TreesForLife

Bush For Life
Native Vegetation Management Plan

Lower Field River – MI002T
Hallett Cove

March 2021

CITY OF MARION

friends of the lower FIELD RIVER

Bush For Life is a program run by **Trees For Life Inc**, a not-for-profit community based organisation, dedicated to the revegetation of South Australia and the protection of its remnant vegetation.

The Bush For Life program builds capacity amongst the community to achieve tangible on-ground improvements in the sustainability of our remnant native vegetation, as well as providing specialist technical and on-ground services through its professional staff.

Since 1994 BFL has built up a volunteer base of over 1200 active bush carers working on more than 300 sites, equivalent to an area of over 4000 ha.

A key feature of the program and a key to its success is the development of a **continuous learning pathway**, which builds awareness and understanding of ecological processes, the role of low disturbance methodology. It empowers volunteers to take direct on-ground action by providing a number of options for active participation in on-ground activities. This ranges from the adopt-a-site approach, to participation in Bush Action Teams (BATs), Bush Management Days and other group activities.

Relationships with volunteers are developed and nurtured through a network of skilled regional coordinators and volunteers are provided with opportunities to further develop their skills in advanced training courses that focus on particular habitat types, weed species, techniques and herbicides. BFL also places high value in training volunteers in the safe handling of tools, chemicals and work site operation.

BFL operates on both public lands in collaboration with local governments and other authorities, and also assists private owners of bushland who have participated in its training courses.

Funded by the City of Marion

CITY OF MARION

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ACKNOWLEDGEMENTS

Thanks to the members of the Friends of the Lower Field River for their input to the management of vegetation in their project area in Cormorant Reserve over the years, including recent comments and discussion with Randall Bates (Trees For Life) and Jerry Smith and Jock Conlon (City of Marion). Thanks also for the input to this management plan by Randall, Jerry and Jock, and to Jason Van Weenen (Species Ecologist, Department for Environment and Water) for his advice regarding the use of Aleppo Pines as habitat for Yellow-tailed Black Cockatoos.

INTRODUCTION

Australia was once covered with native vegetation. Each place had its own unique community of plants and animals, which had evolved over eons of time. While these plant communities may have been quite variable in form and composition, being part of a continuous landscape meant species could move freely between them. This allowed animals to take advantage of resources throughout their home range. Family groups were able to disperse and exchange genetic material with neighbouring populations and escape disturbance events like bush fires. Animals also helped move pollen and seeds of many plant species, so cross-pollination and distribution could take place.

Since European settlement, there has been a high level of clearance for urban, industrial and agricultural development. It is estimated that only about 13% of the pre-European vegetation cover remains in the Adelaide and Mount Lofty Ranges Natural Resource Management Region, with much of it highly degraded and some vegetation communities disproportionately cleared. This has resulted in the fragmentation of habitats into small patches of native vegetation, with populations of plants and animals that are isolated from each other. In addition, these fragments are susceptible to "edge effects". Plants and animals are subject to impacts from the surrounding land use, such as housing developments, farming, rubbish dumps and quarries.

Without actively managing these remnants, they will continue to degrade. Weed invasion is a common result of the "edge effect" and weed management to encourage bush regeneration is one of the most important activities undertaken in the Bush For Life program.

> **"Protecting existing remnant vegetation is by far the most efficient way of conserving biodiversity"**
>
> Australian Conservation Foundation, (1999) Getting back on track – the biodiversity challenge

PURPOSE

This plan is primarily intended to guide the Friends of the Lower Field River volunteers' on-ground bushcare work required to maintain and improve the native vegetation on the site but also provides a resource for the land owner and other stakeholders. It describes:

- the area under management,
- degrading influences on the native vegetation,
- conservation objectives,
- how appropriate actions can be taken to maintain and improve its condition and
- a recommended monitoring program.

OBJECTIVES FOR THE SITE

1. Ensure long-term conservation of the site's native plant and animal species.
2. Protect seed sources for natural regeneration and future revegetation activities.
3. Maintain the integrity of the site's native vegetation and restore degraded areas.
4. Discuss opportunities for future revegetation activities within the reserve.
5. Discuss removal of non-indigenous tree species from the reserve.
6. Encourage the public's appreciation of the native vegetation and biodiversity values of the site and provide opportunities for the local community to become involved in its management.

SITE DESCRIPTION

The Lower Field River site is approximately 20 kilometres south-west of Adelaide, bisected by Cormorant Drive at the corner of Osprey Court. The site incorporates a section of the fore-dunes, between the walking track up to Grand Central Avenue to the north and just south of the river mouth, and extends south-east along Cormorant Reserve to the fenceline of the Seaford railway line.

Reserve Name:	Cormorant Reserve
Local Government Area:	Marion
Location:	Hallett Cove, Hundred of Noarlunga.
GIS reference:	UTM GDA Zone 54H E271605 N6114558
Title Information:	Includes Parcel D33936 A265 CT 5068/796, D33936 A266 CT 5068/797, part Parcel F101647 A4 (DPTI railway corridor) and part of the coastal fore-dune
Site Owner:	City of Marion
Date established as TFL Site:	2018

The total area of the site is approximately 7.2 hectares, incorporating remnant and revegetated native vegetation, mown recreation and planted garden bed areas, and the Field River. The reserve is bound by housing developments on both the north and south sides and the Seaford railway corridor to the east. North from the river mouth there is some connectivity with the narrow coastal dune system to other remnant coastal heathlands and cliff face vegetation, while to the south Hallett Headland is a 13 hectare patch of remnant vegetation, which contains more than 100 native plant species including over 30 species considered to be of conservation significance in the Mount Lofty Ranges. Marino Conservation Park is 3.4km north of the Field River, while Hallett Cove Conservation Park is nearer at 700m north. Across the east side of the railway line and Lonsdale Road, the Field River extends through large areas of open grassy woodland of unknown quality on privately owned land containing a quarry.

Lower Field River in relation to Adelaide

Map showing the approximate boundary of the Lower Field River project site, incorporating coastal dunes at the river mouth and Cormorant Reserve, which is dissected by Cormorant Drive. The site shown includes areas managed by the City of Marion, including mown parkland areas, tracks and the Field River itself.

SITE DESCRIPTION

The Lower Field River project site is located in Cormorant Reserve, extending from the mouth of the Field River at the southern end of Hallett Cover Beach up to the Seaford railway embankment. Here the river's natural flow was diverted through artificial concrete culverts under the railway line and the adjacent Lonsdale Road. The project site comprises a number of different landforms including coastal dune, riparian, cliff and hillslope.

Climate: The climate is typically Mediterranean with cool, moist winters and warm to hot dry summers. Peak rainfall is through the winter months with occasional rain events throughout spring and summer.[1] Mean Annual Rainfall (1976 – 2005) is 503mm.[2]

Native Vegetation

The term Vegetation Community refers to the assemblage of plants that occur in a given location, and can be described using Specht's Major Vegetation Structural Formations in South Australia (Croft, Pedler and Milne 2005).

Pre European mapping indicates that the original vegetation of this site would have been a *Eucalyptus porosa* (Mallee Box) Woodland on the slopes, *Eucalyptus camaldulensis* ssp. *camaldulensis* (River Red Gum) Woodland along the watercourse and *Acacia ligulata* (Umbrella Bush) Low Shrubland along the coast.

The two main vegetation associations that currently occur on site include[3]:

1. *Olearia axillaris* (Coast Daisy-bush) +/- *Rhagodia candolleana* (Sea-berry Saltbush) +/- *Atriplex paludosa* (Marsh Saltbush) Low Shrubland

2. *Enneapogon nigricans* (Black-head Grass) +/- *Austrostipa scabra* (Rough Spear-grass) +/- *Themeda triandra* (Kangaroo Grass) Tussock Grassland with emergent *Acacia victoriae* (Elegant Wattle), *Eucalyptus porosa* (Mallee Box) and *Acacia pycnantha* (Golden Wattle).

A number of plant species of regional conservation significance occur on the reserve, including both remnant and planted species. A full list of indigenous species and combined weed and non-local plant species are given in Appendices 1 & 2 respectively.

Site History

Much of the original vegetation within the Field River catchment has been cleared or modified since European settlement[4]. Grazing and other agricultural pursuits have resulted in a highly modified vegetative cover and, more recently, urban development surrounded the site known as Cormorant

[1] Galley, J.M., 2006, Management Action Plan for the Lower Field River Hallett Cove, City of Marion
[2] http://spatialwebapps.environment.sa.gov.au/naturemaps/?locale=en-us&viewer=naturemaps
[3] Smith, J.J., 2008, City of Marion Indigenous Vegetation Assessments Stage Two, City of Marion
[4] ECO Management Services Pty Ltd & ID&A Pty Ltd in association with Green Environmental Consultants Vivienne Wood, 2000, Field River & Waterfall Creek Riparian Zone Biodiversity Action Plan, Onkaparinga Catchment Water Management Board

Reserve. Pockets of remnant vegetation and plantings of locally indigenous species now compete with invasive weeds and other exotic species that have been planted over the years.

A notice[5] asking for expressions of interest to form the Friends of the Field River was sent out in conjunction with a planned walk along the Field River in December 2005, from the mouth to the railway embankment. The aim was to get people from the community to become *"an integral part of the future care management and planning of the Field River by:*

- *Removal and control of problem weeds especially olives*
- *Seed collection*
- *Planting of native species*
- *Local biodiversity surveys"*

The Friends of the Lower Field River was established in 2006, with their first meeting held in February. Their website[6] has a wealth of information about the group, its history and the area of the Field River in which they concentrate their activities. It includes a downloadable information brochure and their action plan, which talks about the group's aims and objectives.

"Friends of the Lower Field River is a land care group established by Hallett Cove residents in 2006 to protect and care for the lower portion of the Field River and its environs. This area includes Cormorant Reserve, the river's estuary at Hallett Cove Beach and nearby sand dunes.

Over the years this area has been degraded, but it retains huge potential into the future. Our aim is to gather support from the community and work towards the rehabilitation and protection of these areas. Unless long-term plans are made and all of the community comes together, the degradation may not be able to be reversed.

Friends of the Lower Field River believes that all of the community should be seen as guardians of this area's exceptional natural beauty and we are keen to pass onto future generations something they can all feel proud of.

We have developed an action plan outlining our priorities and targets for the next few years and together with the City of Marion (the owners of the reserve) and other interested parties we plan to improve the condition of this urban river, control weeds, protect and enhance coastal dune vegetation and plant indigenous shrubs, trees and grasses.

Even the smallest of works will start bringing native animal and bird life back into the area. Once this starts, momentum will build and we will have an environmental gem on our doorstep."

Site Stakeholders

The following people/groups also have a role or interest in the management of this site.

Name stakeholder/group	role or project
City of Marion	Responsible for overall management of the reserve, including mowing open areas, maintaining fire fuel reduction areas, track and infrastructure maintenance, removal of rubbish dumped in reserve, tree removal where appropriate, weed management activities as requested by the FoLFR from time to time.
Friends of the Lower Field River (FoLFR)	Caring for the local environment in the lower Field River, including revegetation and bushcare activities within Cormorant Reserve.

[5] Galley, J.M., 2006, Management Action Plan for the Lower Field River Hallett Cove, City of Marion
[6] http://www.fieldriver.org/index.php

MANAGEMENT ISSUES AND RECOMMENDATIONS

Land clearance and grazing has resulted in varying levels of degradation within the project site at the lower Field River. While pockets of remnant native vegetation remain, there has been extensive planting within the area over the years. Initially this involved mainly horticultural specimen trees, palms, shrubs and turf, but more recently revegetation of locally indigenous species has taken place.

Invasive weeds represent a major threat to the remnant native vegetation present, as well as the revegetated areas. Priority should be given to weed management in remnant areas containing good native species diversity with lower levels of weed invasion. Areas previously revegetated should now be managed using the same minimum disturbance bush regeneration techniques as the remnant areas, to encourage sustainable populations without the need for constantly replacing plants that die with new tubestock.

