

A survey of roadside conservation values in the Shire of Nungarin



May 2004
Roadside Conservation Committee



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Cover Photo's by T. Spackman and D. Lamont

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Executive Summary

The Shire of Nungarin, aware of the need to conserve roadside remnants, liaised with the Roadside Conservation Committee (RCC) to survey roads under their control and management. Surveys were conducted from September to November 2003. Seventy five percent of the Shires total road network of 639 km were surveyed, the majority being carried out by Tammie Spackman. This data was assessed by the RCC and maps produced via a Geographic Information System (GIS).

The survey revealed that sixty five per cent of the surveyed roadsides (620 km) had high conservation values; twenty three percent (221.5 km) had medium – low values Roadsides of low conservation value occupied nearly six percent or 55.2 km of the roads surveyed. A more detailed analysis of results are presented in the report along with additional information relevant to roadside management and conservation in the Shire of Nungarin.

It is envisaged that the prime use of the roadside survey data and roadside conservation value (RCV) map will be for use by the Shire and community groups as a management and planning tool. Applications may range from prioritising work programs or formulating management strategies. Past experience has shown that this document and accompanying maps are valuable as a road reserve planning and management tool, e.g.

- identifying degraded areas 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.

The Roadside Conservation Value map and accompanying information will ultimately assist the Shire of Nungarin to develop roadside vegetation management plans and the Roadside Conservation Committee is able to assist Local Government with this.

1.0 INTRODUCTION

The Shire of Nungarin is located 280 km east of Perth in Western Australia's northern wheat belt. The Shire covers an area of 1,145 square km and supports a population of approximately 300 people. The area experiences a Mediterranean climate with an average annual rainfall of 328.1 mm. Seasonal temperatures are characterised by warm summers, with maxima averaging from the high twenties, and mild winters, with maxima in the mid teens. Mean daily maximum and minimum temperatures and rainfall statistics are shown below.

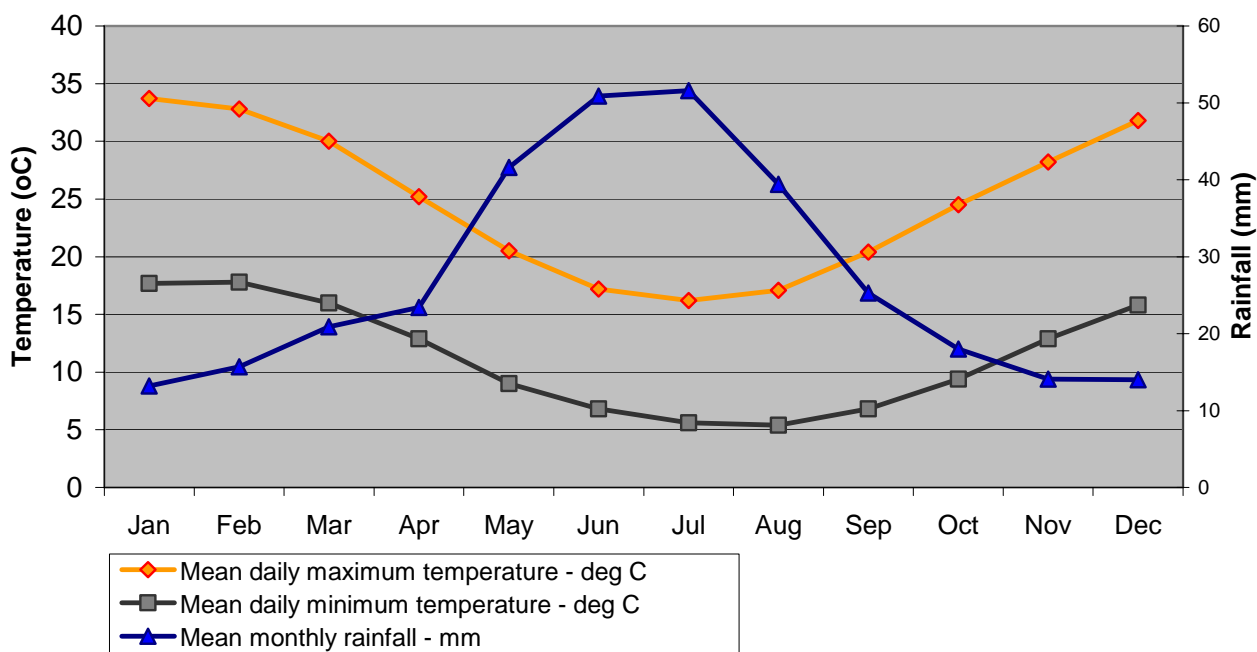


Figure 1 – Mean daily maximum and minimum temperature (°C) and rainfall (mm) in the Shire of Nungarin, based on climate averages from the Merredin weather station 10092.

Major agricultural pursuits are wheat, sheep, cattle and pigs, however other industries such as a gypsum mine and tourism add to the financial prosperity of the district. The latter is greatly enhanced by the area's spectacular natural resources. Salient features of the area include the Mangowine Homestead, McCorry's Old Hotel and the Heritage Machinery and Army Museum.

1.1 Flora

The WA Herbarium records list over 220 species of plants from the Shire of Nungarin. The most prolific genus are *Acacia*, 31 spp, *Eucalyptus* 21 spp, *Melaleuca's* and *Grevillea's* 10 spp each, and 7 species of *Dampiera*. The complete list of recorded flora can be seen in Appendix 4 of this report.



Narrow-spiked Dampiera (*Dampiera stenostachya*), a common native plant of the roadside flora in Nungarin. Photography by B. A. Fuhrer. <http://florabase.calm.wa.gov.au/help/photos#reuse>.

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 Areas (SEA's) and are marked out by yellow stakes with an identification plate welded on, see Section 8.2, Figure 12.

It is suggested that the RCC publication *Guidelines for Managing SEA's in Transport Corridors* is used as a guideline for managing these sites. It is the responsibility of the road manager to ensure these markers are installed, and guides for this are available from the Roadside Conservation Committee.

For information regarding DRF, contact the CALM Flora Officer for the Merredin District. If roadworks are to be carried out near DRF sites, it is advisable to contact CALM at least one week in advance.

Currently (April 2004) 8 populations of DRF species were known from roadside populations within the Shire of Nungarin. Species of DRF recorded from the Shire of Nungarin are:

- *Acacia lobulata*;
- *Eremophila resinosa*;
- *Eremophila virens*; and
- *Philothea basistyla*.



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

Above: Roadside populations of *Acacia lobulata* are present in the Shire of Nungarin.

Below left: *Philothea basistyla* exists within roadsides in the Shire of Nungarin. Below right: *Eremophila resinosa*.



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



Photo by A. P. Brown and L. Sweedman, Photo used with the permission of the WA Herbarium, CALM (<http://florabase.calm.wa.gov.au/help/photos#reuse>)

1.2 Fauna

The Western Australian Museum records more than 100 species of native fauna from the Nungarin area, listed in Appendix 5. WA Museum fauna records comprise specimen records, museum collections and observations from 1850 to present, therefore is intended to act only as a generic representation. Of the fauna species recorded in the Nungarin area, there were 27 bird, 7 amphibia, 15 mammal, 4 exotic mammal and 57 reptile species.

A number of the fauna species recorded from Nungarin are classified as being endemic to the wheatbelt region of Western Australia, or smaller regions within the State. For example, the Western Rosella (*Platycercus icterotis*) occurs only within south western forests and woodlands north to Moora and east to the Norseman district. The Clawless Gecko (*Crenadactylus ocellatus ocellatus*) was recorded in the Nungarin area, and is endemic to the semiarid zone in the southwest of Western Australia (Western Australian Museum, 2004).

Threatened and priority fauna recorded in the Shire of Nungarin indicated that 2 species have been recorded within the Shire, i.e. the Tree Stem Trapdoor Spider (*Aganippe castellum*) and the Crested Bellbird (southern) (*Oreoica gutturalis gutturalis*).



The Crested Bellbird.
Photo by Martin Thompson



The Tree Stem Trapdoor Spider (*Aganippe castellum*) makes its nest from Sheoak needles. Photo by Mick Davis/WWF and illustration by Brad Durrant/CALM.

1.3 Remnant Vegetation Cover

Only 15.2 per cent of the original native vegetation remains in the Shire of Nungarin. This is higher than most of the other NEWROC Shires but this can be depleted if positive steps are not taken to manage this priceless resource.

Shire	% Vegetation Cover Remaining
Nungarin	15.2%
Mukinbudin	14.0%
Westonia	21.5%
Wyalkatchem	4.9%
Trayning	8.4%
Koorda	8.1%
Mt Marshall	10.6%

Table 1. Remnant vegetation in agricultural areas of the NEWROC Shires (Shepherd, Beeston and Hopkins, 2001).

The continued presence of the flora and fauna living in these fragmented remnants is dependant on the connectivity throughout the landscape because it his enables access to habitat and food resources essential for sustainability of species and the overall biodiversity of the region. In many situations remnant native vegetation in transport corridors is of vital importance as it provides the only continuous link throughout the landscape.

The Beard system of vegetation classification suggests 16 broad vegetation associations within the Shire of Nungarin and these are indicated in Table 2. It should be noted that these associations are indicative of the Shire *per se* and not specifically representative of roadside remnants.

National Objectives and Targets for Biodiversity Conservation 2001-2005 (Environment Australia, 2001) note 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 9 vegetation associations below the 30% target of vegetation coverage and 2 with less than 10% remaining in the Shire of Nungarin, 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).

Description	% Remaining
Medium woodland; salmon gum and gimlet	54.5
Bare areas; salt lakes	89.8
Bare areas; rock outcrops	79.1
Shrublands; <i>Acacia neurophylla</i> thicket	21.5
Shrublands; <i>Acacia neurophylla</i> , <i>A. beauverdina</i> & <i>A. resinomarginea</i> thicket	70.4
Medium Woodland;salmon gum and morrel	53.6
Shrublands; <i>Allocasuarina campestris</i> thicket	24.2
Succulent steppe with woodland and thicket; York gum over <i>Melaleuca thyoides</i> and samphire	37.0
Medium woodland; York gum, wandoo and salmon gum (<i>Eucalyptus samonophloia</i>)	5.5
Medium woodland; wandoo, York gum, salmon gum, morel and gimlet	3.1
Shrublands; <i>Melaleuca uncinata</i> thicket with scattered York gum	15.9
Shrublands; York gum and <i>Eucalyptus sheathiana</i> mallee scrub	10.7
Shrublands; thicket, <i>acacia</i> and <i>Allocasuarina campestris</i>	14.6
Mosaic: Shrublands; Medium woodland; salmon gum and gimlet / York gum and <i>Eucalyptus sheathiana</i> mallee scrub	14.3
Mosaic: Medium sparse woodland; salmon gum and yorrell / Succulent steppe; saltbush and samphire	29.0
Shrublands; <i>acacia</i> , <i>casuarina</i> and <i>melaleuca</i> thicket	60.6

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

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. This results in a mosaic of man-made biogeographical islands of small native vegetation remnants which are severely disadvantaged by becoming isolated within a typically unreliable for sustaining wildlife due to paucity of food resources, increased disease and reduced genetic diversity caused by a diminishing gene pool. However, the presence of native vegetation along roadsides often fulfils an important role in alleviating this isolation effect by providing connectivity between bush remnants.

