

Biodiversity Action Planning Local Biodiversity Planning Longwood Zone Trial

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About this Report

This report documents the process undertaken between September 2001 and December 2002 to implement Biodiversity Action Planning (BAP) at a local area scale in the Longwood Zone. The Longwood Zone trial is the first area of the Goulburn Broken Catchment to trial the BAP process of translating resource information contained in the Landscape Plan for Longwood (Ahern *et al* 2002) for on-ground implementation.

This report provides detail on the planning and activities undertaken in the Longwood Zone trial, including an outline of the methodology, discussion on the effectiveness of activities and recommendations for future BAP projects.

This report can be used by other BAP practitioners in developing Local Landscape Plans in other project areas.

Acronyms

ARI	Arthur Rylah Institute, Department of Sustainability and Environment.
BAP	Biodiversity Action Planning.
CAS	Catchment and Agricultural Services.
DPI	Department of Primary Industries.
DSE	Department of Sustainability and Environment.
EVC	Ecological Vegetation Class.
FFG	Flora and Fauna Guarantee Act 1988.
GBCMA	Goulburn Broken Catchment Management Authority.
MGBIC	Mid Goulburn Broken Implementation Committee.
NHT	Natural Heritage Trust.
NRM	Natural Resource Management.
TSN	Threatened Species Network (program of WWF Australia).
VFF	Victorian Farmers Federation.

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1. Background

1.1 Background to Biodiversity Action Planning (BAP)

The purpose of Biodiversity Action Planning (BAP) is to summarise the key biodiversity assets, and the actions and tools that are required to achieve statewide and regional biodiversity goals (Platt and Lowe 2002). BAP is intended to provide scientific information on biodiversity assets and priorities to the regional community and to identify options for action. BAP is intended to inform existing NRM programs operating within a region.

Biodiversity information is collated at three planning levels:

- The **Strategic Overview** provides details of the framework and methodology used in developing biodiversity action planning and an overview of the features and assets of the bioregion.
- **Landscape Plans** provides specific information on assets and priorities for actions within landscape zones. Landscape plans include the native vegetation priorities identified in the regional Native Vegetation Plans (NVP) and identify the best options for restoring native vegetation to recover biodiversity at a more detailed scale than is possible in the NVPs.
- **Local Plans** provide biodiversity information as a resource input into Local Area Plans or other planning processes such as Landcare plans, which may be developed through community engagement processes, and cover the range of natural resource issues.

1.2 Background to the Longwood zone trial

Because BAP is a recent process, trials have been needed to test how to translate the Strategic Overview (Wierzbowski *et al*, 2003) and Landscape Plans (Ahern *et al*, 2003) into planning at a local level. Two trials had already begun in the North Central Catchment. This report documents the first BAP trial in the Goulburn Broken Catchment.

The Longwood Zone Trial was initiated in June 2001 as an outcome of a workshop organised by regional NRE titled 'Landscape Planning for Biodiversity in the Mid Goulburn Broken'. At this workshop a presentation was given by NRE Parks, Flora and Fauna to agencies and members of the Goulburn Broken Catchment Management Authority community. The Nagambie Landcare group expressed interest in being involved in a trial. Longwood was considered to be an appropriate area to conduct a trial due to the community interest shown in the project, the high biodiversity values retained in the area and the highly threatened nature of these assets.

A BAP project officer (Doug Robinson) was appointed in September 2001 at 2 days per week to develop the Longwood Zone trial of Biodiversity Action Planning.

1.3 Background to the study area

The Longwood zone measures 118,292 ha and lies entirely within the Victorian Riverina bioregion roughly in the centre of the Goulburn Broken catchment. Main towns within the zone include Euroa (in the east), Nagambie (to the mid west) and Seymour in the south. The zone consists mainly of the gently sloping or flat riverine plains of the Goulburn River and its associated tributaries. Over 95% of native vegetation cover has been cleared within the zone and the majority of the remnant vegetation is on creeklines and roadsides. Most of the zone is included in the Nagambie Landcare Group area.

The Longwood Zone boundaries (and boundaries of the other zones in the Goulburn Broken catchment) were developed based on several criteria including the bioregional boundaries, practical

social boundaries and an attempt to keep the area of each zone to a manageable size for local landscape planning.

