

Roadside Conservation Values in the Shire of Nannup



Photo by J. Dewing



Adenanthos detmoldii

Photos: S.D. Hopper

Rare and Priority Flora such as the Scott River jug flower can be found along roadsides in the Shire of Nannup.

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Roadside Conservation Committee



CONTENTS

<u>1.0</u>	<u>Introduction</u>	<u>1</u>
	<u>1.1 Flora and Fauna</u>	<u>2</u>
	<u>1.2 Remnant Vegetation Cover</u>	<u>3</u>
<u>2.0</u>	<u>Values of Roadsides</u>	<u>6</u>
<u>3.0</u>	<u>Legislation</u>	<u>8</u>
<u>4.0</u>	<u>Roadside Conservation in the Shire of Nannup</u>	<u>10</u>
	<u>4.1 Collection of native plant material from roadsides</u>	<u>10</u>
	<u>4.2 Declared Rare Flora</u>	<u>10</u>
	<u>4.3 High Conservation Value Roadsides as Flora Roads</u>	<u>12</u>
	<u>4.4 Weeds</u>	<u>13</u>
	<u>4.5 Phytophthora Dieback</u>	<u>16</u>
<u>5.0</u>	<u>Assessment Process</u>	<u>17</u>
	<u>5.1 Methods</u>	<u>17</u>
	<u>5.2 Quantifying Conservation Values</u>	<u>17</u>
	<u>5.3 Mapping Conservation Values</u>	<u>18</u>
<u>6.0</u>	<u>Survey Data Results</u>	<u>20</u>
<u>7.0</u>	<u>Management Techniques</u>	<u>26</u>
	<u>7.1 Environmental Guidelines</u>	<u>27</u>
	<u>7.2 Tree Roads</u>	<u>27</u>
	<u>7.3 Special Environment Areas</u>	<u>28</u>
	<u>7.4 Special Environment Area Register</u>	<u>29</u>
<u>8.0</u>	<u>Roadside Planning, Strategies and Action Plans</u>	<u>30</u>
	<u>8.1 Planning</u>	<u>30</u>
	<u>8.2 Strategies</u>	<u>31</u>
	<u>8.3 Roadside Action Plans</u>	<u>32</u>
	<u>References</u>	<u>33</u>

FIGURES

- Figure 1. Climate statistics
- Figure 2. Width of vegetated roadsides
- Figure 3. Conservation status of roadsides in the Shire of Nannup
- Figure 4. Native vegetation on roadsides
- Figure 5. Extent of native vegetation
- Figure 6. Number of native species
- Figure 7. Value as a biological corridor
- Figure 8. Weed infestation
- Figure 9. Predominant adjoining land use
- Figure 10. Occurrence of specific weeds along roadsides in the Shire of Nannup
- Figure 11. Special Environment Area (SEA) site marker
- Figure 12. Marking SEA sites in the field

TABLES

- Table 1. Remnant vegetation remaining in Nannup and surrounding Shires.
- Table 2. Vegetation associations in the Shire of Nannup and the percentage of original extent remaining throughout WA.
- Table 3. Colour codes used to depict the conservation status of roadsides.
- Table 4. Summary of roadside conditions in the Shire of Nannup.

APPENDICES

- Appendix 1. Definitions of remnant vegetation types.
- Appendix 2. Standard survey sheet.
- Appendix 3. Raw data used to calculate conservation values.
- Appendix 4. Road names, numbers and lengths.
- Appendix 5. Plant species in the Shire of Nannup

EXECUTIVE SUMMARY

The Shire of Nannup supports an extensive network of roads, ie 160.5 km of Main Roads, 457.9 km of Local Government Roads, 67.3 km of Forestry Roads and 15.1 km of National Park roads.

The majority (553.6 km) of roads within the Shire of Nannup were assessed for their conservation status and mapped. Fieldwork was carried out throughout October 2001, May and June 2002 and May, October and November 2003. The Roadside Conservation Committee then processed and mapped the roadside survey data using Geographic Information Systems (GIS).

Roadsides of high conservation value covered 77.1% of the length of roadsides surveyed, medium-high conservation value roadsides accounted for 9.8%, medium-low conservation value roadsides covered 2.9% and areas of low conservation value occupied 10.3% of the roadsides surveyed. Further results of the roadside survey are outlined in this report, along with additional detailed information relevant to roadside management and conservation in the Shire of Nannup.

Primarily, the roadside survey data and roadside conservation value (RCV) map is intended for use by the Shire and community groups as a management and planning tool. Applications may range from setting priorities and formulating management strategies to planning on-ground activities and works projects. As well as providing a road reserve planning and management tool, the roadside conservation value map can be used for:

- identifying degraded areas as areas important for strategic rehabilitation or in need of specific management techniques and weed control programs;
- prioritising roadside vegetation protection and/or rehabilitation programs;
- establishing habitat linkages throughout the Shire's overall conservation network;
- developing regional or district fire management plans;
- identifying tourist routes, i.e. roads depicted as high conservation value would provide visitors to the district with an insight to the flora of the district; and
- incorporating into Landcare or similar projects for 'whole of' landscape projects.

It is hoped that the RCV map and accompanying information will assist the Shire of Nannup in developing roadside vegetation management plans. The Roadside Conservation Committee is available to assist Local Government in developing Management Plans for roadside vegetation.

1.0 INTRODUCTION

The Shire of Nannup is located 288 km south of Perth in Western Australia's Blackwood region. Located on the Vasse Highway between Busselton and Pemberton, Nannup covers an area of 2,953 square kms and supports a population of approximately 1,187 people. The area experiences an average annual rainfall of 832.7 mm, and seasonal temperatures are characterised by warm summers, with maxima averaging from the high twenties, and cool winters, with maxima in the mid teens. Mean daily maximum and minimum temperatures and rainfall statistics are shown below.

Typical of the region, the main industries are timber, agriculture, horticulture, viticulture, aquaculture and small businesses; including woodworking, arts and crafts and floriculture. Tourism plays an important role with the area's spectacular natural resources being a major attraction. The Blackwood River passes through the district providing excellent camping, fishing and recreational opportunities. Scenic drives, bushwalks, canoeing and fishing are major drawcards for tourists. Other prominent attractions are the Balingup Road Drive, Nannup heritage townsite, Tulip Farm, the south coast area and the numerous National Parks. The Nannup Music festival, held annually in March and the Nannup flower festival, held in August, attract a number of visitors to the area.

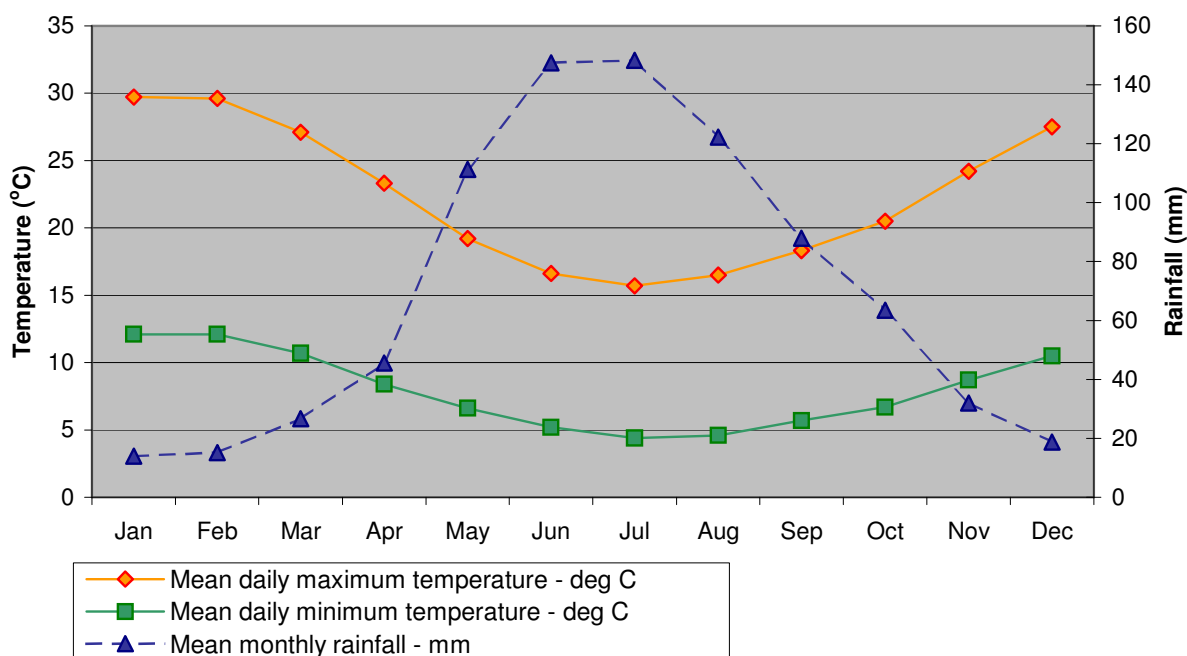


Figure 1 – Mean daily maximum and minimum temperature (°C) and rainfall (mm) for the Blackwood Region, based on climate averages from the Bridgetown weather station 009510.

1.1 Flora

The Western Australian Herbarium records more than 1,100 species of plants from within the Shire of Nannup. Of these, the most abundant genera include 47 species of *Acacia*, 37 *Stylidium* species, 13 species of *Melaleuca* and 22 species of *Leucopogon*, refer to Appendix 5.

Declared Rare Flora (DRF) refers to species, or populations of native plants that are of great significance and should be treated with special care when road and utility service, construction or maintenance is undertaken.

Populations of DRF along roadsides are designated Special Environmental Area's (SEA's) and these are marked out by yellow stakes with an identification plate welded on; refer to figures 11 and 12. It is the responsibility of the road manager to ensure these markers are installed correctly, and the Roadside Conservation Committee's publication *Guidelines for Managing SEA's in transport corridors* provides a guide to this.

Currently (April 2004), CALM records indicated 21 populations of 10 DRF species on roadsides in the Nannup Shire, with 14 of these sites vested in the Shire. These include the following species:

- ♦ *Thysanotus formosus*;
- ♦ *Grevillea drummondii*;
- ♦ *Pultenaea skinneri*;
- ♦ *Stylidium barleei*;
- ♦ *Isopogon formosus* subsp. *dasylepis*;
- ♦ *Adenanthos detmoldii*;
- ♦ *Chordifex jacksonii*;
- ♦ *Meziella trifida*;
- ♦ *Caladenia harringtoniae*; and
- ♦ *Banksia meisneri* subsp. *ascendens*.



Grevillea drummondii

Photos: P.G. Armstrong

Drummond's Grevillea (*Grevillea drummondii*) can be found within roadsides in the Shire of Nannup.

Photography by P. G. Armstrong. Photo used with the permission of the WA Herbarium, CALM (<http://florabase.calm.wa.gov.au/help/photos#reuse>).

Stylidium brunonianum

Photos: B.A. Fuhrer & M. Hislop

The Pink fountain triggerplant (*Stylidium brunonianum*) can be observed within roadsides in the Shire of Nannup.

Photography by B. Fuhrer and M Hislop. Photo used with the permission of the WA Herbarium, CALM (<http://florabase.calm.wa.gov.au/help/photos#reuse>).

For more information regarding DRF it is advisable to contact the Flora Officer for the Blackwood District (08) 9752 5510. The DRF sites register in the Shire of Nannup should be checked for the presence of appropriate markers, and their location be made known to all involved in the management and planning of works within the roadside environment.

1.2 Fauna

The Western Australian Museum records more than 90 species of native fauna from the Nannup area, presented in Appendix 6. Of these, there were 33 bird species, 11 amphibia species, 21 mammal species, 27 reptile species and 3 exotic fauna species. Fauna records obtained from the W.A. Museum comprise specimen records, museum collections and observations from 1850 to present, and is intended only as a generic guide to fauna in the Nannup area.

A number of the fauna species recorded from the Nannup area are classified as being endemic, i.e. limited to a distinct habitat or within a particular area, and occurring nowhere else in the world. For example, the Western Rosella (*Platycercus icterotis*) and Red-capped Parrot (*Platycercus spurius*) occur only within south western forests and woodlands of



Confined to WA, the Chain-striped Skink is distributed throughout the lower west and south coasts, including Nannup.

Photo by D. Robinson, courtesy of FaunaBase
<http://www.museum.wa.gov.au/faunabase/prod/index.htm>

Western Australia, including the Nannup area. Other species of fauna confined to areas within the south west of Western Australia include the Crowned Snake (*Elapognathus coronatus*), the Chain-striped Skink (*Ctenotus catenifer*), and the South-western Crevice Skink (*Egernia napoleonis*) (Western Australian Museum, 2004).

The *Wildlife Conservation Act* 1950 provides for native fauna (and flora) to be specially protected where they are under identifiable threat of extinction, and as such, are considered to be "threatened". Information

from CALM indicated that 13 species of threatened and priority fauna have been recorded or sighted throughout the Nannup Shire, including:

- ♦ Baudin's Black-Cockatoo (*Calyptorhynchus baudinii*);
- ♦ Chuditch (*Dasyurus geoffroii*);
- ♦ Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*);
- ♦ Malleefowl (*Leipoa ocellate*);
- ♦ Quenda (*Isoodon obesulus fusciventer*);
- ♦ Quokka (*Setonix brachyurus*);
- ♦ Southern Brush-tailed Phascogale (*Phascogale tapoatafa tapoatafa*);
- ♦ Western Brush Wallaby (*Macropus irma*);
- ♦ Western False Pipistrelle (*Falsistrellus mackenziei*);
- ♦ Western Ringtail Possum (*Pseudocheirus occidentalis*); and

- ♦ Woylie (*Bettongia penicillata ogilbyi*).

Please note that records from CALM's Threatened and Priority Fauna Database are not intended as an accurate representation of the species present in the Shire, simply those for which there are records for in the database.



Baudin's Black Cockatoo

Photo by B & B Wells/CALM



Red tailed Black Cockatoo

Photo by B & B Wells/CALM



Quenda

Photo by C Freeguard/CALM

1.3 Remnant Vegetation Cover

The Shire of Nannup retains 94% of its original native vegetation, and these are located in a variety of tenures, from nature and crown reserves to privately owned bushland. A comparison of remnant vegetation in Nannup with surrounding Shires, seen in Table 1, shows that Nannup retains a far higher percentage of remnant vegetation.

Shire	Total area (ha)	Vegetation Cover Remaining (%)
Augusta-Margaret River	222,718	71.7%
Bridgetown-Greenbushes	135,387	67.9%
Busselton	145,966	44.5
Donnybrook-Balingup	155,143	72.0%
Manjimup	705,670	83.9%
Nannup	293,198	94.0%

Table 1. Remnant vegetation remaining in the Shire of Nannup and surrounding Shires (Shepherd, Beeston and Hopkins, 2001).

National Objectives and Targets for Biodiversity Conservation 2001-2005 (Environment Australia, 2001) stated that vegetation associations represented by less than 30% remnant vegetation cover are considered ecologically endangered and in need of protection and restoration wherever they are located. There are 2 vegetation associations below the 30% target of vegetation coverage in the Shire of Nannup, see Table 2. National targets for biodiversity conservation (2001-2005) state the need to have protection measures in place for those vegetation associations that are below 30%. Vegetation associations with less than 10% are considered endangered whilst those between 10-30% are considered vulnerable and those between 30-50% are considered depleted (of the pre 1750 extent).



High conservation value roadsides are significant linear tracts of remnant vegetation.

Photo by S. Smith

The Beard system of vegetation classification identified 21 broad vegetation associations from the Shire of Nannup, and these are described in Table 2. It should be noted that these assemblages are indicative of the Shire per se and not specifically representative of roadside remnants.

Vegetation Association	% Remaining
Tall forest; karri (<i>Eucalyptus diversicolor</i>)	66.2
Medium forest; jarrah-marri	72.1
Low woodland; <i>Agonis flexuosa</i>	65.8
Low woodland; jarrah-banksia	67.2
Low woodland; paperbark (<i>Melaleuca</i> sp.)	66.1
Shrublands; tea-tree thicket	55.9
Sedgeland; reed swamps, occasionally with heath	51.7
Low woodland; banksia	82.6
Medium woodland; jarrah & marri	4.7
Low woodland; jarrah	76.3
Low forest; peppermint (<i>Agonis flexuosa</i>)	60.8
Medium woodland; marri	11.8
Medium open woodland; jarrah	95.3
Shrublands; <i>Acacia decipiens</i>	66.6
Shrublands; peppermint scrub, <i>Agonis flexuosa</i>	69.7
Mosaic; Tall forest, karri/Tall forest; jarrah & marri	79.0
Medium woodland; jarrah (south coast)	83.1
Tall forest; karri & marri (<i>Corymbus calophylla</i>)	69.7
Tall forest; jarrah & marri	81.5
Medium woodland; <i>Eucalyptus rudis</i> & Blackbutt with some Bullich, Jarrah & Marri (fringing Blackwood River)	88.0
Medium woodland – fringing; jarrah, marri, <i>Eucalyptus rudis</i> & <i>Agonis flexuosa</i>	51.7

Table 2. Vegetation associations in the Shire of Nannup (Shepherd, Beeston and Hopkins, 2001).



Corymbia calophylla

Photos: S.D. Hopper

Only 11.8% of the pre-1750 extent of medium Marri woodlands remains throughout W.A.

Photography by S. D. Hopper. Photo used with the permission of the WA Herbarium,

2.0 VALUES OF ROADSIDES

Since the settlement of Western Australia by Europeans, large areas of native vegetation in the south west of the state have been cleared for agriculture, roads, settlements, and other development. The fragmentation of the more or less continuous expanse of native vegetation communities by clearing has resulted in the isolation of plant and animal populations. They exist within a mosaic of man-made biogeographical islands of small native vegetation remnants. These are typically unreliable for sustaining wildlife due to food shortages, disease and reduced genetic diversity caused by a diminishing gene pool. Nevertheless, the presence of native vegetation along roadsides can often assist in alleviating this isolation effect by providing connectivity between bush remnants, thereby facilitating the movement of biota across the landscape.

Remnant vegetation includes a diverse mix of trees, shrubs and ground covers (creepers, grasses and herbs) which when intact provide valuable food and shelter for local biodiversity. Existing native vegetation generally requires less maintenance if left undisturbed.

Remnants in transport corridors are valuable because they:

- are often the only remaining example of original vegetation within extensively cleared areas;
- are easier to maintain and generally less fire prone than introduced vegetation;
- provide habitat for many native species of plants, mammals, reptiles, amphibians and invertebrates;
- provide wildlife corridors linking other areas of native vegetation;
- often contain rare and endangered plants and animals.;
- provide the basis for our important wildflower tourism industry;
- they have the potential to improve local tourism and provide a sense of place;
- often contain sites of historic or cultural significance;
- provide windbreaks and stock shelter areas for adjoining farmland by helping to stabilise temperature and reduce evaporation.
- assist with erosion and salinity control, and not only in the land adjoining the road reserve per se;
- are generally far less of a fire threat than annual weeds;



Remnant vegetation includes more than just trees.

Photo by K Jackson

- provide a benchmark for the study of soil change throughout the advancement of agriculture;
- are a vital source of local seed for revegetation projects in the absence of other alternatives;

Approval of the local shire and a CALM permit are required prior to collection.

In a time of rapid change, where the demands placed on the natural resources are numerous, it is vital that there is a coordinated management of lands across all tenures and boundaries to ensure the sustainability and integrity of the natural biota ecosystem processes, agricultural lands and service infrastructure.



Roadsides are the vital link . . . and a priceless community asset.

3.0 LEGISLATION

Uncertainty often exists in the minds of many with regard to the 'ownership', control and management of 'the roadside'. This problem is also exacerbated by the multitude of legislative reference to activities within a transport corridor.

The Department of Conservation and Land Management (CALM) has the legislative responsibility to manage and protect all native flora and fauna in Western Australia. It is important to note that all native flora and fauna is protected under provisions of the *Wildlife Conservation Act 1950* and cannot be taken unless it is taken in a lawful manner. In addition to the general provisions relating to protected flora under the *Wildlife Conservation Act*, special protection is afforded to flora that is declared as rare or threatened under section 23F of the *Wildlife Conservation Act*.

The legislation pertaining to the management of road reserves is complex and includes those listed below.

State legislation:

- *Aboriginal Heritage Act 1972*
- *Agriculture and Related Resources Protection Act 1976*
- *Bush Fires Act 1954*
- *Conservation and Land Management Act 1984*
- **Environmental Protection Act 1986*
- *Mining Act 1978*
- *Soil and Land Conservation Act 1945*
- *State Energy Commission Supply Act 1979*
- *Heritage of WA Act 1990*
- *Main Roads Act 1930*
- *Land Act 1933*
- *Local Government Act 1995*
- *Water Authority Act 1987*
- *Wildlife Conservation Act 1950-1979*

Commonwealth legislation:

- *Environment Protection and Biodiversity Conservation Act 1999*

*It should be noted that currently (April 2004) amendments to the EPA are pending and these will have a major impact on **ALL** activities that require the taking of any native vegetation. It is strongly urged that **ANY ONE** involved in these activities seek competent advice prior to commencement. Heavy Penalties will apply for the breach of this legislation.

It is recommended that a cautionary approach be taken when working within roadsides, and that the relevant authority be contacted if there is any doubt about the management or protection of heritage or conservation values present in the roadsides.

4.0 ROADSIDE CONSERVATION IN THE SHIRE OF NANNUP

4.1 Collection of native plant material from roadsides

Under the *Wildlife Conservation Act*, the Department of Conservation and Land Management may issue a licence following Shire approval. It is suggested the RCC's *Guidelines for Managing the Harvesting of Native Flowers, Seed and Timber from Roadsides* is referred to prior to any approval being given, see Appendix 7. Requests to the Shire of Nannup for permission to collect native plant material from roadsides are relatively infrequent, and whilst they are considered on a case-by-case basis, generally permission is granted for individuals to collect seed from roadsides for bona fide revegetation purposes.

Collecting seed from a roadside may be the only option in cases where there are no other sources of seed for revegetation, although, it has the potential to impact negatively on the roadside flora. Collection of native plant material from roadsides:

- further depletes the already scarce resource,
- can detract from the integrity of the roadside,
- reduces the amount of seed available for natural regeneration,
- reduces the ability of the area to regenerate after disturbances such as fire, and
- threatens roadside plant communities with the potential introduction and spread of two major threats – *Phytophthora* dieback and weeds.

4.2 Flora Roads

A flora road is one which has special conservation value because of the vegetation contained within the road reserve. The managing authority may decide to declare a Flora Road based on the results of the survey of roadside conservation value. The Roadside Conservation Committee has prepared *Guidelines for the Management of Flora Roads*; these are presented in [Appendix 8](#).



Whilst currently there are no Flora Roads designated within the Shire of Nannup, the roadside survey and the roadside conservation value (RCV) map highlighted a number of roadsides determined as having high conservation value. These, and other roads may be investigated further to see if they warrant a declaration as a Flora Road. This has the dual effect of drawing the attention of tourists to the high conservation value roadside and it also alerts all that work in the roadside environment that the marked section of roadside requires due care to protect the values present.

Roadsides determined as having high conservation value, and which may potentially be suitable as Flora Roads in the Shire of Nannup include:

- ♦ • Baker Road,
- Barrabup Road,
- Black Point Road,
- Bridgetown Nannup Road,
- Coronation Road,
- Denny Road,
- Fouracres Road,
- Jalbarragup Road,
- Jandardup Road,
- Manjimup Carlotta Road,
- Milyeannup Coast Road,
- Mount Leewin Loop Road,
- Mowen Road,
- Neverman Road,
- Nickolopolis Road,
- Poison Swamp Road,
- River Road,
- Sears Road,
- Stacey Road,
- Stallard Road,
- Storry Road, and
- Wishart Road.

In order to plan roadworks so that important areas of roadside vegetation are not disturbed, road managers should know of these areas. It is suggested that the Shire establish a *Register of Roads Important for Conservation*, see section 8.2.

Tourism

Attractive roadside drives are an important drawcard in Western Australia, the "Wildflower State". Declared Flora Roads will, by their very nature, be attractive to tourists and would often be suitable as part of a tourist drive network. Consideration should be given to:

- Promoting the road by means of a small brochure or booklet,
- Showing all Flora Roads on a map of the region or State,
- Using specially designed signs to delineate the Flora Road section (contact the RCC).

4.4 Weeds

Weeds are disturbance opportunists and will therefore readily invade roadsides and interfere with the growth and survival of native plants. The effect of weed infestations on native plant populations is severe, and causes flow on effects for native fauna. Once native plants begin to diminish, due to heavy competition, native fauna suffers due to reduced availability of habitat and food. The WA Herbarium records 102 weed species from the Shire of Nannup, see Appendix 5.

The Roadside Conservation Value map and weed overlays will assist the Shire and community in coordinating strategic weed control projects. Throughout the roadside survey,



Flora Roads signs are positioned at each approach, drawing attention to the roadside flora.

Photo by D. Lamont



Roadsides are one of the most accessible places for tourists to view wildflowers.

Photo by CALM

six targeted weed types were recorded, and their locations mapped. These were Cape weed (*Arctotheca calendula*); Wild radish (*Raphanus raphanistrum*), Bridal creeper (*Asparagus asparagoides*), Grass weeds, Bulbs; and Weed wattles (*Acacia spp.*).

Roadside weed populations can be observed in the weed overlays provided with the Shire of Nannup Roadside Conservation Value map (2004). Figure 10 also provides an indication of the extent of the roadside weed infestation based on species.



A number of 'grass weeds' will invade degraded roadsides.

Photo by K. Jackson

In recent years, the Shire of Nannup has been proactive in identifying and managing weeds throughout the Shire, and this is demonstrated by the development of the *Nannup Shire Reserves Weed Control and Management Plan (2003)*, see Appendix 9. Funds received from the Natural Heritage Trust allowed for several weed action coordinators to be employed on a part-time basis in various localities of the Blackwood area, including the Shire of Nannup. Consequently, from September 2001 until September 2003, the Shire of Nannup retained a weed action coordinator, who developed the *Nannup Shire Reserves Weed Control and Management Plan (2003)*. Nine Shire reserves, including roadside reserves, were studied and assessed in terms of their general health, and detailed weed information was collected via on-ground mapping. They were then prioritised according to their conservation values and a brief management plan was compiled for each reserve, with special emphasis on weed management.



Roadside infestation of bridal creeper

Photo by K. Jackson

Nannup's weed action coordinator managed a targeted control program for Bridal Creeper, using biological agents. Bridal creeper rust, a fungus, and the Bridal creeper leaf hopper, an insect, were distributed to community volunteers who were trained in releasing and spreading the agents. The volunteers nominated a small stretch of river or a roadside, and continued spreading and monitoring the biological control agents in those areas.

The *Blackwood Weed Strategy (2003)*, developed by the weed action coordinators, outlines strategies to enable the continuation of the programs initiated by the weed coordinators, see Appendix 10. The Strategy presents a summary of key achievements, target areas and weed species and recommendations for future coordination and implementation by the community, Local Government and Government Agencies.

4.5 *Phytophthora* Dieback

The *Phytophthora* species dieback is made up of several types of introduced fungi. About one third of native plants in Western Australia's south-west are susceptible, including species of Banksia, Hakea, Eucalyptus, Melaleuca, Verticordia, Acacia and Grevillea.

The *Phytophthora* fungus infects the roots and inhibits the uptake of water and nutrients, eventually causing death. It is more widespread and severe in the higher rainfall zone and waterlogged sites. The Shire of Nannup is a known *Phytophthora* dieback risk area as it has an annual rainfall of more than 800mm.

