CONSERVATION PLAN
FOR THE
TUNGAMAH
LANDSCAPE ZONE

Department of Sustainability and Environment 2004

DRAFT AUGUST 2005

Victoria The Place To Be
Department of Sustainability and Environment
Department of Primary Industries
Trust for Nature
GOULBURN BROKEN CATCHMENT MANAGEMENT AUTHORITY
Australian Government

Conservation Plan for Tungamah

Department of Sustainability and Environment 2005.

Acknowledgement

Biodiversity Action Planning is a joint project between the Goulburn-Broken CMA and the Department of Sustainability and Environment, North-East region.

Global Convention on Biological Diversity

National Strategy for the Conservation of Australia's Biological Diversity

Victoria's Biodiversity Strategy

Bioregional Strategic Overview

Landscape Zone Conservation Action Plans

Local Conservation Plans

Site Management Plans

1. INTRODUCTION

Biodiversity Action Planning (BAP) is a recent initiative by the State Government to identify priorities for native biodiversity (Platt & Lowe 2002) 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, and
- achieve community support for landscape planning for biodiversity and the conservation of strategic assets, particularly in rural landscapes (Platt & Lowe 2002).

The diagram on the left shows the biodiversity planning process and how this document fits into that process. Local Conservation Plans are being developed for priority areas of the State.

OBJECTIVES

Local conservation plans, such as this one, aim to translate State, regional and catchment plans and targets for biodiversity to a local level. It ensures that private and public resources expended for conservation are targeted to priority sites for priority actions. In this way, available resources can be used for the greatest possible outcomes, based on the best science.

This plan is intended to be used by extension staff, Landcare officers, land managers and the general community to guide these actions.

It details:

- the landscape, vegetation and significant flora and fauna of the area
- describes a vision for the area, based on the
- conservation objectives for the Tungamah Landscape Zone
- priority assets to be conserved, and the threats to these biodiversity values
- priority actions required to protect and restore the assets
- broad recommendations for the zone based on tools developed using the best available scientific data.

This Local Conservation Plan identifies priority sites. The protection and management of these sites is important for the conservation of flora and fauna in the local area.

The use of resources available for conservation in the local area should be directed to these sites. Information on assistance available to landholders for conservation, including financial assistance and incentives, is detailed on page -- of this Plan.

2. THE STUDY AREA

Landscape

The Tungamah Landscape Zone covers an area of approximately 88,136 ha within the Goulburn Broken Catchment (Fig. 1). The zone is bounded to the west by the Benalla Tocumwal Road and to the north by the boundary of the Goulburn Broken Catchment and with the Murray Fans bioregion and to the east by the boundary with the NECMA.

The soils are comprised of tertiary alluvial sediments in the Victorian Riverina bioregion which cover 74% of the zone, and varying geology from sedimentary to granitic in the Northern Inland Slopes component. The zone lies within the Broken-Boosey Creek system, much of which is Public Land Water Frontage (Figure 1). There are several important wetlands within the zone, including Moodies Swamp and Tungamah Swamp.

Private land covers 98% of the zone (CGDL 2004). This has resulted in extraordinary changes to vegetation, with most of the area cleared (approximately 98%). The remaining vegetation is highly fragmented, and usually occurring as small, isolated remnants (Fig. 3). 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.

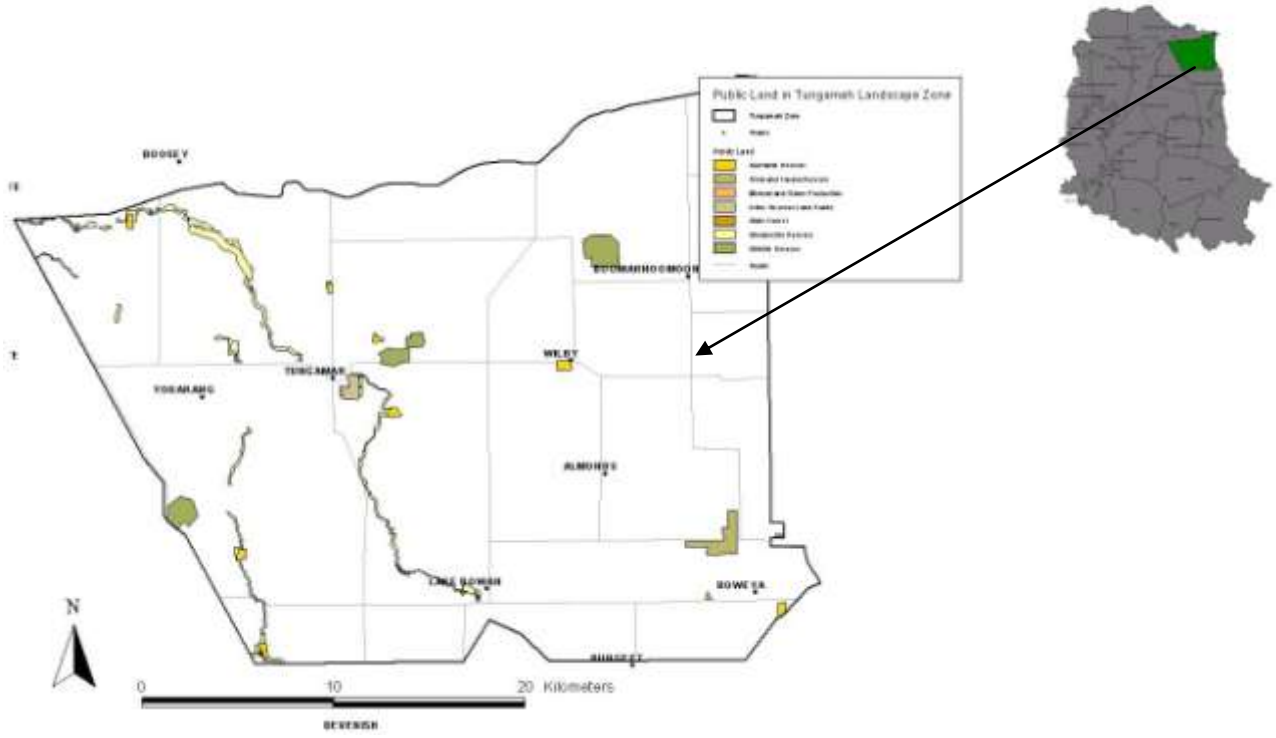


Figure 1: The Tungamah Landscape area and inset, its place in the Goulburn Broken catchment

Within private land, its use is mostly confined to dryland farming, with the majority of area used for mixed cropping and grazing (LCC 1983). Vineyards are being established on better drained slopes and honey producers utilise the Boweya Flora and Fauna Reserve.

Public land occurs along stream frontages (various widths), roadsides and some small reserves, and covers an area of approximately 2% of the zone. Public land reserves occur mostly along the Boosey Creek frontages. This results in a long and narrow reserve system, with few large blocks of public land reserves

(Fig. 1). In addition there are three State Game Reserves which cover approximately 635 hectares. Another notable reserve is the Boweya Flora and Fauna Reserve (300ha) , a Box ironbark area which is known to provide a winter feeding area for Regent Honeyeater and Swift Parrot.

Vegetation

Prior to European settlement, the vegetation of the Tungamah Landscape Zone was a mixture of open woodlands and wetlands. Woodland communities on the plains were dominated by Grey Box *Eucalyptus microcarpa* and White Box *E. albens*, White Cypress Pine *Callitris glaucophylla* and Buloke *Allocasuarina leuhmannii*. River Red Gums E. camaldulensis would have dominated along the creeklines. Ground cover in these woodlands comprised grasses and herbs with peas and wattles providing an understorey. On the rockier outcrops, patches of hilltop woodland would have contained Blakely's Red Gum *E. blakelyii*, Yellow Box *E. melliodora* and White Cypress-pine *Callitris glaucophylla.*

Thirteen Ecological Vegetation Classes[1] (EVCs) have been identified in the zone. The dominant EVCs, are those that are the types of Grassy Woodlands, Grasslands and Wetlands. All EVC's are considered endangered or vulnerable at the bioregional level (GBCMA 2000). The Goulburn Broken Native Vegetation Plan describes goals and targets that have been set for the vegetation communities within the catchment. This includes ensuring that all EVCs are at least 15% of the pre-European cover by 2030 (GBCMA 2000). The majority of EVCs within the Tungamah Landscape Zone are below the 15% target (Table 2). Therefore, revegetation in this zone could be used to help achieve bioregional targets. For further details on each EVC see the EVC cards on the DSE website.

Northern Plains Grassland communities have been listed on the Register of National Estate (Ahern *et al*, 2003b). This is a Federally listed Endangered community due to its rarity, and distinctiveness as a flora community.

