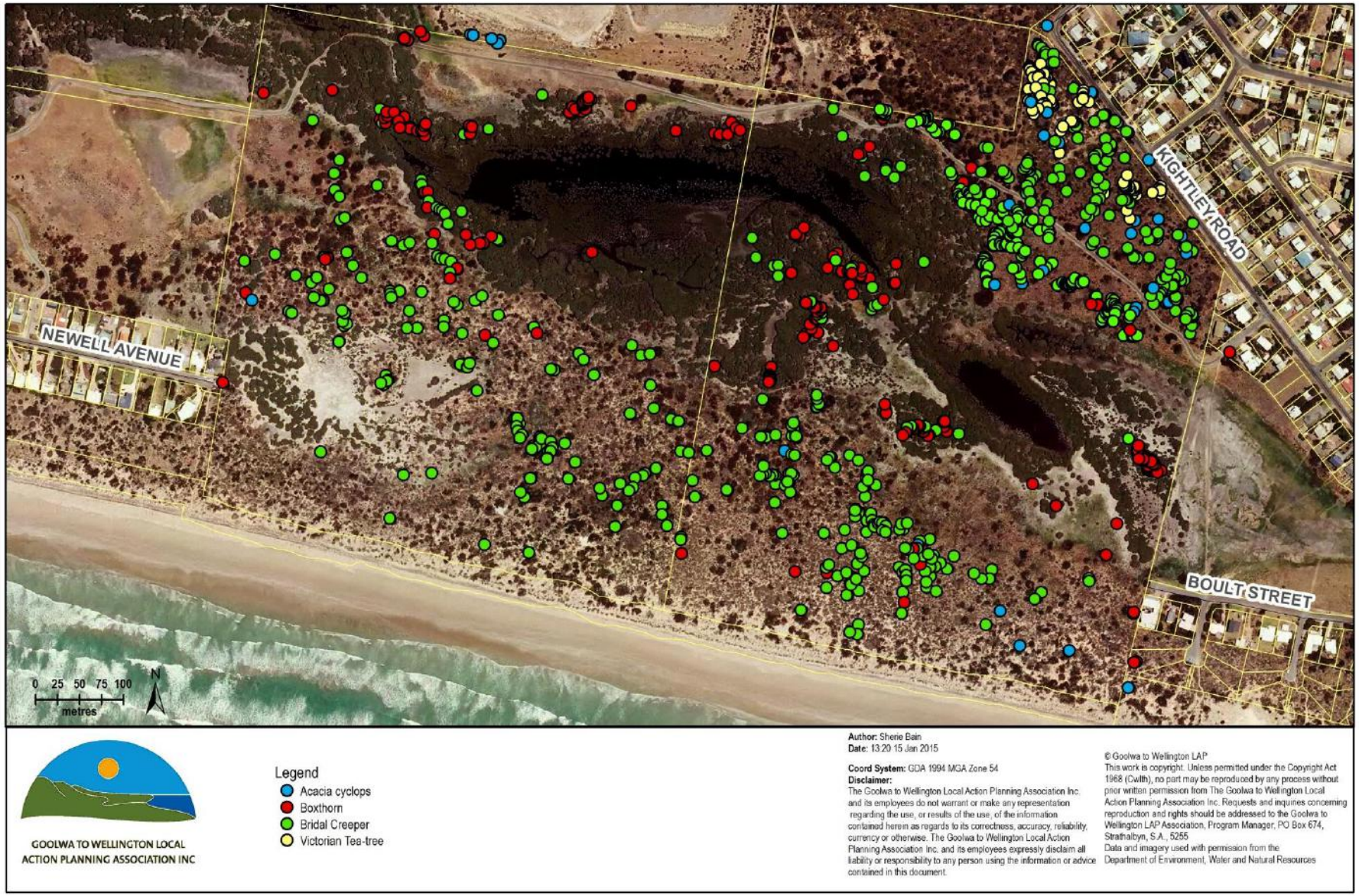
	Priority Level	Present Density	Distribution	Cost Level	Desired outcome of action	Additional comments
Cape Ivy	High	Low	Isolated	Medium	Eradication from Goolwa Dunes	Adjacent neighbours to be engaged in control program. Follow-up all historical sites. Spot spray with Triclopyr/Picloram (Grazon©)
Carpobrotus edulis	High	Low	Isolated	Low	Eradication from Goolwa Dunes	Hand pull and preferably remove from site. Spot spray large patches using Triclopyr and penetrant
Casuarina glauca	Low	High	Isolated	High	Contain at present locality	Not a particular concern but does harbour rabbits. Monitor spread into dunes via suckers
Cocks foot	High	Low	Isolated	Low	Eradication from Goolwa Dunes	Still a chance to remove from the area and found on low lying areas. Glyphosate spot spray
Coprosma	Medium	High	Isolated	Medium	Treatment of known locations and no new populations established	Most on Dent Street Reserve. Target residential properties with large plants to limit further spread in reserves. Hand pull small plant and cut and swab large plants with Diesel and Triclopyr
Couch	Medium	Medium	Scattered	Medium	Containment and reduction of known patches	Reserve boundaries and paths are key entry points. Push back to reserve boundaries using foliar sprays
Dimorthotheca	High	Low	Isolated	Low	Eradication from Goolwa Dunes	Newly detected weed for Goolwa. Hand pull and bag plants. Annual scout of known localities required
Elkhorn plantain	Low	Very High	Isolated	Very High	Reduce around significant native plants	Persists in low lying areas, especially salty ground. Probably not practical to control over large patches
Euphorbia paralias & terracina (D)	Medium	High	Widespread	Very High	Address on an as needs basis	Localised control around revegetation and where isolated patches are observed. Hand pulling is very effective on smaller patches. Ideal volunteer activity
Gladioli	High	Low	Isolated	Low	Eradication from Goolwa Dunes	Hand pulled in Oct 2014. Follow-up at locality required. Small patch.
Ipheion	High	Very low	Isolated	Low	Eradication from Goolwa Dunes	Near Hume keyhole carpark. Hand dig and bag from the site
Kikuyu	Medium	High	Widespread	High	Containment of patches and removal from significant native plant localities	Areas at boundaries need pushing back using foliar spraying when actively growing. Glyphosate is ideal in low off-target sites. Grass selective herbicides are ideal in native reed and sedge patches
Margureite Daisy	Medium	Low	Isolated	Low	Eradication from Goolwa Dunes	Mature plants removed in November 2014 by Goolwa Coastcare Group, follow-up required in 2015 via hand pulling of seedlings
Marram Grass	Low	Low	Scattered	Medium	Minotor and limit spread	Only remove if erosion risk is low or outliers. Hand

	Priority Level	Present Density	Distribution	Cost Level	Desired outcome of action	Additional comments
						pull or cut and swab with Glyphosate
NZ Xmas Bush	Medium	High	Defined	Medium	Eradication from Goolwa Dunes	Main patch on Dent Street Reserve. Cut and swab with Triclopyr and Diesel
Olive (D)	High	Low	Scattered	Low	Eradication from Goolwa Dunes	Boult Reserve as medium plants. Large plants on Goolwa to Pt Elliot Road will continue to re-infest. Drill and fill with Glyphosate or Triclopyr and Diesel mix.
Onion Weed (D)	High	Low	Scattered	Medium	Containment and reduction of known patches	Volunteer programs suit hand chipping or pulling. Bag if seed has formed.
Pennisetum villosum	High	Medium	Defined	High	Containment and reduction of known patches and no new infestations occurring	Beach Road Swamp area main patch. Gotten worse where Gazania was sprayed out. Spray with Glyphosate and penetrant
Perennial Veldt Grass	High	Low	Scattered	Medium	Treatment of known locations and no new populations established	Opportunity exists to limit this weed becoming much more serious. Spot spray and chip outlier clumps
Phalaris	Medium	Medium	Isolated	Low	Treatment of known locations and no new populations established	Worth keeping out of the Boult Street Reserve through spot spraying with Glyphosate
Picris echioides	Low	Medium	Isolated	Medium	Containment and reduction of known patches and no new infestations occurring	Currently in open reserve and will be an issue if revegetation occurs here in future but is currently on open parkland areas
Polygala	High	Low	Isolated	Low	Eradication from Goolwa Dunes	All mature plants were treated when sighted. Annual follow-up required via hand pulling of seedlings
Pyp Grass	High	High	Defined	Very High	Containment and reduction of known patches and no new infestations occurring	Isolated patches along Beach Road outside of project area should be controlled Small isolated patch near Jute trial site highest priority
Rhamnus	High	Low	Defined	Medium	Treatment of known locations and no new populations established	Adjacent neighbours to be engaged in control program. Hand pull, cut and swab or basal treatment with Triclopyr works well
Scabiosa	High	High	Defined	High	Containment and reduction of known patches and no new infestations occurring	Areas adjacent and along paths are assisting the spread of this weed via sticking to clothing and animal fur. Slash tall plants and spot spray healthy rosettes with clopyralid (Lontrel©) or other selectives.

	Priority Level	Present Density	Distribution	Cost Level	Desired outcome of action	Additional comments
Dwarf Sea-lavendar	Medium	Low	Isolated	Medium	Containment and reduction of known patches and no new infestations occurring	Growing around patch of Wilsonia humilis at Beach Road swamp area. Hand pull. A good volunteer activity
Three Corner Jack (D)	High	Low	Isolated	Low	Containment and reduction of known patches and no new infestations occurring	Requires at least annual follow-up of locations. Consider flagging off areas. Hand pull and remove from site
Tree Mallow	Medium	Low	Isolated	Low	Eradication from Goolwa Dunes	Beach Road revegetation site annual follow-up. Hand pull or cut and swab with glyphosate.
Vetch	Low	High	Isolated	High	Containment and reduction of known patches and no new infestations occurring	Mostly in lower lying areas. Spot spray large patches and hand pull small areas if warranted.
Weedy Geranium	High	Low	Isolated	Low	Eradication from Goolwa Dunes	Mature plants have been removed. Follow-up locality annually to check for seedlings. Hand pull

6 Tokuremoar Reserve

Map 10: Key Weeds



6.1 Key Weeds

The following four plants have been grouped together as Key Weeds as they were those most commonly encountered, have a negative effect on the structural component of existing remnants and are 'red alert' weeds in the Goolwa area (Caton. et al 2007). There are several other weeds that have a serious effect on the structure of native vegetation (e.g. Boneseed), but due to the very low numbers (a result of targeted control work over the past seven years) they have been combined under another composite group called Other Weeds, see Map 13.

Acacia cyclops **(Western Coastal Wattle)** was recorded in low numbers through Tokuremoar Reserve, with the majority of records being young, small plants. Significant control works have occurred consistently since 2007 in the reserve. Initial treatment efforts addressed extensive areas of large to very large shrubs (Figure 6.5). Figures 6.1 – 6.3 show the removal and chipping as large *Acacia Cyclops* were removed along the bike path running through the Tokuremoar Reserve. Significant regeneration of indigenous native plants has followed removal of this weed on many sites (Figure 6.4). This survey indicates the success of previous control works undertaken by DEWNR, NR AMLR and GWLAP due to current low densities.

Recommendation: Annual patrol through the reserve to hand pull and cut and swab plants

Figure 6.1: DEWNR assisting with A. Cyclops

Figure 6.2: Before removal near bikeway

Figure 6.3: Following removal and chipping

Figure 6.4: Understorey regeneration following *Acacia cyclops* control

Figure 6.5: Very large *Acacia cyclops* left in-situ for soil stabilisation

Lycium ferocissimum **(Boxthorn)** was recorded where the plant was found still alive, including any recently treated plants with re-growth requiring follow-up. As Map 10 indicates, Boxthorn is most prevalent in the low-lying areas around the fringes of the *Melaleuca halmaturorum* Woodland. Most Boxthorn are small in size and many of similar age class (Figure 6.6a and b). Flooding in 2012 appears to have drowned large boxthorn, with subsequent germination of the seedbank occurring once the flood waters have receded.

Works have occurred in the Tokuremoar Reserve in recent years by the GWLAP and NR AMLR through contractors. The private land adjoining this area with areas of *Melaleuca halmaturorum* was also treated via basal bark application in 2012 with good results. Further follow-up work is required on these areas.

Additionally, there are several large boxthorns on private blocks bordering the reserve and on the Goolwa to Port Elliot Road, that if left will continue to provide a seed source for future reinfestation. Care needs to be taken to ensure that similar looking plants such as *Rhagodia candolleneana* are not hand pulled by mistake.

Recommendation: control areas of Boxthorn ASAP whilst they are small. Plants hand pulled easily in most cases and could be the most certain means of complete kill. Hand pulling following good rainfall or when soil moisture levels are good is advisable. Cut and swab or basal bark treat larger plants using Triclopyr (Garlon©) and Diesel.

Figure 6.6a and b: Mass germination of small Boxthorn in the *Melaleuca halmaturorum* woodland

Asparagus asparagoidies **(Bridal Creeper)** was prevalent through Tokuremoar Reserve as Map 10 indicates. An opportunity exists to get Bridal Creeper under control in the Melaleuca woodland whilst the plants are all small. It appears the larger plants known to be in this area drowned during the last flooding in 2012.

Bridal Creeper was most often recorded amongst large shrubs, particularly old, dying or dead wattles. Bridal Creeper rust was present on many of the larger plants but did not appear to be reducing fruit production.

Recommendation: Bridal Creeper control to continue through Melaleuca woodland via spot spraying using Metsolfuron-methyl (Brush-off©) or Glyphosate. Look into improving rust performance for heavier infestations with key agencies

Leptospermum laevigatum **(Victorian Tea-tree)** was most prevalent in the area known as the Kightley Triangle, where control works have been undertaken over the past ten years for this species. Many large shrubs were felled and left on site to break down (Figure 6.7). Ongoing hand pulling of small seedlings has been a focus of this area through contractor works and regular working bees with Goolwa Coastcare Group and other volunteers programs such as Green Army.

Recommendation: continue to follow-up over past control areas for seedlings. Hand pull seedlings. This is a good volunteer activity. Cut larger plants low to the ground. Swabbing is not necessarily required but can provide a more assured kill.

Figure 6.7: Felled mature shrubs left on site to break down

Map 11: Groundcover Weeds

6.2 Groundcover weeds

***Galenia pubescens* (Coastal Galenia)** is a highly adaptive, vigorous, drought and salt tolerant plant that is recorded around the edges of Tokuremoar Reserve's eastern and northern boundaries. Galenia can quickly colonise large areas of ground, particularly in disturbed or saline environments. The Goolwa Waste and Recycling Depot has extensive patches of Galenia on the slopes uphill from the Tokuremoar Reserve boundary (Figure 6.8) and it is important to prevent the spread of this population into the reserve. Another population threatening the reserve is located to the east near the path between Redcliff and Boult Street through the Council Reserve where control works have been undertaken for several years. Flooding of this site in 2012 appears to have exacerbated the infestation (B. Simon pers. obs.).

Recommendation: Undertake control in accordance with surrounding habitat. In open, degraded areas foliar spraying with Triclopyr/Picloram (Grazon©) is an efficient, cost effective treatment, however in areas with surrounding vegetation, rolling up the runners and cutting and swabbing the main stem with Glyphosate is successful and reduces off target damage. Ensure entire plant is lifted away from soil as it can layer. Collaborate with Alexandrina Council on the management of Galenia as it is likely that slashing assists in the spreading of this weed.

Figure 6.8: Galenia on slope above Tokuremoar boundary

***Gazania linearis* (Gazania)** was recorded as scattered individuals on the edge of Kightley Triangle along the roadside and extending into the reserve for approximately two meters. Small numbers occurred on the western boundary of Tokuremoar Reserve near Newell Avenue and along the boundary with the Goolwa Waste and Recycling Depot.

Extensive control works have been undertaken along the edge of Tokuremoar Reserve and along Kightley Road (Figure 6.9 and 6.10) by the GWLAP to control the spread of this weed. Large areas of neighbouring roadsides have also been controlled with several landholders getting involved in 'plant swap initiatives' – removing Gazania in exchange for native plants.

Recommendation: Continue to patrol boundaries where *Gazania* is entering. Hand chip. Foliar spray with appropriate chemical for the situation.

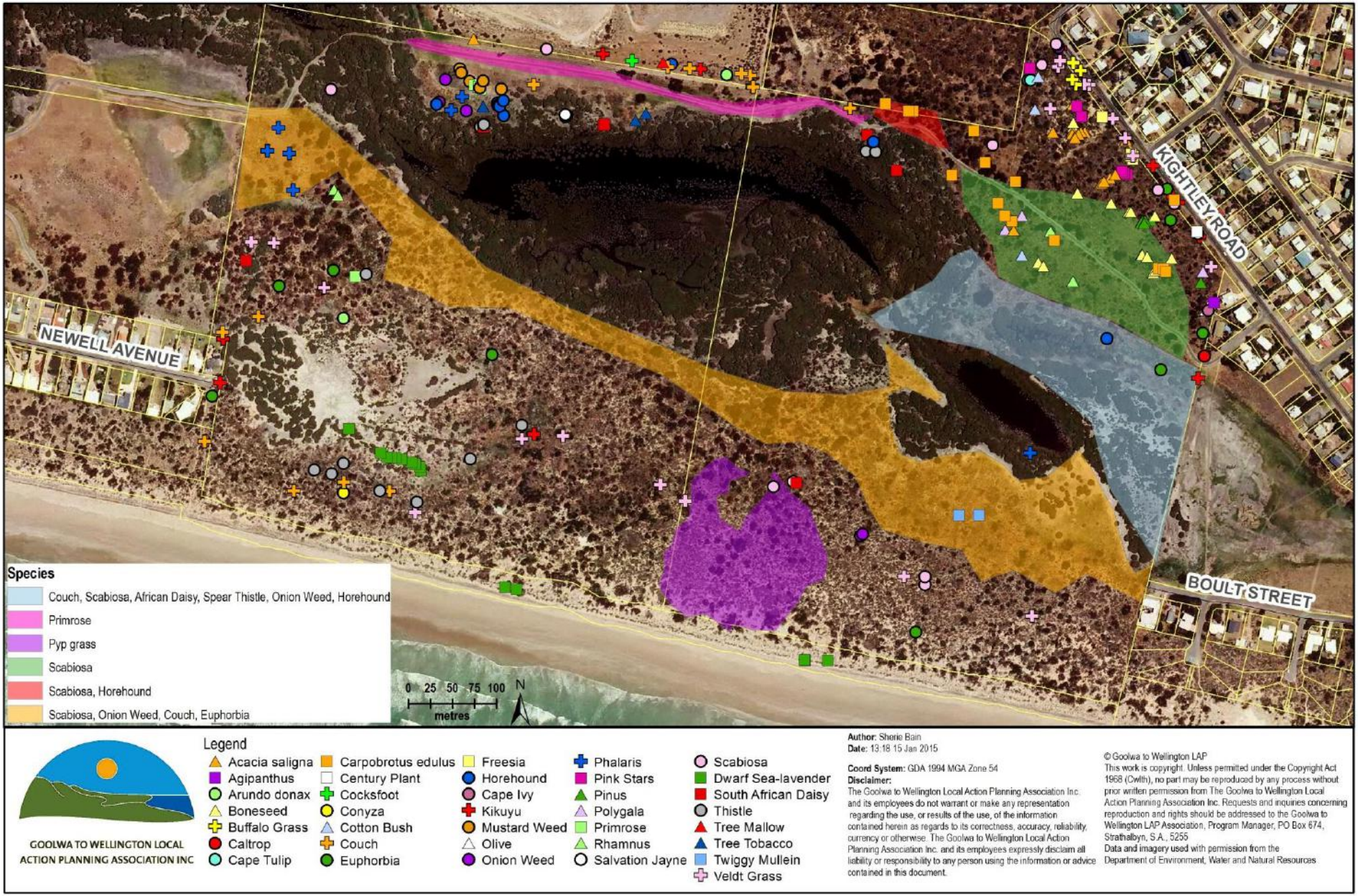
***Mesemryanthemum cristallinum* (Iceplant)** was recorded in very low numbers opposite the Goolwa Waste and Recycling Depot's southern boundary in the adjacent revegetation site and near Redcliff Street.

Recommendation: This weed requires follow-up over the same sites for several years to ensure eradication. Hand pull small areas and bag plants. Spot spray larger patches with Glyphosate. Persists in saline and disturbed sites

***Osteospermum fruiticosum* (Seascape daisy)** has been eradicated from the Kightley Triangle in two areas with one small patch remaining near the boundary along Redcliff Street.

Recommendation: Control has been successful using Triclopyr, with annual follow-up for seedlings undertaken. Hand pull small seedlings. Continue annual follow-up to completely eradicate from Tokuremoar Reserve.

Map 12: Other Weeds



6.3 Other Weeds

***Acacia saligna* (Golden Wreath Wattle)** was recorded predominantly in one distinct location where continued follow-up has been undertaken on an annual basis by the Goolwa Coastcare Group to treat small seedlings. Historically there were several medium sized *Acacia saligna* at this location. The remaining records were single outlying plants and were generally young seedlings.

Recommendation: Continue annual follow-up on historical areas and ensure no new populations are established. Maintain as a volunteer activity. Hand pull and cut and swab small plants.

***Agapanthus praecox ssp. orientalis* (Agapanthus)** was recorded in the south-eastern corner of Kightley Triangle next to the boundary of a residential property.

Recommendation: Eradication should be easily achieved via pulling and removal from site.

***Arundo donax* (Giant Reed)** was found approximately 100 metres from the western boundary of Tokuremoar, see Map 12.

Recommendation: Controlling through slashing and spraying of regrowth with Glyphosate has been successful on the adjoining heritage areas where several large patches existed. *Arundon donax* requires several years of treatment to eradicate.

***Crysanthemon monilifera* ssp. *monilifera* (Boneseed)** was only observed and recoreded as small to medium seedlings through Tokuremoar and all generally restricted to the areas north of the Tea-trees. All plants seen were hand pulled when mapping occurred.

Recommendation: Patrol for new seedlings over historical distribution annually and hand pull when seen.

***Stenotaphrum secundatum* (Buffalo Grass)** was recorded on the edge of Kightley Road where it encroaches into the reserve. This plant currently persists around patches of the rare *Lomandra leucocephala* (Figure 6.11) and also near the patch of *Caledinia latifolia*.

Figure 6.9: *Lomandra leucocephala* surrounded by Buffalo Grass

Recommendation: Work to control via hand pulling and spot spraying where possible using grass selective.

***Tribulus terrestris* (Caltrop)** is found next to the bike path close to the Redcliff Street entrance.

Recommendation: Should be followed up annually at locality to ensure any new seedlings are hand pulled and removed.