Typically, high quality remnant vegetation is a diverse mix of trees, shrubs and ground covers (creepers, grasses and herbs) but there is an erroneous notion that just an over storey of trees is 'good enough'. Native vegetation generally requires less maintenance if left undisturbed and is less flammable than exotic species of grasses.

Other important values of transport corridor remnants are that they:

- are often the only remaining example of original vegetation within extensively cleared areas;
 - often contain rare and endangered plants and animals. Currently, roadside plants represent more than 80 per cent of the known populations of DRF and three species are known only to exist in roadside populations;
 - provide the basis for our important wildflower tourism industry. The aesthetic appeal of well-maintained roadsides should not be overlooked, and they have the potential to improve local tourism and provide a sense of place;
 - often contain sites of Aboriginal /European 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*; and
 - provide a valuable source of seed for regeneration projects. This is especially pertinent to shrub species, as clearing and grazing beneath farm trees often removes this layer;
- 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 provide important links to other remnants thus ensuring connectivity.

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
- *Heritage of WA Act* 1990
- *Land Act* 1933
- *Local Government Act* 1995
- *Main Roads Act* 1930
- *Mining Act* 1978
- *Soil and Land Conservation Act* 1945
- *State Energy Commission Supply Act* 1979
- *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 *Environmental Protection Act* 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 from the Department of Environment 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 NUNGARIN

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 to collect native plant material from roadsides, following Shire approval. It is suggested the seed collection policy of the RCC is referred to prior to any approval being given, refer to Appendix 7.

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.

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*, and these are available from the RCC.



Although presently there are no Flora Roads designated within the Shire of Nungarin, 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 also alerting all that work in the roadside environment that the marked section of roadside requires due care to protect the values present.

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

Roadsides determined as having high conservation value in the Shire of Nungarin include:

- Bandee North Rd;
- Beurteaux Rd;
- Caridi Rd;
- Chandler Rd;
- Cornish Rd;
- Dead Horse Hill Rd;
- Elabbin East Rd;
- English Rd;
- Evans Rd;
- Herbert Rd;
- Karomin Rd;
- Knungajin East Rd;
- Knungajin Merredin Rd;
- Kwelkan North Rd;
- McGinn Rd;
- Nangeenan North Rd;
- Nukarni West Rd;
- Quanta Cutting Weira Rd;
- Sainsbury Rd;
- Stock Rd;
- Talgomine Reserve Rd; and
- Virgin Rd.

Tourism

Attractive roadside drives are an important focus 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).



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

Photo by CALM

4.3 Weeds

Weeds are generally disturbance opportunists and as such the road verge often provides a vacant niche easily colonised. Their establishment can impinge on the sustainability of existing native plants, increase flammability of the vegetation and interfere with the engineering structure of the road. The WA Herbarium records 15 weed species in the Shire of Nungarin, see Appendix 4.

Throughout the roadside survey, six targeted weed species, i.e. Paterson's Curse, Wild Oats, Capeweed, Pimpernel, Barley Grass and Skeleton weed were recorded, and their locations mapped. Roadside weed populations can be observed in the weed overlays provided with the Shire of Nungarin Roadside Conservation Value map (2003). Figure 11 also provides an indication of the extent of the roadside weed infestation based on species.

The Roadside Conservation Value map and weed overlays will assist the Shire in coordinating strategic weed control projects, with the highest priority to protect and preserve the high conservation value roadsides, and working towards rehabilitating those with a lower conservation value.

African lovegrass (*Eragrostis curvula*) is an invasive roadside weed worth noting, as it greatly increases the cost of road maintenance, and is present in the Shire of Nungarin. African lovegrass tends to grow on the edge of the bitumen, and slowly breaks it up by root penetration thereby allowing moisture to penetrate the road substrate resulting in premature failure. Also, grading costs of shoulders are increased because African lovegrass 'bunches'

under the grader blade thereby requiring extra runs to remove it. Also it is difficult to remove without damaging the bitumen running surface.



Roadside infestation of African lovegrass

Photo by B.M. Hussey



Wild Oats; *Avena fatua*

Photo by J. Dodd



Paterson's Curse; *Echium plantagineum*

Photo by R. Knox and J. Dodd

5.0 ROADSIDE SURVEYS

The majority (476.2 km) of the Shire of Nungarin's 639.2 km of roadsides were assessed for their conservation status and mapped. Fieldwork was carried out throughout the months of September, October and November in 2003. The enthusiastic efforts of the roadside surveyor, Community Landcare Coordinator Tammie Spackman 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:

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

Each of these 6 attributes was given a score ranging from 0 to 2 points. Their combined scores provided a conservation value 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:

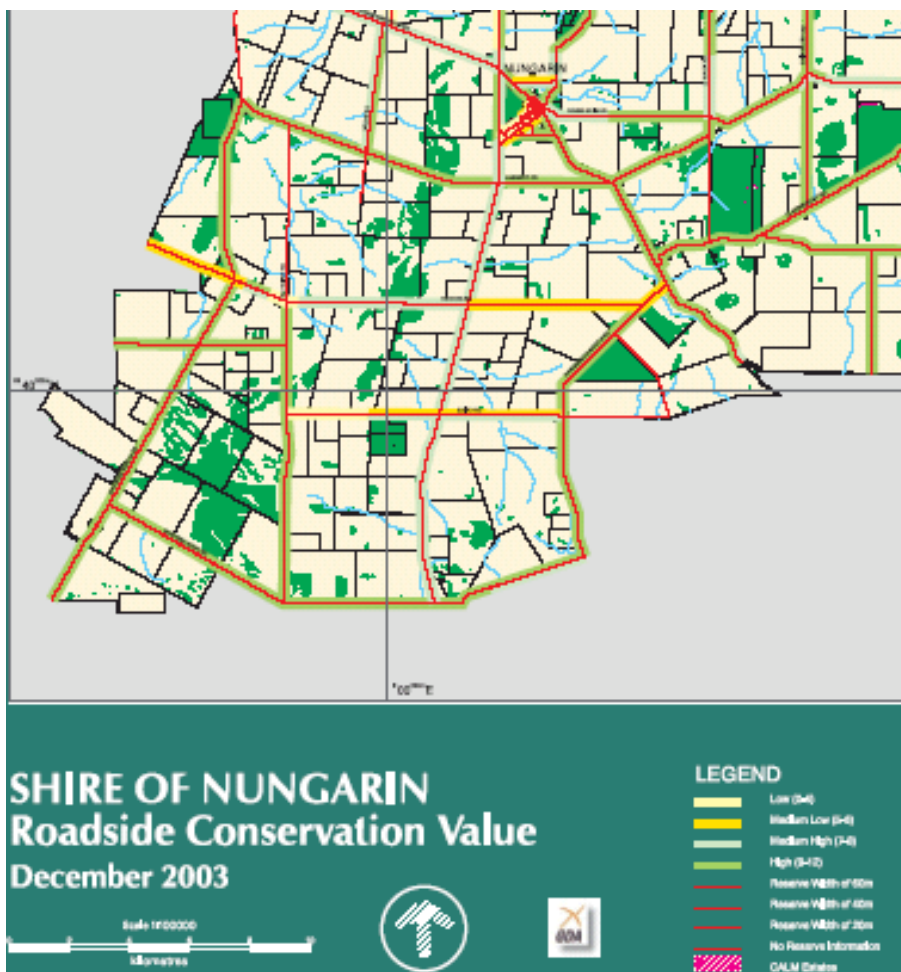
- width of road reserve;
- width of vegetated roadside;
- presence of utilities/disturbances;
- general comments.

It is felt that the recording of these attributes will provide 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 Nungarin. 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 of Nungarin. 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 Conservation and Land Management, Main Roads WA and the Department of Agriculture was used in the 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 RCV map depicts roadside conservation values in the Shire of Nungarin.

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:

- 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;
- regional or district fire management plans;
- 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 survey data and map can be used in developing regional or district fire management plans

Photo by CALM

7.0 RESULTS

A summary of the general roadside conditions in the Shire of Nungarin is presented in Table 4. The 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 Information: Shire of Nungarin 2003					
Length of roadsides surveyed: 952.5 km					
<u>Conservation Status</u>			<u>Native Vegetation on Roadsides</u>		
	Total (km)	%		Total (km)	%
High	619.9	65.1	2-3 vegetation layers	898.0	94.3
Medium-high	221.5	23.2	1 vegetation layer	52.3	5.5
Medium-low	55.9	5.8	0 vegetation layers	2.2	0.2
Low	55.2	5.9	Total	952.5	100.0
Total	952.5	100.0			
<u>Number of Different Native Species</u>			<u>Extent of Native Vegetation</u>		
	Total (km)	%		Total (km)	%
Over 20	554.4	58.2	Over 80%	265.0	27.8
6 to 19	324.9	34.1	20% to 80%	574.7	60.3
0 to 5	73.1	7.7	Less than 20%	112.9	11.9
Total	952.5	100.0	Total	952.5	100.0
<u>Predominant Adjoining Land use</u>			<u>Value as a Biological Corridor</u>		
	Total (km)	%		Total (km)	%
Completely Cleared	782.3	82.1	High	750.9	78.8
Drain	22.7	2.4	Medium	112.8	11.8
Urban/Industrial	11.5	1.2	Low	88.8	9.3
Railway	2.9	0.3	Total	952.5	99.9
Scattered vegetation	17.6	1.8			
Uncleared	115.5	12.1			
Total	952.5	99.9			
			<u>Weed Infestation</u>		
				Total (km)	%
			Light	277.0	29.1
			Medium	350.6	36.8
			Heavy	325.0	34.1
			Total	952.5	100.0

Data was collected in Nungarin Shire throughout September, October and November 2003

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

The 'width of road reserve' attribute indicated the total width of the road reserve, including the running surface, shoulder, drains, batter and the road verge, i.e. from 'fence to fence'. Of the 952.5km of roadsides surveyed in 2003, the width of 15.7% of road reserves was unknown, which is common when a road passes through unfenced

land, such as Nature Reserves. Approximately 28%, or 134.9km, of the roads surveyed measured 40m in width and 55.9%, or 266.4km, were 20m in width.

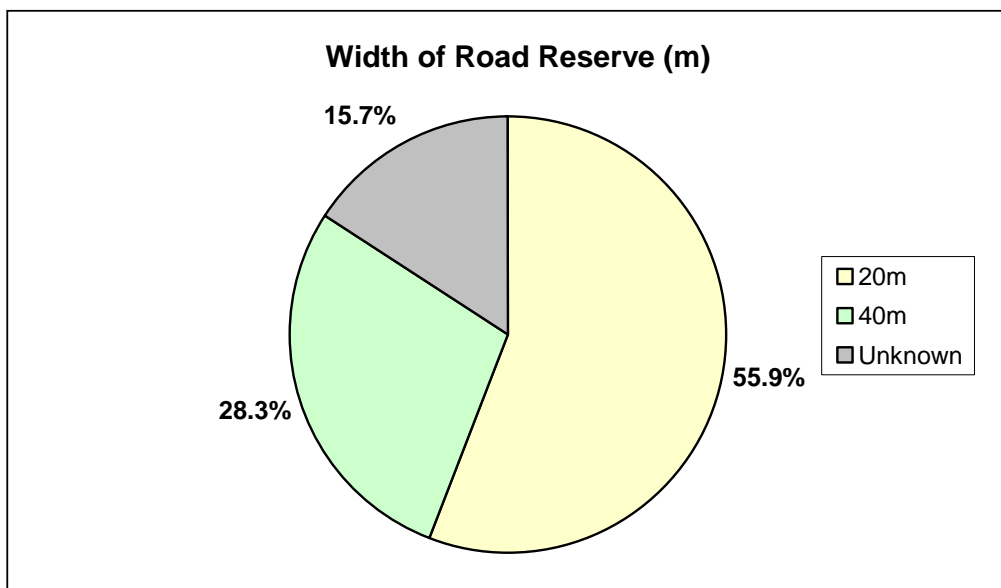


Figure 2- Width of Road Reserves in the Shire of Nungarin (2003).

