Roadside Vegetation and Conservation Values in the Shire of Woodanilling

Photos: K. Payne, RCC

May 2013

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Report compiled by Gillian Stack, Kylie Payne and Edna McLaughlin, Roadside Conservation Committee (RCC)
Map produced by Geographic Information Services (GIS) Section, Department of Environment and Conservation (DEC). Data supplied by RCC from Shire of Woodanilling roadside surveys conducted by local volunteers and RCC staff.

Executive Summary

This report provides an overview of the conservation status of roadside remnant vegetation in the Shire of Woodanilling. The report provides detailed results of the roadside survey and is accompanied by management recommendations. It also briefly describes the natural environment in Woodanilling, legislative considerations and threats to conservation values.

Aware of the need to conserve roadside remnants, the Shire of Woodanilling and local community members liaised with the Roadside Conservation Committee (RCC) to survey roadsides in their Shire. Surveys to assess the conservation values of roadside remnants were conducted between September 2011 and July 2012. Approximately 95% of the Shire's 528 km of rural roadsides were assessed by the RCC for their conservation status, and maps were produced via a Geographic Information System (GIS). This represents the majority of non-urban roads. Roadside locations of six Shire-nominated weeds were also recorded and mapped onto separate clear overlays.

The results of the survey indicated that high conservation value roadsides occupied16% of the roadsides surveyed in the Shire, with medium-high conservation value roadsides accounting for 27%. Medium-low and low conservation value roadsides occupied 31% and 26%, respectively. A more detailed analysis of results is presented in Part C of this report.

It is envisaged that the primary purpose of the roadside survey data and Roadside Conservation Value (RCV) map will be for use by Shire and community groups as a management and planning tool. Applications may range from prioritising work programs to formulating management strategies. Past experience has shown that this document and the accompanying maps are valuable in assisting with:

- formulating a roadside vegetation management plan for road maintenance work;
- identifying degraded areas for strategic rehabilitation or specific management techniques and weed control programs;
- re-establishing habitat linkages throughout the Shire's overall vegetation network;
- developing regional or district fire management plans;
- identifying potential tourist routes, i.e. roads with high conservation value provide visitors with an insight into the natural landscape of the district; and
- planning for Landcare or similar 'whole of landscape' projects.

Successive surveys of some Shires have revealed an alarming decline in the conservation status of many roadside reserves. In some cases the conservation value has declined at a rate of approximately 10% in 9 years. This trend indicates that without appropriate protection and management, roadside reserves will become biological wastelands in the near future. However, proactive and innovative management of roadside vegetation has the potential to abate and reverse this general decline. Opportunities exist for the Shire of Woodanilling to utilise the RCV map in many facets of its Landcare, tourism, road maintenance operations and Natural Resource Management (NRM) strategy documents. The RCC is available to continue to provide assistance with the development of roadside vegetation management plans and associated documents.

PART A

OVERVIEW OF ROADSIDE CONSERVATION

1.0 Why is roadside vegetation important?

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, settlements, and other development. The fragmentation of the more or less continuous expanse of native vegetation communities by clearing has resulted in a mosaic of man-made biogeographical islands of small native vegetation remnants.

Tree hollows are of vital importance to breeding birds.
Photo: L. McMahon, Birds Australia

The flora and fauna in these areas are in jeopardy due to limited resources, increased disease risk and reduced genetic diversity caused by a diminishing gene pool. Some habitat fragments may be too small to provide the requirements for even a small population; therefore it is essential to their survival that they have a means of dispersing throughout the landscape. The presence of native vegetation along roadsides often fulfils an important role in alleviating this isolation effect by providing connectivity between bush remnants. While many roadside reserves are inadequate in size to support many plant and animal communities, they are integral in providing connections between larger areas of remnant vegetation. It is therefore important that all native vegetation is protected regardless of its apparent conservation value in isolation. It is important to acknowledge that even degraded roadsides have the ability to act as corridors for the dispersal of a variety of fauna.

Livestock using roadside vegetation for shade along Ashwell Road.
Photo: RCC

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, such that roadside plants represent more than 20% of the known populations of Threatened Flora and three species are known only to exist in roadside populations (DEC's Threatened & Priority Flora Database, May 2013)
- provide the basis for our important wildflower tourism industry, as roadside native vegetation in good condition is aesthetically appealing and colourful in season; and
- provide a sense of place for tourists and residents alike;
- often contain sites of Aboriginal and 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, in both the land adjoining the road reserve and further afield; and
- provide a valuable source of seed for regeneration projects, especially shrub species, as clearing and grazing beneath farm trees often removes this layer. Approval of the local Shire and a Department of Environment and Conservation (DEC) permit are required prior to collection. Guidelines for seed and timber harvesting can be found in Appendix 1.

Flora Roads are high conservation value roadside remnants.
Robinson West Road – Flora Road
Photo: K. Payne, RCC

2.0 What are the threats?

2.1 Lack of awareness

The general decline of the roadside environment can, in many instances, be attributed to the lack of awareness of the functional and conservation value of the roadside remnants, both by the general community and those who work in the road reserve environment. The lack of awareness of the roadside vegetation's values means that those connected with the roadside are unable to modify their actions to minimise their impact. As a result, activities such as road maintenance and the use of fire can be a catalyst for decline in environmental quality.

Care must be taken when clearing to ensure large trees are not damaged, that the clearing is actually needed and that the necessary permits are obtained.
Photos: RCC

2.2 Roadside clearing

Western Australia's agricultural region, also known as the Intensive Land-use Zone (ILZ), covers an area of approximately 24,834,575 ha, of which only 7,531,044 ha (30.3%) is covered by the original native vegetation. Of the 86 rural Local Government Authorities (LGAs) in this zone, 10 have less than 10% of the original remnant vegetation and a further 38 LGAs have more than 10% but less than 30% of native vegetation extent (DAFWA, 2011).

Road and roadside vegetation management practices have a significant impact on the conservation of roadside vegetation. The decision to minimise clearing for construction and maintenance, and avoid systematic and indiscriminate clearing which creates irreversible damage, will enable roadside vegetation to continue to act as a biological corridor and habitat. Intact native vegetation also often suppresses weeds on roadsides.

Creative solutions including creating passing areas rather than widening a whole road.
Photo: C. Macneall, RCC

Due to the movement and disturbance of soil, all road construction and maintenance activities have the potential to introduce and spread weeds and dieback, which have a devastating impact on native vegetation. It is thus important to work from "clean" areas to "dirty" – that is, from areas that are weed and/or dieback free to those areas in which weeds and/or dieback exist. It is also important to clean down machinery before moving between work sites.

In 2004, amendments to the *Environmental Protection Act* 1986 (EP Act) put in place a permit application process designed to assess proposed vegetation clearing based upon a number of clearing principles which ensure ecological, conservation and land degradation issues are considered. Under the EP Act, clearing native vegetation requires a permit unless it is for exempt purposes (see pg 10-11). These amendments are designed to provide improved protection for native vegetation, maintain biodiversity and allow for some incidental clearing activities to continue without the need for a permit.

2.3 Fire

Although Western Australia's flora and fauna have evolved with a tolerance to pre-European fire regimes, these are generally not present today. Fire in transport corridors will inevitably alter the native vegetation; however the extent of changes is dependent on a number of factors such as:

- species present;
- intensity of fire;
- frequency of fire; and
- seasonality of the fire.

Before a decision is made to burn a road verge, the impact on natural, cultural and landscape values should be carefully considered.
Photo D. Lamont

The RCC's policy on fire management is:

- roadside burning should not take place without the consent of the managing authority;
- Local Government Authorities should adopt by-laws to control roadside burning;

Controlled burning of roadside vegetation should result in a mosaic of burnt & unburnt patches
Photo: DFES

- roadside burning should be planned as part of a total Shire/area Fire Management Plan;
- only one side of a road should be burnt in any one year; *this will ensure habitat retention for associated fauna and also retention of some of the scenic values associated with the road.*
- when designing a Fire Management Plan, the two principles which must be kept in mind are the ecological management of vegetation and the abatement of fire hazard;
- no firebreaks within the Road Reserve should be permitted unless the width of the roadside vegetation strip is greater than 20m;
- a firebreak on any road reserve should be permitted only when, in the opinion of the road manager, one is necessary for the protection of the roadside vegetation. The road manager shall specify the maximum width to which the break may be constructed; and
- in the case of any dispute concerning roadside fire management, the Department of Fire and Emergency Services (DFES) should be called in to arbitrate.

Burnt roadsides showing signs of regeneration of natives and weeds including African lovegrass (below). Follow up weed control needs to occur after burning to ensure flammable weeds don't establish after burning.
Photos: RCC

Before any decision is made to burn a road verge, particularly if threatened flora is present, the proponent should be aware of all values present and the impact the fire will have. It is illegal to burn roadsides where Threatened Flora is present without written permission from the Minister for the Environment. Fire can also be particularly destructive to heritage sites of either Aboriginal or European origin.

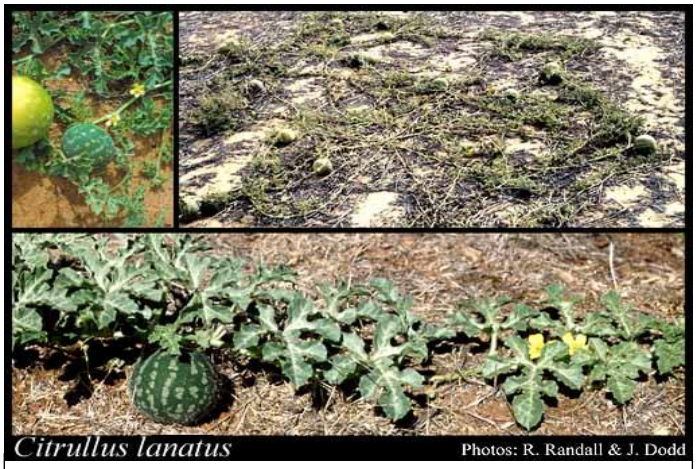
More information about fire management in roadsides can be found in the RCC's publication, *Biodiversity Conservation and Fire in Road and Rail Reserves: Management Guidelines* (2011).

2.4 Weeds

Weeds are generally disturbance opportunists, and the soil disturbance common on road verges provides an easily colonised niche. Their establishment can impinge on the survival of existing native plants, increase flammability of the vegetation and interfere with the engineering structure of the road. The effect of weed infestations on native plant populations can be severe, often with flow on effects for native fauna such as diminished habitat or food resources.

Once weeds become established in an area, they become a long-term management issue, costing considerable resources to control or eradicate. The roadside survey recorded populations of six significant weeds chosen by the Shire. These weeds were:

- Afghan melon (*Citrullus lanatus*)
- Afghan thistle *(Solanum hoplopetalum)*
- Boneseed (*Chrysanthemoides monilifera*)
- Bridal creeper *(Asparagus asparagoides)*
- Cape tulip (*Moraea* spp.)
- Soursob (*Oxalis pes-caprae*)



Afghan melon, also known as Pie melon, is a trailing annual herb or climber which is common along roadsides. The fruit can be up to 15cm across.

DEC, FloraBase. (http://florabase.dec.wa.gov.au/browse/profile/7370 Accessed April 2013.

Roadside populations of Afghan melon, bridal creeper and soursob can be observed on the weed overlays provided with the Woodanilling Roadside Conservation Value map (*2013*). Overlays are not provided for Afghan thistle, boneseed or Cape tulip because there were only one or no infestations found. Additional overlays are provided for prickly paddy melon, nightshade and where 'General Weeds' had greater than 30% cover.

The Roadside Conservation Value map and weed overlays will assist the Shire and community in planning, budgeting and coordinating strategic weed control projects. Further information on the presence of these nominated weeds is presented in Part C of this report. A list of all weeds in the Shire of Woodanilling which are on FloraBase and have a specimen in the WA Herbarium can be found in Appendix 2.

Afghan thistle is native to the south-west of WA. It behaves as a weed along wastelands, roadsides and railway lines. It often forms dense extensive patches.

It has spines all over the plant, which may be up to 1cm long.

DEC, FloraBase. www.florabase.dec.wa.gov.au/browse/profile/7013. Accessed April 2013.

Boneseed is a Weed of National Significance (WONS) and a Declared Plant. It is a shrub which grows up to 3m with yellow flowers from June to October.

Its fleshy seeds are spread by birds which allow the plant to be an aggressive coloniser.

DEC, FloraBase.
www.florabase.dec.wa.gov.au/browse/profile/11900
Accessed April 2013

Bridal creeper is a Weed of National Significance (WONS). It is native to South Africa and is one of W.A.'s worst weeds. It is extremely invasive and spreads rapidly along roadsides.

There are a number of other Asparagus species that are also becoming major weeds.

DEC, FloraBase.
www.florabase.dec.wa.gov.au/browse/profile/8779.
Accessed April 2013.

The one leaf (above) and two leaf **Cape tulip** (below) are Declared Plants. The two leaf cape tulip has a smaller flower than the one leaf cape tulip.

Both are found in similar habitat and can have pink or yellow flowers.

DEC, FloraBase.
www.florabase.dec.wa.gov.au/browse/profile/19179.
Accessed April 2013.

Soursob is a common weed with stalked leaves and yellow flowers from June to October. It is a major weed of roadsides, crops, pastures, disturbed vegetation and gardens.

It is native to South Africa and can cause oxalate poisoning in sheep.
(Hussey et al, 2007)

DEC, FloraBase.
www.florabase.dec.wa.gov.au/browse/profile/4356
Accessed April 2013.

2.5 Salinity

Salinity is one of the greatest environmental threats facing Western Australia's agricultural areas, with over three million hectares in the South West Agricultural Region already affected to some degree (George & Short, 2006). Dryland salinity has occurred as a consequence of the heavy clearing undertaken in the past, namely the removal of deep-rooted perennial native vegetation and replacement by shallow rooted annual crops and the subsequent rising of the water table. The large amount of salt stored within the soil column in these areas of Western Australia is dissolved by the rising water and carried into the root-zone to the soil surface. Once at the surface, the water evaporates leaving a white film of salt over the landscape, making it unproductive for current agricultural practices and severely impacting upon the remaining native vegetation.

In 2006, monitoring of groundwater levels by Department of Agriculture and Food hydrologists indicated that groundwater levels (and hence the risk of salinity) are continuing to climb in most agricultural areas. (DAFWA, 2009)

The effect of salinity has not been restricted to agriculture, but is also having a serious effect on rural townsites and the road and rail network. The National Land and Resources Audit (2000) warned that across Australia nearly 20,000km of roads and 1,600km of railways are at a high risk from dryland salinity (Land & Water Australia, 2001). More than 4,000km (5%) of roads in the South West Land Division of Western Australia are currently affected by salinity (George et al, 2005).

Based on figures supplied by the Department of Agriculture WA for the *Salinity Investment Framework Interim Report* (2003), approximately 6.47%, or 32.65 km of roads in the Shire of Woodanilling are potentially under threat from salinity (Table 1).

Table 1. Distance of road potentially affected by salinity in the Shire of Woodanilling and surrounding shires.

Shire	Total road length assessed (km)	Roads potentially affected by salinity - length in km					
		Highways	Local roads	Main roads	Other roads	Total affected	% of total potentially affected
Woodanilling	**504.96**	**0.83**	**21.63**	**1.83**	**8.38**	**32.65**	**6.47**
Wagin	817.68	-	43.90	4.03	6.05	53.98	6.60
Katanning	726.37	-	31.43	5.08	7.03	43.53	5.99
Dumbleyung	1,020.80	-	49.30	5.10	4.03	58.43	5.72
Kojonup	1,239.49	0.83	22.13	0.33	10.03	33.30	2.69
West Arthur	884.85	1.45	30.00	1.98	13.75	47.18	5.33
Narrogin	739.07	0.38	27.20	2.85	12.53	42.95	5.81

Adapted from material produced by the Department of Agriculture WA for Department of Environment 2003, Salinity Investment Framework Interim Report - Phase 1, 2003, Department of Environment, Salinity and Land Use Impacts Series No. SLUI 32

3.0 Legislative requirements

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

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
- *Environmental Protection (Clearing of Native Vegetation) Regulations* 2004
- *Heritage of WA Act* 1990
- *Land Administration Act* 1997
- *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* 1984
- *Wildlife Conservation Act* 1950, 1979

Commonwealth legislation:

- *Environment Protection and Biodiversity Conservation Act* 1999

Department of Environment and Conservation (DEC) 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 (Wildlife Conservation Act) and *Environmental Protection Act* 1986 (EP Act) 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 Act.

Legalisation introduced under the EP Act specifies that all clearing of native vegetation requires a permit, unless it is for an exempt purpose. Schedule 6 of the EP Act and the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* (the Regulations) detail these requirements. Clearing applications are assessed against ten clearing principles, which encompass the:

- biological value of the remnant vegetation;
- potential impact on wetlands, water sources and drainage;
- existence of rare flora and threatened ecological communities; and
- land degradation impacts.

This assessment process is designed to provide a more comprehensive and stringent land clearing control system. There are two land clearing permit types available: an area permit and a purpose permit. For example, where clearing is for a once-off clearing event such as pasture clearing or an agricultural development, an area permit is required. Where ongoing clearing is necessary for a specific purpose, such as road widening programs, a purpose permit is needed. Clearing of regrowth to maintain an existing Shire road formation is exempt, to the width and height legally cleared for that purpose within the last 10 years (refer to Schedule 2 of the Regulations).

A clearing permit is required for road upgrades. More information can be found on DEC's website www.dec.wa.gov.au/nvc or contact DEC's Native Vegetation Conservation Branch on 9219 8744.

It is recommended that a precautionary 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 Environmentally Sensitive Areas

An Environmentally Sensitive Area (ESA) is an area that requires special protection. Some of the reasons include:

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

Environmentally Sensitive Areas can be delineated by the use of site markers. The RCC publication *Guidelines for Managing Special Environmental Areas in Transport Corridors* has advice on the design and placement of ESA markers. Workers who come across an ESA marker in the field should not disturb the area between the markers unless specifically instructed. If in doubt, the Works Supervisor, Shire Engineer or CEO should be contacted. Western Power and Brookfield Rail also have systems for marking sites near power or rail lines.

Roadside ESA markers are highly visible
Photo: K Payne, RCC

To ensure that knowledge of rare flora and other sites does not get lost due, perhaps, to staff changes, is it recommended that the Shire establish an *Environmentally Sensitive Area Register.* This should outline any special treatment that the site should receive and be consulted prior to any work being initiated in the area. This will ensure that inadvertent damage does not occur.

During the survey, four roadsides with ESA markers in the Shire of Woodanilling were found:

- Carters Road
- Douglas Road
- Orchard Road
- Robinson West Road

There may be other roadsides with Threatened flora or fauna which were not recorded during the surveys.

Local Governments are encouraged to permanently mark ESAs to prevent inadvertent damage to rare flora or other values being protected. Markers of a uniform shape and colour will make recognition easier for other authorities using road reserves.

5.0 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 and upon recommendation of the RCC. The RCC has prepared *Guidelines for the Nomination and Management of Flora Roads* (Appendix 3). The Flora Road signs (provided by the RCC) draw the attention of both the tourist and those working in the road reserve to the roadside flora, indicating that it is special and worthy of protection. The program seeks to raise the profile of roadsides within both the community and road management authorities.

Roadsides are one of the most accessible places for tourists to view wildflowers.
Photo: K Payne, RCC

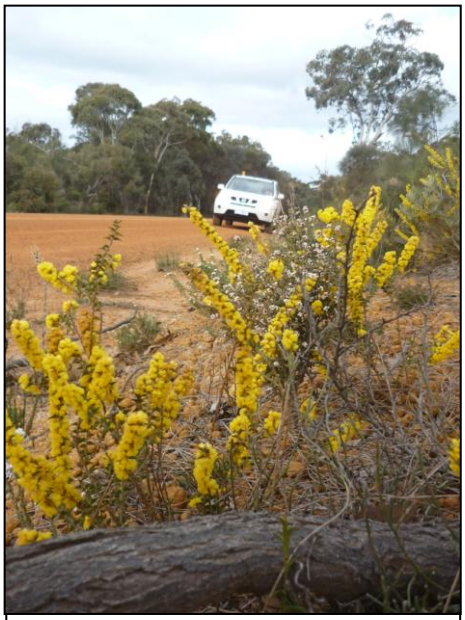
Flora Roads also provide habitat for fauna.
Photo: K. Payne, RCC.

There is currently one Flora Road in the Shire of Woodanilling, Robinson West Road. There are two other roads which have been nominated and assessed; River Road and Link Road. The roadside survey and the RCV map also highlighted a number of other roadsides that have the potential to be declared as Flora Roads. These and other roads may be investigated further to see if they warrant a declaration as a Flora Road (see Part C of this report).

In order to plan roadworks so that important areas of roadside vegetation are not disturbed, road managers should be aware of these areas. To ensure this is not overlooked it is suggested that areas declared as Flora Roads be included in the Shire's *Special Environmental Area Register*.

Attractive roadsides are an important focus in Western Australia, the "Wildflower State". 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; and
- using specially designed signs to delineate the Flora Road section (provided by the RCC).



Wildflowers (*Acacia* sp) along Orchard Road
Photo: K. Payne, RCC

PART B

THE NATURAL ENVIRONMENT IN WOODANILLING

1.0 Flora

On a global scale Western Australia has almost ten times the number of vascular plant varieties than countries such as Great Britain. In fact, Western Australia has some 4.8% of the 250,000 known vascular flora present on Earth. The Western Australian flora is also highly specialised, with the majority of species being endemic: that is, found nowhere else in the world. Up to 75% of the 6,000 species in the south west of the state are endemic.

The WA Herbarium has recorded over 500 species of native plants from the Shire of Woodanilling. The most prolific families are Myrtaceae (92 species), Proteaceae (78 species), Fabaceae (48 species) and Orchidaceae (31 species). The complete list of recorded flora can be viewed on the CD attached to this report.

2.0 Threatened Flora (Declared Rare Flora)

Threatened flora species are of great conservation significance, and populations should therefore be treated with special care when road and utility construction or maintenance is undertaken. Populations of threatened flora along roadsides are designated ESAs and should be delineated by yellow markers. It is the responsibility of the road manager to ensure these markers are installed. The RCC suggests using the publication *Guidelines for Managing Special Environmental Areas in Transport Corridors* as a guideline for managing these sites.

As at April 2013, there are four species of threatened flora and nine species of priority flora found in the Shire of Woodanilling. Nine populations of the threatened flora species are found on roadsides.

Threatened flora sites should be clearly marked with these yellow posts.
Photo: RCC, Carters Road

Threatened flora on Woodanilling roadsides

- *Caladenia luteola* (Lemon spider orchid; 1 population)
- *Conostylis drummondii* (Drummond's conostylis; 1 population)
- *Jacksonia velveta* (3 populations)
- *Verticordia fimbrilepis* subsp. *fimbrilepis* (Shy featherflower; 4 populations)

Priority flora on Woodanilling roadsides

- *Banksia acanthopoda* Priority 2
- *Banksia meganotia* Priority 3
- *Schoenus* sp. Beaufort Priority 1 (Beaufort Bog-rush)

Caladenia luteola Photos: S. Clarke

Caladenia luteola

- **Tuberous, perennial herb**
- **Grows to 0.3m high**
- **Yellow & red/brown flowers in September**
- **Found in lateritic sand**

DEC, FloraBase (florabase.dec.wa.gov.au/browse/profile/17864) Used with permission Western Australian Herbarium, DEC. Accessed April 2013.

Conostylis drummondii Photos: S.D. Hopper

Drummond's conostylis

- **Rhizomatous, tufted perennial**
- **Grass-like or herb**
- **Grows to 0.1-0.3 m high**
- **Yellow flowers from October to November**

DEC, FloraBase (florabase.dec.wa.gov.au/browse/profile/1433). Accessed April 2013.

Verticordia fimbrilepis subsp. *fimbrilepis* Photos: E.A. George, N.J. Stevens & R. Smith

Shy featherflower

- **Shrub, 0.3-0.7m high.**
- **Pink/white flowers October to January.**
- **Grows on gravelly, sandy or clayey soils on flats and road verges.**

DEC, FloraBase (florabase.dec.wa.gov.au/browse/profile/14713) Accessed April 2013.

Jacksonia velveta Photos: C. Brocx & J.A. Cochrane

Jacksonia velveta

- **Open, upright, sometimes sprawling shrub,**
- **Grows to 1.9 m high.**
- **Yellow-orange flowers in December**
- **Found on Brown gravelly loam, dry grey sand, ironstone. Slight hillslopes, and ridges**

DEC, FloraBase (florabase.dec.wa.gov.au/browse/profile/19373) Accessed April 2013.

For definitions of threatened and priority flora refer to Appendix 4. For more detailed information regarding threatened and priority flora in the Shire of Woodanilling, contact the DEC Threatened Flora Administrative Officer in Species and Communities Branch at Kensington flora.data@dec.wa.gov.au, or the Conservation Officer (Flora) for DEC's Wheatbelt Region on 9881 9222. The information provided in this report will not remain current, so it is important that the Shire check with DEC periodically to avoid inadvertent damage to newly discovered populations of threatened flora. If roadworks are to be carried out near known threatened flora sites, it is advisable to contact DEC at least six weeks in advance to obtain necessary permits and have an inspection confirm exactly where plants occur near the road.

3.0 Fauna

The Western Australian Museum has records of approximately 162 species of fauna from the Woodanilling area. (This list can be viewed on the CD attached). WA Museum fauna records include specimen records, museum collections and observations from 1850 to present, and therefore are intended to act only as a general representation of the fauna in the area. Of the fauna species recorded in the Woodanilling area, 102 were bird species, 17 were mammal species, 36 were invertebrate species, 6 were reptile species and there was 1 amphibian species.

Many fauna species, particularly small birds, need continuous corridors of dense vegetation to move throughout the landscape. Roadsides therefore are of particular importance to avifauna because they can contain the only continuous linear vegetation connection in some areas.

The Wildlife Conservation Act provides for native fauna to be specially protected where they are under an identifiable threat of extinction, and as such, are considered to be "Threatened". Based on distributional data from DEC, 14 species of threatened and priority fauna have been recorded or sighted throughout the Shire of Woodanilling, and these are listed below.