Table 2 Total area of pre-1750 and current vegetation in the Tungamah Landscape zone within in the Victorian Riverina Bioregion

EVC Group	EVC Number	EVC Bioregional Conservation Status	EVC Landscape Zone Conservation Status	EVC Name	Pre-1750 Area (ha)	Current Area (ha)	% current cover	15% pre-1750 target
14	294	E	E	Plains Grassy Woodland/Gilgai Plains Woodland/Wetland Mosaic	34026	249	0.01	5104
14	55	E	E	Plains Grassy Woodland	16613	107	0.01	2492
14	867	E	E	Pine Box Woodland/Riverina Plains Grassy Woodland Mosaic	7351	39	0.01	1103
5	175	E	E	Grassy Woodland	2031	3	0.00	304.7
15	68	E	V	Creekline Grassy Woodland	1131	151	0.13	169.7
19	292	E	V	Red Gum Wetland	817	137	0.17	122.6
19	333	E	V	Red Gum Wetland/Plains Grassy Wetland Mosaic	753	83	0.11	113
14	868	E	X	Pine Box Woodland	747	0	0.00	112.1
19	74	E	E	Wetland Formation	541	4	0.01	81.15
19	125	E	E	Plains Grassy Wetland	247	5	0.02	37.05
15	869	E	E	Creekline Grassy Woodland/Red Gum Wetland Mosaic	189	3	0.02	28.35
19	291	X1	E	Cane Grass Wetland	164	0	0.00	24.6
19	297	E	X	Lagoon Wetland/Red Gum Wetland Mosaic	81	<1	0.00	12.15
15	168	E	E	Drainage Line Complex	68	6	0.09	10.2
16	67	E	E	Alluvial Terraces Herb-rich Woodland	24	0	0.00	3.6
14	299	E	X	Unclassified Lunette Woodland	13	0	0.00	1.95
4	61	V	LC	Box Ironbark Woodland	4	<1	0.00	0.6
5	80	X	X	Spring Soak Woodland	<1	0	0.00	
				TOTAL	64801	788	0.01	9720
99	997	NA		Private Land No Tree Cover		64016		

EVC Group	EVC Number	EVC Bioregional Conservation Status	EVC Landscape Zone Conservation Status	EVC Name	Pre-1750 Area (ha)	Current Area (ha)	% current cover	15% pre-1750 target
5	175	E	E	Grassy Woodland	16254	49	0.30	2438
4	61	V	E	Box Ironbark Forest	4512	499	11.06	676.8
14	294	E	E	Plains Grassy Woodland/Gilgai Plains Woodland/Wetland Mosaic	802	1	0.12	120.3
14	868	X	X	Pine Box Woodland	546	0	0.00	81.9
14	867	E	E	Pine Box Woodland/Riverina Plains Grassy Woodland Mosaic	336	<1	0.00	50.4
16	67	E	E	Alluvial Terraces Herb-rich Woodland	278	4	1.44	41.7
14	55	E	E	Plains Grassy Woodland	265	1	0.38	39.75
4	72	LC	E	Granitic Hills Woodland	164	7	4.27	24.6
15	68	E	E	Creekline Grassy Woodland	102	1	0.98	15.3
6	47	E	X	Valley Grassy Forest	40	0	0.00	6
16	81	E	E	Alluvial Terraces Herb-rich Woodland/Creekline Grassy Woodland Mosaic	19	<1	0.00	2.85
19	291	E	X	Cane Grass Woodland	9	0	0.00	1.35
5	80	E	X	Spring Soak Woodland	3	0	0.00	0.45
19	125	X	X	Plains Grassy Wetland	2	0	0.00	0.3
					23332	563	2.41	3500
99	997	NA		Private Land No Tree Cover		22772		

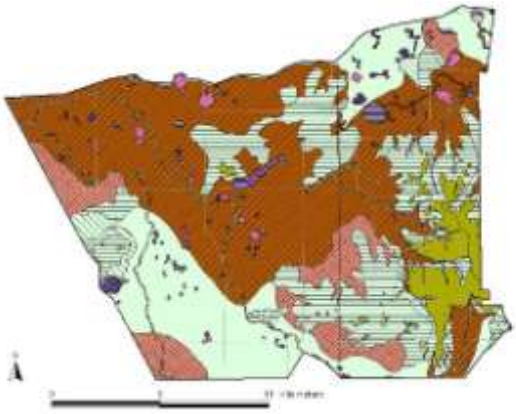


Figure 2. Pre-European vegetation cover

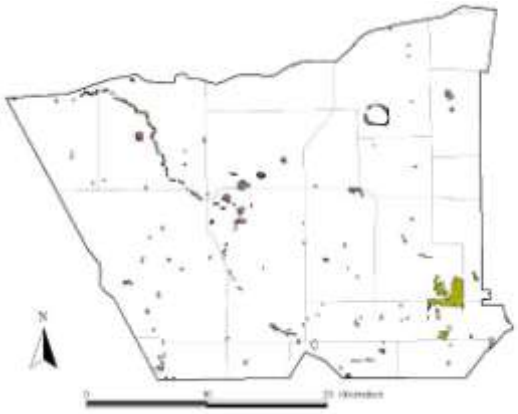


Figure 3. Current extent of native vegetation

Wetlands and watercourses

Wetlands and waterways are a feature of the Tungamah 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. The Broken Creek water frontage is part of a larger drainage system, the Muckatah Depression, which is listed (VIC036) in the Directory of Important Australian Wetlands (EA 2001). Three substantial freshwater swamps are designated as Wildlife and State Game Reserves, Dowdles (291ha), Moodie (198ha) and Tungamah (146ha), and the first two are part of the Muckatah Depression system. Brolga are known to feed and nest in this system.

Significant flora and fauna

Flora

A range of flora, associated with plains grasslands, grassy woodlands and wetlands are a special feature of this zone, as well as pine box woodlands. Robinson and Mann (1996) provide a detailed overview of plants in the area.

A total of 32 species of threatened flora are known from the Tungamah Zone. The list of these species is provided in Robinson et al (2004). The Bluish Raspwort has a limited distribution in Victoria and has a small population within the zone. Many small herbs and orchids are threatened by a proliferation of weeds, including the Plains Leek-orchid and Straw Wallaby-grass.

Fauna

The fauna of the Tungamah Landscape Zone includes mammals, birds, reptiles, amphibians, invertebrates and microfauna. For a landscape to function, all of these elements need to be present and interacting if we are to have long-term conservation and sustainability within the zone.

More than 160 bird species have been recorded in the zone, and of these 35 are considered threatened at the State level (FFG Act 1988). Of particular importance in the zone is the provision of habitat for Bush Stone-curlew and Brolga. Other threatened fauna in the area includes Squirrel Glider and Tree Goanna. Regent Honeyeater and Swift Parrot are known to utilise flowering Ironbark and White Box in winter. The Broken Creek provides significant habitat for threatened fish species, waterbirds and declining woodland birds such as the Black-chinned Honeyeater, Jacky Winter and Brown Treecreeper. For a full list of threatened fauna in the zone, see Robinson et al (2004).

Brolga
Viridans Fauna Display

Leafy Templetonia
Viridans Flora Display

Threats

Threats identified in the region were:

- Grazing
- Firewood collection/Timber removal
- Weeds
- Changes in hydrology

Grazing affects biodiversity conservation because sheep and cattle compact soil, do not allow for regeneration, change nutrient levels in and around native vegetation, contribute to tree dieback and directly compete against native grazers, and small mammals that require tussocky grass for shelter. (Wilson *et al* 2004)

Timber removal removes habitat for a range of species, including (bottom of the food chain) species on which larger animals rely, such as fungi, termites and other invertebrates. Fallen timber also provides shelter for regenerating seedlings, protection from fire and hollows for ground mammals. For further information/ brochures on the importance of fallen timber ask one of the members of the Water and Biodiversity Group.

Weeds are a major threat to biodiversity because they compete for space, light and nutrients with native species. As we cause disturbance and change the nutrient balance and canopy cover (i.e. light) then this

generally favours weedy, introduced species that have proven to be good adaptors to human-dominated landscapes.

Changes in hydrology can particularly affect wetlands, which have evolved to function with the natural cycles of flood and drought. The functioning of wetlands is reduced and so this affects the species that rely on the wetlands, including waterbirds which often rely on flooded wetlands to breed. Changes in hydrology has also resulted in increasing salinity, which is a factor in blue/green algal blooms, tree dieback and loss of productive land.

3. A VISION FOR CONSERVATION

In recognition of the values and threats to the area, DSE's vision for the conservation of the area is that the Tungamah Local Conservation Plan will result in:

"the conservation of biodiversity and restoration of ecosystem function,
through working with landowners to protect and enhance existing natural features,
and ensuring that these features are connected and strengthened
through a matrix or 'web' of sustainable native vegetation"

This vision is consistent with the Goulburn Broken CMA's Regional Catchment Strategy, endorsed by the Victorian Government, sets the following targets for biodiversity:

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 EVCs to at least 15% of pre-European cover by 2030.
4. Increase the 2002 conservation status of 80% threatened flora and 60% threatened fauna by 2030.

4. PREPARING A CONSERVATION PLAN

Methodology

The methodology used to prepare this plan is described fully in Robinson et al 2005. In summary it can be described as having five separate elements:

Identification of conservation features

If we are to achieve the vision for conservation in the Tungamah Landscape Zone, then we need to

- identify which features in the landscape are a priority for conservation,
- the threats to those features, and
- actions that may be taken to enhance values and reduce threats.