Homeria sp. **(Cape Tulip)** was recorded on the northern boundary of Tokuremoar near the fencline and is high priority for eradication before it spreads further.

Recommendation: Scout Northern boundary in Spring. Hand dig and control with Metsolfuron methyl if in patches or wick wipe with glyphosate.

Agave americana **(Century Plant)** is found on the Kightley Road boundary and has been treated and largely eradicated from the reserve. One small pup was recorded and removed as seen.

Recommendation: Conduct annual checks for seedlings and hand pull or chip out

Gomphocarpus sp. **(Cotton-bush)** favour limestone areas and was recorded in the Kightley Triangle area, as well as in a small patch in the revegetation site east of the bikeway.

Recommendation: Hand pull and cut and swab with glyphosate while the population is small.

Euphorbia paralias **and** ***Euphorbia terracina*** **(False caper)** was particularly prevalent across much of Tokuremoar Reserve at varying densities. Significant control works have occurred via the GWLAP and particularly Goolwa Coastcare Group to hand pull this weed, pushing west from Kightley Road into the reserve and has resulted in very low densities on much of the better quality vegetation. Contractor works have been undertaken on several sites via hand pulling (Figures 6.12 and 6.13) and can be an effective means of thinning it from better quality vegetation.

Figure 6.10: Prior to Euphorbia hand pulling

Figure 6.11: Two years following hand pulling

Recommendation: continue pushing the current weed front west from Kightley Road toward bikeway. Hand- pull isolated areas. Spot spray where selective chemicals offer competition from existing natives.

Freesia cultivar **(Freesia)** was recorded at one location in the Kightley Triangle area and is very high priority for eradication. Control works have already been commissioned for this weed by the GWLAP**.** Weedy bulbs, such as Freesias spread quickly into bushland areas and once established are extremely hard to eradicate, therefore this weed is of a very high priority.

Recommendation: Undertake control works and follow-up patch until eradicated from Tokuremoar Reserve. Spot spray, dig up or wick wipe using Glyphosate

Senecio angulatus **(Cape Ivy)** (Figure 6.14) has largely been eradicated from Tokuremoar Reserve through funding from the GWLAP, however follow-up checks for runners or seedlings need to continue at the locality. Cape Ivy was originally covering a large area adjoining houses near Redcliff Street encroaching into the reserve. Treatment via Triclopyr/Picloram (Grazon®) has been most successful (G. Dalton pers. comm.).

Recommendation: Annual follow-up at historical sites. Hand pull or spot spray juvenile plants

Figure 6.12: Cape Ivy

Cynodon sp. **(Couch)** occurs as large patches in the low-lying areas running west from the eastern boundary of Tokuremoar Reserve. These patches currently threaten a patch of the vulnerable *Wilsonia rotundifolia* and should be controlled over this area as a first priority. Other areas have large patches of *Cyperus gymnocaulis* throughout and have had some selective grass control undertaken by the GWLAP in an attempt to remove it from the reed beds. This was successful in the first instance but the Couch has since returned.

Recommendation: Target areas around key native plant populations and use grass selective herbicides where possible. `Chase' out couch from revegetation and where it appears as outliers. Consider works around patch of *Wilsonia* near Eastern boundary.

Limonium binervosum **(Dwarf Sea Lavender)** was found in relatively low numbers on the foredune in the Goolwa Dunes. It was also mapped in the Beach Road swamp area in Tokuremoar Reserve within the samphire communities, including near the *Lawrencia squamata* patch where some patches of the rare *Selliera radicans* (Shiny Swamp-mat) also exist (Figure 6.16). There are some isolated individuals in Boult Street Reserve. (Figure 6.15)

Recommendation: The foredune patch should be dealt with as medium priority via hand pulling. Patches in the samphire areas could also be considered for gradual control via regular hand pulling and chipping out.

Figure 6.13: Sea lavender in Goolwa Dunes (K. Bartley)

Figure 6.14: Dwarf Sea Lavender amongst *Selliera radicans*

Olea europaea **(Olive)** no longer appears to exist in Tokuremoar Reserve following treatment of several plants by the GWLAP. It was recorded near Redcliff Street but appeared to be dead. Olives are highly likely to continue to appear as there are very large specimens on the Goolwa to Port Elliot Roadside and several in the Goolwa Waste and Recycling Depot near the northern boundary of Tokuremoar Reserve.

Recommendation: Monitor for new incursions, especially the Northern boundary between the landfill site.

Asphodelus fistulosus **(Onion Weed)** was scattered in occurrence but was particularly prevalent on low lying flats either side of the Tea-tree areas.

Recommendation: Spot spray when actively growing where abundant. Hand chip outliers.

Centarium sp**. (Pink stars)** was located in Kightley Triangle and should be managed through continued hand pulling on an annual basis when seen.

Recommendation: Continue annual follow-up via hand pulling on historical areas and ensure no further expansion

Pinus radiata **(Radiata Pine)** was recorded as one small seedling in an area where a large pine was removed in past GWLAP works.

Recommendation: Follow-up over this location should be kept in mind when patrolling this area and would be ideal for volunteers. Hand pull seedlings.

Polygala myrtifolia **(Myrtle-leaf Milkwort)** was recorded in three locations. These are sites where parent plants were removed through GWLAP works.

Recommendation: Revisiting of these sites is required annually to hand pull small seedlings.

Rhamnus alaternus **(Blow-fly bush)** was recorded once and should be eradicated from the site. Significant work has occurred through the private heritage agreement at Goolwa.

Recommendation: Target large plants scattered through residential areas of Goolwa. Treat plants via hand pulling, cut and swab or basal bark application using Triclopyr (Garlon©) and diesel.

Scabiosa atropurpurea **(Pincushions)** is a serious weed in Tokuremoar Reserve. Extensive control works have been occurring, pushing west from Kightley Road where the best quality vegetation occurs. Continued control works are recommended as results from recent works have greatly thinned out the areas. Slashing tall Scabiosa followed by spot spraying has been effective (Figure 6.15). Broadleafed herbicide has been used to ensure native grasses and sedges are retained. Hand pulling of larger isolated plants has been undertaken through the better quality vegetation along Kightley Road via contractors and volunteers. The combined approach to tackling this weed currently works very well and minimises off-target damage through spot spraying. Dodder (*Cassytha sp.*) was observed on several occasions appearing to have killed large Scabiosa plants through strangulation (Figure 6.17).

Note: As Scabiosa is removed, Euphorbia tends to emerge (Figure 6.15 and 6.18). Resources need to be allocated for follow up spot spraying and or hand pulling where possible.

Recommendation: continue control works, slashing tall Scabiosa followed by spot spraying with Clopyralid (Lontrel©). Reduce the area of infestation by pushing west from Kightley Road. Target Kangaroo entry points at paths and fence-lines to reduce mobilisation of seeds and slash or hand pull plants.

Figure 6.15: Scabiosa following spot spraying

Figure 6.16: Euphorbia emerging following spraying for Scabiosa

Figure 6.17: Dodder (*Cassytha sp.*) strangling Scabiosa

Figure 6.18: Dense area of Perennial Veldt Grass in Kightley Triangle

***Ehrharta calycina* (Perennial veldt grass)** is particularly common in Tokuremoar Reserve with thick infestations in Kightley Triangle coming in from the northern boundary (Figure 6.18). Isolated plants were recorded as they offer an opportunity to eradicate it from better quality bushland areas.

Recommendation: remove outlier clumps from Tokuremoar Dunes, such as near the eastern boundary. Hand-pull outliers in Kightley Triangle. Some success has been achieved through the use of fluazifop-p (Fusilaide®), a grass selective herbicide, to remove Perennial veldt grass from patches where sedges and rushes persist. This application is worth considering in areas where good populations of *Baumea juncea* exist, such as in the north western corner of Kightley Triangle.

Map 13: Notable Native Plants

GOOLWA TO WELLINGTON LOCAL ACTION PLANNING ASSOCIATION INC

Legend

- Acacia dodoneafolia
- Acacia pycnantha
- Adriana quadripartita
- Baumea juncea
- Billardiera
- Blue Bells
- Caladenia latifolia
- Cyperus gymnocaulos
- Elymus
- Eucalyptus diversifolia
- Exocarpus
- Gahnia
- Hakea vittata
- Lepidosperma
- Linum
- Lomandra juncea
- Lomandra leucocephala
- Myoporum insularum
- Poa poiformis
- Selleria radicans
- Senecio quadridentatus
- Senecio sp.
- Wilsonia rotundifolia

Author: Sherie Bain
Date: 11:15 30 Jan 2015

Coord System: GDA 1994 MGA Zone 54
Disclaimer:
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6.4 Notable Native Plants

There are numerous uncommon, rare and vulnerable native plant species in Tokuremoar Reserve. Areas high in plant diversity and rare species (key hotspot areas) within Tokuremoar Reserve include the samphire areas within the *Melaleuca halmaturorum* Woodland, the low lying areas with *Lawrencia* shrubland and *Acacia cupularis* and in Kightley Triangle. Threat abatement focused on maintaining the diversity of these key hotspot areas is a high priority.

***Acacia dodonaeifolia* (Hop-bush Wattle)** (RA) occurs in one small patch in Tokuremoar Reserve. The patch is comprised of two old remnant plants and another four to six specimens propagated and planted by GWLAP. Shrublands of this species occur on the heritage blocks adjacent to the Goolwa Waste and Recycling Depot and within the depot itself.

***Acacia pycnantha* (Golden Wattle)** (LC) it was seen as important to note as there was only a single plant in the entire reserve; however the species is common at other locations in Goolwa.

***Adriana quadripartita* (Coast Bitter-bush)** (LC) was recorded in Kightley Triangle where it can be found next to and on Kightley Road. The Grund's Blue butterfly (*Theclinesthus albocincta*) uses this plant as a larval food plant (Grund 1997, 2006). *Adriana quadripartita* is listed as uncommon and has been observed to be declining in distribution locally due to the clearance of patches located on house blocks and roadsides (B. Simon pers. obs.). The GWLAP has planted over 400 *Adriana quadripartita* grown from cuttings sourced from a wide sample of both male and female plants in the Goolwa area.

***Baumea juncea* (Bare Twig-rush)** (LC) was recorded in several locations with the biggest patch being found at the northern end of Kightley Triangle amongst high density Perennial Veldt Grass. It also grows along the bikeway near the Goolwa Waste and Recycling Depot boundary in a remnant dune system.

***Billardiera cymosa* (Sweet Apple-berry)** (LC) is common in heritage agreement areas adjoining Tokuremoar Reserve but is only found in a handful of locations in the reserve itself. All but one is found in the Kightley Triangle area. The remaining one is found near the southern side of the *Melaleuca halmaturorum* area.

***Caladenia latifolia* (Pink Caladenia)** (LS) is found in a small area in the Kightley Triangle close to Kightley Road. It is an area known to a nearby resident who watches over the site. Significant threat abatement continues to be undertaken in this area to deal with Buffalo Grass, Veldt Grass, Gazania and a range of other weeds. This is the only orchid recorded. This orchid should be considered rare in Goolwa. It is known in the adjoining heritage areas and Ferguson Reserve in larger numbers.

***Comesperma volubile* (Love creeper)** (LC) is not featured on the map but as there was only one plant recorded in Tokuremoar Reserve in the Kightley Triangle area and it is worth noting its presence as it is uncommon in Goolwa.

***Cyperus gymnocaulis* (Basket Sedge)** (LC) is a particularly important plant in Tokuremoar Reserve as it is used extensively for basket weaving by the Ramindjeri/Ngarrindjeri community. The GWLAP recently introduced the site to a group from Port Elliot (Figure 6.19) members collecting **Cyperus** for weaving were undertaking basket weaving activities and they were astounded at how extensive the patches were. Large patches exist on the north side of the main *Melaleuca halmaturorum* patch. This patch has been managed by the GWLAP through selective control of grassy weeds with Fusilaide® (Figure 6.21). This site is an extremely valuable resource for the Ngarrindjeri/Ramindjeri community and should continue to be managed to protect this area.

Threats include grassy weeds and competition from larger native plants such as *Melaleuca halmaturorum*. It may be worth undertaking more detailed mapping of this patch to monitor it more closely.

Figure 6.19: Ramindjeri/Ngarrindjeri community members collecting *Cyperus* for weaving

Figure 6.20: Large patch of *Cyperus* with Fusilaide® spraying of weedy grasses

Anthosachne scaber var. scaber **(Native Wheat-grass)** (RA) was recorded in the Kightley Triangle and was only seen at one location in Tokuremoar Reserve.

Eucalyptus diversifolia **(Coastal White Mallee)** (LC) was recorded in the Kightley Triangle as a single sapling and is likely to have spread from planted specimens.

Exocarpos syrticola **(Coast Cherry)** (LC) was recorded numerous times in Tokuremoar Reserve largely within the swales behind the foredune. Due to the suckering nature of this plant it is a valuable dune species and may be worth propagating this species and planting in similar habitats where erosion risks occur.

Hakea vittata **(Limestone Needlebush)** (LC) was recorded as a single plant in Tokuremoar in the Kightley Triangle area beneath a sheoak (Figure 6.21). This species is found on the Goolwa Waste and Recycling Depot, private heritage blocks, Pitt Street Reserve and has been cleared from at least four house blocks over the past six years (B. Simon pers. obs.).

Figure 6.21: Fruit of *Hakea vittata*

***Linum marginale* (Native Flax)** (NT) is found in a handful of small patches and isolated plants in Kightley Triangle. It was not seen on other parts of the project area and is likely to occur on the Goolwa Waste and Recycling Depot in the Sheoak woodland areas. It is abundant in the adjoining private heritage agreement properties and also found in the Pitt Street Reserve. It is listed as near threatened for the sub-region.

Lepidosperma sp* and *Gahnia deusta (NT) were both recorded in Kightley Triangle and only known to occur in this part of Tokuremoar Reserve.

***Lomandra juncea* (Desert Mat-rush)** (NT) was recorded in Kightley Triangle growing with ***Lomandra leucocephala ssp. robusta* (Wooly Mat-rush)**, rated near threatened (NT) in the sub-region. Many of the *Lomandra leucocephala ssp robusta* are on the boundary of the reserve near to Kightley Road and are at risk of being lost from spraying or roadworks.

Recommendation: Kightley Road should be considered for roadside marking due to presence of rare species including Adriana and the nearby *Caladenia latifolia*. Removing weeds in this area may reduce need for further spraying by road maintenance activities.

***Poa poiformis* (Coast Tussock-grass)** (LC) was recorded in Kightley Triangle where there are a handful of tussocks. This grass has been planted through the Newell Avenue revegetation site where there are also remnant patches.

***Senecio spanomerus* (Native Groundsel)** (LC) was recorded several times in the *Melaleuca halmaturorum* woodland area where it appears to have emerged after the last flooding. It is locally uncommon in the area as it has not been observed elsewhere in Goolwa during surveys and mapping (B. Simon pers. obs.).

***Senecio quadridentatus* (Cotton Fire Weed)** (LC) was observed once near the bikeway. It is very common in woodlands further inland from Goolwa but was not seen on any of the other sites through the project area.

***Selliera radicans* (Shiny Swamp-mat)** (LC) is located within the areas of Samphire often fringing the *Melaleuca halmaturorum*. It is also growing out in the open in the low-lying area near the *Lawrencia* patch in Tokuremoar Reserve. Patches once grew either side of the bikeway boardwalk but have since been covered over with branch pruning from path maintenance (B. Simon pers. obs.). 200 cuttings were propagated and planted on a number of locations in Goolwa on suitable sites to bolster the remnant populations.

***Wahlenbergia littoricola* (Coast Bluebell)** (NT) is found in the northern corner of Kightley Triangle covering a good sized area (Figure 6.226.21 a and b). Much of this area was previously infested with Victorian Tea-tree.

Figure 6.22a and b: *Wahlenbergia littoricola*

***Wilsonia rotundifolia* (Round-leaf Wilsonia)** (NT) is found in the samphire areas of the reserve and an area near the eastern boundary of the reserve bordering the Boult Street Reserve where it is currently threatened by Couch invasion. GWLAP has had 150 cuttings propagated and have planted them through of suitable sites in Goolwa.

6.5 Weed Control Actions

Table 5: Weed Control Actions Table for Tokuremoar Reserve. (D)=Declared Plant

	Priority Level	Present Density	Distribution	Cost Level	Desired outcome of action	Additional comments
Key Weeds						
Acacia cyclops	High	Low	Defined	Low	Juvenile seedlings removed before seeding maturity.	Foliar spray procumbent shrubs near foredune with Garlon®. Follow-up for small seedlings annually via hand pulling or cutting.
Boxthorn (D)	High	Medium	Scattered	Medium	Juvenile seedlings are treated before mature seeding age.	Key areas in *Melaleuca halmatuorum* are all small to medium in size and hand pull easily. Important to address before they become thickets. Basal bark treat larger plants or cut and swab using triclopyr (Garlon©) and diesel.
Bridal Creeper (D)	High	High	Widespread	High	Juvenile plants in Tea-trees do not reach mature seeding age.	Presence of rust should not cancel out consideration of chemical control options. Spot spray with metsolfuron-methyl (Brush-off©) and penetrant *Melaleuca halmatuorum* areas only has small seedlings at present and should be controlled first.

	Priority Level	Present Density	Distribution	Cost Level	Desired outcome of action	Additional comments
Victorian Tea-tree	Medium	Low	Defined	Low	Juvenile plants do not reach seeding maturity.	Annual follow-up via hand pulling of Tea-tree seedlings required, particularly Kightley Triangle. Encourage nurseries to refrain from selling and offer alternatives such as *Melaleuca lanceolata* or *M.halmatuorum*.
Groundcover Weeds						
Galenia	High	Low	Isolated	Low	Eradication from Tokuremoar Reserve.	Several other patches in Goolwa need addressing such as Goolwa Waste and Recycling Depot and Boult Street Reserve. Spray with triclopyr/picloram (Grazon©) on large patches Hand pull or cut and swab small plants.
Gazania (D)	High	Low	Defined	Low-Medium	Gazania actively controlled to maintain low density.	Engage bordering residents in control of key point source areas. Annual patrol of East and West boundaries for hand pulling Ideal volunteer weeding activity
Iceplant	High	Low	Isolated	Low	All existing plants are treated and no new populations established.	Observe soil hygiene practices and consider hand pulling and bagging this plant where practical. Spot spray with glyphosate if large patches.

	Priority Level	Present Density	Distribution	Cost Level	Desired outcome of action	Additional comments
Osteospermum	Medium	Low	Isolated	Low	All existing plants are treated and no new populations established.	Annual follow-up required. Engage residents in awareness programs. Hand pull seedlings.
Other Weeds						
Acacia saligna	High	Medium	Defined	Low	All existing plants are treated and no new populations established.	All mature plants have been removed via GWLAP. Annual follow-up of seedlings is required in Kightley Triangle via hand pulling and cut and swab Ideal Volunteer activity.
Agapanthus	Medium	Low	Isolated	Low	Eradication from Tokuremoar Reserve.	On eastern boundary near Kightley Avenue. Hand dig and bag.
Arundo donax	Low	Low	Isolated	Medium	Eradication from Tokuremoar Reserve.	Located on Western side of reserve. Slash and spray re-growth with glyphosate.
Boneseed (D)	High	Low	Scattered	Low	Juvenile plants do not reach seeding maturity.	All mature plants treated. Annual patrol in September when flowering is ideal timing House block with large plants in Goolwa Beach need to be addressed (eg next to Pitt Street Reserve). Cut and swab. Hand pull small seedlings.

	Priority Level	Present Density	Distribution	Cost Level	Desired outcome of action	Additional comments
Buffulo Grass	Medium	Medium	Defined	Medium	Eradication from Tokuremoar Reserve. Protect populations of rare native plant species.	Mostly along edge of reserve coming in from Kightley Road. Patches of Lomandra, Wahlenbergia and Caledinia latifolia currently threatened by this weed. Spot spray. Hand dig.
Caltrop	High	Low	Isolated	Low	Eradication from Tokuremoar Reserve.	Next to the bikeway at Redcliff St. end and requires annual patrol for new seedlings. Hand pull and bag seedlings.
Cape Ivy	High	Low	Isolated	Low	Eradication from Tokuremoar Reserve.	Coming in from house on end of Redcliff Street. Annual follow-up required via hand pulling or spot spraying plants.
Carpobrotus edulis	High	Low	Defined	Low	Eradication from Tokuremoar Reserve.	Current locations are historical locations and have been removed. Follow-up is recommended via patrols and hand pulling seedlings.
Century Plant	Low	Low	Isolated	Low	Eradication from Tokuremoar Reserve.	Original parent plant has been destroyed via GWLAP. One tiny pup was recorded during mapping. Annual patrol and hand pull or chip seedlings.
Cocks foot	Low	Low	Isolated	Medium	Eradication from Tokuremoar Reserve.	Only recorded plant was near boundary of landfill site. Spot

	Priority Level	Present Density	Distribution	Cost Level	Desired outcome of action	Additional comments
						spray with glyphosate.
Conyza bonariensis	Medium	Medium	Scattered	High	Isolated plants are removed from native dominant areas.	After flooding in 2012 had receded, this plant was in high numbers around the fringes of the Melaleuca halmaturorum and has gradually thinned out. Hand pull where practical.
Cotton Bush	Medium	Low	Defined	Medium	All existing plants are treated and no new populations established.	Most in the Kightley Triangle section. Cut and swab with glyphosate.
Couch	Medium	High	Scattered	High	Containment and reduction of known patches. Protect rare and vulnerable species through localized control.	Reserve boundaries and paths are key entry points. Areas of Couch around patch of *Wilsonia rotundifolia* is priority for control using grass selective herbicide. Spot spray outliers.
Dimorthotheca	High	Low	Isolated	Low	Eradication from Tokuremoar Reserve.	Newly detected weed for Goolwa and on foredune as a small patch. Hand pull and bag all plants.
Euphorbia paralias & terracina (D)	Medium	High	Widespread	Very High	Address on an as-needs basis to address outlier populations.	Localised control around revegetation and where isolated patches are observed using hand pulling has worked well.
Freshia	Very High	Low	Isolated	Medium	Eradication from Tokuremoar Reserve.	In Kightley Triangle. Seed pods removed by GWLAP 2014 but will require follow-up via hand pulling or spot spraying.

