Introduction

The Shire of Harvey covers an area of 1766 km^2 and supports a population of 17100 people. The area experiences a mediterranean climate with an annual rainfall of 978.7mm. Seasonal temperatures are characterised by warm summers, with maxima averaging in the low thirties, and mild winters, with maxima in the mid teens. Mean daily maximum and minimum temperatures and rainfalls are shown below (Figure 1).

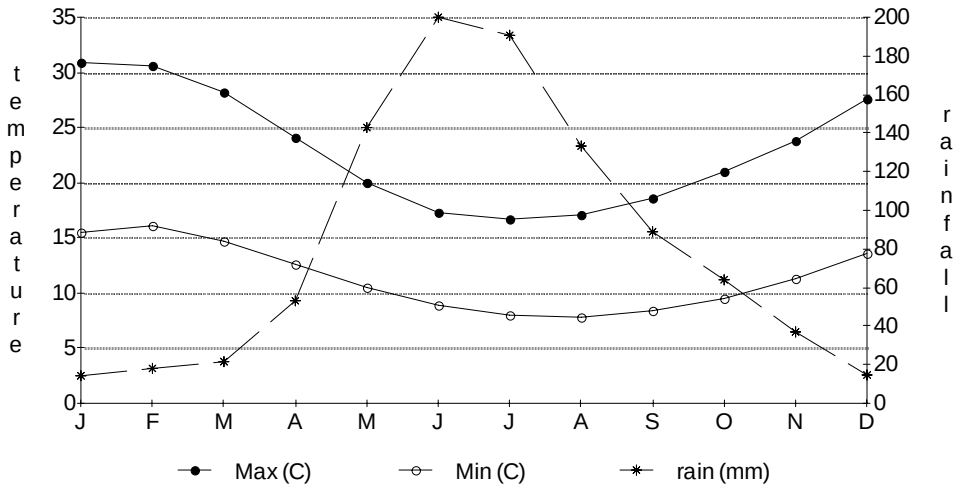

Figure 1. Mean daily maximum and minimum temperature (C) and rainfall (mm) in the Shire of Harvey (measured at Wokalup Agric. Research Station).

Harvey is located 140 km south of Perth in Western Australia's south west land division. Major industries of the area include mining, commerce, dairy farming and horticulture. Tourism is also an important industry with the area's spectacular natural resources being a major attraction. Other attractions include Yarloop Mill Workshops, Emu Tech, Big Orange, Harvey Weir, Stirling Dam, Logue Brook Dam, Harvey Tourist & Interpretive Centre, Henton Cottage, Replica Captain Stirling's Cottage, Italian Interment War Shrine, Leschenault Inlet and the Stirling and Logue Brook Dams.

Based on WA Herbarium records over 800 species of plants have been recorded from the Shire of Harvey. This includes more than 30 species of acacia, 5 species of boronia, 41 species of orchid and 7 species of eucalypt. However, it is of concern that 123 species of exotic weeds are also recorded within the shire.

Value of Roadsides

Since the settlement of Western Australia by Europeans, large areas of native vegetation in the south west of the state have been cleared to make way for agriculture and other development ventures. The fragmentation of the more or less continuous tracts of native vegetation suites by clearing has resulted in the isolation of plant and animal populations and communities. Populations isolated and restricted to these man-made biogeographical islands of small remnants are prone to food shortages, disease and reduced genetic diversity. However the presence of native vegetation along roadsides can often assist in alleviating this isolation effect by providing corridors between bush remnants, thereby facilitating the movement of biota across the landscape. Unfortunately the protective mantle afforded by the native flora

has been badly depleted with now only approximately 187 km^2 (19.4% of the shire area minus public land inside the clearing line) of remnant vegetation remaining in the Shire of Harvey. (Beeston *et al*, 1993).

Remnant native vegetation includes more than just trees. Trees, shrubs and ground covers (creepers, grasses and herbs) combine to provide valuable food and shelter for different types of wildlife. Existing native vegetation will require less maintenance if left undisturbed.

Trees are good - bush is better - native trees, shrubs and grasses on the roadside are valuable because they:

- often are the only remaining example of original vegetation within cleared areas;
- are easier to maintain and generally less fire prone than introduced vegetation;
- provide habitat for many native species of plants, mammals, reptiles amphibians and invertebrates;
- provide wildlife corridors linking other areas of native vegetation;
- often contain rare and endangered plants and animals; (Currently, 321 plant species are declared rare under the wildlife conservation act 1950-1979. Of these, more than 100 are known to be from roadside populations. In fact, roadside plants represent more than 80 per cent of the known populations of 40 of the 'declared rare' species and three of these are known only to exist in roadside populations).
- provide the basis for our important wildflower tourism industry; (The aesthetic appeal of well-maintained roadsides should not be overlooked and they have the potential to improve local tourism and provide a sense of place. As well as creating a more favourable impression of an area, roadsides attract tourists who visit specifically to view wildflowers).
- often contain sites of historical or cultural significance;
- provide windbreaks and stock shelter areas for adjoining farmland; (This can help stabilise temperature and reduce evaporation, and thereby providing microhabitat more suitable to higher levels of productivity. Well conserved roadsides also assist with erosion and salinity control. In addition, native vegetation on roadsides is generally far less of a fire threat than annual weeds. Undisturbed roadsides provide a bench mark for the study of soil change during agricultural development).
- are a vital source of local seed for revegetation projects; (In lieu of other alternatives and cognisant of limitations; road reserves can also provide a valuable source of seed for regeneration projects. This is especially pertinent to shrub species, as clearing and grazing beneath farm trees often removes this layer). **Approval of the local shire and a CALM permit are required prior to collection.**

In a time of rapid change where the demands placed on the natural world are many, it is vital that there is a coordinated management of lands across all tenures to ensure the sustainability and integrity of the natural biota and processes, agricultural lands and service infrastructure. It is somewhat ironic that the reserves established to cater for a transport system in a modern world are now an integral component of this coordinated management approach.

