

Conservation Plan

for the

Central Creek Landscape Zone



**Biodiversity Action Planning
in the
Shepparton Irrigation Region**



Department of Sustainability and Environment
Department of Primary Industries



Developed By:

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Front cover: Naringaningalook Grassland
Inset: Bush Stone-curlew (Burhinus grallarius)

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For Further Information:

For further information about Biodiversity Action Planning please visit the DPI website at www.dpi.vic.gov.au or the DSE website at www.dse.vic.gov.au or call the Customer Service Centre on 136 186. Or visit the Goulburn Broken Catchment Management Authority website at www.gbcma.vic.gov.au

EXECUTIVE SUMMARY

The **ultimate aim** of Biodiversity Action Planning (BAP) is to achieve broad-scale conservation of native biodiversity. BAP identifies priorities for the conservation of native biodiversity, as part of the implementation of the Victorian Biodiversity Strategy 1997. It is not a 'stand-alone' project; rather a process for translating objectives set out in Victoria's Biodiversity Strategy to regional, catchment and local level (Victoria's Biodiversity Strategy fulfils a statutory requirement under Section 17 of the *Flora and Fauna Guarantee Act 1988* and provides the biodiversity action plan for Victoria).

To **translate objectives** from state to regional, catchment and local landscape level, Victoria was first divided on a bioregional basis (Bioregions) and then at a landscape level (landscape zones). The methodology used to develop the Landscape Zone plans is according to 'Developer's Manual for Biodiversity Action Planning in the Goulburn Broken Catchment (GBCMA 2004)'. The Victorian Riverina Bioregional Plans and the Central Creek Landscape Zone Plan outline biodiversity priorities at the bioregional level. This Central Creek Landscape Zone Conservation Plan has been developed at the local (landscape) level and is intended to assist government agencies (primarily extension staff) and the community, to work in partnership towards achieving catchment targets, by setting priority areas for protection and enhancement of native biodiversity. This Plan is also intended to enable biodiversity priorities, data and advice to be disseminated to other planning processes, landholders and agencies.

The **Central Creek Landscape Zone** is located within the Goulburn Broken Catchment of Victoria. The Zone, 41,170 hectares in extent, is part of the Victorian Riverina Bioregion. It is within the Local Government areas of Moira. Since European settlement most of the vegetation in the Zone has been cleared, leaving a fragmented landscape, with many of the remnants that remain, being highly modified.

There are 92 **priority environmental sites** that have been identified within the Central Creek Landscape Zone. The priority sites have been determined and ranked (low, medium, high or very high) based on factors such as, size, vegetation quality, Ecological Vegetation Class (EVC) conservation status, threatened species, landscape context and field survey results. These sites contain remnant vegetation and vary greatly in size from a stand of paddock trees, to the 430 hectares along Broken Creek.

Two important components in the Biodiversity Action Planning process are the **Focal Species** approach and the **Key Biodiversity Assets** approach. The focal species approach uses the habitat requirements of a particular species, or a group of species, to define the attributes that must be present in a landscape, for these species to persist. Five focal species have been identified in the Zone including Squirrel Glider (*Petaurus norfolcensis*), Jacky Winter (*Microeca fascinans*), Black-chinned Honeyeater (*Melithreptus gularis*), Rufous Whistler (*Pachycephala rufiventris*) and Brown Treecreeper (*Climacteris pecumnus*).

The **Key Biodiversity Assets** approach is a method of grouping biodiversity assets (ie. birds, animals and plants) that use the same type of habitat. Seven Key Biodiversity Assets were identified for the Central Creek Landscape Zone including Plains Grassy Woodlands, Wetlands, Major Creeklines, Northern Plains Grasslands, Tree Goanna, Bush Stone-curlew and Plants of local interest. The grouping of these assets will assist in targeting actions towards the very high value sites first.

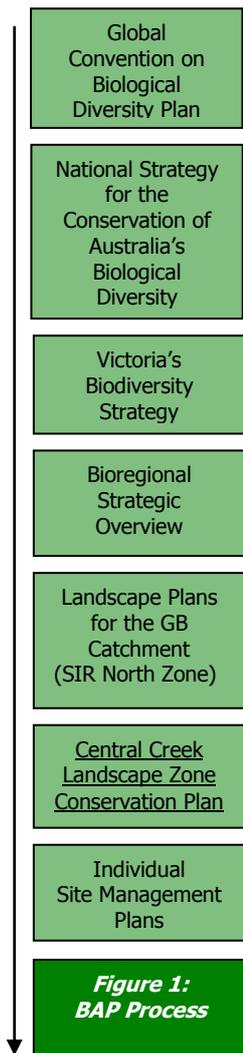
Management actions have been developed for the Central Creek Landscape Zone based on the results of desktop analysis and field surveying. It is intended that government agencies (primarily extension staff) and the community will work together to implement these actions, for the benefit of biodiversity conservation in the Central Creek Landscape Zone and the wider area of the Goulburn Broken Catchment.

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1.0 BACKGROUND

1.1 INTRODUCTION



Biodiversity Action Planning¹ (BAP) is an initiative by the Victorian Government to identify priorities for the conservation of native biodiversity, as part of the implementation of the State's Biodiversity Strategy (Crown 1997). In particular, it aims to:

- Conserve native biodiversity by maintaining viable examples of the range of ecosystems that occur naturally in Victoria
- Promote a more strategic and cost-effective expenditure of public funds for the protection, restoration and ongoing management of priority biodiversity sites
- Achieve community support for landscape planning for biodiversity and the conservation of strategic assets, particularly in rural landscapes.

In order to achieve these aims, effective planning of actions for native biodiversity also requires detailed planning at a bioregional and landscape level. Therefore, Victoria was first divided on a bioregional basis (Appendix 1) and then at a landscape level (landscape zones) (Appendix 2). Figure 1 illustrates the Biodiversity Action Planning process and where the Central Creek Landscape Zone Conservation Plan (as per underlined) fits within a policy context.

At the regional scale the 'Landscape Plan for the Goulburn Broken CMA – Central Creek Zone' identifies the broad priorities for biodiversity conservation in the region. It also provides the foundation for producing detailed Plans. This Central Creek Landscape Conservation Plan is intended to provide biodiversity conservation actions for the community to implement at a local level.

1.2 OBJECTIVES

The Central Creek Landscape Zone Conservation Plan aims to translate state, regional and catchment plans and targets for biodiversity, to a local landscape level. This plan aims to ensure that private and public resources expended for conservation are targeted towards priority sites, for which we have priority actions. In this way, available resources can be used for the greatest possible outcomes, based on the best science. This plan identifies 92 priority sites, ranging across low, medium, high or very high value. The protection and management of these priority sites is important for the conservation of flora and fauna in the local area. Therefore, this plan is intended primarily for use by extension officers, as well as the community, to guide the strategic and coordinated management of conservation in the area.

Broadly, this Plan details;

- The landscape, vegetation and significant flora and fauna of the Zone,
- Conservation vision for the Zone,
- Priority assets to be conserved, their biodiversity values and threatening processes,
- Actions to protect and restore these assets, and
- Monitoring opportunities for the Zone.

¹ For further information on Biodiversity Action Planning visit Department of Sustainability and Environments website at www.dse.vic.gov.au

1.3 A VISION FOR CONSERVATION

The Goulburn Broken Regional Catchment Strategy (RCS) identifies a vision for biodiversity in the catchment. The vision is that “the community will work in partnership with Federal and State Governments and other agencies, to protect and enhance ecological processes and genetic diversity, to secure the future of native species of plants, animals and other organisms in the catchment” (GBCMA 2003 p87). This Central Creek Landscape Conservation Plan is to assist in achieving this vision, through providing a strategic coordinated approach, for conservation of priority assets (Heard, 2007 p6).

The RCS also identifies targets and priorities for the catchment (refer to Appendix 3 for further detail). The following points are intended to provide a summary of the GBRCS targets and priorities for biodiversity conservation. For further information please refer to GBCMA 2003.

The Goulburn Broken Catchment Management Strategy identifies the following biodiversity resource condition targets for native vegetation in the catchment:

- Maintain the extent of all native vegetation types at 1999 levels in keeping with the goal of ‘Net Gain’ listed in Victoria’s Biodiversity Strategy 1997
- Improve the quality of 90% of existing (2003) native vegetation by 10% by 2030,
- Increase the cover of all endangered and applicable vulnerable Ecological Vegetation Classes to at least 15% of their pre-European vegetation cover by 2030
- Increase 2002 conservation status of 80% threatened flora and 60% threatened fauna by 2030,
- Maintain the extent of all wetland types at 2003 levels where the extent (area and number) has declined since European settlement
- Improve the condition of 70% of wetlands by 2030, using 2003 as the benchmark for condition (GBCMA 2003 p11)

Priorities for action to conserve biodiversity in the Goulburn Broken are driven by the conservation significance of the biodiversity asset. Regional investments in biodiversity conservation in the Goulburn Broken Catchment are driven by the following goals (in order of priority):

1. **Protecting** existing viable remnant habitats and the flora and fauna populations they contain (ie through reservation, covenants, management agreements, fencing and statutory planning),
2. **Enhancing** the existing viable habitats that are degraded (management by controlling threats such as pest plants and animals, grazing, salinity, promotion of natural regeneration and/or revegetation with understorey), and
3. **Restoring** under-represented biodiversity assets to their former extent by revegetation (to create corridors, buffers, patches of habitat) (GBCMA 2003).

It is intended that the actions outlined in this plan will complement the targets of the RCS and other policy/strategies pertinent to the state, catchment and region (eg. Victoria’s Native Vegetation Management – A Framework for Action (NRE 2002a): Goulburn Broken Native Vegetation Management Plan (GBCMA 2000): and the Victorian River Health Strategy (NRE 2002b)). This Plan is also intended to integrate such policies (eg. targets and legislative requirements) into the one document, for use by local communities. For example, this plan incorporates aspects of legislation (eg. Action Statements prepared under the *Flora and Fauna Guarantee Act 1988*), into recommended on-ground actions, for the conservation of threatened species and communities (Heard, 2007 p6).

The Biodiversity Action Planning (BAP) process uses current scientific knowledge to produce an ‘ideal’ landscape for biodiversity conservation. This ‘ideal’ landscape provides for the current levels of species abundance, diversity and interactions. BAP attempts to take a strategic approach to the conservation of threatened and declining species and vegetation types, by looking for opportunities to conserve groups of species in appropriate ecosystems (Platt & Lowe 2002). It is therefore intended that this Central Creek Landscape Zone Conservation Plan will assist government agencies and the community, to work in partnership towards achieving catchment targets and an ‘ideal’

landscape, by setting priority areas for protection and enhancement of native biodiversity (Heard 2007 p6).

This Plan is not intended to be a method of 'taking over' land, but rather a resource document, that assists with identifying priority assets and methods of action, to protect or restore valuable assets, through voluntary extension principles. This document may be used by agencies and community groups, for informing existing projects and for strategic planning. However, it must be remembered that this document is by no means 'comprehensive', as the BAP process relies on the regular updating of information, to keep it accurate and timely. This Plan has therefore been developed as an adaptive plan, to enable management actions and information to be modified, in response to further information (e.g. monitoring). This Plan also forms the basis for explanation of the Biodiversity Action Planning process and the associated mapping tool (Heard, 2007 p6).

Therefore this Plan will be reviewed when necessary to ensure that it remains a 'living' document. It is also intended that extension staff will utilise Geographical Information System (GIS) programs, databases and agency staff, to fully identify and understand the BAP process and to provide further information to the community. Consultation and extension with relevant stakeholders, including agencies and community groups, was conducted (and will continue to occur) throughout the development and implementation of this Plan. It is envisaged that this Plan will be a valuable resource, for identifying priority biodiversity sites and initiating further conservation works in the Zone, and that at a later stage, will lead to further sites and projects being identified by interested individuals and groups (Heard, 2007 p6).

2.0 THE STUDY AREA

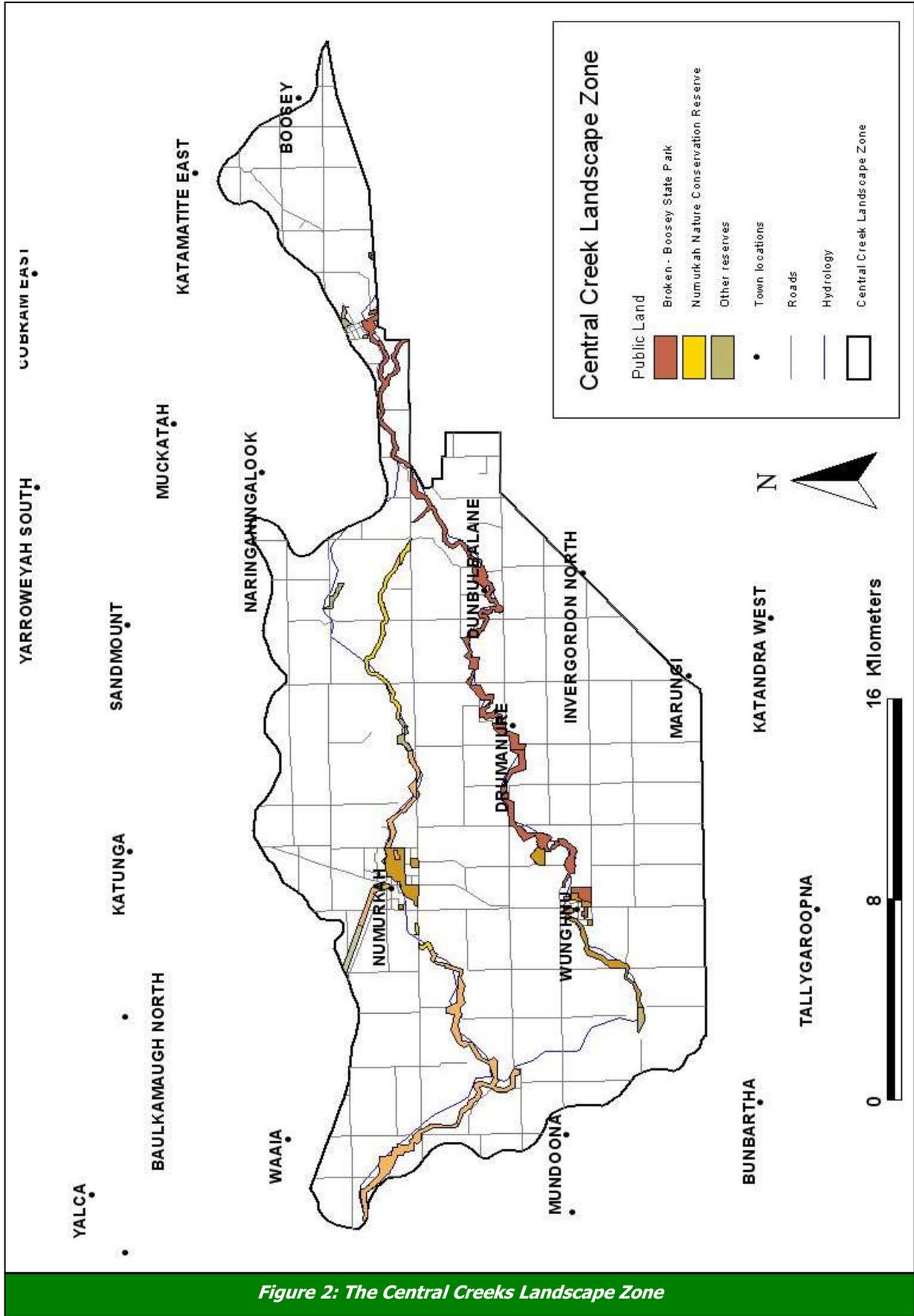


Figure 2: The Central Creeks Landscape Zone

2.1 LANDSCAPE

The Central Creek Landscape Zone covers an area of approximately 41,185 ha within the Goulburn Broken Catchment (Figure 2). The Zone is within the Broken River Basin, with floodplains of grassy woodlands and wetlands surrounding the meandering Broken and Nine-Mile Creeks.

The soils are comprised of Quaternary alluvial sediments, with more recent deposits associated with the course of the present creek systems. The land system is well drained to the north and west of the Zone, with levee banks on some streams and channels.

Private land covers 97% of the Zone (CGDL 2005). This has resulted in extraordinary changes to native vegetation, with most of the area cleared of trees for agriculture (approximately 97%). The remaining treed vegetation is highly fragmented, and usually occurring as small, isolated remnants (Figure 2). This results in not only a loss of habitat but also an inability for the landscape to function in a sustainable way. For example, many species may not be able to move across open farmland and therefore there cannot be any gene exchange and random events such as disease can wipe out sub-populations without replacement. Eventually, this results in decline and then extinction of species.

Within private land, land use is varied, with the majority of area used for dryland mixed cropping and cattle grazing. Where landform and infrastructure permit, low intensity irrigation and mixed farming occurs (LCC 1983; Ahern et al 2003).

Public land makes up 3% of the zone and occurs along stream frontages (various widths), roadsides and some small reserves. Public land Reserves occur mostly along the Broken and Nine-Mile creek frontages. This results in a long and narrow reserve system, with few large blocks of public land reserves (Figure 2).

2.2 VEGETATION

Ecological Vegetation Class (EVC) is a vegetation classification system derived from groupings of vegetation communities based on floristic, structural and ecological functions. Mosaics (combinations of EVCs) are a mapping unit where the individual EVCs could not be separated at the scale of 1:100, 000 (Berwick 2003).

Prior to European settlement, 13 EVCs² were known to have been present within the Central Creek Landscape Zone (Figure 3). The vegetation of Central Creek was a mixture of native grasslands, open woodlands and wetlands. Woodland communities on the plains were dominated by Grey Box (*Eucalyptus microcarpa*) and Yellow Box (*E. melliodora*), White Cypress Pine (*Callitris glaucophylla*) and Buloke (*Allocasuarina leuhmannii*). Ground cover in these woodlands comprised grasses and chenopods with Peas and Wattles (*Acacia spp*) providing an understorey. The stream-sides supported an overstorey of River Red Gum.

Thirteen Ecological Vegetation Classes (EVCs) have been identified in the zone (Table 1; Figure 3). The dominant EVCs are those that are the types of Grassy Woodlands, Grasslands and Wetlands. All EVCs are considered endangered or vulnerable at the bioregional level (GBCMA 2000). A few EVCs of note are described below, and further information can be gained from Berwick (2003) or www.dse.vic.gov.au.

