

Weed Control Strategy, Shire of Mundaring

Eastern Metropolitan Regional Council

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**REPORT FOR EASTERN METROPOLITAN REGION COUNCIL
WEED CONTROL STRATEGY, SHIRE OF MUNDARING
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1.0 Introduction

Weed Control Strategy, Shire of Mundaring

1.1 Overview

The Shire of Mundaring is located in the eastern hills and foothills region of Perth. Weed invasion is an increasing problem in the Shire, compromising the integrity of remnant bushland, reducing plant diversity, creating aesthetically unappealing landscapes, and threatening the function of open drains. The Shire have undertaken to implement a weed control strategy in conjunction with the Shire of Kalamunda through the Eastern Metropolitan Region Council, of which the Shires are members. This report presents the weed control strategy developed by Ecoscape (Australia) Pty Ltd for the Shire.

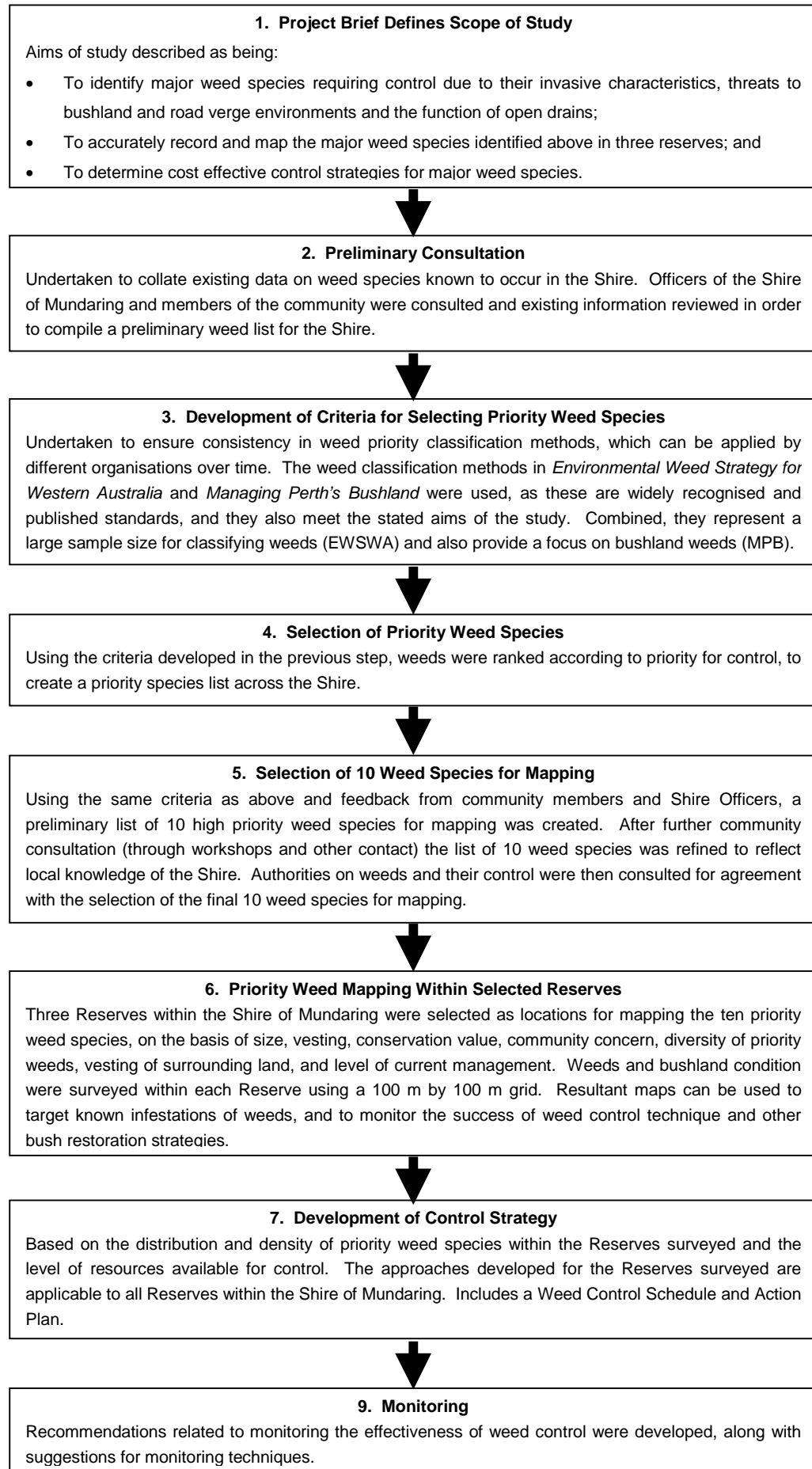
1.2 Objectives

The objectives of the weed control strategy are to:

- Identify the weed species with the highest priority for control due to their invasive characteristics and threats to remnant bushland, road verge environments and the function of open drains, through a process of consultation with the community, shire officers and government agencies;
- For selected reserves (three), map the priority weed species identified above, and bushland condition, in digital format suitable for importation into a Geographic Information System (GIS) Environment;
- Determine cost effective control strategies for priority weed species taking into account bushland condition, land tenure and ownership and the need to achieve a co-ordinated weed control response;
- Prepare annual costing schedules up to five years for with the implementation of recommended weed control strategy;
- Identify external funding sources to assist recommended weed control activities;
- Set performance targets aimed at demonstrating the effectiveness of control strategies, reductions in weed populations and improvement in bushland condition; and
- Identify targeted education strategies aimed at landowners and the wider community.

1.3 Description of Process

The process of preparing the weed strategy has been summarised in Figure 1. This illustrates each of the major tasks and their outcomes. Each of these tasks and outcomes are discussed more fully in later sections of this report.

Figure 1: Outline of the tasks and outcomes involved in the weed strategy.

1.4 Report Structure

This control strategy has five main sections, they are:

- Weed Species List for the Shire – the method for and outcomes of determining a complete weed species list and a priority weed species list for the Shire;
- Control Strategy – determining the best methods for weed control, the appropriate timing for control activities and the development of an overall Weed Control Action Plan;
- Monitoring – outlines the methods and timing for monitoring and criteria for determining the effectiveness of control activities;
- Funding and Management – outlines options for funding weed control activities and management of these activities; and
- Priority Weed Mapping – describes the methods used for mapping weeds on broad and fine scales and for mapping bushland condition, and descriptions of the processes used for selection of reserves, for detailed weed mapping.

2.0 Weeds within the Shire of Mundaring

Weed Control Strategy, Shire of Mundaring

2.1 Weed Species Lists for the Shire

The process of consultation and review of existing data resulted in the creation of a weed list of 193 species known to occur within the Shire of Mundaring. The community members and other people consulted during the preparation of a weed list (and weed mapping) are provided in Appendix One. A weed list for Shire of Mundaring is presented in Appendix Two.

2.2 Priority Weed Species Ranking

2.2.1 Selecting Priority Weed Species

In order to determine the highest priority weeds in the Shire two published sources were used: the *Environmental Weed Strategy for Western Australia* (CALM, 1999) and the *Managing Perth's Bushland* (Dixon and Keighery, 1995).

The EWSWA (CALM, 1999) criteria developed to assess over 1000 weed species in Western Australia, were as follows:

- Invasiveness – ability to invade bushland in good to excellent condition or ability to invade waterways;
- Distribution – wide current or potential distribution including consideration of known history of widespread distribution elsewhere in the world; and
- Environmental Impacts – ability to change the structure, composition and function of an ecosystem, in particular, an ability to form a monoculture in a vegetation community.

The EWSWA scale rates the impacts of weed species on biodiversity as one of the following:

- High – a weed species which scores for all three criteria. A weed species that rates as high would be a high priority for control and ongoing monitoring.
- Moderate – a weed species that scores for two of the above criteria. A weed species that rates as moderate would be a high priority for monitoring. The priority for control may vary from site to site depending on conditions and the values at risk.
- Mild – a weed species that scores on only one of the criteria. A weed species that rates as mild should be assessed in relation to site conditions. It should be monitored and controlled where appropriate.
- Low – a weed species that scores for none of the criteria. A low ranking would mean that this species requires a low level of monitoring and is unlikely to require control.
- TBA – to be assessed (for those species not yet assessed)

The system used by Dixon and Keighery (1995) was to classify all weeds according to the threat they pose to bushland in the Perth Metropolitan region. The three classifications used were:

- Priority 1 - major weeds, which are the most serious weeds within their ecosystem, often affecting many reserves or habitats in ways likely to permanently degrade them;
- Priority 2 - nuisance weeds, which are generally found only in a few locations or ecosystems, usually in disturbed areas; and
- Priority 3 - minor weeds, which have little known effect and occur in smaller numbers or are less competitive than priority 2 weeds.

2.2.2 Ranking of Priority Weed Species

The above sources were used to rank the recorded weed species for the Shire of Mundaring in order of priority for control. Both EWSWA and Dixon and Keighery were used because it allowed most weeds identified in the study area to be assigned a rating and thereby ranked. That is, if only one source had been used then many weed species would have not been assigned a rating score.

(section to be changed as we discussed on the phone)

For the purposes of this study, the Dixon and Keighery (1995) ratings of *Priority 1* and *Priority 2* were considered to be equivalent to the EWSWA ratings of *High* and *Moderate*, respectively. The Dixon and Keighery (1995) rating of *Priority 3* was considered to be equivalent to the EWSWA ratings of *Mild* and *Low*.

Species which had only been rated under one system were assumed to have an equal rating in the other system. For example, a species that had a *High* rating in EWSWA but is not rated in Dixon and Keighery (1995) was assumed to have a *Priority 1* rating in Dixon and Keighery (1995).

The use of two rating systems does result in some conflict when assigning a ranking for a weed species. For example some weeds EWSWA rated them as High whilst Dixon and Keighery rated them as Priority 3 (low) species (eg *Brassica tourefortii*, Appendix Two). To overcome this issue, a scoring system was developed to enable the ranking of the weed species. The scoring system is as follows:

- EWSWA rates were scored as follows: High (3 points), Moderate (2 points) and Mild/Low (1 point). Mild and Low in EWSWA are considered to be equal.
- Dixon and Keighery rates were scored: Priority One (3 points), Priority Two (2 points) and Priority Three (1 point.)
- If a weed was not rated by both EWSWA and Dixon and Keighery it was given a score of 1

The scoring system is summarised in the following table:

EWSWA Rating	Dixon & Keighery (1995) Rating	Score
High	Priority 1	6
High	Priority 2	5
High	Priority 3	4
Moderate	Priority 1	5
Moderate	Priority 2	4
Moderate	Priority 3	3
Mild/Low	Priority 1	4
Mild/Low	Priority 2	3
Mild/Low	Priority 3	2
TBA	Priority 1	6
TBA	Priority 2	4
TBA	Priority 3	2
High	TBA	6
Moderate	TBA	4
Mild/Low	TBA	2
TBA	TBA	1

Note: TBA = To Be Assessed (weed species which have not been priority rated)

Application of the above ranking system resulted in the selection of 15 weed species as being of highest priority for control and 13 weed species as being highest priority for monitoring (refer to Appendix Three).

2.3 Top 10 Priority Weed Species

2.3.1 Method for Selecting Top 10 Priority Weed Species

The ranking system in the previous section does not take into account local conditions particular to the Shire of Mundaring. Therefore, in determining which species should be included as the top 10 Priority weed species, the knowledge of local community members and people working in the Shire was taken into consideration, as well as the species' priority ranking.

This approach highlighted the difficulty in obtaining agreement between professionals and community members on which weed species were the most important for control. It is suspected that this is primarily because of the different focus individuals may have and the visibility of different weed species. For example, *Echium plantagineum* (Paterson's Curse) is highly visible when in flower and so may create a lot of concern about its distribution and abundance. In contrast, a weed species such as *Ehrharta calycina* (Perennial Veld Grass) may feature highly with individuals whose focus may be on fuel loads and fire risk.

In order to ensure the needs and concerns of community members are balanced with the needs and concerns of people working in the Shire, a summary of all of the weed species mentioned by both parties was created. There was general agreement between all parties for 7 species to be included in the top 10 priority weed species list.

The remaining 3 species were chosen according to community opinion. The percentage of respondents who thought a particular weed species should be included in the list of the top 10 priority weed species was calculated, and used to assist in selecting the final 3 species for inclusion on the list. This enabled us to determine which weed species were of greatest concern to *both* the community members and the professionals (refer to Appendix Four).

2.3.2 Top 10 Weed Species Selected

Application of the ranking system and community consultation resulted in the creation of a list of top 10 priority weed species for the Shire.

Two species in the Shire of Mundaring list are not included in the high priority list of 28 weed species because of their low score. However, inclusion of these species was based on community concern (both community members and professionals) (refer to Appendix Four).

Table 1: The top 10 priority weed species for the Shire of Mundaring

Scientific Name	Common Name	Rating		Score
		EWSWA	Managing Perth's Bushland	
<i>Asparagus asparagoides</i>	Bridal Creeper	High	1	6
<i>Eragrostis curvula</i>	African Love Grass	High	1	6
<i>Freesia aff. Leichtlinii</i>	Freesia	High	1	6
<i>Homeria flaccida</i>	One Leaf CapeTulip	High	1	6
<i>Hyparrhenia hirta</i>	Tambookie Grass	High	1	6
<i>Leptospermum laevigatum</i>	Victorian Tea Tree	High	1	6
<i>Watsonia bulbifera</i>	Watsonia	High	1	6
<i>Rubus</i> spp.	Blackberry	Moderate	1	5*
<i>Chamaecytisus palmensis</i>	Tagasaste	Low	2	3*
<i>Echium plantagineum</i>	Paterson's Curse	Moderate	3	3*

* Selected by Community

3.0 Control Strategy for Priority Weeds

Weed Control Strategy, Shire of Mundaring

3.1 Overall Approach to Weed Control

Mapping bushland condition in conjunction with weed species distribution and abundance allows the formulation of a weed control action plan. This action plan is based on two methods of control – site-led and species-led, and follows a series of guiding principles.

3.1.1 Integrated Weed Management

Integrated weed management involves the use of a number of control options which creates a sustainable and effective management system. Reliance on one control process will generally not succeed, for example continual use of herbicide can result in herbicide-resistance development in some weed species. In natural areas integrated weed management involves the use of mechanical, chemical, and biological systems coupled with an appropriate restoration (revegetation) process to increase ecosystem resilience and long-term sustainability.