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

Legislation

Uncertainty often exists in the minds of many with regard to the 'ownership' control and management of the roadside *per se.* When a public road is created, a corridor of land is dedicated for a road, i.e. a road reserve. The road formation and its associated

infrastructure are accommodated within the road reserve. The remaining area on each side of the road is called the road verge or roadside. It is in the control and management responsibilities of this area (and flora and fauna residing within it) that the uncertainty exists.

Public roads other than main roads are dedicated under the ***Local Government Act*** (Part XII). Dedication places care and management of the road (street) in the relevant local government authority. However, under Section 286 of the ***Local Government Act,*** land in a road is the absolute property of the Crown, i.e. still Crown land.

Road reserves may be created in the following ways:

- by approval of a crown subdivisional plans, s.294a of the ***local government act.***
- by approval of a freehold subdivisional plan, s.295 (5) of the **local government act.**
- by approval of a survey plan (crown or freehold), s.28 of the ***town planning and development act.***
- by dedication of crown land (often following acquisition under the **public works act**), ss.287 and 288 of the ***local government act.***
- by a local government undertaking work on a private street, s.296 of the ***local government act.***

When a street is dedicated to a public use, it becomes Crown land under the ***Land Act***, pursuant to s.286 of the ***Local Government Act.*** Care, control and management rest in the relevant local government (s.300 of the ***Local Government Act***) unless the road is declared a highway, main road or secondary road under the ***Main Roads Act.*** In the latter case, care, control and management vests in the Commissioner of Main Roads (ss.15 and 26 of the ***Main Roads Act***). Main Roads Western Australia, rather than DOLA, administers those roads placed under their management responsibility.

The ***Local Government Act*** appears to be written in an urban context, and does not refer specifically to the management of the roadside; rather it only refers to the road itself. It is therefore difficult to determine to what extent the Act places the care, control and management of the roadside with the local government authority in the case of dedicated roads. It is, however, suggested that where a local government authority is managing a road (reserve) that authority may undertake reasonable management of the roadside to facilitate the roadway, including making the road safe and convenient to use.

With the proclamation of the ***Wildlife Conservation Act*** **1950** the responsibility for flora conservation, including the control of harvesting of protected flora, this includes seed, was given to the Minister of the Crown responsible for Fisheries and Wildlife and the Department of Fisheries and Wildlife. With the formation of the Department of Conservation and Land Management (CALM) in 1984 and the accompanying ***Conservation and Land Management Act*** **1984** the conservation and management of all native wildlife passed to the Minister responsible for that Department and the Department itself. As a consequence CALM has the authority to exert controls.
Main Roads Western Australia manages Perth-Bunbury Hwy, South Western Hwy and Coalfields Hwy, and the Shire of Harvey manages all other roads in this survey.

Assessment Process

Methods

The methods to assess and calculate the conservation value of the roadside reserves are described in Hussey (1991). The process involves scoring a set of pre-selected attributes, which, when combined, represent a roadside's conservation status. A list of these attributes is

presented on a standard survey sheet, see Appendix 2. This provides both a convenient and uniform method of scoring. Ideally, 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. Lamont and Blyth (1995).

Fieldwork was carried out from April 1995 to June 1988. The surveyors were:

P Eckersley, M Gibson, Gleeson, T Howe, M Kennedy, Leap, K Marston, N McNerney, H Othery, T Othery, D Pollock, S Pollock, M Reeve, T Reeve, C Smith, W Smith, Stanley,Taylor, and I Wilson.

The enthusiastic efforts of these volunteer surveyors ensured that this project was successfully completed. It is now hoped that the data collected will be used by all sectors of the community who have an interest in the roadside environment.

Quantify Conservation Values

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

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

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

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

Table 1: Colour codes used to depict the conservation status of roadsides.

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

- width of road reserve;
- width of vegetated roadside;
- presence of utilities/disturbances;
- dominant native species;
- dominant weeds;
- fauna observed;

- general comments.

It is felt that the recording of these attributes will provide a community database that would provide information useful in many spheres local government and community interest.

Mapping

A computer generated map (GIS Arc Info) depicting the conservation status of the roadside vegetation and the width of the road reserves within the Shire of Harvey was produced. The data used to produce both the map and the following figures and tables are presented in Appendix 3.

The roadside conservation values map initially provides an inventory of the *status quo* of the condition of the roadside vegetation. This is important as quality of roadside vegetation has far reaching implications for sustaining biodiversity, tourism and Landcare values. Moreover the data and map can be incorporated as a management and planning tool for managing the roadsides *per se*, as it enables the condition of roadside vegetation to be easily assessed. This information can then be used to identify environmentally sensitive areas, high conservation roadsides or strategically important areas, and thus ensure their conservation. Conversely it enables degraded areas to be identified as areas important for strategic rehabilitation, or in need of specific fire management techniques or regimes and weed control programmes.

The map can also be used as a reference to overlay transparencies of other information relevant to roadside conservation. Data obtained from CALM and the Agricultural Department can been used to produce an overlay map that depicts the location of remnant vegetation on both the Crown estate and privately owned land. This enables the roadside vegetation to be assessed in the context of its importance to the shire's overall conservation network. Other transparencies, such as the degree of weed infestation, or the location of environmentally sensitive areas or future planned developments, could also be produced as an aid to roadside management.

As well as providing a road reserve planning and management tool, the survey data can also be used for:

- regional or district fire management plans;
- tourist routes - roads depicted as high conservation value would provide visitors to the district with an insight to the flora of the district;
- landcare/bushcare projects - would be able to incorporate the information from this survey into 'whole of' landscape projects.

Survey Data Results

A summary of the general roadside conditions in the Shire of Harvey is presented in Table 2. The survey data have been combined to provide the total kilometres and percentage of roadside occupied by each of the conservation status categories and the attributes used to calculate the conservation values (Table 2).

