BALLARAT CITY COUNCIL

COMPREHENSIVE KOALA PLAN OF MANAGEMENT

A Joint Initiative of
the City of Ballarat and the Australian Koala Foundation

PART 1: THE PLAN

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1.   INTRODUCTION

1.1   The Purpose of the Plan

The Purpose of the City of Ballarat Comprehensive Koala Plan of Management is

"To provide for the long-term survival of koala populations within the City of Ballarat through the implementation of actions aimed at safeguarding the koala within its natural range within the City."

Procedures for the preparation of a comprehensive koala plan of management have been described by Lunney *et al* (1997). These procedures state that such a plan should:

❖ Identify present koala populations and (if possible) past populations from historical records;

❖ Identify and map koala habitat based on both koala distribution and plant associations;

❖ Identify threatening processes and state actions to reverse koala population decline; and

❖ Establish procedures to secure and manage koala populations into the future.

Implementation of the Plan will achieve the Plan's Purpose through:

❖ Evaluating and ranking koala habitat throughout the City of Ballarat;

❖ Identifying the principal threats that adversely impact on koalas and koala habitat within the City of Ballarat;

❖ Devising conservation strategies to effectively address each of the threats impacting on koalas and koala habitat;

❖ Identify priority conservation areas and strategies to protect koala habitat;

❖ Restoring areas of degraded koala habitat;

❖ Providing guidelines and development standards to protect koala habitat;

❖ Promoting a balanced approach to koala conservation and urban development;

❖ Ensuring that adequate detail is provided with development applications and rezoning proposals in order to assess, minimise and effectively ameliorate likely impacts on koala habitat;

❖ Effective public awareness and education programs concerning koala conservation issues;

❖ Identifying potential funding sources for implementation of the Plan;
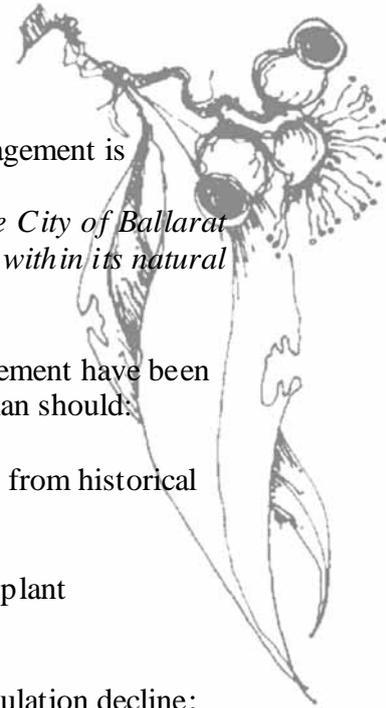
❖ Facilitating targeted koala conservation and management oriented research projects within the City of Ballarat; and

❖ Effective monitoring of the Plan.

1.2 Why it is Important to have a Plan to Protect the Koala in Ballarat

It may come as a surprise to many people, but the long-term survival of the koala in Australia is not secure (Melzer, et al.2000). This fact has been acknowledged by concerned national and international agencies and interest groups (Cork, et al. 2000). In 2000 the U.S. Fish and Wildlife Service listed the koala as a threatened species under the U.S. Endangered Species Act and in 2005 the Queensland government listed the koala in the South-east Queensland Bioregion as a vulnerable species. State governments and the Commonwealth as part of their National Koala Conservation Strategy (ANZECC 1998) have already expressed their concern for the long-term viability of Australia's koalas. Similarly, the Victorian Government encourages all councils with koala habitat to work together with the Australian Koala Foundation to map koala habitat within their municipality and to introduce measures to protect these areas through the local planning system (DSE 2004).
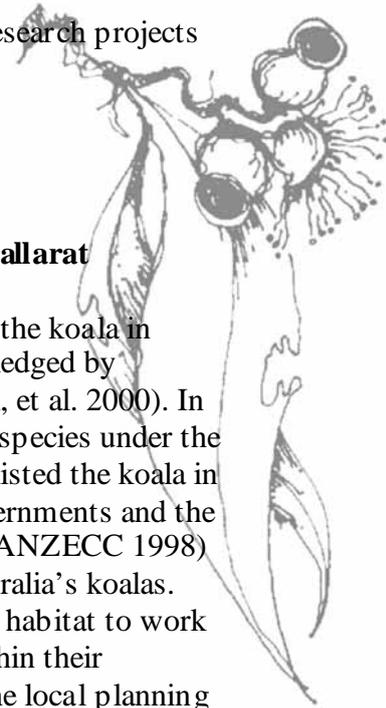
Worldwide, the koala is probably the most recognized of Australia's wildlife species. To see a koala is important to a large proportion of both domestic and international tourists in Australia. The value of the koala as a tourism icon for Australia in 1996 has been estimated at $1.1 billon (Hundloe & Hamilton, 1997).

From a biodiversity perspective, conservation of the koala is highly significant because it is the only living member of its family, the Phascolartidae. This is an ancient family that reached maximum density in the Oligocene Epoch, 32-24 million years ago.

The Ballarat Community-based Koala Survey was undertaken in 2002 to assist with the preparation of this Plan. The survey received a positive response, highlighting the importance that the Ballarat community places on koala conservation. Overall, the numerous and varied comments made by respondents indicated overwhelming support for koala conservation in the City of Ballarat.

There was a general indication that residents perceived koala numbers to be lower today than in the past. The main concerns to koala survival, as expressed by the respondents to the survey, were logging of native forests, housing developments and the removal of vegetation on private land and along roadsides. Roaming dogs and roads were also perceived as threats to koala safety. Interestingly the overall percentage of respondents calling for restrictions on dog ownership, traffic management, more tree planting and habitat restoration, tree preservation orders as well as stronger planning controls was higher than the percentage of respondents that felt these issues pose a threat to koalas.

These responses suggest that the community has concerns about the environment in general, in addition to issues that relate specifically to koala conservation.

1.3 Managing Koalas & the Bigger Environmental Picture in the City of Ballarat

The response to the Community-based Koala Survey provides the Ballarat City Council with the opportunity to introduce further environmental management initiatives, using the koala as the icon for such projects, knowing there is community support for this move. Initiatives that relate to the on-going protection and survival of the koala that relate to management of the natural environment of the City in general, and particularly the region's biodiversity, include vegetation protection through the Ballarat Planning Scheme and other regulatory initiatives, through community biodiversity education initiatives and through on-going revegetation projects.

In fact, the scene is set to initiate a major, landscape-scale revegetation program, using the considerable impetus built up around the local Landcare movement and the achievements of the LINCS program over more than a decade and the work of the joint City of Ballarat/Australian Koala Foundation partnership project over the past five years. Through the implementation of a truly integrated program, based on revegetating habitat linking areas over what is currently mainly cleared land and through utilising the considerable resources and understandings that have been developed and applied over this period, the community has the capacity to achieve a monumental level of change in the quantity and quality of indigenous vegetation that exists in Ballarat.

Environmental improvement initiatives on a scale such as this can and should extend beyond a focus on biodiversity, however, and should extend to implementation of the City's new Environmental Sustainability Strategy. Implementation of this Strategy will include projects concerned with water resource management, climate change and energy management, transport and waste and resource management, which also need to be dealt with on a municipality-wide scale.

In all these situations, the koala can be used to highlight concerns and issues that are of critical importance to establishing a sustainable future for the community of Ballarat and the Ballarat regional area. For example, climate change and ever increasing energy use are having a major bearing on water resources and the future of the region's biodiversity assets. Conversely, major revegetation projects can help to ameliorate the worst affects of climate change and reduced rainfall in many ways; e.g. reduction in evaporation, reduction in ambient temperatures, provision of shade protection. One of the major influences on climate change, in terms of energy usage, is the use of fossil fuels to operate our transport systems. Moreover, the very heavy use of road vehicles is one of the major concerns affecting whether or not the koala can have a sustainable future.
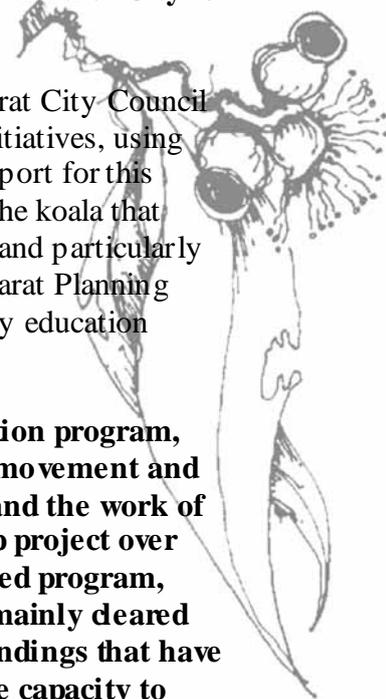
In developing the links between environmental issues, the following two approaches are considered crucial to the successful implementation of any environmental management plan that is likely to lead to long-term changes in human behaviour:

- *Collaboration and integration* – it is vital that links are built with existing environmental strategies, policies and programs, in the case of the koala, those with an emphasis on habitat protection and enhancement. In addition to the City's Environmental Sustainability Strategy, this means the State Native Vegetation Framework and programs such as those run under the LINCS (Linear Network of Communal Spaces) banner; e.g. Yarrowee River restoration project. Legislative mechanisms such as *the Ballarat Planning Scheme*, the *Flora and Fauna Guarantee Act* and the *Environment Protection and Biodiversity Conservation Act*, operating at local, State and Federal level respectively, also need to be part of assessing the best ways, at all levels, of successfully looking after the koala.
- *Education and awareness* – programs specific to the needs of the koala in Ballarat are required, but, as pointed out above, there are many opportunities to use the koala, as Australia's number one iconic species, to highlight the need for the sustainable management of all our unique native species of animals and plants.
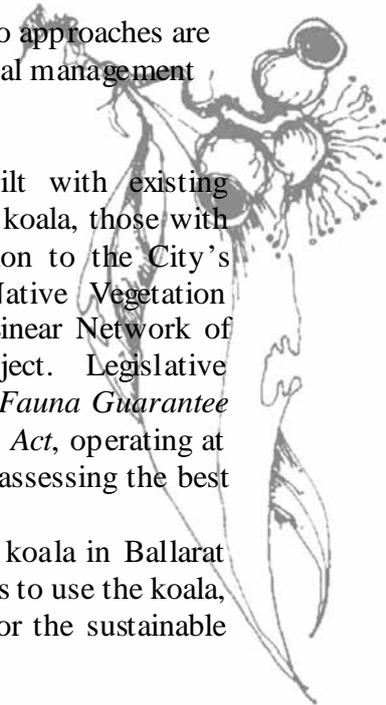
In many respects, it is up to the people of the community of Ballarat as to whether the koala, or for that matter many other local native species of fauna and flora, have a future. As an international icon of this country, the koala is the ideal symbol to use as indicating the health of our natural environment, and the extent to which the community cares for that environment and understands the importance of the need for that care. **This is why this Plan is largely structured around the concept of "Community Involvement – Living with Koalas", as a measure of care for the koala, as much as focusing on the koala itself.**

1.4   Developing the Ballarat Koala Plan of Management

The City of Ballarat has taken the visionary step of becoming the first Council in Victoria to work together with the AKF in producing a Koala Plan of Management (the Plan) for the municipality. The Plan will not only address science, mapping and planning issues, but will draw on the potential of the koala in the fields of tourism, volunteerism, arts and education.

The most important step in the writing of the Plan is the assessment of the native vegetation within the municipality. A detailed process of qualitatively and quantitatively evaluating the approximately 2,500 polygons (individual areas) of native vegetation in Ballarat has culminated in the recent public exhibition of the vegetation maps for Ballarat at the Phoenix Building. A koala habitat map has been prepared and the Management Plan has been prepared in large part to use this information as an essential tool in ensuring the survival of the koala in Ballarat.

The project so far has seen the koala being embraced by the Ballarat community, with numerous education and re-vegetation activities achieving not only a gain for native vegetation but also creating a readiness by the residents to accept and appreciate the need

for this Plan. The use of the koala as a symbol to attract international tourists and researchers, and to stimulate conservation and promote Ballarat has been very successful.

The AKF sees its role as establishing implementation and monitoring programs for the Plan and to further enhance the benefits to Ballarat and its residents of the flagship species, the koala.

The extreme fragmentation of the koala habitat in the City of Ballarat and the necessity to examine approximately 2,500 vegetation polygons has meant that a substantial amount of time has been needed to produce the Plan.

The native vegetation mapping project has great value in providing information about the condition and make up of the City's native vegetation. This information will be of use in the preparation and assessment of development proposals where the existence of native vegetation is a factor that requires consideration, and in the planning and delivery of environmental projects, particularly those involving revegetation works where the emphasis is on replanting indigenous vegetation (e.g. Mt Buninyong, along the Yarrowee River).

The protection and proper management of native vegetation has become a critical environmental issue, particularly where conservation of that vegetation may conflict with proposals for development. The better the information that Council has at its disposal in making decisions on such matters, the better the decisions will be. An example of where the Plan native vegetation mapping will be of considerable use is in implementation of the Canadian Valley and Buninyong Outline Development Plans. Both locations are important areas of habitat for the koala, whilst native vegetation is a key feature of these areas and held to be of high importance by residents. At the same time, these areas are popular residential locations. Thus there is a need to reconcile what may at times be competing interests, and the information provided by the mapping project will assist in doing that by being an important input into the planning and development approval processes.

Once implemented, the Plan and its associated maps will become an essential tool for managers and planners within Council and externally for developers, people carrying out re-vegetation tasks and authorities which are concerned with vegetation management.

The quality of the assessment and maps is of a very high standard, rarely seen in other projects, due to the associated time and costs involved in the comprehensive data collection and development processes.

The project will continue to promote environmental awareness and to engage the community in hands-on conservation activities. It will continue to promote Ballarat's positive image of having an environmentally aware and pro-active Council.

The AKF Liaison Officer will continue to assist Council with any query regarding koalas and koala habitat from residents or through providing comments to Council officers on planning applications and planning policies of relevance to the management of the City's koalas.
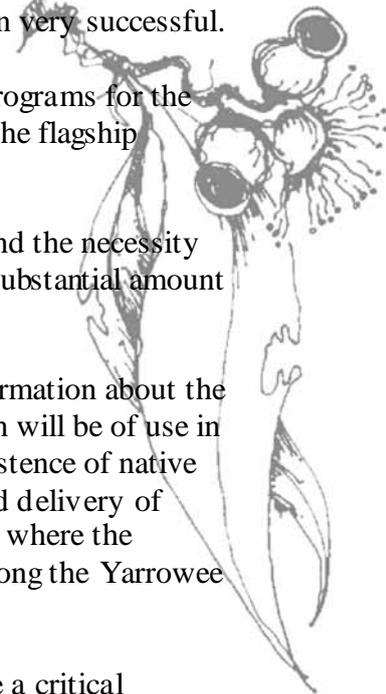
Funding for the preparation of the Ballarat Plan has come from the Ballarat City Council and the Australian Koala Foundation (AKF).

1.5   The Ballarat City Council/Australian Koala Foundation Joint Initiative

The collaboration between the City of Ballarat and the Australian Koala Foundation commenced in 2001 in mutual recognition of the need for practical environment conservation programs to protect and enhance some of Ballarat's key environmental assets, including the koala.

Preparation of the Ballarat Koala Plan of Management has always been seen as the keystone of this initiative. Other key components of the project have been identified as the need to:

❖ Survey and map koala habitat;

❖ Promote koala conservation to residents;

❖ Implement the Koala Management Plan for the City

The arrangement involves an AKF Officer, who manages and runs the project, working from a Council-provided office. Council provides the office space and the use of a computer and photocopying/printing resources as its contribution to the initiative, whilst the AKF pays all other costs. Currently the AKF staff person is Liaison Officer, Rolf Schlagloth, who is based at the Parks & Environment Section offices, located at the Ballarat Horticulture Centre.   This location enables the Liaison Officer to have regular contact with parks and arboricultural staff. The current arrangement is due to continue until 31st January 2008. As part of the process of monitoring implementation of the Plan, the arrangement will be reviewed well in advance of this finish date to determine whether it is recommended to both the AKF and the Ballarat City Council that the initiative should be continued.

The intensive education program that has been undertaken to date, including re-vegetation projects, lectures, media engagements, art and music projects, has been time consuming, but has assisted in preparing residents and the community in general for the imminent implementation of the Plan.

Up to the middle of 2004, the initiative has seen the adoption of four, six months-duration Green Reserve projects (Green Reserve is a volunteer program managed by Greening Australia). These projects have seen long-term unemployed volunteers over the age of 45 years gain experience in the conservation field by supporting AKF's work. The participants gained an appreciation of their environment, learned new skills, and by participating in AKF's work with all sections of society, often developed new insights into the workings of the community in general. Two of the three participants found permanent work after completing their projects.

The initiative has seen a large variety of community groups becoming engaged in re-vegetation work. From school groups to Rotarians, local residents to special school students, the koala and this project is widely known and accepted.
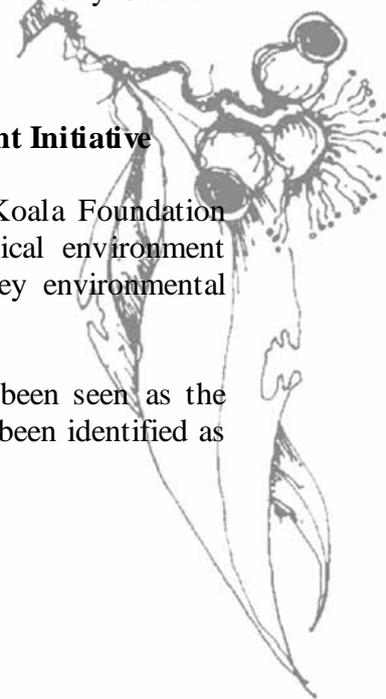
Koalas are recognised and loved all over the world, especially by Japanese visitors. Regarded as unique and adorable, koalas are a symbol of conservation and happiness. It was in this spirit that koalas in the form of two mosaics were used in 2004 to help bring the cultures of Japan and Australia closer together through the medium of art and education. This project coincided with celebrations recognising the 15th anniversary of the Sister City partnership between the City of Ballarat and Inagawa-cho. The result is being felt in each City, having brought additional strength to the relationship through the exchange of the mosaics and their permanent display in each city. The Koala Mosaic Project was also used as a promotion for the Wozzle Funfest, a unique festival for kids, at the University of Ballarat where both mosaics produced for the Project were on display.

The AKF particularly targets overseas tourists to come to, amongst other places, Ballarat for the benefit of re-vegetating koala habitat and cultural exchange. The Ballarat initiative in general and various aspects of it, have been reported on by numerous overseas media, including documentary teams and magazine articles in Japan, USA, Canada, Germany, Italy and France.

The koala opens many doors and opportunities to promote the City. Ballarat and its koala conservation work, together with an exemplary re-vegetation project with the Buninyong Primary School at Mt Innes, has even made it onto 500 000 cereal boxes sold on the North American market.

The initiative not only attracts volunteers to plant thousands of trees and contribute to general conservation work and the beautification of the City, but it has also contributed to a change in the community's perception on conservation in general and the importance of our native flora and fauna in particular. It has given the community a focal species to which it is able to relate, and to support, to the benefit of the species and the natural environment of Ballarat in general.

1.6   A Model for Victoria

The Ballarat community's 25-year plan for the development of the City, "Blueprint Ballarat", and the Council's own Council Plan 2006-09 both express the vision that "Ballarat will be a leader in its management of the natural environment". A stepping-stone towards this vision is the fact that the City has become the first council in Victoria to join with the Australian Koala Foundation in preparing a comprehensive Koala Plan of Management for the municipality. As such, in addition to the benefit that the Plan will have for Ballarat's koalas, the Australian Koala Foundation (AKF) intends that the Ballarat Plan will be used as a model for koala management plans in other municipalities

The Ballarat Koala Plan of Management consists of two parts: Part 1 comprises The Plan, incorporating specific Actions to implement The Plan; Part 2 comprises a detailed Resource Document that includes detailed coverage and analysis for each of the management issues affecting the care and management of the koala and its habitat.

The experience of the AKF in preparing koala management plans in New South Wales (NSW) has been used in preparing the Ballarat Plan. In particular NSW *State*
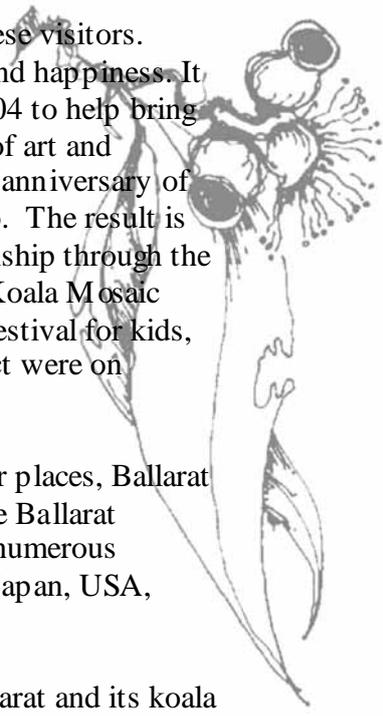
Environmental Planning Policy No. 44 - Koala Habitat Protection (SEPP 44) and accompanying guidelines, including Circular No. B35 (Department of Planning 1995) and NSW National Parks and Wildlife Service (NPWS) draft 'Procedures for preparing comprehensive plans of Management for Koalas under SEPP 44' (Lunney *et al.* 1997) have been used to build the Ballarat Plan.
SEPP 44 has as its principal aim:

"To encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas, to ensure permanent free living populations over the present range and to reverse the current trend of population decline".

The Draft Port Stephens Koala Management Plan (Callaghan, Leathley & Lunney 1994), as referred to in SEPP 44, subsequent joint work by the Australian Koala Foundation (AKF), NSW National Parks and Wildlife Service and Port Stephens Council to complete the approved and adopted Port Stephens Council Plan (2001), and the draft Greater Taree City Council Plan (Callaghan, Curran, Thompson. & Floyd 2002) have provided models for preparing the Ballarat City Council Plan.

Production of the Ballarat Plan was preceded by production of the Ballarat Koala Habitat Atlas (Callaghan, Mitchell, Thomson & Bailey, 2004).

The Ballarat Plan is consistent with the National Koala Conservation Strategy (ANZECC 1998) and Victoria's Koala Management Strategy 2004, in seeking to conserve koalas by identifying and protecting existing habitat and incorporating koala conservation into local government planning processes (Lunney *et al.* 1998).

In particular, Victoria's Koala Management Strategy has as its aim:

"To ensure that viable wild populations of the koala persist wherever suitable habitat occurs throughout the natural (i.e. pre-European settlement) range in Victoria."

Several objectives in the Strategy are particularly pertinent to the development of a koala plan of management on a municipal scale:

Objective 1: *"To conserve the koala and its habitat through joint collaborative management of koala habitat and populations across land tenures.*
Lead agent: DSE in partnership with Parks Victoria, catchment management authorities and local government.
Timeframe: short-term."

Action 1: *"Officers of State and local Government agencies will ensure that the habitat needs of the koala are addressed through the application of all relevant vegetation protection and vegetation management policies.*
Priority: high"

Action 2: *"Ensure that koala management is adequately considered during the development of Biodiversity Action Plans and Park Management Plans.....Improving linkages between remnant forest and woodland patches is particularly important for the koala.*
Priority: high"
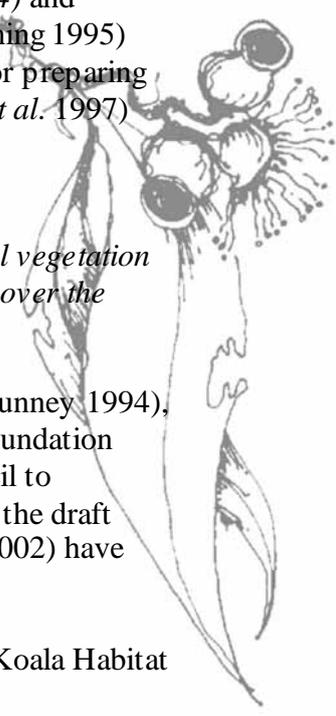
Objective 3: *"To develop detailed maps of the distribution and quality of Koala habitat in appropriate Local Government Areas and incorporate these maps into overlays of environmental significance on shire planning schemes.*
Lead Agent: Local Government in partnership with Australian Koala Foundation and DSE.
Timeframe: medium-term"

Action 5: *"Local Government, in partnership with the Australian Koala Foundation, should undertake Koala Habitat Atlas mapping in key Local Government Areas. Priorities for Local Government Areas to be assessed should be based on degree of pressure for development in areas occupied by koalas.*
Priority: high"

Action 6: *"Once Koala habitat mapping is completed the Local Government should transfer the information to Environmental Significance Overlays that define, rank and map koala habitat.*
Priority: high"

These provisions indicate the significance of the Ballarat project – which began before the State Plan was produced.

The recommendations for action contained in this Plan explicitly support these Objectives and seek to implement the Actions.

1.7   Measuring Achievements

The following performance indicators are designed to facilitate the success of each of the proposed actions and to allow the Plan to be assessed and refined where necessary.
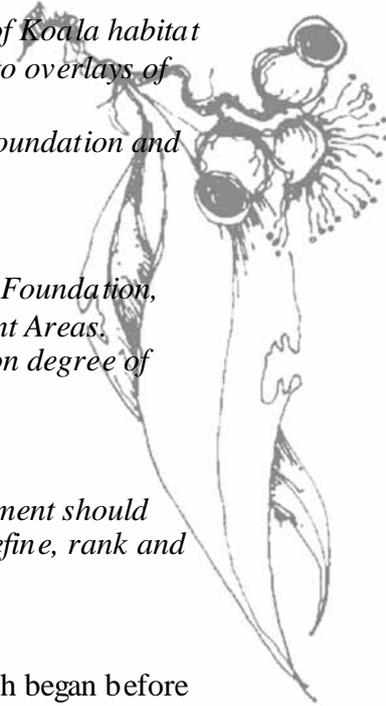
The performance indicators consist of a number of specific conservation outcomes including:

Performance Indicators	Performance Measures (Conservation Outcomes)
Loss of koala habitat within Areas identified as Preferred and Supplementary Koala Habitat, Habitat Buffers and Habitat Linking Areas	• Minimised and restricted to that permissible in accordance with the performance standards for development applications contained in Appendix 2 of the Plan; • Reduced in each successive year over the next five years (with the situation to be reassessed at the conclusion of the first 5 year period and new measures developed for the following 5 years).
Annual Koala population assessments undertaken at designated monitoring sites determined on the basis of: • Activity levels; • Evidence of successful breeding; • Signs of disease, mortality and survivorship; • Population estimates.	Majority of surveyed koala populations, including urban populations, identified as stable or increasing within 5 years from the adoption of the Ballarat Plan.
Koala mortality due to collisions with motor vehicles	• Not on the increase; • Stable or increasing koala population estimates in the vicinity of identified black spot areas.
Koala mortality due to dog attacks	• Not on the increase; • Stable or increasing koala population estimates in the vicinity of identified high-risk dog attack areas.
Ongoing program for koala habitat restoration activities	Established in high priority areas according to the criteria outlined in the Habitat Restoration Chapter of the Plan Resource Document

In addition to the conservation outcomes listed above, the Plan should be assessed in terms of implementation of each of the proposed individual actions. For example, the success of the habitat conservation strategy should be assessed initially by determining whether each of the habitat conservation measures had been implemented according to the schedule.

The Monitoring Chapter of the Resource Document outlines how the performance indicators will be used to monitor and refine the Plan.

2.   BACKGROUND

2.1   Ecological History

According to Victoria's Koala Management Strategy 2004, Victoria has a large and thriving koala population, with koalas widespread in lowland and foothill eucalypt forests and woodlands across much of Victoria where the annual rainfall exceeds 500 mm. However, it is highly probable that the situation is not as healthy as expounded by this statement. For example, Ballarat's annual rainfall has historically been around 700 mm, ideal for koalas. For the past ten years, however, this has reduced markedly to around two thirds of this average, with little prospect of the situation improving as predicted climate change impacts take effect. More broadly, after near elimination of the koala on mainland Victoria during the early 1900s, decades of translocations or re-introductions from mainly one isolated population have seen the species reappear in many lowland and foothill eucalypt forests and woodlands only to see the koala exposed to ongoing threats of disease, the loss and fragmentation of habitat, dog attacks, fires and collisions with vehicles.
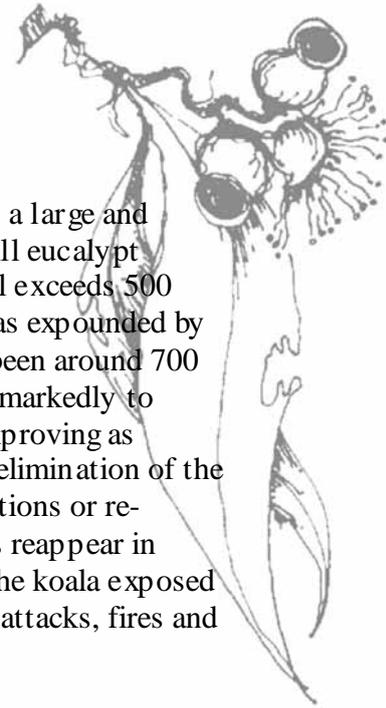
In most Victorian forests and woodlands, koala populations are naturally low (i.e. less than one koala/hectare) and koalas can be difficult to see in these environments. However, in many quite accessible places wild koalas can be readily located and observed. In Ballarat such areas include Mt. Buninyong and the Canadian Forest. Residences close to these areas are frequently visited by koalas, making the nature of the relationship of the koala with the human population and its panoply of apparently essential accoutrements, such as dogs and cars, crucial to the survival of the koala in Ballarat.

A survey of Ballarat residents (Schlagloth, Callaghan & Santamaria 2004) on the distribution of current and historical koala sightings and attitudes of residents towards koala conservation needs and initiatives undertaken in conjunction with the Ballarat City Council has provided valuable information about the current state of the koala population within the City. This information can be accessed from the Ballarat City Council web site at http://www.ballarat.vic.gov.au/Files/Ballaratresidentskoalasurvey.pdf .

In addition, information gathered from other strategies and reports (e.g. the City of Ballarat's LINCS Strategy; Victoria's Koala Management Strategy) includes data about the timing and pattern of human settlement, land use and land clearing, as well as information concerning bushfires, floods and the hunting of koalas.

This historical information emphasises the need for an integrated approach to future management of the local koala population. Koalas and other wildlife do not occur exclusively in protected areas and thus it is essential to involve private landholders and the community in local koala conservation and management initiatives.

The ecological history information in conjunction with Department Sustainability and Environment pre-clearing maps has provided guidance regarding the likely pre-European vegetation of areas that have since been predominantly cleared. This information will

assist with the identification of land for potential habitat restoration projects as described in the Resource Document.

2.2   Role of the Australian Koala Foundation

The Foundation is the premier national body concerned with the sustainable management of koalas throughout Australia. It carries out major roles in koala research and promotion of the koala as part of Australia's natural environment and its importance within the national psyche. The Foundation supports international students doing research, as well as domestic students.

As an independent, scientific organisation, the not-for-profit Foundation works with different sectors of the community, as well as an ever growing number of people within Australia and beyond who share a vision of the koala as a flag-ship species for conservation, tourism, sensible development, education and repair of degraded bush land.

The biggest threat to koalas and many other species in Australia remains the loss and fragmentation of habitat, together with dog attacks, collisions with cars and bushfires. It is very difficult to effectively plan for koala conservation without knowing which vegetation communities and locations are important or vital to the different populations of koalas.

The AKF's Koala Habitat Atlas mapping methodology has now been applied over a wide range of project areas in Eastern Australia, including more than ten municipalities. The Victorian Government has recommended use of the AKF's Koala Habitat Atlas to Councils within the Government's recently exhibited Draft Koala Management Plan.

2.3   Role of the City of Ballarat

The Ballarat City Council has a number of important roles to play that are related to the management of the natural environment and hence the survival of the koala within the City.

First and foremost, the Council is responsible for land use and environmental planning under the *Planning and Environment Act 1987*. Through the *Ballarat Planning Scheme*, the Council sets policy and regulations for the use and development of land and for the management of the environmental and cultural assets that are often on that land. The way in which land is used and developed has a major impact on the sustainability of natural and cultural assets, indeed whether they survive at all. The actions of Council in applying policy and upholding or enforcing the regulations and conditions that flow from those policies send very clear messages to landowners, developers and the community generally as to those matters that Council thinks are important.

Council has a responsibility through the planning system also to implement certain State policies and regulations. This can occur through the Planning Scheme with the implementation of the *State Planning Policy Framework* and the provisions of land use zones and overlay controls that are common throughout the State and which have been
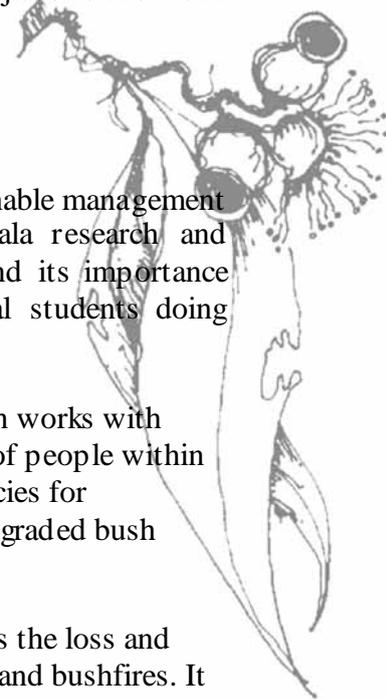
determined at State Government level. For example, the State Native Vegetation Framework and the state-wide native vegetation protection controls, two regulatory mechanisms of considerable relevance to the protection of the koala, are included in the Ballarat Planning Scheme.

In its role as land manager, Council also has responsibilities to implement and enforce State land management legislation and regulations, including provisions of the Catchment and Land Protection Act; for example in the case of the control of weeds that are on Council owned or managed land. Council controls many public areas that are utilised by koalas; e.g. the Mt Buninyong Scenic Reserve and the Yarrowee River Reserve. The way these areas are developed; e.g. through the provision of walking trails, the control of vehicle access and the provision of other facilities such as information boards, can influence the way in which these reserves are used, and hence whether or not these areas remain or are enhanced for use by koalas and other native fauna.