The 'width of vegetated roadside' value provided an insight into the width of the vegetation occurring within roadsides in the Shire of Nungarin. Roadsides where the vegetation width was greater than 20m covered 0.77% (7.4km) of the Shire. 22.8% (217.3km) of roadsides supported vegetation between 5-20m in width, and 70.7% (673.8km) of roadsides contained native vegetation between 1-5m in width. The width of vegetation was unknown for 5.7% (54.1km), which is common when a road passes through unfenced land, such as Nature Reserves.

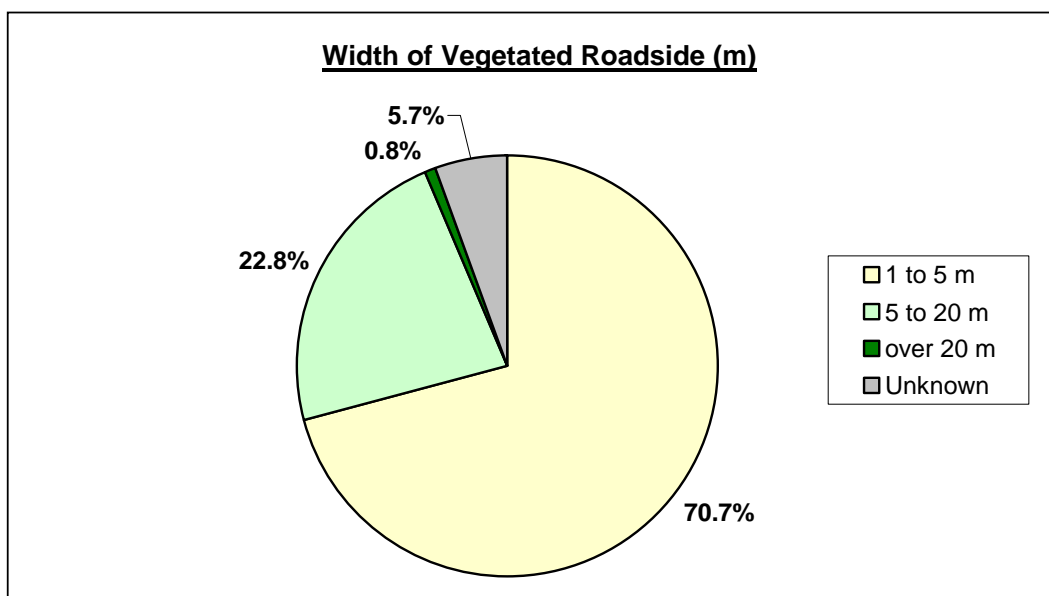


Figure 3- Width of vegetated roadsides in the Shire of Nungarin (2003).

Roadside sections of high conservation value covered 65.1% of the length of roadsides surveyed (619.9 km). Medium-high conservation value roadsides accounted for 23.3% of the total surveyed (221.5 km), medium-low conservation roadside covered 5.9% of the total surveyed (55.9 km). Roadsides of low conservation value occupied 5.8% of the roadsides surveyed (55.2 km), Table 4, Figure 4.

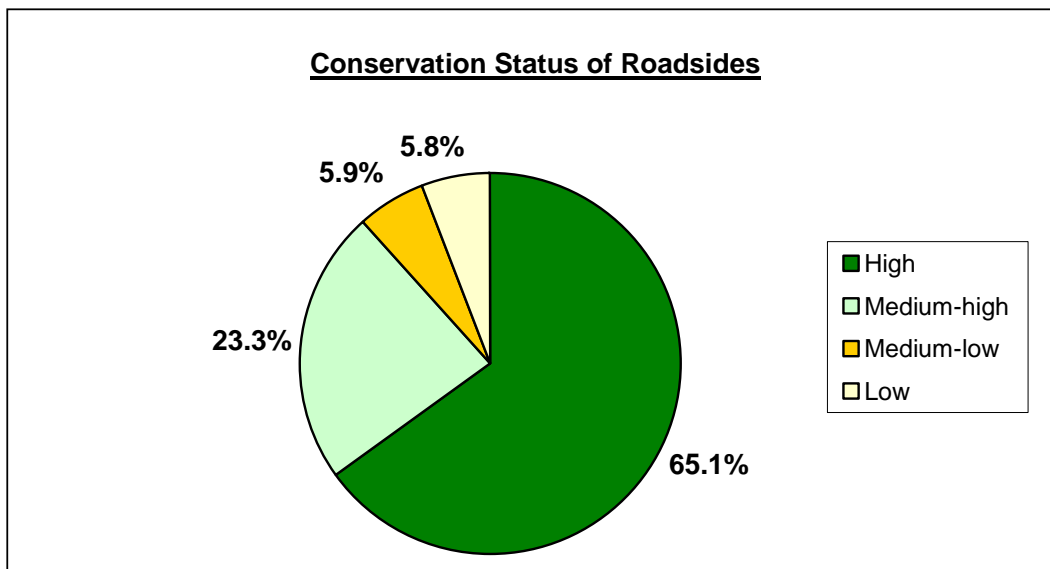


Figure 4 – Conservation status of roadsides in the Shire of Nungarin in 2003.

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 94.3% of roadsides (898.0 km). 5.5% had only one layer (52.3 km) and 0.2% had no layers of native vegetation (2.2 km), Table 4, Figure 5.

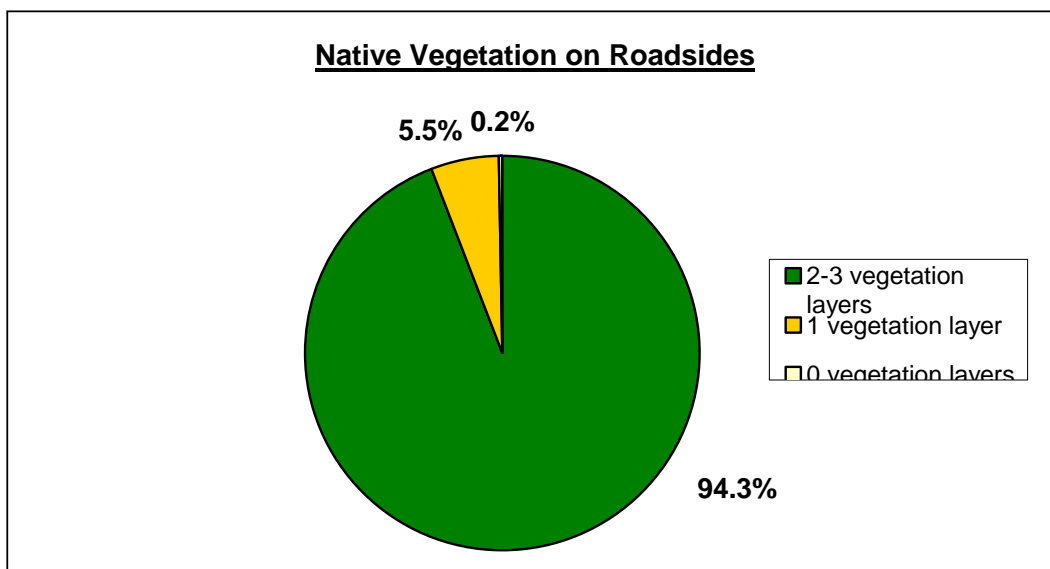


Figure 5– Native vegetation on roadsides in the Shire of Nungarin in 2003.

Roadsides with extensive vegetation cover, i.e. greater than 80%, occurred along 27.8% of the roadsides surveyed (265.0 km). Survey sections with 20% to 80% vegetation cover accounted for 60.3% of the roadsides (574.7 km). The remaining 11.8% had less than 20% native vegetation (112.9 km), and therefore, a low 'extent of native vegetation' value, see Table 4, Figure 6.

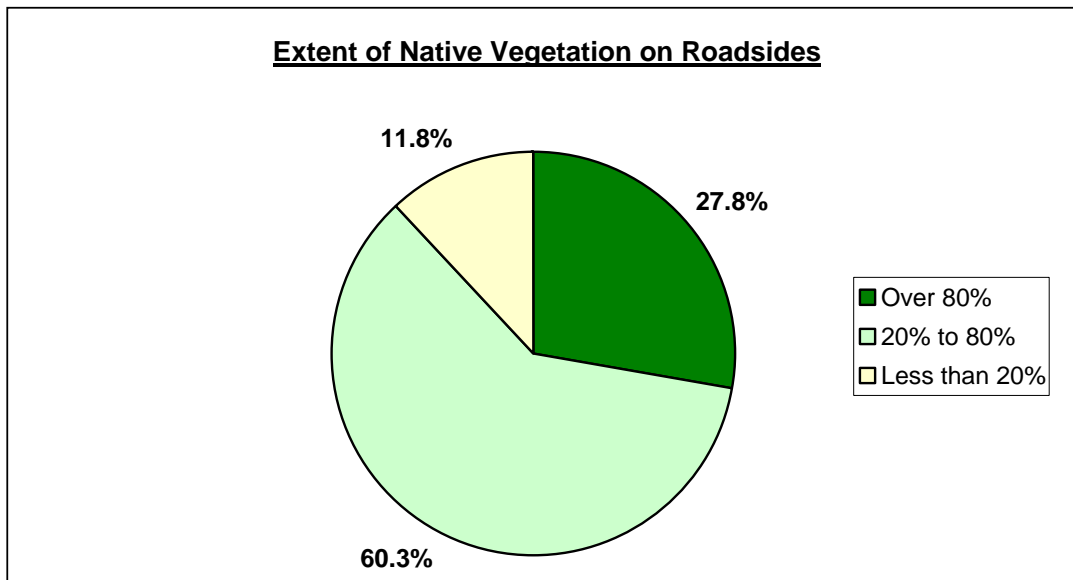


Figure 6 – Extent of native vegetation along roadsides in the Shire of Nungarin (2003).

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 554.4 km (58.2%) of the roadside. Roadside sections with 6 to 19 plant species accounted for 324.9 km (34.1%) of the roadside. The remaining 73.1 km (7.7%) contained less than 5 plant species, see Table 4, Figure 7.