Plains Grassy Woodland communities on the Riverine plains consisted of open woodlands with an understorey of scattered shrubs and a high species diversity of grasses, lilies, orchids, herbs and sedges. The overstorey component was generally comprised of Grey Box, White Box (*Eucalyptus albens*) and/or Yellow Box. Wattles and Pea species provided the majority of the understorey component, whilst the groundcover was generally composed of grasses (e.g. *Austrodanthonia* and *Stipa spp*) and chenopods (e.g. *Atriplex spp*) (Berwick 2003).

² For further information on each EVC, refer to the Department of Sustainability and Environment website at www.dse.vic.gov.au

Creepline Grassy Woodlands were typically located along ephemeral drainage lines on the Riverine Plains and floodplains. The creeks and major depressions typically supported an overstorey of River Red Gum (*Eucalyptus camaldulensis*) and an understorey of Wattles and were generally lined with tall sedges (*Carex spp*). The Drainage Line Complexes varied from grassy wetlands to open herblands, sedgeland and may have developed to Red Gum Wetlands in some areas (Berwick 2003).

Red Gum Wetlands were typically dominated by River Red Gum, sedges (eg. *Eleocharis spp*) and rushes (eg. *Juncus spp*). Plains Grassy Wetlands occurred in shallow depressions on the alluvial plains, where meanders of prior streams occurred. These shallow seasonal wetlands were typically treeless, with a grassland structure, grading in to sedgeland or herbland (Berwick 2003).

The current extent of native vegetation in the Central Creek Zone has been dramatically reduced (Figure 4) since European settlement due to clearing. Table 1 identifies the pre 1750 EVCs in the Central Creek Landscape Zone, including their Bioregional Conservation Status, their current extent (as of 2003) (in hectares and % cover). The table also identifies the area of 'Private Land No Tree Cover' and Unknown/Unclassified EVCs (Ahern et al 2003).

The Goulburn Broken Regional Catchment Strategy identifies goals and targets that have been set for the vegetation communities within the catchment (Appendix 3). This includes "increasing the cover of all 'Endangered' and 'Vulnerable' (where applicable³) EVCs to at least 15% of their pre-European vegetation cover by 2030" (GBCMA 2003). The majority of EVCs within the Central Creek Landscape Zone are below the 15% target (Table 1) and are therefore considered 'Endangered' (17) or 'Vulnerable' (3) at the Bioregional level (Ahern et al 2003).

³ Applicable to Ecological Vegetation Classes that are 'Vulnerable' and are below 15%

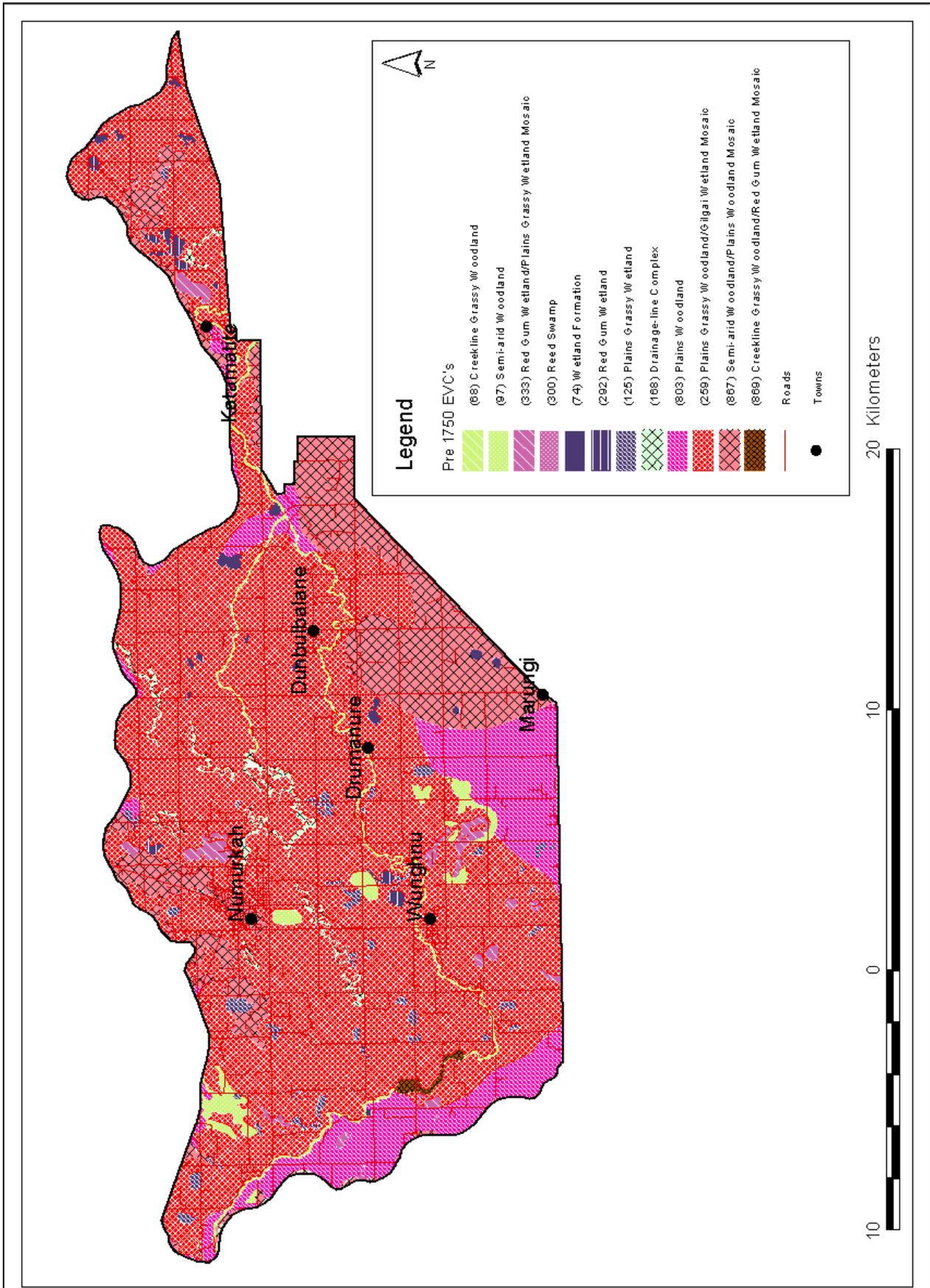


Figure 3: Pre-European Native Vegetation Cover – Central Creek Landscape Zone. The different colours represent different Ecological Vegetation Classes.

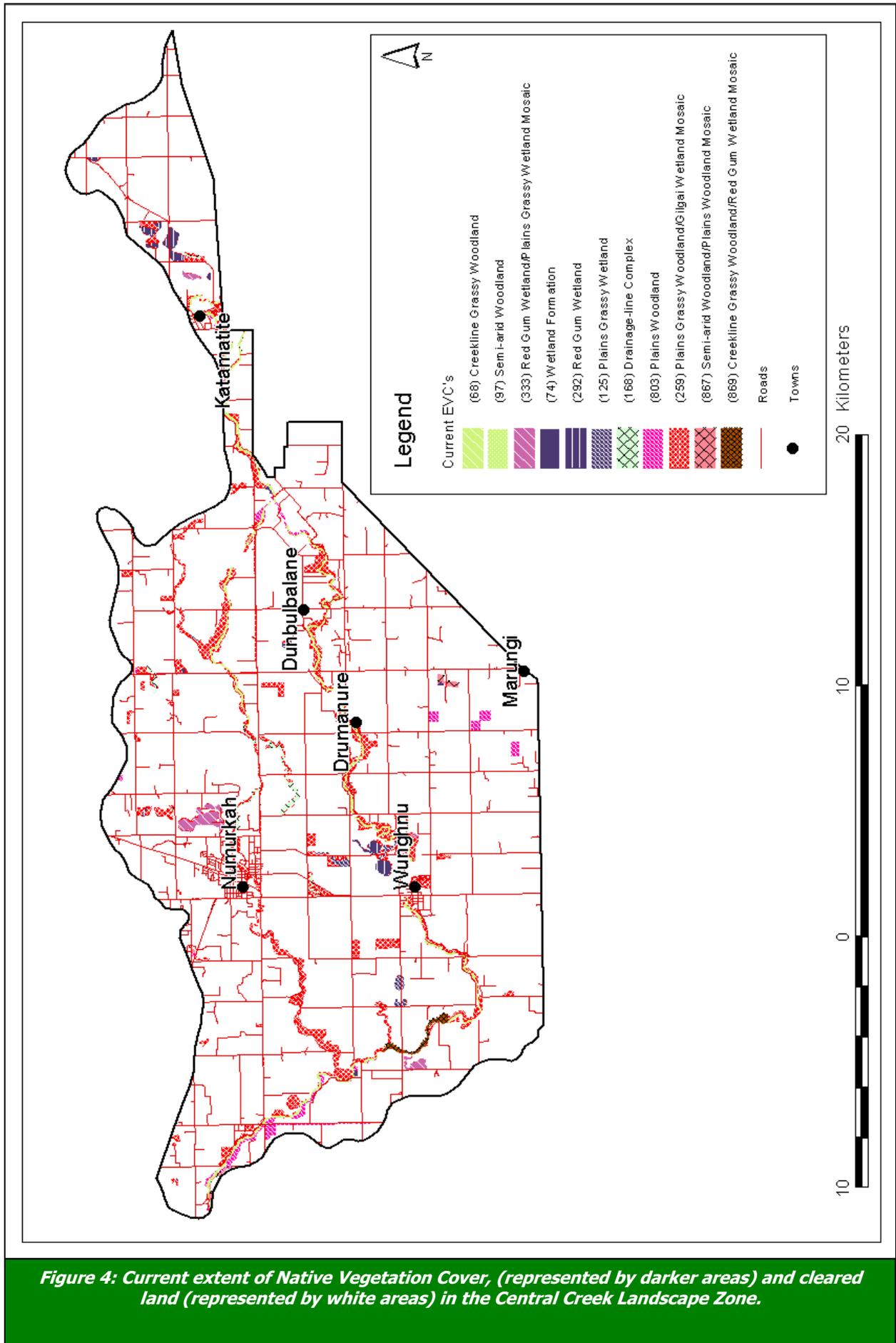


Table 1: Central Creek Landscape Zone – Ecological Vegetation Classes (pre-1750 and current)

EVC Group	EVC Number	EVC Bioregional Conservation Status	Ecological Vegetation Class (EVC) Name	Pre-1750 Vegetation Area (ha)	Current Area of Vegetation (ha)	Current Area of Vegetation (%)	Catchment (15%) Target (ha)
14	55	E	Plains Grassy Woodland	4584	85	1.9	687
14	260	E	Gilgai Plain Woodland/Wetland/Shrubby Riverina Plains Grassy Woodland Mosaic	7	0	0.0	1
14	294	E	Plains Grassy Woodland/Gilgai Plains Woodland/Wetland Mosaic	27628	453	1.6	4144
14	867	E	Pine Box Woodland/Riverina Plains Grassy Woodland Mosaic	5556	13	0.2	833
14	868	E	Pine Box Woodland	616	6	1.0	92
15	68	E	Creekline Grassy Woodland	622	161	25.9	93
15	168	E	Drainage Line Complex	535	27	5.0	80
15	869	E	Creekline Grassy Woodland/Red Gum Wetland Mosaic	96	27	28.1	14
19	74	E	Wetland Formation	183	1	0.5	27
19	125	E	Plains Grassy Wetland	564	5	0.9	85
19	292	E	Red Gum Wetland	239	8	3.3	36
19	300	V	Reed Swamp	3	0	0.0	1
19	333	E	Red Gum Wetland/Plains Grassy Wetland Mosaic	538	19	3.5	81
			TOTAL	41171	805	1.95%	6176
99	997	NA	Private Land No Tree Cover	0	40366		

Table Information including column A & B from Ahern et al 2003

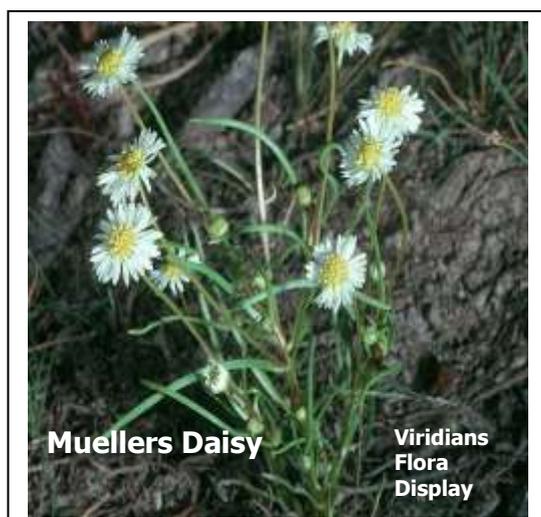
A B C D

Column C derived from (column B divided by column A) multiplied by 100 (for %)

Column D derived from (column A divided by 100) multiplied by 15 (*rounded to unit ten)

Explanation of Terms:

- EVC Bioregional Conservation Status refers to the threatened status of the EVC in the bioregion (eg. Victorian Riverina). Endangered (E) means that 'less than 10% of the pre-European extent remains, whilst Vulnerable (V) is defined as 'less than 10-30% pre-European extent remaining (Platt 2002).
- EVC Number refers to the unique number attributed to that EVC
- Catchment Target refers to the GBRCS targets of increasing native vegetation to 15% of Pre-European extent (GBCMA 2003)



2.3 SIGNIFICANT FLORA AND FAUNA

2.3.1 Flora:

A range of native flora is found within the Central Creek Landscape Zone. Overstorey species include River Red Gum (*Eucalyptus camaldulensis*), Grey Box (*Eucalyptus microcarpa*), Black Box (*Eucalyptus largiflorens*), Yellow Box (*Eucalyptus melliodora*), Murray Pine (*Callitris glaucophylla*) and Buloke (*Allocasuarina leuhmannii*). The range of small trees and shrubs includes species such as, Lightwood Wattles (*Acacia implexa*), Mallee Wattle (*Acacia montana*), Golden Wattle (*Acacia pycnantha*), Gold-dust Wattle (*Acacia acinacea*), Emubush (*Eremophila longifolia*) and Lignum

(*Muehlenbeckia spp*). The zone also contains a range of groundcover plants including Wallaby Grass (*Austrodanthonia spp*) and Spear Grasses such as Corkscrew Spear-grass (*Austrostipa setacea*), herbs such as Leafless Bluebush (*Marieana aphylla*) and Smooth Rice-flower (*Pimelea glauca*) and Lilies such as Chocolate Lily (*Arthropodium strictum*) (Ahern et al 2003).

A total of 33 species of threatened flora are known from the Central Creek Zone. These species are noted in Appendix 4, along with their threatened status, as per the Flora Information System, the State level (Flora and Fauna Guarantee Act (*FFG Act 1988*) and the National level (*Environment Protection and Biodiversity Act (EPBC) 1999*) (Ahern et al 2003). Of particular note is the Mueller Daisy which has a limited distribution, and the Central Creek Zone is one of the few places where it has been recorded. Dryland species such as Leafless Bluebush and Hooked Needlewood are also noteworthy.

A range of flora, associated with plains grasslands, grassy woodlands and wetlands are a special feature of this Zone. Robinson and Mann (1996) provide a detailed overview of plants in the area. Flora of note include those associated with Plains Grasslands.

Examples of threatened plant species recorded in the Central Creek Landscape Zone include:

- Yarran Wattle (*Acacia omalophylla*) (endangered in Victoria),
- Small-leaf Bluebush (*Marieana microphylla*) (endangered in Victoria),
- Spiny-fruit Saltbush (*Atriplex spinibractea*) (endangered in Victoria),
- Small Scurf-pea (*Cullen parvum*) (Endangered EPBC Act 1999, endangered Victoria),
- Mueller Daisy (*Brachyscome muelleroides*) (Vulnerable Australia, endangered Victoria),
- Small-spike Rush (*Eleocharis pusilla*) (rare in Victoria), and
- River Swamp Wallaby-grass (*Amphibromus fluitans*) (Vulnerable Australia) (Ahern et al 2003).

2.3.2 Fauna:

There are 24 threatened species recorded in the Central Creek Zone (refer to Appendix 5 for species, their threatened status and relevant acts) (Ahern et al 2003).

Examples of threatened woodland species recorded in the Central Creek Landscape Zone include:

- Bush-stone Curlew (*Burhinus grallarius*) (Threatened in Australia, endangered in Victoria)
- Superb Parrot (*Polytelis swainsonii*) (Vulnerable in Australia, endangered in Victoria)
- Grey-crowned Babbler (*Pomatostomus temporalis*) (endangered in Victoria, listed under *FFG Act 1988*)
- Diamond Firetail (*Stagonopleura guttata*) (Threatened Australia, vulnerable Victoria) (Ahern et al 2003).

Examples of threatened species recorded within the Central Creek Landscape Zone, predominantly associated with wetlands include:

- Hardhead (*Aythya australis*) (vulnerable in Victoria),
- Australasian Shoveller (*Anas rhynchosotis*) (vulnerable in Victoria),
- Brolga (*Grus rubicunda*) (vulnerable in Victoria)
- Musk Duck (*Biziura lobata*) (vulnerable in Victoria),
- Freckled Duck (*Stictonetta naevosa*) (endangered in Victoria)

Other notable species are, Tree Goanna (*Varanus varius*) (vulnerable in Victoria), Growling Grass Frog (*Litoria raniformis*) (Vulnerable across Australia and endangered in Victoria) and Squirrel Glider (*Petaurus norfolcensis*) (endangered in Victoria)



Photo: Freckled Duck (*Stictonetta naevosa*) By Peter Rogers (NRE 2002d)

3.0 PREPARING A CONSERVATION PLAN



3.1 METHODOLOGY

The methodology used to prepare this plan contained eight main elements. These were,

- 1) Identification of Conservation Features and Threatened Species,
- 2) Ground Potential BAP Sites,
- 3) Field Survey BAP sites,
- 4) Priorities BAP Sites,
- 5) Generate Focal Species List,
- 6) Generate Key Biodiversity Asset List,
- 7) Develop Actions for Key Biodiversity Assets, and
- 8) Landscape Context Analysis.