Conservation Status (km)			Native Vegetation on Roadside (km)			Weed Infestation (km)		
High (9-12)	244.8	18.6%	2 - 3 veg layers	632.7	48.0%	Light (2)	236.4	17.9%
Med (7-8)	166.3	12.6%	1 veg layer	497.1	37.7%	Medium (1)	221.2	16.8%
Med (5-6)	226.2	17.2%	0 veg layers	187.1	14.2%	Heavy (0)	859.3	65.3%
Low (0-4)	679.6	51.6%						
			Total	1316.9	100.0%	Total	1316.9	100.0%
Conservation Values (km)			**Extent of Native Vegetation (km)**			**Value as Biological Corridor (km)**		
0	3.3	0.3%	>80% Good (2)	192.5	14.6%	High (2)	326.1	24.8%
1	105.5	8.0%	20-80 % Med (1)	411.0	31.2%	Medium (1)	332.8	25.3%
2	209.0	15.9%	<20% Low (0)	713.4	54.2%	Low (0)	658.0	50.0%
3	143.8	10.9%						
4	218.0	16.6%	Total	1316.9	100.0%	Total	1316.9	100.0%
5	125.0	9.5%						
6	101.3	7.7%	**Number of Native Species (km)**			**Adjoining Land Use (km)**		
7	104.2	7.9%						
8	62.1	4.7%	Over 20 (2)	282.2	21.4%	Cleared	278.5	21.1%
9	95.2	7.2%	6 - 19 (1)	431.5	32.8%	Scattered	713.7	54.2%
10	125.9	9.6%	0 - 5 (0)	603.1	45.8%	Uncleared	165.5	12.6%
11	21.8	1.7%				Other	159.1	12.1%
12	1.9	0.1%	Total	1316.9	100.0%	Urban	52.8	
						Railway	34.4	
Total	1316.9	100.0%				Drain	47.2	
						Plantation	24.8	
Period of survey: 1998-99						Total	1316.9	100.0%

Table 2: Summary of roadside conditions along roads in the Shire of Harvey. As roadsides occur on both sides of the road, roadside distances (km) are equal to twice the actual distance of road travelled.

Roadside sections of high conservation value covered 244.8 km of roadside, 18.6% of the length of roadside surveyed. Medium-high conservation areas accounted for 166.3km of roadside, 12.6% of the total surveyed. Medium-low conservation roadside covered 226.2km, 17.2% of the total surveyed. Areas of low conservation occupied 679.6km, 51.6% of the roadside surveyed (Table 2, Figure 2).

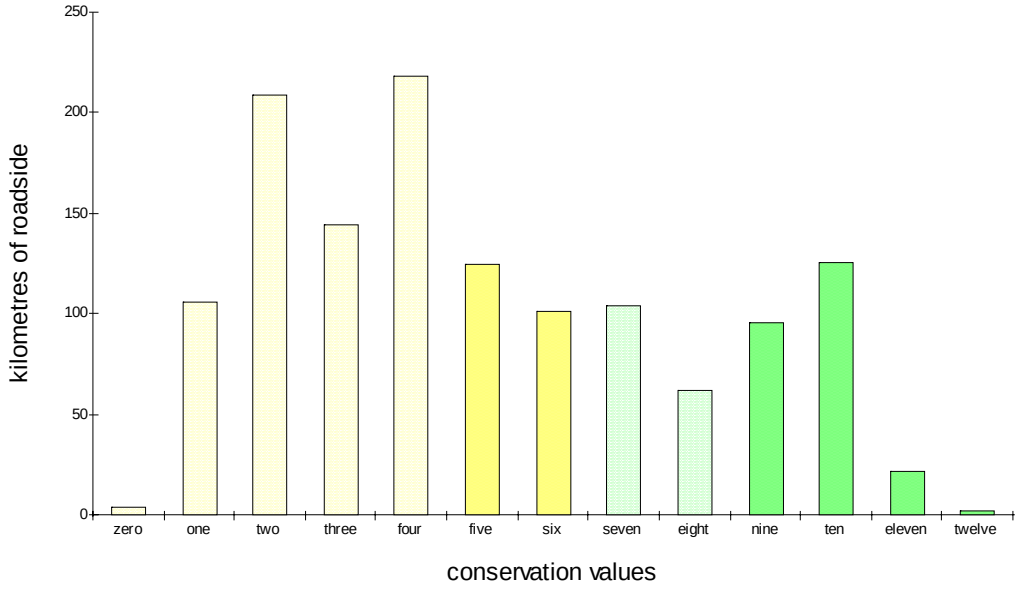

Figure 2. Conservation values of roadsides in the Shire of Harvey. Conservation status: 0-4 Low, 5-6 Medium-low, 7-8 Medium-high and 9-12 High.