	Priority Level	Present Density	Distribution	Cost Level	Desired outcome of action	Additional comments
Gladioli	Very High	Low	Isolated	Medium	Eradication from Tokuremoar Reserve.	This patch was close to the Western side of Tokuremoar and must be contained. Spot spray larger patch using metsolfuron-methyl (Brush-off©).
Horehound (D)	High	Low	Scattered	Medium	All existing plants are treated and no new populations established.	Key patches in boardwalk revegetation area and Eastern edge of Tea-trees. Spot spray and hand pull.
Kikuyu	Medium	Medium	scattered	Medium	Containment of patches and removal from significant native plant localities.	Areas at boundaries need pushing back. Grass selective herbicide has been successful for treating Kikuyu on areas with native rushes and sedges also present.
Mustard weed	Medium	Medium	Isolated	Medium	Containment of patches and removal from significant native plant localities.	Common on disturbed sites and being controlled during revegetation maintenance by GWLAP. Hand pull outliers.
Olive (D)	High	Low	Isolated	Low	Eradication from Tokuremoar Reserve.	All large olives have been destroyed. 1 record is of treated plant with minor re-growth. Monitor Northern boundary for new seedlings.
Onion Weed	Medium	Medium	Scattered	High	Containment and reduction of known patches.	Volunteer programs suit hand chipping or pulling small areas. Bag if seed has formed. Flooding of the area has resulted in fresh germination and distribution of plants throughout

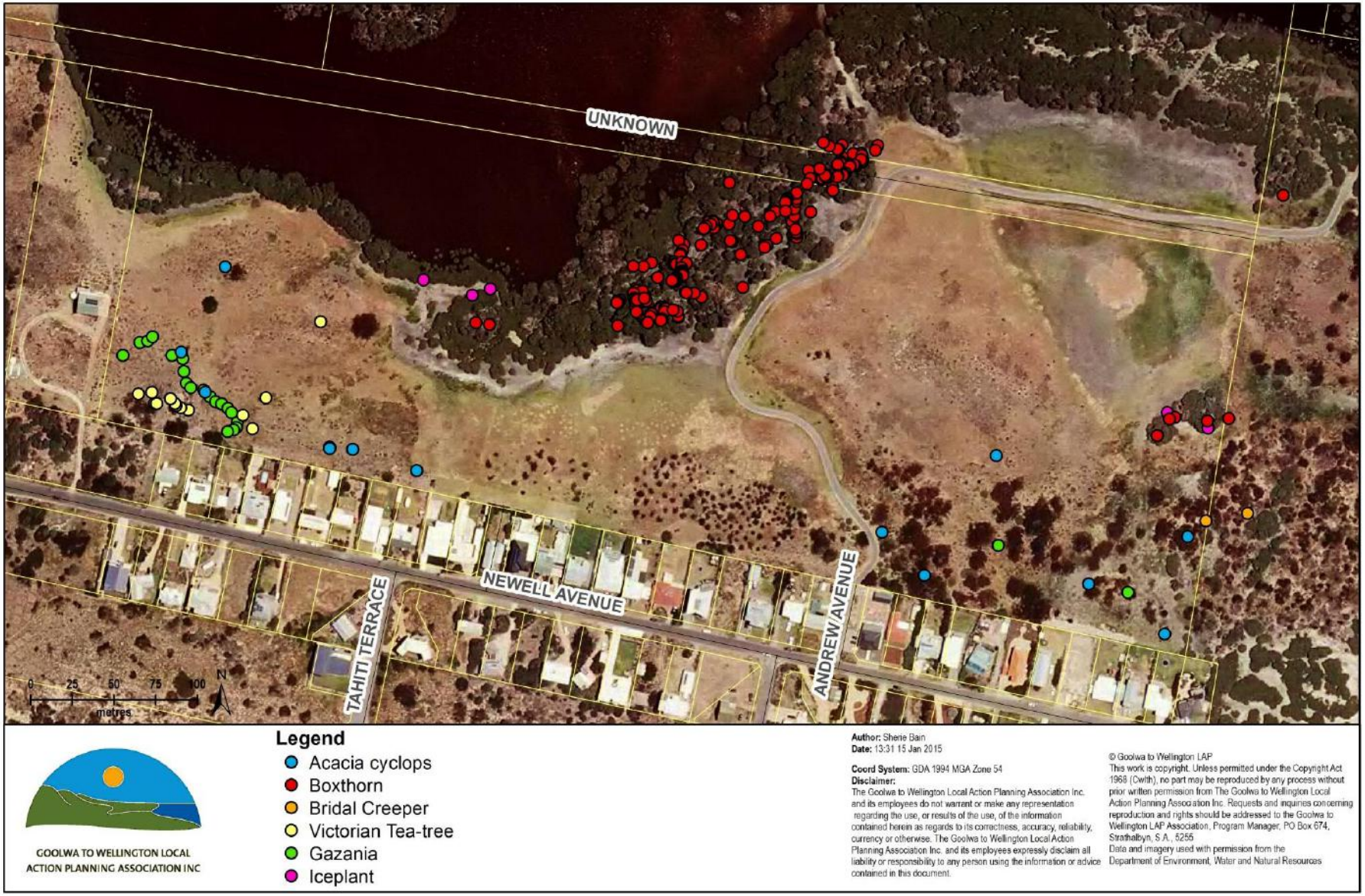
	Priority Level	Present Density	Distribution	Cost Level	Desired outcome of action	Additional comments
						low-lying areas.
Perennial Veldt Grass	High	Low-High	Scattered & defined	High	Treatment of isolated plants and patches allowing no new populations.	Spot spray outliers. Consider selective control over Baumea juncea patches in NE area of reserve.
Phalaris	Medium	Medium	Scattered	Medium	Containment and reduction of known populations.	Persists in low lying areas of the reserve. Spot spray with glyphosate when actively growing.
Picris echioides	Medium	Medium-High	Defined	Medium	Containment and reduction of known patches.	Currently in low lying areas in greatest concentration from eastern end of reserve around the edges of the Tea-trees. Slash tall plants and spot spray .
Pinus radiata	Low	Low	Isolated	Low	Eradication from Tokuremoar Reserve.	Only small seedlings occasionally seen where parent plant was removed in Kightley Triangle. Hand pull seedlings.
Pink stars	High	Low	Defined	Low	Containment of current extent.	In Kightley Triangle. Hand pull patches annually.
Polygala	High	Low	Isolated	Low	Eradication from Tokuremoar Reserve.	All mature plants were treated when sighted. Annual follow-up required at all locations. Hand pull seedlings.
Primrose	Medium	High	Defined & scattered	Medium	Containment of core population. No new outlier populations established.	Either side of bikeway. Outlier patch near Western boundary as marked.

	Priority Level	Present Density	Distribution	Cost Level	Desired outcome of action	Additional comments
						Hand pull. Spot spray
Pyp Grass	High	Medium-High	Defined	High	Containment and reduction of current patch and no new infestations occurring.	Keep patch close to Eastern boundary from expanding further towards Tokuremoar. Slash and spray re-growth with grass selective herbicide.
Rhamnus	High	Low	Isolated	Medium	Eradication from Tokuremoar Reserve.	Adjacent neighbours to be engaged in control program. Several large plants observed on nearby residential blocks.
Salvation Jayne (D)	Medium	Low	Scattered	Low	Containment and reduction of known locations.	Boardwalk revegetation area. Hand pull or spot spray outliers with glyphosate.
Scabiosa	High	High	Defined	High	Containment and reduction of known patches and no new infestations occurring. Containment and reduction of known patches and no new infestations occurring.	Target removal on areas adjacent and along paths and Kangaroo entry point near fences. Continue spot spraying using clopyralid (Lontrel©) to push West from Kightley Road towards bikeway. Target any outlier patches.
Dwarf Sea-lavender	Medium	Low	Isolated	Medium	Containment and reduction of known patches and no new infestations occurring. Reduced densities around rare plant populations.	Growing in patch of the rare *Selliera radicans* and *Samolus repens*. Can be hand pulled in Nov/Dec when in flower and most discernible. Good volunteer

	Priority Level	Present Density	Distribution	Cost Level	Desired outcome of action	Additional comments
						activity.
South African Daisy	Medium	Low-High	Scattered	Medium	Containment and reduction of known patches.	Careful not to remove native Senecio growing in same areas. Hand pull and cut and swab with glyphosate.
Thistle (Scotch and Spear)	Medium	Medium	Defined	High	Containment and reduction of known patches.	Found on fringes of Tea-trees, particularly on the north-east end. Spot spray with broad-leaf herbicide.
Tree Tobacco	Medium	Low	Scattered	Medium	Containment and reduction of known patches and no new infestations occurring.	Mostly found in boardwalk revegetation area. Hand pull small plants. Cut and swab with glyphosate if larger.
Tree Mallow	Medium	Low	Isolated	Low	Eradication from Tokuremoar Reserve.	Found on adjacent landfill slope. Hand pull or cut and swab with glyphosate.
Twiggy Mullein	Low	Low	Defined	Medium	Containment and reduction of known patch.	Growing as an isolated population in what appears to be an old channel. Hand pull via flower stalks when soil is wet.

7 Newell Avenue Reserve

Map 14: Key Weeds and Groundcover Weeds



7.1 Key Weeds

The following four plants have been grouped together as Key Weeds as they were those most commonly encountered, have a negative effect on the structural component of existing remnants and are 'red alert' weeds in the Goolwa area (Caton. et al 2007). There are several other weeds that have a serious effect on the structure of native vegetation (e.g. Boneseed), but due to the very low numbers (a result of targeted control over the past seven years) they have been combined under another composite group called Other Weeds, see Map 16.

Acacia cyclops **(Western Coastal Wattle)** currently exists as a mixture of small individuals located where large specimens were removed by the GWLAP, some are medium sized plants scattered through the site and a number of large plants found mostly along the southern boundary of the reserve.

A relatively small amount of work would be required to deal with the small to medium plants and the large plants will require cut and chipping or removal from the site due to the proximity to housing

Recommendation: continue with control works, patrolling for new seedlings. Remove threat of outlier plants on adjoining reserves and roadsides and consider raising public awareness to encourage removal from residential properties. Hand-pull smaller seedlings and cut and swab larger plants with glyphosate.

Lycium ferocissimum **(Boxthorn)** is found in high density in patchy coverage largely within the *Melaleuca halmaturorum* woodland area. Most specimens are small to medium in size and have germinated after the last flood waters receded. Many of the worst areas have been hand pulled in November 2014 through the GWLAP with continued follow-up required for this site.

Several large plants were seen on the southern and northern boundaries of Newell Avenue Reserve that should be dealt with.

Recommendation: continue control works and ensure that the small to medium sized plants are all removed before they form large impenetrable thickets in years to come. Control large plants in adjoining land containing remnant vegetation if possible. Cut and swab. Basal bark application of triclopyr and Diesel works well on young to medium age plants. Hand-pull small seedlings in wet ground.

Asparagus asparagoidies **(Bridal Creeper)** was not in high numbers in this reserve with most plants recorded near the western boundary of Tokuremoar Reserve. Continued vigilance will be require to ensure it does not become an issue in the future as there are medium density populations just over the fence in Tokuremoar Reserve.

Recommendation: Spot spray with Metsolfuron-methyl when flowering. If small then hand-dig bulbs and destroy

Leptospermum laevigatum **(Victorian Tea-tree)** is restricted to the far south western corner of the reserve where there are a number of small to medium plants. Several large plants exist in the small council reserve which adjoins this site and should be removed.

Recommendation: continue with works to remove from the reserve via hand pulling or cut and swab. Maintain follow-up over this area annually. Encourage nurseries to not stock this weed and offer alternatives.

7.2 Groundcover Weeds

***Gazania linearis* (Gazania)** has been a target for control actions for the past three-four years by the GWLAP and this has effectively dealt with all of the large patches of Gazania in the reserve through spot spraying (Figure 7.1). Gazania still remains in this reserve in the south western corner where it is intertwined with native plants, especially *Acacia cupularis* and outlier plants continue to emerge as scattered plants from the southern boundary.

Planting of Coastal Wattle has been undertaken where there are gaps in the vegetation along the southern boundary in an effort to decrease the amount of Gazania spreading in from house blocks by forming a vegetative barrier.

Figure 7.1: Gazania controlled via long-line spraying

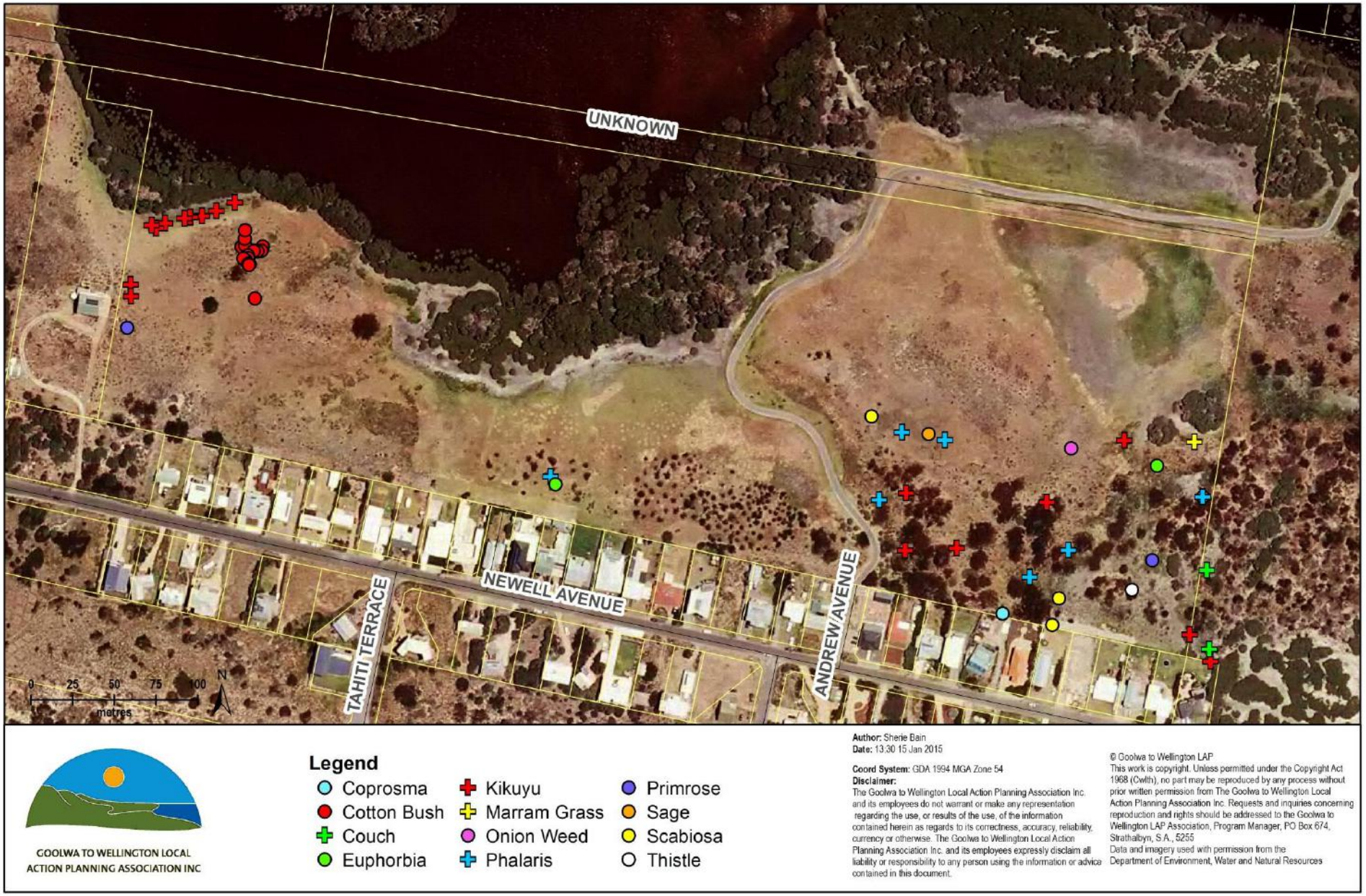
Recommendation: Continue annual follow-up along the Southern Boundary via hand chipping and spot spraying with glyphosate and penetrant. Ideal volunteer activity as current density levels.

***Mesemryanthemum cristallinum* (Iceplant)** occurs around the edges of the *Melaleuca halmaturorum* woodland area in the large patch and is also found beneath isolated *Melaleuca* further east bordering the revegetation area. Rabbits appear to favour this plant as its presence directly correlates with bared out disturbed patches of saline ground next to shrubs.

Threat abatement works have occurred in all known patches in this reserve for the past three-four years via spot spraying and hand pulling.

Recommendation: Continue annual follow-up via spot spraying with glyphosate and hand chipping plants at all known localities annually to minimise seed set.

Map 15: Other Weeds



7.3 Other Weeds

***Coprosma repens* (New Zealand Mirror-bush)** was recorded on the southern boundary and should be controlled if possible. It may require consultation with the property owner adjoining to ensure they are happy to remove it.

Recommendation: Cut and Swab larger specimens with glyphosate. Hand-pull seedlings. Consult with neighbours bordering reserves to target large mature specimens for removal.

***Gomphocarpus sp.* (Cotton-bush)** was largely recorded in the western portion of the reserve on the limestone rise containing remnant native vegetation. This plant tends to correlate with the limestone areas in this reserve and should be easily controlled via cutting and swabbing.

Recommendation: Cut and swab with Glyphosate or hand pull when small.

***Cynodon sp.* (Couch)** is common on the revegetation areas of this reserve and is being progressively removed through revegetation site maintenance activities. Native Couch (*Distichlis distichophylla*) is also present in many of the same locations as the couch and has expanded significantly in patch size since control works have been undertaken. It appears to be quite resistant to glyphosate as areas that were intertwined with couch were over sprayed, with low levels of setback (B. Simon pers. obs.). Other outlier patches have been marked and would be worth controlling before they become more serious patches.

Recommendation: Continue to push Couch out of the reserve through spraying using glyphosate. Annual scouts of the site will be required.

***Euphorbia paralias* and *Euphorbia terracina* (Euphorbia)** are both quite prevalent in this reserve and form several large patches. Work has been undertaken to remove it from patches of *Ficinia nodosa* and *Juncus kraussii* with great success. This was done via hand pulling (Figure 7.2) and spot spraying using a broad-leafed herbicide.

Several local schools have been involved in the active management of this site with a range of management activities undertaken including the hand pulling of Euphorbia across large areas of the site where revegetation occurs. Goolwa Coastcare Group currently undertakes regular working bees on the site to manage plantings and has involved removal of Euphorbia (Figure 7.3).

Figure 7.2: Hand pulled Euphorbia in reed bed areas

Figure 7.3: Goolwa Coastcare Group working bee

Recommendation: Continue to remove this weed where there are other species to replace it, particularly as the revegetation matures. Hand pull. Spot spray large patches if possible.

***Pennisetum clandestinum* (Kikuyu)** is a major issue on this reserve and has been gradually controlled as part of revegetation preparation, with several areas having previously been monocultures of this problematic weed. All of the revegetation areas were historically planted with Kikuyu and were grazed by cattle when the area was a working dairy farm (K. Dennis pers. comm.). When the GWLAP commenced revegetation works here, the areas were knee high kikuyu and took several passes to control with slashing and herbicides.

Kikuyu will remain an issue on this reserve for many years to come and has been left in some areas until the revegetation becomes more established (Figure 7.4).

Figure 7.4: Kikuyu remains in between plantings and is being gradually contracted as plants grow.

Recommendation: Control as revegetation matures to low density within revegetation and native vegetation areas. Push back to bikeway edges. Use grass selective herbicides where it is growing in amongst native vegetation such as clumps of rush.

Ammophila arenaria **(Marram Grass)** is a minor issue in the reserve and occurs on two locations where it was probably planted to address erosion patches. Some control works have occurred on these patches via cutting and swabbing and hand-pulling.

Recommendation: Maintain control to low density via hand pulling, cut and swab or foliar spray with glyphosate and penetrant.

Asphodelus fistulosus **(Onion Weed)** is not a big issue in the reserve yet and has currently been receiving control via hand chipping, hand pulling and spot spraying.

Recommendation: Continue control program with hand-pulling/chipping of outliers when seen. Spot spray with appropriate chemical for the situation.

Phalaris sp. **(Phalaris)** is another remnant from past dairying activities on the site and occurs on all of the low-lying patches other than the samphire areas. Gradual removal of this weed has been occurring via slashing and spot spraying but will be difficult to remove from the site as it is growing in under shrubs in some areas.

Recommendation: continue control works on an annual basis, removing outlier clumps and pushing it out of revegetation areas via spraying of active growth with glyphosate.

Oenothera sp **(Primrose)** occurs in small numbers on the site at present and should be high priority for control via hand pulling or spot spraying. It is largely found in the south western corner of the reserve.

Recommendation: Remove outliers using appropriate approach for the site. Work with council to target large areas on the side of bikeway path and consider boom spraying of this area.

Salvia verbenaca **(Wild Sage)** is largely confined to a swale area where there is very shallow sand over limestone. It currently dominates as a monoculture and could be progressively removed from the site and be replaced with grasses and sedges. Revegetation has commenced in this area.

Recommendation: Gradual removal via spot spraying with broadleaf herbicide and replacement with native species may be worthwhile as the revegetation here matures.

Scabiosa atropurpurea **(Pincushions)** is still at a level where it could conceivably be contained on this site.

Recommendation: Spot spray with clopyrilid (Lontrel©) or glyphosate if low off-target risk, particularly over the two isolated patches. Hand pull isolated plants.

Cirsium vulgare **(Spear Thistle)** occurs mostly in the low lying areas of the site and is fortunately not well established in the reserve as yet. Control should be incorporated into other broad-leafed weed control activities.