Step 1. Identification of Conservation Features and Threatened Species

Features in the landscape that are of potential priority for conservation were identified, as well as flora and fauna species of conservation significance (e.g. Threatened under State or Commonwealth legislation). This involved desktop analysis of data (eg. literature review; spatial data (eg EVC, trees cover, wetlands, flora and fauna records, aerials); corporate databases (eg. Biosites, Victorian Fauna Display and Flora Information Systems); local knowledge investigations; and the Landscape Context Model (refer to Step 8). From this analysis, a series of sites likely to have conservation values and threatened species were identified and mapped using GIS.

Step 2. Ground-Truthing of Potential BAP Sites

Involved surveying of the zone from the roadside, to compare desktop analysis data with the on-ground sites in regards to presence, type of vegetation and condition.

Step 3. Field Survey BAP Sites

Sites were prioritised for survey as per GBCMA in prep method (Appendix 6). One hundred of the sites requiring ground-truthing were field surveyed (on-site or from the nearest public land), by, 3.1) Bird Surveys - Undertaken in accordance with the Birds of Australia - Atlas Search Method 'Area Search'. This covered the same area (1 hectare) as per the Vegetation Quality Assessment, for a period of 20 minutes (Birds Australia 2001).

3.2) Vegetation Quality Assessment (VQA)(DSE 2004) – Site-based habitat and landscape components were assessed against a pre-determined 'benchmark' relevant to the vegetation type being assessed (ie. grasslands, wetlands, plains grassy woodlands) (Refer to Appendix 7).

3.3) Threat Identification – Whilst undertaking the Vegetation Quality Assessment, a list of threatening processes (e.g. pest plants and animals) on the priority sites, were recorded.

Step 4. Prioritise BAP Sites

The 92 sites were given a ranked value of very high (VH), high (H), medium (M) or low (L), based on a range of factors (conservation status of the EVC, presence of threatened species, size, VQA score). Sites not surveyed, nor automatically ranked (as per Appendix 6), were given a ranked value to the lesser of the available options until surveying occurs.

Step 5. Generate Focal Species List

The focal species approach (Lambeck 1997) uses the habitat requirements of a particular species, or group of species, to define the attributes that must be present in a landscape for these species to persist. For example if a species that requires the largest remnant size is selected, then fulfilling the needs of that species may result in the conservation of all species with smaller remnant size

requirements. The factors used in this plan to select focal species were remnant size and isolation distance (GBCMA *in prep*).

Step 6. Generate Key Biodiversity Asset List

The identified environmental features, including flora and fauna species, were categorised into a series of 'nested' environmental assets. For example; similar species or environmental features may be located in 'nested assets' such as; creeklines or ecological vegetation classes.

Step 7. Develop Actions for Key Biodiversity Assets

Involved development of a list of actions aimed at protecting and enhancing the biodiversity values in the Zone, by reducing the identified threats for each Key Biodiversity Asset. Available information (e.g. Actions for Biodiversity Conservation (ABC) database) (DSE 2005a) and the SIR North Landscape Plan (Ahern et al 2003) were also used to compile the actions.

Step 8. Landscape Context Analysis

To achieve long-term viability of the priority sites, they need to be linked together to form a viable, functioning landscape. The Landscape Context Model (LCM) (Ferwerda 2003) uses a model of "known habitat" (based on mapping for tree cover, wetland, and major watercourses) to identify large remnants, key remnant clusters and the key linkages between them. However, because of potential limitations of the input data, areas of conservation significance (particularly grasslands and sparse woodlands) may not be identified. Similarly, areas with minimal conservation significance may be included because habitat quality data is not included in the model.

The LCM identifies areas that have the highest (or least) probability of containing additional sites of conservation interest (as per Step 1). The model is useful in identifying the areas of the landscape that should be used to link and strengthen a network of conservation sites, and create a sustainable landscape. The model can be used to further determine the major linkages between the priority sites. The Central Creek Landscape Zone priority sites and Landscape Context overlay are shown in Appendix 8.

4.0 IDENTIFYING PRIORITY SITES



In the Central Creek Landscape Zone 92 sites have been identified as Biodiversity Action Planning priority sites for conservation management. These sites are termed BAP sites. They contain remnant vegetation and vary greatly from a stand of paddock trees to large forested areas such as the Barmah State Forest. One hundred of these BAP sites have been ground-truthed and surveyed (refer to Section 5.0 for further information on surveying).

In order to identify the BAP sites, each site was assigned a number that identifies its location (maps) and the associated data (attribute table). This unique number has been calculated using the map-index number (1:25,000 Map) and a site number (e.g. 1-92). An example of the site identification numbering system (how the site(s) are identified, using the site number system) is illustrated below Figure 5). An example of the data that is contained in the accompanying data for each BAP site is detailed below (Figure 6). The location of all of the 92 BAP sites (in map form) is available, in hard copy (general map) and electronic form (CD) (Appendix 11).

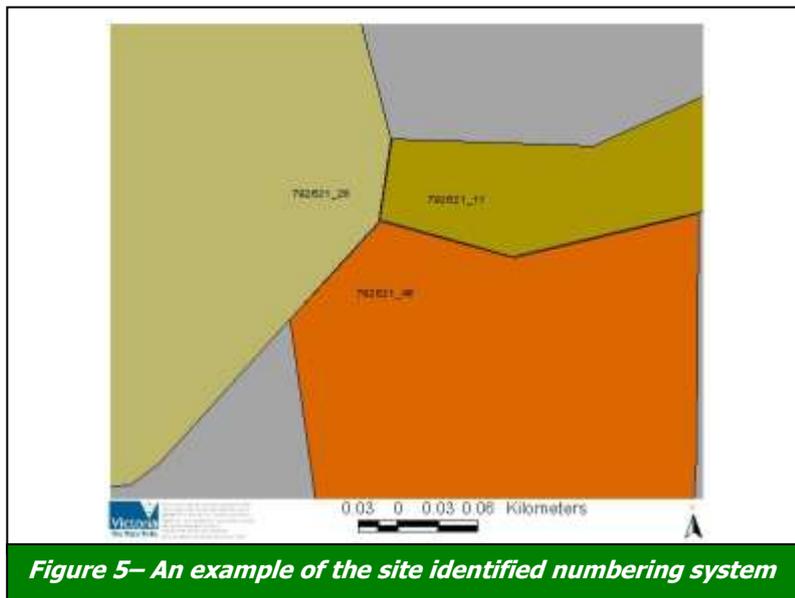


Figure 5– An example of the site identified numbering system

Site Number:	792623_1
Biodiversity Asset	Plains Woodland (Section 6.0)
Priority Status	Very High
Bioregion	Murray Fans/Victorian Riverina
EVC	55 (Section 2.2)
EVC Conservation Status	E (Endangered)
Focal Species	Bush-Stone Curlew (<i>Burhinus grallarius</i>) (Section 6.1)
Threatened Flora	Leafless Bluebush (<i>Marieana aphylla</i>)
Threatened Fauna	Diamond Firetail (<i>Stagonopleura guttata</i>)
Vegetation Quality Score	16/20 (Section 5.1)
Landholder	Private
Threats	Pest plants (230), land clearance (293)

Figure 6– An example of the data contained in the database

5.0. SUMMARY OF SITE SURVEYING



5.1. VEGETATION QUALITY ASSESSMENTS

All of the 92 BAP sites were assessed based on habitat features of, 1) Large trees, 2) Canopy Cover, 3) Understorey, 4) Weediness, 5) Recruitment, 6) Organic Litter, 7) Logs and Landscape Component Scores of, 8) Size, 9) Neighbourhood and 10) Core Area. They were scored out of a maximum score of 20 (intact habitat). An example of the assessment sheet is provided in Appendix 7. Graphical illustration of the results is also provided in Appendix 9.

The sites in the Central Creek Landscape Zone scored between 3 and 15 (Appendix 9). The highest scored site was in the Numurkah area (north of the zone). The lowest scored site was near Boosey (at the eastern end the zone).

The graphical results (Appendix 9) highlight some of the challenges for biodiversity conservation in the Central Creek Zone. In summary, the assessments identified that:

- 24% of sites scored the highest for large trees (more than 7 Large trees/ha)
- 64% of the sites scored the highest for canopy cover (more than 50% of benchmark cover)
- 9% of sites scored adequate understorey (more than 75% understorey cover and more than three forms)
- 17% of sites scored less than 25% weed cover,
- 32% of sites have adequate regeneration (10% or more of each woody species population)
- 58% of sites have adequate organic litter covering the ground (more than 5% cover),
- 30% of sites have adequate number of logs (25m of logs/ha),
- 50% of sites were larger than 10 hectares and 28% between 2-10 hectares
- 5% of sites had more than 50% vegetation cover in the surrounding landscape (to 1 km radius) were surrounded (1km radius) by more than 50% vegetation
- 43% of sites were less than 1km from a block of native vegetation greater than 50-hectares.

(Note: Sites were scored in relation to Ecological Vegetation Class Benchmarks, for each EVC Refer to Appendix 7 for further information on surveying).

Over the entire zone, the surveys show that there is: very little understorey or regeneration, a high percentage of pest plants, a lack of connectivity, small sized remnants (2-10 hectares) and a limited number of large trees. These habitat elements should be targeted within the zone.

The VQA scores for each of the sites provide a valuable monitoring system that can be repeated over time.

5.2 BIRD SURVEYS

All of the 92 priority BAP sites had bird surveys completed. 136 birds were identified in the zone (Appendix 10).

5.3 CONSERVATION THREATS

Threats to the conservation values for the Central Creek Landscape Zone were identified, as:

- Land Clearance – (removal of native vegetation),
- Habitat Fragmentation – (isolation of remnants and species due to land clearance),
- Elevated competition by Noisy Miners,
- Changes in hydrology (inappropriate wetting/drying/flow regimes),
- Inappropriate management of grazing (by introduced animals),
- Removal of habitat (eg. firewood collection, 'cleaning' up),

- Pest Plants,
- Pest Animals (including soil disturbance),
- Salinity (high watertable), and
- Adjacent Land Use Practices (eg. irrigation, laser grading).

Whilst some of the identified threats (eg. land clearance, habitat fragmentation, changes in hydrology and salinity) are primarily a result of historical activities (wide spread clearing, dredging, construction of meander cut-offs), they continue to have impacts on the biodiversity in the zone.

Land clearance (a key threatening process under the *EPBC Act_1999*) (Wierzbowski et al 2002) continues to be a threat to conservation values within the zone. Laser grading and cropping threatens wetlands and natural depression values. For example, further clearing occurred during the recent dry years, when depressions and wetlands were more accessible and were able to be sown to crops. Less than 25% of wetlands identified to occur prior to European settlement were evident in the field. This is due to laser grading, cropping and grazing.

Habitat fragmentation (a potentially threatening process for fauna in Victoria under the *FFG Act 1988* (Wierzbowski et al 2002)), is usually the result of land clearance. A range of species such as the Superb Parrot (*Polytelis swainsonii*) and Grey-crowned Babbler (*Pomatostomus temporalis*) are detrimentally affected by habitat fragmentation, as it affects their ability to source food and suitable habitat required for their survival. Habitat fragmentation also favours species such as Noisy Miners (*Manorina melanocephala*) (Simpson et al 1993). **Elevated competition** from these aggressive species threatens biodiversity in the area, by the exclusion of less aggressive species (e.g. Grey-crowned Babbler (*Pomatostomus temporalis*) from remnants.

Changes in hydrology (eg. wetting/dry/flow regimes) are a threat for native vegetation, particularly for wetlands, which have evolved to function with the natural cycles of flood and drought. Alteration to natural flow regimes of rivers and streams is listed as a threat to Victorian waterways under the *FFG Act 1988* (Wierzbowski et al 2002). A change in water regimes can dramatically alter wetland and waterway appearance and functioning, disrupt natural productivity cycles and cause changes in vegetation and habitat, which in turn affects fauna that rely on wetlands (ie. for resources and breeding) (Howell 2002). The reduction in numbers of Brolga (*Grus rubicunda*) from the zone has been attributed to the loss of breeding habitat, pest animals and changes in hydrology.

Inappropriate Management of Grazing by introduced animals affects biodiversity conservation, through, soil compaction; removal of vegetation (ie. regeneration); changed nutrient levels in and around native vegetation. It contributes to tree dieback; and results in competition for fodder by native animals and small mammals that require tussocky grass for shelter (Wilson & Lowe 2002). A large percentage (more than 80%) of remnants (both fenced and unfenced) within the landscape are grazed, often resulting in minimal shrub or ground cover (only 3% of BAP sites had adequate understorey). A large number of isolated trees in paddocks are stressed and showing signs of dieback (e.g. dead limbs, loss of trunk bark and compacted soils around bases), particularly in highly irrigated paddocks, most likely the result of inappropriate wetting regimes (eg. waterlogging) and compaction from grazing.



Photo: Firewood Collection in remnant vegetation (Heard 2007)

The removal of fallen timber (or 'cleaning up') was evident along roadsides and within private remnants (see photograph above). Fallen timber provides shelter for regenerating seedlings; protection from fire and hollows for ground mammals, and a wide variety of smaller organisms that provide food for mammals and birds. Removal of fallen timber results in a loss of habitat and food on which many animals rely. The Bush-stone Curlew (*Burhinus grallarius*), is just one of the species that is severely impacted upon by timber removal, as this species requires fallen timber for camouflage for protection for chicks and habitat (DSE 2005a).

Pest Plants (Weeds) are a major threat to biodiversity because they compete for space, light and nutrients with native species. Invasion of native vegetation by environmental weeds is listed as a potentially threatening process under the *FFG Act 1988* (Wierzbowski et al 2002). Some of the weeds evident in the zone include Paterson's Curse (*Echium plantagineum*), Horehound (*Marrubium vulgare*), Olives (*Olea europaea*), Peppercorns (*Schinus molle*), Boxthorn (*Lycium ferocissimum*), Bridal Creeper (*Myrsiphyllum asparagoides*), African Love-grass (*Eragrostis curvula*), Willows (*Salix spp*) and Poplars (*Poplar spp*). Weeds are especially evident on roadsides, where edge effects and machinery create disturbance and vehicles spread weed seed, and adjacent to farmland where agricultural weeds invade remnants.

Pest Animals are a major threat to the conservation values of the area. Predation of native wildlife by the cat (*Felis catus*) and by the introduced Red Fox (*Vulpes vulpes*) is listed as potentially threatening processes under the *FFG Act 1988* (Wierzbowski et al 2002). Species such as the Bush-stone Curlew are preyed upon by these species. The European Rabbit (*Oryctolagus cuniculus*) and European Hares (*Lepus europaeus*) compete for habitat, remove native vegetation and disturb soil structure. Noisy miner (*Manorina melanocephala*) competition was also evident in the zone. They were often seen chasing other bird species, such as Grey-crowned Babblers.

Salinity is a potential threat to the area as a result of high watertables (DSE 2005b). In 1996, watertable depths in the zone ranged from 0-1 metres (northern and south-eastern areas) to more than 3 metres (most of the zone) (CGDL 2005). Remnant vegetation on the lower-lying parts of the landscape is especially at risk from a rising watertable. Further loss of vegetation and biodiversity in the Zone (especially in the southern sections) will degrade the capacity of the natural ecosystem to support essential landscape functions (DSE 2005b). If not managed appropriately increases in salinity are also a potential threat to biodiversity.

Adjacent land use practices such as irrigation and inappropriate earthworks⁴ are a threat to remnant vegetation, as they can lead to the colonisation of areas by weeds, waterlogging of vegetation, high watertable depths, nutrient run-off and an increase in sediment input to rivers and streams (DPI 2005).

⁴ The term inappropriate earthworks in this sense refers to the purposeful movement of soil and vegetation without consideration of the natural landscape functions such as water flow

6.0 CONSERVATION ASSETS



6.1 FOCAL SPECIES

Research shows that different species have different types of responses to landscape change. The focal species approach therefore uses the habitat requirements of a particular species or group of species, to define the attributes that must be present in a landscape, for these species to persist. Broadly, the focal species are predicted to be the most sensitive species (in a given landscape) to a threat or ecological process. Such that, their conservation should also conserve other less-sensitive species found in the same vegetation type. Therefore, focal species are a way of defining and guiding targets (eg. patch size and connectivity) for our landscape restoration strategies (Lambeck 1997).

Additional benefits of a focal species approach are that it allows for the monitoring of actions (eg. can undertake regular surveys to establish if focal species are becoming more common and using new sites). It also provides the community and organisations implementing on-ground works, with an 'iconic/focal' species (if they don't already have one), which in turn, is envisaged to enhance enthusiasm for implementing works.

The 5 focal species identified in the Central Creek Zone, and their ecological requirements (thresholds⁵) are identified below (Table 2). A definition of the ecological terms used includes:

- Minimum patch size (patch size threshold) – refers to the minimum patch size of vegetation required, for the species to maintain viable populations,
- Critical distance between habitat patches (isolation threshold) – refers to the size of the gap between habitats, beyond which, on a daily basis, the animal doesn't generally cross (GBCMA *in prep.*),
- Dispersal threshold – refers to the distance (km) for which the species has been known to travel (eg. for breeding, migration), but generally does not on a daily basis,
- Ecological Vegetation Class (EVC) – the vegetation community that the species prefers, and
- Other requirements – identifies some other known requirements (not comprehensive) for the species to survive, or to inhabit an area.

It is envisaged that community groups and agencies may target one, or a combination of, the focal species identified (Table 2), for planning and implementation of on-ground works in the Zone. The focal species are only a suggestion of species to focus on-ground works. Other species may also be the focus for on-ground works, given new information and community desire to implement works for another species. Keeping in mind that if we aim to cater for these species, we are also assisting a suite of species and working towards overall vegetation cover targets for the catchment.

⁵ Thresholds refer to the point at which relatively rapid change occurs (eg loss of species). Therefore, these should be used as a minimum target only.