Revegetation of local species has been a key activity of the FoLFR since their formation in 2006. This was necessary to re-establish native vegetation cover where it had been historically cleared. However, future revegetation activities are restricted by the amount of open or degraded land remaining that does not contain existing remnant vegetation, together with the need to consider fire fuel load management zones near housing and infrastructure.

Planting of trees and shrubs into remnant native grass and mat-rush areas should be avoided in the future, as this poses a threat to this vegetation community. Shading by overstorey species can reduce the health and vigour of these species, while revegetation activities create disturbance that can advantage weeds. Any future revegetation in these areas should be restricted to additional understorey species, including native lilies and groundcovers.

Potential future revegetation opportunities have been included under the Zone Descriptions and Actions section later in this plan. See also section below on revegetation

Many of the historical plantings of non-local species are not particularly invasive, although they may take up space and resources that ideally should be occupied by local species. Unless seeking to be a purist and remove *all* non-local species, efforts should concentrate on the more invasive weeds within areas already occupied by locally indigenous species.

Much discussion over the years has focussed on removal of some of the larger exotic plant species, including stands of *Pinus halepensis* (Aleppo Pine) and a screen planting of *Lagunaria patersonii* (Norfolk Island Hibiscus/ Itchy Powder Tree).

When managing vegetation and planning the removal of introduced species, their use by native wildlife is an essential part of the decision making process. In the case of the Aleppo Pine, this species is known as an important food source for the Yellow-tailed Black Cockatoo (*Calyptorhynchus funereus*), a species that is listed as Vulnerable in South Australia under the National Parks and Wildlife Act.

In December 2018, Jason Van Weenen, Species Ecologist with the Department for Environment and Water, presented to the FoLFR on the subject of the use of Aleppo Pines by the Yellow-tailed Black Cockatoo. Some of the key points mentioned were:

- There are 3 main groups of Yellow-tailed Black Cockatoo with distinct genetics
    - Kangaroo Island = 1000 birds (no genetic movement across to the mainland)
    - South East = 4500 birds

    - Southern Lofty = 2000 birds
- Eyre Peninsula is down from 30 pairs in 1997 to 7 birds now. This group is expected to be extinct within the next 3-4 years.
- Southern Lofty has 600-800 breeding pairs of Yellow-tailed Black Cockatoo once non-breeding birds are accounted for.
- The historic food source was *Hakea* spp. (including *H. carinata*), *Banksia* spp. and borers in sheoaks, Yellow-tailed Black Cockatoo do not eat sheoak seeds (Glossy Black Cockatoos do though).
- The Southern Lofty flock relies on Aleppo Pine cones due to loss of their natural food source since European settlement e.g. land clearance for housing, farming and industry, weed invasion, etc.
- One Aleppo Pine cone is equivalent to 300 Hakea seeds, revegetating Hakea on a scale to replace the Aleppo Pine food source is not feasible.
- The Yellow-tailed Black Cockatoo may not feed on an Aleppo Pine tree for several years due to low quality seed on the plant, but in lean years when other Aleppo Pines are not producing enough seed, the birds will resort to the low quality seed to get them through.
- It has been suggested that Aleppo Pine seeds are not nutritionally suitable for Yellow-tailed Black Cockatoo, but they are still able to survive and successfully raise young on a variety of different diets, which includes Aleppo Pine seed together with their natural diet; the alternative is starvation.

As a result of the presentation, all attendees agreed to have a bird survey undertaken of the Aleppo Pines to assess their habitat value, including as a food source, for Yellow-tailed Black Cockatoo and other native wildlife. The Norfolk Island Hibiscus on the south west side of the river would also be surveyed for habitat value.

It should also be mentioned that Nankeen Night Herons (*Nycticorax caledonicus*) have also been found in the Aleppo Pines. This species is considered Vulnerable under the Regional Species Conservation Assessment within the Mount Lofty Ranges sub-region of the Adelaide and Mount Lofty Ranges region[7]. In July 2019, a visitor from Germany was seeking locations around Adelaide to see the Nankeen Night Heron and was directed to the Aleppo Pines at Lower Field River. He was excited to report that, despite heavy rain at the time, he got a good look at two of the Nankeen Night Herons in the pines[8].

Following the agreement of the attendees of the presentation by Jason Van Weenen to have a bird survey undertaken, John Gitsham, Birding & Nature Connections, was engaged to conduct this in November 2019. The report is included in this plan as attachment 5, with some of the results John highlighted being:

- A lot of bird activity was seen, with 23 native species and 5 introduced species.
- Bird species seen were common for urban/coastal areas.
- No Yellow-tailed Black Cockatoos or Nankeen Night Herons were seen.
- Eucalypts were flowering so there were lots of honeyeater species and Rainbow Lorikeets.
- Australian Reed Warblers were calling in the reed beds along the river as it was their breeding time.
- There was one family of Superb Fairy-wrens seen.

[7] https://www.environment.sa.gov.au/topics/plants-and-animals/Threatened_species_ecological_communities/Regional_significant_projects/Regional_Species_Conservation_Assessment_Project

[8] Watton P, July 2019 personal comments

- An Australian Hobby was a highlight flying along the river and out across the beach.
- There were no Noisy Miners present during the survey.

John couldn't see current evidence that the Yellow-tailed Black Cockatoos were using the Aleppo Pines on the reserve, but there were chewed pine cones to indicate foraging by either these or Sulphur-crested Cockatoos. He said regular mowing would also remove more evidence of chewed cones. John recommends not removing the Aleppo Pines "*as they are a good food source for the YTBC that now depends solely on pines cones as its alternative food source*". He does suggest controlling any young pines that germinate.

While the Aleppo Pine produces large volumes of seed, which in turn create a threat of increasing weed distribution within the area, the seedlings are relatively slow growing and easily controlled before they reach maturity and produce cones at around four years[9]. As a result of this, the invasive threat to the native vegetation is considered relatively low compared to other pest plant species present.

At the Marion Council General Meeting on 26th May 2020, a deputation was made by a resident supported by a petition with 31 signatories to remove all of the Aleppo Pines over a three year period. The following motion was carried:
That:

1. *Council notes the petition.*
2. *The group of approximately 30 Aleppo Pine trees in the Cormorant Drive Reserve, Hallett Cove, be removed in stages over the period of the next three years whilst a revegetation program takes affect during that period.*
3. *The Petitioners be advised of the decision*

At the Marion Council General Meeting on 29th July 2020, a motion regarding the Aleppo Pine trees in the Lower Field River was carried that:
A report be brought to Council regarding the Aleppo Pines which provides Council with the following information:

a. *An external expert opinion on what impacts the removal of the trees will have on:*
    i. *Fauna;*
    ii. *Flora;*
    iii. *Field River environment, in particular the immediate area around the trees;*
b. *A plan for a staged approach to remove the 30 Aleppo Pines;*
c. *Information on what natives can be used to revegetate the site.*

The Council sought expert opinions on the trees and the local fauna, flora and Field River environment, to determine the best plan to manage the trees. Information from three experts, who analysed the Aleppo Pine tree health, the fauna, flora and broader ecology of the environment, and the fire risk of the Aleppo Pine trees, was presented in a report to the General Council Meeting on 27th October 2020[10]. These reports have been included as attachments to this Plan:

1. Report on the current state of the Aleppo Pines in the Lower Field River, and the proposed plan for their removal; prepared by Arborist Sam Cassar
2. Report on ecological impacts of the Aleppo Pines Lower Field River, and likely impacts of their removal; prepared by Ecologist Tim Milne

[9] https://pir.sa.gov.au/__data/assets/pdf_file/0018/223191/Aleppo_pine_policy.pdf
[10] https://cdn.marion.sa.gov.au/meetings/agendas/GC201027-Final-Agenda.pdf?mtime=20201022174915&focal=none

3. Fire risk in the Lower Field River area prepared by Metropolitan Fire Service

An independent review of the expert reports was sought from Professor Chris Daniels, who provided feedback in strong support for the experience of the experts engaged, their comprehensive reports and their balanced and objective recommendations.

At the October Council Meeting the following recommendation was carried unanimously[11] (attachment numbers relate to the Council Agenda not this plan):

1. Notes the expert reports: Evaluation of biodiversity values and impacts of Aleppo Pines in the Lower Field River; Aleppo Pine Management Plan-Cormorant Drive Reserve, Hallett Cove; and the MFS fire risk inspection letter provided in attachments 1, 2 and 3 respectively.
2. Adopts the Aleppo Pine tree removal and revegetation plan to be implemented over 6 years, 2020-2025 (as summarised in Attachment 4).
3. Notes that in adopting the 6 year tree removal and revegetation plan a review will be undertaken after year 3 with a report presented to Council in 2023.
4. Notes that the canopies of the remaining trees will be lifted/pruned in year 1 concurrently with the removal of the year 1 trees to reduce the risk of fire.
5. Notes the independent review provided by Professor Chris Daniels in support of the findings of the experts (Attachment 5).

In summary, the experts recommended an Aleppo Pine Tree removal and revegetation plan over six years with the majority of the trees to be removed over the first four years. They also recommended a review after the first three years of the plan's implementation. The following conclusion is taken from the agenda:
The proposed six year tree removal and revegetation plan provides a balanced approach to removal of a weed species - the Aleppo Pines with the consideration of the Yellow-tailed Black Cockatoos. The plan also enables a targeted revegetation plan which will improve amenity, decrease impacts on the Field River, enhance the environment for a broad range of flora and fauna and mitigate fire risk.

This approach also provides an opportunity to review at various stages of the project, with the largest trees in best condition left until year 6 of the removal program. The approach taken to removal thus ensures the trees most likely to provide the greatest resources are not removed until last. If any new information should emerge regarding the importance of this stand of Aleppo Pines to Yellow-tailed Black Cockatoos (as it relates to the survival of the species), consideration could be given to retention of a small number of trees.

Many of the other non-local tree species planted in the reserve also have a low invasive threat, and may or may not provide much habitat value for native wildlife. These are generally planted in the mown parklands areas of the reserve, which are used by the community for walking and recreation, and do not necessarily impact on the values of the native vegetation. Each will need to be assessed, in consultation with the local community, before the Council commits to their removal.

Other more invasive species, such as Weeping Willow (*Salix babylonica*) and Willow Rhus (*Searsia lancea*) have already been scheduled for removal by the Council.

[11] https://cdn.marion.sa.gov.au/meetings/minutes/GC201027-Final-Minutes.pdf?mtime=20201030143104&focal=none

There are five mature Date Palms (*Phoenix dactylifera*) growing on Cormorant Reserve and the City of Marion has suggested their sale and removal by a qualified Palm Tree dealer. This action has been incorporated into this plan.

Recommendations for tree removals have been included under the Zone Descriptions and Actions section later in this plan.

Volunteers should not work within six metres of the edge of any roads without Work Zone Traffic Management devices being in place to manage traffic. These require a person with current qualifications to be present during the activity, without which the work should be left for City of Marion staff or contractors. The areas affected are adjacent to River Parade, Osprey Court and Cormorant Drive.

Fire fuel load management needs to be considered throughout the reserve, particularly adjacent to housing and development. This has been included in the management actions for zones 1, 9, 15 and 18. Where possible, management of grassed areas should be modified to encourage any native grasses already growing here. Annual exotic grasses generally flower and seed earlier than perennial native grasses, and timing the slashing to take advantage of this can reduce the seed set of the annual exotic grasses, while enabling seed set of the native grasses later in the season. Ideally slashing should be at a height of 10-20cm to avoid scalping and, if this is not achievable with a mower, use of a brushcutter is a more flexible and targeted alternative. Control of woody weeds throughout the reserve is another method of reducing overall fuel load.

The City of Marion manages the path network and mown areas of the reserve. Council also engages contractors to undertake bushcare activities in various parts of the reserve, with an emphasis on large woody weed control and management on steep slopes that should be avoided by volunteers. The contractor work plan should be provided to the volunteer group on a regular basis, to ensure overlap of work does not take place.

NATIVE VEGETATION MANAGEMENT ISSUES

REVEGETATION

The following section on revegetation follows sections from "Guidelines to Protect and Enhance *Eucalyptus porosa* grassy woodlands" (2005) by Peter Tucker, produced for the Goolwa to Wellington, Murray Mallee and Eastern Hills and Murray Plains Local Action Planning groups. Much of the general principles apply for the revegetation at Cormorant Reserve.