Phytophthora spreads by the movement of spores in water, or by the spread of infected soil. The spores can be introduced to uninfected areas by human activities, particularly through the soil carried on vehicle tyres or footwear.

Human activities, such as routine maintenance or construction, have the potential to spread *Phytophthora* fungi. Currently, there is no practical method of eradicating *Phytophthora* once it is established in an area.

The Dieback Working Group publication, *Managing Phytophthora Dieback in Bushland: A guide for Landholders and Community Conservation Groups*, (2000) provides detailed information on minimising the risk of introducing or spreading *Phytophthora*.



Impact of *Phytophthora* Dieback

Photo Dieback Working Group

5.0 ROADSIDE SURVEYS

The majority (553.6 km) of the Shire of Nannup's roads were assessed for their conservation status and mapped. Fieldwork was carried out throughout October 2001, May and June 2002 and May, October and November 2003. The enthusiastic efforts of the volunteer surveyors, Merryn Delaney, Gwen Goodred and Julia Boniface, and the support provided by Council and Shire staff ensured that this project was successfully completed.

5.1 Methods

The methods to assess and calculate the conservation value of the roadside reserves are described in *Assessing Roadsides: A guide for Rating Conservation Value* (Jackson, 2002). The process involves scoring a set of pre-selected attributes, which, when combined, represent a roadside's conservation status. A list of these attributes is presented on a standard survey sheet, see Appendix 2. This provides both a convenient and uniform method of scoring.

5.2 Calculating Conservation Values

The following attributes were used to produce a quantitative measure of conservation value:

- native vegetation on roadside;
- extent of native vegetation along roadside;
- number of native species;
- weed infestation;
- value as a biological corridor; and
- predominant adjoining land use.

Each of these attributes was given a score ranging from 0 to 2 points. Their combined scores provided a conservation score ranging from 0 to 12. The conservation values, in the form of conservation status categories, are represented by the following colour codes

Conservation Value	Conservation Status	Colour Code
9 – 12	High	Dark Green
7 – 8	Medium High	Light Green
5 – 6	Medium Low	Dark Yellow
0 – 4	Low	Light Yellow

Table 3: Colour codes used to depict the conservation status of roadsides.

The following attributes were also noted but did not contribute to the conservation value score:

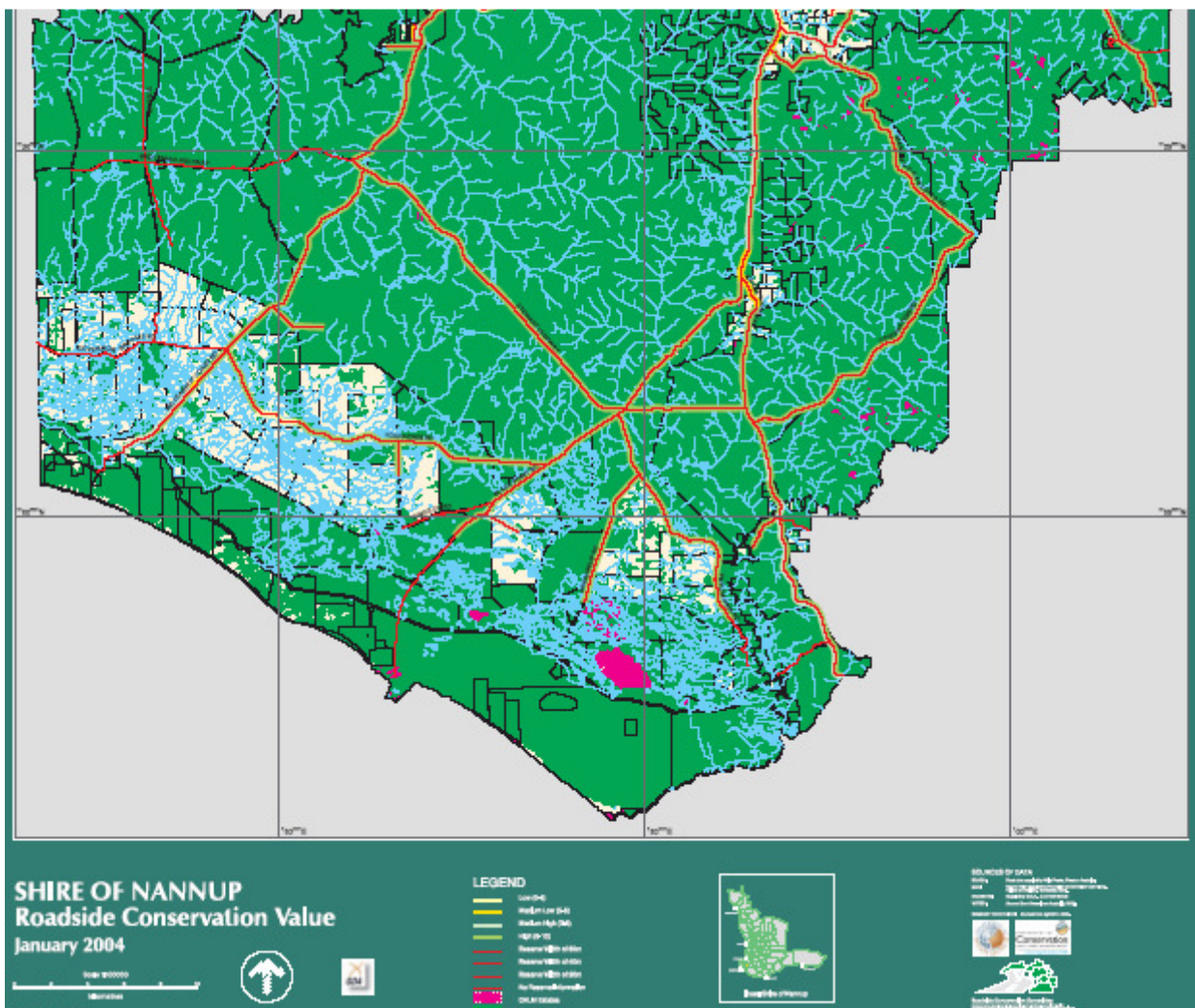
- width of road reserve;
- width of vegetated roadside;
- presence of utilities/disturbances;
- dominant weed species;
- fauna observed;
- general comments.

These attributes may be transferred into a community database that would provide information useful in many spheres, such as local government and community interest groups.

5.3 Mapping Conservation Values

The RCC produced a computer-generated map (using a Geographic Information System, or GIS), at a scale of 1:100,000 for the Shire of Nannup. Known as the Roadside Conservation Value (RCV) map, it depicts the conservation status of the roadside vegetation and the width of the road reserves within the Shire. The data used to produce both the map and the following figures and tables are presented in Appendix 3.

Data obtained from the Department of CALM, Main Roads WA and the Department of Agriculture WA was used in the RCV map, and depicts the location of remnant vegetation on both the Crown estate and privately owned land. Watercourses are also depicted on the RCV map.



The Nannup RCV map depicts roadside conservation values throughout the Shire.

6.0 USING THE RCV MAP

The RCV map initially provides an inventory of the *status quo* of the condition of the roadside vegetation. This is important as the quality of roadside vegetation has far reaching implications for sustaining biodiversity, tourism and Landcare values.

Moreover the data and map can be incorporated as a management and planning tool for managing the roadsides *per se*, as it enables the condition of roadside vegetation to be easily assessed. This information can then be used to identify environmentally sensitive areas, high conservation roadsides or strategically important areas, and thus ensure their conservation. Conversely, it enables degraded areas to be identified as areas important for strategic rehabilitation or in need of specific management techniques and weed control programs.

The map can also be used as a reference to overlay transparencies of other information relevant to roadside conservation. This enables the roadside vegetation to be assessed in the context of its importance to the shire's overall conservation network. Other overlays, such as the degree of weed infestation, or the location of environmentally sensitive areas or future planned developments, could also be produced as an aid to roadside management.

As well as providing a road reserve planning and management tool, the roadside conservation value map can also be used for:

- Regional or district fire management plans;
- Tourist routes, i.e. roads depicted as high conservation value would provide visitors to the district with an insight to the flora of the district;
- Landcare and/or Bushcare projects would be able to incorporate the information from this survey into 'whole of' landscape projects.



Weed control along a roadside

Photo MRWA



The map can be used in developing regional or district fire management plans.

Photo by CALM

7.0 SURVEY DATA RESULTS

A summary of the general roadside conditions in the Shire of Nannup is presented in Table 4. The roadside survey data has been combined to provide the total kilometres, and percentages, of roadside occupied by each of the conservation status categories and the attributes used to calculate the conservation values. As roadsides occur on both sides of the road, roadside distances (km) are equal to *twice* the actual distance of road travelled.

Summary Roadside Information: Shire of Nannup					
Length of roadsides surveyed: 1107.1 km					
<u>Roadside Conservation Status</u>			<u>Native Vegetation on Roadside</u>		
	Total (km)	(%)		Total (km)	(%)
Low	113.6	10.3	0 vegetation layers	54.0	4.9
Medium-low	31.9	2.9	1 vegetation layer	65.2	5.9
Medium-high	108.5	9.8	2-3 vegetation layers	988.0	89.2
High	853.1	77.1			
			Total	1107.1	100.0
Total	1107.1	100.1			
<u>Roadside Conservation Values</u>			<u>Extent of Native Vegetation</u>		
	Total (km)	(%)		Total (km)	(%)
0	0.0	0.0	<20%, Low	132.2	11.9
1	29.5	2.7	20-80%, Medium	130.9	11.8
2	28.4	2.6	>80%, Good	844.0	76.2
3	17.9	1.6			
4	37.9	3.4	Total	1107.1	99.9
5	18.6	1.7			
6	13.3	1.2	<u>Number of Native Plant Species</u>		
7	32.7	3.0		Total (km)	(%)
8	75.8	6.8	0 - 5 native species	120.0	10.8
9	101.2	9.1	6 - 19 native species	133.7	12.1
10	714.2	64.5	Over 20 native species	853.4	77.1
11	37.7	3.4			
12	0.0	0.0	Total	1107.1	100.0
Total	1107.1	100.0			
<u>Adjoining landuse</u>			<u>Weed Infestation</u>		
	Total (km)	(%)		Total (km)	(%)
Cleared	15.7	1.4	Heavy	128.1	11.6
Industrial/urban	1.9	0.2	Medium	91.0	8.2
Plantation	55.2	5.0	Light	888.0	80.2
Scattered	199.8	18.1			
Uncleared	833.5	75.3	Total	1107.1	100.0
Other	0.9	0.1			
Total	1107.1	100.1	<u>Value as a Biological Corridor</u>		
				Total (km)	(%)
			Low	79.7	7.2
			Medium	164.6	14.9
			High	862.9	77.9
			Total	1107.1	100.0

Data was collected in the Nannup Shire throughout 2001, 2002 & 2003

Table 4: Summary of the roadside conditions in the Shire of Nannup.

The 'width of vegetated roadside' value provides a measurement of the amount of vegetation occurring within roadsides in the Shire of Nannup. Roadsides where the vegetation was between 1-5m in width covered 382km (34.5%) of the Shire. 57km (5.1%) of roadsides supported vegetation between 5-20m in width, and 37.2km (3.4%) of roadsides contained native vegetation greater than 20m in width. The width of vegetation was unknown for 630.9 km (57%), which is common when a road passes through unfenced land, such as Nature reserves.

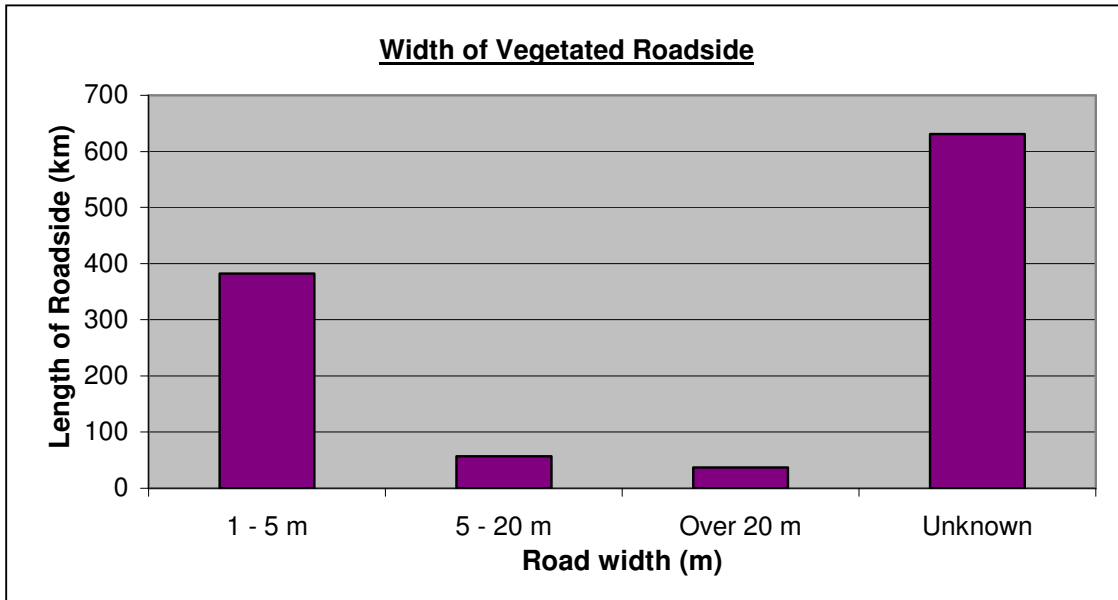


Figure 2- Width of vegetated roadsides in the Shire of Nannup.

Roadside sections of high conservation value covered 77.1% of the length of roadsides surveyed (853.1 km). Medium-high conservation value roadsides accounted for 9.8% (108.5 km), medium-low conservation roadside covered 2.9% (31.9 km) and areas of low conservation value occupied 10.3% of the roadsides surveyed (113.6 km), Table 4, Figure 3.

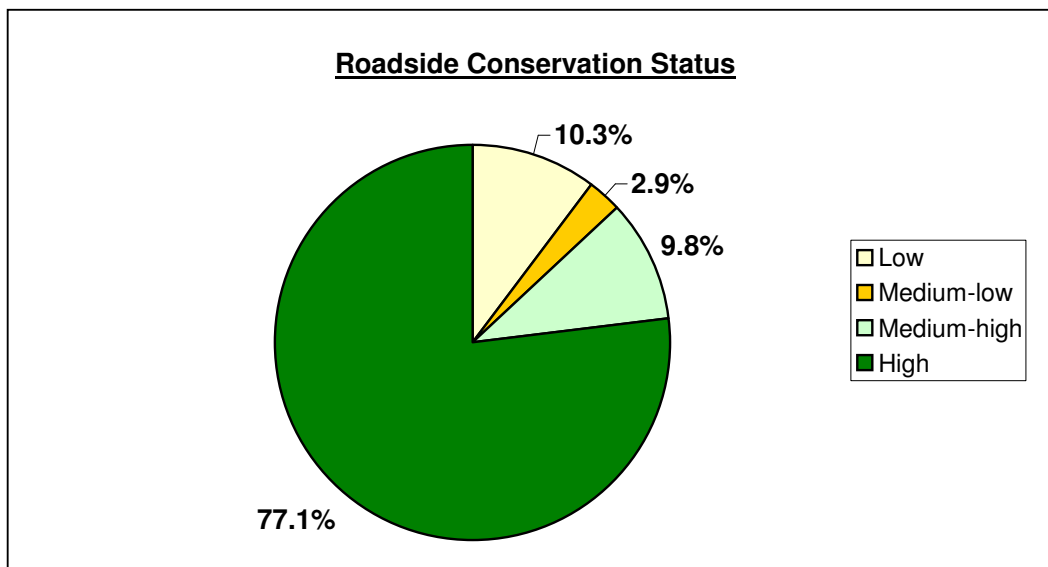


Figure 3 – Conservation status of roadsides in the Shire of Nannup.

The number of native vegetation layers present, either the tree, shrub or ground layers determines the 'native vegetation on roadside' value. Sections with two to three layers of native vegetation covered 89.2% of the roadside (988.0 km). 5.9% had only one layer (65.2 km) and 4.9% had no layers of native vegetation (54.0 km), Table 4, Figure 4.

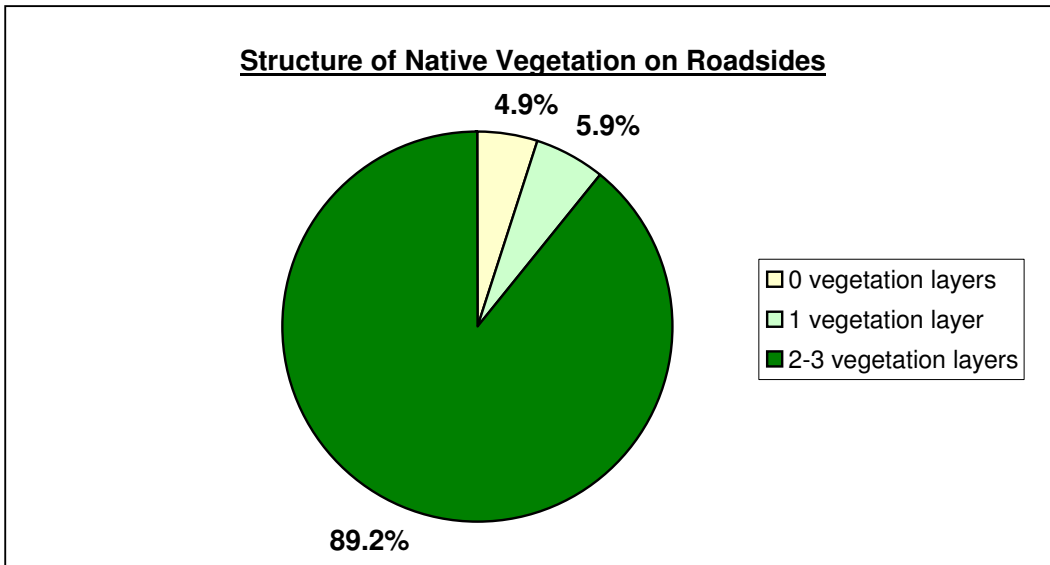


Figure 4– Native vegetation on roadsides in the Shire of Nannup in 2003.

Roadsides with extensive vegetation cover, i.e. greater than 80%, occurred along 76.2% of the roadsides surveyed (844.0 km). Survey sections with 20% to 80% vegetation cover accounted for 11.8% of the roadsides (130.9 km). The remaining 11.9% had less than 20% native vegetation (132.2 km), and therefore, a low 'extent of native vegetation' value, see Table 4, Figure 5.

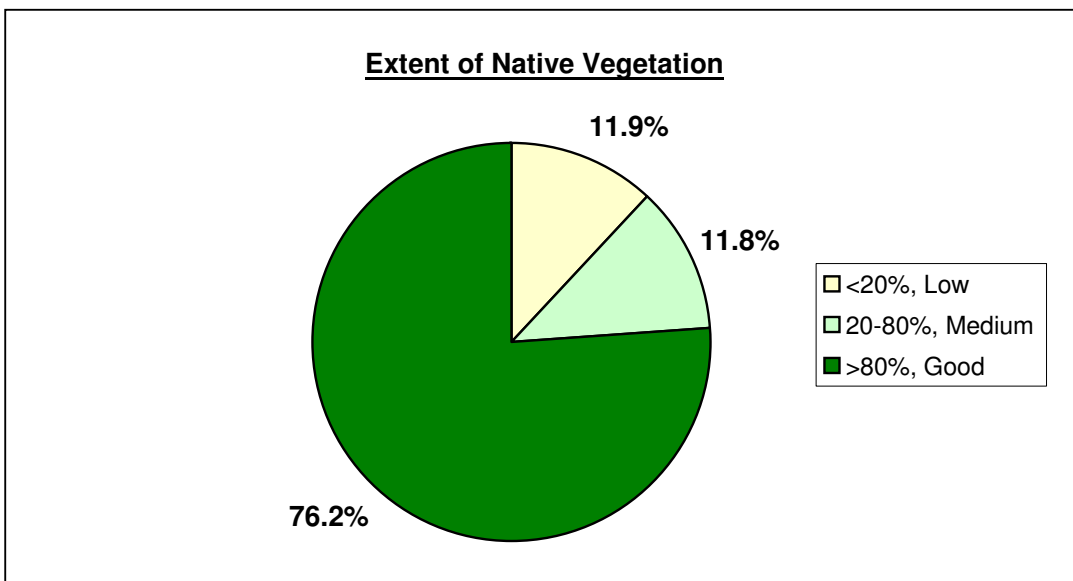


Figure 5 – Extent of native vegetation along roadsides in the Shire of Nannup in 2003.

The 'number of native species' score provided a measure of the diversity of the roadside vegetation. Survey sections with more than 20 plant species spanned 853.4 km (77.1%)

of the roadside. Roadside sections with 6 to 19 plant species accounted for 133.7 km (12.1%) of the roadside. The remaining 120.0 km (10.8%) contained less than 5 plant species; see Table 4, Figure 6.

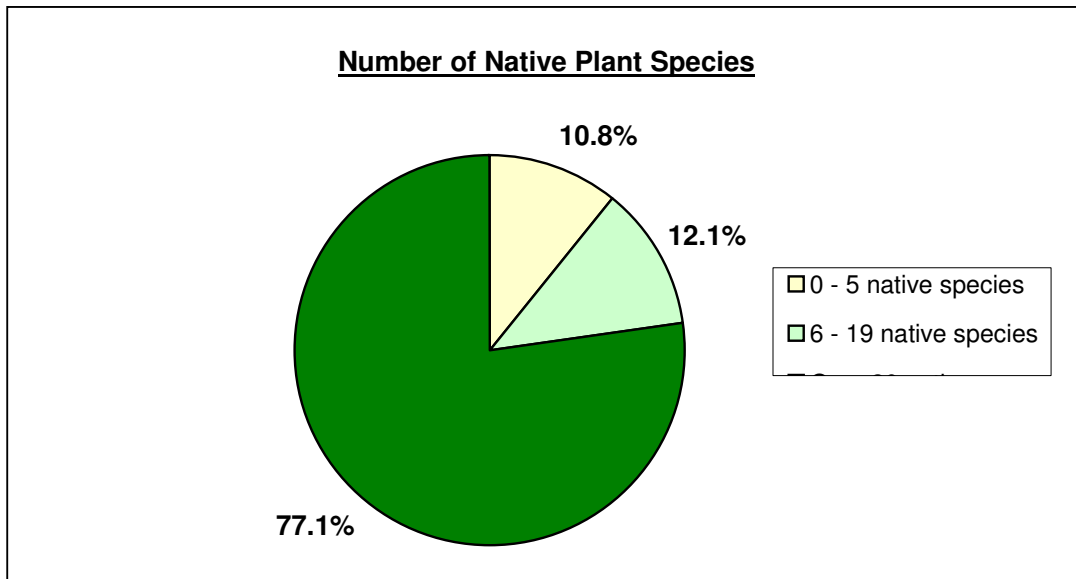


Figure 6 – Number of native plant species within roadides in the Shire of Nannup.

Roadides determined to have high value as biological corridors (as determined by the roadside surveyors) were present along 77.9% (862.9 km) of the roadside, medium value made up 14.9% (164.6 km), and roadides with low value as a biological corridor occurred along 7.2% (79.7 km) of the roadides surveyed, see Table 4, Figure 7.

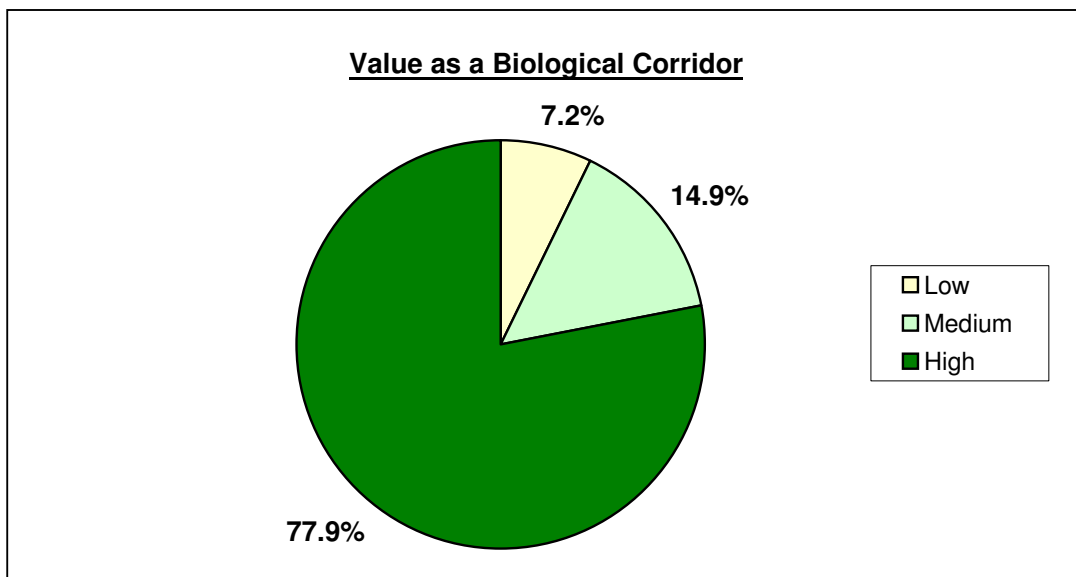


Figure 7 – Value as a biological corridor.

Light levels of weed infestation were observed on 80.2% (888.0 km) of the roadides surveyed, medium level weed infestation occurred on 8.2% (91.0 km) of the roadides and 11.6% (128.1 km) were heavily infested with weeds, see Table 4, Figure 8.

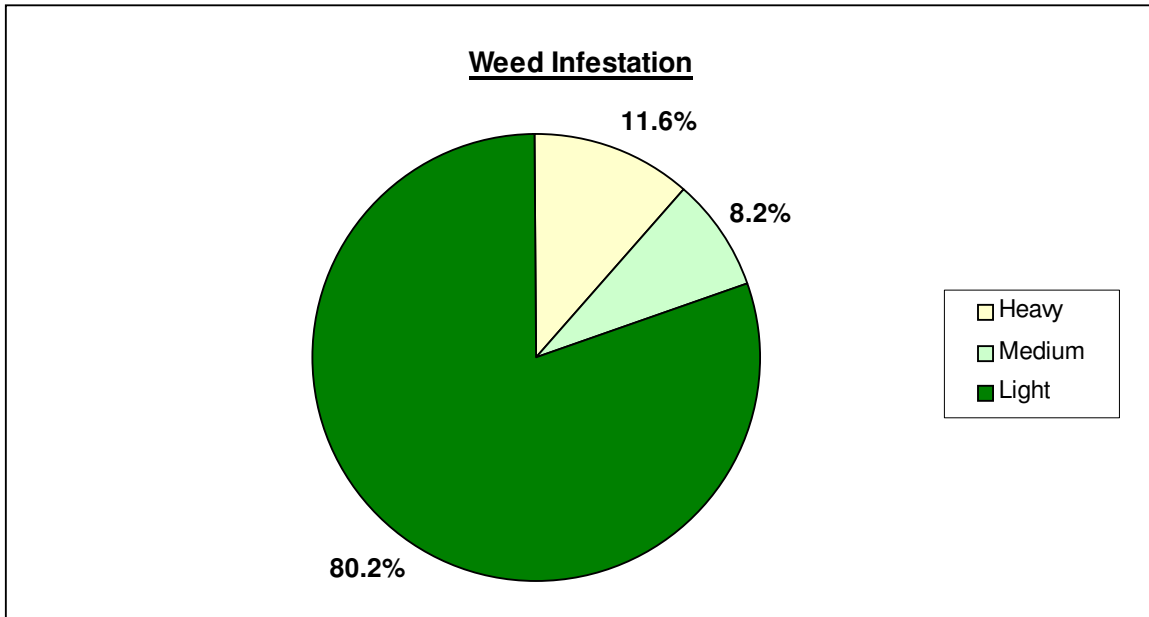


Figure 8 – Weed infestation. Light weed infestation = weeds less than 20% of total plants. Medium weed infestation = weeds 20 to 80% of the total plants. Heavy infestation = weeds more than 80% of the total plants.