Two major methods were used to identify these features. First, a rigorous process of desktop methods were used to identify the general features of the zone, including

- Literature review
- Analysis of maps and spatial data from DSE's Corporate Geospatial Database Library (CGDL) such as current extent of Ecological Vegetation Classes, current tree cover, wetland mapping, land tenure, wildlife records, and flora and fauna records (CGDL, DSE 2003).
- Aerial photograph interpretation
- Discussion with individuals with good knowledge of the flora and fauna of the area

From this analysis, a series of sites likely to have conservation values is identified.

Identify flora and fauna species
Full species lists of all flora and fauna recorded within the study area were analysed. from available records. Species of conservation significance were identified, on the basis that they are listed as Threatened under either State or Commonwealth legislation. Additionally, some species were selected as focal species for the conservation plan. The role of 'focal species' is described below.

Generate list of environmental assets
The identified environmental features, and species of flora and fauna, were categorised into a series of 'nested' environmental assets. By managing each of these asset categories, management of the biodiversity of the study area would be assured.

Generate list of focal species
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, some species have been found only in remnants of a certain size. If we can select the species that requires the largest remnant size, then by fulfilling the needs of that species may result in the conservation of all species with smaller remnant size requirements. The factors used here were remnant size and isolation distance.

Describe and assess sites
A selection of sites identified from these desktop methods were then sampled in the field using

- 20 minute bird surveys, and
- vegetation assessments.

Sites were given a ranked value of either very high, high, medium or low, based on a range of factors including conservation status of the EVC, presence of threatened species or focal species, site area, and the results of the field assessment. The information will be useful for site managers, and is fully described in Section 6.

Landscape context
Whilst the methods above have identified the highest priority sites for protection and restoration, there is little point conserving remnants if they are not viable in the long term. To achieve viability, the remnants need to be linked together to form a viable, functioning natural landscape.

Therefore, in addition to BAP sites, the ‘Landscape Context Model’ (Ferwerder 2003) was used to aid in determining the major linkages between BAP sites, and the probability of any area within the zone having a high value biodiversity asset.

The Landscape Context Model works within a GIS environment, and 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 (See Fig.4). 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 are not included in the model.

For these reasons, the Landscape Context Model is described as showing areas that have the highest (or least) probability of containing additional sites of conservation interest. Generally, though the Model is very 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.

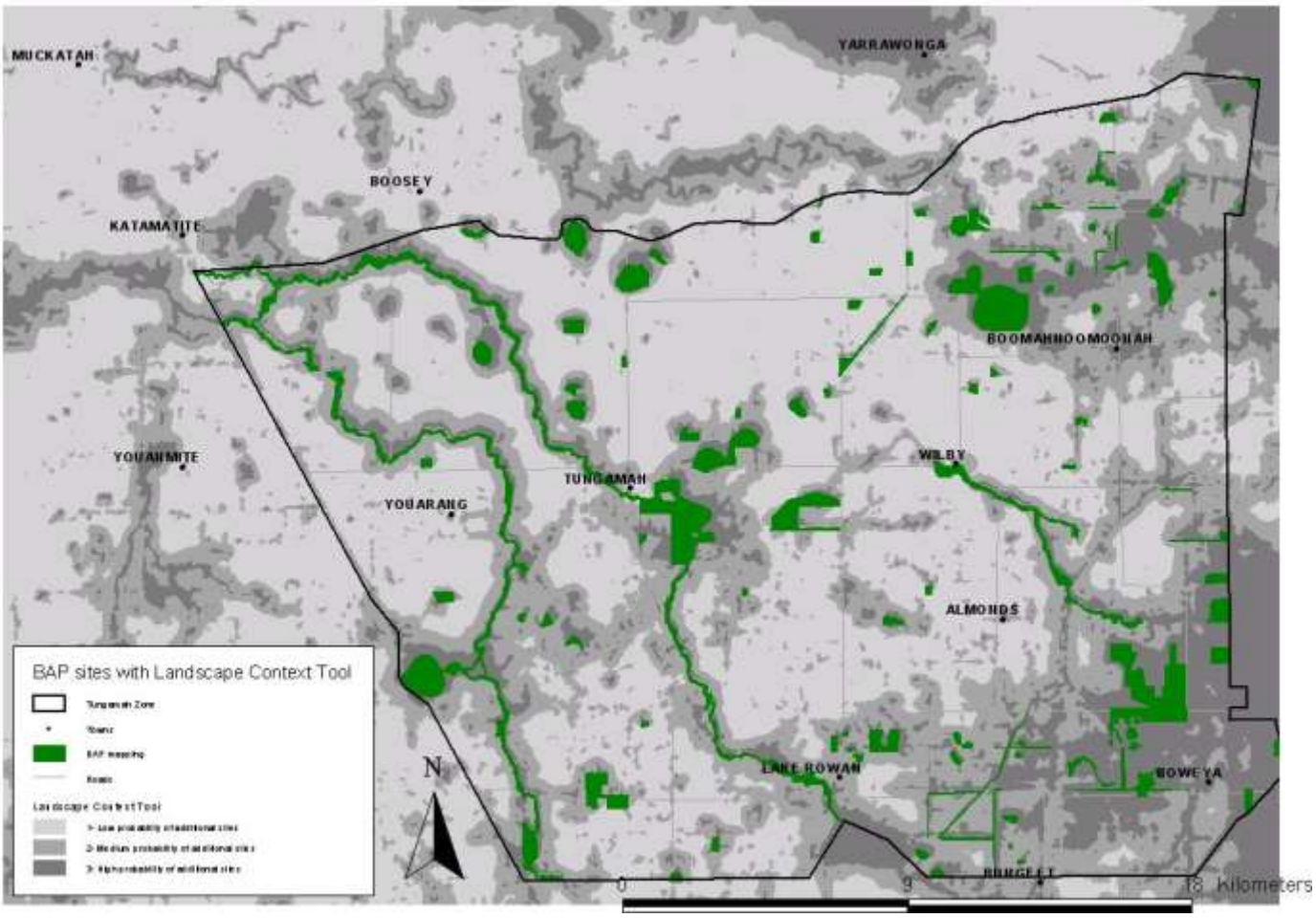


Figure 4: Landscape Context Model

The Landscape Context Model Mapping is now also contained on the BAP CD (Version 1, January 2008)* 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

KEY BIODIVERSITY VALUES

The approach of using Key Biodiversity Values has been used to group together the birds, animals and plants which utilise the same type of habitat under one heading. For example, by choosing Wetlands as a key biodiversity value, it incorporates all of the species that live in, and use a wetland as well as the individual physical assets, e.g. Brolga, Waterbirds, Muellers Daisy, the Muckatah Depression etc. Examples of these are given in section 5.

Key biodiversity values for Tungamah	Locally significant species
Plains Grassy Woodland BVT Was historically the dominant vegetation type in the landscape; now the vegetation type requiring the largest increases in extent	EVCs as listed in Table 2, Tree Goanna, Temperate woodland bird community, Squirrel Glider, Buloke, Leafy Templetonia
Wetlands Include representation of two wetlands which are part of the Nationally Important Wetlands; breeding and feeding habitat for Brolga and other waterbirds; large number of threatened plants	Brolga, waterbirds, Hydrilla, Swamp Billy-buttons, Swamp Star, Slender Water-ribbons, Matted Water-starwort, Tufted Club-sedge, Victorian Club-sedge
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.	Leafy Templetonia, Waterbush, Smooth Minuria, Bluish Raspwort, Bush Stone-curlew, Tree Goanna, Squirrel Glider, Temperate woodland bird community, Superb Parrot, Brown Treecreeper, Nankeen Night-heron
Box Ironbark Contains significant populations of Grey-crowned Babbler and Squirrel Glider. The largest remnant in the zone is the Boweya Flora and Fauna Reserve which links with the larger Killawarra State Forest	Mugga ironbark, Grey-crowned Babbler, Small-leaf Bush-pea, Bush-stone Curlew, Regent Honeyeater, Swift Parrot, Speckled Warbler
Grassy Woodlands with Pine Box Woodland Very little of this vegetation type now remains and on private land White Cypress-pine occurs mainly in isolated stands, especially around Lake Rowan.	Apostlebird, Grey-crowned Babbler, Bush Stone-curlew, Diamond Firetail, Hooded Robin
Tree Goanna Focal species in area for home range needs (160 ha), connectivity (gaps of < 1 km) and mature tree densities. The largest predator in the ecosystem	Squirrel Glider, Bush Stone-curlew, isolation-sensitive species of woodland fauna, mature tree-dependent fauna, litter-dwelling and soil-dwelling fauna
Bush Stone-curlew Large woodland bird; focal species representing other ground-dwelling fauna, especially in relation to predation risk.	Squirrel Glider, temperate woodland bird community, Tree Goanna
Plants of special concern 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	Buloke, Common Joyweed, Cotton Panic-grass, Dark Roly-poly, Painted Diuris, Pale Grass-lily, Smooth Minuria

FOCAL SPECIES

Table 5: The six focal species identified in the Tungamah Landscape Zone, and their minimum requirements in terms of patch size, minimum distance between remnants (isolation threshold), approximate home range size and an estimate of the number of breeding units (pairs or groups).

