First Roadside Vegetation Management Plan for WA: Shire of Chittering

by

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ABSTRACT
Remnant roadside vegetation has assumed special significance in all areas, particularly those that have experienced extensive clearing, most notably in agricultural areas. Roadside vegetation is important to achieving positive outcomes in both Landcare and Bushcare.

To date throughout Western Australia, more than 30 Shires have conducted roadside vegetation surveys to determine conservation value. However, as yet no Local Government Authority has progressed to implementing a Roadside Vegetation Management Plan and many medium to high conservation value roadsides will be substantially degraded or completely destroyed within the next 20 years unless appropriate action is taken.

Development of a roadside vegetation Management Plan for the Shire of Chittering represents the first such plan of this type for a Western Australian local government authority and with the support of the Shire Council and the Chittering Land Conservation District, implementation of the management plan will serve to demonstrate the benefits of a proactive response to the long-term viability of roadside vegetation.

INTRODUCTION

Remnant roadside vegetation has special significance in all areas, but particularly in those areas that have experienced extensive clearing, most notably in agricultural areas. Roadside vegetation (also referred to as roadsides or road verges) can be defined as the area remaining alongside the road formation and its associated drainage, with the total area known as the road reserve.

Remnant vegetation is predominantly found on farmland, roadsides or in designated nature reserves. Although nature reserves are set aside specifically for the conservation of flora and fauna, they are often too small and isolated to maintain sustainable populations. As noted by Norton & Nix (1991), Soule & Gilpin (1991) and Vermeulen & Opdam (1995), roadside vegetation provides the vital link between these small and isolated fragments. The greatest assets of roadside vegetation are undoubtedly in the provision of habitat for flora and fauna and their role in connectivity. However, the additional benefits to agriculture, tourism, and heritage values should not be underestimated. Roadside vegetation also provides a valuable seedbank for revegetation programs and as a guide to the identification of soil types and vegetation communities that existed prior to clearing. Roadside vegetation is also subject to a wide range of threats, including clearing and burning, weed invasion and edge effects, all of which jeopardise the long-term sustainability of these very important remaining vestiges.

This paper outlines the values of, and threats to roadside vegetation and discusses the key features of the Management Plan and Code of Practice developed for roadside vegetation in the Shire of Chittering.

BACKGROUND

The management of roadsides in Western Australia is undertaken by three agencies: Local Government Authorities (responsible for 123,908km of road), the Department of Conservation and Land Management (30,155km) and Main Roads Western Australia [17,326km (Filia, *pers. comm.*)]. Clearly, the health and long-term sustainability of roadside vegetation is largely determined by the roadside management practices of Local Government. Observation of any agricultural area in Western Australia

provides very clear evidence that there has been a general failure by both Local Government and the community to understand and appreciate the importance of roadside vegetation. Based on the results of resurveying roadside vegetation in the rural Shires of York and Serpentine - Jarrahdale, it is estimated that roadside vegetation degrades 10% every five years and thus, many medium and high conservation value roadsides will be substantially degraded within the next 20 years unless appropriate management strategies are implemented (Lamont, *pers. comm*.).

The Shire of Chittering provides just one example of both the importance of roadside vegetation in a largely cleared landscape and the decline in conservation value of roadside vegetation under the control of a Local Government Authority (LGA). Following advice from the Roadside Conservation Committee (RCC), the Shire of Chittering conducted a survey in 1991 to assess the conservation value of roadside vegetation. The survey revealed that 42.3% of the Shire had roadside vegetation of high conservation value with a further 30.2% ranked as medium conservation value. Extensive fieldwork undertaken in 2000 established that the conservation value of much of the roadside vegetation within the Shire has declined since the 1991 survey (Oliver 2001). In some cases, declared rare flora and threatened ecological communities have either been cleared or disturbed.

To date throughout Western Australia more than 30 shires (one-third of Shires in the south-west land division) have conducted roadside vegetation surveys to determine conservation value. However, by 2000, not one LGA had progressed to implementing a Roadside Vegetation Management Plan to assist in the maintenance and/or enhancement of the surveyed conservation value. By contrast, by the end of 2000, more than 85% of Victoria was covered by Local Government Roadside Vegetation Management Plans (Munckton 2000:7). Hopefully the development of a Management Plan and Code of Practice for the Shire of Chittering will encourage other Western Australian LGAs to take similar action.