Council can and does enhance this role through the cooperative relationships that it has established with State Government agencies such as the Department of Sustainability and Environment, Central Highlands Water and the three catchment management authorities that cover the City – Corangamite, Glenelg Hopkins and North Central.

Council determines and enforces Local Laws that cover matters such as the keeping of dogs and cats, burning off and the regulating of vehicles, including controlling access to public land and parking. The importance given to these areas of responsibility and the way in which the relevant controls are administered are matters of considerable importance to the effective management of koalas, as the management of dogs, the control of fires and the behaviour of vehicle owners are all issues identified by this Plan and in the research that has been conducted to date as matters crucial as to whether or not koalas will survive in Ballarat.

Perhaps Council's most well recognised and most familiar role is that of infrastructure provider. This means the provision of roads and drainage systems, open space areas and recreation reserves. The way in which each of these types of infrastructure is provided can have a material effect on the presence or survival of koalas in a particular area. The location, design and speed limit set for roads can all have a direct impact on the mortality of koalas. The number of koalas killed crossing roads is a major influence on koala numbers. As yet, an effective means of providing for koalas to cross busy roads has yet to be found. In the case of open space areas and recreation reserves, the removal of native vegetation, the provision of large, open, grassed areas and the provision of major facilities can make such areas quite unsuitable for use by koalas.

Less well understood or recognised roles of Council are those of educator and communicator. Through its Media Unit and through the work of its various departments, Council is constantly providing advice and information about a very wide range of topics and matters of interest. Some of these that are of relevance to the care of the koala include advice about native plant propagation, opportunities for involvement in environmental rehabilitation projects such as National Tree Day, opportunities for bush walks and cycling tours, clubs and groups that can be joined and information about planning controls and Local Laws.
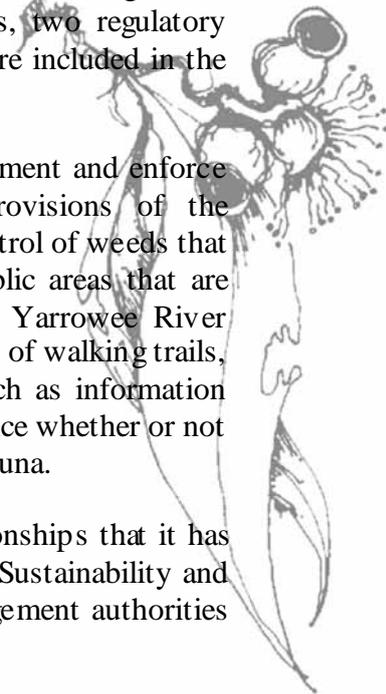
The adoption of this Plan, the establishment of the proposed Implementation Committee, the continuation of the AKF-Ballarat City Council koala initiatives and the appointment of an Executive Officer to assist the Committee – all actions recommended to be undertaken as a high priority by this Plan – provide excellent opportunities for Council to support, undertake and promote actions that are required to ensure the survival of the koala in Ballarat.
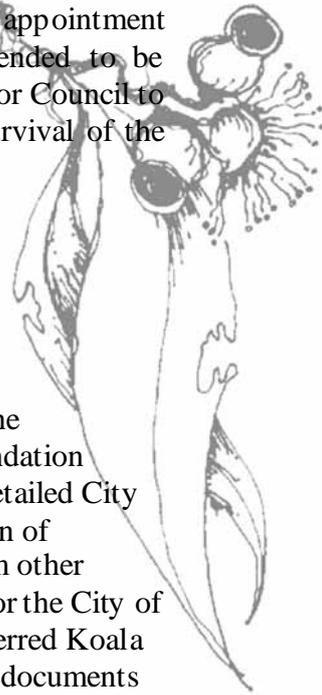
2.4   Background Research

2.4.1   Koala Habitat Identification

The identification of Koala habitat within the City of Ballarat has involved the preparation of a City-wide Koala Habitat Atlas by the Australian Koala Foundation (Callaghan, Mitchell, Thomson & Bailey 2004), the compiling of the very detailed City of Ballarat Forest & Woodland Vegetation Report 2006 and the incorporation of outcomes from a community-based survey combined with koala records from other sources. This resulted in the preparation of a Koala Habitat Planning Map for the City of Ballarat which identified and ranked koala habitat into three categories: Preferred Koala Habitat, Supplementary Koala Habitat and Marginal Koala Habitat. (These documents are contained in full in Part 2 – Resource Document of this Plan.)

The **Koala Habitat Planning Map** (Appendix 5) was derived from the Koala Habitat Atlas by adding 100m Habitat Buffers to all Preferred Koala Habitat and incorporating computer-generated Habitat Linking Areas that show areas where consideration should be given to protection, revegetation or enhancement through creating vegetated links between patches of Preferred Koala Habitat. The Koala Habitat Planning Map provides the basis for identifying the areas considered to warrant the highest level of habitat protection including all **Preferred Koala Habitat and Habitat Buffers**. **Supplementary Koala Habitat, including Habitat Linking Areas over Supplementary Koala Habitat,** also requires protection, although to a lesser degree.

The Ballarat Koala Habitat Atlas (Callaghan, Mitchell, Thomson & Bailey 2004) identified the extent and distribution of koala habitat in the City based on a categorisation of the forest and woodland communities in terms of the relative abundance of preferred tree species in conjunction with the soil types. The field survey results and subsequent analysis support a model of koala habitat utilisation in the City of Ballarat that is primarily based upon the **Manna Gum *Eucalyptus viminalis ssp. viminalis*** as the preferred food source of koalas. This eucalypt species was shown to be the subject of significant levels of utilisation by koalas in the study area. However, it has also been identified that the relative lack of this species within the City means that **Messmate Stringybark *Eucalyptus obliqua*** is utilised extensively by koalas as a substitute food source**. These two tree species are best described as 'primary' koala food tree species and constitute the preferred koala food trees for the City of Ballarat** and their identification as such provides the basis for the koala habitat model and associated mapping (See Chapter 5).

Blue Gum *Eucalyptus globulus ssp. globulus* was classed as a likely 'primary' koala food tree species. Including when occurring in a plantation situation.

Brown Stringybark *Eucalyptus baxteri* and Rough-barked Manna Gum *Eucalyptus viminalis ssp. cygnetensis* were used to a lesser extent but were still used significantly and were therefore classified as 'secondary' koala food tree species.

In addition to protecting areas of significant koala habitat, preferred koala food trees warrant protection wherever they occur within the City. For the purposes of this Plan individual preferred koala food trees are afforded protection within all categories of koala habitat.

Koalas are also known to utilise a number of other eucalyptus and non-eucalyptus tree species within the City of Ballarat.

The procedure undertaken to identify koala tree species and habitat preferences within the City of Ballarat are detailed in chapters 4 and 5 of the Resource Document.

2.4.2 Residents' Survey

The Ballarat Community-based Koala Survey (2002) was modeled on that undertaken in conjunction with preparation of the Draft Port Stephens Koala Management Plan (1994) whilst the layout for reporting the results of the community survey was based on the subsequently approved and adopted 2001 Port Stephens Plan.

The survey sought to obtain both contemporary and historical records of community koala sightings for the City of Ballarat within the living memory of residents. The survey also sought to gauge community attitudes to a range of potential management options for the conservation of the local koala population.

Additional details about the findings of the survey are included in Chapter 4 of the Resource Document.
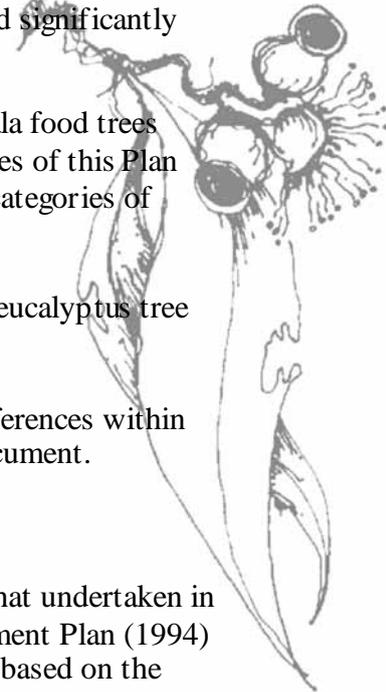
3. THE PLAN

3.1 Structure and Approach

The Plan is essentially set out in two parts: in this Chapter, *discussion and information* about each of the topics relevant to the care and management of the koala, leading to the *recommended actions for implementation* that are set out in Chapters 4 and 5.

The behaviour of people, as much as the behaviour of the koala, is critical to the koala's survival in Ballarat, hence the particular emphasis given to **Collaboration and Integration** and **Education and Awareness** and in the sections below to develop that important sense of "**Community Involvement - Living with Koalas**".

Emphasis is also given to the use of planning controls and other forms of regulation and to the development of a well-formulated publicity program.

3.2 Strategic Context

3.2.1 Links to other strategies, policies and programs

There are many public policies and strategies that are relevant to the task of protecting the koala; e.g. the National Koala Strategy, Victoria's Koala Strategy, the State Native Vegetation Framework, the Ballarat Strategy Plan 1998, the Ballarat Municipal Strategic Statement, particularly the Environment section, the Ballarat Region Conservation Strategy and soon to be released Environmental Sustainability Strategy, development of the City's Open Space Strategy, the LINCS Strategy and its implementation through the likes of the Yarrowee River Master Plan, the implementation of Master Plans for various reserves (e.g. Mt Buninyong Scenic Reserve), City Council and AKF native vegetation mapping projects leading to amendments to the Ballarat Planning Scheme, other provisions of the Ballarat Planning Scheme, including native vegetation protection controls, the three Catchment Strategies that cover Ballarat and the development of the Ballarat Environment Network's Biodiversity Web concept.

The implementation of the majority of these initiatives is reflected in Blueprint Ballarat and Council's 2006-11 Council Plan.

In the Ballarat Strategy Plan 1998, one of 10 principle objectives is to:

"Pursue development of the City based on ecologically sustainable development principles."
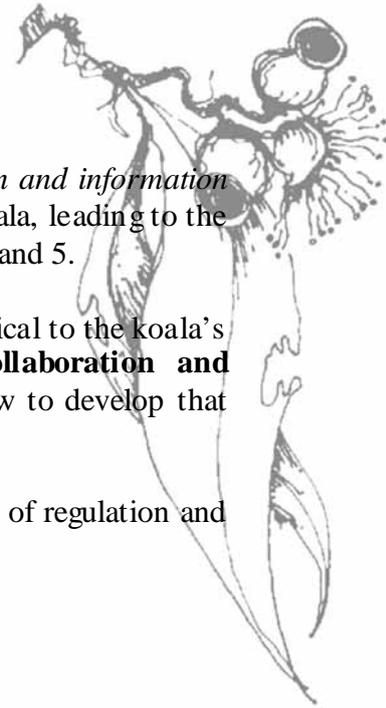
In the Municipal Strategic Statement, Clause 21.04, the Environment Objectives are:

- To minimise any adverse impacts of use and development on native flora and fauna and their habitats.
- To protect and enhance regional native vegetation.
- To rehabilitate, protect and enhance landscapes with identified values.

Strategies to achieve these Objectives include:

- Minimise the detrimental impact of future development on remnant vegetation and wildlife habitat.
- Protect areas of significant native vegetation.
- Ensure that new residential subdivisions protect remnant vegetation and do not threaten the viability of rare and threatened flora and fauna populations.
- Protect identified landscapes through the application of appropriate overlays.
- Encourage the use and development of land in a manner that enhances and protects identified landscape values.
- Protect historic trees (both native remnants and planted specimens) with cultural and historic values.
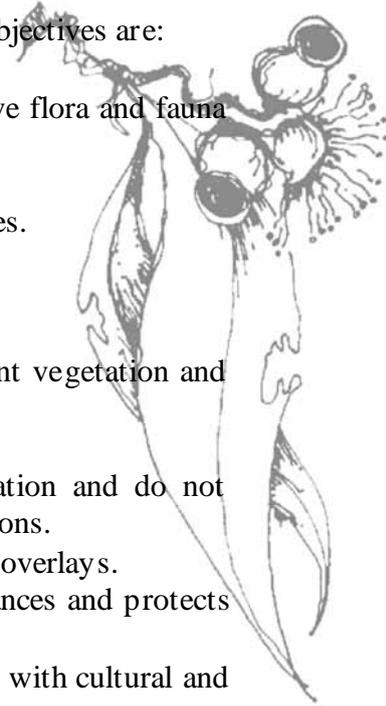
Further strategic work required includes:

- Preparing biodiversity mapping and incorporating the information as an Overlay in the Ballarat Planning Scheme as the key strategic step to ensuring information concerning flora and fauna of the City is accessible and utilized as part of the decision-making process.
- Undertake native vegetation mapping to identify areas of significant native vegetation for inclusion in the Vegetation Protection Overlay.
- Review biodiversity mapping supplied by the DSE and review Vegetation Protection Overlays and Environmental Significance Overlays.
- Identify landscapes with important biological and physical features, cultural or historic values and scenic qualities that provide visual diversity when viewed from public areas and thoroughfares.
- Investigate appropriate means by which significant native vegetation and habitat on undeveloped land zoned Residential 1 can be protected.

Settlement 21.05 – Objectives - aside from providing suitable areas for and types of residential development - also include:

- To ensure that changes in built form within established urban areas are sympathetic with any historic significance or valued character of an area.
- To protect and enhance the quality of the City's presentation, as defined by its built and natural environments.

Strategies to achieve these Objectives include:

- Encouraging a range of lot sizes and densities in new subdivisions.
- Protecting areas with identified character values, including buildings, vegetation and landscapes.
- Identifying and protecting through appropriate planning controls important views and vistas.
- Maintaining low-density forms of development between Mount Clear and Mount Helen and between Mount Helen and Buninyong.

Victoria's State Koala Management Strategy states that while many of Victoria's koala habitats are protected in the State's conservation reserves' system, there are important koala populations that occur in semi-rural freehold land, with increasing infiltration into semi-urban areas, and cites Ballarat as one example.

Key principles of the Strategy include:

- Integrating koala conservation and management with frameworks and plans such as the Native Vegetation Management Framework;
- Recognising the key role played by planning schemes in influencing an area's capacity to maintain koala habitat;
- Recognising that fragmentation of habitat is a critical issue for koala conservation, based on the koala's low capacity to travel between fragmented habitats.

These principles underpin the approach taken by this Plan to both the management of the koala and the management of its habitat.

A strategic framework for native vegetation management is provided in Victoria's *Vegetation Management Framework* and in native vegetation plans prepared by catchment management authorities. The primary goal of the *Framework* is to achieve:

"A reversal across the entire landscape of the long –term decline in the extent and quality of native vegetation leading to Net Gain."

The Native Vegetation Retention Controls, established under the Planning and Environment Act 1987 are also an important policy tool for habitat protection when a development or change in land use is proposed on freehold land.

3.2.2   Integrated habitat management

In Victoria, Biodiversity Action Plans prepared for each bioregion will provide an integrated framework for achieving biodiversity outcomes at a landscape scale. These plans are progressively being developed by a coalition of DSE, CMAs and key regional stakeholders. They focus on the protection, enhancement and linking of remnant vegetation and will benefit koala conservation in the medium to long term.

Habitat Conservation Measures
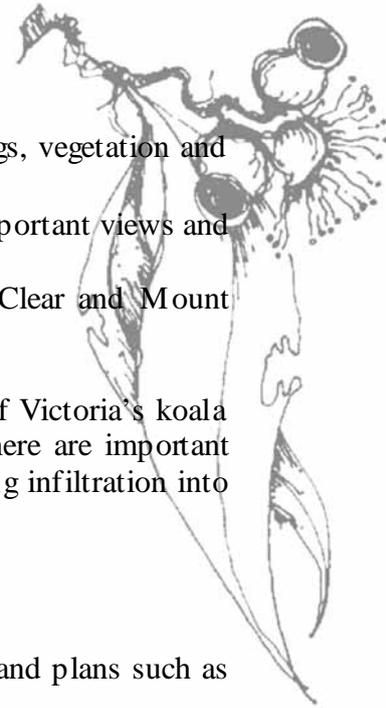
An effective strategy to conserve koala habitat is essential to provide for the long-term survival of the koala population within the City of Ballarat. Such a strategy will need to involve the integration of a range of conservation measures including regulatory (legislative) and incentives-based approaches, in conjunction with effective community education.

The ongoing drought experienced by Ballarat region has contributed to a spreading of lerps that especially affect some *eucalyptus* species. Lerps are a very small leaf-sucking insect. Amongst the koala food tree species that are affected are *E. ovata* (Swamp Gum) and particularly *E. viminalis* (Manna Gum), the most preferred koala food tree species in Ballarat. There is scope for a research project to investigate the impact that the spread of lerps has on the koalas' food resource and therefore on the conservation of the species.

The Habitat Conservation Chapter of the Resource Document details the range of conservation measures proposed for application in the City of Ballarat.

The Victorian land use planning system offers wide scope for managing the use and development of land through the implementation of policies, strategies and associated regulatory controls, including for the management, care and protection of natural assets such as native vegetation, waterways and landscapes. Proposed regulatory measures to protect and enhance koala habitat through the use of the planning system are set out in Section 3.5.2. These measures include utilising appropriate land use zones for high priority areas of koala habitat and to require consent for any proposed use or development within areas identified as **Core Koala Habitat** and to protect preferred koala food tree species wherever they occur.

The matters for consideration and requirements contained in Appendix 2 of the Plan in relation to planning applications proposed in areas containing koala habitat require that applicants, Council planners and other decision-makers have a sound understanding of koala habitat types within the City of Ballarat. The various habitat categories and their areas are detailed in Chapter 5 of the Plan Resource Document and their distribution is shown on the Koala Habitat Planning Map. Hard copies of this map are available from Ballarat City Council.

Voluntary habitat conservation measures recommended for consideration include conservation agreements such as Section 173 Agreements under the Planning and Environment Act 1987, Land for Wildlife agreements and Victorian Conservation Trust covenants, and the rezoning by landowners with properties containing koala habitat to an appropriate land use zone.

Potential financial incentives schemes that could be employed to encourage landholders to voluntarily conserve koala habitat include habitat management grants, no cost habitat assessments and land management plans, rate rebates, development incentives and transferable development rights. The use of these measures is outlined in Chapter 6 - Habitat Conservation in the Resource Document.

A number of land management agencies have land holdings in the City of Ballarat, including the Ballarat City Council, Parks Victoria, the Department of Sustainability and Environment, Central Highlands Water and the Ballarat Environment Network. The
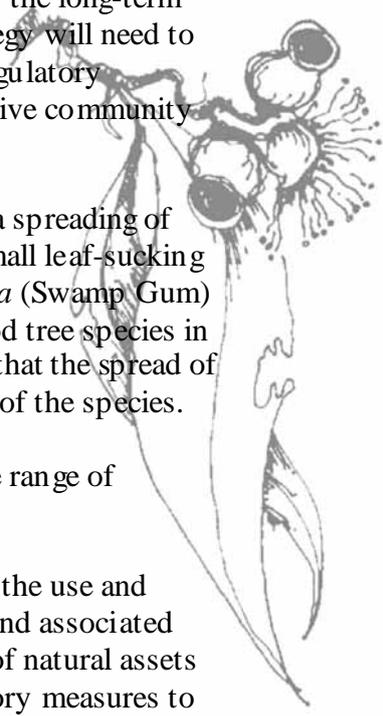
potential role of such agencies in the management of koala habitat in the City of Ballarat is discussed in Chapter 6 of the Resource Document.

Habitat Restoration

In addition to the protection of existing habitat, the Victorian community is putting a great deal of effort into revegetation work throughout the freehold land estate through programs such as Landcare and Bushcare. This often includes the re-establishment of indigenous eucalypt species which will increasingly benefit the koala population as these plantings mature.

In Ballarat, the most notable example has been the LINCS Strategy Yarrowee River and tributaries restoration project. This project has involved the revegetating of more than 20 kilometres of waterway reserves, the construction of five large water treatment wetlands and the installation of a range of litter trap devices. More than 20 kilometres of walking paths have also been part of the project.

LINCS stands for Linear Network of Communal Spaces, a title aimed at emphasising the importance of linking human activity with care, management and enjoyment of the City's natural environment. In this regard, thousands of volunteers have been involved in revegetating the reserves and other activities, a number of them having been run by the AKF as a partner in the LINCS Strategy implementation process, often with the involvement of international visitors.

A strong emphasis in this Plan is to maintain and strengthen the City/community partnership in environmental management through the involvement with LINCS projects, at the same time emphasising the importance such projects play in the care of the koala.

Other LINCS projects include the development of the Ballarat Skipton Rail Trail and the preparation of roadside management plans for the City.

In the absence of careful management, the remaining koala habitat areas have the potential to become further degraded and fragmented to the detriment of koalas and other native species. Existing land management strategies and practices rarely relate specifically to the restoration of koala habitat. Consequently, a management strategy is considered necessary to identify principal impacts associated with land degradation and to outline opportunities to optimise koala habitat quality within the City of Ballarat. Furthermore, as the resources for restoration works are finite, it is essential that areas be prioritised to ensure the maximum possible benefit of habitat restoration efforts to koala conservation.

Revegetation actions should aim to increase the size of existing forest or woodland patches, increase the connectivity of remnants through the establishment of corridors and stepping stones of habitat and provide an increase in tree cover.

Koala habitat restoration projects in the City of Ballarat will need to involve a range of activities including revegetation (plantings), assisted regeneration (e.g. control of weeds; fencing to exclude livestock) and reconstruction. Selection of the most suitable approach
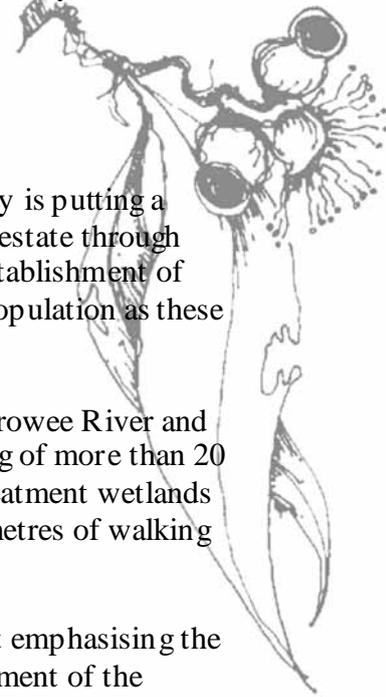
for different sites will depend upon the specific requirements to achieve recovery of the vegetation communities. Regeneration techniques are most appropriate where natural recovery potential is high, whilst more intensive reconstruction activities may be necessary in more heavily cleared and disturbed areas where the potential for natural recovery is low (Greening Australia 1999).

Habitat reconstruction as defined by Saunders and Hobbs (1995) involves recreating the ecological requirements of the target species. For koalas this will include revegetation with suitable trees for food, shelter and social interaction. However, Saunders and Hobbs (1995) maintain that habitat reconstruction means more than simply replanting vegetation. It also involves facilitating the restoration of other ecosystem components and processes that are vital to ecosystem function (see the Chapter 7 - Habitat Restoration, of the Resource Document). Thus, the restoration of Koala habitat should ideally involve more than simply replanting suitable species of trees. Habitat restoration projects should also involve measures to ameliorate impacts from relevant threatening processes.

The computer-modelled Habitat Linking Areas shown on the Habitat Linking Areas for Restoration Map (Appendix 5) should be used as a guide to identifying priority areas of mainly cleared or degraded lands for potential restoration.

In fact, the Map denotes those areas of the City that could be included in a major, landscape-scale revegetation program of national significance. Potentially titled the "Ballarat Koala Biolink", this project, using the considerable impetus built up around the local Landcare movement and the achievements of the LINCS program over more than a decade and the work of the joint City of Ballarat/ Australian Koala Foundation partnership project over the past five years, has the capacity to achieve a monumental level of change in the quantity and quality of indigenous vegetation in Ballarat.

Such a project has the capability of delivering major outcomes in terms of environmental enhancement as a consequence of being built on the considerable strategic scientific, environmental and land use planning work that has been carried out in the City over the past decade.

Major impacts on koalas within the City of Ballarat include habitat destruction, degradation and fragmentation, urban expansion, and feral animals. These factors, together with others such as roaming domestic dogs, traffic and weed infestation can collectively lead to the localised extinction of koala populations. All the more reason why a major habitat/native vegetation restoration project is required as a critical component in safeguarding the koala.

Koala Habitat Destruction, Degradation and Fragmentation

The key piece of legislation in Victoria for the protection of flora and fauna, including the management of threatening processes, is the *Flora and Fauna Guarantee Act 1988*. The objectives of the Act are:

> (a) *"to guarantee that all taxa of Victoria's flora and fauna can survive, flourish and retain their potential for evolutionary development in the wild; and*
> (b) *to conserve Victoria's communities of flora and fauna; and*
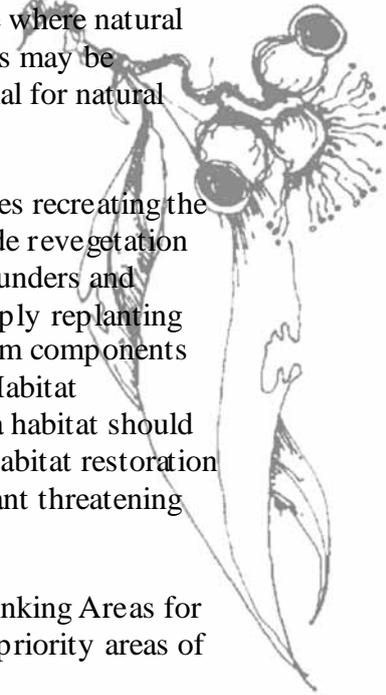
(c) to manage potentially threatening processes; and

(d) to ensure that any use of flora or fauna by humans is sustainable; and

(e) to ensure that the genetic diversity of flora and fauna is maintained; and

(f) to provide programs:

> *(i)   of community education in the conservation of flora and fauna; and*
>
> *(ii)   to encourage co-operative management of flora and fauna through, amongst other things, the entering into of land management co-operative agreements under the **Conservation, Forests and Lands Act 1987**; and*
>
> *(iii)   of assisting and giving incentives to people, including landholders, to enable flora and fauna to be conserved; and*

(g) to encourage the conserving of flora and fauna through co-operative community endeavours."
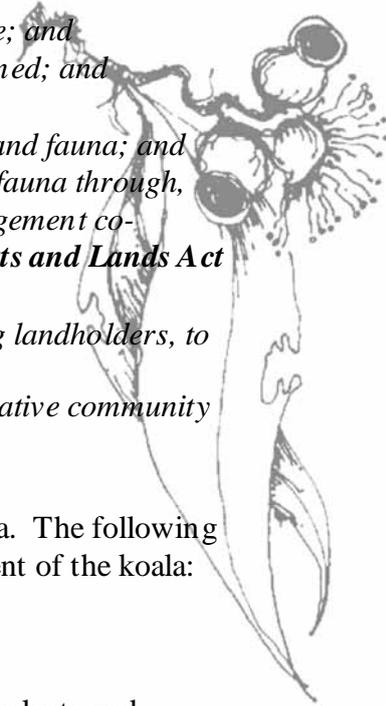
The Act details processes considered to be threatening to fauna and flora. The following listed threatening processes are of particular relevance to the management of the koala:

❖ Habitat fragmentation as a threatening process for fauna in Victoria.

❖ High frequency fire resulting in disruption of life cycle processes in plants and animals and loss of vegetation structure and composition.

❖ Inappropriate fire regimes causing disruption to sustainable ecosystem processes and resultant loss of biodiversity.

Although the koala is not listed as a threatened species under the Act, **the Act's objectives are applicable to the conservation of all of the State's flora and fauna a**nd the threatening processes listed are as much a threat to the survival of the koala as they are to other, rarer species.

Habitat destruction and degradation has devastating effects on populations of native wildlife including koalas (National Koala Conservation Strategy (ANZECC 1998)). As well as potential death or injury to koalas during habitat clearing, habitat destruction and degradation are likely to increase pressure on adjacent habitat as remaining animals are confined to smaller areas, with individuals forced to live under sub-optimal conditions.

Feral Animals

Feral animals including dogs, foxes, cats and others are known to inhabit the City of Ballarat. From the evidence available, it is considered that feral dogs and foxes pose a lower threat to koalas in Ballarat when compared to the risks associated with domestic dogs and vehicular traffic.

The impact of feral animals such as dogs and foxes on koalas is exacerbated when habitat is fragmented, as koalas are forced to spend more time on the ground moving between trees, thus making them more vulnerable to predation (Hume 1990). Hence, restoration of fragmented habitat, in conjunction with measures aimed at controlling feral animals, should help to reduce impacts on koalas.

Bushfires

Bushfires are an uncommon occurrence in the City of Ballarat. However, forested areas in neighbouring shires, not far from the City's boundaries, due to climate and location of these areas and a high incidence of arson, often succumb to serious bushfires which burn rapidly and often over large areas of land. The Creswick forest area to the north and the Enfield forest area to the south in particular are highly susceptible to wildfires due to the high density of bushland and the type of vegetation present (predominantly sclerophyllous trees and shrubs). Other areas within the City that are also potentially high-risk areas include pine plantations to the north, east and in the Mt Clear / Mt Helen areas. Koalas are known to travel through these plantations en route to other, native habitat.

Nursery Stock

The selection of appropriate nursery stock for revegetation works is crucial to the success of restoration programs. Stock should be propagated from local provenance seed harvested from individual trees that have been utilised by koalas. Propagation material should be collected from a range of well-spaced parent trees to avoid inbreeding and to ensure potential for reproduction (Greening Australia 1999). Seedlings produced in nurseries should be labeled with species name and collection locations.

In Ballarat, there is the opportunity to utilise the Ballarat Region Seed Bank as a reliable source of local provenance seed and to utilise the Ballarat Community Indigenous Plants Nursery for propagation purposes. This Nursery grows exclusively local provenance terrestrial and aquatic plants of all plant types, from grasses, sedges and aquatic plants to ground covers, shrubs and trees. Particular attention is paid by the Nursery management to the sites into which plants are to be planted, species selection, origin of seed source and ecology of the planting site. All of these factors are important when carrying out planting that needs to meet the requirements of the koala.

The Nursery services the Ballarat City Council and numerous land care and community groups, principally through LINCS and Greening Ballarat initiatives, by providing plants and professional advice for revegetation projects carried out by those organisations.

3.3 Education and Awareness

3.3.1 Community Education

Public education is an important component of initiatives to conserve the koala population within the City of Ballarat. Public education programs should seek to promote a sense of stewardship and increase awareness of the plight of the local koala population.

Methods of disseminating information to the general public could take the form of information brochures, sign posting, environmental education programs, local council telephone hold recordings and use of the local media. Combination of a range of methods is recommended as the most suitable approach.
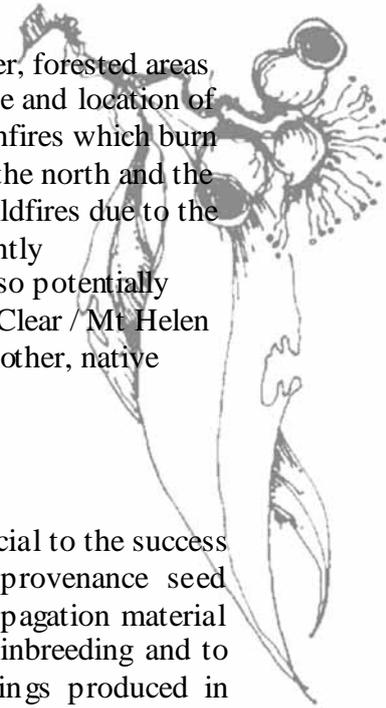
The AKF has produced educational material and information kits for primary and secondary schools, as well as for the general public. The LINCS Yarrowee River restoration project and the draft City of Ballarat Environmental Sustainability Strategy both contain community education components that can be directed to emphasise the situation with the koala in Ballarat as an example of managing the City's biodiversity assets. As dog management and behaviour is a major issue in the management of koalas, it would be appropriate to utilise part of dog registration fees to highlight this issue as another reason why there is a need for responsible dog ownership. It is important to note, however, that promotion of responsible pet ownership is already a responsibility of Council, a responsibility that includes provision to the State Government of an amount levied from the dog and cat registration fees that in 2005-06 amounted to $45,000. Another approach would be to request that the State Government utilise part of this funding on a targeted program in Ballarat directed at increasing dog owner awareness of the likely impact of the unrestrained behaviour of their dogs on koalas.

This and other funding would be used to support a community education program with the suggested title of "Living with Koalas". The program would include the production of brochures, media stories and targeted consultation with and talks to community groups and individual landowners in areas frequented by koalas.

3.3.2 Landowner Education

Working with landowners who have koalas on their properties or who live in areas populated by koalas needs to be a particular focus of the community education program. Whilst many people support initiatives to care for and support Ballarat's koala population, for many other people the presence of koalas as a nuisance and an impediment to the residents' lifestyle. Residents can tire of koalas entering properties and "stirring up" residents' dogs. Other people object to speed limits being imposed on local roads for the sake of avoiding hitting koalas that cross those roads. Still other residents target koalas in acts of cruelty.

Establishing a climate of positive interaction between residents and koalas is crucial to the long-term survival of the koala in Ballarat. This is so because so much of the koala habitat in the City of Ballarat is located in residential or rural residential areas. Far more will be achieved for the koala through landowner education, including the participation of landowners in koala-support projects than will be achieved through attempts at enforcement or other regulatory means, although they also need to part of the koala management process where regulatory action becomes appropriate and necessary.