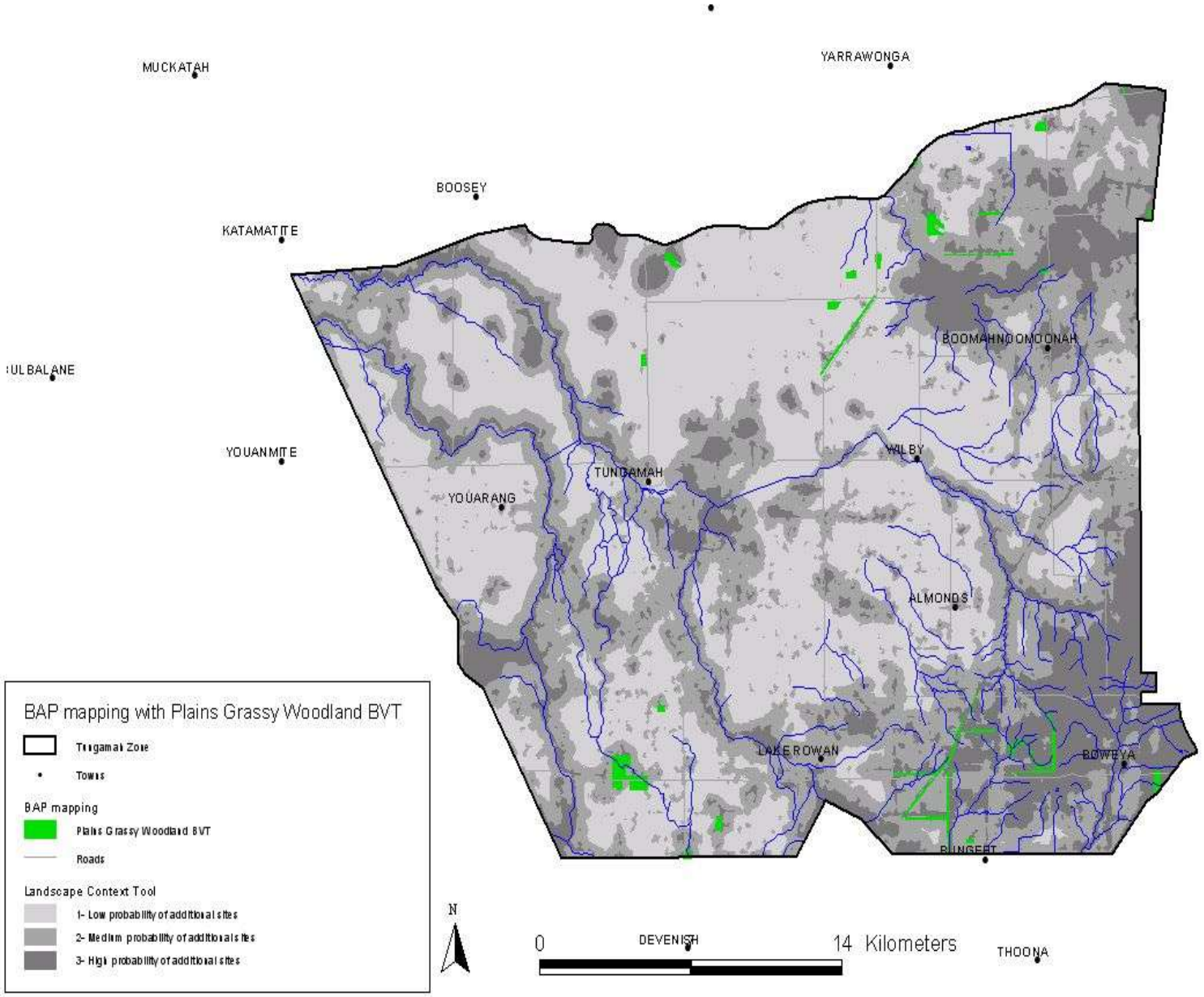
	**Squirrel Glider**	
	Minimum patch size	
	Minimum distance between patches	50m
	Home range size	2ha
	Isolation threshold	50m
	Current estimation of breeding units	unknown
	EVCs utilised by Squirrel Glider	Box Ironbark, Plains Grassy Woodland BVT
	**Jacky Winter**	
	Minimum patch size	10ha
	Minimum distance between patches	
	Home range size	<5ha
	Isolation threshold	1km
	Current estimation of breeding units	20
	EVCs utilised by Jacky Winter	Box Ironbark, Plains Grassy Woodland BVT
	**Black-chinned Honeyeater**	
	Minimum patch size	100ha
	Minimum distance between patches	
	Home range size	unknown
	Isolation threshold	<1km
	Current estimation of breeding units	20
	EVCs utilised by Black-chinned Honeyeater	Plains Grassy Woodland BVT
	**Rufous Whistler**	
	Minimum patch size	10ha
	Minimum distance between patches	
	Home range size	2ha
	Isolation threshold	<2km
	Current estimation of breeding units	20
	EVCs utilised by Rufous Whistler	All EVC types
	**Brown Treecreeper**	
	Minimum patch size	30ha
	Minimum distance between patches	500m
	Home range size	20ha
	Isolation threshold	<1km
	Current estimation of breeding units	40
	EVCs utilised by Tree Goanna	Box ironbark, Plains Grassy Woodland BVT, Wetland EVCs
	**Tree Goanna**	
	Minimum patch size	
	Minimum distance between patches	500m
	Home range size	160ha
	Isolation threshold	<500m
	Current estimation of breeding units	20
	EVCs utilised by Tree Goanna	All except Floodplain woodlands

5. MANAGING FOR CONSERVATION - PRIORITY ACTIONS

The following 8 pages provide maps and actions for the key biodiversity assets.

Plains Grassy Woodland BVT

- Protect and restore identified BAP sites and add to system any subsequently identified.
- Improve the condition of priority sites where Vegetation Quality Assessments have been carried out by encouraging retention of fallen timber, eradication of regionally listed weeds in zone and protecting or enhancing as defined by the mapping
- Identify and prioritise potential sites for habitat expansion and improved connectivity using the Landscape Context Map as a guide.
- Assist Shire to incorporate into roadside conservation plans any BAP sites along roadsides, particularly those that provide a link to other freehold and private sites.



Example of a Plains Grassy Woodland BVT BAP site in good condition

This site is part of the public reserve at Lake Rowan and contains an area of Plains Grassy Woodland in good condition. There is good structure consisting of large trees, many of which are hollow-bearing, as well as shrubs, grasses and herbs. The site also contains fallen timber. There is evidence of rabbit damage and some perennial grasses such as rye.

Actions for this site include:

- Active weed control.
- Active feral herbivore control to encourage recruitment
- Restore linkages to the Lake Rowan Wildlife Reserve.

Example of a Plains Grassy Woodland BVT BAP site in poor condition

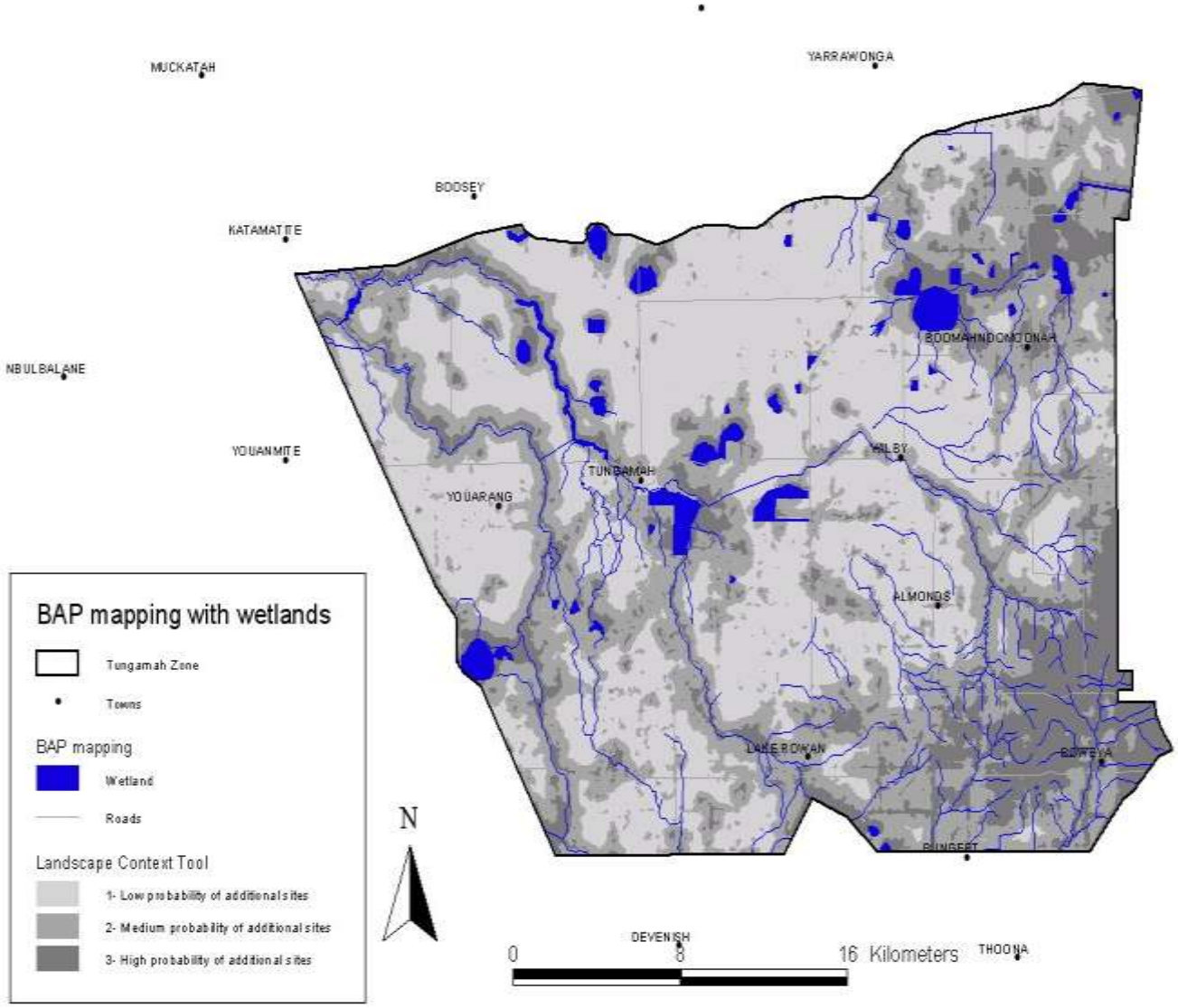
At this BAP site the paddock is grazed, allowing little opportunity for recruitment. There is evidence of native grasses but there is no other understorey recruitment due to year-round grazing. Fallen timber has mostly been removed leaving no opportunity for ground-foraging animals to feed and shelter. There are large scattered trees with hollows and the site provides a link to other remnant patches.