The Roadside Conservation Committee (RCC) provides liaison between all stakeholders in the roadside environment and seeks to foster communication and co-operation between them. The RCC is available to assist in training in roadside conservation, or the development of Codes of Practice and management plans for transport corridors. It can also assist in the mapping of weed infestations and conservation values present in transport corridors.

VALUES OF ROADSIDE VEGETATION

Intrinsic, aesthetic and tourism values

The importance of roadside vegetation, especially for its intrinsic and aesthetic values has been acknowledged since at least the 1920s and in later years was recognised for its functional values. In 1950, the renowned Australian landscape designer Edna Walling, aptly described roadsides as being the front garden of the nation (cited in Munckton 2000:7) while Emily Pelloe, a noted amateur botanist and wildflower artist writing in 1929 about the importance of wildflowers commented:

> *"it may be that in 2029 regret will be expressed that so little effort was made as far back as 1929 to ensure the preservation of the rare and beautiful flora. To deny future generations of the right to enjoy its wonders is to deserve the censure of the unborn" (cited in Napier 1997:428).*

In Western Australia, the importance of roadside vegetation for tourism was acknowledged by the State Government in the 1960s when the then Premier of Western Australia, David Brand was instrumental in gathering community support and committing the government to widen road reserves to provide a show of wildflowers for tourists (Lamont & Blyth 1995:426). In 1962, State Cabinet agreed to recommendations that new road reserves were to have a minimum width of five chains (100 metres) through alienated lands and a minimum width of ten chains (200 metres) through Crown land (Napier 1997:429). However, the majority of roads in Western Australia had already been established at an average width of one chain (20 metres) with insufficient roadside vegetation remaining for sustainable conservation (Napier 1997:429).

According to Blackwell (1989:2), the viewing of wildflowers brings more visitors to Western Australia than any other attraction and prior to becoming the 'State of Excitement' and the 'Home of the America's Cup', Western Australia had long been referred to as the 'Wildflower State'. A survey conducted in 1989/90 found that 18% of the visitors to the south-west of Western Australia listed wildflowers as one of the reasons for their stay (Napier, 1995).

Habitat values

Given the scarcity of remnant vegetation in agricultural landscapes, the very presence of roadside vegetation has great significance for the conservation of flora and fauna with the extensive nature of the road network in Western Australia providing a very diverse range of habitats for fauna. For example, Newby (2000) discusses the use of road verges by birds with Bennett (1999:114) noting that more than 80% of birds utilise roadside vegetation as habitat in the Western Australian wheatbelt. It would appear that with increasing width of the road verge and complexity of vegetation, corridors are capable of supporting a species composition similar to larger remnants of vegetation. Bennett (1999:115) also presents a case study of butterfly use of roadside vegetation in the United Kingdom where it was found that 47% of known butterfly species in the United Kingdom were partly or wholly supported by roadside vegetation.

Roadsides containing declared rare and priority species and threatened ecological communities are not uncommon as roadside vegetation may often be the only remaining example of native vegetation in a region that existed prior to European settlement (English, *pers. comm,* Lamont & Atkins 2000). The Shire of Chittering provides an example of the high incidence of declared rare and priority species and threatened ecological communities with 29 threatened species and two threatened ecological communities identified on road verges in the Shire. A further example is provided by Hopper et al (1990, cited in Merriam & Saunders 1993:76) where, of the 238 plants declared as endangered flora in Western Australia in 1990, a total of 1,386 populations were known, 302 of which occurred on road verges in the wheatbelt.

Roadside corridors

As already noted, roadside vegetation also helps to reduce the detrimental impacts on fragmented areas of remnant vegetation by acting as a corridor to assist movement of wildlife between remnants. From this function stems a series of interrelated benefits to the conservation of flora and fauna as isolation can be detrimental to populations due to food shortages, disease and a decrease in genetic diversity.