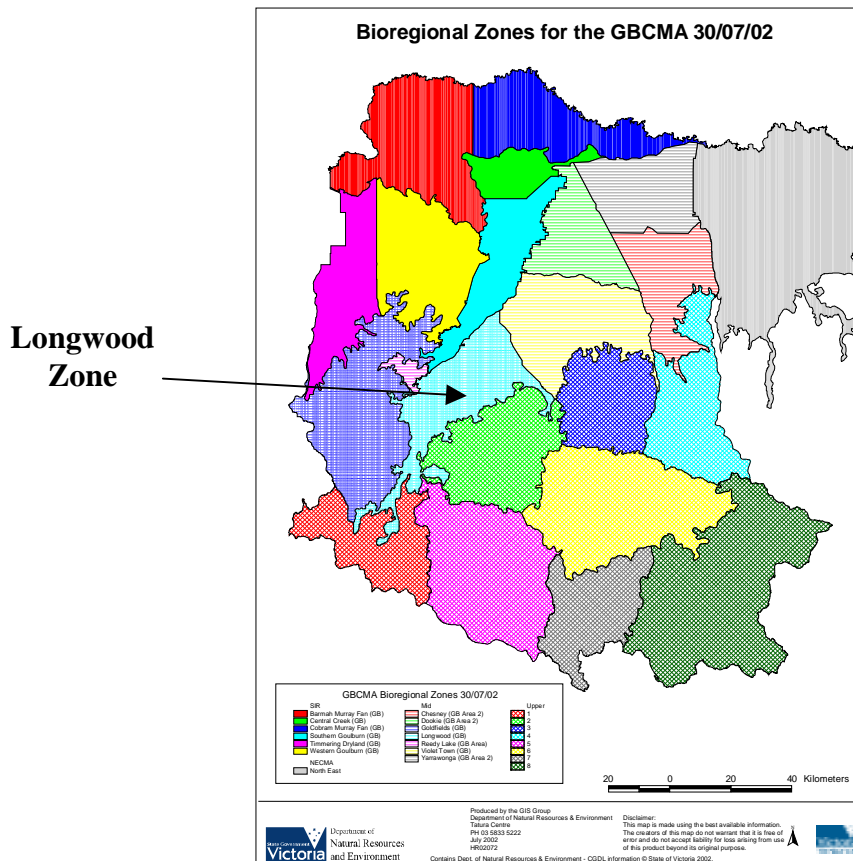


Figure 1. The BAP Landscape Zones of the Goulburn Broken Catchment highlighting the Longwood Zone.

2. The Longwood Zone Trial

2.1 Objectives of the trial

The main objectives of the Longwood Zone Trial were:

- To develop a practical operational plan for conserving biodiversity at a local landscape scale
- To trial a model for landscape biodiversity action planning and implementation that might be applied to other zones in the Goulburn Broken catchment and across Victoria.
- To detail the scientific methodology used to develop biodiversity priorities for the trial and for monitoring of the trial.

2.2 Project scope

The roles of the Project Officer were to:

- Identify biodiversity assets, threats and actions required to conserve assets;
- Prepare the local conservation plan;
- Facilitate implementation of the conservation plan;
- Engage the local community;
- Develop a monitoring framework for the area.

• 3. Conservation Planning Methodology

A tabular summary of the conservation planning methodology is presented in Appendix 1.

3.1 Identification of conservation priorities

3.1.1 Identification of biodiversity assets

The aim of this step was to identify and locate the priority species, EVCs, wetlands and waterways for conservation in the zone (see Appendix 2). These were identified by the following means:

- State and Nationally threatened species, particularly priority 1A species from the Bioregional Network Analysis, were identified from the draft Landscape Plan (Ahern *et al.*, 2003) and DSE Flora Fauna's database Biomap.
- Additional, threatened or regionally threatened species of plants and animals were identified principally from the local knowledge of the Project Officer
- Priority EVCs were identified and located from the Landscape Plans (Ahern *et al.*, 2003) and EVC mapping and conservation status tables held in the DSE corporate database.
- Priority wetlands were identified from the DSE wetlands 1994 corporate layer, the Landscape Plan (Ahern *et. al.* 2003), the recent report on prioritising wetlands for biodiversity conservation (Lyon *et. al.* 2002) and from waterbird breeding information provided by staff at ARI.
- Priority waterways were identified from the Landscape Plan (Ahern *et al.*, 2003), EVC mapping, aerial photographs, advice from the GB CMA Waterways Program and Monash University Research group and native fish records provided by the Freshwater Ecology group at ARI.