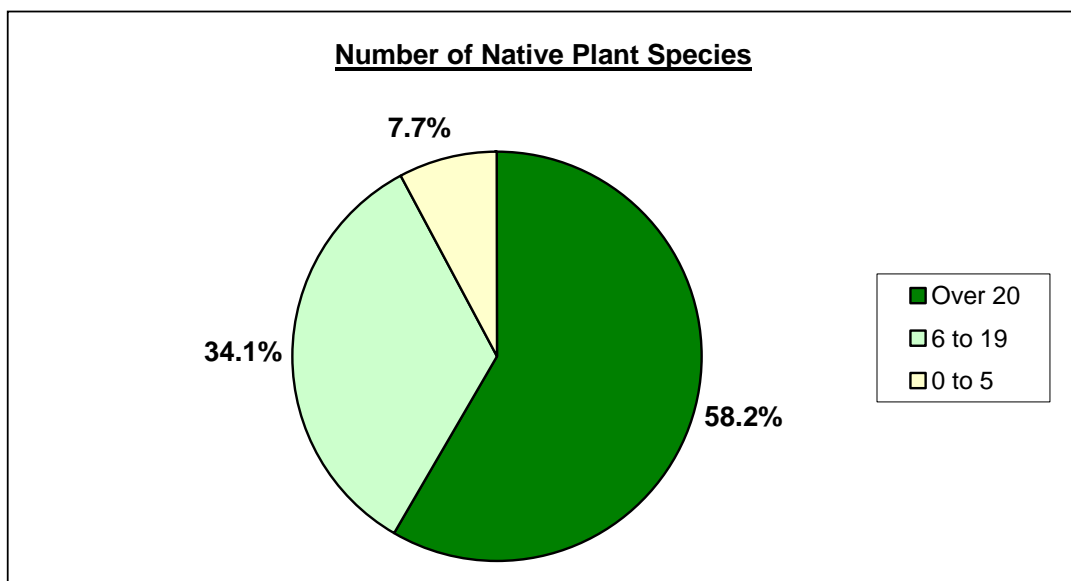


Figure 7 – Number of native plant species within roadsides in the Shire of Nungarin.

Roadsides determined to have high value as biological corridors (as determined by the roadside surveyors) were present along 78.8% (750.9 km) of the roadside, medium value made up 11.8% (112.8 km), and roadsides with low value as a biological corridor occurred along 9.3% (88.8 km) of the roadsides surveyed, see Table 4, Figure 8.

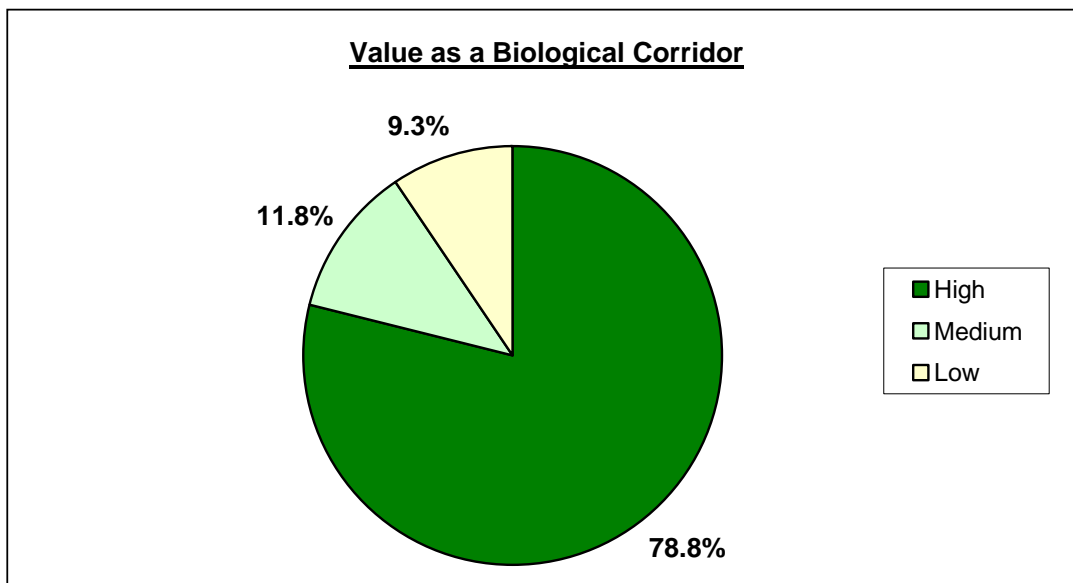


Figure 8 – Value as a biological corridor.

Light levels of weed infestation were observed on 29.1% (277.0 km) of the roadsides surveyed, medium level weed infestation occurred on 36.8% (350.6 km) of the roadsides and 34.1% (325.0 km) were heavily infested with weeds, see Table 4, Figure 9.

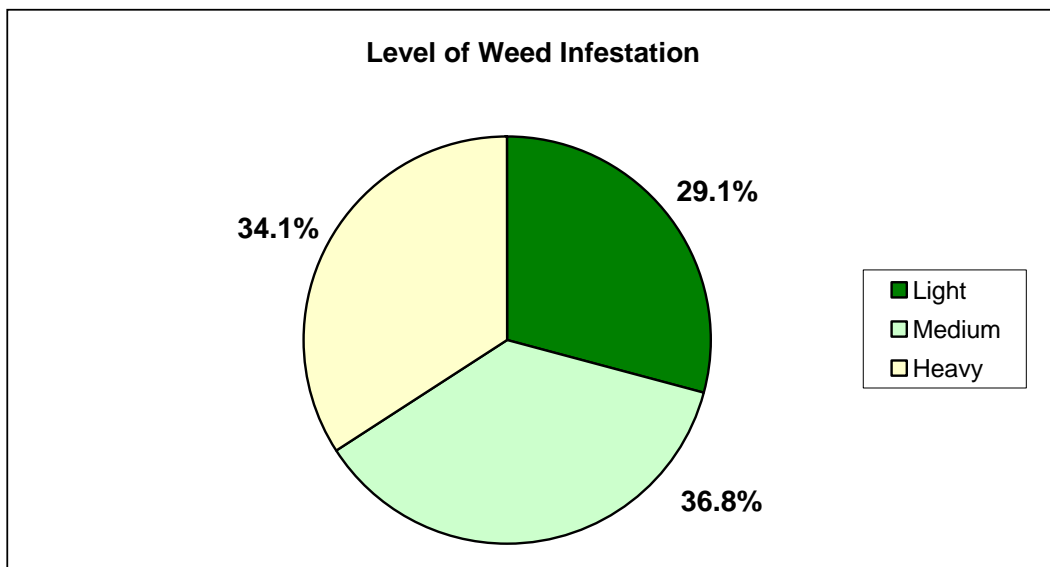


Figure 9 – Weed infestation. Light weed infestation = weeds less than 20% of total plants, Medium weed infestation = weeds 20 to 80% of the total plants, Heavy infestation = weeds more than 80% of the total plants.

Uncleared native vegetation was present on 12.1% (115.5km) of the land adjoining roadsides, whilst 82.1% (782.3 km) of roadsides surveyed were adjoined by land that had been completely cleared for agriculture. 1.8% (17.6 km) of the roadsides surveyed were bordered by land that was cleared for agriculture, but contained a scattered distribution of native vegetation. Drains were the predominant adjoining landuse for 2.4% (22.7 km) of the roadsides surveyed, urban/industrial landuses adjoined 1.2% (11.5 km), and railway reserves adjoined 0.3% (2.9 km) of the roadsides surveyed, see Table 4, Figure 10.

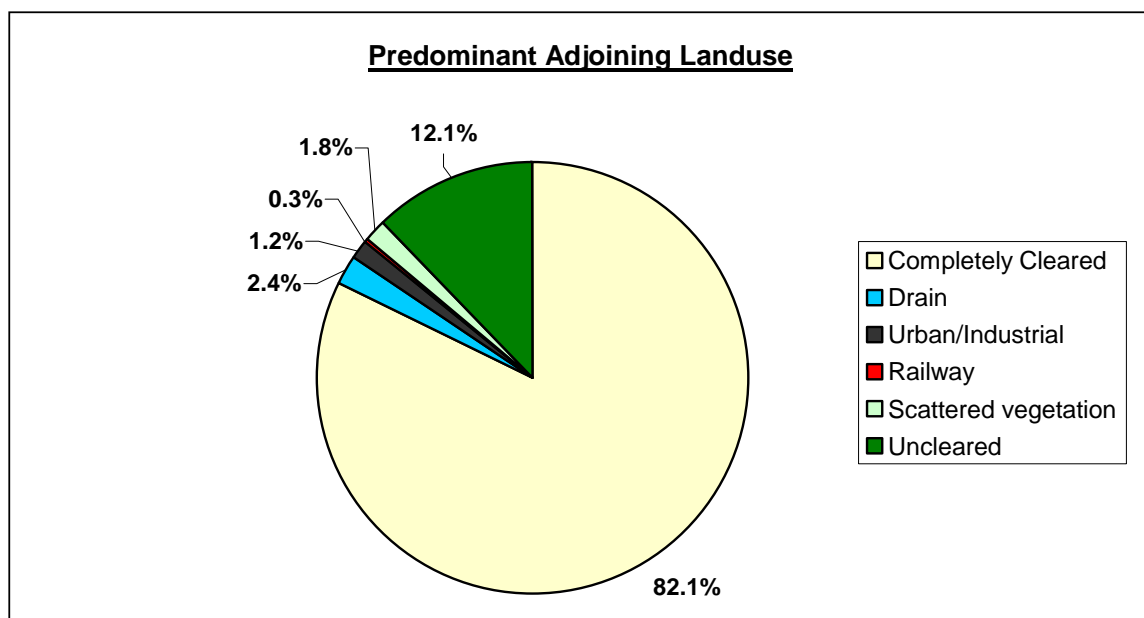


Figure 10 – Predominant adjoining land use.

The following nominated weeds are depicted on clear overlays accompanying the 2003 RCV map:

- Cape weed (*Arctotheca calendula*);
- Wild oat (*Avena fatua*);
- Barley grass (*Hordeum spp.*);
- Skeleton weed (*Chondrilla juncea*).
- Paterson's curse (*Echium plantagineum*);
- Pimpernel (*Anagallis spp.*);

Wild Mustard was the most frequently recorded weed under the category 'Other weeds', and therefore, is also represented in Figure 11 with the other nominated weeds observed along roadsides in the Shire. 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.

Of the 6 nominated weeds surveyed throughout 2003, Wild oats were the most highly recorded weed category, occurring along 1,004 km of roadsides. Cape weed was

present along 720.7 km of the roadsides surveyed, whilst Paterson's curse was recorded along 568.9 km of roadside. Barley grass was the next most commonly recorded weed, occurring along 338.4 km, Mustard was present along 75.5 km, Skeleton weed 32.2 km, and Pimpernel 28 km of roadside, see Figure 11.