Bird

- *Calyptorhynchus latirostris* (Carnaby's Cockatoo) Threatened
- *Charadrius rubricollis* (Hooded Plover) Priority 4
- *Falco peregrinus* (Peregrine Falcon) Specially protected
- *Falco peregrinus* subsp. *macropus* (Australian Peregrine Falcon) Specially protected
- *Platycercus icterotis* subsp. *xanthogenys* (Western Rosella (inland)) Threatened

Carnaby's Cockatoo
© Babs & Bert Wells/DEC

Mammal

- *Bettongia penicillata* subsp. *ogilbyi* (Woylie, Brush-tailed Bettong) Threatened
- *Dasyurus geoffroii* (Chuditch, Western Quoll) Threatened
- *Isoodon obesulus* subsp. *fusciventer* (Southern Brown Bandicoot) Priority 5
- *Macropus eugenii* subsp. *derbianus* (Tammar) Priority 5
- *Macropus irma* (Western Brush Wallaby) Priority 4
- *Myrmecobius fasciatus* (Numbat) Threatened
- *Phascogale calura* (Red-tailed Phascogale) Threatened
- *Phascogale tapoatafa* subsp. *tapoatafa* (Southern Brush-tailed Phascogale,Wambenger) Threatened

Tammar
© Babs & Bert Wells/DEC

Reptile

- *Morelia spilota* subsp. *imbricata* (Carpet Python) S

Carpet Python
© Babs & Bert Wells/DEC

4.0 Remnant vegetation cover

Nineteen percent of the original native vegetation remains in the Shire of Woodanilling and this is located in a variety of tenures from nature reserves to privately owned land (Table 2A). While this is higher than some other shires, the remaining native vegetation could easily be further depleted if proactive measures are not taken to manage this irreplaceable resource.

Photo: K. Payne, RCC

Table 2A. Remnant vegetation remaining in the Shire of Woodanilling and surrounding shires (DEC, 2012).

Shire	Total Area (ha)	Area Cleared (ha)	Vegetation Cover Remaining	
			(ha)	(%)
Woodanilling	**112,895**	**91,198**	**21,697**	**19.22%**
Wagin	194,618	165,692	28,926	14.86%
Dumbleyung	254,060	220,859	33,200	13.07%
Katanning	151,805	126,795	25,009	16.47%
Kojonup	293,098	224,565	68,532	23.38%
West Arthur	283,182	195,278	87,903	31.04%

The continued presence of the flora and fauna living in these fragmented remnants is dependent on connectivity throughout the landscape. This enables access to habitat and food resources essential for the survival 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.

Bird hollow and wedge-tailed eagle along Robinson West Road
Photos: K. Payne,

4.1 Woodanilling Vegetation Associations

The vegetation associations known from the Shire of Woodanilling, noted in Table 2B, provide an indication of the assemblages of native vegetation present prior to European settlement. It should be noted that these assemblages are indicative of the shire overall and not specifically representative of roadside remnants.

Table 2B. Vegetation types and percentages remaining in the Shire of Woodanilling (DEC, 2012).

Woodanilling Vegetation Association Types	% Remaining
Medium woodland; marri & wandoo (4)*	15.84
Low woodland; *Allocasuarina huegeliana* & York gum (25)	20.17
Shrublands; teatree thicket (37)	69.24
Shrublands; scrub-heath (48)	36.76
Bare areas; salt lakes (125)	11.84
Bare areas; freshwater lakes (126)	24.53
Medium woodland; York gum & yate (938)	86.45
Medium woodland; wandoo (946)	17.34
Shrublands; dryandra heath (952)	30.13
Medium woodland; wandoo & yate (967)	46.15
Medium woodland; jarrah & wandoo (987)	33.18
Medium woodland; York gum, wandoo & salmon gum (*E. salmonophloia*) (1023)	14.93
Shrublands; teatree thicket with scattered wandoo & yate (1051)	1.65
Medium woodland; wandoo & mallet (1073)	30.78
Succulent steppe with open woodland & scrub; wandoo, salmon gum & *Allocasuarina obesa* over teatree & samphire (1083)	58.13

* Numbers in brackets refer to the identification numbers of vegetation associations listed in the Statewide Vegetation Statistics Report (DEC, 2012).

Figure 8 in Part C of this report shows the vegetation types recorded along the Shire of Woodanilling roadsides during the survey.

Morrel wandoo woodland Robinson East Road, Banksia mixed heath woodland, Carters Road.
Photos: K. Payne, RCC

PART C

ROADSIDE SURVEYS IN THE SHIRE OF WOODANILLING

1.0 Introduction

Woodanilling Survey Training Day – September 2011
Photo: K.Payne, RCC

The roadside survey and mapping program was developed to provide a method of determining the conservation status of roadsides. Using this method, community volunteers are able to participate in a 'snap-shot' survey of roadside vegetation to identify a range of attributes that, when combined, give an overall indication of the conservation status of the vegetation.

Usually the survey is undertaken by a group of local volunteers, who, aided by their knowledge of the area, are able to provide an accurate and cost-effective method of data collection. Community participation also ensures a sense of 'ownership' of the end product, which increases the likelihood of its acceptance and use by the local community and road managers.

The majority (503.23 km, or 95%) of the Shire of Woodanilling's 527.83 km of rural roads were surveyed by 11 local volunteers and then assessed by the RCC to determine the conservation status of the road reserves. Most of the surveys were carried out from September 2011 to July 2012. The enthusiastic effort of the local roadside surveyors, the support provided by Woodanilling Shire Council and in particular the efforts of the local coordinator and NRM Officer, Danielle Perrie, ensured that this project was successfully completed. The roadside surveyors were:

- Danielle Perrie
- Glen Patterson
- Bev Lockley
- Carla Tassone
- Marion Taylor
- Mike Jones
- Sue Webse
- Kylie Payne
- Edna McLaughlin
- Jana Sturis
- Abby Thomas

1.1 Methods

The roadside surveys were undertaken in a vehicle, generally with two people per vehicle. The passenger recorded all the roadside survey data using the handheld devices or PDAs shown in Appendix 5. The Woodanilling surveys were conducted using new devices and a new survey program which was developed specifically for the roadside surveys. The new devices have inbuilt GPS and camera and collect more data, including vegetation type, tree decline, environmentally sensitive areas and additional weeds. There were some teething problems with the new system, but the Woodanilling volunteers have paved the way and given useful feedback for further refining the survey system.

With the new system, the data is immediately uploaded to a purpose-built RCC survey website, provided there is mobile coverage. This data is then downloaded and analysed by the RCC, and the RCC works with DEC's Geographic Information Systems (GIS) Section to generate the Roadside Conservation Value Map and weed overlays.

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). However, this has been expanded with the new system. All volunteers participate in a 1 day pre-survey volunteer training session. During this session, volunteers are given an overview of the survey process; information to assist with identifying vegetation types and weeds, step by step instructions on how to use the PDAs and survey safety information.

Training allocating roads to volunteers
Photo: RCC

The survey process involves choosing an option from a set of attributes, which when combined represent a roadside's conservation status.

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

- the structure of native vegetation (e.g. layers - trees, shrubs, groundcovers) (Scores: 0-2)
- the extent of native vegetation (% of native vegetation cover) (Scores: 0-2)
- the approximate number of *different* native plant species (diversity) (Scores: 0-2)
- the degree of weed infestation (% weed cover) (Scores: 0-2)
- habitat value / value as a biological corridor (Scores: 0-3)
  (i) connects to other bushland areas;
  provides habitat or food for reptiles birds and other animals e.g. (ii) hollow logs, (iii) tree hollows and (iv) flowering shrubs; and
  (v) environmentally sensitive areas (threatened flora markers)
- width of vegetated roadside (Scores: 0-1).

Each of these attributes is given a score ranging from 0 to 3 points (see above). Their combined scores provide a Roadside Conservation Value score ranging from 0 to 12. The conservation values are represented on the roadside conservation value map by the following colour coded conservation status categories.

Conservation Value	Conservation Status	Colour Code
9 – 12	High	Bright Green
7 – 8	Medium High	Pale Green
5 – 6	Medium Low	Orange
0 – 4	Low	Yellow

The following attributes are also noted but do not contribute to the conservation value score:

- width of road reserve
- vegetation type
- tree decline
- revegetation
- clearing
- rabbits
- presence of utilities/disturbances

- general comments
- presence and percentage of 6 nominated weeds
- presence and percentage of additional weeds

It is intended that the recording of these attributes will provide a dataset capable of being used by a broad range of shire staff plus community and land management interests.

1.2 Mapping Roadside Conservation Values

The RCC in conjunction with DEC's GIS section produced a computer-generated map at a scale of 1:100,000 for the Shire of Woodanilling. Known as the Roadside Conservation Value map (RCV map), it shows the conservation status of the roadside vegetation and the width of the road reserves within the Shire of Woodanilling. The data used to produce both the map and the following figures and tables are presented in Appendix 6.

Digital information of remnant vegetation and watercourses on both Crown estate and privately owned land used in the map was obtained from DEC, Main Roads WA and Department of Agriculture and Food WA.

Bockaring Road, Shire Boundary sign.
Photo: RCC

1.3 Roadside Conservation Value Categories

High conservation value roadsides are those with a score between 9 and 12, and generally display the following characteristics:

- intact natural structure consisting of a number of layers, often ground, shrub and tree layers;
- extent of native vegetation greater than 70%, i.e. little or no clearing or disturbance;
- high diversity of native flora, i.e. greater than 20 different species;
- few weeds, i.e. less than 30% of the total plants; and
- high value as a biological corridor, i.e. may connect uncleared areas, contain flowering shrubs, tree hollows and/or hollow logs for habitat and/or support environmentally sensitive areas.

This high conservation value roadside along Carters Rd contains relatively intact, undisturbed and diverse remnant vegetation.
Photo, RCC.

Medium-high conservation value roadsides are those with a score between 7 and 8, and generally have the following characteristics:

- generally intact natural structure, with one layer disturbed or absent;
- extent of native vegetation between 30 and 70%;
- medium to high diversity of native flora, i.e. between 6 and 19 species;
- few to half weeds, i.e. between 30 and 70% of the total plants; and
- medium to high value as a biological corridor and with some habitat features.

Medium-high conservation value roadsides contain a moderate number of native species, some disturbance and weed invasion, but have relatively intact natural structure. For example, Robinson West Road.
Photo: K. Payne, RCC.

Medium-low conservation value roadsides are those with a score between 5 and 6, and generally have the following characteristics:

- natural structure disturbed, i.e. one or more vegetation layers absent;
- extent of native vegetation between 30 and 70%;
- medium to low diversity of native flora, i.e. between 0 and 5 species;
- half to mostly weeds, i.e. between 30-70% of total plants; and
- medium to low value as a biological corridor and with few habitat features. *May still contain ESAs with threatened flora markers*.

Medium-low conservation value roadside Watson Road
Photo: RCC

Low conservation value roadsides are those with a score between 0 and 4, and generally have the following characteristics:

- narrow roadsides with no natural structure i.e. two or more expected vegetation layers absent;
- low extent of native vegetation, i.e. less than 30%;
- low diversity of native flora, i.e. between 0 and 5 different species;
- mostly weeds, i.e. more than 70% of total plants, or ground layer exclusively weeds; and
- low value as a biological corridor and minimal habitat value.

Low conservation value roadsides are typically dominated by weeds and have little or no native vegetation. Sections from Tieline Road (above) Leggoe Road (right).
Photos: K. Payne, RCC

2.0 Using the Roadside Conservation Value (RCV) Map

The Roadside Conservation Value (RCV) map (Figure 1) initially provides an inventory 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, as it enables the condition of roadside vegetation to be easily viewed. This information can then be used to identify environmentally sensitive areas, high conservation value 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 or 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.

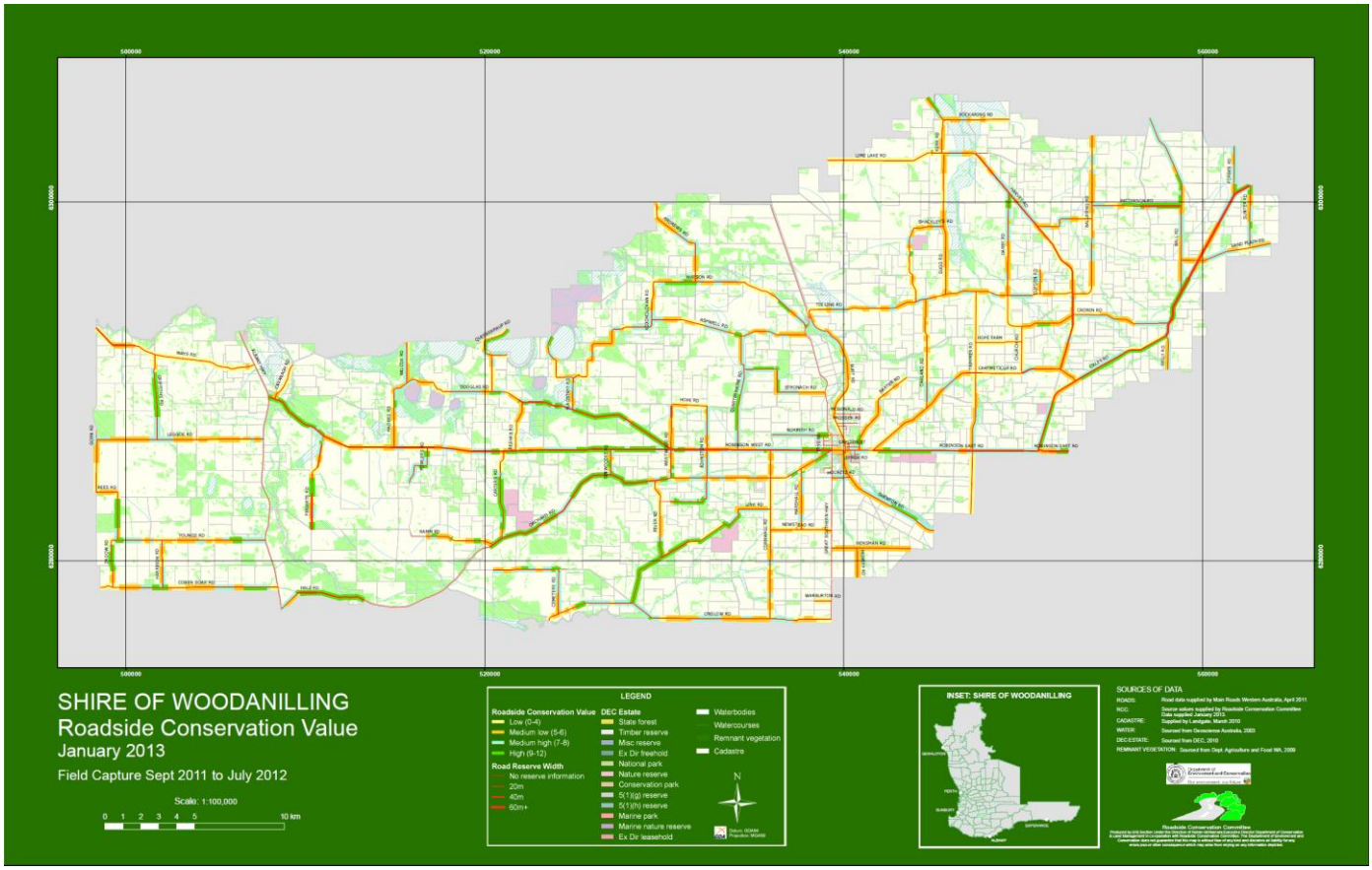


Figure 1. The RCV map depicts Roadside Conservation Values in the Shire of Woodanilling.

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

- roadside vegetation management plans;
- regional or district fire management plans;
- Landcare and/or Bushcare projects that would be able to incorporate the information from this survey into 'whole of landscape' projects; and
- tourist routes, i.e. roads depicted as high conservation value will be attractive, and would provide visitors with a view of the native flora of the district.

The road manager can declare high conservation value roads as Flora Roads. (Robinson Road West - Flora Road)
Photo: K. Payne, RCC

Weed control along Great Southern Highway, Woodanilling.
Photo: D.Morgan, Morgan Rural Services

Landcare projects such as revegetation programs can utilise the information conveyed on roadside conservation value maps.
Photo: D. Perrie, Wagin Woodanilling Landcare Zone

The survey data and map can be used in developing regional or district fire management plans.
Photo: DEC

3.0 Results

Data collected during the Shire of Woodanilling roadside survey has been compiled and a summary is presented in Table 3. Total distances and percentages of roadside occupied by each of the conservation status categories and the attributes used to calculate the conservation values are provided. As roadsides occur on both sides of the road, roadside distances (km) are equal to *twice* the actual distance of roads assessed.

Table 3. Summary of results from roadside survey in the Shire of Woodanilling

Summary Information: Shire of Woodanilling 2013

Length of roadsides surveyed: 1006.46 km (503.23)

Roadside Conservation Status

	Total (km)	(%)
High (9-12)	163.40	16.24
Medium-high (7-8)	275.05	27.33
Medium-low (5-6)	307.41	30.54
Low (0-4)	260.60	25.89
Total	1006.46	100

Native Vegetation in Roadsides

	Total (km)	(%)
2-3 vegetation layers	652.21	64.80
1 vegetation layer	312.10	31.01
0 vegetation layers	42.15	4.19
Total	1006.46	100

Number of Native Plant Species

	Total (km)	(%)
Over 20 species	63.20	6.28
6 to 19 species	204.30	20.30
0 to 5 species	738.96	73.42
Total	1006.46	100

Predominant Adjoining Land Use

	Total (km)	(%)
Cleared	714.30	70.97
Scattered	115.23	11.45
Native Veg	116.70	11.60
Plantation	13.93	1.38
Drainage	0.50	0.05
Urban/Industrial	16.00	1.59
Other	0.60	0.06
Planted Natives	13.50	1.34
Railway Reserve	15.70	1.56
Total	1006.46	100

Weed Infestation

	Total (km)	(%)
Light <30% weeds	644.75	64.06
Medium 30-70% weeds	286.66	28.48
Heavy >70% weeds	75.05	7.46
Total	1006.46	100

Roadside Conservation Values

Score	Total (km)	(%)
0	18.55	1.84
1	23.15	2.30
2	36.30	3.61
3	53.40	5.31
4	129.20	12.84
5	144.81	14.39
6	162.60	16.16
7	164.25	16.32
8	110.80	11.01
9	66.15	6.57
10	43.75	4.35
11	29.70	2.95
12	23.80	2.36
Total	1006.46	100

Width of Vegetated Roadside

	Total (km)	(%)
1 to 5 m	782.36	77.73
5 to 20 m	181.90	18.07
Over 20 m	5.60	0.56
Unknown	36.60	3.64
Total	1006.46	100

Extent of Native Vegetation

	Total (km)	(%)
Over 70%	124.80	12.40
30% to 70%	550.60	54.71
Less than 30%	331.06	32.89
Total	1006.46	100

Habitat Features

	Total (km)	(%)
0	151.35	15.04
1	300.3	29.84
2	358.11	35.58
3 or more	196.7	19.54
Total	1006.46	100

Roadside surveys were carried out in Woodanilling Shire from September 2011 to July 2012

Width of Road Reserve

The RCV map indicates the width of assessed road reserves as well as their conservation value. The width of road reserves was recorded in increments of 20 metres. The majority (77%) of road reserves were 20 metres wide, and almost 10km (2%) of road reserves were 60 metres wide (Table 4 and Figure 2).

Table 4. Width of road reserve in the Shire of Woodanilling

Width of Road Reserve		
Width	Distance (km)	%
20m	388.13	77.13
40m	104.05	20.68
60m	9.85	1.96
Unknown	1.2	0.24
Total	503.23	100

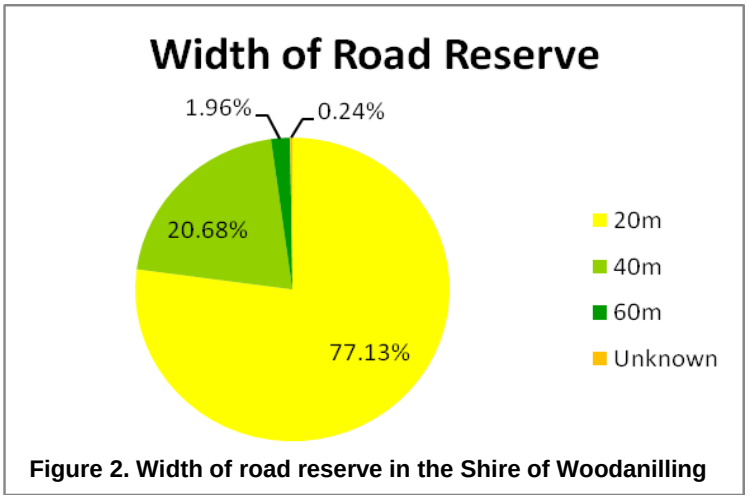


Figure 2. Width of road reserve in the Shire of Woodanilling

Width of Vegetated Roadside

The width of roadside vegetation is closely linked with its' resilience and is often related to conservation value. The wider the reserve, the more resilient to disturbance it is, and often the higher conservation value it has (i.e. more bush equals more habitat, generally in better condition). The width of vegetated roadside was recorded by selecting one of three categories: 1-5 metres, 5-20 metres or over 20 metres in width. The left and right hand sides were recorded independently, and then summed to give the figures presented here (Table 3 and Figure 3). Most roadsides (78%) had vegetation between 1 and 5 metres wide, and most of the remaining roadsides (18%) had vegetation between 5 and 20 metres wide. This indicates that the great majority of roadsides in the shire are vulnerable to disturbance, and that care will be needed to prevent a marked decline in condition. .

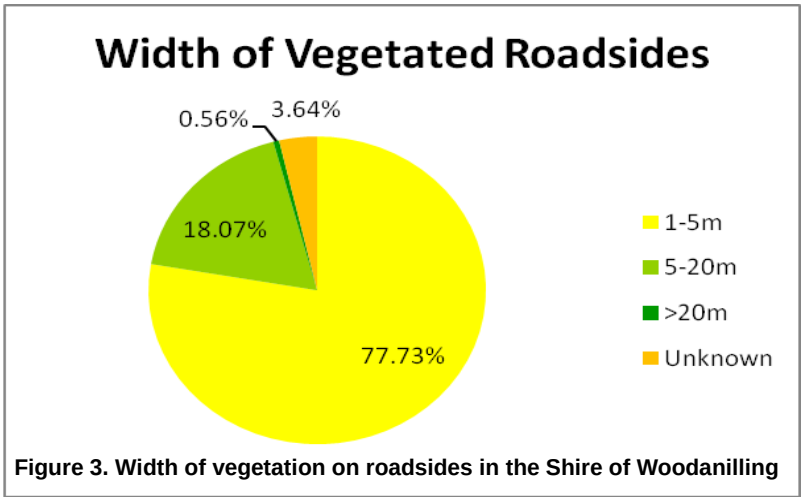


Figure 3. Width of vegetation on roadsides in the Shire of Woodanilling

Structure of Native Vegetation on Roadsides

The number of native vegetation layers present, i.e. tree, shrub and/or ground layers, determined the 'native vegetation on roadside' value. Most roadsides (65%) still had two to three layers of native vegetation present (Table 3 and Figure 4). This vegetation will maintain more natural ecosystem function than that with one or no layers of native vegetation. It will also have value to a greater range of plants and animals. The tree layer is often retained in road management - this is very positive, as they are long-lived and provide both home and food for many vertebrates and invertebrates. However, retaining the shrub and ground layers is also extremely important for conservation, as they provide home and food for a different set of species. These layers also do a great deal to suppress weeds, and in wildflower season will provide a colourful display for residents and tourists. If care is taken during maintenance such as pruning, slashing and clearing, these layers should persist with minimal input.

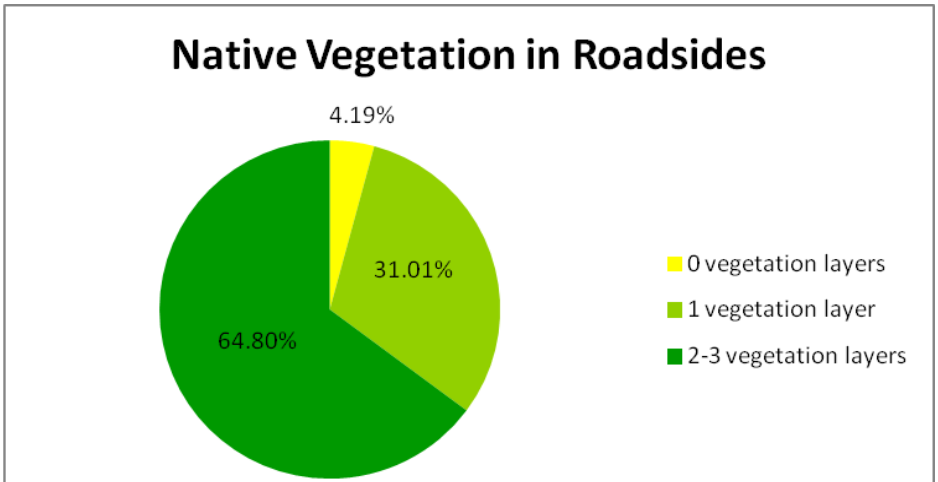


Figure 4. Structure of native vegetation on roadsides in the Shire of Woodanilling

Number of Native Plant Species

As mentioned in Section B, Western Australia has a very high number of native plant species in world terms, with many restricted to small areas of the state. In Woodanilling, a diverse range of native plant species would be expected in intact vegetation. The 'number of native plant species' score provides a measure of the diversity of the roadside vegetation. Survey sections with over 20 plant species spanned only 6% of the roadsides surveyed, while 74% of surveyed roadsides contained less than 5 plant species (Table 3 and Figure 5). These figures suggest that natural plant diversity is dropping in roadside vegetation and with it the range of animals that can be supported there. Hopefully these species persist in larger remnants of vegetation, but the ease with which residents and tourists can see and appreciate local fauna is falling. Likewise, the animals' ability to traverse the landscape to meet their various needs is also dropping.

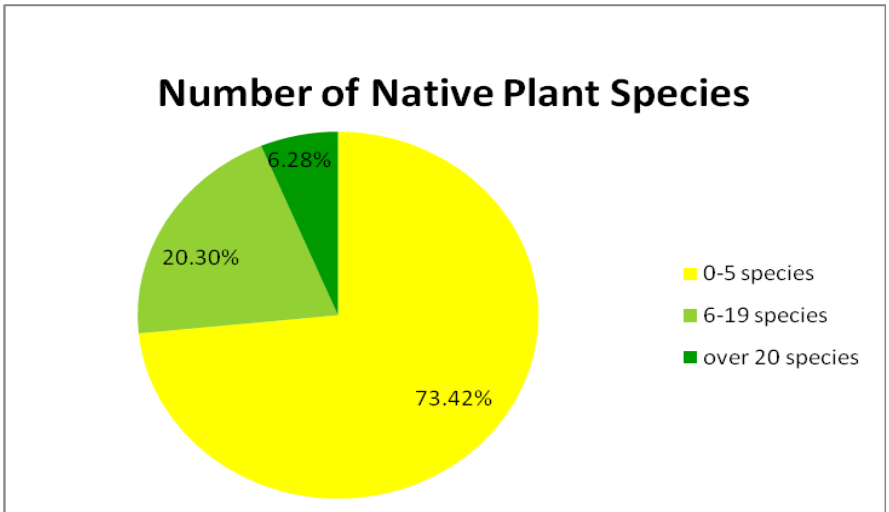


Figure 5. Number of native plant species on roadsides in the Shire of Woodanilling

Extent of Native Vegetation

The 'extent of native vegetation' cover refers to the continuity of the roadside vegetation and takes into account the presence of disturbances such as weeds. Gaps in vegetation cover provide more opportunity for weeds to establish and spread. Roadsides with extensive vegetation cover, i.e. greater than 70%, occurred along 125 km of the roadsides surveyed. Survey sections with medium vegetation cover, i.e. 30% to 70%, accounted for 551 km of the roadsides. The remaining 331km had less than 30% native vegetation cover, and would therefore be very vulnerable to weed incursion (Table 3 and Figure 6).