Uncleared native vegetation was the predominant adjoining land use along 75.3% (833.5km) of roadsides, whilst 1.4% (15.7 km) of roadsides surveyed were adjoined by land that had been completely cleared for agriculture. 18.1% (199.8 km) of the roadsides surveyed were bordered by agricultural land containing a scattered distribution of native vegetation. Plantations of non-native species were the predominant adjoining landuse for 5.0% (55.2 km) of the roadsides surveyed, urban/industrial landuses adjoined 0.2% (1.9 km), and other landuses adjoined 0.1% (0.9 km) of the roadsides surveyed, see Table 4, Figure 9.

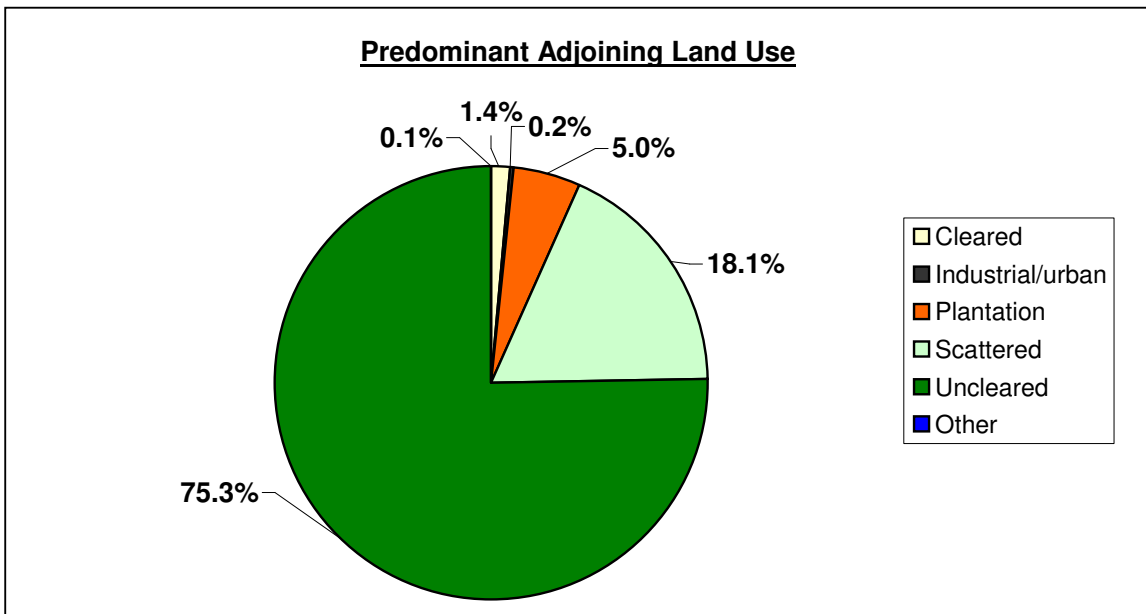


Figure 9 – Predominant adjoining land use.

The following nominated weeds are depicted on clear overlays accompanying the 2004 RCV map:

- Cape weed (*Arctotheca calendula*);
- Wild Radish (*Raphanus raphanistrum*);
- Bridal creeper (*Asparagus asparagoides*);
- Bulbs; and
- Grass weeds;
- Weed wattles (*Acacia spp.*).

The presence of any other weeds observed along roadsides in the Shire was also recorded, and these are presented in Figure 10 with the 6 nominated weed species.

Of the 6 nominated weeds surveyed throughout 2003, Grasses were the most highly recorded weed category, occurring along 319.7 km of roadsides. The category ‘Bulbs’ included weeds such as Watsonia and these were present along 89.7 km of the roadsides surveyed, whilst Cape weed was recorded along 89.4 km of roadside. Bridal creeper was the next most commonly recorded weed, occurring along 73.2 km of roadside, Wild radish was present along 57.6 km, and Weed wattles 33.7 km. Other weeds were recorded along 26.3km of roadside, see Figure 10.

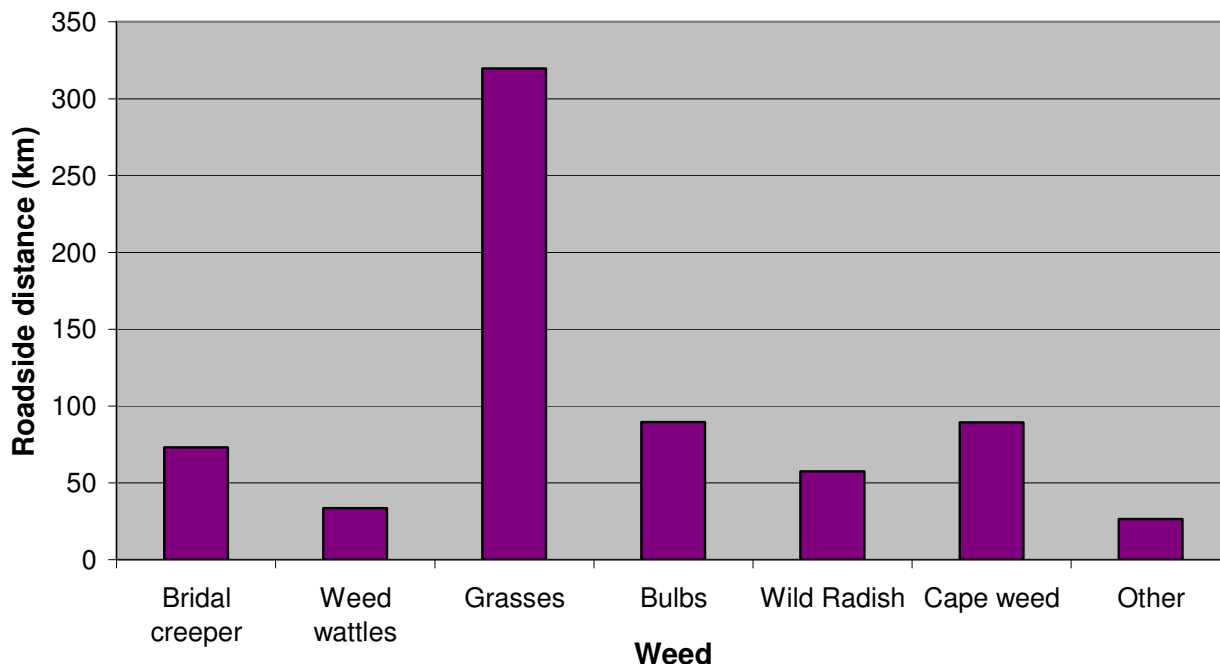




Figure 10 – Occurrence of nominated weeds along roadsides in the Shire of Nannup.



Note- As roadsides occur on both sides of the road, roadside distances (km) of weed infestation are equal to twice the actual distance of road travelled.



8.0 MANAGEMENT TECHNIQUES

The primary aim of road management is the creation and maintenance of a safe, efficient road system. However, the following management procedures are recommended and should be adopted. The following section provides management recommendations that will assist in retaining and enhancing roadside conservation value. These guidelines are taken from the Roadside Conservation Committee's *Roadside Manual* and the *Roadside Handbook*.

The Executive Officer of the Roadside Conservation Committee is also available to assist on all roadside conservation matters, and can be contacted on (08) 9334 0423.

High Conservation Value Roadsides		
Management Goal		Maintain and enhance the native plant communities.
Management Guidelines		Minimal disturbance to existing vegetation. Disturbance leads to weed invasion, which downgrades the conservation value, and increases the fire threat.

Medium Conservation Value Roadsides		
Management Goal		Maintain native vegetation wherever possible, and encourage its regeneration.
Management Guidelines		Minimise disturbance to existing vegetation.

Low Conservation Value Roadsides		
Management Goal		Retain remnant trees and shrubs and encourage their regeneration. Encourage revegetation projects using indigenous plants.
Management Guidelines		Minimise soil disturbance to reduce weed invasion. Encourage revegetation projects by adjacent landholders.

Minimal disturbance can be achieved by:

- adopting a road design that occupies the minimum space;
- diverting the line of a table drain to avoid disturbing valuable flora;
- pruning branches, rather than removing the whole tree or shrub;
- not dumping spoil on areas of native flora;

- observing dieback control measures as required;
- applying the Fire Threat Assessment (Roadside Manual) before burning roadside vegetation;
- using methods other than fuel reduction burns to reduce fire threat; if roadside burning must be undertaken, incorporate it into a district fire management program;
- encouraging adjacent landholders to set back fences to allow roadside vegetation to proliferate;
- encouraging adjacent landholders to plant windbreaks or farm tree lots adjacent to roadside vegetation to create a denser windbreak or shelterbelt;
- encouraging revegetation projects by adjacent landholders.

8.1 Special Environment Areas

A Special Environmental Area is a section of roadside, which has such significance that it requires special protection. Reasons for establishing Special Environmental Areas can include the protection of:

- rare or threatened species of native plants;
- sites that have other high conservation, scientific or aesthetic values; and
- Aboriginal or European cultural sites.

Special Environmental Areas can be delineated by the use of site markers. See Figures 11 and 12 for design and placement of SEA markers. Workers who come across a 'Special Environmental Area' marker in the field should not disturb the area between the markers unless specifically instructed. If in doubt, the Supervisor, Shire Engineer or CEO should be contacted.

Western Power and West Net rail also have systems for marking sites near power or rail lines. Examples of these are seen in the figure below.



Site markers delineate Special Environment Areas.

Photo by K. Jackson

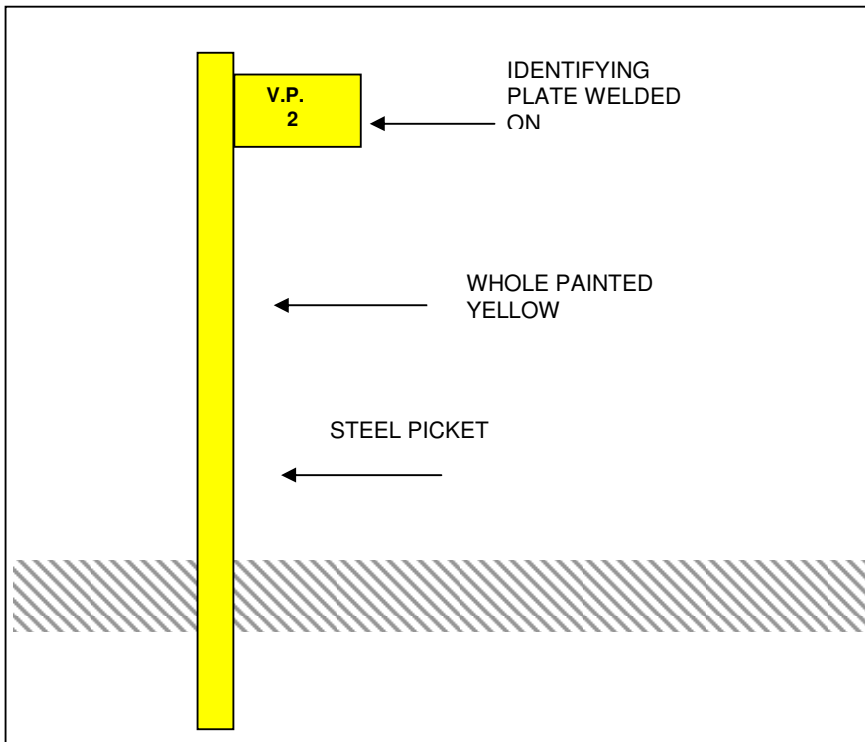


Figure 11 - Special Environmental Area site marker.

8.2 Special Environmental Area Register

To ensure that knowledge of rare flora and other sites does not get lost due, perhaps, to staff changes, a Local Authority should establish a Special Environmental Area Register. This should outline any special treatment, which the site should receive, and be consulted prior to any work being initiated in the area.

The Special Environmental Area Register should be consulted by the appropriate person prior to starting work on any particular road, to ensure that inadvertent damage does not occur. All Special Environment Area sites should be marked on the Shire map, which records Roadside Conservation Value

Local Government is encouraged to permanently mark Special Environmental Areas to prevent inadvertent damage to the rare flora or other values being protected. Markers of a uniform shape and colour will make recognition easier for other authorities using road reserves.

When notified of a population needing marking, the Local Authority should contact the appropriate Department of Conservation and Land Management Regional or District office for assistance to ensure the exact site location and correct positioning of marker posts.

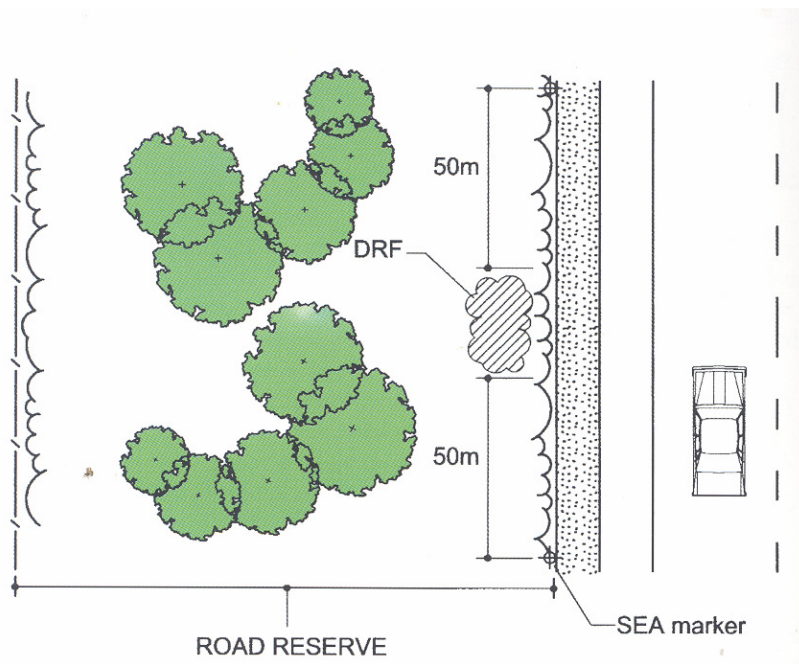


Figure 12 - Marking Special Environment Area (SEA) sites in the field. In this case, a declared rare flora (DRF) site has been marked.

8.3 Planning

The RCC is able to provide good models of Roadside Management Plans and encourages all shires to adopt this practice of planning for roadside conservation. The following actions greatly enhance likelihood of a plan that changes behaviour and results in on-ground actions:

➤ Community support:

encourage ongoing community involvement and commitment by establishing a local Roadside Advisory Committee or working group within the Shire Environmental Committee;

➤ Contract specifications:

maintain roadside values by developing environmental specifications for inclusion in all tender documents or work practices;

➤ Community education:

use of innovative and pertinent material can increase community understanding of roadside values; and

➤ Training:

promote local roadside planning initiatives and gain acceptance and understanding by involving shire staff, contractors, utility provider staff and the community in workshops, seminars or training days. The Roadside Conservation Committee can provide this training.

Training develops recognition and understanding of roadside values and highlights best work practices. Workshops are developed to ensure that local issues and environments are dealt with and they include site visits to high conservation remnants, current projects and works.

The objective of all roadside management planning should be to:

- **Protect**
 - native vegetation
 - rare or threatened flora or fauna
 - cultural and heritage values
 - community assets from fire
- **Maintain**
 - safe function of the road
 - native vegetation communities
 - fauna habitats and corridors
 - visual amenity and landscape qualities
 - water quality
- **Minimise**
 - land degradation
 - spread of weeds and vermin
 - spread of soil borne pathogens
 - risk and impact of fire
 - disturbance during installation and maintenance of service assets
- **Enhance**
 - indigenous vegetation communities
 - fauna habitats and corridors

8.4 Strategies

The development of a strategy enables potentially competing uses to coexist and ensures that roadsides are managed in a coordinated approach. When producing regional strategies the RCC suggests that:

- organisational support from local government is essential from the outset;
- strategies should take no longer than 12 months to produce (including a period for community comment);
- communities need to be provided with background information to make formal decisions.

Management strategies should be produced to address local issues, rather than be to a standard format. Issues can be categorised as:

➤ **Functional**

- Fire prevention
- Installation and maintenance of services
- Road construction and maintenance
- Stockpile and dumpsite management
- Vegetation removal
- Vehicle and machinery activity
- Water supply catchments

➤ **Cultural and Recreational**

- Cultural and heritage values
- Horse riding
- Visual amenity and landscape values
- Wayside stops

➤ **Landcare**

- Apiculture
- Insect Pests
- Pest animals
- Ploughing, cultivating or grading
- Revegetation and site rehabilitation
- Weeds

➤ **Conservation**

- Protecting and conserving remnant native vegetation
- Rare, threatened or significant flora and fauna
- Regeneration of native plant communities
- Roadside marking of special environmental areas
- Unused road reserves
- Wetlands
- Wildlife habitat
- Wildlife corridors

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APPENDIX

1

Definitions of Remnant Vegetation Types

(source-Beeston et al, 1993).

Vegetation classed as "**remnant vegetation**" has one or more of the following characteristics:

- most closely reflects the natural state of vegetation for a given area;
- has an intact understorey (if forest or woodland); and
- has minimal disturbance by agents of human activity.

Vegetation classed as "**modified vegetation**" has one or more of the following characteristics:

- degraded understorey (i.e. reduction in the number of native species, includes weeds);
- obvious human disturbance, i.e. clearing, mining, grazing, weeds;
- affected by salt; and
- narrow corridors of vegetation (usually along roads and railway lines or windbreaks), which are more likely to be affected by edge effects.



Modified remnant vegetation

Photo by K. Jackson

Vegetation classed as "**scattered vegetation**" has:

- no understorey;
- is parkland cleared i.e. scattered single trees; and
- no significant signs or chance of regeneration.



Scattered remnant vegetation

Photo by D. Lamont

APPENDIX

2

Standard Survey Sheet

SURVEY TO DETERMINE THE CONSERVATION VALUE OF ROADSIDES IN THE SHIRE OF _____	Roadside Conservation Committee C/- Locked Bag 104 Bentley Delivery Centre WA 6983	Phone: (08) 9334 0423 Fax: (08) 9334 0199
<p>Date _____</p> <p>Observer(s) _____</p> <p>Road Name _____</p> <p>Shire _____</p> <p>Nearest named place _____</p> <p>Direction of travel (N,S,E,W) _____</p> <p>Section No. _____</p> <p>Starting Point _____</p> <p>Odometer reading _____</p> <p>Ending Point _____</p> <p>Odometer reading _____</p> <p>Length of section _____</p> <p>WIDTH OF ROAD RESERVE (m) _____</p> <p>Side of the road Left Right</p> <p>WIDTH OF VEGETATED ROADSIDE</p> <p>1 – 5 m <input type="checkbox"/> <input type="checkbox"/></p> <p>5 – 20 m <input type="checkbox"/> <input type="checkbox"/></p> <p>Over 20 m <input type="checkbox"/> <input type="checkbox"/></p> <p>NATIVE VEGETATION ON ROADSIDE</p> <p>Tree layer <input type="checkbox"/> <input type="checkbox"/></p> <p>Shrub layer <input type="checkbox"/> <input type="checkbox"/></p> <p>Ground layer <input type="checkbox"/> <input type="checkbox"/></p> <p>EXTENT OF NATIVE VEGETATION ON ROADSIDE</p> <p>Less than 20% <input type="checkbox"/> <input type="checkbox"/></p> <p>20 – 80% <input type="checkbox"/> <input type="checkbox"/></p> <p>Over 80% <input type="checkbox"/> <input type="checkbox"/></p>	<p>No. OF DIFFERENT NATIVE SPECIES</p> <p>0 – 5 <input type="checkbox"/> <input type="checkbox"/></p> <p>6 – 19 <input type="checkbox"/> <input type="checkbox"/></p> <p>Over 20 <input type="checkbox"/> <input type="checkbox"/></p> <p>FAUNA OBSERVED</p> <hr/> <p>VALUE AS A BIOLOGICAL CORRIDOR</p> <p>Connects uncleared areas <input type="checkbox"/> <input type="checkbox"/></p> <p>Flowering shrubs <input type="checkbox"/> <input type="checkbox"/></p> <p>Large trees with hollows <input type="checkbox"/> <input type="checkbox"/></p> <p>Hollow logs <input type="checkbox"/> <input type="checkbox"/></p> <p>PREDOMINANT ADJOINING LANDUSE</p> <p>Agricultural crop or pasture:</p> <p>- Completely cleared <input type="checkbox"/> <input type="checkbox"/></p> <p>- Scattered <input type="checkbox"/> <input type="checkbox"/></p> <p>Uncleared land <input type="checkbox"/> <input type="checkbox"/></p> <p>Plantation of non-native trees <input type="checkbox"/> <input type="checkbox"/></p> <p>Urban or industrial <input type="checkbox"/> <input type="checkbox"/></p> <p>Railway Reserve parallel to road <input type="checkbox"/> <input type="checkbox"/></p> <p>Drain Reserve parallel to road <input type="checkbox"/> <input type="checkbox"/></p> <p>Other: _____</p> <hr/> <p>UTILITIES / DISTURBANCES</p> <p>Disturbances continuous <input type="checkbox"/> <input type="checkbox"/></p> <p>Disturbances isolated <input type="checkbox"/> <input type="checkbox"/></p> <p>Disturbances absent <input type="checkbox"/> <input type="checkbox"/></p> <p>Type: _____</p> <hr/> <p>GENERAL WEEDS</p> <p>Few weeds (<20% total plants) <input type="checkbox"/> <input type="checkbox"/></p> <p>Half weeds (20 - 80% total) <input type="checkbox"/> <input type="checkbox"/></p> <p>Mostly weeds (>80% total) <input type="checkbox"/> <input type="checkbox"/></p> <p>Ground layer totally weeds <input type="checkbox"/> <input type="checkbox"/></p>	<p>NOMINATED WEEDS</p> <hr/> <p>< 20% total weeds <input type="checkbox"/> <input type="checkbox"/></p> <p>20 – 80% total weeds <input type="checkbox"/> <input type="checkbox"/></p> <p>> 80% total weeds <input type="checkbox"/> <input type="checkbox"/></p> <hr/> <p>< 20% total weeds <input type="checkbox"/> <input type="checkbox"/></p> <p>20 – 80% total weeds <input type="checkbox"/> <input type="checkbox"/></p> <p>> 80% total weeds <input type="checkbox"/> <input type="checkbox"/></p> <hr/> <p>< 20% total weeds <input type="checkbox"/> <input type="checkbox"/></p> <p>20 – 80% total weeds <input type="checkbox"/> <input type="checkbox"/></p> <p>> 80% total weeds <input type="checkbox"/> <input type="checkbox"/></p> <hr/> <p>< 20% total weeds <input type="checkbox"/> <input type="checkbox"/></p> <p>20 – 80% total weeds <input type="checkbox"/> <input type="checkbox"/></p> <p>> 80% total weeds <input type="checkbox"/> <input type="checkbox"/></p> <hr/> <p>< 20% total weeds <input type="checkbox"/> <input type="checkbox"/></p> <p>20 – 80% total weeds <input type="checkbox"/> <input type="checkbox"/></p> <p>80% total weeds <input type="checkbox"/> <input type="checkbox"/></p> <hr/> <p>GENERAL COMMENTS</p> <p>_____</p> <p>_____</p> <p>OFFICE USE ONLY</p> <p>Conservation value score <input type="checkbox"/> <input type="checkbox"/></p>

A survey of the roadside conservation values in the Shire of Nannup

APPENDIX

3

Road #	Section #	From	To	Road name	Native Vegetation		Extent of vegetation		# native species		Value as a corridor		Weeds		Adjoining land use		Conservation value score (0-12)		Dominant weeds
					Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	
2160002	1	0.00	1.00	CUNDINUP KIRUP RD	1	1	0	0	0	0	1	1	0	0	S	S	3	3	GRASSES BULBS WILD_RADISH
2160002	2	1.00	2.40	CUNDINUP KIRUP RD	1	0	0	0	0	0	0	0	0	0	S	S	2	1	GRASSES BULBS OTHER
2160002	3	2.40	4.20	CUNDINUP KIRUP RD	2	2	1	1	1	1	2	2	1	1	S	P	8	8	GRASSES
2160002	4	4.20	4.90	CUNDINUP KIRUP RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	
2160004	1	0.00	0.47	EAST NANNUP RD	2	2	1	1	1	1	1	1	1	1	I	I	6	6	BRIDAL_CREEPER WEED_WATTLES GRASSES BULBS OTHER
2160004	2	0.47	2.27	EAST NANNUP RD	2	2	1	1	1	1	2	2	1	1	S	S	8	8	BRIDAL_CREEPER WEED_WATTLES BULBS BRIDAL_CREEPER GRASSES BULBS OTHER
2160004	3	2.27	3.27	EAST NANNUP RD	1	2	0	1	0	1	1	1	1	1	S	P	4	7	BRIDAL_CREEPER GRASSES BULBS OTHER
2160004	4	3.27	3.77	EAST NANNUP RD	0	0	0	0	0	0	0	0	0	0	S	S	1	1	GRASSES OTHER
2160004	5	3.77	5.17	EAST NANNUP RD	2	1	0	0	0	0	0	0	1	1	P	S	4	3	BRIDAL_CREEPER WEED_WATTLES GRASSES
2160004	6	5.17	7.07	EAST NANNUP RD	1	2	0	1	0	1	0	1	1	1	S	P	3	7	BRIDAL_CREEPER GRASSES OTHER
2160004	7	7.07	8.07	EAST NANNUP RD	2	2	1	1	2	2	2	2	1	1	S	S	9	9	BRIDAL_CREEPER GRASSES
2160004	8	8.07	9.07	EAST NANNUP RD	2	2	1	1	2	2	2	2	2	1	S	S	10	9	BRIDAL_CREEPER
2160004	9	9.07	10.47	EAST NANNUP RD	2	2	1	1	1	2	1	2	1	2	S	S	7	10	BRIDAL_CREEPER GRASSES BULBS OTHER
2160004	10	10.47	11.87	EAST NANNUP RD	0	2	0	1	0	0	0	0	0	1	S	S	1	5	GRASSES
2160004	11	11.87	12.87	EAST NANNUP RD	2	2	2	2	2	2	2	2	2	2	U	S	10	11	
2160005	1	0.00	10.30	MILYEANNUP COAST RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	
2160005	2	10.30	11.30	MILYEANNUP COAST RD	2	2	2	1	2	2	2	2	2	1	U	P	10	9	GRASSES
2160005	3	11.30	12.90	MILYEANNUP COAST RD	2	2	2	2	2	2	1	1	2	1	S	S	10	9	WEED_WATTLES CAPE_WEED
2160005	4	12.90	15.40	MILYEANNUP COAST RD	2	2	2	2	2	2	1	1	2	2	S	S	10	10	GRASSES
2160005	5	15.40	16.30	MILYEANNUP COAST RD	2	2	2	0	2	1	1	1	2	0	P	S	10	5	GRASSES
2160005	6	16.30	19.80	MILYEANNUP COAST RD	2	2	2	1	2	2	1	1	2	1	S	S	10	8	GRASSES
2160005	7	19.80	21.10	MILYEANNUP COAST RD	2	2	1	1	1	1	1	1	1	1	S	S	7	7	GRASSES
2160006	1	0.00	13.00	SEARS RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	CAPE_WEED
2160009	1	0.00	8.10	RIVER RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	
2160009	2	8.10	8.70	RIVER RD	2	2	2	1	2	1	2	2	2	1	U	S	10	8	BRIDAL_CREEPER
2160008	1	7.32	8.42	GOLD GULLY RD	2	2	2	2	1	1	2	2	2	2	P	P	10	10	
2160008	2	8.42	9.22	GOLD GULLY RD	2	2	0	2	1	2	0	2	2	2	S	U	6	10	
2160008	3	9.22	22.32	GOLD GULLY RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	
2160010	1	0.00	3.64	BARRABUP RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	
2160010	2	3.64	4.69	BARRABUP RD	2	2	1	1	1	1	2	2	1	1	S	S	8	8	GRASSES
2160010	3	4.69	5.69	BARRABUP RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	
2160010	4	5.69	7.09	BARRABUP RD	2	2	2	1	2	1	2	2	2	1	S	U	10	8	GRASSES CAPE_WEED
2160010	5	7.09	7.69	BARRABUP RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	
2160013	1	0.00	1.00	WHITE RD	2	2	1	1	1	1	2	2	1	1	S	S	8	8	BRIDAL_CREEPER GRASSES