It is widely accepted by most ecologists that blocks of native vegetation are more useful to wildlife than narrow strips, e.g. roadside vegetation. Similarly, large blocks of vegetation are more useful than smaller scattered patches. Linear strips and small patches of bushland have many edges compared to core habitat. These edges are often degraded and more likely to have a higher proportion of weeds. Paton[12] (2010) suggests that in cleared areas revegetation should cover at least 10 hectares to accommodate home ranges of declining bird species.

Revegetation should aim to increase the size of existing patches of native vegetation. Linking existing remnants or providing stepping stones through the landscape should be of next importance. The

[12] Paton D. & O'Connor J., 2010, The State of Australia's Birds 2009, Restoring Woodland Habitats for Birds, Birds Australia, Supplement to Wingspan, vol. 20, no. 1

historical revegetation undertaken by the Friends of the Lower Field River reflects this thinking, aiming to increase the size of the existing remnant native vegetation.

Links should be as wide as possible, not less than 50m if possible. Barrett[13] (2000) has demonstrated that narrow links or corridors of only 10m width rarely have any benefit to declining bird species and often further threaten these species because narrow corridors tend to encourage over abundant and aggressive birds such as Noisy Miners.

Best Practice Revegetation

Natural Regeneration

Natural regeneration is far more efficient, effective and respectful of existing native vegetation. Natural regeneration will usually happen if remnant vegetation is nearby, even if it is skeletal and degraded. Given time and appropriate weed control, native species flourish and new species will appear, either germinating from the soil seedbank, as wind borne seed or via animal droppings. Planting of tubestock or direct seeding is rarely necessary and is usually an expression of our desire to speed up natural processes or to meet requirements of funding bodies that are limited to a 12 month cycle. It is impossible for humans to replicate the random arrangement of plants that occur in a natural system.

Second Best Practice Revegetation

Planting and Direct Seeding

Planting tubestock or direct seeding into remnant vegetation is strongly discouraged. Such planting will compromise the integrity of the existing bushland. Efforts need to be directed towards encouraging natural regeneration using bush regeneration techniques. If, after 3 – 4 years of bush regeneration work, there is little improvement in bushland condition, it may be appropriate for revegetation to be undertaken.

Revegetation should only occur in areas that have been ploughed or cropped or otherwise cleared in the past, preferably with a minimum 10m buffer between revegetation and existing native vegetation.

Many people have an urge to plant tubestock or direct seed, even though native vegetation may be degraded or border the areas they wish to return to native vegetation. Degraded vegetation will respond better to bush regeneration techniques than revegetation.

Historically, all seed collected for planting was collected from as close as possible to the planting site. This was based on the assumption that local genotypes were best adapted to local environments. The general guideline was within 5km. Common sense still needed to be exercised when applying this guideline, in some situations there may not be any native vegetation within 5km, in others it may only be 1km. The logical answer was to collect seed from as close as practical and from the nearest similar soil type and topographical area.

Currently, however, there is a need to consider climate change when sourcing seed for revegetation projects. While the industry is still feeling its way with this issue, collecting a percentage of the propagation material from further afield may satisfy the precautionary approach. In this case,

[13] Barrett G., 2000, Birds on Farms. Ecological Management for Agricultural Sustainability, Birds Australia, Supplement to Wingspan vol. 10, no. 4

collecting say 10%[14] of propagation material from the same species growing further north may provide an element of genetic material adapted to warmer climates.

Often trees and large shrubs are planted too densely, perhaps because of an expectation that many will die, or that dense plantings will reduce the need for weed management. It will be necessary to maintain all plantings with excess trees cut down or drilled and filled. Thinned trees should be left on site to break down naturally and provide additional habitat for wildlife, provided these are not within fire fuel load management zones.

PRINCIPLES AND STRATEGIES OF BUSH REGENERATION

Bush Regeneration Principles

Weed management in remnant vegetation requires a different approach to that in a paddock or garden situation. The most effective method of weed control in bushland is to start from the best quality bushland and work towards the weedier areas, ensuring that the best quality native vegetation is protected first. Remember to focus on the native vegetation you are trying to protect and not the weeds you are trying to get rid of – don't become weed focussed.

The following bush regeneration principles should always be followed:

1. Work from the good native vegetation outwards towards weed infested areas;
2. Cause minimal disturbance to existing plants and soil; and
3. Avoid over clearing.

An overlying principle is to only remove weeds if a native plant will be advantaged. The exceptions to this are new weeds to the site and highly threatening weeds like bridal creeper.

When these principles are put into practice, large areas of bushland can be worked upon even when time is limited. Large areas of good bushland are the easiest to work on, as there are usually fewer weeds present.

Principle 1 - Work from the Good Native Vegetation Outward Towards Weed Infested Areas

With little effort large areas of good vegetation can be maintained by removing isolated individual weeds. This denies these weeds the opportunity to set seed and become established, while also giving the native plants a chance to spread into reclaimed areas, either by new seeds and spores or by seed waiting in the ground for an opportunity to germinate after competition is removed. This method has been proven in South Australia over many years. Keeping weeds out of good quality bushland is much more efficient than trying to eradicate an infestation.

Principle 2 - Cause Minimal Disturbance to Existing Plants and Soil

Most weed infestations have resulted from either natural or human disturbance of the soil. Weeds, with their huge numbers of seed and vigour, are able to take advantage of the disturbed ground more quickly than most native species. Weed carefully using hand tools or targeted herbicide application. Tamp down and replace leaf litter over any soil disturbances.

Weeds should be removed using minimum disturbance techniques. These include:

[14] Lowe AJ (2010) Composite provenancing of seed for restoration: progressing the 'local is best' paradigm for seed sourcing. In T*he State of Australia's Birds 2009: Restoring Woodland Habitats for Birds*. (Eds David Paton and James O'Conner). Supplement to Wingspan20(1) March. pp 16-17

- careful hand weeding (particularly useful near threatened plant species);
- hand spraying using Glyphosate;
- wiping foliage of broadleaf weeds and strappy-leaved bulbous weeds using Glyphosate;
- the cut and swab technique for woody weeds that are too large to be hand weeded;
- drilling and filling for larger woody weeds; and
- strategic slashing to control annual grasses and prevent seeding on perennial grasses.

Principle 3 - Avoid Over Clearing

Over clearing will result in more follow up work than is necessary and may also cause erosion. Weeds will almost invariably re-colonise the cleared area, whether it be the same species from the large quantity of seed in the soil, or possibly one that is even more difficult to control coming in. You should work in areas where native plants are able to spread into, such as:

- halos around native plants (spot regeneration); or
- narrow strips along the edge of good quality native vegetation; or
- peninsulas surrounded by good quality native vegetation on either side.

Remember to allow the native plant regrowth to stabilise before extending further, making sure that you don't work too fast for natural regeneration to occur. Err on the side of caution and consider the possible consequences of your actions. Weeding the same ground over and over, with little native plant regeneration to show for it, can be very demoralising.

Bush Regeneration Strategies

1. Remove Isolated Weeds in Good Native Vegetation

By patrolling and removing isolated weeds in good vegetation before they have a chance to seed and increase, the good areas can be maintained with little time and effort. Native plants can then germinate in these spaces. Spending all of your time and effort clearing large patches of weeds in more degraded areas gives the isolated weeds a chance to establish in the good vegetation. It may also result in over clearing in the weedy areas.

2. Create Weed Fronts and Work along Them

A weed front is created by removing isolated and outlying weeds in good vegetation first and gradually working towards the weed infestation where the weeds are dense. The edge of this dense infestation then becomes the weed front. Once consolidated, work should then continue along the weed front, only moving further into the patch of weeds when the native plants have recovered and begun filling in the gaps. Weed fronts may wander and meander for hundreds of metres.

Working too far into weed fronts often results in soil disturbance and over clearance, providing opportunities for other weeds to take over because there are less native plants present deeper into the weed front. The few natives that remain are more likely to be out competed by weed species that rapidly colonise the void created by excessive weed removal.

Weed fronts are usually easier to identify and establish when targeting herbaceous weeds such as perennial veldt grass, soursob, watsonia, freesia and the like because they are smaller and tend to spread slowly. More difficult to establish are fronts for weeds that multiply quickly over large distances, often spread by birds and other animals or the wind. In these cases it is still important to remove individual plants or outlier populations in the good vegetation first, and then work towards the dense infestation.

Shadow weed fronts can be created by removing parts of the remaining weeds along the weed front to minimise reinfestation e.g. slashing grasses or watsonia, removing seed heads from broom/gorse or cutting back the canes of blackberry.

3. Undertake Spot Regeneration to Rescue Isolated Native Plants within Patches of Weeds

Where isolated native plants struggle amongst a host of weeds, gently and gradually remove the competition allowing them room to grow, reproduce and eventually all join together. This technique can also be used to protect small populations or individuals of a threatened species in weedy areas. Remember not to over clear, as it can be difficult to tell whether the native plant was surviving in spite of the weeds or because they were protecting it, e.g. from rabbits.

4. Prevent Weed Spread

Where appropriate remove any parts of the weed that may reproduce e.g. seeds, bulbs, bulbils, corms, cormlets and roots. However, do not get caught up trying to remove these in large infestations. It is more important where there are only one or a few weeds in good areas of native vegetation or along weed fronts. Seek advice on how to dispose of weeds in an appropriate manner. Clean equipment, clothing and boots before leaving the site so that seeds are not transported to other locations.

5. Remove All Priority Weed Species from Areas Being Worked In

It is a waste of time removing one species of weed if it just makes room for another that may be equally as bad or worse! Your initial progress may seem slower, but you may save hours of follow up work later.

Weed Management Priorities on the Friends of the Lower Field River site

The weeds of greatest concern on the Friends of the Lower Field River site, their priority for control are listed below. It will still be necessary to search for new seedlings regularly and prevent weed species from becoming re-established.

- A list of all weeds and non-local plant species found on the site is in **Appendix 2**.

Some weeds are better treated at different times, others have a limited time before treatment becomes ineffective and some are more invasive than others. Understanding these issues will enable volunteers to efficiently manage the bushland on this site.

- An action schedule for timing of treatments on priority weeds is given in **Appendix 5**.

Priority Areas

The Friends of the Lower Field River project area includes a number of areas that contain valuable remnant native vegetation, from the coastal dunes to the grassy woodlands on the hillslopes. Minimal disturbance bushcare on these areas is the first priority.

There has also been a considerable amount of revegetation undertaken by the group since it was formed in 2006, to bring back a number of species previous lost from the area, and to increase the area covered by native vegetation. Management of these areas using the same minimal disturbance bushcare principles, strategies and techniques is the second priority. Treating these areas in the same way as remnant native vegetation should assist them becoming more sustainable and resilient, so that they form self-sustaining, regenerating populations.