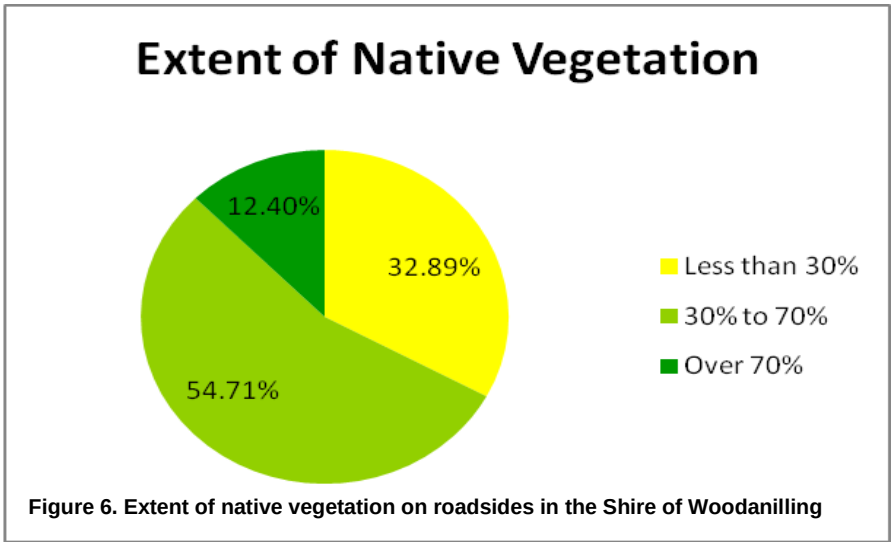


Figure 6. Extent of native vegetation on roadsides in the Shire of Woodanilling

Habitat Value

This factor considered the presence of five attributes: connection of remnant vegetation patches; presence of flowering shrubs; presence of large trees with hollows; presence of hollow logs; and environmentally sensitive areas. Roadsides with a high number (more than 3 out of 5) of habitat features were present along 19% (197km) of the roadsides surveyed. Roadsides having no habitat features at all were recorded along relatively few, 15% (151km) of the roadsides (Table 3 and Figure 7). This indicates that most of the roads in the shire are serving at least some habitat function.

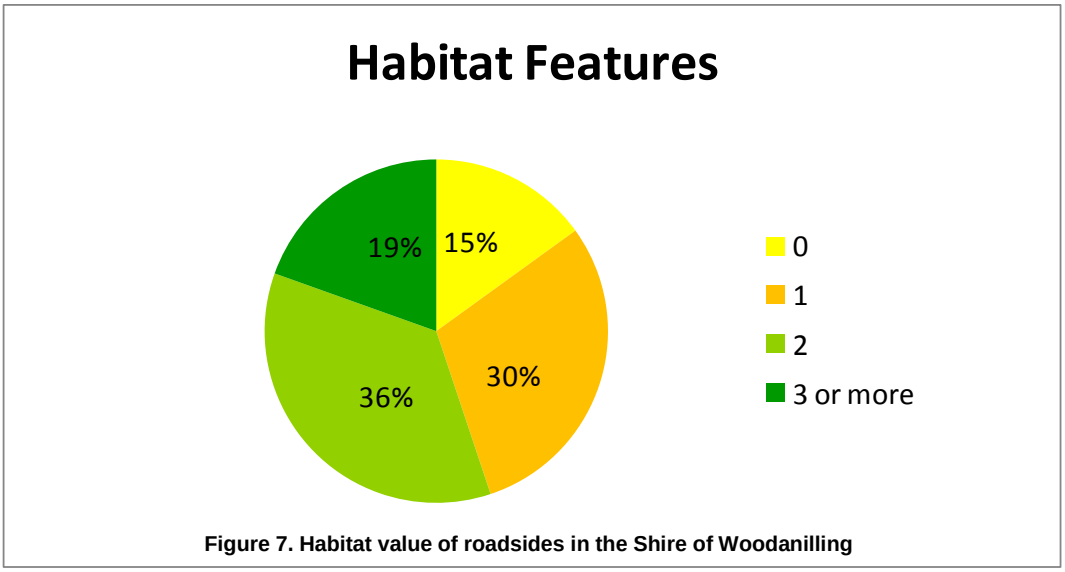


Figure 7. Habitat value of roadsides in the Shire of Woodanilling

Roadside Vegetation Types

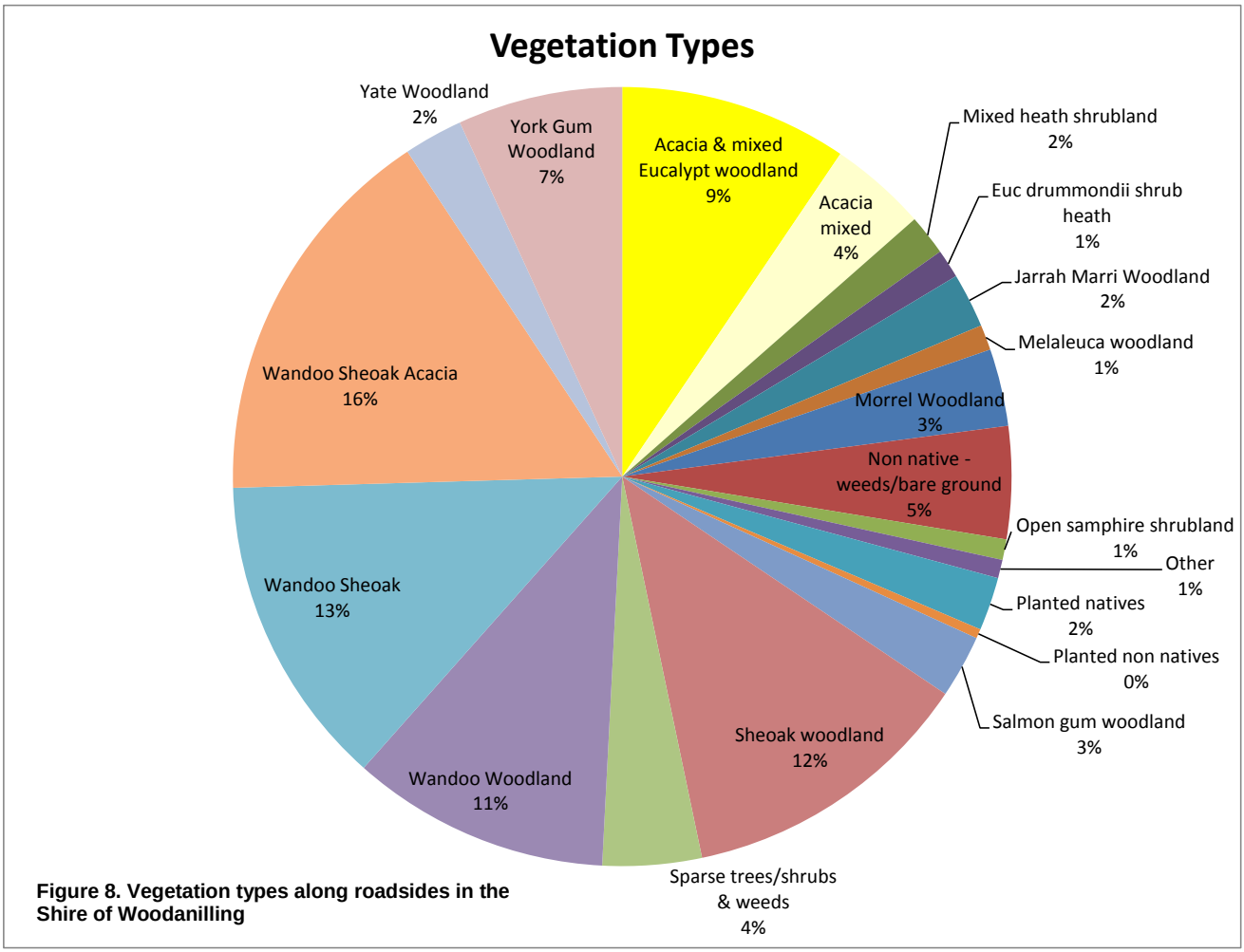


Figure 8. Vegetation types along roadsides in the Shire of Woodanilling

Surveyors were asked to record the main vegetation type along each section of roadside to identify the variety of types present, and those which are particularly characteristic of the shire. The most common vegetation type was Wandoo-Sheoak-Acacia woodland, which was recorded along 163km of roadsides in the Shire of Woodanilling. Wandoo Sheoak (131km) and Sheoak woodland (124km) were also relatively common vegetation types. A range of other woodlands (e.g. York gum, salmon gum, morrel) and shrublands (mixed acacia, open samphire) were recorded, as well as a few 'other' categories such as weeds/bare ground, plantings and sparse natives over weeds. (Figure 8).

3.1 Threats

Weed Infestation

Light levels of weed infestation (weeds comprising less than 30% of total plants), were recorded on most of the roadsides surveyed (645 km), while heavy infestations (more than 70% of the plants present were weeds) were recorded on 287 km of roadsides surveyed (Table 3 and Figure 9).

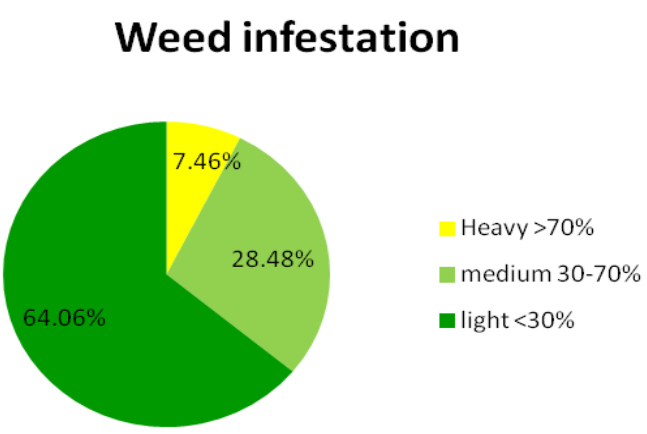


Figure 9. Weed infestations along roadsides in the Shire of Woodanilling.

Nominated Weeds

The following weeds were chosen by the shire landcare coordinator for the Shire of Woodanilling survey

- Afghan melon (*Citrullus lanatus*)
- Afghan thistle (*Solanum hoplopetalum*)
- Boneseed (*Chrysanthemoides monilifera*) – a Weed of National Significance (WON)
- Bridal creeper (*Asparagus asparagoides*)
- Cape tulip (*Moraea* sp.)
- Soursob (*Oxalis pes-caprae*)

Due to one or no infestations being found, Afghan thistle, Cape tulip and boneseed were not depicted on clear overlays accompanying the 2013 Roadside Conservation Value Map. Infestations of Cape tulip may not have been identified due to the time of year the survey took place (Cape tulip does not flower in summer/autumn). Boneseed appears to have been controlled effectively – a great outcome. There was only one infestation of Afghan thistle noted, which occurred on Leggoe Rd. Overlays for nightshade, prickly paddy melon and percentage of general weeds were plotted instead.

Roadside populations of chosen weeds were recorded as being present in the road reserve, and were not recorded specifically for the left and/or right hand sides. Therefore, the occurrence of each weed (in kilometres) indicates the presence of the weed within the road reserve generally.

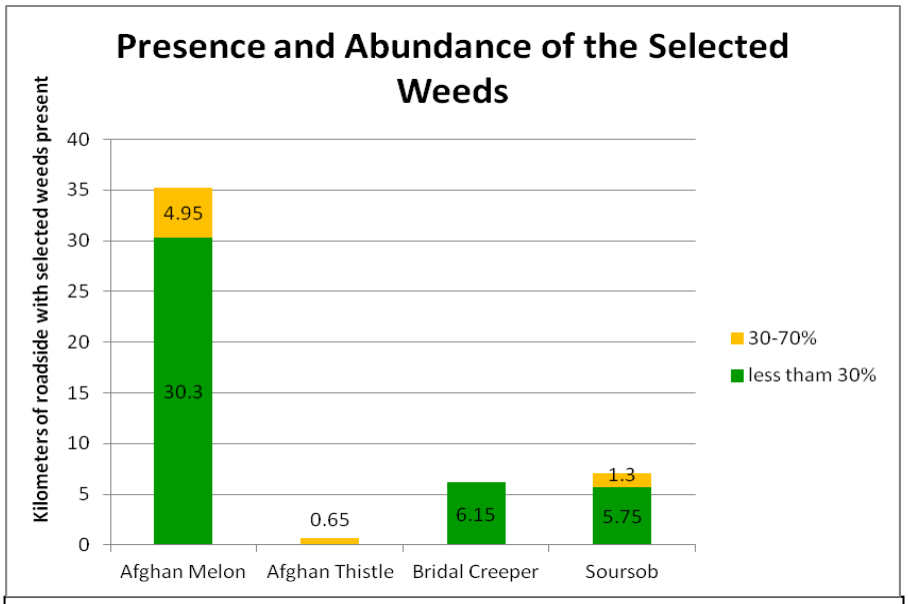
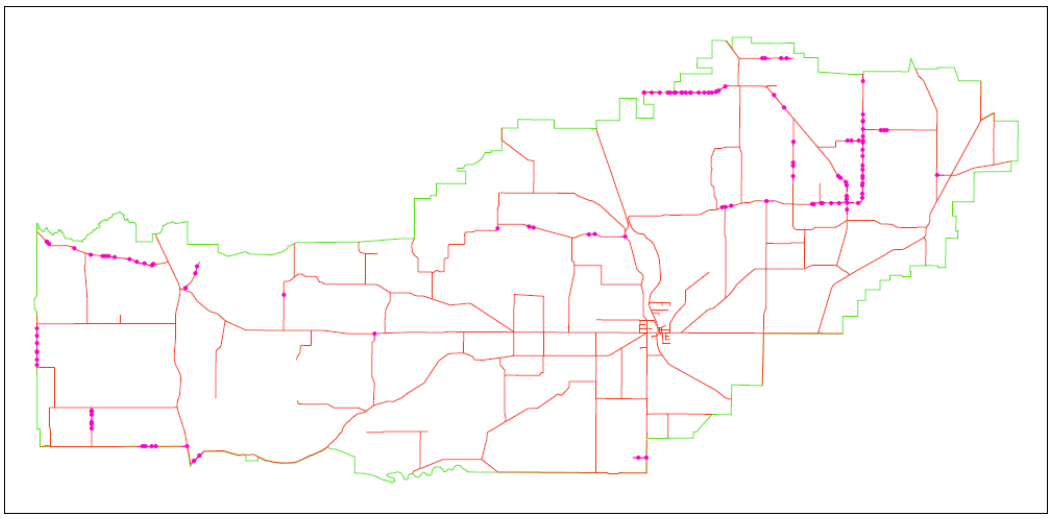


Figure 10. Presence and abundance of chosen weeds along roadsides in the Shire of Woodanilling

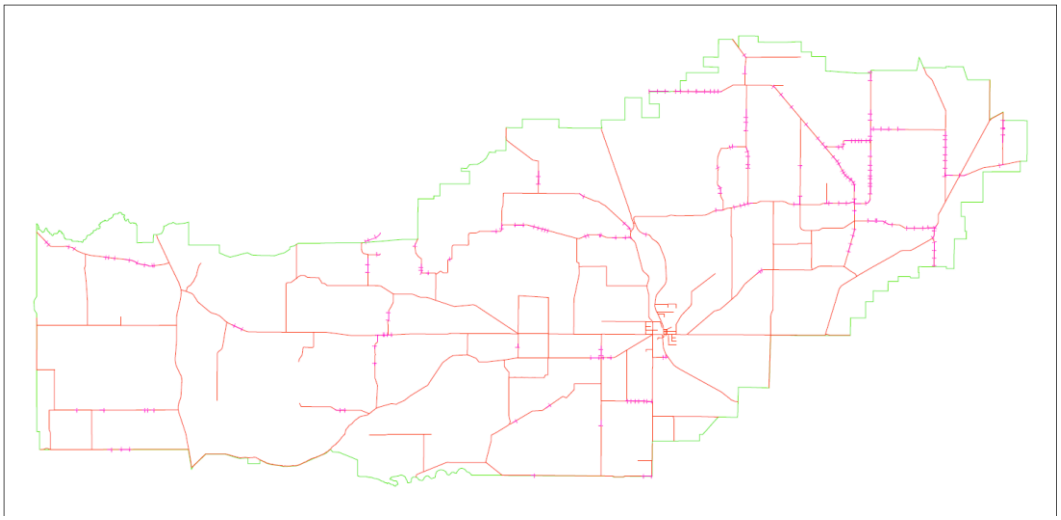
Of the selected weed species, Afghan melon was the most prevalent and was recorded on 35.25 kilometres of the roads surveyed, although for most of this distribution it was at a density of less than 30%. The next most commonly recorded weeds were soursob (7.05km) and bridal creeper (6.15km) respectively. Like Afghan melon, most records of soursob and bridal creeper were at a density of less than 30%. Control of these weeds will need to be done with care to minimise harm done to the native vegetation. If the native vegetation maintains or improves in health, it will help to suppress future weed levels. Afghan thistle occurred densely, but only along 650 metres of roadside (Figure 10). Eradication of Afghan thistle from the shire thus looks achievable within the relatively short term. Contact RCC if advice on control methods is required.

Figure 11 shows the spatial extent of these weeds on a simplified version of the Woodanilling map. These are shown in more detail on the weed overlays provided with the Roadside Conservation Value map.

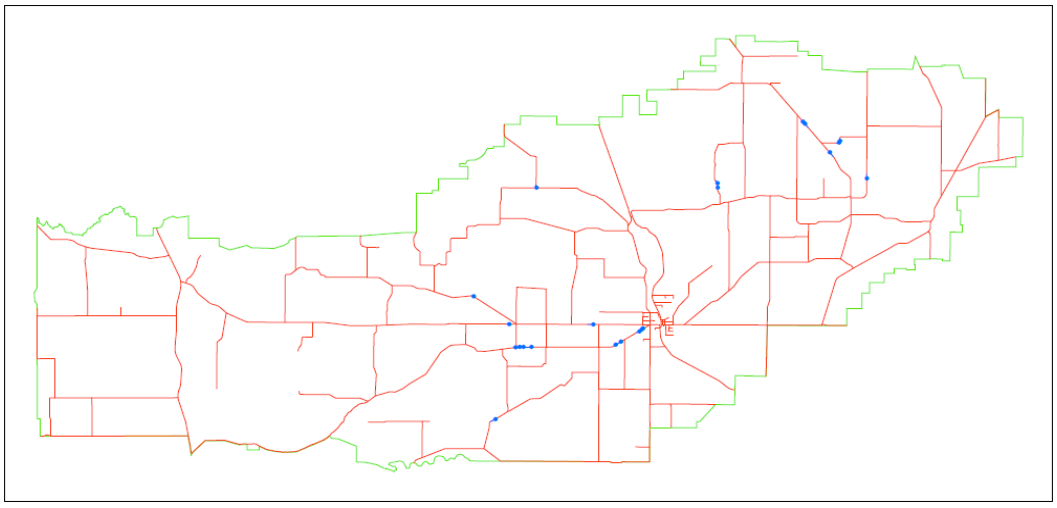
Appendix 7 provides a table and graphs of all additional weeds recorded along roadsides (km) throughout the September 2011 to July 2012 surveys. The final data sheet (on CD attached) is a comprehensive spreadsheet which shows all weeds recorded along roadsides during the surveys.



Afghan melon



Prickly paddy melon



Bridal creeper

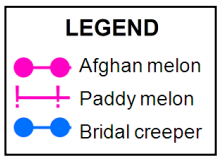
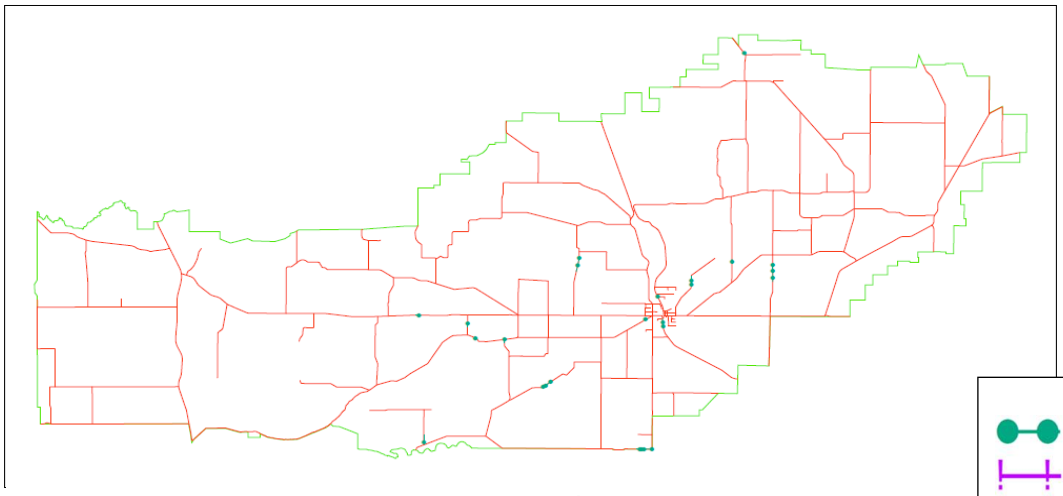
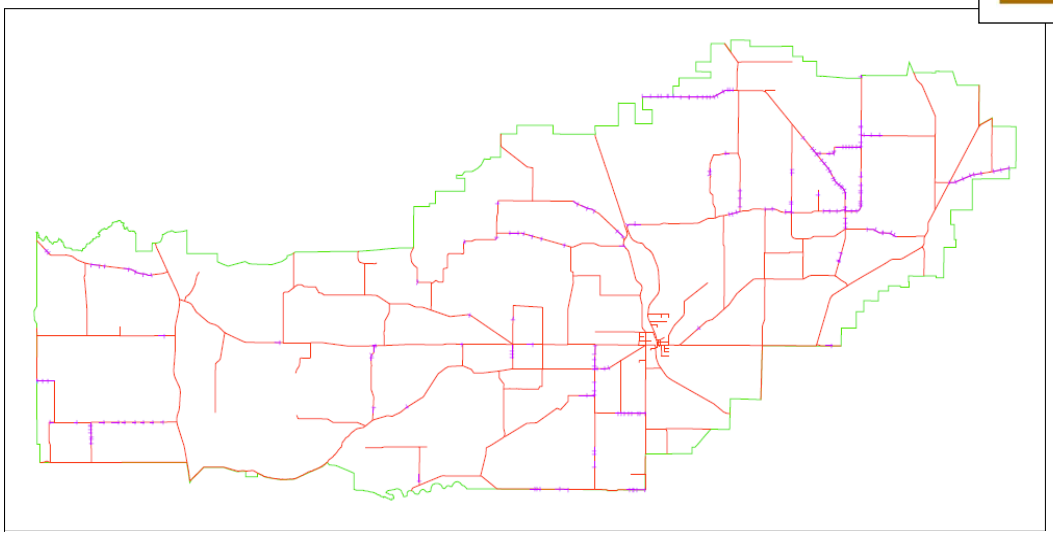


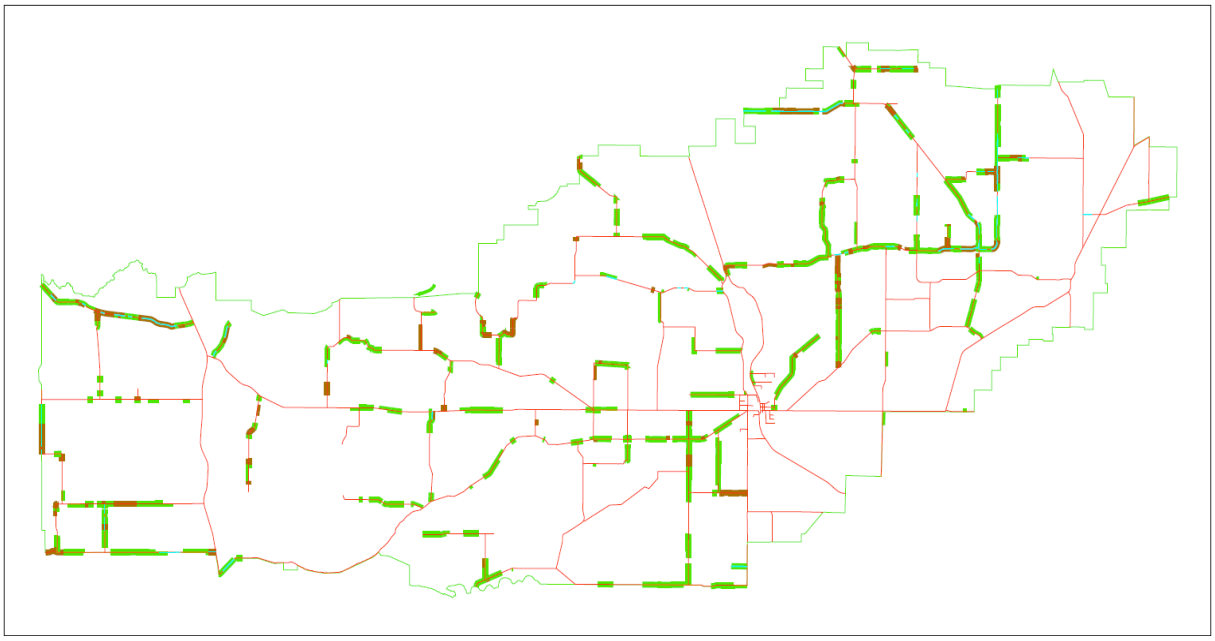
Figure 11. Spatial extent of nominated weeds on roadsides in the Shire of Woodanilling



Soursob



Nightshade



General Weeds

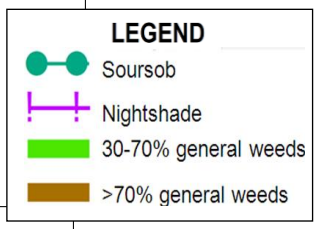


Figure 11. Spatial extent of nominated weeds on roadsides in the Shire of Woodanilling

Feral Animals – Rabbits

There was no evidence or sightings of rabbits on 97% (975km) of the roadsides surveyed. On 3% (32km) of road reserves there was evidence (e.g. warrens) of the presence of rabbits (Figure 12). This is positive for the condition of vegetation, as rabbits foster weeds through their disturbance of soil and spread of weed seed.