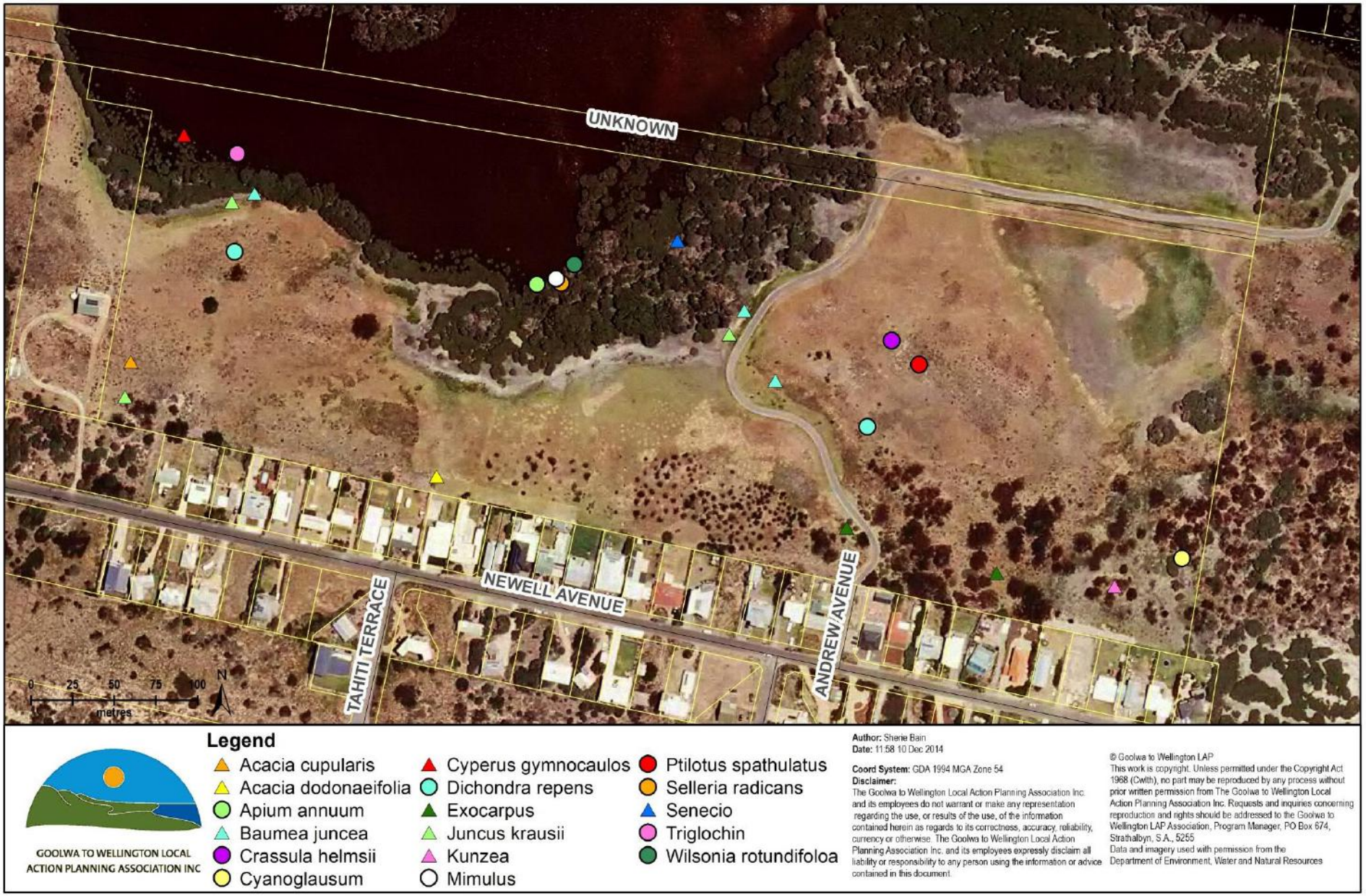
Recommendation: Eradicate from the reserve via spraying using broad-leaf herbicide or hand chipping.

Nicotiana glauca **(Tree tobacco)** was not recorded as a waypoint but is present near the most eastern Iceplant points and has been hand pulled and cut and swabbed several times. It still requires follow-up annually to ensure it is removed from the site. Flooding tends to trigger new germination of this species (B. Simon pers. obs.).

Recommendation: Hand pull small seedlings. Cut and swab larger plants with glyphosate. Annual follow-up required, particularly after seasonal flooding which seems to assist germination of soil seed bank.

Other notable weeds at this site include the common thistle and a range of annual grasses, particularly Annual Rye Grass, Wild Oats and Annual Veldt. Most of these species are treated as part of the revegetation site maintenance and will be on-going on this site. They should reduce in density where revegetation begins to take over.

Map 16: Notable Native Plants



7.4 Notable Native Plants

There are a number of uncommon, rare and vulnerable native plant species found in Newell Avenue Reserve. Several have not been recorded with a waypoint and those that were taken were only done opportunistically or where they were seen as notably different from the dominant plant species within the various vegetation communities.

***Acacia cupularis* (Cup Wattle)** (LC) occurs on several areas as one of the dominant plant species in low shrubland on limestone.

***Acacia dodonaeifolia* (Hop-bush Wattle)** (RA) is present as two old shrubs on the southern boundary of Newell Avenue Reserve. Seed has been collected from the two shrubs and mixed with seed from other plants from the private heritage areas with 20 seedlings planted in the Newell Avenue Reserve.

***Apium annuum* (Annual Celery)** (LC) is locally found in the samphire areas in relatively common abundance.

***Baumea juncea* (Bare twig-rush)** (LC) is present as a number of small patches, largely along the base of the limestone hillocks on the site. It is likely that it was once more widespread in this reserve. Selective removal of weedy grasses has occurred over existing patches to increase the patch size. Over 100 plants have been included in the revegetation of this site by the GWLAP.

***Crassula helmsii* (Swamp Crassula)** (NT) was recorded growing in a small limestone depression where rainwater was observed as persisting for several months. It is on the top of one of the limestone rises and was a particularly unusual find given it was well away from any freshwater riparian areas.

***Cynoglossum* australe (Australian Hound's-tongue)** (LC). This plant is often confused with the more common *Myosotis australis* (Austral Forget-me-not) which also occurs on the site.

***Cyperus gymnocaulis* (Basket Sedge)** (LC) was recorded in only one location growing on the fringes of the samphire areas north of the Tea-trees as per the waypoint (Map 16). This species has been planted through the revegetation site in small groups.

***Dichondra repens* (Tom Thumb)** (LC) was recorded as two patches and was found on the limestone rises. This plant is a very common plant on many bushland sites but is rarely observed in the Goolwa area and is a useful groundcover for landscaping and revegetation.

***Exocarpos syrticola* (Coast Cherry)** (LC) is present as one single plants east of the Bikeway and another patch north of the bikeway entrance to Newell Avenue Reserve. GWLAP has planted over 20 cutting grown seedlings through the revegetation area west of the bikeway path. There are approximately five surviving plants at present.

***Juncus kraussii* (Sea Rush)** (LC) is not common on this reserve and currently occurs in two main locations. One outlier clump has recorded in the south western corner of the reserve well away from the usual flood zone on sand. Another patch grows near the tea tree woodland close to the bikeway. This species has been planted through the low-lying areas of the reserve in the revegetation areas.

***Kunzea pomifera* (Muntries)** (LC) was recorded as it was not common in this reserve as it is in adjoining areas. Over 200 seedlings and 200 cutting grown plants have been included in the revegetation areas in this reserve.

Recommendation: Continue to include in revegetation activities to increase patches in the reserve

***Mimulus repens* (Creeping Monkey-flower)** (LC) was recorded in the samphire areas of the reserve and does not appear to be in Tokuremoar Reserve. It is listed as rare in the Southern Lofty herbarium region.

Recommendation: consider propagation and translocation to other samphire areas in Goolwa

***Ptilotus spathulatus f. spathulatus* (Pussy-tails)** (RA) is listed as rare in region and occurs in a small patch of no more than ten plants on sand over limestone. This plant has only been seen on one or two other location in Goolwa with only two-five plants known to the Pitt Street Reserve.

Recommendation: hand weeding around this population would be worthwhile.

***Selliera radicans* (Shiny Swamp-mat)** (LC) occurs in the samphire areas of the site. This plant has been propagated via cuttings and planted at various locations of suitable habitat. Locally rare.

***Senecio spanomerus* (Native Groundsel)** (LC) was recorded several times in the *Melaleuca halmaturorum* woodland area where it appears to have emerged after the last flooding. It is likely to be uncommon in the area as it has not been observed elsewhere in Goolwa during surveys and mapping (B. Simon pers. obs.).

***Triglochin sp* (Tiny Arrowgrass)** (LC) was recorded in the samphire areas of the reserve. The species name is yet to be verified. This plant was growing amongst one of the patches of *Mimulus repens*.

Recommendation: Have plant species name verified

***Wilsonia rotundifolia* (Round-leaf Wilsonia)** (NT) was recorded in the samphire areas of the reserve and consists of several patches scattered across the site. Propagation via cutting has resulted in over 80 plants being planted in various suitable sites through Goolwa in an effort to bolster numbers.

7.5 Weed Control Actions

Table 6: Weed Control Actions Table for Newell Avenue Reserve. (D)=Declared Plant

	Priority Level	Present Density	Distribution	Cost Level	Desired outcome of action	Additional comments
Key and Groundcover Weeds						
Acacia cyclops	High	Low	Scattered	Medium	All mature seeding plants removed from site and no seedlings reaching seeding maturity	Engage residents in awareness program to remove from house blocks Volunteer suitable
Boxthorn (D)	High	Medium	Defined	Medium	Limit juvenile recruitment and reduce infestation to low	Engage adjacent residents in control program. Most plants are small and able to be hand pulled. Cut and swab or basal bark application of triclopyr (Garlon©) and Diesel works well on young to medium age plants. Hand-pull small seedlings in wet ground.
Bridal Creeper (D)	High	Low	Isolated	Low	No new infestations in reserve	Spot spray with Metsolfuron-methyl (Brush-off©) when flowering. If small then hand-dig bulbs and destroy.
Victorian Tea-tree	Medium	Low	Defined	Medium	Removal of all mature seeding plants from site and no juvenile plants reach seeding maturity	Engage residents in control program Ensure nurseries do not stock this weed and offer suitable alternatives to replace them.
Gazania (D)	High	Low-Medium	Defined	High	Containment of current infestation	Engage residents in control program Continue encouraging replacement with local plants. Annual follow-up along Southern boundary required via hand chipping or spot spraying with glyphosate and penetrant.
Iceplant	High	Low-Medium	Defined	Medium	Containment and reduction of current areas and ensure no new seed set	Patrol fringes of Melaleuca halmatuorum swamp. Spot spray with glyphosate or hand pull.
Other Weeds						

	Priority Level	Present Density	Distribution	Cost Level	Desired outcome of action	Additional comments
Couch	High	Medium	Scattered	High	Containment and reduction of known patches	Gradually remove as revegetation fills in via spot spraying with glyphosate. Patrol for outliers annually
Coprosma	Medium	Low	Isolated	Medium	Eradicate from Newell Avenue Reserve	1 single large plant on Southern boundary as marked on map. Medium cost due to size and removal from site. Cut, swab and remove as close to boundary.
Cotton Bush	Medium	Medium	Defined	Medium	Containment and reduction of current areas and ensure no new seed set	Tends to be on limestone rises in Western portion Cut and swab with glyphosate.
Euphorbia paralias & terracina (D)	Medium	Medium to High	Widespread	High	Containment and reduction of current areas and ensure no new populations	Localised control around revegetation and where isolated patches are observed via hand pulling and cut and swab. Spray large patches with suitable chemical. Volunteers suitable
Kikuyu	High	Medium	Widespread	Medium	Containment and reduction of patches	Areas at Southern boundary need pushing back. Gradually remove as revegetation matures via spot spraying with glyphosate.
Marram Grass	Low	Low	Scattered	Medium	limited spread through monitoring of current populations	Only remove if erosion risk low or outlier patches. Cut and swab with glyphosate or hand pull.
Onion Weed (D)	High	Low	Scattered	Medium	Containment and reduction of known patches	Volunteer programs suit hand chipping or pulling. Bag if seed has formed.
Phalaris	Medium	Medium	Scattered	Medium	Reduction of known populations to favour native plants	Annual control removing outlier clumps and pushing it out of revegetation areas via spraying of active growth with glyphosate.
Primrose	High	Low	Isolated	Medium	Eradication from Newell Avenue Reserve	On limestone rise at Western end of site. Hand pull or spot spray. Work with council with the view to

	Priority Level	Present Density	Distribution	Cost Level	Desired outcome of action	Additional comments
						removing from bikeway edges.
Sage (Wild)	Low	High	Defined	Medium	Containment within current area	Largely isolated in swale on very shallow sand on limestone. Gradual removal via spot spraying with glyphosate and replacement with native species may be worthwhile.
Scabiosa	High	Medium	Defined	Medium	Containment and reduction of known patches and no new infestations occurring	Two distinct patches occur in this reserve. Slash tall plants. Spot spray with clopyrilid (Lontrel©) or glyphosate if low off-target risk
Scotch thistle	High	Low	Isolated	Low	Eradication from Newell Avenue Reserve	Spot spray with glyphosate or hand chip where able. Low numbers at present offer eradication from this site.

8 Surfers Reserve

Map 17: Key Weeds

8.1 Key Weeds

The following four plants have been grouped together as Key Weeds as they were those most commonly encountered, have a negative effect on the structural component of existing remnants and are 'red alert' weeds in the Goolwa area (Caton. Et al 2007). There are several other weeds that have a serious effect on the structure of native vegetation (e.g. Boneseed), but due to the very low numbers (a result of targeted control work over the past seven years) they have been combined under another composite group called Other Weeds, see Map 20.

Acacia cyclops **(Western Coastal Wattle)** was recorded in quite low numbers with nearly all plants either being near the 'Cliffs' portion of this area or occasional windswept and subsequently procumbent specimens. Significant control works have occurred for several years via NR AMLR with the majority of large shrubs having had primary treatment (Figure 8.1). The few large shrubs close to the foredune or on the cliffs (Figure 8.2) that are procumbent in nature may be best treated using in-situ foliar application. Trials in the Goolwa Dunes have successfully killed large shrubs and avoided time consuming cutting and swabbing of multiple stems often covered in sand.

Figure 8.1: Primary treatment of *Acacia* cyc*lops* **Figure 8.2:** Procumbent shrubs along foredune/cliffs **Figure 8.3:** Procumbent Victorian Tea-tree

Recommendation: treat large procumbent plants using Triclopyr (Garlon©) where sand has built up around trunks. Cut and swab and hand pull small to medium plants.

Lycium ferocissimum **(Boxthorn)** was most prevalent in the 'Cliffs' area amongst the Low Coastal Shrubland and was seen on several residential and vacant blocks nearby.

Recommendation: Limit current Boxthorn seed set and maintain follow-up across the site. Target Boxthorns on adjoining land to limit re-infestations into reserves. Cut and swab or basal application with Triclopyr (Garlon©) and diesel

Asparagus asparagoidies **(Bridal Creeper)** was recorded in low numbers. The site is likely to have more than what has been recorded however, there is a good opportunity to keep this plant from establishing in this area. With current Gazania density on this site it is likely that this has limited available niches for this weed to become more prevalent.

Recommendation: Bridal Creeper control via spot spraying or tuber removal is likely to be a cost effective option.

Leptospermum laevigatum **(Victorian Tea-tree)** is largely restricted to adjoining council reserves and vacant house blocks. There were one or two noted in the Surfers Dunes that had a procumbent nature (Figure 8.3).

Recommendation: Continue with works to remove from council reserves. Maintain follow up over this area and engage community in control and replacement programs. Cut and swab with glyphosate or hand pull plants.

Map 18: Groundcover Weeds

8.2 Groundcover Weeds

***Gazania linearis* (Gazania)** was recorded as widespread and scattered in the most eastern third of the Surfers Reserve near Tokuremoar to high density in much of the remainder of the site. It is clear from the mapping work that persistent work via NR AMLR on this site has resulted in lower densities on the treated areas.

Several pockets of *Leucophyta brownii* Low Shrubland offer islands of important vegetation that could be improved with localised control of Gazania. Replacement of Gazania with useful colonising plants such as *Senecio pinnatifolius* (Figure 8.4) and *Pelargonium australe* (Figure 8.5) either through encouragement of natural regeneration or through some revegetation in erosion prone areas would be advisable.

Recommendation: Continue pushing weeds front west towards the 'Cliffs' and consider localised control around key colonising understorey to encourage recruitment and protect seed sources. Collect seed from *Lotus australis* recorded on the site with the view to mixing with seed from other local populations (E.g. Goolwa Dunes).

Figure 8.4: *Senecio pinnatifolius*

Figure 8.5: *Pelargonium australe*

***Mesemryanthemum cristallinum* (Iceplant)** was only recorded at one locality next to the Waikiki Way Carpark on the edge of the reserve.

Recommendation: Ensure no new populations occur in this reserve and continue follow-up of known locations. Hand pull seedlings

***Osteospermum fruiticosum* (Seascape Daisy)** was recorded on the slope just west of Waikiki Way as an isolated patch consisting of several plants (Figure 8.6).

Recommendation: Control existing parent plants and ensure all follow-up juveniles do not reach seeding maturity. Area of slope above Waikiki Way has some erosion risk and it is recommended to undertake control work in off-peak tourist times (Autumn-Winter), leave dead plants in-situ and replace plants with suitable local native groundcovers. Foliar spray with Triclopyr (Garlon©) when healthy and actively growing

Figure 8.6: *Osteospermum fruiticosum* (Seascape Daisy).

Map 19: Other Weeds

8.3 Other Weeds

Aloe sp. **(Aloe)** (Figure 8.7) was recorded close to the eastern boundary of the reserve and appeared as though some control works had already been undertaken (Figure 8.7). Current patch is isolated and of low density.

Recommendation: Contain current patch through annual follow-up via hand chipping or spot spraying until eradicated from this reserve.

Figure 8.7: Aloe in the Surfers Reserve

Anthyllis barba-jovis **(Beard of Jupiter)** (Figure 8.8) was recorded as a single mature plant and originates from the Western Mediterranean where it grows on coastal cliffs. It is a perennial legume, a hermaphrodite and semi-halophilic (salt dependant) plant.

Recommendation: Eradicate parent plant from the reserve. Any subsequent juveniles to be removed prior to reaching seeding maturity. Cut and swab with diesel and Triclopyr (Garlon©)

Figure 8.8: Beard of Jupiter (K. Bartley)

Stenotaphrum secundatum **(Buffalo Grass)** was recorded in the eastern end of the reserve next to the Tokuremoar boundary as a defined patch. Whilst it is of concern it is currently providing some resilient cover next to an access path and would be best gradually removed.

Recommendation: Contain and reduce through spot spraying with glyphosate. Allow no new populations to establish.

Cynodon sp. **(Couch)** was recorded next to the most eastern pathway through the dunes at medium density as isolated patches.

Recommendation: Contain and reduce current patches via spot spraying with glyphosate. No new patches to establish in reserve.

Dimorthotheca pluvialis **(Cape Marigold)** was recorded as an isolated locality on the slope above Waikiki Way. This annual daisy appears to be highly adaptable and can grow near the foredune in harsh conditions. It has the potential to become a more widespread weed in the Goolwa area.

Recommendation: Contain and reduce existing patch via hand pulling. No new populations allowed in Surfers Reserve.

Euphorbia paralias **(Euphorbia)** was recorded as isolated with the one locality being marked on Map 19.

Recommendation: Remove known plants and maintain current low density on the site via hand pulling of plants

Pennisetum clandestinum **(Kikuyu)** was recorded as an isolated patch close to the entrance of the most eastern dune path where it extends into Tokuremoar Reserve (Figure 110)

Figure 8.9: Kikuyu patch in corner of reserve

Recommendation: Contain and reduce current patch. Retain current low presence in this reserve via annual summer patrols and spray with glyphosate or grass selective herbicides

Limonium binervosum **(Dwarf Sea-lavender)** was recorded in a defined area on either side of the Waikiki Way dune path where it extended up onto the slopes of the 'Cliffs' area.

Recommendation: contain and reduce current extent and ensure no new populations establish in the reserve via hand pulling of plants or spot spraying where appropriate. This plant is easiest to see when flowering during the months October, November and December (Figure 8.10).

Figure 8.10: Flowering Dwarf Sea-Lavender (K. Bartley)

Map 20: Notable Native Plants

8.4 Notable Native Plants

Indigenous native plants were only recorded as a waypoint where they were seen as notably different from the dominant native plant species within the current vegetation communities in this reserve. There were other less common natives such as *Pelergonium australe* and *Senecio pinnatifolius* that were not marked with a waypoint. The level of species diversity within this section of the coast was low due to the high density widespread nature of the Gazania over the site.

***Exocarpos syrticola* (Coast Cherry)** (LC) (Figure 8.11) was recorded numerous times in this reserve where it was largely found in the eastern half of the reserve. Several vacant house blocks have scatterings of this plant.

Figure 8.11: *Exocarpus syrticola*

Austral trefoil (*Lotus australis*) (LC) (Figure 8.12) was only recorded once in this reserve. It is under threat from Gazania on this site.

Recommendation: Propagate Lotus using a composition of seed from across the project area and continue to include in revegetation works to bolster numbers. Ensure stakeholders communicate with regard to seed collection and numbers of plants propagated to avoid seed overharvesting or overplanting in areas.