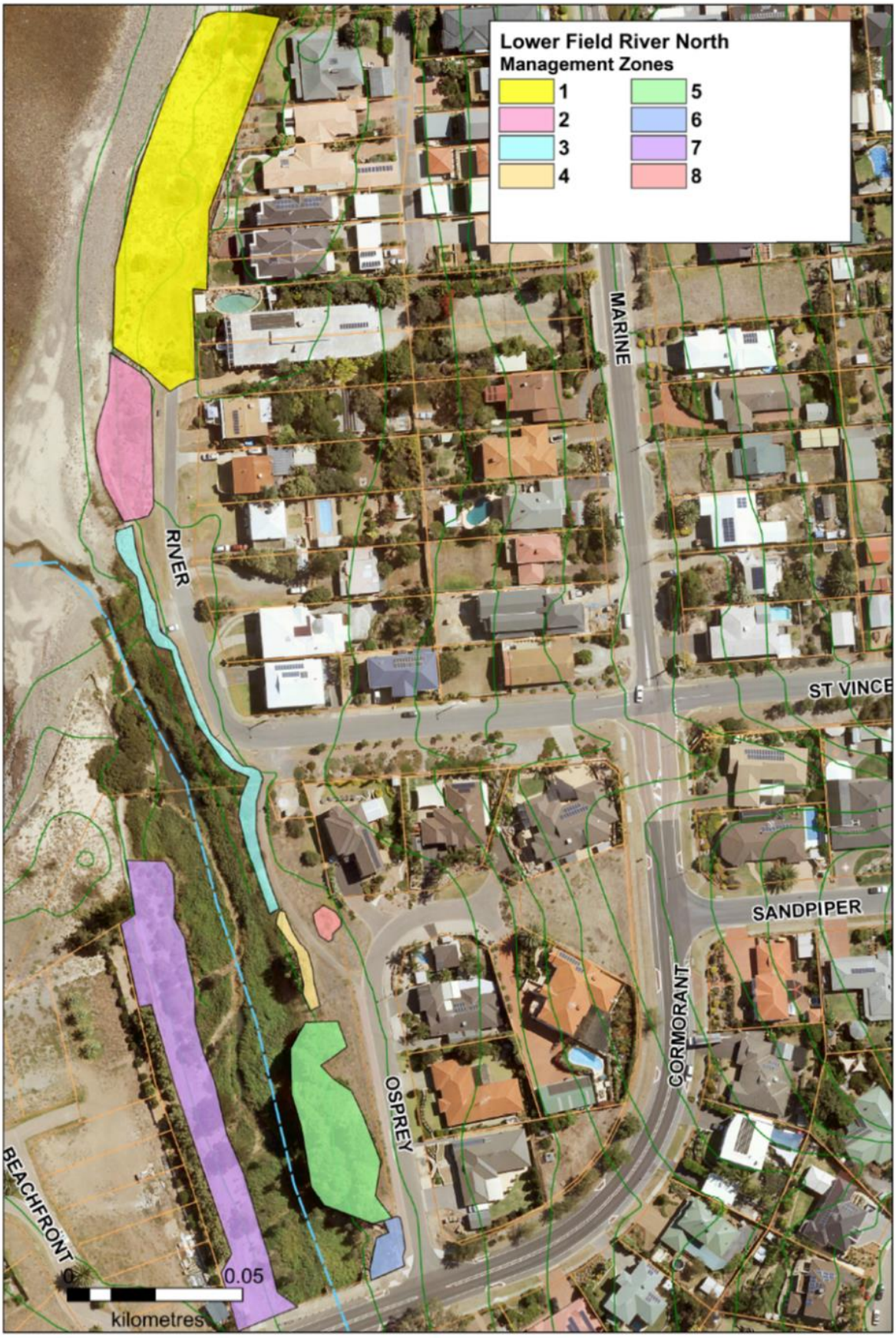
Other parts of the project area are taken up by mown grass under trees, creating a parkland atmosphere that is enjoyed as recreation areas by the community. Add to these the Field River and

its associated wetland vegetation and the variety of vegetation types within a relatively small area is quite remarkable.

Trees For Life was provided with the following maps of the northern and southern parts of the project area, separated by Cormorant Drive. These show Management Zones, which have been adopted for the purpose of directing activities in this plan.

- A Weed Treatment Summary Table showing methods and seasons for weed control for the key species found on site is given in **Appendix 6**
- Profiles of many of the key weeds on the site is given in **Attachment A**
- More details of minimum disturbance weed control techniques are given in **Attachment B**.

Zone Description and Actions



Management Zone: 1

This zone is the remnant coastal dune system, from the stairs down to the beach at the end of River Parade north to the track up to Grand Central Avenue. There are plans to realign the Coastal Walking Trail along this section of the coast, but the location and design have yet to be finalised. There is some opportunity for revegetation in this zone, but it needs to consider any impact on adjoining landholders and the final Coastal Walking Trail location and design.

The weeds in this zone are mostly sparsely scattered herbaceous species and able to be managed by careful hand weeding or cutting and swabbing. Brushcutting annual grasses near the eastern fenceline before seed set should help reduce their numbers. TFL volunteers who have attended a Brushcutter Training Workshop can borrow brushcutters from TFL to use on this site, otherwise Council staff or contractors will have to do this.

Priority	Activity	Common Name	Scientific Name	Notes
1	Weed control	Gazania	*Gazania linearis*	Scattered
		False Sowthistle	*Reichardia tingitana*	Scattered
		Sea Spurge	*Euphorbia paralias*	Scattered
		False Caper	*Euphorbia terracina*	Scattered
		Cape Weed	*Arctotheca calendula*	Scattered
		Soursob	*Oxalis pes-caprae*	Scattered
		Hottentot Fig	*Carpobrotus edulis* ssp. *edulis*	Needs correct identification before treatment, similar to Native Pigface (*Carpobrotus rossii*)
2	Weed control	Herbaceous weeds	Various broadleaf species	Mainly on eastern part of zone hear fenceline
2	Brushcutting	Annual grasses	Various	Reduce fire fuel load, mainly on eastern part of zone near fenceline
3	Revegetation	Only shrubs and groundcovers occurring in this vegetation community	Various	Wait until Coastal Walking Trail has been completed

Management Zone: 2

This zone is the remnant coastal dune between the walking trail down to the beach and the stairs at the south end of Zone 1. There has been significant revegetation undertaken in this zone in the past, particularly on the higher, eastern parts.

The main activities in this zone should focus on management of existing native vegetation using minimum disturbance bushcare techniques. This will encourage regeneration of existing plant species and avoid reliance on additional planting. Some spraying of Soursob and Couch is currently being undertaken in this zone, particularly near the footpath. Volunteers should not work within six metres of the edge of the road.

Priority	Activity	Common Name	Scientific Name	Notes
1	Weed control	Bucks-horn Plantain	*Plantago coronopus* ssp. *coronopus*	Next to the beach

		Soursob	*Oxalis pes-caprae*	Mainly top near footpath
		Couch	*Cynodon dactylon* var. *dactylon*	Mainly top near footpath
2	Weed control	Herbaceous weeds	Various grasses and broadleaf species	Scattered, mainly near beach

Management Zone: 3

This zone takes in the narrow band of native vegetation next to the walking track. There has been revegetation in this area in the past, with smaller species planted closer to the footpath at the northern end more recently. The southern part of this zone is very degraded with annual grasses and broadleaf weeds between the path and the larger native shrubs further down the slope. There is some opportunity for planting in this area once the herbaceous weeds have been controlled.

The main activities in this zone should focus on management of existing native vegetation using minimum disturbance bushcare techniques. This will encourage regeneration of existing plant species and avoid reliance on additional planting. Work should include treatment of priority weeds in the remnant native vegetation between this zone and the Common Reed (*Phragmites australis*) closer to the river, which includes several small Olives.

Priority	Activity	Common Name	Scientific Name	Notes
1	Weed control	Olive	*Olea europaea* ssp. *europaea*	Few scattered mid to southern section down the slope
		Galenia	*Aizoon secundum*	Mainly next to path
		Soursob	*Oxalis pes-caprae*	Mainly next to path
		Couch	*Cynodon dactylon* var. *dactylon*	Mainly next to path
2	Weed control	Herbaceous weeds	Various broadleaf species	Mainly next to path
2	Brushcutting	Annual grasses	Various	Mainly next to path
3	Revegetation	Only small shrubs and groundcovers occurring in this vegetation community	Various	Between existing native plants and path once herbaceous weeds have been controlled

Management Zone: 4

This zone takes in a small revegetated area that starts next to footpath at the northern end, but then takes in part of the adjacent mown area to the south. The main activities in this zone should focus on management of existing native vegetation using minimum disturbance bushcare techniques. This will encourage regeneration of existing plant species and avoid reliance on additional planting. There is some opportunity for planting along the edge in the short term once the herbaceous weeds have been controlled.

Priority	Activity	Common Name	Scientific Name	Notes
1	Weed control	Galenia	*Aizoon secundum*	Mainly along edge
		Soursob	*Oxalis pes-caprae*	Mainly along edge
2	Weed control	Herbaceous weeds	Various grasses and broadleaf species	Mainly along edge

Management Zone: 5

This zone takes in a stand of mature Aleppo Pine growing over Common Reed (*Phragmites australis*). Amongst the Common Reed there are a number of weeds that should be controlled. The Aleppo Pines are not impacting existing native vegetation on the east side of the river, though comment has been made regarding their effect on the growth habit of planted River Red Gum (*Eucalyptus camaldulensis* ssp. *camaldulensis*) close to the river. Nankeen Night Herons are known to frequent this stand of Aleppo Pines, and were observed during two visits to the site by the author.

Priority	Activity	Common Name	Scientific Name	Notes
1	Weed control	Rice Millett	*Piptatherum miliaceum*	Under Aleppo Pines
		Galenia	*Aizoon secundum*	Mainly along edge
		Soursob	*Oxalis pes-caprae*	Mainly along edge
2	Weed control	Herbaceous weeds	Various grasses and broadleaf species	Mainly along edge
3	Weed control and tree management	Aleppo Pine	*Pinus halepensis*	Manage seedling regrowth, mature trees to be removed by Council in accordance with Lower Field River (Cormorant Drive Reserve) Aleppo Pine Tree Removal and Revegetation Action Plan 2020-2025
4	Revegetation	Various	Various	Refer to Lower Field River (Cormorant Drive Reserve) Aleppo Pine Tree Removal and Revegetation Action Plan 2020-2025

Management Zone: 6

This zone is at the corner of Osprey Court and Cormorant Drive and native vegetation here is the result of previous planting. The main activities in this zone should focus on management of existing native vegetation using minimum disturbance bushcare techniques. This will encourage regeneration of existing plant species and avoid reliance on additional planting. Volunteers should not work within six metres of the edge of the road.

Priority	Activity	Common Name	Scientific Name	Notes
1	Weed control	Soursob	*Oxalis pes-caprae*	Scattered
2	Weed control	Herbaceous weeds	Various grasses and broadleaf species	Scattered
3	Revegetation management	Various	Various	Remove tree guards

Management Zone: 7

This zone covers the area on the west side of the river, between Cormorant Drive and the large stand of Melaleuca and Leptospermum behind the coastal dune at the river mouth. These are very large and old planted specimens that are mingled together. The Coast Tea-tree (*Leptospermum laevigatum*) is a known environmental weed, though it does not appear to be spreading in this location. The combined stand in likely important as a windbreak and in reducing erosion of the dune and river bank. Exposed branches were seen to be used by perching Little Pied Cormorants, while

other birdlife frequented the canopy. It is recommended that these remain, unless a detailed assessment is made relating to these issues.

The zone is also adjacent to the long screen of planted Norfolk Island Hibiscus (*Lagunaria patersonii*) along the western fenceline. There has been discussion regarding the replacement of these with a suitable native plant from the area, but this is in the hands of the City of Marion council staff to negotiate with the neighbour. The Norfolk Island Hibiscus is not considered invasive, but the seeds cause irritation to anyone who comes into contact with them. The removal and replacement of these trees should be considered in conjunction with the development of the proposed Coastal Walking Trail.

The majority of the zone comprises planted trees and shrubs, many of them non-local, including Willow Myrtle (*Agonis flexuosa*), removal of which has been discussed, Norfolk Island Pine (*Araucaria heterophylla*), which is not intended to be removed, and Oyster Bay Pine (*Callitris rhomboidea*), which has been included on the native species list along with the local Southern Cypress Pine (*C. gracilis*). While the Oyster Bay Pine was probably planted in error and is outside its natural range in the Mount Lofty Ranges it should remain as habitat.

There is a very degraded understorey with broadleaf herbaceous weeds and a large amount of Kikuyu (*Cenchrus clandestinus*) growing between the path and the river. Some areas of this have been sprayed in the past, but much more is required to prevent its continued invasion of the Common Reed along the river bank. This is probably best left to City of Marion staff or contractors. The Council's Biodiversity Team currently maintains the path network with a six week programmed cycle.

While there may be opportunity for further planting in this area, it is one of the most degraded areas of native vegetation on the site and should be a much lower priority than bushcare activities elsewhere amongst the better quality native vegetation.