Roadside corridors can serve as an extension of a species' home range providing shelter, food and nesting sites. This can be vital to the survival of both flora and fauna populations. Carnaby's Cockatoo (*Calyptorhynchus funereus latirostris*) provides an excellent example. Once prolific throughout the wheatbelt of Western Australia, Carnaby's Cockatoo is now a protected species due to a drastic decline in abundance and distribution. The two main reasons cited by Saunders (1990:277) for this decline were the loss of 30% of the Cockatoo's habitat following clearing (and the resultant fragmentation of its food resources) and increased competition from the Galah (*Cacatua roseicapilla*). The conclusion reached by Saunders (1990:287) was that the presence of high conservation value roadside vegetation corridors may well have averted the localised extinction of Carnaby's Cockatoo by providing vital habitat and channelling movement into isolated reserves for food.

Corridors are also extremely important in aiding the dispersal of both flora and fauna between isolated populations and enhancing both genetic exchange (and therefore diversity) as well as potentially increasing immigration rates and population size. A study of Sugar Gliders (*Petarus breviceps*) in Willung, Victoria by Suckling (1984:49) found that the local population was maintained by dispersal amongst three remnants via the use of roadside corridors.

Vegetation corridors also provide cover for movement. This is particularly important for species vulnerable to attack by predators. Results from numerous studies (see Bennett 1999, Merriam & Saunders 1993), indicate that fauna rarely move across open fields, preferring to follow corridors of vegetation in order to take cover if danger threatens (Breckwoldt et al 1990:15). Another function of roadside corridors, given their linear nature and resulting diversity of habitats over an extensive area, is the ability of plants and animals to shift their geographical distribution in response to change (Bennett 1999:158). This may involve a change in climate, disturbance or catastrophic event.

Landcare and agricultural productivity benefits

In addition to the provision of habitat and corridors for movement, roadside vegetation is extremely useful as functional landscape units in the form of windbreaks and shelterbelts (Saunders & Hobbs 1991:422). Windbreaks slow down wind that would otherwise dry out crops and pastures and remove valuable topsoil, while the microhabitats created by shelterbelts protect stock from sun, heat, drought, wind, cold and frost (Lovett & Price 1999:102). Roadside vegetation also complements on-farm revegetation aimed at controlling rising watertable levels.

Breckwoldt et al (1990:20) discuss an agricultural case study in Armidale on the New England Tableland of New South Wales where, as a result of roadside vegetation providing windbreaks and shelterbelts, wool production is claimed to have increased by 31%. The study also argued that the benefits of roadside vegetation realised higher sheep prices (an extra $4 per head in 1984) and the average weight of sheep increased by 6kg. Pasture and crop yields were also 30% higher in a zone extending downwind for a distance approximating ten times the height of the shelterbelt.

Heritage values
Sites of significance (collectively referred to as Special Environmental Areas) may include Aboriginal and European heritage sites for scientific, aesthetic, historic or cultural reasons (Breckwoldt et al 1990:52). According to Cruickshank (2000:10), Aboriginal sites are particularly common along roadsides in eastern Australia as many roads follow routes that had been used by Aboriginals prior to European settlement.

Scientific value
Roadsides are valuable scientific reference and educational areas providing a better understanding of the entire region and an easily accessible seed source for local revegetation projects (Breckwoldt et al 1990:22). Furthermore, the soil supporting roadside vegetation is often used as a benchmark study of soil change following the clearing of land for agriculture (Lamont 1998:1, Breckwoldt et al 1990:22). Remnant roadside vegetation may also be used to determine the vegetation communities that existed on agricultural lands prior to clearing. This particular technique was used by Beard (1981) in mapping the vegetation of the agricultural areas of south-west Western Australia.

THREATS TO ROADSIDE VEGETATION

Dimensions of road verges
The dimensions of road verges are key factors influencing the ability of roadside vegetation to sustain viable populations of both flora and fauna. Width is the most significant attribute to be considered as the severity of edge effects on the roadside vegetation is dependent upon both width of the road verge and the adjacent landuse. Unfortunately many of the developed road reserves are barely adequate to cater for modern, highly trafficked roads and associated drainage, let alone as an area for the effective and sustainable conservation of vegetation and habitat (Napier 1997:429). As a consequence, most roadside vegetation is susceptible to edge effects.