3.4   Community Involvement

3.4.1   Contributing to Habitat Restoration

There are numerous opportunities for the community to be involved in habitat restoration work. Implementation of LINCS and Greening Ballarat projects are part of long-standing City Council programs that are based on participation by the community in carrying out on-ground works, principally revegetation tasks. Land care groups, resident groups and service clubs also manage restoration projects, often in association with Council. Council's "Adopt a Park/Streamside/Roadside" program is an excellent way of
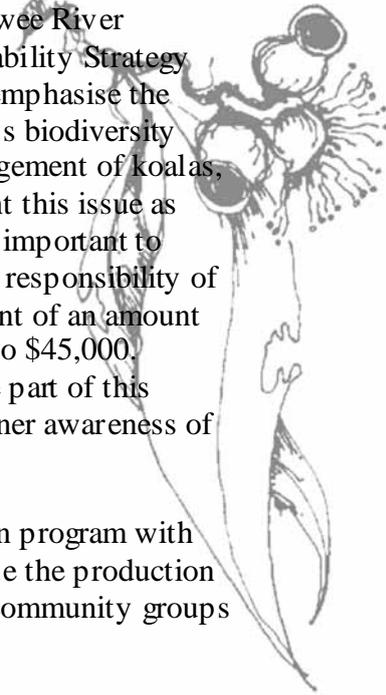
communities becoming responsible for parts of their local environment with the support of Council. Volunteers also assist with seed collection and plant propagation at the Ballarat Community Indigenous Plants Nursery, tasks that are essential to the effective restoration of local habitat types.

A number of the Actions pick up on these initiatives as integral components in the implementation of the Plan.

3.4.2   Living with Koalas

Beyond community education and increasing awareness, there are a number of practical activities or actions that landowners who have koalas on their properties or who live in areas populated by koalas can undertake. As dogs are such a significant problem where koalas are concerned, landowners can either chose not to own a dog or to confine the dog to an area of the property that cannot be accessed by koalas.

A very practical way of improving habitat is to have a land management plan prepared for a property. Land management plans are an excellent way of landowners developing a greater awareness of the environmental attributes of their properties and of improving those attributes through tasks such as revegetation works, weed control, stock management, fencing, facilitating regeneration, providing nest boxes, controlling pests such as feral dogs and foxes and providing suitable watering points.

The preparation of land management plans is an ideal basis for property owners to then participate in voluntary wildlife and environment protection schemes such as Land for Wildlife (operated by the Department of Sustainability and Environment) and Conservation Covenants (operated by the Trust for Nature). Contact details for these two programs are contained in Appendix 5 of the Resource Document.

3.4.3   Traffic Management

The available data set for the Ballarat area is too small to permit any definite conclusions with respect to koala fatalities and traffic speed. However, data analyses undertaken in conjunction with the 2002 Port Stephens Council Comprehensive Koala Plan of Management suggested that the greater the speed of the vehicle, the less the likelihood of a koala surviving a collision. However, collisions at any speed are often fatal and the most important consequence of slower speed is possibly a reduced likelihood of collisions.

Other factors, in addition to traffic speed, are considered likely to influence the chance of koalas being hit while attempting to cross a road. Such factors include: features of the roadside environment; the width of the cleared zone between the road edge and adjacent trees; the width of gravel shoulders; the presence of roadside drains; the height of roadside vegetation; the degree of habitat disturbance in adjacent areas; and the nature of any roadside lighting. These factors may affect driver ability to see a koala before it attempts to cross onto the roadway, and to subsequently avoid a collision.

Twenty-one of the 584 people (3.6%) who responded to the Ballarat Community-based Koala Survey (2002) reported having seen a koala dead on a road within the City of
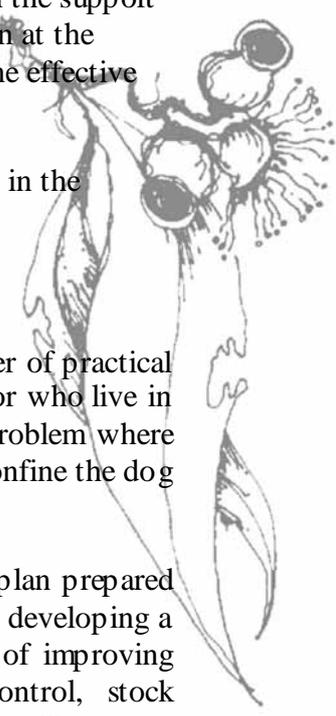
Ballarat in the period since 1995. Over the past two years, the Ballarat-based AKF Liaison Officer has also received reports of dead koalas from residents.

All of these reports and records of traffic collisions with koalas in the City of Ballarat reportedly resulted in the death of the koalas involved.

A large number of other reports on koala road incidents received from veterinarians and wildlife carers over the past 5 years needs to be collated and analysed, with this data being updated on a regular basis. This work has been identified as a proposed research project (see Part 2 - Chapter 14: Research) and is planned to start in the second half of 2006 with the employment of a research student to collate, research and analyse all of the collected data. The resulting conclusion should provide vital information on the state of the region's koalas with respect to the effects of both traffic and attacks by dogs.

The significance of the impact of road fatalities cannot be under-estimated as the actual number of fatalities is most definitely much higher, given the need to analyse existing records. Also, details of koala density and size of the remaining local koala population are not known, thus making it difficult to determine the precise impact of vehicle-related deaths without further research, in which case, a precautionary and conservative attitude to extent of this impact needs to be taken.

The koala road fatality records have been used as a basis for identifying a number of **Black Spot Areas, Conflict Areas, and Potential Problem Areas** for koala road collisions within the City of Ballarat (see Appendix 4 in Part 2). Ballarat City Council and VicRoads are encouraged to be proactive in attempting to reduce the impacts of roads on koalas and other native fauna.

A number of measures to reduce traffic collisions with koalas are discussed in the Traffic Management Chapter of the Resource Document.

3.4.4   Dog Management

Prior to the special registration campaign conducted Ballarat in October 2005 the City of Ballarat's dog register included approximately 9,500 dogs. Following the registration campaign, which included door knocking of properties by Council staff and a wide-spread publicity program, approximately 15,500 dogs were registered.

An unknown number of dogs would still be unregistered, but Bureau of Animal Welfare (www.pets.info.vic.gov.au/community/petshome) figures indicate that around 37% of homes across the nation have a dog. Based on approximately 40,000 households in Ballarat, there should be about 15,000 registered dogs, a figure that indicates that Ballarat must have an unusually high rate of dog ownership and that the campaign resulted in a high proportion of the likely total number of dogs being registered.

Irresponsible dog ownership results in numbers of uncontrolled, roaming domestic dogs within parts of the City. Roaming domestic dogs, particularly large dogs and dog packs, pose a significant threat to koalas and other fauna that occupy habitat near urbanised areas.

The Ballarat community-based koala survey (plus wildlife carer records) produced 70
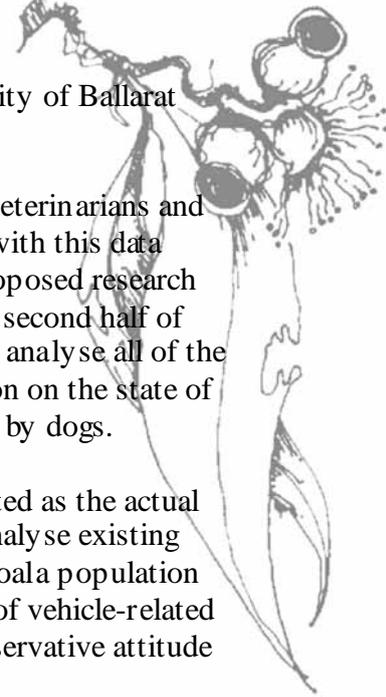
reports of dog attacks on koalas in the City since 1995. A majority of these koalas reportedly died as a result of the attacks.

There is a need to collect, collate and analyse all the available information on dog attacks on koalas in Ballarat in order that an accurate picture of the extent of the problem can be established. Based on the results of this work, actions can be developed that will be specific to the dog attack problem. At this time, on the basis of the largely anecdotal information available, the problem is almost certainly worse than it is currently assumed to be.

There is anecdotal evidence that because of the lack of quality food associated with the prolonged drought, koalas increase and prolong their movement on the ground and extend their home ranges in search of food and often water and by doing so, increase their exposure to collisions with cars and attacks by dogs. There is opportunity to test this hypothesis during controlled trials that could be conducted in Ballarat.

Chapter 9 - Dog Management of the Resource Document discusses a number of management strategies available to Council including regulation under the *Domestic (Feral & Nuisance) Animals Act 1994* and community education to promote responsible dog ownership.

Council's Animal Control (Local Laws) Officers are responsible for enforcing the Act. Staff deal with dogs at large and issue on-the-spot infringements or undertake court prosecutions as appropriate. These staff members, however, have no responsibility for dealing with wildlife other than reporting incidences of injury to the Department of Sustainability and Environment or local wildlife shelters for attention.

In 2005, the Act was amended to require that all councils in Victoria prepare a Domestic Animal Management Plan by no later than November 2008. The Bureau of Animal Welfare is currently developing a model/template that will be provided to councils to assist them in the development of these plans. It is hoped that these plans will enable councils, for example, to identify areas containing species, such as koalas, that are vulnerable to predation by dogs, with special conditions developed to protect native species.

Recommended actions for implementation in regard to dog management are included in Chapter 5 - Actions below.

3.4.5   Fire Management

Bushfire management features prominently in the policies and practices of government and land management agencies within the City of Ballarat. This is particularly the case with respect to the Country Fire Authority, which has considerable fire fighting resources, including a number of local volunteer urban and rural fire brigades operating throughout the City.

Fire Management responsibilities are currently determined by **the *Country Fire Authority Act 1958***, which stipulates the appointment of a Municipal Fire Prevention Officer, a Municipal Fire Prevention Committee and the development of a Municipal Fire Prevention Plan. This structure is currently undergoing change, with the pending
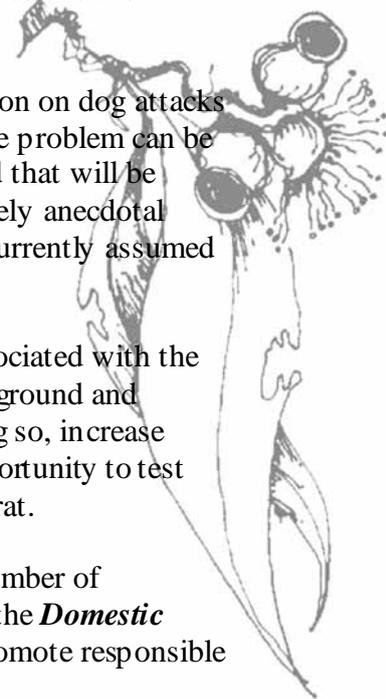
implementation of an Integrated Municipal Fire Management Planning structure.

The Act currently does not require that fire prevention plans deal specifically with the requirements of wildlife species in relation to fire management. Nor does it appear likely that fire management plans in future will deal with specific environmental issues such as koala management, as the plans likely to continue having a focus on fire behaviour, the protection of property and the protection of human life. Production of the Ballarat Koala Management Plan, however, provides an opportunity to integrate the requirements for management of wildlife and the protection of human life and property.

The Chapter 11 - Bushfire & Fire Management of the Resource Document addresses the potential impacts of both bush fire prevention and fuel/hazard reduction programs on koala habitat, highlighting the need for well-founded research as a basis for integrating varying requirements for fire management.
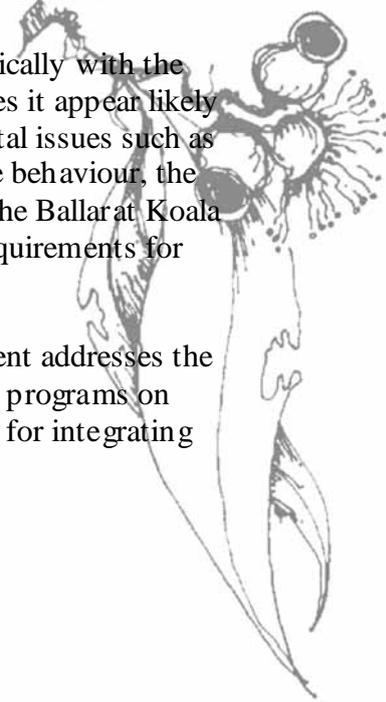
3.4.6 Managing Koalas in Emergency Situations

It is not unusual for the presence of injured or distressed koalas to be reported to Council, the AKF Liaison Officer or the City's wildlife shelters as a result of collisions with vehicles, dog attack or injury by fire. Some koalas that get chased by dogs get into situations that compromise their safety; e.g. they become injured or become isolated in a back yard with no native trees in an area of non-habitat. This can also happen during breeding time where, due to fragmentation of habitat, koalas appear in situations such as up power poles in Mair St or crossing busy intersections in the middle of Sebastopol.

As such impacts are often life-threatening or the cause of stress to koalas, there is the need to have effective procedures in place that can best assist koalas affected by this circumstances and those people endeavouring to provide assistance to injured or distressed koalas. In situations like those described above, the skill of personnel such as an experienced arborist is required to assist in capturing the animal.

In the past, assistance has been provided informally by Council's Arboricultural Unit; e.g. following the recent Brisbane Ranges bushfires as a gesture of good will and occasionally when an injured or disoriented koala has been found up a tree. The AKF Liaison Officer has also captured injured koalas that have been reported by concerned residents and has taken them to a vet or wildlife carer.

To formalise the arrangement with the Ballarat City Council, it proposed that selected staff within the Parks and Environment Section be trained in koala capture and that the Section purchase a catching pole and catching bag, to be permanently available for use. Training would include koala handling techniques, fire awareness and after-fire awareness training and tree climbing techniques.

3.5 Planning Controls

3.5.1 Use of the Planning System

The land use planning system established under the Planning and Environment Act 1987 provides a range of ways of detailing policy and controls over most aspects of land use and development. The system is built around the municipal planning scheme as the way of administering approvals for lands uses and developments and for implementing approved policies. This it does through the structure of each planning scheme that includes:

❖ A **Municipal Strategic Statement (MSS)** – a policy statement expressing land use, development and sustainability goals and strategies to achieve those goals for the municipality. This Plan recommends amendment of the MSS to include goals and strategies relating to the management of the koala.

The MSS states that *"remnant vegetation serves an important role in the preservation of natural biodiversity, provision of habitat, and environmental benefits such as water quality control, ground water management and soil stabilisation. In addition to its biodiversity values, vegetation also has scenic qualities and character. Areas such as Mount Helen and Nerrina are characterised by their bushland setting.*
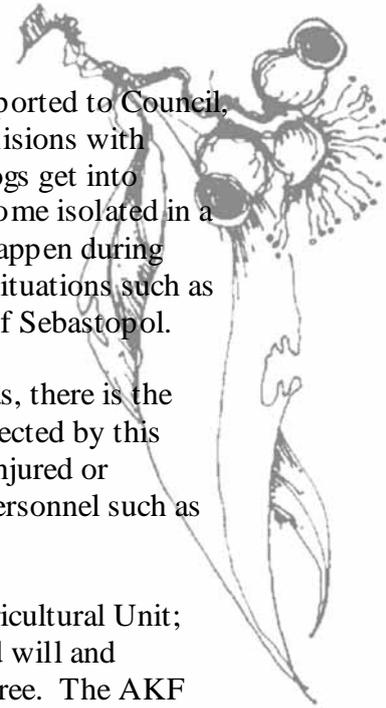
The vegetation in these and other similar areas is also to be protected. Road reserves and waterways supporting remnant vegetation are significant for their conservation value and visual quality, they also importantly provide linkages for fauna to other substantial pockets of remnant vegetation and provide high quality habitat. Enhancement of these linkages through revegetation programs such as the Greening Ballarat Project and the LINCS Project are initiatives in the City that will contribute to the biodiversity of the area both
in terms of flora and fauna species and provides contiguous habitat. In considering the future use and development of land every attempt must be made to protect, and where possible enhance, pockets of remnant vegetation". The MSS thus places a very strong emphasis on the retention and enhancement of the City's native vegetation.

❖ The **State Planning Policy Framework (SPPF)** – this part is common to all planning schemes in the State, being a statement of the State Government's policy on matters considered to be of state-wide or particularly strategic importance. Major environmental policies, linked to land use planning, are highlighted in this Framework, including the Native Vegetation Framework. The Victorian Koala Strategy is not mentioned in the SPPF. Council cannot amend the SPPF, however, it is recommended that the City of Ballarat request the State Government to amend the Framework to include appropriate reference to the Strategy. This inclusion would encourage and give direction to other councils to look at planning for survival of the koala;

❖ The **Local Planning Policy Framework (LPPF)** – this part is developed by the individual council to express a council's position and approach on what it sees as priority land use planning and development matters, in particular how the development of land to accommodate particular uses is to be carried out. It is recommended that the LPPF be amended to include policy about how development should be undertaken to provide or allow for the presence of koalas in areas identified as containing koala habitat. It is within the LPPF that the Ballarat Koala Plan of Management would be referenced;

❖ **Land Use Zones** – zones are used to allocate areas of the municipal area for primary uses; e.g. residential, commercial, industrial, open space, farming, rural living, environmental protection. Land use zones, as a rule, are allocated across the whole of the municipal area. There is opportunity to alter existing land use zonings to provide zones, such as the Environmental Rural Zone, that are appropriate to areas frequented by koalas, in particularly those areas identified as Preferred Koala Habitat; recommendations are included in the Plan in this regard.

The objectives of the Environmental Rural Zone are:

- *"To give effect to the environmental outcome specified in the schedule to this zone.*
- *To conserve and permanently maintain flora and fauna species, soil and water quality and areas of historic, archaeological and scientific interest and areas of natural scenic beauty or importance so that the viability of natural eco-systems and the natural and historic environment is enhanced.*
- *To encourage development and the use of the land which is in accordance with*
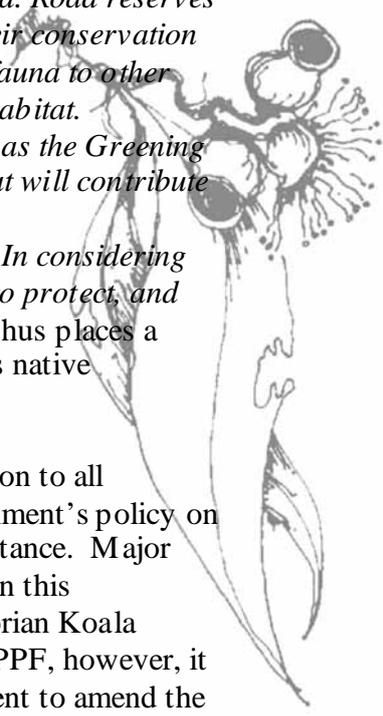
sound management and land capability practices, and which takes into account the environmental sensitivity and the bio-diversity of the locality."

❖ **Overlay controls** – can be allocated to parts of a municipal area to control or manage particular aspects of the use and development of land as they may affect existing attributes of the land, particularly those of recognised natural or built heritage value; e.g. the management of native vegetation, historic buildings, structures, trees and landscapes. The Plan recommends that the Ballarat Planning Scheme be amended to apply overlay controls – most notably the Environment Significance Overlay (ESO) – to land identified as Core Koala Habitat, to include provisions about the protection and enhancement of that habitat and to include requirements relating to the use and development of land that recognise and provide for the presence of koalas in a particular area by including a Schedule to the ESO in the Planning Scheme.

During 2006, Council is proposing introducing additional native vegetation protection controls through the extension of the Vegetation Protection Overlay. It is recommended that the proposed ESO provisions be introduced in conjunction with these additional vegetation protection controls in view of the strong association between the presence of native vegetation generally and Core Koala Habitat;

❖ **Specific use and development controls** – can be used to manage particular aspects of individual land uses; e.g. car parking provision, landscaping requirements. These controls generally apply to uses and developments no matter which zone or overlay control affects the use. Development provisions relating to matters such as koala-friendly forms of fencing or the control of domestic pets would be included under a Schedule to the ESO.

Once Council has adopted the Ballarat Koala Plan of Management and it has been incorporated into the Ballarat Planning Scheme, compliance with the Plan will constitute compliance with the Koala Management Strategy for Victoria for relevant matters in the City of Ballarat. However, where a site koala plan of management has already been approved in conjunction with a planning permit for a development or a subdivision has been approved subject to certain koala conservation/management constraints and they conflict with the provisions of the Plan, it will need to be recognised that the individual site koala plan of management or conservation/management constraints will continue to apply.

It is recommended that **Core Koala Habitat** should include all areas **of Preferred and Supplementary Koala Habitat** as defined in this Plan (and detailed in Part 2). **Core Koala Habitat** should also include those areas where site-specific assessments indicate moderate or high koala activity in accordance with the Spot Assessment Technique (Phillips & Callaghan 1995) (Part 2 - Appendix 7).

Preferred Koala Habitat and Habitat Buffers over Supplementary Habitat require the highest level of protection possible. **Supplementary Koala Habitat and Habitat Linking Areas over Supplementary Habitat** also require a high level of protection, though generally less than for Preferred Koala Habitat and Habitat Buffers (see chapter 5 of the Resource Document). **Preferred Koala Food Trees** require protection wherever they occur in the City of Ballarat.

3.5.2   Planning Controls for Habitat Conservation

It is recommended that all identified areas of **Core Koala Habitat** should be given protection under the Planning Scheme through application of the Environmental Significance Overlay (see Appendix 2) and that the existing land use zones for areas of Preferred Koala Habitat and Habitat Buffers that are aimed at protecting Preferred Koala Habitat be reviewed to determine whether a more appropriate zone such as the Environmental Rural Zone is warranted to support protection of those categories of koala habitat.

Where possible, the introduction of these new controls should be done in conjunction with other, relevant amendments to the Ballarat Planning Scheme, such as the proposed introduction in 2006 of additional native vegetation and/or landscape protection controls.

Proposed regulatory measures include:

❖ Utilising appropriate land use zones for areas of **Preferred Koala Habitat** and **Koala Habitat Buffers over Supplementary Koala Habitat;**
❖ The development of provisions for inclusion in the Ballarat Planning Scheme to require consent for any proposed use or development within **Core Koala Habitat (i.e. Preferred Koala Habitat, Koala Habitat Buffers over Supplementary Habitat, Supplementary Koala Habitat and Koala Habitat Linking Areas over Supplementary Habitat)** and to protect preferred koala food tree species wherever they occur.   Additions to the Municipal Strategic Statement and Local Planning Policy Framework (Appendix 1) and use of the Environmental Significance Overlay and associated Schedules (Appendix 2) are recommended in this regard;
❖ Guidelines for koala habitat assessment and information that must be supplied to accompany development applications and rezoning proposals;
❖ Performance standards for the assessment of development applications and rezoning proposals;

Performance standards have been prepared to guide the assessment of rezoning requests pertaining to land that contains **Preferred or Supplementary Koala Habitat, Habitat Buffers or Habitat Linking Areas**, and/or preferred koala food trees. These performance standards are contained in Appendix 3 of this Plan.

Performance standards for development applications and guidelines for koala habitat assessment are addressed in the following section, 3.5.3 - Development Assessment.

3.5.3   Development Assessment

The development assessment process refers to the procedures by which land use and development is assessed and regulated. This process represents an important means by which Council can regulate development to ensure the protection and effective management of koala habitat in the City of Ballarat. Assessment guidelines and development requirements have been established to standardise the treatment of issues relating to the management of koalas and koala habitat within the development assessment process.
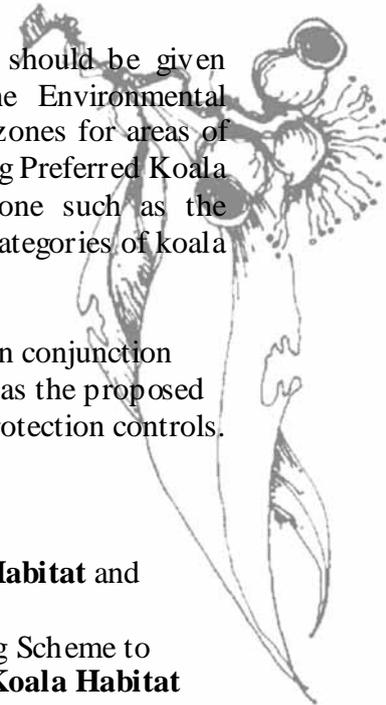
Matters requiring consideration and development requirements have also been prepared to guide the assessment of planning applications pertaining to **land that contains Preferred or Supplementary Koala Habitat, Habitat Buffers or Habitat Linking Areas over Supplementary Koala Habitat and/or preferred koala food trees.** These matters are contained in Appendix 2 of this Plan as part of a proposed Koala and Koala Habitat Protection Schedule to the Environmental Significance Overlay control within the Ballarat Planning Scheme.

Guidelines for Koala Habitat Assessment have been developed to provide the information necessary to support a rezoning proposal made under the provisions of the Planning and Environment Act 1987 or a development application made under the provisions of the Ballarat Planning Scheme. The Guidelines for Koala Habitat Assessments in the City of Ballarat are presented in Appendix 4 of this Plan.

These proposed controls have been developed based on the Draft Planning Guidelines for Koala Conservation & Restoration: A Guide to Best Planning Practice 2006 (Appendix 6), prepared by the AKF for use Australia-wide.

3.6 Research and Monitoring

A consistent question asked by people of researchers about the koala in Ballarat is "How many koalas do we have in Ballarat?" The simple answer at this point in time is "not enough" whilst their basic habitat remains under threat and the koalas themselves are constantly at risk from road traffic and attacks by dogs. What is clear is that with on-going habitat loss, loss from road deaths and continued disturbance and predation by domestic and feral dogs, the remaining koala population in the City of Ballarat is very vulnerable and in need of decisive management.

On-going research and monitoring and the presentation of the results of this work is vital to establishing a proper understanding of the impacts that land use change and human behaviour are having on the Ballarat koala population and the natural environment in general.

3.6.1 Research

On-going scientific research is fundamental to the success of any environmental management project. The environment in which humans and other living beings live is constantly changing, no more so now with the need to consider major terrestrial and climatic impacts such as the Greenhouse Effect and the severe loss of biodiversity, both botanical and animal species. The competition for the use of natural resources is also severe, and if species other than - and perhaps including - human-kind are to survive, then the carrying out of well placed research leading to well considered decisions and actions is critical.

Koala management practice and decision-making should be guided wherever possible by the outcomes of rigorous scientific research. In addition, research is a vital component of programs to monitor and evaluate the effectiveness of management actions.
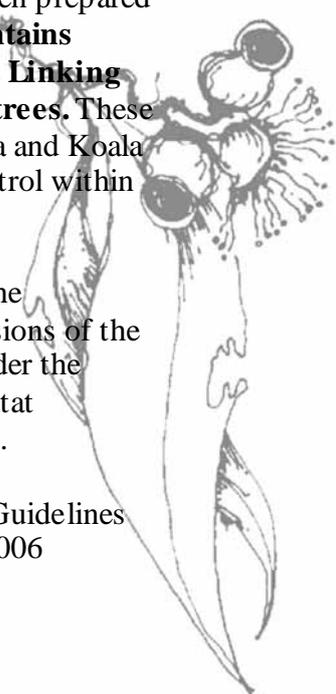
The AKF, as part of the current AKF-Ballarat City Council initiative, has already established strong research links with various universities, including the University of Queensland, University of New South Wales and various universities internationally, including in Germany and the USA.

A number of koala research projects have already been undertaken in the City of Ballarat concerning tree species preferences, habitat utilisation and home-ranging behaviour. Limitations on both financial and staff resources, as well as increasing threats to koalas, accentuate the importance of directing research into areas where information is lacking and where results are likely to be most useful for evaluating, monitoring and improving koala habitat and population management initiatives.

A number of potential koala research projects are outlined in the Research Chapter of the Resource Document.

3.6.2   Monitoring

Monitoring is a very important function in gauging the success of any long-term program. This is particularly so when the objective is to understand the impacts that a program aimed at changing the way the natural environment is being managed is having on that environment. Generally speaking, there is a strong tendency to carry out implementation and then to move on to a new project. This can be particularly true of Council projects, where funding received is often only for a specific initiative or for a short period of time, often no more than 12 months. Without a strong monitoring program, reasons to continue to support implementation of the Plan and thereby the survival of the koala in Ballarat will be poorly understood, with the potential for the support of partners to the Plan to be withdrawn because of a lack of information about the effectiveness of the Plan.

The monitoring program will require the commitment and support of the Ballarat City Council. It is proposed that the responsibility for co-ordinating the monitoring program be assigned to the proposed Implementation Committee, with support from the AKF through its Ballarat-based Liaison Officer.

The monitoring program will provide researchers, planners and the community with ongoing information regarding the size, distribution and health of the local koala population, together with feedback on the effectiveness of alternative management strategies.

An ongoing monitoring program will be implemented once the Ballarat Koala Plan of Management is adopted by the Ballarat City Council. As part of this program a number of performance indicators have been identified (see Section 1.7) to provide a means to determine the level to which the key outcomes have been achieved and to quantify the success or failure of the measures specified within the Plan. The monitoring program will also include a procedure to be followed should the Plan fail to meet the identified performance indicators.

A funding proposal for the monitoring program also needs to be specified. It is intended that the Plan will be regularly reviewed with the potential for periodic amendment of the
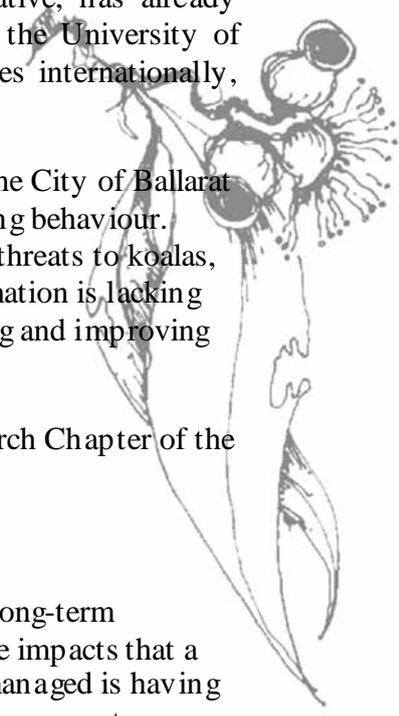
measures employed where necessary to reflect the findings of the ongoing monitoring program.

This program will aim to periodically update the status of the koala population and the available koala habitat within the City of Ballarat. The status of the koala population will be assessed on the basis of estimated koala numbers, evidence of breeding activity, records of mortality and the distribution of koalas within the City. The program will seek to record changes in the amount and quality of available koala habitat, as well as changes in habitat utilisation. The impact of threatening processes upon the koala populations will be monitored to determine the level of success or failure of the measures within the City. The relative significance of each threatening process will need to be regularly assessed to ensure resources are continually focused on the highest priorities.

Further details concerning the monitoring program are provided in the Monitoring Chapter of the Resource Document.

3.7   Publicity

There are many opportunities in Ballarat to use a variety of communication channels, linking to stories and information about all of the above aspects of koala management and to link koala management with other stories about environmental improvements, tourism, community education and community events.

The Implementation Committee should seek to promote and publicise any major events concerning implementation of the Plan including opportunities for involvement of the local community.

Press Releases

Press releases provide an opportunity to communicate to a wide range of people through print and/or radio. Press releases could target specific issues such as the importance of responsible dog ownership and the potential impacts on koalas from roaming domestic dogs/wild dogs. Press releases should also be issued to encourage reporting of koala sightings to AKF's Liaison Officer with Council.

Community Service Announcements

Commercial television and radio stations provide 30 seconds of free air for public awareness campaigns. Community Service Announcements could be used in conjunction with press releases to target specific koala conservation issues within Ballarat.

Weekly Columns

The Ballarat Courier produces a weekly section on the region's natural environment (Author: Roger Thomas). The section could be extended to include notifications to the public of koala issues and request reports of koala sightings within the City. The articles could also provide regular updates on the status of the local koala population and foster a sense of stewardship within the community.
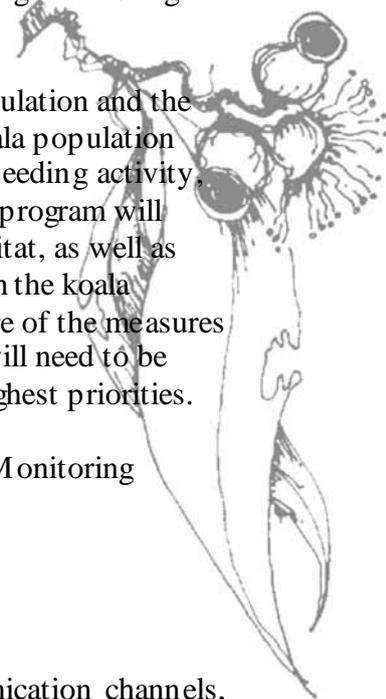
Newsletters

There are many examples of community newsletters that can be used to provide information about and engage the community in the care of the koala; e.g. 'The Running Postman' (Ballarat Environment Network Inc), 'Wildlife Whistler' (South Ballarat Urban Landcare Group) and 'MyBallarat' (City of Ballarat).

4.   COORDINATING IMPLEMENTATION OF THE PLAN

4.1   Ballarat City Council/Australian Koala Foundation Joint Initiative

Its Role

The current initiative has provided very effective impetus to increased understanding of the situation with the koala in Ballarat, which has included a number of practical initiatives, including revegetation works (in conjunction with Ballarat City Council projects) and various promotional projects, which have included the involvement of many international visitors.

Continuing the initiative will provide important support for implementation of the Plan itself. Implementation will involve continuing the emphasis of the current project that has been focused on increased awareness and education but with an increased emphasis on the implementation of management measures focusing on habitat protection (conservation) and enhancement (restoration). This altered emphasis will pick up on the two key themes of the Plan:

❖ **Integration and coordination** – principally through the implementation **of "Integrated Habitat Management"** initiatives, enhancing both the conservation and restoration of koala habitat, and
❖ **Education and awareness** – prinicipally through enhancing the sense **of "Community Involvement - Living with Koalas"**, increasing community interaction with and understanding the situation and circumstances affecting the koala.