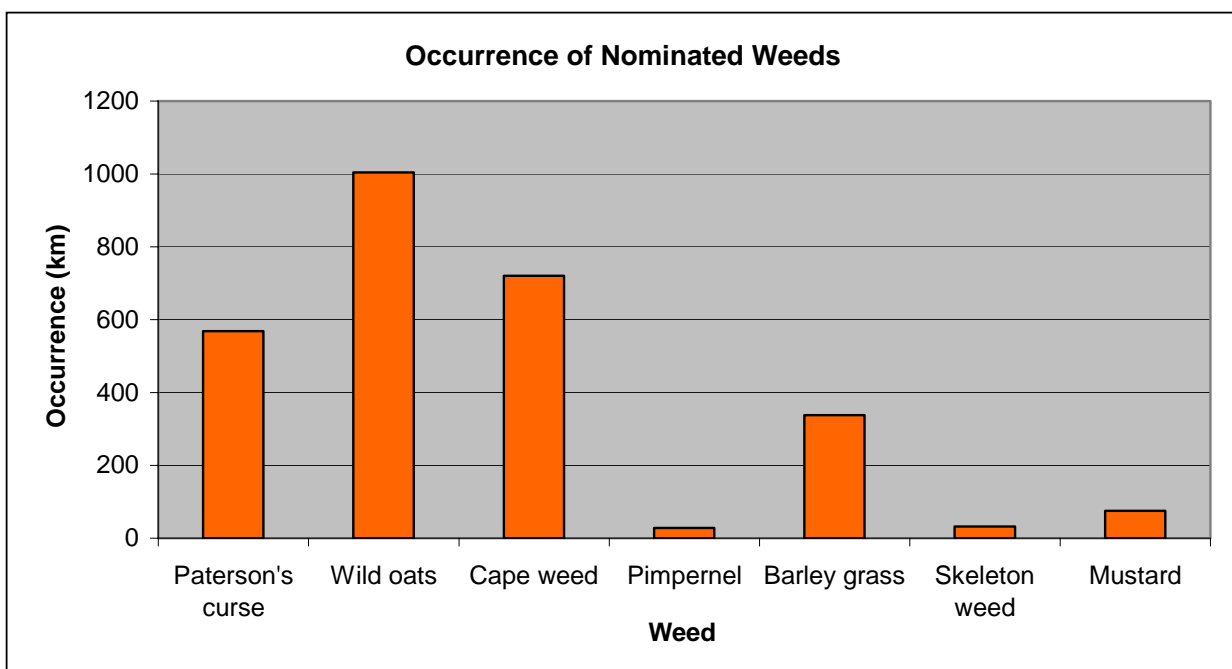






Figure 11 – Occurrence of nominated weeds along roadsides in the Shire of Nungarin



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 general management recommendations that will assist in retaining and enhancing roadside conservation value.

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

Low Conservation Value Roadside		
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;
- Apply the Fire Threat Assessment (Roadside Manual) before burning roadside vegetation;
- Use methods other than fuel reduction burns to reduce fire threat; if roadside burning must be undertaken, incorporate it into a district fire management program;
- Encourage adjacent landholders to set back fences to allow roadside vegetation to proliferate;

- Encourage adjacent landholders to plant windbreaks or farm tree lots adjacent to roadside vegetation to create a denser windbreak or shelterbelt;
- Encourage revegetation projects by adjacent landholders.

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. The following RCC publications provide guidelines and management recommendations that will assist Local Government Authorities:

- *RCC Roadside Manual*,
- *The Roadside Handbook*, and
- *Guidelines for Managing Special Environmental Areas in Transport Corridors*.

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:

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

Special Environmental Areas can be delineated by the use of site markers. See the RCC publication *Guidelines for Managing Special Environmental Areas in Transport Corridors* and Figure 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.

Roadside SEA markers are highly visible.

Photo by K. Jackson

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 work commencing on any particular road. This will 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.

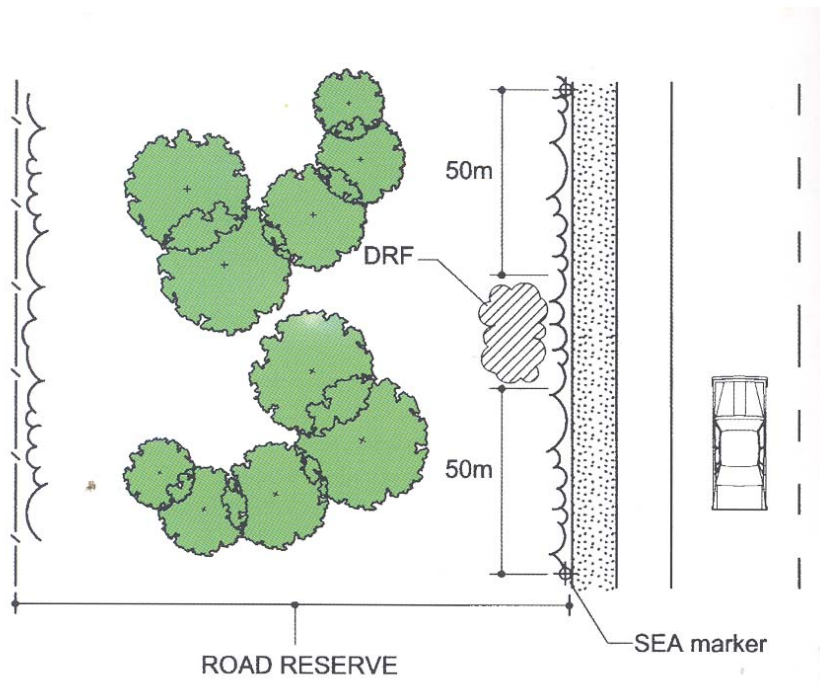


Figure 12 - Marking Special Environmental Area (SEA) sites in the field. In this case, a declared rare flora (DRF) site has been marked.

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.

8.3 Planning

The RCC is able to provide comprehensive 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;
- 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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- Shepherd, D. P., Beeston, G.R. and Hopkins, A. J. M. (2001). Native Vegetation in Western Australia. Technical Report 249. Department of Agriculture, Western Australia, South Perth
- Western Australian Museum (2004) Fauna Base, <http://www.museum.wa.gov.au/faunabase/prod/index.htm>

Appendix

1

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).
- * 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.
- * Narrow corridors of vegetation (usually along roads and railway lines or windbreaks), which are more likely to be affected by edge effects.

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

- * No understorey
- * Parkland cleared i.e. scattered single trees.
- * No significant signs or chance of regeneration.

Appendix

2

Appendix

3

Road #	Section #	Road Name	From	To	Length of section (km)	Native vegetation		Extent of native vegetation		Number of Species		Value as Corridor		Weeds		Adjoining Landuse		Conservation Value Score (0-12)	
						Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right
4220001	1	NUNGARIN NORTH RD	0.00	2.50	2.50	2	2	1	0	1	1	2	2	2	2	C	U	10	7
4220001	2	NUNGARIN NORTH RD	2.50	4.00	1.50	2	2	0	1	1	1	0	0	2	2	C	C	7	8
4220001	3	NUNGARIN NORTH RD	4.00	7.60	3.60	1	2	0	1	0	1	0	2	0	2	S	S	2	9
4220001	4	NUNGARIN NORTH RD	7.60	9.10	1.50	0	2	0	0	0	1	0	1	0	0	S	S	1	5
4220001	5	NUNGARIN NORTH RD	9.10	22.75	13.65	2	1	1	0	1	0	2	1	1	0	C	C	9	4
4220002	1	DANBERRIN RD	0.20	1.70	1.50	1	1	0	0	1	1	2	0	2	2	I	I	6	4
4220002	2	DANBERRIN RD	1.70	17.30	15.60	2	2	1	1	1	1	2	2	0	0	C	C	8	8
4220003	1	CHANDLER RD	0.00	0.60	0.60	2	2	1	1	2	2	2	2	1	1	U	U	8	8
4220003	2	CHANDLER RD	0.60	2.30	1.70	2	2	0	0	2	2	2	2	0	0	C	C	8	8
4220003	3	CHANDLER RD	2.30	9.20	6.90	2	2	1	1	2	2	2	2	1	1	C	C	10	10
4220003	4	CHANDLER RD	9.20	10.40	1.20	2	2	2	1	2	2	2	1	2	0	U	C	10	8
4220003	5	CHANDLER RD	10.40	14.10	3.70	2	2	1	1	1	1	0	0	1	1	C	C	7	7
4220003	6	CHANDLER RD	14.10	15.00	0.90	2	2	2	2	2	2	0	0	2	2	U	U	8	8
4220003	7	CHANDLER RD	15.00	18.00	3.00	2	2	2	2	2	2	2	2	2	2	C	C	12	12
4220003	8	CHANDLER RD	18.00	19.40	1.40	2	2	2	2	2	2	1	2	2	2	C	U	11	10
4220003	9	CHANDLER RD	19.40	20.10	0.70	2	2	2	2	2	2	2	2	1	1	C	C	11	11
4220003	10	CHANDLER RD	20.10	26.60	6.50	2	2	2	2	2	2	2	2	2	2	U	U	10	10
4220003	11	CHANDLER RD	26.60	29.40	2.80	1	1	0	0	1	1	2	2	0	0	C	C	6	6
4220003	12	CHANDLER RD	29.40	35.42	6.02	2	2	1	1	2	2	2	2	1	1	C	C	10	10
4220004	1	KNUNGAJIN RD	0.00	1.10	1.10	2	2	2	2	2	2	2	2	2	2	S	U	11	10
4220004	2	KNUNGAJIN RD	1.10	2.00	0.90	2	2	1	1	1	1	1	1	0	0	C	C	7	7
4220004	3	KNUNGAJIN RD	2.00	4.80	2.80	2	2	2	2	1	1	2	1	2	2	U	C	9	10
4220004	4	KNUNGAJIN RD	4.80	8.60	3.80	2	2	1	1	2	2	2	2	1	1	C	C	10	10
4220004	5	KNUNGAJIN RD	8.60	10.80	2.20	2	2	0	0	0	0	0	0	0	0	C	C	4	4
4220004	6	KNUNGAJIN RD	10.80	11.70	0.90	2	2	1	2	1	1	1	1	1	2	C	C	8	10
4220004	7	KNUNGAJIN RD	11.70	15.20	3.50	2	2	1	1	1	1	1	1	1	1	C	C	8	8
4220005	1	CHANDLER MERREDIN RD	0.00	4.47	4.47	2	2	2	2	2	2	2	2	2	2	U	U	10	10
4220006	1	BURRACOPPIN CAMPION RD	0.00	13.00	15.58	2	2	1	1	1	1	2	2	0	0	C	C	8	8
4220007	1	BANDEE NORTH RD	0.00	1.60	1.60	2	2	2	2	2	2	2	2	2	2	U	U	10	10
4220007	2	BANDEE NORTH RD	1.60	5.80	4.20	2	2	2	2	2	2	2	2	2	2	U	C	10	12
4220007	3	BANDEE NORTH RD	5.80	11.00	5.20	2	2	2	2	1	1	2	2	2	2	C	C	11	11
4220007	4	BANDEE NORTH RD	11.00	13.60	2.60	2	2	1	1	1	1	2	2	2	2	C	C	10	10
4220007	5	BANDEE NORTH RD	13.60	15.50	1.90	2	2	2	2	2	2	2	2	2	2	S	U	11	10
4220007	6	BANDEE NORTH RD	15.50	18.30	2.80	2	2	2	2	2	2	2	2	2	2	C	C	12	12
4220008	1	HODGES RD	0.00	6.95	6.95	2	2	1	1	1	1	0	0	0	0	C	C	6	6
4220008	2	HODGES RD	6.95	9.75	2.80	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 Nungarin and roadside management guidelines