A survey of the roadside conservation values in the Shire of Nannup

Road #	Section #	From	To	Road name	Native Vegetation		Extent of vegetation		# native species		Value as a corridor		Weeds		Adjoining land use		Conservation value score (0-12)		Dominant weeds
																			BULBS OTHER
2160013	2	1.00	1.40	WHITE RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	GRASSES
2160013	3	1.40	1.70	WHITE RD	2	0	2	0	2	0	2	0	2	0	U	S	10	1	GRASSES BULBS
2160013	4	1.70	2.10	WHITE RD	2	0	2	2	2	2	2	2	2	2	U	S	10	9	GRASSES
2160016	1	0.00	1.00	TOWER RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	GRASSES
2160016	2	1.00	1.50	TOWER RD	2	0	0	0	2	0	2	0	2	0	U	S	8	1	GRASSES
2160016	3	1.50	3.22	TOWER RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	
2160017	1	0.00	3.40	MOUNT LEEWIN LOOP RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	
2160017	2	3.40	5.10	MOUNT LEEWIN LOOP RD	2	2	1	1	2	2	2	2	2	2	P	P	10	10	BRIDAL_CREEPER GRASSES BULBS
2160017	3	5.10	6.90	MOUNT LEEWIN LOOP RD	2	2	1	1	1	1	2	2	1	1	S	S	8	8	GRASSES CAPE_WEED
2160019	1	0.00	4.83	CAMBRAY RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	
2160020	1	0.00	1.63	NICKOLOPOLIS RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	GRASSES CAPE_WEED
2160021	1	0.00	2.60	OLD CUNDINUP RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	
2160021	2	2.60	3.50	OLD CUNDINUP RD	2	1	1	1	1	0	2	1	2	0	U	O	8	4	GRASSES
2160021	3	3.50	5.60	OLD CUNDINUP RD	2	2	2	2	2	2	2	2	2	2	U	S	10	11	
2160022	1	0.00	0.50	STACEY RD	2	2	2	1	1	1	2	2	2	2	U	P	9	9	GRASSES
2160022	2	0.50	2.68	STACEY RD	2	2	2	2	1	1	2	2	2	2	U	U	9	9	
2160026	1	0.00	0.30	GUTHRIDGE RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	
2160026	2	0.30	1.70	GUTHRIDGE RD	2	2	2	2	2	2	2	2	2	2	U	S	10	11	
2160026	3	1.70	2.25	GUTHRIDGE RD	2	2	1	1	1	1	2	2	1	1	S	S	8	8	GRASSES BULBS
2160029	1	0.00	0.60	CHALWELL RD	2	2	0	2	0	2	1	2	0	2	S	U	4	10	GRASSES CAPE_WEED
2160029	2	0.60	1.70	CHALWELL RD	2	2	1	1	1	1	2	2	1	1	S	S	8	8	WEED_WATTLES GRASSES BULBS
2160029	3	1.70	4.50	CHALWELL RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	BULBS
2160029	4	4.50	5.20	CHALWELL RD	0	0	0	0	0	0	1	1	2	2	P	P	4	4	
2160031	1	0.00	0.65	RINNS RD	2	2	2	2	1	1	2	2	2	2	U	U	9	9	
2160045	1	3.00	3.53	JALBARRAGUP RD	2	2	1	1	1	1	2	2	1	1	S	P	8	8	WEED_WATTLES GRASSES BULBS
2160045	2	3.53	4.53	JALBARRAGUP RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	GRASSES
2160045	3	4.53	19.80	JALBARRAGUP RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	
2160047	1	0.00	23.34	MOWEN RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	
2160048	1	0.00	17.20	BAKER RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	
2160049	1	0.00	10.30	BLACK POINT RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	
2160049	2	10.30	15.80	BLACK POINT RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	
2160049	3	15.80	19.80	BLACK POINT RD	2	2	2	2	2	2	2	2	2	2	S	U	11	10	
2160052	1	0.00	9.50	STALLARD RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	
2160055	1	0.00	0.65	PERKS RD	2	2	1	1	1	1	0	2	2	2	S	U	7	8	GRASSES
2160055	2	0.65	1.30	PERKS RD	1	1	0	0	0	0	1	1	0	0	S	S	3	3	WEED_WATTLES WILD_RADISH CAPE_WEED
2160056	1	0.00	1.30	FOLLY RD	0	0	0	0	0	0	0	0	0	0	C	C	2	2	GRASSES CAPE_WEED OTHER

A survey of the roadside conservation values in the Shire of Nannup

Road #	Section #	From	To	Road name	Native Vegetation		Extent of vegetation		# native species		Value as a corridor		Weeds		Adjoining land use		Conservation value score (0-12)		Dominant weeds
2160056	2	1.30	3.95	FOLLY RD	0	0	0	0	0	0	1	1	0	0	S	S	2	2	GRASSES CAPE_WEED OTHER
2160056	3	3.95	6.92	FOLLY RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	GRASSES
2160063	1	0.00	17.70	CORONATION RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	
2160066	1	0.00	9.50	PNEUMONIA RD	2	2	2	2	2	2	2	2	2	2	U	U	10	11	
2160067	1	0.00	3.10	JANGARDUP RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	GRASSES BULBS
2160067	2	3.10	5.80	JANGARDUP RD	2	2	2	2	2	2	1	2	2	2	P	P	11	10	
2160067	3	5.80	7.10	JANGARDUP RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	
2160067	4	7.10	9.70	JANGARDUP RD	2	2	2	2	2	2	2	2	2	2	S	U	11	10	
2160067	5	9.70	11.39	JANGARDUP RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	
2160069	1	0.00	4.10	FOURACRES RD	2	2	2	2	2	2	2	2	2	2	U	U	11	11	WEED_WATTLES
2160069	2	4.10	6.60	FOURACRES RD	0	0	0	0	0	0	0	0	0	0	P	P	1	1	GRASSES
2160069	3	6.60	9.50	FOURACRES RD	2	2	2	2	2	2	1	1	2	2	P	P	10	10	GRASSES
2160069	4	9.50	12.50	FOURACRES RD	2	2	2	2	2	2	1	1	2	2	U	P	10	10	
2160069	5	12.50	22.20	FOURACRES RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	
2160071	1	0.00	2.30	DENNY RD	2	2	1	1	1	1	1	0	2	2	U	U	7	6	
2160071	2	2.30	3.00	DENNY RD	2	2	0	0	0	0	2	1	2	2	U	U	6	5	
2160071	3	3.00	12.09	DENNY RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	
2160072	1	0.00	1.92	DON RD	2	2	2	2	2	2	1	1	2	2	P	S	10	10	GRASSES
2160076	1	0.00	1.00	Longbottom RD	2	1	0	0	0	0	0	0	0	0	S	S	3	2	WEED_WATTLES BULBS OTHER
2160076	2	1.00	4.08	Longbottom RD	2	2	2	2	1	1	2	2	2	2	U	U	9	9	
2160080	1	0.00	0.50	HELYAR RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	GRASSES CAPE_WEED
2160080	2	0.50	1.22	HELYAR RD	2	2	0	2	1	1	1	2	0	0	S	U	5	7	GRASSES CAPE_WEED
2160081	1	0.00	1.00	BEGGARS RD	1	2	1	0	1	0	2	0	1	0	U	I	6	2	WEED_WATTLES GRASSES BULBS CAPE_WEED
2160082	1	0.00	0.60	BOGADILLUP RD	2	2	2	2	1	1	2	2	2	2	U	U	9	9	
2160082	2	0.60	1.40	BOGADILLUP RD	2	1	1	1	1	0	0	2	0	1	S	S	5	6	BRIDAL_CREEPER WEED_WATTLES BULBS
2160083	1	0.00	1.60	POISON SWAMP RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	
2160085	1	0.00	3.44	SOUTH COAST RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	
2160086	1	0.00	2.34	STORRY RD	2	2	2	2	1	2	2	2	2	2	U	U	9	10	
2160091	1	0.00	2.20	JOHNSTON RD	2	2	0	0	0	0	0	1	0	0	S	S	3	4	WILD_RADISH
2160091	2	2.20	2.97	JOHNSTON RD	2	2	1	1	1	1	1	1	2	2	U	U	7	7	
2160092	1	0.00	0.58	CRAIGIE DRV	1	1	0	0	0	0	1	1	0	0	S	S	3	3	
2160093	1	0.00	1.00	CUNDINUP WEST RD	0	2	0	2	0	2	0	2	0	2	S	U	1	10	GRASSES BULBS WILD_RADISH
2160093	2	1.00	2.00	CUNDINUP WEST RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	BULBS
2160093	3	2.00	5.00	CUNDINUP WEST RD	0	2	0	2	1	2	0	2	0	2	S	U	2	10	GRASSES BULBS CAPE_WEED
2160093	4	5.00	8.00	CUNDINUP WEST RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	BULBS OTHER
2160093	5	8.00	9.41	CUNDINUP WEST RD	2	2	1	1	1	1	2	2	1	1	S	S	8	8	GRASSES BULBS CAPE_WEED
2160094	1	0.00	0.50	CUNDINUP SOUTH RD	2	2	1	2	2	2	2	2	1	1	S	U	9	9	BULBS

A survey of the roadside conservation values in the Shire of Nannup

Road #	Section #	From	To	Road name	Native Vegetation		Extent of vegetation		# native species		Value as a corridor		Weeds		Adjoining land use		Conservation value score (0-12)		Dominant weeds
2160094	2	0.50	2.50	CUNDINUP SOUTH RD	1	1	0	0	0	0	0	0	0	0	S	S	2	2	BRIDAL_CREEPER WEED_WATTLES GRASSES BULBS CAPE_WEED OTHER
2160094	3	2.50	4.50	CUNDINUP SOUTH RD	1	2	2	2	2	2	0	2	2	2	U	U	7	10	
2160094	4	4.50	5.50	CUNDINUP SOUTH RD	2	2	1	2	1	2	2	2	0	2	S	U	7	10	WEED_WATTLES GRASSES BULBS
2160094	5	5.50	7.50	CUNDINUP SOUTH RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	BULBS
2160094	6	7.50	8.50	CUNDINUP SOUTH RD	2	2	0	2	1	2	2	2	0	2	S	U	6	10	GRASSES BULBS
2160094	7	8.50	10.50	CUNDINUP SOUTH RD	0	2	0	2	0	2	0	2	2	2	U	U	2	10	
2160094	8	10.50	13.03	CUNDINUP SOUTH RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	
2160098	1	0.00	2.12	MAYALL RD	2	2	1	1	2	2	1	1	1	1	S	S	8	8	GRASSES
2160099	1	0.00	0.40	KING RD	2	2	2	2	1	1	2	2	2	2	U	U	9	9	
2160099	2	0.40	0.89	KING RD	0	0	0	0	0	0	0	1	0	0	S	P	1	2	BRIDAL_CREEPER GRASSES CAPE_WEED
2160100	1	0.00	2.20	BLACKWOOD RIVER DRV	0	0	0	0	0	0	2	1	0	0	S	S	3	2	GRASSES WILD_RADISH CAPE_WEED
2160101	1	0.00	1.18	GREENWOOD RD	0	0	0	0	0	0	0	0	0	0	S	S	1	1	GRASSES CAPE_WEED
2160105	1	0.00	1.92	NEVERMAN RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	GRASSES
2160106	1	0.00	2.21	DEAN RD	0	0	0	0	0	0	0	1	0	0	S	S	1	2	GRASSES CAPE_WEED
2160107	1	0.00	0.79	BALINGUP RD	1	2	0	0	0	0	2	2	0	0	S	P	4	5	BRIDAL_CREEPER GRASSES BULBS
2160107	2	0.79	1.29	BALINGUP RD	0	1	0	0	0	0	1	1	0	0	S	S	2	3	BRIDAL_CREEPER WEED_WATTLES GRASSES BULBS WILD_RADISH OTHER
2160107	3	1.29	2.29	BALINGUP RD	0	1	0	0	0	0	0	1	0	0	S	S	1	3	GRASSES BULBS WILD_RADISH
2160107	4	2.29	7.29	BALINGUP RD	2	2	1	1	1	1	2	2	1	1	S	S	8	8	BRIDAL_CREEPER GRASSES BULBS WILD_RADISH OTHER
2160107	5	7.29	10.69	BALINGUP RD	1	1	0	0	0	0	2	2	0	0	S	S	4	4	BRIDAL_CREEPER GRASSES WILD_RADISH
2160107	6	10.69	19.49	BALINGUP RD	1	1	0	0	0	0	2	2	0	0	S	S	4	4	BRIDAL_CREEPER GRASSES BULBS WILD_RADISH CAPE_WEED
2160109	1	0.00	14.00	BRIDGETOWN NANNUP RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10	GRASSES
2160109	2	14.00	15.35	BRIDGETOWN NANNUP RD	2	2	1	2	1	2	1	0	0	1	S	U	6	7	GRASSES
2160109	3	15.35	17.35	BRIDGETOWN NANNUP RD	2	2	1	1	1	1	2	2	1	1	P	P	8	8	GRASSES
2160109	4	17.35	18.65	BRIDGETOWN NANNUP RD	2	2	1	1	1	1	2	2	1	1	U	S	7	8	GRASSES WILD_RADISH
2160109	5	18.65	23.24	BRIDGETOWN NANNUP RD	0	0	0	0	0	0	0	0	0	0	P	P	1	1	BRIDAL_CREEPER GRASSES WILD_RADISH
2160114	1	0.00	0.40	THOMAS RD	0	2	0	1	0	0	0	2	0	0	S	S	1	6	WEED_WATTLES GRASSES
2160114	2	0.40	0.58	THOMAS RD	1	2	0	0	0	0	2	1	0	0	S	S	4	4	GRASSES
2160115	1	0.00	1.40	WOODABURRUP RD	2	2	1	1	2	2	1	2	1	1	S	S	8	9	GRASSES
2160115	2	1.40	2.60	WOODABURRUP RD	2	2	2	2	2	2	1	1	2	2	U	U	9	9	GRASSES
2160115	3	2.60	4.79	WOODABURRUP RD	2	2	0	0	1	1	1	1	0	0	S	S	5	5	GRASSES OTHER
2160116	1	0.00	2.74	LESCHENAULTIA RD	2	2	1	1	1	1	2	2	2	2	U	U	8	8	

A survey of the roadside conservation values in the Shire of Nannup

Road #	Section #	From	To	Road name	Native Vegetation		Extent of vegetation		# native species		Value as a corridor		Weeds		Adjoining land use		Conservation value score (0-12)		Dominant weeds	
2160123	1	0.00	1.70	WISHART RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10		
2160300	1	0.00	11.00	DICKSON RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10		
2160119	1	0.00	14.50	MANJIMUP CARLOTTA RD	2	2	2	2	2	2	2	2	2	2	U	U	10	10		
2160119	2	14.50	17.70	MANJIMUP CARLOTTA RD	2	2	1	1	1	1	2	2	1	1	S	S	8	8	GRASSES	
2160119	3	17.70	18.26	MANJIMUP CARLOTTA RD	0	0	0	0	0	0	0	1	0	0	S	S	1	2	WEED_WATTLES GRASSES WILD_RADISH	
M080	1	0.00	0.80	STEWART HWY	2	2	2	2	2	2	2	2	2	2	U	U	10	10		
M080	2	0.80	10.10	STEWART HWY	2	2	2	2	2	2	1	2	2	2	U	U	9	10		
M080	3	10.10	27.56	STEWART HWY	2	2	2	2	2	2	2	2	2	2	U	U	10	10		
M027	1	0.00	0.94	BROCKMAN HWY	2	2	1	1	0	0	1	1	0	0	S	S	5	5	WEED_WATTLES GRASSES	
M027	2	0.94	18.38	BROCKMAN HWY	2	2	2	2	2	2	2	2	2	2	U	U	10	10		
M027	3	18.38	19.40	BROCKMAN HWY	2	1	0	0	0	0	1	0	0	0	S	S	4	2	WEED_WATTLES GRASSES CAPE_WEED OTHER	
M027	4	19.40	31.62	BROCKMAN HWY	2	2	2	2	2	2	1	1	2	2	U	U	9	9		
M008	1	34.70	36.70	VASSE HWY	2	2	2	2	2	2	1	1	2	2	U	U	9	9		
M008	2	36.70	37.70	VASSE HWY	2	2	0	0	1	1	2	2	0	0	S	S	6	6	GRASSES CAPE_WEED	
M008	3	37.70	51.10	VASSE HWY	2	2	2	2	2	2	1	1	2	2	U	U	9	9		
M008	4	51.10	53.20	VASSE HWY	2	2	2	1	2	1	2	2	2	2	1	U	S	10	8	WEED_WATTLES GRASSES
M008	5	53.20	56.40	VASSE HWY	2	2	2	2	2	2	2	2	2	2	U	U	10	10	GRASSES CAPE_WEED	
M008	6	56.40	58.00	VASSE HWY	0	1	0	0	0	0	0	1	0	0	S	S	1	3	BRIDAL_CREEPER WEED_WATTLES GRASSES BULBS WILD_RADISH	
M008	7	60.01	62.76	VASSE HWY	2	2	1	1	0	2	2	2	0	1	C	C	7	10	BRIDAL_CREEPER GRASSES	
M008	8	62.76	65.16	VASSE HWY	2	2	2	2	2	2	2	2	2	2	U	S	10	11	GRASSES	
M008	9	65.16	66.26	VASSE HWY	1	0	0	0	0	0	0	0	0	0	U	S	2	1	GRASSES	
M008	10	66.26	70.06	VASSE HWY	1	2	0	2	0	1	0	2	1	2	C	C	4	11	GRASSES	
M008	11	70.06	70.86	VASSE HWY	0	0	0	0	0	0	0	0	2	2	P	P	3	3	GRASSES	
M008	12	70.86	72.86	VASSE HWY	2	2	1	2	1	2	1	2	0	2	P	U	6	10	GRASSES	
M008	13	72.86	83.76	VASSE HWY	2	1	2	1	2	1	2	2	2	2	U	U	10	7	GRASSES	
M008	14	83.76	87.26	VASSE HWY	2	2	0	0	1	1	1	1	0	0	S	S	5	5	GRASSES	
M008	15	87.26	95.96	VASSE HWY	2	2	2	1	2	2	2	2	2	2	U	U	10	9		
M008	16	95.96	97.26	VASSE HWY	2	2	2	1	2	1	2	2	2	0	U	S	10	7	GRASSES	
M008	17	97.26	98.46	VASSE HWY	2	2	2	2	2	2	2	2	2	2	U	U	10	10		
M008	18	98.46	99.26	VASSE HWY	2	2	1	2	1	2	1	2	2	2	S	U	8	10	GRASSES	
M008	19	99.26	109.70	VASSE HWY	2	2	2	2	2	2	2	0	2	2	U	U	10	8		

A survey of the roadside conservation values in the Shire of Nannup

APPENDIX

4

Road names, numbers and lengths in the Shire of Nannup

(source data- Main Roads WA)

Road number (MRWA)	Road name	Length (km)
2160034	ADAM ST	0.32
2160057	ANNELS RD (F)	5.47
2160058	ASPLINS RD (F)	2.77
2160064	AVERY RD	1.61
2160048	BAKER RD	17.20
2160107	BALINGUP-NANNUP RD	19.49
2160010	BARRABUP RD	7.69
2160081	BEGGARS RD	1.00
2160043	BISHOP ST	0.16
2160049	BLACK POINT RD	25.00
2160301	BLACKWATER RD	5.00
2160100	BLACKWOOD RIVER DRIVE	2.20
2160082	BOGGADILLUP RD	1.60
2160109	BRIDGETOWN-NANNUP RD	23.24
2160039	BROCKMAN ST	0.32
2160122	BUCKLEY RD	0.72
2160019	CAMBRAY RD (F)	4.83
2160078	CAREY RD	0.62
2160035	CAREY ST	0.80
2160029	CHALWELL RD	5.29
2160084	CHESTER RD (F)	4.86
2160063	CORONATION RD	17.70
2160092	CRAIGIE DRIVE	0.58
2160041	CROSS ST	0.18
2160001	CUNDINUP RD	0.53
2160094	CUNDINUP SOUTH RD	13.03
2160093	CUNDINUP WEST RD	9.41
2160014	CUNDINUP-DUDINYILLUP RD	6.29
2160002	CUNDINUP-KIRUP RD	4.86
2160106	DEAN RD	2.21
2160071	DENNY RD (F)	12.09
2160300	DICKSON RD	11.00
2160072	DON RD	1.92
2160011	DONNELLY MILL RD	2.40
2160037	DUNNET RD	1.44
2160004	EAST NANNUP RD	12.87
2160056	FOLLY RD (F)	6.92
2160087	FORD WAY	0.24
2160040	FORREST ST	0.16
2160108	FORREST ST	0.15
2160069	FOURACRES RD	22.20
2160015	FULLERS RD	3.56
2160065	GINGILUP RD	5.15
2160125	GLACIER RD	3.71
2160008	GOLD GULLY RD	22.32
2160007	GOVERNOR BROOME RD	10.73
2160032	GRANGE RD	0.66
2160101	GREENWOOD RD	1.18
2160026	GUTHRIDGE RD	2.25
2160018	HALLEY FORMATION	4.84
2160074	HARTNETTS RD	1.00
2160028	HAYES RD	1.29
2160080	HELYAR RD	1.22
2160038	HIGGINS ST	0.72
2160117	HOVEA PLACE	0.74
2160045	JALBARRAGUP RD	19.80
2160067	JANGARDUP RD	11.39

A survey of the roadside conservation values in the Shire of Nannup

Road number (MRWA)	Road name	Length (km)
2160042	JEPHSON ST	0.16
2160091	JOHNSTON RD	2.97
2160033	KEARNEY ST	0.81
2160099	KING RD	0.89
2160116	LESCHENAUTIA DRIVE	2.74
2160076	Longbottom RD	4.08
2160119	MANJIMUP-CARLOTTA RD	18.26
2160098	MAYALL RD	2.12
2160121	MCKITTRICK RD	1.03
2160112	MELALEUCA PLACE	0.19
2160005	MILYEANNUP COAST RD	23.80
2160095	MONOGHAN ST	0.21
2160079	MONOHAN RD	0.90
2160017	MOUNT LEEWIN LOOP RD	6.90
2160047	MOWEN RD (F)	23.34
2160077	NEDS RD	0.25
2160105	NEVERMAN RD	1.92
2160020	NICKOLOPLOS RD	1.63
2160036	NORTH ST	0.70
2160124	NURSERY RD	0.49
2160021	OLD CUNDINUP RD (F)	5.60
2160118	ORCHID PLACE	0.66
2160055	PERKS RD	1.30
2160066	PNEUMONIA RD	12.41
2160083	POISON SWAMP	1.60
2160090	PRIVATE RD TO HOUSES	0.16
2160089	PRIVATE RD TO MILL	0.21
2160111	RAILWAY ST	0.11
2160031	RINNS RD	0.65
2160009	RIVER RD	9.00
2160104	RIVERGUM WAY	0.39
2160103	ROSELLA CLOSE	0.20
2160024	SAVAGE RD	1.80
2160030	SCOTT RD	3.50
2160006	SEARS RD	13.00
2160025	SEVEN DAY RD	1.93
2160097	SEXTON WAY	0.75
2160113	SHEOAK PLACE	0.19
2160023	SMITH RD	1.77
2160085	SOUTH COAST RD (F)	3.44
2160022	STACEY RD	2.68
2160052	STALLARD RD	9.50
2160120	STEWART RD	27.82
2160086	STORRY RD	2.34
2160046	STRUTHERS ST	0.40
2160110	TERRY ST	0.15
2160114	THOMAS RD	0.58
2160075	TOMAS RD	0.45
2160016	TOWER RD	3.22
2160088	UN-NAMED RD	0.50
2160073	WALTER ST	0.48
2160102	WATTLE PL	0.38
2160013	WHITE RD	3.70
2160096	WILSON ST	0.50
2160123	WISHART RD	1.70
2160115	WOODABURRUP RD	4.79

APPENDIX

5

Flora species in the Shire of Nannup

(Source- WA Herbarium)

* = exotic flora species. Note: This is not a comprehensive list.