Future

It is important for the effective implementation of the Plan that the Ballarat City Council and AKF continue the current partnership arrangements, preferably for another 5 years. This will enable the AKF Liaison Officer to continue a number of important roles, including:

❖ Carrying out the vital research and monitoring roles, including gathering koala sightings data and analysing these records;

❖ Providing vital liaison and advisory functions to the Implementation Committee and to other involved parties;

❖ Providing practical support for implementation of the Plan;

❖ Assistance with identifying funding sources through established sources and networks.
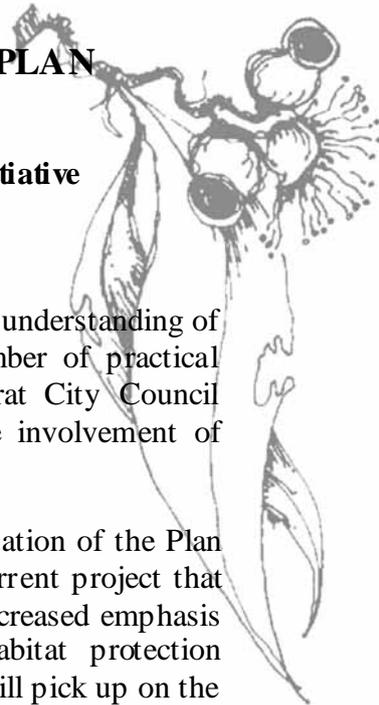
Actions

- Ballarat City Council to continue to provide support to AKF for the Liaison Officer position; Council and the AKF enter into an agreement to continue to the current partnership arrangement for a further 5 years from the expiration of the current arrangement.

4.2   Implementation Committee

The ongoing support and involvement of stakeholders will be vital throughout the implementation of the Plan. This will particularly require the support of Ballarat City Council, the Department of Sustainability and Environment, land management agencies, the AKF and the local community.

It is important that an Implementation Committee be established to:

❖ Oversee and co-ordinate implementation of the Plan;
❖ Regularly review the Plan;
❖ Propose revisions where necessary to improve performance.

Core members of the Committee should include representatives from the Ballarat City Council, Department of Sustainability and Environment, the AKF and the Ballarat Environment Network (representing community environmental interests). A Councillor should be invited to chair the Committee.

The implementation of the Plan will involve organising and coordinating a large number of projects. A very important role of the Committee will be to establish relationships with partner agencies and businesses, particularly when it comes to gaining funding support for projects. It is also important that the business of the Committee is handled professionally and expeditiously. To ensure the business of the Committee can be transacted in this way, the Committee requires the input and expertise of an Executive Officer. It is envisaged this role would be part-time, probably around 1 day/fortnight, which is considered sufficient if the initiative with the AKF is extended as recommended above. The appointment would be on a limited tenure, contracted basis. It is considered appropriate that the Implementation Committee should be in charge of the appointment process, following Council's protocols and procedures.

A senior Council officer should be appointed to have responsibility for the Committee. It is considered the appropriate officer would be the Manager Strategic Planning in view of the environmental planning responsibilities of the position, particularly the implementation of the Environmental Sustainability Strategy, and overall responsibility for land use planning.

The Implementation Committee should convene as soon as possible following adoption of the Plan by the Ballarat City Council. The Implementation Chapter of the Resource Document contains further details about implementation of the Plan.
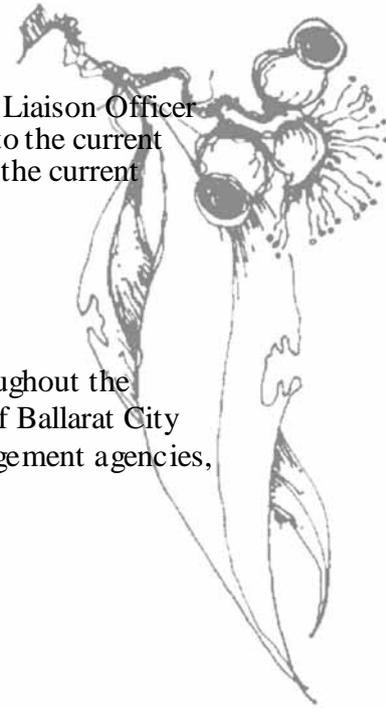
Operation of the Committee

It is recommended that:

❖ The Committee meets at least quarterly in its first year of operation and as often as considered necessary by the Committee thereafter.

❖ Invite representatives from agencies and organisations, other than from the core member organisations, to participate with the Implementation Committee as required.

❖ Ballarat City Council provides the Committee with the necessary administrative support, including the appointment of an Executive Officer.

❖ The Committee produce an Annual Report to address:
  • Progress with implementation of the Plan;
  • Outcomes from the monitoring program and apparent effectiveness of the Plan;
  • Current research projects;
  • Any recommended amendments to the Plan.

❖ The Committee undertakes the first full review of the Plan and its implementation twelve months after adoption of the Plan, and thereafter review the Plan every 12 months. This will include reviewing the Performance Indicators, the monitoring program, the extent to which the proposed actions have been implemented and their apparent effectiveness.

❖ The first 12 months' Plan Review Report be submitted to the Ballarat City Council and the Regional Manager of the Department of Sustainability and Environment for consideration by both organisations and for public exhibition.

❖ The Committee recommends to Council the adoption of any necessary amendments to the Plan.
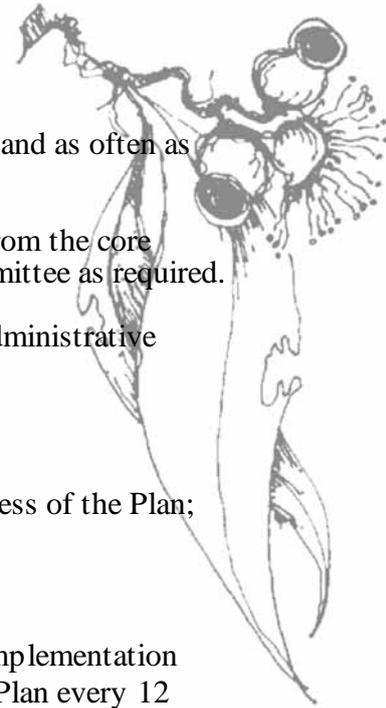
Actions

• Council establish the Ballarat Koala Plan of Management Implementation Committee as a matter of the highest priority with respect to implementation of the Plan.

• Council appoint a senior Council officer to have responsibility for the Committee.

• Council appoint an Executive Officer to support the work of the Committee.

4.3   Funding

The ability of this Plan to meet the identified objectives will be partly dependent upon funding to implement the recommendations. Funding can be sought from a number of sources including State and Federal Government grants (such as Natural Heritage Trust, Environmental Trust Grants and the Eco-tourism Grants Program), CMAs, Council revenue, and private or corporate sponsorship. Appropriate funding sources need to be identified for implementation of the recommendations that require financial input. For example, a portion of dog registration fees could be utilised to implement certain actions

of the Plan, in particular that part of the community education program – "Living with Koalas" – that deals with the responsible ownership of dogs.

The Implementation Committee should be chiefly responsible for investigating and seeking funding for actions.

In view of the essential nature of the Executive Officer position to the effective operation of the Committee, it is recommended that Council fund the position, in the first instance, for the first 12 months of the life of the Plan. It is anticipated the cost would be in the vicinity of $15,000, which should be sufficient to allow for operational expenses including travel and office costs. Early appointment of the Executive Officer, supported by funding through Council, will allow the Committee to immediately pursue funding for projects, which could include supporting funding for the Executive Officer position beyond the first 12 months' of the Committee's operation.

Further details of potential funding sources and opportunities are outlined in the Funding Chapter of the Resource Document.

Actions

- The Implementation Committee to develop a Funding Strategy for the implementation of actions that require financial input.

- The Implementation Committee to seek and co-ordinate funding in accordance with the Funding Strategy.

- The Ballarat City Council budget to meet the costs of engaging the Ballarat Koala Plan of Management Implementation Committee Executive Officer.
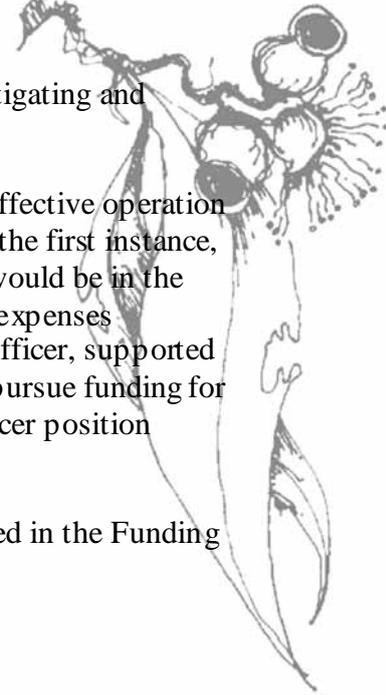
5.   THE ACTIONS

This section lists the actions, identifies the organisations responsible for their implementation, and assigns an initial priority for each action. Appropriate target completion dates for each action should be determined as a first priority by the Implementation Committee during their initial meetings.

The following abbreviations are used in the table below:

AKF	=	Australian Koala Foundation
BCC	=	Ballarat City Council
BEN	=	Ballarat Environment Network Inc
CFA	=	Country Fire Authority
CHW	=	Central Highlands Water
DSE	=	Department of Sustainability and Environment
EO	=	Executive Officer - Implementation Committee
IC	=	Implementation Committee - Ballarat Koala Plan of Management
PV	=	Parks Victoria
Univs	=	Universities, incl. Ballarat, Queensland, New South Wales & international

5.1   Approach

In this Chapter, specific actions are listed for each of the topics discussed in Chapter 3 – The Plan. The actions are set out by topic in the same order as in Chapter 3.

5.2   Strategic Context

5.2.1 Links to Other Strategies, Policies & Programs

Lead Agency	Supporting Agencies	Project	Priority	Funding Arrangements
BCC	AKF, BCC (IC)	**Business and strategic planning** processes, including the development of the Council Plan, the Environmental Sustainability Strategy and revision of Blueprint Ballarat, to include appropriate references to the Plan and its implementation.	1	Strategy Development unit
DSE	BCC (IC)	**Prepare initiatives for implementation of the Native Vegetation Framework and State Koala Strategy** that complement implementation of the Ballarat Plan.	2	Regional Fauna & Flora staff

5.2.2 Integrated Habitat Management

Lead Agency	Supporting Agencies	Project	Priority	Funding Arrangements
BCC (IC)	AKF	**Prepare a prioritised list of koala habitat areas for restoration** using criteria detailed in the Habitat Restoration Chapter of the Resource Document.	1	AKF Liaison Officer, EO
BCC (IC)	AKF	**Prepare a 'Koala Habitat Restoration Plan'**, including the identification of areas that would constitute a **"Ballarat Koala Biolink"** within the City, based upon the prioritised areas' list.	2	AKF Liaison Officer, EO
BCC (IC)	AKF, DSE, CHW, BCC, Greening Australia, CVA	**Determine budget and resource requirements for implementation of the Koala Habitat Restoration Plan**, including the identification of funding sources.	2	AKF Liaison Officer, EO
BCC (IC)	BCC, BEN, CHW DSE, PV	**Jointly develop guidelines for the management of koala habitat on lands managed by each of these organisations in the Ballarat area.**	3	EO; within work programs of each organisation
BCC, Land care & community groups	BCC (IC), AKF, DSE, BEN	Utilise resources such as the Ballarat Community Indigenous Plants Nursery and the Ballarat Region Seed Bank to **provide appropriate plant species for revegetation projects that suit the requirements of the koala.**	1	Within work programs of each organisation

5.3 Education and Awareness

5.3.1 Community Education

Lead Agency	Supporting Agencies	Project	Priority	Funding Arrangements
BCC (IC)	AKF, DSE, Univs	Prepare an **information brochure** concerning the Ballarat koala population with options for people to contribute to koala conservation.	1	AKF Liaison Officer, EO
BCC (IC)	AKF, DSE, Univs, Dept of Education	Establish the feasibility of developing a **koala-based education program – "Living with Koalas" - for school and community groups**, with any educational material that is produced being compatible with the Education Department's Environmental Education Curriculum.	2	AKF Liaison Officer, EO
BCC (IC)	AKF, DSE, Univs, Dept of	**Include information on the impacts of high fire frequency and arson on koalas and other wildlife in environmental education programs.**	2	AKF Liaison Officer, EO

Lead Agency	Supporting Agencies	Project	Priority	Funding Arrangements
	Education			
BCC (IC)	AKF, BEN, Community & Landcare, groups	**Integrate education programs** with those utilised by community groups, including the community education component of the LINCS Yarrowee River project.	2	AKF Liaison Officer, EO

5.3.2 Landowner Education

Lead Agency	Supporting Agencies	Project	Priority	Funding Arrangements
BCC (IC)	AKF, BEN, DSE, Landcare networks & groups	**Prepare management and community education strategies to minimise threats to koalas and koala habitat in specific areas** if the first Review Report indicates the need for finer-scale management in these areas.	2	AKF Liaison Officer, EO

5.4 Community Involvement

5.4.1 Contributing to Habitat Restoration

Lead Agency	Supporting Agencies	Project	Priority	Funding Arrangements
BCC (IC)	BEN, other community & land care groups, schools	**Identify suitable groups prepared to undertake or assist with koala habitat restoration projects**, including land care and residents' groups**.	1 & on-going	AKF Liaison Officer, EO
BCC, BEN, land care, groups,	AKF, BCC (IC), DSE	**Integrate the needs of the koala into environmental rehabilitation projects**, in particular: • In the case of revegetation projects through the selection of appropriate species, • Through the protection of existing vegetation, particularly where located in known koala corridors.	1 & on-going	AKF Liaison Officer, EO In conjunction with existing activities of each group
BCC	BEN, other community & land care, groups, schools	**Continue with and expand revegetation programs,** including LINCS, in order to increase koala habitat and to increase linkages between existing areas of habitat, particularly the achievement of the **"Ballarat Koala Biolink"**.	1 & on-going	Note 3-year funded LINCS program: 2005-08
BCC (Parks & E'ment Section)	AKF, BCC (IC)	Identify **a Ballarat City Council officer to be responsible for overall coordination of the koala habitat restoration program.**	1	Within existing BCC resources

5.4.2 Living with Koalas

Lead Agency	Supporting Agencies	Project	Priority	Funding Arrangements
Private land owners	AKF, DSE, BEN, BCC (IC)	**Restore, conserve and manage koala habitat on private lands to the greatest extent possible.** Encourage the preparation of property land management plans as part of this process.	1 & on-going	Private land owners
Private land owners	AKF, DSE, BEN, BCC (IC)	**Undertake appropriate and required procedures and consultation,** including the obtaining of any necessary approvals, prior to commencing any use or development likely to affect the environment of koalas on private land. This extends to any proposal for land clearing or the removal of individual preferred koala food trees.	1 & on-going	Private land owners
BCC (IC)	AKF, DSE	**Investigate the potential for conservation agreements on private land for the conservation of koala habitat,** including the introduction of **incentive-based measures** to encourage voluntary conservation and the protection, management, enhancement and restoration of koala habitat and the City's native vegetation asset in general and the achievement of the **"Ballarat Koala Biolink"** in particular, in support of relevant, existing Council strategies, including the LINCS Strategy 1995 (See also 5.5.2). The process should include consultation with landowners to identify incentives that would be both feasible for Council and appealing to land owners.	2	AKF Liaison Officer, EO
BCC (IC)	AKF, DSE	In conjunction with the introduction of conservation agreements and incentives, **develop and implement a community consultation strategy to seek voluntary support for the introduction of new planning controls** over private land containing **Core Koala Habitat and Habitat Linking Areas.**	2	EO

5.4.3 Traffic Management

Lead Agency	Supporting Agencies	Project	Priority	Funding Arrangements
AKF	BCC (IC), Community, VicRoads	**Evaluate the current location of 'Koala Warning' signs** in relation to established Koala Black Spots.	2	AKF Liaison Officer
BCC	BCC, AKF,	**Investigate the need for more regular**	2	AKF, BCC -

Lead Agency	Supporting Agencies	Project	Priority	Funding Arrangements
(IC)	VicRoads	**roadside slashing of grass in Black Spot, Conflict and Potential Problem Areas** to minimise the height of roadside ground cover, where this does not necessitate tree removal including regrowth.		Parks & Environment unit
BCC	BCC (IC), VicRoads	**Install 'Koala Warning' signs and 'Injured Wildlife' signs at newly identified Black Spot and Conflict Areas and at potential Problem Areas** if and when a future koala collision is reported for any of the identified Problem Areas.	3	Budget required for signs @ $200/sign
BCC	BCC (IC), VicRoads, Victoria Police, Community	Following consultation with the community, approach VicRoads and Victoria Police to support the **reduction of speed limits** to 60 km/hr where the present limit is greater at each of the identified Black Spot Areas and to 80 km/hr where the present limit is greater at each of the identified Conflict Areas.	3	Infrastructure Planning unit – within existing resources
BCC (IC)	AKF, BCC, Powercor	**Investigate possible installation of street lighting at identified Black Spot Areas.**	4	AKF, EO, BCC & Powercor staff
BCC (IC)	AKF, BCC	**Investigate the provision of a 1m wide painted strip (with rumble strips) across the roadway at the start and end of each designated Koala Black Spot Area** to alert drivers, in addition to signage.	4	AKF, EO, BCC – Infrastructure Planning unit

5.4.4   Dog Management

Lead Agency	Supporting Agencies	Project	Priority	Funding Arrangements
BCC	Community AKF	**Prosecute the owner or person in charge of any dog that attacks or chases a koala** under the provisions of the *Domestic (Feral & Nuisance) Animals Act 1994*, whenever evidence can be obtained that is likely to result in a conviction.	1 & on-going	BCC Local Laws unit – within existing resources
BCC		**Invoke the 'dangerous dog provisions'** of the *Domestic (Feral & Nuisance) Animals Act 1994* where a dog has attacked, killed or chased a koala, on more than one occasion.	1 & on-going	Local Laws unit – within existing resources
BCC	AKF	**Develop suitable educational material** to raise awareness of the threat to koalas from roaming domestic dogs and to promote responsible dog ownership, particularly the management of dogs on rural properties.	1	Local Laws unit – within existing resources; AKF
BCC		**Publicise successful prosecutions** against dog owners under the *Domestic (Feral & Nuisance) Animals Act 1994*.	1 & on-going	Local Laws & Comms units – within existing resources
BCC	BCC (IC)	**Ensure that all designated off-leash dog**	2	Local Laws unit

Lead Agency	Supporting Agencies	Project	Priority	Funding Arrangements
		exercise areas within the City do not conflict with identified **Preferred or Supplementary Koala Habitat**.		- within existing resources; AKF Liaison Officer
BCC		**Ensure that all public reserves are effectively sign-posted regarding dog exercise provisions.**	2	$200/sign
BCC	AKF	Prepare a Local Law under the *Domestic (Feral & Nuisance) Animals Act 1994* prohibiting dogs from public areas identified as **Preferred or Supplementary Koala Habitat.**	2	Local Laws unit – within existing resources; AKF Liaison Officer
BCC (IC)	AKF	**Prepare educational and publicity material** that encourages dog owners who become aware of the presence of a koala on their property to restrain or confine their dog until the koala has left the property.	2	AKF Liaison Officer, EO
BCC (IC)	AKF, BCC – Local Laws Unit	Investigate the opportunity to utilise a small percentage of the funding collected through dog registrations to go towards **modification of the Domestic Animals Management Plan and implementation of the Plan, in particular for research into investigating the relationships between koalas and dogs.**	2	AKF Liaison Officer, EO, Local Laws Officers

5.4.5   Fire Management

Lead Agency	Supporting Agencies	Project	Priority	Funding Arrangements
BCC, CFA, DSE, PV, fauna welfare organis-ations	BCC (IC)	Land management agencies and the Country Fire Authority to **co-operate with licensed fauna welfare organisations and DSE concerning fauna welfare issues following bushfires.**	1 & on-going	Agencies to use existing processes
BEN, BCC, CFA, DSE, PV	BCC (IC)	**Fuel reduction burns in areas known to support koalas and koala habitat to be maintained at low intensity** or otherwise managed in such a way as to minimise risks to resident koalas.	1 & on-going	Agencies to use existing processes
Ballarat Munic-ipal Fire Prevent-ion Comm-ittee	BCC (IC)	The Committee to thoroughly consider including areas of **Preferred and Supplementary Koala Habitat and vegetated Habitat Buffers and Habitat Linking Areas** as environmental assets within the Ballarat Municipal Fire Prevention Plan.	2	Ballarat Municpal Fire Prevention Committee using existing processes
AKF	BCC (IC), Ballarat Municipal Fire Prevention Committee,	**Investigate establishing a research program concerning potential long-term impacts of fire on koala habitat**, including contributing to the development of fire management strategies that best meet objectives for minimising the risk to koalas,	2	AKF Liaison Officer Agencies to use existing

	CFA, DSE, Univs	whilst conserving koala habitat and associated plant and animal communities.		resources
AKF	BCC (IC), Ballarat Municipal Fire Prevention Committee CFA, DSE, PV	Map areas of bush fire and utilise satellite imagery whenever possible as a means of **delineating the extent and intensity of bushfires and monitoring post-fire regrowth.**	2	AKF Liaison Officer Agencies to use existing resources

5.4.6 <u>Managing Koalas in Emergency Situations</u>

Lead Agency	Supporting Agencies	Project	Priority	Funding Arrangements
BCC	AKF	**Train selected staff within the Parks and Environment Section in koala capture,** training to include koala-handling techniques, fire awareness and after-fire awareness training and tree climbing techniques.	1 & on-going	Parks & Environment – within existing resources
BCC		**Purchase a catching pole and catching bag**, to be permanently available for use.	1 & on-going	Parks & Environment – within existing resources

5.5 Planning Controls

5.5.1 Planning Policy

Lead Agency	Supporting Agencies	Project	Priority	Funding Arrangements
BCC	BCC (IC)	Council prepare an amendment to the Municipal Strategic Statement and the Local Planning Policy Framework to include provisions (as per Appendix 1) **to incorporate the planning requirements of the Plan into the Ballarat Planning Scheme,** including the performance standards for assessment of rezoning proposals and development applications.	1	Strategic Planning unit staff – build into work programs; EO
BCC	BCC (IC)	Request the State Government to **amend the State Planning Policy Framework to include appropriate reference to the State Koala Strategy and its implementation**	2	Strategic Planning unit staff; EO

5.5.2 Planning Controls for Habitat Conservation

Lead Agency	Supporting Agencies	Project	Priority	Funding Arrangements
BCC	BCC (IC), DSE	Prepare amendments to the Municipal Strategic Statement and Local planning Policy Framework to **incorporate the Ballarat Koala Management Plan into the Ballarat Planning Scheme.**	1	Strategic Planning unit staff – build into work programs; EO
BCC	BCC (IC), DSE	Include provisions within a Koala Habitat Protection Schedule to the Environmental Significance Overlay **to protect Core Koala Habitat & preferred koala food tree species** wherever they occur. Where possible, prepare the necessary planning scheme amendment in conjunction with other amendments dealing with additional native vegetation and landscape protection controls.	1	Strategic Planning unit staff – build into work programs; EO
BCC (IC)	BCC, DSE	Investigate the introduction of a suitable **planning policy into the Planning Scheme that would require the enhancement of Habitat Linking Areas** in conjunction with the approval of any planning application for the development of affected private land.	2	EO
BCC	BCC (IC)	**Adopt and apply the performance standards for the assessment of rezoning proposals.** (Appendix 3).	1	Strategic Planning unit staff; EO
BCC (IC)	BCC, DSE, Land-owners	**Consult with all affected private landowners** (see also 5.4.2) to seek their support for the rezoning of lands containing **Preferred Koala Habitat & associated**	3	EO

		Habitat Buffers to an appropriate land use zone, such as the Environmental Rural Zone.		
BCC	BCC (IC), DSE	In accordance with the outcomes of the consultation process, **prepare amendments to the Ballarat Planning Scheme to rezone areas of koala habitat to an appropriate land use zone.**	4	Strategic Planning unit staff – build into work programs; EO

5.5.3   Development Assessment

Lead Agency	Supporting Agencies	Project	Priority	Funding Arrangements
BCC	BCC (IC)	**Adopt and apply the performance standards for assessment of development applications** (Appendix 2).	1	Statutory Planning unit – use existing processes
BCC	BCC (IC)	**Adopt and promote the Guidelines for Koala Habitat Assessment** (Appendix 4).	1	Statutory Planning unit – use existing processes
BCC	BCC (IC)	**Include information regarding the presence of koala habitat with planning certificates.**	2	Statutory Planning unit – use existing processes

5.6 Research

5.6.1   Research

Lead Agency	Supporting Agencies	Project	Priority	Funding Arrangements
BCC (IC)	AKF, Univs	**Identify and prioritise potential koala research projects** on the basis of their application to koala habitat and population management, as well as implementation and monitoring of the Plan.	2	AKF Liaison Officer, EO
BCC (IC)	AKF, Univs	**Identify and promote potential final year or postgraduate University student research projects from the nominated project list.**	On-going	AKF Liaison Officer
BCC (IC)	AKF, Univs	Liaise with those groups undertaking koala research in order to **facilitate the involvement of interested volunteers in any suitable projects.**	On-going	AKF Liaison Officer, EO
BCC (IC)	AKF, Univs	**Maintain a register of completed, ongoing and proposed future koala research projects** within the City of Ballarat. This register is to be kept at Council in liaison with AKF.	On-going	AKF Liaison Officer
BCC (IC)	AKF, Univs	**Maintain a reference library** at Council of all reports concerning koala-related research undertaken within the City.	On-going	AKF Liaison Officer, EO

Researchers	AKF, Univs, BCC (IC)	Seek to **make their research findings readily available**, subject to intellectual property rights issues relating to publication.	On-going	Researchers; AKF Liaison Officer, EO

5.6.2 <u>Monitoring</u>

Lead Agency	Supporting Agencies	Project	Priority	Funding Arrangements
BCC (IC)	AKF	**Purchase the latest available satellite imagery** for the City of Ballarat at four-year intervals to assist with reviews of the Plan and with 'State of the Environment' reporting.	1 & on-going	Within BCC (IC) global budget
BCC (IC)	BCC, DSE, AKF	**Establish a process for identifying changes in the extent of each category of koala habitat resulting from incremental habitat loss, degradation or fragmentation and ongoing habitat restoration activities** as identified by satellite imagery, ground survey and information received, for inclusion in the Committee's annual reports.	1	AKF Liaison Officer, EO
BCC (IC)	BCC, DSE, AKF	**Maintain a detailed register of incremental habitat losses and ongoing habitat restoration activities.**	1 & on-going	AKF Liaison Officer, EO
BCC (IC)	AKF	**Maintain a register of potential discrepancies in the vegetation mapping,** investigate these and make revisions where necessary.	1 & on-going	AKF Liaison Officer
BCC (IC)	BCC	Implementation Committee to **report annual findings of the monitoring program** to the Council.	1 & on-going	EO
BCC (IC)	AKF	Develop a program that **encourages local community organisations to contribute to the ongoing monitoring program.**	2	AKF Liaison Officer, EO
BCC (IC)	AKF	Investigate the value of **developing a Population Viability Analysis model** for the Ballarat koala population as a component of the monitoring program.	2	AKF Liaison Officer
BCC (IC)	AKF	**Revise the koala habitat mapping** in conjunction with future refinements to the vegetation mapping.	On-going	AKF Liaison Officer
DSE, BCC (IC)	AKF	**Maintain a koala records database** that will contribute to the City-wide monitoring program.	On-going	AKF Liaison Officer
BCC (IC)	AKF	**Co-ordinate annual transect-based koala searches of designated sites.**	On-going	AKF Liaison Officer
BCC (IC)	AKF	**Establish and annually assess a series of monitoring sites** within the City using the AKF Spot Assessment Technique.	On-going	AKF Liaison Officer
BCC (IC)	AKF	**Maintain a register of dog attacks and traffic collisions with koalas.**	On-going	AKF Liaison Officer, EO
BCC	BCC	**Seek the necessary funding**, assistance and	On-	AKF Liaison

(IC)		resources, including sponsorship, to implement research projects and monitoring programs.	going	Officer, EO
BCC	BCC (IC)	**Incorporate updates on the status of the koala within the City and the actions taken to implement the Plan into annual 'State of the Environment' reporting.**	On-going	EO
BCC (IC)	Univs	**Provide satellite imagery to partner Universities** if requested for relevant postgraduate research projects.	On-going	AKF Liaison Officer, EO
BCC (IC)	AKF	**Provide progress reports to the IC on the monitoring program**	On-going, every 6 mths	AKF Liaison Officer, EO

5.7 Publicity

Lead Agency	Supporting Agencies	Project	Priority	Funding Arrangements
BCC (IC)	BCC	**Provide information concerning koala conservation and other environmental issues on telephone hold recordings.**	1 & on-going	AKF Liaison Officer, EO; Comms unit
BCC (IC)	AKF, BCC	Develop a program to ensure that **relevant koala information is regularly provided to local media.**	1 & on-going	AKF Liaison Officer, EO; Comms unit
BCC (IC)	AKF, BCC, media agencies, VicRoads, RSPCA	Undertake **media campaigns to inform the public about traffic Black Spot Areas and responsible dog management**, to coincide with the koala-breeding season.	1 & on-going	AKF Liaison Officer, EO; Comms unit

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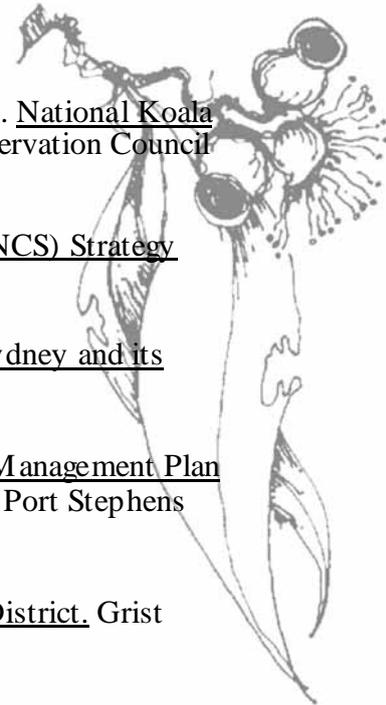
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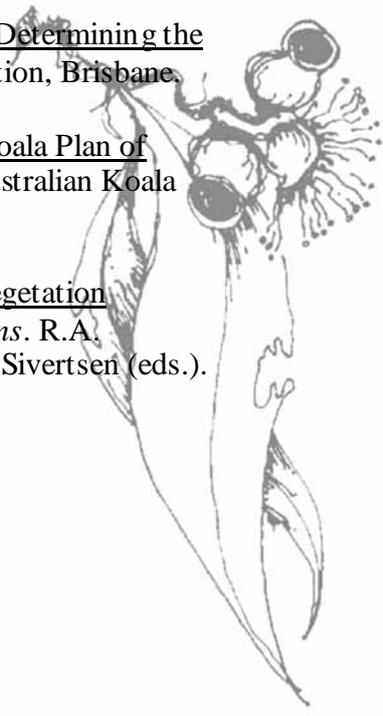
Appendix 1

Amendment to the Ballarat Planning Scheme –
Municipal Strategic Statement and Local Planning Policy Framework

Municipal Strategic Statement

It is recommended that the following additions be made to Clause 21.04-1 of the Environment section of the Ballarat Strategic Statement by inserting after the content on Landscape, the following words:

"Overview - Protecting the Koala in Ballarat

The City of Ballarat, together with the Australian Koala Foundation, has prepared the Ballarat Koala Plan of Management 2006. The Plan has as its purpose:

"To provide for the long-term survival of koala populations within the City of Ballarat through the implementation of actions aimed at safeguarding the koala within its natural range within the City."

The Plan has been prepared in recognition of the significance of the koala community within Ballarat and its relative vulnerability across its range due to a number of key factors, including habitat loss and the cumulative impacts of on-going urban development.

Worldwide, the koala is probably the most recognized of Australia's wildlife species. To see a koala is important to a large proportion of both domestic and international tourists in Australia. The value of the koala as a tourism icon for Australia in 1996 has been estimated at $1.1 billon (Hundloe & Hamilton, 1997).

The long-term survival of the koala in Australia, however, is not secure. In 2000 the U.S. Fish and Wildlife Service listed the koala as a threatened species under the U.S. Endangered Species Act and in 2005 the Queensland government listed the koala in the South-east Queensland Bioregion as a vulnerable species.

State governments and the Commonwealth as part of their National Koala Conservation Strategy (ANZECC 1998) have already expressed their concern for the long-term viability of Australia's koalas.

Similarly, the Victorian Government, through the State Koala Strategy, encourages all councils with koala habitat to work together with the Australian Koala Foundation to map koala habitat within their municipalities and to introduce measures to protect these areas through the local planning system (DSE 2004). Accordingly, the Ballarat Koala Plan of Management has been incorporated into the Ballarat Planning Scheme insofar as the implementation of the Plan relates to the land use planning process.

Key Issues – Protecting the Koala in Ballarat
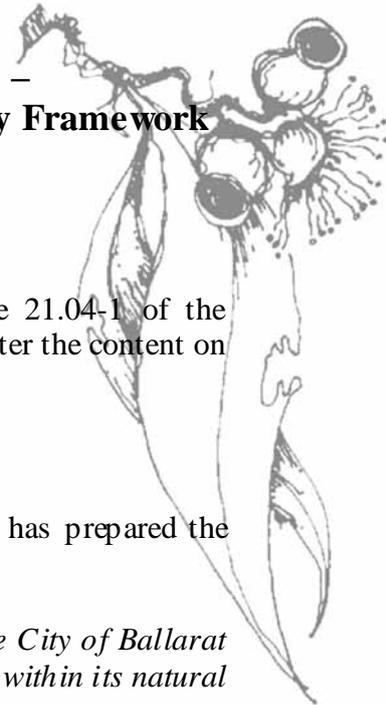
- The Ballarat Community-based Koala Survey undertaken in 2002 indicates overwhelming support for koala conservation in the City of Ballarat.
- Key issues affecting the survival of the koala in Ballarat include housing developments in areas of koala habitat, the removal of native vegetation on private land and along roadsides, roaming dogs, road traffic and the locations of roads in areas frequented by koalas.
- The Koala Survey indicates strong community support for restrictions on dog ownership, improved traffic management, more tree planting and habitat restoration and stronger planning controls over urban development that reflect the need to protect areas frequented by local koala populations."
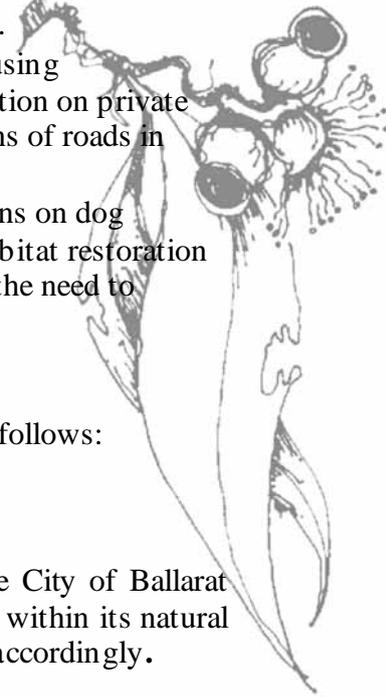
In Clause 21.04-2 Environment Objectives, insert a new Objective 9 as follows:

"Objective 9 – Protecting the Koala in Ballarat

To provide for the long-term survival of koala populations within the City of Ballarat through the implementation of actions aimed at safeguarding the koala within its natural range within the City" and renumber the following existing Objectives accordingly.