3.1.2 Identification of focal species

The aim of this step was to identify a suite of fauna species that would capture the needs of a wider range of species in the trial area. Based on the original focal-species selection work done by Lambeck (1999), focal species were selected for every EVC (Appendix 2) to represent:

1. **Resource factors** – patch size, habitat quality and connectivity. Threshold data for these attributes came from local knowledge of the project officer, the analysis of the Bird Atlas by Lowe *et al.* 2002, and from other published focal species studies in south-eastern Australia (Freudenberger 1999, 2001, 2002).
2. **Specialised resource needs** (eg. large old trees with hollows; nectar-rich sites).
3. **Ecological processes** such as predation or flooding regimes.
4. **Lower threshold targets.** It was recognised that it may not be feasible to conserve all threatened species or focal species in all parts of the Longwood Zone (eg. may not be able to provide 40+ ha remnants in some parts of the zone). Lower threshold target conservation assets were identified using the same principles and information sources to determine focal species. For example in Plains Grassy Woodland EVC the Diamond Firetail was identified as the most sensitive species to patch size and quality, requiring patches > 20ha in size. Lower threshold assets were also identified being Rufous Whistler (patches > 10ha) and Restless Flycatcher (patches > 1ha).

In common with most of the previous focal species-based projects (Lambeck, Freudenberger), most of the focal species selected were birds, primarily because of their widespread recognition by landholders, the relative ease of recording them, the project officer's specialised knowledge in relation to birds and the large datasets available to measure their distribution and abundance (e.g Blakers *et al.* 1980; Emison *et al.* 1987; Lowe *et al.* 2002). In other BAPS, however, other fauna or flora groups may be more appropriate as focal species.

3.2 Identification of ecological needs, threats and actions for biodiversity assets.

Following the identification of conservation assets for the trial area, we collated the ecological needs, threats and actions needed for their conservation. This information was documented on the basis of existing biological information from a range of books, reports, studies, and local knowledge. An example of the assets, their conservation needs and threats is shown in Appendix 3.

Proposed actions consisted of both on-ground actions and policy-related actions, with the focus of the project officer being development and implementation of those on the ground.

Once on-ground actions were documented against each targeted conservation asset a summary list of actions was developed for the Longwood Zone that identified which asset would benefit. These summary actions were linked to specific sites via an Excel database and can be found in Appendix 4.

3.3 Identification and mapping of priority sites.

On the basis of the summary actions identified as priorities for on-ground works, potential sites to implement these actions and conserve key biodiversity assets were drawn onto maps using:

- Biomap (DSE Flora Fauna corporate database);
- Aerial photographs (held within DSE);
- Satellite imagery (held on DSE corporate database);
- Land tenure maps (from the Landscape Plans and DSE corporate database);
- Local knowledge of the project officer.

Every site was given a unique code that was linked to an Excel database. For every site, the following information was recorded:

- The potential biodiversity asset(s) to be conserved at that site;
- EVC;
- Land tenure;
- Land manager(s); and
- Suggested actions.

Due to the large size of the project area (about 110,000 ha), it was decided to focus on one sub-catchment within the trial area – the Pranjip Creek sub-catchment (c. 30,000 ha).

Following the desk-top mapping exercise, site visits were made to the 326 sites identified in the Pranjip Creek sub-catchment for potential on-ground works to assess:

- Habitat quality (tree size, understorey diversity, ground layer composition, weediness, recruitment);
- Landscape attributes (surrounding land-use, connectivity);
- Suitability for the biodiversity assets nominated in the database as species to be conserved at that site. For example, Jacky Winter (*Microeca leucogaster*) is identified as a Moderate Threshold species for the Box-ironbark Forest EVC in the trial area but can often be found in poor quality woodland sites in terms of a Habitat Hectare assessment, so long as the site is large enough. Accordingly, sites which might be ranked only as moderate condition in terms of their habitat Hectares score, might be ranked as High Priority in regard to their conservation value for Jacky Winter;
- Ground-truthing of the information derived from the desk-top exercise (e.g. EVC type); and
- Additional, specific actions required at that site.

The time required to assess all 326 sites was 4.5 days. This was relatively quick due to the project officer's detailed knowledge of the area.

From these on-site assessments, every site was given a priority ranking based on the attributes listed above. Priority rankings were High, Medium or Low. The 251 high and medium priority sites were mapped as polygons on Arcview GIS and printed on a digital satellite imagery map (Figure 2). The Excel database was also updated with priority rankings included for every site, as well as the addition of new information on the site or actions required.