Table 2: Focal Species and their Habitat Requirements – Central Creek Zone

	Squirrel Glider (<i>Petaurus norfolcensis</i>)	
	Minimum patch size (threshold) Critical distance between patches Dispersal threshold Ecological Vegetation Class Some other requirements (general)	2 ha 50m 100m Box Ironbark, Grassy Woodland fox/cat control, feral bee control
	Jacky Winter (<i>Microeca fascinans</i>)	
	Minimum patch size (threshold) Critical distance between patches Dispersal threshold Ecological Vegetation Class Some other requirements (general)	10 ha 800m 150m Box Ironbark, Grassy Woodland Noisy miner control and increase remnant widths
	Black-chinned Honeyeater (<i>Melithreptus gularis</i>)	
	Minimum patch size (threshold) Critical distance between patches Dispersal threshold Ecological Vegetation Class	100 ha 1 km 1 km Grassy Woodland
	Rufous Whistler (<i>Pachycephala rufiventris</i>)	
	Minimum patch size Critical distance between patches Dispersal threshold EVC utilised	10 ha 1 km 2 km All EVC types
	Brown Tree Creeper (<i>Climacteris picumnus</i>)	
	Minimum patch size (threshold) Critical distance between patches Dispersal threshold Ecological Vegetation Class	30 Ha 500m 1 km Box ironbark, Grassy Woodland, Wetland EVCs

Habitat Requirement Source: Variety of Sources in GBCMA in prep

Photo Credits: Squirrel Glider (John Seedbeck) Jacky Winter (Wendy Opie), Black-chinned Honeyeater (Graeme Chapman), Rufous Whistler, Brown Treecreeper (Ian McCann)

6.2 KEY BIODIVERSITY ASSETS

The identification of the appropriate biodiversity assets to focus conservation effort is the most critical part of the BAP process. The approach of using 'Key Biodiversity Assets' has been used to group together the birds, animals and plants that utilise the same type of habitat. For example, by choosing 'Wetlands' as a key biodiversity asset, it incorporates all of the species that live in, and use a wetland, as well as the individual species (e.g. Brolga (*Grus rubicunda*), Barking Marsh Frog (*Limnodynastes fletcheri*) and Small Spike-rush (*Eleocharis pusilla*)) (GBCMA in prep).

Seven Key Biodiversity Assets have been identified for the Central Creek Landscape Zone (Table 3). The 92 priority sites have been categorised in one of these Key Biodiversity Assets (Appendix 11). The 92 priority sites have also been mapped in accordance with the correlating Key Biodiversity Asset (Figure 7).

The benefit of this approach is that specific actions (Section 7.0), based on the requirements of each asset (to counter the threats and improve the status of the asset), can be developed. Planning and implementation of on-ground works and actions that specifically target each of these assets can then occur.



Photo: Diamond Firetail (Stagonopleura guttata). Photo by Ian McCann

Table 3: Key Biodiversity Assets – Central Creek Zone

Key Biodiversity Assets	Examples of Locally Significant Species per Asset
<p>(1) Plains Grassy Woodland Was historically the dominant vegetation type in the landscape; now the vegetation type requiring the largest increases in extent</p>	<p>Fauna: Tree Goanna, Temperate woodland bird community and Squirrel Glider EVCs: EVCs as listed in Table 1</p>
<p>(2) Wetlands Include representation of two Nationally Important Wetlands; breeding and feeding habitat for Brolga and other waterbirds; large number of threatened plants</p>	<p>Fauna: Brolga, waterbirds Flora: Ridged Milfoil, Striped Milfoil, Slender Water-Milfoil, Winged Water-starwort, Riverina Bitter-cress, Swamp Billy-buttons, Long Eryngium, Slender Water-ribbons, Muellers Daisy EVCs: Groups 15 & 19 as listed in Table 1</p>
<p>(3) Major Creeklines The most significant areas of native vegetation left in the landscape (Robinson & Mann 1996). Major bioregional habitat links. Habitat for most of the threatened species found in the zone.</p>	<p>Fauna: Bush Stone-curlew, Tree Goanna, Squirrel Glider, Temperate woodland bird community, Superb Parrot, Brown Treecreeper, Nankeen Night-heron Flora: Spiny-fruit Saltbush, Leafless Bluebush, Narrow-leaf Sida, Coolibah Grass, Leafy Templetonia, Waterbush, Smooth Minuria, Yellow-tongue Daisy, Bluish Raspwort</p>
<p>(4) Northern Plains Grasslands Includes two sites listed on Register of National Estate; vegetation community at eastern edge of range; highly endangered community; distinctive ecosystem</p>	<p>Fauna: Grassland-dependent invertebrate community Flora: Spurred Spear-grass, Corkscrew Spear-grass, Rye Beetle-grass, Ridged Milfoil, Striped Milfoil, Slender Water-Milfoil, Winged Water-starwort, Slender Water-ribbons, Muellers Daisy, Woolly Buttons, Yellow-tongue Daisy, Erect Pepper-cress, Silky Swainson-pea</p>
<p>(5) Tree Goanna Focal species in area for home range needs (160 ha), connectivity (gaps of < 1 km) and mature tree densities. The largest natural predator in the ecosystem</p>	<p>Squirrel Glider, Bush Stone-curlew, isolation-sensitive species of woodland fauna, mature tree-dependent fauna, litter-dwelling and soil-dwelling fauna will benefit from the same habitat conditions as the Tree Goanna</p>
<p>(6) Bush Stone-curlew Large woodland bird; focal species representing other ground-dwelling fauna, especially in relation to predation risk.</p>	<p>Squirrel Glider, temperate woodland bird community and Tree Goannas will benefit from the same habitat conditions as the Bush Stone-curlew</p>
<p>(7) Plants of local interest Threatened plants with small populations and/or restricted occurrences and/or no recruitment where protection from grazing will not be sufficient to ensure survival and ongoing recruitment</p>	<p>Buloke, Spiny-fruit Salt-bush, leafless Bluebush, Erect Peppercress, Hooked Needlewood, Waterbush, Narrow-leaf Sida, Southern Swainson-pea, locally threatened shrub species such as Lightwood, Wedge-leaf Hop-bush, Desert Cassia and Hedge Wattle (Robinson & Mann 1996)</p>

* The numbering of the Key Biodiversity Assets (1-7) is only intended to assist with the identification of the assets throughout the remainder of the report.

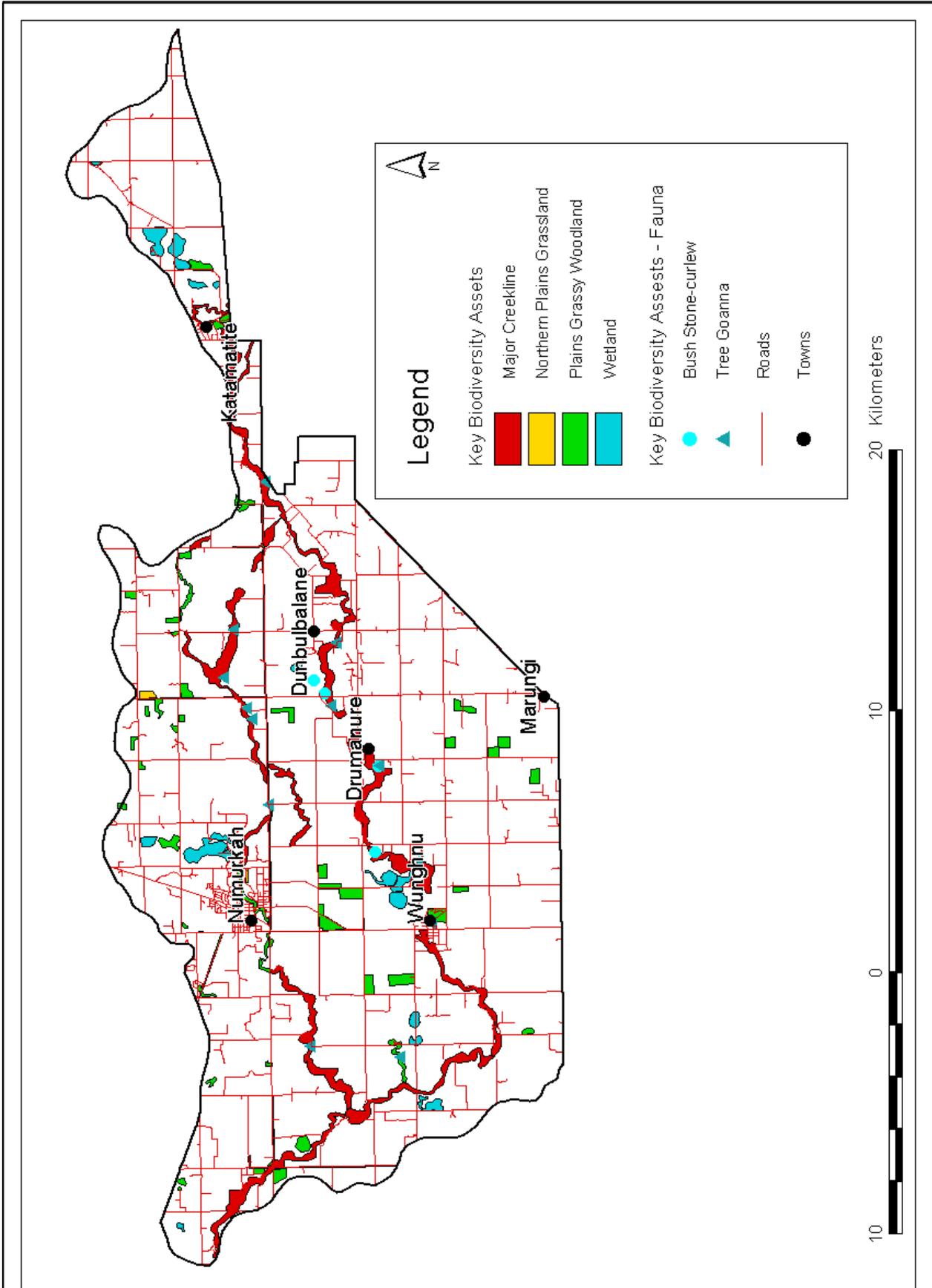


Figure 6 – Location of Key Biodiversity Assets – Central Creek Landscape Zone

7.0 PRIORITY ACTIONS - KEY BIODIVERSITY ASSETS



For each of the seven Key Biodiversity Assets (1-7), the following pages identify:

- A) An introduction to the Asset in the Central Creek Landscape Zone
- B) Photographic example of the Asset in good condition in the Zone
- C) The Actions for each of the Assets in the Zone (broader actions are also identified for the Central Creek Landscape Zone in Ahern et al 2003).

Priority actions for the Central Creek Landscape Zone have been developed and grouped based on each 'Key Biodiversity Asset' (refer to Section 6.2 and Table 3). Priority actions for the key biodiversity assets were developed based on the following factors: size/extent, condition and landscape processes (eg. habitat connectivity, appropriate water regimes). The condition section was also further split in relation to education/extension, on-ground works, threatened species and pest plants and animals. For example, an action relating to the condition of a remnant, due to rabbits, can be found under 'Condition' – 'Pest plants and animals'. Many of these actions can also be found in the, 'Broken-Boosey State Park and Nathalia, Numurkah, Tungamah and Youarang Natural Features Reserves' Draft Management Plan (PV 2005). This management plan contains a comprehensive list of actions for all aspects of the Broken-Boosey State Park and should be consulted in conjunction with this document.

It is proposed that the community and agencies in the Central Creek Landscape Zone investigate option for implementing these actions in to existing projects/polices. For example, BAP in each asset type, should be targeted in order of priority (Very High, High, Medium to Low) in relation to these actions (where applicable) This forms the basis of BAP, where the very high value sites, that require less cost for long-term protection, will provide the highest prospect for conservation (GBCMA in prep). The location of the Assets (maps) and the photographic examples of the condition of the Assets will assist with the planning and implementation of the actions.

1) KEY BIODIVERSITY ASSET – PLAINS GRASSY WOODLAND

1A) Introduction - Plains Grassy Woodland:

The Key Biodiversity Asset Plains Grassy Woodland is comprised of the EVC Group 14. These were historically the dominant vegetation types in the riverine plain part of the Central Creek landscape, but are now endangered. The majority of Plains Grassy Woodland in the zone occurs on private land, roadsides and edges of larger public land. These remnants serve many important functions, including water conservation, aesthetic values, habitat values, sources of native seed and sources of food, shelter and nesting sites for a range of woodland birds and mammals (Lunt 1998).

This asset is scattered throughout the Central Creeks Landscape Zone. Many of the areas in the zone that once contained these vegetation types have been cleared for agriculture, leaving fragmented landscapes. Other threats include Adjacent Land Use Practices, Grazing, Pest Plants and Pest Animals. The actions identified below are intended to assist in the protection of the remaining remnants within the zone. However, these actions are specific to the Central Creek Landscape Zone and are by no means comprehensive for the region.

1B) Photographic Example – Plains Grassy Woodland:

Example of a Waterway BAP Site of Good Condition - Central Creek Zone

Site 792511-11 (pictured below) is an example of a Plains Grassy Woodland BAP site in good condition. It is a Trust for Nature and Land for Wildlife site just south of Numurkah. It is one of the best examples of a Plains Grassy Woodland site in the zone and has a diverse and largely intact structure. It has a good, mixed understorey cover but recruitment is limited. The habitat quality score was lowered by the lack of neighbouring native vegetation, common in this type of agricultural landscape.



Photo: Plains Grassy Woodland – A Key Biodiversity Asset - Central Creek Landscape Zone

1C) Actions – Plains Grassy Woodland:

Size/Extent:

- **Create buffers**, through revegetation, on freehold land abutting roadside remnants or reserves to widen the habitat.
- **Increase connectivity** to remnants and reserves along roadsides and the riparian areas.
- **Expand** patch size and improve connectivity of isolated or partly disconnected patches

Condition:

Education/Extension

- **Encourage** landholders to increase the size of existing remnants, to establish new areas of indigenous species of trees and shrubs, and to retain or establish buffer zones of revegetation or unimproved, uncultivated pasture around woodland.
- **Liase** with Parks Victoria, DSE, Trust for Nature, committees of management and adjacent landholders, to establish the best practice for reserve management.
- **Encourage protection** (fencing) of all remnants and manage grazing practices to benefit the grassy woodland (such as exclude all domestic grazing stock in remnants to allow plants to set seed and regenerate. Manage stock grazing to benefit the native vegetation once plants have set seed).
- Organise **community education** activities relating to the importance of Plains Grassy Woodlands and associated flora and fauna species, specifically targeting high priority remnants in paddock environments.
- Further **promote** the benefits of protecting and enhancing remnant patches through extension and voluntary programs, such as Environmental Management Incentives.
- **Educate** landowners on the need to retain fallen in privately owned sites and making sure that fallen timber is not removed illegally from public land.

On-ground Works

- **Minimise disturbance** at high value sites to prevent erosion and minimise weed invasion.
- **Ensure** clusters or individual specimens of large, hollow-bearing trees and dead standing trees are retained and protected throughout the zone.
- **Enhance** high value sites with shrubs and other species if regeneration has not occurred following fencing (eg. no existing seed source).
- **Identify** additional native grassland paddocks for protection and restoration, where artefact grasslands were once grassy forests.

Threatened Species

- **Install nest boxes** where hollows are deficient to increase the number of nesting hollows for woodland birds and Squirrel Gliders.

Pest Plant and Animals

- Continue ongoing **control of foxes and feral cats**.
- Irradicate **feral Bee** populations to allow the hollows to be used for native animals.
- Control regionally listed **weeds** and environmental weeds from sites.

Landscape Processes (ie. hydrological regime, habitat connectivity):

- **Encourage** adjacent landholders to revegetate adjacent to significant road reserves such as Walshes Bridge South Road, Walshes Bridge Road and Katamatite-Nathalia Road. In order to widen and buffer them against weed invasion.
- **Identify and prioritise potential** sites for habitat expansion and improved connectivity as identified by the landscape context tool and maps provided in this document.

2) KEY BIODIVERSITY ASSETS – WETLANDS

2A) Introduction – Wetlands:

Wetlands are a characteristic feature of the Central Creek Landscape Zone. The wetlands and waterways are interconnected systems and therefore any changes in one, such as reduced flows or salinity, will affect the other. Two wetland systems found in the Central Creek Zone are listed in the Directory of Nationally Important Wetlands (Lyon et al. 2002). These listed systems are the Broken Creek, including the Nine Mile system, and the Muckatah Depression. The Muckatah Depression contains mainly sedge-dominated freshwater meadows and supports at least 5% of the Victorian population of Brolga (Lyon et al. 2002). The Broken Creek wetland is the floodplain associated with the Broken Creek. It is classified as Nationally Important mostly because of the presence of many waterbird species, including at Moodies Swamp, as well as the presence of threatened flora and fauna (Lyon et al. 2002). Several other bioregionally important wetlands are also identified in Central Creek, including Black Swamp near Wunghnu and wetlands east of Katamatite (Ahern et al. 2003).

Within the Central Creek Landscape Zone wetlands are amongst the most important, productive and valuable ecosystems. They perform vital functions including water purification, nutrient processing, flood management and maintenance of the watertable.

There are a number of threats affecting wetlands in the zone, such as land clearing, changed hydrological regime, adjacent land use practices and pest plants and animals. The actions identified below are intended to assist in the protection of the remaining wetlands within the Central Creek Landscape Zone. However, these actions are specific to the zone and are by no means comprehensive for the region. Other strategies (e.g. Draft Wetlands Strategy for the GB) (GBCMA 2003), provide a framework for protecting wetlands in the catchment, and are overarching strategies for the area.

2B) Photographic Example – Wetlands:

Example of a Wetland BAP Site of Good Condition – Central Creek Zone

The site pictured right is Blacks Swamp, north east of Wunghu. Plains Grassy Woodland surrounds the swamp and the swamp itself is an important refuge for waterbirds. The structure is simplified and fallen timber is absent due to illegal firewood collection. Native grasses and large trees are present, and there is some River Red Gum regeneration.



Photo: Wetlands – A Key Biodiversity Asset – Central Creek Landscape Zone

2C) Actions – Wetlands:

Size/Extent:

- **Create buffers** around all identified wetlands (as far out beyond the rim of the basin as possible) and protect and maintain vegetative cover on inflow paths (eg. revegetate Surface Water Schemes).
- **Protect** natural wetlands from grazing (while wet) and earthworks.
- If feasible **design reuse dams** to include areas for water birds to feed and breed.
- **Create artificial wetlands** designed to attract particular species of birds in areas where no wetlands or native vegetation currently exist.

Condition:

Education/Extension:

- Produce a site **management plan** for all high value wetlands and encourage incentives for other wetlands in the zone.
- Provide opportunities for **education of landholders** and school children regarding the benefits of wetlands on the farm, including the provision of an extension campaign on the productive value of intact wetlands, rather than for agricultural pursuits.
- Provide **extension** to all landholders with wetlands in the zone, to assist with recognition of the benefits of wetlands on their properties and to assist with identification of plants and animals.
- **Identify** a demonstration site (show casing a very high value site) for educational purposes.