In Clause 21.04-3 Environment Strategies include after the content on "Landscape" the following:

"Protecting the Koala in Ballarat

- Providing guidelines and development standards to protect and restore koala habitat, including the use of Performance Standards for Rezoning Proposals as incorporated in the Planning Scheme where a rezoning proposal affects land containing identified Koala Habitat;

- Changing existing land use zones and introducing an additional Schedule to the Environmental Significance Overlay to recognise areas of koala habitat that require this level of protection;

- Promoting a balanced approach to koala conservation and urban development;

- Ensuring that adequate detail is provided with development applications and rezoning proposals in order to assess, minimise and effectively ameliorate likely impacts on koala habitat."

In Clause 21.04-4 Environment – Implementation, amend the provision referring to application of the Environmental Significance Overlay by the insertion of the words "areas of core koala habitat" as follows:

"Zones and Overlays……

Apply the Environmental Significance Overlay to areas of significant wetlands and waterways, *areas of core koala habitat*, sites of biological significance and water catchment areas."

In Clause 21.04-4 Environment – Implementation, incorporate reference to the Clause 22.18 Koala and Koala Habitat Protection Policy as follows:

"Policy and Exercise of Discretion…….

Apply Clause 22.18 (Koala and Koala Habitat Protection Policy)."

In Clause 21.04-5 Further Strategic Work, insert the following provisions at the end of the existing listed provisions as follows:

- "Evaluating and ranking koala habitat throughout the City of Ballarat;

- Identifying the principal threats that adversely impact on koalas and koala habitat within the City of Ballarat;

- Devising conservation strategies to effectively address each of the threats impacting on koalas and koala habitat;

- Identify priority conservation areas and strategies to protect koala habitat."

In Clause 21.04-6 Other Actions, insert the following provisions at the end of he existing listed provisions as follows:

- "Restoring areas of degraded koala habitat;

- Effective public awareness and education programs concerning koala conservation issues;

- Identifying potential funding sources for implementation of the Plan;

- Facilitating targeted koala conservation and management oriented research projects within the City of Ballarat; and

- Effective monitoring of the Plan."
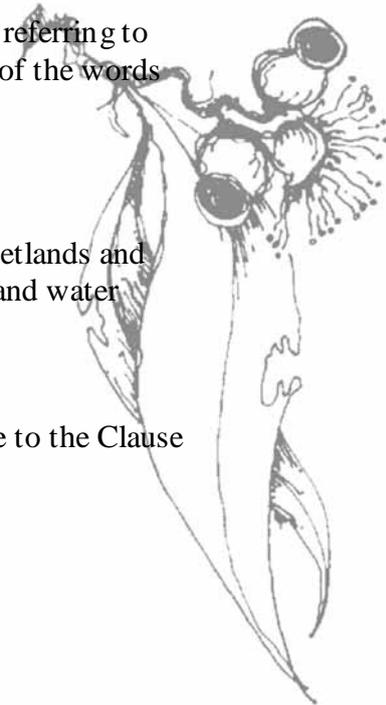
In Clause 21.08 Reference Documents insert reference to the "Ballarat Koala Plan of Management 2006".

Local Planning Policy Framework

Insert a new Clause 22.05-18 of the Local Planning Policy Framework as follows:

"Koala and Koala Habitat Protection

To assist in achieving the long-term sustainability of Ballarat's koala population, it is policy in implementing the Ballarat Koala Plan of Management 2006 through the Ballarat Planning Scheme:

- To protect koala habitat areas from any development that would compromise the quality or integrity of existing koala habitat.

- To ensure that any development within or adjacent to koala habitat areas occurs in an environmentally sensitive manner.

- To ensure that acceptable levels of investigation are undertaken, considered and approved prior to any development within or adjacent to koala habitat areas.

- To incorporate the restoration of koala habitat as a component of developments where restoration is identified as required by the Ballarat Koala Habitat Planning Map.

- To ensure that any development maintains existing connectivity between areas of koala habitat and minimises threats to safe koala movement between such areas.

- To provide guidelines and standards to minimise impacts on koalas during and after development, including any monitoring requirements.

- To provide readily understandable advice to proponents preparing planning applications involved in the assessment of applications."
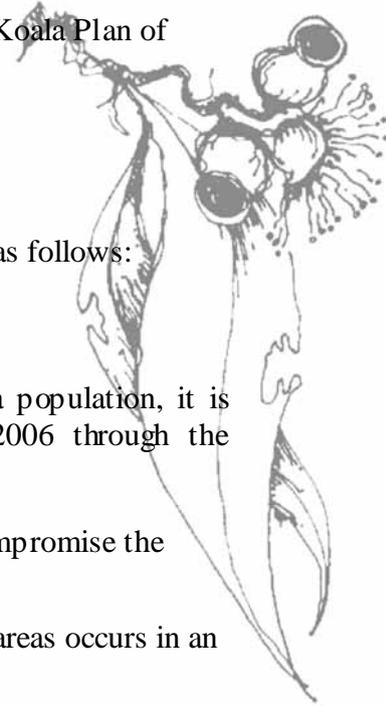
Appendix 2

Amendment to the Ballarat Planning Scheme - Schedule to the Environmental Significance Overlay

It is recommended that the following new Schedule be added to the Environmental Significance Overlay as contained in the Ballarat Planning Scheme:

"SCHEDULE 5 - KOALA AND KOALA HABITAT PROTECTION

Shown on the Planning Scheme Map as **ESO5.**

1.0 Statement of environmental significance

To provide for the long-term survival of koala populations within the City of Ballarat it is imperative to recognize the vital roles that the City's native vegetation plays in the survival of the koala in Ballarat as habitat and food source, in particular the presence of Manna Gum and Messmate Stringybark.

Numerous land management issues affect the long-term survival of the koala in Ballarat. The 2002 Ballarat Community-based Koala Survey highlighted overwhelming support for and the importance that the Ballarat community places on koala conservation. Residents perceive that koala numbers are lower now than in the past, with the main concerns affecting koala survival being the logging of native forests, housing developments, the removal of vegetation on private land and along roadsides, roaming dogs and the danger created by roads and vehicular traffic.

To deal with these issues, respondents perceived the need for restrictions on dog ownership, improved traffic management, more tree planting and habitat restoration, tree preservation orders and stronger planning controls over urban development. The Koala and Koala Habitat Protection Schedule has been introduced to deal with these issues, insofar as they can be dealt with through the Ballarat Planning Scheme.

2.0 Environmental objectives to be achieved

❖ To maintain and enhance koala habitat.

❖ To ensure the type, density, design and layout of new development is such as to minimise any adverse impacts on koala movements that occur or are likely to occur throughout areas of koala habitat and associated areas and on koala behaviour and health generally.

❖ To coordinate the protection of koala habitat with the protection of native vegetation generally within Ballarat.

3.0 Permit requirement

A permit is required to construct any buildings or carry out works, including the removal of native vegetation, and to undertake the subdivision of land.

4.0 Information to be submitted with Application

The following information must be submitted with applications for development on **sites that contain** koala habitat as shown on the Ballarat Koala Habitat Planning Map;

❖ An assessment of koala habitat, by a suitably qualified person, in accordance with the City of Ballarat's Guidelines for Koala Habitat Assessment.

❖ Clear and precise details concerning which vegetation is to be cleared or disturbed and that which is to be retained.

❖ Details of any proposed building envelopes and the means by which they are to be enforced.

❖ Proposed measures to restore koala habitat, including those that would result in a net gain of koala habitat over time.

❖ Proposed measures to facilitate the safe movement of koalas across the site including road designs and speed mitigation measures, fence construction details, landscaping proposals and swimming pool specifications.

❖ Proposed measures to mitigate the impacts on koalas by dogs. This should include such measures as education of dog owners, appropriate signs, or restrictions on dog ownership to reduce the likelihood of domestic dogs straying into adjacent koala habitat.

❖ Details of any proposed program to monitor koalas and koala habitat, during and following development activity on the site. Monitoring programs are not required for single lot developments, but are to be submitted with all applications for subdivision of land affecting koala habitat.

The following information must be submitted with applications for development on **sites adjacent to** areas of koala habitat as shown on the Ballarat Koala Habitat Planning Map:

❖ Proposed measures to mitigate the impacts of dogs on any koalas that may occupy adjacent habitat.

❖ Proposed measures to mitigate the impact on koalas from motor vehicles travelling to the site. This should include appropriate traffic control measures on roads that run through or adjacent to nearby koala habitat and which would be subject to increased traffic volumes due to the development.

4.0 Decision guidelines
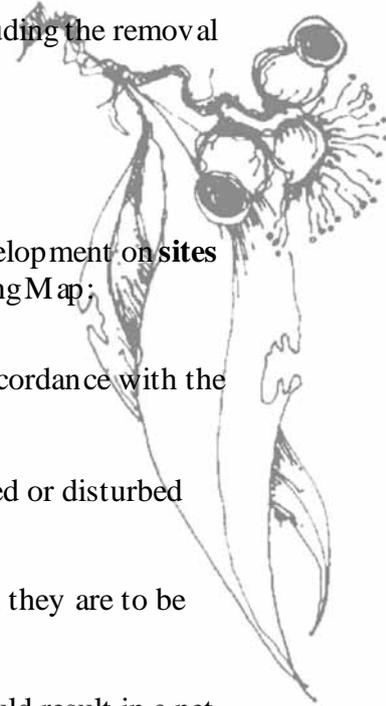
Before deciding on an application the Responsible Authority must consider:

❖ Opportunities for koala habitat restoration presented by the proposed development.

❖ The means proposed to maintain and enhance connectivity between areas of koala habitat and to prevent further fragmentation of habitat and Habitat Linking Areas.

❖ The means proposed to minimise threats to safe koala movements between habitat areas and the safety of koalas within the development site generally.
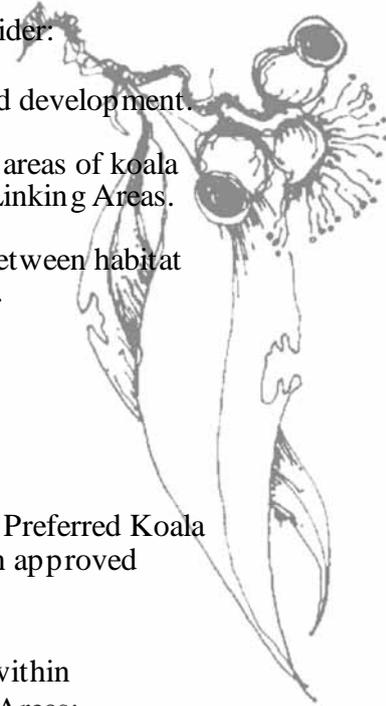
5.0 Application Requirements

All planning applications must**:**

❖ Not result in the removal or degradation of native vegetation within Preferred Koala Habitat, except for the purpose of providing a building site within an approved building envelope in accordance with Clause 5.1.

❖ Maximise retention and minimise degradation of native vegetation within Supplementary Koala Habitat, Habitat Buffers and Habitat Linking Areas;

❖ Not result in the removal of any individuals of Preferred Koala Food Trees, wherever they occur on the subject land, except for the purpose of providing a building site within an approved building envelope in accordance with Clause 5.1.

❖ Make provision, where appropriate, for the restoration of koala habitat areas, including Habitat Buffers and Habitat Linking Areas over Mainly Cleared Land and Other Vegetation;

❖ Make provision for long term management and protection of koala habitat, including both existing and restored habitat, on the subject land;

❖ Not compromise the potential for safe movement of koalas across the subject land. This should include minimising the likelihood that the proposal would result in the creation of barriers to koala movement by carrying out fencing on the subject land in accordance with Clause 5.2.

❖ Specify that the proposed development will be dog free or set out the manner in which dogs will be managed on the subject land to minimise contact between koalas and dogs, including in accordance with the fencing and location requirements for dog compounds set out in Clause 5.2.

5.1 Provision of Building Envelopes

The removal of koala habitat may be approved for the purpose of constructing buildings and associated works within a defined building envelope **only if** the applicant can demonstrate that:

❖ The building envelope **cannot** be located so as to avoid the removal of native vegetation within areas of koala habitat;

❖ The location of the building envelope **minimises** the need to remove native vegetation;

❖ In the case of a plan of subdivision, it has been designed so as to **retain and enhance** koala habitat on the site and are consistent with the objectives of this Schedule; and

❖ Koala survey methods in accordance with Section 4 of the Guidelines for Koala Habitat Assessment have been used to determine the most appropriate location for the building envelope.
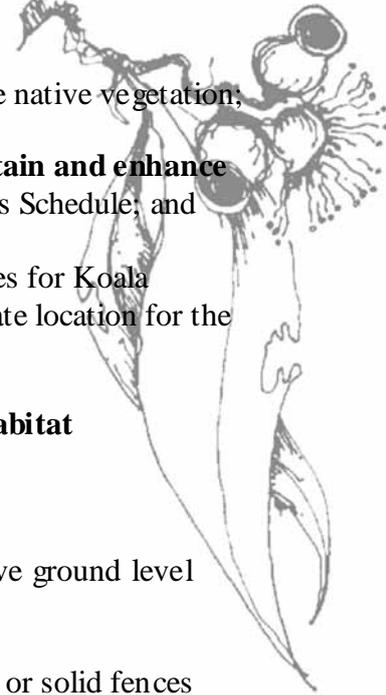
5.2 Fencing for Development Sites located within Areas of Koala Habitat

Fencing in areas of or adjoining areas of koala habitat must comprise:

❖ Fences where the bottom of the fence is a minimum of 300 mm above ground level so as to allow koalas to move underneath;

❖ Fences that facilitate easy climbing by koalas, including chain mesh or solid fences with timber posts on both sides at regular intervals;

❖ Open post and rail or post and wire fences, without the use of barbed wire.

❖ Where the keeping of domestic dogs is proposed, fencing of a type that will effectively contain dogs in and exclude koalas from a dog compound, the compound to be restricted to a location within a designated building envelope. Fences should be located away from any trees that could allow koalas to cross the fence.

Planning Scheme Maps:

The maps to the Ballarat Planning Scheme will be altered to show a new ESO – Schedule 5, incorporating all Core Koala Habitat as recommended in the Ballarat Koala Plan of Management and as identified on the Ballarat Koala Habitat Planning Map.

Appendix 3

Performance Standards for Rezoning Proposals

Consideration is to be given to the following matters when assessing the appropriateness of rezoning requests under the Ballarat Planning Scheme **other than** those that propose rezoning land to the Environmental Rural Zone in accordance with the Ballarat Koala Plan of Management.

Prior to approving any rezoning proposal for land that is **within** land defined as Preferred or Supplementary Koala Habitat or Preferred Habitat Buffers or Habitat Linking Areas over Supplementary Habitat, Council should be satisfied that possible future development or activity in accordance with the requested rezoning would:

❖ Within areas of Preferred Koala Habitat or Preferred Habitat Buffers over Supplementary Habitat: not allow for an intensification of land use or development;

❖ Within areas of Supplementary Koala Habitat and Habitat Linking Areas over Supplementary Habitat: allow only for a level of development that is consistent with the matters for consideration for planning applications contained in Appendix 2;

❖ With respect to preferred Koala Food Trees: be unlikely to result in the removal of any individuals, wherever they occur on the site; and

❖ Would not prevent koala movement across the site. This should include consideration of the need for maximising tree retention and for minimising the likelihood of impediments to safe and unrestricted koala movement.

The required information to support a rezoning request must include an investigation of the site by an appropriately qualified person in accordance with the Guidelines for Koala Habitat Assessment as presented in Appendix 4 of this Plan.
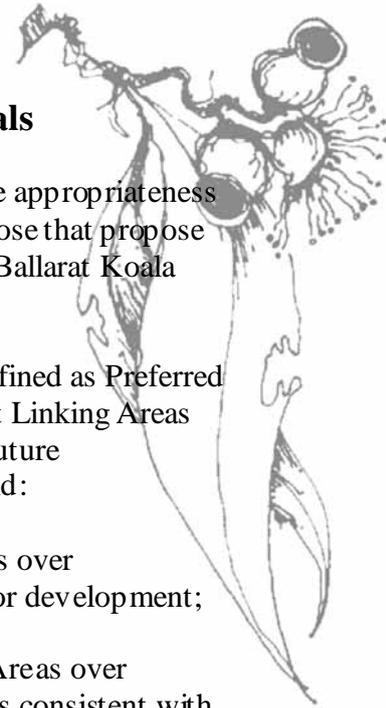
Appendix 4

Guidelines for Koala Habitat Assessments

Purposes

The Guidelines for Koala Habitat Assessments in the City of Ballarat serve the following functions:

❖ To enable provision of the information necessary to support a rezoning proposal under the *Planning and Environment Act 1987.*

❖ To enable provision of the information necessary to support a planning application being considered in accordance with Schedule 5 of the Environmental Significance Overlay of the Ballarat Planning Scheme.

Assessments to be carried out by Qualified and Experienced Personnel

A Koala Habitat Assessment **must** be carried out by a person or persons with qualifications and experience in:
❖ Tree species identification and,
❖ In the case of assessments of koala habitat utilisation at Step 4, in biological science and fauna survey.

The person or persons carrying out the Assessment **should** also have specific experience in conducting koala surveys.

Brief curriculum vitae for each person undertaking Assessments according to these Guidelines should be appended to the survey report.

Method for Carrying Out Assessments

Koala Habitat Assessment in the City of Ballarat should include the following steps as the minimum acceptable approach:

1. **Preliminary Assessment.**

2. **Vegetation Mapping.**

3. **Koala Habitat Identification.**

4. **Assessment of the Proposal.**

5. **Locating a Suitable Building Envelope.**
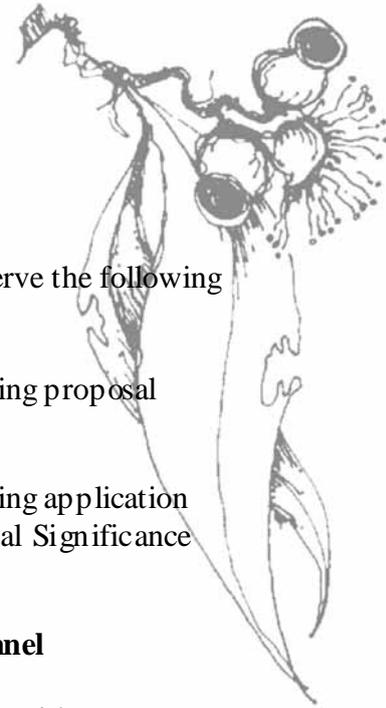
Flow chart outlining the procedure for undertaking Koala Habitat Assessments

See text for a more detailed explanation. The following abbreviations are included in the flow chart: KHA=Koala Habitat Atlas: PKH=Primary Koala Habitat; SAKH=Secondary A Koala Habitat; SBKH=Secondary B Koala Habitat; SCKH=Secondary C Koala Habitat; TKH=Tertiary Koala Habitat (*i.e.* Habitat Buffers and Habitat Linking Areas): LGA=Local Government Area: DA=Development Application.

STEP 1: PRELIMINARY ASSESSMENT

START HERE

Preliminary Habitat Assessment (Consult Koala Habitat Atlas (KHA) and conduct site inspection)

Does the site contain PKH, SAKH, SBKH, SCKH or TKH (*i.e.* Habitat Buffers or Habitat Linking Areas; other than over Mainly Cleared Land) according to the KHA and/or does it contain Preferred Koala Food Trees?

Yes

Does site contain TKH over Mainly Cleared Land according to the KHA?

No

Yes

No

Is the site < 1Ha?

Yes

No

No further koala habitat assessment required. Consent not constrained by Koala habitat

STEP 2: VEGETATION MAPPING

Undertake vegetation mapping of the site (as per Guidelines) as follows:

i) Show distribution of vegetation associations on site and for 100m beyond; and
ii) Show location of individual Preferred Koala Food Trees outside of PKH and SAKH.

Produce site specific vegetation map. Is site specific vegetation map consistent with LGA-wide vegetation map?

Yes

Then LGA-wide KHA and site specific map of Preferred Koala Food Trees applies

No

STEP 3: KOALA HABITAT IDENTIFICATION

3a) Then identify and rank Koala habitat for the site and adjoining area as follows:

i) *Map PKH, SAKH, SBKH & SCKH on site;*
ii) *Apply 100 m Habitat Buffers to all PKH and SAKH over native vegetation and 50 m over Mainly Cleared Lands; and*
iii) *Approximate Habitat Linking Areas.*

Produce revised KHA for the site and adjoining area

3b) *Is there PKH, SAKH, SBKH, SCKH, TKH or Preferred Koala Food Trees on the site?*

Consent not constrained by Koala habitat

No

Yes

STEP 4: ASSESSMENT OF PROPOSAL

Proposal requires additional survey work (assessment of koala habitat utilisation)

Assess proposal against performance standards (Ch 5; Appendices 3 & 4)

Refine the development (such as size and placement of building envelope/essential infrastructure)

Development proposal meets standards

Step 1: A **Preliminary Assessment** must include the following:

❖ Reference to the Koala Habitat Planning Map for the City of Ballarat[*] (or excerpts thereof) to make a preliminary assessment of the koala habitat on the site of the proposed development (hereafter referred to as 'the site') and to consider the koala habitat of the site in the broader local (and regional) context; and

❖ An inspection of the site to determine whether the site contains individuals of Preferred Koala Food Trees outside areas mapped as Preferred Koala Habitat.

From this Preliminary Assessment it should be possible to determine if the site contains Preferred or Supplementary Koala Habitat, any Habitat Buffers, or Habitat Linking Areas according to the City-wide Koala Habitat Planning Map and/or if the site contains Preferred Koala Food Trees.

Scenario 1: If the site contains any of the above, it will be necessary to proceed to Step 2 - Vegetation Mapping.

Scenario 2: If the site **does not contain** any of the above mentioned habitat categories or it does contain Habitat Linking Areas but the area is less than one hectare in size, then no further koala habitat assessment is required and consent for the proposed development or rezoning should not be withheld on koala habitat grounds.

Step 2: Vegetation Mapping should be undertaken at the largest scale appropriate, and presented in accompanying reports at A3 size. It is recommended that aerial photography (depending upon scale) complemented by detailed ground-truthing be used as a basis for such mapping. Ground-truthing must include verification of vegetation association boundaries, and systematic sampling of the floristic and structural characteristics (*e.g.* using methods specified by Walker and Hopkins (1990)) within each vegetation association using standard procedures such as quadrat-based or transect-based surveys. The vegetation mapping should accurately depict:

❖ The distribution of vegetation associations for the site (defined on the basis of floristic composition of the tallest stratum along with structural data, as per Walker and Hopkins 1990), plus a 100m area around the site; and

❖ The location of all individuals of Preferred Koala Food Tree species; *Eucalyptus viminalis spp viminalis* and *Eucalyptus obliqua** wherever they occur on the site, outside vegetation associations already classified as Preferred Koala Habitat.

(***Note:** the field survey (Koala Habitat Atlas) identified *Eucalyptus viminalia spp viminalis* and *Eucalyptus obliqua* as the Preferred Koala Food Tree species within the City of Ballarat (Callaghan, Mitchell, Thomson & Bailey 2004.)

The boundaries of vegetation associations and the location of Preferred Koala Food Trees (outside of identified Preferred Koala Habitat) are to be accurately surveyed, such as by a stadia survey or by using differential GPS, in accordance with the points above.
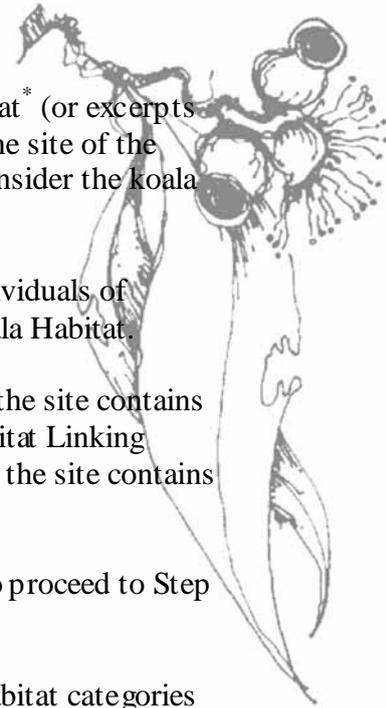
Once a site-specific Vegetation Map has been prepared in accordance with the above standards it should be compared to the City-wide Vegetation Map.

Scenario 1: If there are inconsistencies between the site-specific and City-wide Vegetation Maps, it will be necessary to undertake the procedure for Koala Habitat Identification outlined in Step 3a - Production of a site-specific Koala Habitat Planning Map.

Scenario 2: If the site-specific Vegetation Map is consistent with the City-wide Vegetation Map, particularly in regard to the mapping of vegetation associations that comprise Preferred or Supplementary Koala Habitat, then the City-wide Koala Habitat Planning Map and the site-specific map of Preferred Koala Food Trees will apply for the assessment of the proposal; see Step 3b - Koala Habitat Identification.

[Note: Because the City-wide Vegetation Map was prepared from 1:25 000 and 1:16 000 scale aerial photographs, there are limitations regarding accuracy for the purposes of development assessment for a given site. Thus, it is likely that there will be a need to refine vegetation association boundaries when mapped at a larger scale in conjunction with development assessment. In instances where the City-wide Vegetation Map has accurately identified the vegetation associations, but where there are inaccuracies regarding the location of vegetation association boundaries, it will be appropriate to proceed to Step 3a, provided any such inaccuracies are corrected. This must include surveying or mapping (e.g. using differential GPS) of any such boundaries.]

Council staff also ask that consultants notify them of any suspected instances off-site where the City-wide Vegetation Map appears to be inaccurate, particularly where this could influence the location of Habitat Buffers and/or Habitat Linking Areas across a site, and to assess koala habitat on the site accordingly.

Step 3: Koala Habitat Identification

3a) This step should be applied in instances where the City-wide Vegetation Map does not accurately describe the nature of the vegetation on the site. This will require the following:

❖ Application to the **Vegetation Map** of the definitions of Preferred and Supplementary Koala Habitat as defined in Chapters 4 and 5 of the Plan Resource Document and as outlined below to show the distribution of koala habitat categories across the site and adjacent areas, **where revisions to the Vegetation Map are considered necessary**;

❖ Application of 100m **Habitat Buffers** to all Preferred Koala Habitat; and

❖ Approximation of **Habitat Linking Areas** between all patches of Preferred Koala Habitat and Supplementary Koala Habitat that occur within 3,500 metres of each other as detailed in Chapter 5 of the Plan Resource Document and as outlined at the end of this Appendix, **where revision of the Koala Habitat Planning Map has been necessary**. Alternatively, site inspections and survey work in conjunction with any koala records for the general area that may be available from Council to identify areas that are either in use by koalas or that are considered to have the potential to be
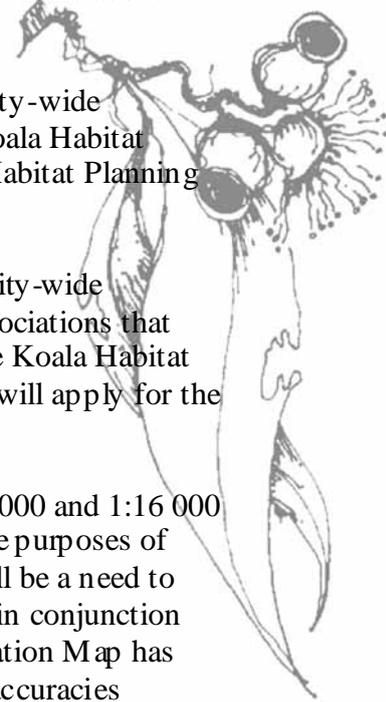
effectively used by koalas could be applied to identify suitable site-specific Habitat Linking Areas.

After a site-specific Koala Habitat Planning Map has been produced, proceed to Step 3b.

3b) This step should be applied after completing Step 3a or in instances where the City-wide Vegetation Map accurately describes the vegetation of the site and where any inaccuracies regarding the location of vegetation association boundaries have been corrected.

A site-specific map showing the location of **individual Preferred Koala Food Trees,** where they occur outside Preferred Koala Habitat, is also required at this step. If the relevant Koala Habitat Planning Map indicates that there is either Preferred or Supplementary Koala Habitat, Habitat Buffers or Habitat Linking Areas on the site, or if the site-specific map indicates the presence of Preferred Koala Food Trees, proceed to Step 4 - Assessment of Proposal. If none of the above occurs on the site, then consent should not be withheld on koala habitat grounds.

Step 4: Assessment of Proposal

The final step involves using the information produced from Steps 1 to 3 to assess the appropriateness of the proposal. This must involve reference to the **Application Requirements** for planning applications contained in Appendix 2 **Performance Standards** for rezoning proposals as contained in Appendix 3 of the Plan.

This step must also include a map showing the key elements of the proposal overlain on the **Koala Habitat Planning Map**, as revised if necessary. The assessment must also address the impacts of potential future development of the site in the broader context of a catchment area with an outer limit of one kilometre beyond the site boundary, with particular reference to any areas of Preferred or Supplementary Koala Habitat, Habitat Buffers or Habitat Linking Areas as shown on the Koala Habitat Planning Map.

Rezoning requests must satisfy the performance standards specified in Appendix 3 of this Plan. Development applications must satisfy the requirements specified in Appendix 2 of this Plan.

Step 5: Locating a Suitable Building Envelope

If a planning application includes provision for one or more building envelopes involving the removal of koala habitat, additional survey work is required to be undertaken to identify the most suitable location for the building envelopes.

An assessment of koala habitat utilisation on the subject land must be undertaken by a suitably qualified person with experience in koala surveys. A standard, reportable survey technique that allows habitat utilisation by koalas to be quantified, such as the AKF's faecal pellet-based 'Spot Assessment Technique' (Phillips & Callaghan 1995) should be employed to identify the extent of any Koala Activity Levels across the site. When using the Spot Assessment Technique, the minimum density of spot assessment
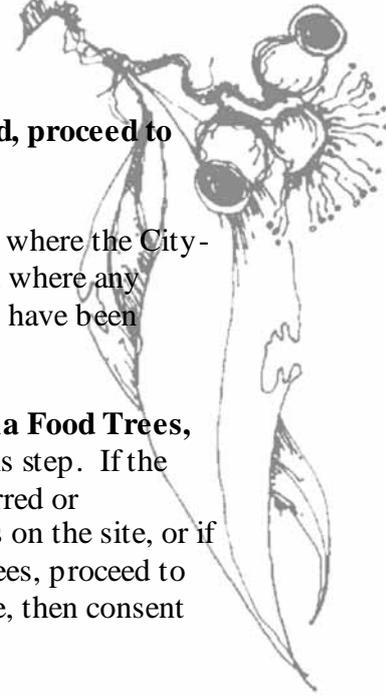
plots should be 1 plot per 1,000m^2 of land that contains native trees within the areas where building envelopes and associated works could potentially be located. Plots sites should be located systematically using a grid approach, with precise locations for sites within grid cells selected to ensure maximum sampling of Preferred Koala Food Trees.

A survey must also be undertaken for koalas involving day-time searches and spotlighting over the course of at least two days and evenings. The day surveys should include searches of the site for any heavily scratched trees that might be koala home-range trees. Council should be contacted to obtain any existing koala records for the specific site and the local area.

Wherever possible, building envelopes and associated works should be positioned away from areas that return evidence of Koala Activity or any suspected koala home-range trees. Where this is not possible, building envelopes and associated works should be positioned in areas that return the lowest Koala Activity Levels.

Definitions

Koala Activity

For the purposes of the above assessments "Koala Activity" means one (1) or more reliable Koala records or sightings (either recent or historical), and/or koala faecal pellet evidence.

Koala Activity Level

"Koala Activity Level" means as defined in Callaghan, Mitchell, Thomson & Bailey, 2004.

