

Remnant Vegetation Corridor Management Strategy for Crows Nest Shire

DRAFT for PUBLIC COMMENT

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1.0 Executive Summary

Crows Nest Shire is in the fortunate position to retain significant areas of remnant vegetation on all land tenures, linked across the landscape by strips of vegetation (termed corridors) on both private and public lands. A range of pressures are being exerted on the integrity of these remnants and corridors ranging from; the invasion of exotic weeds to urbanisation, land development practices to economic pressures on landholders and the lack of understanding of ecological processes to fire management. This report has built on previous Council initiatives that have identified the conservation values of reserves within the Shire (Dorricott and Brennan 1994) and mapping remnant vegetation of the Shire (Parry 1995) and additionally, taken into account community expectations that Crows Nest Shire Council will provide solid leadership in the management of remnant vegetation for the wider community.

The vegetation and wildlife corridors of the Shire were mapped and categorised into levels of importance and linkages. All the identified corridors are vulnerable to a range of threatening processes which, if unchecked, will result in the continued fragmentation of remnant vegetation communities and the potential local extinction of flora and fauna species.

Landholders within Crows Nest Shire were surveyed to gain their views on vegetation management issues and the role that they were prepared to play in the retention, maintenance and enhancement of remnant vegetation.

A number of strategies and mechanisms are discussed, that if implemented by Council and landholders, will assist in the ongoing viability of remnant vegetation corridors within the Shire. The project, “Holistic Natural Resource Management of Crows Nest Shire” submitted by Crows Nest Shire Council to the Natural Heritage Trust for funding, if successful will assist in the implementation of the corridor strategies proposed by this report.

2.0 Introduction

Crows Nest Shire is fortunate to have significant areas of remnant vegetation remaining, the majority of which is on freehold lands. This remnant vegetation provides linkages across the landscape, aided by vegetation contained within road reserves, stock routes and other public lands. These linkages, which connect large areas of remnant vegetation, permit the movement of flora and fauna to a greater or lesser extent across the landscape and are important in maintaining the biodiversity of the region.

Crows Nest Shire is striving to preserve and maintain in a sustainable manner, the biodiversity of the region. The shire is currently growing at the rate of 2.5% per year, with rapid urbanisation occurring in the southern portion of the shire, and large increases in the number of small landholders in the remainder of the shire. Pressure is also being exerted from developing horticultural and agricultural industries, extremes of climate and weed invasion.

2.1 Background

Crows Nest Shire is situated to the west of Brisbane and north of Toowoomba in the Great Dividing Range and takes in the headwaters of the Queensland Murray Darling Basin to the west and the Brisbane River to the east.

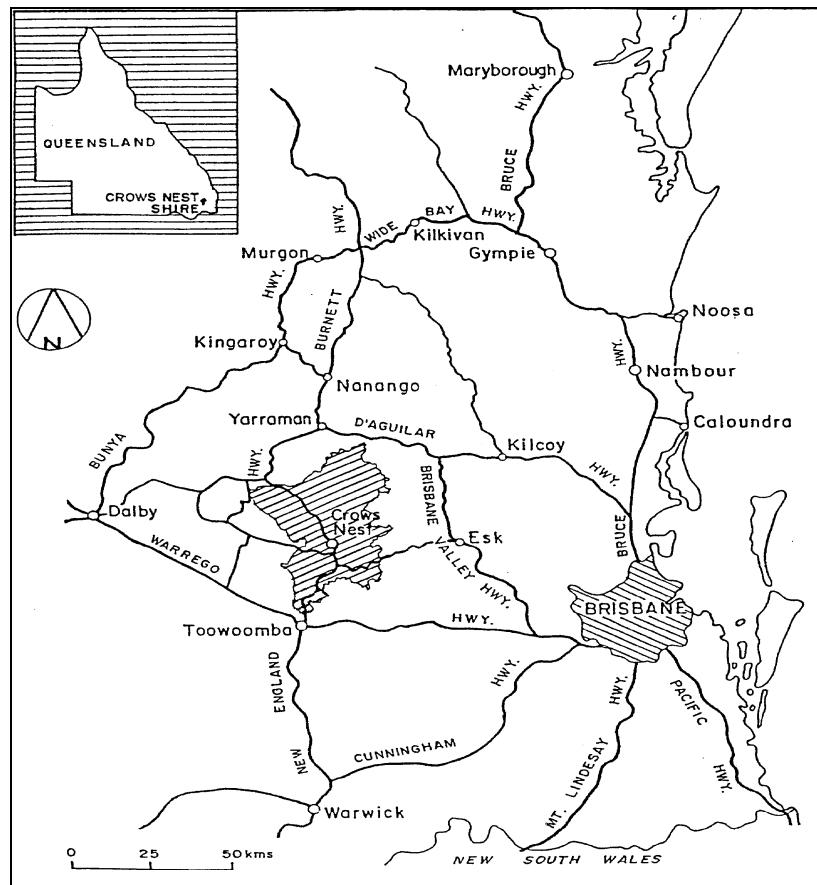


Figure 1.1: - Location Map Crows Nest Shire (Sourced from Crows Nest Shire Town Planning Scheme)

2.1.1 Topography

The Shire's topography is mainly undulating country with low, rolling hills on the west to higher ridges along the ranges on the eastern sides of the Shire. The land slopes steeply off these ranges, particularly in the southeast where an escarpment of the Main Range drops sharply into Murphy's Creek in Gatton Shire. Landslips and surface erosion are evident in many areas.

In the areas where development is most intense, (from Toowoomba City boundary north to Crows Nest town) the topography is composed of gently undulating Downs country, generally of high fertility and popular for rural residential living, market gardens and nurseries.

The Northern boundary is formed by the Blackbutt Range which joins the Great Dividing Range at the northwest boundary. The Great Dividing Range or Main Range forms the western boundary and a watershed in the southern section of the Shire. The highest point is Mt. Perseverance with an elevation of 807m. The lowest point is Maronghi Creek at about 150m. The Shire has an average elevation of 575m above mean sea level.

The northern half of the Shire is drained by Emu Creek and its tributaries, the eastern portion is drained to the east by Perseverance and Crows Nest Creeks which form part of the Brisbane River Catchment. Oakey Creek drains the area west of the Main Range and forms part of the upper catchment of the Queensland Murray Darling Basin. Dams have been constructed on Perseverance Creek, Cressbrook Creek, and Cooby Creek. These dams form the major water sources for City of Toowoomba and the towns in Crows Nest Shire. Figure 1.2 displays the major physical features of Crows Nest Shire.

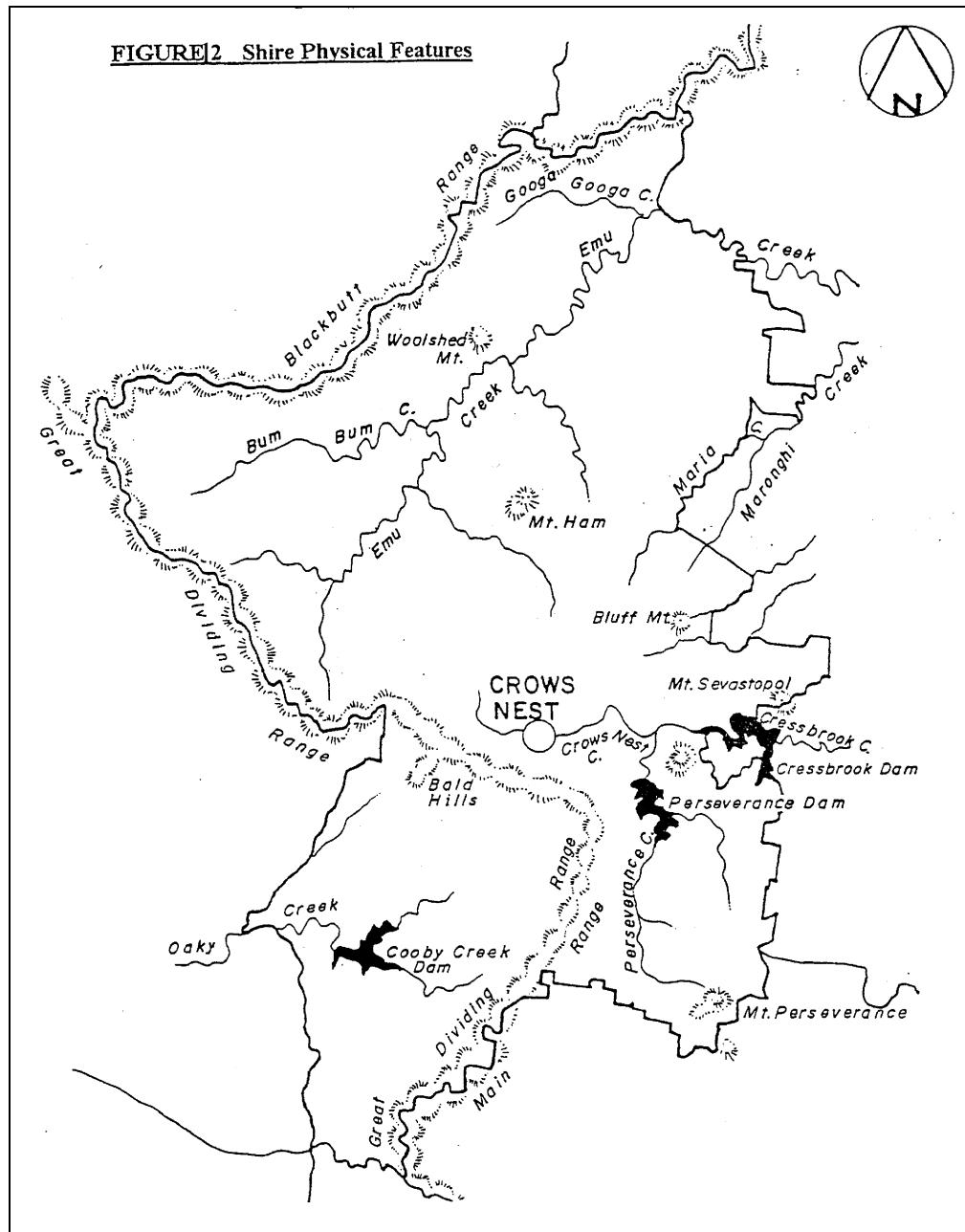


Figure 1.2: - Major physical features of Crows Nest Shire. (Sourced from 1992 Crows Nest Shire Town Planning Scheme)

2.1.2 Geology and Soils

The geology of Crows Nest Shire is interesting in that there is a distinct division of geological units. The Shire is almost exactly bisected in a northwest/southeast direction into equal parts of coarse grained sediments and basalts to the west of the division and metamorphics and granites to the east (excepting a few isolated pockets).

The Shire is comprised of seven basic soils types that influence greatly the distribution of vegetation. The types of soils and the vegetation which grows on them is described below in

Table 1.1. The table gives a broad description of what vegetation is associated with which soils.

Table 1.1: - Soils and Associated Vegetation

Land System	Physiography	Brief Soil Description	Associated Vegetation
Alluvium	Alluvial plains derived mainly from Tertiary Basalts and Jurassic shales and sandstones	Deep dark, self mulching, cracking clay soils (black earths) with small areas of texture contrast soils (red-brown earths, solodized / solonetz / solodics).	Grassy open woodland of Blue Grass, Poplar Box and Queensland Blue Gum.
Marburg	Undulating plains to low hills up to moderately high hills of Jurassic sandstones.	Moderately deep to deep, hard setting loams to clay loams overlying yellow clayey subsoils (Solodized solonetz / Solodics). Deep sands (siliceous sands), texture contrast soils (red brown earths & yellow earths).	Layered open forest to shrubby woodland of Narrow-Leaved Ironbark, Gum-Topped Box, Bull Oak, Qld Blue Gum, Spotted Gum and Wattles.
Toowoomba Basalt	Undulating to hilly plateau and plateau remnants of laterized tertiary basalts.	Moderately deep to deep, gradational red soils (krasnozems) and self-mulching, dark, cracking clays (black earths). Fine to medium structure, some <i>areas</i> of yellow earths.	Layered open forest of white Stringybark, Sydney Blue Gum, Tallowwood, Red Bloodwood, Mountain Coolibah and Ironbark with an understorey of wattles and other scrub species.
Basalt – West	Hilly to mountainous terrain on basalt	Moderately deep to deep, dark, cracking clays (black earths) with weak to strong, very fine to fine surface structure. Shallow, stony, brown, grey brown to grey lithosols.	Varies from layered open forest of ‘scrub species’ with some Brigalow, Belah, and Wilga to grassy open woodland with narrow-leaved Ironbark.
Granites	Undulating to hilly terrain on granites.	Shallow to moderately deep sands and loams (lithosols & siliceous sands) overlying red and brown clay subsoils (red brown earths, yellow earths, and solodized solonet /solodics)	Open forest to woodland of Narrow-Leaved Ironbark, Grey Gum, Silver-Leaved Ironbark. Bloodwood and Stringybarks.
Metamorphics	Steep to mountainous	Shallow stony sands & loams (lithosols) and hard setting clay loams overlying yellowish grey clay (solodized solonetz / solodics) and reddish brown clay loams overlying red and brown, clay subsoil (red-brown & yellow earths).	Open forest to woodland of Narrow-Leaved Ironbark and Grey Gum.

Source: Peter Voller, David Wildermuth, Catherine Hys. (1993) Tree Identification Manual, QDPI, Landcare

2.2 Climate

Crows Nest Shire is located in the warm, moist sub-coastal region with maximum rainfall in the summer months. Average temperatures are moderate, although extremes of high in summer and very low in winter are normal, particularly when southwesterly winds are prevalent. Frosts usually occur between May and September.

2.2.1 Rainfall

The average annual rainfall of the Shire varies from 650 mm at Meringandan to 1200 mm at Ravensbourne. Crows Nest has an annual rainfall of about 650 mm. Maximum rainfall occurs in the summer months. The rainfall is more prolonged along the southeast ranges and forest areas and decreases in the north and west of the Shire.

2.2.2 Temperature and Humidity

Average temperatures for the Shire are moderate, although extremes of high in summer and very low in winter are normal, particularly when southwesterly winds are prevalent. Frosts usually occur between May and September. On average, temperatures exceed 32°C on only 10 days of the year.

2.3 Vegetation

Crows Nest Shire is fortunate to retain extensive areas of remnant vegetation. The types of vegetation vary widely throughout the Shire being influenced by soil type and rainfall. High rainfall areas with deep red soils such as Ravensbourne are typified by wet sclerophyll and rainforests, sandstone derived soils covering much of the Shire support open woodlands comprised of a variety of eucalypt species whilst the drier western portions of the Shire have a diversity of ironbark species interspersed with pockets of semi evergreen vine thickets on the better quality soils. Areas of grassy open woodlands are present in the east and northeastern portions of the Shire.

2.4 Population

Crows Nest Shire has one of the highest growth rates for the Darling Downs region. In 1998, the population of Crows Nest Shire was estimated to be 9275. (Recent Population and Housing Trends in Queensland – 1999). Annual growth rates for the Shire were 5.4% for the 1991 - 1996 period and 2.5% for 1996 – 1998. Population growth is highest in the southern portion of the Shire due to its close proximity to Toowoomba. The population growth rates for the Shire are expected to remain high for the foreseeable future.

2.5 Purpose of Study

The Remnant Vegetation Corridor Strategy project builds on the Remnant Vegetation Mapping Project (Parry 1995) and seeks to provide the mechanisms to develop vegetation and wildlife corridors and linkages and to ensure the continued integrity, survival and protection of remnant vegetation for the benefit of biodiversity and future generations.

Funding was made available through the 1996/1997 National Landcare Program to:

- identify and map vegetation corridors,
- research and develop incentives that the Crows Nest Shire Council can implement to encourage landholders to retain remnant vegetation corridors on their properties.
- research and develop management strategies to ensure the continued survival and enhancement of the existing remnant vegetation.
- identify and map significant vegetation corridors and the linkage of significant areas of remnant vegetation within the Crows Nest Shire.
- develop incentives for landholders to manage and enhance critical and significant vegetation corridors on their properties.
- ensure the protection and long term survival of the natural environment of Crows Nest Shire.

This report and accompanying maps are the result of this project. They are intended to provide resource information to assist Council in decision making and planning for the future of the vegetation resources of Crows Nest Shire.

It is hoped that this project will better inform local government, planners, landholders and land managers of the values and benefits of vegetation corridors and to encourage positive community attitudes towards their retention and development in the future.

2.6 Crows Nest Shire Council Strategic Plan

The Crows Nest Shire Council Strategic Plan was prepared in accordance with the provisions of the Local Government (Planning and Environment) Act 1990 and consists of three parts.

1. A map identifying the preferred dominant land uses for the Shire.
2. A statement of objectives in respect to management and progressive development of lands within the Shire.
3. A document containing supporting information used in the preparation of the Strategic Plan.

The principal aim of this document is: -

“To encourage the orderly growth of the urban and rural areas of the Shire by the expansion of towns and rural living, provision for tourism and industry and preservation of arable resources for primary industry.”

Within the Strategic Plan are a number of objectives that set out the broad vision and goals for the shire. A number of these objectives relate to the natural environment of Crows Nest Shire. These objectives are;

OBJECTIVE 1.4.1 *“To preserve the character of rural areas.”*

OBJECTIVE 1.5.2 *“To ensure that both the water supply resources and water supply catchment areas within the Shire are maintained free from pollution.”*

OBJECTIVE 1.9.1 “To retain the unique features of some areas of the shire and to ensure that any development is compatible with the environment, the capacity and characteristics of the area.”

OBJECTIVE 1.9.2 “To ensure tourist facilities are developed in a manner compatible with the great beauty of the area.”

OBJECTIVE 1.10.3 “To encourage the provision of a range of areas of sufficient size to allow for the protection of a range of ecological and conservation values and to allow for their managed use by different interest groups.”

These objectives provide a framework for how the shire’s natural environment should be managed for the future. There needs however, to be a more detailed plan outlining how these objectives will be achieved.

It is anticipated that the implementation of the Remnant Vegetation Corridor Management Strategy will assist in achieving the Shire’s vision, objectives and goals relating to the natural environment.

2.7 Crows Nest Shire Council’s Corporate Plan

To adequately perform the role of local government, that is “good rule and government of its area,” it is important that the elected members, management and staff of Crows Nest Shire Council work together to a plan that addresses the present and future needs of the residents of the Shire. The Corporate Plan is designed to achieve this aim. Associated with the Corporate Plan is a vision statement and a number of goals relating to the Shire.

The vision statement is: -

“That the Shire of Crows Nest is developed in an orderly and progressive manner, enhancing the beauty and amenity of the natural environment; and that appropriate services and infrastructure exist to meet community needs.”

The goal of Crows Nest Shire for the environment is: -

“THAT the natural environment is protected and enhanced for future generations.”

3.0 Corridors – Functions and Benefits

A vegetation corridor has been defined as “a conduit which encourages movement of animals and plants across adjacent inhospitable territory to more hospitable territory.” (Dorricott and Roberts, 1993). Another definition is “a linear two-dimensional landscape element that connects two or more patches of wildlife habitat that have been connected in historical time; it is meant to function as a conduit for animals.” (Soule and Gilpin, 1991)

In general, wildlife corridors have varying degrees of ‘value’ and ‘significance’. ‘Value’ is the intrinsic quality of a corridor; that is, a combination of size, health, ratio of edge to core habitat, etc, whilst ‘significance’ relates to the corridor’s relationship to other vegetation remnants, for example, does it join core habitats. As such, a long narrow strip of native

vegetation that is unconnected at either end and is surrounded by modified agricultural or pastoral lands may have a high intrinsic biodiversity value but a relatively low significance. This is in comparison to a smaller strip in poorer condition but which provides the only linkage between two areas of remnant vegetation and hence would have a low intrinsic biodiversity value but high connectivity significance. Wildlife corridors, to be of high significance, must provide a link between relatively large patches of remnant vegetation and should accommodate a variety of species. For example, a narrow, densely vegetated corridor retained alongside a creek would not be suitable for most macropods, however, if a wider area was retained on either side of the creek it would be suitable for a variety of species and result in a higher quality corridor. (Department of Main Roads 2000)

Corridors can improve a remnant's capacity for conservation by decreasing its isolation and facilitating colonisation. Several factors that are largely responsible for determining the number of species found in remnant native vegetation are:

- distance from the remnant to the nearest large area of habitat eg. National Park, state forest, undeveloped area etc;
- the quality of the intervening landscape;
- the size of the remnant habitat; and
- the behavioural characteristics of particular wildlife

3.1 Wildlife Movement

Wildlife corridors have been reported as being a 'safe channel' for the movement of plant and animal species. Animals need to move to forage for food, exploit resources on a daily or seasonal basis, accommodate different life stages, colonise new territory, extending their range, migrating and breeding (Harris and Scheck, 1991). Plants, although sessile need to disperse seed for gene flow and their roots need to move in search of nutrients (Harris and Scheck, 1991). Apart from the reasons listed, animals need a 'safe channel' where barriers to movement are minimised so that their daily, seasonal or annual activities are not affected. Examples of barriers to movement are open unprotected areas such as cultivated land in rural areas, roads, large expanses of water and concrete, noise and light. Barriers can inhibit the movement of animals and therefore their ability to feed, reproduce, disperse and recolonise, ultimately affecting biodiversity values of an area.