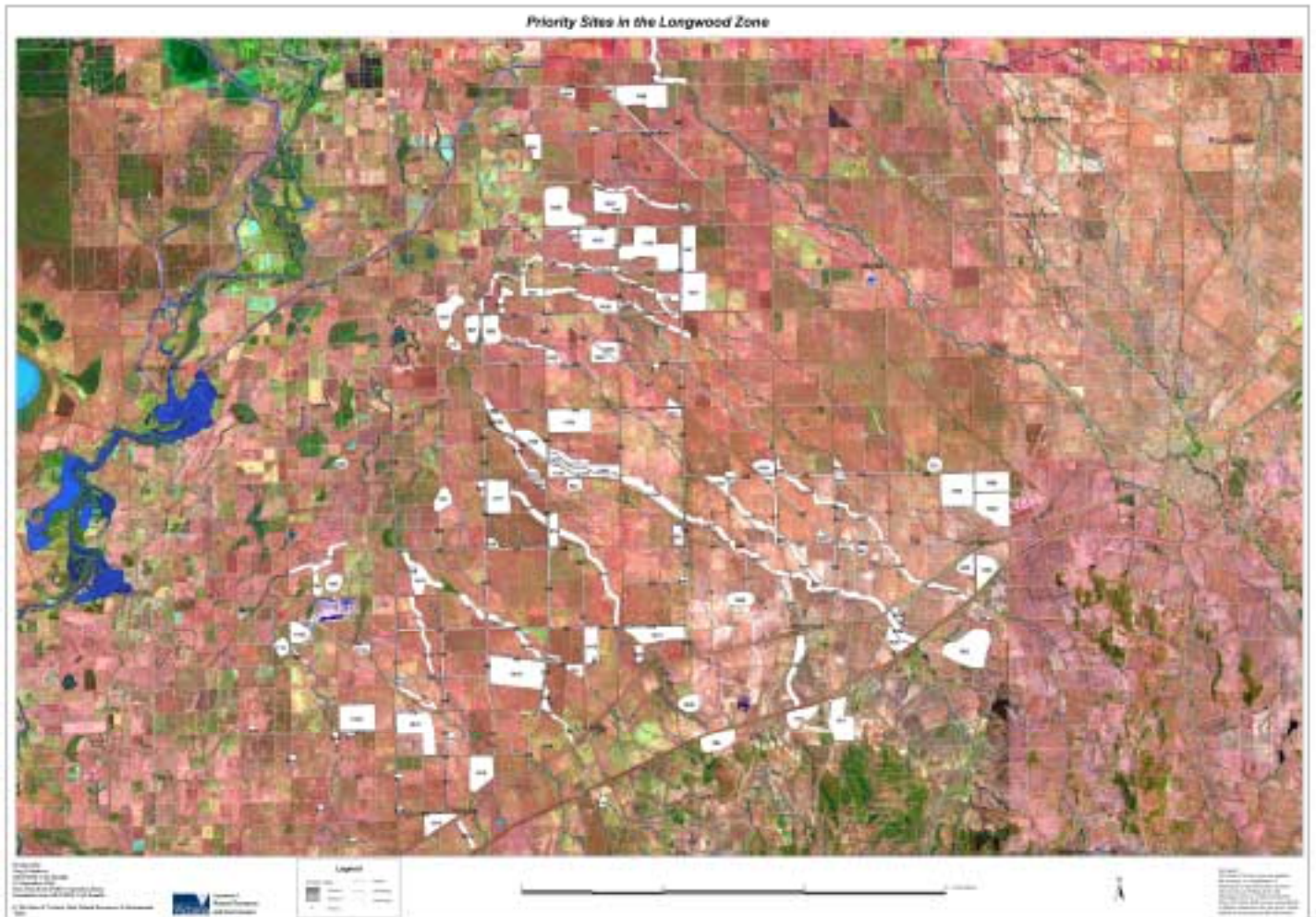


Figure 2. High and medium priority sites mapped in Arcview GIS for part of the Longwood Zone.

3.4 Development of policy and research actions

As explained above (Section 3.2), analysis of the ecological needs, threats and actions for each of the targeted biodiversity assets identified both on-ground and policy/research actions which were needed in order to conserve these assets. For example, the protection of existing roadsides requires on-ground works in the form of habitat enhancement or revegetation of gaps, but also needs formal recognition and appropriate management of these key roadsides by the Shire of Strathbogie for their future conservation.