Preferred Koala Habitat

Is as defined in the Resource Document – Section 5.2.2.
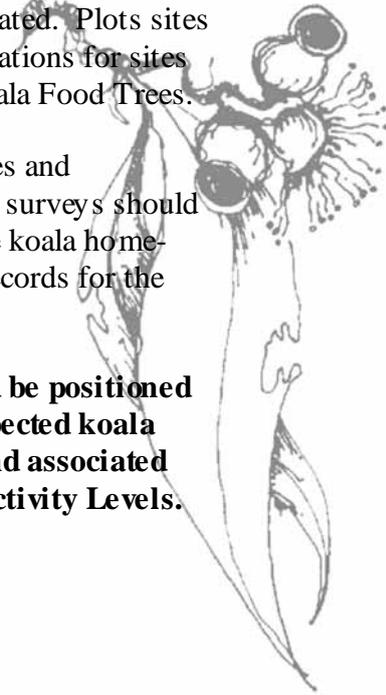
Appendix 5

Ballarat Koala Habitat Planning Map
& Habitat Linking Areas for Restoration Map
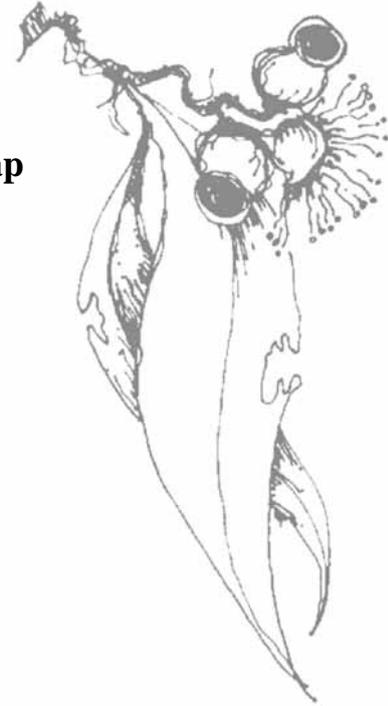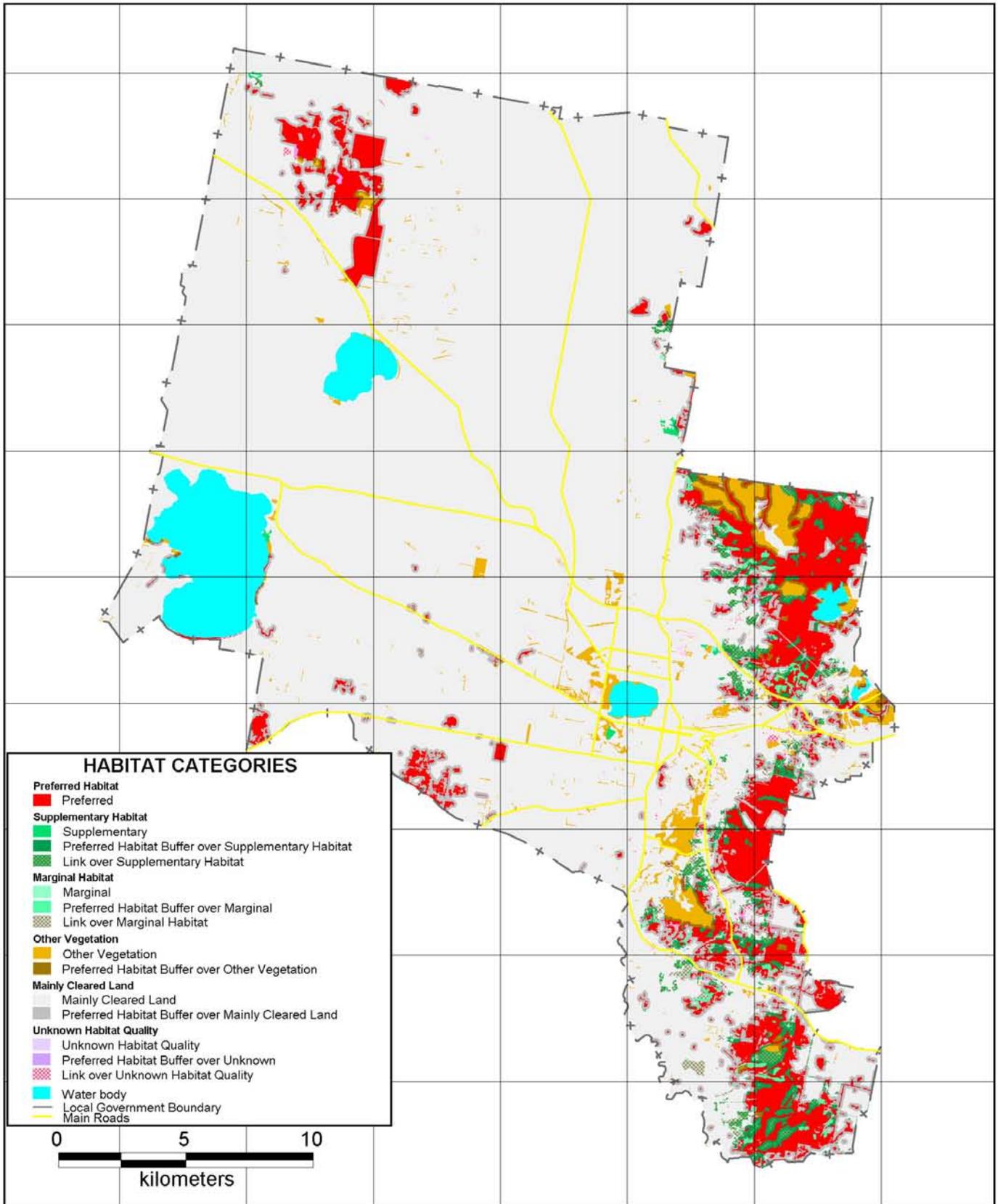
HABITAT CATEGORIES

Preferred Habitat
- ⬛ Preferred

Supplementary Habitat
- ⬛ Supplementary
- ⬛ Preferred Habitat Buffer over Supplementary Habitat
- ⬛ Link over Supplementary Habitat

Marginal Habitat
- ⬛ Marginal
- ⬛ Preferred Habitat Buffer over Marginal
- ⬛ Link over Marginal Habitat

Other Vegetation
- ⬛ Other Vegetation
- ⬛ Preferred Habitat Buffer over Other Vegetation

Mainly Cleared Land
- ⬛ Mainly Cleared Land
- ⬛ Preferred Habitat Buffer over Mainly Cleared Land

Unknown Habitat Quality
- ⬛ Unknown Habitat Quality
- ⬛ Preferred Habitat Buffer over Unknown
- ⬛ Link over Unknown Habitat Quality

- ⬛ Water body
- —— Local Government Boundary
- —— Main Roads

0   5   10

kilometers
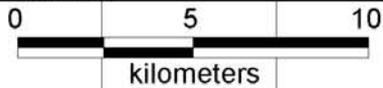
AUSTRALIAN KOALA FOUNDATION

CITY OF BALLARAT
KOALA PLAN OF MANAGEMENT
Koala Planning Map

JULY 2006

Map Grid Of Australia (MGA94) Zone 54 shown at 5 km intervals

Map Copyright 2006 The Australian Koala Foundation

Appendix 6

**Planning Guidelines for Koala Conservation & Restoration: A Guide
to Best Planning Practice**

PLANNING GUIDELINES FOR KOALA CONSERVATION AND RECOVERY

A guide to best planning practice

Draft July 2006

Prepared by:

Clive McAlpine (landscape ecologist), Jonathan Rhodes (landscape ecologist and ecological modeller), Ann Peterson (conservation planner) and Hugh Possingham (ecological modeller): The University of Queensland, Brisbane, QLD 4072.

John Callaghan (ecologist), Tim Curran (ecologist) and Dave Mitchell (spatial analyst): Australian Koala Foundation, GPO Box 2659, Brisbane, QLD 4001.

Dan Lunney (zoologist): New South Wales Department of Environment and Conservation, PO Box 1967, Hurstville, NSW 2220.

The geographic range of the koala extends from tropical Queensland to western Victoria and south-east South Australia. Range contractions have occurred, especially in South Australia due to habitat loss, while koalas have experienced local extinctions within their range. Approximately 300 local government areas and over 30 catchment management authorities/ regional natural resource management bodies are responsible for planning decisions affecting koalas within their geographic range. Koalas are listed as vulnerable in South East Queensland and New South Wales.

CONTENTS

PREFACE

FOREWORD

KOALAS CROSS HERE…These dramatic words set next to a silhouette of a koala appear on conspicuous black-and-yellow road signs that greet travellers on our coastal highways. More of these signs appear off the highways in larger urban coastal cities and suburbs. They provoke travellers to think about koalas, even if for just a moment. One of the common responses of travellers, when asked, is that they have never seen a koala in the wild. This is not surprising because koalas are a threatened species in New South Wales and Southeast Queensland and there are far fewer of them than we would like. If the travellers did see a koala, it may well have been a freshly-killed animal, either lying by the roadside or flattened on the road. These are grim and unpleasant memories. Occasionally, an alert driver has not only seen a koala, but has slowed down to let it cross the road safely. So, busy roads and koalas do not mix. The response can be to leave one's car at home, and simply walk, or ride a pushbike, or go by train, or drive more slowly and carefully. What we are really urging here is to take a deeper look at the meaning of the koala road sign and the planning implications. For planners, there is a powerful story to tell.

"Why did the koala cross the road?" "To get to the other side", seems to be the obvious answer to this common kids' riddle. Now enlarge that answer with an ecological twist, and it becomes "to get to the habitat on the other side". Either the koala was moving within its home range, or was dispersing from its mother's range to find a suitable patch of habitat in which to establish a territory. So, the traveller and the planner have essentially been looking at four of the most serious threats to the survival of koalas on Australia's east coast, even if that was not immediately apparent. These threats include the loss of habitat to coastal development, the fragmentation of what remains, exposure of resident koalas to death on roads, and attacks on koalas by roaming dogs when crossing ever-increasing open ground.

If a traveller stops in a koala shire and visits a known koala habitat area, patient scanning of trees may be rewarded with a koala sighting. The classical image is a koala sitting in a tree either at rest or slowly chewing a gum leaf. Not just any leaf will do, it will most likely be from one of a small list of preferred koala food trees for any given region. One of the most glorious sights is when a female koala has a young on its back. Such a sight confirms to the watcher that the koala is one of the world's most attractive and inspiring animals. The koala is an Australian icon, and it can also serve brilliantly as a shire planner's icon. If one agrees, then there are some rules to follow that are specific to a koala's needs. Those rules can be set in an ecological context that ranges in scale from the importance of a particular species of tree, to a stand of trees, to a patch of forest, and then to the surrounding landscape. This is now beginning to mesh koala ecology with the range of scales over which planners operate.

The planning guidelines in this document have placed the ecology of the koala at centre stage. We have written them as ecologists, keen to combine the ecology of koalas within the spatially-explicit framework commonly known as landscape ecology. **We offer these guidelines to all those responsible for conservation planning for koalas and the forest ecosystems they depend upon, in the interests of securing the long-term future of this Australian icon.**

HOW TO USE THIS GUIDE

The aim of these guidelines is to inform local government planners, regional planning bodies, community organisations, developers and environmental consultants how best to conserve and restore koala populations in fragmented landscapes. They specifically target the urban and semi-urban local governments and regions of Queensland, New South Wales and Victoria, although the general principles captured in the guidelines equally apply to rural areas. They recommend practical ways for dealing with issues of habitat management, road deaths and dog attacks. They are designed to produce a more consistent approach to koala conservation across all levels of planning. The guidelines are not meant to be prescriptive. Rather, the main purpose is to inform local government planners, decision makers, developers and the community on how to design and implement compatible developments within and around areas that still support koalas and to restore populations in suitable habitat where they may no longer be present. Given the wide range of threats facing koalas, there are no quick-fix solutions for long-term conservation and restoration. We see use of the *Planning Guidelines for Koala Conservation and Recovery* as an important step towards improved planning and management practises that will help ensure long-term conservation of this iconic species.

We recommend application of the guidelines to:

- Conserve koalas in their natural habitat;
- Bring koala conservation to the forefront in planning for key areas;
- Set minimum habitat area and connectivity requirements for koala population viability;
- Help mitigate the threats posed by vehicle collisions and dog attacks;
- Evaluate future development proposals and conservation initiatives by establishing minimum targets for habitat protection, restoration and management;
- Set standards for koala conservation and recovery planning that can be applied throughout much of the koala's geographic range; and
- Develop long-term monitoring programmes for koalas.

The guidelines are split into two spatial levels: the landscape and the site. **The landscape (1000s ha) is the level of strategic planning focus** and the reference point for assessing rezoning proposals and development applications at the site-level (1-100 ha), and for developing conservation strategies for whole local government areas or regions (Figure 2). **At the local-government-level, the guidelines can be applied by strategic planning across multiple-landscapes.** The guidelines concentrate on the habitat requirements for viable koala populations at the landscape-level, aiming to avoid the commonly recognised problem of "death by a thousand cuts", whereby the incremental loss and fragmentation of koala habitat makes populations unviable and ultimately leads to their local extinction. The objectives and guidelines specify the 'desired' landscape structure necessary to support what we consider likely to constitute a viable koala population. They do not automatically preclude development, but rather aim to achieve a balance between conservation and human land use in landscapes where koalas occur.

Urban planners regularly have to assess development applications and rezoning proposals covering individual or multiple parcels of land. Depending on the location and the type of development, each proposal has the potential to impact on local koala populations through clearing or degradation of habitat, new roads, increased traffic volumes and predation by domestic dogs. The site-level guidelines for development assessment and rezoning applications, that follow the landscape-level guidelines, detail key considerations aimed to minimise impacts on local koala populations. We urge users, when assessing local development applications or

rezoning proposals, to first evaluate the proposal in the context of the strategic landscape planning objectives. If the proposed development is in conflict with one or more of these criteria (e.g., critical habitat retention thresholds), then there is a strong case for not proceeding as proposed on the grounds of koala conservation concerns.
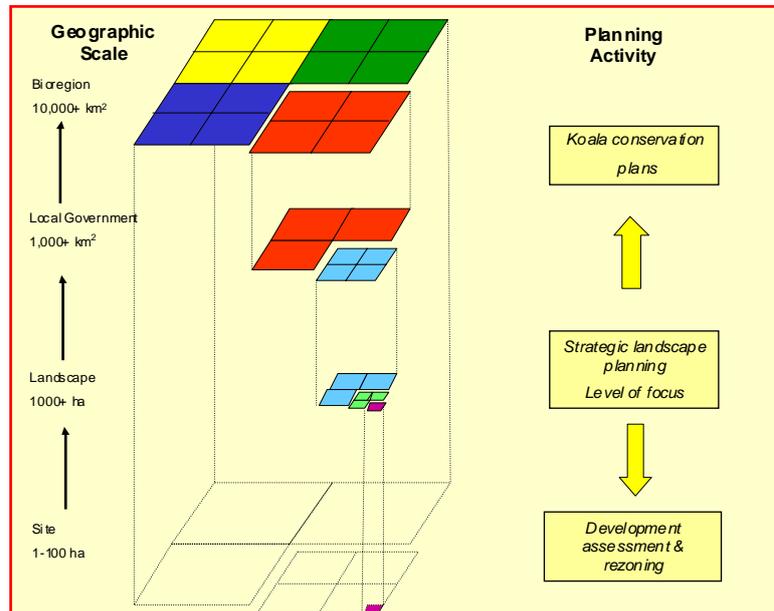
Figure 1. A multi-level framework for using the guidelines. The landscape is the building block for conserving viable koala populations. Start at the landscape level and work up or down the hierarchy. Strategic planning should also apply to the local government scale, where planning at this scale consists of planning across multiple landscapes.

The guidelines are structured into several sections or parts. First, we outline key terms and definitions used in the guidelines to help the reader understand the ecological terminology used in the guidelines proper. **In Part A**, we present strategic-planning guidelines for informing planning codes and policy at the landscape and local government (multiple-landscape) scales. Part A begins with background information on:

- What is a landscape? and
- How to map koala habitat?

It then presents specific guidelines for addressing the following planning and landscape management questions:

- How much habitat is enough?
- How big patches need to be?
- What shape should patches be?
- How to maintain the quality of koala habitat patches and linkages?
- How to maintain and restore habitat connectivity?
- How to minimise impacts from road networks? and
- How to minimise predation by dogs?

Each guideline consists of four sections: (1) the planning objective, (2) the planning guideline(s), (3) the planning action(s) and, (4) a summary of the supporting science, outlining the rationale behind the guideline(s) and action(s).

In Part B, we outline site-level guidelines for assessing:

- Rezoning proposals; and
- Planning and development applications.

In Part C, we outline monitoring protocols to inform future planning strategies for conserving koala populations and their habitat.

Terms and Definitions

Clearing: Process of anthropogenic destruction or substantial thinning of one or more strata of native vegetation using mechanical, chemical, manual or biological methods.

Connectivity: The degree to which all patches are spatially linked by corridors, small patches (stepping stones) or clumps of trees.

Corridor: A linear strip of habitat that differs from its surroundings.

Dispersal: One way movement of an individual away from its natal home range to its breeding home range.

Ecological integrity: An ecosystem with ecological integrity is one which possesses those structural and compositional elements that maintain its functioning within the bounds of natural disturbance regimes (e.g., fire) and are not subject to excessive human-induced disturbance such as grazing, logging, thinning or prescribed burning.

Forest: Areas of forest, including all the koala habitat categories as defined in Appendix B.

Fragmentation: The breaking apart of a habitat or landscape into smaller, more isolated parcels.

GIS (Geographical Information System): Computer hardware and software used for storage, retrieval, mapping, and analysis of geographic data.

Habitat buffers: Areas of modified vegetation or cleared land that aim to conserve the habitat values of remnant habitat and protect from nutrient impacts, wind damage and weed invasion, as well as facilitating koala activity beyond areas of preferred habitat.

Habitat linking areas: Areas of modified vegetation (trees or clumps of trees) or cleared land that facilitate safe movement of koalas (e.g., natal dispersal and recruitment of sub-adults) between breeding populations or into areas of vacant preferred habitat.

Highly connected patches: Patches or clusters of patches that are less than 200 m apart. Intervening areas should preferably be cleared land or modified vegetation, and free from physical barriers such as roads, fences, water bodies and residential or industrial areas.

Home range: The area of an animal's home that is used for feeding and other daily activities.

Isolated patches: Patches or clusters of patches that are separated by more than 200 m and/or are divided by physical barriers such as roads, fences, water bodies and residential or industrial areas.

Koala habitat class: Primary, secondary (class A), secondary (class B), secondary (class C), tertiary, and unknown koala habitats.

Koala habitat atlas: Digital map of koala habitat classes based on the proportion of primary, secondary and supplementary tree species.

Likely primary or secondary food tree species: A eucalypt species considered highly likely to be of primary or secondary importance to koalas despite the absence, or scarcity, of koala faecal pellet evidence from within the study area. Such a conclusion might be reached on the basis of other evidence such as historical records, information regarding browse selection from local koala welfare groups, or results from other LGAs.

Landscape: Mosaic of habitat patches that differ in quality and spatial properties.

Landscape composition: Proportion of different habitat types in the landscape.

Landscape configuration: The physical layout of all habitat patches within the landscape mosaic.

Matrix: The most extensive and most connected land use element present in the landscape. Also the land use element surrounding a habitat patch.

Non-eucalypts: For the purposes of these guidelines, and the Australian Koala Foundation Koala Habitat Atlas, significant use of non-eucalypt species is considered most likely to be associated with their shelter and general habitat value for koalas. It is acknowledged that non-eucalypt species also provide an important supplementary food resource.

Patch: A relatively homogeneous area of vegetation (native or exotic) that differs from its surroundings.

Patchiness: The density of patches or the fineness of the mosaic.

Population: A group of individuals of the same species located in a particular time and place, and which regularly exchange genes through reproduction.

Preferred koala food tree species: primary and secondary koala food trees.

Primary Habitat: Areas of forest or woodland where primary koala food tree species comprise at least 50% of the overstorey trees.

Primary food tree species: A eucalypt species that returns a strike rate (koala faecal pellets present) of generally 40% or greater which is significantly higher compared to that for other tree species on the basis of a stratified sampling protocol.

Remnant Habitat: Native forest or woodland habitat which is largely structurally intact. In Queensland, remnant vegetation is defined as vegetation where the dominant canopy has greater than 70% of the height and greater than 50% of the cover relative to the undisturbed height and cover of that stratum and dominated by species characteristic of the vegetation's undisturbed canopy.

Regrowth Habitat: Secondary native forest or woodland that has regenerated after clearing or structural modification. Regrowth can include scattered trees or clumps of trees.

Secondary Habitat (Class A): Areas of forest or woodland where primary koala food tree species comprise less than 50% (but at least 30%) of the overstorey trees; or:

- Areas of forest and woodland where primary koala food tree species comprise less than 30% of the overstorey trees, but together with secondary food tree species comprise at least 50% of the overstorey trees; or

- Areas of forest or woodland where secondary food tree species alone comprise at least 50% of the overstorey trees (primary koala food tree species absent).

Secondary Habitat (Class B): Areas of forest or woodland where primary koala food tree species comprise less than 30% (but at least 10%) of the overstorey trees; or

- Areas of forest or woodland where primary koala food tree species together with secondary food tree species comprise at least 30% (but less than 50%) of the overstorey trees; or

- Areas of forest or woodland where secondary food tree species alone comprise at least 30% (but less than 50%) of the overstorey trees (primary koala food tree species absent).

Secondary Habitat (Class C): Areas of forest or woodland where koala habitat is comprised of secondary and supplementary food tree species (primary koala food tree species absent or less than 10%) where secondary food tree species comprise less than 30% of the overstorey trees.

Secondary food tree species: A eucalypt species that returns a strike rate of generally less than 40%, but which is significantly higher compared to that for other tree species, with the exception of those in the primary categories, on the basis of a stratified sampling protocol.

Supplementary food tree species: A eucalypt species that returns a strike rate less than that for species in either the primary or secondary food tree categories, but which is significantly higher compared to that for other tree species on the basis of a stratified sampling protocol. This class is ranked lowest when compared to primary and secondary species.

Tertiary Habitat: Areas of forest or woodland where primary and secondary koala food tree species are absent, but which have important supplementary koala habitat values such as habitat buffers and habitat linking areas. Such areas are considered to be necessary components of habitat for the overall conservation of koala populations. Tertiary habitat is not normally capable of supporting koala population/s in the absence of primary or secondary habitat.

Thinning: Process of partial removal of one or more strata of native vegetation using mechanical, chemical, manual or biological methods.

Viable Population: For planning purposes, a viable population is regarded as one which has adequate numbers and distribution of reproductive individuals to ensure its continued existence in the planning area (landscape). In order to insure that viable populations will be maintained, births must exceed deaths over an extended period. This requires maintaining adequate habitat and minimising mortality from dogs, vehicle collision and disease.

PART A: LANDSCAPE-LEVEL PLANNING

1. WHAT IS A LANDSCAPE?

Standard dictionaries define "landscape" in terms of natural scenery or landform. However, landscapes also have an important ecological dimension for wildlife populations including the koala. **From a koala perspective, a landscape is an area of land 100s-1000s ha in area, and containing a mosaic of habitat patches of different quality, size and shape.** Habitat patches represent relatively discrete areas (well defined boundaries) of different habitat quality. Koala habitat quality is defined on the basis of the proportion of preferred eucalypt species and soil type, which collectively affect leaf chemistry including nutrient levels and toxins. Koalas demonstrate marked preferences for a relatively small number of the eucalypt species, especially those occurring on more fertile soils with a higher nutrient status, in any given area. Eucalypt communities on fertile soils have a higher nutrient status. However, many of these communities have been severely depleted by historical and ongoing clearing for agriculture and urban development. Therefore, many landscapes in which koalas now occur are highly fragmented by human land use and/or occur on lower quality soils.

The first step in implementing these guidelines is to define landscapes and landscape boundaries that are meaningful for koala conservation. The simplest method is to visually interpret a habitat or vegetation map, aerial photograph or satellite image, delimiting areas with similar topography, vegetation and land use patterns. Recurring patterns and spatial discontinuities in habitat and land use, topographic barriers such as major rivers and cliff-lines, and main roads are key criteria for delimiting landscapes for koala conservation.

Landscapes differ in the quality, amount and spatial configuration of remaining koala habitat. These factors are critical for the survival of individual koalas and the viability of local populations, whether consisting of 100s or 1,000s of individuals. Without suitable habitats (primarily eucalypt forests), individual koalas are unable to survive and reproduce and local populations will soon become extinct. In Figure 2a, mature eucalypt forests (shaded green) form the most extensive land use, referred to as the matrix. As the landscape is modified, forest habitats are replaced by urban land uses and roads, which become the matrix as development progresses (Figure 2b, c and d). While the urban matrix provides habitat for people, it provides very limited habitat resources for koalas. Rather, the risk of koala mortality from dog attacks and vehicle collisions is high as koalas move into and through urban areas and cross roads.
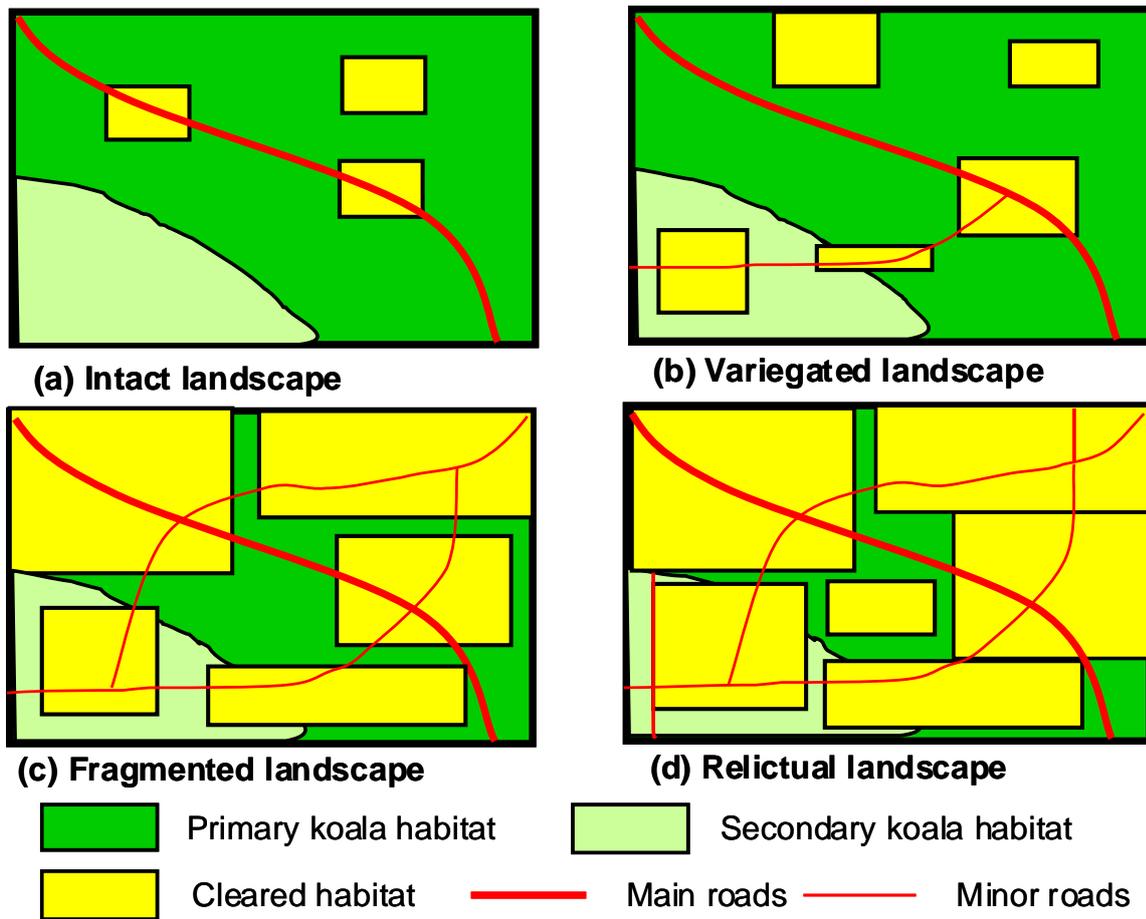
Figure 2. Conceptual model of landscapes with different levels of habitat destruction and subdivision by roads. Each landscape is characterised by the amount of remaining habitat, human land use and road density. Modified from: McIntyre and Hobbs (1999).

Intact landscapes are areas of predominantly native forest (>90%) that are free from major highways (Figure 2a). Intact landscapes may have a low proportion (<10%) of urban and rural land use, but provide almost continuous native forest habitat for koalas. Threats from road traffic and dog attacks are generally low.

Variegated landscapes have 60-90% native forest with an expanding human land use and road network perforating and subdividing the original forests (Figure 2b). Koalas face increasing pressures from habitat loss, fragmentation, vehicle collisions and dog attacks.

Fragmented landscapes are landscapes with 10-60% of the original forest habitat remaining (Figure 2c). In urban and semi-urban landscapes, road densities and traffic volumes are high as the human population increases. The remaining koalas are forced to live in small remnants surrounded by urban and rural land use and roads. Movement of individuals is more hazardous, especially in urban areas, although koalas may move more easily through rural areas if scattered trees are present.

Relictual landscapes are landscapes have <10% native forest remaining and are dominated by human land uses (Figure 2d). They have a high density of roads and high traffic volumes. The likelihood of koalas surviving in these landscapes is low, especially if urban land use dominates.

2. KOALA FOOD TREE SPECIES AND MAPPING HABITAT

The identification of koala food tree species preferences should be based upon adequate field research and data analysis. This work should be undertaken by researchers/consultants with appropriate ecological qualifications and relevant experience. For Koala Habitat Atlas mapping, habitat utilisation and tree species preferences of koalas in each Local Government Area (LGA) are assessed using a plot-based faecal pellet survey methodology developed by the Australian Koala Foundation. This methodology involves the following steps.

Field Surveys

First, field survey sites should be randomly stratified to sample the range of soil and vegetation floristic variables within each LGA to the fullest extent possible according to vegetation communities and soil landscapes or geology. Targeted or adaptive approaches may be required in order to generate statistically valid datasets for particular tree species as the sampling progresses.

Pellet searches should be undertaken within pre-selected plot survey sites by searching for pellets within 1 metre of base of each tree, with 30 trees surveyed per site. Sites affected by recent bushfire should not be surveyed. Plot sites are 20 m in radius and are located in the field using handheld GPS units and topographic maps. All live trees (with the exception of tree ferns, palms and cycads) with a dbh (diameter at breast height) of at least 100 mm within each plot site are flagged and systematically searched for evidence of koala faecal pellets. The search area includes a 1 metre catchment around the base of each tree, searched for two-person minutes, or until a koala pellet is found. A "presence" is recorded for each tree where one or more koala pellets are found. In addition to tree species, dbh and presence/absence of pellets, completed data sheets for each plot site also include vegetation descriptions and any evidence of disturbance, and any koalas observed in the site.

Identifying Preferred Koala Food Tree Species

Second, tree species are grouped into primary, secondary and supplementary preference classes according to the level of utilisation.

A primary koala food tree is a *Eucalyptus* species with a significantly higher proportion of trees having one or more koala faecal pellets (an indicator of use), compared to other tree species. Similarly, a secondary food tree is a *Eucalyptus* species that registers a significantly higher proportion of trees with pellets compared to that observed for remaining species (excluding the primary category). A third category, supplementary food tree species, records a significantly lower proportion of trees with pellets than for secondary species, but greater than for other tree species, which generally lack evidence of use by koalas. It is acknowledged that non-*Eucalyptus* species often provide supplementary food resources, as well as shelter for koalas. Primary tree species commonly demonstrate density independence (i.e. the strike rate of pellets does not vary significantly in response to different densities of that species recorded within plot sites). Conversely, the strike rate for secondary tree species tends to decline with increasing density of that species, suggesting a density dependent relationship.

Vegetation Mapping

The third step involves "scaling up" the koala food tree preferences from the site scale to LGA or study area scale. This step requires an accurate vegetation map of the LGA showing vegetation

communities/regional ecosystems and the dominant species in each map polygon. Vegetation mapping at 1:25,000 scale is considered to be the minimum standard useful for derivation of the Koala Habitat Atlas, although in areas with greater vegetation homogeneity 1:50,000 scale may be adequate. Floristic descriptions of vegetation communities should include, at a minimum, dominant and sub-dominant species, and other species found in the community. If vegetation mapping is commissioned specifically for a Koala Habitat Atlas, the actual percentages of each species in each vegetation community will greatly assist the classification of each community into a koala habitat category. An example of suitable vegetation mapping is Victoria's State Forest Resource Inventory mapping program which enables approximate species percentages to be derived from the polygon code. Regional ecosystem mapping by the Queensland Herbarium provides similar information.

The Minimum Mapping Unit (MMU), or polygon size, is an important consideration in vegetation mapping. Primary koala food trees often occur in quite small patches or narrow strips, for example higher-fertility soils adjoining wetlands and watercourses. It is desirable to separate these small patches from surrounding vegetation communities. Australian Koala Foundation vegetation mapping employs a MMU of 0.2 ha for patches containing primary food trees. Remnant primary and secondary food trees in farmland are mapped when the total groundcover (on an aerial photo) exceeds 10%.

Recent experience indicates that a "rapid-assessment" approach to collection of field sites for vegetation mapping yields the best mapping result. A 20-metre radius site is selected, and stem counts of trees with dbh over 100 mm are recorded. The stem-count method thereby matches the data collected for spot faecal pellet assessments, and is much more rapid than estimating foliage projective cover. A greater number of field sites can then be collected within budgetary or time constraints.

Preparation of a Koala Habitat Atlas Map

A Koala Habitat Atlas is derived by firstly assigning habitat categories to each vegetation community or ecosystem according to the proportional abundance of the identified preferred koala food tree species. The assigned habitat category for a given vegetation community may be subsequently upgraded or downgraded according to GIS modelling outcomes for identified key factors such as soil types or proximity to watercourses.

The final habitat category or class is then added to the vegetation map attribute table allowing convenient presentation of the vegetation map as a Koala Habitat Atlas, and providing a means to calculate total areas for each habitat class, and derive landscape metrics such as habitat area, connectivity and fragmentation using the appropriate software. The Koala Habitat Atlas may then be used to inform planning guidelines outlined below.

Habitat Buffers and Linking Areas

Habitat buffers can contribute to the long-term survival of koalas in high quality primary and secondary (class A) koala habitat by ensuring that incompatible *uses, developments* or *activities* do not occur on immediately adjacent lands. Habitat buffers include lands that may be a source of threats that need to be managed through effective planning and design strategies, to minimise or eliminate impacts on koalas. By encouraging land uses and activities that are compatible with koala conservation, land in the buffer does not need to be fenced off and totally protected, but rather buffer areas may include a range of land uses as long as they do not threaten koalas. Buffers can also help protect remnants from nutrient impacts, wind damage and weed invasion. Habitat buffers also provide for the likely extension of significant koala activity beyond areas of preferred koala

habitat and can include native vegetation (forests, woodlands, wetlands and heathlands) and cleared land. Habitat buffers that extend over mainly cleared land containing only scattered trees can help to facilitate koala activity within preferred koala habitat areas and safe koala movement between adjoining habitats. Such areas should be considered a priority for habitat restoration projects where feasible. Habitat buffers warrant protection and management through performance standards equivalent to those recommended for secondary (class B) and secondary (class C) koala habitat.