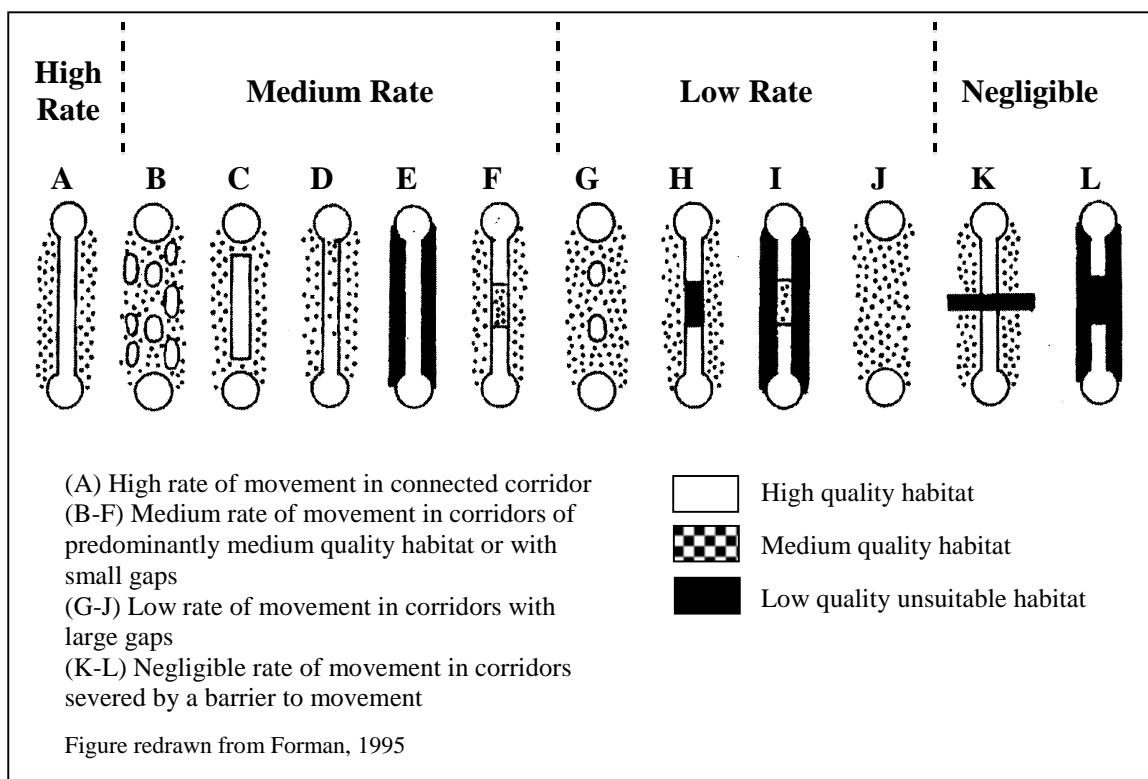
Movement through the landscape is essential for healthy, viable populations of native animals. Movements are highly variable, ranging from long-distance migration to small dispersals of non-motile individuals. Animals need to move in response to catastrophic events such as fire. Thus, the time scale of movements also varies from daily movements for resource access, to seasonal dispersal for migration and breeding. For these reasons, populations artificially confined to small areas are unlikely to survive in the long-term, and perhaps not even in the medium-term, without intensive and expensive management.

The mobility of wildlife varies widely between species and this affects the characteristics of suitable corridors. Generally, birds are highly mobile and cope better with habitat fragmentation than small ground dwelling mammals such as antechinus or melomys. Individuals may traverse the corridors between habitats either by a single direct movement, or

by a series of movements punctuated by one or more periods of temporary residence in the corridor.

Harris and Scheck (1991) indicated that corridors are a useful tool in assisting animal movement and provide a link or connection between habitat areas. Linkages such as corridors provide an avenue for movement and facilitate a variety of behaviours such as matings.

Figure 2.1: - Expected movement of wildlife in corridors as a consequence of variations in the quality and type of connectivity.



3.2 Gene flow

Genetic variation within a species (animal or plant) is highly desirable because it enables the species population to:

- better respond to long term changes in the environment
- better respond to new pressures and diseases; and
- reduce the impact of genetic defects.

Genetic variation is promoted by out-breeding (mating of unrelated individuals). Habitat fragmentation therefore tends to increase inbreeding and suppress genetic variation. Estimates can sometimes be made of the minimum viable breeding population, which is the number of individuals required to maintain a population or species without causing lethal genetic problems through inbreeding.

Dispersal prevents overpopulation and inbreeding that may occur in an isolated community. Successful dispersal requires that an animal has somewhere to go and a way to get there (Hussey, et al, 1989). Plants also need the opportunity to move, not only to enable seed dispersal, but also, by cross-pollination, to allow the exchange of genes between different plants of the same species. It is this gene flow that ensures that variability and adaptability will persist within a population; an essential feature that enables a population to cope with change. Appropriate conservation corridors can facilitate this movement.

3.3 Recreation and Aesthetics

Vegetation corridors can form part of the public or private open space network providing opportunities for recreation and protection of scenic amenity. Corridors can generate revenue indirectly to local government by providing potential visitors with scenic routes, vantage points, conserving or creating landscape and roadside vistas (Greening Australia, 1995).

Corridors can provide opportunities for nature appreciation, education, walking, cycling and passive recreation. A high degree of recreational use however, may not be consistent with the goal of maintaining wildlife habitat and facilitating wildlife movement. This may lead to increased disturbance within the corridor and result in a reduction of native fauna utilising these areas.

Visitors to Crows Nest Shire are attracted by the local National Parks, water reservoirs and rural atmosphere. From the landholder survey conducted, it was found that the public wanted bushland to be retained within the Shire and was a major factor for people choosing to reside in the area.

It has been recognised that landholders, in order to remain viable in today's economic environment need to investigate alternative forms of income generation. By retaining, enhancing and increasing the areas of native vegetation, including corridors, opportunities exist for tourism and the harvesting of local native products such as honey, seeds and bush foods.

3.4 Value of Corridors as Habitat

Vegetation corridors can function as in-situ habitat for some species that are able to live within strips of habitat and provide recruits for other connected patches. Corridors along roads and railways in particular can sometimes provide the last remaining habitats for endangered plants and animals. For example the rare and threatened plant species, *Stemmacantha australis* found on the Darling Downs area is known to exist only along road reserves.

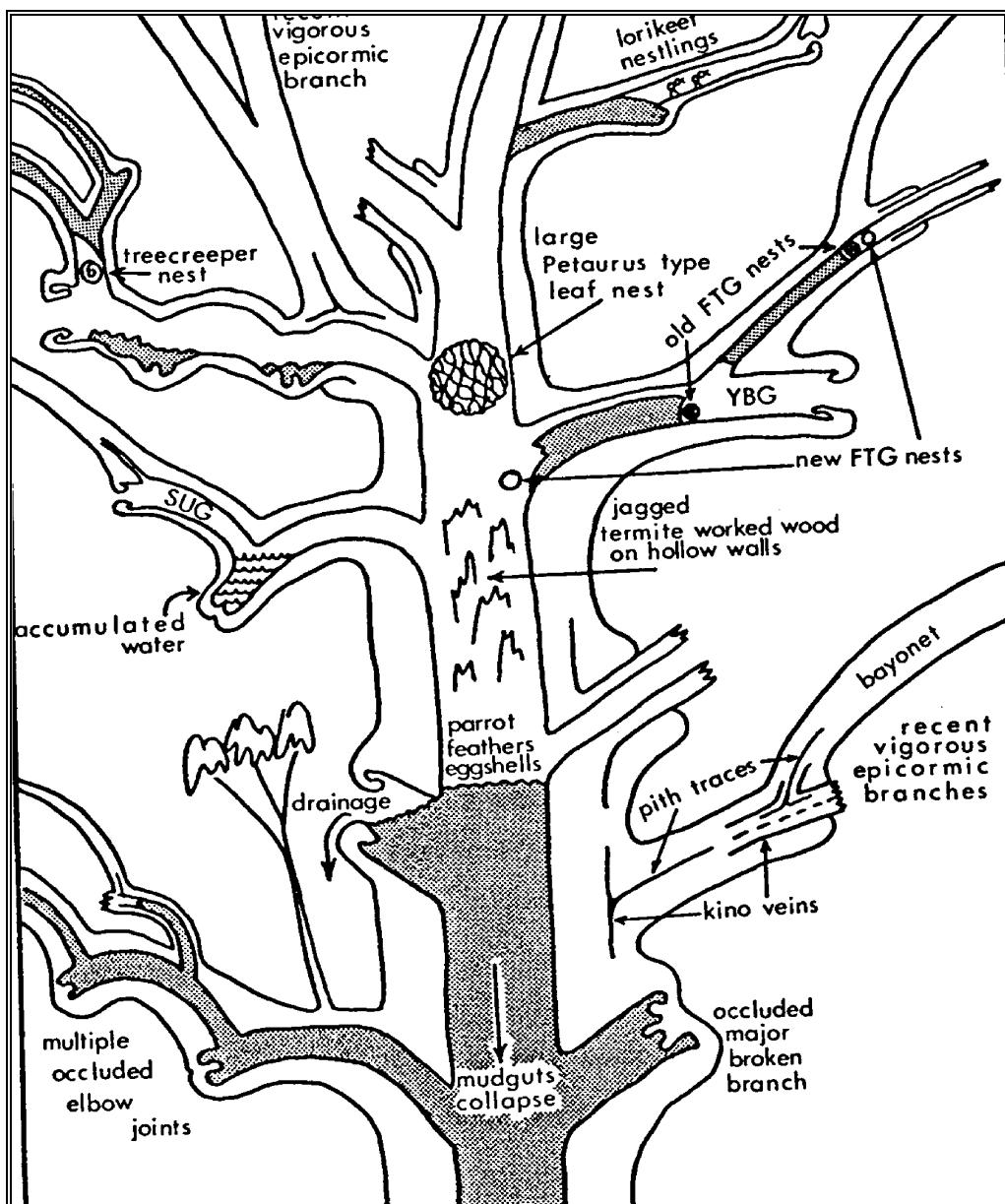
Corridors provide a varying range of habitats for many native faunal species. To be truly effective, these corridors need to replicate or contain the original elements of the ecosystem present in that area, including, rocks, dead trees and fallen branches and logs. These corridors need to be more than just trees, and can be very diverse, containing a wide range of ecosystems and elements that make them suitable for wildlife. The size, shape, type and condition of vegetation present in a corridor will be a determining factor in the type and density of fauna utilising it. Research into population ecology has concluded that small habitats that are physically interconnected to larger source pools of organisms will support and maintain greater

species richness than comparable habitats that are not physically connected (Harris and Scheck 1991)

Some native fauna are able to inhabit narrow linear corridors, whilst others have specific requirements, requiring much larger areas connected to extensive areas of remnant vegetation.

Vegetation corridors are often the only portions of the landscape containing old mature trees with well-developed hollows that provide roosting, refuge and nesting areas for a diverse range of species that can include owls, possums, parrots, insectivorous bats and geckos. As standing, dying and dead trees provide breeding and shelter hollows for 17% (119 species) of native birds, 42% (95 species) of native mammals, 35% of arboreal reptiles and an unknown number of invertebrates.

Figure 2.2: - Dissected View of an Old Hollow Tree



Key: - FTG – Feather-tailed Glider (*Acrobates pygmaeus*)

SUG – Sugar Glider (*Petaurus breviceps*)

YBG – Yellow-bellied Glider (*Petaurus australis*)

Source: Mackowski, 1984 as presented in Wildlife Conservation on Planned Properties, Dorricott and Roberts 1993

Fallen trees, logs and stumps provide specialised habitat for small mammals, reptiles, invertebrates, fungi, mosses, lichen and bacteria. Fungi and bacteria are associated with the decomposition of wood and recycling of nutrients and provide a valuable food source for a wide range of wildlife. The fruiting bodies of toadstools for example, are a critical food resource for some small mammals.

Quality remnant vegetation corridors, with the exception of grasslands are composed of several layers of vegetation, which can include,

- ground layer - herbs, grasses and forbs,
- shrub layer - a diversity of species of varying size, foliage density and age, and
- tree canopy layer - that can provide a continuous canopy, diversity of species, emergent trees and habitat trees (with hollows)

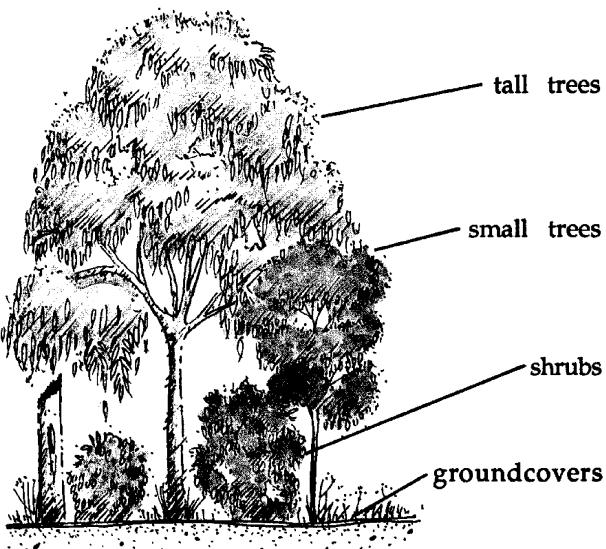


Figure 2.3: - Vegetation layers of a typical bushland remnant in good condition (Reprinted from Roadside Handbook Vicroads)

Vegetated corridors provide habitat for both immobile and migratory or mobile species. Mobile fauna may visit corridors seasonally to feed on seed, fruits and seasonally flowering trees. For example, fruit bats, scaly breasted and rainbow lorikeets feed on nectar and pollen provided by native flora. Visiting fauna not only benefit from the food supply but also play a key role in increasing the genetic variability of plant species by pollination.

3.5 Home Ranges

Home range is a measurement of the area of habitat that an individual, pair or family group would typically utilise for shelter, foraging and breeding purposes. Within species, males and females and different age groups may differ in their home range requirements. Large, carnivorous or more mobile wildlife generally have a larger home range than small, sedentary, or herbivorous species. For example, the dingo has a home range of 2500 to 5000 hectares depending on quality of habitat compared with the fawn-footed melomys that would be expected to range through approximately 0.2 hectares. As a general rule, species with larger home ranges require wider corridors than those species with smaller ranges. It is believed that there may also be a relationship between an animal's home range diameter and its sensitivity to habitat discontinuities. Accordingly, species with small home ranges will be affected by quite small gaps in corridors.

3.6 Refuges

Refuges are a region or area in which a species or suite of species persist for short periods when large parts of their preferred habitats become uninhabitable because of unsuitable climatic or ecological conditions (e.g. drought, flooding, environmental change brought about by European settlement or a biologically driven collapse in food supply). Such ecological refugia may operate for less than one generation, or just a few. Streams, swamps, water bodies and rocky outcrops can all serve as refugia for wildlife. In the short term, wildlife may rely on marginal or apparently unsuitable habitat as a refuge. Corridors can aid or facilitate the movement of wildlife to places of refuge and permit the recolonisation of areas following catastrophic events.

3.7 Environmental Benefits

Native vegetation corridors can reduce the effects of land degradation whilst aiding the conservation of flora and fauna. Benefits include:

- Maintenance of biodiversity
- Prevention of land and water degradation
- Increasing the viability of rural communities

3.7.1 The Value of Native Vegetation to Biodiversity

The landscape of Crows Nest Shire has a rich diversity of native plant species occurring in a broad range of habitats. Over eighty percent of the native vascular plant species occurring in Australia are endemic. Typically, a healthy area of native vegetation contains several tree species with twenty or more plant species in the understorey of small trees, shrubs and groundcover. Native vegetation provides habitat for a diverse range of native fauna species. Although the tree layer provides simple habitat in terms of shelter, nesting hollows and food, it is often the understorey which provides the widest range of fauna habitat. The understorey plants of flowering shrubs, rushes, sedges and grasses provide the majority of feeding, roosting, migration and nesting sites in an area of native vegetation.

3.7.2 Prevention of Land and Water Degradation

Native vegetation is the key to maintaining the stability of rivers and creeks, either through protection of stream banks from erosion or in filtering sediments and their associated nutrients before they enter the waterway. It plays a critical role in preventing waterlogging, salinity and the prevention of landslips on steep slopes. Native trees, with their deep roots, are capable of tapping into groundwater and so are able to lower watertables. Similarly, many perennial native grasses, for example Kangaroo Grass (*Themeda triandra*), Pitted Bluegrass (*Bothriochloa decipiens*) and Queensland Bluegrass (*Dicanthium sericeum*), readily use excess surface water during summer rainfall and keep potentially saline water tables at depth.

3.7.3 The Economic And Social Value Of Native Vegetation To Agriculture

The development of Crows Nests was a direct result of its wealth of natural resources that were utilised by early settlers. This consisted of timber harvesting from natural stands and cattle grazing of native grass pastures and open woodlands. Enterprises have been developed based on the use of native vegetation, including the wildflower and foliage trade, essential oil production and plant nurseries. The shade and shelter afforded by native vegetation can increase production in crops, pastures and livestock by up to 30%. Shade and shelter are most efficient when existing areas of native vegetation are managed to ensure that, in addition to trees, the understorey of shrubs and groundcover is retained. Well-managed native vegetation also provides habitat for predators of a range of agricultural pests that prey on valuable crops and pastures. (Rural Production and Native Vegetation Conservation – Information for Landholders NSW Dept of Land and Water Conservation 1998)

Beneficial Wildlife

Wildlife can serve a valuable role in controlling pests in the landscape.

- Sugar-gliders will eat up to 25 scarab beetles a day
- Insects comprise 40-60 per cent of the diet of crows and ravens
- Small insect-eating bats eat up to about half their body weight each night.
- One Straw-necked Ibis will consume about 200 grams of insects every day and enjoys a diet of grasshoppers and grubs.
- Small mammals such as bats and antechinus, predatory insects and spiders consume significant quantities of insects harmful to agricultural production

4.0 Threats to Corridors and Remnant Vegetation

All wildlife faces a life or death struggle due to a range of common threats, both natural and man created. Threats that commonly occur in Crows Nest Shire include land clearing with the resulting fragmentation of remaining vegetation, pasture improvement, grazing, impacts of domestic and feral livestock and animals, fire, firewood collection, road kill and urbanisation.

4.1 Isolation and Fragmentation

Fragmentation and isolation of native vegetation has many negative effects on the distribution and population of native flora and fauna. Numbers are often reduced by the destruction of habitat or the intrusion of non-native species invading from adjoining lands. These may be species competing for the same resources, for example, the interaction between native herbivores and introduced livestock whilst introduced predators, for example, the fox and cat can significantly impact upon native fauna species not normally subject to high levels of predation.

Unplanned clearing for agricultural and urban expansion is often at the expense of remnant vegetation, resulting in reduced remnant size, fragmentation, decreased linkages and an increase in the degree of isolation of remnants. Within the Coalbank-Haden-Pinelands district, Semi Evergreen Vine Thicket communities have been extensively fragmented as a result of clearing for agricultural expansion. Softwood scrub vegetation communities are listed as threatened by the Environmental Protection Agency.

Semi Evergreen Vine Thickets

Remnants of Semi Evergreen Vine Thickets (SEVT) locally known as dry scrubs are scattered throughout the Shire. They have been extensively cleared and their conservation status is listed of concern. Today, they cover less than thirty percent of their pre European settlement area. Typically, remnants are small 0.2 to 5 hectares in size and vulnerable to degradation. Remaining areas of SVET are threatened by weed invasion, cattle grazing, fire and habitat fragmentation. These SVETs are species rich, provide habitat for a number of rare and threatened flora species and contain a wealth of invertebrate, plant and animal species.

Urbanisation especially the southern portion of Crows Nest Shire is a major threat to existing native vegetation. The Highfields area is experiencing rapid growth due to its close proximity to Toowoomba and current estimates are that the population is expected to double in the next ten years. Population growth and the demand for housing often result in the fragmentation and isolation of remnant vegetation. A development control plan (DCP) has been developed for the southern portion of the Shire to ensure the orderly and planned development of the area. Development pressures on the eastern and southeastern areas of Highfields are reduced due to the steep gradient of the landscape making them unsuitable for medium to high-density urban development. Without proper development guidelines for this area, existing vegetation will be at serious risk of clearing and degradation.

4.2 Rural Residential Development

The desire for a rural lifestyle has led many people, usually with no natural resource management skills, to purchase a rural residential block typically 2 to 5 hectares in area and possessing a greater or lesser amount of native vegetation. To complement this rural life style, an assortment of life stock – horses, cattle, sheep, goats along with cats and dogs – are

introduced, often with little thought to the impact that these animals may have on the local environment. Within a short period of time, the block is over grazed, the ground and shrub layer reduced to dust and remaining trees ring barked. The dogs and cats have succeeded in killing off or chasing away the native birds, mammals and marsupials whilst a range of garden plants introduced to beautify the area have escaped into adjoining bushland. Rural residential subdivisions throughout the Shire have the potential to exert a serious negative impact on remnant vegetation and wildlife corridors.