Edges are particularly susceptible to fertiliser influx, stock grazing, weed invasion, effects of soil borne pathogens, modified hydrology, salinisation due to clearing and as a consequence, reduced numbers of native species. Micro-climatic conditions, including light, wind speed, temperature, humidity and solar radiation are also altered (Panetta & Hopkins 1991:342, Bennett 1999:134). These edge effects result in changes to the composition and structure of plant communities and therefore affect habitat provision for fauna (Bennett 1999:135).

Weed invasion
Weeds generally outcompete native vegetation and are capable of colonising large areas very rapidly. In Western Australia 1,350 weed species have been identified (Agriculture WA 2000:4), presenting a major threat to the long-term health of roadside vegetation. Not only do weeds outcompete native vegetation (particularly slow growing species) and suppress seedlings, but weeds also pose a greater fire threat due to their flammability, increase in fuel loads and the presence of a continuous fuel bed compared to native vegetation (Breckwoldt et al 1990:42).

A study carried out by Milberg & Lamont (1995:45) of six vegetation plots on the Brand Highway in the south-west of Western Australia revealed that following controlled burning of the roadside vegetation, the frequency and cover of weeds increased by up to 59.1%. Thus, the number of weed species increased at the expense of native species. In control plots not burnt, weed cover increased only marginally, with one plot recording a maximum increase in the cover of weeds of only 2.4%.

Bushfire control measures
Although it is illegal under the *Bush Fires Act*, burning is frequently carried out by adjacent land owners in order to protect their property from bushfires (Clement and Bennett 1998:208). Local Authorities are however able to enact Local Laws to permit roadside burning under set conditions.

There is a common misconception that 'fire is good for the bush' and this attitude is based on short-term outcomes, that is, the desire to have minimal fuel loads prior to the bushfire season without regard to the long-term health of native vegetation. Fire can be beneficial for the bush given due heed is paid to intensity, frequency and seasonality. Weeds are the inevitable result whenever native vegetation is repeatedly burnt before plants reach reproductive maturity and disperse seeds. In the end, weeds present a greater fire risk than the original native vegetation cover due to the presence of a continuous fuel layer and the annual nature of exotic grasses. As already noted, the study by Milberg and Lamont (1995), demonstrated that only one burn is necessary for significant weed colonisation and thus, it is generally recommended that burning should only be carried out for ecological purposes, that is for the regeneration of senescent vegetation (Napier 1997:431).

Under the *Bush Fires Act*, landholders are required to construct firebreaks inside their property boundaries but it is illegal for the adjacent landholder to construct a firebreak within the road reserve. Despite this, firebreaks are often constructed within the road reserve and in extreme cases, adjacent landholders have removed all of the roadside vegetation and sterilised the soil to prevent regeneration. Similarly, when erecting or maintaining a fence, some landholders clear an excessive amount of roadside vegetation to allow for a firebreak.

Utility service provision
With the exception of power lines, which may be located above or below ground, all other services are placed underground. Services placed underground may either be placed in a common trench or more frequently, have their own standard alignment. Inevitably, the use of standard alignment results in the greatest damage to roadside vegetation as the vegetation is disturbed in more than one area within the road verge (including the pruning of vegetation in the case of overhead powerlines) and at different times. The roots of the vegetation are damaged and weed growth is enhanced through this disturbance.

Road construction and road maintenance works
The importance of a Code of Practice to conserving both biodiversity and conservation value of roadside vegetation has been acknowledged by the Western Australian Labor Government as noted in Labor's 2001 Policy Platform to "provide statutory authority to the Code of Practice for Roadside Conservation in Road Construction and Maintenance" (*http://www.votelabor.org*). Work practices undertaken by road construction and road maintenance workers within the road reserve can adversely affect roadside vegetation, especially through unnecessary disturbance such as the practice of extracting road construction material from road reserves. Similarly stockpiling of soil and/or removal of vegetation within the road verge and use of inappropriate machinery disturbs the vegetation, enhances weed growth and may promote the spread of soil-borne pathogens such as *Phytophthora cinnamomi* (Dieback). Widening of roads to cater for larger volumes of traffic also poses a significant threat as vegetation is inevitably removed, for example, the proposed widening of roads for the transportation of lime from the coast to the wheatbelt (Lloyd, *pers. comm*.). At least some of the proposed 'lime' routes are now under review.