Habitat linking areas may provide opportunities for the successful movement of koalas (e.g., dispersal and recruitment of sub-adults) between breeding populations or into areas of vacant preferred koala habitat. Habitat linking areas may also be used as part of established koala home ranges, depending upon factors such as the vegetation associations and/or species of scattered trees they contain and their location relative to other habitat areas. Development within habitat linking areas should aim to retain any preferred koala food trees (primary and secondary food trees) that may be present and not compromise the safe use of such areas by koalas. Such areas should also be considered a priority for habitat restoration projects. Habitat linking areas over existing native vegetation also warrant protection and management through performance standards equivalent to those recommended for secondary (class B) and secondary (class C) koala habitat.

a) Four Preferred Habitat polygons (dark grey) requiring Habitat Protection Buffers and Habitat Linking Areas within a cleared landscape (light grey).

b) 100m-wide Habitat Protection Buffer applied to Preferred Habitat polygons.

c) An additional 200m-wide buffer begins the Habitat Linking Area process.

d) The cleared area is erased within the 100m and 200m buffers.

e) The cleared area is buffered 200m.

f) The buffer generated in e) is used to erase the buffer generated in c). Arrows indicate smoothing and slight extension of the 100m buffer. A drainage line captured by the final Habitat Linking Area is shown.
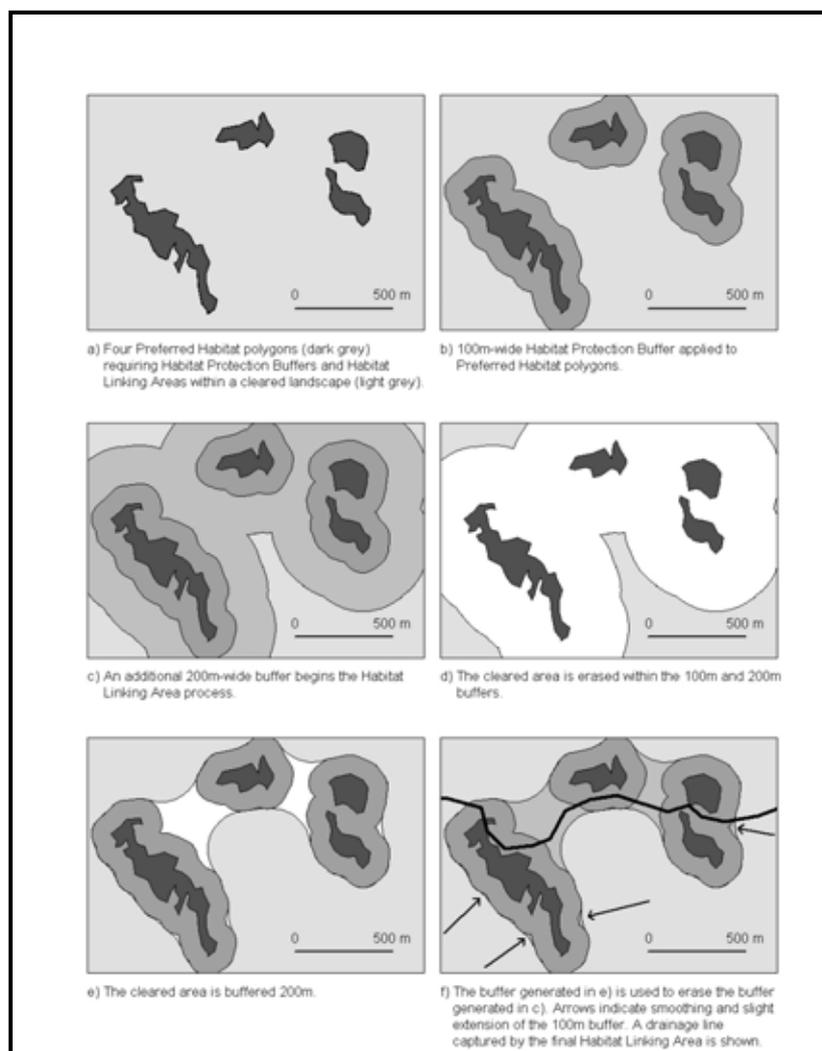
**Figure 3.** Steps to generate habitat buffers and habitat linking areas.

2. HOW MUCH HABITAT IS ENOUGH?

Planning Objective

To maintain and conserve a landscape that contains a sufficient amount of habitat to sustain a viable koala population.

Guideline 1.1

Maintain at least 40- 50% of the landscape as primary and secondary koala habitat across landscape extents 1 kilometre radius around where koalas occur. The protection of primary and secondary (class A) habitats should be the top priority.

Scale of application: whole landscape or multiple landscapes within local government area.

Actions

i) Identify and map areas of primary and secondary habitat of each class using a transparent and repeatable approach, preferably within a GIS and at an appropriate scale.

ii) Map areas of koala habitat using a transparent and repeatable approach, preferably within a GIS and at an appropriate scale.

iii) Conserve and maintain the ecological integrity of areas of primary and secondary habitat. Give priority to primary and secondary (class A) habitat and habitat of all classes that exists in contiguous blocks. Priority should also be afforded to areas that are known to contain existing koala populations. However, the apparent absence of koalas should not preclude the protection of such areas wherever possible as koala populations may be present intermittently over time as they shift focus through the landscape. These areas may also be a critical resource for the recovery of local populations.

iv) Implement revegetation programs, especially where the amount of primary and secondary habitat in the landscape is close to, or below 50%, or is highly fragmented. Priority should be given to revegetating areas adjacent to contiguous blocks of existing habitat. Revegetation should involve planting of local eucalypt species and other local native species consistent with the pre-existing forest types and the koala's preferred tree species for the area.

Guideline 1.2

Where detailed koala habitat mapping is not currently available or possible, maintain at least 50-60% of the landscape as forest (preferably native forest) across landscape extents 1 kilometre square where koalas occur. This guideline is not necessarily expected to be applied at the scale of the whole local government area, but rather for landscapes where koalas occur.

Scale of application: whole landscape or multiple landscapes within local government area.

Actions

i) Map areas of forest using a transparent and repeatable approach, preferably within a GIS and at an appropriate geographic scale.

ii) Conserve and maintain the ecological integrity of areas of forest. Give priority to eucalypt forests occurring in contiguous blocks and which contain existing koala populations.

iii) Implement revegetation programs, especially where the amount of forest in the landscape is close to, or below 40% or is highly fragmented. Give priority to the revegetation of areas adjacent to contiguous blocks of forest. Revegetation should involve planting of local eucalypt species and other local native species consistent with the pre-existing forest types and the koala's preferred tree species for the area.

The Science

As the amount of natural habitat in a landscape is reduced, the size of wildlife populations declines and the chance of extinction increases. However, there can be a threshold amount of habitat, below which population sizes decline rapidly and the chance of extinction increases rapidly, rather than a gradual decline. **For koalas, habitat loss is one of the primary threatening processes.** However, few studies have attempted to identify the minimum amount of habitat required to support a viable koala population. This is difficult because it is dependent on a range of interrelated factors, including the level of fragmentation, clearing history, level of disease, birth rates and mortality rates. Studies in South East Queensland suggest that up to 4,000 ha is required to support a viable koala population of at least 500 individuals, depending on population density. Hence, where the density of koalas is low, the area of habitat required may be much higher than where the density of koalas is high.

There is good evidence from Noosa Shire in Queensland that the chance of koalas being present declines rapidly as the percentage of koala habitat or forest falls below around 60-70% of the landscape (Figure 4). Similar evidence from Port Stephens on the New South Wales central coast suggests that the probability of koalas being present falls as the percentage of koala habitat or forest falls below around 40% (Figure 4). Where the percentage of primary and secondary habitat of the landscape is less than around 20% for Ballarat, 30% for Port Stephens to 50% for Noosa, then there is a greater likelihood of koalas being absent than present. Although the amount of primary and secondary habitat is crucial, the importance of the total amount of forest in the landscape indicates that having adequate amounts of marginal or low quality habitat, in conjunction with primary and secondary habitat, is an important component for maintaining viable koala populations. It is likely that marginal habitat performs an important buffering function for primary and secondary habitat as well as providing supplementary food and shelter resources and habitat connections. **The landscapes discussed here are typical of coastal eastern Australia and these results suggest that the amount of habitat, as a percentage of the landscape, required to sustain viable koala populations may be much higher than the commonly recognised 20-30% for mammals and birds. This will particularly be the case for populations highly affected by road traffic, dog attacks, bushfires, and disease, all of which reduce the potential for population growth.**

Further, the studies used to identify these thresholds are based on the occurrence of koalas at a single point in time. Over time, populations of koalas in some habitat patches will become extinct because of the effects of past clearing. This lag between clearing and the impact on animal population is know as an 'extinction debt' and suggests that the real thresholds may indeed occur at lesser clearing extents than generally detected. This emphasises the need to adopt a precautionary approach by protecting more habitat than indicated by thresholds whenever possible.
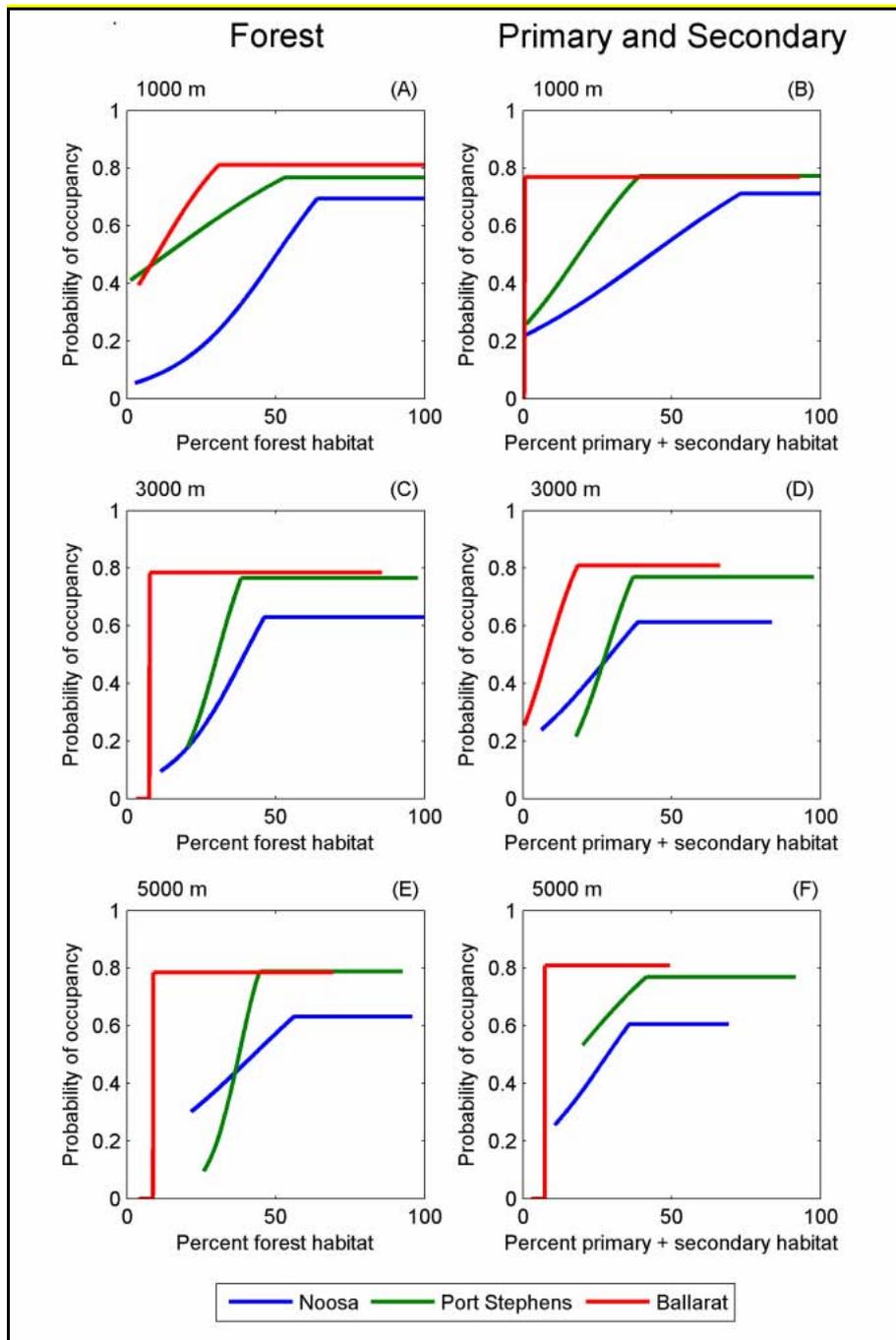
Figure 4. The relationship between the probability of koalas being present and (1) the percentage of forest, and (2) the percentage of primary and secondary habitat. Graphs show relationship for Noosa Shire, Port Stephens Shire and Ballarat for 1 km (314 ha), 3 km (2827 ha) and 5 km (7867 ha) radii circular buffers surrounding koala survey sites. Lines show two-phase (broken-stick) logistic regression models fitted to the data with the break points indicating critical thresholds in the amount of habitat below which there is an increased probability of koalas being absent. Threshold levels tend to decrease at larger spatial extents from a survey site, indicating a hierarchy effect with habitat proximate to where koalas occur more important than more distant habitat.

3. HOW BIG DO PATCHES NEED TO BE?

Planning Objective

To maintain and restore koala habitat patches, or clusters of highly connected patches, that are large enough to sustain viable koala populations.

Guideline 2.1

Primary and secondary koala habitat patches should be larger than 50-100 ha in size, unless they are part of a cluster of highly connected patches (*see Guideline 2.2*).

Scale of application: whole landscape or multiple landscapes within local government area.

Actions

i) Conserve and maintain the ecological integrity of habitat patches, with priority given to patches larger than 50 ha. Give lower priority to very small (less than 2 ha in size) habitat patches, unless these patches are part of a cluster of highly connected patches (see Guideline 3.2 below) or currently contain koalas.

ii) Implement revegetation programs to enlarge the size of remnant koala habitat patches. Priority should be given to revegetating habitat patches 10- 50 ha, with the aim of increasing their size. Give lower priority to revegetation of areas adjacent to very small (< 2 ha in size) habitat patches. Revegetation should involve planting local eucalypt species and other local native species consistent with the pre-existing forest types and the koala's preferred tree species for the area.

Guideline 2.2

Clusters of koala habitat patches that are highly connected (i.e., separated by less than 100-200 m) should be larger than 100 ha in total area.

Scale of application: whole landscape or multiple landscapes within local government area.

Actions

i) Conserve and maintain the ecological integrity of clusters of highly connected habitat patches. Prioritise the protection of clusters that are larger than 100 ha and give lower priority to very small clusters, unless they currently contain koalas.

ii) Implement revegetation programs to enlarge the size and improve the connectivity of clusters of koala habitat patches. Give priority to clusters that are smaller than 100 ha in total size, but lower priority to very small clusters. Within these clusters, give priority to the revegetation of areas adjacent to and between large and medium sized patches. Revegetation should involve planting eucalypt species and other native species consistent with the pre-existing forest types for the area and the locally preferred tree species of koalas. As an illustration in Figure 5, the striped areas indicate possible priority areas (adjacent to the large patches) for revegetation, as opposed to areas adjacent to small patches.
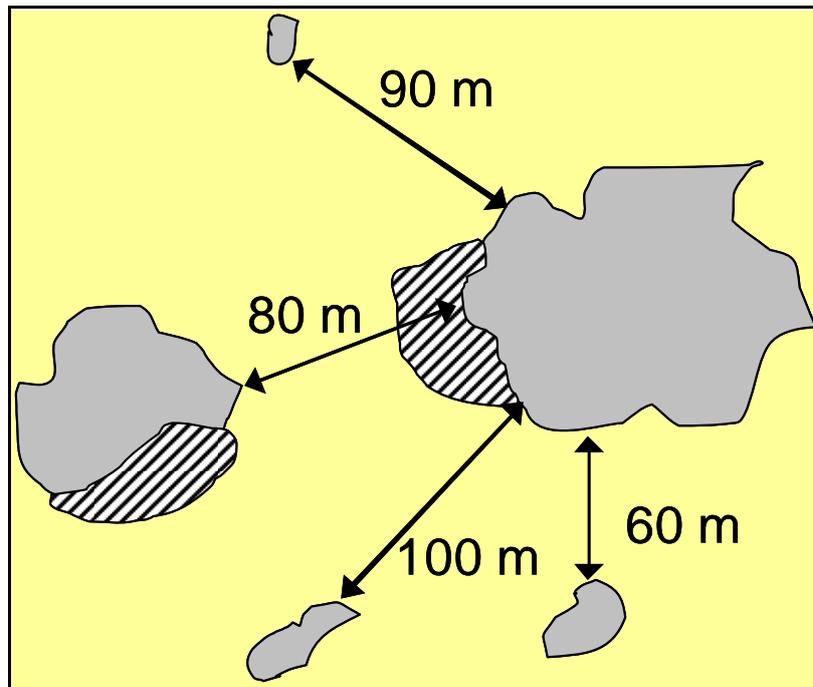
Figure 5. Hypothetical example of a cluster of highly connected (< 100 m apart) patches (grey areas) and possible priority areas for revegetation (striped areas) adjacent to the larger patches.

The Science

As a general rule, as the area of a habitat patch is reduced, population sizes fall and the chance of a species going extinct in the patch increases. At some point the patch size will become too small to support a viable population of the species. This is particularly the case for isolated patches because there is then limited opportunity for small, declining populations in these patches to be 'rescued' by immigration from adjacent patches. In fact, as habitat patch sizes become smaller, patches often also become more isolated which in turn increases the chance of local extinction. Small isolated patches are also subject to much higher edge effects than large patches, which can also increase the chance of extinction, especially for edge sensitive species.

The minimum patch size, below which a viable koala population cannot be supported, will depend to some extent on the level of patch connectivity. For example, if several small patches are very close together they may function as a single larger patch if koalas can move freely and safely between them. However, if a patch is highly isolated, then it would need to be much larger to support a viable population. Isolated habitat patches of 2 ha in size, for example, are likely to be of little use as breeding habitat for koalas as this equates roughly to the smallest home range size for an individual koala in high quality habitat. In a fragmented coastal landscape in Noosa Shire evidence of critical patch size requirements have been shown, with koalas more likely (probability <0.5) to be absent in patches less than 50 ha in size. Further, there is some evidence to suggest that once patches become smaller than around 150 ha the chance of koalas being present starts to decline (Figure 6). Although in some landscapes, for example in Port Stephens, New South Wales, patch size appears to be less critical, although habitat amount remains important.

If habitat patches are close enough to each other for koalas to move freely between them on a daily basis then they are considered to be highly connected, providing there are no major barriers such as roads, fences, or significant threats such as wild dogs or roaming domestic

dogs. In general, koalas could be expected to move between habitat patches on a daily basis if they are separated by distances no greater than 100-200 m and provided there are no significant barriers or threats. In Port Stephens, the median daily movement distances of female koalas was found to be just less than 100 m, with males moving slightly longer daily distances.
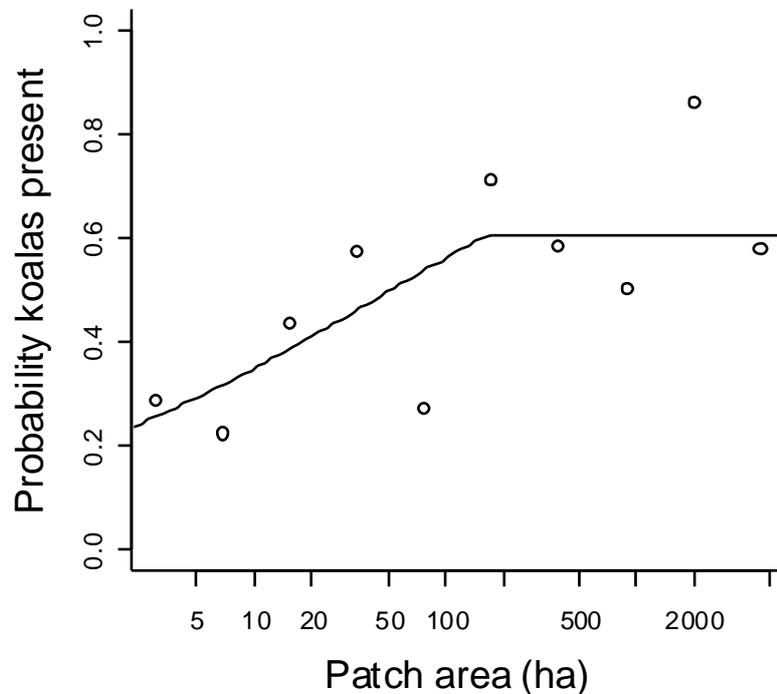
Figure 6. Relationship between the probability of koalas being present in a patch of primary or secondary habitat and the patch size for Noosa Shire, Queensland. Circles show actual data and the line shows a two-phase logistic regression model fitted to the data.

4. WHAT SHAPE SHOULD PATCHES BE?

Planning Objective

To maintain and restore a landscape that contains patches of koala habitat with shapes that minimise edge effects.

Guideline 3.1

Koala habitat patches should be more circular than linear in shape so as to minimise edge effects.

Scale of application: whole landscape or multiple landscapes within local government area.

Actions

i) Development should avoid creation of narrow linear strips, especially for small habitat patches. This may be particularly important in deciding where habitat should be retained on a development site. However, some habitat patches, such as riparian habitat along water courses,

may be linear by definition and this must also be taken into account. Linear riparian habitats often provide important forage trees for koalas as well as conduits for movement.

ii) Revegetation programs should aim to consider the shape of the area being revegetated and avoid constructing narrow linear patches.

The Science

As habitat patches become smaller, the amount of edge, relative to the area of each patch (the perimeter-area ratio) increases. Therefore, small patches are generally more subject to edge effects than large patches. Edge effects have negative consequences for many species. For a given patch size, the amount of edge is smallest for a circular shape, but largest for a narrow linear shape. Therefore, edge effect may be minimised by maintaining habitat patches that are more circular than linear in shape.

For koalas, edge effects may lead to increased predation risk by dogs or increased stress leading to disease. In Noosa Shire, koalas tend to be absent in small habitat patches with high perimeter to area ratios, especially those less than 100 ha in size (Figure 7). This suggests that the shape of small patches should be an important consideration in planning for koala conservation, while the shape of large patches is probably less important with regard to edge effects.
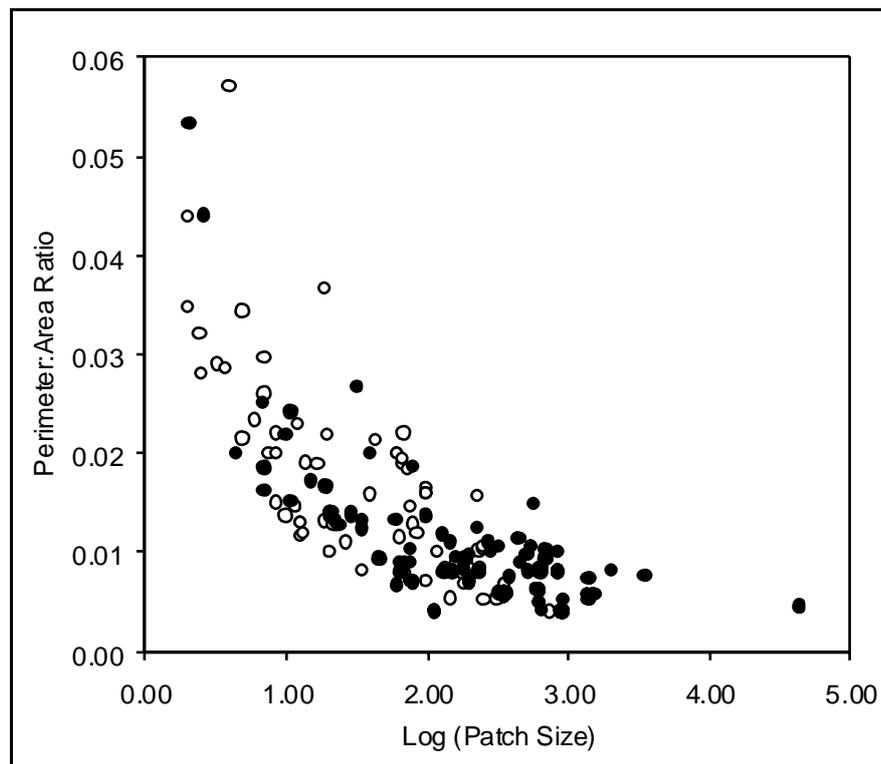

Figure 7: Graph of log patch size (ha) against the perimeter-area ratio for primary and secondary habitat in Noosa Shire, Queensland. Solid circles show patches with evidence of koala use and empty circles show patches with no evidence of use. Source: McAlpine et al. (2005).

5. HOW TO MAINTAIN THE QUALITY OF KOALA HABITAT PATCHES AND LINKAGES?

Planning Objective

To maintain the integrity and quality of koala habitat patches and linkages.

Guideline 4.1

Within koala habitat patches, or corridors, maintain sufficient proportions of mature preferred koala food tree species (i.e., greater than 30%).

Scale of application: whole patches or multiple patches within landscape.

Actions

i) Maintain koala habitat patches, and linkages, in as natural a state as possible.

ii) Avoid the removal of preferred koala food tree species and other trees known to be used by koalas. This is particularly important for patches with low proportions of koala food trees.

iii) Consider planting additional preferred food trees where they are in low proportions within habitat patches or linkages.

Guideline 4.2

Avoid the internal fragmentation of koala habitat patches and linkages, and any reductions in tree density.

Scale of application: whole patches or multiple patches within landscape.

Actions

i) Avoid construction of roads and barriers, such as walls and fences within koala habitat patches or linkages.

ii) Avoid clearing and thinning trees within koala habitat patches, or linkages that would substantially increase the distance between mature trees. If clearing of trees is unavoidable then this should be done so that the distance between remaining mature trees is at most 20-30 m.

Guideline 4.3

Maintain the structural and species diversity of trees within koala habitat patches and linkages.

Actions

i) Avoid clearing and thinning tree species (particularly preferred koala food trees) within koala habitat patches that would result in a decline in the number and age distribution of tree species.

ii) Retain a variety of age classes of trees, both young and mature trees, and other vegetation in koala habitat patches. Avoid clearing that would result in a substantial loss of koala food trees of all age classes (Figure 8).
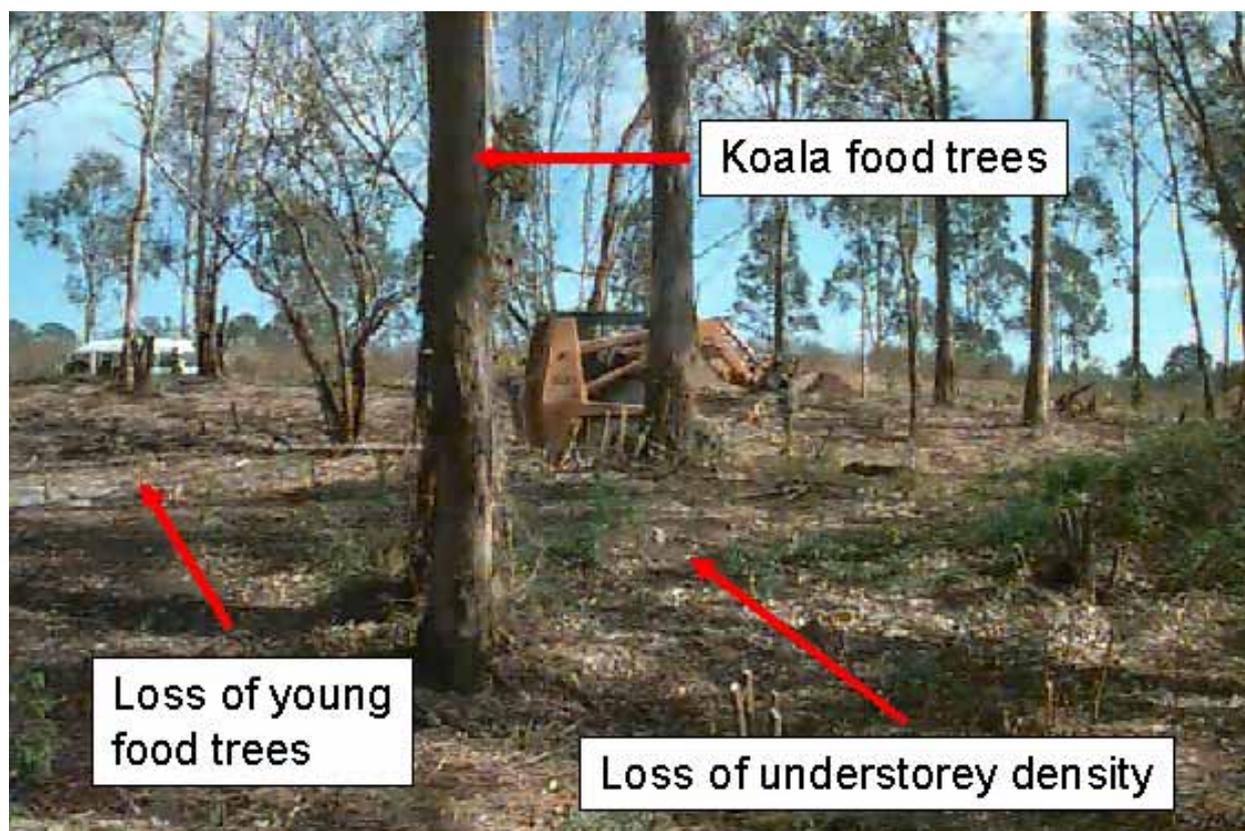
Figure 8: Development within koala habitat that results in reductions in the proportion of koala food tree species, tree density, species diversity, the size of trees and structural diversity should be avoided. (Photo: Clive McAlpine)

The Science

The tree is the basic unit of koala survival and therefore habitat quality within koala habitat patches will depend largely on the nature of the trees present in that patch. Koalas demonstrate regional preferences for particular tree species. The quality of koala browse is thought to relate primarily to nutritional value and chemical composition, which depends on factors such as the tree species, nutrient status of the soil and water availability. Within the constraints imposed by soil nutrients and water availability, the proportion and abundance of preferred food tree species appears to be the most important determinant of koala habitat quality. However, the presence of large trees and high tree species diversity can also enhance koala habitat quality. Forests that have high densities of preferred tree species potentially have greater carrying capacity and could support more viable koala populations, compared to forests that have low densities of preferred tree species. Hence, forests with low proportions of preferred tree species, or low densities of trees, tend to constitute poorer quality koala habitat (see Appendices B and C). At least for the coastal areas of Queensland and New South Wales, once the proportion of preferred koala food trees falls below around 30% of total trees, the habitat appears to be lower-secondary to marginal quality for koalas. For corridors, the spacing between mature trees should be no greater than 20-30 m apart, although for breeding habitat higher densities will certainly be more appropriate.

6. HOW TO MAINTAIN AND RESTORE HABITAT CONNECTIVITY?

Planning Objective

To maintain and conserve a landscape in which patches of koala habitat are sufficiently connected to sustain a viable koala population.

Guideline 5.1

Maintain a network of habitat patches and corridors linking blocks of koala habitat.

Scale of application: whole landscapes or multiple landscapes within LGA.

Actions

i) Identify patches, or corridors, of forest that act as important links between blocks of habitat. For example, whilst the patches between the two larger patches may be too small to support koalas on their own, they act as valuable stepping stones connecting the two larger patches (see Figure 9).

ii) Conserve and maintain the ecological integrity of habitat identified as providing important linking functions between larger blocks of habitat. A continuous restored habitat corridor between the two larger patches could greatly enhance connectivity. This will be particularly important where the blocks of habitat are separated by up to 3-4 km, as this appears to be a typical dispersal distance for koalas.
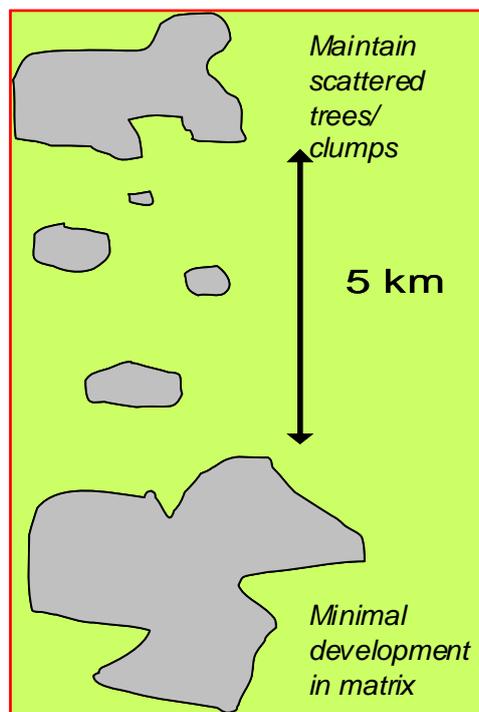

Figure 9. Hypothetical example of two large patches connected by smaller patches acting as 'stepping stones'.

iii) Where blocks of habitat, especially those separated by up to 3-4 km, have no linking habitat between them, the restoration of habitat corridors or habitat patches should be considered. Habitat corridors should ideally be 100s of metres wide to avoid large edge effects. Irregular-shaped patches of habitat that act as 'stepping stones' may suffer less from edge effects than a linear corridor and for this reason may be preferable when restoration of a wide corridor is impractical. Threats to koalas, such as road traffic and dogs should be sufficiently reduced prior to restoration of linking habitat.

Guideline 5.2

Maintain areas between separate blocks of koala habitat free from barriers to koala movement.

Scale of application: whole landscapes or multiple landscapes within LGA.

Action

Avoid the construction of major new roads, fences, buildings, sheer retaining walls, or other barriers that will impede the movement of koalas between habitat patches. This will be particularly important for patches within 3-4 km of each other.

Guideline 5.3

Blocks of koala habitat separated by more than 10 km, or by significant barriers to koala movement, should be managed as separate populations.

Scale of application: whole landscapes or multiple landscapes within LGA.