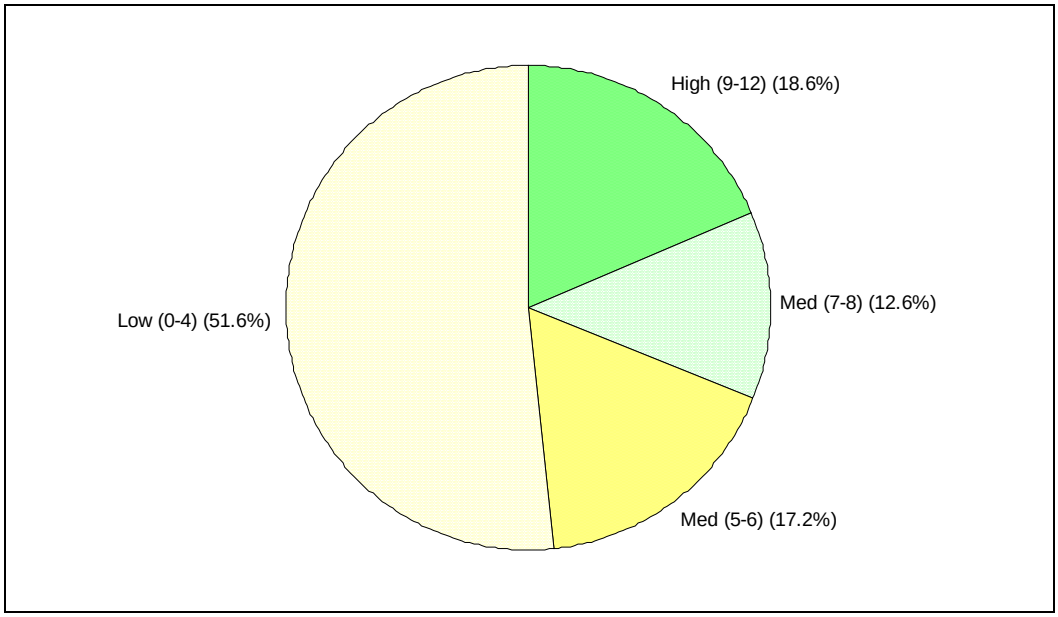

Figure 3: Conservation Status of roadsides in the Shire of Harvey

The *Native Vegetation on Roadside* value is determined from the number of native vegetation layers from either the tree, shrub or ground layers. Sections with at least two layers of native vegetation covered 48% of the roadside, 37.7% had only one layer and 14.2% had no layers of native vegetation (Table 2, Figure 3).

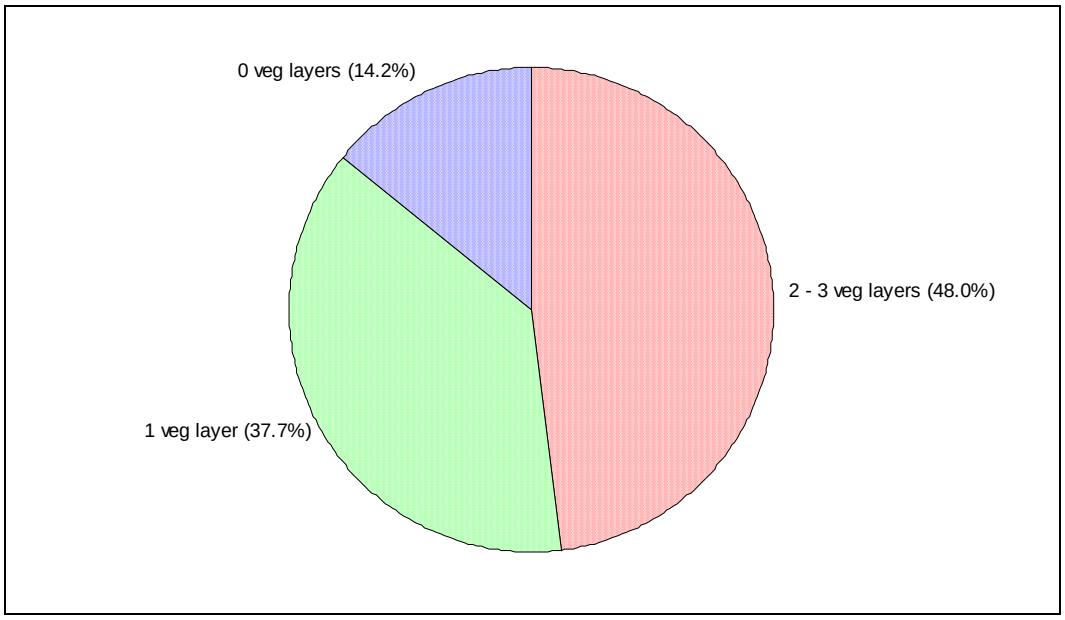

Figure 3: Native Vegetation on Roadside.

Roadside vegetation with *Extent of Native Vegetation* value deemed as good, ie with native vegetation cover greater than 80%, occurred along 14.6% of the length of roadside surveyed. Survey sections with 20 to 80% cover of native vegetation, accounted for 31.2% of the roadside. Whilst the remaining 54.2% had less than 20% native vegetation and, therefore, low *Extent of Native Vegetation* value (Table 2, Figure 4).

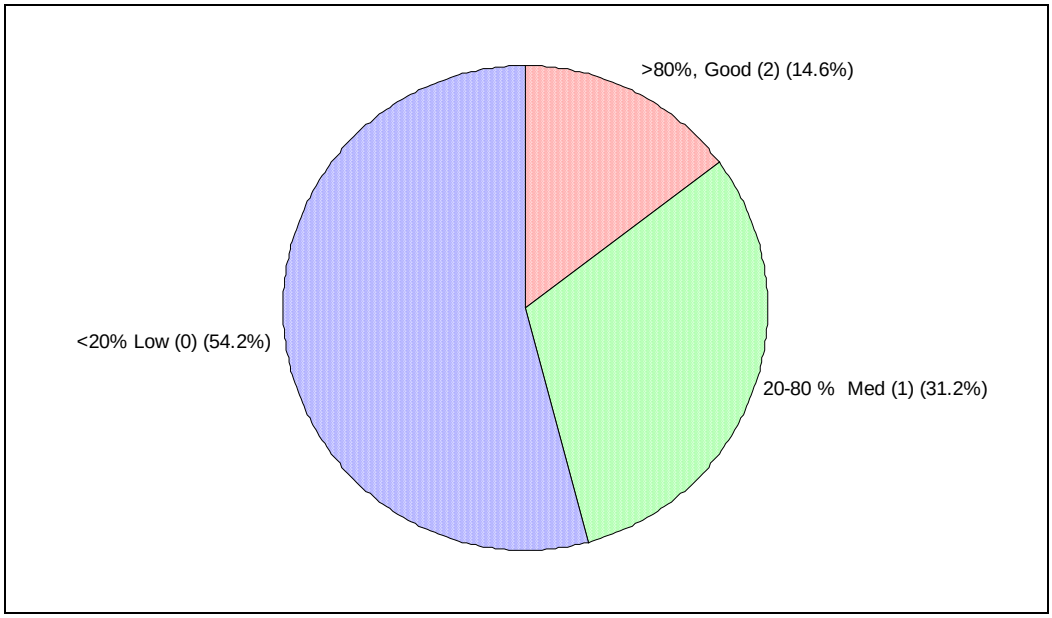

Figure 4: Extent of Native Vegetation.

The *Number of Native Species* score provides a measure of the diversity of the vegetation. Survey sections with more than 20 plant species spanned 21.4% of the roadside. Roadside sections with 6 and 19 plant species accounted for 32.8% of the roadside. The remaining 45.8% of roadside had less than 6 plant species and, therefore, nil contribution to the conservation value scores (Table 2, Figure 5).