Mapping bushland condition in conjunction with weed species distribution and abundance allows the formulation of a weed control action plan. This action plan is based on two methods of control – site-led and species-led, and follows a series of guiding principles.

3.1.2 Guiding Principles

When undertaking weed control programmes, the primary guiding principle is to work from areas in the best condition to those in the worst condition, and all works should be undertaken in conjunction with a restoration strategy (Bradley, 1971; Bradley, 1988; Buchanan, 1989). The bushland condition maps can provide an overall direction for priority weed control actions.

1. Those populations occurring in *very good - excellent* condition bushland areas (green areas) should be treated first;
2. Those populations occurring in *fair - good* condition bushland areas (blue areas) should be treated next, in the order of:
 - Blue within green areas
 - Blue bordering green areas;
3. Those populations occurring in *poor* condition bushland areas should be treated last, in the order of:
 - Orange within green or blue areas
 - Orange bordering green or blue areas.

Using bushland condition as a criteria for determining weed control priorities ensures that:

- *Very good - excellent* condition bushland is maintained;
- *Fair - good* condition bushland is enhanced, moved closer to being in *very good - excellent* condition, and prevented from deteriorating to *poor* condition bushland; and

- *Poor* condition bushland is enhanced, moved closer to being in *fair - good* or *very good - excellent* condition, and prevented from deteriorating to *very poor* condition bushland.

The *very poor* condition bushland areas are generally not suitable for targeted weed control. Instead, weeds in these areas should be addressed within the context of a comprehensive restoration plan.

When working in *very good - excellent* and *fair - good* condition bushland, the Bradley method of weed control is recommended (Appendix Five). Essentially, this method involves assisted natural regeneration of native plants from seed banks, rather than the use of replanting programmes.

3.1.3 Species-led Control

Generally, it is recommended that species-led control be undertaken prior to site-led control. Weed species were placed in this category if they:

- have small populations;
- are relatively easy to remove; and
- have a high potential to spread and therefore become a problem in the future.

These weed species should be tackled on a weed by weed basis, using the guiding principles listed above.

3.1.4 Site-led Control

Generally, it is recommended that site-led control be undertaken after control of species-led weeds. Weed species were placed in this category if they:

- have wide-spread and well-established populations;
- require concentrated and/or long-term efforts to remove; and
- are highly detrimental to ecological functions of bushland if left unchecked.

3.1.5 Resource-led Control

Resource-based weed control is recommended where a particular species is known to be within a defined area, and thereby providing a focus for community projects.

3.1.6 Threatened Species or Communities-led Control

This approach to weed control focuses on the ecological significance of threatened flora species or vegetation types. If a particular site is known to contain either of these, weed control in these areas becomes a priority to protect the ecological integrity of the site, and thereby promote the long-term survival of the species or community.

3.1.7 Cause-led Control

If a source or cause of weed infestation can be identified, cause-led control can be used. This is suitable where the cause or source can be eliminated or reduced. An example of this may be where weed species are able to spread from a residence neighbouring bushland.

3.2 General Weed Control Action Plan

A general Weed Control Action Plan (Table 2) was developed, based on the guiding principles outlined previously. It is provided as a general guide for determining the priority for weed control activities.

Table 2: General Weed Control Action Plan

Priority	General Shire or Region Recommendations
Priority 1 Start with species-led control	<p>Species-led control:</p> <ol style="list-style-type: none"> 1. Select weeds for control on a species basis according to time of year and available resources. 2. For each weed species, use bushland condition and weed distribution maps to: <ul style="list-style-type: none"> • Start control efforts in <i>very good-excellent</i> condition bushland • Move to <i>good-fair</i> condition bushland • Move to <i>poor</i> condition bushland <p>The above represents primary weed control. Secondary weed control and long-term monitoring of weed populations will also need to be undertaken.</p>
Priority 2 Move to site-led control	<p>Site-led control:</p> <ol style="list-style-type: none"> 1. Select sites suitable for site-based control. 2. Use bushland condition and weed distribution maps to: <ul style="list-style-type: none"> • Start control efforts in <i>very good-excellent</i> condition bushland • Move to <i>good-fair</i> condition bushland • Move to <i>poor</i> condition bushland <p>Depending on resources and time of year it may be necessary to undertake control of different site-led species, prior to moving to other areas. Again, the above represents primary weed control. Secondary weed control and long-term monitoring of weed populations will also need to be undertaken.</p>
Priority 3 Move to resource-led control	<p>Resource-led control:</p> <ol style="list-style-type: none"> 1. Select sites suitable for resource-based control. 2. Use bushland condition and weed distribution maps to: <ul style="list-style-type: none"> • Start control efforts in <i>very good-excellent</i> condition bushland • Move to <i>good-fair</i> condition bushland • Move to <i>poor</i> condition bushland <p>Again, the above represents primary weed control. Secondary weed control and long-term monitoring of weed populations will also need to be undertaken.</p>

Can you relate the reserve selected for mapping to the process for selection in the text. Ie reserves with high bushland condition were selected for mapping

3.3 Specific Reserve Weed Control Action Plans

Weed Control Action Plans specific to the Reserves surveyed are provided in Tables 3 to 5. However, further information would be required on the distribution and abundance of weeds for these Reserves. This information can be obtained from community volunteers and Shire Officers working within the reserves.

In developing the specific recommendations, the following factors were assessed:

- the proportion of bushland in *Very Good*, *Good*, *Poor* and *Very Poor* condition;
- the location of weeds in relation to bushland condition;
- the area of weed infestation; and
- whether the weeds were in dense infestations or isolated areas with defined boundaries.

These assessments allow determination of the approach for weed control, the priorities for weed control and the timing. The same procedure can be applied to other reserves and other weed species.

Table 3: Weed Control Action Plan 2001-2005, Brookside Park, Shire of Mundaring

WEED CONTROL					
Weed Species	Priority	Area/Location of Coverage	Control Methods	Timing	Cost*
<i>Asparagus asparagoides</i> (Figure 17)	1	• Spot infestation near Brookside Lane	<ul style="list-style-type: none"> • Handweeding, seed removal, pulling and digging or herbicide wipe (community) • Repeat each year until eradicated 	July-September	~\$8,300
<i>Eragrostis curvula</i> (Figure 18)	1	• Spot infestations in western half of Reserve	<ul style="list-style-type: none"> • Handweeding, seed removal, pulling and digging or herbicide wipe (community) • Repeat each year until eradicated 	November - March	
<i>Rubus</i> spp. (Figure 19)	1	• Spot infestation near Brookside Lane	<ul style="list-style-type: none"> • Handweeding, seed removal, pulling and digging or herbicide wipe (community) • Repeat each year until eradicated 	December - April	
<i>Watsonia bulbifera</i> (Figure 20)	1	• Spot infestations throughout Reserve	<ul style="list-style-type: none"> • Handweeding, seed removal, pulling and digging or herbicide wipe (community) 	September - November	
	2	• Dense infestations along creek line and on western boundary	<ul style="list-style-type: none"> • Spot spraying (Shire) • Repeat each year until eradicated 		
MONITORING AND REVIEW					
Monitoring Technique	Monitoring Area		Target Species or Factor	Timing	Cost
Quadrat survey	Place quadrats in areas subject to the different types of weed control		<ul style="list-style-type: none"> • Assess effectiveness of different control methods • Count all weed species present in quadrat 	April-May	~4 hours
Grid point survey	Whole of reserve – particular attention to creek line		<ul style="list-style-type: none"> • Priority weed cover-abundance at each grid point 	April-May, once every five years	~4 hours
MAPPING					
Mapping Technique	Mapping Area		Target Species or Factor	Timing	Cost
Aerial photograph and trace overlay	Whole of reserve		<ul style="list-style-type: none"> • Bushland condition 	April-May, once every five years	~4 hours

*Cost based on cost for complete coverage of selective herbicide such as Fusilade, in *Very Poor* and *Poor* condition areas only.

Table 4: Weed Control Action Plan 2001-2005, Hovea Conservation Park, Shire of Mundaring

WEED CONTROL					
Weed Species	Priority	Area/Location of Coverage	Control Methods	Timing	Cost*
<i>Eragrostis curvula</i> (Figure 23)	1	<ul style="list-style-type: none"> Spot infestations along southern boundaries of Reserve (Hedges Drive and Brooking Road) 	<ul style="list-style-type: none"> Handweeding, seed removal, pulling and digging or herbicide wipe (community) Repeat each year until eradicated 	November - March	
<i>Watsonia bulbifera</i> (Figure 24)	1	<ul style="list-style-type: none"> Spot infestation on southern boundary (Hedges Drive) 	<ul style="list-style-type: none"> Handweeding, seed removal, pulling and digging or herbicide wipe (community) Repeat each year until eradicated 	September - November	
<i>Chamaecytisus palmensis</i> (Figure 22)	3	<ul style="list-style-type: none"> Spot infestation in south-eastern portion of Reserve (P211451) 	<ul style="list-style-type: none"> Cut stump (Shire), seed removal. 	August - October	
MONITORING AND REVIEW					
Monitoring Technique	Monitoring Area		Target Species or Factor	Timing	Cost
Quadrat survey	Place quadrats in areas subject to the different types of weed control		<ul style="list-style-type: none"> Assess effectiveness of different control methods Count all weed species present in quadrat 	April-May	~8 hours
Grid point survey	Whole of reserve – particular attention to creek line		<ul style="list-style-type: none"> Priority weed cover-abundance at each grid point 	April-May, once every five years	~8 hours
MAPPING					
Mapping Technique	Mapping Area		Target Species or Factor	Timing	Cost
Aerial photograph and trace overlay	Whole of reserve		<ul style="list-style-type: none"> Bushland condition 	April-May, once every five years	~8 hours

*Cost based on cost for complete coverage of selective herbicide such as Fusilade, in *Very Poor* and *Poor* condition areas only.

Table 5: Weed Control Action Plan 2001-2005, North Darlington Reserves, Shire of Mundaring

WEED CONTROL					
Weed Species	Priority	Area/Location of Coverage	Control Methods	Timing	Cost*
<i>Eragrostis curvula</i> (Figure 27)	1	• Spot infestations along western boundary, along Darlington Road	<ul style="list-style-type: none"> Handweeding, seed removal, pulling and digging or herbicide wipe (community) Spot spraying (Shire) Repeat each year until eradicated 	November - March	~\$17,100
	2	• Infestation in the eastern part of the Reserve (P208603)			
<i>Watsonia bulbifera</i> (Figure 28)	1	• Spot infestations in northwestern section of Reserve	<ul style="list-style-type: none"> Handweeding, seed removal, pulling and digging or herbicide wipe (community) Spot spraying (Shire) Repeat each year until eradicated 	September - November	
	2	• Large infestation in the eastern part of the Reserve (P208603)			
<i>Chamaecytisus palmensis</i> (Figure 26)	2	• Spot infestations off Ferguson Road and in eastern part of Reserve (P208603)	• Cut stump (Shire), seed removal.	August - October	
MONITORING AND REVIEW					
Monitoring Technique	Monitoring Area		Target Species or Factor	Timing	Cost
Quadrat survey	Place quadrats in areas subject to the different types of weed control		<ul style="list-style-type: none"> Assess effectiveness of different control methods Count all weed species present in quadrat 	April-May	~8 hours
Grid point survey	Whole of reserve – particular attention to creek line		<ul style="list-style-type: none"> Priority weed cover-abundance at each grid point 	April-May, once every five years	~8 hours
MAPPING					
Mapping Technique	Mapping Area		Target Species or Factor	Timing	Cost
Aerial photograph and trace overlay	Whole of reserve		<ul style="list-style-type: none"> Bushland condition 	April-May, once every five years	~8 hours

*Cost based on cost for complete coverage of selective herbicide such as Fusilade, in *Very Poor* and *Poor* condition areas only.

3.4 Control Methods for Priority Weeds

Control methods for the top 10 priority weeds are presented in Table 6.

Table 6: Control methods for priority weed species.

Source: *weedBase* (Ecoscape, 1999)

Species	Method*				Control Notes
	1	2	3	4	
<i>Asparagus asparagoides</i> Bridal Creeper	✓	✓	✓		Roundup/Glyphosate 360 at 1 in 100 water (check rates). Ally/Brushoff can also be used with similar results, at rates of 2.5 to 5g ha in 250 L water. Treat when actively growing July-Sept. Repeat applications are necessary. As plants are usually under trees and shrubs they are difficult to dig out. However, young plants are easily removed by hand. Mats of bridal creeper can be rolled up and destroyed. Treat any regrowth in same way.
<i>Chamaecytisus palmensis</i> Tagasaste	✓	✓			No specific information on herbicide control. Suggest cut stump method, using Glyphosate. straight after cutting 1 part Glyphosate/Roundup to 15 parts water. Will not regrow if cut at ground level.
<i>Cortaderia selloana</i> Pampas Grass	✓	✓	✓		Educate local home owners, advise removal of cultivated plants to reduce risk of reinfestation. Replaces native species, now found in much drier areas eg Kings Park. Produces large numbers of seed up to 100,000 seed per plume. Remove flower plumes and destroy. Remove top by burning or cutting as low to ground as possible with a heavy duty brush cutter. Treat new growth with Glyph. 360 wick applic. rate 1L in 2L water wipe both sides of leaf. Knapsack 200mL in 10L water + Pulse. Thoroughly wet foliage, 2 or more applic. may be necessary on large plants. Treat in late spring-summer. Dug out plants left on the ground can re-root so remove.
<i>Echium plantagineum</i> Paterson's Curse	✓	✓	✓		In highly disturbed areas usually on heavy soils. Hand weed small populations or suggest using a wick applicator and Glyphosate. Use Glyphosate/Roundup 75-100mL in 15L water, knapsack.
*Method 1 - Hand Weeding, Pulling, Digging; Method 2 - Herbicide Wipe, Stem Injection or Cut Stump; Method 3 - Spot Spraying; Method 4 - Blanket Spraying					