Figure 8.12: *Lotus australis*

8.5 Weed Control Actions

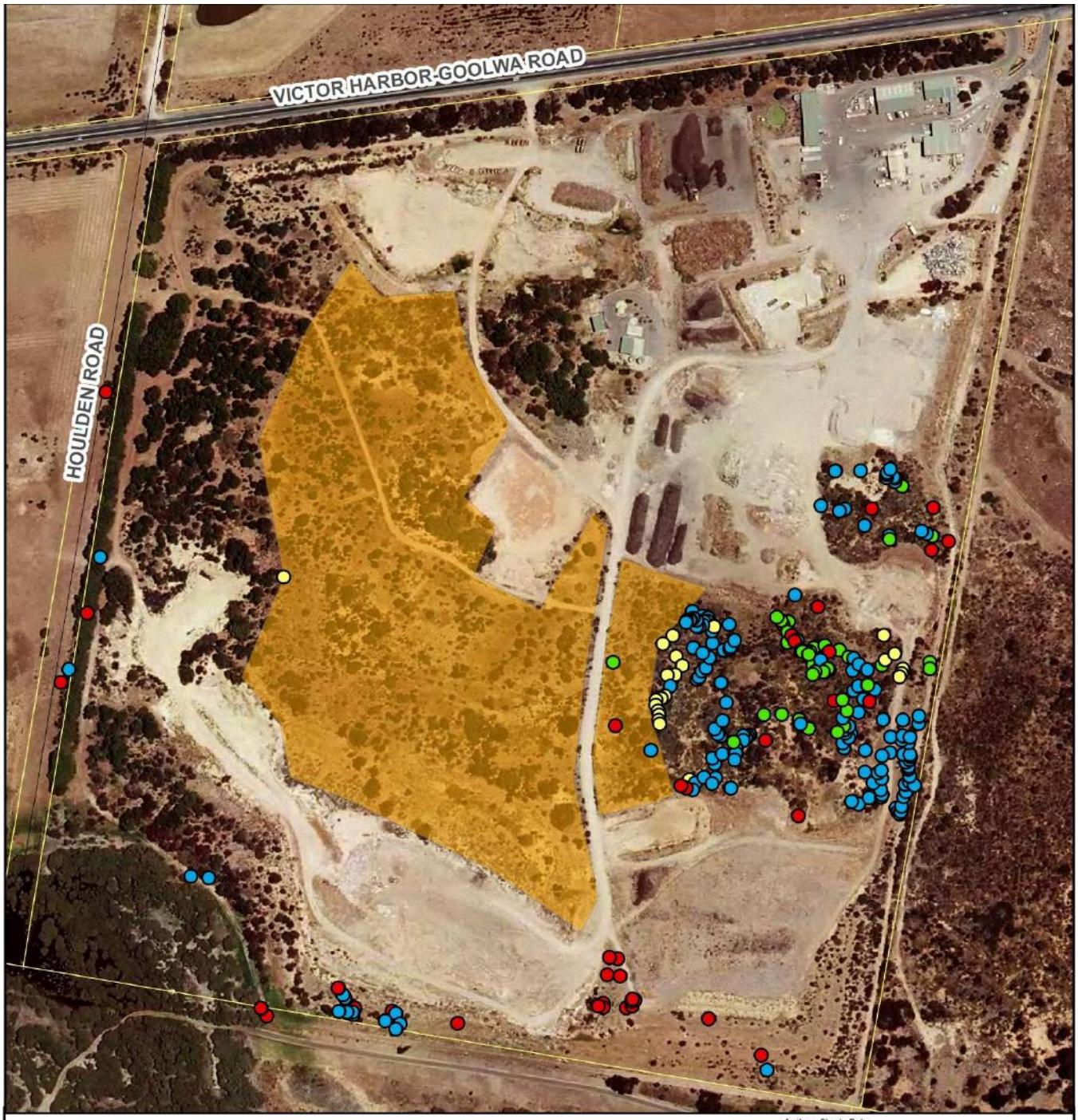
Table 7: Weed Control Actions Table for Surfers Reserve. (D)=Declared Plant

	Priority Level	Present Density	Distribution	Cost Level	Desired outcome of action	Additional comments
Key Weeds						
Acacia cyclops	High	Low	Scattered	Low	All mature seeding plants removed from site and no seedlings reaching seeding maturity	Engage residents in awareness program to remove from house blocks Volunteer suitable Some large procumbent plants are scattered in site Cut and swab and hand pull.
Boxthorn (D)	High	Low	Defined	Low	Limit juvenile recruitment and reduce infestation to low	Engage adjacent residents in control program. Mostly around cliffs area. Cut and swab or basal application of Triclopyr (Garlon©) and diesel.
Bridal Creeper (D)	Low	Low	Isolated	Low	No new infestations in reserve	Control via spot spraying with low rates of Metsolfuron methyl (Brush-off©) or tuber removal is likely to be a cost effective option. Regular patrols recommended as presence may increase as Gazania is removed.
Victorian Tea-tree	Medium	Low	Defined	Medium	Removal of all mature seeding plants from site and no juvenile plants reach seeding maturity	Engage residents in control program Ensure nurseries do not stock this weed and offer alternative options. Work to remove from adjoining council reserves. Hand pull and cut and swab with glyphosate.
Groundcover Weeds						
Gazania	High	Medium-High	Widespread	High	Containment of current infestation Reduce density on key native vegetation patches to Medium Limit spread to adjoining reserves Reduce density to Low near significant plant species (e.g. *Lotus australis*)	Engage residents in control program Continue encouraging replacement with local plants. Maintain follow-up spot spraying of outliers. Consider localised control around native colonisers such as Senecio or Pelargonium australe and

	Priority Level	Present Density	Distribution	Cost Level	Desired outcome of action	Additional comments
						the Leucophyta shrublands.
Iceplant	High	Low	Isolated	Low	Containment and reduction of current areas and ensure no new seed set	Close to Waikiki Way carpark entrance. Hand pull, remove from site if seeding.
Osteospermum	High	Medium	Isolated	Medium	All existing plants are treated and no new populations established	On slope above Waikiki Way carpark. Treat plants in off-peak season via foliar spraying with triclopyr (Garlon©) to reduce erosion risks.
Other Weeds						
Aloe	Medium	Low-Medium	Defined	Low	Containment and reduction of patch	Appears to have been treated before. Hand chip out or spot spray.
Couch	High	Medium	Scattered	High	Containment and reduction of known patches	Be wary of erosion risks near paths if removing this weed. Spot spray with glyphosate or grass selective.
Beard of Jupiter (*Anthyllis barba-jovis*)	High	Low	Isolated	Low	Eradicate from the site No new germinant allowed to reach seeding maturity	In one locality as a single shrub. Cut and swab with Triclopyr and diesel.
Buffulo Grass	Medium	Medium	Defined	Medium	Containment and reduction of known patches	Avoid removing in erosion risk areas in peak period such as near paths. Spray with glyphosate when active.
Euphorbia paralias & terracina (D)	Medium	Low	Isolated	Medium	Containment and reduction of current areas and ensure no new populations	Mostly around the entrance path on Western boundary of Tokuremoar. Volunteers suitable. Hand pull.
Kikuyu	Medium	Medium	Defined	Medium	Containment and reduction of patches	Area near Tokuremoar entrance path. Spot spray with glyphosate or suitable grass selective
Dimorphotheca pluvialis	High	High	Isolated	Low	Contain and reduce existing patch. No new populations allowed	On slope above Waikiki Way. Hand pull and remove from site is seeding
Dwarf Sea-lavendar	Medium	Low	Defined	Medium	Contain and Reduce	Either side of Waikiki Way. Hand - pull in October, November and December when flowering and easily spotted.

9 Goolwa Waste and Recycling Depot

Map 21: Key Weeds



0 20 40 60 80
metres

N

GOOLWA TO WELLINGTON LOCAL ACTION PLANNING ASSOCIATION INC

Legend

- Acacia cyclops
- Boxthorn
- Bridal Creeper
- Victorian Tea-Tree
- Small to Medium High Density Acacia cyclops and Victorian Tea-Tree

Author: Sherie Bain
Date: 15:09 5 Dec 2014

Coord System: GDA 1994 MGA Zone 54
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9.1 Key Weeds

The following four plants have been grouped together as Key Weeds as they were those most commonly encountered, have a negative effect on the structural component of existing remnants and are 'red alert' weeds in the Goolwa area (Caton. Et al 2007). There are several other weeds that have a serious effect on the structure of native vegetation (e.g. Boneseed), but due to the very low numbers (a result of targeted control work over the past seven years) they have been combined under another composite group called Other Weeds, see Map 24.

Acacia cyclops **(Western Coastal Wattle)** was recorded as widespread through the site with density ranging from low to high. Plants covered all age classes from small seedlings to very large mature shrubs.

Recommendation: All seed producing plants in remnant vegetation treated as highest priority for removal. Eastern boundary high priority for control to limit spread into adjoining private heritage areas. Cut and swab medium to large plants. Hand pull small seedlings or spot spray with triclopyr where many seedlings exist.

Lycium ferocissimum **(Boxthorn)** was scattered throughout the site with medium density recorded overall. Most plants were medium in size with the majority at seeding maturity. Large plants exist along eastern boundary of the Depot.

Recommendation: Reduce density on site to low. Cut and swab small to medium plants with triclopyr (Garlon©) and diesel. Basal bark application where possible has been very effective in the Goolwa dunes.

Asparagus asparagoidies **(Bridal Creeper)** was recorded as high density in the Sheoak Woodland area where it was predominantly growing up both dead and live *Acacia dodonaeifolia*.

Recommendation: Ensure rust is present on the site and consider further work to establish this biological control as required. Consider spot spraying with Metsolfuron methyl (Brushoff ©).

Leptospermum laevigatum **(Victorian Tea-tree)** was recorded as scattered through the site in low to medium density. There are several large plants on the western boundary of the Sheoak Woodland.

Recommendation: Remove mature seeding plants as first priority and prevent all juvenile seedlings from reaching seeding maturity via cut and swab, hand pulling or foliar spraying where thickets of small seedlings exist.

Map 22: Groundcover Weeds

0 25 50 75 100 metres

N

Legend

- Galenia
- Gazania
- Iceplant
- Osteospernum

GOOLWA TO WELLINGTON LOCAL ACTION PLANNING ASSOCIATION INC

Author: Sherie Bain
Date: 12:45 15 Jan 2015

Coord System: GDA 1994 MGA Zone 54

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9.1 Groundcover Weeds

***Galenia pubescens* (Coastal Galenia)** is a vigorous, drought and salt tolerant plant that can colonise large areas of ground, particularly in disturbed or saline environments. Galenia was recorded in a defined area in high density in the south western corner of the site (Figure 9.1)

Recommendation: This plant should be considered high priority for control using triclopyr/picloram (Grazon©). It is present in low numbers on adjoining conservation areas such as Tokuremoar Reserve and private heritage areas and is important to protect this investment by controlling this patch.

Figure 9.1: Large blankets of Galenia in the south western corner of the Goolwa Waste and Recycling Depot

***Gazania linearis* (Gazania)** was recorded as a defined patch in medium density on the slope above the southern boundary. It was also scattered around the eastern boundary at low density.

Recommendation: Contain and reduce core infestation. Remove all outlier plants on eastern boundary. Treat outliers near southern boundary to limit spread into Tokuremoar Reserve. Consider treating Galenia at the same time.

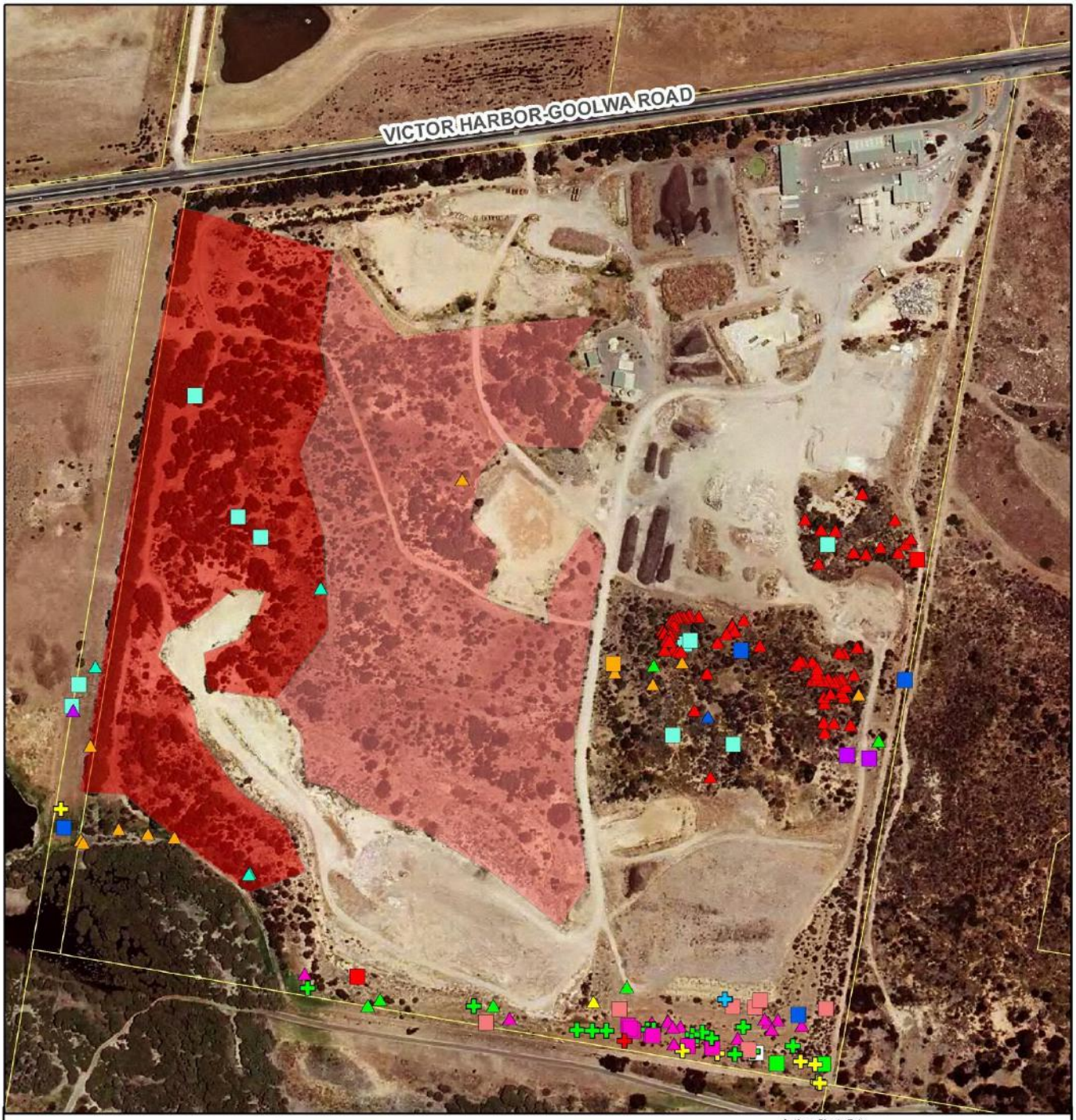
***Mesemryanthemum cristallinum* (Iceplant)** was recorded as isolated groups at low to medium density. Avoid placing waste fill to close to native vegetation edges.

Recommendation: Limit new infestations and undertake annual follow-up of known sites. Hand- pull isolated plants and remove from site. Spot spray large patches with glyphosate.

***Osteospermum fruiticosum* (Seascape Daisy)** was recorded as an isolated plant growing on the edge of a pile of fill near the northern boundary of the Sheoak Woodland area.

Recommendation: Remove all mature seeding plants. Allow for annual follow-up of seedlings. No new populations to establish on the site.

Map 23: Other Weeds



9.2 Other Weeds

***Acacia saligna* (Golden Wreath Wattle)** was present as isolated individuals in the Sheoak woodland area and was also scattered along the southern boundary amongst various other woody weeds. This weed is likely to be scattered but widespread throughout the landfill site. Mapping was not undertaken in detail through the high density Aleppo Pines areas containing small to medium plants as per polygon (Map 23).

Recommendation: Address large mature trees near western boundary of the Sheoak Woodland by ensuring all non-seeding mature plants are treated via drilling/frilling and filling with triclopyr (Garlon©) and diesel before seed set. Basal bark treatment using triclopyr (Garlon©) and diesel is effective.

***Pinus halepensis* (Aleppo Pine)** is widespread across the majority of the site ranging from low to high density areas. Areas of high value Grassland/Sedgland (Figure 9.2) should be relatively cost effective to access and control this infestation towards a desired low density.

Extensive control works have been occurring through the GWLAP coastal program in the private heritage blocks east of the site via felling and some grooming via Mechanical Vegetation Solutions (Figure 9.4 a and b). This resulted in almost 100% kill rate of all seeding age pines on this site with subsequent follow-up of seedlings on-going.

Habitat value provided by the stand of large pines on the western boundary needs to be considered during removal stages. Yellow-tailed black cockatoos regularly feed at this site (Figure 9.3).

Recommendation: Ensure all mature seeding trees are removed from Sheoak woodland areas and maintain current low density. Remove all outliers from *Acacia dodonaeifolia* Shrubland and maintain low density. Control Aleppo Pines in small to medium pines polygon to low density. Push back Aleppo weed front towards areas with large mature pines on western boundary. Consider removing large mature fruiting specimens first to limit reinfestation.

Figure 9.2: *Lomandra effussa* grassland area

Figure 9.3: Yellow-tailed black cockatoo feeding (K. Bartley)

Figure 9.4a and b: Groomed Aleppo Pines in adjacent heritage areas

***Arundo donax* (Giant Reed)** occurs as an isolated clump on the southern boundary. Slashing and persistent annual spraying of re-growth with Glyphosate has proven most effective at controlling this weed after trailing several herbicides (Adelaide Flora Management pers. comm.).

Recommendation: Contain and reduce current patch until eradicated. No new populations established. Slash old growth and spray re-growth with glyphosate annually until eradicated.

***Chrysanthemon monilifera* ssp. *monilifera* (Boneseed)** was recorded in low density and in two defined areas with one large isolated plant recorded on western boundary in the Houlden unmade road (Figure 9.5).

Recommendation: Conduct annual patrols for seedlings in September when flowering (ideal timing) and ensure all mature plants are treated via cut and swabbing with glyphosate. Ensure juveniles do not reach seeding maturity. Hand pull seedlings.

Figure 9.5: Large Boneseed in Houlden unmade road

***Carpobrotus edulis* (Hottentot Fig)** was recorded as an isolated patch in the small patch dominated by *Hakea mitchellii* near the eastern boundary of the site. Extensive works by the GWLAP over numerous years has reduced this weed to very low numbers in Tokuremoar Reserve and private heritage areas through hand pulling and spot spraying. It has been observed hybridising with *Carpobrotus rossii*.

Recommendation: Eradicate from the site via hand pulling and foliar spraying where applicable.

***Ricinus communis* (Castor Oil Plant)** was recorded as an isolated patch at medium density in a dug depression near the southern boundary.

Recommendation: Contain and control known patch. No new infestations to occur. Spray with triclopyr (Garlon©) or cut and swab. Hand-pull seedlings.

***Agave americana* (Century Plant)** was recorded as an isolated patch of juvenile plants in high density east of the central path.

Recommendation: Contain and control patch. No plant to reach seeding maturity. Largely spread vegetatively. Spray with triclopyr (Garlon©) and diesel.

***Dactylis glomerata* (Cocksfoot)** was recorded as isolated plants on the slope near the southern boundary in low density.

Recommendation: Eradicate from known locations via spot spraying with glyphosate or chipping out.

***Gomphocarpus sp.* (Cotton Bush)** was scattered through the site and was most prevalent on limestone.

Recommendation: Containment and reduction of current areas and ensure no new seed set by cutting and swabbing plants with glyphosate.

***Cynodon sp.* (Couch)** was largely confined to the south eastern corner of the site where it is in high density.

Recommendation: Containment and reduction of current areas as a vital component of revegetation preparation and maintenance. Aim to reduce current density to low. Ensure aggressive broadleaf weeds such as horehound are reduced to low density prior to removal of large patches of couch. Utilise revegetation to assist with shading out. Spray out using glyphosate when couch is healthy and actively growing.

***Euphorbia paralias* (Euphorbia)** was recorded as scattered patches and currently appears to be in low density at locations where it was mapped.

Recommendation: Containment and reduction of current patches and ensure no new populations establish via hand pulling of isolated patches and spot spraying other areas with appropriate chemical.

***Freesia cultivar* (Freesia)** was isolated to one area either side of the most eastern access track in low density. This weed has the ability to infest good quality bushland and can become very hard to control when it is amongst good understorey. The opportunity still exists to keep most problematic bulbs from establishing in the Goolwa precinct area.

Recommendation: Ensure no further seed set. Eradicate through persistent annual treatment and consider digging and bagging or spot spraying using Metsolphuron Methyl (Brushoff©) and a penetrant.

***Marrubium vulgare* (Horehound)** was recorded as confined to one main area, with only one other outlier plant recorded. It is highly likely there are other patches outside of the conservation areas that have not been recorded, particularly around compost and land fill areas. The main area was on the slope above the southern boundary (Figure 9.6).

Recommendation: Containment and reduction of current areas and eradicate outlier plants. Spray with appropriate chemical and hand pull outliers.

Figure 9.6: Horehound on Southern Slope

***Pennisetum clandestinum* (Kikuyu)** was recorded as defined at medium to high density along the slope across the southern boundary.

Recommendation: Containment and reduction of current areas and ensure no new seed set. Spray with glyphosate and aim to reduce where revegetation can offer competition.

***Olea europaea* (Olive)** was recorded as scattered individuals with the high priority plants being found in the south western corner of the site. Large plants also occur on the Goolwa to Port Elliot Road and in the northern boundary

of the Goolwa Waste and Recycling Depot. These large fruiting trees will continue to re-infest all adjoining areas if not eventually controlled.

Recommendation: Treat large fruiting plants as priority via drilling and filling with glyphosate. Target outlier populations on roadsides that are continuing to re-infest areas.

Phalaris sp. **(Phalaris)** occurred in a defined area along the slope near the southern boundary of the site and has the ability to dominate in low lying areas such as the adjoining Tokuremoar Reserve where it currently persists.

Recommendation: Containment and reduction of current areas and ensure no new populations. Eradicate from the site.

Rhamnus alaternus **(Rhamnus)** was recorded as one isolated plant and should be removed before seed set.

Recommendation: Eradication from site via drill and fill or cut and swab with triclopyr (Garlon©) and diesel.

Rosa sp. **(Briar Rose)** was recorded a single isolated plant on the western road reserve.

Recommendation: Eradication from site via hand chipping plant from site.

Scabiosa atropurpurea **(Pincushions)** was recorded in a defined area along the slope near the southern boundary

Recommendation: slashing tall Scabiosa followed by spot spraying with Clopyralid (Lontrel©) has been very effective on nearby sites. Hand-pull outliers. Glyphosate can be used on low off-target risk areas.

Malva dendromorpha **(Tree Mallow)** was recorded in a defined area along the slope near the southern boundary in medium density. Tree Mallow persists for several years following removal of parent plants.