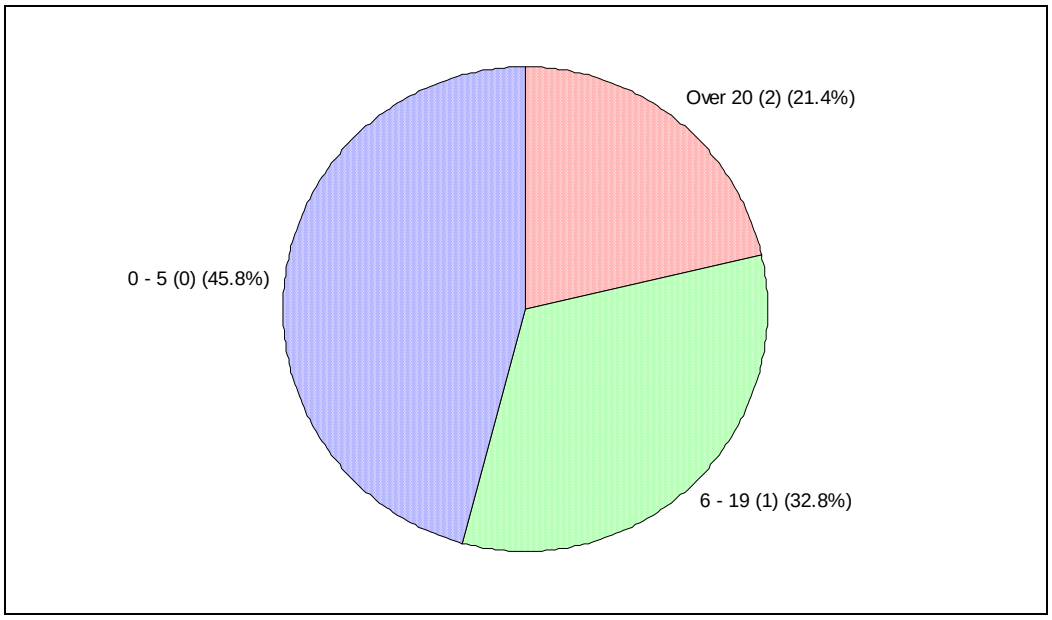

Figure 5: Number of Native Species.

17.9% of the roadside surveyed was only lightly affected by weeds. Medium level weed infestation occurred on 16.8% of the roadside. Whilst 65.3% of the roadside was heavily affected by weeds (Table 2, Figure 6).

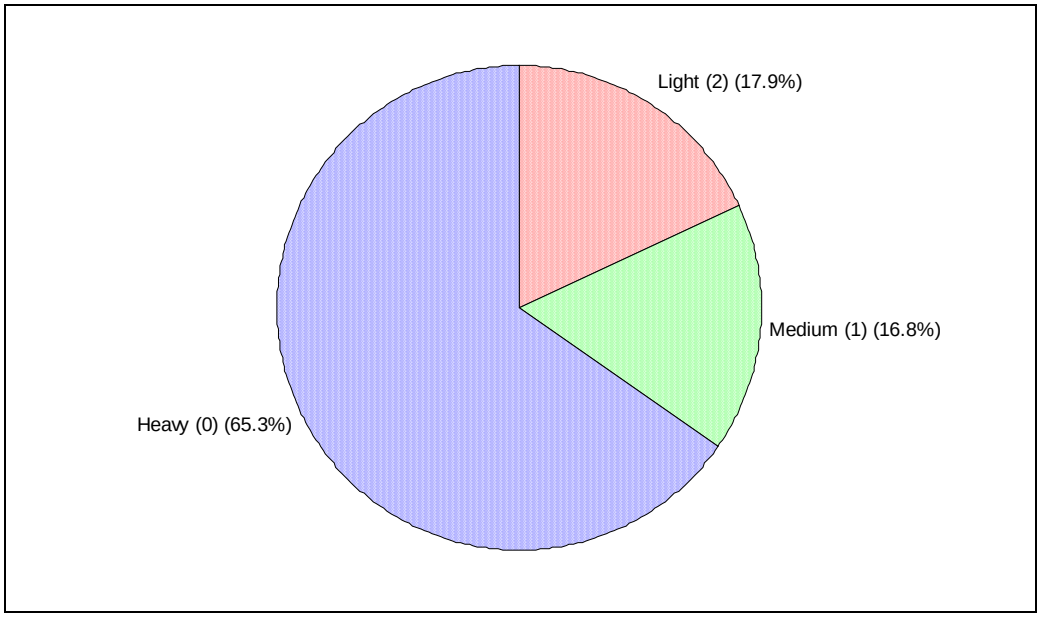

Figure 6: Weed Infestation. Light infestation = weeds less than 20% of ground layer. Medium infestation = weeds 20 to 80% of the ground layer. Heavy infestation = weeds more than 80% of the ground layer.

The *Value as a Biological Corridor* score is largely dependent upon the diversity of habitat and whether the corridor connects areas of uncleared land. High value biological corridor (as determined by the roadside surveyors) was present along 24.8% of the roadside, medium value along 25.3% of the roadside and low value corridor 50% (Table 2, Figure 7).