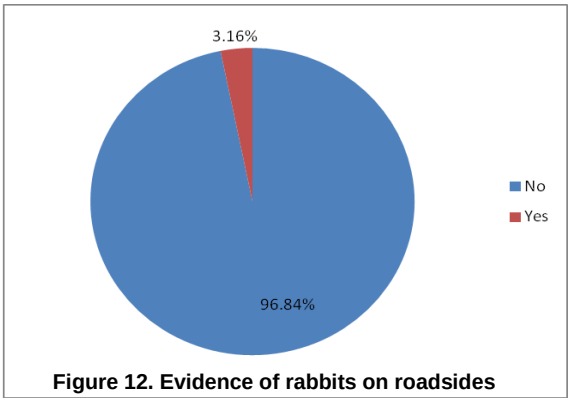


Figure 12. Evidence of rabbits on roadsides

Tree Decline

Roadside surveyors were asked to record areas of tree decline and to suggest a possible reason for that decline where possible. Of the roadsides surveyed, 73% (741km) did not have noticeable signs of tree decline. The majority of tree decline recorded (13%) was from an unknown cause, and salinity was given as the likely reason for a further 10% (98 km) of tree decline. Three percent of roadsides were possibly affected by drought (Figure 13).

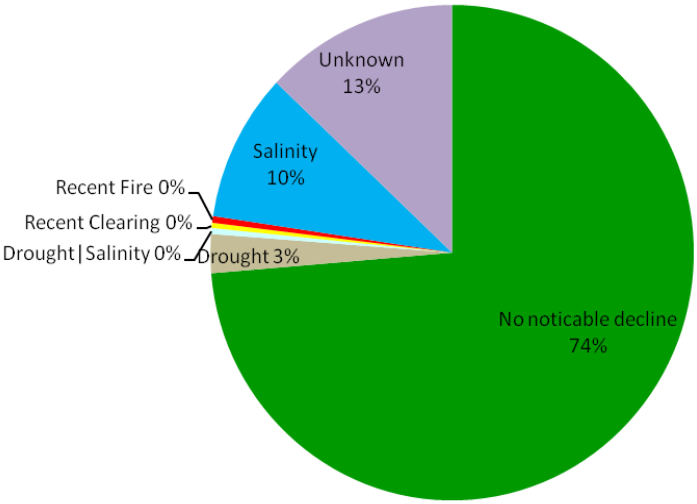


Figure 13. Possible reasons for tree decline

Adjoining Land Use

Most (71%) (714 km) of roadsides adjoined land that had been completely cleared, and land cleared for agriculture but retaining scattered native vegetation (e.g. paddock trees) adjoined another 11% (115 km) of the roadsides. Remnant native vegetation adjoined 12% (117 km) of surveyed roadsides. It is important to protect these areas from weed invasion to prevent the roadside acting as a launchpad for weeds into these larger areas of vegetation (Table 3 and Figure 14).

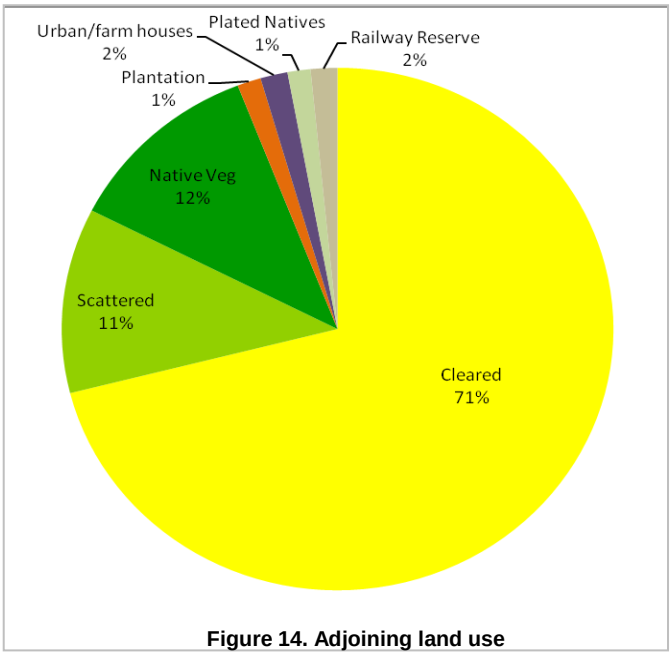


Figure 14. Adjoining land use

Roadside Conservation Value Scores

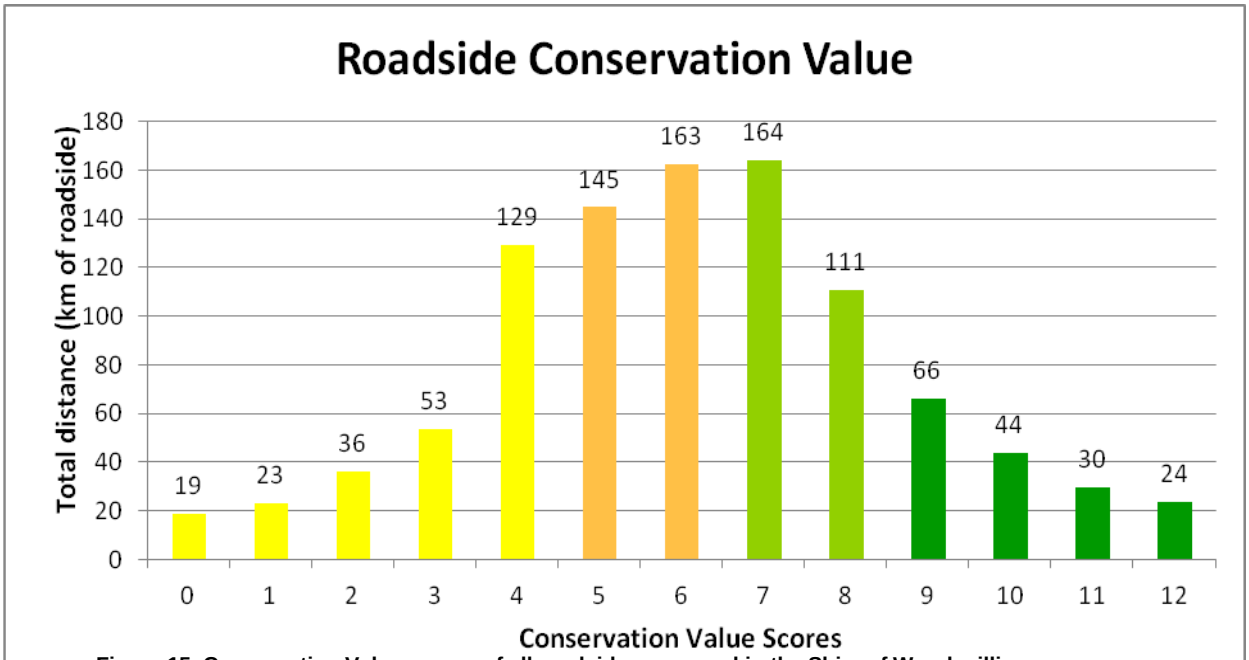


Figure 15. Conservation Value scores of all roadsides surveyed in the Shire of Woodanilling

Roadside conservation value (RCV) scores were calculated for each section of roadside surveyed. Scores range from 0 to 12, from lowest to highest conservation value respectively (Figure 15). These figures follow a standard bell curve, with the extremes at either end much less common than the middle range of scores. The single most commonly occurring RCV score was 7, followed by 6, 5 and 4. There is a slight tendency to the lower value end, with a total of 261 kilometres (26%) of roadsides rated as Low (coloured yellow in Figure 15), and 307 kilometres (31%) rated as Medium-low (orange), versus 275 kilometres (27%) rated as Medium-high (pale green) and 163 kilometres (16%) rated as High (dark green). (Table 3 and Figure 16). However, there is room to be pleased that almost half of the roadsides are of medium high to high conservation value considering all the pressures that this vegetation has faced and continues to face in the years since extensive agriculture was established in the area. This resilience is considerable.

The conservation status category indicates the combined conservation value of roadsides surveyed in the Shire of Woodanilling

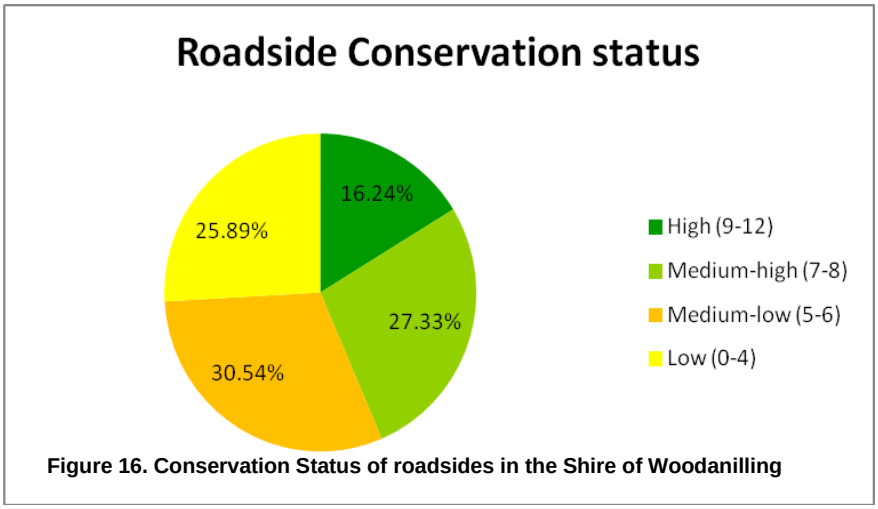


Figure 16. Conservation Status of roadsides in the Shire of Woodanilling

3.2 Comparison with previous Shire of Woodanilling survey

Roadside conservation mapping was undertaken previously for the Shire of Woodanilling in 1997/98. A comparison with the 2011/12 survey is presented in Table 5. It should be noted that there were differences in the equipment used, some of the attributes recorded and in the way that different observers see and record things, but large differences are likely to be the result of change over time rather than observer bias.

Summary Information: Shire of Woodanilling

Comparison of 1997/98 survey with 2011/12 survey

Roadside Conservation Status

	1997/98 (%)	2011/12 (%)
High (9-12)	17.3	16.2
Medium-high (7-8)	27.4	27.3
Medium-low (5-6)	46.0	30.5
Low (0-4)	9.4	25.9
Total	100.0	100.0

Native Vegetation in Roadsides

	1997/98 (%)	2011/12 (%)
2-3 vegetation layers	27.1	64.8
1 vegetation layer	70.6	31.0
0 vegetation layers	2.3	4.2
Total	100.0	100.0

Number of Native Plant Species

	1997/98 (%)	2011/12 (%)
Over 20 species	17.0	6.3
6 to 19 species	74.3	20.3
0 to 5 species	8.7	73.4
Total	100.0	100.0

Adjoining Land Use

	1997/98 (%)	2011/12 (%)
Cleared	1.6	71.0
Scattered	93.0	11.4
Native Veg	5.2	11.6
Plantation	0.0	1.4
Drainage	0.0	0.0
Urban/Industrial	0.0	1.6
Other	0.1	0.1
Plated Natives	0.0	1.3
Railway Reserve	0.1	1.6
Total	100.0	100.0

Weed Infestation

	1997/98 (%)	2011/12 (%)
Light <30% weeds	26.5	64.1
Medium 30-70% weeds	66.4	28.5
Heavy >70% weeds	7.1	7.5
Total	100.0	100.0

Roadside Conservation Values

Score	1997/98 (%)	2011/12 (%)
0	0.0	1.8
1	1.3	2.3
2	2.3	3.6
3	2.0	5.3
4	3.8	12.8
5	13.8	14.4
6	32.1	16.2
7	20.4	16.3
8	7.0	11.0
9	7.7	6.6
10	6.4	4.3
11	3.2	3.0
12	0.0	2.4
Total	100.0	100.0

Width of Vegetated Roadside

	1997/98 (%)	2011/12 (%)
1 to 5 m	78.3	77.7
5 to 20 m	20.0	18.1
Over 20 m	0.2	0.6
Unknown	1.5	3.6
Total	100.0	100.0

Extent of Native Vegetation

	1997/98 (%)	2011/12 (%)
Over 70%	5.1	12.4
30% to 70%	82.5	54.7
Less than 30%	12.4	32.9
Total	100.0	100.0

Habitat Features / Biological Corridor Value

	1997/98 (%)	2011/12 (%)
High	32.0	19.5
Medium	50.3	65.4
Low	17.7	15.0
Total	100.0	100.0

Table 5. Comparison of summary of results from the 1997/98 and 2011/12 roadside surveys in the Shire of Woodanilling

The results show that between 1997/98 and 2011/12 there has been a slight decrease in the percentage of high conservation status vegetation (from 17% to 16%), while the medium-high conservation status vegetation has remained steady. There has been a decrease in medium-low vegetation from 46% to 30% and a large increase in low conservation value roadside vegetation (from 9% to 25%) (Figure 17). These results highlight the relative stability of high conservation value vegetation, and the ongoing decline in conservation value that follows fragmentation of the natural vegetation.

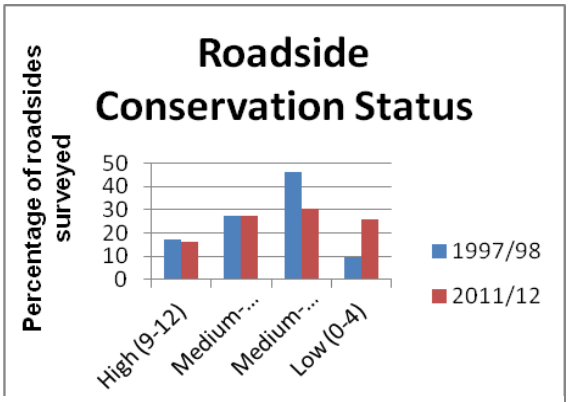


Figure 17. Comparison of conservation status for Woodanilling from 1997/98 to 2011/12.

The **adjoining landuse** results indicate a dramatic loss of scattered vegetation (from 93% in 1997/98 to 11% in 2011/12) and corresponding sharp rise in completely cleared land (from 1.6% to 71%). This suggests small pockets of vegetation and/or paddock trees on agricultural land are being removed. Whether this is due to vegetation death from salinity or other threats, or clearing to accommodate larger machinery or similar is not recorded, but it represents a strong pattern of declining vegetation support for roadside vegetation. Interestingly, the proportion of uncleared native vegetation rose from 5.2% in 1997/98 to 12% in 2011/12. (Figure 18). This figure is quite surprising. It may be because there were some different roads surveyed and/or some of the planted natives are now established and are appear similar to uncleared native vegetation.

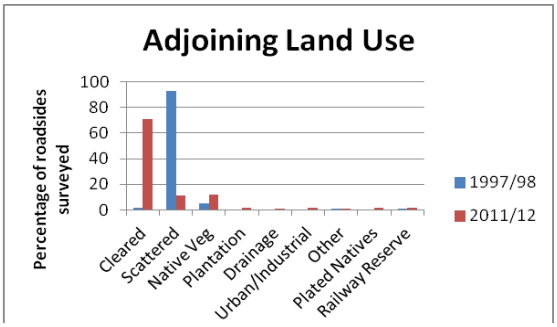


Figure 18. Comparison of adjoining landuses for Woodanilling from 1997/98 to 2011/12.

From 1997/98 to 2011/12 **width of vegetated roadside** remained fairly constant. Results show that 38% of roadsides improved from having just one layer of vegetation structure to having 2-3 layers by 2011/12. Rainfall records indicate that the Katanning area had strong rainfall from May 2011 right through until January of 2012 (see Appendix 8) – perhaps this unusually high rainfall through the summer of 2011 promoted survival of germinated shrubs and herbs.

Species diversity dropped from 1997/98 to 2011/12. The percentage of roadsides with over 20 different plant species recorded fell from 17% to just 6%. This is unfortunate, as high species diversity helps to meet a diversity of different ecosystem needs and functions.

Medium density **weed infestation** (30-70%) decreased from 66% in 1997/98 to 28% in 2011/12. This may reflect the effectiveness of shire weed control activities. Heavy weed infestations (>70%) remained the same at 7%.

With regards to the **extent of native vegetation**, the gap between high and low connectivity widened from 1997/98 to 2011/12, with more roadsides with highly connected vegetation (>70%), but also more roadsides with poorly connected vegetation (<30%). In the middle there was a decrease from 82% to 55%.

A rise from 50% to 65% in medium value as a **biological corridor** gave a corresponding decrease in high value from 32% to 19%.

Graphs comparing the results from the 1997/98 and 2011/12 roadside surveys in the Shire of Woodanilling are displayed in Appendix 9.

3.3 Comparison of conservation status with nearby shires

Roadside conservation mapping has been undertaken at five adjoining Shires with comparable vegetation and landscapes to Woodanilling: Wagin in 2004/5, Dumbleyung in 2005, Katanning in 2005/6, Kojonup in 1998/99 and West Arthur in 1993. West Arthur had the largest percentage of high conservation value roadsides (58%). Kojonup and Dumbleyung had 30 and 25% Woodanilling came 4th with 16% and Katanning and Wagin had the lowest with 12% and 8 % respectively (Figure 19). It is likely that the roadside conservation status values recorded for the other shires have decreased since being surveyed 8 to 20 years ago. This is due to the general trend of declining vegetation condition along roadsides.

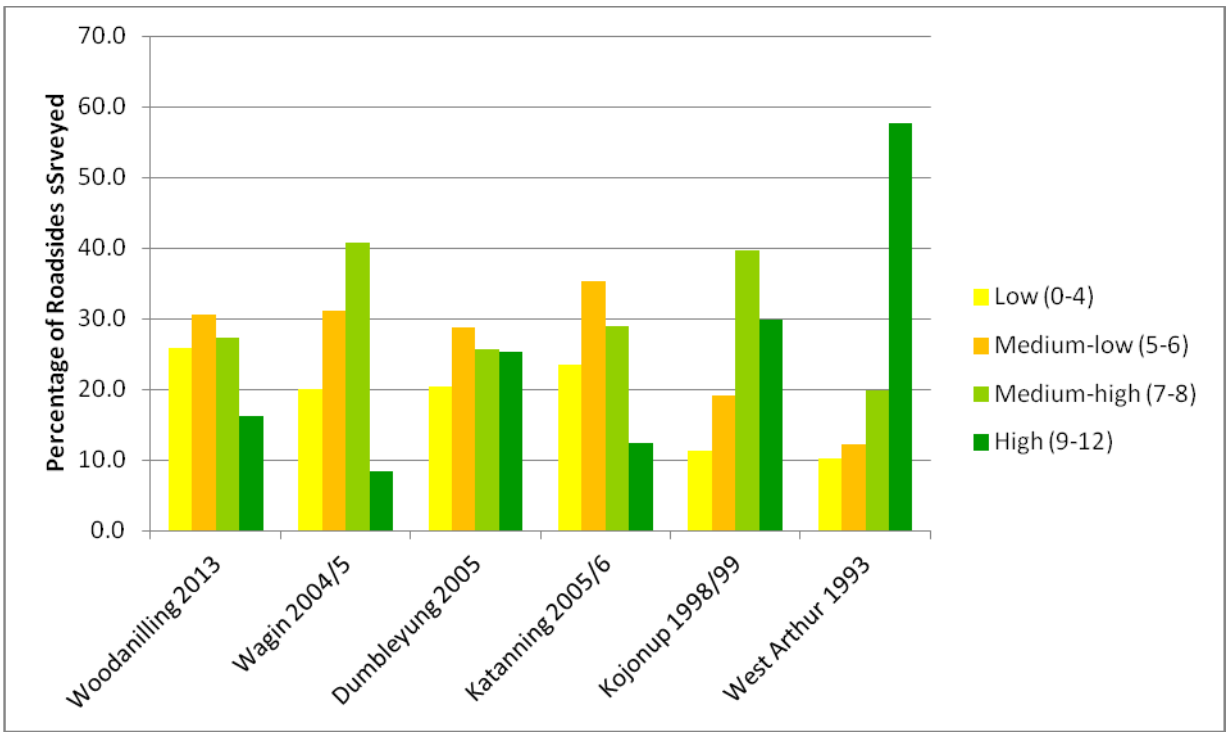


Figure 19. Comparison of conservation status with nearby shires

3.4 Flora Roads

A Flora Road is one which has special conservation value because of the vegetation contained within the road reserve. The Roadside Conservation Committee has prepared *Guidelines for the Nomination and Management of Flora Roads* (Appendix 3).

Robinson Rd West is currently the only Flora Road in the Shire of Woodanilling. It was surveyed in 2007 and declared in May 2008. Link and River Roads were nominated and assessed in 2012. The roadside survey and the 2013 RCV map highlighted a number of other roadsides that have the potential to be declared as Flora Roads. Roadsides, or large sections of roadsides, determined as having high conservation value in the Shire of Woodanilling include:

- Carters Road
- Douglas Road
- Griffiths Road
- Hale Road
- Link Road
- Orchard Road
- Oxley Road
- Patterson Road
- Robinson West Road
- Robinson East Road
- River Road

Robinson West Road, declared in May 2008
Photos: K. Payne, RCC

If nominated, these roadsides would need to be assessed by the RCC to determine their suitability as Flora Roads as landscapes, tourism, access and other factors, not just the roadside conservation value score, are taken into account.

Banksias on River Road (above) and a Honeypot dryandra (*Banksia nivea*) on Link Road (right). Both are recently nominated Flora Roads
Photos: K. Payne, RCC

PART D

ROADSIDE MANAGEMENT RECOMMENDATIONS

1.0 Management recommendations

The primary aim of road management is the creation and maintenance of a safe, efficient road system. However, there are often important conservation values within the road reserve and thus this section provides general management procedures and recommendations that will assist in retaining and enhancing roadside conservation values.

The Executive Officer of the Roadside Conservation Committee is also available to provide assistance 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:

- *Guidelines for Managing Special Environmental Areas in Transport Corridors*
- *Handbook of Environmental Practice for Road Construction and Maintenance Works*
- *Biodiversity Conservation and Fire in Road and Rail Reserves: Management Guidelines*

1.1 Protect high conservation value roadsides by maintaining and enhancing the native plant communities.

This can be achieved by:

- retaining remnant vegetation
- minimising disturbance to existing roadside vegetation
- minimising disturbance to soil
- preventing or controlling the introduction of weeds.

1.2. Promote and raise awareness of the conservation value associated with roadside vegetation by:

- establishing a register of Shire roads important for conservation
- declaring suitable roadsides as Flora Roads
- incorporating Flora Roads into tourist, wildflower and/or scenic drives.

1.3 Improve roadside sections of medium to low conservation value by:

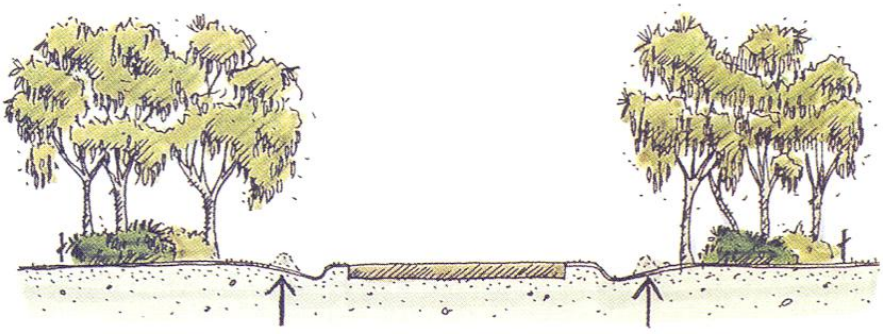
- minimising disturbance caused by machinery, adjoining land practices and incidences of fire
- carrying out a targeted weed control program
- retaining remnant trees and shrubs
- allowing natural regeneration
- spreading local native seed to encourage regeneration
- encouraging revegetation projects by adjacent landholders.

Revegetation area along Zadow Rd
Photo: K. Payne, RCC.

2.0 Minimising Disturbance

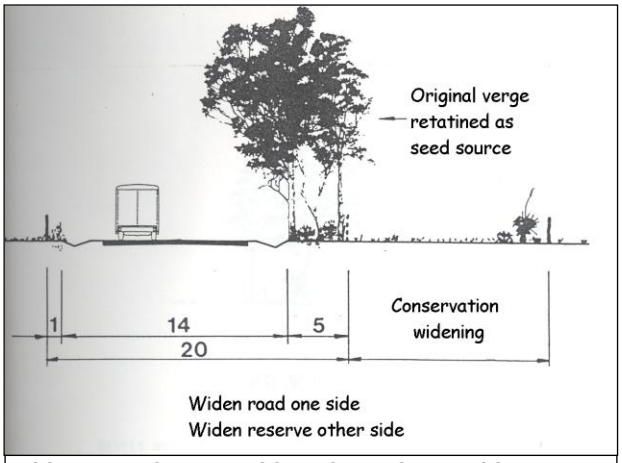
Minimal disturbance can be achieved by:

- 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;
- applying the Fire and Roadside Assessment before burning roadside vegetation and using methods other than fuel reduction burns to reduce fire threat. Refer to the Management Strategies recommended in '*Biodiversity Conservation and Fire in Road and Rail Reserves: Management Guidelines'.*
- 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; and
- encouraging revegetation projects by adjacent landholders.



Avoid windrowing drain material into vegetation

Creative solutions: A high value Flora Road in the Shire of Plantagenet. Passing lanes were established at various locations along the road to eliminate the need for widening the whole road.
Photo: C. Macneall, RCC.



Widen a road to one side only so that a wider section of roadside vegetation is retained on the other side of the road reserve.

3.0 Planning for Roadsides

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 the likelihood of a plan which 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. For training enquiries please contact the RCC Executive Officer on (08) 9334 0423.

4.0 Setting Objectives

The objective of all roadside management 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

5.0 Specific recommendations for Woodanilling roadsides

5.1 Weed management

- Identify a 5-10 weeds to target for control in high value areas such as Flora Roads and high conservation value roads. For example, afghan melon, prickly paddy melon, African lovegrass, veldt grass, wild oats, nightshade and stinkwort.
- Identify 5 – 10 weeds with small infestations on a small number of roadsides to target for eradication. (See graph in Appendix 7 'Extent of additional weeds covering less than 5km of roadside) For example afghan thistle, blackberry, caltrop, eastern states wattles, tagasaste and spiny rush.

Refer to weed overlays provided with the RVC Map, the graphs in Part C and Appendix 7 of the Report, the comprehensive data sheet on the CD and the RCC Environmental Roadside Weed List http://www.dec.wa.gov.au/management-and-protection/conservation-on-other-lands/roadside-conservation/roadside-conservation-committee-publications.html for suggestions.

Refer to the DEC website for control methods and resources http://www.dec.wa.gov.au/management-and-protection/plants/invasive-plants/control-methods.html

5.2 Revegetation

Identify 5-10 areas on high value roads (e.g. Flora Roads) suitable for revegetation.