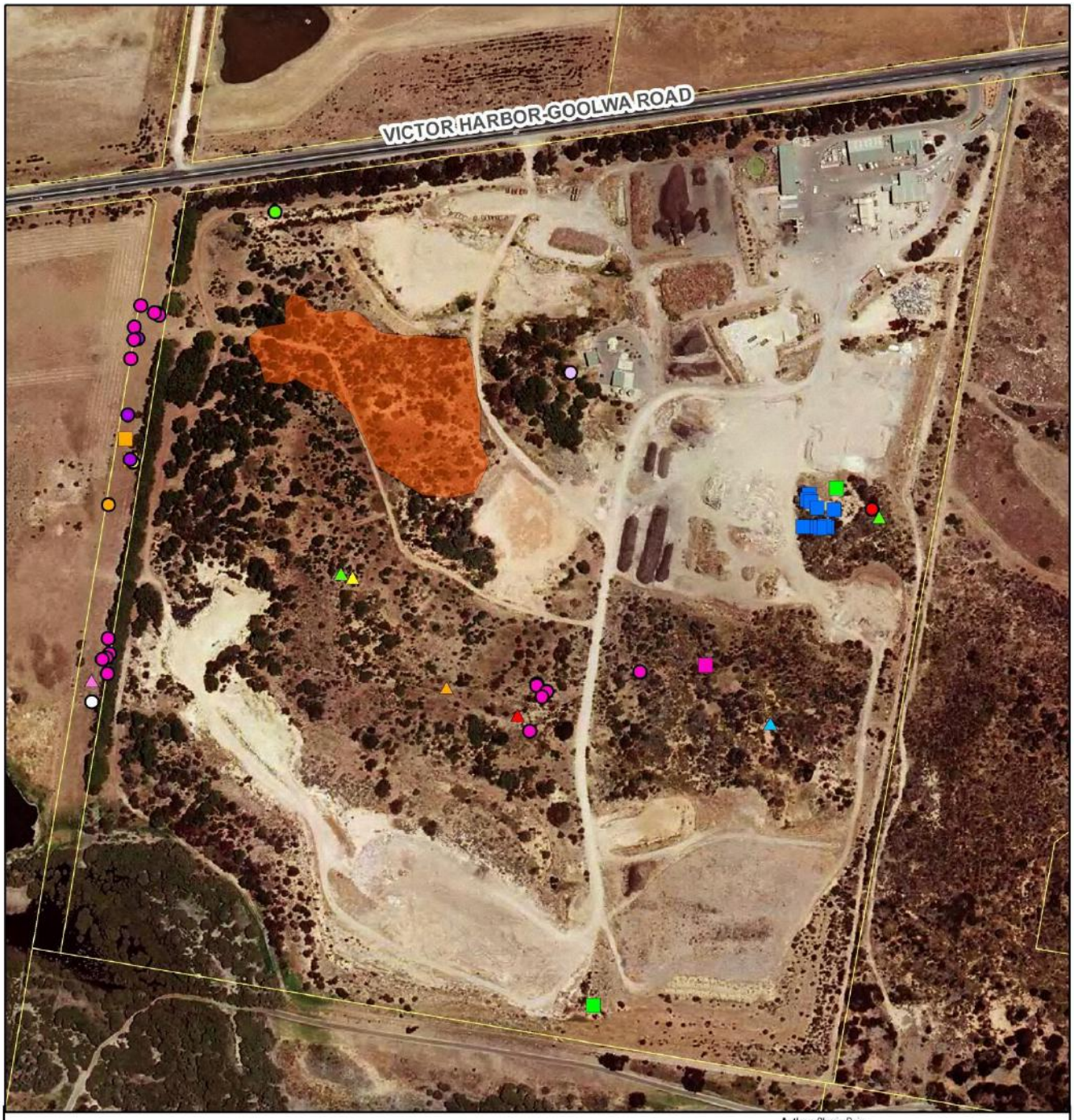
Recommendation: Cut and swab with glyphosate or hand pull where able. Follow-up required for several years on disturbed sites.

Yucca gloriosa **(Yucca)** was recorded as a single isolated clump (Figure 9.7) and should be contained and reduced until eradicated. It is low priority due to the speed at which it moves through the landscape and proximity to good quality vegetation on this site.

Recommendation: Possibly treat via drill and fill or foliar spraying using triclopyr (Garlon©) and diesel. Mechanical removal is another control option.

Figure 9.7: Yucca on Southern slope

Map 24: Notable Native Plants



9.3 Notable Native Plants

There are numerous uncommon, rare and some vulnerable native plant species found in the Goolwa Waste and Recycling Depot. Many have not been recorded with a waypoint and were only recorded opportunistically or where they were seen as notably different from the dominant plant species within the various vegetation communities. All of the native vegetation on this site is valuable, with the featured points on this map merely locating a small sub-set of the total values of this site.

Acacia dodonaeifolia forms a dominant shrub layer in the Sheoak Woodland and as a distinct Shrubland in other areas (Figure 9.7). This plant is state listed and is one of numerous important plants found in the landfill site. The only other example of *Acacia dodonaeifolia* Shrubland remaining in Goolwa is on the private heritage agreement areas to the east of the Tokuremoar Action Plan area. This plant and the Shrubland areas on the site are high priority for conservation.

It is recommended that this shrub be planted as the dominant species in the proposed revegetation areas on capping at the south of the property where it is growing on the same contour in the private heritage areas directly adjoining. This could be sown thick via direct seeding and inter-planted with other suitable species.

Figure 9.8: *Acacia dodonaeifolia* Shrubland

***Acacia ligulata* (Umbrella Bush)** (LC) was recorded as a single plant growing on the edge of the small patch of vegetation containing the rare *Hakea mitchellii.* *Acacia ligulata* is a rare occurrence in the Goolwa area with few other locations known. This plant should be protected along with the associated patch of *Hakea mitchellii* dominated Shrubland. Locally rare

***Adriana quadripartita* (Coast Bitter-bush)** (LC) is listed as uncommon in the Southern Lofty herbarium region. It was noted on several occasion on the limestone rises through the site and marked as a point in the Houlden Road unmade road reserve where there were a few plants. There are several patches of this shrub growing on the adjoining slope on private property to the west.

Adriana quadripartita has been propagated and planted on several sites around Goolwa by the GWLAP and Goolwa Coastcare Group in an effort to bolster remnant populations. A number of key populations growing in Goolwa on roadsides and vacant house blocks have been cleared over the past five years.

***Austrostipa elegantissima* (Feather Spear-grass)** (LC) was recorded in the small patch of *Hakea mitchellii* Shrubland where there was only one plant recorded. It has a scattered distribution in Goolwa and is listed as uncommon in the Southern Lofty herbarium region.

***Anthosachne scaber var. scaber* (Native Wheat-grass)** (RA) was recorded as a small patch in the Houlden Road unmade road reserve. It has a scattered occurrence in Goolwa.

***Gahnia deusta* (Limestone Saw-sedge)** (NT) was sighted on numerous occasion and recorded in a number of locations through the site. It formed a co-dominant species in the large areas of open Grassland/Sedgeland. This plant and other associated sedges provide significant butterfly larva food resources.

***Hakea mitchellii* (Desert Hakea)** (LC) is listed as rare in the Southern Lofty herbarium region and formed a co-dominant shrub in a small patch of remnant vegetation just north of the main Sheoak population.

***Hakea vittata* (Limestone Needlebush)** (Figure 9.9) (LC) was noted in several areas on the site. It is locally scattered in occurrence and should be considered as rare in the Goolwa area.

Figure 9.9: *Hakea vittata*

***Lepidosperma sp* (Sword-sedge)** (RA) was noted in the Grassland/Sedgeland and is another notable butterfly larval food plant (Grund, 1997). The species name was not determined.

***Lomandra densiflora* (Soft Tussock Mat-rush)** (RA) was recorded as isolated and was found within the Grassland/Sedgeland area.

***Lomandra collina* (Sand Mat-rush)** (RA) is listed as rare in the region and was recorded once and found in the Grassland/Sedgeland area.

***Lomandra effussa* (Scented Mat-rush)** (LC) was noted numerous times in the Grassland/Sedgeland areas including in the Houlden Road unmade road reserve. It should be considered rare in Goolwa

***Lomandra juncea* (Desert Mat-rush)** (NT) was scattered through the site. Should be considered rare in Goolwa

***Lomandra leucocephala ssp. robusta* (Wooly Mat-rush)** (NT) (Figure 9.10) was noted several times and recorded as a waypoint in the Sheoak Woodland area and the Grassland/Sedgeland. It should be considered rare in Goolwa

Figure 9.10: *Lomandra leucocephala ssp robusta* in flower

Figure 9.11: *Lomandra sororia*

Lomandra sororia (Sword Mat-rush) (Figure 9.10) (RA) was noted in the Houlden Road unmade road reserve.

Wilsonia rotundifolia **(Round-leaf Wilsonia)** (NT) was recorded as one isolated patch growing on the edge of the most northern vehicle track in what appears to be fill brought in from elsewhere (Figure 9.12). This plant was noted in 2008 in the same location and appears to be healthy despite being outside of its normal saltmarsh habitat.

Figure 9.12: *Wilsonia rotundifolia* on boundary earthen windrow

9.4 Weed Control Actions

Table 8: Weed Control Actions Table for the Goolwa Waste and Recycling Depot. (D)=Declared Plant

	Priority Level	Present Density	Distribution	Cost Level	Desired outcome of action	Additional comments
Key Weeds						
Acacia cyclops	High	Medium-High	Widespread	Medium	All mature seeding plants removed from site and no seedlings reaching seeding maturity	Large shrubs along front boundary planting need gradual removal. Cut and swab or hand pull plants. Foliar spray patches of small seedlings with triclopyr (Garlon©)
Boxthorn (D)	High	Medium	Scattered	Medium	Treat all mature seeding plants asap. Limit juvenile recruitment and reduce infestation to low and maintain.	Engage adjacent residents in control program. Key roads house very large specimens requiring control. Cut and swab or basal bark treat using triclopyr (Garlon©) and diesel.
Bridal Creeper (D)	High	Medium	Scattered	High	No new infestations in reserve Reduce outlier infestations to defined distribution.	Ensure rust is present on the site and consider further work to establish this biological control as required. Consider spot spraying with Metsolfuron methyl (Brushoff©)
Victorian Tea-tree	Medium	Low- Medium	Scattered	Medium-High	Removal of all mature seeding plants from site and no juvenile plants reach seeding maturity. Native plant competition reduced	Remove mature seeding plants as first priority via cut and swab with glyphosate and prevent all juvenile seedlings from reaching seeding maturity via cut and swab or hand pulling. Persistent follow-up required near parent stumps.
Groundcover weeds						
Gazania	High	Medium-High	Defined	Medium	Containment of current infestation No new populations to establish Reduce density to low	Engage residents in control program Continue encouraging replacement with local plants. Extensive control has greatly reduced core infestations
Galenia	High	High	Defined	Medium	Containment and reduction of core areas	Avoid trying to revegetation until several years after control if

	Priority Level	Present Density	Distribution	Cost Level	Desired outcome of action	Additional comments
					No new populations to occur Reduce to low density	possible. Spray with triclopyr/picloram (Grazon©) is effective. Possible treatment efficiency to spray when doing Gazania also.
Osteospermum	High	Medium	Isolated	Medium		Spray using triclopyr (Garlon©)
Iceplant	High	Low-Medium	Defined	Medium	Containment and reduction of current areas and ensure no new seed set	Limit new infestations and undertake annual follow-up of known sites. Hand- pull isolated plants and remove from site. Spot spray large patches with glyphosate.
Other Weeds						
Acacia saligna	High	Low	Scattered	Medium	All mature seeding plants removed from site and no seedlings reaching seeding maturity	Not extensively mapped in small to medium Aleppo polygon area
Aleppo- Large (D)	High	High	Defined	Very High	Mature seeding trees removed Containment and reduction of core seeding trees	Removal of non-seeding pines in quality grassland/sedgeland areas recommended first. Gradual removal to allow black cockatoos to adjust to reduced feed source should be considered.
Aleppo-Small-Medium (D)	High	High	Widespread And defined	Medium	No seed set from small to medium trees Structure of remnant grassland/sedgeland improved	Relatively feasible to reduce pines from high quality area of the site via cut and swab and chipping or stacking in burn piles.
Arundo donax	Medium	Medium	Isolated	High	Containment and reduction Ensure no new populations Reduce density to low to zero	Slashing old growth and spraying regrowth with glyphosate has worked well on adjacent sites.
Boneseed	Very High	Low	Scattered	Medium	Containment and reduction Ensure no new populations Reduce density to low to zero	Large plant on Houlden Road unmade road and in isolated areas. Conduct annual patrols in Sept. Cut and swab with glyphosate. Hand pull seedlings. Patrol annually for seedlings.

	Priority Level	Present Density	Distribution	Cost Level	Desired outcome of action	Additional comments
Carpobrotus edulis	High	Low	Isolated	Medium	Containment and reduction. Ensure no new populations Eradication from site	Should be hand pulled and spot sprayed from Tokuremoar Reserve and Heritage agreements by GWLAP to very low density levels.
Castor Oil Plant	Medium	Medium	Isolated	Medium	Containment and reduction. Ensure no new populations Eradication from site	Largely confined within an old pit area at the back of the site. Spray with triclopyr (Garlon©) and penetrant or cut and swab. Hand pull seedlings.
Century plant	Medium	Low	Isolated	Medium	Containment and reduction. Ensure no new populations Eradication from site	Slower moving but could be easily treated in current degraded site using triclopyr (Garlon©) and diesel
Cocksfoot	High	Low	Isolated	Low	Eradication from site	Highly undesirable grass for revegetation area. only a few tussocks and easily spot sprayed with glyphosate. Can chip out plants.
Cotton Bush	Medium	Medium	Scattered	Medium	Containment and reduction of current areas and ensure no new seed set	Tends to be on limestone rises and worth dealing with early. Cut and swab with glyphosate.
Couch	High	Medium-high	Scattered	High	Containment and reduction of known patches. No patches within native vegetation	Revegetation sites should be progressively spraying out couch using glyphosate.
Euphorbia paralias & terracina (D)	Medium	Low-Medium	Scattered	Medium	Containment and reduction of current areas and ensure no new populations	Localised control around revegetation and where isolated patches are observed has been very effective. Volunteers suitable
Freesia	Very High	Low	Isolated	Medium	Containment and reduction. Ensure no new populations Eventual eradication from site	Only a few tiny locations have been found within the Goolwa area. Eradicate through persistent annual treatment. Consider digging and bagging or spot spraying using Metsolphuron Methyl (Brushoff ©).
Horehound (D)	High	Low	Scattered	Medium	Containment and reduction. Ensure no new populations Eradication from site	Mostly on slope near southern boundary. Spray when actively growing. Hand-pull outliers.

	Priority Level	Present Density	Distribution	Cost Level	Desired outcome of action	Additional comments
Kikuyu	Medium	Medium-high	Defined	Medium	Containment and reduction of patches Ensure no new populations	Areas at Southern boundary need pushing back. Spray with glyphosate around revegetation areas where competition is offered by native plants.
Olive	High	Low	Scattered	High	Containment and reduction. Ensure no new populations Densities remain low	Large fruiting plants on Southern boundary require urgent attention due to proximity to Tokuremoar. Drill and fill with glyphosate or triclopyr (Garlon©).
Phalaris	High	Low	Isolated	Low	Containment and reduction. Ensure no new populations Eradication from site	All Phalaris on this site needs t be removed asap. Spot spray with glyphosate or chip out.
Primrose	Medium	Low	Isolated	Low	Containment and reduction. Ensure no new populations Eradication from site	Near Southern Boundary. *Not marked as waypoint. Chip out or hand pull.
Rhamnus	High	Low	Isolated	Low	Ensure no new populations Eradication from site	Isolated plants in Sheoak area. Goolwa urban areas house some large outliers. Drill and fill or basal bark treat with triclopyr (Garlon©) and diesel. Cut and swab small plants.
Rosa	High	Low	Isolated	Low	Eradicate from site No new infestations established	Isolated small plant in Houlden Road Unmade Road reserve. Hand chip plant out.
Scabiosa	High	Medium-high	Defined	Medium-high	Containment and reduction of known patches and no new infestations occurring	Mostly on the Eastern and Southern boundaries. Slashing tall Scabiosa followed by spot spraying with Clopyralid (Lontrel©) has been very effective on other sites nearby. Hand- pull outliers.
Tree Mallow	Medium	Low	Defined	Medium	Containment and reduction. Ensure no new populations Eradication from site	Cut and swab with glyphosate or hand pull where able. Follow-up required for several years on disturbed sites.

	Priority Level	Present Density	Distribution	Cost Level	Desired outcome of action	Additional comments
Yucca	Low	Low	Isolated	Medium	Contain existing clump Eradicate from site	On Southern boundary slope. Possibly treat via drill and fill or foliar spraying using triclopyr (Garlon©) and diesel. Mechanical removal is another control option.

10 Adjoining Land Tenures

It is worth briefly noting other significant land with remnant vegetation adjoining the Tokuremoar Action Plan area. These areas are highly significant due to their relative intactness, size, species diversity and number of rare and threatened native plants species, as well as regionally significant vegetation communities.

Private Property (Lot 134, Section 2256) – Boettcher Road, Middleton: This grassland/heathland area between Newell Avenue and Boettcher Road houses some extremely important patches of remnant vegetation. The dominant vegetation community observed is diverse coastal heath with large areas of *Lomandra effusa* dominated grassland (Figure10.1a and b). It is likely that this property houses a range of rare and threatened plant species due to the protection afforded to the plants from the rocky and prickly nature of the site. Rare species such as *Veronica hillerbrandii*, *Hakea vittata* and *Acrotriche patula* have also been observed on the site. It appears this vegetation could be considered under the EPBC Act as a *Lomandra effusa* Natural Temperate Grassland and as such is a critically endangered vegetation community that is locally poorly conserved.

Figure 10.1a and b: Coastal heath dominated by *Lomandra effusa.*

Recommendation: Further communication undertaken with the landowner/s with the view to seeking protection for these areas and a vegetation survey to record the biological data. This may help guide further developments to the property.

Private Properties (D39400 A4, D28958 A2 and H150400 S2212) – Golfview Road, Goolwa: These properties are actively managed conservation areas with heritage agreements. The Goolwa Golfcourse is included in these properties and contains highly significant remnant vegetation (Figure 10.4) with a high diversity of plant species, various woodland communities, a large patch of rare *Acacia dodonaeifolia* shrubland as well as exceptional quality heath (Figure 10.2 &10.3) The GWLAP has been actively engaged in implementing and funding on-going threat abatement over these areas. A contractor works weekly alongside the landowner to control various weeds through the properties.

Figure 10.2 & 10.3: Exceptional quality heath in flower

Figure 10.3: Highly significant remnant vegetation on Goolwa Golfcourse

Private Property (D46150 A4) – Victor Harbor – Goolwa Road, Middleton: This property has a significant area of *Melaleuca halmaturorum* Low Woodland and a large open seasonally inundated lagoon fringed by samphire shrubland. The area supports a range of wetland bird species and has two permanent springs. There is also a man-made lagoon (Figure 10.4) at the back of the *Melaleuca halmaturorum* Woodland that was created when excavation in the area apparently hit the water table (Dig Treager Pers Comm). Areas of sand on calcrete on adjacent higher ground support small remnant areas of coastal heath and large patches of the rare *Imperata cylindrical* (BLady grass). This area has had initial treatment of Boxthorn through the entire woodland area via the GWLAP using basal bark application but will require continued follow-up for some time.

Figure 10.4: Man-made lagoon

Sir Richard Peninsula (H150400 S292 and H150400 S404) – Barrage Road, Goolwa: Sir Richard Peninsula is current under the care and control of SA Water, as they are responsible for managing barrage operations. This area of land forms a continuous corridor from Goolwa to the Murray Mouth. NR SAMDB have been investing in the control of declared weeds over the area via Murray Darling Basin Authority funding (S. Cummings Pers Comm). An operations plan has been developed for the on-ground maintenance of the area by SA Water, focusing on erosion management and weed control, and Ngarrindjeri have developed a plan with regard to the cultural significance and conservation of the site.

Recommendation: Continue discussions between SA Water, Alexandrina Council, NR SAMDB, GWLAP and Ngarrindjeri with the view to establish greater collaboration and integration of management actions relating to native vegetation, pest animal and vehicle and foot traffic control measures along the peninsula.

Unmade Roads: There are opportunities to undertake revegetation through two unmade roads, including the unmade road section of Houlden Road (Figure 10.6) and the unmade road running from Boettcher Road. Houlden Road has good quality remnant native vegetation, with 30 native species recorded along the roadside of the made section and adjoins several revegetation buffers undertaken by the landholders with support from the GWLAP. Both unmade roads have some areas of significant native vegetation including areas of *Lomandra effusa* dominant grassland (Figure 10.6).

Opportunities exist for linkages to both Tokuremoar Reserve and inland properties via roadside vegetation towards the Currency Creek township. Extensive revegetation corridors have been established to link and buffer various made and unmade roads in the Goolwa area via the GWLAP.

Figure 10.5: Houlden Road unmade road

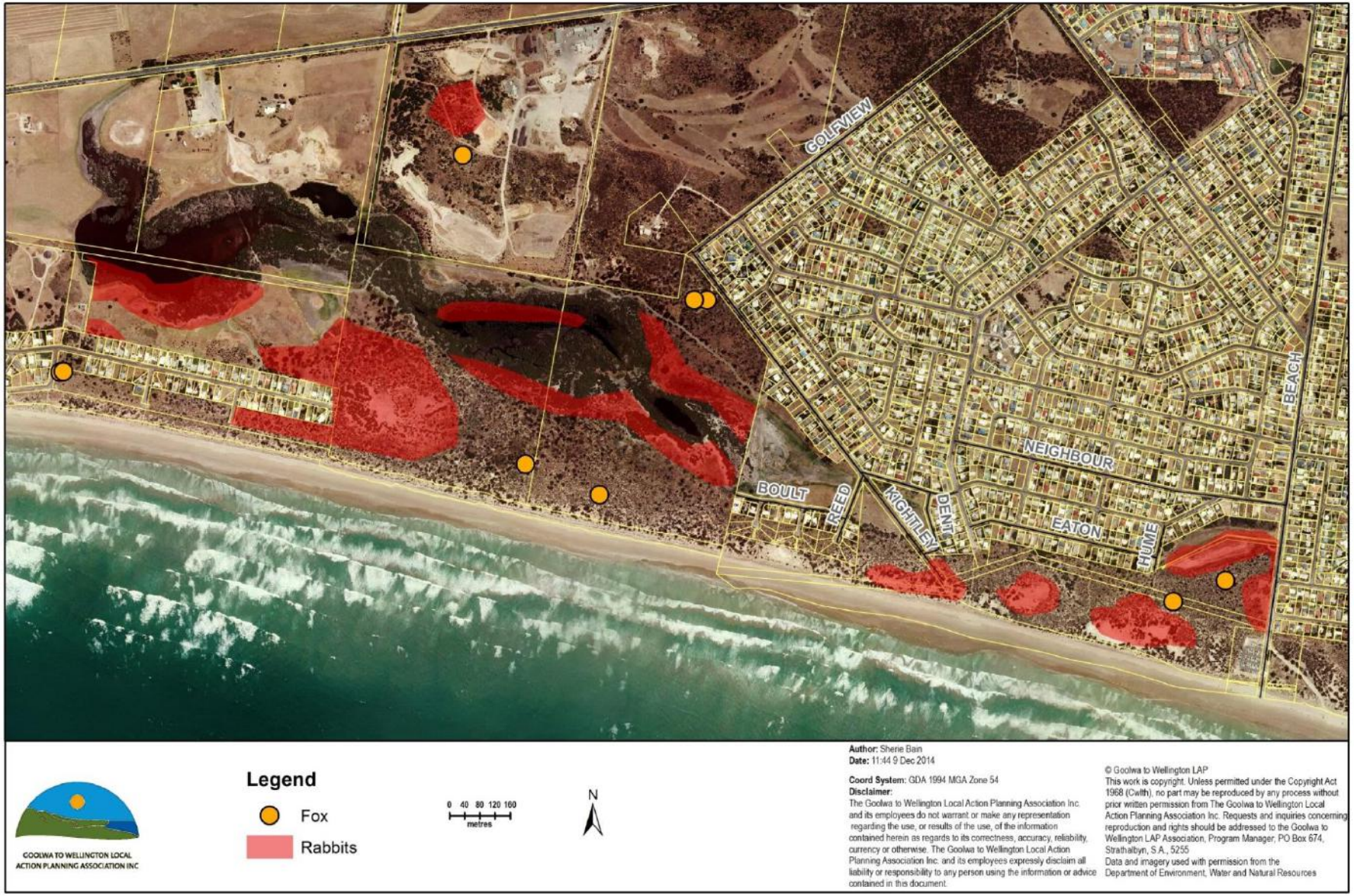
Figure 10.6: Good quality grassland

Figure 10.7: *Lomandra effusa*

Recommendation: Seek to enhance current biodiversity values through weed control actions and revegetation of degraded sections to link the Goolwa Waste and recycling depot and Tokuremoar Reserve with properties and associated revegetation North of the Goolwa to Port Elliot Road.