Identification of these policy actions and knowledge gaps was initially undertaken by the project officer. The subsequent responsibility for pursuing these actions has been shared among staff from DSE, DPI and the GBCMA.

3.5 Development of a monitoring framework

A key component of BAP is the principle that all on-ground works are targeted to assist a suite of focal species, and that conservation of sites for these focal species will conserve a wider array of biodiversity by providing for larger patches, better-quality patches, more connected patches and so forth. It is therefore imperative that there be monitoring of the biota at sites to measure changes in habitat quality, species composition or population size of the biodiversity assets.

The development of a monitoring framework for the Longwood zone is still not complete. However, the following set of guidelines has been proposed.

For terrestrial sites, it is proposed to identify and monitor two sets of sites: at least 30 sites where on-ground works are occurring and 30 sites where no works have occurred. These sites should be monitored before and after works have occurred. At every site, we are intending to measure:

- 1 Changes in vegetation condition (Habitat Hectares assessment).
- 2 Changes in groundcover composition, using a set of character species for each EVC which have known responses to changes in grazing pressure or other management.
- 3 Changes in population size or recruitment for targeted flora species.
- 4 Changes in population size or distribution for threatened fauna (especially using species that are easy to survey, e.g. Grey-crowned Babbler, Tree Goanna, Bush Stone-curlew).
- 5 Changes in population size or site use for focal species of birds.
- 6 Changes in abundance or site use for reptiles and macroinvertebrates.
- 7 Possibly the abundance of a widespread species of butterfly such as the Common Brown.

Sites would be surveyed at least once a year over the next ten years to provide useful data on changes in biodiversity condition.

For waterways, it is intended to measure:

- Changes in the Index of Stream Condition (a 5 yearly review done by the CMA).
- Changes in the abundance or distribution of selected fauna species, primarily using the ongoing survey work of researchers from Monash University.

For wetlands, the key attributes to be monitored are:

- Changes in flooding regime.
- Changes in vegetation condition.
- Changes in the abundance or use of sites by selected water-bird species.

The monitoring undertaken for BAP will link into the broader Biodiversity Monitoring Framework being developed for the Goulburn Broken Catchment.

4.0 Process for Community and Agency Engagement in the Trial Area

4.1 Development of agency understanding and involvement in BAP

The promotion and inclusion of BAP to agencies has been undertaken at five different levels.

1. Steering Committee establishment: Following the initiation of BAP in the Goulburn-Broken catchment, a steering committee was formed to oversee the trial. This committee meets every three months to review progress of BAP, to identify explicit tasks for the various agencies and personnel involved and to review and organise funding. The Committee has involved the following members:
 - GBCMA - Biodiversity/Bushcare Manager.
 - GBCMA - Biodiversity Officer.
 - DSE Flora Fauna – Biodiversity Project Leader.
 - DPI CAS – Nature Conservation Coordinator.
 - Trust for Nature Regional Coordinator.
 - BAP Project officer/s.
2. Mid-Goulburn Implementation Committee (MGBIC): Several presentations have been made to the MGBIC about BAP, progress of the Longwood trial and specifically seeking funding to continue the Longwood trial and begin trials in other parts of the Mid Goulburn-Broken Implementation Committee area. The MGBIC has been very supportive of BAP and has provided an effective means of disseminating information about BAP to the broader community.
3. Functional Managers: Following the initiation of the Longwood Zone trial, memos were sent from the Manager, Flora and Fauna, to other Functional Managers and to the Parks Victoria Chief Ranger to notify them about the BAP process and to request support.
4. Team Leaders: Following the initiation of the trial, Flora and Fauna organised a meeting with team leaders from CAS and Land Victoria, and rangers-in charge from Parks Victoria to outline the BAP process and specifically discuss possible roles of the different groups in regard to land management in the Longwood trial.
5. Extension officers/rangers: Many presentations and one workshop have been given for staff working on the ground to facilitate their understanding of the value of BAP in identifying strategic sites to protect from a biodiversity perspective. This group has been very interested in and supportive of BAP.