Actions for this site include:

- Fence around area of Grey Box and exclude stock to allow recruitment.
- Consider some direct seeding or planting to enhance natural regeneration.
- Active weed and feral herbivore control.

Wetlands

- Prevent channelisation, drainage or laser-levelling of all identified wetlands in the zone.
- Control foxes where Brolgas are known to breed and educate landholders of the threat of foxes to Brolgas
- Encourage landholders to fence wetland areas where Brolgas breed
- Protect and manage all high and medium priority wetlands in zone
- Restore habitat connectivity and natural flows along drainage lines and creeklines connecting wetlands
- Protect and restore identified BAP sites and increase VQA score, particularly fallen timber.
- Identify and prioritise potential sites for habitat expansion and improved connectivity using the Landscape Context Map as a guide.



Example of a Wetland BAP site in good condition

Moodie's Swamp Wildlife Reserve is a canegrass wetland that is part of the Broken Boosey Creek system. It is a component of a larger system listed in the Directory of Important Australian Wetlands.

Actions for this site include the following:

- Increase natural wetting and drying regime by restoring natural flows
- Active feral herbivore control to encourage recruitment
- Active weed control to control and prevent weed invasion.

Example of a Wetland BAP site in poor condition

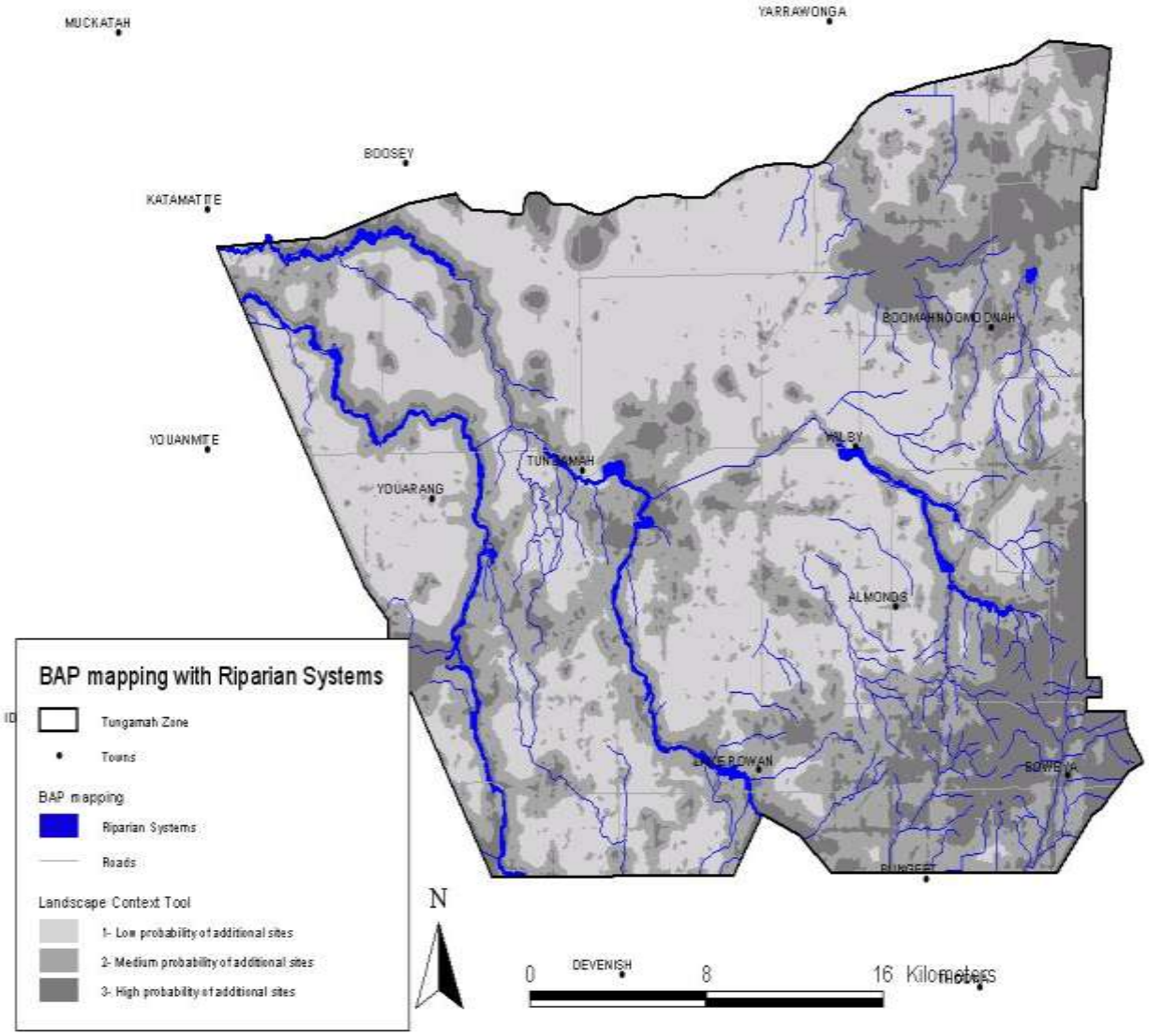
This site is part of the Lake Rowan Public Reserve. The understorey has been largely replaced with exotic grasses leaving only River Red Gums around the wetland area. The wetland has also been partly channelised which has reduced the natural flooding regime of the site.

Actions for this site include the following:

- Active weed control
- Active feral herbivore control to encourage recruitment
- Restore natural wetting and drying regime
- Plant indigenous species to area
- Link this site to Lake Rowan Wildlife Reserve

Creeklines

- Identify priority sites <100 wide for expansion, based on current high VQA values
- Work to restore linkages between creeklines and major wetlands e.g. Tungamah Swamp and Dowdle Swamp
- Continue control of foxes and feral cats along the Broken Creek system as recommended in Coman (2002)
- Encourage landholders to restore and revegetate riparian habitat especially where they link to public water frontage
- Negotiate Conservation Licences with licencees of Water Frontages
- Improve the condition of riparian vegetation to provide additional instream organic material and food.
- Negotiate to improve natural flow regimes for fish community and for nesting waterbirds.



Example of a Creekline BAP site in good condition

This site forms part of the Broken Boosey National Park near Telford. The site has a good structure, consisting of large, mature trees, shrubs, grasses and herbs. There is little fallen timber due to illegal firewood removal and snags are largely absent from the creek.

Actions for this site include:

- Active weed
- Active feral herbivore control to encourage recruitment
- Discourage removal of fallen timber for firewood
- Encourage neighbouring landholders to extend riparian zone along frontage.