Action

i) Where blocks of habitat are separated by more than 10 km with no linking habitat between, successful koala dispersal between the blocks will be rare. In these cases, the guidelines should be applied independently to each habitat block, as if they were separate populations and separate management units.

The Science

Small populations that are highly isolated tend to suffer much higher extinction risks than populations that are connected to each other via animal movement. This is because immigration into a population from other areas can 'rescue' the population from extinction and can prevent loss of genetic diversity. The survival of metapopulations (a group of spatially structured populations or sub-populations connected by dispersal) actually relies on the ability of animals to recolonise habitat patches where a sub-population has gone extinct. Although, habitat patches that are further apart are often considered to be less connected than habitat patches close together, connectivity also depends upon the nature of the matrix and the existence of barriers to movement. Although the construction of corridors has been advocated as a means of connecting habitat patches, the effectiveness of such measures remains unclear.

Prior to establishing a home range (or territory), koalas can disperse relatively long distances, up to around 10 km, although distances of around 3-4 km are more commonly observed. Therefore, in theory, patches separated by distances of up to 3-4 km may remain relatively well connected

for a koala sub-population, depending on the level of forest cover and potential threats or barriers between patches. **However, despite the fact that koalas are relatively mobile, the isolation of patches is an important predictor of koala occurrence, with koalas more likely to occur in patches close to other patches than in isolated patches.** This highlights the connectivity role of the landscape matrix. In urban and semi-urban landscapes, koalas may suffer elevated mortality due to dog attacks and vehicle collisions, reducing their ability to successfully move between patches. In addition, barriers such as fences, buildings and major roads can reduce connectivity. Some studies suggest that corridors of trees may be of little use to koalas, while others show some evidence for the use of corridors of sparse trees by koalas. However, linear corridors may need to be 100s of metres wide to avoid excessive edge effects, such as an increased incidence of dog attacks.

Defining habitat connecting or linking areas may provide opportunities for the successful movement of koalas (e.g., dispersal and recruitment of sub-adults) between breeding populations or into areas of vacant preferred koala habitat. Habitat linking areas may also be used as part of established koala home ranges, depending upon factors such as the vegetation associations and/or species of scattered trees they contain and their location relative to other habitat areas. Development within habitat linking areas should aim to retain any preferred koala food trees (as defined in Appendix C) that may be present and not compromise the safe use of such areas by koalas. Such areas should also be considered a priority for habitat restoration projects. Habitat linking areas over existing native vegetation also warrant protection and management through performance standards equivalent to those recommended for secondary (class B) and secondary (class C) koala habitat.

7. HOW TO MAINTAIN AND DEVELOP ROAD NETWORKS?

Planning Objective

To minimise the impacts of roads on koala populations.

Guideline 6.1

Avoid the construction of roads within and between koala habitat patches.

Scale of application: whole landscapes or multiple landscapes within LGA.

Actions

i) Avoid the construction of new roads, or increases in traffic volume on existing roads, within koala habitat patches, especially if this habitat contains high proportions of primary and secondary habitat (Figure 10).

ii) Avoid the construction of new roads, or increases in traffic volume on existing roads, in areas that adjoin koala habitat patches, especially if these patches contains high proportions of primary and secondary habitat.

iii) Avoid the construction of new roads, or increases in traffic volume on existing roads, between large ($\geq$ 50 ha) blocks of habitat that are within 3-4 km of each other.

iv) If required, accommodate increased traffic volumes by upgrading existing roads, or rerouting traffic on existing roads away from koala habitat, rather than by building new roads within or near to patches of koala habitat.

Guideline 6.2

Minimise the risk of koala-vehicle collisions on roads.

Scale of application: whole landscapes or multiple landscapes within LGA.

Action

i) Essential new roads in close proximity to koala habitat, or between blocks of koala habitat (especially blocks of habitat within 3-4 km apart) should be constructed in such a way as to minimise the risk of koala-vehicle collisions. Potential mitigation measures include low speed limits (e.g., 40-60 kph) and engineering designs to reduce traffic speed (traffic calming devices), warning signage, roadside lighting, clear road verges, and exclusion fencing (for some extreme risk situations). Measures to reduce the risk of koala mortality are particularly important on roads with high traffic volumes, high speed limits, and/or poor roadside visibility.

The Science

The direct effect of roads on wildlife populations are wide ranging and include the destruction and modification of habitat, modification of animal behaviour, fragmentation of habitat by the formation of barriers and elevated mortality due to vehicle collisions. These effects can have substantial negative implications for wildlife populations. Increased mortality and habitat fragmentation imposed by roads is a serious concern for long-term koala survival. This is particularly the case in rapidly urbanising coastal areas of New South Wales and South East Queensland. In the Koala Coast area of South East Queensland, at least 250-300 koalas are known to be involved in vehicle collisions annually, of which ~ 80% do not survive. With an estimated population size of around 6,000 koalas in this region, this equates to a significant threat. Recent studies in Port Stephens show that the presence of koalas is greatly reduced by high road densities, especially in areas within or adjacent to koala habitat. Attempts to reduce koala-vehicle collisions by measures such as reduced speed limits and underpasses have generally only shown limited success. Therefore, a combination of these measures together with careful design of road networks and traffic flow to minimise impacts on koalas is necessary. This should include careful consideration of placement of new roads, to avoid areas within or adjacent to koala habitat. Further, upgrading existing roads to carry greater traffic volumes or for improved safety is likely to be less detrimental to koala populations than building new roads, although the location of roads remains a crucial consideration (see Figure 10).

Not only do roads increase koala mortality rates, they also tend to form barriers to movement because either few koalas can successfully cross without suffering mortality, or because of physical barriers, such as fences or retaining walls. These effects reduce connectivity between patches and increase habitat fragmentation. On existing roads, with very high traffic volumes, and/or high traffic speeds, it may be appropriate to construct exclusion fencing in known black spot areas. This measure creates a physical barrier to movement, offset by the benefit of reducing direct mortality rates. However, this could potentially have the negative effect of isolating parts of a population. The preferred approach should always be to avoid the construction of new roads that bisect koala habitat or that are located between blocks of habitat.
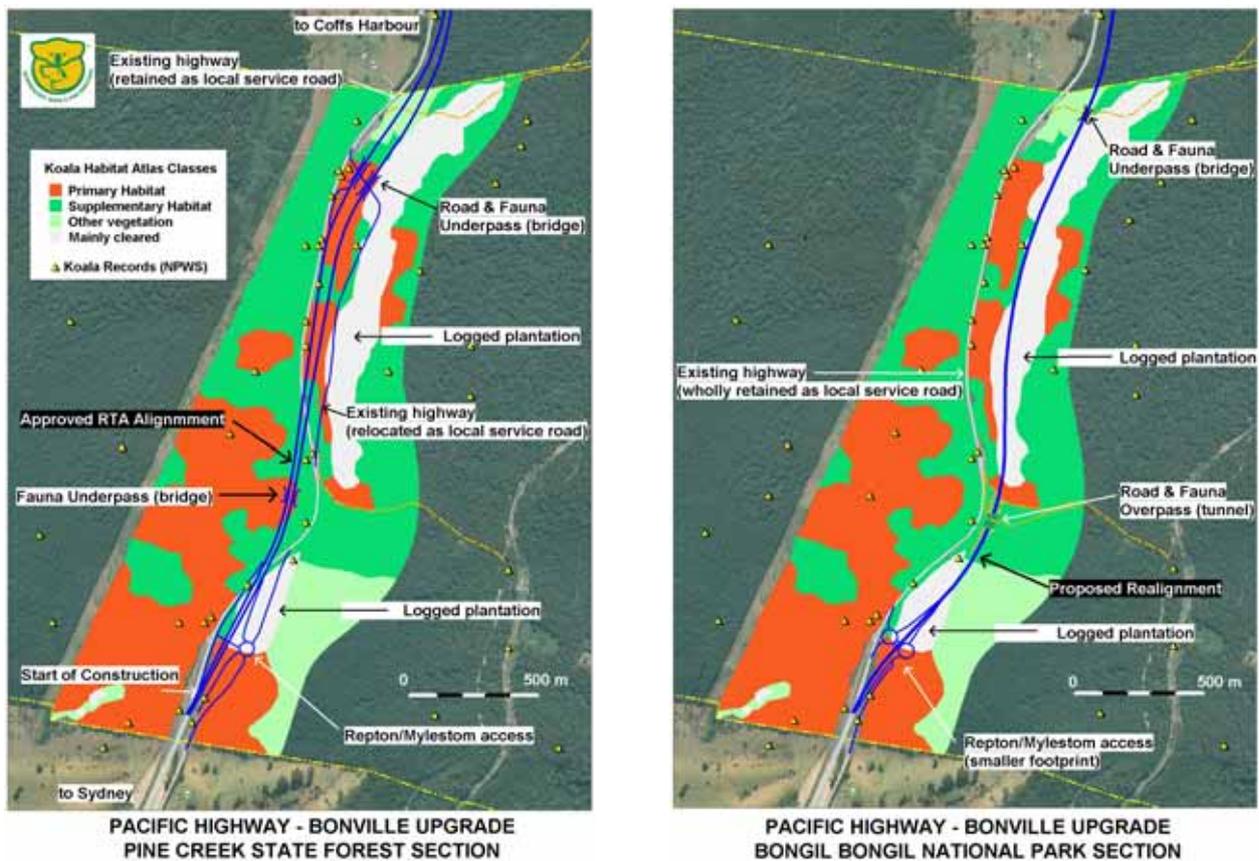
Figure 10: Alternative Pacific Highway alignment through Bongil Bongil National Park, south of Coffs Harbour. The NSW Road Transit Authority alignment (left-hand side picture) was approved prior to transfer of Pine Creek State Forest to National Park Estate, with two flooded gum (*E. grandis*) plantations logged pre-transfer. The alternative alignment avoids as much primary koala habitat as possible by utilising a route through the logged plantations. A smaller ecological "footprint" is achieved with smaller roundabouts at the southern end, a single north-south divided carriageway, retention of recently-upgraded existing highway, and by avoiding a deep gully on the western side of the existing Highway. Through adopting the alternative route, primary habitat loss is reduced from 15.2 ha to 2.5 ha, supplementary habitat from 12.5 ha to 2.5 ha. Maps compiled from Road Transit Authority, State Forests NSW and AKF data.

8. HOW TO MINIMISE PREDATION BY DOGS?

Planning Objective

To minimise predation on koalas by domestic and wild (feral) dogs.

Guideline 7.1

Minimise potential contact between domestic dogs and koalas. Whilst medium and large-sized dogs are of particular concern, even small dogs can be capable of inflicting serious or fatal injuries to koalas.

Scale of application: whole landscapes or multiple landscapes within LGA.

Actions

i) Identify areas where existing high dog ownership densities coincide with or are adjacent to koala habitat, or existing koala populations as priorities for measures such as those outlined below.

ii) Within koala habitat areas or adjacent neighbourhoods, implement measures to effectively reduce the incidence of roaming domestic dogs, especially at night. Areas where high dog ownership densities coincide with koala habitat should be a priority. Measures might include increased policing of dog control and registration requirements, education programs for dog owners, prohibiting dog ownership in new residential areas adjacent to koala habitat, impounding roaming dogs, requiring dogs to be kept within an enclosure or inside dwellings at night, provision of additional off-leash dog exercise areas away from koala habitat (see Part B: Site Level Planning).

Guideline 7.2

Minimise the size of populations of wild dogs within areas containing koala habitat.

Actions

i) Identify areas of koala habitat that contain wild (feral) dogs. This may be achieved through monitoring approaches, such as predator scat surveys and community sightings.

ii) Where wild dogs occur in koala habitat, implement appropriate feral animal management control measures.

The Science

Elevated mortality due to dog attacks is a key conservation concern for koalas, especially in the rapidly urbanising coastal areas of Queensland and New South Wales. Studies from areas with relatively high human populations report that dog attacks account for between 5% and 40% of total recorded mortalities. This can have significant negative consequences for the viability of koala populations near urban areas. **Elevated mortality rates in koalas due to dog attacks is a key contributor to the decline in koala populations**. Therefore, reducing dog attack mortality should be a key goal of planning to conserve koala populations. Dog attack mortality will particularly be a problem where high densities of dog ownership coincide with koala habitat and

koala populations (see Figure 11). These areas should be identified and prioritised for implementation of measures to reduce dog attacks on koalas, especially for large and medium-sized dogs, but even small dogs can kill or seriously injure koalas (Figure 12). Although domestic dogs contribute significantly to dog attacks, in some areas wild dogs will also be a problem. In these cases it is important that appropriate pest animal control measures are also implemented.
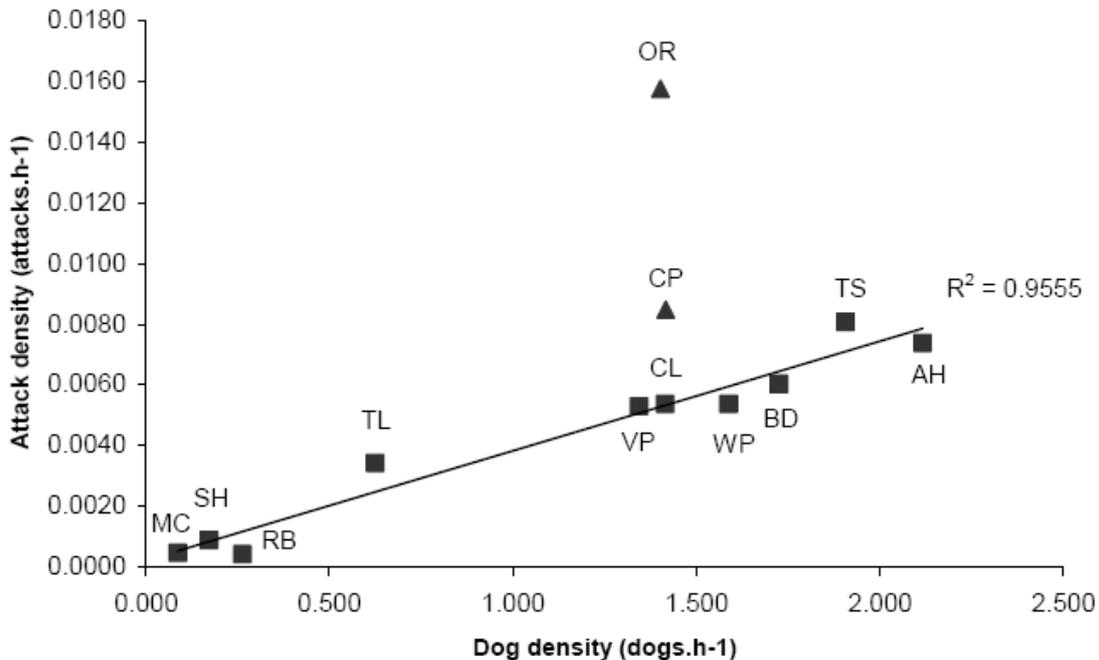

Figure 11: Koala mortality caused by dogs in south-east Queensland: domestic dog attacks in the Koala Coast: Source: Deidré L. de Villiers, Harriet J. Preece and David S. Dique. Queensland Environmental Protection Agency.

Figure 12: Even small to medium sized dogs can kill or seriously injure a koala, especially juveniles. (Photo: C Parkinson)

PART B: SITE-LEVEL PLANNING

The following site-level planning guidelines are aimed to inform local government planners and other consent authorities on measures to help protect koalas and koala habitat when assessing rezoning proposals and development applications. We recommend that, wherever possible, these measures should be incorporated into a regulatory framework such as a local environmental planning scheme in order to ensure consistent application.

9. REZONING PROPOSALS

Objective

To guide councils in assessing compatibility with koala conservation planning requirements when assessing rezoning proposals.

Scale of application: Site of proposed development and adjacent areas.

Guideline 8.1: Performance Standards for Rezoning Proposals

Consideration should be given to the following matters when assessing the appropriateness of rezoning requests (here rezoning refers to any amendments to a Local Environmental Plan or Planning Scheme), **other than** those that propose rezoning to an appropriate Environmental Protection Zone or a Conservation Area.

Actions

Prior to approving any rezoning proposal, it is recommended that the local government should be satisfied that possible future development or activity in accordance with the requested rezoning would:

i) not allow for an intensification of landuse or development within areas of Primary and Secondary (Class A) Koala Habitat or Habitat Buffers;

ii) allow for only *low impact development* (*i.e.* consistent with the following Performance Standards for Development Applications) within areas of Secondary (Class B) and Secondary (Class C) Koala Habitat or Habitat Linking Areas over existing native vegetation;

iii) be unlikely to result in the removal of any primary or secondary koala food trees, wherever they occur on the site;

iv) not result in development that would impede or stop koala movement across the site. This should include consideration of the need for maximising tree retention and for minimising the likelihood of impediments to safe/unrestricted koala movement. Potential impediments include medium-high density residential and industrial development, roads and other urban infrastructure which create barriers to koala movement; and

v) be consistent with the above (Part A) Strategic Planning Guidelines.

The required information to support a rezoning request should include an investigation of the site by an appropriately qualified and experienced ecologist.

10. PLANNING AND DEVELOPMENT APPLICATIONS

Objective

To guide councils in assessing compatibility with koala conservation planning requirements when assessing planning and development applications.

Guideline 9.1: Performance Standards for Planning and Development Applications

Specific aims of the performance standards are as follows:

i)	To ensure that koala populations are sustainable over the long-term;
ii)	To protect koala habitat areas from any development that would compromise habitat quality or integrity;
iii)	To ensure that any development within or adjacent to koala habitat areas occurs in an environmentally sensitive manner;
iv)	To ensure that acceptable levels of investigation are undertaken, considered and approved prior to any development within or adjacent to koala habitat;
v)	To encourage koala habitat restoration;
vi)	To maintain connectivity between areas of koala habitat and minimise threats to safe koala movement between such areas;
vii)	To ensure that development does not further fragment habitat areas either through the removal of habitat or habitat linking areas or through the imposition of significant threats to koalas;
viii)	To provide guidelines and standards to minimise impacts on koalas during and after development, in conjunction with any monitoring requirements; and
ix)	To provide readily understandable advice for proponents preparing development applications.

Regulation of development via the assessment of Planning and Development Applications represents an important means by which koala habitat can be protected and effectively managed.

It is recommended that all Planning and Development Applications (including subdivision proposals) should demonstrate that they are consistent with the above aims and objectives.

Scale of application: Site of proposed development and adjacent areas.

Actions

The following standards are recommended for all developments proposed on sites that contain or are adjacent to primary or secondary koala habitat, habitat buffers or habitat linking areas. For the purposes of these standards, native vegetation is defined as any of the following types of indigenous

vegetation: trees (including saplings and shrubs), understorey plants, groundcover or plants occurring in a wetland.

A proposed *use, development* or *activity* should:

a) Not result in the removal or degradation of native vegetation within primary or secondary (class A) koala habitat;

b) maximise retention and minimise degradation of native vegetation within secondary (class B) and secondary (class C) koala habitat, habitat buffers and habitat linking areas;

   i. Development assessments to be accompanied by a recent air photograph (1:2500 or larger) with an overlay to show impacts on trees.

   ii. Inspection by suitably qualified ecologist immediately prior to any tree removal activities.

c) Not result in the removal of any primary or secondary koala food trees, wherever they occur on a development site.

   i. Locations of all these trees to be accurately surveyed and mapped and submitted with development assessment.

   ii. All these trees to be fenced or clearly flagged prior to commencement of any construction activity.

d) Streetscape and landscape plantings to include at least one preferred koala food tree for every residential allotment (with species and locations for plantings nominated by a suitably qualified ecologist for inclusion in a *Statement of Landscape Intent* to accompany each planning and development application);

e) Make provision, where appropriate, for restoration of protected primary and secondary koala habitat areas including habitat buffers and habitat linking areas. In instances where Council approves the removal of koala habitat (in accordance with the **Waive Provisions** below), and where circumstances permit, this should include measures that result in a *net gain* of koala habitat on the site and/or adjacent land;

f) Ensure preparation of a Habitat Rehabilitation and Restoration Plan for the site and wherever feasible, ensure plantings under the Plan are propagated from locally collected seed.

g) Any necessary Bushfire Asset Protection Zones or Fire Protection Overlay should be located within the developable lands and not within adjoining habitat protection or restoration areas.

h) Make provision for long-term management and protection of koala habitat, including both existing and restored habitat. For example, it may be possible to apply a "Special Rate" to generate funding for allocation by a Management Committee;

i) Not compromise the potential for safe movement of koalas across the site. This should include maximising tree retention and restoration and minimising the likelihood that the proposal would result in the creation of barriers to koala movement, such as would be imposed by certain types of fencing. The preferred option for a development within or

adjacent to primary or secondary koala habitat, habitat buffers or habitat linking areas that would minimise restrictions to safe koala movement would be:

❖ No fencing within the site; or

❖ Fencing of a sort that would not preclude koalas, and

❖ Would be dog free.

Suitable fencing within these areas could include:

i. fences where the bottom of the fence is a minimum of 300 mm above ground level to allow koalas to move underneath;

ii. fences that facilitate easy climbing by koalas; for example, sturdy chain mesh fences, or solid style fences with timber posts on both sides at regular intervals of approximately 20 m; or

iii. open post and rail or post and wire (preferably not barbed wire).

iv. *Where keeping of domestic dogs is permitted* within or adjacent to Primary or Secondary Koala Habitat, Habitat Buffers or Habitat Linking Areas, fencing of a type that would effectively contain dogs (and which would ideally also preclude koalas) should be restricted to the designated building envelope. Fences that are intended to preclude koalas should be located away from any trees that could allow koalas to cross the fence.

j) Be restricted to identified 'building envelopes' that contain all buildings and infrastructure. In general, there should be no clearing outside these envelopes, other than that which may be required for bushfire asset protection. In the case of applications for subdivision, such envelopes should be registered as a restriction on the title; and

k) Include measures to effectively minimise the threat posed to koalas by dogs, motor vehicles and swimming pools by adopting the following minimum standards:

i. The development should include measures to effectively abate the threat posed to koalas by dogs through restrictions or prohibitions on dog ownership. Restrictions on title may be appropriate;

ii. The development should include measures to effectively minimise the threat posed to koalas from traffic by restricting motor vehicle speeds where appropriate to 40 kph or less; and

iii. Swimming pools. Appropriate measures could include: trailing a length of floating stout rope (minimum diameter of 50mm) secured to a stable poolside fixture, in the swimming pool at all times; designing the pool in such a way that koalas can readily escape (e.g. with a shallow ramp area); or enclosing the pool with a fence that precludes koalas. This last option should include locating the fence away from any trees that koalas could use to cross the fence.

l) Ensure that adequate space is allowed surrounding preferred koala food trees to ensure that they will not pose a future hazard to persons or property.

m) Be consistent with the above (Part A) Strategic Planning Guidelines.

Waive Provisions

The following waive provisions have been designed in order to allow for the construction of a dwelling and associated access on bush-covered blocks (where there is no alternative but to remove some native vegetation), so as to identify the location likely to cause least impacts on koalas and koala habitat. This provision is not for the purpose of allowing for subdivisions.

On this basis, the provisions of a), b) and c) above could be waived for the purposes of establishing a building envelope and associated works, where the proponent demonstrates that:

a) The building envelope and associated works **cannot** be located so as to avoid the removal of native vegetation within Primary or Secondary Koala Habitat, Habitat Buffers, or Habitat Linking Areas, or the removal of preferred koala food trees;

b) The location of the building envelope and associated works **minimises** the need to remove native vegetation as per l) above;

c) The most suitable location for building envelopes and associated works should be assessed by a suitably qualified independent ecologist with experience in koala surveys. A standard, reportable survey technique that allows koala habitat utilisation to be quantified, such as the faecal pellet-based 'Spot Assessment Technique' should be employed to identify the extent of any Koala Activity Levels across the site. When using the Spot Assessment Technique for this purpose, the recommended density of spot assessment survey sites is 1 site per 100m X 100m (10,000m^2) over land that contains native trees within the areas where building envelopes and associated works could potentially be located. Survey sites should be located systematically using a grid approach, with precise locations for sites within grid cells selected to ensure maximum sampling of preferred koala food trees.

d) Wherever possible, building envelopes and associated works should be positioned away from areas that return evidence of Koala Activity or suspected home-range trees. Where this is not possible, building envelopes and associated works should be positioned in areas that return lowest Koala Activity Levels; and

e) In the case of subdivision proposals, they are designed so as to **retain and enhance** koala habitat on the site and are consistent with the above (Part A) Strategic Planning Guidelines and the Performance Standards for Development Assessment.

Figure 13. A combination of measures together with careful design of road networks and traffic flow is necessary to minimise impacts of vehicle collisions on koalas. (Photo: Koala Beach Estate, Tweed Shire on the north coast of NSW - Australian Koala Foundation)

Background and Examples

The above standards for assessing Planning and Development Applications in koala areas have been modelled on provisions applied as conditions of development consent for the Koala Beach Estate at Pottsville in Tweed Shire on the far north coast of New South Wales, and incorporated into the Port Stephens (CKPoM) Comprehensive Koala Plan of Management, the draft Greater Taree City Council CKPoM and the draft Campbelltown City Council CKPoM.

The Koala Beach Estate totals 365 ha with residential development on approximately 90 ha over seven stages. It was agreed that the undeveloped sections of the site would be handed over to Tweed Shire Council for Environmental Protection zoning. The koala conservation measures that were built into the Koala Beach development were set out in a (KPoM) Koala Plan of Management, updated by the Australian Koala Foundation in 2004 (See Figure 14). The KPoM was approved and adopted under NSW *State Environmental Planning Policy No. 44-Koala Habitat Protection* (SEPP 44), providing a legislative framework for measures such as koala habitat protection and restoration, population monitoring, resident education and involvement in ongoing management. A "Special Rate" or Environmental Levy applies to all residents of the Estate to fund ongoing environmental management, habitat restoration, and implementation of threatened species management and monitoring programs. A Wildlife and Habitat Management Committee was established as a provision of the KPoM, chaired by Tweed Shire Council with representatives from the residents, the Australian Koala Foundation, the local koala carer group, and the NSW Department of Environment and Conservation. Some of the key provisions of the KPoM include:

- Protection of preferred koala food trees by Covenant on title;
- Maximised protection of other native vegetation;
- Developers required to prepare a Habitat Restoration Plan for all protected areas;
- Landscape plantings to include at least one preferred koala food tree for every allotment;
- Prohibited domestic dog and cat ownership by Covenant;
- Restriction of traffic speed to 40 km/hr throughout the Estate;
- Traffic speed mitigation measures including speed humps with koala crossing signs;
- Minimum ground clearance of 300mm for any necessary fencing (except around pools);
- Stout rope (minimum 50mm diameter) to be installed in all swimming pools;
- Preparation of a koala monitoring program; and
- Review of the KPoM each five years.

Monitoring surveys aimed to detect population trends at the Koala Beach Estate using the Spot Assessment Technique, since the development of Stages 1 and 2, have not as yet detected any significant changes in overall habitat utilisation. There are some indications that the koala population at the site may have declined marginally from ~ 30-40 individuals estimated during baseline studies. However, the results of other surveys and examination of koala records suggest that this may be indicative of a broader koala population decline within the Tweed coastal zone. Pressures on the Koala Beach koala population will increase to some extent as the Estate becomes fully occupied over the next few years, although streetscape plantings and habitat restoration works should contribute positively. Monitoring over the course of a further 10 years or more may be necessary before any conclusive trends in the population become apparent. However, at this stage the provisions implemented at the Koala Beach Estate appear to be successful in allowing for the continuation of a breeding population of koalas at the site, which is encouraging for the potential broader adoption of such measures as a minimum standard for other developments. It is clear that such measures should be supported by corresponding landscape-scale planning standards in order to provide realistic chances of success over the long-term.

Figure 14: Koala Habitat with Buffers and Links
Koala Beach Estate, Pottsville

Scale - 1:10,000

PART C: MONITORING KOALA POPULATION TRENDS

Planning Objective

To develop monitoring protocols to inform future planning strategies for conserving koala populations and their habitat.

Guideline 10.1

Develop and implement monitoring programs capable of detecting changes in koala populations over time (e.g., changes in population size and distribution within whole landscapes, patches or sites).

Scale of application: Multiple landscapes within LGA.

Actions

i) Undertake koala faecal pellet surveys at fixed monitoring stations at regular intervals (e.g., every year for patch or site scale surveys and every five years for landscape to local government scale surveys) using the AKF faecal pellet survey methodologies (Spots). The number of monitoring stations required will depend on the specific survey objectives and the level of statistical confidence required. However, for landscape-scale monitoring at least 50 stations are likely to be required to detect even quite large changes in the abundance of koalas. Ideally, a statistical power analysis should be conducted to determine sample size requirements prior to commencement of the monitoring program. Studies have also show that it may be best to concentrate these survey stations in high to medium quality habitat (e.g., primary and secondary habitat classes) rather than in low quality habitat.

ii) Undertake line or strip transect koala surveys at fixed monitoring stations at regular intervals (e.g., yearly to five yearly for site scale surveys and five yearly to ten yearly for landscape to local government scale surveys). Given that transect surveys tend to be much more costly and time consuming to complete than faecal pellet surveys they are likely to be most useful for monitoring population trends at specifically selected sites, rather than across whole landscapes. Once again, a statistical power analysis should be conducted to determine sample size requirements prior to commencement of the monitoring program. The aim of the transect surveys is to complement the faecal pellet surveys, rather than being an alternative.

iii) Maintain a koala sightings records database through regular (e.g., five yearly) community surveys.

iv) Regularly report monitoring outcomes in the scientific/planning literature, to the planning authorities and the local community.

Guideline 10.2

Develop and implement monitoring programs capable of detecting changes in koala habitat quality and extent over time.

Scale of application: Multiple landscapes within LGA.

Actions

i) Where possible, obtain the latest available satellite imagery at two to four-year intervals to identify changes in the extent of koala habitat resulting from incremental habitat loss, degradation or fragmentation and over the longer term, with ongoing habitat restoration.

ii) Maintain a detailed register of incremental habitat loss and ongoing habitat restoration.

iii) Regularly report monitoring outcomes in the scientific/planning literature, to the planning authorities and the local community.

Guideline 10.3

Develop and implement monitoring programs capable of detecting changes in koala mortality threats over time.

Scale of application: Multiple landscapes within LGA.

Actions

i) Maintain a record of changes to road networks and traffic volumes in areas containing koala habitat.

ii) Maintain a record of dog ownership in areas containing koala habitat.

iii) Maintain a record of dog attacks and traffic collisions with koalas.

iv) Regularly (e.g., five yearly) conduct surveys of feral dog populations in areas containing animal populations (e.g., using faecal pellet surveys).

iv) Regularly report monitoring outcomes in the scientific/planning literature, to the planning authorities and the local community.

Overview

Well designed monitoring programs can provide planners, researchers and the community with ongoing information concerning the size, distribution and health of local koala populations, changes in koala habitat, changes in other threats and feedback on the effectiveness of management strategies and actions.

A number of performance indicators would need to be identified to provide a means to determine the level to which the key outcomes have been achieved and to quantify the success or failure of implemented measures. Monitoring programs should also specify a procedure to be followed in the event that performance indicators are not met. Management strategies and actions should be regularly reviewed and amended where necessary to reflect findings of the ongoing monitoring program. A funding proposal for ongoing monitoring should also be outlined.

The status of koala populations should be assessed on the basis of estimated koala numbers, evidence of breeding activity, signs of disease, records of mortality, and local distribution. The monitoring program should seek to record changes in the amount and quality of available koala habitat, as well as changes in habitat utilisation. The impact of threatening processes should also be monitored to determine the level of success or failure of measures designed to minimise

threats. The relative significance of each threatening process should be regularly assessed to ensure resources are continually focused on the highest priorities.

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APPENDIX 1

Summary of primary, secondary and supplementary tree species for each study area, as identified by the Australian Koala Foundation.(*based on taxonomic affiliation and evidence from other areas)

Noosa

Preference Category	Species name	Common name
Primary	*E. microcorys*	Tallowwood
Primary	*E. robusta*	Swamp Mahogany
Primary	*E. robusta x E. tereticornis*	Hybrid
Primary	*E. tereticornis*	Forest Red Gum
Primary	*E. bancroftii*	Bancroft's Red Gum*
Secondary	*E. propinqua*	Small-fruited Grey Gum
Secondary	*E. racemosa*	Scribbly Gum
Secondary	*E. resinifera*	Red Mahogany
Secondary	*E. siderophloia*	Grey Ironbark
Supplementary	*E. acmenoides*	White Mahogany
Supplementary	*E. grandis*	Flooded Gum

Port Stephens

Primary	*E. parramattensis*	Parramatta Red Gum
Primary	*E. robusta*	Swamp Mahogany
Primary	*E. robusta x E. tereticornis*	Hybrid
Primary	*E. tereticornis*	Forest Red Gum
Primary	*E. microcorys*	Tallowwood*
Secondary	*E. canaliculata*	Large-fruited Grey Gum
Secondary	*E. mollucana*	Gum-topped Box
Secondary	*E. propinqua*	Small-fruited Grey Gum
Secondary	*E. resinifera*	Red Mahogany
Supplementary	*E. agglomerata*	Blue-leaved Stringybark
Supplementary	*E. capitellata*	Brown Stringybark
Supplementary	*E. eugenioides*	Thin-leaved Stringybark
Supplementary	*E. globoidea*	White Stringybark
Supplementary	*E. piperita*	Sydney Peppermint

Ballarat

Primary	*E. viminalis viminalis*	Manna Gum
Primary	*E. camaldulensis*	River Red Gum*
Primary	*E. globulus globulus*	Tasmanian Blue Gum*
Secondary	*E. viminalis cygnetensis*	Rough-barked Manna Gum
Secondary	*E. obliqua*	Messmate
Secondary	*E. baxteri*	Brown Stringybark
Secondary	*E. melliodora*	Yellow Box
Supplementary	*E. aromaphloia*	Scent Gum
Supplementary	*E. dives*	Broad-leaved Peppermint
Supplementary	*E. ovata*	Swamp Gum
Supplementary	*E. radiata*	Narrow-leaved Peppermint
Supplementary	*E. rubida*	Candlebark