4.2 Establishment of the Longwood working group

In December 2001 the project officer invited the following people to form an on-ground working group for the Longwood Zone:

- Parks Victoria rangers.
- Relevant DPI CAS extension staff (Catchment Management Officers and Links Officers).
- DSE Flora and Fauna project officer.
- GB CMA Waterways extension staff.
- Land Victoria representative.
- Nagambie Landcare Group.
- Researchers from Monash University, studying the ecology of the creeks systems in the trial area.

The main objective of this group was to introduce the concept of Biodiversity Action Planning and to coordinate on-ground efforts in the Longwood Zone. In that regard, a recent development by this group has been a shared database which lists all landholder and any site contacts that have been made by members of the group. The database also records a report on progress at the site. This database allows extension officers to know who is already in contact with various landholders and what progress has been made, to avoid doubling up.

4.3 Nagambie Landcare Group involvement

4.3.1 Initial information sharing

As the Nagambie Landcare Group initially suggested that the Goulburn Broken Catchment BAP trial be undertaken within its area, there has been significant involvement by the Landcare Group in the trial. The project officer and CMA staff have attended meetings of both branches of the group to present BAP information. In addition, a presentation has been made to the Landcare Group committee requesting specific support for the project.

Presentations on BAP and biodiversity in the Longwood zone have been given at information sessions arranged by the Landcare group and progress reports on the BAP project and articles about biodiversity are included in most issues of the Landcare Group newsletter.

4.3.2 Increased level of involvement by the group in BAP.

1. The Nagambie Landcare Group was invited to nominate at least three committee members to become part of the Longwood working group. Four members of the Group are now participating on the working group, in addition to the Landcare Group's employed facilitator. These committee members have also become the steering committee for funding received under the World Wide Fund for Nature's Threatened Species Network grant program.
2. The project has agreed to subsidise a wider circulation (to non-paid members) of the Nagambie Landcare Group newsletter in exchange for inclusion of BAP information in the newsletter. This has enabled the information to be spread much wider across the Landcare Group community at no cost to the group.
3. The group were encouraged to submit a funding application through the World Wide Fund for Nature's Threatened Species Network Program to progress BAP in partnership with DSE the GB CMA and Trust for Nature. The application was successfully funded for \$28,800 which included funding towards a paid facilitator from within the group. The role of the paid facilitator has been to provide logistical support to extension staff working in the area, facilitate implementation of works once grants are processed and to encourage support for the project from within the community.

4.4 Wider community involvement

4.4.1 Links with other groups and organisations

The project has benefited from the fact that the Longwood zone does have high biodiversity values and also high levels of threat to those values. Accordingly, the Longwood zone has been the focus for a relatively large number of ecological research and monitoring projects (e.g. O'Connor 1991, 1992, 1993; O'Connor & Lake 1994; Davidson 1996; Davis & Finlayson 2000; Van der Ree 2000; Simondson 2001; Van der Ree *et al.* 2001; Robinson *et al.* in prep.). In turn, the presence of these researchers in the local landscape has meant that many landholders are familiar with scientific interest in the natural features of their farms. It has also meant that there is considerable expertise available for field days and information sessions. Both of the creek field days, for instance, have been run in

conjunction with researchers from Monash University, while other field days have included scientists from Deakin University.

In addition, there are strong links between the Longwood BAP and other community conservation projects, notably the Grey-crowned Babbler conservation project organised by the Friends of the Grey-crowned Babbler group, and the Euroa Arboretum project, which grows most of the plants for the BAP and Babbler projects. Working relationships have also been established with local members of the VFF and the golf course committee at Murchison, who happen to manage some land with high conservation values.

4.4.2 Links with Trust for Nature

- The Longwood trial has benefited from a unique relationship with Trust for Nature, where the BAP Project Officer also works part-time as Trust for Nature's regional co-ordinator for the catchment. Due to the high biodiversity values present on the predominantly freehold landscape in the Longwood Zone, Trust for Nature had already begun to focus on the area as one of its priority regions. The BAP trial has consequently benefited from considerable investment by Trust for Nature in the Longwood Zone.

4.4.3 Links with local schools

As part of the community education program, letters about the Longwood trial and possible roles for schools were sent to all local primary and secondary schools. From that contact, projects have been developed with four of the local primary schools and Seymour Secondary College. These projects include plant propagation, restoration of habitat on the school grounds, nest-box construction and ecological research.