4.3 The Effect of Past Clearance

Long after clearance has stopped, biodiversity can continue to decline. Clearance for farming often results in a mosaic of vegetation remnants and open farmland across the landscape. This type of mosaic can be seen in the Pinelands and Coalbank districts, where there are fragments of dry rainforest scrubs remaining. These vegetation remnants left behind after clearance will retain most of their biodiversity for a period of time and the decline may not be seen for years or decades. The isolation of these remnants can have a serious impact on ecosystem processes. Wildlife can lose their access to food and water resources and plants can lose their access to pollinators species (eg. insects, birds and small marsupials). The changed environment can also bring new or larger numbers of competitor and predator species into the area. (Boyes, 2000)

4.4 Lack of Conservation Awareness

Most of the residents of Crows Nest Shire are unaware of the significant biodiversity of their area. This lack of awareness can lead to uninformed management decisions that impact negatively on biodiversity. In particular, residents are unaware of:

- The threatened species and ecosystems contained within the Shire,
- The threats to these species and ecosystems,
- How to implement cooperative "win-win" biodiversity conservation programs that benefit both biodiversity and the rights and needs of landholders and the community, and
- The significant economic potential of the Shire's biodiversity.

4.5 Fire

Fire is a natural element of the Australian landscape, that can be a powerful management tool when used correctly, or catastrophic when used incorrectly.

"Fires are easy to ignite and can spread widely. They can be a cheap management tool (such as pasture regeneration) and costly reality (such as wildfire damage). Fires can be considered both "natural" and "artificial". They impact on human values and ecosystem characteristics while their influences can be dramatic or enigmatic. It is no wonder that fires and their effects have been and will continue to be, controversial topics. With feelings often running high on conservation issues involving perceived or possible extinctions of plant and animal species, and the interest in species rarity, biodiversity and ecologically sustainable development, the controversy is exacerbated." (Gill and Bradstock: 1995)

The impact of fire can be either positive or negative, depending on the type of plant community and when and how it is used. Rainforest and softwood scrub communities are fire sensitive and can be devastated by fire never to recover, whilst the opposite can be the case with other communities where it actively aids the regeneration of flora. The impact that fire has on remnant vegetation depends on:

- fire frequency,
- time of the year,
- seasonal conditions,
- fire intensity,
- patchiness of the fire; and
- rainfall before and after the fire.

Frequent burning can change species composition of plant communities, remove fire sensitive species and destroy old hollow bearing trees.

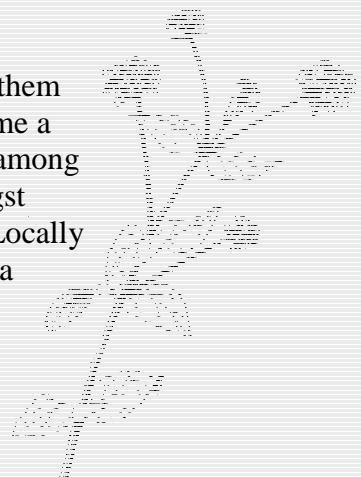
4.6 Introduced Flora

The invasion of exotic flora species into remnant vegetation areas is one of the greatest threats to biodiversity in Crows Nest Shire, having a profound effect on native flora and fauna populations. Weed species that include garden and agricultural escapees (trees, shrubs and pasture grasses) can reduce or prevent the regeneration of plant species and actively compete with endemic species. The quality of habitat can be significantly impacted upon by the reduction of food reserves and nesting sites. Local examples of this are Lantana (*Lantana camara*) invading rocky areas that provide habitat for the vulnerable Brush Tailed Rock Wallaby, Broadleaf privet (*Ligustrum lucidum*) dominating riparian zones and changing the ecology of them, African boxthorn (*Lycium ferocissimum*) forming impenetrable thickets and Ferny Asparagus (*Protasparagus africanus*) smothering Semi Evergreen Vine Thickets.

All over Australia, native animals are learning to live with weeds. Most fruit and seed eating birds in Australia take exotic foods, and dietary studies show that parrots and pigeons in many regions are now weed dependent.

Lantana – Friend or Foe

Some wildlife have adapted to the presence of weeds and utilise them for food and shelter. Lantana, our most prevalent weed has become a valuable resource for wildlife. Wallabies and bandicoots shelter among its thickets, whipbirds, fairy wrens and scrub wrens forage amongst its foliage, butterflies sip its nectar and native birds eat its fruit. Locally the vulnerable Black-Breasted Button Quail has adapted to lantana thickets, having lost much of its dry rainforest habitat to farming. Unfortunately, Lantana's downside is that it has become a major weed, invading farm land, out competing native plants and changing fire regimes. (Low, 1999)



A critical element of managing remnant vegetation for nature conservation is effective weed management and control. *The National Weeds Strategy* (1997) identifies a weed as ‘a plant which has, or has potential to have, a detrimental effect on economic, social or conservation values’. In simple terms, a weed is a plant in the wrong place. Most people think of ‘weeds’ as little things like the dandelions disfiguring their lawns, but environmental weeds can be enormous. Most of them are trees, shrubs, vines, grasses, lilies and waterweeds. The worst of them - ‘the environmental engineers’ - can form whole forests, shrublands or grasslands. (Low 1999) Weeds are opportunistic colonisers that often establish after disturbances such as fire, flooding, clearing, grazing and increased nutrient levels. Weeds threaten remnant vegetation by:

- competing for resources including light, space, water and nutrients;
- altering the structure of the vegetation;
- reducing natural regeneration by suppressing seedlings of indigenous canopy and understorey species;
- altering fire regimes;
- modifying food sources and habitat available to native fauna; and
- modifying the soil environment to ensure their own survival, creating unfavourable conditions for native species.

4.7 Introduced Faunal Species

Introduced fauna such as foxes, cats, dogs, cattle, feral pigs, horses and cane toads can all have a significant impact on native flora and fauna. Foxes, cats and dogs threaten populations of small mammals, marsupials, reptiles and invertebrates through predation and presence in their territories. Native animals consuming cane toads are often die as a result, whilst cattle and horses browse on existing vegetation and graze seedlings, reducing their chances of survival. Australia’s landscape is adapted to grazing by soft-footed animals and the introduction hard hooved animals has in many cases resulted in serious environmental impacts. These animals can trample plants, compact soil, cause soil erosion, increase levels nutrients particularly around cattle camps and introduce weeds through their faeces or seeds carried on their coats. Grazing by introduced livestock can reduce the diversity and abundance of preferred food plants available for native wildlife and lead to the disappearance of particular grazed species from the landscape, especially the more palatable ones. All these impacts increase the likelihood of weed infestation and establishment.

The major effect of stock grazing in remnants is the trampling or browsing of seedling plants, shrubs, or ground covers. Grazing can pose a threat to understorey plants and prevent the regeneration of replacement tree seedlings. Other undesirable effects of overgrazing include soil erosion, soil compaction and increased soil nutrient levels where stock congregate. (Smith, 1994)

According to Hobbs, 1987, the major form of disturbance to remnant areas is the movement of livestock into them. He also stated that grazing by cattle or other livestock can drastically alter the structure of native vegetation and prevent the regeneration of flora species.

The total absence of livestock grazing in areas retained for wildlife conservation has proven to be a key factor in retaining and improving habitat value. Specific management practices that control or exclude grazing for short periods of time can be used to manage vegetation for a particular purpose, for example allowing trees and shrubs to regenerate in shadelines.

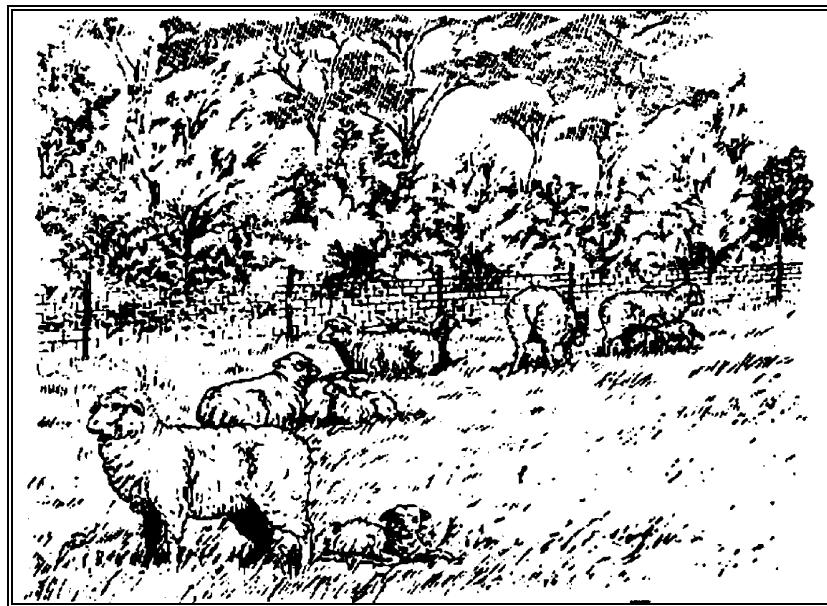


Figure 3.1: - Excluding grazing for short periods of time can be used to manage vegetation
(Diagram from VegNotes Series 2 Dept of Land and Water Conservation)

Wildlife corridors should be monitored and managed so that species protection is maximised (Loney and Hobbs, 1991). Programs need to be put into place where data is continuously collected about species density, population and location, movement, predator population, diseases, climate changes (monitor risks of fire and floods) and the health of vegetation.

Feral Cats and Native Fauna

A pilot study was conducted to determine the food items consumed by stray cats inhabiting three council rubbish tips in the Crows Nest district. Cats were trapped, euthenased; and their gut contents examined. It was found that 37% of the total gut samples for all sites contained native prey and 15 % contained exotic fauna. Individual sites showed variation in the amount of native prey items consumed, the highest having 67% of gut samples containing native prey. Examination of the gastrointestinal parasites (Tapeworms) was also used to indicate prey consumed prior to the time of capture. It uses the fact that certain parasites can only be transmitted by certain prey animals. Prevalence of two species of parasites, *Spirometra erinacei* and *Taenia taeniaeformis* was high at all sites. *S. erinacei* occurs primarily in native vertebrates, while *T taeniaeformis* has been reported in both native and exotic vertebrates. At all sites male cats had a 100% infection rate with either one or both species of parasite, females had an average infection rate of 48%. This report has concluded that both the direct and indirect evidence suggest high levels of predation of native fauna at all of the

sample sites.

(Analysis of the Gut Contents of Stray Cats From Rubbish Tips in the Crows Nest District, South-east Queensland. Jo Davis 1999)

4.8 Costs of vegetation corridors

There are costs and problems that require attention so that wildlife conservation can be successfully achieved in rural and urban environments. Economic pressures may preclude farmers from being able to set aside portions of their land for conservation purposes or for a wildlife corridor that may be contiguous with another corridor (Dorricott and Roberts, 1993).

The costs may include foregone agricultural production from the areas to be conserved, the materials and labour associated with fencing, and the ongoing management of the remnant (Miles and Lockwood, 1998).

Remnant native vegetation can contribute to on-farm productivity through provision of unimproved grazing, timber products and stock shelter. It can impose an opportunity cost if the forested land could otherwise be cleared and used as improved pasture, cropping, or some other enterprise. The study “*Assessment of the On-farm Economic Values of Remnant Native Vegetation*” was conducted to assess the economic values of remnant native vegetation on farms. It was determined that landholders managed their remnant native vegetation due to economic pressure, rather than environmental and nature conservation considerations. Most participants from the study indicated that they would undertake activities to conserve their remnant native vegetation if incentives were available, in particular economic incentives (Miles, et al, 1998).

According to Breckwoldt, 1983 most landholders who are interested in nature conservation, and are already doing something about it, are economically secure. Most often landholders lack the funds to carryout rehabilitative works and regeneration of native vegetation on their properties. Tax concessions funded from the Natural Heritage Trust are available for landholders who perform conservation and landcare activities on their properties

5.0 Study Area and Methods

5.1 Corridor Design and Location

Clearing practices in Crows Nest Shire have reduced the area of native habitat available to flora and fauna. Much of the remaining vegetation is in a fragmented state due to clearing for agriculture particularly on the better quality soils and more recently land development for rural residential and urban living.

The proposed corridors and linkages were developed using the existing remnant vegetation within the shire. Location, extent, and type of vegetation corridors and linkages were determined using the recent Remnant Vegetation condition maps (Parry, 1995), aerial photography (1993) and ground truthing.

The project was prepared in conjunction with the report *Remnant Vegetation Survey of Crows Nest Shire* (Parry, 1995). The vegetation within the shire was assessed according to condition. Remnant vegetation was categorised into three conditions; Good, Fair and Poor. A map showing the condition of remnant vegetation in Crows Nest Shire is presented in Appendix 1. This vegetation classification was utilised when determining the vegetation corridors. The categories of vegetation condition are as follows:

- *Good* - vegetation appears to be quite intact with minimal disturbance to community structure, composition and function. Each stratum within the community is intact and weed invasion is minimal. Regeneration occurs readily.



Figure 4.1: - Good vegetation condition

- *Fair* - the basic structure of the community is intact and there is some regeneration, the community is considered to be in fair condition. Although these remnants may have undergone significant change, they still have the capacity to be viable and could return to their original structure, composition and function if allowed to remain undisturbed over time. Examples are areas that have been selectively logged for timber production or thinned for grazing. Regeneration is evident but weeds may be a problem



Figure 4.2: - Fair vegetation condition

- *Poor* - these areas have undergone major disturbance and alteration to structure, composition and functioning of the original plant community. Weed invasion and disturbance is obvious.

- 2 categories

- (i) communities with thinned canopy or understorey, and little/no regeneration. They are heavily grazed.
- (ii) “regeneration” areas which have previously been cleared. There are few or no mature trees in these areas.

In both circumstances the return to original vegetation condition is unlikely, even in the long term.



Figure 4.3: - Poor vegetation condition

(Vegetation drawings were sourced from Rural Production and Native Vegetation Conservation – Information for Landholders NSW Dept of Land and Water Conservation 1998)

The result is a map on which vegetation corridors and linkages are marked. The categories are as follows:

- *Critical corridor* - These corridors are of shire significance (> 1000ha) and form part of large remnants along the eastern escarpment, Ravensbourne, Perseverance Dam, Crows Nest township, Emu Creek, Pierces Creek, and northern areas of the Shire. Critical corridors have been designed to incorporate the large areas of good to fair condition remnant vegetation that currently exists in the Shire and link with remnant vegetation in adjoining shires.
- *Critical linkage* - These have been designed to connect large areas of good to fair condition remnant vegetation within the Shire’s corridor network of regional significance. Some of the critical linkages are very narrow and essential in linking the critical corridors. An example of this in the Emu Creek and Pierces Creek areas. These linkages are critical in the future conservation and enhancement of the corridor. In some situations, these linkages are very tenuous and require protection and enhancement.
- *Important corridor* - Corridors that have substantial areas of good, fair and poor condition remnant vegetation that link critical corridors. Whilst these corridors in general, are narrow they follow natural features and create links across the landscape to large remnants. These corridors have been designated within the Ravensbourne, Palmtree, Saltwater Hole Creek, Emu Creek Stock Route and Cabarlah-Kleinton districts. Within these districts, there is the likelihood of rural-residential subdivisions and fragmentation of remnant vegetation.

- *Important linkage* - Important linking areas of good/fair vegetation condition to areas of fair/poor vegetation condition resulting in the linkage of areas of significance. These linkages are often composed of fragmented vegetation that will require extensive rehabilitation work and regeneration of plant species through planting or natural regeneration.
- *Potential corridor* - Existing vegetation that is fragmented and of fair/ poor condition and contains natural features such as creek lines and road reserves. These corridors will need extensive rehabilitation work through planting or natural regeneration by of native plant species. It should be noted that potential corridors in the Haden, Pinelands and Coalbank districts contain significant remnants of threatened softwood scrub and vine thicket vegetation communities.
- *Potential linkage* - Linkages that can be potentially implemented to link important or critical corridors with good, fair and poor remnant vegetation condition. An example is the eastern escarpment to Cooby Dam that allows the movement of animals to a large water body. These linkages will need extensive rehabilitation to allow regeneration of endemic plant species to occur. Potential linkages follow road reserves or natural features such as creeks, gullies and ridgelines.

Appendix 2 illustrates the designated corridors and linkages within the Crows Nest Shire.

The Remnant Bushland Management Strategy Project, Dorricott and Brennan, (1994), identified a number of unleased reserves within the Crows Nest Shire of medium and high conservation value. These reserves and others with conservation values, along with National Parks, State Forests, water reservoirs, creeks and waterways have been included within the proposed corridor network where possible. Ground truthing was preformed on occasions to evaluate the suitability of some of the proposed corridors.

5.2 Landholder survey

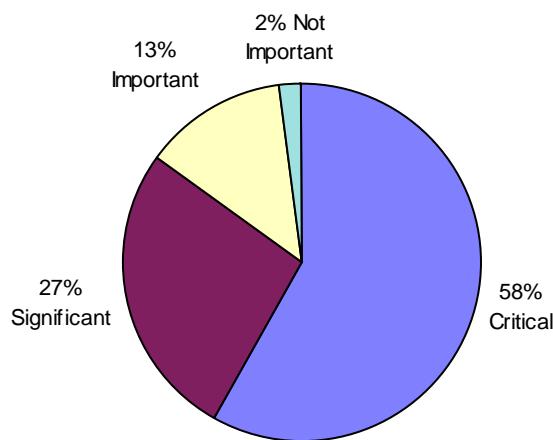
In February 1998, a survey was conducted to determine the opinions of the landholders within the proposed corridors. The areas surveyed were Highfields, Cabarlah, Geham, Hampton, Crows Nest and Pierces Creek. The survey asked the landholder for opinions in the following subject area:

- importance of existing areas of natural vegetation for conservation
- landholders willingness to retain and maintain areas of natural vegetation on their properties for rate rebates.
- considerations of rate rebate levels.
- willingness to replant or revegetate areas of their properties to contribute to local vegetation corridors.
- contribution of ideas that could help the council in conserving and managing areas of natural vegetation within the shire.

Refer to Appendix 3 for the Landholder Remnant Vegetation Corridor Survey and Landholder responses to Remnant Vegetation Corridor Survey.

In general, the responses from the survey were positive. A majority of the feedback from the surveys was in favour of the development and implementation of a vegetation corridor network. Landholders believed that retaining natural vegetation in the shire was critical.

Figure4.4: Community views of the importance of the existing native vegetation in the Crows Nest Shire.



Respondents to the survey had a wide range of views from negative to positive opinions. Selections of the responses from the survey are as follows:

"This is unreasonable for a handful of 'Greenies' to expect a freehold landholder to fulfil their unrealistic anti progress goals"

"I already retain vegetation corridors on my land and have planted others. If we lose the little that is left then it will be a disaster for succeeding generations"

"Good town planning is essential to ensure that the Highfields area does not become overtaken by small residential blocks. We agree that some tree coverage needs to be maintained on rural properties"

"A large attraction to our shire is the 'country' atmosphere including the bush. Tourism is increasing and can be promoted without ill effects if some local effort is made to maintain and increase our local bush. A street full of houses will not attract tourists"

"Every new area of land submitted for rezoning and subdivision must be examined for future conservation of native trees, birds and animals"

For copies of the respondents comments, refer to Appendix 3.

6.0 Vegetation Conservation Corridor Design

There are a number of characteristics that make up desirable corridor designs within a network. Exact dimensions for corridors cannot be given as each flora and fauna species has different

habitat requirements and there is limited understanding of the movement of Australian fauna. The basic principles for corridor design are:

- bigger is better.
- larger areas of remnant vegetation situated within a corridor support more flora and fauna species.
- smaller islands of bush are more vulnerable to disturbances.
- habitat corridors should connect remnant “islands” and follow the natural contours of the landscape. Rivers and creeks often form natural corridors of vegetation.
- retain, restore or extend existing corridors

Location and dimensions of corridors need to be considered. If corridors are not adequately connected to larger conservation areas, are isolated, or have insufficient width to alleviate edge effect problems, the corridor can become a hindrance to species survival (Dorricott and Roberts, 1993). The success of corridors is dependent on the linkage to larger conservation areas and dimensions. (Harris and Sheck 1991)

In general corridors can be either: -

- Line corridors, which are narrow features where 'edge effects' affect the entire width of the corridor. These will help species to move between habitat areas, but may not represent good habitat in themselves;
- Strip corridors, which are wide enough to contain interior habitat; or
- 'Stepping stones', which are isolated patches of vegetation. The distance between these patches is small enough for some species to be able to move from one patch to the next, and so these patches (taken together) form a corridor. Even isolated paddock trees can act as 'stepping stones' for some species.

What may be only a line corridor for some species may be a strip corridor for other species. A series of 'stepping stones' may work as a corridor for some species, but not for others, depending on the distance between each 'stepping stone'.

An ideal conservation corridor network should consist of several “parallel” corridors linking large remnants of different habitat types. These links should have a full range of available landscape diversity (multi-gradient corridors), for example, from ridge top to river. Ridgelines often remain vegetated due to their rugged nature rendering them unsuitable for development. However, they should not be relied upon as the only corridors of a network. Habitat connections between gullies and ridges sometimes support greater species diversity and abundance than corridors confined to a single topographic situation. Animals that need to make altitudinal movements also benefit from such corridors.