On ground works:

- **Protect** (via incentives) all identified wetlands in the zone, commencing with very high value sites.
- **Provide** off-stream, watering points for private wetlands through the Environmental Incentives program.
- **Reduce** the use of chemicals and other water contaminants on farms and within local communities, especially along the Muckatah Depression.
- In consultation with the Waterwatch program, enhance **monitoring** of wetlands and encourage the community to adopt new wetland monitoring sites.

Threatened Species:

- **Manage grazing** to exclude grazing when wet, or prior to being wet, to allow flowering and seed-set of native plants (such as Milfoil). Graze under management only when dry to prevent seed set of weeds. Monitor growth of cane grass and other nesting habitat, to ensure that grazing does not remove habitat for bird species such as Brolga (*Grus rubicunda*) (eg. allow time for growth of rush/sedges/grasses prior to Brolga and other birds searching for breeding sites).

Pest plants and animals:

- **Undertake fox control** programs within the Muckatah Depression and other wetlands, for the benefit of all species. These fox control works should be coordinated with the Broken-Boosey Catchment Management Network's (BBCMN) Fox baiting program (PV 2005)

Landscape Processes (ie. hydrological regime, habitat connectivity):

- Give priority for protection to wetlands that are currently in close proximity to one another, or in close proximity to a high value site, to **form clusters of wetlands** if size cannot be extended.
- Liaise with Goulburn-Murray Water and landholders, to restore and deliver natural hydrological regimes to all identified wetlands, for the benefit of flora and fauna.
- Re-evaluate and **negotiate hydrological recommendations** along the Muckatah Depression and monitor wetting/drying regimes.
- **Prevent** further **removal** of wetlands, through education and legislation where required.

3) KEY BIODIVERSITY ASSET – MAJOR CREEKLINES

3A) Introduction – Major Creeklines:

Creeklines comprise 4.5% of the zone and contains the most significant areas of native vegetation left in the landscape (Robinson & Mann 1996). These Creeklines also form major habitat links in the bioregion as well as providing habitat for most of the threatened species within the zone. These areas are priority for protection due to their extent, connectiveness and the high priority vegetation types and threatened flora and fauna that they contain.

The Major Creeklines in the zone include the Broken Creek, Boosey Creek and Nine Mile Creek which form the Broken-Boosey Catchment Management Network (BBCMN). Sections of these creeks are protected by state parks (Broken Boosey State Park) and Conservation Reserves (Numurkah Nature Conservation Reserve).

The actions identified below should be implemented in conjunction with the Broken-Boosey State Park and Nathalia, Numurkah, Tungamah and Youarang Natural Features Reserves Draft Management Plan (PV 2005).

3B) Photographic Example – Major Creeklines:

Example of a Creeklines BAP Site of Good Condition- Central Creek Zone

The Broken Creek at this BAP site runs through an area that contains good vegetation cover with a diverse understorey, although it does not contain many large River Red Gums. Understorey is reduced in diversity and cover, but contains wattles, salt bushes and lignum plants. The creek suffers from a lack of surrounding vegetation that inhibits fauna movement between patches.



Photo: Major Creeklines - a Key Biodiversity Asset - Central Creek Landscape Zone

3C) Actions – Major Creeklines:

Size/Extent:

- **Revegetate** those remnant sites that are lacking understorey and native grasses or herbs.
- **Encourage** landowners to revegetate adjacent to Major Creekline reserves as a way of increasing the area of remnants and providing a buffer to weed invasion.
- **Create buffers** around Major Creeklines to manage cattle impacts on banks and vegetation

Condition:

Education/Extension

- Produce a site **management plan** for all Major Creeklines in the Zone.
- Provide opportunities for **education** of landholders and school children regarding the benefits of healthy creeks.
- Provide extension to all landholders with land adjoining creeklines in the zone, to assist with recognition of the benefits of healthy creeklines on their properties and to assist with **identification of plants and animals**.
- Identify a **demonstration site** (showcasing a very high value site) for educational purposes.

On-ground Works

- Liaise with Parks Victoria, committees of management and adjacent landholders, regarding current **management** of the Major Creekline reserves.
- Through incentive schemes such as the water ways grants (for more information about waterways grants contact the GBCMA – Shepparton) fence off and **regenerate** the riparian vegetation.
- Install **solar pumps** and off stream watering points to reduce the impacts of stock
- **Encourage or replant** native Water-milfoils (*Myriophyllum* spp.) which help filter out suspended sediments and nutrients.

Threatened Species

- Major Creeklines form important habitat for threatened fauna (16 of the 24 threatened fauna species recorded in the Central Creek zone have been recorded within 500m of a Major Creekline) therefore protection and restoration of these sites are essential.

Pest Plant and Animals

- Remove weeds such as Willows, Parrot Feather and Arrow Head.
- Encourage the removal of Carp.

Landscape Processes (ie. hydrological regime, habitat connectivity):

- Where ever possible the above actions should be applied upstream so that the benefits can flow downstream and improve the health of the whole Zone.

4) KEY BIODIVERSITY ASSET – NORTHERN PLAINS GRASSLANDS

4A) Introduction – Northern Plains Grasslands:

Northern Plains Grasslands occur on poorly drained heavy clay soils in areas with low annual rainfall (<400mm) on the plains. The heavy clay soils effectively limit the establishment of trees in true grasslands. Whilst dominated by a variety of grasses, sedges and rushes, Plains Grasslands are characterised by their rich diversity of herbs (lilies, orchids, saltbushes, native peas and daisies). Grasslands are typically dominated by Bristly Wallaby-grass with Spider Grass, Rigid Panic and Knotty Spear-grass. Forbs include Small Vanilla-lily, Chocolate Lilly, Prickly Woodruff, Yellow Bulbine-lily, Cut-leaf Burr-daisy, Common Everlasting, Goodenias, Blue Devil, Scaly Buttons, Yam Daisy, Woolly-heads, Lamb-tails, Drumsticks, Bluebells, Berry Saltbush and Common and Slender Bluebush.

More than 99.5% of Plains Grasslands in the Goulburn Broken Catchment have disappeared or been significantly modified since European settlement. The majority of the few remnants occur on private land. Many of the plants and animals that rely on this habitat are now also threatened, and some are extinct. Therefore, the support of private landholders is essential for the ongoing conservation of Plains Grasslands.

The main threats affecting Northern Plains Grasslands are:

- poor timing of stock grazing and overgrazing, which causes loss of native species, hinders native plant flowering, seed set and regeneration, disturbs the soil and increases nutrient levels
- Loss of ground habitat through cultivation, pasture improvement and overgrazing
- Tree planting in naturally treeless grassland areas, which introduces weeds by ripping, results in the loss of habitat, alters the structure and the trees compete with the indigenous ground layer)
- Weed invasion (threatens native plant species, the structure and viability of remnants)
- Increased nutrients from fertiliser application and stock faeces and urine. This favours weeds, can eliminate plants, and cause excessive exotic plant growth which can shade-out smaller species
- Lack of frequent burning, this is important in stock and macropod free areas, which can otherwise become 'choked' by dominant native or exotic grasses and weeds, and can result in changes to structure and loss of species that require fire to regenerate
- Irrigation changes the structure by eliminating native plants, which require drier conditions, and can encourage species preferring wetter conditions including weeds.

4B) Photographic Example – Northern Plains Grasslands:

Example of a Northern Plains Grassland BAP Site of Good Condition – Central Creek Zone

The Site (792511-13) pictured below is an example of a Northern Plains Grassland BAP site in good condition. The Naringaningalook Grassland is a Trust for Nature owned property and is listed on the Register of National Estate. It contains a large diversity of grassland species and is highly endangered.



Photo: Northern Plains Grassland – A Key Biodiversity Asset - Central Creek Landscape Zone

4C) Actions – Northern Plains Grasslands:

Size/Extent:

- **Revegetate** those remnant sites that are lacking understorey and native grasses or herbs.
- **Encourage landowners** to revegetate areas adjacent to grasslands as a way of increasing the area of remnants and providing a buffer to weed invasion.

Condition:

Education/Extension:

- Produce a site **management plans** for all grasslands in the Zone.
- Provide opportunities for **education** of landholders on identification of grassland species (in many cases native grasslands are not recognised on private land).
- Identify a **demonstration site** (show casing a very high value site) for educational purposes
- **Discourage** planting of trees and shrubs in identified grassland sites.
- **Liase** with Native Grass officer (DSE) regarding a process and input of grassland sites on the Native Pasture Management layer and ongoing management of sites.

On ground works:

- **Protect** (via incentives) all identified grasslands in the zone, commencing with very high value sites.
- **Create** grasslands through revegetation of indigenous species into areas that have experienced a minimal amount of cultivation, irrigation and fertiliser application (in many cases this may be roadsides).
- **Develop** "Friends Of" groups who will monitor and maintain existing grasslands, collect seed for use at other sites.

Threatened Species:

- **Protect** any threatened species that are present at sites such as orchids or lilies to allow them to flower and set seed.
- **Provide** landholders with pictures and known records of rare and threatened species, with extension information regarding their protection and enhancement.

Pest plants and animals:

- Undertake Rabbit and Hare **control programs**, for the benefit of all species.
- **Implement** ongoing weed control programs for invasive species such as *Phalaris* spp. and Patterson's Curse.
- Conduct **ecological burns** every 2–3 years to reduce biomass and reduce the domination of herbs by grasses.

Landscape Processes (ie. hydrological regime, habitat connectivity):

- Identify and prioritise potential sites for habitat expansion and improved connectivity, using the Landscape Context map as a guide.

5) KEY BIODIVERSITY ASSET – TREE GOANNA

5A) Introduction – Tree Goanna:

A very large, narrow-snouted and long-tailed lizard. Upper surface dark grey to dark blue-grey with small white spots arranged in rough bands from neck to the tail. Tail with broader, more distinct bands (particularly towards the tip) and compressed laterally. Head slender with a tapered snout. Tongue long and narrow with a deeply forked tip. Legs powerful. Feet have five, long, narrow, long-clawed toes (Viridians 2005). Tree Goannas feed on insects and small mammals, but is a major predator of nestling birds. It also feeds on carrion and many lace monitors may be seen feeding on the same carcass. Tree Goannas often forage on the ground but will take to a tree when disturbed (Cogger 1994).

5B) Photographic Example – Tree Goanna



Photo: Tree Goanna (Varanus varius) (also known as a Lace Monitor)

5C) Actions – Tree Goanna:

Condition:

Education/Extension:

- Undertake community **education** programs and extension about the importance of Tree Goannas in ecosystem function.
- Undertake initial surveys to provide baseline data.

On ground works:

- **Revegetate** key gaps in the landscape by overlaying BAP sites with areas identified as having a high rating on the Landscape Context Tool to facilitate dispersal.
- **Retain** fallen timber on both public and private land.
- Moira shire to **prohibit** firewood collection from all high and medium value roadsides.

Pest plants and animals:

- **Continue** control of foxes and feral cats along the Broken Creek system as recommended in Coman (2002) and PV (2005).

Landscape Processes (ie. hydrological regime, habitat connectivity):

- Identify and prioritise potential sites for habitat expansion and improved connectivity, using the Landscape Context Tool as a guide.

6) KEY BIODIVERSITY ASSET – BUSH STONE-CURLEW

6A) Introduction – Bush Stone-curlew:

The Bush Stone-curlew has been listed under the FFG Act 1988 and is listed as endangered in Victoria.

Bush Stone-curlews are monogamous and are most often found in pairs at their daytime roosts (Bedggood 1977, Johnson and Baker-Gabb 1994). Nests consist of a simple scrape or clearing on the ground, Nest sites are sometimes abandoned if the grass around the nest becomes taller than 15 cm (Johnson and Baker-Gabb 1994). On reaching adulthood, Bush Stone-curlews live for over 20 years, with the same territories being occupied for 10-30 years (Baker-Gabb 2002).

The diet of the Bush Stone-curlew consists mainly of insects as well as a seeds, small fruit, spiders, centipedes, snails, crustaceans, frogs, lizards, snakes and even mice (Marchant and Higgins 1993). They usually forage at night alone or with their dependent young. They are especially active on moonlit nights. Bush Stone-curlews forage in grasslands and in woodlands among fallen timber where they may probe for food in soft soil, rotting wood, among pebbles and water-washed debris (Baker-Gabb 2002).

The major cause of the decline of the Bush Stone-curlew has been extensive clearing of its preferred lowland woodland habitat for agriculture (Marchant and Higgins 1993). Older observers can recall up to four pairs of Bush Stone-curlews in 250 ha where now only one pair can exist because of habitat changes (Baker-Gabb 2002).

6B) Photographic Example – Bush Stone-curlew:

The Bush Stone-curlew is a medium-sized (625-670 g) ground-dwelling bird It has a long neck, legs and tail, a somewhat hunched appearance, rather large pale eyes and a cryptic grey, brown and white plumage (Baker-Gabb 2002).



Photo: Bush Stone-curlew (Burhinus grallarius)

6C) Actions – Bush Stone-curlew:

Condition:

Education/Extension:

- Undertake **community education** programs and extension about the importance of Bush Stone-curlews in ecosystem function.
- Provide landholders and community **extension** services relating to the Bush Stone-curlew and other threatened woodland species in the woodland regions.
- Encourage landholders to **increase** the size of existing remnants, to establish new plantations of indigenous species of trees and shrubs, and to retain or establish buffer zones of unimproved, uncultivated pasture around woodland remnants.
- Continue to undertake targeting of EMP incentives in the Central Creek Zone using the Curlew as a focal species.

On ground works:

- **Revegetate** key gaps in the landscape by overlaying BAP sites with areas identified as having a high rating on the Landscape Context Tool to facilitate dispersal.
- **Retain** fallen timber on both public and private land.
- Under the Land Protection Incentive Scheme and Landcare program, encourage landholders to **fence off** woodland remnants that are in unimproved pasture and have an intact layer of native ground-cover plants, to control grazing.
- **Manage** the ground layer in existing Bush Stone-curlew sites and High priority BAP sites to maintain short (10cm high) ground cover and abundant fallen timber.
- Establish ten **predator-proof** enclosures at known Bush Stone-curlew sites.
- **Enhance** the vegetation condition of all public land sites by 2 points.

Pest animals:

- Continue **control** of foxes and feral cats along the Broken Creek system as recommended in Coman (2002) and PV (2005).

Landscape Processes (ie. hydrological regime, habitat connectivity):

- **Identify** and prioritise potential sites for habitat expansion and improved connectivity, using the Landscape Context map as a guide.

7) KEY BIODIVERSITY ASSET – PLANTS OF LOCAL INTEREST

7A) Introduction – Plants of Local Interest:

Within the Central Creek Landscape Zone there are a number of plants that are of local interest (Robinson & Mann 1996). While these species are not listed as rare or threatened in Victoria, they are rare within the Central Creek Landscape Zone:

- Buloke
- Spiny-fruit Salt-bush
- Leafless Bluebush
- Erect Peppergrass
- Hooked Needlewood
- Waterbush
- Narrow-leaf Sida
- Southern Swainson-pea
- Lightwood
- Wedge-leaf Hop-bush
- Hedge Wattle

With the exception of Buloke, these species are all shrubs or ground covers that were found to be lacking at most sites surveyed within the zone.

7B) Actions – Plants of Local Interest:

Condition:

Education/Extension:

- Undertake community **education** programs and extension about how to recognise these native herbs and shrubs.
- Run **training** courses on plant identification, seed collection and propagation techniques.
- Provide extension about the threats to these species and the best ways of protecting them.

On ground works:

- Undertake **survey** for all of the species above to establish baseline data on abundance and distribution.
- **Collect** seed and propagate ex situ populations to establish seed banks.
- **Propagate** seedlings to be used in revegetation projects throughout the Zone.

8.0 FURTHER INFORMATION - PRIORITY SITES



Priority Site Data:

Information on the 92 priority BAP sites within the Central Creek Landscape Zone has been derived using the Geographical Information System - Arcview 3.3. It is intended that the priority site information and other information detailed in this Plan, will allow groups and staff (ie. extension staff and community groups) to:

- ◆ Be pro-active in targeting sites,
- ◆ Act as a basis for informed management of the site,
- ◆ Provide a rationale for applying incentives,
- ◆ Provide a tool for landholders and the wider community,
- ◆ Provide a tool to show how a site fits into the wider landscape, and
- ◆ Provide a benchmark against which future improvements in management can be monitored.

How To Use The Data Provided:

The data provided is intended for use by a range of organisational, agency and community groups, to assist with biodiversity conservation in the zone. It is particularly targeted towards agency extension officers. For example, it is anticipated that prior to or following a site visit, an extension officer will investigate the data associated with their site, including:

- ◆ What is the Ecological Vegetation Class of the site?
- ◆ How does the site fit in to the wider landscape?
- ◆ Are there any management agreements or incentives for the site (ie. covenant, bush tender)?
- ◆ Are there threatened or significant species recorded at the site or nearby?
- ◆ What is the BAP rating of the site and those near it (e.g. Very high, high, medium or low)?
- ◆ What is the overarching management recommendation for the site (ie. protect or restore)?
- ◆ What are the actions recommended for the site (e.g. pest plant management)? (Negotiations need to occur to get the best possible outcome for all involved).
- ◆ What are the options available to the landholders to fulfil these actions (ie. fencing incentive)?
- ◆ What are the options for joining the site to public land (ie. widening roadsides to provide a corridor/link)?
- ◆ Using the Landscape Context Map (Appendix 8), determine where possible linkages (revegetation) may be of the most benefit – think about the landscape, what we could do to help the area.
- ◆ It is also important to remember that sites with scattered trees are still a vital link in the landscape and especially in an area where much of the original vegetation has given way to agriculture. Officers need to determine on site, where the best possible linkages could occur, and often this should include scattered vegetation, as although they generally have not been identified as a site in this plan, they form an important element for providing links between the identified sites.

Keeping the Data Current:

The data contained in this report is by no means 'comprehensive', as this process relies on the regular updating of information, to keep it accurate and timely. Therefore this Plan is adaptive, to enable management actions and information to be modified in response to further information, including monitoring actions. The plan will also be reviewed when necessary to ensure that it remains a 'living' document. In order for the data and associated maps to remain as up to date and relevant as possible, it is important that site data continue to be added to the database. For example, the Department is not always aware of sightings of flora and fauna by individual landholders or community groups and there are still a number of sites that require Vegetation Quality Assessments and Bird Surveys.