4.5 Extension activities

4.5.1 Wildlife booklet

A booklet titled *A Wildlife Guide for Landholders in the plains and box-ironbark regions of the Goulburn Broken Catchment* has been produced with funding from the WWF's Threatened Species Network grant, and the GBCMA, through NHT funding, to encourage and assist landholders to undertake activities for biodiversity outcomes. This booklet was modelled closely on the woodland animal booklet produced for the North Central CMA BAP trial (Jeavons & Morison 2002).

Whilst the booklet has been developed for the Longwood and Violet Town Zones, it will also be applicable for all of the BAP zones that include the plains and box-ironbark regions (essentially the northern half of the Goulburn Broken Catchment). The booklet includes a picture and description of a range of mammal, bird, amphibian and fish species; details of their needs and threats; and suggestions for actions that landholders can take to help conserve the species. The booklet will be distributed to all rural landholders in, at a minimum, the Longwood and Violet Town BAP zones.

4.5.2 General extension material

- Generic extension guidelines were developed to complement the summary list of on-ground actions identified for the trial area (Appendix 5). These guidelines were distributed to all of the extension officers working in the area to help them understand the ecological principles behind the proposed actions.
- In response to requests for information from members of the working group, graphic information was developed and circulated that showed bird species' distribution in relation to

the width and habitat quality of waterways and revegetation plantings (this is shown in Appendix 6).

- In response to requests from the working group, a new fact sheet is now being prepared that demonstrates the need for wider plantings and buffer strips in relation to bird species use, survival rates of plants and growth rates of the surviving seedlings

4.5.3 Field days

Seven field days have been held in the Longwood Zone since September 2001, focusing on:

- The biodiversity values of creeks.
- The importance of pools in creeks as drought refugia and options for off-creek watering.
- The bird species composition of different types of remnant.
- Fox control.
- Habitat values of roadsides.
- Arboreal mammals.
- The Murchison East Golf Course native grassland.

All field days have been accompanied by articles in local newspapers.

5. Conservation Planning Outputs

5.1 On-ground outputs

5.1.1 Biodiversity asset identification and site mapping

- Key biodiversity assets and focal species have been identified for all EVCs in the trial area.
- The needs, threats and priority actions required for these assets have been tabulated.
- 326 sites have been identified as potentially suitable for the target biota across approximately one third (30,000 ha) of the trial area; the Pranjip Creek sub-catchment.
- All of these sites have been ground-truthed and assessed for quality, resulting in the short-listing of 251 sites for priority works in the sub-catchment.
- All of the priority sites have been mapped as a GIS layer and published as a layer onto satellite maps of the area. These maps have been distributed to members of the Longwood working group (see Section 5.2).
- An Excel database has been developed and distributed to all members of the Longwood working group. The database links uniquely numbered sites on the maps to information relating to the values of the site, the land manager and the actions needed.
- A landcare group application to WWF for TSN funding to support the project was funded and has allowed the employment of a project facilitator, completion of mapping, initial survey work at priority sites, the preparation of extension material and the initiation of on-ground works.

5.1.2 On-ground outcomes

- 65 of the 251 sites have been visited.
- 60% of approaches to landholders have resulted in on-ground works, with a further 17% of landholders still thinking about proposals.
- All of the extension officers have begun to use the BAP priority maps as a tool to help them decide where to target works. In addition, when the extension officers receive an enquiry about works in the area they are using the priority mapping to direct interested landholders to priority sites.
- Directly out of the TSN grant, 14 landholders have committed to 98 ha of works to protect and enhance remnants and 29 ha of revegetation.
- Land managers are factoring suggested activities at priority sites into upcoming works programs, particularly Parks Victoria and the GB CMA.
- Five large remnants in the Longwood Zone were nominated for purchase under the National Reserves System. Two of these sites (129 ha and 43 ha) have now been purchased and two are under negotiation.
- Negotiations have commenced with Parks Victoria to remove grazing from three Bushland Reserves within the zone totalling 47 ha.
- Negotiations have begun with Parks Victoria to establish a seed orchard for future revegetation projects on some of their land.
- Members of the Longwood working group have identified 45 ha of Crown frontage of high conservation value that Parks Victoria has agreed to manage.
- Through negotiations with DSE, several sections of Crown land water frontage have been identified as experimental sites at which fencing will be included as a part of licence conditions.