Example of a Creekline BAP site in poor condition

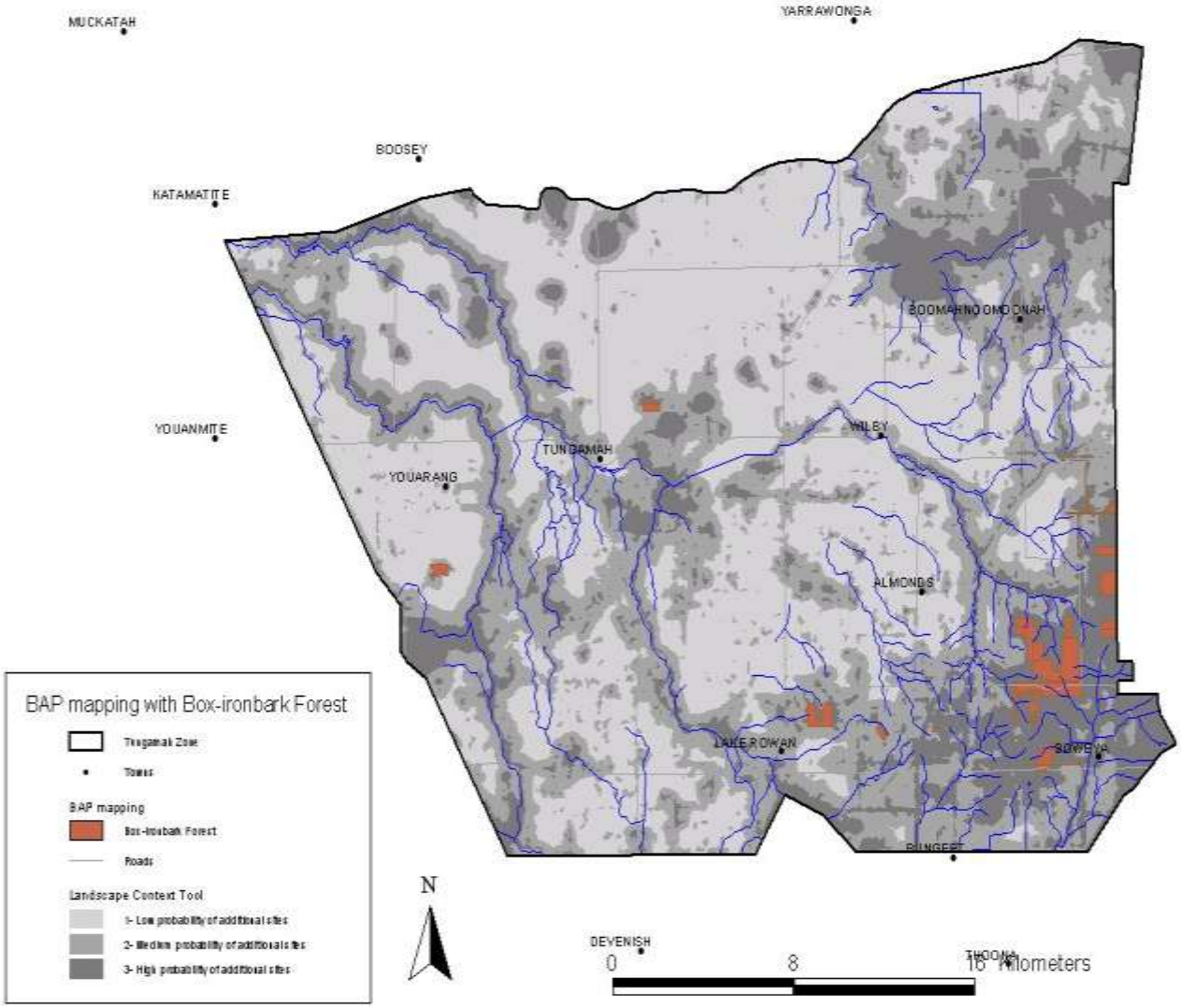
The creek running through Wilby is a narrow strip of riparian vegetation with little understorey. There are few mature, hollow-bearing trees and no shrubs. The ground layer is composed of exotic grasses. This creek is included as a BAP site as it forms a vital link in a largely cleared landscape.

Actions for this site include:

- Restore understorey through planting and direct seeding and allow recruitment
- Encourage adjacent landholders to extend riparian zone along the frontage
- Active weed control
- Active feral herbivore control to encourage recruitment

Box ironbark

- Encourage landholders to protect and expand sites where Squirrel Gliders and Grey-crowned Babblers are known to exist, particularly adjacent to roadsides by protecting or creating strips
- Protect and restore identified BAP sites and add to system any subsequently identified.
- Improve the condition of priority sites where Vegetation Quality Assessments have been carried out by encouraging retention of fallen timber, eradication of regionally listed weeds in zone and protecting or enhancing as defined by the mapping
- Identify and prioritise potential sites for habitat expansion and improved connectivity using the Landscape Context Map as a guide.
- Encourage Shire to enforce prohibition of roadside timber removal, especially where groups of Grey-crowned Babblers are known to exist
- Encourage fox and cat control



Example of a Box ironbark BAP site in good condition

This site is in the Boweya Flora and Fauna Reserve is representative of the Box ironbark of the Tungamah Conservation Zone. There are few large trees left in the reserve due to past logging, but the structure is largely intact with a good cover of grasses, herbs and shrubs. Firewood removal still occurs in places.

Actions for this site include:

- Enforce ban on firewood collection
- Active feral herbivore control to encourage recruitment
- Active weed control.

Example of a Box ironbark BAP site in poor condition

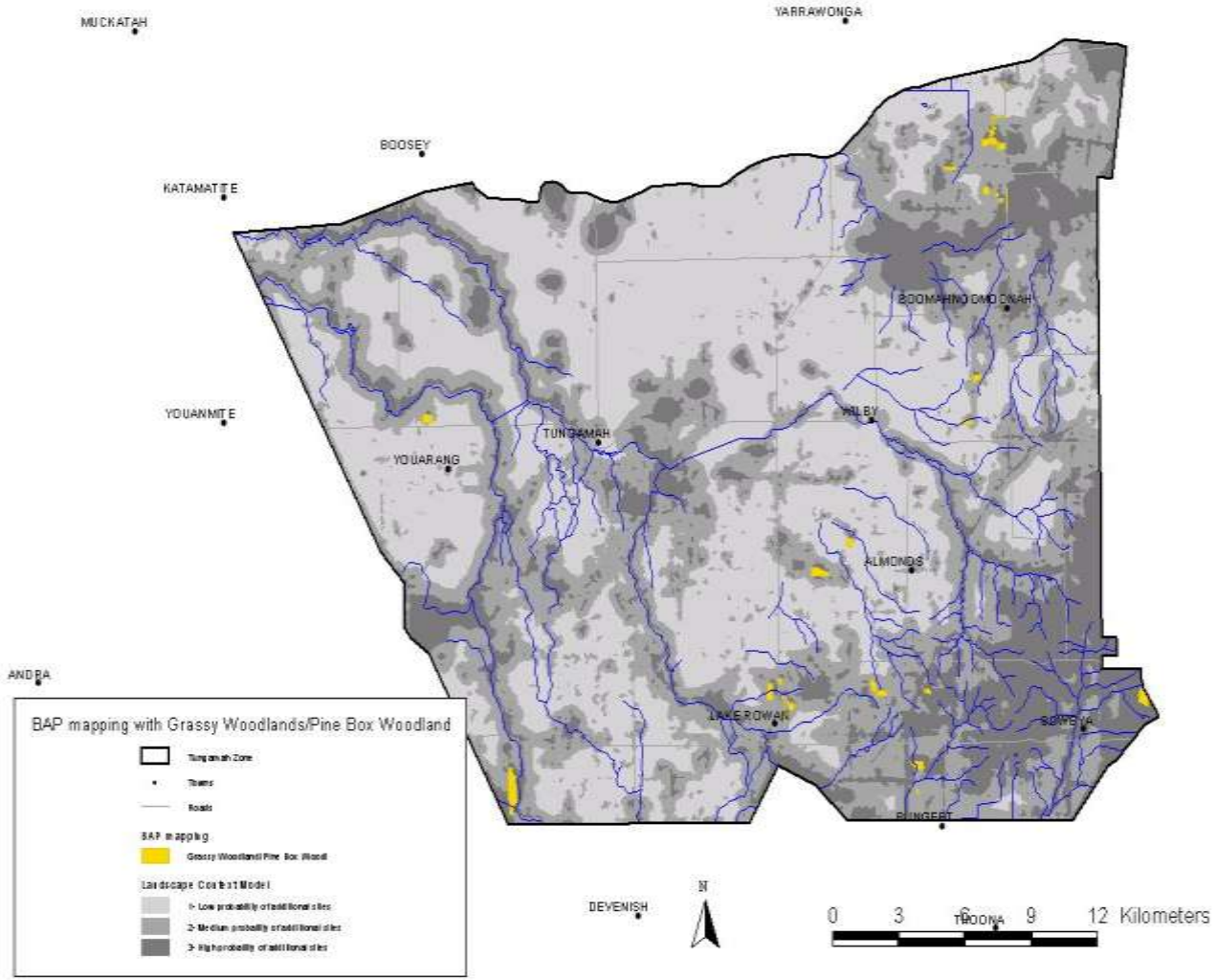
This site is a privately owned area where timber removal still occurs and occasional stock grazing takes place. As a consequence regeneration has not occurred and the understorey is degraded. There is no fallen timber left in situ.

Actions for this site include:

- Fence off and exclude stock until recruitment has established
- Restore some limited understorey through planting and direct seeding and allow recruitment
- Retain fallen timber and old, dead trees.