For example, sections such as:

- Robinson West Road between Cornwall and Westwood Roads, and/or between Reske and Fiegerts Roads
- Orchard between Marshall and River Road
- northern part of River Road
- north-eastern part of Link Road
- western part of Douglas Road
- small part of Patterson Road
- small parts of Robinson East Road

Refer to the Roadside Conservation Map and look for small low conservation sections in otherwise high to medium high conservation roads.

6.0 Conclusion

The Shire of Woodanilling has some high conservation roadsides with intact native vegetation with a high diversity of species and habitat for native fauna. Selective weed management near these areas is a priority to ensure they remain intact. Otherwise they will gradually decline in condition, as can be seen in the comparison with the previous roadside survey. The percentage of low conservation roadsides has more than doubled since the previous survey (Figure 17) and many of these roadsides have been taken over by weeds causing a greater fire hazard and/or causing salinity and erosion problems. The landcare, aesthetic, tourism, environmental and cultural values of roadside vegetation cannot be overestimated. It is a priceless resource that once removed or degraded requires considerable effort time and expense to replace.

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APPENDICES

Roadside Vegetation and Conservation Values in the Shire of Woodanilling

Appendix

1

RCC VERGE NOTE

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

APPENDIX 1
GUIDELINES FOR MANAGING THE HARVESTING OF NATIVE FLOWERS, SEED AND TIMBER FROM ROADSIDES

Introduction

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 include material for making didgeridoos, other types of craft wood, and stakes or poles for various purposes.

The implementation of these simple guidelines by road managers for the removal of flora and timber material from the roadsides will ensure that the vegetated roadside reserve is 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 Environment and Conservation (DEC) and/or the RCC for advice. Licences allowing the taking of roadside flora may be issued by DEC 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 means that a person can 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, such as those approved under the *Environmental Protection (Clearing of Native vegetation) Regulations 2004*. 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.

In issuing a licence, DEC is required to be assured that the activity will not compromise the conservation of the flora. In determining this, DEC will seek advice from the road manager 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, potentially providing a significant financial boost to local economies. Wildflower harvesting in many instances detracts from the biodiversity and tourism values of the roadside and should therefore be discouraged.

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. However, 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 and has a smaller impact on biodiversity. 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. Road managers have been discouraged from supporting or allowing such harvesting to occur, but 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 one of few sources of such seed.

Seed production is an important component of remnant vegetation. Some species, called re-seeder species, regrow only from seed 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 continuity 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 managing authority may consider giving permission for collection of seed from roadsides. Such collection must be under the appropriate licence issued by DEC 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 craft wood. Due to the ease of access, timber harvesters may wish to source timber from roadside vegetation for these purposes.

Roadside managers are encouraged to retain timber on roadsides as an important component of the natural habitat, which fulfils ecological, aesthetic and land management functions. Fallen logs and branches within the roadside create 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 recommends 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 judgment 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 DEC or the RCC.
- 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 DEC.
- 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 cannot be removed for commercial purposes without a special endorsement on the Commercial Purposes Licence issued by DEC.
- No flora of special conservation concern (Declared Rare Flora or Priority Flora) should be removed without special authorisation through DEC.
- No commercial harvesting of any plant product should be allowed for any reason between the markers that delineate an Environmentally Sensitive Areas defined in the *Environmental Protection (Clearing of Native vegetation) Regulations 2004*.
- 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 roadside in areas where the vegetation is close to the road, where vehicles cannot be safely parked off the road, or where there is poor driver visibility.

Appendix

2

WEEDS IN THE SHIRE OF WOODANILLING ON FLORABASE

APPENDIX 2

WEEDS IN THE SHIRE OF WOODANILLING WITH SPECIMENS IN THE WA HERBARIUM

There are 17 weeds occurring in Woodanilling with specimens on FloraBase

Displaying records 1–17 of 17 for terms: ‘Alien:yes Distribution:LGA: WOODANILLING (ALL)’.

- **Amaranthaceae** Juss.
  Fam. Pl. 2:266 (1763)
- *Gomphrena* L.
  Species plantarum 2:224 (1753)
  - *Gomphrena celosioides* Mart.
    Gomphrena Weed; Beitr.Kenntn.Nat.Fam.Amarantac. 93 (1825)
- **Asteraceae** Bercht. & J. Presl
  Prir. Rostlin p254 (1820)
- *Chrysanthemoides* Fabr.
  Enumeratio Methodica Plantarum horti medici Helmstadiensis p79 (1759)
  - *Chrysanthemoides monilifera* (L.) Norl. subsp. *monilifera*
- *Cotula* L.
  Species plantarum 2:891 (1753)
  - *Cotula coronopifolia* L.
    Waterbuttons; Sp.Pl. 2:892 (1753)
- *Ursinia* Gaertn.
  De Fructibus et Seminibus Plantarum p462, t. 174, fig. 4. (1791)
  - *Ursinia anthemoides* (L.) Poir. subsp. *anthemoides*
- **Boraginaceae** Juss.
  Genera plantarum p128 (1789)
- *Heliotropium* L.
  Species plantarum 2:130 (1753)
  - *Heliotropium europaeum* L.
    Common Heliotrope; Sp.Pl. 1:130 (1753)
- **Campanulaceae** Juss.
  Gen.Pl. 163 (1789)
- *Monopsis* Salisb.
  Trans.Hort.Soc. 2 (1817)
  - *Monopsis debilis* (L.f.) C.Presl
    Prod.Monog.Lobel. 11 (1836)
- **Caryophyllaceae** Juss.
  Genera plantarum p299 (1789)
- *Vaccaria* Wolf
  Genera et Species Plantarum p234 (1816)
  - *Vaccaria hispanica* (Mill.) Rauschert
    Cow Soapwort; Feddes Repert. 73:52 (1966)
- **Chenopodiaceae** Vent.
  Tabl.Règne Vég. 2:253 (1799)
- *Chenopodium* L.
  Species plantarum 2:218 (1753)
  - *Chenopodium glaucum* L.
    Glaucous Goosefoot; Sp.Pl. 1:220 (1753)
- **Fabaceae** Lindl.
  Intr.Nat.Syst.Bot. Ed.2:148 (1836)
- *Medicago* L.
  Sp.Pl. 2:778 (1753)

	Medicago sativa L. Alfalfa; Sp.Pl. 2:778-779 (1753)	*	○	✓					
−	**Iridaceae** Juss. Genera plantarum p57 (1789)		○	✓					
−	*Freesia* Klatt Linnaea 34:672 (1865)		○	✓					
	Freesia alba x leichtlinii	*	○	✓					
−	*Hesperantha* Ker Gawl. Ann.Bot.(Koenig & Sims) 1:224 (1805)		○	✓					
	Hesperantha falcata (L.f.) Ker Gawl. Ann.Bot.(Koenig & Sims) 1:225 (1804)	*	○	✓					
−	**Orobanchaceae** Vent. Tabl.Règne Vég. 2:292 (1799)		○	✓					
−	*Parentucellia* Viv. Fl.Lib.Spec. 31 (1824)		○	✓					
	Parentucellia latifolia (L.) Caruel Common Bartsia; Parl., Fl.Ital. 6:480 (1885)	*	○	✓					
−	**Oxalidaceae** R. Br. Narr. Exped. Zaire p433 (1818)		○	✓					
−	*Oxalis* L. Sp.Pl. 1:433 (1753)		○	✓					
	Oxalis purpurea L. Largeflower Wood Sorrel; Sp.Pl. 1:433 (1753)	*	○	✓					
−	**Pinaceae** F.Rudolphi		○	✓					
−	*Pinus* L. Species plantarum 2:1000 (1753)		○	✓					
	Pinus pinaster Aiton Pinaster Pine; Hort.Kew. 3:367 (1789)	*	○	✓					
	Pinus radiata D.Don Radiata Pine; Trans.Linn.Soc.London 17:442 (1837)	*	○	✓					
−	**Plantaginaceae** Juss. Genera plantarum p89 (1789)		○	✓					
−	*Plantago* L. Species plantarum 2:112 (1753)		○	✓					
	Plantago coronopus L. Buckshorn Plantain; Sp.Pl. 1:115 (1753)	*	○	✓					
−	**Poaceae** Barnhart & Barnh. Bull. Torrey Bot. Club 22:7 (1895)		○	✓					
−	*Cenchrus* L. Species plantarum 2:1049 (1753)		○	✓					
	Cenchrus setaceus (Forssk.) Morrone Fountain Grass; Ann.Bot. 106:129 (2010)	*	○	✓					

DEC (April 2013) http://florabase.dec.wa.gov.au/search/advanced

Appendix

3

RCC VERGE NOTE

GUIDELINES FOR THE NOMINATION AND MANAGEMENT OF FLORA ROADS

FLORA ROAD NOMINATION FORM

APPENDIX 3A

GUIDELINES FOR THE NOMINATION AND MANAGEMENT OF FLORA ROADS

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 highlight areas of high conservation flora as a tourist asset to local communities. These 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;
  - harbours rare or endangered plants in the roadside;
  - may provide nest sites and refuges for native animals; and
  - 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, Local Government Authority, and the road manager (MRWA, Local Government or CALM);
- distance of the proposed Flora Road; and
- width of the road reserve.

The following information would also be useful:

- photograph(s) of the road;
- a list of the dominant plant species; and
- threats such as weeds, disturbances, etc.

This information is stored in the RCC Flora Roads Register, a database that is maintained by the RCC Technical Officer.

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.

Part 16 of the RCC *Roadside Manual* details the establishment and management of Flora Roads. 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; and
- where rehabilitation is contemplated, local native species should always 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; and
- 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 has established links with the W.A. Tourism Commission for inclusion on wildflower tourist publications.

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 establishes a *Register of Roads Important for Conservation* also. This register should be consulted prior to any works being initiated in the area.

Roadside Conservation Committee

APPENDIX 3B - FLORA ROAD NOMINATION FORM

For enquiries phone 9334 0423

Name of person making nomination: _____

Date: _____

Contact details:

Phone: _____

Fax: _____

Email: _____

Postal address: _____

_____

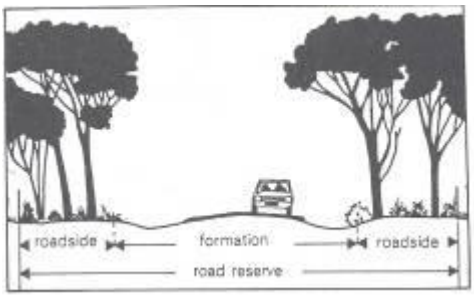
_____

General Information:

Road Name: _____

Locality: _____

Shire: _____



Road Reserve Details:

Length of road section (km): _____

Width of roadside vegetation (m): _____

Width of road reserve (m): _____

Condition of vegetation: _____

_____

Vegetation Type (E.g. types of trees, shrubs or annuals): (if known)

_____

_____

Is the road close to a Main road or Highway? (Please name) _____

_____

Have RCC roadside surveys been carried out previously? _____

Are there other values are present? (i.e. landscape, cultural, tourism, historic, etc) _____

_____

_____

Other information/comments: _____

_____

Please include photos if possible. Photos should show the road as part of a landscape rather than just close ups of particular plant species.

To nominate a Flora Road, please fill in this form and send to the Roadside Conservation Committee

Post- Locked Bag 104, Bentley Delivery Centre, Bentley, WA 6983.
Fax- (08) 9334 0199.
Email- rcc@dec.wa.gov.au

Appendix

4

THREATENED FLORA DEFINITIONS

APPENDIX 4

THREATENED FLORA DEFINITIONS

What is Threatened Flora (Declared Rare Flora)?

- Flora that is likely to become extinct, is rare or in need of special protection
- Protected under the Wildlife Conservation Act 1950
- Declared as 'rare' by the Minister for the Environment
- Ministerial permission required to 'take' Threatened Flora
- 412 species listed as Threatened Flora in Western Australia
- 4 Threatened Flora species known to occur within the Shire of Woodanilling

  Threatened Flora is further divided into 3 categories *(International Union for Conservation of Nature (IUCN) Criteria):*
  - Critically Endangered – Extremely high risk of becoming extinct in the wild
  - Endangered – Very high risk of becoming extinct in the wild
  - Vulnerable – High risk of becoming extinct in the wild

What is Priority Listed Flora?

- Flora that could potentially meet the criteria for Threatened Flora however is poorly known and in need of further survey
- 2947 species of priority flora in WA, 9 in the Shire of Woodanilling
- Priority 1 Flora
  - Known from <5 populations which are under immediate threat (all on lands not managed for conservation. e.g. on agricultural land, urban areas, Shire, Main Roads, road and rail reserves or active mineral leases). In urgent need of further survey
- Priority 2 Flora
  - Known from <5 populations which are under threat. At least one population occurs within conservation estate. In urgent need of further survey
- Priority 3 Flora
  - Known from several populations (>5) that are not under immediate threat. The known populations are protected, widespread or large. In need of further survey.
- Priority 4 Flora
  - Species that have been adequately surveyed and although 'rare' are not under threat. Should be monitored every 5-10 years.
- Priority 5 Flora
  - Species that are not threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened in five years.

(DEC (2013) http://florabase.dec.wa.gov.au/conservationtaxa.php)
(DEC (April 2013) Threatened & Priority Flora Database)

Appendix

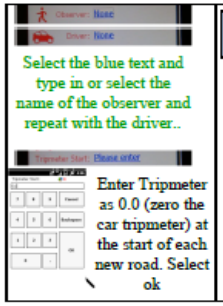
5

OVERVIEW OF SURVEY PROGRAM

(HANDHELD DEVICES - SCREEN SHOTS)

ROADSIDE CONSERVATION VALUE (RCV) SURVEY PROGRAM
Handheld Devices

START TAB

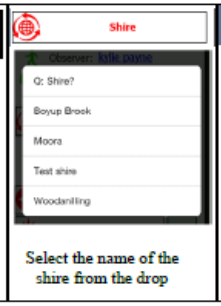


Select the blue text and type in or select the name of the observer and repeat with the driver..

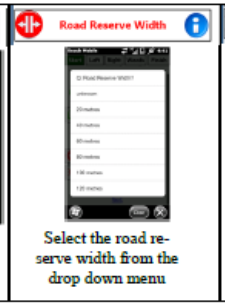
Enter Tripmeter as 0.0 (zero the car tripmeter) at the start of each new road. Select ok

Enter the road name and start location/ intersection using the qwerty keyboard

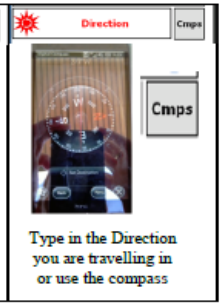
QWERTY keyboard



Select the name of the shire from the drop

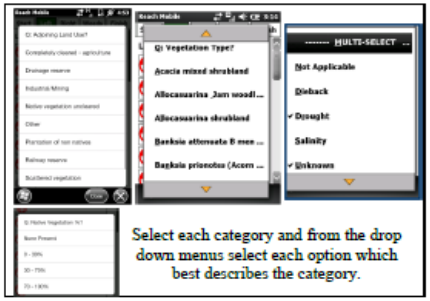


Select the road reserve width from the drop down menu



Type in the Direction you are travelling in or use the compass

LEFT AND RIGHT TAB

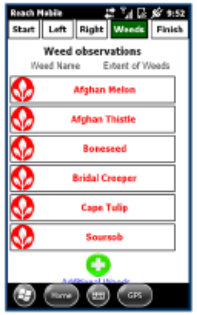


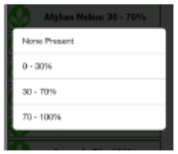
Select each category and from the drop down menus select each option which best describes the category.

Select either yes or no.

Fill out the right tab the same as for the left OR select copy from left if it's the same and change individual categories.

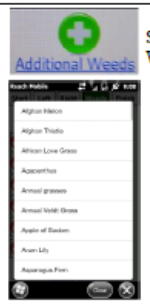
WEED TAB





Select the amount of weed observed

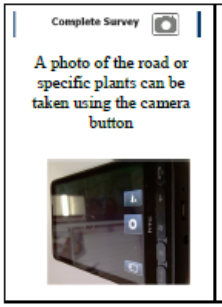
Finished Tab



Select Additional Weeds

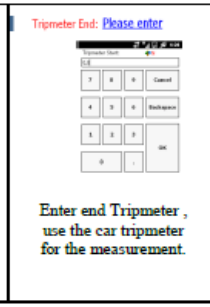
Select the additional weed from the drop down menu and then the amount present

FINISH TAB

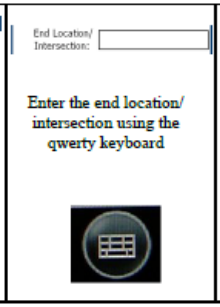


A photo of the road or specific plants can be taken using the camera button

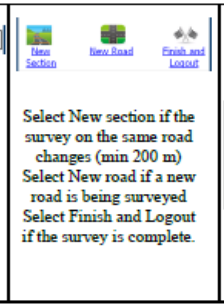
Comments can be entered using the QWERTY keyboard



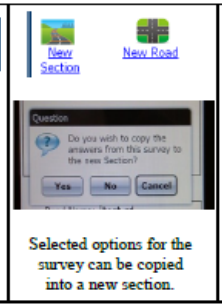
Enter end Tripmeter , use the car tripmeter for the measurement.



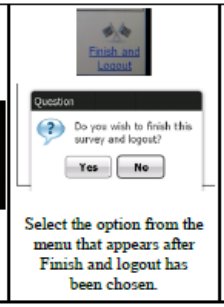
Enter the end location/ intersection using the qwerty keyboard



Select New section if the survey on the same road changes (min 200 m) Select New road if a new road is being surveyed Select Finish and Logout if the survey is complete.



Selected options for the survey can be copied into a new section.



Select the option from the menu that appears after Finish and logout has been chosen.

Switch off the device once data has been sent

Appendix

6

SUMMARISED SURVEY SHEET

SHOWING SAMPLE ROADS AND EXPLANATION OF FIELDS USED TO CALCULATE ROADSIDE CONSERVATION VALUES

APPENDIX 6 - SUMMARISED SURVEY SHEET FOR A SMALL SELECTION OF ROADS IN THE SHIRE

(NB: The full survey sheet showing all fields and attributes that were surveyed for each section of each road is included in the attached CD)

Road Name	Road Number	Section #	OD Start	OD End	Distance	Direction	Intersection		Width of Vegetation		Extent of Vegetation		# of Native plant species		General Weeds		Native Vegetation		Habitat Features		Conservation Value Score (0-12)		Dominant Weeds Combined	Other Weeds Combined	Comments
			(km)	(km)	(km)		Start	End	L	R	L	R	L	R	L	R	L	R	L	R	L	R			
Andrews Rd	3170061	1	0	0.2	0.2	N	Watson Rd		1-5	1-5	1	1	0	0	1	1	1	2	2	2	5	6	Bridal_Creeper	Ann_Grass Wild_Oats E_Sts_Euc_Sps	Weeds resurveyed 18 April 2012
Andrews Rd	3170061	2	0.2	0.4	0.2	N			5-20	5-20	1	0	0	0	2	2	1	1	2	2	7	6		Ann_Grass	creek at 0.2
Andrews Rd	3170061	3	0.4	0.6	0.2	N			1-5	1-5	0	0	0	0	2	2	1	1	0	0	3	3		Ann_Grass Sorrel	buffer of native vegetation
Andrews Rd	3170061	4	0.6	1.5	0.9	N			1-5	1-5	0	0	0	0	1	1	2	2	2	2	5	5		Ann_Grass Paddy_Melon Stinkwort Wild_Oats	
Andrews Rd	3170061	5	1.5	1.8	0.3	N			1-5	1-5	1	1	0	0	2	2	2	2	2	2	7	7		Ann_Grass Ann_Veldt_Grs	
Andrews Rd	3170061	6	1.8	2	0.2	N			1-5	1-5	0	1	0	0	1	2	0	2	1	2	2	7		Ann_Grass Wild_Oats Ann_Veldt_Grs	
Andrews Rd	3170061	7	2	2.1	0.1	N			1-5	1-5	2	2	0	0	1	2	2	2	2	1	7	7		Ann_Grass Ann_Veldt_Grs	
Andrews Rd	3170061	8	2.1	2.3	0.2	N			1-5	1-5	2	2	0	0	1	2	2	2	2	1	7	7		Ann_Grass Ann_Veldt_Grs	
Andrews Rd	3170061	9	2.3	2.5	0.2	N			1-5	1-5	0	0	0	0	2	2	2	2	2	2	6	6		Ann_Grass Ann_Veldt_Grs	
Andrews Rd	3170061	10	2.5	2.7	0.2	N			1-5	1-5	1	1	0	0	2	2	2	2	2	2	7	7		Ann_Grass Ann_Veldt_Grs	
Andrews Rd	3170061	11	2.7	2.9	0.2	N			1-5	1-5	1	1	0	0	2	2	2	2	2	2	7	7		Ann_Grass Ann_Veldt_Grs Ursinia	
Andrews Rd	3170061	12	2.9	3.1	0.2	N			1-5	1-5	1	1	0	0	2	2	2	2	2	2	7	7		Ann_Grass Ann_Veldt_Grs	
Andrews Rd	3170061	13	3.1	3.3	0.2	N			1-5	1-5	1	1	0	0	2	2	2	2	2	2	7	7		Ann_Grass Ann_Veldt_Grs	WA teatree
Andrews Rd	3170061	14	3.3	3.5	0.2	N			1-5	1-5	1	0	0	0	2	1	2	2	2	2	7	5		Ann_Grass Ann_Veldt_Grs	WA teatree in section
Andrews Rd	3170061	15	3.5	3.7	0.2	N			1-5	1-5	1	0	0	0	1	1	2	2	2	2	6	5		Ann_Grass Ann_Veldt_Grs	
Andrews Rd	3170061	16	3.7	4.8	1.1	N			1-5	1-5	1	1	0	0	1	1	2	2	2	2	6	6		Ann_Grass Ann_Veldt_Grs	
Andrews Rd	3170061	17	4.8	5.2	0.4	N			1-5	1-5	0	0	0	0	0	0	2	2	2	2	4	4		Ann_Grass Ann_Veldt_Grs	
Andrews Rd	3170061	18	5.2	5.4	0.2	N			1-5	1-5	0	0	0	0	0	2	2	2	2	2	4	6		Ann_Grass Ann_Veldt_Grs	
Andrews Rd	3170061	19	5.4	5.6	0.2	N			1-5	1-5	0	0	0	0	1	1	2	1	2	2	5	4		Ann_Grass Ann_Veldt_Grs	

Road Name	Road Number	Section #	OD Start	OD End	Distance	Direction	Intersection		Width of Vegetation (m)		Extent of Vegetation		# of Native plant species		General Weeds		Native Vegetation		Habitat Features		Conservation Value Score (0-12)		Dominant Weeds Combined	Other Weeds Combined	Comments
			(km)	(km)	(km)		Start	End	L	R	L	R	L	R	L	R	L	R	L	R	L	R			
Douglas rd	3170017	1	0	0.8	0.8	0	Robinson west rd		5-20	5-20	2	1	1	1	2	2	2	2	3	3	11	10		Ann_Grass Stinkwort Couch Veldt_Grass	Weeds resurveyed on 19 April 2012
Douglas rd	3170017	2	0.8	1.1	0.3	0.8			5-20	1-5	2	1	1	1	2	2	2	2	3	3	11	9		Ann_Grass Veldt_Grass	
Douglas rd	3170017	3	1.1	1.3	0.2	1.1			5-20	1-5	2	2	2	1	2	2	2	2	3	3	12	10		Ann_Grass Veldt_Grass	
Douglas rd	3170017	4	1.3	1.8	0.5	1.3			5-20	1-5	2	2	2	2	2	2	2	2	3	3	12	11		Ann_Grass	
Douglas rd	3170017	5	1.8	2.5	0.7	1.8			5-20	1-5	2	2	1	1	2	2	2	2	3	3	11	10		Ann_Grass Wild_Oats Stinkwort Sowthistle Barley_Grass	Windmill grass
Douglas rd	3170017	6	2.5	2.7	0.2	2.5			5-20	1-5	1	1	1	1	2	2	2	2	3	3	10	9		Ann_Grass Wild_Oats Stinkwort Sorrel Sowthistle Veldt_Grass	
Douglas rd	3170017	7	2.7	3	0.3	2.7			5-20	1-5	1	1	1	1	1	1	1	1	2	2	7	6		Ann_Grass Veldt_Grass	
Douglas rd	3170017	8	3	3.2	0.2	3			5-20	1-5	2	2	2	2	2	2	2	2	3	3	12	11		Ann_Grass Veldt_Grass	
Douglas rd	3170017	9	3.2	3.4	0.2	3.2			5-20	1-5	2	2	2	2	2	2	2	2	3	3	12	11			
Douglas rd	3170017	10	3.4	3.6	0.2	3.4			5-20	1-5	2	2	2	2	2	2	2	2	3	3	12	11	Bridal_creeper	Nightshade Veldt_Grass Sowthistle	banksia spherocarpa
Douglas rd	3170017	11	3.6	3.9	0.3	3.6			1-5	1-5	2	2	2	2	2	2	2	2	3	3	11	11		Veldt_Grass	banksia spherocarpa, woolly bush, quandongs 3.8
Douglas rd	3170017	12	3.9	4.1	0.2	3.9			1-5	1-5	2	2	1	1	2	2	2	2	3	3	10	10		Veldt_Grass	
Douglas rd	3170017	13	4.1	4.3	0.2	4.1			1-5	1-5	2	2	2	2	2	2	2	2	3	3	11	11			
Douglas rd	3170017	14	4.3	4.5	0.2	4.3			1-5	1-5	2	2	2	2	2	2	2	2	3	3	11	11		Veldt_Grass	
Douglas rd	3170017	15	4.5	4.7	0.2	4.5			1-5	1-5	2	2	2	2	2	2	2	2	3	3	11	11			
Douglas rd	3170017	16	4.7	4.9	0.2	4.7			1-5	1-5	1	1	1	1	2	2	2	2	3	3	9	9			
Douglas rd	3170017	17	4.9	5.2	0.3	4.9			1-5	1-5	1	1	1	1	2	2	2	2	3	3	9	9			

Road Name	Road Number	Section #	OD Start (km)	OD End (km)	Distance (km)	Direction	Intersection		Width of Vegetation		Extent of Vegetation		# of Native plant species		General Weeds		Native Vegetation		Habitat Features		Conservation Value Score (0-12)		Dominant Weeds Combined	Other Weeds Combined	Comments
							Start	End	L	R	L	R	L	R	L	R	L	R	L	R	L	R			
Watson Rd	3170010	1	0	0.1	0.1	NW	Grt South-ern Hwy		1-5	Unknown	1	2	0	2	2	2	2	2	2	3	7	12		Ann_Grass Wild_Oats	Weeds resurveyed / corrected on 18 April 2012
Watson Rd	3170010	2	0.1	0.2	0.1	NW			1-5	Unknown	0	2	0	2	2	2	0	2	0	3	2	12		Ann_Grass Wild_Oats	
Watson Rd	3170010	3	0.2	0.9	0.7	NW			1-5	1-5	1	1	1	1	1	1	2	2	2	3	7	8		Ann_Grass Stinkwort Nightshade Mintweed Paddy_Melon Wild_Oats Ann_Veldt_Grs	
Watson Rd	3170010	4	0.9	1.3	0.4	NW			1-5	1-5	0	0	0	0	1	1	2	2	2	3	5	6		Ann_Grass Sowthistle Ann_Veldt_Grs	
Watson Rd	3170010	5	1.3	1.9	0.6	NW			1-5	1-5	2	1	0	0	2	2	2	2	3	3	9	8		Ann_Grass Wild_Oats Ann_Veldt_Grs	
Watson Rd	3170010	6	1.9	2.2	0.3	NW			1-5	1-5	2	1	0	0	2	2	2	2	3	3	9	8		Ann_Grass Ann_Veldt_Grs Wild_Oats	

Key to table interpretation:

Road Name: Official 'Road Name' on Main Roads WA database are (NB Sometimes local names or the signposted name is different).