Species	Method*				Control Notes
	1	2	3	4	
<i>Eragrostis curvula</i> African Love Grass	✓	✓	✓		Best to spray after fire onto fresh young growth in summer months before seed set. Use Roundup or Glyphosate 360, 1L in 100 L water & wetter eg Agral 60, X77 when actively growing. Thorough coverage of foliage essential. In areas clear of non target species use mixtures of Roundup/Oust or Frenock. May require mop up spray next year. Burn off tussocks in January and spray new growth with Roundup 3 -5 L ha of Glyphosate (ie 3-5L in 100L water) when actively growing (eg Nov - March). Smothers small plants and competes with natives. A serious fire hazard.
<i>Freesia aff. Leichtlinii</i> Freesia	✓	✓	✓		Competes, smothers, small native plants and bulbous herbs. Prolific seeder. Very difficult to control in natural bushland. Plants spread quickly forming large colonies. Small infestations can be removed by careful digging. Spray large infestations with Glyphosate 1 in 100 just before flowering to mid flowering (Aug - Sept). Brushoff, Ally 2.5 to 5g ha in 250 to 500 L water ha.
<i>Homeria flaccida</i> One-leaf Cape Tulip	✓	✓	✓		Very difficult to control. Widespread. Highly invasive especially in disturbed areas. Toxic to stock. Declared plant in some areas contact APB. Small infestations in sandy soil can be removed by hand, cut roots with knife or long narrow trowel and pull out at or just before flowering time. Difficult to control as not all corms shoot every year, therefore need repeat treatments. If spot spraying use Glyphosate high rate or Ally, 5g/ ha. Weeding wand Glyphosate or Ally/ Brushoff, Glean 1g in 1L water.
<i>Hyparrhenia hirta</i> Tambookie Grass	✓	✓	✓		For seedlings at 5 leaf stage use over 1L Fusilade ha. No information on rate for mature plants, suggest 4-6L ha. Glyphosate 1 in 100. Best on new growth between November and March. Repeat applications may be necessary. Competes with native plants. Fire hazard.
<i>Leptospermum laevigatum</i> Victorian Tea Tree	✓	✓	✓		Replaces native species. Produces large amounts of seed. Killed by fire. Hand pull small seedlings. Spot spray small plants. Paint cut stump when actively growing. Apply Roundup/Glyphosate straight after cutting. Remove tops which may have seeds still attached. Check following years for new seedlings. Can use Garlon, Grazon or Velpar with care. If cut at ground level no need for herbicide.
*Method 1 - Hand Weeding, Pulling, Digging; Method 2 - Herbicide Wipe, Stem Injection or Cut Stump; Method 3 - Spot Spraying; Method 4 - Blanket Spraying					

Species	Method*				Control Notes
	1	2	3	4	
<i>Rubus</i> spp. Blackberry	✓	✓	✓		<p>Mainly in highly disturbed areas. Edges of creeks etc. NOTE: They are declared plants outside of Metropolitan area in Southern Shires. Contact APB.</p> <p>Brush cut or burn brambles. Treat regrowth as described below.</p> <p>Glyphosate 360 or Roundup 12mL to 1L water, flowering time to fruit maturity – December to April. Follow up treatment will be necessary. Better control using more residual herbicides has been achieved eg Brushoff, Garlon. Biological control with rust disease is having an effect on some populations. Hand weeding, removing the knotty stump and as many connected roots as possible has been successful, especially in waterlogged sites. This technique has also been used successfully in conjunction with the cut stump method.</p>
<i>Watsonia bulbifera</i> Bulbil Watsonia	✓	✓	✓		<p>Excellent results obtained by wiping one side of leaf using sprayer with foam attached at 1 part water to 10 parts Roundup. Roundup best applied in October, in some areas as late as November, when plants are in full flower.</p> <p>Spot spray Glyphosate 1 in 100.</p> <p>Amitrol & 2,2-DPA are registered for Watsonia control in WA. Latter is most widely used & is very cost effective, especially in degraded areas. 2,2-DPA best before flowering. <u>Extreme caution should be taken when applying 2,2-DPA as it remains viable in the soil for some time and will kill non-target species.</u></p> <p>Ally/Brushoff & Glean have also been used – spot spray 5-10g ha or use wick applic. 1g in 1L water. Ally/Brushoff and Glean best in July and August for successful control.</p> <p>Herbicide control recommended September-November when in flower, but control achieved July to as late as December, in moist shady positions.</p> <p>Hand removal of small populations by pulling or grubbing in moist soil removes the corm, or by snapping/twisting the top off near the corm which rots it. Latter method is ideal for sensitive areas such as granite rocks. An important factor in control is removing any bulbil/seed heads to stop reinfestation.</p>
*Method 1 - Hand Weeding, Pulling, Digging; Method 2 - Herbicide Wipe, Stem Injection or Cut Stump; Method 3 - Spot Spraying; Method 4 - Blanket Spraying					

A key to the herbicides and their active ingredients is provided below.

Product Name	Active Ingredient	Product Name	Active Ingredient	Product Name	Active Ingredient	Product Name	Active Ingredient
Ally ®	metsulfuron-methyl	Fusilade ®	fluazifop-butyl	MCPB ®	tropotox	Spray-Seed ®	paraquat + diquat
Amitrol T ®	amitrole + ammonium thiocyanate	Garlon 600 ®	triclopyr	Pulse ®	polyalkyloxyated dimethylpolysiloxane	Targa ®	quizalofop-p-ethyl
Brushoff ®	metsulfuron-methyl	Glean ®	chlorsulfuron	Roundup ®	glyphosate	Velpar ®	hexazinone
Dalapon ®	2,2-DPA	Grazon DS ®	triclopyr + picloram	Sertin ®	sethoxydim		

**

Please note: (link to the previous page ie **)

The products highlighted in **bold typeface** above have been registered for the above specific purposes with the National Registration Authority for Agricultural and Veterinary Chemicals. Other products may be registered via an Off-Label Permit, which allows use of registered or non-registered products for specific purposes.

It is necessary that the application of herbicides be in accordance to labelling requirements or the manufacturers Materials Safety Data Sheet and must be undertaken by personnel trained in the use of herbicide chemicals. The application of any herbicide for purposes not specified on the labelling requires an Off-Label Permit from the National Registration Authority in Canberra.

The application of herbicides must also be in accordance with water catchment restrictions. Chemical based weed control strategies in particular must recognise potential adverse impacts on water resources such as lakes, wetlands, streams, rivers and dams. Clearly, significant control measures must be implemented in Public Drinking Water Sources Areas for the water we consume. *Statewide Policy No.2 Pesticides in Public Drinking Water Sources Areas, 2000* is a Water and Rivers Commission document that will provide further advice on this matter. It is available on the net at www.wrc.wa.gov.com.au.

3.5 Timing of Weed Control

Table 7: Weed Control Schedule

Weed Species	Location	Method of Control	Time of Year
<i>Asparagus asparagoides</i> Bridal Creeper	Brookside Park	Hand weeding, pulling or digging Herbicide wipe, stem injection or cut stump Spot Spraying	July - September
<i>Chamaecytisus palmensis</i> Tagasaste	Hovea Reserve North Darlington Reserves	Hand weeding, pulling or digging Cut stump	August - October
<i>Cortaderia selloana</i> Pampas Grass		Hand weeding, pulling or digging Herbicide wipe, stem injection or cut stump Spot Spraying	October - January
<i>Echium plantagineum</i> Paterson's Curse		Hand weeding, pulling or digging Herbicide wipe, stem injection or cut stump Spot Spraying	August - September
<i>Eragrostis curvula</i> African Love Grass	Brookside Park Hovea Reserve North Darlington Reserves	Hand weeding, pulling or digging Herbicide wipe Spot Spraying	November - March
<i>Freesia aff. Leichtlinii</i> Freesia		Hand weeding, pulling or digging Herbicide wipe Spot Spraying	August - September
<i>Homeria flaccida</i> One-leaf Cape Tulip		Hand weeding, pulling or digging Herbicide wipe Spot Spraying	August - October (hand weeding)
<i>Hyparrhenia hirta</i> Tambookie Grass		Hand weeding, pulling or digging Herbicide wipe Spot Spraying	November - March
<i>Leptospermum laevigatum</i> Victorian Tea Tree		Hand weeding, pulling or digging Herbicide wipe, stem injection or cut stump Spot Spraying	August - October
<i>Rubus</i> spp. Blackberry	Brookside Park	Hand weeding, pulling or digging Herbicide wipe Spot Spraying	December - April
<i>Watsonia bulbiflora</i> Bulbil Watsonia	Brookside Park Hovea Reserve North Darlington Reserve	Hand weeding, pulling or digging Herbicide wipe Spot Spraying	September - November

3.6 Control of Other Weed Species

Weed species which were not included in the list of priority species should not be excluded from control activities on that basis.

A detailed weed list for each reserve surveyed was not part of the scope of this study, however, Appendix 6 provides a list of weeds known to occur in these reserves, based on published weed lists. These species should be included in any weed control programme as species which could be controlled if resources allow, but are not classed as high priority at this stage.

As weed control of priority species progresses, other weed species which previously may not have been rated as highly, may become more important. Therefore, it is important to keep weed control programmes flexible and updated according to monitoring data, to ensure that as bushland condition changes and weed species dominance changes, the control activities are adjusted accordingly.

The priority status of individual weed species should be used as a basis for its control, along with factors such as its abundance and distribution. For example, weed species with a *moderate* or *mild* priority for control, but which has a limited distribution within a reserve should be controlled if resources allow, rather than left to spread and become a bigger problem. In general, those species with a *high* priority rating should be tackled first, but the situation for each reserve needs to be assessed in context with which other species are present and what resources are available.

4.0 Monitoring

Weed Control Strategy, Shire of Mundaring

Monitoring programmes should be integrated with State and National monitoring programmes advocated in the National Weed Strategy (ARMCANZ¹, ANZECC² and Forestry Ministers, 1997), the Environmental Weed Strategy for WA (CALM, 1999) and the Draft State Weed Plan (Ecoscape and Farm Information Services, 2000).

As part of objectively assessing the success of the Weed Control Strategy, performance indicators or completion criteria should be developed based on monitoring programmes. This will not only contribute to its accountability where public funds are involved but also provide a mechanism for modifying the Strategy and maintaining its flexibility.

4.1 Monitoring Criteria

4.1.1 Reserve Monitoring

When monitoring site specific projects within Reserves, the following strategies should be adopted:

- Establish monitoring quadrats in areas subject to weed control programs to record the effectiveness of control methods:
- For site-led control – establish monitoring quadrats and survey and record annually
- For species-led control – monitor effectiveness of control of discrete weed populations or patches, including presence or absence, and, if present, the degree of new infestation
- For both control methods – monitor the effectiveness of different control methods used (manual vs. chemical control; spot spray vs. blanket spray; contractor vs. community control). The use of photographs from set points enhances this process; and
- Monitor for establishment of new weed species.

4.1.2 Shire or Regional Monitoring

At a whole-of-Reserve level, the following strategies should be adopted to monitor the effectiveness of broad-scale weed control programs:

- Map bushland condition and distribution of high and moderately rated weed populations at regular intervals (e.g. every 5 years);
- Map the extent of other major weed populations at regular intervals (e.g. every 5 years)

¹ ARMCANZ - Agriculture and Resource Management Council of Australia and New Zealand

² ANZECC - Australian and New Zealand Environment and Conservation Council

4.1.3 Performance Criteria

In order to determine the effectiveness of any weed control programme, there needs to be a method of determining success and ongoing progress. Performance criteria can be applied at both the Reserve level and the Shire or Region level.

Reserve Level Performance Criteria

When considering appropriate performance criteria, it should be noted that not all criteria will be applicable to all reserves, depending on the number of weed species present, the area of the Reserve and the level of volunteer activity within the Reserve. However, the following performance criteria could be used at a Reserve level, based on the monitoring data collected:

- Remove at least four priority weed species from each Reserve over the next five years;
- Reduction in the area of priority weed infestations by 5% over 5 years; and
- Reduction in the total number of weed species in the reserve by 5% over 5 years.

Although not appropriate as performance criteria, other information can be recorded to assist in an overall view of the effectiveness of weed control activities within Reserves:

- The number of volunteer hours spent on bushland management in each Reserve – this will give an indication of the degree of work required and whether it is diminishing over time as well as the level of resources required for individual Reserves;
- The number of new weed species recorded – it is expected that, initially, new weed species will be recorded because the current study has focussed on particular weed species. However, previous studies (Armstrong, 1993; Payne and Burns, 1993; Bean, 1999) can provide detailed weed species lists for most reserves. Over time, it is anticipated that the number of new species recorded should plateau, and then the total number of weed species decrease; and
- Any new infestations of priority species within reserves – this information can be used to determine source areas for new infestations, and, assessed against the number of hours spent on its control, allow an analysis of the success of control of particular species.

Shire or Region Level Performance Criteria

Bushland condition is one way of measuring success, as it can be used to demonstrate increases in area of *Very good* or *Good* condition bushland, through improvements to the proportion of native species present, the structural integrity of the bushland and a decline in the number and/or level of disturbances present. Accordingly, targets can be set to determine what increase in area of *Very good* or *Good* condition bushland is required over the term of the weed control programme. However, if the only weed control work undertaken is aimed at those priority species identified, then the bushland condition maps may not change significantly over time, as the bushland condition maps consider all weed species. Therefore, suitable performance criteria could include:

- Increase the area of bushland condition assessed as *very good - excellent* and *fair - good* by 2% each year respectively over five years;
- Remove at least four priority weed species over the next five years; and
- Reduce the area of priority weed infestations by 10% over five years.

4.2 Frequency of Monitoring

At a Shire or Region level, monitoring of bushland condition is recommended to be undertaken every 5-10 years. This is based on the time it takes to undertake initial weed control and then follow-up weed control to remove plants missed initially. Monitoring bushland condition within the region over a shorter time frame is unlikely to show dramatic changes and could be a waste of resources.

At a local Reserve level, monitoring of weed quadrats should occur annually, and updating of records (e.g. updating the database) should occur as often as is practicable. This depends on the manner in which the database is distributed – if it is placed on a web site, it could be updated as frequently as the users desire, whereas if it is located at a central location such as a Shire office it may be updated less frequently. Bushland condition for individual reserves could be remapped after an entire Reserve has been treated for weeds, which may take several years to achieve, depending on the size of the reserve and the resources available.