Grassy Woodlands with Pine Box Woodland

- Protect and restore identified BAP sites and add to system any subsequently identified.
- Improve the condition of priority sites where Vegetation Quality Assessments have been carried out by encouraging retention of fallen timber, eradication of regionally listed weeds in zone and protecting or enhancing as defined by the mapping
- Identify and prioritise potential sites for habitat expansion and improved connectivity using the Landscape Context Map as a guide.
- Encourage Shire to enforce prohibition of roadside timber removal, especially where groups of Grey-crowned Babblers are known to exist
- Encourage fox and cat control to protect Bush Stone-curlew and groups of Apostlebirds and Grey-crowned Babblers where they occur



Example of a Grassy Woodland Pine Box Woodland BAP site in good condition

Although small, Lake Rowan Cemetery contains an excellent example of Pine Box Woodland. There is Cypress Pine recruitment and the understorey is predominantly Kangaroo Grass and herbs. Peaceful Dove, Rufous Songlark, Restless Flycatcher and Diamond Firetail have all been sighted here.

Actions for this site include:

- Active feral herbivore control to encourage recruitment
- Possible autumn burning to reduce Kangaroo Grass mass and increase interstitial spaces for herb growth
- Active weed control.

Example of a Grassy Woodland Pine Box Woodland BAP site in poor condition

This site contains mature Cypress Pine and Grey Box but little recruitment is taking place. The understorey consists mainly of a few Golden Wattle and wallaby grass. There is a large component of perennial weeds, mainly rye and soursob (oxalis).

Actions for this site include:

- Fence off and exclude stock until recruitment has established
- Active weed control
- Restore some limited understorey through planting and direct seeding and allow recruitment
- Retain fallen timber and old, dead trees.

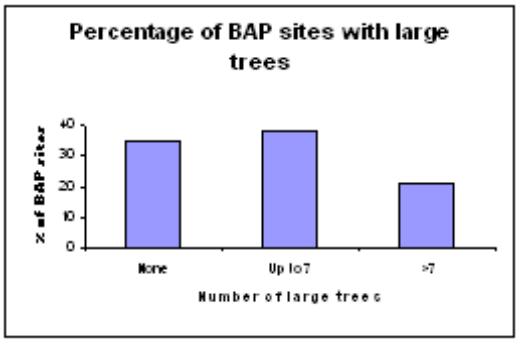
PRIORITY ACTIONS FOR OTHER KEY BIODIVERSITY VALUES

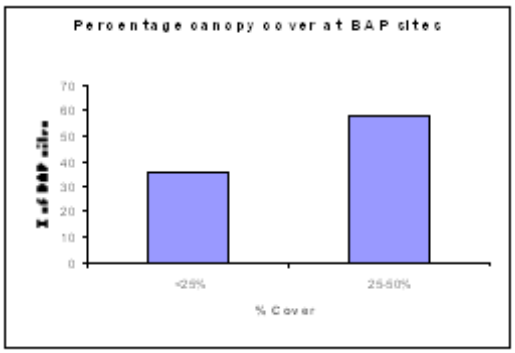
Biodiversity asset		Action
Tree Goanna		➢ Encourage Moira and Benalla Shires to prohibit firewood collection from all High and Medium value roadsides ➢ Retain fallen timber on all public land (Parks Victoria 2004) ➢ Encourage retention of fallen timber on private land ➢ Encourage revegetation of key gaps in landscape by overlaying BAP sites with areas identified as having a high rating on the Landscape Context Model to facilitate dispersal ➢ Undertake initial surveys in 2005 to provide baseline data ➢ Encourage a community education program ➢ Continue control of foxes and feral cats along the Broken Creek system as recommended in Coman (2002)
Bush Stone-curlew		➢ Continue control of foxes and feral cats along the Broken Creek system as recommended in Coman (2002) ➢ Undertake a community education program ➢ Protect and enhance sites , particularly BAP sites on private land, managing the ground layer to maintain short (<10cm high) ground cover and abundant fallen timber ➢ Establish predator-proof enclosures at known stone-curlew sites ➢ Enhance the vegetation condition of all public land sites by 1-2 points.
Significant plants of concern		➢ Undertake surveys for all the listed species to establish baseline data on abundance and distribution in accordance with VROTPop procedures (see Earl 2001) ➢ Identify current threats to existing populations and, where possible, manage threats to increase population sizes ➢ For Taxa ranked as a high conservation priority in the zone, encourage research into their life histories and ecological requirements.

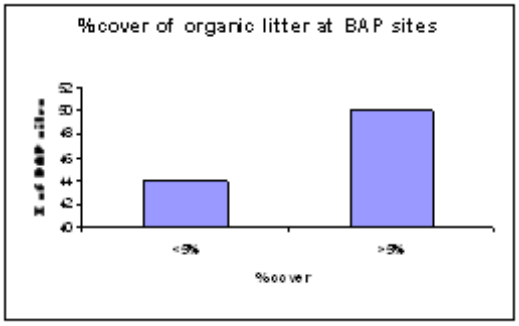
Summary of results of vegetation quality assessments

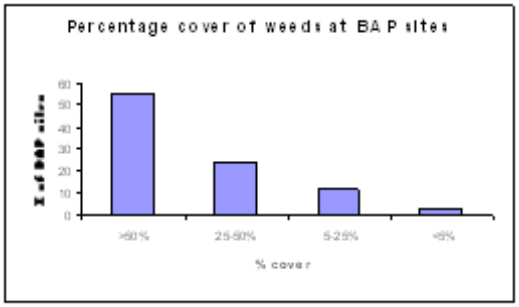
94 of the 171 sites identified through this study were subject to a Vegetation Quality Assessment. The results highlight the challenges for biodiversity conservation in the area. It should be remembered that these 171 sites constitute the most valuable sites for conservation in the area, but of these sites:

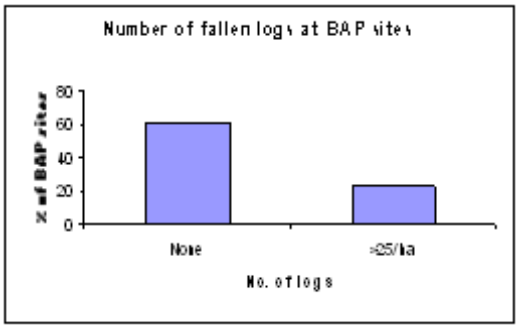
- only 22% of sites have adequate numbers of large trees.
- Only 24% of sites have fallen logs
- Only 20% of sites have adequate understorey
- Less than 4% of sites have adequate regeneration
- Less than 16% of sites have low levels of weeds.

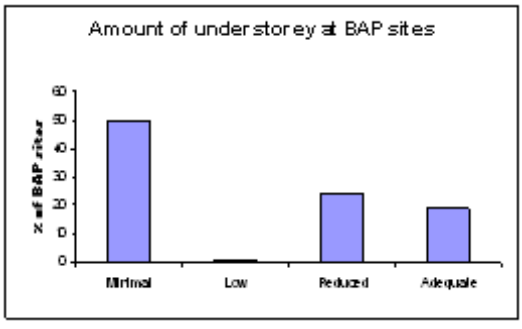












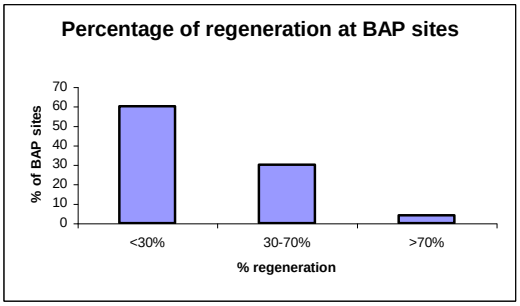


Figure 6: The following graphs illustrate the values for each of the components of the BAP sites assessed.

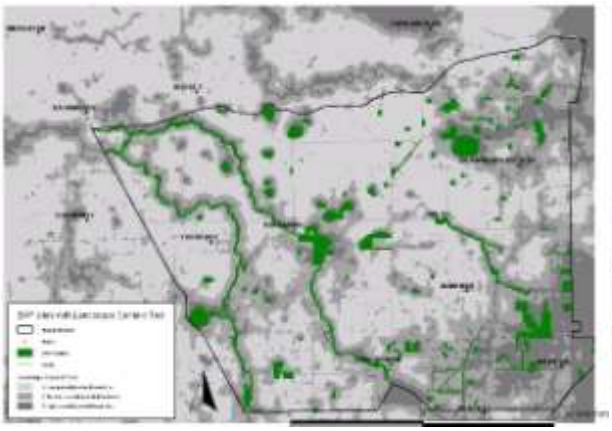
6. MANAGING FOR CONSERVATION - PRIORITY SITES

Identifying priority sites

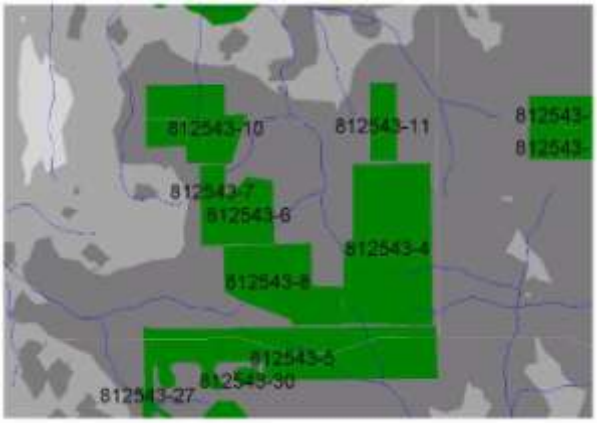
171 sites have been identified within the Tungamah Landscape Zone. These sites contain remnant vegetation and vary greatly from a stand of paddock trees to parts of the Broken-Boosey Linear Park Network. Almost all of these sites have been assessed either on-site or by observation from the nearest public land, and where possible a bird survey undertaken.