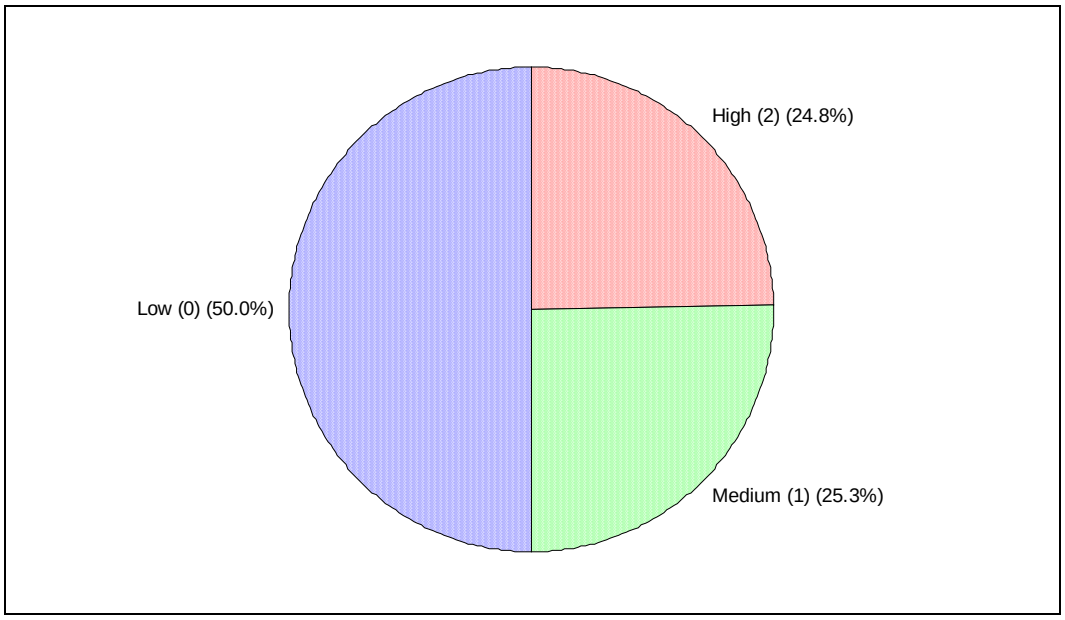

Figure 7: Value as Biological Corridor.

Most land adjoining the roadsides had at least some natural vegetation remaining. A scattered distribution of native vegetation was present on the land adjoining 54.2% of the roadside and 12.6% of roadside was adjoined by land that had not been cleared. 21.1% of the roadside surveyed was adjoined by land that had been totally cleared of its native vegetation. Plantations of non-native trees, railway reserve, drain reserve or urban development adjoined the remaining 12.1% of roadside (Table 2, Figure 8).

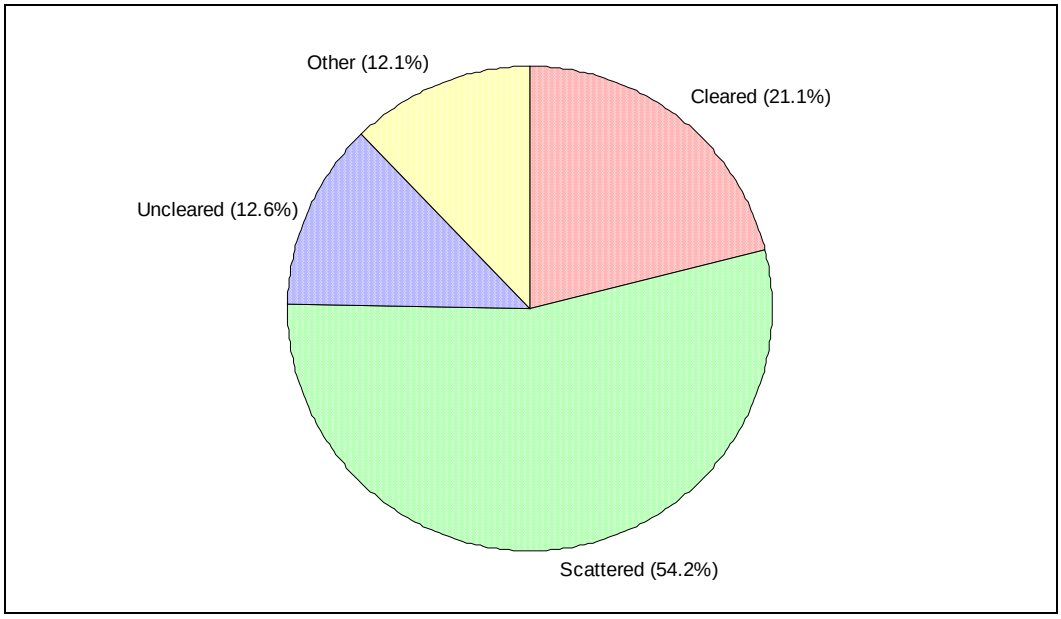

Figure 8: Adjoining Land Use.

Management Techniques

The following section provides management recommendations that will assist in retaining and enhancing roadside conservation value. These guidelines are taken from the Roadside Conservation Committee's Roadside Manual and or the Roadside Handbook. The Executive Officer of the Roadside Conservation Committee is also available to assist on all roadside conservation matters and can be contacted on (08) 9334 0423. The primary aim of road management is the creation and maintenance of a safe, efficient road system. However, the following management procedures should be adopted.

High conservation value roadsides

Management Goal ☞ **Maintain and enhance the native plant communities.**

Management Guidelines 🕮 **Minimal disturbance to existing vegetation**.

because disturbance leads to weed invasion, which downgrades the conservation value, and increases the fire threat.

Minimal disturbance can be achieved by:

- adopting a road design that occupies the minimum space;
- diverting the line of a table drain to avoid disturbing valuable flora;
- pruning branches, rather than removing the whole tree or shrub;
- not dumping spoil on areas of native flora;
- observing dieback control measures as required;
- apply the Fire Threat Assessment (Roadside Manual chapter 9) before burning roadside vegetation;
- use methods other than fuel reduction burns to reduce fire threat; if roadside burning must be undertaken, incorporate it into a district fire management program;
- encourage adjacent landholders to set back fences to allow roadside vegetation to proliferate;
- encourage adjacent landholders to plant windbreaks or farm tree lots adjacent to roadside vegetation to create a denser wind or shelterbelt;
- encourage revegetation projects by adjacent landholders.

Medium Conservation Value Roadsides

Management Goal ☞ **Maintain native vegetation wherever possible, and to encourage its regeneration.**

Management Guidelines 🕮 **Minimise disturbance to existing vegetation**.

With the information available on weed infestation on roadsides within the Shire of Gnowangerup, consideration could be given to strategic roadside weed control programs.