Road Number: Official 'Road Number' assigned by Main Roads WA.

Section#: Roads are surveyed chronologically in sections. When there is a change in roadside attributes, a new section is started.

OD Start/Finish: Odometer reading for the section start and finish points.

Distance: Distance between the OD start and OD finish for each section. It is the length of the section.

Direction: Main Roads WA direction of the road and generally the direction travelled by the surveyors when assessing the roadside.

Intersection:

The following attributes are ranked from 0 (lowest level) to 1, 2 or 3 (highest level) as per the descriptions below on the left and right sides of the road.

Width of Vegetation: Vegetation alongside the road to the fenceline line - 0-5m (scores 0), greater than 5m (scores 1)

Extent of Vegetation: Proportion of native vegetation in the roadside. Scores 0 for 0-30%, 1 for 30-70%, 2 for greater than 70%

#Native Plant Species: Diversity of native plants species in the roadside. Scores 0 for 0-5 species, 1 for 6-19 species, 2 for 20 or more species

General Weeds: Level of weed infestation (lower scores indicate higher levels of weed infestation) Score 0 for greater than 70%, 1 for 30-70%, 2 for 0-30% weed cover.

Native Vegetation: Number of native vegetation layers present (ie) tree, shrub and/or ground cover layers. Scores 0 for no layer, 1 for 1 layer, 2 for 2 or more layers.

Habitat Features: Number of roadside vegetation attributes present that are important for fauna habitat or biodiversity. Eg. Connects uncleared areas, Hollow logs, tree hollows, flowering shrubs andenvironmentally sensitive areas. Score 1 for each feature up to maximum of 3.

Conservation Value Score: Tally of the scores for the 6 attributes described above. This is the score which is shown on the map. 0-4 Low conservation, 5-6 Medium Low Conservation, 7-8 Medium High Conservation, 9-12 High Conservation.

Dominant Weeds: Weeds chosen by shire staff and/or landcare group members to target – weed overlays are generally provided for these species.

Other Weeds: Additional Weeds noted during the survey.

Comments: Any additional comments or information noted during the survey.

Appendix 7

ADDITIONAL WEED DATA AND GRAPHS

APPENDIX 7A

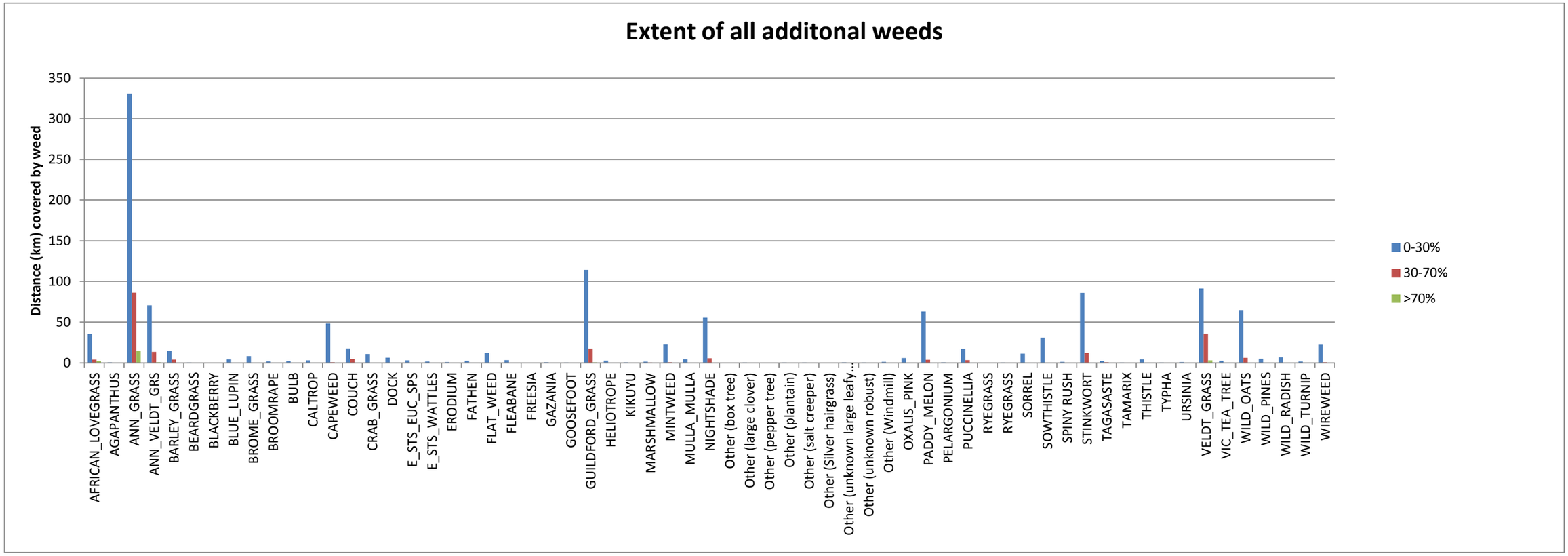
LIST OF ADDITIONAL WEEDS RECORDED ON SHIRE OF WOODANILLING ROADSIDES DURING THE 2011/2012 ROADSIDE SURVEYS

	WEED_OTH	Distance (km) 0-30% cover	Distance (km) 30-70% cover	Distance (km) >70% cover
1	AFRICAN_LOVEGRASS	35.53	4.05	2
2	AGAPANTHUS	0.55	0	0
3	ANN_GRASS	330.85	86.33	14.7
4	ANN_VELDT_GRS	70.73	13.5	0.8
5	BARLEY_GRASS	14.75	3.95	0
6	BEARDGRASS	0.3	0	0
7	BLACKBERRY	0	0	0.2
8	BLUE_LUPIN	4.3	0	0
9	BROME_GRASS	8.3	0	0
10	BROOMRAPE	1.8	0	0
11	BULB	2.15	0	0
12	CALTROP	3.13	0	0
13	CAPEWEED	48.3	0.75	0
14	COUCH	17.8	4.85	0
15	CRAB_GRASS	11	0	0
16	DOCK	6.45	0	0
17	E_STS_EUC_SPS	3.1	0	0
18	E_STS_WATTLES	1.75	0	0
19	ERODIUM	0.9	0	0
20	FATHEN	2.45	0	0
21	FLAT_WEED	12.23	0	0
22	FLEABANE	3.3	0	0
23	FREESIA	0.2	0	0
24	GAZANIA	0.85	0	0
25	GOOSEFOOT	0.4	0	0
26	GUILDFORD_GRASS	114.25	17.6	0.6
27	HELIOTROPE	2.65	0	0
28	KIKUYU	0.65	0	0
29	MARSHMALLOW	1.5	0.4	0
30	MINTWEED	22.5	0.7	0
31	MULLA_MULLA	4.45	0	0
32	NIGHTSHADE	55.63	5.75	0
33	Other (box tree)	0.2	0	0
34	Other (large clover)	0.3	0	0
35	Other (pepper tree)	0.2	0	0
36	Other (plantain)	0.25	0	0
37	Other (salt creeper)	0.4	0	0
38	Other (Silver hairgrass)	0.1	0	0
39	Other (unknown large leafy weed)	0.5	0	0
40	Other (unknown robust)	0.45	0	0
41	Other (Windmill)	1.25	0	0
42	OXALIS_PINK	6.05	0	0

43	PADDY_MELON	63.25	3.75	0.2
44	PELARGONIUM	0.6	0	0
45	PUCCINELLIA	17.3	3.45	0.2
46	RYEGRASS	0.2	0	0
47	RYEGRASS	0.4	0	0
48	SORREL	11.28	0.2	0
49	SOWTHISTLE	31.05	0.2	0
50	SPINY RUSH	1.25	0	0
51	STINKWORT	86.03	12.35	0.2
52	TAGASASTE	2.35	0.75	0
53	TAMARIX	0.3	0	0
54	THISTLE	4.2	0	0
55	TYPHA	0.4	0	0
56	URSINIA	0.9	0	0
57	VELDT_GRASS	91.55	35.9	3.1
58	VIC_TEA_TREE	2.5	0	0
59	WILD_OATS	64.8	6.25	0
60	WILD_PINES	5	0	0
61	WILD_RADISH	6.75	0	0
62	WILD_TURNIP	1.6	0	0
63	WIREWEED	22.3	0.7	0

GRAPH SHOWING ADDITIONAL WEEDS RECORDED ON SHIRE OF WOODANILLING ROADSIDES DURING THE 2011/2012 ROADSIDE SURVEYS

**Graph shows distance of roadside each weed was recorded along and the degree of infestation:
less than 30%, 30-70% or greater than 70%**



APPENDIX 7B

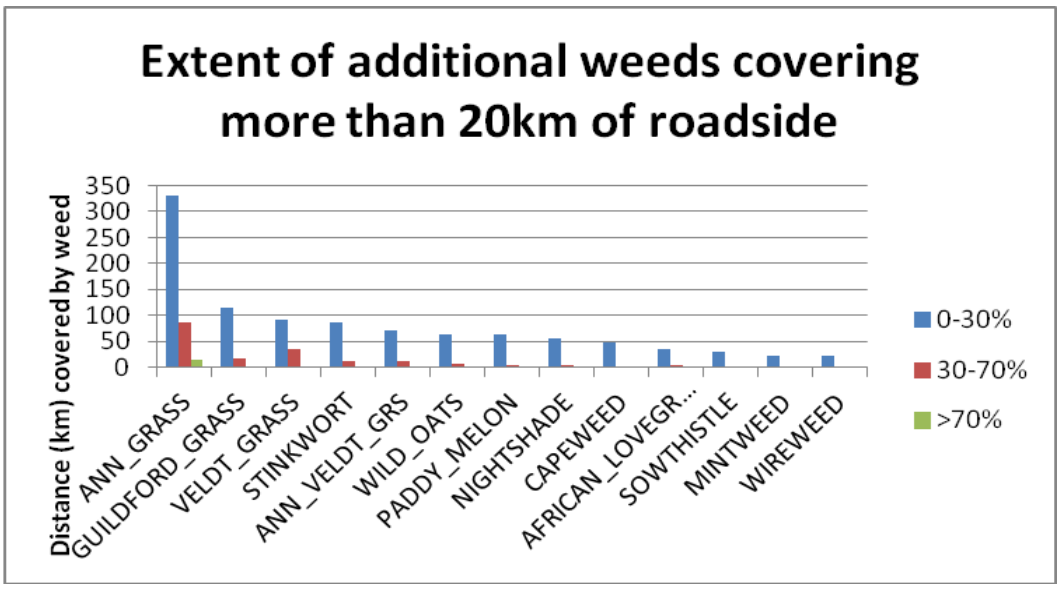
ADDITIONAL WEEDS RECORDED ON SHIRE OF WOODANILLING ROADSIDES IN PRIORITY ORDER FROM WIDEST SPREAD WEEDS TO MINOR OCCURANCE WEEDS
(Does not indicate priority to control - some of the weeds with small infestations may be problem weeds which could be removed relatively easily)

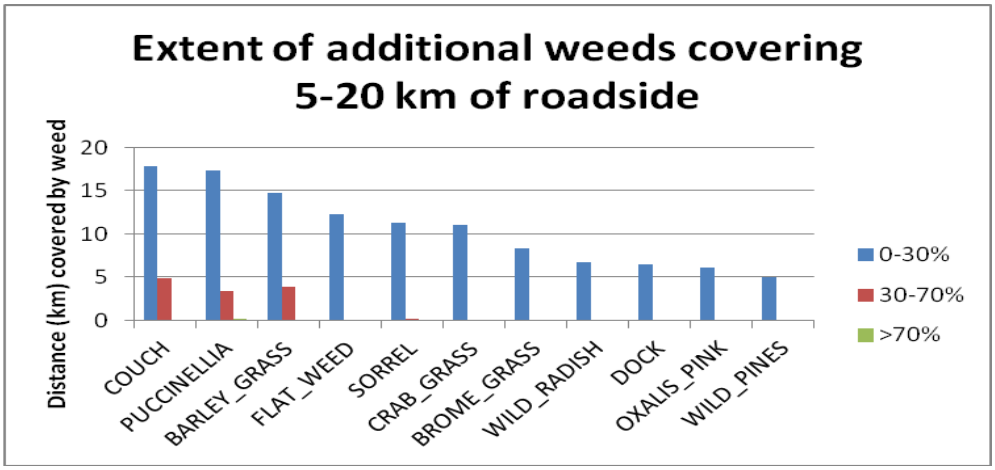
	WEED_OTH	Distance (km) 0-30% cover	Distance (km) 30-70% cover	Distance (km) >70% cover
3	ANN_GRASS	330.85	86.33	14.7
26	GUILDFORD_GRASS	114.25	17.6	0.6
57	VELDT_GRASS	91.55	35.9	3.1
51	STINKWORT	86.03	12.35	0.2
4	ANN_VELDT_GRS	70.73	13.5	0.8
59	WILD_OATS	64.8	6.25	0
43	PADDY_MELON	63.25	3.75	0.2
32	NIGHTSHADE	55.63	5.75	0
13	CAPEWEED	48.3	0.75	0
1	AFRICAN_LOVEGRASS	35.53	4.05	2
49	SOWTHISTLE	31.05	0.2	0
30	MINTWEED	22.5	0.7	0
63	WIREWEED	22.3	0.7	0
14	COUCH	17.8	4.85	0
45	PUCCINELLIA	17.3	3.45	0.2
5	BARLEY_GRASS	14.75	3.95	0
21	FLAT_WEED	12.23	0	0
48	SORREL	11.28	0.2	0
15	CRAB_GRASS	11	0	0
9	BROME_GRASS	8.3	0	0
61	WILD_RADISH	6.75	0	0
16	DOCK	6.45	0	0
42	OXALIS_PINK	6.05	0	0
60	WILD_PINES	5	0	0
31	MULLA_MULLA	4.45	0	0
8	BLUE_LUPIN	4.3	0	0
54	THISTLE	4.2	0	0
22	FLEABANE	3.3	0	0
12	CALTROP	3.13	0	0
17	E_STS_EUC_SPS	3.1	0	0
27	HELIOTROPE	2.65	0	0
58	VIC_TEA_TREE	2.5	0	0
20	FATHEN	2.45	0	0
52	TAGASASTE	2.35	0.75	0
11	BULB	2.15	0	0
10	BROOMRAPE	1.8	0	0
18	E_STS_WATTLES	1.75	0	0
62	WILD_TURNIP	1.6	0	0
29	MARSHMALLOW	1.5	0.4	0
50	SPINY RUSH	1.25	0	0

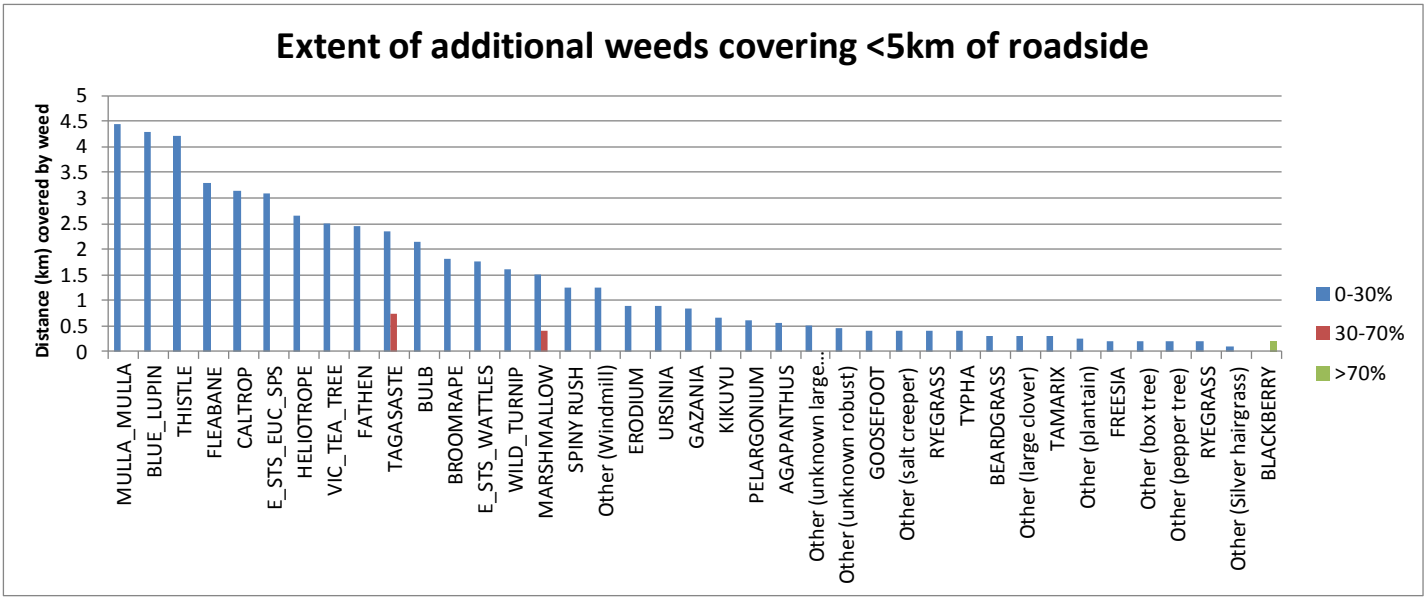
41	Other (Windmill)	1.25	0	0
19	ERODIUM	0.9	0	0
56	URSINIA	0.9	0	0
24	GAZANIA	0.85	0	0
28	KIKUYU	0.65	0	0
44	PELARGONIUM	0.6	0	0
2	AGAPANTHUS	0.55	0	0
39	Other (unknown large leafy weed)	0.5	0	0
40	Other (unknown robust)	0.45	0	0
25	GOOSEFOOT	0.4	0	0
37	Other (salt creeper)	0.4	0	0
46	RYEGRASS	0.4	0	0
55	TYPHA	0.4	0	0
6	BEARDGRASS	0.3	0	0
34	Other (large clover)	0.3	0	0
53	TAMARIX	0.3	0	0
36	Other (plantain)	0.25	0	0
23	FREESIA	0.2	0	0
33	Other (box tree)	0.2	0	0
35	Other (pepper tree)	0.2	0	0
47	RYEGRASS	0.2	0	0
38	Other (Silver hairgrass)	0.1	0	0
7	BLACKBERRY	0	0	0.2

GRAPHS SHOWING ADDITIONAL WEEDS RECORDED ON SHIRE OF WOODANILLING ROADSIDES

Graph shows distance of roadside each weed was recorded along and the degree of infestation: less than 30%, 30-70% or greater than 70%







Appendix

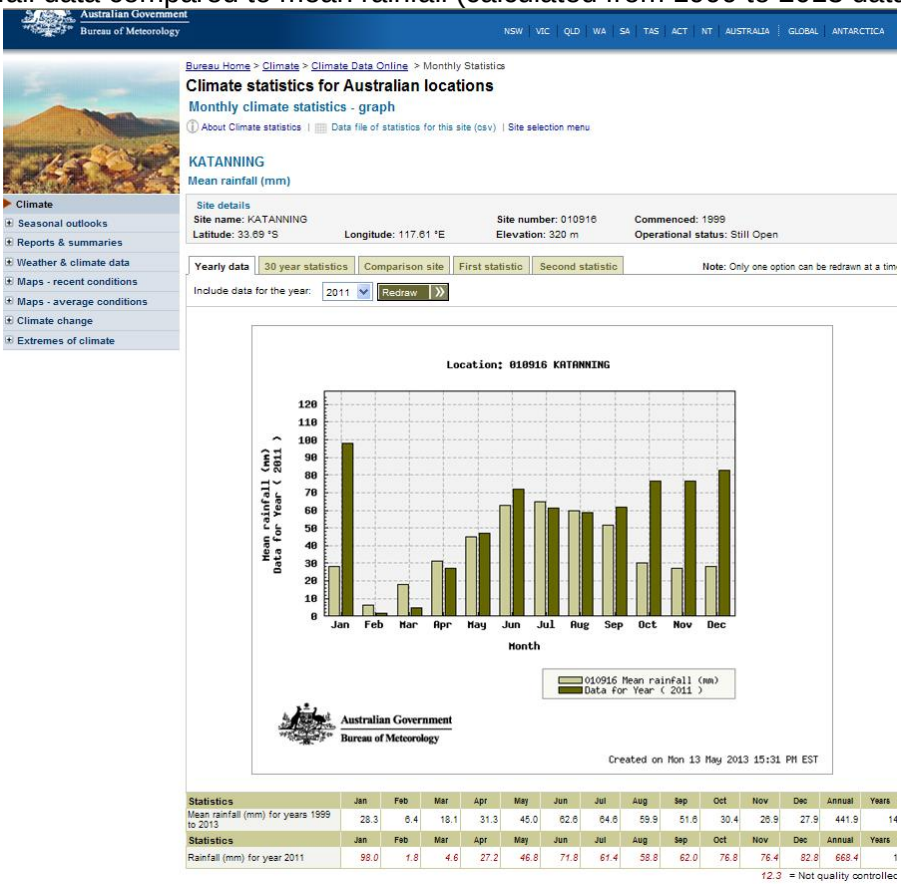
8

2011/12 RAINFALL DATA COMPARED TO AVERAGE RAINFALL IN KATANNING

APPENDIX 8

2011/12 RAINFALL DATA COMPARED TO AVERAGE RAINFALL
KATANNING WEATHER STATION
www.bom.gov.au

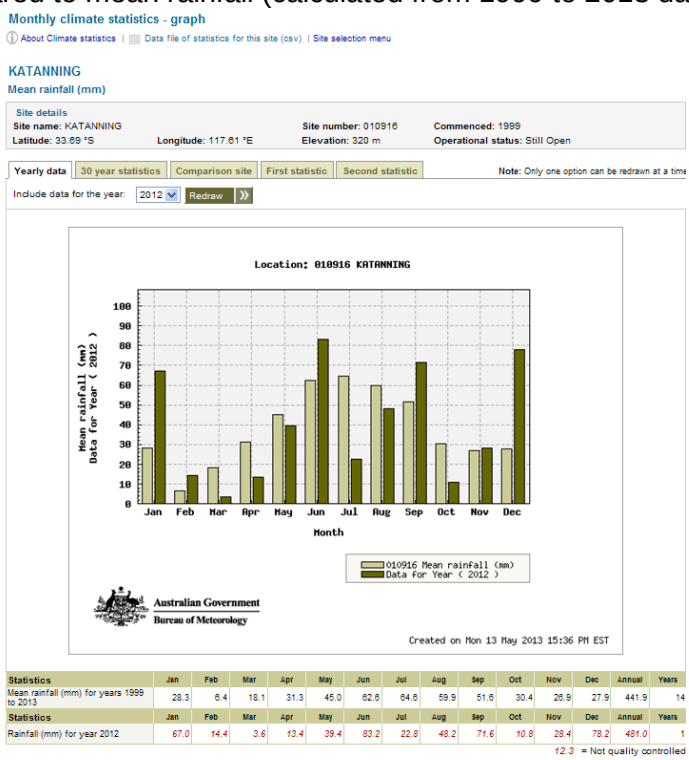
2011 rainfall data compared to mean rainfall (calculated from 1999 to 2013 data) - Katanning



Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years
Mean rainfall (mm) for years 1999 to 2013	28.3	6.4	18.1	31.3	45.0	62.6	64.6	59.9	51.6	30.4	26.9	27.9	441.9	14
Statistics	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**	**Years**
Rainfall (mm) for year 2011	*98.0*	*1.8*	*4.6*	*27.2*	*46.8*	*71.8*	*61.4*	*58.8*	*62.0*	*76.8*	*76.4*	*82.8*	*668.4*	1

12.3 = Not quality controlled

2012 rainfall data compared to mean rainfall (calculated from 1999 to 2013 data) - Katanning



Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years
Mean rainfall (mm) for years 1999 to 2013	28.3	6.4	18.1	31.3	45.0	62.6	64.6	59.9	51.6	30.4	26.9	27.9	441.9	14
Statistics	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**	**Years**
Rainfall (mm) for year 2012	*67.0*	*14.4*	*3.6*	*13.4*	*39.4*	*83.2*	*22.8*	*48.2*	*71.6*	*10.8*	*28.4*	*78.2*	*481.0*	1