Mapping of these sites is available, in either hard-copy form or digital data, from DSE. The examples below shows

- the priority of sites for protection and restoration, and
- how sites are identified, including the numbering system for sites.



An example of site prioritisation mapping



An example of available Site ID Mapping

Site information available for managers

As can be seen from the diagram above, each site has been assigned a number that identifies it in a database. Mapping and accompanying information for each of the 'priority BAP sites' is now 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.

An example of the data held is given below.

Site Number	812543-4
Biodiversity Asset	Box ironbark
Conservation Status	Very High
Management Action	Protect
EVC	61
EVC status	V
Focal Species	Jacky Winter Rufous Whistler Squirrel Glider
Threatened Spp Record?	Y
Buffered for Focal Species?	Y
Veg Quality Score	17 (out of 20)
Management Agreements	N/A

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

Map and site information is available from DSE. It will allow extension staff to:

- be pro-active in targeting sites
- act as a basis for informed management of the site
- provide a rationale for applying grants
- provide a tool for landholders and the wider community
- provide a tool to show how a site fits into the wider landscape.
- use a benchmark against which future improvements in management can be monitored.

Additional data available

- GIS mapping products incorporating aerial imagery, BAP sites, threatened species localities
- Species information, site preferences, photos, biological data
- Access to BAP database for vegetation quality assessments and bird survey lists

Keeping the information up to date

This process is not set in stone now the mapping has been completed. In order for BAP mapping to remain as up to date and relevant as possible, it is important that site data continue to be added to the information already held. That might be adding a vegetation quality assessment where one hasn't been done previously or updating one already in there. It may be adding sites that have just been discovered or couldn't be accessed before. This version is only the first draft and it will constantly be added to and updated.

In this way, the data provides a benchmark for how well we are doing in protecting and restoring the remnant native vegetation and the species it contains.

What you can do

When about to visit a site, take some time to look at the site mapping and think about how it fits into the wider landscape.

- Are there threatened species recorded nearby that could benefit from a vegetated corridor?
- What are the options for widening roadsides to provide a link?
- Ask for species information if you cannot access it, or ask for a species list for the site. Staff in the Water and Biodiversity Group will be pleased to provide that information
- 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.

Assistance available for managers

Property planning and management tools

LOCAL AREA PLANS	WHOLE FARM PLANS	ENVIRONMENTAL MANAGEMENT SYSTEM
Local Area Plans consist of more than just biodiversity goals and BAP can provide input into the preparation of LAPs so that on-ground works can be planned that have a benefit for wildlife and the local community.	Protecting biodiversity on a farm should be part of any Whole Farm Plan as there are economic benefits from protecting habitat. BAP mapping can inform the process.	Aims to assist farmers to voluntarily adopt best agricultural practice for native biodiversity.

Advice and information

Land for Wildlife provides ongoing advice and information to assist land managers. Members of Land For Wildlife receive regular newsletters, technical notes, and access to expert advice and site assessment.

Incentives for on-ground works

Environmental Management Incentives, made available through the GBCMA, provide cost-share assistance for fencing, revegetation, and weed and pest management.

Management payments

Programs such as Carbon Tender, Bush return, and Bush Broker may provide management payments for conservation management of properties

Permanent Protection

A Conservation Covenant permanently protects sites for conservation. It may provide assistance to rate relief, tax concessions, and payment for the costs of on-ground works.

7. Monitoring, research and survey

The following actions have been identified as necessary increase knowledge of the biodiversity values within the Tungamah Landscape Zone and to ensure their on-going protection.

Biodiversity asset	Indicator	Conservation Goal	Methodology	Frequency	Essential?
Plains Grassy Woodland BVT	Changes in extent	Increase to 15% pre-1750 cover by 2030	Remote sensing comparisons; CAMS inputs	Every 5 years	Yes
"	Changes in condition – assumption based (area protected)	10% improvement in the quality of 90% of existing vegetation through fencing, protection and public land management programs	CAMS; TFN reporting; PV reporting; Shire reporting	Every 5 years	Yes
"	Changes in condition based on VQA at sites	20% improvement in the quality of protected sites	Site-based assessments of protected and unprotected sites	Every 5 years	Yes
"	Changes in landscape context	Increases in total cover, connectivity and the number of large patches	Remote sensing comparisons, LCAT comparisons	Every 5 years	Yes
"	Changes in the matrix – land use, % native pasture, abundance of scattered trees	Maintain or increase the current cover of native pasture and scattered paddock trees	Remote-sensing	Every 5 years	No
"	Changes in landscape functionality	Improvement in functionality	Site-based assessments using LFA or likely fauna-response groups (e.g. woodland birds, terrestrial invertebrates)	Every 5 years	No, ideally at least as a one-off study
Wetlands	Changes in extent	Maintain current extent	Remote-sensing comparisons	Every 5 years	Yes
"	Changes in condition (assumption-based) – area/number fenced; area/number with restored flows	Improve the condition of 25% of wetlands by 2015 and 70% by 2030	CAMS; GBCMA reporting	Every 5 years	Yes
"	Changes in condition – site-based	Improve the condition of 25% of wetlands by 2015 and 70% by 2030	ISC-type assessments of a set of managed and unmanaged wetlands	Every 5 years	Yes
Creeklines	Changes in condition and functionality (assumption-based) – area/number fenced; area/number with restored flows; area/number with added woody debris		CAMS inputs; ISC assessments	Every 5 years	Yes
"	Changes in extent	Increase extent to 15% pre-1750 cover by 2030	Remote sensing; CAMS inputs	Every 5 years	Yes
"	Changes in native fish community	Increase the diversity of the native fish community and the proportion of native/exotic fish	Site-based surveys based on Monash University's current set of sampling sites	Every 5 years	No
	Changes in landscape functionality of the riparian zone	Improvement in riparian functionality	Site-based assessments using LFA or likely fauna-response groups (e.g. woodland birds, terrestrial invertebrates)	Every 5 years	No, ideally at least as a one-off comparative study
Box ironbark	Changes in extent	Increase to 15% pre-1750 cover by 2030	Remote sensing comparisons; CAMS inputs	Every 5 years	Yes
"	Changes in condition – assumption based (area protected)	10% improvement in the quality of 90% of existing vegetation through fencing, protection and public land management programs	CAMS; TFN reporting; PV reporting; Shire reporting	Every 5 years	Yes
"	Changes in condition based on VQA at sites	20% improvement in the quality of protected sites	Site-based assessments of protected and unprotected sites	Every 5 years	Yes
"	Changes in landscape context	Increases in total cover, connectivity and the number of large patches	Remote sensing comparisons, LCAT comparisons	Every 5 years	No
"	Changes in landscape functionality	Improvement in functionality	Site-based assessments using LFA or likely biotic-response groups	Every 5 years	No, ideally at least as a one-off study
Grassy Woodland with Pine Box Woodland	Changes in extent	Increase to 15% pre-1750 cover by 2030	Remote sensing comparisons; CAMS inputs	Every 5 years	Yes
	Changes in condition – assumption based (area protected)	10% improvement in the quality of 90% of existing vegetation through fencing, protection and public land management programs	CAMS; TFN reporting; PV reporting; Shire reporting	Every 5 years	Yes
	Changes in condition based on VQA at	20% improvement in the quality of protected sites	Site-based assessments of protected and	Every 5 years	Yes

	sites		unprotected sites		
	Changes in landscape context	Increases in total cover, connectivity and the number of large patches	Remote sensing comparisons, LCAT comparisons	Every 5 years	Yes
	Changes in the matrix – land use, % native pasture, abundance of scattered trees	Maintain or increase the current cover of native pasture and scattered paddock trees	Remote-sensing	Every 5 years	No
	Changes in landscape functionality	Improvement in functionality	Site-based assessments using LFA or likely fauna-response groups (e.g. woodland birds, terrestrial invertebrates)	Every 5 years	No, ideally at least as a one-off study
Bush Stone-curlew	Number of pairs of Bush Stone-curlews and number raising young	• Increase the current population size by 20% as a result of increased breeding success and adult survival • Reduced fox numbers	• 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	Yes No
Tree Goanna	Population size	Increase population size by 10% from 2005 levels	Population surveys throughout the project area	Every 2 years	
	Population size and recruitment	Increase the number of sightings of young Goanna I landscape	Population surveys throughout the project area	Every 2 years	
Plants of special concern	Population size(s)	Increase the number of populations of every species to > 5 populations, each with > 50 plants	Repeat VROTPop assessments at known sites and translocation sites	Every 5 years	Yes for VROTS; No for other species
“	Recruitment	Successful recruitment of young individuals into the population	Repeat VROTPop assessments at known sites and translocation sites	Every 5 years	Yes for VROTS; No for other species

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