Priority	Activity	Common Name	Scientific Name	Notes
1	Weed control	Olive	*Olea europaea* ssp. *europaea*	Few scattered seedlings
		Galenia	*Aizoon secundum*	Mainly next to path
		Short-fruited Wild Turnip	*Rapistrum rugosum* ssp. *rugosum*	Mainly next to path
		Soursob	*Oxalis pes-caprae*	Mainly next to path
		Kikuyu	*Cenchrus clandestinus*	Extensive between path and river – spray by City of Marion staff or contractors, avoid slashing as this further spreads the weed
2	Weed control	Herbaceous weeds	Various broadleaf species	Mainly next to path
3	Tree management	Norfolk Island Hibiscus	*Lagunaria patersonii*	Leave mature plants until strategy developed after survey of habitat value, as discussed under management issues and recommendations above

		Willow Myrtle	*Agonis flexuosa*	Leave mature plants until strategy developed after survey of habitat value, as discussed under management issues and recommendations above

Management Zone: 8

This zone is a small island of planted local species within a mown area of grass, and requires only an occasional hand weed.

Priority	Activity	Common Name	Scientific Name	Notes
1	Weed control	Herbaceous weeds	Various grasses and broadleaf species	Scattered


Lower Field River South
Management Zones
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EBAIRN
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kilometres

Management Zone: 9

This zone extends along the length of the western side of the reserve, south of Cormorant Drive, and is managed by the City of Marion for fire fuel load adjacent to neighbouring houses. Care should be taken as some parts of this zone are very steep.

Focus should be on slashing exotic grasses, while encouraging native perennial grasses and other native ground flora. If native grasses require slashing, this should be undertaken by brushcutting and timed to allow for them to set seed. In the long term, less disturbed native ground flora species, including grasses, will provide a lower fire fuel load than weedy annual grass species, which produce large volumes of dead thatch once they die at the end of the growing season. Slashing at a height of 10-20cm and avoiding scalping the ground should produce the best and healthiest native understorey.

Priority	Activity	Common Name	Scientific Name	Notes
1	Fire fuel load reduction	Herbaceous weeds	Various grasses and broadleaf species	Brushcutting by City of Marion staff or contractors

Management Zone: 10

This zone contains the best quality broad extent of remnant native vegetation within the project area. There are good stands of native grass, mat-rush, lily and other native understorey species. There has been a considerable amount of planting of locally indigenous plants in this zone, in particular in the northern half, and several of these species are now regenerating well themselves.

It is recommended that no further planting of shrub and tree species take place in this zone, as they threaten the health and vigour of the remnant understorey species, which may be shaded out. If further revegetation activities are sought in this zone, they should be restricted to native understorey species, including grasses, lilies and other ground flora.

The proximity of this zone to the fire fuel load reduction Management Zone 9 reinforces the need to avoid further planting of tree and shrub species. The removal of the small number of medium to large Aleppo Pines that have spread up this slope has also been discussed before. These trees have less habitat value than the taller ones along the sides of the creekline and it is recommended that they be removed, to reduce fire fuel load and the threat to regenerating native plants in the understorey. Accumulated pine needles also add to these threats. Any revegetation in this area should be delayed until the acidity in the soil returns to something like normal.

Spraying of Soursob in this zone has been undertaken by City of Marion staff or contractors using metsulphuron methyl in the past and this should continue. Volunteers who have attended the Introduction to Bushcare workshop run by Trees For Life are also able to attend its Broadleaf and Bulb Weed Management in Grassy Ecosystems workshop. Once this has been attended, they can also spray susceptible weeds with metsulphuron methyl provided by the Trees For Life coordinator for the site. Care needs to be taken to avoid off-target damage to native plants, in particular lilies, which are said to have been killed by spraying in this area before. Similarly, these volunteers can attend Brushcutter training with Trees For Life and then borrow a brushcutter to slash weed grasses on the site.

Priority	Activity	Common Name	Scientific Name	Notes
1	Weed control	Olive	*Olea europaea* ssp. *europaea*	Few scattered seedlings

		Aleppo Pine	*Pinus halepensis*	Only seedlings
		Scabious	*Scabiosa atropurpurea*	Scattered
		Plantain/Ribwort	*Plantago lanceolata* var. *lanceolata*	Scattered
		Short-fruited Wild Turnip	*Rapistrum rugosum* ssp. *rugosum*	Scattered
		False Caper	*Euphorbia terracina*	Scattered
		Soursob	*Oxalis pes-caprae*	Extensive, some areas previously sprayed, leave to City of Marion staff and contractors or trained volunteers
		Guildford Grass	*Romulea rosea* var. *australis*	Scattered patches
		Thread Iris	*Moraea setifolia*	Scattered patches
2	Weed control	Herbaceous weeds	Various grasses and broadleaf species	Scattered – hand weed around native understorey
3	Weed control	Herbaceous weeds	Various grasses and broadleaf species	Brushcutting by City of Marion staff or contractors or trained volunteers
4	Revegetation	Only low growing species occurring in this vegetation community	Various species including grasses, lilies and other herbaceous ground covers	Plant in bare areas or adjacent to remnant grassy woodland species – tubestock or hand direct seed

Management Zone: 11

Most of this zone is grassed with a few scattered non-local trees and large shrubs that were planted in the past. The area is mown by the City of Marion. Removal of a large Carob Tree (*Ceratonia siliqua*) has been discussed. Consultation with City of Marion is required prior to this taking place, with a decision on whether it can be drilled and filled and left to die standing, or whether council will arrange for its physical removal. This species is not considered invasive, but has Bridal Creeper (*Asparagus asparagoides* f. *asparagoides*) growing under it.

Priority	Activity	Common Name	Scientific Name	Notes
1	Weed control	Bridal Creeper	*Asparagus asparagoides* f. *asparagoides*	Under Carob Tree
	Mowing	Exotic grasses	Various	Mowing by City of Marion staff or contractors
2	Tree Management	Carob Tree	*Ceratonia siliqua*	Wait for City of Marion decision regarding treatment

Management Zone: 12

This zone incorporates an old cutting with an exposed rocky embankment on the south-eastern side. This area contains some high quality remnant native grasses and herbaceous natives, including Twining Glycine (*Glycine rubiginosa*), which is only found in two small patches on this reserve, and Pink Garland-lily (*Calostemma purpureum*) and Annual Rock-fern (*Cheilanthes austrotenuifolia*). There are herbaceous weeds growing around these native understorey plants, plus One-leaf Cape

Tulip (*Moraea flaccida*), Broadleaf Cotton-bush (*Gomphocarpus cancellatus*) and several large Willow Rhus (*Searsia lancea*) growing in the cutting which can be drilled and filled.

Take care to stay well away from the steep embankments.

Priority	Activity	Common Name	Scientific Name	Notes
1	Weed control	Short-fruited Wild Turnip	*Rapistrum rugosum* ssp. *rugosum*	Scattered
		One-leaf Cape Tulip	*Moraea flaccida*	Scattered
		Herbaceous weeds	Various grasses and broadleaf species	Scattered – hand weed around native understorey
		Broadleaf Cotton-bush	*Gomphocarpus cancellatus*	Scattered
2	Weed control	Willow Rhus	*Searsia lancea*	Several large plants in cutting

Management Zone: 13

This large zone takes in much of the hillside at the south end of the reserve along the west side to the DPTI railway corridor at the locally named Hidden Valley. Care should be taken as some parts of this zone are very steep.

While there is some good remnant scattered in this zone, it has been revegetated with local species. Previously it had many Olives growing across the slopes and much of the understorey remains very degraded. Activities in this zone should focus on some of the more invasive species listed, and not on the numerous herbaceous weeds.

Priority	Activity	Common Name	Scientific Name	Notes
1	Weed control	Olive	*Olea europaea* ssp. *europaea*	Scattered mature, regrowth and seedlings
		Aleppo Pine	*Pinus halepensis*	Only seedlings
2	Weed control	Scabious	*Scabiosa atropurpurea*	Scattered
		Short-fruited Wild Turnip	*Rapistrum rugosum* ssp. *rugosum*	Scattered
		Gazania	*Gazania linearis*	Scattered
		Artichoke Thistle	*Cynara cardunculus ssp. flavescens*	Scattered
		Rice Millet	*Piptatherum miliaceum*	Mainly along the bottom edge
		Fennel	*Foeniculum vulgare*	Mainly along the bottom edge
3	Weed control	Herbaceous weeds	Various grasses and broadleaf species	Brushcutting by City of Marion staff or contractors or trained volunteers

Management Zone: 14

This zone follows the walking track on the east side of the river, extending down the embankment on the west side and including the rock cutting above the site where the Diprotodon fossil remains were found. There are some remnant native grasses in this area, together with some previous

planting of local native species. Much of the understorey is very degraded, with a cover of herbaceous annual grasses and broadleaf weeds.

Priority	Activity	Common Name	Scientific Name	Notes
1	Weed control	Herbaceous weeds	Various grasses and broadleaf species	Hand weed halo around native plants
2	Weed control	Herbaceous weeds	Various grasses and broadleaf species	Brushcutting by City of Marion staff or contractors or trained volunteers

Management Zone: 15

This zone is predominantly a mix of native and introduced grasses and herbaceous weeds, which is maintained as a brushcut fire break between the reserve and the houses along the eastern side and to allow vehicle access in an emergency. Management should be modified to encourage the native grasses already growing here. Annual exotic grasses generally flower and seed earlier than perennial native grasses, and timing the brushcutting to take advantage of this can reduce the seed set of the annual exotic grasses, while enabling seed set of the native grasses later in the season. Ideally brushcutting should be at a height of 10-20cm to avoid scalping. The use of tractors and other mowers should be avoided in this area, as they damage the native grassy understorey and it is difficult to avoid scalping this uneven ground with them. If it is desirable to fill in gaps in the native grass cover in the short term, this can be achieved by some targeted hand direct seeding, without resorting to the more resource intensive tubestock planting.

Priority	Activity	Common Name	Scientific Name	Notes
1	Weed control	Scabious	*Scabiosa atropurpurea*	Scattered
		Galenia	*Aizoon secundum*	Scattered
2	Weed control	Herbaceous weeds	Various grasses and broadleaf species	Spray with selective herbicide, leave to City of Marion staff and contractors or trained volunteers
3	Fire fuel load reduction	Herbaceous weeds	Various grasses and broadleaf species	Brushcutting by City of Marion staff or contractors
4	Revegetation	Native grasses	Various low growing species	Hand direct seed in areas between existing native grass patches.

Management Zone: 16

This zone contains some remnant native grasses and planted local species. Management to advantage the spread and regeneration of the native grasses and other native species should be the priority here. There is the opportunity for some small scale tubestock planting of understorey species, including Black-anther Flax-lily (*Dianella revoluta* var. *revoluta*) and ground covers occurring in this vegetation community.

Priority	Activity	Common Name	Scientific Name	Notes
1	Weed control	Onion Weed	*Asphodelus fistulosus*	Scattered
		Herbaceous weeds	Various grasses and broadleaf species	Hand weed halo around native plants

2	Weed control	Herbaceous weeds including Soursob	Various grasses and broadleaf species	Spray with selective herbicide, leave to City of Marion staff and contractors or trained volunteers
3	Revegetation	Only low ground cover species occurring in this vegetation community	Various	Between existing native plants

Management Zone: 17

This zone has an open mown area, with planted local and non-local species along the east, next to the walking track, and north end at the Cormorant Drive Bridge. There is a stand of mature Aleppo Pine growing over Common Reed (*Phragmites australis*) along the west side, at the edge of the river. There are a number of priority weeds growing within the native vegetation, including Rice Millet, Galenia, Plantain and Soursob, along with annual grasses and other herbaceous weeds. Where these grow in the grassed area, management can be left to the mowing.