Further Information or To Provide Data:

BAP data relies on regular updating to keep the information relevant for users. For clarification of information or to provide further data, please refer to Appendix 11 (CD) or contact bap@gbcma.vic.gov.au, or the Biodiversity Action Planning Officer, Department of Sustainability and Environment, Benalla PO BOX 124, Vic 3672.

9.0 LANDHOLDER ASSISTANCE



There is a range of assistance available to landholders in regards to planning for biodiversity conservation, and implementing works, on their properties. This section is designed to provide an overview of some of the property planning, management tools and incentives available to landholders and the community, within the Shepparton Irrigation Region. Also included are some of the programs within the community that will benefit from the information provided in this plan.

LOCAL AREA PLANS	WHOLE FARM PLANS
Biodiversity Action Planning Conservation Plans will provide an extra resource for Local Area Planning groups, in relation to their Local Area Plans. It can assist groups with both implementation and further information for conducting biodiversity planning in their area.	Protecting biodiversity on a farm is an important element when developing and implementing a Whole Farm Plan. Biodiversity Action Planning can inform the process and provide extra information for landholders.

Advice and Information:

Please contact your local Department of Primary Industries/Department of Sustainability and Environment Office, the Goulburn Broken Catchment Management Authority or the Goulburn Murray Landcare Network, for further information on biodiversity conservation. There are extension officers within these organisations who can provide advice on a range of aspects such as; whole farm planning, irrigation design, groundwater management, revegetation and protection of remnant vegetation, threatened species protection and best management practices.

Incentives for On-Ground Works:

There is a range of incentives available for landholders within the Shepparton Irrigation Region for catchment works; including,

- ◆ Environmental incentives to assist with the protection and/or enhancement of remnant vegetation, including wetlands and grasslands,
- ◆ Tree Growing incentives to assist with the re-establishment of native vegetation,
- ◆ Whole Farm Plan incentives, to assist with the development of Whole Farm Plans,
For the above points, contact the Department of Primary Industries, Tatura.
- ◆ Waterways Incentives – for on-ground works along rivers and creeks.
For the above point, contact the Goulburn Broken Catchment Management Authority, Shepparton.

Management Arrangements:

Programs such as Carbon Tender, Bush Returns, EcoTender and Bush Broker, may provide incentives and advice, for long-term conservation management on properties. *Contact the Goulburn Broken Catchment Management Authority, Shepparton or Benalla office for further information.*

Permanent Protection:

A Conservation Covenant permanently protects sites for conservation. It may provide assistance for rate relief, tax concessions and incentives for the costs of on-ground works. *Trust for Nature (Vic) is the managing organisation in regards to Conservation Covenants; visit the website at www.tfn.org.au*

Other Assistance:

- ◆ Goulburn Murray Landcare Network Shepparton – offers Landcare related advice.
- ◆ Land for Wildlife – a voluntary scheme aiming to encourage and assist landholders to protect and enhance biodiversity values on their properties. *Managed by the Department of Sustainability and Environment – for further information visit internet site at www.dse.vic.gov.au.*
- ◆ Local Government (Moira Shire) – managing authority for native vegetation statutory planning requirements.

10.0 MONITORING



Monitoring is a fundamental component of all management activities and an important tool, which can be used to enhance the knowledge of biodiversity assets and manage for their on-going protection (GBCMA *in prep.*).

The following table (Table 4) provides a basis for monitoring in the Central Creek Landscape Zone. Where possible, this information will feed into the various Goulburn Broken Catchment monitoring programs. It identifies a general monitoring outline, including actions that may be conducted to determine progress towards achieving catchment biodiversity targets. It identifies the key biodiversity asset, key indicators for monitoring and the suggested frequency/intensity of monitoring.

It is important to note that many of the monitoring activities listed below are already taking place, through a variety of mechanisms (e.g. collection of data via local/catchment and Statewide databases and processes). Where existing mechanisms are already in place, they will continue to be used. However, there are other monitoring activities that are needed to provide useful information and allow for accurate assessment of the Catchments progress, towards meeting the Biodiversity Resource Condition Targets (RCTs).

A wide variety of monitoring actions are listed below. However this does not result in a binding commitment of those organisations (e.g. time or funding) to undertake all of the monitoring. Rather, this table is intended to be a source of ideas for agency staff and community groups (e.g. community groups may be interested in conducting future surveys). Interested persons can contact the Goulburn Broken Catchment Management Authority, Shepparton, or the Department of Primary Industries and Department of Sustainability and Environment Offices, Tatura, to discuss ideas and to ensure a coordinated approach (refer to Section 9.0 for contact information).

Whilst Table 4 outlines monitoring actions, evaluation of the BAP process also needs to occur to evaluate the effectiveness of the BAP process (e.g. in engaging people and prioritising works). An evaluation plan is therefore being developed to provide an overarching evaluation process for BAP in the Goulburn Broken Catchment.

Table 4 Monitoring - Central Creek Landscape Zone

Key Biodiversity Asset	Key Indicators for Monitoring	Methodology	Frequency/ Intensity
Plains Grassy Woodland	Changes in extent Changes in condition – assumption based (area protected) Changes in condition based on VQA at sites Changes in landscape context Changes in the matrix – land use, % native pasture, abundance of scattered trees Changes in landscape functionality	Remote sensing comparisons; CAMS inputs CAMS; TFN reporting; PV reporting; Shire reporting Site-based assessments of protected and unprotected sites Remote sensing comparisons, LCAT comparisons Remote-sensing Site-based assessments using LFA or likely fauna-response groups (e.g. woodland birds, terrestrial invertebrates)	Every 5 years Every 5 years Every 5 years Every 5 years Every 5 years
Wetlands	Changes in extent Changes in condition (assumption-based) – area/number fenced; area/number with restored flows Changes in condition – site-based	Remote-sensing comparisons CAMS; GBCMA reporting ISC-type assessments of a set of managed and unmanaged wetlands	Every 5 years Every 5 years Every 5 years
Major Creeklines	Changes in condition and functionality (assumption-based) – area/number fenced; area/number with restored flows; area/number with added woody debris Changes in extent Changes in native fish community Changes in landscape functionality of the riparian zone	CAMS inputs; ISC assessments Remote sensing; CAMS inputs Site-based surveys based on Monash University's current set of sampling sites Site-based assessments using LFA or likely fauna-response groups (e.g. woodland birds, terrestrial invertebrates)	Every 5 years Every 5 years Every 5 years Every 5 years
Northern Plains Grassland	Changes in extent Changes in condition – assumption based (area protected) Changes in condition based on VQA at sites Changes in landscape context	Remote sensing comparisons; CAMS inputs CAMS; TFN reporting; PV reporting; Shire reporting Site-based assessments of protected and unprotected sites Remote sensing comparisons, LCAT comparisons	Every 5 years Every 5 years Every 5 years Every 5 years

	Changes in landscape functionality	Site-based assessments using LFA or likely biotic-response groups	Every 5 years
Bush Stone-curlew	Number of pairs of Bush Stone-curlews and number raising young	Standardised surveys throughout the district, initially re-surveying sites used in the early 1990s Fox scat counts at the set of protected and unprotected sites	Every year initially At least every year
Tree Goanna	Population size Recruitment of young into the population Tree Goanna population size and recruitment	Population surveys throughout the project area Population surveys throughout the project area Population surveys based on standard 1000 ha sampling unit used for Brush-tailed Phascogale across Victoria. At least one such area established – one in the high quality Angle Road section; one in the degraded southwestern section	Every 2 years Every 2 years Every year initially to determine population variance from year to year
Plants of local interest	Population size(s) Recruitment	Repeat VROTPop assessments at known sites and translocation sites Repeat VROTPop assessments at known sites and translocation sites	Every 5 years Every 5 years

* Five yearly refers to five times per year

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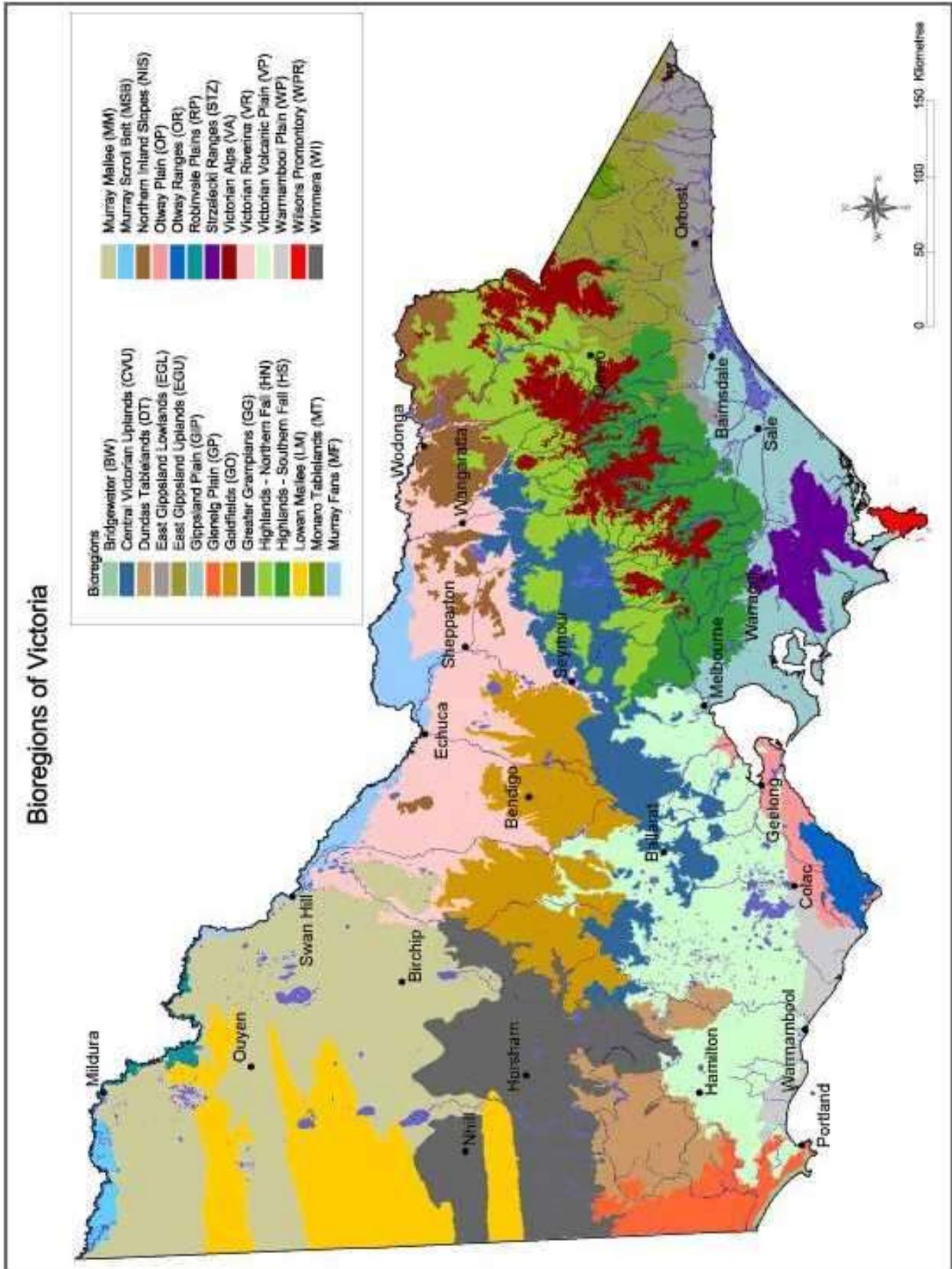
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12.0 APPENDICES



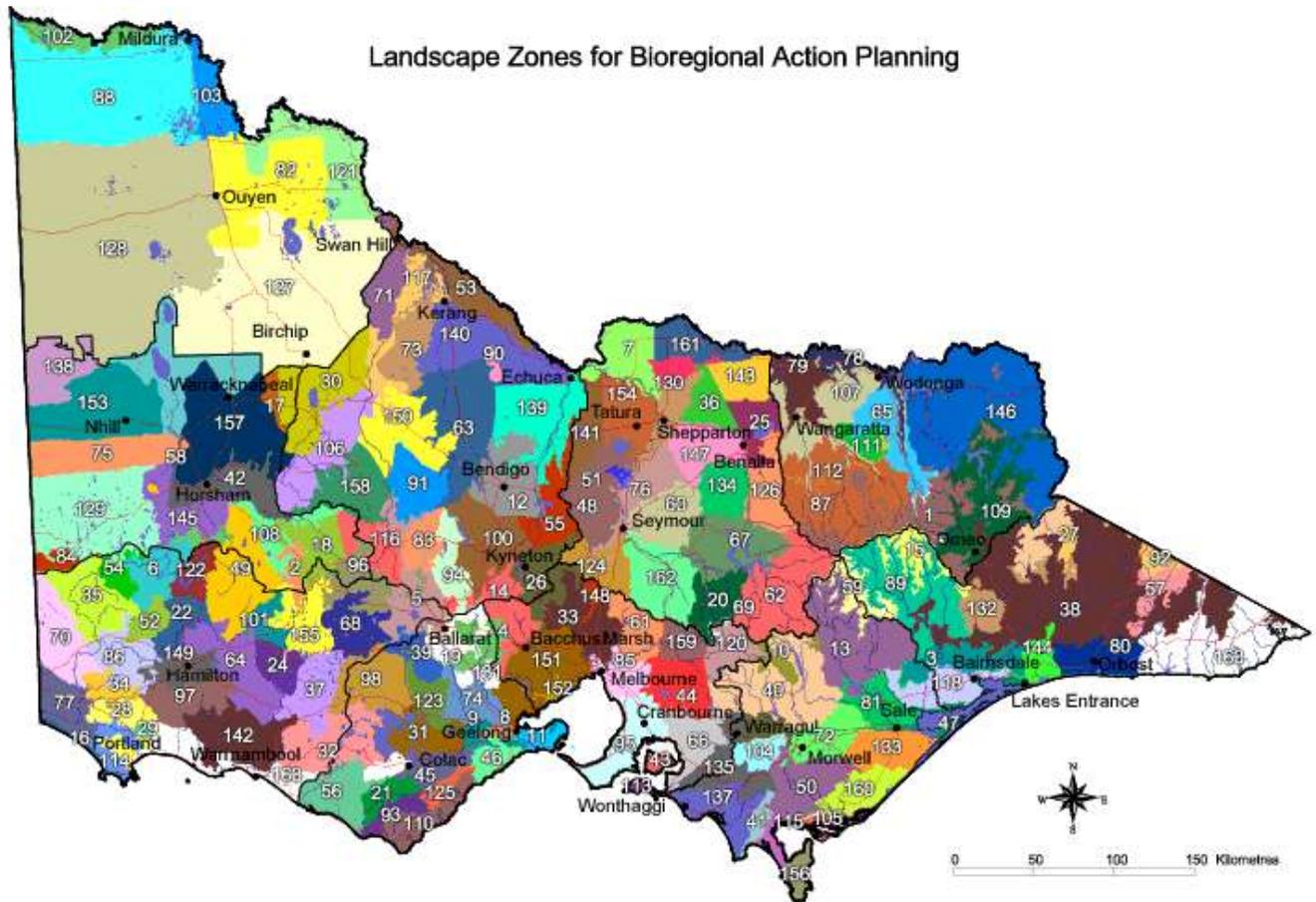
APPENDIX 1 – VICTORIAN BIOREGIONS

Source: www.dse.vic.gov.au



APPENDIX 2 – VICTORIAN LANDSCAPE ZONES

Source: www.dse.vic.gov.au



1. Alpine	34. Crawford River	67. Lake Elidon	100. Muckefford	133. Stradbroke
2. Ararat Hills	35. Derghoim	68. Lake Goldsmith	101. Muirhead	134. Strathbogie
3. Bainsdale foothills	36. Dookie	69. Lake Mountain	102. Murray Scroll Belt	135. Strzelecki West
4. Ballan	37. Dundonnell	70. Lake Mundi	103. Nangiloc - Colignan	136. Tanjil
5. Ballarat	38. East Gippsland Uplands	71. Lalbert	104. Narracan	137. Tarwin/Powlett
6. Balmoral	39. Enfield	72. Latrobe	105. Nooramunga	138. Telopea Downs
7. Barramah Murray Fan	40. Erica	73. Leaghur	106. North Central	139. Tennyson
8. Barrabool	41. Fish Creek	74. Leigh	107. North East	140. Terrick
9. Barwon	42. Flat Grey Plains	75. Little Desert	108. Northern Footholes	141. Timmering Dryland
10. Baw Baw	43. French Island	76. Longwood	109. Omsco	142. Tower Hill
11. Bellarine	44. Gembrook	77. Lower Glenelg	110. Otway	143. Tungamah
12. Bendigo	45. Gerangamelo	78. Lower Kiewa	111. Ovens	144. Tyres
13. Black Range	46. Gherang	79. Lower Ovens	112. Ovens & King	145. Undulating Alluvial
14. Blackwood	47. Gippsland Lakes	80. Lower Snowy	113. Phillip Island	146. Upper Murray Mitta
15. Bogong	48. Goldfields	81. Macallister	114. Portland	147. Violet Town
16. Bridgewater	49. Grampians	82. Manangatang	115. Prom Plain	148. Wallan
17. Brim Laxier	50. Grand Ridge	83. Maryborough	116. Pyrenees	149. Wannon
18. Bulgara	51. Graytown	84. Meerook	117. Quambatook	150. Wedderburn
19. Buninyong	52. Gringegalonga	85. Melbourne	118. Red Gum Plain	151. Werribee
20. Buxton	53. Gunbower	86. Merino	119. Reedy Lake	152. Werribee South
21. Carlisle	54. Harrow	87. Mid King	120. Rzeffon	153. West Wimmera Plain
22. Cavendish	55. Heathcote	88. Millwa - Carwarp	121. Robinvale - Nyah	154. Western Goulburn
23. Central Creek	56. Heytesbury	89. Mitchell	122. Rocklands	155. Willaura
24. Chatsworth	57. Highlands - Far East	90. Mitiamo	123. Rokewood	156. Wilsons Promontory
25. Chesney	58. Hindmarsh	91. Moliagul	124. SW Goulburn	157. Wimmera Plains
26. Cobaw	59. Howitt	92. Monaro Tableland	125. Sabine	158. Wingallock
27. Cobblers	60. Hughes Creek	93. Moomiooroo	126. Samaria/Lake Nillahcootie	159. Yarra
28. Cobboboonee	61. Hurstbridge	94. Moorookyle	127. South East Mallee	160. Yarram
29. Codrington	62. Jamieson/Bulla	95. Mornington	128. South West Mallee	161. Yarrswonga Murray Fan
30. Corack	63. Jankin	96. Mount Cole	129. South West Wimmera	162. Yea
31. Corangamite East	64. Karbeal	97. Mount Eccles	130. Southern Goulburn	163. unnamed
32. Corangamite West	65. Kiewa	98. Mount Elephant	131. Steiglitz	
33. Craigieburn	66. Koo Wee Rup	99. Mt Talbot	132. Stirling	

APPENDIX 3 – GOULBURN BROKEN CATCHMENT TARGETS

This Appendix is intended to provide a summary of the Goulburn Broken Regional Catchment Strategy targets and priorities for biodiversity conservation. For further information please refer to GBCMA 2003.