Low Conservation Value Roadsides

Management Goal ☞ **Retain remnant trees and shrubs and encourage their regeneration.**

Management Guidelines 🕮 **Encourage revegetation projects using indigenous plants.**

Minimise soil disturbance to reduce weed invasion.

Encourage revegetation projects by adjacent landholders.

A Code of Practice is included in Appendix 4. This document is provided as the basis for developing a Shire of Harvey Code of Practice for roadside conservation and Roadside Management Plans. Development of these documents will provide defined parameters for all roadside management works and also provide the local community with an overview of management practices that will ensure the sustainability of native roadside vegetation.

Tree Roads

Tree roads are defined as those roadsides with a sufficient density of mature trees to create an attractive tunnel effect. Besides the aesthetic benefits, these areas also provide valuable habitat for birds and other arboreal fauna. Since mature trees are slow growing and hard to replace, care should be taken to conserve these avenues wherever possible. The points following should be considered when working on Tree Roads:

- prune offending branches rather than remove the whole tree;
- cut branches off close to limb or tree trunk;
- divert line of table drain to avoid disturbing tree roots;
- import fill to build up formation, rather than using side-borrow from roadside;
- when using herbicide for weed control on the roadside do not use a soil residual type, such as Siomazine or Atrazine. Eucalypts are especially sensitive to these;
- encourage the adjoining landholders to plant shelter belts on their property that will complement the roadside vegetation.

Flora Roads and Roads Important for Conservation

Flora Roads are significant sections of road having a special conservation value due to the vegetation growing on the road reserve. Signs are available to mark these roads as Flora Roads. This has a twofold effect of drawing the attention of tourist to the high conservation roadside and it also alerts all that work in the roadside environment that the marked section of roadside requires due care to protect the values present.

In order to plan roadworks so that important areas of roadside vegetation are not disturbed, road managers should know of these areas. It is suggested that the Shire Engineer or Environmental Officer establish a Register of Roads Important for Conservation. The following guidelines should be considered prior to establishing this register:

- 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, i.e. trees, shrubs and groundcovers (herbs or native grasses). 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, may provide a source of local seed for revegetation projects and acts as a wildlife habitat for the protection of fauna;
- rare or endangered plants may occur on the roadside;
- it may provide nest sites and refuges for native animals. dense vegetation provides habitat for avifauna and invertebrates.

Special Environmental Areas

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

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

'Special Environmental Areas' can be delineated by the use of site markers. See Figures 9 & 10 for design and placement of SEA markers. Workers who come across a 'Special Environmental Area' marker in the field should not disturb the area between the markers unless specifically instructed. If in doubt, the Supervisor, Shire Engineer or CEO should be contacted.

Western Power and Westrail also have systems for marking sites near power or rail lines. Examples of these are seen in the figure below (Figure 9).

Figure 9. Shire Special Environmental Area site marker

Special Environmental Area Register

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

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

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

Figure 10. Marking sites in the field

When notified of a population needing marking, the Local Authority should contact the appropriate C.A.L.M. Regional or District office for assistance to ensure the exact site location and correct positioning of marker posts.

Roadside Management Strategies

Planning

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

- **community support** encourage ongoing community involvement and commitment by establishing a local Roadside Advisory Committee or working group within the Shire Environmental Committee;
- **contract specifications** maintain roadside values by developing environmental specifications for inclusion in all tender documents or work practices;
- **community education** use of innovative and pertinent material can increase community understanding of roadside values;
- **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.

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

The objective of all roadside management planning should be to:

- **protect**
  - native vegetation
  - rare or threatened flora or fauna
  - cultural and heritage values
  - community assets from fire

- **enhance**
  - indigenous vegetation communities
  - fauna habitats and corridors

- **maintain**
  - safe function of the road
  - natives 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

Strategies

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

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

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

❖ **Functional**

- Firewood collection and timber harvesting
- Fire prevention
- Installation and maintenance of services
- Road construction and road widening
- Road maintenance
- Stockpile and dumpsite management
- Vegetation removal
- Vehicle and machinery activity
- Water Supply Catchments

❖ **Cultural and Recreational**

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

❖ **Landcare**

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

❖ **Conservation**

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

Roadside Action Plans

A Roadside Action Plan is prepared for an individual road and contains a works program that will enable conservation values and other road uses to be managed compatibly.

Roadside Action Plans are based on the guidelines that are produced as part of the roadside strategy.

The RCC suggests that Roadside Action Plans be:

- short term documents (to be reviewed within 2 years);
- prepared on a need basis;
- prepared after consultation with major stakeholders;
- a maximum of 2 pages per road;
- names a person or agency responsible for implementing the management recommendations.

Weeds

WA Herbarium records indicate that a total of 123 species of weeds have been recorded from within the Shire of Harvey. However this should not be considered as a complete list as collectors often over look weed as legitimate botanical specimans.

List of exotic plants (weeds) recorded in the Shire of Harvey

Acaena echinata	sheep's burr
Acaena echinata var. subglabricalyx	
Acaena echinata var. tylacantha	
Acetosella vulgaris	sorrel, sheep's sorrell
Aira caryophyllea	silvery hairgrass
Aira cupaniana	hairgrass
Anagallis arvensis	pimpernel
Anthoxanthum odoratum	sweet vernal grass
Asparagus asparagoides	bridal creeper
Asparagus officinalis	asparagus
Avena barbarta	wild oats
Bromus catharticus	prairie grass
Bromus madritensis	madrid brome
Cakile maritima	sea rocket
Callitriche stagnalis	common starwort
Carduus pycnocephalus	slender thistle
Carduus tenuiflorus	sheep thistle
Carthamus lanatus	saffron thistle
Centaurium tenuiflorum	slender centaury
Chamaecytisus palmensis	tree lucerne, tagasaste
Chasmanthe floribunda	African cornflag
Chrysanthemum segetum	corn marigold
Cirsium vulgare	spear thistle
Crassula alata var. alata	
Cuscuta epithymum	lesser dodder
Cynodon dactylon	couch
Cynosurus echinatus	rough dog's tail