Lack of legislation specific to roadside vegetation
The absence of specific legislation relating to the protection and management of roadside vegetation is a threat in itself as this results in confusion as to what extent the managing authority is responsible for the management of roadside vegetation. The main Acts pertaining to the management of roadsides include the *Wildlife Conservation Act*, *Conservation and Land Management Act*, *Main Roads Act*, *Environment Protection and Biodiversity Conservation Act*, *Soil and Land Conservation Act* and the *Agriculture and Related Resources Protection Act*.

DEVELOPING A MANAGEMENT PLAN AND CODE OF PRACTICE

The Management Plan provides the policy framework that guides the planning of work activities within the road reserve while the Code of Practice provides the guidelines to be observed by on-ground staff undertaking works. The two documents are complementary. The overarching objective of the Management Plan is to maintain and/or enhance the conservation value of roadside vegetation within the Shire of Chittering, irrespective of current conservation value. In order to achieve this outcome, specific objectives were identified (refer to Table 1) for each key activity or issue relating to roadside management. Each specific objective is then supported by a number of strategies. Key strategies relevant to the objectives include adherence to a Code of Practice by all contractors, planners, engineers and other personnel undertaking work on the roadside; the provision of appropriately trained

and environmentally aware personnel; and, the application of minimal disturbance procedures to soil and vegetation. In addition, there was a clearly identified need for an ongoing community education program to promote the importance of roadside vegetation and the negative impacts of unauthorised practices such as fuel reduction burning and the clearing of roadside vegetation for the erection or maintenance of fences.

Nine key activities or issues were identified relating to the conservation of roadside vegetation, namely, road construction and road maintenance; soil-borne diseases; fire management; weeds; utility service provision; Special Environmental Areas; road user facilities; fence lines and, revegetation. Pest animals, the grazing of stock and collection of firewood can all be important roadside management issues, however they are not identified as significant issues in the Shire of Chittering and were therefore not included in the Management Plan.

Table 1: Management Plan Objectives.

To protect the conservation status of roadside vegetation during road construction and road maintenance activities with special attention to the presence of declared rare and priority species, threatened ecological communities and native fauna habitat.
To design and construct drainage requirements that minimise damage to roadside vegetation including long-term risks associated with the spread of pathogens such as *Phytophthora* (Dieback).
To minimise the risk of introducing and spreading soil-borne pathogens, especially *Phytophthora*.
To minimise the use of fire as a management tool in order to avoid lowering the conservation value of roadside vegetation.
To control and progressively eradicate weed species within the Shire.
To develop a good working relationship with all utility service providers to ensure minimum site disturbance occurs on all road reserves where native vegetation is present.
Whenever possible, locate service utilities away from Special Environmental Areas and roadside vegetation of medium or high conservation value.
To identify and protect Special Environmental Areas through provision of adequate signage and appropriate training techniques for personnel involved in roadside activities.
To increase community, employee and contractor awareness of the values of vegetation within Special Environmental Areas.
To achieve a balance between road user facilities and the retention of remnant vegetation on roadsides with special attention to the protection of high conservation value roadside vegetation and Special Environmental Areas.
To encourage adjacent landholders to re-align fence lines inside their property boundary when erecting or maintaining a fence rather than removing roadside vegetation.
To enhance the conservation value of selected areas of degraded roadside vegetation through revegetation with local provenance species.

Specific management plans were also developed for eight nominated roads classified as having high conservation value roadside vegetation in 1991. The management plan for each of these eight roads forms an integral part of the generic Management Plan as the protection of roadside vegetation along these eight roads is critical to ensuring the preservation of high conservation value vegetation, declared rare and priority species; threatened ecological communities and the provision of strategic corridors for wildlife movement.