Road #	Section #	Road Name	From	To	Length of section (km)	Native vegetation		Extent of native vegetation		Number of Species		Value as Corridor		Weeds		Adjoining Landuse		Conservation Value Score (0-12)	
4220008	3	HODGES RD	9.75	12.55	2.80	2	2	1	1	1	1	1	1	1	1	C	C	8	8
4220008	4	HODGES RD	12.55	13.55	1.00	2	1	0	0	0	0	0	0	0	0	C	C	4	3
4220008	5	HODGES RD	13.55	14.45	0.90	2	2	1	1	1	1	1	1	2	2	S	C	8	9
4220008	6	HODGES RD	14.45	17.15	2.70	2	2	1	1	0	0	0	0	1	1	C	C	6	6
4220008	7	HODGES RD	17.15	17.95	0.80	1	1	0	0	1	1	0	0	2	2	C	C	6	6
4220009	1	NUKARNI WEST RD	0.00	3.30	3.30	2	2	1	1	1	1	1	2	1	1	C	C	8	9
4220009	2	NUKARNI WEST RD	3.30	10.33	7.03	2	2	1	1	2	2	2	2	0	0	C	C	9	9
4220009	3	NUKARNI WEST RD	10.33	16.93	6.60	2	2	1	1	2	2	2	2	1	1	C	C	10	10
4220010	1	KAROMIN RD	0.00	5.30	5.30	2	2	2	2	2	2	1	1	2	2	C	C	11	11
4220010	2	KAROMIN RD	5.30	6.90	1.60	2	2	1	1	1	1	1	1	0	0	C	C	7	7
4220010	3	KAROMIN RD	6.90	11.60	4.70	2	2	1	1	1	1	2	2	1	1	C	C	9	9
4220011	1	CORNISH RD	0.00	2.30	2.30	2	2	1	1	2	2	2	2	1	1	C	C	10	10
4220011	2	CORNISH RD	2.30	4.40	2.10	2	2	2	2	1	1	2	2	2	2	U	U	9	9
4220011	3	CORNISH RD	4.40	10.80	6.40	2	2	1	1	2	2	2	2	2	2	C	C	11	11
4220011	4	CORNISH RD	10.80	12.40	1.60	2	2	1	1	2	2	2	2	1	2	C	U	10	9
4220011	5	CORNISH RD	12.40	16.50	4.10	2	2	1	1	2	2	2	2	1	1	C	C	10	10
4220012	1	LAKE BROWN STH RD	0.00	3.00	3.00	2	2	0	0	0	0	2	2	0	0	C	C	6	6
4220012	2	LAKE BROWN STH RD	3.00	10.70	7.70	2	2	1	1	1	1	2	2	0	0	C	C	8	8
4220012	3	LAKE BROWN STH RD	10.70	13.90	3.20	2	2	2	2	2	2	2	2	2	2	U	U	10	10
4220013	1	KNUNGAJIN MERREDIN RD	0.00	9.20	9.20	2	2	1	1	2	2	2	2	1	1	C	C	10	10
4220014	1	ELABBIN EAST RD	0.00	2.22	2.22	2	2	0	1	2	2	2	2	2	1	C	C	10	10
4220014	2	ELABBIN EAST RD	2.22	3.92	1.70	2	2	2	2	2	2	2	2	2	2	U	U	10	10
4220014	3	ELABBIN EAST RD	3.92	6.52	2.60	2	2	2	2	2	2	2	2	2	2	C	C	12	12
4220014	4	ELABBIN EAST RD	6.52	10.62	4.10	2	2	2	2	2	2	2	2	2	2	U	C	10	12
4220015	1	KNUNGAJIN EAST RD	0.00	1.70	1.70	2	2	0	0	2	2	2	2	2	2	C	U	10	8
4220015	2	KNUNGAJIN EAST RD	1.70	2.20	0.50	2	2	1	1	1	1	2	2	0	0	C	C	8	8
4220015	3	KNUNGAJIN EAST RD	2.20	2.90	0.70	2	2	2	1	2	1	2	1	2	0	U	C	10	7
4220015	4	KNUNGAJIN EAST RD	2.90	4.89	1.99	2	2	1	1	2	2	2	2	1	1	C	C	10	10
4220015	5	KNUNGAJIN EAST RD	4.89	9.09	4.20	2	2	1	1	2	2	2	2	0	0	C	C	9	9
4220016	1	HERBERT RD	4.42	17.12	12.70	2	2	1	1	2	2	2	2	1	1	C	C	10	10
4220016	2	HERBERT RD	17.12	17.52	0.40	2	2	2	2	1	1	2	2	2	2	C	C	11	11
4220017	1	BEURTEAUX RD	0.00	5.91	5.91	2	2	1	1	2	2	2	2	0	0	C	C	9	9
4220018	1	KWELKAN NORTH RD	0.00	1.10	1.10	2	2	2	2	2	2	2	2	2	2	U	U	10	10
4220018	2	KWELKAN NORTH RD	1.10	6.70	5.60	2	2	1	1	2	2	2	2	0	0	C	C	9	9
4220018	3	KWELKAN NORTH RD	9.35	15.45	6.10	2	2	1	1	2	2	2	2	0	0	C	C	9	9
4220020	1	BAIRD RD	0.00	2.70	2.70	1	1	0	0	0	0	0	0	0	0	C	C	3	3
4220020	2	BAIRD RD	2.70	3.90	1.20	2	2	1	2	1	1	1	2	0	1	S	U	6	8

A survey of the roadside conservation values in the Shire of Nungarin and roadside management guidelines

Road #	Section #	Road Name	From	To	Length of section (km)	Native vegetation		Extent of native vegetation		Number of Species		Value as Corridor		Weeds		Adjoining Landuse		Conservation Value Score (0-12)	
4220020	3	BAIRD RD	3.90	9.10	5.20	1	2	1	1	0	1	1	2	0	0	C	C	5	8
4220021	1	MCGINN RD	0.00	10.00	10.00	2	2	1	1	2	2	2	2	0	0	C	C	9	9
4220022	1	NANGEENAN NORTH RD	0.00	9.80	9.80	2	2	2	2	2	2	2	2	2	2	C	C	12	12
4220023	1	MOODILJING RD	0.00	6.31	6.31	2	2	1	1	2	2	2	2	1	1	C	C	10	10
4220023	2	MOODILJING RD	6.31	9.01	2.70	1	1	0	0	0	0	0	0	0	0	C	C	3	3
4220024	1	WILLIAMS RD	0.00	7.78	7.78	2	2	1	1	1	1	1	1	1	1	C	C	8	8
4220024	2	WILLIAMS RD	7.78	8.78	1.00	2	2	2	2	1	1	2	2	2	2	U	U	9	9
4220024	3	WILLIAMS RD	8.78	13.28	4.50	2	2	2	2	2	2	2	2	0	0	C	C	10	10
4220024	4	WILLIAMS RD	13.28	14.48	1.20	2	2	2	2	2	2	2	2	2	2	C	U	12	10
4220025	1	LE VAUX RD	0.00	2.31	2.31	2	2	2	2	2	2	2	2	2	2	C	U	12	10
4220025	2	LE VAUX RD	2.31	4.42	2.11	2	2	0	0	1	1	1	2	1	1	C	C	7	8
4220025	3	LE VAUX RD	4.42	8.53	4.11	2	2	2	2	2	2	2	2	2	2	C	C	12	12
4220026	1	LEES RD	0.00	2.20	2.20	2	2	2	2	2	2	2	2	2	2	U	U	10	10
4220026	2	LEES RD	2.20	3.40	1.20	2	2	2	2	1	1	2	2	2	2	C	C	11	11
4220026	3	LEES RD	3.40	4.20	0.80	2	2	2	2	2	2	2	2	2	2	C	U	12	10
4220027	1	EVANS RD	0.00	5.70	5.70	2	2	1	1	2	2	1	1	1	1	C	C	9	9
4220028	1	CREAGH RD	0.00	5.05	5.05	2	2	0	0	0	0	0	0	0	0	C	C	4	4
4220029	1	PAYNE RD	0.00	4.00	4.00	2	2	1	1	2	2	2	2	0	0	C	C	9	9
4220030	1	VIRGIN RD	0.00	6.60	6.60	2	2	2	2	2	2	2	2	2	2	C	C	12	12
4220031	1	MUHS RD	1.75	5.95	4.20	2	2	0	1	2	2	1	2	0	0	C	C	7	9
4220032	1	CARIDI RD	0.00	4.60	4.60	2	2	2	2	2	2	2	2	1	1	C	C	11	11
4220032	2	CARIDI RD	4.60	6.92	2.32	1	2	1	1	1	1	2	2	0	0	C	C	7	8
4220033	1	SAINSBURY RD	0.00	4.31	4.31	2	2	2	2	2	2	2	2	2	2	C	C	12	12
4220033	2	SAINSBURY RD	4.31	10.91	6.60	2	2	1	1	2	2	2	2	1	1	C	C	10	10
4220033	3	SAINSBURY RD	10.91	11.71	0.80	2	2	1	2	2	2	2	2	1	2	C	U	10	10
4220035	1	JOHNSON RD	0.00	1.35	1.35	2	2	1	1	1	1	1	1	1	1	C	C	8	8
4220035	2	JOHNSON RD	1.35	3.50	2.15	2	2	1	1	0	0	0	0	1	1	C	C	6	6
4220035	3	JOHNSON RD	3.50	5.85	2.35	2	2	2	2	1	1	1	1	2	2	C	C	10	10
4220036	1	STOCK RD	0.00	5.41	5.41	2	2	1	1	1	1	2	2	0	0	C	C	8	8
4220036	2	STOCK RD	5.41	7.41	2.00	2	2	1	1	2	2	2	2	2	2	U	U	9	9
4220036	3	STOCK RD	7.41	14.21	6.80	2	2	1	0	2	2	2	2	1	1	U	C	8	9
4220036	4	STOCK RD	14.21	15.11	0.90	2	2	2	2	2	2	2	2	2	2	U	U	10	10
4220038	1	TALGOMINE RESERVE RD	0.00	4.60	4.60	2	2	2	2	2	2	2	2	1	1	C	C	11	11
4220038	2	TALGOMINE RESERVE RD	4.60	7.72	3.12	2	2	2	2	2	2	2	2	2	2	U	U	10	10
4220039	1	YOUNG RD	2.20	4.70	2.50	2	2	1	1	2	2	2	2	1	1	C	C	10	10
4220040	1	QUANTA CUTTING WEIRA RD	0.00	7.22	7.22	2	2	2	2	2	2	2	2	2	2	C	C	12	12
4220041	1	MITCHELL TERRACE	0.00	1.45	1.45	2	1	0	0	1	1	0	0	1	1	I	I	4	3

A survey of the roadside conservation values in the Shire of Nungarin and roadside management guidelines