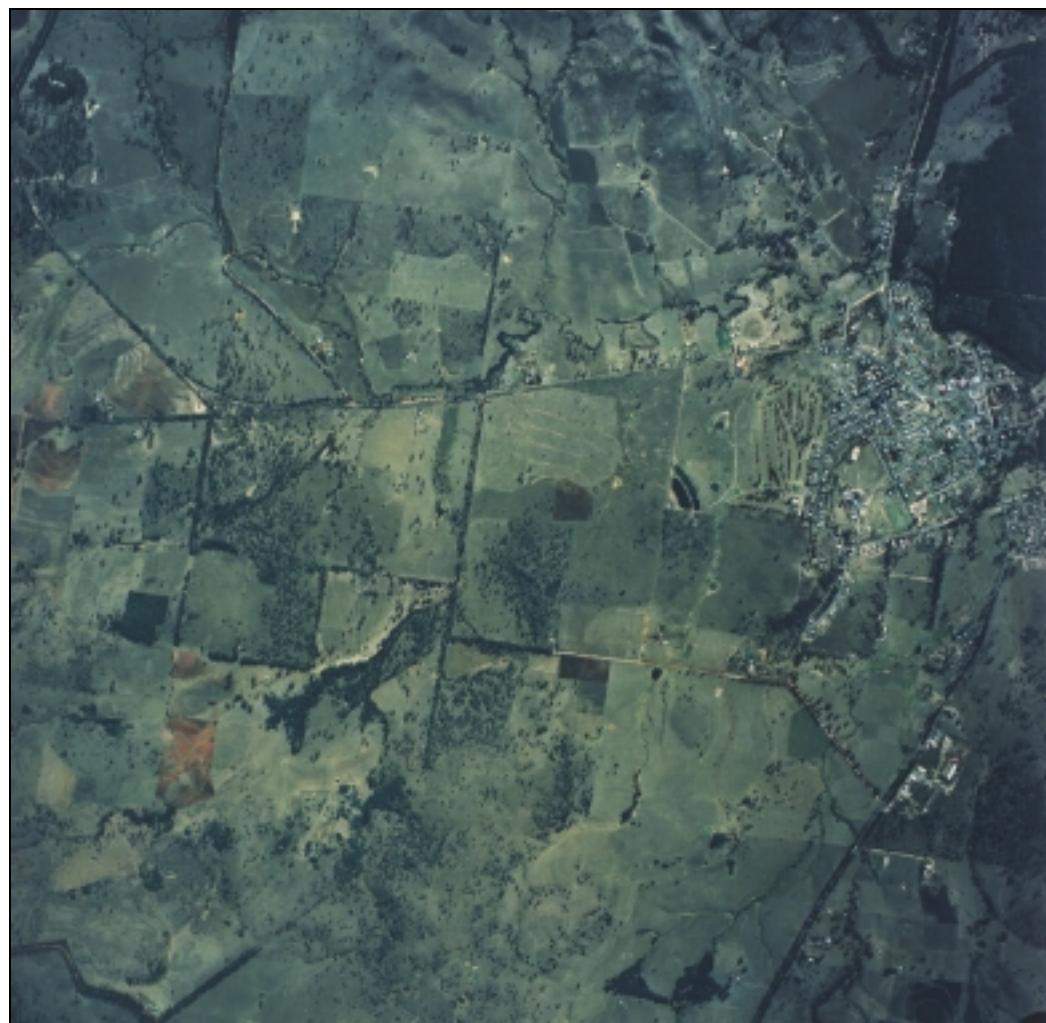
Links between areas of similar habitat, for example, several wetland areas allows wildlife to migrate and re-colonise, especially during times of environmental stress or disturbance, such as fire or drought. Priority should be given to conserving existing corridors in good condition, which protect wildlife important in ecosystem processes or rare and threatened species.

Corridors of riparian vegetation should be protected as a matter of priority as they are more fertile and better watered than surrounding lands and usually support a richer assemblage of plants and animals. The ecological significance of riparian corridors is such that they have been referred to as Australia's ecological arteries. They link ecosystems, traverse quite different landscapes and sub-catchments, and follow regional bio-climatic gradients. They may also be areas of more intense resource utilisation by animals seeking water and food resources.

Figure 5.1: - Aerial photo of Crows Nest district showing vegetation corridors.

6.1 Corridor Vegetation Structure

The structure of a vegetation corridor will be dependent on the plant communities that already exist or existed before modification through clearing. The more the vegetation resembles the original native vegetation the better the corridor will be from a conservation perspective. Within Crows Nest Shire there is a diversity of plant communities that display different structural types.



The integrity of remnant vegetation has a bearing on the habitat value of a corridor. In Crows Nest Shire some vegetated corridors have been largely impacted on by weed species resulting in decreased values.

6.2 Corridor Width and Length

Corridors should be as wide and natural as possible and complemented by compatible adjacent land uses. Narrow corridors will generally service the needs of only a few species some of the time, but wide corridors will function effectively more often and for a greater range of wildlife. In most situations however, any corridor between otherwise isolated patches is better than none at all. Corridor width and length will be dictated by factors such as topography, land availability, adjacent land uses and the extent and condition of remnant vegetation.

Optimum widths for conservation corridors are difficult to prescribe as they are species and site specific. In determining corridor widths primary consideration should be given to the requirements of the existing flora and fauna species. Corridor width is dependent on the edge effects. Small predation-prone species may require a wider corridor than a large predator or herbivore. Narrower vegetation strips may however, still be valuable, and should not be discounted. A strip that is one shrub wide can facilitate movement of some animals, although it will not be viable in the long term (Dorricot and Roberts, 1993).

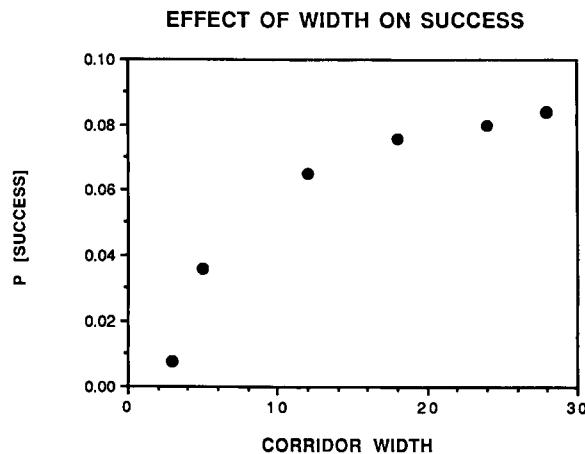
Guiding principles for corridor design are:

- Wider is better,
- Large remnants should be connected by wide corridors where possible,
- narrow corridors may be sufficient to make connections at the local scale, and
- occasional bulges in width, especially along lengthy corridors are highly desirable.

The size of the corridor will be dependent on restrictions from clearing and flora and fauna species requirements. Of course larger areas support more individuals of species, and often a larger number of species as well. Large fauna require significant areas for feeding, shelter and territories. For instance a population of grey kangaroos, requires an area of approximately 50 to 100,000 hectares to enable it to survive and reproduce successfully (Dorricot and Roberts, 1993).

A study conducted by Soule and Gilpin (1991) indicated that corridor width contrasts species movement through corridors in various ways. Narrow corridors increase rate of movement resulting in higher mortality rates (Refer to Figure 5.1). Wider corridors have a higher rate of occupancy, permit unconstrained movement of individuals and have a relatively low rate of mortality because of the low ratio of edge to interior.

Figure 5.2: - The effect of corridor width on the success rate of movement of wildlife through it.



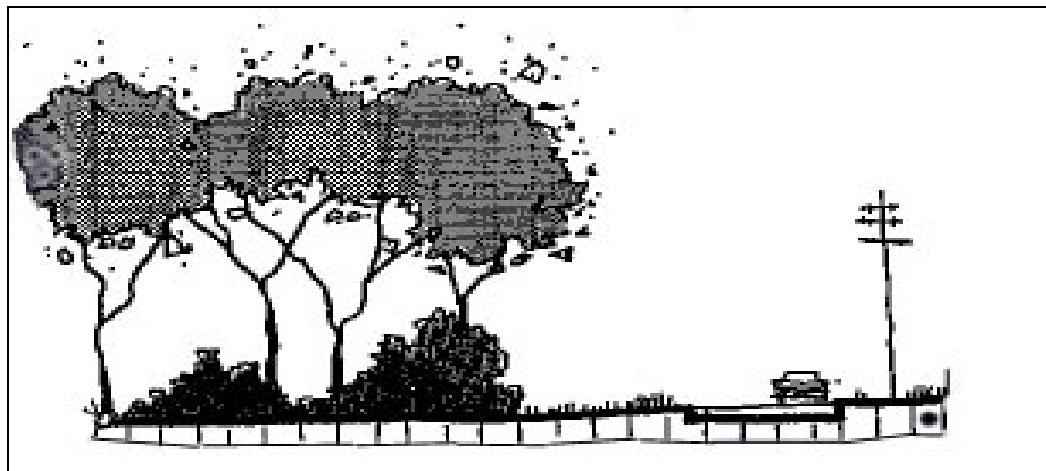
Source: Soule and Gilpin, 1991

Corridors should be designed to have a minimum width of more than twice the distance up to which edge effects in that locality have been observed. An estimated width between 30-100 metres is regarded as minimum. This will be dependent on the type of country, vegetation community and faunal species requirements. If however, corridors are narrow then it is particularly important to protect the corridor from the impact of edge effects; if necessary by buffers, increasing the effective width through compatible adjacent land uses, providing local "bulges" of habitat along the corridor route and retaining, protecting and enhancing the structural diversity and canopy cover.

The effective width of the corridor may decline over time due to weed invasion, fire, road widening, gradual creep of adjacent cultivation and mortality of native species from dieback. These matters should be considered when planning for corridors to prevent or mitigate possible effective narrowing of the corridor. With the cooperation of adjoining landholders and where appropriate, the involvement of community groups, the effective width of corridors can be enhanced.

Where corridors are shared with infrastructure, or where services encroach on existing corridors, it is preferable that the disturbance be concentrated along one side only of the corridor. To compensate for the resultant edge effects, disturbance on one side should be balanced by buffers maintained along the opposite side. An example of this is Figure 5.2 which illustrates a possible design of the shared corridor. The road and public utilities (e.g. power, water and telecommunications) are concentrated on one side of the road leaving a wider corridor of remnant vegetation.

Figure 5.3: - Shared Corridors



The retention of riparian buffers in rural areas is recommended in tree clearing guidelines and serve as a dual function as corridors. Suggested widths commence at 200 metres from the high bank on each side of major waterways and progressively decrease to 50 metres on each side of minor tributaries and creeks. The Tree clearing guidelines for the Darling Downs state clearing widths for vegetation along watercourses and forested areas. A copy of the Tree clearing guidelines – Darling Downs has been included in Appendix 4.

In rural areas of Crows Nest Shire that have been extensively cleared and developed for agriculture, strips of vegetation along gazetted roads (constructed or unconstructed) may represent the greatest corridor opportunities. In these modified landscapes even a corridor of a single row of trees can be important.

The distance between two remnants of vegetation or landforms determines the length of corridors. If corridors are long it suggests that the distance between core areas and remnants may be large. This would indicate the need to develop other conservation strategies to address habitat fragmentation. With increasing length there is a reduced probability of individual animals travelling the full length. As length increases greater attention must be given to ensuring that appropriate food, water and shelter requirements are available within the corridor or that the corridor is widened.

It is advisable that nodes are established or large remnants retained along lengthy corridors to enable the successful movement of animals. Major landscape or regional level corridors that extend over tens of kilometres would ideally be hundreds of metres in width, to maximise the value of the corridor as habitat and to mitigate edge effects.

6.3 Edge Effects

Edge effects occur naturally in the environment where native vegetation ceases abruptly, such as along waterways or at a cliff edge. The altered physical conditions such as, increased sunlight and temperature, decreased humidity, exposure to wind and to airborne seeds and spores at the edge are often so different to those of the habitat interior, it permits the growth of a different suite of plants, especially weeds. Consequently, the different floral species on the

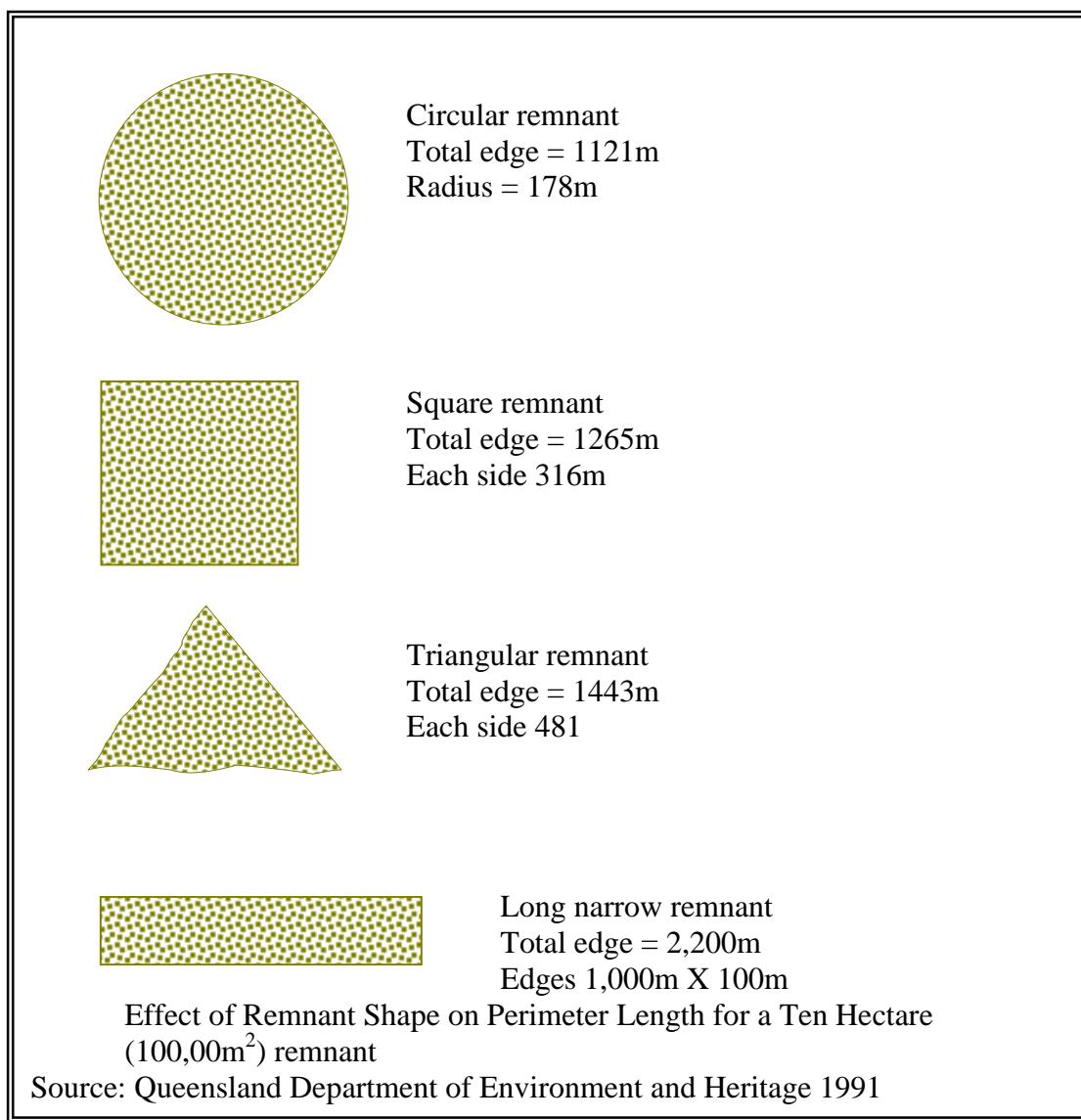
edge will not be suitable habitat for some wildlife. The same result occurs where native vegetation has a new edge artificially imposed upon it from development or disturbance. Other edge effects may include increased risk of fire, predation by domestic pets and feral animals, trampling and soil compaction from domestic livestock or people, litter, drainage and discharge of nutrients and contaminants.

Edge effects can penetrate into a corridor by 15 to 50 metres depending on the process and the vegetation type involved. If a corridor is too narrow, the entire width may be impacted upon by edge effects. Remnant patches, especially those circular in shape, can have quite low edge to area ratios. Corridors that are linear possess a high edge to area ratio. Bulges of habitat along the corridor will assist in mitigating edge effects, as will ensuring that adjacent land uses are as compatible to habitat integrity as possible.

The optimum shape for a habitat area is a square or circle, as this provides the maximum area with smallest perimeter. This factor means less susceptibility to edge effects, and increases the area's chances for long term survival. Long narrow strips are very susceptible to disturbances such as weed infestation, fire, wind exposure or tree dieback.

Many animals and birds have roughly circular territories – which means they do not have to forage too far in any one direction from the safety of a nest or burrow.

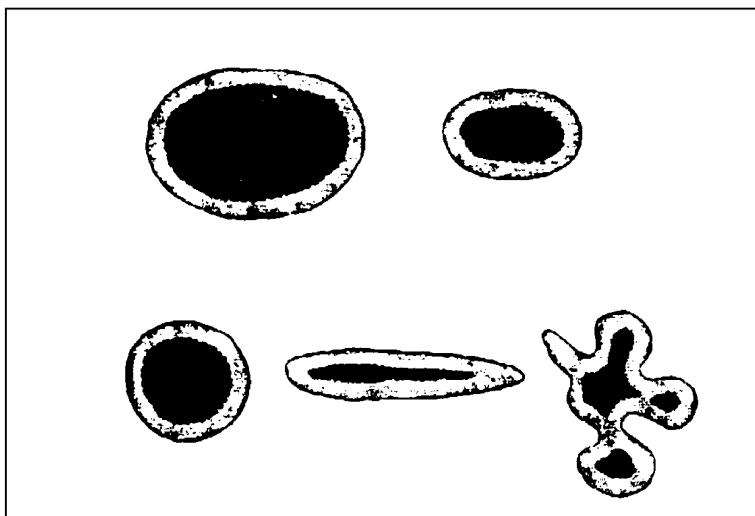
Figure 5.4: - Effect of Remnant Shape on Perimeter Length for a Ten Hectare Remnant



The ideal remnant or corridor should: -

- have a low edge to area ratio (refer to Figure 5.4);
- have a width greater than twice the edge effect to ensure that the same proportion is relatively free from disturbance;
- allow for the movement of wildlife;
- provide habitat rather just allowing wildlife to move from one remnant to the next;
- connect remnants across the landscape;
- enable recolonisation of habitat areas; and
- connect gene pools.

Figure 5.5: - “Edge effect” on vegetation remnants.



Ideally remnants should have a low edge to area ratio. Small, narrow and irregular shaped remnants are more susceptible to edge effects, degradation and the invasion of exotic weed species than larger circular ones.

Illustration from “*Living With the Environment in Pine Rivers Shire*” – Pine Rivers Shire Council 1998)

The length of the perimeter of remnants should be minimised in order to reduce ‘edge effects’. The best method of reducing edge effects is through proper planning and management. As an example, rainforest remnants are very susceptible to edge effects. Sealing the boundary of these remnants with pioneer rainforest species helps to retain the integrity of the remnant. These pioneer species provide ideal habitats for regenerating rainforest plant species as they filter sunlight, increase soil moisture and reduce competition from aggressive, invasive weed species that rapidly colonise and degrade exposed sites.

6.4 Maintenance and Enhancement of Corridors

Active management is required to maintain and enhance the effectiveness and viability of existing vegetation corridors. This can take the form of weed and feral animal control, fire management and controlled grazing. For example, the use of fire to reduce fuel loads, enhance and maintain vegetation structure.

Habitat values can be improved by the removal of degrading influences (e.g. weed species), revegetation or allowing the natural regeneration of endemic species to occur. Certain management strategies need to be considered that take into consideration the maintenance and enhancement of vegetated corridors. Examples are, fencing remnant vegetation to decrease grazing pressure from domestic livestock, preventing the intrusion of fire into semi evergreen vine thickets and planning for the regeneration of native flora species. Planting for shelterbelts, shadelines and windbreaks on farms can extend the effectiveness of corridors. Often, it is easier and more effective to retain and improve the condition of existing natural vegetation or to set aside areas for natural regeneration than to re-establish vegetated areas on cleared land.