Acacia alata	Actinotus omnifertilis
Acacia alata var. alata	Adenanthos barbiger subsp. intermedius ms
Acacia applanata	Adenanthos detmoldii P4
Acacia assimilis subsp. assimilis	Adenanthos meisneri
Acacia browniana	Adenanthos obovatus
Acacia browniana var. browniana	Adenanthos x pamela P4
Acacia browniana var. obscura	Adiantum aethiopicum
Acacia cochlearis	Agonis flexuosa
Acacia cyclops	Agonis flexuosa var. flexuosa
*Acacia dealbata	Agonis juniperina
*Acacia decurrens	Agonis linearifolia
Acacia dentifera	Agonis parviceps
Acacia divergens	Agonis sp.Coarse Agonis(J.R.Wheeler 2939)
Acacia extensa	Agonis sp.Lake Jasper(B.Hammersley 567)
Acacia flagelliformis P4	Agrostis plebeia
Acacia gilbertii	Agrostocrinum scabrum
Acacia hastulata	*Aira caryophyllea
Acacia insolita	Allocasuarina decussata
Acacia insolita subsp. insolita	Allocasuarina fraseriana
Acacia lateriticola	Alternanthera nodiflora
Acacia littorea	Amaryllis belladonna
Acacia mearnsii	Amperea ericoides
*Acacia melanoxylon	Amperea simulans
Acacia mooreana P2	Amperea volubilis
Acacia myrtifolia	Amphipogon amphipogonoides
Acacia nervosa	*Anagallis arvensis
Acacia obovata	Anarthria gracilis
Acacia pentadenia	Anarthria laevis
Acacia preissiana	Anarthria prolifera
Acacia pulchella	Anarthria scabra
Acacia pulchella var. glaberrima	Andersonia amabile ms P3
Acacia pulchella var. goadbyi	Andersonia auriculata P2
Acacia pulchella var. pulchella	Andersonia barbata
Acacia pycnantha	Andersonia caerulea
Acacia saligna	Andersonia heterophylla
Acacia scalpelliformis	Andersonia involucrata
Acacia semitrullata P3	Andersonia latiflora
Acacia stenoptera	Andersonia lehmanniana
Acacia subracemosa P2	Andersonia longifolia P3
Acacia tayloriana	Andersonia micrantha
Acacia tayloriana P4	Andersonia sprengelioides
Acacia tetragonocarpa	Anigozanthos bicolor subsp. decrescens
Acacia triptycha	Anigozanthos flavidus
Acacia urophylla	Anigozanthos manglesii subsp. manglesii
Acacia varia	Anigozanthos viridis subsp. viridis
Acacia varia var. varia	*Anthoxanthum odoratum
Acacia willdenowiana	Aotus intermedia
Acanthocarpus preissii	Aotus passerinoides
Actinodium cunninghamii	Aotus sp.Scott River(K.F.Kenneally 2371)
Actinotus glomeratus	*Aphanes arvensis

Aphelia cyperoides
 **Arctotheca calendula*
 **Asparagus officinalis*
Asplenium aethiopicum P4
Asplenium flabellifolium
Astartea fascicularis
Astartea sp.Gingalup(N.Gibson & M.Lyons 119)
Astartea sp.Rivers(K.Newbey 1740)
Astartea sp.Scott River(D.Backshall 88233) P4
Asterolasia pallida subsp. *pallida*
Asterolasia squamuligera
Astroloma baxteri
Astroloma ciliatum
Astroloma drummondii
Astroloma pallidum
Astroloma prostratum
Astroloma sp.Nannup(R.D.Royce 3978) P4
Austrodanthonia acerosa
Austrodanthonia pilosa
Austrostipa campylachne
Austrostipa compressa
Austrostipa macalpinei
Austrostipa semibarbata
Baeckea arbuscula P4
Banksia attenuata
Banksia grandis
Banksia ilicifolia
Banksia littoralis
Banksia meisneri subsp. *ascendens* P4
Banksia occidentalis
Banksia occidentalis subsp. *occidentalis*
Banksia seminuda
Baumea acuta
Baumea articulata
Baumea juncea
Baumea preissii subsp. *laxa* ms
Baumea rubiginosa
Baumea vaginalis
Baxteria australis
Beaufortia decussata
Beaufortia sparsa
Beaufortia squarrosa
Billardiera coeruleo-punctata
Billardiera floribunda
Billardiera laxiflora
Billardiera parviflora
Billardiera parviflora var. *parviflora*
Billardiera variifolia
Boronia crenulata
Boronia crenulata subsp. *pubescens* ms
Boronia crenulata var. *crenulata*
Boronia defoliata
Boronia dichotoma
Boronia fastigiata
Boronia fastigiata subsp. *tenuior* ms
Boronia gracilipes
Boronia heterophylla
Boronia juncea
Boronia juncea subsp. *minima* ms
Boronia megastigma
Boronia molloyae
Boronia spathulata
Boronia stricta
Bossiaea aquifolium
Bossiaea aquifolium subsp. *aquifolium*
Bossiaea aquifolium subsp. *laidlawiana*
Bossiaea laidlawiana
Bossiaea linophylla
Bossiaea ornata
Bossiaea praetermissa
Bossiaea pulchella
Bossiaea rufa
Brachyloma preissii
Brachyscome iberidifolia
Bracteantha bracteata
 **Briza minor*
 **Bromus diandrus*
Burchardia multiflora
Caesia micrantha
Caesia occidentalis
Caladenia arrecta ms P4
Caladenia attingens subsp. *atingens* ms
Caladenia brownii ms
Caladenia cairnsiana
Caladenia corynephora
Caladenia flava
Caladenia flava subsp. *flava* ms
Caladenia flava subsp. *sylvestris* ms
Caladenia gardneri ms
Caladenia harringtoniae ms R
Caladenia huegelii R
Caladenia infundibularis
Caladenia interjacens ms P4
Caladenia latifolia
Caladenia longicauda subsp. *longicauda* ms
Caladenia longicauda subsp. *merrittii* ms
Caladenia longiclavata
Caladenia macrostylis
Caladenia nana subsp. *nana* ms
Caladenia nana subsp. *unita* ms
Caladenia pholcoidea ms
Caladenia plicata P4
Caladenia rhomboidiformis
Calandrinia liniflora
Callistachys lanceolata
Callistemon glaucus
Calochilus robertsonii
Calothamnus graniticus
Calothamnus lateralis
Calothamnus pallidifolius P3
Calothamnus sanguineus
Calothamnus sp.Scott River(R.D.Royce 84) P2

Calytrix angulata
 Calytrix tenuiramea
 *Cardamine hirsuta
 *Carduus pycnocephalus
 Carex fascicularis
 Cartonema philydroides
 Cassytha flava
 Cassytha glabella
 Cassytha pomiformis
 Cassytha racemosa
 Cassytha racemosa forma pilosa
 Cassytha racemosa forma racemosa
 *Centaurium erythraea
 Centella asiatica
 Centipeda cunninghamii
 Centrolepis aristata
 Centrolepis drummondiana
 Cephalotus follicularis
 Chaetanthus leptocarpoides
 Chamaescilla corymbosa
 Chamaescilla corymbosa var. corymbosa
 Chamaexeros serra
 Chamelaucium erythrochlorum ms P4
 Cheiranthra preissiana
 *Chenopodium glaucum
 Chordifex amblycoleus ms
 Chordifex gracilior ms P3
 Chordifex jacksonii ms P1
 Choretrum lateriflorum
 Chorilaena quercifolia
 Chorzandra cymbaria
 Chorzandra enodis
 Chorzandra multiarticulata P3
 Chorzizema cordatum
 Chorzizema diversifolium
 Chorzizema glycinifolium
 Chorzizema nanum
 Chorzizema reticulatum P3
 Chorzizema retrorsum
 Chorzizema retrorsum ms
 Chorzizema rhombeum
 Chorzizema spathulatum
 *Cirsium vulgare
 Clematis pubescens
 Comesperma calymega
 Comesperma ciliatum
 Comesperma confertum
 Comesperma flavum
 Comesperma nudiusculum
 Comesperma virgatum
 Conospermum caeruleum
 Conospermum caeruleum subsp. caeruleum
 Conospermum caeruleum subsp. marginatum ms
 Conospermum capitatum
 Conospermum capitatum subsp. capitatum
 Conospermum capitatum subsp. glabratum
 Conospermum paniculatum P3
 Conospermum stoechadis
 Conospermum teretifolium
 Conostephium pendulum
 Conostephium preissii
 Conostylis aculeata
 Conostylis aculeata subsp. aculeata
 Conostylis juncea
 Conostylis laxiflora
 Conostylis serrulata
 Conostylis setigera
 Conostylis setigera subsp. setigera
 *Conyza albida
 *Conyza parva
 *Corrigiola litoralis
 Corybas recurvus
 Corymbia calophylla
 Corymbia haematoxylon
 Corynotheca micrantha
 *Cotula australis
 *Cotula turbinata
 Crassula colorata var. acuminata
 *Crepis capillaris
 *Crepis foetida
 Crowea angustifolia var. angustifolia
 Crowea angustifolia var. platyphylla
 Cryptostylis ovata
 *Cuscuta epithymum
 Cyanicula sericea ms
 Cyathochaeta avenacea
 Cyathochaeta clandestina
 Cyathochaeta stipoides P3
 Cyathochaeta teretifolia P3
 *Cyperus congestus
 *Cyperus tenellus
 Cyrtostylis huegelii
 Cyrtostylis robusta
 *Dactylis glomerata
 Dampiera hederacea
 Dampiera heteroptera P3
 Dampiera leptoclada
 Dampiera linearis
 Darwinia citriodora
 Darwinia inconspicua ms
 Darwinia oederoides
 Darwinia sp. Williamson (G.J. Keighery 12717) R
 Darwinia thymoides
 Darwinia vestita
 Dasypogon bromeliifolius
 Dasypogon hookeri
 Daucus glochidiatus
 Daviesia angulata
 Daviesia cordata
 Daviesia decurrens
 Daviesia horrida
 Daviesia inflata

Daviesia longifolia
 Daviesia physodes
 Daviesia preissii
 Daviesia rhombifolia
 Desmocladus fasciculatus ms
 Desmocladus flexuosus ms
 Deyeuxia inaequalis P1
 Deyeuxia quadriseta
 Dianella revoluta
 Diaspasis filifolia
 Dichelachne crinita
 Dichondra repens
 Dichopogon preissii
 Dillwynia uncinata
 Dillwynia uncinata var. Capel(R.D.Royce 4853)
 Diplolaena drummondii
 *Dipogon lignosus
 *Dischisma arenarium
 Diuris heberlei P2
 Diuris laxiflora
 Diuris longifolia
 Dodonaea ceratocarpa
 Dodonaea viscosa
 Dodonaea viscosa subsp. angustissima
 Drakaea glyptodon
 Drakaea livida
 Drakaea micrantha ms R
 Drakaea thynniphila
 Drosera enodes
 Drosera erythrorhiza
 Drosera hamiltonii
 Drosera macrantha subsp. macrantha
 Drosera modesta
 Drosera myriantha
 Drosera pallida
 Drosera pulchella
 Drosera stelliflora
 Drosera stolonifera subsp. stolonifera
 Dryandra armata
 Dryandra bipinnatifida subsp. bipinnatifida
 Dryandra formosa
 Dryandra lindleyana subsp. sylvestris
 Dryandra lindleyana var. lindleyana
 Dryandra mimica R
 Dryandra nivea
 Dryandra nivea subsp. uliginosa R
 Dryandra squarrosa subsp. argillacea R
 Dryandra squarrosa subsp. squarrosa
 Dysphania glomulifera subsp. glomulifera
 Echinopogon ovatus
 *Ehrharta erecta
 *Ehrharta longiflora
 Elythranthera brunonis
 Elythranthera emarginata
 Empodisma gracillimum
 Eragrostis brownii
 *Eragrostis curvula
 Eremosyne pectinata
 Eriochilus dilatatus subsp. magnus ms
 Eriochilus dilatatus subsp. multiflorus ms
 Eriochilus scaber subsp. scaber ms
 Eriochilus tenuis
 Eriostemon gardneri subsp. globosa ms P1
 Eriostemon spicatus
 Eryngium pinnatifidum
 Eucalyptus cornuta
 Eucalyptus decipiens subsp. chalara
 Eucalyptus diversicolor
 Eucalyptus drummondii
 Eucalyptus marginata
 Eucalyptus marginata subsp. marginata
 Eucalyptus megacarpa
 Eucalyptus obtusa ms
 Eucalyptus patens
 Eucalyptus rudis
 Euchilopsis linearis
 Euchiton gymnocephalus P3
 Euchiton sphaericus
 *Euphorbia peplus
 Eutaxia densifolia
 Eutaxia epacridoides
 Eutaxia obovata
 Eutaxia virgata
 Evandra aristata
 Exocarpos sparteus
 *Festuca arundinacea
 *Ficus carica
 *Filago gallica
 Franklandia fucifolia
 Franklandia triaristata P4
 *Fumaria capreolata
 Gahnia aristata
 Gahnia decomposita
 Gahnia lanigera
 Gahnia trifida
 *Galium divaricatum
 Gastrolobium bilobum
 Gastrolobium spinosum
 *Genista monspessulana
 *Geranium dissectum
 Geranium solanderi
 Glischrocaryon aureum var. angustifolium
 Gompholobium amplexicaule
 Gompholobium capitatum
 Gompholobium confertum
 Gompholobium knightianum
 Gompholobium marginatum
 Gompholobium ovatum
 Gompholobium polymorphum
 Gompholobium preissii
 Gompholobium scabrum
 Gompholobium tomentosum

Gompholobium venustum
 Gompholobium villosum
 Gonocarpus benthamii
 Gonocarpus benthamii subsp. benthamii ms
 Gonocarpus diffusus
 Gonocarpus hexandrus
 Gonocarpus hexandrus subsp. "unsorted"
 Gonocarpus hexandrus subsp. serratus
 Gonocarpus paniculatus
 Gonocarpus simplex P3
 Goodenia caerulea
 Goodenia eatoniana
 Goodenia filiformis
 Goodenia incana
 Goodenia leptoclada
 Goodenia pulchella
 Goodenia pusilla
 *Grammatotheca bergiana
 Gratiola pubescens
 Grevillea brachystylis
 Grevillea brachystylis subsp. brachystylis P2
 Grevillea bronwenae
 Grevillea centristigma
 Grevillea cirsiifolia P4
 Grevillea disjuncta
 Grevillea drummondii P4
 Grevillea manglesioides
 Grevillea papillosa P3
 Grevillea pulchella
 Grevillea pulchella subsp. ascendens
 Grevillea pulchella subsp. ascendens ms
 Grevillea pulchella subsp. pulchella
 Grevillea quercifolia
 Grevillea sp.Scott River(G.J.Keighery 4070) P1
 Grevillea trifida
 Gymnoschoenus anceps
 Haemodorum discolor
 Haemodorum laxum
 Haemodorum paniculatum
 Haemodorum simplex
 Haemodorum sparsiflorum
 Haemodorum spicatum
 Hakea amplexicaulis
 Hakea ceratophylla
 Hakea cyclocarpa
 Hakea falcata
 Hakea lasiantha
 Hakea lasianthoides
 Hakea linearis
 Hakea lissocarpha
 Hakea oleifolia
 Hakea ruscifolia
 Hakea sulcata
 Hakea varia
 Haloragis brownii
 Hardenbergia comptoniana
 Hemarthria uncinata var. uncinata
 Hemiandra pungens
 Hemigenia incana
 Hemigenia rigida
 Hemigenia sp.Albany(G.J.Keighery 8712)
 Hibbertia acerosa
 Hibbertia amplexicaulis
 Hibbertia aurea
 Hibbertia commutata
 Hibbertia cuneiformis
 Hibbertia cunninghamii
 Hibbertia ferruginea
 Hibbertia furfuracea
 Hibbertia furfuracea
 Hibbertia glomerata
 Hibbertia grossulariifolia
 Hibbertia hypericoides
 Hibbertia inconspicua
 Hibbertia lasiopus
 Hibbertia mylnei
 Hibbertia pachyrrhiza
 Hibbertia perfoliata
 Hibbertia pilosa
 Hibbertia quadricolor
 Hibbertia racemosa
 Hibbertia recurvifolia
 Hibbertia rhadinopoda
 Hibbertia serrata
 Hibbertia silvestris P4
 Hibbertia sp.hairy sepals(J.R.Wheeler 2464)
 Hibbertia stellaris
 Hibbertia subvaginata
 Hibbertia vaginata
 Hodgsoniola junciformis
 *Holcus lanatus
 Homalosciadium homalocarpum
 Homalospermum firmum
 *Homeria flaccida
 Hovea chorizemifolia
 Hovea elliptica
 Hovea trisperma
 Hyalosperma pusillum
 Hybanthus debilissimus
 Hybanthus volubilis P2
 Hydrocotyle alata
 Hydrocotyle callicarpa
 Hydrocotyle hirta
 Hydrocotyle plebeya
 *Hypericum perforatum var. angustifolium
 Hypocalymma angustifolium
 Hypocalymma cordifolium
 Hypocalymma ericifolium
 Hypocalymma robustum
 Hypocalymma scariosum
 Hypocalymma sp.Scott River(A.S.George 11773)
 P4

Hypocalymma strictum
 *Hypochaeris glabra
 Hypolaena exsulca
 Hypolaena fastigiata
 Hypolaena pubescens
 Hypolaena viridis ms
 *Hypolepis rugosula
 Hypoxis glabella
 *Iris germanica
 Isolepis cyperoides
 *Isolepis marginata
 Isolepis nodosa
 *Isolepis prolifera
 Isolepis setiformis
 Isopogon attenuatus
 Isopogon formosus subsp. dasylepis P3
 Isopogon sphaerocephalus
 Isotoma hypocrateriformis
 Isotropis cuneifolia
 Ixiolaena viscosa
 Jacksonia aff. horrida
 Jacksonia furcellata
 Jacksonia horrida
 Jacksonia sparsa ms P3
 Jansonia formosa P3
 Johnsonia lupulina
 Juncus amabilis
 Juncus aridicola
 *Juncus bufonius
 Juncus caespiticus
 *Juncus capitatus
 Juncus gregiflorus
 Juncus holoschoenus
 Juncus kraussii
 Juncus kraussii subsp. australiensis
 Juncus pallidus
 Juncus pauciflorus
 Juncus planifolius
 Juncus subsecundus
 *Juncus usitatus
 Kennedia carinata
 Kennedia coccinea
 Kingia australis
 Kunzea ciliata
 Kunzea glabrescens
 Kunzea recurva
 Kunzea rostrata
 Kunzea spathulata ms
 Kunzea sulphurea
 Labichea lanceolata
 Lagenifera huegelii
 Lambertia multiflora
 Lambertia orbifolia R
 Lambertia rariflora subsp. rariflora P4
 Lasiopetalum floribundum
 Latrobea diosmifolia
 Latrobea tenella
 Latrobea tenella var. tenella
 *Lavandula stoechas
 Laxmannia jamesii R
 Laxmannia sessiliflora subsp. australis
 Laxmannia squarrosa
 Lechenaultia biloba
 Lechenaultia expansa
 Lepidosperma angustatum
 Lepidosperma effusum
 Lepidosperma gladiatum
 Lepidosperma gracile
 Lepidosperma leptostachyum
 Lepidosperma leptostachyum
 Lepidosperma longitudinale
 Lepidosperma pubisquamatum
 Lepidosperma resinatum
 Lepidosperma squamatum
 Lepidosperma striatum
 Lepidosperma tenue
 Lepidosperma tetraquetrum
 Lepidosperma tuberculatum
 Lepidosperma viscidum
 Leptinella drummondii P2
 Leptocarpus crebriculmis ms
 Leptocarpus diffusus ms
 Leptocarpus elegans ms
 Leptocarpus ramosissimus ms
 Leptocarpus scariosus
 Leptocarpus tenax
 Leptocarpus tephelinus ms
 Leptoceras menziesii
 Leptomeria cunninghamii
 Leptomeria ellytes ms
 Leptomeria lehmannii
 Leptomeria scrobiculata
 Leptomeria squarrolosa
 Lepyrodia drummondiana
 Lepyrodia heleocharoides P3
 Lepyrodia hermaphrodita
 Lepyrodia muirii
 Leucophyta brownii
 Leucopogon aff. pendulus
 Leucopogon alternifolius
 Leucopogon atherolepis
 Leucopogon australis
 Leucopogon capitellatus
 Leucopogon carinatus
 Leucopogon cinereus
 Leucopogon cordatus
 Leucopogon distans
 Leucopogon distans subsp. distans ms
 Leucopogon elatior
 Leucopogon gilbertii P3
 Leucopogon glabellus
 Leucopogon hirsutus

Leucopogon obovatus
 Leucopogon oxycedrus
 Leucopogon parviflorus
 Leucopogon pendulus
 Leucopogon propinquus
 Leucopogon racemulosus
 Leucopogon reflexus
 Leucopogon unilateralis
 Leucopogon verticillatus
 Levenhookia preissii
 Levenhookia pusilla
 Lindsaea linearis
 Lobelia alata
 Lobelia rhytidisperma
 Lobelia tenuior
 Logania campanulata
 Logania serpyllifolia
 Logania serpyllifolia subsp. angustifolia
 Logania serpyllifolia subsp. serpyllifolia
 Logania spermacocea
 Logania vaginalis
 *Lolium perenne
 *Lolium rigidum
 Lomandra brittanii
 Lomandra caespitosa
 Lomandra drummondii
 Lomandra hermaphrodita
 Lomandra integra
 Lomandra nigricans
 Lomandra nutans
 Lomandra odora
 Lomandra pauciflora
 Lomandra preissii
 Lomandra purpurea
 Lomandra sericea
 Lomandra sonderi
 *Lonicera japonica
 Loxocarya cinerea
 Loxocarya flexuosa
 Loxocarya sp. Rosa Brook (R.D. Royce 2465)
 *Lupinus angustifolius
 Lycopodiella serpentina
 Lyginia barbata
 Lysinema ciliatum
 Lysinema conspicuum
 Macrozamia riedlei
 Marianthus candidus
 Meeboldina coangustata ms
 Meeboldina crassipes ms P3
 Meeboldina denmarkica
 Meeboldina roycei ms
 Meeboldina scariosa ms
 Meeboldina tephрина ms
 Meeboldina thysanantha ms P3
 Melaleuca basicephala P4
 Melaleuca incana subsp. Gingilup (N. Gibson & M. Lyons 593) P2
 Melaleuca incana subsp. incana
 Melaleuca lateritia
 Melaleuca microphylla
 Melaleuca pauciflora
 Melaleuca preissiana
 Melaleuca raphiophylla
 Melaleuca ringens P2
 Melaleuca thymoides
 Melaleuca viminea subsp. "unsorted"
 Melaleuca viminea subsp. viminea
 Melanostachya ustulata ms
 *Mentha pulegium
 *Mentha spicata
 *Mentha suaveolens
 Mesomelaena graciliceps
 Mesomelaena preissii
 Mesomelaena stygia
 Mesomelaena tetragona
 Meziella trifida R
 Microlaena stipoides
 Microtis brownii
 Microtis media subsp. media
 Microtis pulchella P4
 Millotia myosotidifolia
 Millotia tenuifolia var. tenuifolia
 Mirbelia dilatata
 *Modiola caroliniana
 *Monopsis debilis
 Monotaxis grandiflora
 Monotaxis occidentalis
 *Muehlenbeckia adpressa
 Myoporum oppositifolium
 Myriocephalus helichrysoides
 Nemcia coriacea
 Notodanthonia occidentalis
 Notodanthonia pilosa
 Nuysia floribunda
 Olax benthamiana
 Olax phyllanthi
 Olearia axillaris
 Olearia cassinae
 Olearia muricata
 Olearia paucidentata
 Opercularia apiciflora
 Opercularia echinocephala
 Opercularia hispidula
 Opercularia vaginata
 Opercularia volubilis
 *Ornithopus pinnatus
 Orthrosanthus laxus
 Orthrosanthus laxus var. laxus
 Orthrosanthus polystachyus
 *Ottelia ovalifolia subsp. ovalifolia
 *Oxalis corniculata

*Oxalis glabra
 *Oxalis purpurea
 Oxylobium lineare
 Ozothamnus cordatus
 Ozothamnus ramosus
 Paracaleana nigrita
 Paraserianthes lophantha subsp. lophantha
 *Parentucellia viscosa
 Patersonia babianoides
 Patersonia juncea
 Patersonia limbata
 Patersonia pygmaea
 Patersonia sp. Swamp Form (N. Gibson & M. Lyons 544)
 Patersonia umbrosa
 Patersonia umbrosa var. xanthina
 Pelargonium littorale subsp. littorale
 *Pennisetum clandestinum
 *Pennisetum macrourum
 Pentapeltis peltigera
 Pentapeltis silvatica
 Pericalymma crassipes
 Pericalymma ellipticum
 Pericalymma ellipticum var. ellipticum ms
 Pericalymma ellipticum var. floridum ms
 Pericalymma spongiocaulum ms
 Persicaria decipiens
 Persicaria prostrata
 Persoonia elliptica
 Persoonia graminea
 Persoonia hakeiformis P2
 Persoonia longifolia
 Persoonia saccata
 Petrophile acicularis
 Petrophile diversifolia
 Petrophile linearis
 Petrophile serruriae
 Petrophile squamata
 Petrophile squamata subsp. pluridissecta ms
 Petrophile squamata subsp. squamata
 *Petrorhagia velutina
 Phebalium anceps
 Phebalium obovatum ms
 Philydrella pygmaea
 Phlebocarya ciliata
 Phlebocarya filifolia
 Phyllangium paradoxum ms
 Phyllanthus calycinus
 Phylloglossum drummondii
 Picris angustifolia subsp. angustifolia
 Pimelea angustifolia
 Pimelea ciliata subsp. ciliata
 Pimelea clavata
 Pimelea ferruginea
 Pimelea hispida
 Pimelea imbricata
 Pimelea imbricata var. piligera
 Pimelea lanata
 Pimelea longiflora
 Pimelea longiflora subsp. longiflora
 Pimelea preissii
 Pimelea rosea subsp. rosea
 Pimelea spectabilis
 Pimelea suaveolens
 Pimelea suaveolens subsp. suaveolens
 Pimelea sylvestris
 Pimelea tinctoria
 *Pinus pinaster
 Pithocarpa pulchella var. melanostigma ms
 *Plantago lanceolata
 *Plantago major
 Platychorda applanata ms
 Platysace compressa
 Platysace filiformis
 Platysace tenuissima
 Platytheca galioides
 Poa drummondiana
 Poa homomalla
 Poa poiformis
 Poa porphyroclados
 Poa serpentum
 Podocarpus drouynianus
 Podolepis canescens
 Podolepis gracilis
 Podotheca angustifolia
 Podotheca chrysantha
 *Polygala myrtifolia
 *Polypogon monspeliensis
 Poranthera huegelii
 Prasophyllum brownii
 Prasophyllum elatum
 Prasophyllum macrostachyum
 Prasophyllum triangulare
 *Prunella vulgaris
 *Prunus cerasifera
 Pseudanthus virgatus
 *Pseudognaphalium luteoalbum
 Pteridium esculentum
 Pterostylis aff. nana
 Pterostylis barbata
 Pterostylis pyramidalis
 Pterostylis recurva
 Pterostylis turfosa P1
 Pterostylis vittata
 Ptilotus manglesii
 Ptilotus sericostachyus subsp. sericostachyus
 Pultenaea drummondii
 Pultenaea ericifolia
 Pultenaea ochreatea
 Pultenaea pinifolia P3
 Pultenaea radiata P3
 Pultenaea reticulata

Pultenaea skinneri P4
 Pultenaea strobilifera
 Pultenaea verruculosa var. verruculosa
 Pyrorchis forrestii
 Pyrorchis nigricans
 Quinetia urvillei
 Ranunculus colonorum
 *Ranunculus muricatus
 Reedia spathacea P4
 Regelia ciliata
 Restio amblycoleus
 Restio applanatus
 Rhagodia baccata
 Rhodanthe citrina
 Ricinocarpos glaucus
 *Rosa laevigata
 *Rosa rubiginosa
 *Rubus discolor
 Rulingia corylifolia
 Scaevola calliptera
 Scaevola crassifolia
 Scaevola glandulifera
 Scaevola globulifera
 Scaevola microphylla
 Scaevola nitida
 Scaevola striata
 Scaevola striata var. striata
 Schizaea fistulosa
 Schoenolaena juncea
 Schoenus cruentus
 Schoenus curvifolius
 Schoenus efoliatus
 Schoenus grandiflorus
 Schoenus laevigatus
 Schoenus sp. Bullsbrook (J.J. Alford 915) P2
 Schoenus subbulbosus
 Schoenus subflavus
 Schoenus subflavus subsp. subflavus
 Schoenus sublateralis
 Schoenus sublaxus
 Schoenus tenellus
 Schoenus variicellae
 Selaginella gracillima
 *Senecio diaschides
 *Senecio elegans
 Senecio glomeratus
 Senecio hispidulus
 Senecio minimus
 Senecio ramosissimus
 Sequoia sempervirens
 *Sigesbeckia orientalis
 Siloxerus filifolius
 Siloxerus humifusus
 *Silybum marianum
 *Solanum linnaeanum
 Sollya heterophylla
 *Sonchus asper
 *Sonchus oleraceus
 Sowerbaea laxiflora
 Sphaerolobium fornicatum
 Sphaerolobium grandiflorum
 Sphaerolobium medium
 Sphaerolobium nudiflorum
 Sphaerolobium racemosum
 Sphaerolobium scabriusculum
 Sphaeropteris cooperi
 Sphenotoma capitatum
 Sphenotoma gracile
 Sphenotoma parviflorum P3
 Sphenotoma squarrosus
 *Spinifex hirsutus
 Sporadanthus rivularis ms P3
 Sporadanthus strictus ms
 Spyridium globulosum
 Stachystemon vermicularis
 Stackhousia monogyna
 Stackhousia pubescens
 Stenotalis ramosissima
 Stirlingia latifolia
 Stirlingia seselifolia
 Strangea stenocarpoides
 Stylidium adnatum
 Stylidium adnatum var. abbreviatum
 Stylidium aff. spathulatum
 Stylidium affine
 Stylidium amoenum
 Stylidium barleei P3
 Stylidium breviscapum
 Stylidium brunonianum
 Stylidium brunonianum subsp. brunonianum
 Stylidium brunonianum subsp. minor
 Stylidium bulbiferum
 Stylidium calcaratum
 Stylidium ciliatum
 Stylidium corymbosum
 Stylidium crassifolium
 Stylidium falcatum
 Stylidium glaucum
 Stylidium glaucum subsp. angustifolium
 Stylidium guttatum
 Stylidium inundatum
 Stylidium junceum
 Stylidium junceum subsp. brevius
 Stylidium lateriticola
 Stylidium leeuwinense ms P3
 Stylidium lineatum
 Stylidium luteum
 Stylidium mimeticum P3
 Stylidium piliferum
 Stylidium plantagineum P4
 Stylidium pulchellum
 Stylidium repens