11 Pest Animals

Map 25: Rabbit and Fox Activity



***Oryctolagus cuniculus* (European Rabbit)** is present on all of the plan areas and currently can be considered to be low-medium density on most sites. Warrens and buck heaps were mapped. Hotspot areas have been highlighted around the edges of the *Melaleuca halmaturorum* swamp, around the edges of samphire areas and in the open flats through the project area. Several warrens were observed beneath large *Acacia longifolia var sophorae* and some in the sides of dunes in the Kightley Triangle.

Extensive rabbit baiting between key landholders, Alexandrina Council, GWLAP, NR SAMDB and NR AMLR has been occurring in a semi-coordinated manner for the past seven years. The GWLAP has employed the use of licensed contractors to hand bait using Pindone Carrots and fumigate warrens where required and has been working with several adjoining rural landholdings to bait areas.

Key hotspot areas are highlighted on the map, however this can change depending on the season. Flooding in recent times seemed to push rabbits further into the dune areas on higher ground and away from traditional areas of harbour in the tea trees and shrubs, with several new warrens appearing in large Acacia (B.Simon pers. obs.).

Recommendation: Continue with annual baiting program. Maintain landholder baiting program with rural landholders via NR SAMDB and GWLAP. Work to raise awareness of rabbit and control options in urban areas. Maintain baiting program with all relevant tenures to keep rabbit and total grazing pressure on native vegetation low and current BushRAT regeneration scores at current high levels.

Figure 11.1: Relevant signage displayed at Tokuremoar

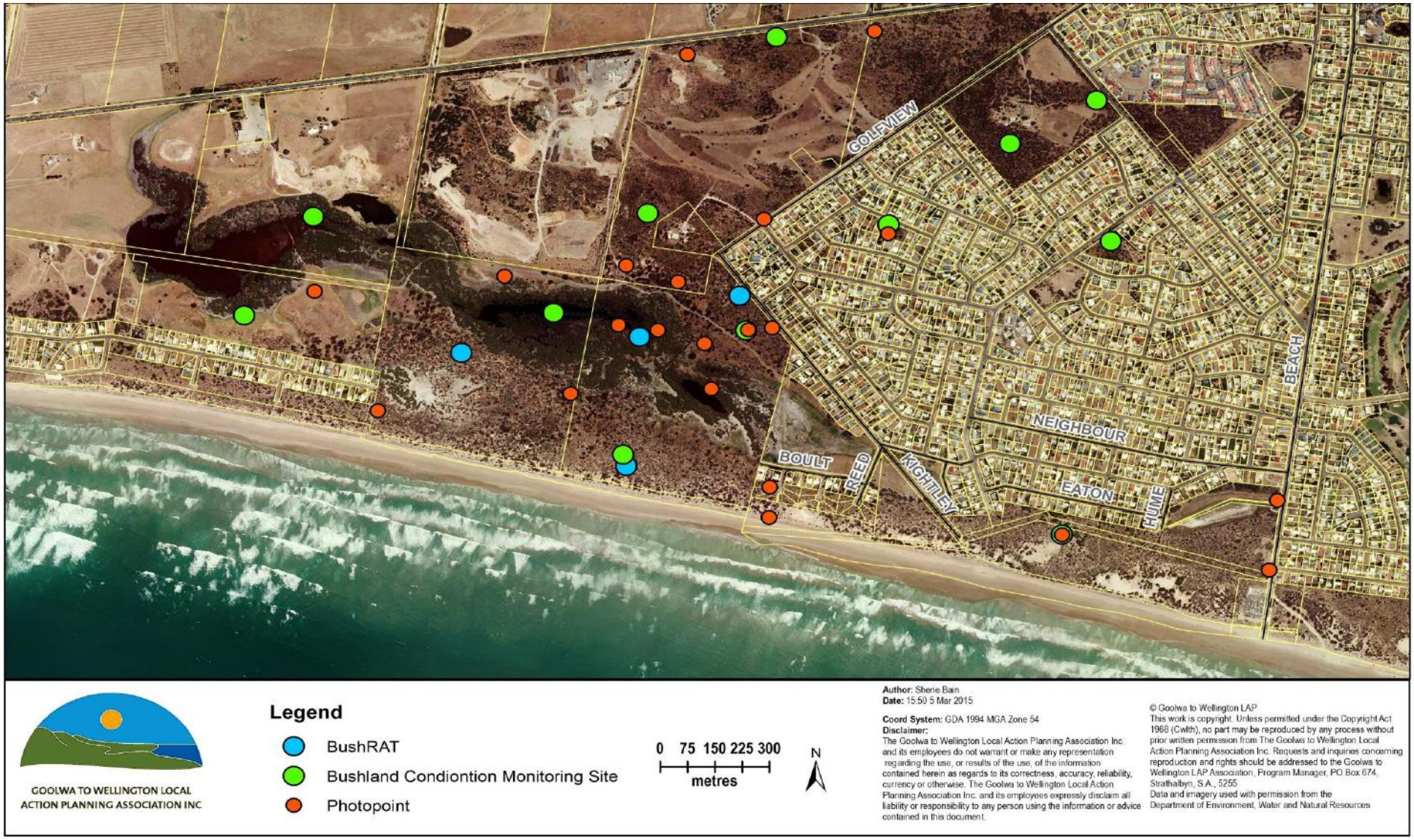
Vulpes vulpes (Red Fox) was sighted several times in the plan area and is well known to the Goolwa are (Figure 11.2). Several dens were noted and mapped. Presently there has been little direct actions undertaken by key stakeholders to address what are suspected to be medium density fox numbers in the area. Several dead fox were noted in Tokuremoar Reserve in 2013 by contactors but it was not clear how they died**.**

Recommendation: Consider mapping and trapping program to be undertaken be experienced and licensed contractor. Options are available to use track cameras and cage traps in urban areas with humane disposal options available (E. Onderstal per. comm.)

Figure 11.2: Fox in Goolwa Dunes

12 Monitoring

Map 26: GWLAP Monitoring Locations



Monitoring

A variety of monitoring is occurring across the project area at present including;

- **Bushland Condition Monitoring** (BCM)-this focuses mainly on vegetation condition in representative 30 x 30 quadrats to measure vegetation condition changes over time.
- **Bushland Rapid Assessment Technique** (BushRAT) is a method used to assess the biodiversity value of bushland. It separately scores a variety of attributes under the headings of Vegetation Condition, Conservation value and Landscape context and then weights these attributes according to their importance. BushRAT assesses the wider biodiversity value (including condition) over an informal 1ha quadrat.
- **Fixed Photo Points** (Figure 12.0.1 a&b) -generally entails permanent stakes (often star droppers) at 10m apart with a photo board and a set recording process to allow accurate follow-up that aligns with earlier photos.
- **Bird monitoring** has been occurring in Tokuremoar Reserve, Newell Avenue Reserve and the Goolwa private heritage areas since 2012 by the GWLAP via Barron Environmental. The GWLAP is holding community bird monitoring workshops and monitoring sessions at Goolwa in 2015/16 to continue to add to monitoring info.

12.1 Bushland Condition Monitoring (BCM)

BCM sites have been established over the past five to seven years on a range of vegetation communities across the Goolwa coastal precinct by the GWLAP (via contractors) on current works sites including;

- *Sarcocornia quinqueflora +/- Halosarcia pergranulata ssp pergranulata* - Tokuremoar Reserve
- *Olearia axillaris +/- Acacia longifolia var sophorae shrubland* - Tokuremoar Reserve
- *Acacia longifolia var sophorae* shrubland- Tokuremoar Reserve-Kightley Triangle
- *Melaleuca halmaturorum* Woodland +/- Revegetation site
- *Acacia dodonaeifolia* shrubland – Private property
- *Eucalyptus odorata +/-Allocasuarina verticillata* Woodland over heath - Private heritage property
- *Allocasuarina* Woodland - Private heritage property
- *Pink gum* Woodland - Private heritage property
- *Allocasuarina* Woodland over *Dodonea ssp spatulata* - Bradford Reserve
- *Allocasuarina* Woodland over heath - Slaughter Reserve
- *Eucalyptus odorata +/-Allocasuarina* Woodland over heath - Pitt Street Reserve
- *Olearia axillaris +/-Acacia longifolia var sophorae* - Sir Richard Peninsula Reserve

Other monitoring that has occurred in the area through the NR AMLR board includes;

- Three BCM sites set up in Tokuremoar Reserve covering
    - Coastal Shrublands
    - Coastal Swamp Paperbark Low Open Forests and
    - Tall Shrublands

Recommendation: Utilise BCM to assist in tracking changes in condition on sites via re-assessment every 5 years on a selection of representative sites across the project area.

12.2 BushRat

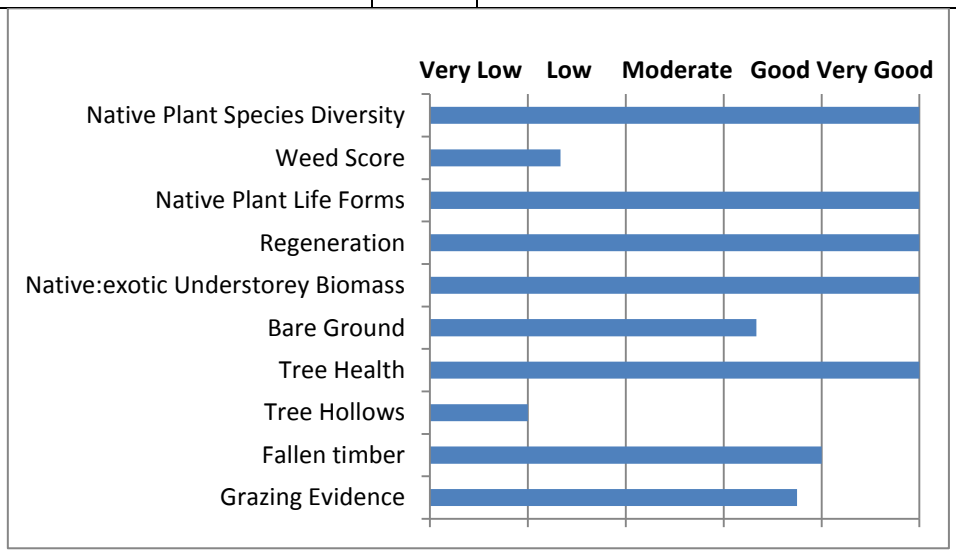
The following BushRat quadrats have been established across Tokuremoar reserve on 4 separate localities in late February 2015;

- **Site Tokuremoar A1** - *Olearia axillaris* and *Acacia longifolia var. sophorae* Coastal Shrubland + emergent *Allocasuarina verticillata*
- **Site Tokuremoar A2** - *Olearia axillaris* and *Acacia longifolia var. sophorae* Coastal Shrubland
- **Site Tokuremoar A3** - *Melaleuca halmatuorum* Low Open Shrubland
- **Site Tokuremoar A4** - *Olearia axillaris* and *Acacia longifolia var. sophorae* Coastal Shrubland with patchy low-lying *Ficinia nodosa*

The following table provides a broad overview of each Site within the Tokuremoar Reserve and some general comments and recommendations regarding the top condition categories and or categories of note.

Figure 0.1: One of 12 Bushland Condition Monitoring (BCM) sites in the Tokuremoar Action Plan area

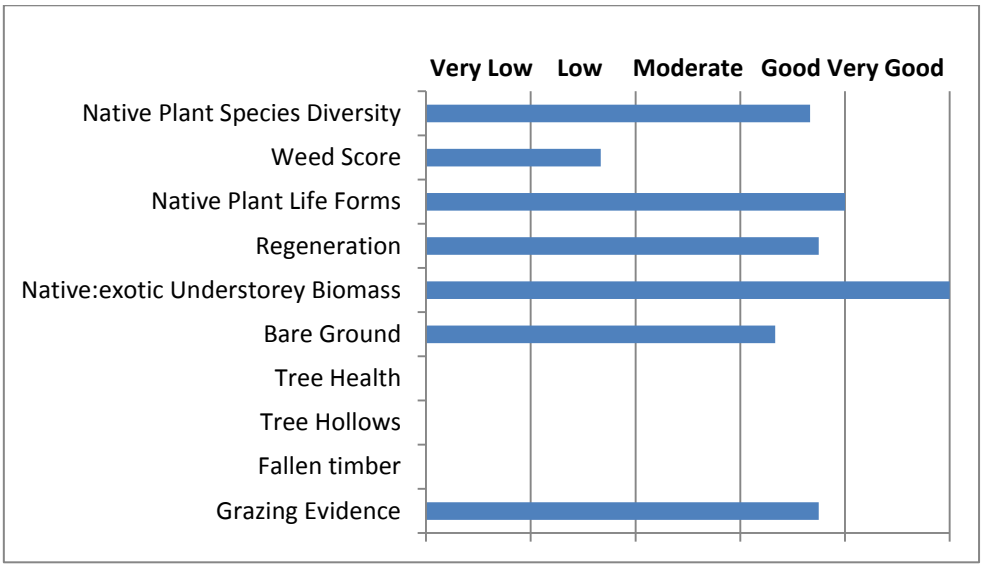
Site: Tokuremoar - A1		RECORDER: BN, JE DATE: 24/02/2015
DESCRIPTION: *Olearia axillaris and Acacia longifolia var. sophorae* Coastal Shrubland + Emergent *Allocasuarina verticillata*		**BCM CODE: SMLR Coastal 7.2**
VEGETATION CONDITION SCORE (max. in brackets)	**Score**	**Comments**
Native Plant Species Diversity (15)	**15**	Currently at highest score.
Weed Score (15)	**4**	Increase weed score through continued control of *Leptospermum laevigatum*, *Acacia cyclops*, bridal creeper and false caper
Native Plant Life Forms (10)	**10**	Currently at highest score. Maintain current score for Life forms through on-going threat abatement
Regeneration (8)	**8**	Currently at highest score. Maintain current regeneration score through ongoing threat abatement works
Native: exotic Understorey Biomass (10)	10	
Bare Ground (3)	2	
Tree Health (5)	5	
Tree Hollows (5)	1	
Fallen timber (5)	4	
Grazing Evidence (4)	3	
TOTAL VEGETATION CONDITION SCORE (ADD UP ALL POINTS)	**62**	
If community is naturally treeless x TOTAL by 1.23		
If community is not benchmarked for regen x 1.11		
ADJUSTED TOTAL SCORE	**62**	



Comment-Site A1: This site shows Very Good scores for Species Diversity, Native Plant Regeneration and Native Plant Life Forms. Veldt grass in this site (particularly in the northern portion where it is most prevalent) is going to be an on-gong challenge and may make it hard to increase the weed score for this site unless significant (and expensive!) control works are undertaken and maintained over many years.

Recommendation: It is suggested that threat abatement works continue to ensure that the southern portion of this site is maintained and that the Veldt Grass weed front is pushed north where possible. *Scabiosa* was not picked up as a top five weed but is still a significant threat to vegetation condition in this area. Works should continue to push this weed front west towards the bikeway.

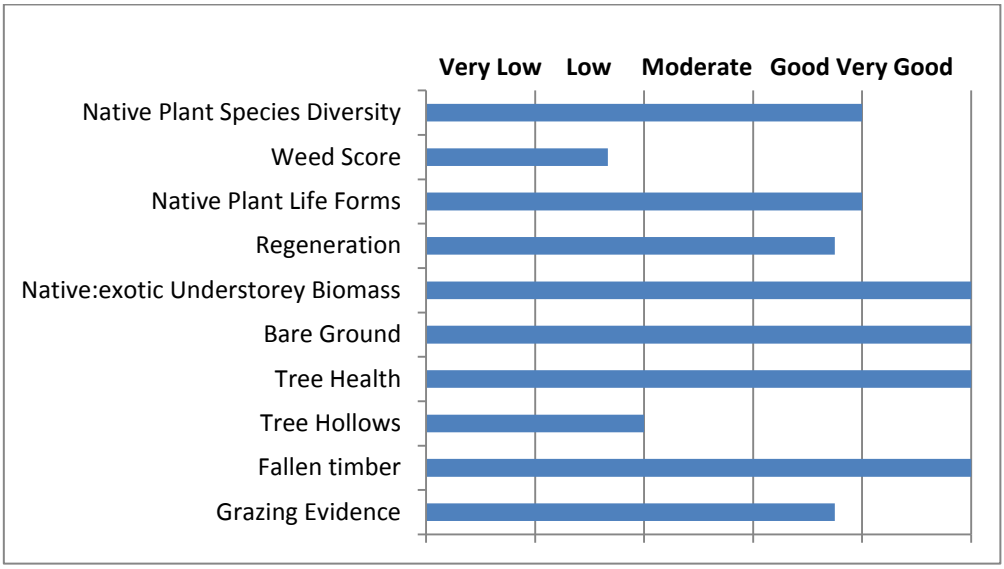
Site: Tokuremoar - A2		RECORDER: BN, JE DATE: 24/02/2015
DESCRIPTION: *Olearia axillaris* and *Acacia longifolia var. sophorae* Coastal Shrubland		**BCM CODE: SMLR Coastal 7.2**
VEGETATION CONDITION SCORE (max. in brackets)	**Score**	**Comment**
Native Plant Species Diversity (15)	**11**	Maintain Good species diversity through on-going threat abatement
Weed Score (15)	**5**	Increase weed score through continued control of *Leptospermum laevigatum* , *Acacia cyclop*s, Bridal Creeper and False Caper. Continue Pyp Grass control
Native Plant Life Forms (10)	**8**	
Regeneration (8)	**6**	
Native: exotic Understorey Biomass (10)	10	
Bare Ground (3)	2	
Tree Health (5)	0	
Tree Hollows (5)	0	
Fallen timber (5)	0	
Grazing Evidence (4)	3	
TOTAL VEGETATION CONDITION SCORE (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	0	
ADJUSTED TOTAL SCORE	55.35	



Comment- Site A2: This site scored well for Native Plant Species Diversity and Native Plant Life Forms. The area that the site was established in was within the portion of Tokuremoar Reserve where a patch of Pyp Grass exists and is not necessarily representative of the condition of the remaining areas of this vegetation community in Tokuremoar Reserve, which does not have Pyp Grass. Scores such as regeneration may also be skewed as Pyp Grass is well known to limit open ground and opportunities for natural regeneration.

Recommendation: Contain and reduce Pyp Grass to limit the suppressive nature of this grass on the other areas of Tokuremoar and Goolwa Dunes. Consider re-doing BushRAT on an area of dune without Pyp Grass.

Site: Tokuremoar - A3		RECORDER: BN, JE DATE: 24/02/2015
DESCRIPTION: *Melaleuca halmaturorum* Low Open Shrubland		**BCM CODE: SMLR Coastal 8.3**
VEGETATION CONDITION SCORE (max. in brackets)	**Score**	**Comment**
Native Plant Species Diversity (15)	**12**	This score is Very Good. It is suggested that works look to maintain and potentially improve this score through continued threat abatement, including rabbit control.
Weed Score (15)	**5**	Annual Beard-grass and Curly Ryegrass within this site is contributing to a Low score for weeds. Both species may be difficult to control given their total cover across the site and their ability to react to annual seasonal variations such as flooding and unseasonal rainfall events.
Native Plant Life Forms (10)	**8**	
Regeneration (8)	**6**	
Native: exotic Understorey Biomass (10)	10	
Bare Ground (3)	3	
Tree Health (5)	5	
Tree Hollows (5)	2	
Fallen timber (5)	5	Maintain firebreak created by bikeway and verges between Goolwa landfill to reduce risk of losing accumulated fallen timber. Seek to ensure access gates are accessible for fire crews as currently overgrown.
Grazing Evidence (4)	3	
TOTAL VEGETATION CONDITION SCORE (ADD UP ALL POINTS)	**59**	
If community is naturally treeless x TOTAL by 1.23		
If community is not benchmarked for regen x 1.11		
ADJUSTED TOTAL SCORE	59	



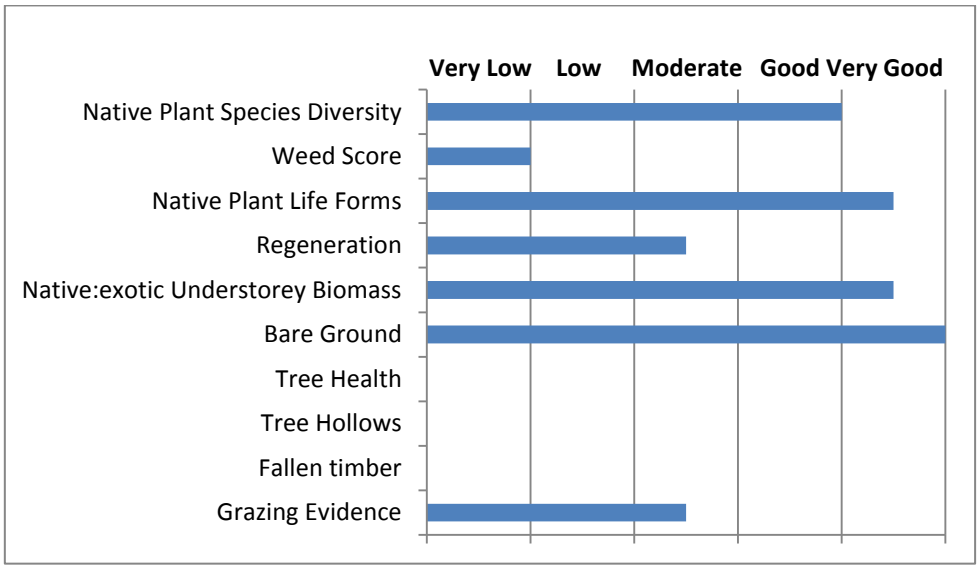
Comment Site A3: Annual Beard-grass and Curly Ryegrass within this site is contributing to a Low score for weeds. Both species may be difficult to control given their total cover across the site and their ability to react to seasonal variations such as flooding and unseasonal rainfall events. The Kind Island Melliot (also an annual), also seems to come and go on this site according to flooding regimes (B. Simon pers. comm.). Investment in controlling annual weeds needs careful justification and consideration. Examples of photos defining this site are pictured below (Figure 12.2 & 12.3).