Priority	Activity	Common Name	Scientific Name	Notes
1	Weed control	Rice Millett	*Piptatherum miliaceum*	Scattered
		Galenia	*Aizoon secundum*	Scattered
		Soursob	*Oxalis pes-caprae*	Scattered
2	Weed control	Herbaceous weeds	Various grasses and broadleaf species	Widespread
3	Weed control and tree management	Aleppo Pine	*Pinus halepensis*	Manage seedling regrowth, mature trees to be removed by Council in accordance with Lower Field River (Cormorant Drive Reserve) Aleppo Pine Tree Removal and Revegetation Action Plan 2020-2025
4	Revegetation	Various	Various	Refer to Lower Field River (Cormorant Drive Reserve) Aleppo Pine Tree Removal and Revegetation Action Plan 2020-2025

Management Zone: 18

The main part of this zone is between the walking track and the Field River, on the west side of the river, with a small section next to the house on the northern side at the end of Egret Court. The area has been planted with local species in the past, but has a very degraded understorey with broadleaf herbaceous weeds and a large amount of Kikuyu (*Cenchrus clandestinus*) closer to the river. The most efficient way of managing this is to slash the herbaceous weeds through the growing season, with Kikuyu sprayed by City of Marion staff or contractors.

Weeping Willow (*Salix babylonica*) has previously been treated in this zone, next to the river, but needs follow-up. This has already been contracted for removal by City of Marion.

Removal of two young Norfolk Island Pine (*Araucaria heterophylla*) at the southern end of this zone has been discussed. Consultation with City of Marion is required prior to this taking place, confirming their removal and including a decision on whether they can be drilled and filled and left to die standing, or whether council will arrange for their physical removal. This species is not considered invasive.

Priority	Activity	Common Name	Scientific Name	Notes
1	Weed control	Weeping Willow	*Salix babylonica*	City of Marion has contracted removal
		Herbaceous weeds	Various grasses and broadleaf species	Extensive – brushcutting by City of Marion staff or contractors
		Kikuyu	*Cenchrus clandestinus*	Extensive – spraying by City of Marion staff or contractors, avoid slashing as this further spreads the weed
2	Tree Management	Norfolk Island Pine	*Araucaria heterophylla*	Wait for City of Marion decision regarding treatment

Management Zone: 19

This large zone takes in the Department of Planning, Transport and Infrastructure (DPTI) land between Cormorant Reserve and the fenceline of the Seaford railway corridor. An agreement has been reached with DPTI to enable FoLFR volunteers to work in this area.

Much of this zone is quite degraded and has been heavily disturbed in the past. The Field River was diverted through a large culvert under the railway line and adjacent Lonsdale Road, with a very deep cutting. This has been fenced off with wire mesh, including across the top, for safety and has material flaps hanging down to discourage the roosting of feral pigeons over the water, to reduce pollution.

There are a number of areas in this zone that have priority native vegetation management actions. The City of Marion has been engaging contractors to treat large Olives in the north-eastern corner of the zone above the rock face. This avoids the need for volunteers to work in this steep section and should continue, including future follow-up.

The rock face contains some valuable remnant native vegetation, including Blanket Fern (*Pleurosorus rutifolius*), Grassland Geranium (*Geranium retrorsum*), Climbing Saltbush (*Einadia nutans* ssp. *nutans*) and Tall Scurf-pea (*Cullen australasicum*). Great care needs to be taken with any weed control in the rock face, as it will be very easy to disturb the soil and cause erosion. This particularly applies to any careful hand weeding that takes place. In these circumstances it may be better to either cut and swab or swab herbaceous weeds. Naturally volunteers should not scale the rock face.

There is another nice area of remnant native vegetation growing amongst the rocky slope at the southern end of this zone, below Zone 13. The same management advice applies to this area.

There is a nice patch of remnant native grasses with lilies either side of the track coming down from above and behind the river cutting on the north side. Minimal disturbance bushcare principles and techniques should be used to enhance this area. City of Marion has offered to provide tubestock

Kangaroo Grass (*Themeda triandra*) to plant near this area, which may be done, provided the remnant native understorey plants are not disturbed.

There is also the opportunity to do some more revegetation on the modified flat area immediately to the south of the river cutting. There has previously been some planting here, but the ground flora is sparse and weedy. This is a low priority in the context of the other activities in this zone.

A stand of Common Reed (*Phragmites australis*) was removed from the old river flat, from which the Field River was diverted to the present cutting, and planted with River Red Gum (*Eucalyptus camaldulensis* ssp. *camaldulensis*). There is additional opportunity for revegetation using suitable wetland species, including Silky Tea-tree (*Leptospermum lanigerum*) and rushes and sedges.

Three Date Palms (*Phoenix dactylifera*) in Hidden Valley, in the southern section of this zone, may be sold and removed by a qualified Palm Tree dealer, in addition with two other large specimens in the mown parkland area near the playground west of zones 14 and 16. This requires further investigation by the City of Marion.

Priority	Activity	Common Name	Scientific Name	Notes
1	Weed control	Olive	*Olea europaea* ssp. *europaea*	Large plants above track to the east and in north-eastern corner of this zone above rock face to be treated by contractors arranged by City of Marion
1	Weed control	Olive	*Olea europaea* ssp. *europaea*	Scattered mature, regrowth and seedlings elsewhere
		Western Coast Wattle	*Acacia cyclops*	Near fenceline above track, north of Field River cutting
		Broad-leaf Cotton-bush	*Gomphocarpus cancellatus*	Scattered
		Castor Oil Plant	*Ricinus communis*	Scattered
		Tall Wheat Grass	*Thinopyrum elongatum*	Just east across creek from Hidden Valley palms
2	Tree management	Date Palm	*Phoenix dactylifera*	City of Marion to investigate sale and removal by qualified Palm Tree dealer
2	Weed control	Scabious	*Scabiosa atropurpurea*	Scattered
		Short-fruited Wild Turnip	*Rapistrum rugosum* ssp. *rugosum*	Scattered
		Gazania	*Gazania linearis*	Scattered
		Three-cornered Garlic	*Allium triquetrum*	Bottom of rock face next to planted River Red Gum area
3	Weed control	Herbaceous weeds	Various grasses and broadleaf species	Brushcutting by City of Marion staff or contractors or trained volunteers
4	Revegetation	Kangaroo Grass	*Themeda triandra*	Adjacent to remnant native grass and lily area next to track north of river cutting

				down to River Red Gum forest
5	Revegetation	Silky Tea-tree and other local wetland species, including rushes and sedges	*Leptospermum lanigerum* and other local wetland species, including rushes and sedges	Amongst River Red Gum planting
6	Revegetation	Various shrub and understorey species	Various species	Degraded flat area south of river cutting

Management Zone: 20

This zone is the rest of the project area, with day to day management remaining with the City of Marion. These areas include the tracks and trails throughout the Cormorant Reserve and the footpaths alongside the adjoining roads. Any vegetation within six metres of the road, where volunteers are unable to work without Work Zone Traffic Management devices and supervision are also included. There are also all the open parkland areas that are mown and the Field River and its banks. Other than regular mowing, there is the opportunity to have broadleaf weeds such as Galenia treated within these areas, to reduce their spread into adjacent native vegetation. The path network is brushcut by the City of Marion Biodiversity Team on a six weekly cycle.

Priority	Activity	Common Name	Scientific Name	Notes
1	Mowing	Exotic grasses	Various	Mowing by City of Marion staff or contractors
2	Weed control	Herbaceous weeds	Various grasses and broadleaf species	City of Marion staff or contractors

OTHER ACTIVITITES

Phytophthora prevention

Phytophthora species are soil and waterborne fungi that cause disease and often death to a wide variety of native plant species, exotic fruits and vegetables. The most common species is *Phytophthora cinnamomi*. *Phytophthora* attacks the roots and stems of plants. Early symptoms of the disease are root-rot, and depending on the plant species, stem-rot and eventual death. In effect, the susceptible plants die from an inability to take up sufficient water and nutrients.

Phytophthora can spread from plant to plant through root contact. It is spread most rapidly when rainfall coincides with warm temperatures, generally in spring, summer and autumn. The disease can spread very quickly through the transport of infested soil and plant material by human activities, such as roadworks, firefighting, bike riding and bushwalking.

The best way to control the fungus is to prevent the transfer of infested soil and plant material by avoiding activities in an area when the soils are wet and sticky. Brush soil off footwear and tools before and after each visit to a bushland area and spray them with undiluted methylated spirits. TFL recommends this hygiene procedure take place throughout the year, not just when the soils are moist. [15]

Herbarium

A herbarium of all plants occurring within the site should be established. A herbarium is beneficial for identifying weed species and native species. It provides a permanent record of all species on the site and helps in identification, particularly when reproductive material may not be available on plants in the field. Photos (not cuttings) of orchids, lilies and any rare plant species should be used in the herbarium, as the collection of these plants could be detrimental to their existence.

- **Attachment C** provides details of how to establish a herbarium.

Monitoring

Photopoints

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

Photopoints are simple to establish. A permanent marker is driven into the ground at a key location; often a star dropper is used. Brightly coloured tape or a plastic cap is placed on the star dropper to aid relocation in the future. A second marker is driven into the ground 10 metres from the first marker. A camera is placed on the first marker and photograph taken with the top of the second marker in the middle of the frame. A white board should be placed on the second marker noting the location and date. It is important the same photograph is taken each time, therefore a standard camera and settings should be used. Cameras with zoom lenses should always be used at the same focal length. In the past, the recommended format to use was a 35mm SLR camera equipped with a 50mm lens. Increasingly, digital cameras are being used instead.

[15] Adapted from the Department for Environment and Heritage biodiversity information brochure – "*Phytophthora* Root-rot fungus is killing our plants!" – revised January 2002

Photopoints depicting changes between spring and summer

When setting up a photopoint the markers should be placed in a way that will give a meaningful photograph. If a weed front is being monitored, the photopoint should be set up to give the best coverage of the weed front. There should be an unobstructed line of sight between the markers. Care needs to be taken not to have tree or shrub seedlings between the markers, as they will obscure the line of sight when they grow. It is useful to take photographs in both directions.

- **Attachment D** provides detailed explanations of how to establish a photopoint.

NCSSA Bushland Condition Monitoring

Trees For Life and the Nature Conservation Society of SA (NCSSA) are undertaking a joint project to collect scientifically based information on the condition of bushland under Bush For Life care. The condition monitoring uses the protocol described in the NCSSA's *Field Guide to Bushland Condition Monitoring (2005)*. This manual has been designed specifically so that a wide range of people can take part in monitoring their bushland's condition (from bushcarers and landholders to technical-support field workers such as Landcare officers) after undertaking a two day training course.

Use of the protocol not only provides people with a way to show the positive impact they might be having on their bushland's condition but it also raises their awareness of the vital natural processes going on in the bush and how to detect the early warning signs of threatening processes. Data from individual monitoring sites is also being collated on a regional basis to provide better information on the condition and trends in native vegetation

Apart from the practical methodology and data sheet section in the Field Guide there are two additional sections that contain extensive background information on the flora and fauna of various regions, and provide further information on condition indicators.

It is beyond the scope of this Action Plan to detail the bushland condition monitoring methodology, but further information and future training dates are available from Trees For Life or the NCSSA.

BushRAT Monitoring

The Bushland Rapid Assessment Technique[16] ('BushRAT') for native vegetation is derived from the Bushland Condition Monitoring above, including a rapid assessment version, but uses an informal quadrat of approximately 1 ha rather than the 30m x 30m quadrats used in the BCM methodology.

[16] Native Vegetation & Biodiversity Management Unit, BushRAT manual for native vegetation, May 2013

The technique is intended for use in most assessments undertaken within the Native Vegetation & Biodiversity Management Unit, including clearance via clearance application, clearance via Regulation, potential 2SEB offset areas, Heritage Agreement assessments and compliance assessments. Each area to be assessed is termed an '**application area**', within which different **vegetation associations** are identified and then linked with and compared to a '**benchmark**' **vegetation community**. Each identified vegetation association is termed a '**site'**, within which a representative 1ha quadrat is surveyed. One datasheet is completed per site.

Three 'components' of the biodiversity value of the site are measured and scored: vegetation condition, conservation value and landscape context. Vegetation condition is the main component for which field data is gathered.

A BushRAT assessment has recently been completed for the Lower Field River, and on-going monitoring using this technique should continue as a part of this plan.

USEFUL RESOURCES FOR FURTHER READING

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Bush For Life: Introductory Bush Regeneration Workshop

Bush Regeneration

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Electronic

Atlas of Living Australia: Search for lists of local plants and animals from your location. www.biocache. ala.org.au/explore/your-area.