4.3 Use of Monitoring Data

Monitoring data is useful not only for determining the success of weed control activities, but also for planning weed control activities from year to year, in a coordinated manner across the Shire of Mundaring. In order for monitoring data to be useful, it needs to be fed back to the managing agencies. That is, any work undertaken in the field, whether it be actual weeding or monitoring of previous weed control sites, should be fed back into a central management system to ensure efforts are being focussed where they are most needed, and to ensure each group, whether they be community volunteers or Shire Officers, is aware of each others' activities. Figure 2 in the following Section illustrates a mechanism for this to occur.

4.3.1 weedBase

The development of a central weed database would provide a mechanism to monitor control activities, weed infestations and resources required at a local and regional level. In 1999, Ecoscape developed a database called *weedBase* on behalf of the Department of Conservation and Land Management for this purpose, but at a State level. Appendix Seven provides an overview of *weedBase* and the type of information it stores.

The information contained by *weedBase* is minimal at this stage, as it was designed to be updated as more information becomes available from those people undertaking weed monitoring and control activities. The database could readily be adapted to store the monitoring data collected as part of weed control activities in the Shire of Mundaring, and is particularly amenable to contributions from community volunteers. The database can also be linked to GIS coverage of weed distributions, so that when a particular location is selected, information related to the weeds species at that location can be displayed.

5.0 Management and Funding

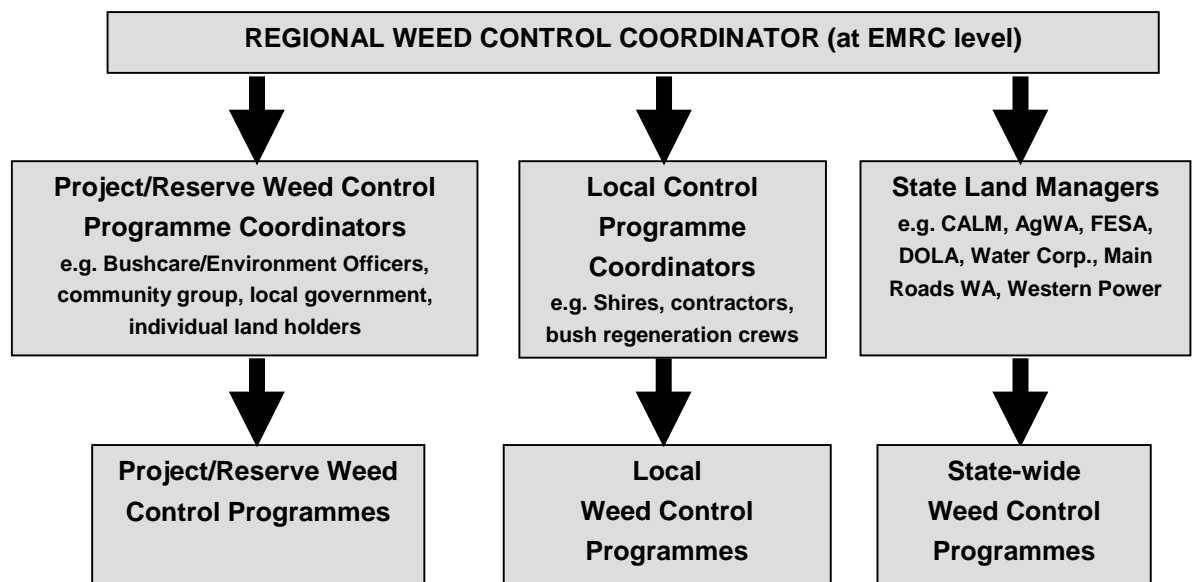
Weed Control Strategy, Shire of Mundaring

5.1 Management and Coordination

A large number and wide range of government agencies, industry and other groups, land and water managers and other stakeholders are involved in weed management activities, including on-ground weed control, education and training, policy making, implementation of legislation and conservation and restoration of bushland areas. Currently, many of these groups act in isolation, rather than sharing resources in a strategic manner. An example may be application of herbicide on one side of a road but not the other because of legislative boundaries. However, to achieve the best results with the least resource usage, weed management should be planned, coordinated, implemented and monitored at an appropriate level. This level could be local, catchment, regional or State based depending on the scope of the weed control activities.

Central to the success of a weed control strategy is the coordination of all weed control activities. A coordinator can ensure that volunteer activities are complementary to each other as well as Shire activities, and coordinate resources and timing of programmes. The coordinator should be representative of all stakeholders and effective coordination will only be achievable through agreement with between all stakeholders on the role of the coordinator. The EMRC is in a good position to achieve this role. Figure 2 provides a summary of how the coordinator and other parties could work together to achieve efficient weed control.

Figure 2: Framework for Co-operative Weed Control



Although each Shire has its own Parks and Reserve section, Bushcare Officer and/or Environmental Officer, who are generally responsible for weed control programmes, the EMRC could act as a facilitator to coordinated weed control activities across the Region. Similarly, government agencies such as CALM, who have a large area of State forest within the Shire, could also work with the EMRC to ensure a coordinated approach to weed control. This central role of coordination fulfils the aims of the EMRC, to facilitate the development and implementation of regional strategies and to provide services and facilities for the benefit of the region.

5.2 Community Participation

The Shire of Mundaring encourage community involvement in weed control programmes on Council controlled reserves. The involvement of the community in volunteer works is important to the successful implementation of this Weed Control Strategy.

The managing agencies acknowledge the considerable efforts by the community in undertaking weed control works within the region. Existing volunteer and Friends groups have undertaken weed control projects successfully within the region for a significant period of time. Council should not only rely on volunteer effort alone. There is a need for the skills of a professional bush regenerator, either from within Council staff (e.g. Bushcare Officers, Environmental Officers) or from the private industry sector, to undertake a major share of the control works.

Both the managing agencies and volunteer groups should recognise that the successful implementation of significant weed control projects requires all works to be carefully planned. This will help ensure that activities are achievable and consistent with the planning and operations of the managing agencies.

Although the overall coordination of weed control within the region is the responsibility of the managing agencies (e.g. Local Government, State Government, EMRC), volunteer groups and the agencies should establish cooperative partnerships with agreed processes and outcomes when undertaking specific weed control projects. Where volunteer groups initiate a project, discussion should occur with the relevant managing agency to ensure that activities are consistent with the Shire's annual works programmes, implementation plans and monitoring processes.

The following flow chart (Figure 3) illustrates the process volunteer groups should follow when proposing to undertake significant weed control projects within the region. This process establishes a clear communication line between the managing agencies and the volunteer groups, which underpins the successful completion of a weed control project. This process is not intended to restrict volunteer actions. It is however, important that the managing agencies are informed of their actions.

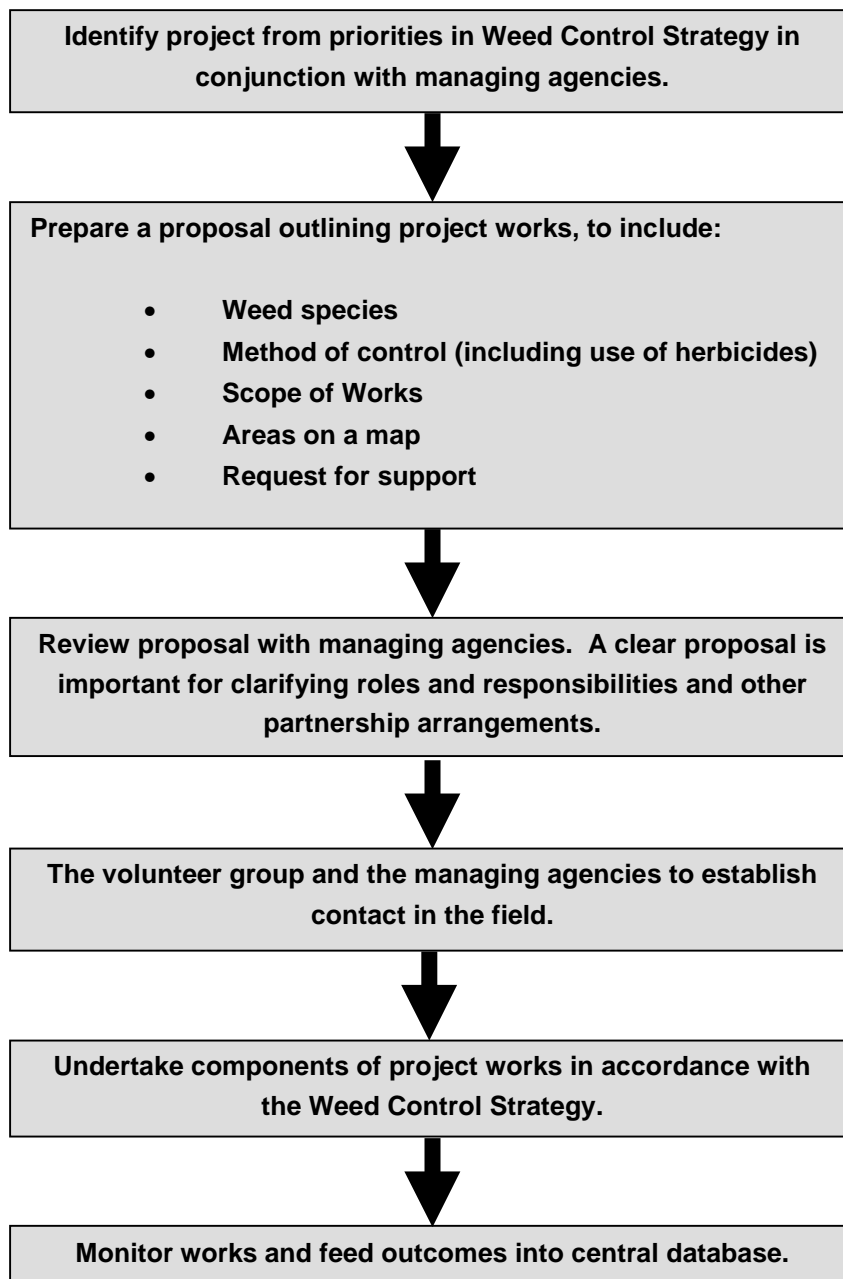
Members of the community wanting to be involved in weed control programmes in the region can do so by:

- joining the community volunteer groups within the Shire; and
- participating in activities in the Shire organised or co-ordinated by the managing agencies.

In recognition of the valuable role of community volunteers, the managing agencies could offer training and support strategies including:

- Training in the use of herbicides - safety, application methods, choosing the right herbicide;
- Bush regeneration training (e.g. APACE) - training in regeneration techniques and principles, as well as seed collection and storage ;
- Provision of equipment and resources - herbicides, weeding tools, mulch;
- Assistance with mapping and technical support - to allow updating of weed distribution maps and the database, and indicate where weed control works have been undertaken;
- Assistance with monitoring techniques; and
- Promotional assistance - to encourage other community members to join in and to promote the benefits to the Shire of weed control.

Figure 3: Process for Community Involvement in Weed Control Activities



5.3 Cost of Control Works

The following breakdown of costs (Table 8) is based on a flat rate of \$0.05/m² in *Good* to *Very Good* condition bushland and \$0.10/m² in *Poor* to *Very Poor* condition bushland, using broad-scale application of a selective herbicide such as Fusilade. The cost refers to a single application of herbicide, which may take more than one year to achieve coverage of the entire Reserve. The cost of follow-up herbicide application can only be calculated once the bushland condition is remapped following the initial herbicide application and other control activities.

Table 8: Estimated Cost of Control Works

RESERVE	CONDITION	AREA (m2)	ESTIMATED COST
Brookside Park Shire of Mundaring	Very good	4,401	\$220
	fair	25,570	\$1,279
	poor	71,846	\$7,185
	Very poor	11,178	\$1,118
	total	112,995	\$9,801
Hovea Conservation Park Shire of Mundaring	very good	375,769	\$18,788
	fair	12,128	\$606
	poor	54,921	\$5,492
	very poor	6,136	\$614
	total	448,954	\$25,501
North Darlington Reserve Shire of Mundaring	very good	80,594	\$4,030
	fair	76,410	\$3,821
	poor	154,954	\$15,495
	very poor	16,071	\$1,607
	total	328,029	\$24,953

The above costings represent an ideal level of funding, and perhaps do not reflect the reality of funding available within Council budgets for weed control. Where this is the case, a recommended approach is to budget for smaller amounts for each reserve every year (for example, \$5,000 for each reserve being targeted), with the view to undertaking control works over several years. Further, the costings above do not reflect the situation in many reserves where the main weed infestations are related to edge effects and the interiors are in good condition with few weed species. Where this is the case, the cost for weed control can be substantially decreased.

5.4 Ongoing Financial Obligations

Any initial weed control should be followed up with annual re-treatment, until such time the weed species is either eradicated or reduced in area and abundance to the extent that it no longer poses a threat to the ecological integrity of the bushland, and is unlikely to be able to re-establish because of competition from native flora. Similarly, monitoring of the effectiveness of weed control is also required to ensure resources are allocated efficiently. Therefore, any budget for weed control activities should extend over a 10 year period and incorporate:

- Funds for initial control activities;
- Funds for follow-up control activities – generally 25-50% of initial budget for 3- 5 years;

- Funds for monitoring effectiveness of control activities – relatively inexpensive through the use of feedback from community members involved in control activities. This will require further mapping of weed distribution and cover/abundance, which could be undertaken by Shire officers, trained volunteers or consultants; and
- Funds for co-ordination of weed control activities (Regional Weed Coordinator position).

5.5 Funding

Local Government Authorities (LGAs) are increasingly required to manage and conserve larger areas of bushland, often without budgets commensurate with the task. Further, LGAs spend a significantly higher amount of their annual budgets on environmental matters (EMRC, 2000), despite this not being considered a core activity. Unless legislative change is achieved, which includes environmental programmes as a core activity, it is essential that collaborative arrangements for funding the management and conservation of bushland, of which weed control is an important part, be sought. Co-operative funding agreements could be sought between the EMRC and:

- The Water Corporation – in water supply catchment areas;
- CALM – in nature reserves and state forests;
- The Western Australian Planning Commission – for all Crown land; and
- Agriculture Western Australia – in relation to control of Declared Weeds.