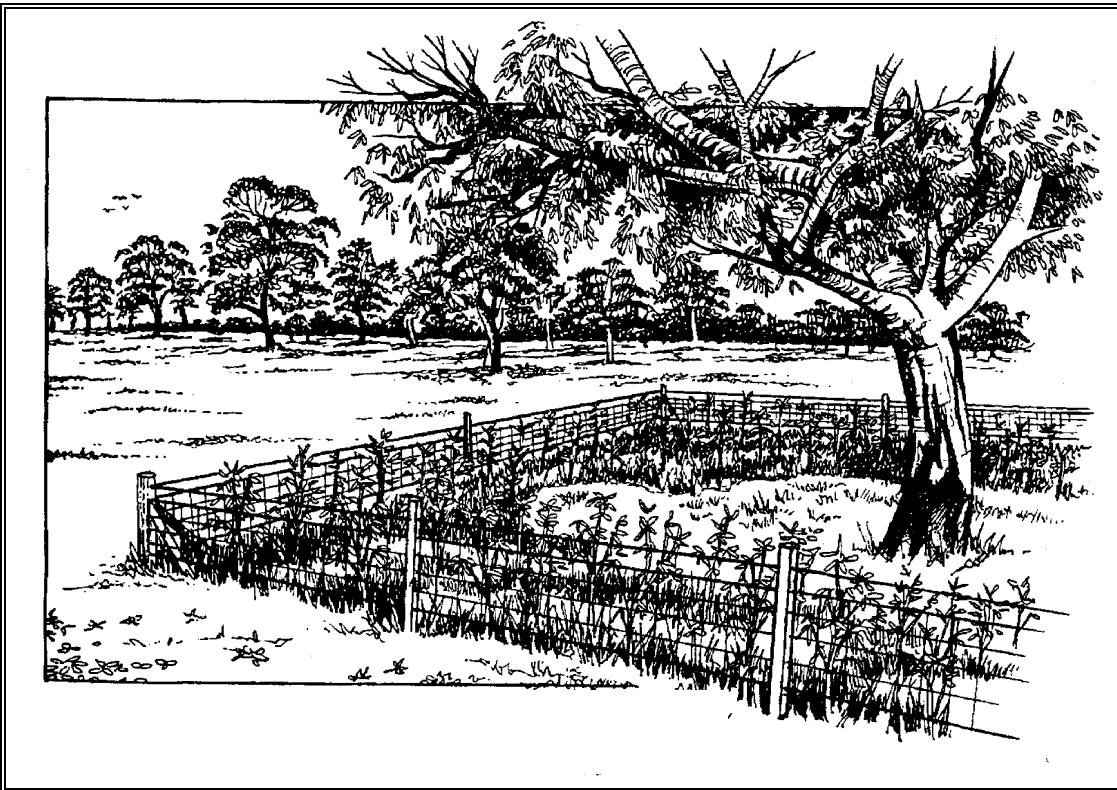


Figure 5.6: - Regeneration of existing species can often be achieved by fencing off mature trees from livestock. Species that have previously been eliminated from the site may need to be reintroduced by direct seeding or planting. (Illustration from Greening Australia 1995)

6.5 Buffers:

Runoff from surrounding land can contain sediments and pollutants that flow into our waterways. A pollutant can be defined as, “*a substance that does not occur naturally in a body of water, or excessive quantities of anything that occurs naturally.*” These pollutants may include:

- Nutrients: Excessive nutrients, particularly phosphorous and nitrogen, in water can result in algal blooms and can cause excessive growth of aquatic weeds.
- Turbidity: Turbidity refers to the discolouration and cloudiness of the water mostly caused by suspended material such as clay particles and organic matter.
- Microbiological Contamination: A wide variety of microbiological contaminants, including disease causing bacteria, can be found in poor quality water. Sewage treatment plants treat waste water to remove microbiological contaminants, but effluent from intensive animal production (e.g. feedlots and piggeries) which are not treated may be a major source of this form of pollutant. Septic systems which are not properly maintained or that are built on inappropriate soils can also be significant contributors.
- Chemicals, Oils and Other Pollutants: Agricultural chemicals, oils and industrial chemicals can reach waterways in runoff, and if concentrations are high enough, can cause serious damage to aquatic ecosystems. Careful use of agricultural

pesticides is the key to minimising the impact on waterways and aquatic ecosystems.

Buffers are an essential component of the landscape, and those next to watercourses are referred to as riparian buffers. Riparian land is any land that adjoins or directly influences a body of water. It includes:

- the land immediately alongside small creeks and rivers, including the riverbank itself
- gullies and dips which sometimes run with surface water
- areas surrounding lakes
- wetlands on river floodplains which interact with the river in times of flood.

Riparian land is not just a narrow strip along each side of a river or stream bank. Depending on the nature of the land (floodplain, gorge or valley) and the adjacent land use (national park, farming, forestry, housing), the width of riparian land that needs special management will range from very narrow or non-existent, through to a wide, densely vegetated corridor.

Good management of riparian land can decrease the amount of soil and nutrients moving from the land up slope of the riparian zone to the stream. By trapping soil and nutrients water quality will improve and the loss of in-stream habitat through siltation and nutrient loading will decrease. Riparian lands serve as corridors between tablelands and lowlands and enable the essential seasonal movement of wildlife between the two.

While managing riparian land is not costless, the many benefits which can be derived, and the problems which can be avoided, can easily outweigh the costs in the medium to long term.

There are many specific measures which can be used to rehabilitate and maintain riparian land. The key measures are:

- retention of riparian vegetation;
- stock management; and
- revegetation of degraded riparian areas.

(Riparian Management 1 - Managing Riparian Land. Land and Water Resources Research and Development Corporation (LWRRDC) 1998).

7.0 Protection and Management Strategies

7.1 Incentives

Although Council is not under any legal obligation, they do have the discretionary power to offer a variety of incentives that encourage the conservation of biodiversity and remnant vegetation within the Shire as a component of their activities and programs. This would include the protection, enhancement and maintenance of vegetation and wildlife corridors within the Shire. Table 7.1 summarises the main types of financial incentives and other related mechanisms that Council could implement.

Table 7.1: - Conservation incentives and other mechanisms

Financial incentives

- Rate rebates (including differential rates)
- Grants to individual landholders or groups (including community groups)
- Linked to management agreements under local planning schemes

Property right mechanisms

- Management agreements (e.g. voluntary conservation agreements and covenants)
- Revolving funds (acquisition of land)

Revenue raising mechanisms

- Environmental contributions and levies (may be used to fund a local incentive scheme)

Non-financial motivational incentives

- Local award scheme
- Training for property management or whole farm planning

Planning or development incentives

- Tradable or transferable development rights

(Sourced from “Incentives for Sustainable Land Management: - Community cost sharing to conserve biodiversity on private lands. A guide for local government.” Interim Report January 2000 Paul Bateson)

Motivational incentives encourage people to share information and contribute to the conservation of biodiversity. The more motivated people are, the less the need for expensive enforcement and monitoring activities. This means that motivational incentives are a core mechanism for biodiversity conservation, both at a shire and regional level. Prizes and awards can play a role in raising community awareness of biodiversity issues. Their main benefit is the free publicity that accompanies them which, in turn, motivates others to conserve biodiversity. (Reimbursing the Future 1996 Young, Howard et al)

Voluntary incentives are those for which the local governments contribution is only part of the total, and people are free to choose whether or not they should participate. Voluntary incentives are perceived as non-interventionist and regarded as equitable within the community. There are opportunities to use such incentives in circumstances where applicants have a genuine interest in protecting biodiversity and little interest in obtaining financial concessions for themselves. (Reimbursing the Future 1996 Young, Howard et al)

Regulation has an important role, because, acting alone, bundles of less interventionist, financially positive and motivational instruments are not sufficient to protect biodiversity in all

circumstances. Regulations provide an essential safety net in a way that other instruments may not, to protect against the recalcitrant few who are not persuaded by other attributes of the mix of incentives. Regulatory incentives provide protection against those who do not respond to other measures, and are particularly important when threats to biodiversity are likely to become irreversible, for example, in the case of land clearance. (Reimbursing the Future 1996 Young, Howard et al)

A review of existing council incentives schemes indicates that perhaps the most effective approach is to combine rate relief with grants to individual landholders, especially when linked to land management agreements (or covenants). The latter are property-right mechanisms and not direct financial incentives, and can be made a key requirement for landholders to participate in a local scheme and receive payment(s).

Under this type of scheme, a landholder may first receive a grant to fence an area of remnant vegetation. The subsequent rate relief would then provide the incentive to maintain the protected remnant over time through weed control, fence repairs and so on. This ongoing type of incentive is likely to be more effective than relying on the threat of enforcement to ensure compliance with an agreement.

Enviros Australia: The Local Government Environment Network
Incentives for Sustainable Land Management: Community cost sharing to conserve biodiversity on private lands - Version 2.0 Interim Report January 2000

Refer to Appendix 7: - Steps for Implementing a Financial Incentives Scheme.

7.1.1 Rate Deferrals/Rebates

Rate Deferrals and Rate Rebates are one type of incentives that Council could adopt to enable designated vegetation corridors and linkages to be protected for long-term survival. As stated by CSIRO, 1998, a rebate on rates may be provided to landholders who have agreed to manage an area of remnant vegetation for conservation. In such a scheme, a discount on rates payable or rebate on the land is given to the participating landholder.

Johnstone Shire Council has developed a policy of Rate Deferrals for Habitat Conservation. The policy is to provide rate deferrals to landholders who actively contribute to the council's Habitat Conservation Strategies by entering into conservation agreements with the council. The policy applies to land in the shire that is included in the Conservation zones of the Johnstone Shire Planning Scheme.

Refer to Appendix 9 for a copy of the Johnstone Shire Council Policy - Rate Deferrals for Habitat Conservation.

Crows Nest Shire Council could adopt rate deferrals within the areas of corridors and linkages in accordance with their significance. A possible method for the calculation of rate deferrals is shown in the table below.

Table 7.2: - Possible level of rate rebates for wildlife corridors

Habitat Classification	% Deferral on eligible component of general rate
Critical Corridor	60
Critical Linkage	60
Important Corridor	50
Important Linkage	50
Potential Corridor	40
Potential Linkage	40

Private landholders with properties within vegetation corridors and linkages could be compensated by a reduction in rates payable to council. The landholder would be responsible for managing their section of the corridor. Financial and physical assistance may be available through a variety of sources. Assistance for funding fencing, revegetation and other conservation-based activities can be sought from the Natural Heritage Trust subject to conditions, or Greening Australia and local Landcare groups via a devolved grant program.

Logan City Council (Queensland) has identified areas of environmental significance requiring conservation. Purchase of these lands is not feasible, so council has introduced a residential conservation zone into its planning scheme. Rate rebates of between 25% and 50% have been offered as an incentive for private landholders to rezone their property to the residential conservation zone, and thereby meeting broader conservation objectives (CSIRO, 1998).

Melton Shire Council located on the urban fringe of Melbourne, Victoria has developed an innovative approach to environmental management by linking Landcare to the Council's rating system, providing a direct monetary reward for those who undertake environmental enhancement works.

The types of works undertaken must comply with the requirements of Council's Environmental Enhancement Policy, in order to qualify for a rebate on rates under Section 169 of the *Local Government Act 1989*. The Policy has been developed specifically to target land degradation and priority must be given to the control of noxious weeds (such as serrated tussock), pest animals (rabbits) and soil erosion.

After two years of implementation of the Policy, the level of compliance has reached 98 per cent, with those landowners having carried out sufficient works to retain their rebate. The initial success of the Policy is seen in the increased awareness among landowners of the need to control noxious weeds and pests and how to achieve this. This demonstrates the effectiveness of the Policy as a tool for the education of landowners.

Cooloola Shire Council introduced the first rate rebate scheme in Queensland that aimed to encourage the conservation of high value vegetation and wildlife habitat on private land within the Shire. A Council Environmental audit and community consultation revealed that providing assistance for the conservation of significant natural resources on private holdings, was a high priority action that could be taken to address problems of land degradation and loss of natural resources. The rates rebate scheme is subsidised by the environment levy and acknowledges the broader community benefits associated with natural area conservation.

As part of its Conservation Strategy, Cooloola Shire Council promoted the conservation of vegetation on private property by way of incentives, rather than restrictive controls. A key plank in this program is the offering of rate rebates to people wishing to enter into conservation agreements covering their properties. General requirements for attracting the rebate include:

- The subject site meets the selection criteria identified for Nature Conservation Areas,
- A Conservation Agreement will be entered into over the property or that part of the property subject to the rates reduction application,
- Rates discount will be provided for at least three years,
- Rates discount that will apply are 50% of the general rate up to a predetermined maximum value.

Ratepayers who believe that they qualify for the granting of a rebate, complete an expression of interest form. Additional information is then sought from landholders who appear to meet the selection criteria. Council is not bound to accept all or any of the applications for rebates and provides the discounts at its discretion.

A technical panel was formed to assess the merits of each application. Each application was scored using a “decision matrix” taking into account vegetation type, ecological linkages, ecosystem status, wildlife habitat, catchment management and scenic qualities.

It should be noted that incentive schemes based on local government rates may only be successful in areas where land valuations/rates are higher. In rangelands and areas used for broad scale farming, rates payable on areas of conservation value within the property may only represent a small proportion of outgoings for the landholder (Slee, 1998).

7.1.2 Grants

Assistance could be provided to landholders for vegetation and stream management activities that are in accordance with regional plans. This could include, for example, grants for large-

scale revegetation activities, for fencing to exclude stock from remnant vegetation areas and from streams, or for revegetation of stream banks and weed management. The grants could be made conditional on recipients placing remnant vegetation under a conservation covenant. (Managing Natural Resources in Rural Australia for a Sustainable Future. Agriculture, Fisheries and Forestry – Australia. 1999)

7.2 Voluntary Conservation Agreements

Voluntary Conservation Agreements (VCAs) are now used widely throughout South-East Queensland. A VCA is a formal agreement between a landholder and another body, typically a Council, in which the landholder agrees to set aside all or part of their property as a protected area for conservation. The landholder enters the agreement voluntarily -it is not compulsory or forced upon them. Councils typically provide assistance to landholders who enter into a VCA. For example, Brisbane City Council provides direct financial assistance of up to \$1,500 per year to VCA landholders. Other Councils provide assistance through rate rebates.

The Queensland Government also has a type of VCA. Called the Nature Refuge Agreement (NRA), it has the disadvantage of not including guaranteed assistance for the landholder. It does however, have the advantage of being able to be fixed on the property title. This means that the conservation area is protected in perpetuity, even if the property is sold to other landholders. Many landholders like this feature, because it ensures that future owners must continue to protect the conservation values of the property. Council VCAs are becoming the preferred agreement to the Queensland Government Nature Refuge Agreements. This is because VCAs are more flexible, the VCA process is locally owned, and Councils have been more proactive in promoting and using VCAs. Recent changes to legislation allow for the registration of covenants against the title. (Gatton Shire Biodiversity Strategy. Boyes 2000)

A voluntary conservation agreement may be linked with incentives such as; ongoing rate rebates, initial cash payment and provision of materials (eg. fencing, chemicals, spray equipment) to assist in management works. The Gold Coast City Council has adopted this type of agreement and requires the landholder to give a security of intent. This enables the landholder to be part of the protection and continued survival of the Shire's vegetation and native fauna whilst feeling that they are able to contribute to the project (Gold Coast City Council, 1997).

Voluntary Conservation agreements have been developed and implemented by a number of Queensland local governments including;

- Brisbane City
- Johnstone Shire
- Logan City
- Cairns City

The Johnstone Shire Council has adopted a policy that provides incentives for habitat protection. This policy applies to land included within the Conservation and Rural Conservation zones and within the Rural Residential and Residential Conservation Precincts. To be eligible, a landholder within one of these areas must have entered into an agreement with

the council to protect habitat values on a property. If there is a breach of the agreement by the landowner or successors in title, all related rebates will become a charge against the land and be refundable to the council with interest charged at current commercial rates. Brisbane City Council's Voluntary Conservation Agreement Program enables landholders to maintain remnant vegetation with council assistance. The agreement can have a duration of up to 99 years. A landowner can participate in the scheme if:

- the property has high conservation significance;
- the land has strategic function (i.e. position in the landscape);
- there is likely to be leadership/promotional value for improved environmental management in the local community.

A copy of Johnstone Shire Councils Policy - Rate Deferrals for Habitat Conservation is presented in Appendix 9.

Voluntary conservation agreements will be introduced in Crows Nest Shire by the new Natural Heritage Trust funded project "Holistic Natural Resource Management in the Crows Nest Shire". The voluntary conservation agreements and any associated funding assistance should target the highest conservation priority areas.

7.2.1 Property-Right Conservation Agreements

Whilst VCAs have been very successful in achieving cooperative conservation outcomes on private lands in places like Brisbane, they are not yet in widespread use in rural areas like Crows Nest Shire.

VCAs in their current form have been designed for use in urban or rural residential settings. Financial assistance and rate rebates are significant incentives for urban and rural residential landholders, and would encourage many landholders to sign a VCA. However, unlike most urban and rural residential landholders, broad acre landholders in Crows Nest Shire need to derive an income from their properties. Conservation policies to date have largely ignored the livelihood needs of rural landholders. Many landholders have opposed these policies, not because they are opposed to the conservation of the natural values on their properties, but because they see conservation as a threat to their survival. (Gatton Shire Biodiversity Strategy, Boyes 2000)

"Property-Right Conservation Agreements" secures *both* the land- use rights of the landholder *and* the conservation of biodiversity values. This approach is endorsed by the Australian and new Zealand Environment and Conservation Council's, "*Draft National Framework for the Management and Monitoring of Australia's Native Vegetation (1999)*" which states;

"Property right measures can be used to clarify rights, entitlements and obligations, such as in the case of a conservation covenant. They will be most effectively used where site specific arrangements for the management of native vegetation are required."

Property-Right Conservation Agreements (PRCAs) could be used in Crows Nest Shire to secure the conservation of biodiversity values and the rights of landholders to carry out a range of activities including:

- Grazing.
- Timber production
- Agriculture.
- Eco-tourism

PRCAs could be offered for a range of different durations. Conservation agreements can either be "fixed-term" or "in-perpetuity". Fixed term agreements operate for a defined period, for example 1 or 5 years. In-perpetuity agreements are registered permanently on the property title, making the agreement binding on the current and all future landholders.

For some landholders, fixed-term agreements can be more attractive than in-perpetuity agreements. Some landholders are understandably uncomfortable with the idea of an agreement that lasts forever, particularly landholders who have had bad experiences with government in the past. As a result, fixed-term agreements can often achieve higher levels of landholder participation.

To ensure that the property-right land use secured through a PRCA is carried out sustainably, there could be a requirement for the land use to be carried out in accordance with a recognised code of practice. Codes of practice have been developed for sustainable native forest timber productions and sustainable agriculture, and there is an accreditation program for ecotourism. Compliance with a relevant code of practice/accreditation program could be a mandatory prerequisite for entry into a PRCA. Alternatively, a higher level of incentives could be offered for PRCAs where there is compliance with a code of practice. (Boyes 2000)

7.2.2 Land For Wildlife

Land for Wildlife is a simple, non-coercive, flexible program that is designed to recognise and support landowners who wish to manage some or all of their land for nature conservation. It aims to establish an ethic amongst private landholders of conserving nature on private land. The strength of the program is in its simplicity .It provides recognition, information, education and contact between people with common interests. Additionally it provides an opportunity to gather and record data on wildlife and habitat distribution.

Land for Wildlife is new to Queensland but has been operating very successfully in Victoria since the early 1980's where more than 4 000 properties covering around 470 000 hectares are currently registered.

Key features of the Land for Wildlife program are:

- The program will complement the range of other conservation initiatives on private land currently employed by State and Local Governments and non government organizations (e.g. Greening Australia and the World Wide Fund For Nature);

- The program is voluntary and landholders are not committed to any legally binding agreement;
- Any landholder with a reasonable area of native vegetation serving as wildlife habitat can apply for registration (though properties would normally be larger than a suburban block);
- The program aims to show landholders how farming or other land uses can be compatible with nature conservation;
- Landholders are provided with free information and advice on the species present on their properties and management issues such as weeds, fire and revegetation; and
- Landholders will be offered a free sign to promote *Land for Wildlife* and show their commitment to nature conservation.

Given the high levels of biodiversity in Crows Nest Shire and the fact that large areas of remnant native vegetation are managed by private landholders, *Land for Wildlife* can make a very significant contribution to nature conservation as well as providing an interesting and rewarding experience for landholders who participate. It is the most effective means of introducing landholders to a conservation scheme and in time can progress to more detailed and binding agreements.

7.2.3 Covenants Registrable on Title

There have been recent changes to state legislation that enable local governments to register covenants on property titles. The *Natural Resources and Other Legislation Amendment Act 2000* commenced on 9 March 2000. Among other things, this Act expands the relevant sections of the *Land Act 1994* and the *Land Title Act 1994* that deal with covenants. The purposes for covenants capable of registration under the *Land Act 1994* and the *Land Title Act 1994* have been expanded to allow the State, statutory body representing the State or a local government to enter into registrable covenants that:

- are about the use of land, a building, or a proposed building; or
- relate to the conservation of a physical or natural feature of the land, including soil water plants or animals; or
- ensure environmental and/or conservational land use.

Registrable covenants are an option that Crows Nest Shire Council could further investigate in order to fill the gap between the *Land For Wildlife* program and Nature Refuges agreements. Refer to Appendix 10 for further Title Covenant details.

7.2.4 Nature Refuges

The *Nature Conservation Act 1992* provides property owners with the means to commit themselves formally to protecting the conservation values of their land as an integral part of managing their property. Property owners have the opportunity to have part, or all their property declared a nature refuge by entering into a conservation agreement.

A conservation agreement is a contract between the property owners and the Minister for Environment and Heritage on behalf of the State of Queensland. This agreement provides for the management of a specified area of land to conserve its significant natural resources whilst

allowing for ongoing productive use by the landholder. In particular, the agreement outlines those activities that can occur on the nature refuge. Each agreement is tailored to suit the management needs of the individual area and landholder.

Ownership of, and management responsibility for, the nature refuge remain with the landholder, although the Queensland Parks and Wildlife Service may provide certain assistance with management activities such as fire management or the control of pest plants and animals. Most agreements are perpetual and bind successive owners of the land. A perpetual agreement is the best means for property owners to ensure that the protection and restoration work put into an area will not be wasted when a new owner takes over.

The intention of a nature refuge is to provide long-term protection of the land's significant natural values whilst allowing for the ecologically sustainable use of its natural resources. A detailed evaluation of the land is performed in order to establish the existence of significant conservation values that are worthy of protection through the declaration of a nature refuge prior to proceeding with the negotiation of a conservation agreement.