The Code of Practice provides guidelines to be observed by on-ground workers in order to minimise disturbance to both soil and vegetation. The Code of Practice is written in simple English and follows the guidelines provided in the generic RCC Code of Practice (RCC 1995) and the RCC Roadside Handbook (Lamont 1998). The issues addressed in the Code of Practice include: road construction and road maintenance; machinery access and parking; vegetation removal; soil-borne diseases (Dieback); weed control; herbicide use; site rehabilitation; and, waste management.

It is envisaged that the implementation of the Management Plan will be a co-operative effort between the Shire of Chittering, the Chittering and North Swan Land Conservation District and the Roadside Conservation Committee. At the time of writing this paper, the Management Plan and Code of practice had just been presented to the Shire of Chittering for consideration. Funding to implement a number of strategies may be available from a range of sources including the Natural Heritage Trust, the Gordon Reid Foundation or through the State Government Weed Strategy.

Based primarily on fieldwork observations, a number of recommendations have been made to the Shire of Chittering (refer to Table 2). Adoption and implementation of these recommendations will enable the Shire of Chittering to better manage the long-term maintenance and/or enhancement of the conservation value of roadside vegetation. The majority of these recommendations are likely to be applicable to many Western Australian LGAs.

CONCLUDING COMMENT

Roadside vegetation has a diverse range of values. With continued clearing of remnant vegetation and other associated threats, roadside vegetation will assume an even more significant role, particularly for the preservation of wildlife. The development and implementation of a Roadside Vegetation Management Plan and Code of Practice by LGAs provides the best opportunity to undertake a more sustainable approach to the management of roadside vegetation in Western Australia. The Shire of Chittering is now uniquely placed to play a leadership role in protecting the conservation value of roadside vegetation

Table 2: Recommendations for the long-term maintenance of conservation value of roadside vegetation in the Shire of Chittering.

Condition of roadside vegetation to be resurveyed every five years to identify any change in conservation value.
Consideration be given to undertaking specific management plans for additional roads, namely, Cook Road, Blue Plains Road, Davis Road, Flat Rocks Road, Harris Road, Maddern South Road and Polinelli Road.
Undertake surveys and prepare a database and maps of roadside vegetation as a basis for planning/management decisions including all activities undertaken on the roadside.
All new subdivisions adjacent to high conservation value roadside vegetation to have conditions attached to planning approvals to ensure that road works, fence construction and other activities do not compromise the conservation value of roadside vegetation.
Consideration be given to the development of local laws relating to illegal fire management practices and clearing of vegetation for fences and firebreaks.
The Management Plan and Code of Practice be reviewed annually.
Develop and implement a weed management strategy for roadside vegetation.
Watsonia (*Watsonia bulbillifera*) and Bridal Creeper (*Asparagus asparagoides*) invasions to be removed through recommended methods of control as soon as identified.
Records of herbicide use are to be kept by personnel undertaking spraying including the quantity used and location of spraying as required under the *Public Health Act*.
Consideration be given to the establishment of a seed orchard in partnership with the Landcare Centre to ensure a supply of local provenance species.
Burning of the roadside vegetation to cease except where deemed necessary for bona fide ecological purposes.
A District Fire Plan be prepared to assist in maintaining the conservation value of roadside vegetation.
Signage to be erected to designate Special Environmental Areas, 'Flora Roads' and areas of revegetation/conservation with a register of these areas established and the information provided to work crews.
Wherever possible, corridors of strategic importance linking conservation reserves should be revegetated with local provenance species and maintained.
Adopt a co-ordinated approach to the management of roadside vegetation and work with adjoining Shires to develop a district plan identifying existing and/or potential vegetation corridors to provide an extensive and continuous network linking isolated conservation reserves.
Investigate opportunities for landholders accessing funds through the Remnant Vegetation Protection Scheme to re-align fences inside property boundaries to allow for a wider road verge.
The Chittering Shire Council and the Chittering and North Swan Land Conservation District Committee to work co-operatively on the development of a community education strategy addressing the values of, and threats to roadside vegetation.
An information board be erected at the intersection of Maddern North Road and Great Northern Highway to provide information on the values of roadside vegetation and the importance of roadside vegetation to the annual display of local wildflowers for tourism.

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