With the impending release of the State Weed Plan, produced by the Department of Agriculture, the focus on the importance of weed control will be increased. Although the State Weed Plan does not have any funding attached to it (S. Lloyd, pers. comm.), it does provide an overall framework for cooperation between government agencies, both state and local, to achieve effective weed control. The result of this focus may, in future years, result in the implementation of a funding strategy for such purposes, and can provide the impetus needed for changes in descriptions of LGA core activities. The State Weed Plan effectively places a higher level of importance on weed control, and those LGAs which are currently approaching weed control in an integrated manner should be the primary beneficiaries of any future funding.

An additional option is to levy the community that enjoy the semi-rural lifestyle on offer in the Shire of Mundaring to contribute to funding for environment based projects. Although these options are generally unpopular, they do represent a stable and long-term method of funds acquisition for weed control and other environment-based projects. Another option suggested in EMRC (2000) is to pursue incentive schemes such as rate relief for those land-owners who undertake weed control on their private land. This is particularly important as often it is private land which is the source of weeds within bushland areas.

Other potential sources of funding are discussed below.

5.5.1 Bushcare and the Natural Heritage Trust

Bushcare is a programme administered by Environment Australia and funded by the Natural Heritage Trust. It provides funding to projects which can demonstrate:

- A regional perspective;
- Activities are aimed at conservation of bushland;
- Projects are community-based;
- Have a 1-3 year time frame; and
- Detailed programmes have been developed for projects.

Further emphasis is placed on those areas which contain significant ecological communities and/or species, which are afforded protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. It is also necessary to demonstrate that the funding can achieve a demonstrable improvement in bushland condition. The use of a central database and monitoring of all weed control activities and their outcomes could assist in demonstrating this requirement for funding.

5.5.2 Gordon Reid Foundation

The Lotteries Commission's Gordon Reid Foundation for Conservation provides funding to help community groups conserve natural habitats and biodiversity. There are two grant categories, Minor Grants for up to \$5000 and Major Grants for grants over \$5000, which are available to incorporated organisations. Only local government authorities and non-profit community groups can apply for this type of funding. Projects that have previously received funding support from the Foundation include revegetation, direct seeding, fencing remnant vegetation, and controlling weeds, feral animals, disease and fire.

5.5.3 Financial Assistance Grants

Funds received through Financial Assistance Grants can only be used for recurrent core activities of local governments. Therefore, these are not suitable for weed control activities unless policy is altered to recognised such activities a part of the core role of Councils.

5.5.4 Greening WA

Greening WA Inc works with the community to protect and restore native vegetation at a greater rate than the rate of decline. Greening WA is particularly concerned with restoring degraded farmland, neglected wetlands and natural bushland. Greening WA is a member of the national Greening Australia federation. It is resourced through the Federal Government's Bushcare program, the Western Australian government, corporate sponsors and members. Greening WA are involved with administering a number of programs for revegetation and protection of remnant vegetation, such as the National Corridors of Green Program.

5.5.5 Development Contributions

It is possible to obtain funding for weed control projects through the placement of bonds on development applications within the Shires. These bonds could be for the purpose of protecting the environment from development related impacts, and the funds partially used for weed control activities. This was also recommended in EMRC (2000).

5.5.6 Corporate Sponsorship

There are a number of bushland management activities currently funded (either jointly or wholly) by corporate parties, such as Alinta Gas, Western Power, Alcoa, Woodside, insurance companies and banks. This avenue for funds for weed control needs to be explored more fully.

5.5.7 Festivals and Fundraiser Events

Community festivals and fairs and other such activities can serve several purposes. Two of relevance here are their role in bringing the community together and the potential for corporate sponsorship of such events. An Environment Festival or similar event on an annual basis (for example during Environment Week) with the joint aims of promoting the valuable work undertaken by the Shires and community and seeking corporate sponsorship for ongoing programmes.

5.5.8 Donations and Bequests

The *Conservation and Land Management Act 1984* provides for donations and bequests for conservation purposes. Although philanthropy is not as well established in Australia as other countries such as the United States of America, there is the potential, through promotion of the benefits, to seek funding through donations.

6.0 Priority Weed Mapping

Weed Control Strategy, Shire of Mundaring

6.1 Broadscale Weed Mapping

Broadscale weed maps were compiled from a number of sources, including community consultation (as outlined in Section 2.3), and were not limited to reserves vested in the Shire. During the Public Workshops, participants marked on the maps provided the location and infestation level of nominated weed species. In addition, interested members of the community who were unable to attend the workshops provided information by mail.

In addition to community-based information, weed distribution data was obtained from *weedBase* (Ecoscape, 1999) and Payne and Burns (1993). *weedBase* has records of weeds for the whole of Western Australia as recorded by the Western Australian Herbarium. For the purposes of this study, only records for the Shire of Mundaring were included. In the Payne and Burns (1993) study, weed distributions were documented by graduate students in all Reserves in the Shire of Mundaring, but the study was constrained by a short time frame and limited resources.

It should be noted that the broadscale weed maps represent a snap-shot in time and have been developed as a starting point for the future development of more detailed broadscale weed maps specific to the Shire. The information base on which they have been developed is limited, but it is anticipated that the depth of information will increase as more data is collected.

6.2 Reserve Selection for Detailed Mapping

As the size of the Shire prohibited detailed weed mapping of all reserves throughout the Shire because of costs, a selection of reserves were chosen in which detailed mapping could be undertaken. Initially, three reserves for the Shire were to be mapped. The reserves were selected using a set of ranked criteria, which were presented to Shire officers to enable short listing of suitable reserves within the Shire. The criteria were based upon the conservation value and size of the bushland, community interest, the threat posed by priority weeds, and the feasibility and importance of implementing a weed management plan. The criteria were:

- 1) Reserve size between 20 to 30 ha;
- 2) Reserve vested in the Shire of Mundaring;
- 3) Reserve has high conservation value;
- 4) Reserve has existing friends group;
- 5) Reserve has diversity of priority weeds for mapping;
- 6) Reserve has private land abutting;
- 7) Reserve has state government land abutting; and
- 8) Reserve does not have current management plan.

Using these criteria and reserves suggested by the Shire, a final list of three reserves from the Shire of Mundaring were selected, as shown in Table 9.

Table 9: Final list of reserves selected for detailed weed mapping

Reserve	Shire
Brookside Park	Mundaring
Hovea Conservation Park	Mundaring
North Darlington Reserves	Mundaring

6.3 Detailed Priority Weed Mapping

Weeds were mapped using a grid point survey method. An aerial photograph on a cadastral base was overlain with AMG co-ordinates, and a corresponding 100 m by 100 m grid. Weed sample points were located at the intersection of grid lines. This method was not always suitable, especially in narrow areas of reserves and creek-lines, where few of the grid points fell within the area to be sampled. In these situations, weeds were sampled approximately every 100 m along the area to be sampled. In addition, the sparse density of weeds in many reserves necessitated the use of opportunistic sampling in areas where localised infestations were noted, which would not have been recorded using the grid survey method alone.

The cover and abundance of each of the ten priority weeds was assessed using the Braun-Blanquet scale for estimating cover/abundance (Mueller-Dombois and Ellenberg, 1974) (see Table 10) within a search zone of 15 m radius surrounding each sample point. AMG co-ordinates were recorded at each sample point using a DGPS.

Table 10: Braun-Blanquet scale for estimating cover/abundance.

Source: Mueller-Dombois and Ellenberg (1974).

Braun-Blanquet Cover Abundance Scale	
R	solitary, with small cover (occurs once)
T	few, with small cover (<1%)
1	numerous, but less than 5% cover, or scattered with cover up to 5%
2	any number, with 5-25% cover
3	any number, with 25-50% cover
4	any number, with 50-75% cover
5	any number, with >75% cover

6.4 Bushland Condition Mapping

The bushland condition maps were prepared for each reserve using the criteria of Kaesehagen (1995), as shown in Table 11. Bushland condition was recorded at each weed survey point, and was also mapped for the entire reserve in the field with the aid of colour aerial photos. Cross-referencing the bushland condition recorded at known sample points with field maps of bushland condition across the entire reserve ensured that accurate bushland condition maps were produced. Bushland condition maps are intended to be used as a baseline for assessing the success of weed control strategies.

Bushland condition maps will not always necessarily closely correlate with maps of weed infestations, as bushland condition maps also consider other factors such as the structural integrity of the bushland and signs of disturbance such as clearing, disease and tracks. This should be considered when comparing weed distribution maps and bushland condition maps. Another factor which should be considered when comparing the bushland condition maps with the weed distribution maps, is that the weed distribution maps are concerned only with 10 priority weed species. There may be an area within a reserve mapped as being in *Very poor* condition, which does not contain any of the 10 priority weed species mapped, but may well contain other weed species that have affected the condition rating.

Table 11: Bushland condition scale used for mapping.

Source: Kaesehagen (1995).

CONDITION	CRITERIA
Very Good – Excellent	<ul style="list-style-type: none"> • 80 – 100% Native Flora composition • Vegetation structure intact or nearly so • Cover/abundance of weeds less than 5% • Minor signs of disturbance
Fair – Good	<ul style="list-style-type: none"> • 50 – 80% Native Flora composition • Vegetation structure modified or nearly so • Cover/abundance of weeds 5 – 20% • Disturbance influence moderate
Poor	<ul style="list-style-type: none"> • 20 – 50% Native Flora composition • Vegetation structure completely modified • Cover/abundance of weeds 20 – 60% • Disturbance incidence high
Very Poor	<ul style="list-style-type: none"> • 0 – 20% Native Flora composition • Vegetation structure disappeared • Cover/abundance of weeds 60 – 100% • Disturbance incidence very high

6.5 Map Production

DGPS co-ordinates for each sampling site and the estimates of cover-abundance of weeds were imported from Excel 95 into ArcView GIS 3.2, and used to produce cover-abundance/distribution maps of priority weeds. Bushland condition maps were digitised on Microstation SE with the aid of colour aerial photos and imported to ArcView GIS 3.2.

6.6 Results of Weed Mapping

6.6.1 Broadscale Weed Maps

Although it was intended to produce a broadscale weed map for each of the 10 priority weed species listed in Table 1, the priority weed species list for the Shire was revised based on further public input after the mapping workshops had been conducted. Maps of *Gladiolus undulatus* (Wavy Gladiolus) and *Allium triquetrum* (Three-cornered Garlic) were produced for the Shire of Mundaring, although they too were not included on the final list of priority weed species.

Figures 4 to 15 present the broadscale weed maps for recorded locations (see section 2.3 and 6.1) of nine of the ten priority weeds in the Shire of Mundaring.

Watsonia spp., *Leptospermum laevigatum*, *Chamaecytisus palmensis*, *Freesia* aff. *Leichtlinii*, *Asparagus asparagoides* and *Rubus* spp were mapped as widespread within the Shire, with *Homeria flaccida* locally abundant within John Forrest National Park, and *Eragrostis curvula* largely confined to road verges.

6.6.2 Detailed Reserve Weed Maps

Most reserves surveyed contained only a few of the priority weed species, with an average of just over 3 priority species recorded per reserve. *Eragrostis curvula* (African Love Grass) and *Watsonia* spp. were the most ubiquitous species, occurring in 7 and 6 of the reserves, respectively. Consequently, these species have the highest priority of the 11 species for control. All other species were only recorded at a maximum of two reserves. *Homeria flaccida* (One-leaf Cape Tulip) and *Freesia* aff. *Leichtlinii* were not recorded in any of the reserves, despite intensive searching at designated search points.

Brookside Park

Brookside Park was a narrow reserve encompassing bushland and an unnamed tributary of Jane Brook. The condition of the reserve was generally *Poor*, particularly along the creek line, with some areas of upland vegetation in *Fair - Good* condition (Figure 16). The *Very Poor* condition of the creek line in the area bounded by Owen Road, Byfield Road and Brookside Lane was due to the high abundance of weeds such as *Watsonia*, Blackberry, Bridal Creeper and Kikuyu Grass along the creek bed.

Priority weed species found in Brookside Park were Bridal Creeper (Figure 17), African Love Grass (Figure 18), Blackberry (Figure 19) and *Watsonia* (Figure 20). Of these, *Watsonia* was present in the highest numbers, concentrated along the creek line, with some individuals found in upland bushland. A large, dense infestation of *Watsonia* was noted just west of the reserve.

Hovea Conservation Park

The majority of bushland within Hovea Conservation Park was in *Very Good - Excellent* condition, with a high diversity of understorey species and few weeds. Priority weeds were generally limited to disturbed areas near major tracks and rehabilitated quarrying sites or gravel pits. All of the *Poor* and *Very Poor* condition areas shown in Figure 21 represent disused, generally rehabilitated gravel pits. The bushland was of such high quality that even road verges showed very low levels of weed infestation.

The disused gravel pit in the southwest portion of Parcel P211451, west of Brooking Road, represented the only major infestation of *Tagasaste* noted within the three reserves sampled in the Shire of Mundaring (Figure 22). In this area, *Tagasaste* infestation was dense, at up to 75% cover, and other major shrub species were also exotic. African Love Grass was noted at low cover/abundance values in disturbed areas at the periphery of the reserves (Figure 23). One incidence of *Watsonia* was noted within an area of *Very Poor* condition (Figure 24).

North Darlington Reserves

The condition of the North Darlington Reserves varied between reserves, but was fairly consistent within each reserve (Figure 25). Parcel Nos P208556 and P208558 were generally in *Very Good - Excellent* condition, with the major sites for weed invasion occurring along road verges, a granite outcrop, and the creek line. Although few weeds occurred in Parcels P208589, P208603 and P208619, the condition of bushland was generally *Poor to Fair - Good*, due to the evidence of past disturbances such as logging, leading to a lack of understorey species, low diversity, absent, dying or unhealthy overstorey species, and large areas of bare ground. Gravel pits and car parks contributed to the area of *Very Poor* condition in Parcels P208603 and P208619.

A single Tagasaste plant was found in Parcel P208603 (Figure 26). African Love Grass occurred along road verges and adjacent to degraded areas (Figure 27). *Watsonia* occurred in low numbers throughout a wetland area adjacent to Great Eastern Highway in Parcel P208603, and at a small number of locations along the creek line and adjacent to the road in Parcel P208556 (Figure 28).