Road #	Section #	Road Name	From	To	Length of section (km)	Native vegetation		Extent of native vegetation		Number of Species		Value as Corridor		Weeds		Adjoining Landuse		Conservation Value Score (0-12)	
4220042	1	FIRST AVE	0.00	0.48	0.48	1	1	0	0	0	0	1	1	1	1	I	I	3	3
4220043	1	SECOND AVE	0.00	0.40	0.40	2	1	0	0	1	0	2	2	1	1	I	I	6	4
4220044	1	WATERHOUSE TERRACE	0.00	0.24	0.24	2	2	1	1	1	1	1	1	1	1	I	U	6	6
4220045	1	THIRD AVENUE	0.00	0.50	0.50	2	2	1	1	1	1	2	1	1	1	U	I	7	6
4220046	1	BENNETT RD	0.00	0.40	0.40	2	2	2	2	1	1	2	2	2	1	U	U	9	8
4220047	1	SUBURBAN RD	0.00	1.37	1.37	2	2	2	2	2	2	2	2	2	2	U	C	10	12
4220049	1	OLD HOTEL RD	0.00	1.45	1.45	2	2	1	0	1	0	2	1	0	0	S	C	7	5
4220050	1	JOLLY ST	0.08	0.48	0.40	2	2	0	1	1	2	2	2	0	1	S	S	6	9
4220051	1	RAILWAY AVENUE	0.00	0.68	0.68	0	1	0	0	0	0	1	1	2	2	I	I	3	4
4220052	1	DEAD HORSE HILL RD	0.00	6.60	6.60	2	2	1	1	1	1	2	2	1	1	C	C	9	9
4220052	2	DEAD HORSE HILL RD	6.60	7.67	1.07	2	2	1	2	2	2	2	2	1	2	U	U	8	10
4220053	1	CHANDLER NORTH WEST RD	0.00	3.00	3.00	2	2	1	1	2	2	2	2	1	1	C	C	10	10
4220053	2	CHANDLER NORTH WEST RD	3.00	6.10	3.10	2	2	0	0	1	1	0	1	0	0	C	C	5	6
4220053	3	CHANDLER NORTH WEST RD	6.10	7.56	1.46	2	2	1	1	2	2	2	2	1	1	C	C	10	10
4220054	1	MASTERS RD	0.00	2.40	2.40	2	2	0	0	1	1	2	2	0	0	C	C	7	7
4220058	1	BROWN DRIVE	0.00	0.40	0.40	1	1	0	0	0	0	0	0	2	2	I	I	3	3
4220059	1	DUGDALE STREET	0.00	0.30	0.30	2	2	1	1	2	1	2	1	1	1	U	I	8	6
4220060	1	ENGLISH RD	0.00	7.20	7.20	2	2	2	2	2	2	2	2	0	0	C	C	10	10
4220060	2	ENGLISH RD	7.20	8.80	1.60	2	2	1	1	2	2	2	2	2	2	U	U	9	9
4220061	1	WOODWARD RD	0.00	2.00	2.00	2	2	1	1	1	1	2	2	0	0	C	C	8	8
M016	1	MERREDIN GOOMALLING RD	120.15	130.88	10.73	2	2	1	1	1	1	2	0	1	1	D	C	8	7
M016	2	MERREDIN GOOMALLING RD	130.88	132.28	1.40	2	2	1	2	2	2	2	2	1	1	R	U	9	9
M016	3	MERREDIN GOOMALLING RD	132.28	132.88	0.60	1	1	0	0	0	0	1	1	1	1	R	I	4	3
M016	4	MERREDIN GOOMALLING RD	132.88	133.77	0.89	2	2	2	2	1	1	2	2	2	2	R	U	10	9
M016	5	MERREDIN GOOMALLING RD	133.77	143.57	9.80	2	2	1	1	2	2	2	2	1	1	D	C	9	10
M016	6	MERREDIN GOOMALLING RD	143.57	145.77	2.20	2	2	1	2	1	1	2	2	1	2	D	C	8	11

A survey of the roadside conservation values in the Shire of Nungarin and roadside management guidelines

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APPENDIX 4

Road names and lengths: Shire of Nungarin (source- Main Roads WA)

Road # (MRWA)	Road Name	Road length (km)
4220007	BAANDEE NORTH RD	18.30
4220020	BAIRD RD	12.70
4220046	BENNETT RD	0.40
4220017	BEURTEAUX	5.91
4220058	BROWN DR	0.40
4220006	BURRACOPPIN-CAMPION RD	15.58
4220032	CARIDI RD	6.92
4220053	CHANDLER NORTH WEST RD	7.56
4220003	CHANDLER RD	35.42
4220005	CHANDLER-MERREDIN RD	4.47
4220062	CLEMENT RD	1.00
4220011	CORNISH RD	16.50
4220028	CREAGH RD	5.05
4220002	DANBERRIN RD	17.30
4220052	DEAD HORSE HILL RD	7.67
4220037	DEVLIN RD	7.54
4220059	DUGDALE ST	0.30
4220014	ELABBIN EAST RD	10.62
4220056	ELABBIN-LE VAUX RD	3.40
4220060	ENGLISH RD	9.60
4220027	EVANS RD	10.12
4220042	FIRST AVE	0.48
4220019	GOOMARIN-NUNGARIN RD	6.00
4220016	HERBERT RD	17.52
4220008	HODGES RD	17.95
4220035	JOHNSON RD	5.85
4220050	JOLLY ST	0.48
4220010	KAROMIN RD	11.60
4220015	KNUNGAJIN EAST RD	9.09
4220004	KNUNGAJIN RD	15.20
4220013	KNUNGAJIN-MERREDIN RD	9.20
4220018	KWELKAN NORTH RD	15.45
4220012	LAKE BROWN SOUTH RD	17.60
4220025	LE VAUX RD	8.53
4220026	LEES RD	4.20
4220054	MASTERS RD	4.18
4220021	MC GLINN RD	16.00
4220041	MITCHELL TCE	1.45
4220023	MOODILJING RD	9.01
4220063	MT GREY RD	4.70
4220031	MUHS RD	5.95
4220022	NANGEENAN-NORTH RD	9.80
4220009	NUKARNI WEST RD	16.93
4220001	NUNGARIN NORTH RD	22.75
4220049	OLD HOTEL RD	1.45
4220029	PAYNE RD	4.00
4220040	QUANTA-CUTTING WEIRA RD	7.22
4220048	RAILWAY ACCESS RD	0.76
4220051	RAILWAY AVE	0.68
4220034	ROBERTS RD	3.45
4220033	SAINSBURY RD	11.71

A survey of the roadside conservation values in the Shire of Nungarin and roadside management guidelines

4220043	SECOND AVE	0.40
4220036	STOCK RD	15.11
4220047	SUBURBAN RD	1.37
4220038	TALGOMINE RESERVE RD	7.72
4220045	THIRD AVE	0.50
4220030	VIRGIN RD	6.60
4220044	WATERHOUSE TCE	0.24
4220024	WILLIAMS RD	14.48
4220061	WOODWARD RD	2.00
4220064	WYALKATCHEM-SOUTHERN CROSS RD	9.72
4220039	YOUNG RD	4.70

Appendix

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APPENDIX 5

Native Plant species in the Shire of Nungarin (source- W.A Herbarium)

Note: not a comprehensive list.

* = weed species

Acacia acuaria
Acacia acuminata subsp. *acuminata* ms
Acacia beauverdiana
Acacia chrysella
Acacia colletioides
Acacia coolgardiensis subsp. *coolgardiensis*
Acacia denticulosa R
Acacia dielsii
Acacia erinacea
Acacia fauntleroyi
Acacia graniticola ms
Acacia hemiteles
Acacia heteroneura var. *heteroneura*
Acacia heteroneura var. *jutsonii*
Acacia jennerae
Acacia merrallii
Acacia neurophylla subsp. *erugata*
Acacia neurophylla subsp. *neurophylla*
Acacia obtecta
Acacia prainii
Acacia restiacea
Acacia rigens
Acacia sericocarpa
Acacia sessilispica
Acacia sp.P58(B.R.Maslin 3625)
Acacia steedmanii
Acacia stereophylla var. *stereophylla*
Acacia tratmaniana
Acacia trigonophylla
Acacia verricula
Acacia yorkrakinensis subsp. *acrita*
Actinobole uliginosum
Allocasuarina acutivalvis subsp. *acutivalvis*
Allocasuarina campestris
Allocasuarina corniculata
Amphipogon caricinus
Amyema miquelii
Amyema miraculosa subsp. *boormanii*
Angianthus tomentosus
Anthocercis anisantha subsp. *anisantha*
Anthocercis genistoides
**Arctotheca calendula*
**Argemone ochroleuca* subsp. *ochroleuca*
Argyroglottis turbinata
Arthropodium dyeri
Astroloma epacridis
Astroloma serratifolium
Atriplex nana
Austrodanthonia acerosa
Austrodanthonia caespitosa
**Avena fatua*
Baeckea benthamii ms
Baeckea crispiflora
Baeckea recurva ms
Baeckea tenuiramea
Billardiera lehmanniana
Boronia adamsiana R
Boronia coerulescens subsp. *spinescens*
Boronia ternata
Boronia ternata var. *foliosa*
Boronia ternata var. *ternata*
**Buglossoides arvensis*
Caladenia hirta subsp. *rosea* ms
Caladenia radialis
Caladenia roei
**Callitris glaucophylla*
Calothamnus quadrifidus var. "unsorted"
Calycopeplus paucifolius
Calytrix leschenaultii
Calytrix violacea
Carpobrotus modestus
**Carthamus lanatus*
Cassythia nodiflora
Chamaeberos fimbriata
Chamelaucium brevifolium
Chamelaucium pauciflorum pauciflorum ms
**Chondrilla juncea*
Comesperma integerrimum
Commersonia stowardii
Conostylis argentea
Cryptandra minutifolia subsp. *minutifolia*
Cryptandra myriantha
Cyanicula amplexans ms
Dampiera haematotricha subsp. *dura*
Dampiera haematotricha subsp. *haematotricha*
Dampiera juncea
Dampiera luteiflora
Dampiera scaevolina P1
Dampiera stenostachya
Dampiera wellsiana
Dicrastylis corymbosa
Diplolaena velutina
Dodonaea inaequifolia
Dodonaea viscosa subsp. *angustissima*
Drosera andersoniana
Drosera macrantha subsp. *macrantha*
Drummondita hassellii
Duboisia hopwoodii

Dysphania glomulifera subsp. *eremaea*
**Echium plantagineum*
Enchylaena lanata
Eremophila decipiens linearifolia
Eremophila decipiens subsp. *linearifolia* ms
Eremophila drummondii
Eremophila oppositifolia var. *angustifolia* ms
Eremophila virens R
Eremophila viscida R
Eriostemon tomentellus
Eucalyptus aff. *leptophylla*
Eucalyptus brevipes R
Eucalyptus burracoppinensis
Eucalyptus caesia subsp. *magna* P4
Eucalyptus calycogona var. *calycogona*
Eucalyptus capillosa subsp. *capillosa*
Eucalyptus crucis subsp. *lanceolata*
Eucalyptus erythronema var. *erythronema*
Eucalyptus hypochlamydea subsp. *ecdysiastes*
ms
Eucalyptus leptopoda subsp. *leptopoda*
Eucalyptus leptopoda subsp. *subluta*
Eucalyptus loxophleba subsp. *lissophloia*
Eucalyptus loxophleba subsp. *supralaevis*
Eucalyptus melanoxylon
Eucalyptus myriadena
Eucalyptus myriadena subsp. *myriadena*
Eucalyptus semivestita ms
Eucalyptus sheathiana
Eucalyptus stowardii
Eucalyptus subangusta subsp. *cerina*
Eucalyptus yilgarnensis
Exocarpos aphyllus
Frankenia cinerea
Frankenia tetrapetala
Gastrolobium floribundum
Gastrolobium spectabile
Gilberta tenuifolia
Granitites intangendus
Grevillea acuaria
Grevillea didymobotrya subsp. *didymobotrya*
Grevillea eriobotrya P3
Grevillea minutiflora P1
Grevillea nana subsp. *nana*
Grevillea paradoxa
Grevillea petrophiloides
Grevillea sarissa subsp. *sarissa*
Grevillea umbellulata subsp. *umbellulata*
Grevillea yorkkrakinensis
Gunniopsis glabra
Gunniopsis intermedia
Gyrostemon subnudus
Hakea rigida ms P2
Halgania anagaloides var. *anagaloides* ms
Halgania andromedifolia
Halosarcia halocnemoides
Halosarcia lylei
Halosarcia pterygosperma subsp. *pterygosperma*
Hemiphora elderi
Hibbertia glomerosa
Hibbertia rupicola
Homalocalyx thryptomenoides
**Hordeum leporinum*
Hyalochlamys globifera
Hybanthus floribundus subsp. *floribundus*
Isoetes australis
Isotoma hypocrateriformis
Juncus radula
Keraudrenia integrifolia
Leptospermum erubescens
Leptospermum roei
**Limonium lobatum*
Logania flaviflora
Lomandra collina
Lomandra effusa
Lycium australe
Maireana erioclada
Maireana georgei
Maireana suaedifolia
Maireana trichoptera
Malleostemon roseus
Malleostemon tuberculatus
Marianthus erubescens
**Medicago lupulina*
Melaleuca acuminata
Melaleuca coroncarpa
Melaleuca ctenoides
Melaleuca halmaturorum
Melaleuca lanceolata subsp. *thaeroides*
Melaleuca laxiflora
Melaleuca nematophylla
Melaleuca sp. *Wongan Hills* (R. Davis 1959)
Melaleuca uncinata
Melaleuca viminea
**Mesembryanthemum nodiflorum*
Mirbelia magentea ms
Mirbelia multicaulis
Mirbelia seorsifolia
Persoonia quinquenervis
Phebalium laevigatum ms
Phebalium tuberculatum
Pimelea brevistyla subsp. *minor*
Pimelea imbricata var. *piligera*
Pittosporum phylliraeoides var. *microcarpa*
Pityrodia terminalis
Podolepis capillaris
Pododthea gnaphalioides
Prostanthera grylloana
Ptilotus obovatus var. *obovatus*
**Ptilotus polystachyus* var. *polystachyus*
Ptilotus spathulatus
Pultenaea obcordata