Such values may include endangered or poorly conserved habitats or vegetation types, rare or threatened plant or animal species, a high diversity of plant or animal species, or areas that act as drought refuges or movement corridors for native animals or buffer zones for adjacent natural areas.

7.3 Regulatory Measures

7.3.1 Vegetation Management Act 1999

The Vegetation Management Act was introduced to manage vegetation contained on freehold land. Once enacted, the legislation will restrict the clearing of threatened ecosystems and other high nature conservation value areas. The purposes of this Act are to regulate the clearing of vegetation on freehold land to: -

- (a) preserve the following:
 - (i) remnant endangered regional ecosystems;
 - (ii) remnant of concern regional ecosystems;
 - (iii) vegetation in areas of high nature conservation value; and
 - (iv) areas vulnerable to land degradation; and
- (b) ensure that the clearing does not cause land degradation; and
- (c) maintain or increase biodiversity; and
- (d) maintain ecological processes; and
- (e) allow for ecologically sustainable land use.

The purposes of the act are achieved mainly by providing for: -

- (a) codes for the *Integrated Planning Act 1997* relating to the clearing of vegetation that are applicable codes for the assessment of development applications under IDAS; and
- (b) the enforcement of vegetation clearing provisions.

7.3.2 Vegetation Management Local Laws

The *Local Government Act 1993* provides the basis for the powers granted to local governments. Local governments have the power to pass local laws enforcing or enacting vegetation conservation either directly or in relation to existing State legislation. Local government can apply conditions on the development of subdivisions and/or tree clearing on rural lands to protect native vegetation. The purpose of planning controls for conservation purposes is to preserve the environmental values of existing native flora and fauna. The conservation of these environmental values is an essential precondition when Council considering any form of development.

Development approvals conducted in a planned manner are more likely lead to quality planning outcomes that, over time, result in the effective conservation of native vegetation with reference to broader regional objectives. Development approvals given on an ad hoc basis are unlikely to result in quality planning outcomes. One way of addressing the problem of inconsistency is to introduce a ‘no net loss’ of native vegetation rule. This rule requires that where native vegetation is to be cleared for development, other areas are managed for conservation or revegetated to offset impacts of the development. This then leads to a net benefit or gain for the environment. Gold Coast City Council offers an offset scheme to developers by allowing increased development densities in return for setting aside land as public space within the development proposal.

7.3.3 Planning Schemes

Corridors can be incorporated into the town plan, in the same way that areas are zoned for future urban or industry development. Areas of significant conservation value can be identified and set aside for conservation purposes.

Redland Shire introduced a minimum rural subdivision size (range from 8-10ha), clearing and subdivision restrictions to secure valuable vegetation assets. Some of the restrictions involve residences being located within a clearly defined and predetermined building envelope, fencing off portions of the property containing significant vegetation and retaining remnant vegetation. The advantage of this type of zoning is that it retains large, linked strips or pockets of bushland that are valuable for habitat. Large subdivision size (8 to 10 hectares) ensures large patches of bushland are protected (Greening Australia, 1995) from fragmentation.

Brisbane City Council has introduced an urban conservation zone and put in place Vegetation Protection Orders for sites of high conservation value within the city. Landholders who voluntarily place their land within the conservation zone via a Voluntary Conservation Agreement are eligible for a grant of up to \$1500, which is set in proportion to the value of their property. Prior to developing land covered by a Vegetation Protection Order, a development application must be lodged and consent given by the council.

7.3.3.1 Integrated Planning Act 1997

The Integrated Planning Act 1997 (all local governments are required to prepare their strategic plans to conform to the requirements of this Act) lays out a framework to integrate planning and development assessment so that development and its effects are managed in a way that is ecologically sustainable, and for related purposes

The purpose of this Act is to seek to achieve ecological sustainability by:

- (a) coordinating and integrating planning at the local, regional and State levels; and
- (b) managing the process by which development occurs; and
- (c) managing the effects of development on the environment (including managing the use of premises).

Warwick Shire Council produced one of the first planning schemes in the region based on the Integrated Planning Act (IPA). The Warwick Shire Planning Scheme, Section 3.2.1 Health of Ecological Systems states:

“In order to protect and manage areas of environmental significance, Council may utilize any of the following techniques:

- *land acquisition through a rates levy, trust funds, donations or loans secured against future income;*
- *conservation agreements with private landholders, or*
- *use of vegetation protection orders to protect areas of particular habitat type and stands of trees of importance.”*

(Warwick Shire Planning Scheme 1999)

The Brisbane City Plan 2000 Planning Scheme addresses a range of issues, including biodiversity which has attached to it, codes and related provisions along with performance criteria and acceptable solutions. The purpose of the biodiversity code is to:

- ensure that the ecological features and processes that underpin the biological, social, cultural and economic well being of the City are protected and managed to ensure their long term viability.

Table 7.3 below presents a portion of the performance criteria and acceptable solutions contained in the Brisbane City Plan 2000 Biodiversity Code.

Table 7.3: - Performance criteria and Acceptable Solutions

Performance Criteria	Acceptable Solutions
General	
A2 Ecological corridors within or adjacent to the site are identified and retained to create, maintain and/or improve connectivity between habitat areas and to allow wildlife movement between habitat areas	A2 The design and management of ecological corridors is consistent with the principles as contained within the <i>Brisbane City Council Ecological Assessment Guidelines</i> 1999
A4.1 The management of fire maintains and/ or enhances biodiversity	A4.1 Where appropriate, a Fire Management Plan, demonstrating the protection of biodiversity, is provided. The Plan is consistent with the principles as contained within the <i>Brisbane City Council Fire Management Guidelines and Ecological Assessment Guidelines</i> 1999
A4.1 Significant biodiversity areas are given the highest levels of legal protection	A4.1 Areas supporting significant ecological features and/ or processes are transferred to community ownership or control, e.g. Council or community group trusteeship OR A4.3 Areas supporting significant ecological features and/or processes are protected under a Voluntary Conservation Agreement, Land for Wildlife Agreement or other agreement OR A4.3 Areas supporting significant ecological features and/ or processes are included in a Green Space Area

Brisbane City Plan 2000

The new Gatton Shire Council Draft Planning Scheme also includes a Biodiversity Code, which is linked to a Biodiversity Policy. The Biodiversity Policy is in turn linked to a Recovery Plan for Threatened Species and Ecosystems. This offers the advantage of ensuring

that the Biodiversity Code and Biodiversity Policy are part of, and informed by, a larger overall conservation program.

The Integrated Planning Act 1999 provides the opportunity for Crows Nest Shire Council to integrate the protection of the Shire's environmental values with economic and social development, ensuring that the ecological sustainability of the Shire is maintained for the present and future.

7.3.3.2 Compatible adjacent land uses

Adjacent land uses can significantly impact on the effectiveness of conservation corridors. Such uses should be compatible with the functions of a particular corridor. Appropriate measures that need to be considered on adjoining lands could include; providing buffers next to corridors, restricting domestic animal access and fire and weed management.

A number of land uses are compatible with corridor retention and nature conservation. In urban and semi rural areas, public parkland and open space systems can be incorporated with corridors, so that the side bordering the corridor is more vegetated than the remainder. The more open areas of these reserves being utilised for traditional recreational purposes. Public lands in rural areas, including camping and water reserves and stock routes, which were set aside for the movement of stock prior to the advent of road and rail transport, can provide a valuable adjunct to the corridor. Often, stock routes form valuable corridors across the landscape. Many people are moving to rural areas for lifestyle reasons. These people are often willing to retain remnant vegetation on their properties or to revegetate additional areas so as to provide habitat for wildlife. Land uses that allow, for example, limited grazing of conserved areas may also be compatible with the needs of particular wildlife.

7.3.4 Environmental Rates Contribution

Environmental levies have been used in a number of jurisdictions to raise funds for environmental programs. They typically have been a flat rate charge of \$15-\$40 per ratepayer. Funds from a levy may be used to purchase land, enter into management agreements with landholders or provide grants to individuals and community groups to undertake on-ground conservation works.

Redland Shire Council has implemented an Environmental Charge to purchase bushland that could not be protected by Tree Protection by-laws applying to private land. The charge was 6% or \$15/rate assessment in the shire. Funds generated by the Environmental Charge go towards preventing illegal access, dumping of rubbish, repairing tracks, increasing public accessibility to some areas, revegetation and supporting the Shire's Community Bushcare Groups. A survey of Redland Shire residents found that 98% of respondents wanted to see bushland managed.

Cooloola Shire Council has introduced an environmental levy of \$10 per rateable property per annum to finance their conservation strategy. This levy has funded a number of conservation initiatives and proven to be very successful in attracting additional funding through the

National Landcare Program, Save the Bush Scheme and the Coastcare program (Cooloola Shire, 1996).

Crows Nest Shire has approximately 4400 landholders and introducing an Environmental Contribution of \$25 per landholder has the potential to raise in excess of \$100,000 per year for environmental and conservation works.

Refer to Appendix 5 for list of shires that have implemented environmental levies to ratepayers in the shire.

7.4 Motivation and Educational Measures

7.4.1 Adopt-a-Corridor

Local residents and landholders within the shire can be encouraged to manage and retain native vegetation regardless of whether or not it is in a designated corridor. Creating an environment that encourages people to take an active role in vegetation management enables them to take ownership of, or responsibility for these areas. This enables people taking on this role to feel that their actions can make a difference. The resultant outcome is the enhancement, enrichment, protection and continued survival of the Shire's remnant vegetation corridors.

Corridors are an effective way to make revegetation popular as they are clearly visible, can provide a sense of community pride and achievement is reasonably quick (Greening Australia, 1995). Through the designation of the corridor network devised for Crows Nest Shire, local residents and landholders have the opportunity to contribute to the success of this conservation plan through the actual development and enhancement of the existing corridor network. Local residents could assist the council or landholders by giving their time and labour or becoming part of a local Bushcare or Landcare group that assists in the regeneration, protection and development of linkages and corridors. Activities could include weed control, fencing of remnants, collection of seed and propagation and planting of native species.

Local schools could encourage their students to adopt a corridor or linkage near their schools. This would provide students with the awareness and skills to maintain and enhance endemic vegetation leading to the conservation of habitat for fauna species.

An example of this stewardship is the Downfall Creek Reserve in Brisbane that has broad support from the community surrounding the reserve. Brisbane City Council, Greening Australia and the local community have worked together to protect and rehabilitate an area of native vegetation in suburban Brisbane. Under a contract with Brisbane City Council, Greening Australia staff devised a range of programs to inform and involve the community in passive recreation, bushland care and the active regeneration of the reserves flora and fauna. A result has been the expansion of the reserve through purchases of additional land and an informed, aware community who have developed a sense of ownership of the reserve.

The adopt-a-corridor concept could be extended to other natural resource management issues in Crows Nest Shire.

7.4.2 Education programs

Education programs are critical for the achievement of long-term remnant vegetation conservation outcomes. Landholders need to be assisted to:

- identify the values of the remnant vegetation they own or manage (e.g. whether their remnant vegetation has threatened species or ecosystems present, whether it is part of a corridor or linkage etc.);
- identify the threats to their remnant vegetation (e.g. weed invasion, inappropriate fire regimes etc.); and
- understand the protection and management strategies that they can implement (e.g. incentives, conservation agreements, weed control programs etc.)

A range of remnant vegetation education programs could be implemented in Crows Nest Shire including workshops, field days, conferences, newsletters, information booklets/brochures, media articles, interpretive trails through bushland areas and website information. The cost of participating in educational programs should be kept as low as possible because high costs (e.g. expensive workshop registration fees, expensive information booklets etc.) can be a disincentive to landholder and land manager participation.

7.4.3 Awards schemes

Awards schemes can recognise the good efforts of ‘champion’ landholders and are a good way of encouraging nature conservation action. An annual environmental awards competition could be conducted in Crows Nest Shire, with a range of different award categories such as a private landholder award, school award and community group award.

7.5 Managing public land

Local Governments are significant managers of public lands and as such, are in a position to demonstrate leadership to their local community in the sustainable management of corridors and remnant vegetation. Greening Australia estimates that there are 15-20 million hectares of land in various forms of reserve that are directly under local government control. These include local roads, parks, stock routes and pasture protection areas (Greening Australia, 1995) all of which need to be managed to protect, maintain and enhance their conservation values. Existing crown land reserves of significance should have appropriate mechanisms in place to maintain their conservation values. These mechanisms could include restrictions on grazing and the implementation of a fire regime that reflects the management requirements of the particular vegetation types/communities. Technical advice may be obtained from government agencies and non-government organisations including The Environmental Protection Agency, Department of Natural Resources and Mines, Greening Australia and Landcare.

7.6 Fire Management

Fire management is an important issue with respect to the maintenance of ecological processes, biological diversity and integrity of native plant and animal communities. Native plant

communities may require their complete protection or varying degrees of exposure to fire in order to maintain species diversity and vigour.

Plant communities may benefit from a controlled fire regime. Species diversity can be enhanced in relatively "fire tolerant" communities where a mosaic or patchwork of burns provides a variety of environmental conditions and successional stages. Such a pattern can benefit wildlife and impede the progress of hot wildfires.

The preparation of property Fire Management Plans are highly desirable and would:

- identify property and conservation values,
- detail proposed prescribed burns and their frequency,
- map location, identify seasonal timing and estimate the duration of a burn, and
- detail equipment and manpower requirements.

The plans need to take account of the ecological requirements of the various plant communities including the need for the exclusion of fire from fire sensitive vegetation communities. The objectives of a fire management plan are to promote ecological diversity of communities that are fire adapted, to lower fuel loads and to reduce the incidence and intensity of wildfires.

See Appendix 6 "Landholders Bushfire Management Planning Kit for Private Property."

Communication with landowners and rural fire brigade officers is of vital importance in developing fire management strategies. It is important therefore, to develop and maintain effective communication with these groups. Fire access routes and firebreaks within the Crows Nest Shire should be identified and displayed in a map format and be maintained on Councils GIS. Fire management planning should occur in an integrated manner across the whole landscape, encompassing all land tenures including private property, roadsides, National Parks, State Forests and other public land reserves.

Table 6.1: - Management intent for ecological burning of some identified plant communities within the Crows Nest Shire.

Plant Community	Fire management objectives and measures
Rainforest and softwood scrub communities	Total exclusion of Fire to maintain diversity and current extent of these communities.
Eucalypt forest - <i>E. eugenoides</i> (Stringybarks)	Low to medium intensity fires to maintain health of the community; encourage recruitment of trees and maintain grassy and shrub ground layer.
Eucalypt woodlands - <i>E. tereticornis</i> & <i>E. crebra</i> (Qld Blue Gum and Narrow Leaved Ironbark)	Mosaic burning pattern through rotational cool burning approximately every four years to ensure open forest structure and encourage recruitment of trees.
Transitional vegetation communities	Cool burns on an irregular basis - every three to five years to maintain edge dynamics and mix of existing species.

To promote ecological diversity, fire management practices should aim to create a diverse mosaic of plant communities in all stages of regeneration whilst protecting plant communities that are fire sensitive.

The fire requirements of most plant communities and wildlife living within them are not yet fully understood. Close liaison with the Department of Primary Industries, the Environmental Protection Agency, the Queensland Parks and Wildlife Service and other organisations is encouraged so that appropriate fire regimes for plant communities found within the shire can be determined. Appendix 8: - Recommended Fire Management Strategies for Land Uses and Institutions provides some general guidelines for land use, the objectives of fire management and strategies or actions that could be undertaken.

7.7 Grazing Management

Livestock grazing within a remnant can pose a threat to the survival and regeneration of native fauna and flora. Unlike natural levels of grazing by marsupials, commercial grazing by stock can result in abnormally high levels of defoliation and litter removal. The intrusion of stock into areas of native vegetation from surrounding land will often lead to the depletion, if not the almost total removal of understorey vegetation. Much of the damage to native vegetation caused by grazing has been because of one factor alone - *the grazing of native vegetation has not allowed the regeneration of many species of native plants*. Over time, this eliminates these species completely. Some areas of native vegetation that have been subject to grazing have retained much of their original diversity of native plant and animal species. This demonstrates that it is possible for grazing to be part of the sustainable management of native vegetation; but, for this to happen, it is important that grazing is carefully managed. Careful grazing management means choosing and implementing an appropriate grazing regime to ensure the maintenance of native and pasture species. Grazing regimes can vary according to:

- Timing - the time of year during which grazing occurs will affect the growth of plants. For example, grazing whilst native plants are flowering and setting seed may damage the vegetation more than grazing at other times when plants are growing vegetatively.
- Duration - the length of time that stock is left in one area.
- Stocking rate - increasing the stocking rate increases the amount of biomass removed.
- Recovery period - the length of time that an area is spelled between grazing.
- Stock type - the type of animal and their nature of grazing has an impact. For instance, sheep graze lower to the ground than cattle and thus sheep have a greater potential to deplete groundcover.

A grazing regime needs to be implemented that allows native vegetation to quickly recover from a grazing event. Just as different land types have their own capability for agricultural production, different vegetation types have their own tolerance for grazing. A sustainable grazing regime will be one that maintains a diversity of plant species and the structure of the vegetation community. The emphasis must be on carefully controlling and managing grazing pressure, not necessarily totally excluding grazing. Where areas of native vegetation have been extensively modified or degraded, the total exclusion of livestock may be the most effective action that can be undertaken in order to allow for the regeneration of native plant species and

the continued or enhanced viability of vegetation corridors. Following are some suggested guidelines for grazing management.

1. Avoid set or heavy stocking for long periods of time.
2. Graze during times when plants are not flowering or setting seed.
3. Remove stock during regeneration events. For example when rainfall, temperature and seed fall coincide to provide favourable conditions for regeneration to occur.
4. Plan for drought.
5. Monitor the impact of grazing on species composition and condition of native vegetation.

(VegNotes Series 2. Managing Native Vegetation NSW Department of Land and Water Conservation 1998).

Grazing management programs need to include the management of roadside vegetation and riparian corridor vegetation.

7.8 Weed Management

Effective weed management requires a coordinated joint effort by all landholders and land managers in the shire. An education program needs to be developed and implemented that increases awareness about existing and potential weed species that could threaten farming viability and remnant vegetation of Crows Nest Shire. This program needs to cover identification, biology and control of weed species.

The responsibility for this education program rests with community groups (eg: Emu Creek Landcare Group and Ravensbourne & District Landcare Group) and State and Local Governments (eg: Department of Natural Resources and Crows Nest Shire Council).

External funding could be sought for this program from the Natural Heritage Trust for the purchase of materials and education and awareness. Labour could be obtained from a variety of sources, for example, Green Corp, Work for the Dole, Prison work crews and trainees.

7.9 Feral and Domestic Animal Control

Crows Nest Shire has a number of feral animals, including dogs, foxes, cats and cane toads, all of which have the potential to impact upon native fauna. A proactive control program needs to be implemented to achieve the maximum benefit for the vegetation corridors to act as habitat for faunal species. Corridors typically concentrate fauna making them vulnerable to predation by feral animals. It is therefore important that feral animals are controlled in these areas so that threats to the continued survival of local native plant and animal species are reduced. Complete eradication of feral animals is unlikely to occur in Crows Nest Shire, the best alternative being effective detection and the implementation of a co-ordinated control program to minimise numbers in sensitive areas. Cooperation between landholders and Council is critical for the success of this program.

Landholders in or within the vicinity of vegetation corridors need to be encouraged to control the movements of their domestic pets, particularly cats and dogs into wildlife habitat areas. Domestic cats and dogs can do irreparable damage to our wildlife populations, not only killing fauna, but the scent of these animals faeces can be enough to deter some native animal species from using the corridor as a passage area. An education program or stricter rules and/or by-laws should be implemented within the Council's town plan to eliminate dogs and cats straying into these areas. Measures need to be put into place to minimise the effects of feral animals on the ecosystem.

7.10 Other strategies

“Revolving funds” purchase environmentally significant properties on the open market, establish binding conservation covenants on the properties, and then re-sell the properties. Revolving funds have been recommended as a Local Government conservation mechanism (as shown in Table 7.1).

Crows Nest Shire Council does not have a large enough financial base to operate a revolving fund successfully. However, a revolving fund is being considered at a State level as a component of the proposed Queensland Land Trust.

8.0 Recommendations

- i) That the Remnant Vegetation Corridor Management Strategy be put out for public comment by the community of Crows Nest Shire.
- ii) That the Remnant Vegetation Corridor Management Strategy be incorporated into the Crows Nest Town Planning Scheme as it is prepared to conform with the Integrated Planning Act 1997.
- iii) That policies be developed to protect, maintain and enhance the nature conservation values of Crows Nest Shire, which includes the vegetation and wildlife corridors identified in this report. (See Appendix 11 for examples of goals and objectives that could be developed for Crows Nest Shire)
- iv) That Crows Nest Shire Council actively seek to maintain and enhance the corridors contained within council controlled lands by;
 - Developing codes of practice,
 - Adopting conservation programs to control declared and environmental weeds, and
 - Educating the community of the value of maintaining corridors on publicly owned land.