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Appendix One – Contributors to Weed Selection and Mapping

Weed Control Strategy, Shire of Mundaring

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Anita Vandenberg	Friends of Clare Road
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Jan Gathe	Shire of Kalamunda
Gillian Smith	Shire of Kalamunda
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Margaret Fowler	Shire of Kalamunda
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Appendix Two – General Weed Species List for Both Shires

Weed Control Strategy, Shire of Mundaring

The following table lists, in alphabetical order, all of the weed species identified in the Shire of Mundaring, as determined through the sources listed at the end of the table.

Scientific Name	Common Name	Source	Rating	
			EWSWA	Managing Perth's Bushland
<i>Acacia baileyana</i>	Cootamundra Wattle	1,2,3,5,6	L	3
<i>Acacia cyclops</i>	Coastal Wattle	2,6	TBA	TBA
<i>Acacia decurrens</i>	Early Black Wattle	1,4,5,6,7	Mi	3
<i>Acacia iteaphylla</i>	Flinders Range Wattle	1,5,6,7	L	3
<i>Acacia longifolia</i>	Sydney Golden Wattle	1,3,6,7	Mo	3
<i>Acacia podalyriaefolia</i>	Queensland Silver Wattle	1,3,5,6,7	L	3
<i>Acacia pycnantha</i>	Golden Wattle	1,3,4,5,6,7	L	3
<i>Agonis flexuosa</i>	Peppermint Tree	3,5	Mo	3
<i>Aira cupaniana</i>	Hairgrass	1,3,4	Mo	3
<i>Albica canadensis</i>		4	L	TBA
<i>Allium triquetrum</i>	Three-cornered Garlic	3,5,6	Mo	3
<i>Amaranthus albus</i>	Tumbleweed	3,4	L	3
<i>Anagallis var. arvensis</i> & <i>var. caerulea</i>	Pimpernel	3,4,5	Mo	3
<i>Arctotheca calendula</i>	Capeweed	2,3,4,5,6	Mo	3
<i>Arrhenatherum elatius var. bulbosum</i>	Bulbous Oatgrass, Onion Couch	3	TBA	TBA
<i>Arundo donax</i>	False Bamboo	4,5,6,7	TBA	2
<i>Asparagus asparagoides</i>	Bridal Creeper	2,3,5,6,7	H	1

Shire	Both	Both Shires	EWSWA	H	High priority	Source	1	Shire of Kalamunda, 1992
	Kal	Kalamunda		Mo	Moderate priority		2	Payne and Burns, 1993
	Mun	Mundaring		Mi	Mild priority		3	Bean, 1999
				L	Low priority		4	CALM, 1999
			MPB	1	Major weeds		5	Armstrong, 1993
				2	Nuisance weeds		6	Community, Shire Officers
				3	Minor weeds		7	Wildflower Society, ?
				TBA	Unrated to date			

Scientific Name	Common Name	Source	Rating	
			EWSW A	Managing Perth's Bushland
<i>Asparagus officinalis</i>	Asparagus	4	L	1
<i>Asphodelus fistulosus</i>	Onion Weed	2,3	Mi	1
<i>Avena barbata</i>	Bearded Oat	3	Mo	1
<i>Babiana disticha</i>	Baboon Flower	4,6,7	Mi	1
<i>Babiana stricta</i>	Baboon Flower	2,3,5	L	3
<i>Baeometra uniflora</i>		4	L	3
<i>Bambusa</i> spp.	Bamboo	1,2,3	TBA	TBA
<i>Bartsia trixago</i>		4	TBA	TBA
<i>Bidens pilosa</i>	Cobbler's Pegs	4	TBA	TBA
<i>Brassica tournefortii</i>	Wild Turnip	2,3	H	3
<i>Briza maxima</i>	Blowfly Grass	3,4,5,6	Mo	TBA
<i>Briza minor</i>	Shivery Grass	3,4,5	Mo	2
<i>Bromus catharticus</i>	Prairie Grass	3	L	3
<i>Bromus hordeaceus</i>	Soft Brome	4,5	L	3
<i>Calotropis procera</i>	Calotrope	6	H	TBA
<i>Carderia draba</i>	Hoary Cress	3	L	TBA
<i>Centaurium tenuiflorum</i>	Slender Centaury	4	L	TBA
<i>Chamaecytisus palmensis</i>	Tagasaste	1,3,5,6,7	L	2
<i>Chamelaucium uncinatum</i>	Geraldton Wax	3,5	Mo	2
<i>Chasmanthe floribunda</i>	African Cornflag	3,4,6	Mo	3
<i>Chenopodium album</i>	Fat Hen	2	L	3
<i>Chrysanthemoides monilifera</i>	Boneseed, Bitou Bush	4	Mo	3
<i>Cichorium intybus</i>	Chicory	4	L	TBA
<i>Colocasia esculenta</i>	Taro	5,6	Mo	3
<i>Conyza albida</i>	Tall Fleabane	2,3,4,5	L	3
<i>Conyza bonariensis</i>	Flaxleaf Fleabane	2,3,4,5,6,7	L	3

Shire	Both	Both Shires	EWSWA	H	High priority	Source	1	Shire of Kalamunda, 1992
	Kal			Kalamunda	Mo		Moderate priority	2
	Mun	Mundaring		Mi	Mild priority		3	Bean, 1999
				L	Low priority		4	CALM, 1999
			MPB	1	Major weeds		5	Armstrong, 1993
				2	Nuisance weeds		6	Community, Shire Officers
				3	Minor weeds		7	Wildflower Society, ?
				TBA	Unrated to date			

Scientific Name	Common Name	Source	Rating	
			EWSWA	Managing Perth's Bushland
<i>Corrigiola litoralis</i>	Strapwort	4	L	3
<i>Cortaderia selloana</i>	Pampas Grass	1,2,3,4,5,6,7	H	1
<i>Crassula alata</i>		4	L	TBA
<i>Crassula natans</i>		4	Mo	3
<i>Crepis foetida</i>	Hawks Beard	4	L	3
<i>Cucumis myriocarpus</i>	Prickly Paddy Melon	2,4	TBA	3
<i>Cynodon dactylon</i>	Couch	3,4,6	Mo	1
<i>Cyperus congestus</i>	Dense Flat Sedge	4,5	Mo	2
<i>Cyperus tenellus</i>	Tiny Flat Sedge	4	Mo	TBA
<i>Cyperus tenuiflorus</i>	Scaly Sedge	4	L	TBA
<i>Datura ferox</i>	Fierce Thornapple, Longspine Thornapple	4	L	TBA
<i>Datura stramonium</i>	Common Thornapple, Jimson Weed	2	L	TBA
<i>Digitaria sanguinalis</i>	Crab Grass	2,6	L	3
<i>Diploxys muralis</i>	Wall Rocket	4	L	3
<i>Dipogon lignosus</i>	Dolichos Pea	4,5	L	3
<i>Dischisma capitata</i>		4	Mo	3
<i>Dittrichia graveolens</i>	Stinkwort	4,5	Mi	3
<i>Echium plantagineum</i>	Paterson's Curse	1,2,3,5,6,7	Mo	3
<i>Ehrharta calycina</i>	Perennial Veld Grass	1,3,5,6	H	1
<i>Ehrharta longiflora</i>	Annual Veld Grass	2,4,5	Mo	3
<i>Eragrostis cilanensis</i>	Stinkgrass	3,4	L	TBA
<i>Eragrostis curvula</i>	African Love Grass	1,3,5,6	H	1
<i>Erodium botrys</i>	Long Storksbill	2,3,5	L	3
<i>Erodium moschatum</i>	Musky Storksbill	3,4	L	TBA
<i>Eucalyptus globulus</i>	Blue Gum	2	L	TBA
<i>Festuca arundinacea</i>	Tall Fescue	4	L	TBA
<i>Ficus carica</i>	Edible Fig	2,3,4,5	Mo	1
<i>Filago gallica</i>	Slender Cudweed	3,4	L	3

Shire	Both	Both Shires	EWSWA	H	High priority	Source	1	Shire of Kalamunda, 1992
	Kal	Kalamunda		Mo	Moderate priority		2	Payne and Burns, 1993
	Mun	Mundaring		Mi	Mild priority		3	Bean, 1999
				L	Low priority		4	CALM, 1999
			MPB	1	Major weeds		5	Armstrong, 1993
				2	Nuisance weeds		6	Community, Shire Officers
				3	Minor weeds		7	Wildflower Society, ?
				TBA	Unrated to date			

Scientific Name	Common Name	Shire	Source	Rating	
				EWSWA	Managing Perth's Bushland
<i>Freesia aff. leichtlinii</i>	Freesia	Both	2,3,5,6,7	H	1
<i>Fumaria capreolata</i>	White Fumitory, Climbing Fumitory	Both	3,4,6	Mi	2
<i>Galium divaricatum</i>	Slender Bedstraw	Mun	4	Mo	3
<i>Gastridium phleoides</i>	Nit Grass	Mun	4	L	TBA
<i>Genista linifolia</i>	Flaxleaf Broom	Both	3,4,5,6	L	3
<i>Gladiolus alatus</i>		Mun	4	L	TBA
<i>Gladiolus caryophyllaceus</i>	Wild Gladiolus	Both	4,5,6	Mo	1
<i>Gladiolus undulatus</i>	Wavy Gladiolus	Both	5,6,7	Mo	2
<i>Gomphocarpus fruticosus</i>	Swan Plant, Narrow Cottonbush, Cottonbush	Both	1,4,5,6,7	Mo	3
<i>Hedera helix</i>	Ivy	Both	2,5	L	3
<i>Hedypnois rhagadioloides</i>	Cretan Weed	Mun	3	Mi	TBA
<i>Hesperantha falcata</i>		Mun	3,4	Mo	1
<i>Hibiscus diversifolius</i>		Mun	4	Mo	3
<i>Holcus lanatus</i>	Yorkshire Fog	Mun	4	Mo	3
<i>Homeria flaccida</i>	One Leaf CapeTulip	Both	2,3,6,7	H	1
<i>Hordeum leporinum</i>	Barley Grass	Both	3,6	Mo	3
<i>Hyparrhenia hirta</i>	Tambookie Grass	Both	6	H	1
<i>Hypochaeris glabra</i>	Smooth Cat's Ear	Both	2,3,4,5,6	Mo	3
<i>Ipomoea cairica</i>	Mile-A-Minute	Both	3,5	Mi	3
<i>Ipomoea indica</i>	Morning Glory	Both	1,2,3,5,6	Mi	3
<i>Isolepis prolifera</i>	Budding Club Rush	Mun	4	Mo	2
<i>Juncus bufonius</i>	Toad Rush	Both	4,5	Mo	3
<i>Juncus microcephalus</i>		Both	3,4,5	Mi	2

Shire	Both	Both Shires	EWSWA	H	High priority	Source	1	Shire of Kalamunda, 1992
	Kal	Kalamunda		Mo	Moderate priority		2	Payne and Burns, 1993
	Mun	Mundaring		Mi	Mild priority		3	Bean, 1999
				L	Low priority		4	CALM, 1999
			MPB	1	Major weeds		5	Armstrong, 1993
				2	Nuisance weeds		6	Community, Shire Officers
				3	Minor weeds		7	Wildflower Society, ?
				TBA	Unrated to date			

Scientific Name	Common Name	Shire	Source	Rating	
				EWSWA	Managing Perth's Bushland
<i>Kickxia elatine</i>	Sharp-leaved Fluellen, Pointed Toadflax	Both	4,5	TBA	TBA
<i>Lactuca serriola</i>	Prickly Lettuce	Both	4	Mo	3
<i>Lathyrus tingitanus</i>	Perennial Sweet Pea, Tangier Pea	Both	3,4,5,6,7	L	3
<i>Lavandula stoechas</i>	Topped Lavender, Spanish Lavender	Both	3,4,5,6	L	3
<i>Leptospermum laevigatum</i>	Victorian Tea Tree	Both	3,4,5,6,7	H	1
<i>Lespedeza juncea</i>		Mun	4	TBA	TBA
<i>Linum trigynum</i>	French Flax	Both	4,5	L	3
<i>Lolium perenne</i>	Perennial Ryegrass	Mun	3	L	3
<i>Lotus angustissimus</i>	Narrowleaf Trefoil	Mun	4	L	3
<i>Lotus suaveolens</i>	Hairy Bird's-foot Trefoil	Both	4	L	TBA
<i>Lupinus angustifolius</i>	Narrow Leaf Lupin	Both	3,4,5	Mi	3
<i>Lupinus cosentinii</i>	Pearl Lupin	Both	2,3,5,6	H	1
<i>Medicago arabica</i>	Spotted Medic	Mun	3	L	TBA
<i>Medicago polymorpha</i>	Burr Medic	Both	3,4	Mi	3
<i>Melilotus indica</i>	Common Melilot	Mun	3	Mo	3
<i>Melinis repens</i>	Natal Redtop	Both	3,4,5,6,7	Mi	TBA
<i>Misopates orontium</i>	Lesser Snapdragon	Both	4	L	3
<i>Monadenia bracteata</i>	South African Orchid	Both	4,5	Mo	3
<i>Monopsis debilis</i>		Mun	4	L	TBA
<i>Narcissus papyraceus</i>	Paperwhite	Mun	4	L	TBA
<i>Narcissus tazetta</i>	Jonquil	Mun	4	L	TBA
<i>Nothoscordum gracile</i>	False Onion Weed	Mun	6	L	TBA

Shire Both Both Shires
Kal Kalamunda
Mun Mundaring

EWSWA H High priority
Mo Moderate priority
Mi Mild priority
L Low priority
MPB 1 Major weeds
2 Nuisance weeds
3 Minor weeds
TBA Unrated to date

Source 1 Shire of Kalamunda, 1992
2 Payne and Burns, 1993
3 Bean, 1999
4 CALM, 1999
5 Armstrong, 1993
6 Community, Shire Officers
7 Wildflower Society, ?