Rhagodia drummondii
Rhodanthe rubella
Schoenus hexandrus
Senna pleurocarpa var. *angustifolia*
**Spergularia* aff. *rubra*
Stackhousia monogyna
Stipa hemipogon
Stylidium yilgarnense
Stypandra glauca
Swainsona oliveri
Templetonia sulcata
Thryptomene australis
Thryptomene cuspidata
Thysanotus rectantherus
Trymalium daphnifolium
Verticordia chrysantha
Verticordia chrysanthella
Verticordia mitodes P3
Verticordia pritzelii
Wurmbea densiflora
Zygophyllum aff. *aurantiacum*
Zygophyllum iodocarpum
Zygophyllum ovatum

Appendix

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APPENDIX 6

Fauna species in the Shire of Nungarin (source- W.A Museum)

Information provided by Western Australian Museum, Fauna Base, latitude/longitude coordinates - 30.3333, 117.9166 and -31.3333, 118.5000. Note- not a comprehensive list.

* represents introduced species.

Scientific name	Common name
<u>Birds</u>	
<i>Aquila audax</i>	Wedge-tailed Eagle
<i>Hamirostra isura</i>	Square-tailed Kite
<i>Coracina novaehollandiae novaehollandiae</i>	Black-faced Cuckoo Shrike
<i>Charadrius rubricollis</i>	Hooded Plover
<i>Peltohyas australis</i>	Inland Dotterel
<i>Climacteris rufa</i>	Rufous Treecreeper
<i>Grallina cyanoleuca</i>	Peewee
<i>Falco peregrinus</i>	Peregrine Falcon
<i>Leipoa ocellata</i>	Mallee Fowl
<i>Lichenostomus leucotis novaenorcae</i>	
<i>Oreoica gutturalis</i>	Crested Bellbird
<i>Pardalotus striatus</i>	Striated Pardalote
<i>Pardalotus striatus westraliensis</i>	
<i>Eopsaltria australis griseogularis</i>	Western Yellow Robin
<i>Podargus strigoides</i>	Tawny Frogmouth
<i>Podargus strigoides brachypterus</i>	
<i>Calyptorhynchus latirostris</i>	Carnaby's Cockatoo
<i>Neophema elegans</i>	Elegant Parrot
<i>Platycercus icterotis</i>	Western Rosella
<i>Platycercus zonarius</i>	Ring-necked Parrot
<i>Polytelis anthopeplus anthopeplus</i>	Regent Parrot
<i>Porzana pusilla palustris</i>	
<i>Himantopus himantopus leucocephalus</i>	
<i>Ninox novaeseelandiae</i>	Boobook Owl
<i>Turnix varia varia</i>	Painted Bustard-Quail
<i>Tyto alba</i>	Barn Owl
<i>Tyto alba delicatula</i>	
<u>Amphibia</u>	
<i>Crinia pseudinsignifera</i>	Bleating Froglet
<i>Heleioporus albopunctatus</i>	Western Spotted Frog
<i>Limnodynastes dorsalis</i>	Bullfrog, Banjo Frog
<i>Neobatrachus kunapalari</i>	Kunapalari Frog, Wheatbelt Frog
<i>Neobatrachus pelobatoides</i>	Humming Frog
<i>Neobatrachus sutor</i>	Shoemaker Frog

Scientific name	Common name
<i>Pseudophryne guentheri</i>	Crawling Frog, Gunther's Frog
<u>Mammals</u>	
* <i>Vulpes vulpes</i>	Red Fox
* <i>Felis catus</i>	Cat
* <i>Oryctolagus cuniculus</i>	Rabbit
* <i>Mus musculus</i>	House Mouse
<i>Phascogale tapoatafa tapoatafa</i>	Brush-tailed Phascogale, Wambenger
<i>Sminthopsis crassicaudata</i>	Fat-tailed Dunnart
<i>Sminthopsis dolichura</i>	Little Long-tailed Dunnart
<i>Sminthopsis granulipes</i>	White-tailed Dunnart
<i>Macropus fuliginosus</i>	Western Grey Kangaroo
<i>Macropus robustus erubescens</i>	Biggada
<i>Macropus rufus</i>	Red Kangaroo
<i>Petrogale lateralis lateralis</i>	Black-footed Rock-wallaby
<i>Myrmecobius fasciatus</i>	Numbat, Walpurti
<i>Mormopterus planiceps</i>	Southern Freetail-bat
<i>Tadarida australis</i>	White-striped Freetail-bat
<i>Chalinolobus gouldii</i>	Gould's Wattled Bat
<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat
<i>Vespadelus regulus</i>	Southern Forest Bat
<i>Notomys mitchellii</i>	Mitchell's Hopping Mouse
<u>Reptiles</u>	
<i>Ctenophorus cristatus</i>	Crested Bicycle Dragon
<i>Ctenophorus isolepis citrinus</i>	
<i>Ctenophorus maculatus griseus</i>	
<i>Ctenophorus ornatus</i>	Ornate Rock dragon
<i>Ctenophorus reticulatus</i>	Western Nettle Dragon
<i>Ctenophorus salinarum</i>	Salt Lake Dragon
<i>Ctenophorus scutulatus</i>	Lozenge-marked Bicycle Dragon
<i>Moloch horridus</i>	Thorny Devil
<i>Pogona minor minor</i>	Western Bearded dragon
<i>Antaresia stimsoni stimsoni</i>	Western Stimson's Python
<i>Aspidites ramsayi</i>	Ramsay's Python, Woma
<i>Brachyuophis semifasciata</i>	Southern Shovel-nosed Snake
<i>Demansia psammophis reticulata</i>	
<i>Furina ornata</i>	Moon Snake
<i>Neelaps bimaculatus</i>	Black-naped Snake
<i>Parasuta gouldii</i>	Gould's Snake
<i>Parasuta monachus</i>	Monk Snake

Scientific name	Common name
<i>Pseudechis australis</i>	Mulga Snake
<i>Pseudonaja modesta</i>	Ringed Brown Snake
<i>Pseudonaja nuchalis</i>	Gwardar
<i>Simoselaps bertholdi</i>	Jan's Banded Snake
<i>Suta fasciata</i>	Rosen's Snake
<i>Crenadactylus ocellatus ocellatus</i>	Clawless Gecko
<i>Diplodactylus granariensis granariensis</i>	Wheatbelt Stone Gecko
<i>Diplodactylus maini</i>	Main's Ground Gecko
<i>Diplodactylus pulcher</i>	Beautiful Gecko
<i>Gehyra variegata</i>	Variegated Tree Dtella
<i>Heteronotia binoei</i>	Bynoe's Gecko
<i>Nephrurus vertebralis</i>	Midline Knob-tailed Gecko
<i>Oedura reticulata</i>	Reticulated Velvet Gecko
<i>Strophurus spinigerus</i>	Western Spiny-tailed Gecko
<i>Strophurus spinigerus inornatus</i>	
<i>Underwoodisaurus mili</i>	Barking Gecko
<i>Delma australis</i>	Marbled-faced Delma
<i>Delma fraseri fraseri</i>	Fraser's Legless Lizard
<i>Delma grayii</i>	Side-barred Delma
<i>Lialis burtonis</i>	Burton's Legless Lizard
<i>Pygopus lepidopodus</i>	Common Scaly-foot
<i>Pygopus nigriceps</i>	Hooded Scaly-foot
<i>Cryptoblepharus plagiocephalus</i>	Fence or Wall Skink
<i>Ctenotus atlas</i>	Southern Mallee Skink
<i>Cyclodomorphus melanops elongatus</i>	Eastern Slender Bluetongue
<i>Egernia inornata</i>	Unadorned Desert Skink
<i>Egernia stokesii badia</i>	Western Spiny-tailed Skink
<i>Eremiascincus richardsonii</i>	Banded Skink
<i>Lerista macropisthopus macropisthopus</i>	
<i>Lerista muelleri</i>	
<i>Menetia greyii</i>	Common Dwarf Skink
<i>Morethia butleri</i>	
<i>Morethia obscura</i>	Woodland Flecked Skink
<i>Tiliqua occipitalis</i>	Western Bluetongue
<i>Ramphotyphlops australis</i>	
<i>Ramphotyphlops bituberculatus</i>	
<i>Ramphotyphlops hamatus</i>	
<i>Ramphotyphlops waitii</i>	
<i>Varanus gouldii</i>	Gould's Sand Monitor
<i>Varanus tristis tristis</i>	Black-headed Monitor

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

ABN 94 657 944 768

TAX INVOICE

Enquiries: David Lamont
Phone: (08) 9334 0423
Fax: (08) 9334 0199

Roadside Conservation Committee
Department of CALM
Locked Bag 104
Bentley Delivery Centre WA 6983

Invoice number: #7-04
Invoice date: 16-03-2004
Invoice to: Shire of Nungarin
PO box 8,
Nungarin, WA 6490

Your order No.
Payment: N/A

Item number	<u>Particulars</u>	<u>Quantity</u>	<u>Unit cost</u> \$	<u>Postage & handling</u>	<u>Total</u> \$
1	RCC data processing	26.5 hrs	\$30.00/hr	0	\$795.00
2	GIS Map Production	10 hrs	\$35.00/hr	0	\$350.00
	Hardcopy maps	5	\$20.00	0	\$100.00
	Clear Overlays	6	\$35.00	0	\$210.00
3	Report Production	40 hrs	\$30.00	0	\$1,200.00
	Copying and binding	8	\$8.93	0	\$71.44
TOTAL COST					\$2,726.44

Comments:

This invoice does not require payment; it merely indicates the monetary value of the product given to the Shire of Nungarin by the Roadside Conservation Committee.

This invoice does not account for the monetary value of the RCC training session and the volunteer surveyor's time and petrol costs.

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