- v) That Crows Nest Shire Council support and encourage landholders entering into Voluntary Conservation Agreements (e.g. Land for Wildlife, Nature Refuges, etc) to protect conservation values on freehold land.
- vi) That Crows Nest Shire Council implement a program of Voluntary Conservation Agreements that are capable of being registered as covenants on the property title, and which compliment existing programs (e.g. Land for Wildlife and Nature Refuges) and offers incentives through funding, grants, rate relief, etc.
- vii) That Crows Nest Shire Council develop and implement a program that includes, but is not limited to;
 - Identifying and rewarding “champions” within the community of Crows Nest Shire who have managed their properties taking into account the conservation values of them,
 - Providing funding for on ground works to protect and maintain nature conservation values across all land tenures,
 - Providing financial incentives (e.g. differential rates, rate rebates or rate deferrals) to assist landholders manage their properties for their conservation values,
 - Seeking to identify sources of funding to implement conservation works, and
 - Sharing the financial cost of implementing these measures across the community by introducing an environmental contribution.
- vii) That Crows Nest Shire develop a partnership with community groups within the Shire (e.g. Landcare groups, Friends of the Park and Greening Australia) to assist in the education of the community of the value and benefit of retaining and managing remnant vegetation which includes corridors on private property.

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Appendix 1: - Remnant Vegetation Condition - Crows Nest Shire

Appendix 2: - Vegetation Corridors of Crows Nest Shire

Appendix 3: - Landholder Survey and Responses

CROWS NEST SHIRE COUNCIL

REMNANT VEGETATION CORRIDOR SURVEY LANDHOLDER RESPONSE

Please answer the following questions. Your thoughts and comments are important to us.

1. Do you believe that existing areas of natural vegetation are important for conservation in our Shire?

Please circle one of the following that you believe best reflects your views.

- 1 Not important
- 2 Important
- 3 Significant
- 4 Critical

Additional comments you would like to make.

.....
.....

2. Would you be prepared to retain and maintain areas with natural vegetation on your property in return for a rate rebate over these areas?

.....
.....
.....
.....

3. What would you consider a reasonable rate rebate to be, in return for retention of natural bushland areas on your property?

.....
.....
.....

4. Would you be prepared to replant or revegetate some areas of your property in order to contribute to a local vegetation corridor scheme? If funding was available, would this influence your response?

.....
.....
.....
.....

5. What ideas do you have that would assist Council in conserving and managing areas of natural vegetation within the Shire (other than the rate rebate scheme)?

.....
.....
.....
.....

Additional comments you would like to make

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.....
.....
.....

Responses from landholders in Crows Nest Shire. Remnant Vegetation Corridor Survey

1. Landholders willingness to retain and maintain areas of natural vegetation on their properties for rate rebates.

“No” 2

“Yes” 28

- “I would like to talk about all the required implications of saying yes”.
- No, for example subdividing and building another house on your block and selling it.
- Would much prefer council help in the lantana and privet.
- Yes, provided that I have the final say on what is allowed to grow on my own property.
- On the approved subdivision (Lot 64 R.P 838426) in rural land, my wife and I have made every effort to retain for the Shire the best timbered section with rock pools that could be dedicated to park and wildlife.
- Yes perhaps this need to be for a specific time, eg 3-5 years until planted area can be safely grazed again.
- The areas on private property could be managed in coordination with public areas, roadsides, parks and contribute to Local Government savings/expenditure.
- Yes, our ambition is to commence a 5 acre regeneration area (i.e. to fence out the cattle) within the next 1 to 2 years. We already have about 3 acres closed off.
- Yes, but I would need help in identifying the local species.
- We have the creek running through our property, and I would like to think it could be preserved - any inducement to people to maintain this and similar areas would have to be a step in the right direction.
- No, because half our property is over grown with trees, hence not much is productive grassland for grazing cattle and if I say yes we would be hindered or even stopped from thinning out some areas if we wanted to there will however always be trees retained in this area.
- Yes, but we doubt that any of our vegetation would qualify as being “significant”.
- Council should not have to provide a rebate on this type project. Rebates decrease the amount of funding that council has available for roads and services.
- I will do this regardless of a rate rebate.
- Yes. We already have a large portion of preserved native forest on our 10 acres but rebate would be appreciated.
- Yes. But more important than money is the right advice in managing natural bush areas - to learn or not, what are weeds that need removing, what do you replace them with. What habitat could be provided/improved on.

2. Considerations of a reasonable rate rebate.

- “What are we trying to do here? This is not the responsibility of freehold landholders. If you want a plantation of native vegetation, plant one on public land.”
- “50%”
- “What is your offer”

- “A percentage that is relevant to land kept natural”
- “Depending on the size of the natural bushland area, and maintaining this area, say 10% rate rebate-6 monthly (for a 5 acre block)”
- “To difficult at this stage”
- “What ever the council deems.”
- “No idea.”
- “Just want natural bushland.”
- “\$200 per year off standing rates as present”
- “No idea, would have to be discussed.”
- “Quite a considerable rebate would be in order because of the low level of services to the area.”
- “100% on fenced off areas managed expressly for nature conservation and 60% on other areas of natural vegetation that are not managed for stock grazing.”
- “Relative to area, but suggest 10% of general rate plus basic amount for water. More the merrier.”
- “Level 1 = open forest 10% and remnant rainforest 25% including fencing out livestock.

Level 2 = active regeneration 30% for natural regrowth, replanting etc.

Level 3 = established regeneration 50%, this level is achieved after perhaps 5 or 7 (maybe 10) years where the landowner is prepared to include the regeneration area in perpetuity (any new landowner to sign contract to continue). ”

- “Perhaps we would need to estimate time spent on maintaining the area, say 1 hour, 2 hour, 5 hours weekly, whatever, and base a rebate on a fair hourly rate.”
- “10%”
- “50%”
- “Nil excess water for watering.”
- “I don’t know. Without comparisons, between areas where this has/is occurring, it’s very difficult to say.”
- “100% ?”
- “Perhaps an increase in the free water usage rate would be helpful to enable the maintenance of the proposed areas, particularly in dry times.”
- “100 % on the area retained. Such areas are for the public benefit. Retaining areas would limit future uses and therefore reduce the value of the total property.”
- “10% water rate reduction / rebate or increase in excess amount.”
- “It probably should be a sliding scale depending upon the percentage coverage of the property.”
- “I suppose it would depend on the quality of bushland and what wildlife it supports. Maybe a sliding scale according to conservation value, combined with the percentage of property retained for bush.”
- “Council could assist property owners with labour and the use of machinery to remove and clear the area of mistletoe in lieu of rebate.”
- “10%”

- A cow productive rate or equivalent per hectare for the zone involved eg if you can carry one beef cow per hectare = \$200. This for the case where an area is denied to grazing or other income producing pursuits.
- It probably should be a sliding scale depending upon the percentage coverage of the property eg. 0-5% of property 2% rebate

5-10% 4% rebate

>10% 6% rebate

- Council could assist property owners with labour and the use of machinery to remove and clear the area of mistletoe in lieu of rebate (our property 1 1/2acres).
- \$25.00
- I suppose it would depend on the quality of bushland and what wildlife it supports. Maybe a sliding scale, according to conservation value, combined with the percentage of property retained for bush, i.e. 30% of property attracts 30% off rates, plus or minus a certain amount according to conservation value and whether or not the land the land is totally excluded or has some grazing etc carried on.

3. Revegetate areas of their properties to contribute to a local vegetation corridor.

- This is unreasonable for a handful of “Greenies” to expect a freehold landholder to fulfil their unrealistic anti progress goals.
- Yes I would, funding would help greatly to offset the time and work involved.
- Need to know answer to Question 2. Funding always speaks.
- Would be prepared to discuss proposal. Location of corridor and costs/rebate would be factors.
- Yes. Yes. But I have only 5 acres, and I want to keep my horses on it, so I would not want to make the property unsuitable for them, nor would I want to be forced to remove trees that I particularly want to keep and like.
- Yes funding would definitely help.
- If our land was used for rural purposes only – yes.
- Yes do it now. The cost of shrubs and trees from nurseries mounts up so the issue of free or subsidised plants is a help.
- Yes, funding would help.
- Yes, provided that local species are used and this varies widely even over small areas here on the range (Grevillea, Melaleucas etc are not suitable regeneration species locally). Funding - Provision of plants, trees understorey species etc would be of assistance to many (Funding would not influence our response).
- Yes - funding would definitely be welcome but it would be my intention to do this even if it was not an offer.
- We already have a good balance of trees all over the property.
- Yes, prepared to replant and am in the process of doing so. Funding would be helpful, but wonder at the level of interference from funding body.
- Yes, we would be prepared to replant. Funding would influence our response but even just supply of plants would help.

- Yes we are prepared to replant. No, we do not require funding as we would like it to be our choice on our land.
- Yes if funding was available it would make it much more possible to do so.
- It certainly would. I'm sure some of the original native species are no longer found on my block.
- We already have replanted about 100 red cedars to replace what was a naturally occurring forest tree on the Cabarlah escarpment area.
- Funding definitely makes the project more attractive. Advice and availability of suitable plants. Its relatively easy to find out about what to plant but finding the right plants is not so easy.

4. Contribution of ideas that can help the council in conserving and managing areas of natural vegetation within the shire.

- This is not necessarily the councils responsibility, it's the state and federal governments area. We have state forests and the like for this purpose.
- I think the council should spray the road verges to kill Lantana etc, that crowds out the natural vegetation.
- None at this time – rate rebate scheme makes good sense.
- Get an overall plan together and enforce it.
- Consult as many people with an interest and knowledge in this field.
- Get rid of lantana – assist us who have a problem with information and possibly financial aid.
- The promise of repair and improvement to roads, eg. New England highway in some parts is in bad need of resurfacing.
- Use prison inmates and other volunteers (there must be many) with someone in charge, this person having “clout” and a simple plan.
- Keeping areas clean so that bushfires do not destroy what we already have.
- It needs lots of public relations, find out what areas you want and approach those people individually with a proposal. And make it clear why you want those areas and what benefits, to wildlife are there.
- Supply of trees native to the area. Someone to give advice.
- Involve volunteers in managing vegetation
 - i) “Friends of reserves” groups
 - ii) “Bushcare” groups – scouts, school, Apex etc. Individuals to take on care weeding etc in particular areas.
 - iii) Assistance with fencing of bushland areas, on weed control or of making equipment and advice available to landowners.
- We feel that all landowners in the Shire should make every effort to eradicate noxious pests and plant that restrict our natural native flora and fauna. Lantana is one of the greatest curses to progress in the natural timbered forests.
- Suggest that operators of heavy machinery eg. Graders, dozers and chainsaw users to minimise the removal of vegetation. It is easy and tempting to become carried away on these jobs.

- Community streetscape plans incorporated into council strategic plans, sense of ownership.
- People love recognition:
 - 1 Council could prepare a list of landholders and publish in the council newsletter/paper with an update each year.
 - 1 Perhaps a council officer could arrange a monthly or quarterly visit to 2 or 3 sites in a local area so that participants and interested locals can share notes.
 - 1 Involve local residents - send a 'flyer' around a local area (with landholders permission) for a planting working bee etc.
- Developers could be required to set aside areas in their developments which would link up with other corridors. Aerial maps to show residents of particular areas where suitable corridors might be established. The identification of areas and establishing of some if possible. To make us aware that if we see such aims as worthwhile/necessary/desirable we must be ready to do our bit - not "leave it to the council".
- We would need a local plant nursery, seedling plots and of course water. I would like to know what species are native to our area.
- Community working bees.
- Genuine attempt to maintain existing areas by council.
- "Adopt - a - Plot" where people may be able to help towards looking after areas - where they are able to assist in their own area. Any well defined areas of bushland, should have a proportion of that area kept for life and not let development occur - so there will always be proportions of scrub land.
- Establish network of landholders and interested people to help promote its value.
- Encouragement for landholder to remove lantana, privet, noxious weeds etc. Maybe council could have a privet eradication scheme similar to Toowoomba City Council. Council to eradicate lantana, privet etc on council owned lands and road verges (Possibly using funding from Work for the Dole).
- Toowoomba city council have a \$25/year bushland levy which has almost full support. If Crows Nest Council was able to produce an inventory of the significant vegetation, identify required corridors and negotiate either acquisition or rate rebate protection/enhancement then I think that a similar levy could work here as well. People will pay for such things if they know how the money will be spent and what will be achieved. This system could even be applied only to residential properties.
- Providing free trees, hand out times should be any time if one is not here on hand out day one does miss out.
- Employment of community service persons in lieu of fines. Provision of drought resistant and fast growing species of flora.
- Maybe some unemployed people would help in clearing up the sides of roads (vines, undergrowth and cactus etc).
- More rigid inspection and assessment of blocks (semi-rural and residential) applied for in proposed subdivisions on the fragile escarpment areas - this would prevent properties with large erosion problems and instability being subjected to extra strain (eg. Overgrazing and extra runoff from new road works etc). Covenants and specific guidelines re: clearing etc to be in place with new subdivisions. Preserve our lovely scenic gum trees on the highway between Toowoomba and Crows Nest.

- Encourage local nurseries or interested local people to grow local plants. Keep the environment an issue. In the council newsletters mention something each issue about environmental issues, what is happening in the shire or what people can do.

5. Additional Comments

- This questionnaire was designed to get a specific set of answers, it is invalid in its approach, It is not a true reflection of what people think! – This questionnaire comes from the position of accepting all in the Crows Nest Shire want to impose freehold landholders some sort of “green” regime. The landholders affected don’t want to lock up their land because of someone else’s ideals!
- Don’t let radicals run the agenda. A conservative educated approach would be more acceptable to all concerned. Land owners should benefit by enhanced value of beautiful areas and this must be the incentive. Don’t use legislation or punitive measures to enforce the corridors. Landowners should keep the corridors because they can see the benefits.
- Perhaps council would provide free chemicals for landowners to spray road verges. It is difficult to remove weeds from properties if seeds are spread from council land (road verges)
- The free native trees with every rates notice is a great idea. It encourages people to plant trees who normally wouldn’t bother.
- Is the scheme just to maintain vegetation or is it also to provide habitat for animals/birds etc. Fencing, watering, protecting of new plants would strongly influence costs.
- Best of Luck. Mankind needs to redress the balance. Increasing volatile/errant weather patterns will remind us constantly – we just need to get rid of our blinkers.
- People are unlikely to do this for rate rebate alone, they need to motivated by understanding the ecological benefits. Sure, anyone would like their rates reduced, but, particularly people who own small blocks of land like my five acres, need to see that their efforts can make a difference to an overall plan. You need to educate your rate payers to stop them destroying natural vegetation which is ecologically important and to help them regrow suitable vegetation. I’m interesting in growing a rainforest area but know if it is suitable.
- It is a great benefit for small birds eg. Wrens, thornbills and small animals to have continuous interlocking corridors. A satellite picture of the shire could show areas which should be targeted to achieve this.
- Projects could be designed for areas of subdivision which form part of natural subcatchments. Eg. Grey Gums Drive forms part of a subcatchment which needs to be managed down to Murphy’s creek to provide a complete wildlife corridor.
- I believe that this conservation project by the council will be advantageous to the shire in the long term. The next step is for council to carry out measures (by laws) to ensure that the money put into the project (ie. The rates rebate money) is not lost when ownership of land changes as development occurs.
- As long time residents of the shire we would like to express our respect and appreciation of this Council’s role in involving and looking to involve ratepayers in decisions about this and other issues. We think you perform a difficult and sometimes (often?) thankless task admirably. Likewise to staff.

- I would welcome council assistance to deep rip and break up the soil prior to planting a conservation corridor. I would be happy to grow native species from seed once I get established with our new house on the land.
- It is really great to see the Council making a determined effort towards this and it is hoped that a successful outcome will see these corridors, and retention of bushland areas in Crows Nest Shire.
- The small area of vine scrub at the top of Frankes Rd Highfields should be preserved and maintained for future generations.
- Besides vegetation in areas which will remain rural I think that greater emphasis needs to be given to protecting areas earmarked for future residential development (this applies mostly to Highfields). If council is proactive and identifies these significant areas then the planning scheme can be adjusted to ensure their protection. That way, the levy scheme above can be used to acquire these areas for the benefit of all of the community without impacting too heavily on developers.
- Have these work for the dole to help council workers do this otherwise the whole of this bush country will be inundated with lantana.
- Eradication of lantana and privet especially along highways and replacement with natives would be a good start.

Conservation is a specialised knowledge area. For those who care about conserving the bush but don't have the knowledge the ideal solution would be to have an experienced person survey the property, advise what to remove, what to leave, what to plant and be able to apply the plants from local seed. Money/funding is definitely an issue and is the first step, but availability of advice and plants is just as important.

Appendix 4: - Tree Clearing Guidelines for the Eastern Darling Downs

Appendix 5: - Local Government Environmental Levies South East Queensland

ENVIRONMENTAL LEVY					
Council	Levy Yes/No	Levy Amount	Use	Policy Basis	Proposed Levy Increase
Brisbane City Council	Yes	30	Bushland acquisition and management Break-up 51% acquisition 49% maintenance Formalise a policy on the split Total \$34m on acquisition. Acquired 1400 ha On-going program	Policy under development	None proposed
Caboolture Shire Council Pauline Fitzgibbon	No		Budgeted to acquire land out of general rate. \$200,000 96/97 presently not known. Policy basis for acquisition (selection criteria)		
Cooloola Shire Council Greg Marta					
Crows Nest Shire Council	No				
Gold Coast City Council	Yes	\$15 2.4 million	Open space preservation levy only used for purchases of land that is environmentally significant	No policy prepared	Included in the nature Conservation Strategy questionnaire 97/98 financial year
Ipswich City Council Robb Sewell	Yes	\$28	1.1 million out of reserve in 96/97 for acquisition. Acquiring properties. Surveying resident consultation on levy is not yet complete	Policy basis is under preparation	\$28 per rate payer \$18 per pensioner rate payer
Logan City Council	Yes	\$15	Buying ecological land Fund Greening Initiative Education Community program/grant Greening Logan Project	Only Council decision	No not at this point. Usually raised by Councillors.
Maroochy Shire Council	No		Minor purchases from General Rates to date.	None	

Noosa Shire Council	Yes	\$30	Land purchase	Ecological Acquisition. Policy	
Pine Rivers Shire Council Jim McEvoy	No		Not likely to have a levy this term. Minor purchases to date from General Rates.	May be proposals to fund/purchase	
Redcliffe City Council	Yes	\$25	Improving the Environment Purchase of land Repair drainage Waste water treatment Maintenance of ecological reserve Funds development project in nature reserves Split over a number of departments	None	Levy may not survive
Redland Shire Council Dominic Newland	Yes	\$35 \$1.72 m	Two components \$20 into acquisition \$1 million \$700,000 maintenance	Acquisition policy Selection criteria Purchases by loan funds. Likelihood against levy.	No proposal. Dependent upon political processes which are pro-acquisition. Mayor supports acquisition.
Toowoomba City Council	Yes	\$15	Bushland Acquisition	None linked to Toowoomba Strategic Plan Local Policy Open Space Strategy	Not known
Caloundra City Council	Yes	\$25	Bushland acquisition \$9.75 Planning/Greening \$6.00 Reserve Management \$6.75 Discount \$2.50	Under preparation	

Appendix 6: - Landholder's Bushfire Management Planning Kit For Private Property

Appendix 7: - Steps to Implementing a Financial Incentives Scheme

Stage 1 Development	Stage 2 Implementation	Stage 3 Monitoring & Evaluation
ACTION STEP	ACTION STEP	ACTION STEP
1. Getting Started <ul style="list-style-type: none"> Consider financial incentives with other existing or potential programs and tools Secure commitment of council Determine what resources are to be conserved Identify the local issues and priority areas Identify and survey your target audiences and others to be involved Involve the various groups 	7. Promote and market to landholders 8. Undertake initial assessment of application received by council 9. Visit landholder and provide advice 10. Discuss proposed agreement 11. Identify works to be undertaken, proposed financial and/ or other assistance, and associated requirements 12. Sign agreement 13. Works undertaken by landholder 14. Landholder submits works completed form to council	15. Evaluate your scheme <ul style="list-style-type: none"> Annual evaluation Expand or modify scheme Major evaluation Self-assessment 16- Cost-benefit assessment
2. Assess financial implications and potential funding opportunities <ul style="list-style-type: none"> Assess your financial resources (rate base/ structure) Pursue other funding opportunities Assess the cost implications of various rate rebates Calculate payment and other costs of scheme Allocate the budget 		
3. Set your desired outcomes		
4. Determine works to be funded and criteria to be applied to applicants		
5. Choose your type(s) of incentives and related mechanisms		
6. Set up a framework for assessing applicants and monitoring of compliance		

Enviros Australia: The Local Government Environment Network

Incentives for Sustainable Land Management: Community cost sharing to conserve biodiversity on private lands -Version 2.0 Interim Report January 2000

Appendix 8: - Recommended Fire Management Strategies for Land Uses and Institutions