Scientific Name	Common Name	Shire	Source	Rating	
				EWSWA	Managing Perth's Bushland
<i>Oenothera mollissima</i>		Mun	4	L	TBA
<i>Opuntia</i> spp.		Both	1,2,3,5	TBA	TBA
<i>Orobanche minor</i>	Lesser Broomrape	Both	4,5	Mo	3
<i>Oxalis corniculata</i>	Yellow Wood Sorrel	Mun	2,3	L	TBA
<i>Oxalis corymbosa</i>	Pink Shamrock, Lilac Oxalis	Both	3,4,5	L	TBA
<i>Oxalis glabra</i>	Finger Leaf Oxalis	Both	3,4,5	Mi	3
<i>Oxalis pes-caprae</i>	Soursob, Sour Grass	Both	2,3,5,6	Mi	2
<i>Oxalis purpurea</i>	Four O'clock, Purple Wood Sorrel	Both	3,4,5	L	3
<i>Parentucellia latifolia</i>	Common Bartsia	Both	3,4	Mo	3
<i>Parkinsonia aculeata</i>	Parkinsonia, Jerusalem Thorn	Mun	4	Mo	TBA
<i>Paspalum dilatatum</i>	Paspalum	Both	2,3,5,6	Mo	2
<i>Paspalum distichium</i>	Water Couch	Both	5,6	Mo	2
<i>Paspalum urvillei</i>	Yassey grass	Both	4,5,6	L	2
<i>Pennisetum clandestinum</i>	Kikuyu Grass	Both	1,2,3,5,6	Mo	1
<i>Pennisetum macrourum</i>	African Feather Grass	Both	1,4,5,6	Mo	TBA
<i>Pennisetum setaceum</i>	Fountain Grass	Both	3,4,6,7	Mi	3
<i>Pennisetum villosum</i>	Feather Top	Mun	4	L	3
<i>Petrorhagia velutina</i>	Velvet Pink	Both	3,4,5	Mi	3
<i>Phyllopodium cordatum</i>		Mun	3	Mi	TBA
<i>Pinus</i> spp.		Both	2,3,5	Mo	3
<i>Piptatherum miliaceum</i>	Rice Millet	Mun	3	L	3
<i>Plantago lanceolata</i>	Ribwort Plantain	Both	2,3,4,5	L	3

Shire	Both	Both Shires	EWSWA	H	High priority	Source	1	Shire of Kalamunda, 1992
	Kal	Kalamunda		Mo	Moderate priority		2	Payne and Burns, 1993
	Mun	Mundaring		Mi	Mild priority		3	Bean, 1999
				L	Low priority		4	CALM, 1999
			MPB	1	Major weeds		5	Armstrong, 1993
				2	Nuisance weeds		6	Community, Shire Officers
				3	Minor weeds		7	Wildflower Society, ?
				TBA	Unrated to date			

Scientific Name	Common Name	Shire	Source	Rating	
				EWSWA	Managing Perth's Bushland
<i>Podalyria sericea</i>		Both	3,4,5	L	3
<i>Polycarpon tetraphyllum</i>	Four-leaf Allseed	Mun	4	L	3
<i>Polygala myrtifolia</i>	Myrtle-leaved Milkweed	Both	3,5	Mo	3
<i>Polygonum aviculare</i>	Wireweed	Both	2,6	L	3
<i>Poa annua</i>	Winter Grass	Mun	2,3	Mi	3
<i>Populus alba</i>	White Poplar	Both	5,6	TBA	3
<i>Pseudognaphalium luteoalbum</i>	Jersey Cudweed	Mun	4	Mo	3
<i>Raphanus raphanistrum</i>	Wild Raddish	Both	2,3,4,5,6,7	Mi	TBA
<i>Retama monosperma</i>		Mun	4	TBA	TBA
<i>Rhamnus alaternus</i>	Buckthorn	Mun	4	Mo	3
<i>Ricinus communis</i>	Castor Oil Bush	Both	1,2,3,5,6,7	L	3
<i>Robinia pseudoacacia</i>	Black Locust	Mun	4	L	TBA
<i>Romulea rosea</i>	Guildford Grass, Onion Grass	Both	2,3,4,5,6	H	1
<i>Rubus discolor</i>	Blackberry	Both	2,3,4,6	M	1
<i>Rubus fruticosus</i>	Blackberry	Both	1,6	L	TBA
<i>Rubus selmeri</i>	Blackberry	Both	4,5,6	Mo	1
<i>Rubus ulmifolius</i>	Blackberry	Both	4,6	Mo	1
<i>Rumex crispus</i>	Curled Dock	Both	2,5	Mi	3
<i>Salix babylonica</i>	Weeping Willow	Both	5,6	TBA	3
<i>Salvia verbenaca</i>	Wild Sage	Mun	4	L	TBA
<i>Schizolobium parahyba</i>	Yellow Jacaranda	Both	2,3,5	TBA	TBA
<i>Senecio vulgaris</i>	Common Groundsell	Mun	4	L	3
<i>Solanum nigrum</i>	Black Berry Nightshade	Both	2,3,5,6	Mo	2
<i>Solanum sodomaeum</i>	Apple of Sodom	Mun	2	Mo	3

Shire	Both	Both Shires	EWSWA	H	High priority	Source	1	Shire of Kalamunda, 1992
	Kal			Kalamunda	Mo		Moderate priority	2
	Mun	Mundaring		Mi	Mild priority		3	Bean, 1999
				L	Low priority		4	CALM, 1999
			MPB	1	Major weeds		5	Armstrong, 1993
				2	Nuisance weeds		6	Community, Shire Officers
				3	Minor weeds		7	Wildflower Society, ?
				TBA	Unrated to date			

Scientific Name	Common Name	Shire	Source	Rating	
				EWSWA	Managing Perth's Bushland
<i>Sonchus oleraceus</i>	Common Sowthistle	Both	4,5	Mo	3
<i>Sorghum sudanense</i>	Sudan Grass	Mun	4	L	3
<i>Sparaxis bulbifera</i>	Harlequin Flower	Both	3,4,5,6	H	1
<i>Spergula arvensis</i>	Corn Spurry	Both	4	L	3
<i>Sporobolus indicus var. capensis</i>	Paramatta Grass, Rat's Tail	Mun	3	L	TBA
<i>Stachys arvensis</i>	Stagger Weed	Both	3,4,5	L	3
<i>Stenotaphrum secundatum</i>	Buffalo Grass	Both	2,3,4,5	Mo	1
<i>Taraxacum officinale</i>	Dandelion	Mun	4	L	TBA
<i>Thunbergia alata</i>	Black-eyed Susan	Both	5,6	TBA	3
<i>Tribolium uniola</i>		Both	3,4,5	Mo	3
<i>Trifolium angustifolium</i>	Narrow Leaf Clover	Both	3,4,5,7	L	3
<i>Trifolium campestre</i>	Hop Clover	Both	3,5	Mo	3
<i>Trifolium dubium</i>	Suckling Clover	Mun	3,4	Mo	TBA
<i>Tritonia lineata</i>		Mun	4	L	3
<i>Tropaeolum majus</i>	Nasturtium	Both	2,3,5	L	3
<i>Typha orientalis</i>	Bulrush	Both	2,3,4,5	H	1
<i>Urospermum picroides</i>	False Hawkbit	Mun	3	Mo	3
<i>Ursinia anthemoides</i>	Ursinia	Both	3,4,5	Mo	3
<i>Vellereophyton dealbatum</i>	White Cudweed	Both	4,5	Mo	3
<i>Verbascum virgatum</i>	Twiggy Mullerin	Mun	4	L	3
<i>Veronica persica</i>	Creeping Speedwell	Mun	4	L	TBA
<i>Vicia sativa</i>	Common Vetch	Both	5,6	Mo	3
<i>Vinca major</i>	Blue Periwinkle	Both	3,5	L	3
<i>Vitis vinifera</i>		Mun	4	TBA	TBA
<i>Vulpia bromoides</i>	Squirrels Tale Fescue	Both	4	Mo	3

Shire	Both	Both Shires	EWSWA	H	High priority	Source	1	Shire of Kalamunda, 1992
	Kal	Kalamunda		Mo	Moderate priority		2	Payne and Burns, 1993
	Mun	Mundaring		Mi	Mild priority		3	Bean, 1999
			MPB	L	Low priority		4	CALM, 1999
				1	Major weeds		5	Armstrong, 1993
				2	Nuisance weeds		6	Community, Shire Officers
				3	Minor weeds		7	Wildflower Society, ?
				TBA	Unrated to date			

Scientific Name	Common Name	Shire	Source	Rating	
				EWSWA	Managing Perth's Bushland
<i>Watsonia borbonica</i>		Both	4,6,7	Mo	TBA
<i>Watsonia bulbillifera</i>	Watsonia	Both	1,3,5,6,7	H	1
<i>Watsonia marginata</i>	Watsonia	Both	2,4,6,7	Mo	1
<i>Watsonia meriana</i>	Watsonia	Both	4,6,7	Mo	1
<i>Xanthium spinosum</i>	Bathurst Burr	Mun	4	L	TBA
<i>Zantedeschia aethiopica</i>	Arum Lily	Both	1,2,5,6,7	H	1

Shire	Both	Both Shires	EWSWA	H	High priority	Source	1	Shire of Kalamunda, 1992
	Kal	Kalamunda		Mo	Moderate priority		2	Payne and Burns, 1993
	Mun	Mundaring		Mi	Mild priority		3	Bean, 1999
				L	Low priority		4	CALM, 1999
			MPB	1	Major weeds		5	Armstrong, 1993
				2	Nuisance weeds		6	Community, Shire Officers
				3	Minor weeds		7	Wildflower Society, ?
				TBA	Unrated to date			

Appendix Three – Priority Weed Species for Both Shires

Weed Control Strategy, Shire of Mundaring

Scientific Name	Common Name	Shire	Rating		Score
			EWSWA	Managing Perth's Bushland	
<i>Asparagus asparagoides</i>	Bridal Creeper	Both	High	1	6
<i>Calotropis procera</i>	Calotrope	Both	High	Unrated	6
<i>Cortaderia selloana</i>	Pampas Grass	Both	High	1	6
<i>Ehrharta calycina</i>	Perennial Veld Grass	Both	High	1	6
<i>Eragrostis curvula</i>	African Love Grass	Both	High	1	6
<i>Freesia aff. Leichtlinii</i>	Freesia	Both	High	1	6
<i>Homeria flaccida</i>	One Leaf CapeTulip	Both	High	1	6
<i>Hyparrhenia hirta</i>	Tambookie Grass	Both	High	1	6
<i>Leptospermum laevigatum</i>	Victorian Tea Tree	Both	High	1	6
<i>Lupinus cosentinii</i>	Pearl Lupin	Both	High	1	6
<i>Romulea rosea</i>	Guildford Grass, Onion Grass	Both	High	1	6
<i>Sparaxis bulbifera</i>	Harlequin Flower	Both	High	1	6
<i>Typha orientalis</i>	Bulrush	Both	High	1	6
<i>Watsonia bulbifera</i>	Watsonia	Both	High	1	6
<i>Zantedeschia aethiopica</i>	Arum Lily	Both	High	1	6
<i>Avena barbata</i>	Bearded Oat	Mun	Moderate	1	5
<i>Avena fatua</i>	Wild Oat	Both	Moderate	1	5
<i>Cynodon dactylon</i>	Couch	Both	Moderate	1	5
<i>Ficus carica</i>	Edible Fig	Both	Moderate	1	5
<i>Gladiolus caryophyllaceus</i>	Wild Gladiolus	Both	Moderate	1	5
<i>Hesperantha falcata</i>		Mun	Moderate	1	5
<i>Pennisetum clandestinum</i>	Kikuyu Grass	Both	Moderate	1	5
<i>Rubus discolor</i>	Blackberry	Both	Moderate	1	5
<i>Rubus selmeri</i>	Blackberry	Both	Moderate	1	5
<i>Rubus ulmifolius</i>	Blackberry	Both	Moderate	1	5
<i>Stenotaphrum secundatum</i>	Buffalo Grass	Both	Moderate	1	5
<i>Watsonia marginata</i>	Watsonia	Both	Mod	1	5
<i>Watsonia meriana</i>	Watsonia	Both	Mod	1	5

Shire Both Both Shires
 Kal Kalamunda
 Mun Mundaring

EWSWA H High priority
 Mo Moderate priority
 Mi Mild priority
 L Low priority

MPB 1 Major weeds
 2 Nuisance weeds
 3 Minor weeds
 TBA Unrated to date

Appendix Five – Bradley Approach to Weed Control

Weed Control Strategy, Shire of Mundaring

(from Bradley, 1971, Bradley 1988 and Buchanan, 1989)

The aim of bush regeneration by the Bradley Method is the systematic removal of weeds to allow native plants to re-establish themselves when and where they choose. This method does not involve replanting – simply the gradual removal of weeds so that no large openings are made. This makes the Bradley method ideal for many situations, such as where native plants are able to colonise the site by seeds or vegetative means, areas sensitive to erosion and areas likely to be over-used.

UNDERLYING PRINCIPLES

Always work from areas with native plants towards weed-infested areas.

This makes good ecological sense. If you are relying on natural regeneration then choose areas that will contain the maximum number of existing native plants and native plant seeds, and minimal weed seeds and vegetative reproductive organs of weeds.

Make minimal disturbance.

Application of this principal depends on the native species to regenerate. Many plant communities (both weeds and native) need disturbed and sunlit soil for successful regeneration. However, by following the 1st principle above, any weed regeneration should be minimised. Any soil that is disturbed should be returned in its original layers, thus ensuring that any native seed stored in the soil will still be on top. This principle also applies to the application of natural plant mulch in the work area – where a gap is left as a result of weeding, it is recommended that mulch from surrounding areas be added to the gap. This helps to minimise weed regeneration.

Let native plant regeneration dictate the rate of weed removal.

The ability to follow this principle may depend on the amount of time and money committed to a particular project. If few weeds and many native plants regenerate, or if the ground remains weed free, little time will need to be spent re-weeding a site, allowing time to be spent on other sites. If masses of weeds regenerate then a lot of time will be required re-weeding so that regenerating native plants can flourish.

DEVELOPING WORK PLANS

Prevent deterioration of good areas.

Start by removing weeds scattered through otherwise clean bush. Practically no follow up work will be needed, but it should be checked once or twice a year.

Improve the next best area.

Once you are confident you have prevented deterioration of better condition bush, you can start work on thicker patches of weed. Choose a place you can visit easily and often, where thick native growth is pushing up against weeds, preferably no worse than one weed species to every two native plant species. Start with a strip approximately 12 feet wide and no longer than can be managed with monthly weeding days. If the area to be cleared of weeds runs up a slope which may erode, clear a number of smaller patches instead.