12.3 = Not quality controlled

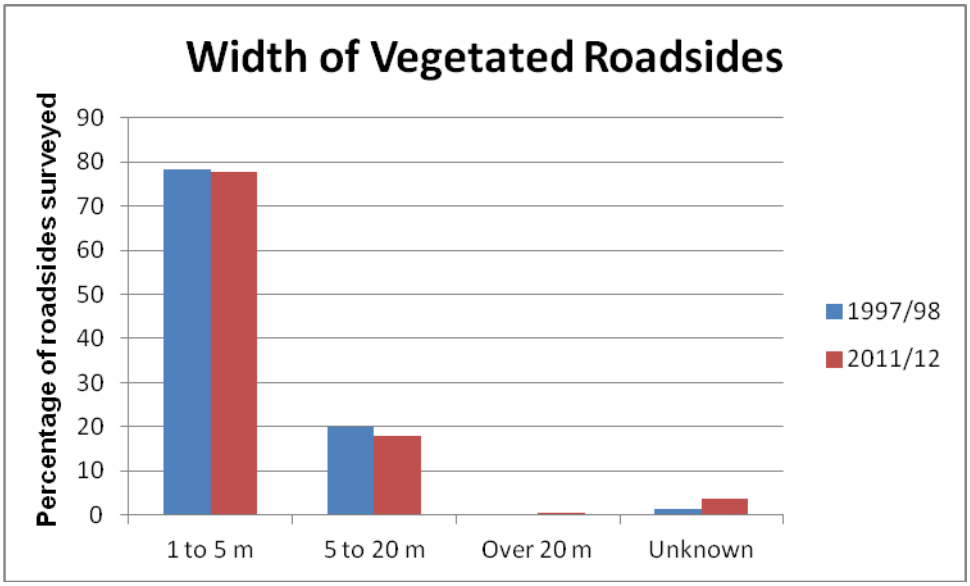
Appendix

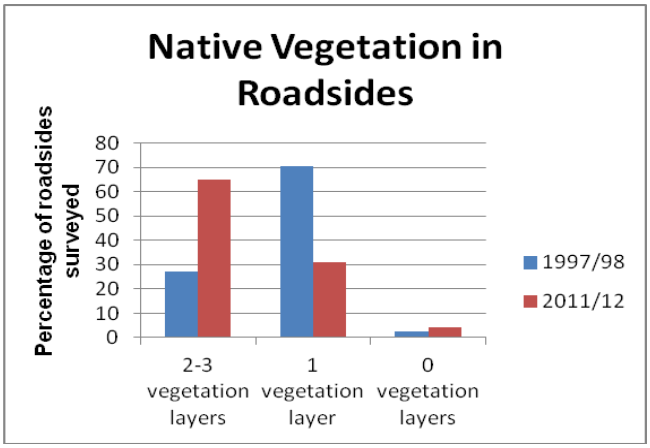
9

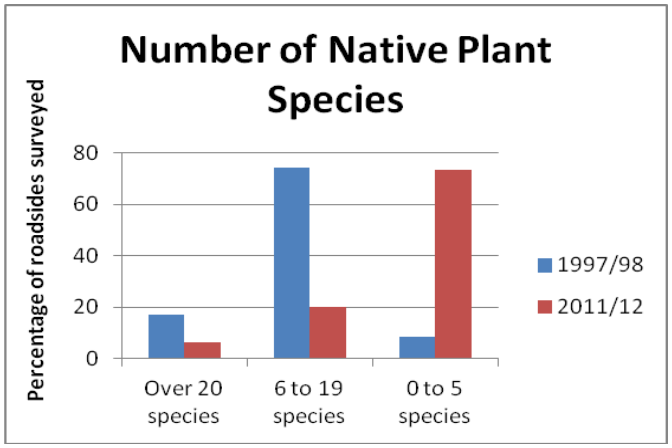
GRAPHS COMPARING RESULTS FROM THE 1997/98 AND 2011/12 ROADSIDE SURVEYS

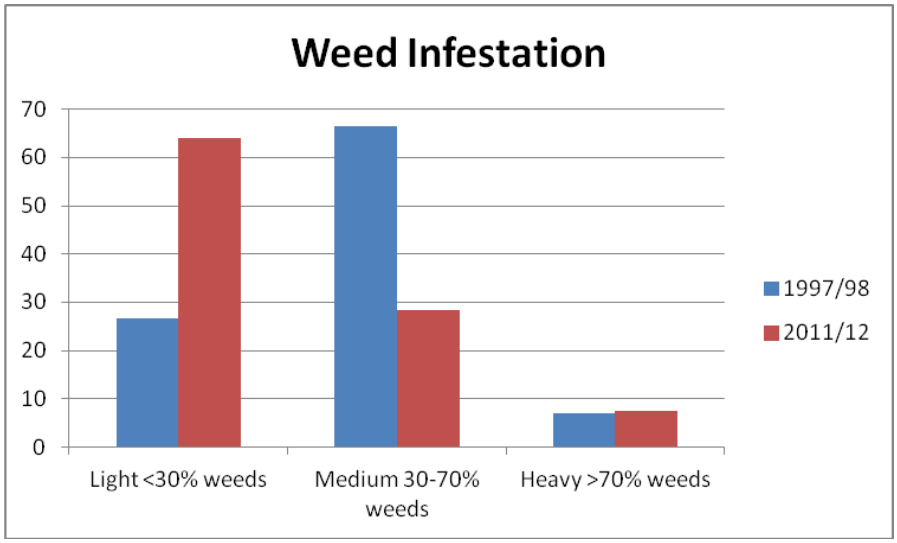
APPENDIX 9

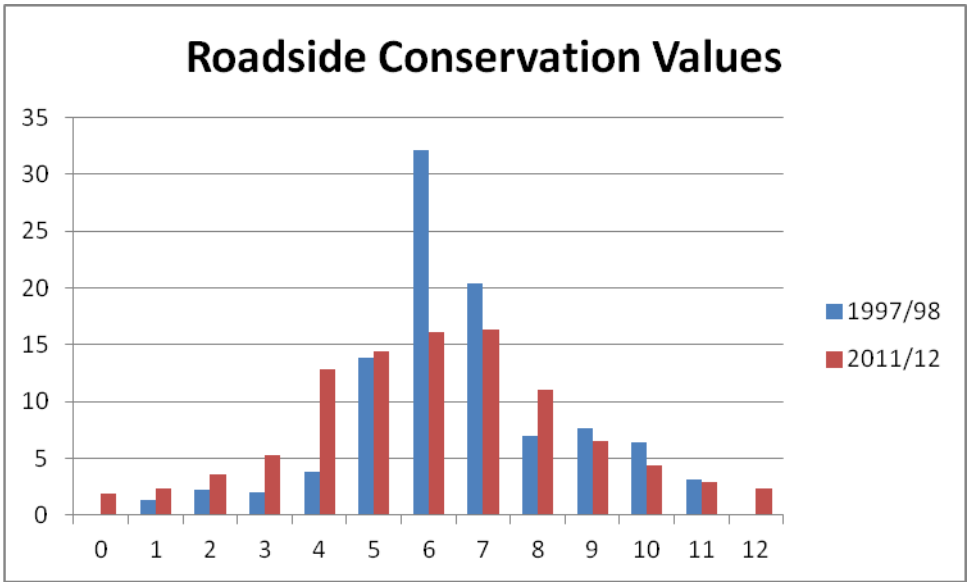
GRAPHS COMPARING RESULTS FROM THE 1997/98 AND 2011/12 ROADSIDE SURVEYS IN THE SHIRE OF WOODANILLING

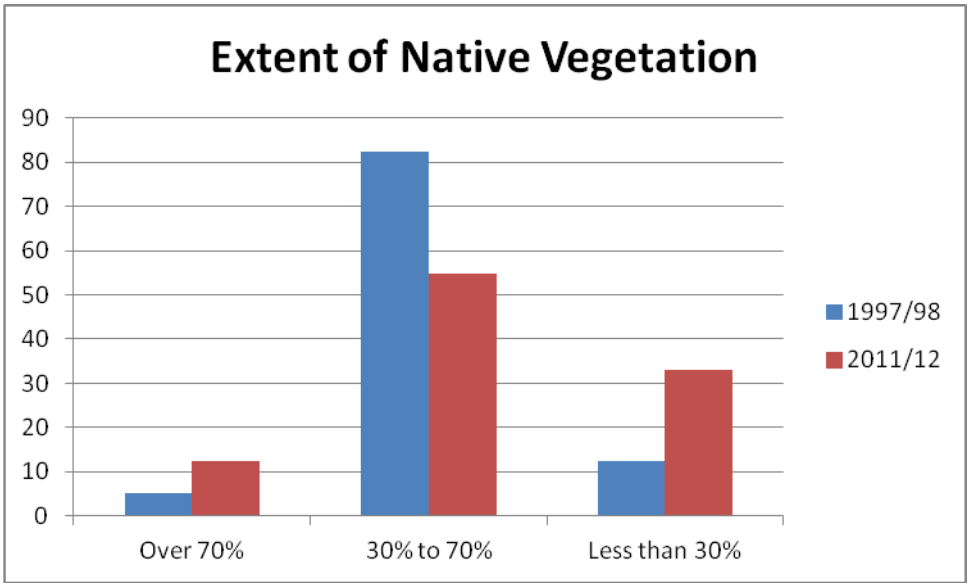


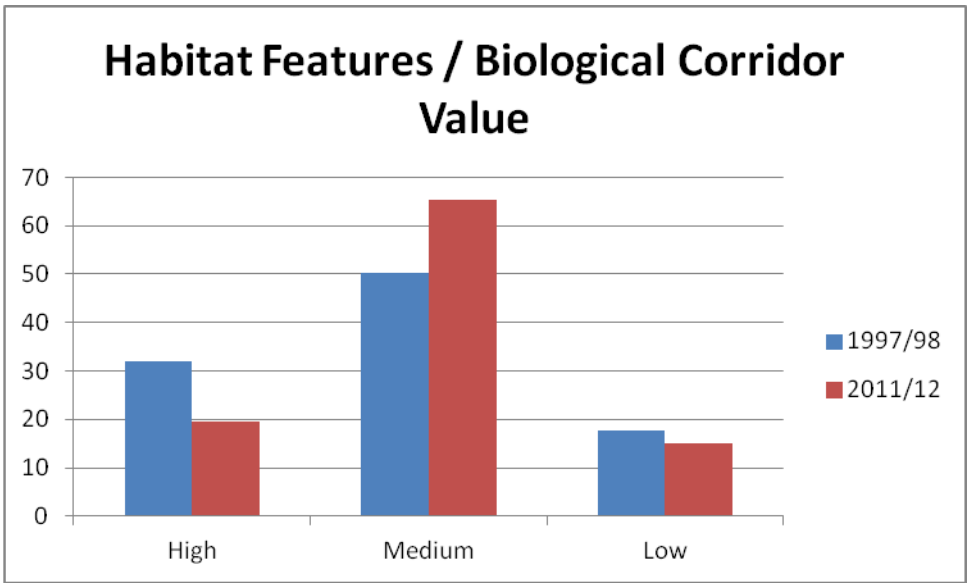







Roadside Conservation Values
35
30
25
20
15
10
5
0
0 1 2 3 4 5 6 7 8 9 10 11 12
1997/98
2011/12


Extent of Native Vegetation
90
80
70
60
50
40
30
20
10
0
Over 70%
30% to 70%
Less than 30%
1997/98
2011/12


Habitat Features / Biological Corridor Value
70
60
50
40
30
20
10
0
High
Medium
Low
1997/98
2011/12

NatureMap
Mapping Western Australia's biodiversity

NatureMap Species Report

Created By Kylie Payne on 23/04/2013

Current Names Only Yes
Core Datasets Only Yes
Species Group All Animals
Method 'Predefined Area Intersect'
Area Type Shire Boundary
Intersect WOODANILLING

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
1.	24260	*Acanthiza apicalis (Broad-tailed Thornbill)*			
2.	24261	*Acanthiza chrysorrhoa (Yellow-rumped Thornbill)*			
3.	24262	*Acanthiza inornata (Western Thornbill)*			
4.	24560	*Acanthorhynchus superciliosus (Western Spinebill)*			
5.	25535	*Accipiter cirrocephalus (Collared Sparrowhawk)*			
6.	25536	*Accipiter fasciatus (Brown Goshawk)*			
7.	25755	*Acrocephalus australis (Australian Reed Warbler)*			
8.		*Aedes camptorhynchus*			
9.	25544	*Aegotheles cristatus (Australian Owlet-nightjar)*			
10.		*Alboa worooa*			
11.	24312	*Anas gracilis (Grey Teal)*			
12.	24316	*Anas superciliosa (Pacific Black Duck)*			
13.		*Anisops sp.*			
14.	24561	*Anthochaera carunculata (Red Wattlebird)*			
15.	24562	*Anthochaera lunulata (Western Little Wattlebird)*			
16.		*Apocyclops dengizicus*			
17.	24285	*Aquila audax (Wedge-tailed Eagle)*			
18.	24341	*Ardea pacifica (White-necked Heron)*			
19.	-14444	*Argoctenus igneus*			
20.	25566	*Artamus cinereus (Black-faced Woodswallow)*			
21.	24353	*Artamus cyanopterus (Dusky Woodswallow)*			
22.		*Austrochiltonia subtenuis*			
23.		*Austrolestes analis*			
24.		*Austrolestes annulosus*			
25.		*Berosus sp.*			
26.	24162	*Bettongia penicillata subsp. ogilbyi (Woylie, Brush-tailed Bettong)*		T	
27.		*Bezzia sp. (not 1 or 2)*			
28.		*Boeckella triarticulata*			
29.		*Brachionus plicatilis s.l.*			
30.	25598	*Cacomantis flabelliformis (Fan-tailed Cuckoo)*			
31.	24788	*Calidris ruficollis (Red-necked Stint)*		IA	
32.	24734	*Calyptorhynchus latirostris (Carnaby's Cockatoo (short-billed black-cockatoo))*		T	
33.	24086	*Cercartetus concinnus (Western Pygmy-possum)*			
34.	24186	*Chalinolobus gouldii (Gould's Wattled Bat)*			
35.	24376	*Charadrius rubricollis (Hooded Plover)*		P4	
36.	24377	*Charadrius ruficapillus (Red-capped Plover)*			
37.	24321	*Chenonetta jubata (Australian Wood Duck)*			
38.	24488	*Cheramoeca leucosternus (White-backed Swallow)*			
39.		*Chironomus aff. alternans (V24)*			
40.		*Chironomus tepperi*			
41.	24833	*Cincloramphus cruralis (Brown Songlark)*			
42.	24834	*Cincloramphus mathewsi (Rufous Songlark)*			
43.		*Cladopelma curtivalva*			
44.	24396	*Climacteris rufa (Rufous Treecreeper)*			
45.	25675	*Colluricincla harmonica (Grey Shrike-thrush)*			
46.	24613	*Colluricincla harmonica subsp. rufiventris*			
47.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
48.	-14815	*Cormocephalus turneri*			
49.	25592	*Corvus coronoides (Australian Raven)*			
50.	24671	*Coturnix pectoralis (Stubble Quail)*			
51.		*Coxiella exsposita*			
52.	25595	*Cracticus tibicen (Australian Magpie)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
53.	24422	*Cracticus tibicen subsp. dorsalis (White-backed Magpie)*			
54.	25596	*Cracticus torquatus (Grey Butcherbird)*			
55.		*Culicoides sp.*			
56.	24322	*Cygnus atratus (Black Swan)*			
57.		*Cyprinotus edwardi*			
58.	30901	*Dacelo novaeguineae (Laughing Kookaburra)*	Y		
59.		*Daphniopsis pusilla*			
60.		*Daphniopsis quadrangulus*			Y
61.	25673	*Daphoenositta chrysoptera (Varied Sittella)*			
62.	24092	*Dasyurus geoffroii (Chuditch, Western Quoll)*		T	
63.		*Diacypris spinosa*			
64.	25607	*Dicaeum hirundinaceum (Mistletoebird)*			
65.		*Dicrotendipes pseudoconjunctus*			
66.	25251	*Echiopsis curta (Bardick)*			
67.	24651	*Eopsaltria australis subsp. griseogularis (Western Yellow Robin)*			
68.	24652	*Eopsaltria georgiana (White-breasted Robin)*			
69.	24567	*Epthianura albifrons (White-fronted Chat)*			
70.	25621	*Falco berigora (Brown Falcon)*			
71.	25622	*Falco cenchroides (Australian Kestrel)*			
72.	25623	*Falco longipennis (Australian Hobby)*			
73.	25624	*Falco peregrinus (Peregrine Falcon)*		S	
74.	24475	*Falco peregrinus subsp. macropus (Australian Peregrine Falcon)*		S	
75.	25727	*Fulica atra (Eurasian Coot)*			
76.	25530	*Gerygone fusca (Western Gerygone)*			
77.	24735	*Glossopsitta porphyrocephala (Purple-crowned Lorikeet)*			
78.	24443	*Grallina cyanoleuca (Magpie-lark)*			
79.	24295	*Haliastur sphenurus (Whistling Kite)*			
80.		*Haliplus sp.*			
81.	24491	*Hirundo neoxena (Welcome Swallow)*			
82.	24153	*Isoodon obesulus subsp. fusciventer (Quenda, Southern Brown Bandicoot)*		P5	
83.	25659	*Lichenostomus leucotis (White-eared Honeyeater)*			
84.	24577	*Lichenostomus ornatus (Yellow-plumed Honeyeater)*			
85.	24581	*Lichenostomus virescens (Singing Honeyeater)*			
86.	25661	*Lichmera indistincta (Brown Honeyeater)*			
87.		*Limnochares australica*			
88.	24131	*Macropus eugenii subsp. derbianus (Tammar Wallaby (WA subsp))*		P5	
89.	24133	*Macropus irma (Western Brush Wallaby)*		P4	
90.	24326	*Malacorhynchus membranaceus (Pink-eared Duck)*			
91.	25654	*Malurus splendens (Splendid Fairy-wren)*			
92.	24583	*Manorina flavigula (Yellow-throated Miner)*			
93.	25663	*Melithreptus brevirostris (Brown-headed Honeyeater)*			
94.	24586	*Melithreptus brevirostris subsp. leucogenys*			
95.	24598	*Merops ornatus (Rainbow Bee-eater)*		IA	
96.		*Mesochra nr flava*			
97.	25693	*Microeca fascinans (Jacky Winter)*			
98.	25240	*Morelia spilota subsp. imbricata (Carpet Python)*		S	
99.	24184	*Mormopterus planiceps (Southern Freetail-bat)*			
100.	24223	*Mus musculus (House Mouse)*	Y		
101.	25610	*Myiagra inquieta (Restless Flycatcher)*			
102.	24146	*Myrmecobius fasciatus (Numbat)*		T	
103.		*Mytilocypris ambiguosa*			
104.		*Mytilocypris tasmanica chapmani*			
105.		*Necterosoma sp.*			
106.	24738	*Neophema elegans (Elegant Parrot)*			
107.	25748	*Ninox novaeseelandiae (Boobook Owl)*			
108.	24194	*Nyctophilus geoffroyi (Lesser Long-eared Bat)*			
109.	24407	*Ocyphaps lophotes (Crested Pigeon)*			
110.	24618	*Oreoica gutturalis (Crested Bellbird)*			
111.	24328	*Oxyura australis (Blue-billed Duck)*			
112.	25679	*Pachycephala pectoralis (Golden Whistler)*			
113.	24623	*Pachycephala pectoralis subsp. fuliginosa*			
114.	25680	*Pachycephala rufiventris (Rufous Whistler)*			
115.	25681	*Pardalotus punctatus (Spotted Pardalote)*			
116.	25682	*Pardalotus striatus (Striated Pardalote)*			
117.		*Paroster sp. 2 (Parkeyerring)*			
118.	24659	*Petroica goodenovii (Red-capped Robin)*			
119.	24660	*Petroica multicolor subsp. campbelli*			
120.	24667	*Phalacrocorax sulcirostris (Little Black Cormorant)*			
121.	24409	*Phaps chalcoptera (Common Bronzewing)*			
122.	24098	*Phascogale calura (Red-tailed Phascogale, Kenngoor)*		T	

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
123.	24099	*Phascogale tapoatafa subsp. tapoatafa (Southern Brush-tailed Phascogale, Wambenger)*		T	
124.	24594	*Phylidonyris melanops (Tawny-crowned Honeyeater)*			
125.	24596	*Phylidonyris novaehollandiae (New Holland Honeyeater)*			
126.	24841	*Platalea flavipes (Yellow-billed Spoonbill)*			
127.	25720	*Platycercus icterotis (Western Rosella)*			
128.	24746	*Platycercus icterotis subsp. xanthogenys (Western Rosella (inland))*		T	
129.		*Platycypris baueri*			
130.	24680	*Podiceps cristatus subsp. australis*			
131.	24681	*Poliocephalus poliocephalus (Hoary-headed Grebe)*			
132.	25722	*Polytelis anthopeplus (Regent Parrot)*			
133.	24683	*Pomatostomus superciliosus (White-browed Babbler)*			
134.	25732	*Porzana pusilla (Baillon's Crake)*			
135.	24771	*Porzana tabuensis (Spotless Crake)*			
136.		*Procladius paludicola*			
137.	25259	*Pseudonaja affinis subsp. affinis (Dugite)*			
138.	25433	*Pseudophryne guentheri (Crawling Toadlet)*			
139.	25613	*Rhipidura fuliginosa (Grey Fantail)*			
140.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
141.	25534	*Sericornis frontalis (White-browed Scrubwren)*			
142.	25266	*Simoselaps bertholdi (Jan's Banded Snake)*			
143.	30948	*Smicrornis brevirostris (Weebill)*			
144.	24108	*Sminthopsis crassicaudata (Fat-tailed Dunnart)*			
145.	24329	*Stictonetta naevosa (Freckled Duck)*			
146.	25597	*Strepera versicolor (Grey Currawong)*			
147.	25590	*Streptopelia senegalensis (Laughing Turtle-Dove)*	Y		
148.	24259	*Sus scrofa (Pig)*	Y		
149.	25705	*Tachybaptus novaehollandiae (Australasian Grebe)*			
150.	24185	*Tadarida australis (White-striped Freetail-bat)*			
151.	24331	*Tadorna tadornoides (Australian Shelduck)*			
152.		*Tanytarsus barbitarsis*			
153.		*Tanytarsus fuscithorax/semibarbitarsus*			
154.	-13561	*Tasmanicosa leuckartii*			
155.	25203	*Tiliqua occipitalis (Western Bluetongue)*			
156.	25549	*Todiramphus sanctus (Sacred Kingfisher)*			
157.	24852	*Tyto alba subsp. delicatula (Barn Owl)*			
158.	-14745	*Urodacus novaehollandiae*			
159.	24386	*Vanellus tricolor (Banded Lapwing)*			
160.	25218	*Varanus gouldii (Bungarra or Sand Monitor)*			
161.	24206	*Vespadelus regulus (Southern Forest Bat)*			
162.	25765	*Zosterops lateralis (Grey-breasted White-eye)*			

Conservation Codes
T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

[1] For NatureMap's purposes, species flagged as endemic are those whose records are wholely contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

NatureMap
Mapping Western Australia's biodiversity

NatureMap Species Report

Created By Kylie Payne on 23/04/2013

Current Names Only Yes
Core Datasets Only Yes
Species Group All Plants
Method 'Predefined Area Intersect'
Area Type Shire Boundary
Intersect WOODANILLING