Stylidium rhynchocarpum
 Stylidium rupestre
 Stylidium scandens
 Stylidium spathulatum
 Stylidium squamosotuberosum
 Stylidium uniflorum
 Styphelia tenuiflora
 Synaphea acutiloba P3
 Synaphea favosa
 Synaphea floribunda
 Synaphea gracillima
 Synaphea otio stigma P1
 Synaphea petiolaris
 Synaphea petiolaris subsp. petiolaris
 Synaphea petiolaris subsp. triloba
 Synaphea whicherensis P3
 Taraxis glaucescens ms
 Taraxis grossa ms
 Tetraria capillaris
 Tetraria octandra
 Tetrarrhena laevis
 Tetratheca filiformis
 Tetratheca hirsuta
 Tetratheca setigera
 Thelymitra canaliculata
 Thelymitra cornicina
 Thelymitra crinita
 Thelymitra cucullata
 Thelymitra flexuosa
 Thelymitra fuscolutea
 Thomasia brachystachys P1
 Thomasia grandiflora
 Thomasia heterophylla ms
 Thomasia laxiflora P1
 Thomasia macrocalyx
 Thomasia paniculata
 Thomasia pauciflora
 Thomasia sp. Big Brook (M.Koch 2373)
 Thomasia triphylla
 Thryptomene saxicola
 Thysanotus arbuscula
 Thysanotus arenarius
 Thysanotus dichotomus
 Thysanotus formosus P1
 Thysanotus glaucus P4
 Thysanotus gracilis
 Thysanotus manglesianus
 Thysanotus multiflorus
 Thysanotus patersonii
 Thysanotus pauciflorus
 Thysanotus pseudojunceus
 Thysanotus sparteus
 Thysanotus spiniger
 Thysanotus tenellus
 Thysanotus thyrsoides
 Thysanotus triandrus
 *Tolpis barbata
 Trachymene coerulea var. coerulea
 Trachymene pilosa
 Trachymene sp. Walpole (A.S. George 15063)
 Tremandra diffusa
 Tremandra stelligera
 Tremulina cracens ms
 Tremulina tremula ms
 Tribonanthes australis
 Trichocline spathulata
 Tricoryne elatior
 Tricoryne humilis
 Tricostularia neesii var. elatior
 Tricostularia neesii var. neesii
 *Trifolium dubium
 *Trifolium ligusticum
 *Trifolium resupinatum var. resupinatum
 Triglochin huegelii
 Triglochin lineare
 Triglochin mucronatum
 Tripterococcus brunonis
 *Tritonia lineata
 Trymalium floribundum
 Trymalium floribundum subsp. trifidum
 Trymalium ledifolium var. rosmarinifolium
 Tyrbastes glaucescens ms P4
 Utricularia benthamii
 Utricularia multifida
 Utricularia simplex
 Utricularia violacea
 Velleia macrophylla
 Velleia trinervis
 *Vellereophyton dealbatum
 *Verbascum virgatum
 Veronica calycina
 Verticordia lehmannii P4
 Verticordia plumosa var. plumosa
 *Vicia sativa subsp. nigra
 Villarsia albiflora
 Villarsia lasiosperma
 Villarsia latifolia
 Villarsia parnassifolia
 Villarsia submersa P4
 Wahlenbergia communis
 Wahlenbergia littoricola
 Wahlenbergia multicaulis
 Wahlenbergia preissii
 Wurmbea monantha
 Xanthorrhoea brunonis subsp. semibarbata
 Xanthorrhoea gracilis
 Xanthorrhoea preissii
 Xanthosia atkinsoniana
 Xanthosia candida
 Xanthosia huegelii
 Xanthosia huegelii subsp. southern (G.J. Keighery 2165)

Xanthosia peduncularis P3
Xanthosia pusilla
Xylomelum occidentale
Xyris flexifolia
Xyris indivisa
Xyris lacera
Xyris lanata
Xyris laxiflora
Xyris roycei
*Zantedeschia aethiopica

APPENDIX

6

Fauna Species in the Shire of Nannup
(source- Western Australian Museum, Fauna Base)

Note- not a comprehensive list.
* represents introduced species.

Scientific name	Common name
Reptiles	
<i>Caretta caretta</i>	Loggerhead Turtle
<i>Chelodina oblonga</i>	Oblong Turtle
<i>Elapognathus coronatus</i>	Crowned Snake
<i>Elapognathus minor</i>	Short-nosed Snake
<i>Notechis scutatus</i>	Tiger Snake
<i>Parasuta nigriceps</i>	Black-headed Snake
<i>Pseudonaja affinis affinis</i>	Dugite
<i>Rhinoplocephalus bicolor</i>	Square-nosed Snake
<i>Christinus marmoratus</i>	Marbled Gecko
<i>Aprasia pulchella</i>	Granite worm Lizard
<i>Acritoscincus trilineatum</i>	South-western Cool Skink
<i>Ctenotus catenifer</i>	Chain-striped Skink
<i>Ctenotus labillardieri</i>	Red-legged Skink
<i>Egernia kingii</i>	King's Skink
<i>Egernia luctuosa</i>	Glossy Swamp Skink
<i>Egernia napoleonis</i>	South-western Crevice Skink
<i>Egernia pulchra pulchra</i>	Spectacled Rock Skink
<i>Glaphyromorphus gracilipes</i>	Southwestern Mulch Skink
<i>Hemiergus peronii peronii</i>	Four-toed Earless Skink
<i>Hemiergus peronii tridactyla</i>	Three-toed Earless Skink
<i>Hemiergus quadrilineata</i>	Two-toed Earless Skink
<i>Lerista microtis</i>	
<i>Lerista microtis microtis</i>	
<i>Menetia greyii</i>	Common Dwarf Skink
<i>Morethia lineoocellata</i>	
<i>Ramphotyphlops australis</i>	
<i>Varanus rosenbergi</i>	Southern Heath Monitor
Mammals	
<i>Cercartetus concinnus</i>	Western Pygmy-possum, Mundarda
<i>Antechinus flavipes leucogaster</i>	Mardo
<i>Dasyurus geoffroii</i>	Western Quoll, Chuditch
<i>Phascogale tapoatafa tapoatafa</i>	Brush-tailed Phascogale, Wambenger
<i>Sminthopsis gilberti</i>	Gilbert's Dunnart

Scientific name	Common name
<i>Sminthopsis griseoventer griseoventer</i>	Grey-bellied Dunnart
<i>Macropus fuliginosus</i>	Western Grey Kangaroo
<i>Macropus irma</i>	Western Brush Wallaby
<i>Setonix brachyurus</i>	Quokka
<i>Tadarida australis</i>	White-striped Freetail-bat
<i>Hydromys chrysogaster</i>	Water rat
* <i>Mus musculus</i>	House Mouse
<i>Rattus fuscipes</i>	Bush rat
* <i>Rattus rattus</i>	Black rat
<i>Isoodon obesulus fusciventer</i>	
<i>Trichosurus vulpecular</i>	Common brushtail possum
<i>Tarsipes rostratus</i>	Honey Possum, Noolbenger
<i>Chalinolobus gouldii</i>	Gould`s wattled bat
<i>Falsistrellus mackenziei</i>	Western False Pipistrelle
<i>Nyctophilus geoffroyi</i>	Lesser long-eared bat
<i>Nyctophilus gouldi</i>	Goulds long-eared bat
<i>Nyctophilus timoriensis timoriensis</i>	Greater Long-eared Bat
<i>Vespadelus regulus</i>	Southern Forest Bat
Birds	
<i>Acanthiza apicalis</i>	Broad-tailed Thornbill (Inland Thornbill)
<i>Calamanthus campestris</i>	Rufous Fieldwren
<i>Sericornis frontalis</i>	White-browed Scrubwren
<i>Sericornis frontalis maculatus</i>	
<i>Pandion haliaetus cristatus</i>	
<i>Climacteris rufa</i>	Rufous Treecreeper
* <i>Dacelo novaeguineae</i>	Laughing Kookaburra
<i>Malurus elegans</i>	Red-winged Fairy-wren
Stipiturus malachurus westernensis	
<i>Leipoa ocellate</i>	Mallee Fowl
<i>Acanthorhynchus superciliosus</i>	Western Spinebill
<i>Phylidonyris novaehollandiae</i>	Yellow-winged Honeyeater

Scientific name	Common name
<i>Daphoenositta chrysoptera pileata</i>	
<i>Colluricincla harmonica rufiventris</i>	
<i>Pardalotus punctatus</i>	Spotted Pardalote
<i>Pardalotus punctatus punctatus</i>	Spotted Pardalote
<i>Pardalotus punctatus xanthopyge</i>	Yellow-rumped Pardalote
<i>Pardalotus striatus</i>	Striated Pardalote
<i>Stagonopleura oculata</i>	Red-eared Firetail
<i>Eopsaltria australis griseogularis</i>	Western Yellow Robin
<i>Eopsaltria georgiana</i>	White-breasted Robin
<i>Coturnix ypsilophora</i>	Brown Quail
<i>Calyptorhynchus banksii naso</i>	Forest Red-tailed Black Cockatoo
<i>Calyptorhynchus baudinii</i>	Baudin`s Cockatoo
<i>Calyptorhynchus latirostris</i>	Carnaby`s Cockatoo
<i>Neophema elegans</i>	Elegant Parrot
<i>Platycercus icterotis</i>	Western Rosella
<i>Platycercus icterotis icterotis</i>	
<i>Platycercus spurius</i>	Red-capped Parrot
<i>Platycercus zonarius</i>	Ring-necked Parrot
<i>Turdus merula merula</i>	Blackbird
<i>Tyto alba delicatula</i>	
<i>Tyto novaehollandiae</i>	Masked Owl
<i>Tyto novaehollandiae novaehollandiae</i>	Masked Owl
Amphibia	
<i>Litoria adelaidensis</i>	Slender Tree Frog
<i>Litoria moorei</i>	Motorbike Frog or Bell Frog
<i>Crinia georgiana</i>	Quacking Frog
<i>Crinia glauerti</i>	Glauert`s Froglet
<i>Crinia pseudinsignifera</i>	Bleating Froglet
<i>Geocrinia leai</i>	Lea`s Frog
<i>Geocrinia rosea</i>	Roseate Frog
<i>Heleioporus eyrei</i>	Moaning Frog
<i>Limnodynastes dorsalis</i>	Bullfrog or Banjo Frog
<i>Metacrinia nichollsi</i>	Nicholls` Toadlet
<i>Pseudophryne guentheri</i>	Crawling Frog or Günther`s Toadlet

APPENDIX

7



ROADSIDE CONSERVATION COMMITTEE

GUIDELINES FOR MANAGING THE HARVESTING OF NATIVE FLOWERS, SEED AND TIMBER FROM ROADSIDES

Preamble

The diversity of values associated with roadside vegetation is well documented and acknowledged. In landscapes that have been extensively cleared, roadside vegetation provides essential wildlife corridors and habitat for local flora and fauna, including a number of threatened species. Hence it is highly desirable that this asset is managed in such a way as to ensure its conservation and sustainability.

The control and management of roadside vegetation is the responsibility of the road manager. Local government authorities, as road managers, are often approached for 'permission' to take various flora products from the roadside. These requests are mainly for wildflowers, native seed and firewood. Other products which may be sought includes material for making didgeridoos, other types of craftwood, and stakes or poles for various purposes.

Although road managers are primarily concerned about the maintenance of the running surface itself, through the implementation of these simple guidelines for the removal of flora and timber material from the roadsides, the vegetated roadside reserve should be maintained for its biodiversity values, and the benefit of the community and road users.

In some instances the Roadside Conservation Committee (RCC) is supportive of the sustainable harvesting of flora, such as salvage (removal of dead material that is not significant wildlife habitat or is material to be destroyed by road works), or the selective collection of seed for revegetation. However, each case should be viewed on its merits and any decision to facilitate harvesting from roadsides should be referred to the Department of Conservation and Land Management (CALM) and/or the RCC for advice. Licences allowing the taking of roadside flora may be issued by CALM when supported by the road managing authority.

Legislation

All Western Australian native flora is protected under the *Wildlife Conservation Act 1950*. Native flora includes all parts of a native plant, including its flowers, seed, and timber. Protection of native flora under the Act has the effect of requiring a person to only take (cut or remove) native flora from Crown land under a licence.

Road and rail reserves are Crown land, and hence a licence is required to cut or remove any native flora from a roadside or rail line. There is, however, a legal provision by which the road manager or their agent (contractor) does not require a licence whilst undertaking legitimate road management

activities. This provision does not extend to other persons who wish to take protected flora from roadsides.

There are two types of licences that apply to the taking of protected flora from Crown land - Commercial Purposes Licences where the flora is being taken for any commercial purpose, and Scientific or Other Prescribed Purposes Licences where the protected flora is being taken for specific non-commercial purposes.

These licences are issued by CALM. In issuing a licence, CALM is required to be assured that the activity will not compromise the conservation of the flora. In determining this, CALM will seek advice from the land manager for which the application relates to determine the potential impact of the activity, and how the activity relates to the management objectives being applied to that land.

A licence application may be refused if the activity is either a conservation concern, or does not fit in with the management objectives of the road manager. Once issued with a licence, a licensee must comply with the conditions of the licence that are designed to ensure the activity does not adversely impact on the conservation of the flora or the natural environment in which it occurs.

Commercial Wildflower Harvesting

Western Australia is referred to as the '*Wildflower State*', and its wildflowers attract a significant number of tourists each year. Roadside vegetation provides the most accessible, and hence the most commonly viewed, array of wildflowers, and as such are an important feature of regional tourism and can provide a significant financial boost to local economies.

The RCC considers that the flora on roadsides is reserved and maintained for public benefit. It is therefore seen as a contradiction of purpose to allow wildflowers on roadsides to be harvested, particularly for private gain, and this activity should not be permitted.

Wildflower harvesting in many instances detracts from the biodiversity and tourism values of the roadside. It is often the case that flora is harvested from roadsides because of the convenience of access, and harvesters should be directed to find alternative locations.

There are situations where some harvesting may be considered, such as in very wide road reserves where the activity can be screened from road users, but mostly road managers have been discouraged from supporting or allowing such harvesting to occur. If harvesting is to be approved, then the points provided at the end of these guidelines should be considered.

Seed Collection

Throughout much of the south west, revegetation of the native flora is being undertaken to redress the problems that historic clearing has created. Increasingly, this revegetation is aimed at using local native flora so as to recreate the native vegetation to support biodiversity objectives. The paradox is that in many areas the native vegetation has been cleared to such an extent that adequate sources of native seed cannot be found for undertaking this work. Roadside vegetation may be a source of such seed.

Native seed is an important component of remnant vegetation. It is critical for the regeneration of certain species, called re-seeder species, when plants are either killed by an event, such as fire, storm damage, or die as part of their natural cycle. The maintenance of adequate seed of these species is necessary as a precaution to ensure the sustainability of the flora biodiversity.

Native seed is also an important food source for native fauna living in roadside vegetation, from ants to birds and mammals. The maintenance of this fauna is important for the continuing survival of the vegetation, especially where the fauna is required to pollinate the flora.

When seed is needed for *bona fide* revegetation projects within the local community, and no other source of local seed is available, then the controlling authority may consider giving permission for collection of seed from roadsides. Such collection must be under the appropriate licence issued by CALM and the harvesting should be done in a way that does not endanger the long-term survival of the roadside vegetation.

Where seed collection is to be authorised on roadsides, the road manager should consider the points listed at the end of these guidelines. Specific consideration should be given to the methods that are approved for harvesting the seed, the quantity of seed that may be taken, and the species from which the seed is to be sourced.

Timber Harvesting from Roadsides.

Timber is harvested for a range of reasons, including saw logs, firewood and craftwood. Due to the ease of access, timber harvesters may wish to source timber from roadside vegetation for these purposes.

The RCC seeks to encourage roadside managers to retain timber on roadsides as an important component of the natural habitat, which fulfils ecological, aesthetic and land management functions. The value of fallen logs and branches within the roadside is often not realised, but this material forms an important habitat for many species of insects, reptiles, mammals and birds, thus enhancing the roadside biodiversity. Insects and reptiles that live in fallen timber are also important elements of the food chain, and are very important to the functioning of natural systems, and the survival of many other native animals.

The RCC believes that harvesting of timber from roadsides should not be permitted except in defined road safety, fence line or service clearance zones, or where a tree has fallen, or appears likely to fall into clearance zones.

Where timber removal is to be allowed, consideration should be given to the points raised at the end of these guidelines, especially in relation to safety issues related to timber cutting. Permission to remove timber should be specific to certain sections of roadsides where the removal is necessary for other planned road management purposes.

Guidelines For Harvesting On Roadsides

- ✓ In all cases the permission of the managing authority, i.e. Main Roads WA, Local Government or CALM, must be sought before native flora is removed from a roadside.
- ✓ Flora removal should be from only designated roads, which have wider vegetated road verges i.e. vegetation width > 3metres
- ✓ The number of operators authorised to remove flora from a roadside should be strictly limited to that which can be sustained and managed. The determination of this is at the judgement of the managing authority, but consideration should be taken of the type of flora being harvested and an evaluation of monitoring of the impact of the harvest activity. Advice may be sought from CALM.
- ✓ Approval for flora harvesting should be for a set period, with a review of the impact and operation before renewal.
- ✓ Approval should also stipulate approved methods of harvesting, the species which may be harvested, and the quantity of material to be taken. Advice on harvest conditions may be obtained from CALM.
- ✓ Any flora removed should not affect the viability of the residual seed bank. It is recommended that no more than 20% of the flowers or seed on a plant should be taken, unless it is in an area that is scheduled to be cleared as part of road management.
- ✓ Methods of harvesting flora should not jeopardise the survival of the plant/tree, unless it is in an area that is scheduled to be cleared as part of road management.
- ✓ The removal of whole plants should be restricted to areas that are scheduled to be cleared as part of road management. Note, some species of flora such as zamia palms and grass trees can not be removed for commercial purposes without a special endorsement on the Commercial Purposes Licence issued by CALM.
- ✓ No flora of special conservation concern (Declared Rare Flora or Priority Flora) should be removed without special authorisation through CALM.
- ✓ *No commercial harvesting of any plant product should be allowed for any reason between the markers that delineate a Special Environmental Area.*
- ✓ *Flora harvesting should be prohibited from designated Flora Roads.*
- ✓ Care should be taken that access to Dieback infected areas is limited to the drier months of the year, and vehicular access disallowed.
- ✓ Safety should always be of prime concern and every effort should be made to ensure that personal safety is a key consideration in any harvesting operation.
- ✓ Flora harvesters should not operate from the road side in areas where the vegetation is close to the road, where vehicles can not be safely parked off the road, or where there is poor driver visibility.

Appendix

8



ROADSIDE CONSERVATION COMMITTEE

Guidelines for the Nomination and Management of Flora

Introduction

The Flora Roads program began as an initiative of the Roadside Conservation Committee (RCC), as a means of encouraging road managers to protect and conserve roadside vegetation of high conservation value. Flora Roads also highlight areas of high conservation flora as a tourist asset to local communities and are easily identified to passing travellers as areas worthy of an inspection to view the local flora.



The Roadside Conservation Committee has defined Flora Roads as "those roads which have conservation value owing to the vegetation growing within the reserve".

Principle Conservation Values of Flora Roads:

- The roadside must contain a significant population of native vegetation. Introduced trees and grasses are not important for conservation.
- The native vegetation must be in as near to its natural condition as possible. In undisturbed vegetation, several layers of plants occur - trees, shrubs and herbs are present in woodlands, for example. If one or more of the expected layers are missing, the conservation value is reduced.
- The roadside may be the only remaining example of original vegetation within a cleared area. It thus:
 - Assists in vegetation mapping and distribution studies
 - Provides a benchmark for study of soil change during agricultural development
 - Provides a source of local seed for revegetation projects
 - Acts as a wildlife habitat for the protection of fauna.
 - Rare or endangered plants may occur on the roadside.
 - May provide nest sites and refuges for native animals.
 - May act as a biological corridor.

Identification and Nomination of Flora Roads

The RCC has been coordinating a volunteer roadside survey program since 1989, which provides a list of high conservation value roads within many Shires in the agricultural areas of this state. These roadsides can be investigated further to see if they warrant declaration as a Flora Road. Nevertheless, roadsides that have not been surveyed may still be nominated.

Any person may suggest to the managing authority or to the RCC that a road, or a section of road fits the criteria of a Flora Road. However, only the managing authority in whom care, control and management of the road is vested can officially declare it a Flora Road.

A road may be nominated as a Flora Road by submitting a written request to the RCC.

The RCC requires the following information:

- Endorsement from the managing authority,
- Name of the road, LGA, and the road manager (MRWA, Local Government or DCLM);
- Distance of the proposed Flora Road;
- Width of the road reserve.

The following information would also be useful:

- Photograph(s) of the road;
- A list of the dominant plant species;
- Threats (weeds, disturbances, etc).

This information will be stored in the RCC Flora Roads Register, a database which will be maintained by the RCC Technical Officer (Mapping).

Establishment of a Flora Road

Given that only the managing authority can officially declare a road, or section of road as a Flora Road, it is important to have the support of the road manager.

The RCC will provide two Flora Road signs to the managing authority. The signs are in the tourist sign colours of white letters and symbols on a leaf brown background. It is the responsibility of the managing authority to erect the signs, and to provide signposts, auxiliary signs and carry out maintenance. One sign may be placed at each approach to the area.

Management Implications

A standard sign was developed by Main Roads WA in the late 1980's, a policy for the erection of Flora Road signage was developed shortly afterwards. See Appendix 1

Part16 of the RCC *Roadside Manual* details the establishment and management of Flora Roads, and the RCC's *Guidelines for Managing Special Environment Areas in Transport Corridors* and the *Roadside Handbook* also provides information on Flora Road establishment.

The aim of all management should be to minimise any disturbance to the roadside flora, consistent with the provision of a safe and efficient roadway.

The managing authority will be expected to take into consideration the high conservation values present, and take special care when working within the Flora Road road reserve and the surrounding area. More specifically though;

- Council may choose to adopt a policy on Roadside Conservation
- Environmental assessments (pre-construction checklists) should be completed prior to any upgrade work, to assist with planning for flora preservation.
- Fire Management should be undertaken in such a way so as to take into account the ecological needs of the flora.
- Where rehabilitation is contemplated, local native species should be used.

Tourism Implications

Declared Flora Roads will, by their very nature, be attractive to tourists, and would often be suitable as part of a tourist drive network. Consideration should be given to:

- Promoting the road by means of a small brochure or booklet,
- Eventually showing all Flora Roads on a map of the region or State,
- Using specially designed signs to delineate the Flora Road section,
- Constructing roadside flora rest areas where people can get out and enjoy the flora. Walk trails could be made from these, and information brochures produced.
- The RCC hope to establish links with the Tourist Commission for inclusion on wildflower tourist maps.

Flora Road Register

To ensure that knowledge of Flora Roads sites does not get lost, due perhaps to staff changes, the RCC has established a Flora Roads Register. Information pertaining to each Flora Road (i.e. road name, location, length, etc) will be stored in the Flora Roads database, and updated as necessary.

In order to plan roadworks so that these important areas of roadside vegetation are not disturbed, road managers should also know of these areas. Therefore, it is suggested that the Managing Authority (Shire, MRWA, DCLM) establish a *Register of Roads Important for Conservation* also. This register should be consulted prior to any works being initiated in the area.

Appendix

9

NANNUP SHIRE RESERVES – WEED CONTROL AND MANAGEMENT PLAN

<u>1</u>	Objectives.....	1
<u>2</u>	Background.....	1
<u>3</u>	Introduction.....	1
<u>4</u>	Assessment Procedure.....	1
<u>5</u>	The Reserves.....	2
5.1	Reserve No1. Blackwood River foreshore between Vasse Hwy Bridge and end of Kearney St	2
5.2	Reserve No. 2 E.Nannup Brook/Vasse Highway.....	3
5.3	Reserve No. 3 Brockman Hwy, 2 km south of Nannup	4
5.4	Reserve No. 4 Vasse Highway	5
5.5	Reserve No. 5 East Nannup Rd, Gravel Pit	6
5.6	Reserve No. 6 Johnson Rd	7
5.7	Reserve No. 7 Denny Rd	8
5.8	Reserve No. 8 Blackwood Meadows Subdivision	9
5.9	Reserve No. 9 Cundinup Hall and surrounds	10
<u>6</u>	Comparison of Scores Between the Reserves.....	12
<u>7</u>	Summary of Priority Management Recommendations	13
<u>8</u>	References.....	13

NANNUP SHIRE RESERVES – WEED CONTROL AND MANAGEMENT PLAN

1. Objectives

- To prioritise reserves vested in the Shire for weed control and management
- To compile a management plan for each reserve.

2. Background

Bushland areas, whether they exist as isolated remnants or areas adjoining larger bushland areas, are under threat from a broad range of pressures exerted through human activity. We need to be able to identify what these threats are, and how much affect they are having on our bushland, in order to protect it from serious degradation. The major threats to bushland stem from land clearing, salinity and waterlogging, urban development, stormwater runoff transporting high nutrient levels, inappropriate fire management, weed invasions and predation or displacement of fauna by introduced animals such as foxes, cats, dogs and rabbits.

Bushland needs to be identified as a **community asset**, and the value it brings to the community ranges from ecological significance, aesthetic and recreational features, through to essential enhancement and protection of catchment water quality. According to the principles of ecologically sustainable development, bushland should be used, conserved and enhanced so that ecological processes on which life depends are maintained and the quality of life for present and future generations is increased. ¹

3. Introduction

Shire reserves with a significant portion of remnant native vegetation were selected for this study, as the reserves were looked at in terms of their conservation value (potential habitat for native plants and animals) as well as their need for weed management. Reserves adjoining the Blackwood River were also selected being a potential source of weeds for areas downstream. Nine reserves were assessed.

The reserves were assessed in terms of their general health using “Guidelines for Assessing and Monitoring Sclerophyll Bushland Health of Shire Reserves in the Boyup Brook Shire” adapted by Lynda Coote, Blackwood Basin Group. They were then ranked in order of priority using the results of the assessment. This ranking indicates the conservation value of the reserves

The checklists used are explained in Appendix 1.