The Goulburn Broken Catchment Management Strategy identifies the following biodiversity resource condition targets for native vegetation in the catchment:

1. Maintain the extent of all native vegetation types at 1999 levels in keeping with the goal of 'Net Gain' listed in Victoria's Biodiversity Strategy 1997,
2. Improve the quality of 90% of existing (2003) native vegetation by 10% by 2030,
3. Increase the cover of all endangered and applicable vulnerable Ecological Vegetation Classes to at least 15% of their pre-European vegetation cover by 2030,
4. Increase 2002 conservation status of 80% threatened flora and 60% threatened fauna by 2030,
5. Maintain the extent of all wetland types at 2003 levels where the extent (area and number) has declined since European settlement, and
6. Improve the condition of 70% of wetlands by 2030, using 2003 as the benchmark for condition (GBCMA 2003 p11).

Priorities for action to conserve biodiversity in the Goulburn Broken are driven by the conservation significance of the biodiversity asset. Regional investments in biodiversity conservation in the Goulburn Broken Catchment are driven by the following goals (in order of priority):

1. Protecting existing viable remnant habitats and the flora and fauna populations they contain (ie through reservation, covenants, management agreements, fencing and statutory planning),
2. Enhancing the existing viable habitats that are degraded (management by controlling threats such as pest plants and animals, grazing, salinity, promotion of natural regeneration and/or revegetation with understorey), and
3. Restoring under-represented biodiversity assets to their former extent by revegetation (to create corridors, buffers, patches of habitat) (GBCMA 2003).

APPENDIX 4 – THREATENED FLORA

List of threatened flora and their conservation status in the Central Creek Landscape Zone (NRE 2002c). Table from Ahern et al 2003.

Scientific Name	English Name	Australian Status	Victorian Status	FFG Code	Species Code
<i>Allocasuarina luehmannii</i>	Buloke			L	678
<i>Alternanthera nodiflora</i>	Common Joyweed		k		185
<i>Alternanthera nodiflora</i>	Common Joyweed		k		185
<i>Atriplex spinibractea</i>	Spiny-fruit Saltbush		e		4608
<i>Brachyscome chrysoglossa</i>	Yellow-tongue Daisy		v	L	3654
<i>Brachyscome muelleroides</i>	Mueller Daisy	V	e	L	465
<i>Callitriche umbonata</i>	Winged Water-starwort		r		575
<i>Calotis cuneifolia</i>	Blue Burr-daisy		r		594
<i>Calotis lappulacea</i>	Yellow Burr-daisy		r		598
<i>Cardamine moirensis</i>	Riverina Bitter-cress		r		5032
<i>Cardamine paucijuga s.s.</i>	Annual Bitter-cress		v		5035
<i>Eleocharis pallens</i>	Pale Spike-sedge		k		1143
<i>Eryngium paludosum</i>	Long Eryngium		v		1238
<i>Glossostigma cleistanthum</i>	Small-flower Mud-mat		r		1450
<i>Haloragis glauca f. glauca</i>	Bluish Raspwort		k		3766
<i>Hypoxis exilis</i>	Swamp Star		v		3777
<i>Leiocarpa leptolepis</i>	Pale Plover-daisy		e	N	3782
<i>Lepidium pseudohyssopifolium</i>	Native Peppercress		k		1908
<i>Maireana aphylla</i>	Leafless Bluebush		k		2096
<i>Minuria integerrima</i>	Smooth Minuria		r		2201
<i>Myoporum montanum</i>	Waterbush		r		2240
<i>Myriophyllum gracile var. lineare</i>	Slender Water-milfoil		e	N	4517
<i>Myriophyllum porcatum</i>	Ridged Water-milfoil	V	v	N	2257
<i>Myriophyllum striatum</i>	Striped Water-milfoil		v	N	3869
<i>Panicum laevinode</i>	Pepper Grass		v		4808
<i>Panicum queenslandicum var. queenslandicum</i>	Coolibah Grass		e		4806
<i>Ranunculus sessiliflorus var. pilulifer</i>	Annual Buttercup		k		4911
<i>Sclerolaena muricata var. muricata</i>	Black Roly-poly		k		4974
<i>Swainsona behriana</i>	Southern Swainson-pea		r		4944
<i>Swainsona sericea</i>	Silky Swainson-pea		v	N	4946
<i>Triglochin dubia</i>	Slender Water-ribbons		r		5010
<i>Tripogon loliformis</i>	Rye Beetle-grass		r		3455

Definitions - V: vulnerable in Australia; k: poorly known in Victoria; e: endangered in Victoria; v: vulnerable in Victoria; r: rare in Victoria; L: listed under FFG; N: nominated under FFG

APPENDIX 5 – THREATENED FAUNA

List of threatened fauna and their conservation status in the Central Creek Landscape Zone (NRE 2002d). Table from Ahern et al 2003.

Scientific Name	English Name	International Status	Australian Status	Victorian Status	FFG Code	Code
<i>Botaurus poiciloptilus</i>	Australasian Bittern			e	L	197
<i>Anas rhynchotis</i>	Australasian Shoveler			v		212
<i>Falco subniger</i>	Black Falcon			v		238
<i>Melithreptus gularis</i>	Black-chinned Honeyeater			n		580
<i>Coturnix ypsilophora</i>	Brown Quail			n		10
<i>Climacteris picumnus</i>	Brown Treecreeper			n		555
<i>Burhinus grallarius</i>	Bush Stone-curlew			e	L	174
<i>Stagonopleura guttata</i>	Diamond Firetail			v	L	652
<i>Stictonetta naevosa</i>	Freckled Duck			e	L	214
<i>Ardea alba</i>	Great Egret	C, J		v	L	187
<i>Litoria raniformis</i>	Growling Grass Frog		V	e	L	3207
<i>Aythya australis</i>	Hardhead			v		215
<i>Gallinago hardwickii</i>	Latham's Snipe	C, J		n		168
<i>Biziura lobata</i>	Musk Duck			v		217
<i>Nycticorax caledonicus</i>	Nankeen Night Heron			n		192
<i>Todiramphus pyrrhopygia</i>	Red-backed Kingfisher			n		325
<i>Platalea regia</i>	Royal Spoonbill			v		181
<i>Circus assimilis</i>	Spotted Harrier			n		218
<i>Petaurus norfolcensis</i>	Squirrel Glider			e	L	1137
<i>Polytelis swainsonii</i>	Superb Parrot		V	e	L	277
<i>Lathamus discolor</i>	Swift Parrot		E	e	L	309
<i>Varanus varius</i>	Tree Goanna			v		2283
<i>Chlidonias hybridus</i>	Whiskered Tern			n		110

Definitions – C: CAMBA listed (China-Australia Migratory Bird Agreement); J: JAMBA listed (Japan-Australia Migratory Bird Agreement); V: vulnerable in Australia; E: Endangered in Australia; e: endangered in Victoria; v: vulnerable in Victoria; n: near threatened in Victoria; L: listed under FFG

APPENDIX 6 – SITE PRIORITISATION METHOD

To determine the conservation significance and the need for ground-truthing (surveying), sites were prioritised according to the following table (GBCMA in prep). If ground-truthing was required and no survey was completed (eg. more than 100 sites required survey), the minimum priority status was applied. *LCM refers to the Landscape Context Model.

Conservation status of EVC	Potential habitat within known dispersal range of threatened taxon or focal species, or within priority areas as identified by LCM*	EVC Patch Size	Ground-truthing required to confirm priority rank on basis of vegetation condition	Priority Status: Very High, High, Medium, Low
Endangered	Y	<5ha	Ground-truthing needed	VH or H
E	N	<5ha	Ground-truthing needed	VH or H
E	Y	5-10ha	Ground-truthing needed	VH or H
E	N	5-10ha	Ground-truthing needed	VH or H
E	Y	11-40ha		VH
E	N	11-40ha		VH
E	Y	>40ha		VH
E	N	>40ha		VH
Vulnerable	Y	<5ha	Ground-truthing needed	M, H or VH
V	N	<5ha	Ground-truthing needed	M or H or VH
V	Y	5-10ha	Ground-truthing needed	M, H or VH
V	N	5-10ha	Ground-truthing needed	M or H or VH
V	Y	11-40ha		VH
V	N	11-40ha	Ground-truthing needed	H or VH
V	Y	>40ha		VH
V	N	>40ha		VH
Rare	Y	<5ha	Ground-truthing needed	M, H or VH
R	N	<5ha	Ground-truthing needed	M or H or VH
R	Y	5-10ha	Ground-truthing needed	M, H or VH
R	N	5-10ha	Ground-truthing needed	M or H or VH
R	Y	11-40ha		VH
R	N	11-40ha	Ground-truthing needed	H or VH
R	Y	>40ha		VH
R	N	>40ha		VH
Depleted	Y	<5ha	Ground-truthing needed	M or H
D	N	<5ha	Ground-truthing needed	L or M
D	Y	5-10ha	Ground-truthing needed	M or H
D	N	5-10ha	Ground-truthing needed	L, M or H
D	Y	11-40ha		H
D	N	11-40ha	Ground-truthing needed	M or H
D	Y	>40ha		VH
D	N	>40ha		VH
Least Concern	Y	<5ha		M
LC	N	<5ha		L
LC	Y	5-10ha		M
LC	N	5-10ha	Ground-truthing needed	L or M
LC	Y	11-40ha	Ground-truthing needed	M or H
LC	N	11-40ha	Ground-truthing needed	L or M
LC	Y	>40ha	Ground-truthing needed	H or VH
LC	N	>40ha	Ground-truthing needed	H or VH

APPENDIX 7 –VEGETATION QUALITY ANALYSIS (VQA) ASSESSMENT FORM

There are four survey forms for vegetation types in the Central Creek Landscape Zone (eg. grassland, wetland, plains grassy woodlands or forests and riverine woodlands or forests). This example is the plains grassy forests or woodland sheet. Refer to DSE 2004 for further information.

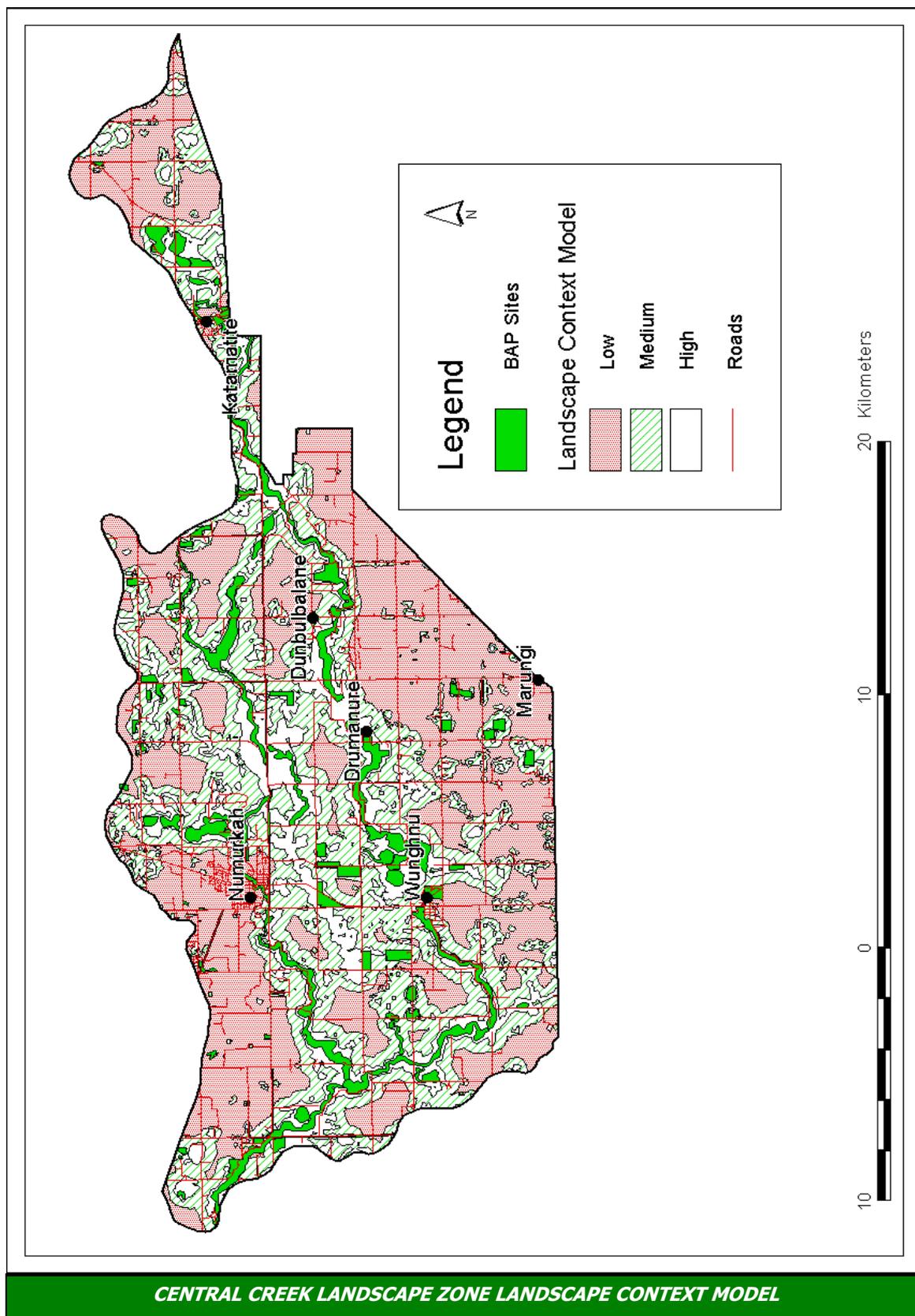
ASSESSMENT OF HABITAT QUALITY – Self-assessment method

Site score sheet 12. Plains Grassy FORESTS or WOODLANDS

Component & Benchmark	Observations	Quality Range	Score
LARGE TREES Defined as trunk diameter or circumference at breast height. Apply to both WOODLANDS and FORESTS: Diameter (80 cm) (Circumference) (250 cm)	Number of large trees /ha (100m x 100m)	no large trees	0
		up to 7 LARGE TREES /ha in WOODLANDS 12 LARGE TREES /ha in FORESTS	1
		more than 7 LARGE TREES /ha in WOODLANDS 12 LARGE TREES /ha in FORESTS	2
CANOPY COVER Defined as the tallest stratum of native trees greater than 5m tall. Apply as: Plains Grassy WOODLANDS 10% benchmark Plains Grassy FORESTS 30% benchmark	% canopy cover % cover/benchmark x 100	less than 25% CANOPY COVER	0
		between 25 – 50% CANOPY COVER	0.5
		more than 50% CANOPY COVER	1
UNDERSTOREY (B) Tick appropriate boxes for PRESENCE of native vegetation (i.e. different life forms)	(A) % cover of native species Tree >5m Large herb >1m Grass or grasslike <1m Other Shrub 1-5m Small herb <1m Fern Small shrub <1m Grass or grasslike >1m Moss or lichen	minimal COVER less than 10%	0
		low COVER between 10% – 25%	2
		reduced COVER between 25% - 75% AND less than 4 boxes ticked for WOODLANDS less than 5 boxes ticked for FORESTS	3
		adequate 4 or more boxes for ticked WOODLANDS 5 or more boxes ticked for FORESTS	4
		COVER more than 75% AND less than 4 boxes for ticked WOODLANDS less than 5 boxes ticked for FORESTS	4
		OR 4 or more boxes for ticked WOODLANDS 5 or more boxes ticked for FORESTS	5
WEDDINESS	% weed cover	50% or more WEED COVER	0
		between 25% - 50% WEED COVER	1
		between 5% - 25% WEED COVER	2
		less than 5% WEED COVER	3
RECRUITMENT A woody species is considered to be recruiting when the number of immature plants (i.e. not flowering or fruiting) of an individual woody species is at least 10% of the total population of that species	(A) Number of woody species present (B) Number of woody species recruiting % recruitment = B/A x100	less than 30% woody species RECRUITING	0
		between 30% -70% woody species RECRUITING	1
		70% or more woody species RECRUITING	2
ORGANIC LITTER Defined as small branches (less than 10cm diameter), twigs, leaves and other fallen or dead organic matter	% cover of organic litter	less than 5% ORGANIC LITTER for WOODLANDS 10% ORGANIC LITTER for FORESTS	0
		more than 5% ORGANIC LITTER for WOODLANDS 10% ORGANIC LITTER for FORESTS	1
LOGS Defined by length of stumps, fallen trees or branches at least 10 cm diameter (30 cm circumference)	Length of logs greater than 10 cm dia in 50m x50m (i.e. 0.25 ha) Logs (m) x 4 (i.e. m/ha)	no logs	0
		less than 25m LOGS/ha	0.5
		more than 25m LOGS/ha	1
SIZE Defined by the size of the area being assessed AND any adjoining native vegetation		less than 2 ha	0
		between 2 – 10 ha	1
		more than 10 ha	2
NEIGHBOURHOOD Defined by the % area covered by native vegetation within 1 km of the site being assessed		less than 10% area covered	0
		between 10% - 50% area covered	1
		more than 50% area covered	2
CORE AREA Defined by the distance of the site being assessed from a block of native vegetation greater than 50ha		1 km or more from 50 ha block of native vegetation	0
		less than 1 km from 50 ha block of native vegetation	1
Department of Sustainability and Environment ENVIRONMENTAL MANAGEMENT IN AGRICULTURE Native Biodiversity Resource Kit ©2004			Assessment of Habitat Quality (total)