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
1.	3200	*Acacia acuminata (Jam)*			
2.	3324	*Acacia erinacea*			
3.	3357	*Acacia grisea*		P4	
4.	3383	*Acacia incurva*			
5.	15721	*Acacia lasiocarpa var. sedifolia*			
6.	11448	*Acacia leptospermoides subsp. leptospermoides*			
7.	14606	*Acacia lullfitziorum*			
8.	15481	*Acacia pulchella var. glaberrima*			
9.	15482	*Acacia pulchella var. goadbyi*			
10.	3505	*Acacia pycnocephala*			
11.	30033	*Acacia saligna subsp. lindleyi*			
12.	3554	*Acacia squamata*			
13.	3557	*Acacia stenoptera (Narrow Winged Wattle)*			
14.	13506	*Acacia sulcata var. platyphylla*			
15.	15717	*Acacia varia var. crassinervis*			
16.	15715	*Acacia varia var. parviflora*			
17.	11837	*Adenanthos cygnorum subsp. cygnorum (Common Woollybush)*			
18.	184	*Aira caryophyllea (Silvery Hairgrass)*	Y		
19.	1731	*Allocasuarina huegeliana (Rock Sheoak)*			
20.	1732	*Allocasuarina humilis (Dwarf Sheoak)*			
21.	13908	*Allocasuarina lehmanniana subsp. lehmanniana*			
22.	1734	*Allocasuarina microstachya*			
23.	1739	*Allocasuarina thuyoides (Horned Sheoak)*			
24.	200	*Amphipogon turbinatus*			
25.	2380	*Amyema miquelii (Stalked Mistletoe)*			
26.	2383	*Amyema preissii (Wireleaf Mistletoe)*			
27.	6305	*Andersonia brevifolia*			
28.	6307	*Andersonia carinata*		P2	
29.	6318	*Andersonia parvifolia*			
30.	7833	*Angianthus preissianus*			
31.	1409	*Anigozanthos humilis (Catspaw)*			
32.	11434	*Anigozanthos humilis subsp. humilis*			
33.	1116	*Aphelia brizula*			
34.	1117	*Aphelia cyperoides*			
35.	7850	*Asteridea nivea*			
36.	6325	*Astroloma drummondii*			
37.	6334	*Astroloma pallidum (Kick Bush)*			
38.	2452	*Atriplex cinerea (Grey Saltbush)*			
39.	2475	*Atriplex semibaccata (Berry Saltbush)*			
40.	17237	*Austrostipa elegantissima*			
41.	17241	*Austrostipa hemipogon*			
42.	17246	*Austrostipa nitida*			
43.	5341	*Baeckea crispiflora*			
44.	5346	*Baeckea floribunda*			
45.	32687	*Banksia acanthopoda*		P2	
46.	32176	*Banksia acuminata*		P4	
47.	32681	*Banksia armata (Prickly Dryandra)*			
48.	32682	*Banksia armata var. armata*			
49.	32683	*Banksia armata var. ignicida*			
50.	1800	*Banksia attenuata (Slender Banksia)*			
51.	32598	*Banksia cynaroides*		P4	
52.	32580	*Banksia dallanneyi var. dallanneyi*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
53.	32561	*Banksia densa*			
54.	32562	*Banksia densa var. densa*			
55.	32560	*Banksia drummondii subsp. hiemalis*			
56.	32538	*Banksia fililoba*			
57.	32523	*Banksia fraseri var. fraseri*			
58.	1819	*Banksia grandis (Bull Banksia)*			
59.	32213	*Banksia lepidorhiza*		P1	
60.	32212	*Banksia meganotia*		P3	
61.	17108	*Banksia meisneri subsp. meisneri*			
62.	32203	*Banksia nivea subsp. nivea*			
63.	32200	*Banksia nobilis subsp. nobilis*			
64.	1836	*Banksia nutans (Nodding Banksia)*			
65.	11941	*Banksia nutans var. cernuella*			
66.	32198	*Banksia obovata (Wedge-leaved Dryandra)*			
67.	32196	*Banksia octotriginta*			
68.	32158	*Banksia porrecta*		P4	
69.	32088	*Banksia rufa*			
70.	32087	*Banksia rufistylis*		P2	
71.	1851	*Banksia sphaerocarpa (Round-fruit Banksia)*			
72.	11868	*Banksia sphaerocarpa var. caesia*			
73.	32041	*Banksia stuposa*			
74.	32035	*Banksia tenuis*			
75.	32034	*Banksia tenuis var. reptans*			
76.	1856	*Banksia violacea (Violet Banksia)*			
77.	743	*Baumea juncea (Bare Twigrush)*			
78.	13889	*Beaufortia sp. column (J.S. Beard 8119)*		P3	
79.	25798	*Billardiera fusiformis (Australian Bluebell)*			
80.	3160	*Billardiera lehmanniana (Kurup)*			
81.	7856	*Blennospora drummondii*			
82.	7857	*Blennospora phlegmatocarpa*			
83.	16639	*Boronia scabra subsp. scabra*			
84.	4441	*Boronia spathulata (Boronia)*			
85.	1272	*Borya scirpoidea*			
86.	1273	*Borya sphaerocephala (Pincushions)*			
87.	3710	*Bossiaea eriocarpa (Common Brown Pea)*			
88.	7878	*Brachyscome iberidifolia*			
89.	1277	*Caesia occidentalis*			
90.	29439	*Caesia sp. Wongan (K.F. Kenneally 8820)*			
91.	15340	*Caladenia caesarea subsp. caesarea*			
92.	1580	*Caladenia cairnsiana (Zebra Orchid)*			
93.	20433	*Caladenia denticulata subsp. Jarrah forest (G.J. Keighery 13592)*			
94.	18020	*Caladenia exilis*			
95.	11165	*Caladenia falcata*			
96.	15348	*Caladenia flava subsp. flava*			
97.	15355	*Caladenia hirta subsp. rosea*			
98.	15363	*Caladenia longicauda subsp. eminens*			
99.	1603	*Caladenia longiclavata (Clubbed Spider Orchid)*			
100.	17864	*Caladenia luteola*		T	
101.	15376	*Caladenia polychroma*			
102.	20431	*Caladenia sp. Moodiarrup (A.P. Brown 233)*			
103.	15383	*Caladenia uliginosa subsp. uliginosa*			
104.	17590	*Caladenia x cala*			
105.	19340	*Caladenia x suffusa*			
106.	15398	*Caladenia xantha*			
107.	16365	*Calandrinia sp. Kenwick (G.J. Keighery 10905)*			
108.	20096	*Calandrinia sp. Piawaning (A.C. Beauglehole 12257)*		P1	
109.	19308	*Calectasia grandiflora subsp. Wheatbelt (A.M. Coates 4315)*			
110.	36560	*Callitris arenaria (Sandplain Cypress)*			
111.	5413	*Calothamnus huegelii*			
112.	5424	*Calothamnus planifolius*			
113.	35162	*Calothamnus planifolius var. planifolius*			
114.	5425	*Calothamnus preissii*			
115.	35816	*Calothamnus quadrifidus subsp. quadrifidus*			
116.	5429	*Calothamnus sanguineus (Silky-leaved Blood flower)*			
117.	5465	*Calytrix leschenaultii*			
118.	13655	*Calytrix simplex subsp. suboppositifolia*			
119.	5483	*Calytrix tetragona (Common Fringe-myrtle)*			
120.	11211	*Cassytha glabella forma dispar*			
121.	1742	*Casuarina obesa (Swamp Sheoak)*			
122.	760	*Caustis dioica*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
123.	41568	*Cenchrus setaceus (Fountain Grass)*	Y		
124.	1123	*Centrolepis caespitosa*		P4	
125.	1134	*Centrolepis polygyna (Wiry Centrolepis)*			
126.	1280	*Chamaescilla corymbosa (Blue Squill)*			
127.	11299	*Chamaescilla corymbosa var. corymbosa*			
128.	1281	*Chamaescilla spiralis*			
129.	1217	*Chamaexeros serra (Little Fringe-leaf)*			
130.	5491	*Chamelaucium ciliatum*			
131.	3169	*Cheiranthera preissiana*			
132.	2490	*Chenopodium glaucum (Glaucous Goosefoot)*	Y		
133.	6746	*Chloanthes coccinea*			
134.	2334	*Choretrum glomeratum (Common Sour Bush)*			
135.	11900	*Chrysanthemoides monilifera subsp. monilifera*	Y		
136.	4555	*Comesperma integerrimum*			
137.	4559	*Comesperma polygaloides (Small Milkwort)*			
138.	4561	*Comesperma scoparium (Broom Milkwort)*			
139.	4566	*Comesperma volubile (Love Creeper)*			
140.	16878	*Conospermum caeruleum subsp. spathulatum*			
141.	15044	*Conospermum cinereum*			
142.	8824	*Conospermum croniniae*			
143.	1868	*Conospermum distichum*			
144.	16848	*Conospermum multispicatum*			
145.	1882	*Conospermum stoechadis (Common Smokebush)*			
146.	1433	*Conostylis drummondii (Drummond's Conostylis)*		T	
147.	1447	*Conostylis pusilla*			
148.	1453	*Conostylis serrulata*			
149.	1454	*Conostylis setigera (Bristly Cottonhead)*			
150.	11363	*Conostylis setigera subsp. dasys*		T	
151.	11597	*Conostylis setigera subsp. setigera*			
152.	17104	*Corymbia calophylla (Marri)*			
153.	7945	*Cotula coronopifolia (Waterbuttons)*	Y		
154.	13470	*Cryptandra arbutiflora var. arbutiflora*			
155.	4800	*Cryptandra leucopogon*			
156.	4809	*Cryptandra pungens*			
157.	15114	*Cyanicula gemmata*			
158.	6748	*Cyanostegia corifolia (Tinsel Flower)*			
159.	7438	*Dampiera eriocephala (Woolly-headed Dampiera)*			
160.	13157	*Dampiera haematotricha subsp. haematotricha*			
161.	7449	*Dampiera juncea (Rush-like Dampiera)*			
162.	7451	*Dampiera lavandulacea*			
163.	7453	*Dampiera lindleyi*			
164.	7471	*Dampiera sacculata (Pouched Dampiera)*			
165.	5533	*Darwinia vestita (Pom-pom Darwinia)*			
166.	15505	*Daviesia incrassata subsp. incrassata*			
167.	3819	*Daviesia longifolia*			
168.	17663	*Desmocladus asper*			
169.	17691	*Desmocladus fasciculatus*			
170.	11636	*Dianella revoluta var. divaricata*			
171.	11049	*Diuris corymbosa*			
172.	1634	*Diuris laxiflora (Bee Orchid)*			
173.	4765	*Dodonaea humifusa*			
174.	4775	*Dodonaea pinifolia*			
175.	15709	*Drosera androsacea (Cone Sundew)*			
176.	3095	*Drosera erythrorhiza (Red Ink Sundew)*			
177.	13213	*Drosera erythrorhiza subsp. squamosa*			
178.	3106	*Drosera macrantha (Bridal Rainbow)*			
179.	14298	*Drosera macrantha subsp. macrantha*			
180.	3109	*Drosera menziesii (Pink Rainbow)*			
181.	3133	*Drosera subhirtella (Sunny Rainbow)*			
182.	347	*Ehrharta calycina (Perennial Veldt Grass)*	Y		
183.	349	*Ehrharta longiflora (Annual Veldt Grass)*	Y		
184.	1644	*Elythranthera emarginata (Pink Enamel Orchid)*			
185.	5541	*Eremaea pauciflora*			
186.	7215	*Eremophila glabra (Tar Bush)*			
187.	12740	*Erymophyllum tenellum*			
188.	5551	*Eucalyptus angustissima (Narrow-leaved Mallee)*			
189.	13017	*Eucalyptus argyphea*			
190.	13534	*Eucalyptus aspersa*			
191.	19508	*Eucalyptus calycogona subsp. calycogona*			
192.	5600	*Eucalyptus conglobata (Port Lincoln Mallee)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
193.	12870	*Eucalyptus densa*			
194.	5628	*Eucalyptus drummondii (Drummond's Gum)*			
195.	5643	*Eucalyptus falcata (Silver Mallet)*			
196.	18521	*Eucalyptus flocktoniae subsp. flocktoniae*			
197.	5656	*Eucalyptus gardneri (Blue Mallet)*			
198.	12872	*Eucalyptus gardneri subsp. gardneri*			
199.	12899	*Eucalyptus hebetifolia*			
200.	5673	*Eucalyptus horistes*			
201.	5675	*Eucalyptus incrassata (Lerp Mallee)*			
202.	15671	*Eucalyptus kochii subsp. kochii*			
203.	15670	*Eucalyptus kochii subsp. plenissima*			
204.	12697	*Eucalyptus latens (Narrow-leaved Red Mallee)*			
205.	5702	*Eucalyptus loxophleba (York Gum)*			
206.	11423	*Eucalyptus loxophleba subsp. gratiae (Lake Grace Gum)*			
207.	13037	*Eucalyptus loxophleba subsp. lissophloia*			
208.	11295	*Eucalyptus loxophleba subsp. loxophleba (York Gum)*			
209.	13547	*Eucalyptus marginata subsp. marginata (Jarrah)*			
210.	5723	*Eucalyptus occidentalis (Flat-topped Yate)*			
211.	20047	*Eucalyptus orthostemon*			
212.	5735	*Eucalyptus pachyloma (Kalgan Plains Mallee)*			
213.	12695	*Eucalyptus perangusta*			
214.	16201	*Eucalyptus phenax*			
215.	12865	*Eucalyptus pluricaulis subsp. porphyrea (Purple-leaved mallee)*			
216.	5763	*Eucalyptus rudis (Flooded Gum)*			
217.	5775	*Eucalyptus spathulata (Swamp Mallet)*			
218.	11475	*Eucalyptus spathulata subsp. spathulata (Swamp Mallet)*			
219.	19653	*Eucalyptus thamnoides*			
220.	19655	*Eucalyptus thamnoides subsp. megista*			
221.	5796	*Eucalyptus uncinata (Hook-leaved Mallee)*			
222.	5797	*Eucalyptus wandoo (Wandoo)*			
223.	12906	*Eucalyptus wandoo subsp. wandoo*			
224.	12877	*Eucalyptus xanthonema subsp. xanthonema*			
225.	37860	*Eutaxia empetrifolia*			
226.	3879	*Eutaxia parvifolia*			
227.	1944	*Franklandia fucifolia (Lanoline Bush)*			
228.	18392	*Freesia alba x leichtlinii*	Y		
229.	907	*Gahnia trifida (Coast Saw-sedge)*			
230.	3895	*Gastrolobium calycinum (York Road Poison)*			
231.	20505	*Gastrolobium celsianum*			
232.	20472	*Gastrolobium dorrienii*			
233.	3910	*Gastrolobium obovatum (Boat-leaved Poison)*			
234.	3924	*Gastrolobium spinosum (Prickly Poison)*			
235.	3930	*Gastrolobium trilobum (Bullock Poison)*			
236.	3931	*Gastrolobium truncatum*			
237.	32380	*Gemmabryum pachythecum*			
238.	6143	*Glischrocaryon aureum (Common Popflower)*			
239.	7991	*Gnephosis drummondii*			
240.	8002	*Gnephosis tenuissima*			
241.	3950	*Gompholobium knightianum*			
242.	3951	*Gompholobium marginatum*			
243.	3954	*Gompholobium polymorphum*			
244.	3957	*Gompholobium tomentosum (Hairy Yellow Pea)*			
245.	2677	*Gomphrena celosioides (Gomphrena Weed)*	Y		
246.	7495	*Goodenia berardiana*			
247.	7538	*Goodenia pulchella*			
248.	19285	*Goodenia pulchella subsp. Wheatbelt (L.W. Sage & F. Hort 795)*			
249.	2005	*Grevillea fasciculata*			
250.	19435	*Grevillea hookeriana subsp. hookeriana*			
251.	2048	*Grevillea newbeyi*		P3	
252.	2066	*Grevillea pilulifera (Woolly-flowered Grevillea)*			
253.	2116	*Grevillea uncinulata (Hook-leaf Grevillea)*			
254.	12225	*Hakea brownii*			
255.	2145	*Hakea corymbosa (Cauliflower Hakea)*			
256.	2164	*Hakea gilbertii*			
257.	2166	*Hakea incrassata (Marble Hakea)*			
258.	2172	*Hakea lehmanniana (Blue Hakea)*			
259.	2175	*Hakea lissocarpha (Honey Bush)*			
260.	2197	*Hakea prostrata (Harsh Hakea)*			
261.	2212	*Hakea sulcata (Furrowed Hakea)*			
262.	31013	*Halgania anagalloides var. Southern (A.E. Orchard 1609)*			

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263.	8024	*Helichrysum leucopsideum*			
264.	6710	*Heliotropium europaeum (Common Heliotrope)*	Y		
265.	6839	*Hemiandra pungens (Snakebush)*			
266.	1526	*Hesperantha falcata*	Y		
267.	5108	*Hibbertia acerosa (Needle Leaved Guinea Flower)*			
268.	5114	*Hibbertia commutata*			
269.	5131	*Hibbertia gracilipes*			
270.	20059	*Hibbertia hemignosta*			
271.	20048	*Hibbertia hibbertioides var. pedunculata*			
272.	5144	*Hibbertia microphylla*			
273.	19687	*Hibbertia notibractea*			
274.	5157	*Hibbertia polystachya*			
275.	5161	*Hibbertia quadricolor*			
276.	11481	*Hibbertia spicata subsp. spicata*			
277.	6222	*Homalosciadium homalocarpum*			
278.	450	*Hordeum marinum*	Y		
279.	3966	*Hovea pungens (Devil's Pins)*			
280.	12741	*Hyalosperma cotula*			
281.	11546	*Hydrocotyle pilifera var. glabrata*			
282.	5817	*Hypocalymma angustifolium (White Myrtle)*			
283.	20200	*Isolepis cernua var. setiformis*			
284.	2222	*Isopogon attenuatus*			
285.	12909	*Isopogon buxifolius var. linearis*			
286.	16534	*Isopogon buxifolius var. spathulatus*			
287.	2238	*Isopogon teretifolius (Nodding Coneflower)*			
288.	14439	*Isopogon teretifolius subsp. teretifolius (Nodding Coneflower)*			
289.	3997	*Jacksonia alata*			
290.	4005	*Jacksonia condensata*			
291.	4029	*Jacksonia sternbergiana (Stinkwood)*			
292.	19373	*Jacksonia velveta*		T	
293.	4044	*Kennedia prostrata (Scarlet Runner)*			
294.	17508	*Kunzea micrantha subsp. oligandra*			
295.	2247	*Lambertia ilicifolia (Holly-leaved Honeysuckle)*			
296.	2248	*Lambertia inermis (Chittick)*			
297.	16870	*Lambertia inermis var. drummondii*			
298.	13284	*Lawrencella rosea*			
299.	1301	*Laxmannia brachyphylla (Stilted Paper-lily)*			
300.	11815	*Laxmannia grandiflora subsp. grandiflora*			
301.	1305	*Laxmannia omnifertilis*			
302.	7568	*Lechenaultia biloba (Blue Leschenaultia)*			
303.	7575	*Lechenaultia formosa (Red Leschenaultia)*			
304.	7590	*Lechenaultia tubiflora (Heath Leschenaultia)*			
305.	1075	*Lepidobolus preissianus*			
306.	930	*Lepidosperma costale*			
307.	41647	*Lepidosperma sanguinolentum*			
308.	947	*Lepidosperma tenue*			
309.	120	*Lepilaena cylindrocarpa*			
310.	121	*Lepilaena preissii (Slender Water Mat)*			
311.	1653	*Leporella fimbriata (Hare Orchid)*			
312.	2347	*Leptomeria lehmannii*			
313.	5847	*Leptospermum erubescens (Roadside Teatree)*			
314.	6426	*Leucopogon ozothamnoides*		P1	
315.	25815	*Leucopogon sp. Dongolocking (K. Kershaw KK 2333)*			
316.	28311	*Leucopogon sp. Great Southern (R.S. Cowan A 586)*			
317.	7676	*Levenhookia pusilla (Midget Stylewort)*			
318.	4362	*Linum marginale (Wild Flax)*			
319.	7406	*Lobelia rhombifolia (Tufted Lobelia)*			
320.	6508	*Logania flaviflora (Yellow Logania)*			
321.	14542	*Lomandra micrantha subsp. micrantha*			
322.	1242	*Lomandra rupestris*			
323.	1246	*Lomandra suaveolens*			
324.	34736	*Lysinema pentapetalum*			
325.	17699	*Lysiosepalum hexandrum*			
326.	4080	*Medicago sativa (Alfalfa)*	Y		
327.	20284	*Melaleuca atroviridis*			
328.	5880	*Melaleuca bracteosa*			
329.	18527	*Melaleuca brophyi*			
330.	5916	*Melaleuca halmaturorum*			
331.	5918	*Melaleuca haplantha*			
332.	15663	*Melaleuca pauperiflora subsp. fastigiata*			

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333.	5956	*Melaleuca pungens*			
334.	5959	*Melaleuca rhaphiophylla (Swamp Paperbark)*			
335.	5961	*Melaleuca scabra (Rough Honeymyrtle)*			
336.	20290	*Melaleuca scalena*			
337.	5969	*Melaleuca spicigera*			
338.	5972	*Melaleuca strobophylla*			
339.	5975	*Melaleuca subtrigona*			
340.	15673	*Melaleuca tuberculata*			
341.	18232	*Melaleuca tuberculata var. tuberculata*			
342.	5987	*Melaleuca viminea (Mohan)*			
343.	13280	*Melaleuca viminea subsp. viminea*			
344.	954	*Mesomelaena preissii*			
345.	6891	*Microcorys ericifolia*			
346.	8103	*Microseris scapigera (Yam)*		P3	
347.	14344	*Millotia tenuifolia var. tenuifolia (Soft Millotia)*			
348.	4090	*Mirbelia dilatata (Holly-leaved Mirbelia)*			
349.	4100	*Mirbelia spinosa*			
350.	4102	*Mirbelia subcordata*			
351.	4104	*Mirbelia trichocalyx*			
352.	7410	*Monopsis debilis*	Y		
353.	14187	*Myriocephalus occidentalis*			
354.	492	*Neurachne alopecuroidea (Foxtail Mulga Grass)*			
355.	6978	*Nicotiana rotundifolia (Round-leaved Tobacco)*			
356.	2401	*Nuytsia floribunda (Christmas Tree)*			
357.	2365	*Olax benthamiana*			
358.	8149	*Olearia rudis (Rough Daisybush)*			
359.	18255	*Opercularia vaginata (Dog Weed)*			
360.	4358	*Oxalis purpurea (Largeflower Wood Sorrel)*	Y		
361.	516	*Parapholis incurva (Coast Barbgrass)*	Y		
362.	7089	*Parentucellia latifolia (Common Bartsia)*	Y		
363.	1546	*Patersonia juncea (Rush Leaved Patersonia)*			
364.	2270	*Persoonia quinquenervis*			
365.	2292	*Petrophile divaricata*			
366.	14443	*Petrophile ericifolia subsp. ericifolia*			
367.	20605	*Petrophile filifolia subsp. filifolia*			
368.	14444	*Petrophile imbricata*			
369.	2302	*Petrophile media*			
370.	2308	*Petrophile seminuda*			
371.	2309	*Petrophile serruriae*			
372.	2311	*Petrophile squamata*			
373.	17765	*Petrophile squamata subsp. squamata*			
374.	4504	*Phebalium tuberculosum*			
375.	17366	*Phyllangium palustre*		P2	
376.	16824	*Phyllangium sulcatum*			
377.	4141	*Phyllota gracilis*			
378.	5231	*Pimelea angustifolia (Narrow-leaved Pimelea)*			
379.	11928	*Pimelea ciliata subsp. ciliata*			
380.	5251	*Pimelea imbricata*			
381.	11402	*Pimelea imbricata var. piligera*			
382.	5259	*Pimelea preissii*			
383.	87	*Pinus pinaster (Pinaster Pine)*	Y		
384.	88	*Pinus radiata (Radiata Pine)*	Y		
385.	7297	*Plantago coronopus (Buckshorn Plantain)*	Y		
386.	6252	*Platysace effusa*			
387.	6255	*Platysace juncea*			
388.	573	*Poa drummondiana (Knotted Poa)*			
389.	8172	*Podolepis canescens*			
390.	8173	*Podolepis capillaris (Wiry Podolepis)*			
391.	8175	*Podolepis gracilis (Slender Podolepis)*			
392.	8177	*Podolepis lessonii*			
393.	8182	*Podotheca angustifolia (Sticky Longheads)*			
394.	8188	*Pogonolepis stricta*			
395.	582	*Polypogon monspeliensis (Annual Beardgrass)*	Y		
396.	4691	*Poranthera microphylla (Small Poranthera)*			
397.	15424	*Praecoxanthus aphyllus*			
398.	1669	*Prasophyllum cyphochilum (Pouched Leek Orchid)*			
399.	10778	*Pterostylis picta*			
400.	1693	*Pterostylis recurva (Jug Orchid)*			
401.	18652	*Pterostylis sp. robust (W. Jackson BJ294)*			
402.	1698	*Pterostylis vittata (Banded Greenhood)*			

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403.	2716	*Ptilotus declinatus (Curved Mulla Mulla)*			
404.	2733	*Ptilotus humilis*			
405.	20653	*Ptilotus sp. Beaufort River (G.J. Keighery 16554)*			
406.	4171	*Pultenaea empetrifolia*			
407.	6013	*Regelia cymbifolia*		P4	
408.	6014	*Regelia inops*			
409.	13300	*Rhodanthe citrina*			
410.	15035	*Rhodanthe corymbosa*			
411.	13294	*Rhodanthe laevis*			
412.	13234	*Rhodanthe manglesii*			
413.	6022	*Rinzia fumana*			
414.	115	*Ruppia megacarpa*			
415.	117	*Ruppia tuberosa*			
416.	40427	*Rytidosperma setaceum*			
417.	6483	*Samolus junceus*			
418.	2591	*Sarcocornia blackiana*			
419.	980	*Schoenus capillifolius*		P3	
420.	1002	*Schoenus nanus (Tiny Bog Rush)*			
421.	17614	*Schoenus plumosus*			
422.	1014	*Schoenus sesquispiculus*			
423.	16280	*Schoenus sp. Beaufort (G.J. Keighery 6291)*		P1	
424.	16251	*Schoenus subflavus subsp. long leaves (K.L. Wilson 2865)*			
425.	1025	*Schoenus trachycarpus (Rough Fruited Bog-rush)*			
426.	8231	*Sonchus oleraceus (Common Sowthistle)*	Y		
427.	1312	*Sowerbaea laxiflora (Purple Tassels)*			
428.	8900	*Spergularia marina*			
429.	17551	*Sphaerolobium drummondii*			
430.	4207	*Sphaerolobium medium*			
431.	4733	*Stackhousia monogyna*			
432.	30278	*Stylidium androsaceum*			
433.	7696	*Stylidium calcaratum (Book Triggerplant)*			
434.	7698	*Stylidium caricifolium (Milkmaids)*			
435.	12844	*Stylidium coatesianum*		P2	
436.	40944	*Stylidium decipiens*			
437.	7712	*Stylidium despectum (Dwarf Triggerplant)*			
438.	7713	*Stylidium dichotomum (Pins-and-needles)*			
439.	19251	*Stylidium eriopodum*			
440.	7747	*Stylidium lepidum (Redcaps)*		P3	
441.	7749	*Stylidium leptophyllum (Needle-leaved Triggerplant)*			
442.	7773	*Stylidium petiolare (Horn Triggerplant)*			
443.	7774	*Stylidium piliferum (Common Butterfly Triggerplant)*			
444.	7786	*Stylidium rhipidium (Fan Triggerplant)*		P3	
445.	7798	*Stylidium schoenoides (Cow Kicks)*			
446.	7801	*Stylidium squamellosum (Maize Trigger Plant)*		P2	
447.	9304	*Stylidium zeicolor (Maize Triggerplant)*			
448.	1260	*Stypandra glauca (Blind Grass)*			
449.	12912	*Synaphea drummondii*		P3	
450.	15971	*Synaphea flabelliformis*			
451.	16769	*Synaphea hians*		P3	
452.	16761	*Synaphea interioris*			
453.	12911	*Synaphea obtusata*			
454.	30711	*Synaphea sp. Woodanilling (G.J. Keighery & N. Gibson 4614)*		P2	
455.	2329	*Synaphea spinulosa*			
456.	32437	*Syntrichia antarctica*			
457.	31718	*Tecticornia lepidosperma*			
458.	33296	*Tecticornia pergranulata*			
459.	33297	*Tecticornia pergranulata subsp. pergranulata (Blackseed Samphire)*			
460.	29720	*Tetrapora glomerata*			
461.	1036	*Tetraria octandra*			
462.	4528	*Tetratheca confertifolia*			
463.	4535	*Tetratheca hirsuta (Black Eyed Susan)*			
464.	4546	*Tetratheca virgata*			
465.	1701	*Thelymitra antennifera (Vanilla Orchid)*			
466.	10856	*Thelymitra benthamiana (Cinnamon Sun Orchid)*			
467.	11143	*Thelymitra graminea*			
468.	11053	*Thelymitra macrophylla*			
469.	5086	*Thomasia macrocalyx*			
470.	16994	*Thomasia sp. Arthur River (H.F. & M. Broadbent 1409)*		P1	
471.	1325	*Thysanotus brevifolius*		P2	
472.	1327	*Thysanotus cymosus*		P3	

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
473.	1328	*Thysanotus dichotomus (Branching Fringe Lily)*			
474.	1338	*Thysanotus manglesianus (Fringed Lily)*			
475.	1343	*Thysanotus patersonii*			
476.	1357	*Thysanotus thyrsoideus*			
477.	6280	*Trachymene pilosa (Native Parsnip)*			
478.	1361	*Tricoryne elatior (Yellow Autumn Lily)*			
479.	147	*Triglochin mucronata*			
480.	9008	*Urodon dasyphyllus (Mop Bushpea)*			
481.	38388	*Ursinia anthemoides subsp. anthemoides*	Y		
482.	2920	*Vaccaria hispanica (Cow Soapwort)*	Y		
483.	7665	*Velleia trinervis*			
484.	12388	*Verticordia acerosa var. preissii*			
485.	14708	*Verticordia brevifolia subsp. brevifolia*		P3	
486.	15432	*Verticordia densiflora var. densiflora*			
487.	14713	*Verticordia fimbrilepis subsp. fimbrilepis*		T	
488.	6082	*Verticordia grandiflora (Claw Featherflower)*			
489.	6084	*Verticordia habrantha (Hidden Featherflower)*			
490.	12430	*Verticordia huegelii var. stylosa*			
491.	12433	*Verticordia insignis subsp. compta*			
492.	12439	*Verticordia lindleyi subsp. purpurea*			
493.	14717	*Verticordia multiflora subsp. multiflora*			
494.	6107	*Verticordia pennigera*			
495.	12449	*Verticordia plumosa var. brachyphylla*			
496.	15267	*Verticordia roei subsp. roei*			
497.	15617	*Verticordia serrata var. serrata*			
498.	12465	*Verticordia subulata*			
499.	13331	*Waitzia acuminata var. acuminata*			
500.	6660	*Wilsonia rotundifolia (Round-leaf Wilsonia)*			
501.	1252	*Xanthorrhoea drummondii*			
502.	6284	*Xanthosia candida*			
503.	6285	*Xanthosia ciliata*			

Conservation Codes
T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

[1] For NatureMap's purposes, species flagged as endemic are those whose records are wholely contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.