A brief management plan was compiled for each reserve, with special emphasis on weed management in the reserve.

4. Assessment Procedure

Each reserve was monitored using the checklists mentioned above.

On-ground mapping was carried out using a clear overlay on an aerial photograph. In most reserves, each individual weed infestation was recorded, in order that a detailed management plan for the reserve can be implemented.

Most areas were mapped in a grid fashion, with the surveyor walking through the area in lines at regular, measured intervals and recording weed infestations on datasheets and using GPS.

The mapping information was entered into an Access database and maps produced using Geomedia software.

5. The Reserves

5.1 Reserve No1. Blackwood River foreshore between Vasse Hwy Bridge and end of Kearney St (26775, 8307, 24774, 20333, 865)

Size : 16 ha

Purpose: Various

Description:

Strip of remnant bush adjacent to the river. Mainly flooded gum and marri. Some areas away from the river have been cleared and are used for recreation purposes. The northern portion has been designated as Nannup Foreshore Park, and is being managed for recreation purposes.

Overall assessment:

The site as a whole has been severely disturbed. Much of the foreshore has little in the way of native understorey and there are heavy weed infestations in most places. In addition to the weeds marked on the map, there are widespread infestations of Kikuyu, African Love Grass, Phalaris, Wild Radish, Dock and many others. There is frequent public access to most of the site. In the Foreshore Park, weed control and revegetation projects have been started and walk trails have been established with interpretive signage.

Bushland Health:

Summary of Bushland Health (from attached checklists)

Checklist	Score			
No.2 Site Features	6	- 4 to 3 poor	4 to 8 average	9 to14 good
No.3 Biodiversity Traverse	0	- 4 to 0 poor	1 to 4 average	5 to 8 good
No.4 Bushland Health	4	- 7 to -1 poor	0 to 5 average	6 to 10 good
No.5 Habitat	10	0 to 6 poor	7 to12 average	13 to 18 good
No. 6 Disturbances	- 13	- 8 to -14 poor	-5 to -7 average	0 to - 4 good
Total	7			

Although the scores range from poor to average, this site cannot be assessed by purely objective methods. It is an important reserve for several reasons:

- It adjoins the Blackwood River and contains a variety of riparian habitats.
- It is visited by many people, making it an ideal site to demonstrate revegetation and weed management techniques and to provide information to the public.
- The site is already being managed, so this should continue.

Ongoing weed control is essential to maintain the areas already revegetated and to prevent the spread of the many weeds already there.

The Bridal Creeper biological control agents, leafhoppers and rust fungus, have already been released. The success of this strategy can be enhanced by community involvement in spreading these agents.

Management recommendations for weed control

Monitor and spread the biocontrol agents for Bridal Creeper

Other management recommendations

Because the major understorey in many places is weeds, there is little point attempting to eradicate these weeds, unless a revegetation program is implemented at the same time. The weeds, especially grasses, are protecting the site from erosion and helping to prevent the spread of the more serious weeds such as Bridal Creeper, Blackberry and Watsonia.

For general management of the site refer to "Blackwood River Foreshore Management Plan, Nannup" by Julia Boniface. August 2000.

5.2 Reserve No. 2 E.Nannup Brook/Vasse Highway (21217)

Size: 0.9 ha

Purpose: Water and Camping

Description:

This reserve is at the confluence of East Nannup Brook and Carlotta Brook, and is mainly a riparian site. It is adjacent to the Blackwood River. The predominant vegetation is Flooded Gum.

Overall Assessment:

Most of the site is severely weed infested, primarily with Blackberry and Bridal Creeper. The blackberry infestation continues to the Blackwood River foreshore.

Bushland Health:

Summary of Bushland Health (from attached checklists)

Checklist	Score			
No.2 Site Features	4	- 4 to 3 poor	4 to 8 average	9 to 14 good
No.3 Biodiversity Traverse	2	- 4 to 0 poor	1 to 4 average	5 to 8 good
No.4 Bushland Health	3	- 7 to -1 poor	0 to 5 average	6 to 10 good
No.5 Habitat	12	0 to 6 poor	7 to 12 average	13 to 18 good
No. 6 Disturbances	-5	- 8 to -14 poor	-5 to -7 average	0 to - 4 good
Total	16			

All scores were in the average range. Although the site has a good range of habitat features, the severity of weed infestations have significantly reduced the biodiversity of the site. The small size of the reserve would also appear to reduce its conservation values, although this is offset by its proximity to the Blackwood River ecosystem and the fact that neighbouring properties provide good habitat. It is a significant area in terms of being a tributary of the river and effort should be made to limit the impact of the weeds.

The blackberries were sprayed by the Dept. of Agriculture during January 2003. The availability of government funding will determine whether control continues in the future.

Bridal Creeper rust fungus was released at 8 sites in the reserve in July 2003, and should have an impact within 2 – 3 years

Management recommendations for weed control

1. Liaise with the Department of Agriculture regarding blackberry spraying. If not being carried out in 2004, then the Nannup Shire should undertake control.
2. Monitor the impact of the rust fungus on Bridal Creeper.

5.3 Reserve No. 3 Brockman Hwy, 2 km south of Nannup (42287)

Size: 20.2 ha

Purpose: Recreation

Description:

This reserve is situated 2 km south of Nannup. Jarrah / marri remnant bush cover most of the site. It has been used as a gravel pit in the past.

Overall Assessment:

Despite major disturbances with the gravel pit and numerous tracks running through the reserve, there are large areas of undisturbed bush. These areas are in surprisingly good condition with little weed infestation. The main weed infestations are around the gravel pits, close to the tracks and entrance and at the southern end at the start of the plantation.

Bushland Health:

Summary of Bushland Health (from attached checklists)

Checklist	Score			
No.2 Site Features	12	- 4 to 3 poor	4 to 8 average	9 to 14 good
No.3 Biodiversity Traverse	6	- 4 to 0 poor	1 to 4 average	5 to 8 good
No.4 Bushland Health	6	- 7 to -1 poor	0 to 5 average	6 to 10 good
No.5 Habitat	12	0 to 6 poor	7 to 12 average	13 to 18 good
No. 6 Disturbances	- 13	- 8 to -14 poor	-5 to -7 average	0 to - 4 good
Total	24			

Most scores were in the **good** range, although the assessment was carried out away from the disturbed areas. The fact that there are serious disturbances in parts of the reserve (ie gravel pits, tracks etc.) detracts somewhat from such a favourable assessment.

However, because the site is of significant size, and there are large areas of relatively undisturbed bush, it is a site worth managing to protect these areas. There are several weed hotspots needing attention while they are still at a manageable stage, in particular several Bridal Creeper infestations at the south end of the reserve (see map).

The site is connected at the south end to state forest, and is part of a corridor to the Blackwood River via private property on the north side of Brockman Highway. For this reason it is a valuable site to manage.

Management Recommendations for weed control

1. Spray Bridal Creeper infestations – they will rapidly spread if not controlled, and are small enough to treat effectively at present.
2. Continue control of Cape Tulip (the patch was sprayed by Michael Lindsay in 2002)
3. Remove single Apple of Sodom plant near the entrance.
4. Spray Watsonia and Vinca infestations (small and easily controlled at present)
5. Over time remove weed wattles, especially the silver wattle patch (*Acacia dealbata*) on main track approximately 100m from the entrance. This species suckers and can spread rapidly (as seen near Workers Pool, Barrabup).

Other Management Recommendations

The areas which were once used as a gravel pit, could be gradually revegetated with local native species. This would make a good community project.

5.4 Reserve No. 4 Vasse Highway (35981)

Size: 16.6 ha

Purpose: Parkland and picnic area

Description:

This reserve runs parallel to the Vasse Highway just south of Nannup for several kilometres, and is a long thin site. It adjoins farmland on the west side. The vegetation is Jarrah and Marri and there are several tracks running through the area.

Overall Assessment:

The site is fairly free of weeds in most parts, although a Bridal Creeper infestation is starting to dominate the northern end. Freesias can be found close to tracks and fencelines. The understorey is generally healthy and diverse.

Bushland Health:

Summary of Bushland Health (from attached checklists)

Checklist	Score			
No.2 Site Features	3	- 4 to 3 poor	4 to 8 average	9 to14 good
No.3 Biodiversity Traverse	5	- 4 to 0 poor	1 to 4 average	5 to 8 good
No.4 Bushland Health	6	- 7 to -1 poor	0 to 5 average	6 to 10 good
No.5 Habitat	12	0 to 6 poor	7 to12 average	13 to 18 good
No. 6 Disturbances	-7	- 8 to -14 poor	-5 to -7 average	0 to – 4 good
Total	19			

The long, thin shape of the reserve reduces its value as a conservation area as it is exposed to disturbances from both the road and adjacent farmland. It is connected to larger forest areas by vegetation on adjacent farmland.

The only serious weed infestation is the Bridal Creeper at the northern end of the site. The Bridal Creeper rust fungus was released here by the owners of the adjacent property in July 2003, and should have an impact within 2 – 3 years.

Management recommendations for weed control

Monitor progress of the Bridal Creeper rust fungus.

5.5 Reserve No. 5 East Nannup Rd, Gravel Pit (29204)

Size: 29 ha

Purpose: Gravel

Description:

Jarrah/Marri bush over most of the site. Part of the site has been a gravel pit in the past and has grown over with native vegetation. Another area has been more recently used. Soil, gravel and green waste has also been dumped in this area. The reserve is adjacent to private property and crown land.

Overall Assessment:

Although the gravel pits constitute a major disturbance to the site, the undisturbed areas of bush are in very good condition with little in the way of weed infestation. There are small patches of Blackberry and Bridal Creeper in the area cleared for gravel. These infestations were on mounds of soil/green waste dumped at the site.

Bushland Health:

Summary of Bushland Health (from attached checklists)

Checklist	Score			
No.2 Site Features	10	- 4 to 3 poor	4 to 8 average	9 to14 good
No.3 Biodiversity Traverse	5	- 4 to 0 poor	1 to 4 average	5 to 8 good
No.4 Bushland Health	10	- 7 to -1 poor	0 to 5 average	6 to 10 good
No.5 Habitat	12	0 to 6 poor	7 to12 average	13 to 18 good
No. 6 Disturbances	-11	- 8 to -14 poor	-5 to -7 average	0 to - 4 good
Total	26			

Most scores were in the good range, although the assessment was carried out away from the disturbed areas. The fact that there are serious disturbances in parts of the reserve (gravel pits, tracks etc), detracts somewhat from such a favourable assessment.

However, because the site is of a significant size and there are large areas of relatively undisturbed bush, it is worth managing to protect these areas. If the Blackberry and Bridal Creeper infestations in the gravel pit area are controlled, this should be sufficient management.

The reserve has the advantage of being some distance from town, so tends not to be used for recreational purposes, lessening the risk of weed infestation.

Management Recommendations for Weed Control

Spray bridal Creeper and Blackberry infestations and monitor annually.

5.6 Reserve No. 6 Johnson Rd (40288)

Size: 18 ha

Purpose: Public recreation

Description:

This site covers various different sectors of the landscape and is narrow and irregularly shaped. Part of the reserve adjoins the river foreshore below Stacey's subdivision, while the rest runs through the subdivision itself. Some is cleared land, some is remnant bush (Flooded Gum along the river foreshore, Jarrah/Marri on higher ground) and some is in the process of natural regeneration.

Overall Assessment:

There is a lot of variation within this reserve. The cleared areas have little value as habitat, while other parts are more diverse. The reserve is virtually free of weeds, apart from grasses and Guildford Grass in the cleared areas. There are a few small outbreaks of Blackberry and Bridal Creeper along the river foreshore.

Bushland Health:

Summary of Bushland Health (from attached checklists)

Checklist	Score			
No.2 Site Features	6	- 4 to 3 poor	4 to 8 average	9 to14 good
No.3 Biodiversity Traverse	3	- 4 to 0 poor	1 to 4 average	5 to 8 good
No.4 Bushland Health	6	- 7 to -1 poor	0 to 5 average	6 to 10 good
No.5 Habitat	15	0 to 6 poor	7 to12 average	13 to 18 good
No. 6 Disturbances	-8	- 8 to -14 poor	-5 to -7 average	0 to - 4 good
Total	22			

It was hard to evaluate this reserve as there are several different types of ecosystem. The biodiversity traverse was carried out in remnant bush along the river foreshore. The area of totally cleared land is relatively small compared to areas of regeneration and remnant bush, so was given less emphasis in the evaluation. The narrow irregular nature of the reserve should make it less valuable as habitat, but this is offset by the fact that it connects the river ecosystem to crown land to the north of the subdivision and is part of the river foreshore corridor. Overall, the reserve scores fairly high for bushland health.

Management Recommendations for Weed Control

As there are no serious weed problems, little management is required.

5.7 Reserve No. 7 Denny Rd (43555)

Size: 8.7 ha

Purpose: Public recreation

Description:

This is a riparian site where McAtee Brook joins the Blackwood River. The vegetation is mainly Flooded Gum and associated understorey.

Overall Assessment:

The main weed in this reserve is Blackberry. Where there are no weed infestations, the understorey is fairly healthy.

Bushland Health:

Summary of Bushland Health (from attached checklists)

Checklist	Score			
No.2 Site Features	6	- 4 to 3 poor	4 to 8 average	9 to14 good
No.3 Biodiversity Traverse	3	- 4 to 0 poor	1 to 4 average	5 to 8 good
No.4 Bushland Health	8	- 7 to -1 poor	0 to 5 average	6 to 10 good
No.5 Habitat	14	0 to 6 poor	7 to12 average	13 to 18 good
No. 6 Disturbances	-6	- 8 to -14 poor	-5 to -7 average	0 to - 4 good
Total	25			

The table shows that the reserve vegetation is mainly healthy, and provides good habitat features. There are, however, significant infestations of blackberry along both McAtee Brook and the Blackwood River. Some of these infestations have been

sprayed during summer/autumn 2003, which has resulted in the surrounding native vegetation also being killed.

Management Recommendations for Weed Control

1. Monitor the effect of blackberry control during 2004
2. A follow-up spray may be necessary, although care should be taken not to spray the surrounding vegetation.

5.8 Reserve No. 8 Blackwood Meadows Subdivision (42358)

Size: 13 ha

Purpose: Public Recreation

Description:

Most of the reserve is cleared land, except for the portion adjoining the Blackwood River.

Overall Assessment:

As there is no native vegetation on the majority of the reserve, it has limited value as habitat. Its main value lies in the strip of river foreshore adjoining it, which is a valuable corridor between other areas of native vegetation. There are significant weed infestations on the site.

Bushland Health:

Summary of Bushland Health (from attached checklists)

Checklist	Score			
No.2 Site Features	6	- 4 to 3 poor	4 to 8 average	9 to14 good
No.3 Biodiversity Traverse	0	- 4 to 0 poor	1 to 4 average	5 to 8 good
No.4 Bushland Health	1	- 7 to -1 poor	0 to 5 average	6 to 10 good
No.5 Habitat	10	0 to 6 poor	7 to12 average	13 to 18 good
No. 6 Disturbances	- 13	- 8 to -14 poor	-5 to -7 average	0 to - 4 good
Total	4			

The assessment was carried out on the basis that there was some native vegetation ie the river foreshore.

This resulted in higher scores than if the cleared area alone had been assessed.

The fact that this reserve does adjoin the river foreshore means that some management would be advantageous. It is important to keep the major weeds, such as Bridal Creeper, Blackberry and Arum Lily under control along this section of river foreshore.

Management Recommendations for Weed Control

1. Monitor Arum Lily infestations and spray if necessary. Sprayed in January 2003
2. Monitor Cape Tulip infestations in cleared areas and spray if necessary. Sprayed in late 2002
3. Bridal Creeper leafhoppers and rust fungus were released in winter 2002 amongst the worst Bridal Creeper infestations. These should spread and ultimately provide some control.
4. The Blackberry infestations should have been sprayed by the Department of Agriculture in January 2003. Continued monitoring and spraying will be necessary.

5. In the longer term, *Watsonia* infestations could be a problem and are best controlled before they spread too far. The small outbreaks would be controlled easily at this stage.

Other Management Recommendations

In the longer term this would be an ideal site for a community revegetation project. With the large numbers of trees being planted by property owners on the subdivision, a wildlife corridor could eventually be created between the Blackwood River and State Forest the other side of Barrabup Rd.

5.9 Reserve No. 9 Cundinup Hall and surrounds (5323,17320, 22979)

Size: 27.5 ha

Purpose: Gravel and hall site.

Description:

Jarrah/marri remnant bush over most of the site. Areas at the north end of the site have been used as a gravel pit and general dumping ground in the past. Most of the reserve is unfenced from adjoining agricultural land. Much of the site is fairly rocky. There is a lack of medium to tall shrub species on the site.

Adjoining the reserve to the south is another 15 ha of unvested crown land. It would be beneficial to treat this area as part of the reserve.

Overall assessment:

Weeds are present around the hall site, in the areas which were previously gravel pit and a strip adjoining Cundinup Road South, on the western boundary. The remainder of the reserve is more or less free of weeds. Major weed species are *watsonia*, pine, other bulbs and one patch of Bridal Creeper.

As the reserve is unfenced, cattle have access. This is evidence from the paths and manure present. There are no other obvious signs of their impact, although this could be the reason for the lack of a shrub layer in most places.

Bushland Health:

Summary of Bushland Health (from attached checklists)

Checklist	Score			
No.2 Site Features	11	- 4 to 3 poor	4 to 8 average	9 to14 good
No.3 Biodiversity Traverse	3	- 4 to 0 poor	1 to 4 average	5 to 8 good
No.4 Bushland Health	7	- 7 to -1 poor	0 to 5 average	6 to 10 good
No.5 Habitat	10	0 to 6 poor	7 to12 average	13 to 18 good
No. 6 Disturbances	- 11	- 8 to -14 poor	-5 to -7 average	0 to - 4 good
Total	20			

Most scores were in the **average** range, with serious disturbances as a result of the gravel pit and dumping of gravel and dirt. Although the fact that cattle have access to the reserve has produced little obvious disturbance, their presence is likely to lead to the import of more weed species and damage to the understorey in the future. The reserve is of a significant size and connected to large areas of state forest. Much of the reserve is free of weeds, and so is worth managing to prevent the spread of the weeds already there. In particular, the patch of Bridal Creeper is small at present and is confined to a load of rubbish which has been dumped (obviously

where it came from). It would be easy to control that patch now, before it becomes a much bigger problem.

Management recommendations for weed control

1. Spray Bridal Creeper infestation – it will spread rapidly if not controlled.
2. Prevent the spread of *Watsonia* infestations by spot spraying isolated patches moving out from the main areas. This should preferably be done annually.
3. Monitor the site for spread of pine seedlings and other weeds outside the infested areas.

Other management recommendations

Fence the reserve from adjacent farmland to prevent cattle access.

6. Comparison of Scores Between the Reserves

Reserve No.	Name	Total site score	Ranking
5	East Nannup Rd	26	1
7	Denny Rd	25	2
3	Brockman Hwy	24	3
6	Johnson Rd	22	4
9	Cundinup Hall	20	6
4	Vasse Hwy	19	5
2	East Nannup Bk/Vasse Hwy	16	7
1	Town Foreshore	7	8
8	Blackwood Meadows	4	9

The higher the score, the higher the conservation value of the reserve. A score of 20 and over indicates that the bushland is in generally good condition, is likely to be of a significant size and shape to be valuable as habitat and connected to larger areas of native vegetation.

Five of the reserves studied fall into this category. These are the sites which are likely to be the easiest and cheapest to manage, and for that reason should be priority for management. It is better to protect areas that are already in good condition, rather than spending limited resources on areas that need a high level of management to restore them.

This does not mean the other reserves should not be managed at all, but that they are lower priority.

The exception to this is the Town Foreshore, which although scores poorly, should be at the top of the priority list for the following reasons:

- Weed control and revegetation work has already begun and should be continued.
- The site has been designated as the Nannup Foreshore Park and is being developed as an area for recreation and conservation.
- It has a high public profile and for that reason is a good demonstration and education site for weed control and revegetation techniques.
- Being a riparian site increases its importance as it has a potentially diverse range of ecosystems. It is also an important site for helping maintain water quality in the river.

7. Summary of Priority Management Recommendations

1. Treat the following isolated weed infestations and monitor annually:
 - Bridal Creeper – Cundinup
 - Bridal Creeper and Blackberry – E. Nannup gravel pit
 - Bridal Creeper and Cape Tulip – Brockman Highway (Check with Evelyn Harris first as she was going to spread rust fungus on the Bridal Creeper)
2. Remove Apple of Sodom plant near entrance – Brockman Highway
3. Treat Watsonia and Vinca (Periwinkle) infestations – Brockman Highway
4. Implement weed control to protect 2002 tree plantings in Foreshore Park.
5. Monitor and treat Blackberry in Foreshore Park.
6. Monitor and treat Cape Tulip and Arum Lily – Blackwood Meadows
7. Liaise with Department of Agriculture re treatment of Blackberry – Denny Rd. Treat if necessary.
8. Liaise with Department of Agriculture re treatment of Blackberry – E.Nannup Bk/Vasse Hwy. Treat if necessary, but avoid spraying Bridal Creeper – rust fungus introduced.

References

¹ Coote, Lynda (Blackwood Basin Group). Guidelines for Assessing and Monitoring Sclerophyll Bushland Health of Shire Reserves in the Boyup Brook Shire.

² Boniface, Julia. Blackwood River Foreshore Management Plan, Nannup.

APPENDIX

10

*Blackwood Weed Strategy
and Report on Local Weed
Activities – March 2003*

TABLE OF CONTENTS

1	Summary of Recommendations.....	86
2	Background.....	88
2.1	Description of area.....	88
2.2	About the BBG.....	89
2.3	History of weed coordinators	89
3	Introduction	91
3.1	Defining the problem.....	91
3.2	How the weed strategy is compiled	92
3.3	Emphasis on community involvement.....	92
4	Visions and Goals.....	93
4.1	Goals	93
4.2	Roles of the weed coordinators.	93
5	Information gathering.....	94
5.1	Surveys.....	94
5.2	Weed mapping	94
5.2.1	Road verges	95
5.2.2	Shire reserves	95
5.2.3	Private land	95
5.2.4	Other	95
5.2.5	Mapping techniques.	95
5.3	Stakeholders meetings	96
6	Identify stakeholders.....	97
6.1	Obligations and Roles of stakeholders	97
7	Weed Action Groups.....	98
7.1	Role of WAGs.....	98
7.2	Motivating the community	98
7.3	What makes the strong groups endure?.....	99
8	Target areas and species	101

8.1	Id key weed problems.....	101
8.2	Prioritising.....	101
8.2.1	General guidelines for prioritising weed management:.....	101
8.2.2	Factors governing the selection of individual reserves	101
9	Key achievements of weed coordinators so far	102
10	Recommendations.....	103
10.1	General.....	103
10.2	Shire role	104
10.3	Community role	104
10.4	Coordination and implementation	104
10.5	Education.....	105
10.6	Monitoring and evaluation.....	105

1. Summary of Recommendations

General

- Weed management should be the responsibility of all land managers, therefore communication between the agencies, shires and community should be encouraged and maintained.
- Weed mapping is a crucial part of any weed strategy. It is important that the maps produced by the weed coordinators are actually used for future work in the Blackwood Basin.
- Natural Heritage Trust or other funding for weed coordinators should be continued in order that momentum is maintained to carry on the work already achieved.
- Federal Government should be lobbied for more funding for weed management. A united campaign from Shires, community and regional planners such as the Blackwood Basin Group is more likely to be successful than individual efforts.
- Ensure that funding for weed management is spent on on-ground activities rather than on more strategies, plans, consultants etc.
- Return to a system similar to that which used to operate, whereby Agricultural Protection or other staff are employed to implement more on-ground weed control and encourage landholders to control weeds on private land.

Shire role

Local Shires should be the focal point for coordinating weed action, as they are in a good position to coordinate all the stakeholders.

Role of Shires to include:

- Provide support to community groups to implement any grant funding received and work together with them to ensure that all projects are in line with the overall weed strategy.
- Choose appropriate plants for planting in public areas, with the emphasis on local native species and not using plants with the potential to become environmental weeds.
- Produce a weed pamphlet showing the main local environmental weeds for the area.
- Provide information to landholders concerning the impact of environmental weeds. Signs in Shire reserves would help to place more focus on weed issues and would serve as an effective educational tool.

- Encourage the greater involvement of local garden centres and nurseries with the 'Garden Thugs' campaign promoted through the Nursery and Garden Industry Association and the Environmental Weeds Action Network (EWAN).

Community role

- Weed action works best on a local scale, and so small, weed action groups are one of the most effective weapons against weeds.
- Use examples from other weed groups to find ways to encourage community involvement with and ownership of weed issues. This is one of the keys to successful weed management.

Coordination and implementation

- All shires and zones should employ environmental staff whose portfolios include weeds, to ensure that weed strategies are implemented and to act as a liaison person between community groups and local government.
- Coordination between zones and shires is recommended in order that weed management projects complement each other and are prioritised on a regional basis.
- An essential part of any weed action plan should be the identification of who is actually going to undertake the on-ground weed control. It may be volunteers, a contractor or Shire employees, but needs to be stated in the plan.

Education

People need to be aware of weeds, their identification and impact on the environment, in order that they can be actively involved in weed management. Education should be an integral part of any weed strategy.

Monitoring and evaluation

A system for monitoring weed invasions should be incorporated into all weed action plans in order that the success of a weed management program can be evaluated.

2. Background

2.1 Description of area.

The Blackwood Basin is the largest catchment in the south-west of Western Australia and covers an area of 23 500 km² (2.35 million ha) stretching from Dumbleyung to Hardy Inlet at Augusta. The upper catchment boundary is approximately 350 km inland from the Indian Ocean. The area, particularly the lower and middle basin, is well known for its scenic qualities and hence its tourism and recreation values. It is also a highly productive agricultural area and has significant mineral and timber resources. The basin supports a population of approximately 37 000 and approximately 380 000 tourists per year. Agriculture, forestry, mining and tourism industries contribute more than \$550 million per year to the State's economy. Agriculture is the predominant form of economic production in the Blackwood Basin and generates approximately \$400 million per annum. The traditional agricultural industries are sheep, wool, beef, grain, dairy, horticulture and viticulture. Other industries supported within the basin include forestry, tourism and mining.

The Blackwood Basin has a Mediterranean climate with characteristic dry summers and wet winters. Average annual rainfall ranges from 375 mm in the upper catchment at Dumbleyung, to 700 mm in the middle catchment at Boyup Brook, to over 1000 mm at Augusta.

The Blackwood River is one of the longest rivers in the South West, extending 280 km from Moodiarrup to Augusta and carries the greatest flow of any South West river. The Blackwood River ceases to exist in name beyond Moodiarrup and is supplied exclusively by tributaries from these point eastwards. There are a number of prominent upper catchment tributaries that extend the catchment beyond Moodiarrup, including the Arthur, Balgarup and Beaufort Rivers. The Coblinine River system is also a significant contributor to the Blackwood, although only during extreme flood years.

The wetlands and waterways of the Blackwood Basin and particularly the middle and upper reaches, have been significantly impacted by salinisation. The rise in the water table following clearing for agriculture that started in the early 1900s, has resulted in progressive changes in the wetland system. Most of the wetlands in the catchment were fresh or near-fresh until the 1940s. They were covered by sheoak, paperbark and tea-tree.

About 60% of the catchment or 1.6 million hectares has been cleared for agriculture. At the lower end of the catchment, the land is still fairly heavily forested, with a large proportion of crown land. Further up river (east of Bridgetown), progressively more land has been cleared.