Department of Primary Industries and Regions: Information about weeds and pest animals, weed identification notes, Weed Control App, Weed Control Handbook for Declared Plants in SA. www.pir. sa.gov.au/biosecurity/weeds_and_pest_animals

eflora SA: www.flora.sa.gov.au

Plant Distribution Mapper Within this tool you can use the plant distribution mapper to see where a known species has been collected from. www.flora.sa.gov.au/mapper2.shtml

Flora Fact Sheets. www.flora.sa.gov.au/factsheets.html

Census of SA Flora, a list of all the species found in SA, both indigenous and naturalised exotics, provides current names and synonyms. www.flora.sa.gov.au/census.shtml

Identification Tools

Australia's Virtual Herbarium

Natural Resources Adelaide and Mount Lofty Ranges: Includes information about native plants, animals and biodiversity, pest plants and animals, training, grant funding and volunteering opportunities. www. naturalresources.sa.gov.au/adelaidemtloftyranges/home

Nature Maps: The Department of Environment and Natural Resources' interactive online mapping site supporting South Australia's natural resource management. www.naturemaps.sa.gov.au/

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APPENDIX 1: NATIVE PLANT LIST

Based on City of Marion Remnant Vegetation Plan 2018 to 2023
Additions 26th June 2019 by Peter Watton & Randall Bates

Scientific Name	Common Name	AUS	SA	AMLR	Notes
Acacia acinacea	Wreath Wattle			NT	planted
Acacia cupularis	Cup Wattle			RA	planted
Acacia longifolia ssp. *sophorae*	Coastal Wattle			LC	planted
Acacia paradoxa	Kangaroo Thorn			LC	
Acacia victoriae ssp. *victoriae*	Elegant Wattle			VU	planted
Adriana quadripartita	Coast Bitter-bush			RA	planted
Allocasuarina muelleriana ssp. *muelleriana*	Common Oak-bush			LC	planted
Allocasuarina verticillata	Drooping Sheoak			LC	planted
Aristida behriana	Brush Wire-grass			LC	
Atriplex cinerea	Coast Saltbush			LC	
Atriplex paludosa ssp. *cordata*	Marsh Saltbush			LC	planted & remnant
Atriplex semibaccata	Berry Saltbush			LC	
Atriplex suberecta	Lagoon Saltbush			LC	
Austrostipa scabra	Rough Spear-grass			NT/LC	ssp. unknown
Banksia marginata	Silver Banksia			LC	planted
Callitris gracilis	Southern Cypress Pine			LC	planted
Callitris rhomboidea	Oyster Bay Pine			NT	planted
Calostemma purpureum	Pink Garland-lily			LC	
Calystegia sepium	Large Bindweed			RA	
Carpobrotus rossii	Native Pigface			LC	
Cheilanthes austrotenuifolia	Annual Rock-fern			LC	
Chloris truncata	Windmill Grass			LC	
Convolvulus angustissimus	Native Bindweed			NT/RA	ssp. unknown
Cullen australasicum	Tall Scurf-pea			NT	planted & remnant
Dianella revoluta var. *revoluta*	Black-anther Flax-lily			LC	
Dodonaea viscosa ssp. *spatulata*	Sticky Hop-bush			LC	planted
Einadia nutans ssp. *nutans*	Climbing Saltbush			LC	
Enchylaena tomentosa var. *tomentosa*	Ruby Saltbush			LC	
Enneapogon nigricans	Black-head Grass			LC	
Eucalyptus camaldulensis ssp. *camaldulensis*	River Red Gum			NT	planted & remnant
Eucalyptus porosa	Mallee Box			NT	
Eutaxia microphylla	Common Eutaxia			LC	
Ficinia nodosa	Knobby Club-rush			LC	
Geranium retrorsum	Grassland Geranium			LC	
Glycine rubiginosa	Twining Glycine			LC	
Hardenbergia violacea	Native Lilac			LC	planted

Juncus sp.	Rush				
Kunzea pomifera	Muntries			RA	planted
Lomandra densiflora	Soft Tussock Mat-rush			LC	
Lomandra effusa	Scented Mat-rush			RA	
Maireana brevifolia	Short-leaf Bluebush			LC	
Maireana enchylaenoides	Wingless Fissure-plant			LC	
Melaleuca lanceolata	Dryland Tea-tree			RA	planted
Muehlenbeckia gunnii	Coastal Climbing Lignum			LC	
Myoporum insulare	Common Boobialla			NT	planted
Myoporum parvifolium	Creeping Boobialla		Rare	VU	planted
Olearia axillaris	Coast Daisy-bush			NT	
Olearia ramulosa	Twiggy Daisy-bush			LC	planted
Oxalis perennans	Native Sorrel			LC	
Phragmites australis	Common Reed			LC	
Pimelea curviflora var. *gracilis*	Curved Riceflower			RA	
Pimelea micrantha	Silky Riceflower			NT	
Pittosporum angustifolium	Native Apricot			NT	
Pleurosorus rutifolius	Blanket Fern			LC	
Poa poiformis var. *poiformis*	Coast Tussock-grass			LC	
Pseudognaphalium luteoalbum	Jersey Cudweed				
Rhagodia candolleana ssp. *candolleana*	Sea-berry Saltbush			LC	planted & remnant
Roepera confluens	Forked Twinleaf			VU	
Rytidosperma setaceum	Small-flower Wallaby-grass			LC	
Santalum acuminatum	Quandong			RA	
Scaevola albida	Pale Fanflower			LC	
Scaevola crassifolia	Cushion Fanflower			VU	
Setaria constricta	Knotty-butt Paspalidium			NT	
Sida corrugata var. *angustifolia*	Grassland Sida			RA	
Solanum laciniatum	Cut-leaf Kangaroo-apple			NT	planted
Spinifex hirsutus	Rolling Spinifex			LC	
Themeda triandra	Kangaroo Grass			LC	
Typha domingensis	Narrow-leaf Bulrush			LC	
Wahlenbergia luteola	Yellow-wash Bluebell			RA	

Number of species: 69

SA	Rare	{none}
Number of species	1	68

AMLR	VU	RA	NT/R	NT	NT/L	LC	{none}
Number of species	4	10	1	11	1	40	2

AUS= EPBC Act Status, **SA**=South Australia NPW Act Status, **AMLR** = Regional Status for Adelaide and Mount Lofty Ranges[17]

RE = Regionally Extinct, CR = Critically Endangered, E or EN = Endangered, V or VU = Vulnerable, R or RA = Rare, NT = Near Threatened, LC = Least Concern, DD = Data Deficient, NE = Not Evaluated

[17] Definitions as per IUCN Red List Categories and Criteria, ratings from Gillam, S. and Urban, R. (2014) *Regional Species Conservation Assessment Project, Phase 1 Report: Regional Species Status Assessments, Adelaide and Mount Lofty Ranges NRM Region*. Department of Environment, Water and Natural Resources, South Australia.

APPENDIX 2: WEED AND NON-LOCAL PLANT LIST

Compiled by Peter Watton and Randall Bates 26th June 2019

Scientific Name	Common Name	SA	Notes
**Acacia cyclops*	Western Coastal Wattle		
**Acacia salicina*	Willow Wattle		
**Acacia* sp.	Wattle		
**Agonis flexuosa*	Willow Myrtle		planted
**Aizoon secundum*	Galenia		
**Allium triquetrum*	Three-cornered Garlic	Declared	
**Apium graveolens*	Celery		
**Araucaria heterophylla*	Norfolk Island Pine		planted
**Arctotis stoechadifolia*	White Arctotis		
**Arctotheca calendula*	Cape Weed		
**Asparagus asparagoides* f. *asparagoides*	Bridal Creeper	Declared	
**Asphodelus fistulosus*	Onion Weed	Declared	
**Avena* sp.	Oats		
**Brachychiton populneus ssp. populneus*	Kurrajong		planted
**Cakile maritima* ssp. *maritima*	Two-horned Sea Rocket		
**Carpobrotus edulis* ssp. *edulis*	Hottentot Fig		
**Casuarina glauca*	Grey Buloak		planted
**Cenchrus clandestinus*	Kikuyu		
**Ceratonia siliqua*	Carob Tree		
**Chondrilla juncea*	Skeleton Weed	Declared	
**Chrysanthemoides monilifera* ssp. *monilifera*	Boneseed	Declared	
**Cynara cardunculus* ssp. *flavescens*	Artichoke Thistle	Declared	
**Cynodon dactylon* var. *dactylon*	Couch		
**Ehrharta longiflora*	Annual Veldt Grass		
**Erodium* sp.	Storksbill		
**Euphorbia paralias*	Sea Spurge		
**Euphorbia terracina*	False Caper	Declared	
**Foeniculum vulgare*	Fennel		
**Fraxinus angustifolia* ssp. *angustifolia*	Desert Ash	Declared	
**Fumaria* sp.	Fumitory		
**Galium aparine*	Cleavers		
**Gazania linearis*	Gazania		
**Gomphocarpus cancellatus*	Broad-leaf Cotton-bush		
**Lagunaria patersonii*	Itchy Powder Tree/ Norfolk Island Hibiscus		planted
**Lagurus ovatus*	Hare's Tail Grass		
**Leptospermum laevigatum*	Coast Tea-tree		planted
**Lycium ferocissimum*	African Boxthorn	Declared	
**Malva* sp.	Mallow		
**Marrubium vulgare*	Horehound	Declared	
**Medicago* sp.	Medic		
**Melaleuca hypericifolia*			

**Moraea flaccida*	One-leaf Cape Tulip	Declared	
**Moraea setifolia*	Thread Iris		
**Olea europaea* ssp. *europaea*	Olive	Declared	
**Oxalis pes-caprae*	Soursob	Declared	
**Paspalum dilatatum*	Paspalum		
**Phalaris aquatica*	Phalaris		
**Phoenix dactylifera*	Date Palm		
**Pinus halepensis*	Aleppo Pine	Declared	
**Piptatherum miliaceum*	Rice Millet		
**Plantago coronopus* ssp. *coronopus*	Bucks-horn Plantain		
**Plantago lanceolata* var. *lanceolata*	Plantain/Ribwort		
**Polygonum aviculare*	Wireweed		
**Rapistrum rugosum* ssp. *rugosum*	Short-fruited Wild Turnip		
**Reichardia tingitana*	False Sowthistle		
**Ricinus communis*	Castor Oil Plant		
**Romulea rosea* var. *australis*	Guildford Grass		
**Rosmarinus officinalis*	Rosemary		planted
**Salix babylonica*	Weeping Willow		
**Scabiosa atropurpurea*	Scabious/Pincushion		
**Searsia lancea*	Willow Rhus		
**Solanum nigrum*	Black Nightshade		
**Sonchus oleraceus*	Common Sow-thistle		
**Stellaria media*	Chickweed		
**Symphyotrichum subulatum*	Wild Aster		
**Thinopyrum elongatum*	Tall Wheat-grass		
**Tropaeolum majus*	Nasturtium		
**Vicia* sp.	Vetch		

Number of species: 68

SA	Declared	{none}
Number of species	12	56

SA=South Australia NPW Act Status

NOTE:
This list consists of known environmental weeds together with planted specimens that are not indigenous to the area. This is not an exhaustive list and others are expected to exist within the boundaries of this site.