Hold the advantage gained.

Resist the temptation to push deeper into the weeds before regenerating natives have stabilised each cleared area. The natives do not need to be very tall, but they usually need to form an almost complete ground cover. Weeds will always nearly keep germinating until this is achieved. These newly regenerated areas are most vulnerable to weed reinvasion and so must be re-weeded as required. If weeding occurs adjacent to the regenerating area prior to sufficient new cover light from adjacent cleared patches can affect the regeneration of natives.

Cautiously move into the really bad areas.

When new growth coming up consists almost entirely of native plants with only a few weeds among them, it is safe to move deeper into the weeds. Keep working along the regeneration boundary, making new clearings smaller as the weeds get more dense.

WEEDING TECHNIQUES

Disturb the soil as little as possible.

All tools used for weeding programmes should be small, such as a broad boning knife, trowels, secateurs, pliers (for pulling roots), loppers, hatchet and small saws. This recommendation is based on the belief that using small tools will cause minimum soil disturbance and minimal damage to the roots and shoots of nearby native plants.

Sweep back the mulch surface.

Any weeding will disturb the ground litter and soil will be exposed. Repair the damage as you go, by pushing back as much mulch as possible. It is often helpful to sweep aside mulch prior to removing large plants, so that it can easily be redistributed when you have finished removing the plant.

Mulch with the weeds themselves.

Weeds removed can be used to add to existing mulch. In dry areas leaving the weed with its roots exposed will be sufficient to kill it. In moist areas, hanging the weeds on nearby native vegetation will allow them to dry out and die. Some items are

unsuitable for mulch, and these are removed from the site. Such items include bulbs and tubers, plants that root at every node and free-seeders with ripe seed.

Watch where you put your feet.

Be careful how you move through the bush. A small weeding party moving through thick bush single file can open up a track. Efforts should be made to not walk on the same paths all the time, and to watch where you walk to ensure you are not trampling native vegetation.

Appendix Six – Weed Lists for Reserves Surveyed

Weed Control Strategy, Shire of Mundaring

In each of the following tables, the Priority rating refers to that of the Environmental Weed Strategy for Western Australia.

Shire of Kalamunda, Hartfield Park

Taxonomic Name	Common Name	Priority
<i>Acacia podalyriifolia</i>	Queensland Silver Wattle	Low
<i>Anagallis arvensis</i>	Scarlet Pimpernel	Low
<i>Avena fatua</i>	Wild Oat	Low
<i>Bellardia trixago</i>	White Bartsia	Low
<i>Briza maxima</i>	Blowfly Grass	Mod
<i>Briza minor</i>	Shivery Grass	Mod
<i>Conyza</i> sp.	Unknown Fleabane	Unrated
<i>Gladiolus caryophyllaceus</i>	Pink Gladiolus	Mod
<i>Hypochaeris glabra</i>	Smooth Catsear	Mod
<i>Juncus bufonius</i>	Toad Rush	Mod
<i>Lolium rigidum</i>	Annual Ryegrass	Mod
<i>Monadenia bracteata</i>	South African Orchid	Mod
<i>Ornithopus compressus</i>	Yellow Serradella	Mild
<i>Parentucellia viscosa</i>	Sticky Bartsia	Mod
<i>Paspalum distichum</i>	Water Couch	Mod
<i>Romulea rosea</i>	Guildford Grass	Unrated
<i>Silene gallica</i>	French Catfly	Unrated
<i>Sonchus oleraceus</i>	Sowthistle	Mod
<i>Trifolium campestre</i>	Hop Clover	Mod
<i>Ursinia anthemoides</i>	Ursinia	Mod
<i>Wahlenbergia capensis</i>	Cape Bluebell	Mod

Shire of Kalamunda, Ledger Road Reserve

Taxonomic Name	Common Name	Priority
<i>Anagallis arvensis</i>	Scarlet Pimpernel	Low
<i>Avena fatua</i>	Wild Oat	Low
<i>Bellardia trixago</i>	White Bartsia	Low
<i>Briza maxima</i>	Blowfly Grass	Mod
<i>Briza minor</i>	Shivery Grass	Mod
<i>Dittrichia graveolens</i>	Stinkwort	Mild
<i>Erharta calycina</i>	Perennial Veld Grass	High
<i>Eucalyptus</i> sp. (non-local)		Unrated
<i>Gazania</i> sp.		Low
<i>Gladiolus caryophyllaceus</i>	Pink Gladiolus	Mod
<i>Gladiolus undulatus</i>	Wavy Gladiolus	Mod
<i>Hypochaeris glabra</i>	Smooth Catsear	Mod
<i>Lantana camara</i>	Lantana	Mod
<i>Lathyrus tingitanus</i>	Tangier Pea	Low
<i>Lavandula stoechas</i>	Spanish Lavender	Low
<i>Lolium rigidum</i>	Annual Ryegrass	Mod
<i>Melia azedarach</i>	Cape Lilac	Low
<i>Monadenia bracteata</i>	South African Orchid	Mod
<i>Opuntia stricta</i>	Common Prickly Pear	Unrated
<i>Oxalis caprina</i>	White-flowering Woodsorrel	Mild
<i>Paspalum distichum</i>	Water Couch	Mod
<i>Pennisetum clandestinum</i>	Kikuyu	Mod
<i>Petrorhagia velutina</i>	Velvet Pink	Mild
<i>Plantago lanceolata</i>	Ribwort Plantain	Low
<i>Raphanus raphanistrum</i>	Wild Raddish	Mild
<i>Romulea rosea</i>	Guildford Grass	Unrated
<i>Silene gallica</i>	French Catfly	Unrated
<i>Sonchus oleraceus</i>	Sowthistle	Mod
<i>Stachys arvensis</i>	Stagger Weed	Low
<i>Tribolium uniolae</i>		Mod
<i>Trifolium angustifolium</i>	Narrowleaf Clover	Unrated
<i>Trifolium campestre</i>	Hop Clover	Mod
<i>Ursinia anthemoides</i>	Ursinia	Mod

Shire of Kalamunda, Maida Vale Road Reserve

Taxonomic Name	Common Name	Priority
<i>Acacia longifolia</i>	Sydney Golden Wattle	Unrated
<i>Acacia podalyriifolia</i>	Queensland Silver Wattle	Low
<i>Anagallis arvensis</i>	Scarlet Pimpernel	Low
<i>Arundo donax</i>	False Bamboo	Unrated
<i>Avena fatua</i>	Wild Oat	Low
<i>Briza maxima</i>	Blowfly Grass	Mod
<i>Chamaecytisus palmensis</i>	Tagasaste	Low
<i>Conyza</i> sp.	Unknown Fleabane	Unrated
<i>Dittrichia graveolens</i>	Stinkwort	Mild
<i>Erharta calycina</i>	Perennial Veld Grass	High
<i>Erodium botrys</i>	Long Storksbill	Low
<i>Ficus carica</i>	Edible Fig	Mod
<i>Gladiolus caryophyllaceus</i>	Pink Gladiolus	Mod
<i>Gomphocarpus fruticosus</i>	Narrow Cottonbush	Mod
<i>Hypochaeris glabra</i>	Smooth Catsear	Mod
<i>Kickxia elatine</i>	Sharp-leaved Fluellen,	Unrated
<i>Kunzea</i> sp. (non-local)		Unrated
<i>Linum trigynum</i>	French Flax	Low
<i>Melenis repens</i>	Natal Red Top	Mild
<i>Monadenia bracteata</i>	South African Orchid	Mod
<i>Orobanche minor</i>	Lesser Broomrape	Mod
<i>Ornithopus compressus</i>	Yellow Serradella	Mild
<i>Paspalum distichum</i>	Water Couch	Mod
<i>Pennisetum clandestinum</i>	Kikuyu	Mod
<i>Petrorhagia velutina</i>	Velvet Pink	Mild
<i>Plantago lanceolata</i>	Ribwort Plantain	Low
<i>Ricinus communis</i>	Castor Oil Bush	Low
<i>Romulea rosea</i>	Guildford Grass	Unrated
<i>Rumex crispus</i>	Curled Dock	Mild
<i>Solanum nigrum</i>	Black Berry Nightshade	Mod
<i>Sonchus asper</i>	Prickly Sowthistle	Mod
<i>Sonchus oleraceus</i>	Sowthistle	Mod
<i>Tribolium uniolae</i>		Mod
<i>Trifolium angustifolium</i>	Narrowleaf Clover	Unrated
<i>Trifolium arvense</i>	Hare's Foot Clover	Mod
<i>Ursinia anthemoides</i>	Ursinia	Mod
<i>Watsonia leipoldtii</i>		Unrated

Shire of Kalamunda, Poison Gully

Taxonomic Name	Common Name	Priority
<i>Acacia podalyriifolia</i>	Queensland Silver Wattle	Low
<i>Anagallis arvensis</i>	Scarlet Pimpernel	Low
<i>Arundo donax</i>	False Bamboo	Unrated
<i>Avena fatua</i>	Wild Oat	Low
<i>Briza maxima</i>	Blowfly Grass	Mod
<i>Erharta calycina</i>	Perennial Veld Grass	High
<i>Gomphocarpus fruticosus</i>	Narrow Cottonbush	Mod
<i>Ipomoea indica</i>	Morning Glory	Mild
<i>Monadenia bracteata</i>	South African Orchid	Mod
<i>Oxalis glabra</i>	Finger Leaf Oxalis	Mild
<i>Paspalum distichum</i>	Water Couch	Mod
<i>Pennisetum clandestinum</i>	Kikuyu	Mod
<i>Rumex crispus</i>	Curled Dock	Mild
<i>Sonchus asper</i>	Prickly Sowthistle	Mod
<i>Trifolium arvense</i>	Hare's Foot Clover	Mod
<i>Tropaeolum majus</i>	Nasturtium	Low

Shire of Mundaring, Brookside Park

Taxonomic Name	Common Name	Priority
<i>Acacia baileyana</i>	Cootamundra Wattle	Low
<i>Acacia</i> sp.	Unknown Wattle	Unrated
<i>Anagallis arvensis</i>	Scarlet Pimpernel	Low
<i>Arundo donax</i>	False Bamboo	Unrated
<i>Avena fatua</i>	Wild Oat	Low
<i>Briza maxima</i>	Blowfly Grass	Mod
<i>Erharta calycina</i>	Perennial Veld Grass	High
<i>Ficus carica</i>	Edible Fig	Mod
<i>Hypochaeris radicata</i>	Flatweed	Mod
<i>Oxalis glabra</i>	Finger Leaf Oxalis	Mild
<i>Oxalis pes-caprae</i>	Soursob, Sour Grass	Mild
<i>Paspalum distichum</i>	Water Couch	Mod
<i>Plantago lanceolata</i>	Ribwort Plantain	Low
<i>Podalyria sericea</i>		Low
<i>Rumex crispus</i>	Curled Dock	Mild
<i>Tropaeolum majus</i>	Nasturtium	Low

Shire of Mundaring, Hovea Conservation Park

Taxonomic Name	Common Name	Priority
<i>Acacia podalyriifolia</i>	Queensland Silver Wattle	Low
<i>Anagallis arvensis</i>	Scarlet Pimpernel	Low
<i>Arctotheca calendula</i>	Capeweed	Mod
<i>Briza maxima</i>	Blowfly Grass	Mod
<i>Erharta calycina</i>	Perennial Veld Grass	High
<i>Filago gallica</i>	Slender Cudweed	Low
<i>Hypochaeris radicata</i>	Flatweed	Mod
<i>Plantago lanceolata</i>	Ribwort Plantain	Low
<i>Oxalis glabra</i>	Finger Leaf Oxalis	Mild
<i>Oxalis pes-caprae</i>	Soursob, Sour Grass	Mild
<i>Romulea rosea</i>	Guildford Grass	Unrated

Shire of Mundaring, North Darlington Reserves

Taxonomic Name	Common Name	Priority
<i>Acacia podalyriifolia</i>	Queensland Silver Wattle	Low
<i>Arctotheca calendula</i>	Cape Weed	Mod
<i>Aira cupaniana</i>	Hairgrass	Mod
<i>Anagallis arvensis</i>	Scarlet Pimpernel	Low
<i>Arundo donax</i>	False Bamboo	Unrated
<i>Avena fatua</i>	Wild Oat	Low
<i>Babiana disticha</i>	Baboon Flower	Mild
<i>Brassica tournefortii</i>	Wild Turnip	High
<i>Briza maxima</i>	Blowfly Grass	Mod
<i>Carderia draba</i>	Hoary Cress	Low
<i>Cynodon dactylon</i>	Couch	Mod
<i>Erharta calycina</i>	Perennial Veld Grass	High
<i>Erodium botrys</i>	Long Storksbill	Low
<i>Fumaria capreolata</i>	White Fumitory, Climbing Fumitory	Mild
<i>Hypochaeris radicata</i>	Flatweed	Mod
<i>Lathyrus tingitanus</i>	Tangier Pea	Low
<i>Lupinus cosentinii</i>	Pearl Lupin	High
<i>Navarretia squarrosa</i>	Stinkweed	Low
<i>Oxalis glabra</i>	Finger Leaf Oxalis	Mild
<i>Oxalis pes-caprae</i>	Soursob, Sour Grass	Mild
<i>Oxalis purpurea</i>	Four O'clock, Purple Wood Sorrel	Low
<i>Parentucellia latifolia</i>	Common Bartsia	Mod
<i>Pennisetum clandestinum</i>	Kikuyu	Mod
<i>Petrorhagia velutina</i>	Velvet Pink	Mild
<i>Plantago lanceolata</i>	Ribwort Plantain	Low
<i>Raphanus raphanistrum</i>	Wild Raddish	Mild
<i>Romulea rosea</i>	Guildford Grass	Unrated
<i>Solanum nigrum</i>	Black Berry Nightshade	Mod
<i>Sonchus asper</i>	Prickly Sowthistle	Mod
<i>Stachys arvensis</i>	Stagger Weed	Low
<i>Trifolium angustifolium</i>	Narrowleaf Clover	Unrated
<i>Trifolium campestre</i>	Hop Clover	Mod
<i>Ursinia anthemoides</i>	Ursinia	Mod

Appendix Seven – *weedBase*

Weed Control Strategy, Shire of Mundaring