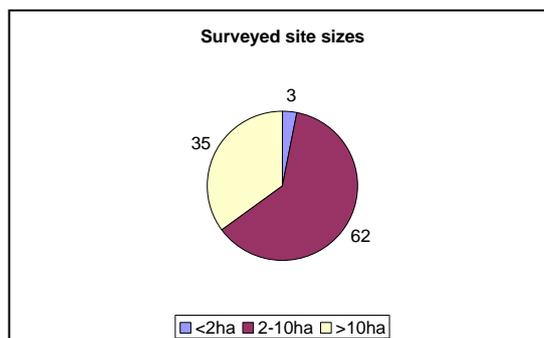
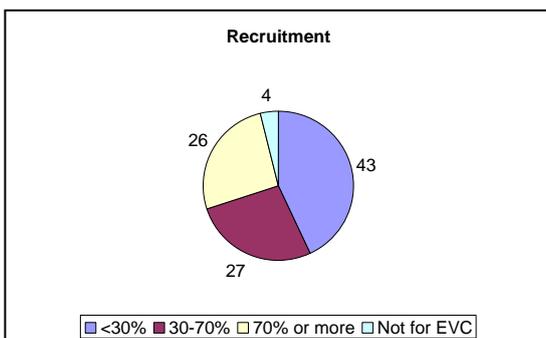
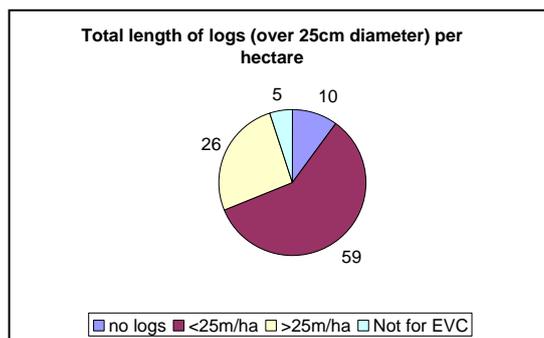
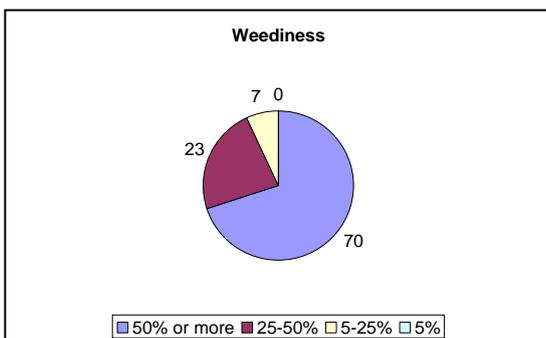
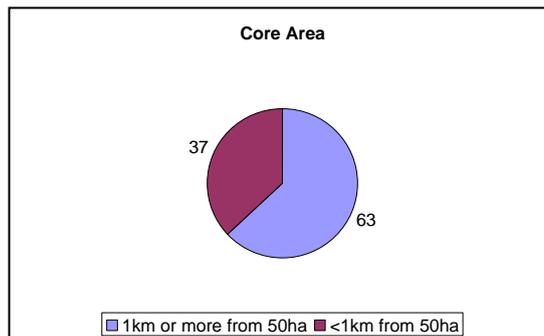
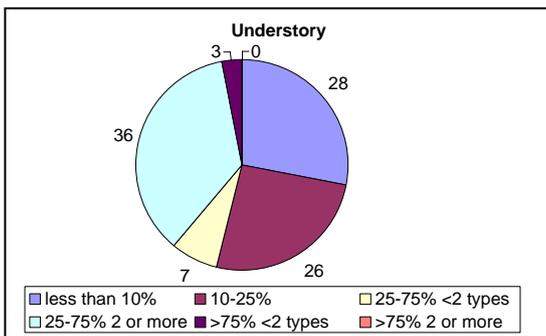
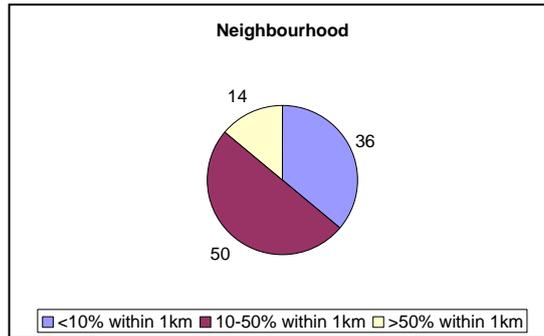
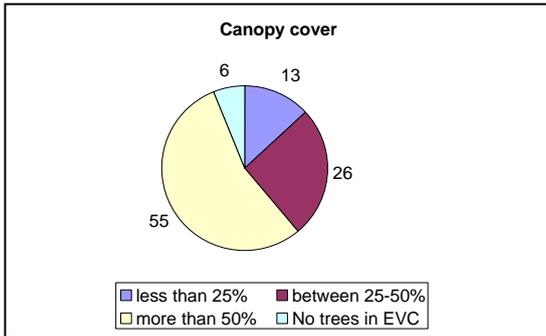
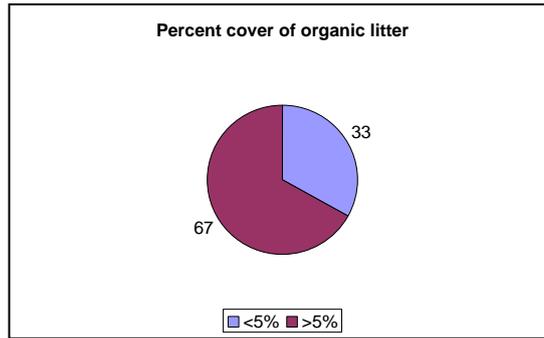
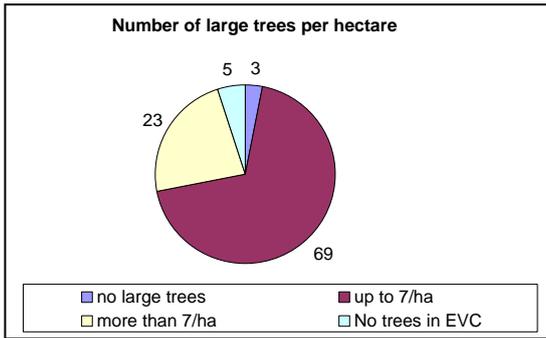
APPENDIX 8 – LANDSCAPE CONTEXT MODEL

The Landscape Context Model Mapping is now also contained on the BAP CD* (Version 1 January 2008) (refer to Appendix 11) or on the GBCMA website (www.gbcma.vic.gov.au). This mapping can be used in conjunction with the BAP mapping and this Conservation Plan.



* To obtain copies of the BAP CD (Version 1, January 2008), or for further information on BAP, please contact bap@gbcma.vic.gov.au OR the Biodiversity Action Planning Officer, Department of Sustainability and Environment (DSE) Benalla at Ph: (03) 57 611 611

APPENDIX 9 – VEGETATION QUALITY ASSESSMENT RESULTS



APPENDIX 10 – BIRD LIST

* List includes birds surveyed during 92 site (20 minute) surveys. It is not intended to represent the entire bird population in the Central Creek Landscape Zone. For further information on birds surveyed at each site refer to Appendix 11 (CD).

Scientific Name	English Name	Number of sites ⁽ⁿ⁼⁹²⁾ at which species were observed
<i>Pardalotus striatus</i>	Striated Pardalote	92
<i>Lichenostomus penicillatus</i>	White-Plumed Honeyeater	92
<i>Psephotus haematonotus</i>	Red-Rumped Parrot	91
<i>Climacteris picumnus</i>	Brown Treecreeper	88
<i>Rhipidura leucophrys</i>	Willie Wagtail	83
<i>Sturnus vulgaris</i>	Common Starling*	82
<i>Gymnorhina tibicen</i>	Australian Magpie	81
<i>Grallina cyanoleuca</i>	Magpie-Lark	78
<i>Manorina melanocephala</i>	Noisy Miner	69
<i>Hirundo neoxena</i>	Welcome Swallow	66
<i>Dacelo novaeguineae</i>	Laughing Kookaburra	64
<i>Cacatua roseicapilla</i>	Galah	62
<i>Myiagra inquieta</i>	Restless Flycatcher	56
<i>Corvus coronoides</i>	Australian Raven	54
<i>Coracina novaehollandiae</i>	Black-Faced Cuckoo-Shrike	52
<i>Hirundo nigricans</i>	Tree Martin	51
<i>Anas superciliosa</i>	Pacific Black Duck	47
<i>Colluricincla harmonica</i>	Grey Shrike-Thrush	45
<i>Playtcercus eximius</i>	Eastern Rosella	43
<i>Ocyphaps lophotes</i>	Crested Pigeon	33
<i>Cincloramphus mathewsi</i>	Rufous Songlark	33
<i>Chenonetta jubata</i>	Wood Duck	30
<i>Artamus cyanopterus</i>	Dusky Woodswallow	29
<i>Corcorax melanorhamphos</i>	White-Winged Chough	29
<i>Corvus mellori</i>	Little Raven	28
<i>Malurus cyaneus</i>	Superb Fairy-Wren	28
<i>Falcunculus frontatus</i>	Crested Shrike-Tit	24
<i>Passer domesticus</i>	House Sparrow*	24
<i>Acantheiza chrysorrhoa</i>	Yellow-Rumped Thornbill	24
<i>Todiramphus sanctus</i>	Sacred Kingfisher	22
<i>Porphyrio porphyrio</i>	Purple Swamphen	21
<i>Egretta novaehollandiae</i>	White-Faced Heron	21
<i>Artamus superciliosus</i>	White-Browed Woodswallow	20
<i>Philemon citreogularis</i>	Little Friarbird	19
<i>Cormobates leucophaeus</i>	White-Throated Treecreeper	19
<i>Microeca fascinans</i>	Jacky Winter	18
<i>Melithreptus brevirostris</i>	Brown-Headed Honeyeater	17
<i>Cacatua galerita</i>	Sulphur-Crested Cockatoo	17
<i>Black-chinned Honeyeater</i>	Black-Chinned Honeyeater	16
<i>Smicrornis breirostris</i>	Weebill	16
<i>Pelecaus conspicillatus</i>	Australian Pelican	15
<i>Acrocephalus stentoreus</i>	Calmourous Reed-Warbler	15
<i>Rhipidura fuliginosa</i>	Grey Fantail	15
<i>Pachycephala pectoralis</i>	Golden Whistle	14
<i>Threskiornis molucca</i>	Australian White Ibis	13
<i>Oriolus sagittatus</i>	Olive-Backed Oriole	13
<i>Geopelia striata</i>	Peaceful Dove	12

<i>Pachycephala fufiventris</i>	Rufous Whistler	11
<i>Gerybone fusca</i>	Western Gerygone	11
<i>Platycercus elegans flaveolus</i>	Yellow Rosella	11
<i>Acanthiza nana</i>	Yellow Thornbill	11
<i>Anas gracilis</i>	Grey Teal	10
<i>Chrysococcyx basalis</i>	Horsefield's Bronze-Cuckoo	10
<i>Strepera graculina</i>	Pied Currawong	10
<i>Haliastur sphenurus</i>	Whistling Kite	10
<i>Nycticorax caledonicus</i>	Nankeen Hight Heron	9
<i>Merops ornatus</i>	Rainbow Bee-Eater	9
<i>Aquila audax</i>	Wedge-Tailed Eagle	9
<i>Gallinula tenebrosa</i>	Dusky Moorhen	8
<i>Platalea flavipes</i>	Yellow Billed Spoonbill	8
<i>Falco berigora</i>	Brown Falcon	7
<i>Hirundo ariel</i>	Fairy Martin	7
<i>Cacatua tenuirostris</i>	Long-Billed Corella	7
<i>Cracticus nigrogularis</i>	Pied Butcherbird	7
<i>Acanthiz lineata</i>	Striated Thornbill	7
<i>Daphoenositta chrysoptera</i>	Varied Sittella	7
<i>Phaps chalcoptera</i>	Common Bronzewing	6
<i>Anhinga melanogaster</i>	Darter	6
<i>Stagonopleura guttata</i>	Diamond Firetail	6
<i>Glossopsitta pusilla</i>	Little Lorikeet	6
<i>Phalacrocorax melanoleucos</i>	Little Pied Cormorant	6
<i>Philemon Corniculatus</i>	Noisy Friarbird	6
<i>Circus approximans</i>	Swamp Harrier	6
<i>Melithreptus lunatus</i>	White-Naped Honeyeater	6
<i>Entomyzon cyanotis</i>	Blue-Face Honeyeater	5
<i>Accipiter fasciatus</i>	Brown Goshawk	5
<i>Acanthiza reguloides</i>	Buff-Rumped Thornbill	5
<i>Burhinus grallarius</i>	Bush Stone-Curlew	5
<i>Turdus merula</i>	Common Blackbird*	5
<i>Ardea alba</i>	Great Egret	5
<i>Vanellus miles</i>	Masked Lapwing	5
<i>Falco peregrinus</i>	Peregrine Falcon	5
<i>Petrocica goodenovii</i>	Red-Capped Robin	5
<i>Carduelis carduelis</i>	European Goldfinch*	4
<i>Cacomantis flabelliformis</i>	Fan-Tailed Cuckoo	4
<i>Ninox novaeseelandiae</i>	Southern Boobook	4
<i>Ardea pacifica</i>	White-Necked Heron	4
<i>Tadorna tadornoides</i>	Australian Shelduck	3
<i>Cygnus atratus</i>	Black Swan	3
<i>Gallinula ventralis</i>	Black-Tailed Native Hen	3
<i>Platycercus elegans</i>	Crimson Rosella	3
<i>Eurystomus orientalis</i>	Dollarbird	3
<i>Proicca phoenicea</i>	Flame Robin	3
<i>Phhalacrocorax sulcirostris</i>	Little Black Cormorant	3
<i>Dicaeum hirundinaceum</i>	Mistletoebird	3
<i>Turnix varia</i>	Painted Button-Quail	3
<i>Anthochaera caruncluata</i>	Red Wattlebird	3
<i>Lanthmus discolor</i>	Swift Parrot	3
<i>Taeniopygia guttata</i>	Zebra Finch	3
<i>Gallinago hardwickii</i>	Latham's Snipe	3
<i>Falco Longipennis</i>	Australian Hobby	2
<i>Alcedo azurea</i>	Azure Kingfisher	2
<i>Coturnix ypsilophora</i>	Brown Quail	2
<i>Golden-headed Cisticola</i>	Golden-Headed Cisticola	2

<i>Phalacrocorax carbo</i>	Great Comorant	2
<i>Megalurus gramineus</i>	Little Grass Bird	2
<i>Clossopsitta porphyrocephala</i>	Purple-Crowned Lorikeet	2
<i>Trichoglossus haematodus</i>	Rainbow Lorikeet	2
<i>Anthus novaeseelandiae</i>	Richard's Pipit	2
<i>Petroica multicolor</i>	Scarlet Robin	2
<i>Chrysococcyx lucidus</i>	Shining Bronze-Cuckoo	2
<i>Todargus strigoides</i>	Tawny Frogmouth	2
<i>Lalage suerii</i>	White-Winged Triller	2
<i>Tyto alba</i>	Barn Owl	1
<i>Artamus cinereus</i>	Black-Faced Woodswallow	1
<i>Meophema chrysotostoma</i>	Blue-Winged Parrot	1
<i>Grus rubicunda</i>	Brolga	1
<i>Anas coatanea</i>	Chestnut Teal	1
<i>Nymphicus hollanicus</i>	Cockatiel	1
<i>Dromaius novaehollandiae</i>	Emu	1
<i>Hichenostomus fuscus</i>	Fuscous Honeyeater	1
<i>Cracticus torquatus</i>	Grey Butcherbird	1
<i>Cacatua sanguinea</i>	Little Corella	1
<i>Hieraaetus morphnoides</i>	Little Eagle	1
<i>Dendrocygna eytoni</i>	Plumed Whistling Duck	1
<i>Todiramphus pyrrhopygia</i>	Red-Backed Kingfisher	1
<i>Turnix pyrrhothorax</i>	Red-Chested Button-Quail	1
<i>Zosterops lateralis</i>	Silvereye	1
<i>Mirafra javanica</i>	Singing Bushlark	1
<i>Circus assimilis</i>	Spotted Harrier	1
<i>Pardalotus punctatus</i>	Spotted Pardalote	1
<i>Threskoirnis spinicollis</i>	Straw-Necked Ibis	1
<i>coracina papuensis</i>	White-Bellied Cuckoo-Shrike	1
<i>Artamus leucorhynchus</i>	White-Breasted Woodswallow	1

APPENDIX 11 – PRIORITY SITE INFORMATION (MAPPING):

Mapping and accompanying information for each of the priority BAP sites is contained on the BAP CD* (Version 1, January 2008) or on the GBCMA website (www.gbcma.vic.gov.au). This mapping data is designed to be used in conjunction with this Conservation Plan to assist users to obtain further information on priority sites.

HOW TO OBTAIN INFORMATION FROM THE BAP CD:

1. Locate the available mapping data by clicking on the 'BAP Mapping' hyperlink#.
2. Click on the hyperlink relating to the Zone of interest under 'BAP Mapping' and the 'Available Maps Subheading' (e.g. 'Barmah').
3. This will lead to a map identifying priority BAP sites within the chosen Zone.
4. On this map, locate the area/site of interest by clicking on the area.
5. Zoom in or out to the areas/sites of interest, using the North, South, East, West arrows.
6. Click on a BAP site to view the Attribute Table information for that site.
7. Refer to the list of birds surveyed at each site (where available).
8. An explanation of the data provided in the Attribute Table is provided in the 'Attribute Table Definition' document under the 'BAP Mapping' subheading.
9. For further information to assist with the identification of opportunities to link the BAP sites, refer to 'BAP Mapping', 'Landscape Context Model Maps' and choose the relevant Zone name hyperlink (e.g. 'Barmah').
10. To access the data via the Geographical Information System (GIS) (where available) select 'BAP Mapping', 'GIS data' then either 'BAP GIS layer' or 'LCM GIS layer'.

Note: Mapping data for each Landscape Zone can also be located by clicking on the 'BAP Zones' hyperlink and choosing the Landscape Zone of interest from the map of the Goulburn Broken Catchment.

* To obtain copies of the BAP CD (Version 1, January 2008), or for further information on BAP, please contact bap@gbcma.vic.gov.au OR the Biodiversity Action Planning Officer, Department of Sustainability and Environment (DSE) Benalla at Ph: (03) 57 611 611