APPENDIX 3: SAMPLE REVEGETATION PLANT LIST

Scientific Name	Common Name	Form	Riparian	Zone(s)
Acacia cupularis	Cup Wattle	S		3
Aristida behriana	Brush Wire-grass	G		10, 15, 16, 19
Arthropodium strictum	Common Vanilla-lily	H		10, 16, 19
Atriplex cinerea	Coast Saltbush	S		1
Atriplex semibaccata	Berry Saltbush	GC		3
Austrostipa scabra	Rough Spear-grass	G		10, 16, 19
Calostemma purpureum	Pink Garland-lily	H		10, 16, 19
Carex appressa	Tall Sedge	Se	yes	19
Carex bichenoviana	Notched Sedge	Se	yes	19
Carpobrotus rossii	Native Pigface	GC		1, 3
Chloris truncata	Windmill Grass	G		10, 15, 16, 19
Convolvulus angustissimus	Native Bindweed	Tw		10, 15, 16, 19
Cullen australasicum	Tall Scurf-pea	H		10, 16, 19
Cyperus gymnocaulos	Spiny Flat-sedge	Se	yes	19
Dianella revoluta var. *revoluta*	Black-anther Flax-lily	Tu		10, 16, 19
Einadia nutans ssp. *nutans*	Climbing Saltbush	Tw		10, 16, 19
Enneapogon nigricans	Black-head Grass	G		10, 16, 19
Ficinia nodosa	Knobby Club-rush	Se		1, 3, 19
Geranium retrorsum	Grassland Geranium	H		10, 16, 19
Glycine rubiginosa	Twining Glycine	Tw		10, 16, 19
Juncus pallidus	Pale Rush	R	yes	19
Kunzea pomifera	Muntries	GC		3
Leptospermum lanigerum	Silky Tea-tree	ST	yes	19
Leucophyta brownii	Coast Cushion Bush	SS		1, 3
Lotus australis	Australian Trefoil	H		10, 16, 19
Maireana enchylaenoides	Wingless Fissure-plant	SS		19
Malva preissiana	Australian Hollyhock	S		19
Myoporum parvifolium	Creeping Boobialla	GC		1, 3
Poa poiformis var. *poiformis*	Coast Tussock-grass	G		3
Rytidosperma setaceum	Small-flower Wallaby-grass	G		10, 15, 16, 19
Scaevola albida	Pale Fanflower	GC		10, 16, 19
Sida corrugata var. *angustifolia*	Grassland Sida	H		10, 16, 19
Spinifex hirsutus	Rolling Spinifex	G		1
Themeda triandra	Kangaroo Grass	G		19
Wahlenbergia luteola	Yellow-wash Bluebell	H		10, 16, 19

Plant Form	Code	Plant Form	Code
Grass	G	Sedge	Se
Ground Cover	GC	Shrub – Small	SS
Herb	H	Shrub – Tall	ST
Rush	R	Tussock – non-grass	Tu
Shrub	S	Twining plant	Tw

APPENDIX 4: BIRD SPECIES LIST

Compiled by Peter Watton & Randall Bates from personal observations, John Gitsham survey 23rd November 2019, and Atlas of Living Australia records[18]

Common Name	Scientific Name	AUS	SA	AMLR
Australasian Gannet	*Morus serrator*			
Australian Hobby	*Falco longipennis*			LC
Australian Magpie	*Gymnorhina tibicen*			LC
Australian Pelican	*Pelecanus conspicillatus*			RA
Australian Reed-Warbler	*Acrocephalus australis*			LC
Black Swan	*Cygnus atratus*			RA
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*			LC
Black-faced Cormorant	*Phalacrocorax fuscescens*			RA
Black-shouldered Kite	*Elanus axillaris*			LC
Caspian Tern	*Sterna caspia*			VU
Common Blackbird	*Turdus merula*			F
Common Starling	*Sturnus vulgaris*			F
Crested Pigeon	*Geophaps lophotes*			LC
Crested Tern	*Thalasseus bergii*			VU
Crimson Rosella	*Platycercus elegans*			LC
Dusky Moorhen	*Gallinula tenebrosa*			LC
Eastern Reef Egret	*Egretta sacra*		RA	CR
European Goldfinch	*Carduelis carduelis*			F
Fan-tailed Cuckoo	*Cacomantis flabelliformis*			NT
Feral Pigeon	*Columba livia*			F
Galah	*Cacatua roseicapilla*			LC
Great Egret	*Ardea alba*			VU
Greater Crested Tern	*Thalasseus bergii*			VU
Grey Fantail	*Rhipidura fuliginosa*			LC
Grey Shrike-thrush	*Colluricincla harmonica*			LC
Grey Teal	*Anas gracilis*			LC
Hooded Plover	*Thinornis rubricollis*		VU	EN
House Sparrow	*Passer domesticus*			F
Little Black Cormorant	*Phalacrocorax sulcirostris*			LC
Little Grassbird	*Megalurus gramineus*			LC
Little Pied Cormorant	*Phalacrocorax melanoleucos*			LC
Little Raven	*Corvus mellori*			LC
Magpie-lark	*Grallina cyanoleuca*			LC
Masked Lapwing	*Vanellus miles*			LC
Musk Lorikeet	*Glossopsitta concinna*			LC
Nankeen/Australian Kestrel	*Falco cenchroides*			LC
Nankeen Night Heron	*Nycticorax caledonicus*			VU
New Holland Honeyeater	*Phylidonyris novaehollandiae*			LC

[18] https://www.ala.org.au/

Noisy Miner	*Manorina melanocephala*			LC
Pacific Black Duck	*Anas superciliosa*			VU
Pacific Gull	*Larus pacificus*			VU
Pied Cormorant	*Phalacrocorax varius*			LC
Rainbow Lorikeet	*Trichoglossus haematodus*			LC
Red Wattlebird	*Anthochaera carunculata*			LC
Silver Gull	*Larus novaehollandiae*			LC
Silvereye	*Zosterops lateralis*			VU
Sooty Oystercatcher	*Haematopus fuliginosus*		RA	EN
Spotted Turtle-Dove	*Streptopelia chinensis*			F
Superb Fairy-wren	*Malurus cyaneus*			LC
Welcome Swallow	*Hirundo neoxena*			LC
White-faced Heron	*Egretta novaehollandiae*			LC
White-plumed Honeyeater	*Lichenostomus penicillatus*			LC
Willie Wagtail	*Rhipidura leucophrys*			NT
Yellow-tailed Black Cockatoo	*Calyptorhynchus funereus*		VU	VU

Number of species: 53

SA	VU	RA	{none}
Number of species	2	2	49

AMLR	CR	EN	VU	RA	NT	LC	F	{none}
Number of species	1	2	8	3	2	30	6	1

AUS= EPBC Act Status, **SA**=South Australia NPW Act Status, **AMLR** = Regional Status for Adelaide and Mount Lofty Ranges[19]
RE = Regionally Extinct, CR = Critically Endangered, EN = Endangered, VU = Vulnerable, RA = Rare, NT = Near Threatened, LC = Least Concern, F = Feral

[19] Definitions as per IUCN Red List Categories and Criteria, ratings from Gillam, S. and Urban, R. (2014) *Regional Species Conservation Assessment Project, Phase 1 Report: Regional Species Status Assessments, Adelaide and Mount Lofty Ranges NRM Region*. Department of Environment, Water and Natural Resources, South Australia.

APPENDIX 5: ACTION SCHEDULE SUMMARY

Timing	Who	Priority	Activity	Location & Strategy	Technique
Summer & Autumn	Friends of the Lower Field River	1	Woody weeds – including Boneseed, Olive, Aleppo Pine seedlings only, Broadleaf Cotton-bush, Castor Oil Plant, Willow Rhus, Weeping Willow	Patrol entire site with focus on following up regrowth in areas previously worked and then extending weed fronts in Zones 13 & 19	Hand weed seedlings, cut & swab or drill & fill larger plants (glyphosate 1:5)
		2	Perennial broadleaf herbs – including Sea Spurge, Gazania, Buckthorn Plantain, Galenia	Coastal areas, Zones 1, 2 & 3	Hand weed seedlings and small plants, cut & swab/wipe larger plants (glyphosate 1:5)
		2	Perennial broadleaf herbs – including Scabious, Galenia, Plantain, Onion Weed	Woodland areas, Zones 10, 12 & 16	Hand weed seedlings and small plants, cut & swab/wipe larger plants (glyphosate 1:5)
		3	Perennial weed grasses – including Rice Millet, Tall Wheat Grass (only in Hidden Valley)	Prioritise follow-up of areas previously worked in and then continue to expand along weed fronts – focus on better remnant native vegetation areas, Zones 10, 12 and then 5, 13, 17 & 19	Cut below crown with serrated knife, cut & swab/wipe canes of larger plants (glyphosate 1:5)
		4	Perennial broadleaf herbs – including Scabious, Galenia, Plantain, Onion Weed	Zones 7, 13, 17, 18 & 19	Hand weed seedlings and small plants, cut & swab/wipe larger plants (glyphosate 1:5)
		Optional	Revegetation		Collect seed (permit required), grow or order tubestock for any revegetation activities planned, undertake weed management in revegetation area

	Trees For Life Coordinator	On-going	Coordination of Friends of the Lower Field River group		Attend FoLFR field day activities and respond to requests from the group as required
		On-going	Management plan		Review and update action schedule and management plan as required
	City of Marion	On-going	Tree management – including Aleppo Pine, Norfolk Island Hibiscus, other large planted tree specimens	Mainly Zones 5, 7, 17 and adjacent to Zone 11	Arrange public consultation and removal if appropriate following survey of use as habitat by native fauna
		Low	Date Palm	3 in Zone 19 Hidden Valley, 2 in parkland area with playground	Arrange sale and removal by qualified Palm Tree dealer
		On-going	Mowing	Parkland areas	Mower (staff)
		Annual	Couch	Along the edge of footpath and in Zones 1, 2 & 3	Spray (staff or contractor)
		6-monthly	Kikuyu	Along creekline and amongst Common Reed	Spray (staff or contractor)
		On-going	Olive	Zone 19 north-eastern corner above rock face	Engage contractor to treat

Winter & Spring	Friends of the Lower Field River	1	Bridal Creeper	Patrol entire site for any plants, known under Carob Tree adjacent to Zone 11	Carefully hand weed, removing bulbs from the site for safe disposal or wipe foliage with tongs (glyphosate 1:5)
		2	Strappy-leaved bulb weeds – including One-leaf Cape Tulip, Guildford Grass, Thread Iris, Three-cornered Garlic (Zone 19 only)	Prioritise follow-up of areas previously worked in and then continue to expand along weed fronts – focus on better remnant native vegetation areas, Zones 10, 12, 16 & 19	Carefully hand weed, removing bulbs from the site for safe disposal, or wipe foliage with tongs (glyphosate 1:5), remove flowerheads and seed later in season
		2	Soursob	Prioritise follow-up of areas previously worked in, halo around native understorey plants – focus on better remnant native vegetation areas, Zones 10, 12 & 16	Wipe foliage with swabber (glyphosate 1:5) Trained volunteers – spot spray with metsulphuron methyl
		3	Annual and perennial broadleaf herbs – including Sea Spurge, Gazania, Buckthorn Plantain, Galenia, False Sowthistle, Capeweed – and annual grasses	Prioritise follow-up of areas previously worked in, halo around native understorey plants, Zones 1, 2, 3, 4 & 8	Carefully hand weed around native understorey species
		3	Annual and perennial broadleaf herbs – including Scabious, Galenia, Plantain, Onion Weed, Capeweed	Prioritise follow-up of areas previously worked in, halo around native understorey plants – focus on better remnant native vegetation areas, Zones 10, 12 & 16	Carefully hand weed around native understorey species
		4	Annual grasses	Prioritise follow-up of areas previously worked in, halo around native understorey plants – focus on better remnant native vegetation areas, Zones 10, 12 & 16	Carefully hand weed around native understorey species, Trained volunteers – brushcut prior to seed maturity
		Optional	Revegetation		Undertaken planting or hand direct seeding as planned

	Trees For Life Coordinator	Annual	Soursob	Prioritise core areas, Zone 10	Spray with metsulphuron methyl with trained volunteers
		Annual	Annual grasses	Prioritise core areas, Zones 10. 12 & 19 in remnant native grass areas	Brushcut with trained volunteers
	City of Marion	On-going	Mowing	Parkland areas	Mower
		Prior to fire season	Fire fuel load management	Zones 1, 9 & 15	Time brushcutting to reduce seed set of annual grasses and encourage native grasses
		Annual	Soursob	Zone 10	Engage contractor to spray with metsulphuron methyl
		6-monthly	Kikuyu	Along creekline and amongst Common Reed	Spray (staff or contractor)
		On-going	Olive	Zone 19 north-eastern corner above rock face	Engage contractor to treat