Cyperus congestus	dense flat sedge
Cyperus eragrostis	umbrella sedge
Cyperus polystachyos	
Cyperus tenuiflorus	scaly sedge
Dipogon lignosus	doliches pea
Dischisma arenarium	
Dittrichia graveolens	stinkwort
Echinochloa crusgalli	barnyard grass
Ehrharta longiflora	annual veldt grass
Erodium moschatum	musky storksbill
Euphorbia lathyrus	caper spurge
Ficus carica	edible fig
Foeniculum vulgare	fennel
Fumaria muralis	wall fumitory
Galium murale	bedstraw
Hedysarum coronarium	Yorkshire fog
Holcus setiger	annual fog
Homeria flaccida	one leaf cape tulip
Hordeum geniculatum	Mediterranean barley grass
Hypochaeris glabra	smooth catsear
Juncus bufonius	toad rush
Juncus polyanthemus	
Juncus usitatus	
Kickxia elatine subsp. crinita	sharpleafed fluellen, pointed toadflax
Linum trigynum	French flax
Lolium perenne	perennial ryegrass
Lonicera japonica	Japanese honeysuckle
Lotus angustissimus	slender birdsfoot trefoil
Lotus suaveolens	hairy birdsfoot trefoil
Lotus uliginosus	greater birdsfoot trefoil
Lupinus albus	white lupin
Medicago intertexta var. intertexta	Calvary medic
Medicago lupulina	black medic
Medicago polymorpha	burr medic
Mentha pulegium	pennyroyal
Monadenia bracteata	South African orchid
Narcissus tazetta	jonquil
Olea europaea subsp. europaea	olive
Orobanche minor	lesser broomrape
Oryza sativa	rice
Ottelia ovalifolia	swamp lily
Oxalis glabra	finger leaf oxalis
Oxalis pes-caprae	soursob, sourgrass
Oxalis purpurea	four o'clock, large flower wood sorrell
Parentucellia latifolia	red bartsia, common bartsia
Parentucellia viscosa	sticky bartsia
Paspalum dilatatum	paspalum
Paspalum distichum	
Paspalum urvillei	vasey grass
Phalaris aquatica	phalaris
Phalaris minor	lesser canary grass
Phytolacca octandra	inkweed
Plantago lanceolata	ribwort plaintain
Podalyria sericea	
Polygonum arenastrum	sand wireweed
Polypogon monspeliensis	annual barbgrass
Pseudognaphalium luteo-album	Jersey cudweed

Ranunculus muricatus	sharp buttercup
Rhamnus alaternus	buckthorn
Romulea rosea var. australis	Guildford grass, onion grass
Rosa rubiginosa	sweet briar
Rubus selmeri	
Rubus ulmifolius	
Rumex brownii	swamp dock
Rumex conglomeratus	clustered dock
Salvinia molesta	salvinia
Senecio diaschides	ragwort
Senecio lautus subsp. dissectifolius	variable groundsel
Senecio vulgaris	groundsel
Setaria pumila	pale pigeon grass
Silene gallica	French catchfly
Silene gallica var. gallica	
Silybum marianum	variegated thistle
Solanum linnaeanum	apple of sodom
Sorghum halepense	Johnson grass
Sporobolus indicus var.	
Tolpis barbata	tolpis
Trifolium angustifolium var. angustifolium	narrowleaf clover
Trifolium campestre var. campestre	hop clover
Trifolium dubium	suckling clover
Trifolium fragiferum var. fragiferum	strawberry clover
Trifolium glomeratum	cluster clover, ball clover
Trifolium ligusticum	ligurian clover
Trifolium repens var. repens	white clover
Trifolium subterraneum	sub-clover, subterranean clover
Tritonia lineata	
Tropaeolum majus	
Typha domingensis	yanget
Vaccaria hispanica	cowcockle
Vicia hirsuta	hairy vetch
Vicia sativa	common vetch
Vulpia bromoides	squirrel's tail fescue
Watsonia borbonica	
Watsonia marginata	
Watsonia meriana	
Yucca aloifolia	yucca

References

Beeston, G., Mlodawski, G., Saunders, A and True, D. (1993, unpub.). *Remnant Vegetation Inventory in the Southern Agricultural Areas of Western Australia*. Western Australian Department of Agriculture, South Perth.

Hussey, B.M.J. (1991). The flora roads survey - volunteer recording of roadside vegetation in Western Australia. In *Nature Conservation 2: The Role of Corridors*, ed by Saunders, D.A and Hobbs, R.J. Surrey Beatty & Sons, 1991.

Lamont, D.A. and Blyth, J.D. (1995). Roadside corridors and community networks, pp 425-35. In *Nature Conservation 4: The Role of Networks,* ed by Saunders, D.A., Craig J.L., and Mattiske E.M. Surrey Beatty & Sons, 1995.

Roadside Conservation Committee. (1990). *Roadside Manual* Roadside Conservation Committee, Como WA

Lamont D A (1998) Western Australian Roadside Handbook, Enironmental guidelines for road construction and maintenance workers. Roadside conservation Committee, Kensington, Western Australia.

Definitions of remnant vegetation types, Beeston et al (1993).

Vegetation classed as **"remnant vegetation"** has one or more of the following characteristics (Beeston et al., 1993):

* Most closely reflects the natural state of vegetation for a given area.
* Has an intact understorey (if forest or woodland).
* Has minimal disturbance by agents of human activity.

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

* Degraded understorey (ie reduction in the number of native species, includes weeds).
* Obvious human disturbance-clearing, mining, grazing, weeds.
* Affected by salt.
* Narrow corridors of vegetation (usually along roads and railway lines or windbreaks), which are more likely to be affected by edge effects.

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

* No understorey
* Parkland cleared ie are scattered single trees.
* No significant signs or chance of regeneration.

APPENDIX 2

Standard Survey Sheet

APPENDIX 3

Raw data used to calculate the conservation values

APPENDIX 4

Draft Code of Practice

APPENDIX 5

Plant species in the Shire of Harvey

APPENDIX 6

Roadside Survey Instruction Booklet