Land Use	Objectives of Fire Management	Strategies/Actions
Nature Conservation	<ul style="list-style-type: none"> • Maintain diversity of ecosystems; • ensure the existence of unique species assemblages; • ensure a suitable habitat for the conservation of endangered, vulnerable and rare fauna and flora species; • a fire regime and burning practices that will lead to minimal degradation of the environment 	<ul style="list-style-type: none"> • Consider civil obligations • Apply fuel reduction burning • Manually reduce fuel • Habitat Conservation Burning • Cooperative arrangements • Fire Line Construction • Smoke management considerations when burning • Obtain a permit before conducting burn • Monitoring effects of fire strategies to environment
Environmental Tourism	<ul style="list-style-type: none"> • Fire should not lead to any major negative impact on scenic values; • fuel reduction for the protection of buildings and facilities; • adequate fire protection design of buildings and facilities; • a fire regime and burning practices that will lead to minimal degradation of the environment; ensure that recreational pursuits do not pose a risk of wildfire (such as poorly constructed campfires). 	<ul style="list-style-type: none"> • Consider civil obligations • Fuel reduction burning and buffers • Manual fuel reduction • Habitat conservation burning • Cooperative arrangements • Design and location of buildings • Water storage for fire suppression • Fire lines • Smoke management considerations • Obtain a permit prior to burning • Participate and facilitate in education programmes, particularly alerting visitors to the dangers of bushfires • Wildfire suppression response <p>Additional Actions</p> <ul style="list-style-type: none"> • do not conduct controlled burning when people are undertaking recreational pursuits • manually reduce fuels where burning will detract the aesthetic appeal and experience • Implement monitoring
Private Timber Production	<ul style="list-style-type: none"> • Ensure sustainable timber production by fire regimes and fire management practices; • protect timber resources and quality; • fire regimes and burning practices leading to minimal degradation of the environment. 	<ul style="list-style-type: none"> • Civil obligations • Fuel reduction burning • Manually fuel reduce • Timber conservation burn • Timber conservation burning/Pasture regeneration burning • Habitat Conservation burning in areas not intended for timber production • Cooperative arrangements • Fire line construction and

Land Use	Objectives of Fire Management	Strategies/Actions
		<p>maintenance around timber production areas (</p> <ul style="list-style-type: none"> • Smoke management considerations • Obtain permits when burning • Wildfire suppression considerations
Road Area	<ul style="list-style-type: none"> • Fuel hazard reduction on the sides of roads; • a fire regime and burning practices that will lead to minimal degradation of the environment. 	<ul style="list-style-type: none"> • Roads and road reserves, because of a thin portion of land, is more suitable to slashing or being used as a fire break of adjoining properties when adjoining properties are subject to controlled burning.
State Forest, National Park or Conservation Park	<p><i>State Forest</i></p> <ul style="list-style-type: none"> • Ensure sustainable timber production by fire regimes and other fire management practices that promote regeneration of timber species whilst maintaining biodiversity; • protects timber resources and quality; • a fire regime and burning practices that will lead to minimal degradation of the environment. <p><i>National Parks</i></p> <ul style="list-style-type: none"> • Maintain diversity of ecosystems; • ensuring unique species assemblages; • ensure a suitable habitat for the conservation of endangered, vulnerable and Rare fauna and flora; • a fire regime and burning practices that will lead to minimal degradation of the environment. 	<p><i>State Forests (DPI administered):</i></p> <ul style="list-style-type: none"> • same actions as private timber production <p><i>State Forests (DPI and DNR administered) and National Parks (only if this is an outcome of the Regional Forest Agreement):</i></p> <ul style="list-style-type: none"> • apply same actions as Nature Conservation. <p>Additional Actions (Both State Forests and National Parks)</p> <ul style="list-style-type: none"> • Abide by fire management policies of the governing bodies; • undertake and participate with monitoring; • fire management considerations of recreational areas and activities; • fire protection measures (fuel reduction zones etc.) of campsites and other recreational areas.
Rural Industries	<ul style="list-style-type: none"> • Fire protection of assets; • using fire for pest removal and inhibiting pest development (not lantana); 	<ul style="list-style-type: none"> • Civil obligations • Fuel reduction burning • Timber Conservation / Pasture Regeneration burning

Land Use	Objectives of Fire Management	Strategies/Actions
	<ul style="list-style-type: none"> • wildfire preparedness; • using fire to promote farm production; • a fire regime and burning practices that will lead to minimal degradation of the environment. 	<ul style="list-style-type: none"> • Pasture regeneration burning • habitat conservation burning to be applied where production is minimal or non existent • Cooperative arrangements between stakeholders, landholders, Rural Fire Brigades and Fire Wardens • Network of fire lines between adjoining landholders • Smoke management considerations • Obtain permits when burning • Wildfire suppression considerations, particularly the section on mopping up, response and responsibility
Rural Residential Areas	<ul style="list-style-type: none"> • Wildfire preparedness; • fire regime and burning practices that will lead to minimal degradation of the environment; • reduce the threat of wildfire by having adequate fuel reduction zones; • have adequate protection measures from wildfires including fire lines, water storage and an appropriate building design and building location; • educate people about the dangers of fire; • strategic location of fire lines, fuel reduction buffers, other fire protection measures and the strategic location of resources for fire fighting. 	<ul style="list-style-type: none"> • Civil obligations • Fuel reduction burning • Manual fuel reduction close to assets • Timber Conservation / Pasture Regeneration burning • Pasture regeneration burning • habitat conservation burning to be applied where production is minimal or non existent • Cooperative arrangements between stakeholders, landholders, Rural Fire Brigades and Fire Wardens • Network of fire lines between adjoining landholders • Smoke management considerations • Obtain permits when burning • Wildfire suppression considerations, particularly the section on mopping up, response and responsibility
Local Government	<ul style="list-style-type: none"> • Collect and distribute fire brigade levies from rates; • assist community organisations with resources and equipment during the event of wildfires; • assist landholders with the implementation of this plan; • ensure adequate fire protection with building design and 	<ul style="list-style-type: none"> • Civil obligations • Promote habitat conservation burning • Promote cooperation between stakeholders • Administer the design and location of buildings • Promote adequate water storage • Promote a network of fire lines

Land Use	Objectives of Fire Management	Strategies/Actions
	<p>location by the administration of building or development applications.</p>	<ul style="list-style-type: none">• Advocate information about fire management and protection measures• Be aware of wildfire suppression and response• Involvement with monitoring <p>Additional Actions</p> <ul style="list-style-type: none">• Continue collection and distribution of fire brigade levies;• support rural fire brigades with funding and resources to implement wildfire suppression and controlled burning activities;• support the community with fire management and advice

Appendix 9: - Johnstone Shire Council Policy - Rate Deferrals for Habitat Conservation.

INTENT:

JOHNSTONE SHIRE COUNCIL

POLICY

Rate Deferrals for Habitat

Conservation

1.1 The intent of the policy is to provide rate deferrals to landowners within Johnstone Shire who actively contribute to Council's Habitat Conservation Strategies by entering into conservation agreements with Council.

SCOPE:

2.1 This policy applies to land in the shire which is included in the Conservation and Rural Conservation zones and within the Rural Residential and Residential Conservation Precincts of the Johnstone Shire Planning Scheme.

POLICY:

3.1 A rate deferral shall be allowed on the general rate for property owners within the Conservation, Rural Conservation zones and within the Rural Residential Conservation and Residential Conservation precincts who have entered into an

agreement with Council to protect values of their properties.

3.2 The deferral will be calculated on the basis shown in the following table:

HABITAT CLASSIFICATION	% DEFERRAL ON ELIGIBLE COMPONENT OF GENERAL RATE.
Critical Habitat	60
Important habitat	55
Important Corridor/linkage	50
Potentially Critical/Important	45
Natural Habitat/Corridor	40

** This may be increased in particular circumstances with Council Approval.

The habitat classification is based upon the classification system developed as part of the Environmental Audit of the shire and subsequent reports. The deferral would apply to the

classification at the time of entering into the conservation agreement. There will be a provision to allow multiple categories per lot.

3.3 Rate deferrals granted under this policy will be funded to an amount up to 2% of the total general rate revenue (nett after discounts) received by Council and this amount shall be regarded as an annual budget commitment by Council.

4.0 RESOLUTION:

4.1 This policy adopted by resolution of Council on 7 July 1998.

E.L McEACHAN

GENERAL MANAGER

Appendix 10: - Covenants Advice From the Registrar of Titles

Land Title Form No: 31 Decision No: 2000-004

Form Item No: n/a Title Covenants

Effect Date: 9 March 2000 Issue Date: 18 April 2000

Replaces Decision No. 2000-001 Page 1 of 4

PRACTICE DECISION

Background

The *Natural Resources and Other Legislation Amendment Act 2000* commenced on 9 March

2000. Among other things, this Act expands the relevant sections of the *Land Act 1994* and the *Land Title Act 1994* that deal with covenants.

The purposes for covenants capable of registration under the *Land Act 1994* and the *Land Title*

Act 1994 have been expanded to allow the State, statutory body representing the State or a local government to enter into registrable covenants that:

- are about the use of land, a building, or a proposed building; or
- relate to the conservation of a physical or natural feature of the land, including soil water plants or animals; or
- ensure environmental and/or conservational land use.

Covenants may be appropriate to support a planning scheme where no development approval has been sought.

Within the limitations allowed, a covenant may be used to achieve an objective that is consistent with a planning scheme or a condition of development approval. A covenant may impose a positive obligation (e.g. work to be carried out or money to be spent) or a negative obligation (e.g. restricting the use of the land to low cost housing).

The State, a statutory body representing the State or a local government must be the grantee of a covenant.

Both the grantor (the owner of freehold or lessee of State owned land) and the grantee (the State, a statutory body representing the State or a local government) must sign the covenant instrument.

However, if the land is leased from the State, the Minister who administers the *Land Act 1994* must consent to a covenant affecting that land.

The amended sections to the *Land Act 1994* and the *Land Title Act 1994* are reproduced below.

Land Act 1994 - Division 8A - Covenant by registration

373A. (1) Non-freehold land (other than a road for which a person does not hold a road licence) may be made the subject of a covenant by the registration of the document creating the covenant in the appropriate register.

(2) A document creating a covenant may be registered under this division only if the covenantee under the document is the State, or a statutory body representing the State, or a local government.

(3) Subject to subsection (4), a covenant to which non-freehold land is subject must be only for ensuring that the land may be transferred to a person only if there is also transferred to the person—

- (a) other non-freehold land that is also the subject of the covenant; or
- (b) a lot that, under the *Land Title Act 1994*, is the subject of the covenant; or
- (c) non-freehold land mentioned in paragraph (a) together with a lot mentioned

in

paragraph (b).

(4) If non-freehold land is the subject of a lease, other than a trustee lease, or is land over which a person holds a road licence, a covenant to which the land is subject may—

- (a) relate to the use of—

- (i) the land or part of the land; or
- (ii) a building, or building proposed to be built, on the land; or
- (b) relate to the conservation of a physical or natural feature of the land, including soil, water, animals and plants.

(5) A covenant under this division may be a positive covenant or a negative covenant.

(6) In this section—

“**building**” means a fixed structure that is wholly or partly enclosed by walls and is roofed, and includes a part of a building.

“**use**”, of a building, does not include architectural or landscaping standards for the building.

Amending document creating covenant

- 373C.(1) A covenant may be amended by registering a document amending the covenant.
- (2) The amending document may be registered only if—
 - (a) it is validly executed; and
 - (b) the Minister has given written approval to the amendment.
- (3) However, the amending document must not—
 - (a) increase or decrease the area of land the subject of the covenant; or
 - (b) add or remove a party to the covenant.

Releasing a covenant

- 373D (1) A registered covenant may be wholly or partly discharged by registering a document releasing the covenant.
- (2) The document must be signed by the covenantee.
- (3) On lodgement of the document, the registrar may register the release to the extent shown in the document.
- (4) On registration of the document, the covenant is discharged, and the land is released from the covenant, to the extent shown in the document.

Land Title Act 1994 - Covenant by registration

- 97A.(1) A lot may be made the subject of a covenant by the registration of an instrument of covenant under this division.
- (2) An instrument of covenant may be registered under this division only if the covenantee under the instrument is the State, or a statutory body representing the State, or a local government.
- (3) The covenant must—
 - (a) relate to the use of—
 - (i) the lot or part of the lot; or
 - (ii) a building, or building proposed to be built, on the lot; or
 - (b) relate to the conservation of a physical or natural feature of the lot, including soil, water, animals and plants; or
 - (c) be for ensuring that the lot may be transferred to a person only if there is also transferred to the person—
 - (i) another lot that is also the subject of the covenant; or
 - (ii) non-freehold land that, under the *Land Act 1994*, is the subject of the covenant; or
 - (iii) a lot mentioned in subparagraph (i) together with non-freehold land mentioned in subparagraph (ii).
- (4) The covenant—
 - (a) may be a positive covenant or a negative covenant; and
 - (b) is binding on the covenantor and the covenantor’s successors in title.
- (5) In this section—
- “**use**”, of a building, does not include architectural or landscaping standards for the building.

Amending an instrument of covenant

- 97C.(1) A covenant may be amended by registering an instrument of amendment of the covenant.
- (2) The instrument of amendment may be registered only if it is validly executed.
- (3) However, the instrument of amendment must not—
 - (a) increase or decrease the area of land the subject of the covenant; or
 - (b) add or remove a party to the covenant.

Releasing a covenant

- 97D(1) A registered covenant may be wholly or partly discharged by registering an instrument releasing the covenant.

- (2) The instrument must be signed by the covenantee.
- (3) On lodgement of the instrument, the registrar may register the release to the extent shown in the instrument.
- (4) On registration of the instrument, the covenant is discharged, and the lot is released from the covenant, to the extent shown in the instrument.

Application of Property Law Act 1974, s 181

97DA. The *Property Law Act 1974*, section 181, (4) applies to a registered covenant.

(4) *Property Law Act 1974*, section 181 (Power to modify or extinguish easements and restrictive covenants)

9.1.1.1 Action

Requirements for a covenant

A covenant may only be registered if the covenantee is the State, a statutory body representing the

State or a local government. A covenant may only relate to:

- the use of a lot or part of a lot; or
- the use of a building built or proposed to be built on a lot; or
- the conservation of a physical or natural feature of a lot; or
- ensure that all lots that are subject to the covenant are transferred to another person together (the lots subject to the covenant may be freehold, non-freehold or a combination of freehold and non-freehold).

9.1.1.2 Survey requirements of covenant over part of a lot

- The covenant is to be described by an alpha descriptor (e.g. Covenant A in Lot 1 on SP123456)
- ‘Proposed’ covenant is not acceptable
- The Instrument granting the covenant must be lodged immediately after the plan
- A single covenant description (e.g. covenant A) cannot be created over more than one lot (i.e. covenant A in Lots 1 and 2 on SP123458 is not acceptable)
- A covenant may be included with a survey of lots on a plan of subdivision
- There cannot be more than one occurrence of an alpha descriptor on a plan (e.g. Covenant A in Lot 1 and Easement A in Lot 2 on SP134567 is not acceptable)

A covenant may not be used to

- set architectural standards (e.g. all brick house construction);
 impose landscaping standards;
- substitute for easements or other registrable interests;
- grant a right to or impose an obligation on any third party (i.e. any person or corporation other than the covenantor (i.e. the registered owner or lessee who grants the covenant) and the covenantee (i.e. the State, a statutory body representing the State or a local government)).

A covenant may be positive or negative and is binding on the covenantor and all successors in title to the covenantor.

A covenant that is to be registered against non-freehold land requires the approval of the Minister for Natural Resources.

Requirements for an instrument amending a covenant

A covenant may be amended by registering an instrument amending the covenant provided the instrument is validly executed by all parties to the covenant (i.e. the current registered owner or lessee and the State, a statutory body representing the State or a local government). The amendment must not:

- increase or decrease the area of land the subject of the covenant; or
- add or remove a party to the covenant.

Requirements for releasing a covenant

A registered covenant may be wholly or partially discharged by registering a release of covenant in a

Form 33.

For a partial discharge of covenant the instrument must clearly specify the extent to which the covenant is released.

The instrument must be signed by the covenantee. A covenant that is for ensuring that lots remain in the same ownership can only be partially discharged if at least two lots remain subject to the covenant after the partial release.

G Mitchell
Registrar of Titles

Appendix 11: - Examples of Policies, Goals and Objectives to Manage Environmental Values

Wildlife Conservation Program

GOAL

Critical wildlife habitats are conserved and linkages and corridors are maintained and/or restored.

Wildlife is managed to conserve the wildlife and its values and, in particular to -
conserve the biological diversity of the wildlife to the greatest possible extent ;
identify, and reduce or remove, the effects of threatening processes relating to
wildlife; and
identify the wildlife's critical habitat and conserve it to the greatest possible extent.

OBJECTIVES

To preserve and enhance wildlife habitats and linkages including those which traverse privately owned land.

STRATEGIES	ACTIONS	RESPONSIBILITY
To promote the ecologically sustainable use of wildlife and natural areas through the preparation and implementation of conservation plans and property management plans which are consistent with the values and needs of the wildlife or natural areas concerned.	<ul style="list-style-type: none">Establish provisions of the Planning Scheme to ensure wildlife habitat along with identified habitat links are considered as an integral part of planning and development processes;Give encouragement to the preservation and enhancement of wildlife habitat links on privately owned land;Protect and maintain in a natural state all public land and waterways that contain valuable wildlife habitat or forms part of an identified habitat link;Extend and consolidate wildlife habitat and habitat links by the dedication of appropriate areas as parkland required under the land development process;	Chief Executive Officer / Director Technical Services Planning PO Environmental Officer Director Technical Services / Works Overseer Planning Officer

Adapted from "Cooloola Conservation Strategy" Cooloola Shire Council and the Cooloola Conservation Co-ordination Team 1996.

Feral Animal and Weed Management Sub-Program

GOAL

Minimise the economic, social and environmental impact of declared and other feral animals.

Minimise the economic, social and environmental impact of declared and environmental weeds

OBJECTIVES

Ensure that declared plants and animals are controlled within the Shire.

Implement strategies to prevent the introduction and spread of declared animals and plants into and within the Shire.

Provide landholders with necessary information and advice to allow the appropriate control of pests on private land.

STRATEGIES	ACTIONS	RESPONSIBILITY
<ul style="list-style-type: none">• Develop policies and guidelines for the control of feral animals as part of a Shire Land Protection Plan;• Conduct an awareness and education program to highlight the issues relating to feral animals;• Consult with key stakeholder representatives in the preparation of a land management plan.	<ul style="list-style-type: none">• In conjunction with the Lands Protection Branch of the Dept of Natural Resources prepare information packages to distribute to schools and other education establishments, landholders and community groups, on the environmental problems of feral animals and their control;• Harness local community knowledge in a voluntary scheme to survey distributions of feral animal populations;• Develop long term feral animal and declared plant control plans;• Convene a forum/s on feral animals to combine local and expert experience in animal control; and• Support and maintain a 1080 baiting program where appropriate.	<p>Director Technical Services Environmental Officer</p> <p>Environmental Officer</p> <p>Stock Routes Officer / Director Technical Services Stock Routes Officer / Environmental Officer Stock Routes Officer</p>

Adapted from "Cooloola Conservation Strategy" Cooloola Shire Council and the Cooloola Conservation Co-ordination Team 1996.

ADMINISTRATIVE POLICY A05/97 ENVIRONMENTAL POLICY STATEMENT

ENVIRONMENTAL POLICY STATEMENT

Toowoomba City Council values the importance of a healthy environment and a quality of life that makes Toowoomba a liveable City. Council is committed to protecting and enhancing the natural and built environment so that ecological, social and economic benefits are provided to current and future residents and businesses.

Council has responsibilities under environmental legislation. We will also aim to achieve additional environmental benefits through local initiatives. We will continually review and improve our environmental practices. To further these commitments, we aim to:

- provide guidelines, staff and resources to assist in ensuring that environmental management practices for the City's natural and built assets are implemented
- incorporate ecologically sustainable development principles into the design, implementation and monitoring of services and facilities provided by Council
- document, review and communicate the environmental policy to all staff, Councillors, Council contractors, residents and businesses
- maintain our responsibility of environmental care to Toowoomba's neighbours through catchment and escarpment management
- maintain and enhance the nature conservation values of the City's natural assets, for example watercourse and bushland areas
- continue to reduce energy consumption, minimise waste and prevent pollution
- provide training for staff on environmental best practice and incorporate suggestions on improved environmental care from staff into operational procedures
- consult with the community and encourage participation in opportunities for environmental improvement in Toowoomba
- promote adoption of sound environmental principles and practices by residents and businesses both within Toowoomba and the surrounding region
- publish regular progress reports on environmental management of the City's natural and built assets

This policy will ensure that Toowoomba's environment is maintained and enhanced. It also recognises that environmental well being is essential to the social and economic vitality of Toowoomba.

An Environmental Policy Statement will benefit Council, by providing a common environmental goal for Council's initiatives in management and protection of Toowoomba's environment.

Appendix 12 - Updates to Remnant Vegetation Corridor Management Strategy May 2001

The following updates were made to the Draft *Remnant Vegetation Corridor Management Strategy* in May 2001 (as recommended by the Crows Nest Shire Council Natural Resource Management Reference Group):

Section 7.2

The last paragraph of this section has been changed. The original wording was: "Crows Nest Shire Council could apply for funding through a variety of sources including the Natural Heritage Trust for on-ground works and the appointment of an Extension Officer to implement voluntary conservation agreements. The Extension Officer would be responsible for enhancing awareness of native vegetation corridors and the development and implementation of the corridors strategy in the designated corridor and linkage zones within the shire."

Subsection 7.2.3

The last paragraph of this subsection has been changed. The original wording was: "This is an option that the Crow's Nest Shire Council could pursue in order to fill the gap between the Land For Wildlife program and Nature Refuges agreements."

Subsection 7.4.1

A new sentence has been added at the end of this subsection.

Subsection 7.4.2

This new subsection has been added.

Section 7.6

A new paragraph has been added immediately before Table 6.1.

Section 7.7

A new sentence has been added at the end of this section.

Section 7.10

This new section has been added.