Recommendation: On-going management of boxthorn and sea spurge may be a better investment of time as they may be influenced less by flooding regimes than the annual species.

Figure 0.2: Photo at 90 degrees from bearing for BushRAT Site A3

Figure 0.3: Photo at 180 degrees from bearing for BushRAT Site A3

Site: Tokuremoar- A4		RECORDER: BN, JE DATE: 25/02/2015
DESCRIPTION: *Olearia axillaris* and *Acacia longifolia var. sophorae* Coastal Shrubland with patchy low-lying *Ficinia nodosa*		**BCM CODE: SMLR Coastal 7.2**
VEGETATION CONDITION SCORE (max. in brackets)	**Score**	**Comment**
Native Plant Species Diversity (15)	**12**	
Weed Score (15)	**3**	
Native Plant Life Forms (10)	**9**	
Regeneration (8)	**4**	
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	Continue with rabbit control program to work toward higher score
TOTAL VEGETATION CONDITION SCORE (ADD UP ALL POINTS)	42	
If community is naturally treeless x TOTAL by 1.23	51.66	
If community is not benchmarked for regen x 1.11	0	
ADJUSTED TOTAL SCORE	51.66	



Comment Site A4: This has large areas of Perennial Veldt Grass, Euphorbia and Bridal Creeper taking up much of the available spaces and open ground on the site. Opportunities for increasing some of the key vegetation condition scores will be several limited in this area due to the practicalities and cost in managing Perennial Veldt Grass and extensive stands of *Euphorbia*. From recent experience with managing other areas with perennial grassy weeds, it was found that they are often replaced with other invasive groundcover weeds such as *Euphorbia*, thistles or other broad-leafed weeds with the same or similar ratings**.** It may be that highly palatable weeds such as Perennial Veldt grass and *Phalaris* are contributing to attracting more grazing pressure than other sites but may also act to limit browsing on native plants.

Recommendation: maintain current scores and aim to improve overall vegetation condition score through continued and improved rabbit control through the area. Push weed front of Perennial Veldt Grass further west as it is not as prevalent in the Eastern portion of this community. *Scabiosa* is a serious concern in the Eastern half of this community and is having a serious effect on the health of the low lying *Ficinia* patches. Continue controlling *Scabiousa* with selective herbicides and strategic slashing.

12.3 Fixed photo points

Fixed photo points have been set up at various locations and in particular at revegetation sites that the GWLAP have planted and where visible changes in presence of woody weeds is likely to be captured (eg Victorian Tea-tree (Figure 12.4 a and b)

Figure 12.4 a and b: Before and after of Victorian Tea-tree removal

Recommendation: Follow-up fixed photo point sites regularly (i.e. every 1-3 years) where visual changes are more likely to be captured such as revegetation and large woody weed removal programs.

13 Fauna

The total collective size of the remnant vegetation of the Goolwa area offers excellent habitat value for a range of fauna species. Western Grey Kangaroos (*Macropus fuliginosus*), Short-beaked echidna (*Tachyglossus aculeatus*), Common Brush-tailed possum (*Trichosurus vulpecula*), Common ringtail possum (*Pseudocheirus peregrinus*) and Swamp Rats (*Rattus lutreolus*) have all been seen within the Goolwa Dunes and Tokuremoar Reserve Environmental Action Plan area. Various reptiles and amphibians are noted in dedicated chapters and the project area has been noted as highly significant butterfly habitat and feeding areas. The adjoining *Eucalyptus fasciculosa* Woodland of the private heritage agreement areas is the only areas containing any hollows likely to be suitable for the Possum species. Several mobs of Western Grey Kangaroos are frequently seen in Tokuremoar Reserve and all other adjoining areas (Figure 13.1).

Figure 13.1: Large Male Western Grey Kangaroo

13.1 Swamp Rats

The Swamp Rat (*Rattus lutreolus*) is listed as rare under the *National Parks and Wildlife Act 1972*. Swamps Rats were recorded on all of the project areas and particularly in the Goolwa Dunes along the northern boundary abutting fences. Significant areas of `honeycombing' were observed through and under shrubbery, native rushes, groundcovers and weedy perennial grasses and it is likely many extend into the yards of adjoining properties towards moisture and food resources.

As Swamp Rats are a tunnelling animal, softer soils are preferred (Braithwaite & Lee 1979). Of particular note was swamp rat evidence recorded in the Goolwa Dunes revegetation site and adjoining remnant dunes well away from any water sources. Any future development of this area, such as extensions to the Goolwa Beach carpark will need to take this state rare species into account.

Snakes have been observed on several occasions hunting around or using the holes in Swamp Rat areas (Figure 13.2).

Figure 13.2: Brown Snake exploring swamp rat holes (K. Bartley)

13.2 Birds

Bird monitoring has been undertaken in Tokuremoar Reserve by Barron Environmental for the GWLAP since 2012 with sessions occurring across all seasons. Over 90 native bird species have been recorded in Tokuremoar Reserve with several having conservation significance. The highest number and diversity of species were recorded when the area has been in flood and included a wide range of wetland bird species. Small flocks of the Yellow-tailed Black Cockatoo (*Calyptorhynchus funereus*) were observed both in the drooping Sheoak Woodland areas and also in patches of the Aleppo Pines found in abundance in the Goolwa Waste and Recycling Depot. It would be wise to gradually remove the large pines in the western portion of this site as there are few other areas of suitable habitat within the landscape for some distance either side of this area.

Suitable feeding and roosting habitat for the critically endangered Orange-Bellied Parrot (*Neophema chrysogaster*) occurs in Tokuremoar Reserve, with funding provided to the GWLAP for threat abatement activities in 2008 from the Orange-Bellied Parrot Recovery Program based on the proximity to Hindmarsh Island and the Coorong National Park, which have been stronghold for the species in the past decade.

Californian Quail (*Callipepla californica*) may be present in the Goolwa Dunes. A photo was taken in October 2014 (Figure 13.3). It was provided to several bird experts and the consensus was that it is highly likely to be the Californian Quail, which is an invasive species that can compete with local quail species and possibly interbreed. (J. Gitsham pers. comm.).

Figure 13.3: Suspected Californian Quail

Figure 13.4: Spoonbill in Tokuremoar (P. Barron)

Figure 13.5: Golden Whistler

Recommendation: To continue bird monitoring program currently occurring in Tokuremoar Reserve and the adjoining private heritage areas. Consider monitoring locaility of Californian Quail sighting.

13.3 Frog Species

By Regina Durdridge, GWLAP

Three nocturnal frog surveys were conducted at Tokuremoar Reserve on the evening of 17th November 2014; Dennis Block Quarry Pond, Tokuremoar South lagoon and Tokuremoar West lagoon. In total four species of frog were recorded; Common froglet (*Crinia signifera*), Spotted grass frog (*Limnodynastes tasmaniensis*) (Figure 13.5), Eastern Banjo frog (*Limnodynastes dumerilli*) and the Painted frog (*Neobatrachus pictus*) (Figure 13.3 and 13.4). The Painted frogs were observed and not actively calling with three juvenile metamorphlings recorded.

Other frog species may also be present at the site; the Southern Brown tree frogs (*Litoria ewingii*) (Figure 13.6) which are quite common in the region but may not have been actively calling due to weather conditions on the night of surveys, the Southern Bell Frog (*Litoria raniformis*) (Vulnerable EPBC listing) and the Bibron's toadlet (*Pseudophyrne bibronii*) which also breeds outside of the usual targeted frog monitoring survey periods. Frog monitoring in the Coorong, Lower Lakes and Murray Mouth (CLLMM) region with Natural Resources SA MDB is conducted from September through to January and the SA Frog Census (Zoos SA Frog Atlas) is only just done during

the month of September. As the Painted frog and Bibron's toadlet breed in Autumn/Winter their breeding calls would not be recorded in current frog monitoring programs.

While the Painted frog species is listed as secure – there is probably insufficient data as to the actual distribution of this species as breeding occurs outside of current frog monitoring projects in the region. The Painted frog was recorded at seven additional sites in the 2013 Frog Monitoring in the CLLMM region, however in low numbers. The Signal Point Riverine Environment Group at Goolwa who undertake a lot of frog monitoring in the local area observed >30 individuals after heavy rain in April 2013 at Tokuremoar – making it the largest single abundance observed in the region.

Monitoring has also occurred in the Beach Road swamp area where four species were recorded.

Recommendation: More frequent and or seasonal frog monitoring be undertaken at Tokuremoar to establish how many species are actually present. Interpretive signage at Newell Avenue swamp could be an option for future.

Figure 13.6 Painted frog

Figure 13.7: Painted frog

Figure 13.8: Spotted grass frog

Figure 13.9: Southern Brown tree frog

Figure 13.10: Eastern Banjo frog

Figure 13.11 Common froglet

13.4 Reptiles

Reptiles observed in the field within the Tokuremoar Action Plan area over the past seven years by the GWLAP include:

- Painted Dragon (*Ctenophorus pictus*) (Figure 13.13)
- Bearded Dragon (*Pogona barbata*)
- Lined Worm Lizard (*Aprasia striolata*) (Figure 13.14)
- Olive Snake-lizard (*Delma inornata*) (Rare in South Australia)
- Garden Skink (*Lamphropholis guichenoti*)
- Eastern Blue-tongue (*Tiliqua scincoides*) (Figure 13.12)
- Sleepy Lizard (*Tiliqua rugosa*) and
- Eastern Brown Snakes (*Pseudenaja textilis*)

Recommendation: Undertake a detailed reptile survey throughout the area.

Figure 13.12: Sleepy Lizard eating *Tetragonia* fruit

Figure 13.13: Painted Dragon, Goolwa Dunes

Figure 13.14: Lined Worm Lizard, Newell Avenue

13.5 Butterflies

Tokuremoar Reserve is highlighted in the Southern Fleurieu Coastal Action Plan (SFCAP) 2007, as significant major breeding habitat for several butterfly species. Food plants known to be favoured by a range of butterflies and sedge skippers (Figure 13.17) include; *Gahnia*, *Lepidosperma*, *Adriana* and *Austrostipa* and are all recorded in the Tokuremoar Action Plan area and in particular the Kightley Triangle area (Figure 13.16), Goolwa Waste and Recycling Depot and the Newell Avenue Reserve. Large areas of coastal heath and sedge land exist on the adjoining private heritage agreement areas including the Goolwa Golfcourse with abundant nectar yielding plants present including *Pimelia ssp.* (Riceflowers) (Figure 13.15a) and *Kunzea pomifera* (Muntries) (Figure 13.15b)

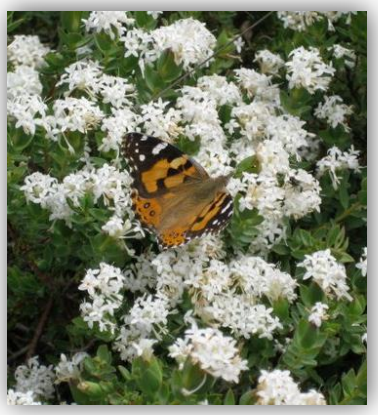


Figure 13.15a: *Nectar laiden Pimela* shrubs and **13.15 b:** *Kunzea pomifera* flowering

Figure 13.16: Sedge abundant Butterfly habitat in Kightley Triangle

Figure 13.17: Sedge skippers

14 Compliance Issues and Concerns

Map 27: Compliance Issues and Concerns

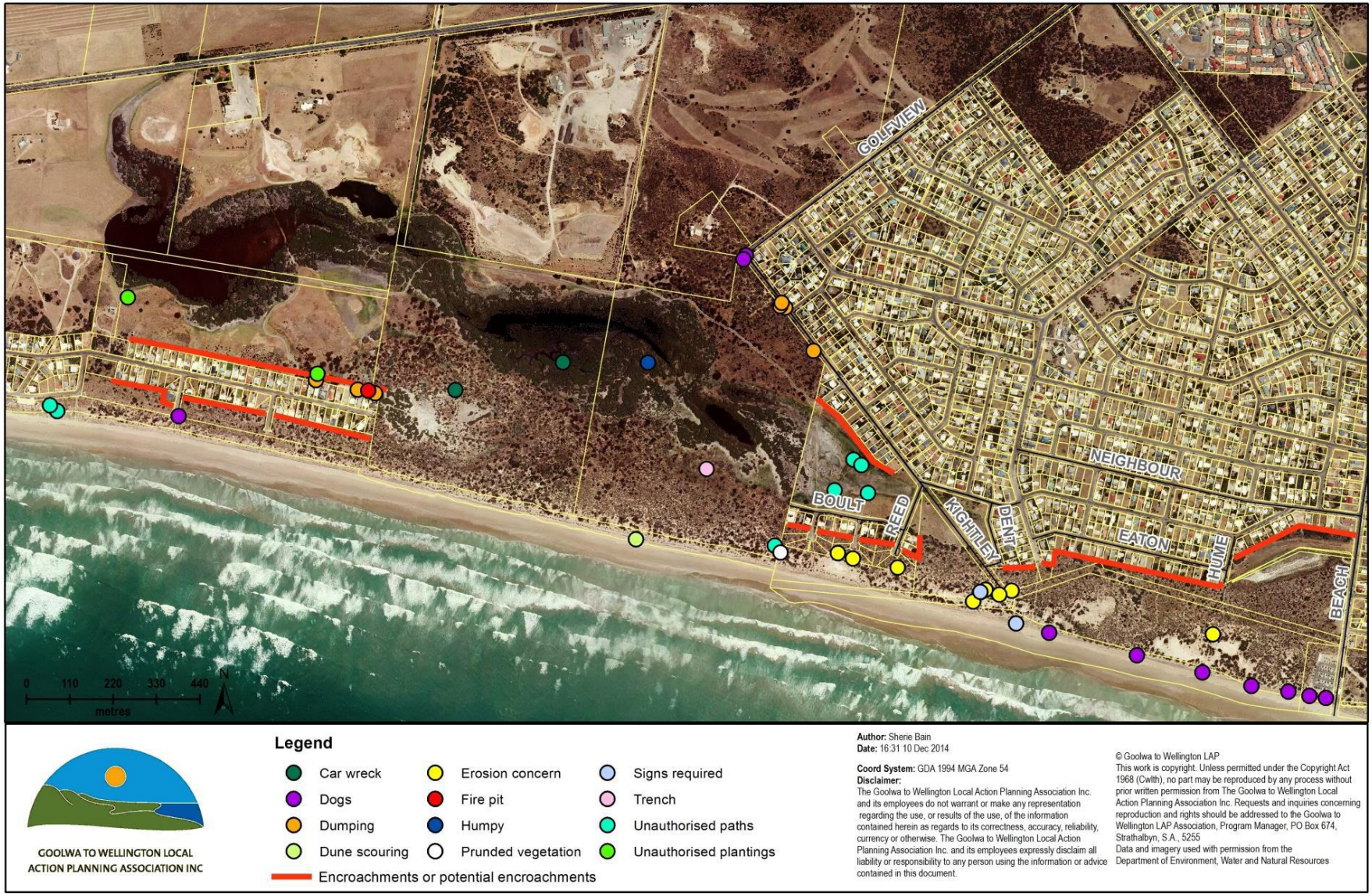


Table 9: Compliance Issues and Concerns

	Priority Level	Description	Action required	Cost Level	Desired outcome of action	Additional comments
Goolwa Dunes						
Hume Street – Erosion concern	High	Erosion strips up side of dune from human foot traffic	Signage replaced Brush/jute covering Patrol in peak season	Medium	Increase in native vegetation cover and decrease in unnatural erosion Protection of cultural sites including middens	Has had signage and some attempt using Jute before. Lay brush and hand seed with local shrubs
Dent Street-Erosion concern	Medium	Gaps in fencing Foot traffic issues	Fencing repairs and new sections More Signage	Medium	Increase in native vegetation cover and decrease in unnatural erosion Protection of cultural sites including middens	
Reed Place and other keyholes to West-Erosion concern	Medium	Small historical blowouts and areas prone to blow-outs	Monitor site for further erosion	Low	Prevention of more serious blow-outs. Sites were recorded due to early signs of erosion due to foot traffic	Pyp grass may have been planted here in the past due to erosion
Northern Boundary of reserve	High	Dumping of garden and household waste	Signage placed along boundary Regular patrols by compliance officers Fines considered	Medium	Reduction in garden escapees in dunes Raised awareness of pest plants	Several new houses have resulted in various negative impacts on the dunes via vehicles, garden waste dumping and unauthorised plantings
Impacts from Dogs	Medium	Dog faeces was recorded regularly along the foredune	Consider targeted signage Greater enforcement and compliance	Medium	Better environmental health such as reduced pollution Improved aesthetics Protection of native wildlife	Investigating impacts on reptiles from contact with dog faeces could provide greater support reasons to enforce management of dog faeces
Unauthorised plantings	High	Unauthorised planting in dunes	Discussions with residents in question and more signage highlighting area as conservation reserve	Low	Reduction of weeds in dunes	Areas near the Northern boundary of the reserve appear to be the worst areas.

	Priority Level	Description	Action required	Cost Level	Desired outcome of action	Additional comments
Unauthorised paths	Medium	Several paths running through the council owned Boult Street reserve	Letter to residents to request a halt to this activity	Low	Reduction in unnecessary mowing of reserves and associated native vegetation damage. Halting of a precedent	Given there are set authorised paths they should not be necessary
Fire Management Considerations	High	Fuel Loads	Continue removal of woody weeds with material removed from site where possible	Depends on target weeds	Reduction in fire fuel loads from removal of highly flammable weeds such as Victorian tea-tree, Boneseed and Acacia cyclops	Coastal plants often have high salt and moisture content that can burn poorly. Evidence of fireworks were observed in dunes
Tokuremoar Reserve						
Dumping	Medium	Lawn clippings, branches and other rubbish	Signage discouraging dumping Compliance enforced	Medium	Reduced dumping and associated spread of weeds and increases in nutrient levels	One area has had dumping of lawn clippings (Figure 14.2) for several years from adjacent resident on Kightley Road
Dune scouring	Medium	Scouring is resulting erosions issues	Needs to be considered in climate change impacts assessments or other studies	High	Retention of dune area Greater understanding of coastal dynamics	Sea Wheat Grass appears to by contributing to slab failure due to over-stabilisation
Pruned vegetation	Medium	Cutting of branches in fore-dune for improved view from house	Monitor locality. It appears that it could have been done more than a year ago	Low	Reduction in native vegetation clearance	She-oaks along Kightley Road have been heavily pruned in the past for view improvements
Dogs	Medium	Concentration of dog faeces at Kightley Road pathway entrance	Signage Bag dispensers	Medium	Better environmental health such as reduced pollution Improved aesthetics Protection of native wildlife	Link in with current dog programs to highlight concerns
Trench	Low	Appears to be an old man-made trench	No action.	Low	Awareness of existence	Suspect this may be man-made and undertaken to re-direct flood waters. It appears older than 10 years
Humpy	Low	Crude shelter in tea trees	Rubbish pick-up	Low	Locality known for possible future policing of the site for illegal	Lots of rubbish indicating camping and an old towel

	Priority Level	Description	Action required	Cost Level	Desired outcome of action	Additional comments
					camping etc	still hanging in the site remain
Car Wrecks	Low	2 old car wrecks	No action	Low	May be useful to relate locality to other issues in reserve	
Fire Management Considerations	High	Actions to reduce risks	Ensure access gates are maintained. Ensure current break between Goolwa Landfill and Tokuremoar is maintained	Medium	Reduction in fire fuel loads from removal of highly flammable weeds such as Victorian tea-tree, Boneseed, Scabiousa, Veldt grass and Acacia cyclops should continue	Fuel reduction burning would potentially create more fire risk than it ever abates due to mass germination of Acacia cyclops soil seed bank.
Newell Avenue Reserve						
Fire pit	Medium	Fire surround with rocks within reserve	Removal and possible signage considered	Medium	Reduction in fire risk to reserve and surrounding residents	Appears to have been used before to burn off garden rubbish.
Dumping	High	Large pile of pruning and branches	Residents contacted Signage along Southern boundary	Low	Reduction in fire fuel loads Reduction in garden refuse weeds into reserve	Found along Southern boundary of this reserve, particularly the Eastern corner
Dumping	Medium	Garden waste entering reserves	Signage Possibly letter drop	Low	Reduction in fire fuel loads Reduction in garden refuse weeds into reserve	
Unauthorised plantings	Medium	2 locations where non-indigenous plants have been planted	Residents contacted via council and asked to refrain Removal of plants	Low	Integrity of existing vegetation communities maintained Potential for plants to become weeds reduced	The main plantings are within current revegetation site under SEB and are not indigenous or in keeping with the target vegetation community Some clearance of indigenous plants has also occurred on site near bikeway
Fire Management Considerations	Medium	Southern boundary fire break between houses and reserve	Slash Southern boundary of reserve	Medium	A maintained firebreak along back of reserve near houses	Maintenance works pertaining to revegetation needs to continue to slash

	Priority Level	Description	Action required	Cost Level	Desired outcome of action	Additional comments
						and maintain this reserve
Surfers Reserve						
Dogs	Low	Dog feces recorded along the foredune	Signage Bag dispensers?	Medium	Better environmental health such as reduced pollution Improved aesthetics Protection of native wildlife	
Fire Management Considerations	Medium	Woody weeds	Remove large woody weeds from the site. Do not pile weeds on site.	Medium	Reduction in fire fuel loads	Gazania density does provide a level of fire retardation.

Figure 14.1: Lawn clippings. Typical dumping occurring near reserve boundaries

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16 Glossary

ALOC-Aboriginal Learning On Country

BCM-Bushland Condition Monitoring

BFL-Bush For Life

BushRAT-Bushland Rapid Assessment Technique

CLLMM-Coorong, Lower Lakes and Murray Mouth

DEWNR-Department of Environment, Water and Natural Resources

DPTI-Department of Planning, Transport and Infrastructure

EPBC ACT-Environment, Protection and Biodiversity Conservation Act

ESRI-Environmental Systems Research Institute Inc, USA

GIS-Geographic Information Systems

GWLAP-Goolwa to Wellington Local Action Planning Association Incorporated

NR AMLR –Natural Resources Adelaide and Mount Lofty Ranges

NR SAMDB-Natural Resources South Australian Murray Darling Basin

SEB-Significant environmental benefit

SFCAP-Southern Fleurieu Coastal Action Plan

sp.-Species

ssp.-Sub Species

TFL-Trees For Life