As a result, the weed issues affecting the different parts of the catchment vary, with emphasis on agricultural weeds in the upper catchment and both agricultural and environmental weeds in the middle and lower catchments.

Agricultural weeds are those affecting the economic productivity of agricultural land, whereas environmental weeds impact on natural ecosystems with less emphasis on economic factors.

Salinity, loss of biodiversity, river degradation, water logging, erosion, environmental weeds and soil acidity threaten the long term viability of the basin environment and industries.

2.2 About the BBG.

In 1990, a meeting was held (comprising 250 participants from LCDCs, shires, conservation groups, recreation groups, politicians and government agencies) to address concerns about the Blackwood River and its catchment. The Blackwood Basin Group (BBG) was formed in 1992 in response to community concerns about the above mentioned issues.

Representation within the BBG includes LCDCs, Local Government, industry, conservation groups, the West Australian Farmers Federation and other community members. There are also State agency members on the BBG representing the Departments of Agriculture and Conservation and Land Management (CALM), and the Waters and Rivers Commission.

The BBG manages several incentive programs to assist and encourage landowners to change or improve land management practises.

2.3 History of weed coordinators

The spread of environmental weeds has been noted as one of the seven major environmental challenges in the Blackwood Basin (*Blackwood Basin Group, 2000*) and as a result a specific program focussed on weeds was developed by the group.

The Blackwood Basin Group initiated a Community Weeds Forum in April 1998, to make a positive step towards the development of a weed action plan for Western Australia's south west region.

Forum participants provided valuable input on issues relating to the generation of a weed action plan for the south west.

The Blackwood Basin Group applied for National Heritage Trust funding to progress the work achieved by the community at this forum in building a weeds action plan.

Originally, a brief was drawn up for a contractor to develop a Blackwood Basin Weed Strategy. The strategy produced was to be in line with other groups developing Weed Strategies (eg. Geographe Catchment Weed Strategy), the National Weeds Strategy and the Environmental Weed Strategy for Western Australia.

Following some initial work carried out by a contractor, the Blackwood Basin Group decided that a number of community weed co-ordinators, situated throughout the areas of most need and working in a part time capacity, would be a more cost effective way of achieving the project outcomes.

An expression of interest was put out to the community of the Blackwood Basin.

The funding received from the Natural Heritage Trust allowed for a number of part-time coordinators to be employed 1-2 days /week. As there were not enough resources to provide this support throughout the basin, it was necessary to assess requests for support from groups in the Blackwood to allow the most effective targeting of resources.

The overriding principle for the project was to involve the Blackwood Basin community and to deliver outcomes that are practical and of value to the community.

The outcome was the employment of 4 weed coordinators in the following areas:

- Shire of West Arthur
- Blackwood Valley Landcare Zone
- Shire of Nannup
- Lower Blackwood Landcare Zone

A contractor (Department of Agriculture Protection Services) was also employed to compile a weed strategy for the Wagin-Woodanilling Zone. (*Appendix 1*)

In addition a Team Leader was employed half a day a week to coordinate the work of the other coordinators.

The duties of the Team Leader were to:

- Co-ordinate activities of the weed co-ordinators and other individuals and organizations involved with environmental weed control in the Blackwood Basin
- Liaise between the weed co-ordinators and the Blackwood Basin Group, reporting on a regular basis
- Communicate and network with a range of appropriate organizations – e.g. WA Herbarium, the Department of Agriculture, Community Weed and Pest Co-ordinators, other Community Weed Action Groups and ensure that the coordinators of Community Weed Action Groups have sufficient knowledge and interaction with these organizations.
- Engage suitable technical expertise where necessary. Organise workshops and other appropriate methods to ensure that the weed co-ordinators are developing a cohesive strategy and using compatible methods to design and implement weed control plans
- Communicate project progress and success in conjunction with the BBG's Communications Coordinator.

3. Introduction

3.1 Defining the problem.

Weeds have been identified as one of the most significant environmental challenges facing Western Australia. Recent Bureau of Statistics reports that 47% of farmers consider weeds to be their greatest problem.(as compared to 21% for salinity). In Western Australia's agricultural systems, weed control costs have been estimated at 20% of production costs. Australia wide this is generally accepted to cost at least \$3.3 – 4.0 billion per year, not considering losses to biodiversity. By comparison, salinity was estimated to cost \$250 – 330 million per year. (www.abs.gov.au.) If we extend the figures to cover the cost of environmental weeds to natural ecosystems, the problem becomes even more enormous.

Estimations from weed control programs in urban bushland reserves indicate that over a five year period, the average costs for controlling grassy and broadleaf/bulbous weeds are up to \$600/hectare/year, and up to \$1,500/hectare/year for woody weeds (*P.Strano, City of Cockburn, Personal Communication*). When these figures are extrapolated to the thousands of hectares of bushland in the Blackwood Basin that are infested with weeds, it is clear that the costs to adequately control weed infestations are immense. Efforts to control weeds should therefore be extremely focussed and targeted to ensure the highest levels of cost effectiveness.

Over 60% of the plants we now look on as weeds, were introduced as ornamental garden plants. For example, Bridal Creeper and Arum Lily, two of our worst weeds, were originally garden ornamentals. There are likely to be many more species in gardens and nurseries with the potential to become weeds. It is important that people are informed about their choice of plants for gardens . It is impossible to predict which plants will eventually become weeds (it often takes up to 50 years for weeds to show their true colours), but we can apply “The Tens Rule” (*Williamson and Fritter, 1996*) to give an indication of how many of the plants introduced into Australia will eventually become a serious problem. The Tens Rule says that out of every 10 plants introduced, one will become naturalised, and of every 10 plants that become naturalised one will become a serious problem. It has been calculated that \$90 million of herbicide is used on the top 10 weeds in WA. It is a simple matter of arithmetic to calculate that for every 1000 plants let into WA, one of these can be expected to cost nearly \$10 million a year in control costs.

Appendix 9 shows weeds of the south west. Many of these plants are sold in nurseries and garden centres. Appendix 9 also includes a list of local native species suitable for planting in the Bunbury-Margaret River area.

From the above it is clear that prevention is better than cure. Weeds are already one of the major environmental problems and concerted action by all sectors of the community is the only way any form of management is going to be achieved.

3.2 How the weed strategy was compiled

This weed strategy was developed from the work done by the Blackwood Basin's weed coordinators over a two year period. Some of it is specific to the areas involved, but much can be applied on a broader basis. It outlines strategies designed to continue the work of the weed coordinators that can be implemented by the community, Shires and Agencies. It is hoped that NHT funding will be available to continue the work of the weed coordinators as part of the Blackwood Biodiversity Program.

Weeds have been identified as a major threat in the Draft South West Regional Strategy for Natural Resource Management, and this Blackwood-based project will feed directly into the SW Strategy.

Because of the wide area covered by this strategy, there tend to be differences between the communities regarding prioritising weed problems. Therefore, the strategies are to some extent community driven (one of the outcomes of the weed surveys) and as a result, different approaches and techniques were used in the different areas. For example, community interest in the Lower Blackwood Landcare Zone was predominantly towards agricultural weeds, whereas in the Blackwood Valley Landcare Zone, it was oriented to environmental weeds.

3.3 Emphasis on community involvement

New legislation in the form of the Agriculture Management Act, currently in the process of being formulated, means that the future funding situation for weeds appears bleak. The implication is that responsibility for weed control will fall more and more to the community, both in terms of local government and volunteers. The strategies in this report take this situation into account, and offer ways the community can be effective in weed management.

In the past, the community has seen the role of weed control as a problem for agricultural protection officers, Shire councils and agencies such as CALM and DOLA. As funding to these bodies decreases annually, it is becoming clear that if anything is to be done, the impetus has to come from the community.

In general, farmers have a history of good weed management, partly because it is in their economic interests to do so, and partly from a feeling of responsibility for the land. It is important that other members of the community also become involved in the care of the natural environment.

The increasing severity of the weed problem only serves to highlight the huge inadequacies of funding for Natural Resource management.

4. Visions and Goals

Protecting biodiversity in the Blackwood Basin is one of the long term goals of the Blackwood Basin Group. As one of the main threats to biodiversity is weeds, weed management is an integral part of most biodiversity protection programs. This means that the end goal for weed management is not just dead weeds, but that the process is part of a wider strategy, which includes revegetation, monitoring etc.

The overall vision for the weed coordinators is to encourage and foster extensive community involvement in controlling the weeds that threaten our environment.

This community involvement should also extend to the agricultural sector, and to foster the involvement of all land managers.

4.1 Goals

- Extend community involvement in environmental weed control.
- Protect biodiversity by implementing an effective weed management strategy.
- Undertake weed mapping using a standard technique, ensuring consistency across the Blackwood Basin.
- Consult with Agriculture Western Australia Protection Officers and Shires.
- Involvement with National Bridal Creeper Strategy.
- Assist in the development and implementation of the Blackwood Basin Group Weed strategy through developing local weed strategies and action plans.
- To provide a model for community based weed action that can be replicated elsewhere in the South West Region.

4.2 Roles of the weed coordinators.

- To increase the understanding in the community for the need to control environmental weeds.
- To bring land managers together to resolve weed issues.
- To coordinate and establish weed action groups.
- To coordinate and establish “Friends of” groups for bush regeneration in conservation areas.
- To produce weed maps using a standard technique, ensuring consistency across the basin.
- To develop weed action plans for conservation areas, roadsides and other areas.
- To organise weed control days including organising weed control equipment and volunteers.
- To facilitate training for volunteers including safe pesticide use training.
- To liaise with Agriculture Western Australia Protection Officers and Shires.
- To become Involved with the National Bridal Creeper Strategy.
- To assist in the development and implementation of the Blackwood Basin Group Weed Strategy through developing local weed strategies and action plans.

- To assist weed action groups formulate weed strategies.

5. Information gathering

5.1 Surveys

Most weed coordinators used survey techniques to obtain feedback from landowners and other residents in the Shire on the nature and extent of the weed problem. This feedback was designed to give the weed coordinators information on the following:

- Location of weed infestations.
- Weed species present.
- Control methods being used.
- Opinions about weed control in the Shire generally.
- Indication of number of people willing to be involved in community weed action.
- Areas where people need help.

The survey forms were based on a prototype compiled by Julia Boniface (Weed Action Coordinators, Team Leader) and Peta White, who was then Weed and Pest Community Coordinator for the region. Each weed coordinator adapted the survey form to fit their own criteria. *See Appendix 2 for survey forms.*

Different sampling techniques were used in the different areas:

- Shire of Nannup – bulk mail out to all householders.
- Lower Blackwood Landcare Zone – bulk mail out to all rural landholders.
- The Shire of West Arthur – random sample of landowners selected with telephone follow up.
- Blackwood Valley Landcare Zone – no survey.
- Wagin-Woodanilling – no survey.

The rate of return for the surveys was about 7% for Nannup and Lower Blackwood and 10% for West Arthur. The fairly low percentage cannot be regarded as an indication of the level of commitment to weed control, as many people have a resistance to filling out forms.

The surveys were, however, a good guide to general attitudes towards weeds.

For copies of survey reports see Appendix 3.

5.2 Weed mapping

Weed mapping was an important role of the weed coordinators.

Purposes of weed mapping:

- To identify the main weed infestations, in order to prioritise their management.
- To provide a permanent record of weed infestations - most weed information at the moment is not documented and relies on the memory of people involved, with no provision for passing that knowledge on to future staff.

- To provide a baseline to enable the success of weed management programs to be monitored.
- To enable monitoring of weed infestations in order to determine how weeds spread in the area and to predict areas vulnerable to future weed spread.

Weed mapping can be divided into several areas:

5.2.1 Road verges

The technique used for road verges was that used by the Roadside Conservation Committee. (See *Appendix 4*). As well as the weeds being mapped, the verges were also ranked in terms of conservation value. Areas of high conservation are given high priority in any weed management/revegetation program. Road verge mapping was completed in the Lower Blackwood Landcare Zone, West Arthur Shire and Blackwood Valley Landcare Zone. Some roads have been surveyed in the Nannup Shire and should be completed during winter 2003. Maps are being produced by David Lamont of the Roadside Conservation Committee.

5.2.2 Shire reserves

Shire reserves were high priority for weed mapping. It is essential to have the information available if Shires are to implement a weed strategy.

5.2.3 Private land

Landowners were helped to weed map their property if required.

5.2.4 Other

River and creek reserves were another priority for mapping as waterways are a prime vehicle for spreading weeds. In 1998, the BBG conducted a vegetation survey of the entire foreshore of the Blackwood River (*Blackwood Basin Group 1999. Stream Foreshore Assessment for the Blackwood River*). Although this survey was focussed on ranking the general condition of the vegetation, it helps to provide an indication of the level of weed infestation along the river. Weed mapping supplements the information obtained in the survey.

5.2.5 Mapping techniques.

It was important that all the weed coordinators used the same basic techniques for weed mapping so as to enable the data to be entered into an Access database, for storing and managing the information into the future. A database was set up by Clark Ward, Zone Manager of the Blackwood Valley Landcare Zone for this purpose.

Maps were then produced using Geomedia GIS software and workshops were held to enable the weed coordinators to use this software.

On-ground mapping was carried out using a clear overlay on an aerial photograph where available, or contour map where aerial photos were not available. Weed infestations were marked on the map, entered onto

datasheets, including details of the site (*see Appendix 5*). Exact locations of weed infestations were recorded using a GPS.

The information was then entered onto the database and maps produced. In some areas, such as along the Blackwood River in the Nannup Shire, a general overview of the weed situation was recorded, in order for larger areas to be covered, although priority weeds such as Bridal Creeper and Blackberry infestations were mapped accurately.

In most other areas, each individual weed infestation was recorded, in order that a detailed management plan for each bushland area could be implemented.

Most areas were mapped in a grid fashion, with surveyors walking through the area in lines at regular, measured intervals and recording weed infestations on datasheets and GPS.

5.3 Stakeholders meetings

The aim of these meetings was to bring together as many of the stakeholders in the area as possible, to discuss a wide range of weed issues. The weed surveys showed that one of the main complaints from the community was that agencies, local government and other land managers were not willing to take responsibility for weed management. They deemed it unfair that they were trying to control weeds on their property, when new weed seed was constantly being introduced from neighbouring properties.

Stakeholders meetings can be held on a Shire wide level, or be restricted to a local catchment or LCDC. The latter is often more manageable, and can be incorporated into regular meetings. Meetings on a whole Shire level can be a useful tool to help formulate a weed strategy for the whole area.

None of the weed coordinators has yet held a Shire wide meeting, but meetings have taken place at a more local level.

For example, in the Nannup Shire, local landholders from the Cundinup area have met to negotiate with CALM regarding responsibility for weeds on CALM – managed land. This has met with a fair degree of success, and improved ongoing communication has resulted.

It is important for all parties to be involved in these discussions as just one dissension can have the effect of spoiling what the group is trying to achieve. A key factor affecting the success of such meetings is good facilitation. Weeds can be an emotive issue, and with feelings running high, it is hard to achieve a good outcome unless the meeting is kept running on track. In other areas, weed issues are discussed at catchment group or LCDC meetings.

6. Identify stakeholders

Potential participants in any weed strategies include the following stakeholders:

- Landholders
- Land Conservation District Committees (LCDCs)
- Catchment groups
- Weed action groups
- Shire – from councillors to gardeners
- Water and Rivers
- CALM
- Main Roads
- Westrail
- DOLA
- Department of Agriculture
- Agricultural Protection
- Western power
- Telstra
- Water Corporation
- Local community groups
- Schools
- Nurseries
- Media

6.1 Obligations and Roles of stakeholders

It is well documented that it is the obligation of landholders to control weeds on their land, particularly where declared weed species are concerned. The difficulty in this role is that many stakeholders eg. Shire Councils, control many reserves on behalf of the community and have few resources to manage the land. It is recommended that Shire Councils adopt a weed policy and a process to manage the land, and to allocate appropriate resources to weed control each year. In order to be cost effective areas for control will need to be prioritised. A good starting point for councils is to carry out assessments of the reserves to look at the quality of vegetation and identify any new weed infestations. Weed control in the initial stages of infestation will be much more cost effective.

In many instances responsibility for weed control may still fall upon the community, in which case councils should be supporting keen community groups with contractors, weed control equipment and training.

7. Weed Action Groups

Weeds have become such a major issue in the community and with limited funding available through government agencies, the only way forward for effective weed management and conservation of native biodiversity, is through weed action groups, either in the form of Friends Groups or Catchment Groups.

One of the roles of the weed coordinators was to establish and assist weed action groups in their areas. This met with varying degrees of success in the Blackwood Basin.

7.1 Role of Weed Action Groups

The role of weed action groups is inherently flexible, depending on the degree of involvement, skill level etc of the people involved. A weed action group in its broadest sense sometimes comprises individuals in an area working independently. Ideally, the group will work together towards a common goal eg managing weeds in a reserve or catchment.

Aims of a weed action group can include:

- To develop a management strategy for the area involved.
- To work in partnership with a managing authority – usually a Shire Council.
- To hold regular work days.
- To have fun.

7.2 Motivating the community

One of the hardest jobs of the weed coordinators was to motivate volunteers in the community, and even harder to encourage them to work together as a group. The main problem being that most of the areas covered by the weed coordinators had a relatively small population base from which to draw volunteers, so although response was often good, the people who were motivated tend to be involved in many other organisations.

Different strategies were employed to encourage community involvement in weed issues: eg

- Newspaper articles
One of the roles of the weed coordinators was to keep the community informed about weed issues in the area. Regular articles in local newspapers were the most effective way of achieving this. Calls for help and expressions of interest in helping with weed control were included in the articles and met with mixed success. The community was encouraged to contact their local weed coordinator for help and advice on specific weed issues.
- Workdays
Workdays were held in all areas, where a specific task was nominated eg hand weeding small areas of *Watsonia* from a Shire reserve. It was important to designate a manageable task where the participants could

see the result of their efforts by the end of the day. A picnic or barbecue is an added incentive for people to volunteer their time.

The usual response was a small but enthusiastic turn out.

This approach is useful for getting small jobs done and can sometimes result in the group of volunteers deciding to undertake further weed action and start a Weed Action Group. Generally though it relies on a coordinator initiating any further work.

- Talks at local bushfire brigade meetings.
The advantage of this approach is that it addresses a very local community of people who already know each other and are often aware of the weed problems in the area. It is sometimes only a small step for these people to see that by working together they can make a difference in their area.
- Weedbuster Week activities.
This is an opportunity to mount a publicity campaign with displays, activities etc.
- School involvement.
Encouraging the involvement of schools in weed activities not only introduces the students to the threat that weeds impose, but has in an impact in the wider community via teachers and parents.
Projects such as breeding Bridal Creeper Leafhoppers are well suited to schools, as it can be done in the classroom. Rearing seedlings for replanting following weed control is another project that can be incorporated into a school project.

Examples of Community Involvement

- In the Nannup Shire, there are a lot of subdivisions adjoining the Blackwood River. The people living here are very aware of the huge Bridal Creeper and Blackberry problem along the river, and many are keen to address the problem. The role of the weed coordinator was to coordinate a biological control program for Bridal Creeper. Rust fungus and bridal creeper leafhoppers were given to volunteers, who were shown how to release and spread the agents. They could then take responsibility for a small stretch of river, and keep spreading and monitoring the biocontrol agents. An action such as this is likely to continue even if there is no weed coordinator, as people are able to see the impact they are having and this in turn encourages continuation of the action.
- Enthusiastic volunteer help with road mapping has enabled road mapping in the Lower Blackwood Landcare Zone to be completed in a short time frame.
- Weed Management is being undertaken by groups of volunteers in several Shire reserves in the Blackwood Valley Landcare Zone.
- In the West Arthur Shire there is interest in forming a community group to protect the Hilman River system (approx. 20km).

7.3 What makes the strong groups endure?

From the experience of other weed action groups, certain factors have been identified which will increase the chance that a group will keep going and be effective.

- Key person in leadership role – someone in the community with strong motivation and vision. Without this, groups will tend to gradually lose motivation.
- Friendship – social aspect of weed group.
- Fun – if people enjoy what they are doing, motivation will remain high. Therefore the social aspect is as important as the work aspect. Rewards in the form of barbecues, lunches etc will tend to hold groups together and are important in celebrating achievements.
- Good organisation of the group – eg allowing people to do the jobs they enjoy and varying practical tasks so that one person does not spend a whole day hand weeding.
- Feedback from partner agency eg Shire – appreciation of what is being achieved.
- Strong links with partner agency – ie a committed staff member to work with the group.
- Ownership of a project is important if people are to continue to be motivated. This could mean that the weed group not only undertakes weed control, but is involved in the planning and revegetation of the site.
- Having a successful program which achieves results.

8. Target areas and species

8.1 **Identify key weed problems**

In order to identify the key problem weeds, all Shires in the Blackwood Basin were sent a questionnaire asking for information on the occurrence and distribution of the worst 30 weeds in the Basin. (*Ecoscape 1999 – in litt.*)

The results of the questionnaire are shown in Appendix 6.

8.2 **Prioritising**

8.2.1 General guidelines for prioritising weed management:

- Prioritising should be done across the whole area of concern.
- Where possible link in with existing biodiversity conservation programs.
- High conservation areas should be prioritised for weed management.
- Balance community concerns with biodiversity concerns appropriately.
- Choose weed species that are relatively easy to control.
- Choose small isolated infestations to tackle first.

There are several factors that contribute to classifying an area as having high conservation value. Generally this ranking applies to areas of remnant vegetation that are already in a fairly healthy state and require the least management to protect their biodiversity values.

8.2.2 Factors governing the selection of individual reserves for priority weed management: (*Guidelines for Assessing and Monitoring Sclerophyll Bushland Health of Shire Reserves in the Boyup Brook Shire. Adapted by Lynda Coote, Blackwood Basin Group, Boyup Brook*).

- Size of reserve – larger areas of remnant vegetation are better able to survive as viable areas of native habitat and should be prioritised for weed management.
- Position of reserve – areas of remnant vegetation along watercourse, gullies or steep slopes are important for maintaining water quality and preventing erosion. Reserves which connect other areas of native vegetation (wildlife corridors) should also be prioritised. Other important areas are those which protect the land from salinity and water logging by improving water use and lowering recharge (*State Salinity Council, 2000 Salinity: A guide for land managers. Government of Western Australia*).
- Shape of reserve – the shape of the remnant is important because it determines how much edge is exposed to disturbances such as fire, pesticide drift, weed invasions etc. The smaller the ratio of edge to area, the less impacts the outside influences will have on the reserve.
- Public Access – areas frequently used by the public can be used to demonstrate weed management strategies and techniques.

9. Key achievements of weed coordinators so far

- Good networks established with other key weed people, groups and organisations.
- Successful establishment of Bridal Creeper Leafhoppers and Rust Fungus in all areas.
- Improved communication between landowners and other stakeholders - with some resolution of weed issues.
- Extensive weed mapping in all targeted areas.
- Increasing the general level of weed awareness within the community through workshops, newspaper articles and interaction with the community.
- Good community involvement in the release and spread of Bridal Creeper Rust Fungus.
- Providing the community with assistance to identify and manage their weed problems.
- Carried out weed control trials in partnership with the Department of Agriculture.

10. Recommendations

10.1 General

- Weed management should be the responsibility of all land managers, therefore communication between the agencies, shires and community should be encouraged and maintained.
This can often be achieved more easily on a catchment or local basis than shire-wide.
A meeting involving all stakeholders is generally the first step, to define the issues of concern and discuss how these issues can be resolved. Communication is a key factor here, and so good facilitation of these meetings is essential. As weeds are often an emotive topic, it is strongly recommended that an outside facilitator is employed, in order to keep the meeting on track and to achieve a positive outcome.
- Weed mapping is a crucial part of any weed strategy, and so it is important that the maps produced by the weed coordinators are actually used for future work in the Blackwood Basin. If possible, maps produced by CALM and the Dept. of Agriculture should be combined with the weed coordinators' maps in order to give a more comprehensive overall picture. This could also save the duplication of effort in the future.
- Natural Heritage Trust or other funding for weed coordinators should be continued in order that momentum is maintained to carry on the work already achieved.
The continuation of this project aims to coordinate, manage and guide the development and implementation of the Weed Strategy and produce an on-ground Action Plan for the Blackwood Basin, primarily through the work of weed coordinators.
- Federal Government should be lobbied for more funding for weed management. A united campaign from Shires, community and regional planners such as the BBG is more likely to be successful than individual efforts. A well-planned weed management strategy is also more likely to get funding. An opportunity for this could be during the public consultation phase of the new Agricultural Management Bill later in 2003.
- Ensuring that funding for weed management is spent on on-ground activities rather than on yet more strategies, plans, consultants etc. There are plenty of good weed strategies already written that could be used in most situations.
- Return to a system similar to that which used to operate, whereby Agricultural Protection or other staff are employed to implement on-ground weed control and encourage landholders to control weeds on private land.

- Coordinate, manage and guide the development and implementation of a weed strategy and action plan for the Blackwood Basin, which will directly link into the development of a regional weed strategy.

10.2 Shire role

Local Shires should be the focal point for coordinating weed action, as they are in a good position to pull together all the stakeholders – both government and non-government stakeholders. All Shires should have a weed strategy, and employ staff to coordinate it. This position could be part of the role of a Bushcare Officer or Environmental Officer. The person thus employed would ensure that the following roles were fulfilled:

- Provide support to community groups to implement any grant funding received. The Shire should work together with community groups to ensure that all projects are in line with the overall weed strategy.
- Set an example regarding the choice of appropriate plants for planting in public areas, with the emphasis on local native species and not using plants with the potential to become environmental weeds.
- Produce a weed pamphlet showing the main local environmental weeds for the area.
- Provide information to landholders concerning the impact of environmental weeds. Signs in Shire reserves would help to place more focus on weed issues and would serve as an effective educational tool.
- Encourage the greater involvement of local garden centres and nurseries with the 'Garden Thugs' campaign promoted through the Nursery and Garden Industry Association and the Environmental Weeds Action Network (EWAN).

10.3 Community role

- Weed action works best on a local scale, and so small, weed action groups are one of the most effective weapons against weeds.
- Use examples from other weed groups to find ways to encourage community involvement with and ownership of weed issues. This is one of the keys to successful weed management.

10.4 Coordination and implementation

- A coordinator should be employed in all shires and zones to ensure that weed strategies are implemented and to act as a liaison person between community groups and local government. This person would also ensure that the roles of Shires (10.2) are carried out.
- Coordination between zones and shires is recommended in order that weed management projects complement each other and are prioritised on

a regional basis. This will ensure that funding is spent in the most effective way across the basin.

- An essential part of any weed action plan should be the identification of who is actually going to undertake the on-ground weed control. It may be volunteers, a contractor or Shire employees, but needs to be stated in the plan.

10.5 Education

People need to be aware of weeds, their identification and impact on the environment, in order that they can be actively involved in weed management. Education should be an integral part of any weed strategy. Involving schools is an excellent method of increasing community awareness, in conjunction with other strategies such as pamphlets, surveys, displays, work days etc.

10.6 Monitoring and evaluation

A system for monitoring weed invasions should be incorporated into all weed action plans in order that the success of a weed management program can be evaluated. Techniques for monitoring include photopoints, updating weed maps and periodic weed walks to note any new weed species and invasions.

(Bushcare have produced an excellent manual – Coote, Moller and Claymore. Monitoring and Evaluating Biodiversity conservation Projects. Bushcare, Dept. of Conservation and Land Management.)

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