- A management agreement has been developed between the Murchison East Golf Course Committee and DSE to manage remnant grassland (1 ha) at the golf course for conservation, with some funding support from DSE.
- Three conservation covenants with Trust for Nature have been negotiated in the area (totalling 26 ha); and approaches have been made to eight other landholders.
- A management agreement has been developed between Trust for Nature and an individual landholder to increase native vegetation cover on their 360 ha property from 5% to 20% over the next ten years.
- Initial bird surveys have been undertaken at 40 sites.
- Three rounds of co-ordinated fox-baiting, covering 270,000 ha, have been undertaken by Nagambie Landcare Group and 11 other landcare groups in the area.
- DSE successfully applied for funding to erect a fox-proof fence around a 12 ha sheep paddock containing a breeding pair of Bush Stone-curlews.
- Noisy Miners were experimentally removed from the 8 ha Arcadia Bushland Reserve within the zone, to provide a community demonstration of the effects of this species on woodland bird diversity. Fourteen new species of woodland bird have been recorded in the reserve, following the removal.
- Additional funding applications are being made by the Landcare Group and Trust for Nature to maintain the BAP project in the Longwood zone.
- To date 12 agencies/organisations and 45 landholders have been actively involved in the project.

5.2 Policy outputs

- Strathbogie Shire's roadside management plan is now in the final stages of completion as a result of encouragement from the Project Officer.
- The Strathbogie Shire is currently undertaking a review of their Municipal Strategic Statement. DSE Flora Fauna is currently involved in discussions with the Shire over this review.
- Several parcels of Crown land having high conservation value were identified through the priority mapping process. Discussions have been held with Land Victoria over the review of license status on these parcels of public land. As a result an agreed outcome is that any future application for Crown land licence in the Longwood Zone will come through DSE Flora Fauna for comment.
- Initial discussions have been held with Land Victoria over a land swap of low-value public land for a high value conservation site on private land owned by the licensee.
- Land purchase for conservation through the National Reserves System program now highlights that land in the Longwood and Violet Town BAP zones is a priority for purchase.
- There has been some correspondence with Goulburn Murray Water to collect data on current volumes of water extraction from streams in the Longwood Zone in relation to the annual flow of those streams. This process will hopefully lead to the development of Streamflow Management Plans for these streams or a review of existing water extraction licences on these waterways.
- There have been initial discussions with DPI and the Mid Goulburn Broken Implementation Committee of the CMA regarding the inclusion of BAP information into the Whole Farm Planning process as it is developed.

- Discussions have been held with DPI CAS staff and CMA about reviewing the Environmental Management Grants to provide funding to landholders interested in protecting scattered trees on their properties or in establishing multiple small patches of habitat across their land.
- Fox predation was recognised as a key threat to the endangered Bush-stone Curlew and some of the other targeted biodiversity assets. The Project Officer provided input into the draft FFG Action Statement for fox predation to include Bush-stone Curlew as one of the key species affected by fox predation. He also lobbied on behalf of local landholders and the VFF for the introduction of a fox bounty.
- Noisy Miners were identified as a major threat to woodland birds. The Project Officer provided a recommendation to DSE for a Statewide policy to be developed to allow the destruction of Noisy Miners under permit. This has been agreed to by DSE and policy development is in process.

6.0 Project Resources

6.1 Project Coordination Budget

- \$38,180 - Salary, on-costs and operational expenses for a project officer at 2 days per week over 12 months.
- \$7000 – towards DSE officer to undertake bird surveys and assist with administrative tasks.
- Un-costed contribution from the Project Officer's role as part of Trust for Nature.
- \$28,800 – Funding received from the WWF TSN project which contributed towards project facilitator, extension material and on-ground materials (eg. fencing).

6.2 Time

Time required to complete priority mapping for the Pranjip Creek sub-catchment (50,000 ha):

Activity	Days
Select conservation targets and identify actions for each target	5.5
Desktop mapping of potential sites and establishment of site database	2.5
Ground truthing and prioritisation of sites	4.5
Preparation of priority map	2.5
GIS map production	2.5
	17.5 days

It should be noted that this was relatively quick due to the detailed local knowledge of the project officer.

6.3 Personnel

- One part-time project officer (2 days per week) employed by DSE Flora Fauna based at Benalla.
- A project officer employed through DSE undertook bird surveys and assistance with administrative tasks for the project.
- The project was overseen by a steering committee comprising members of the biodiversity program with the GBCMA, DSE Flora Fauna and DPI CAS staff.
- Technical support for Arcview was provided by DPI GIS group at Benalla and Flora Fauna officer at DSE Benalla.
- A successful application through the WWF Threatened Species Network funding has provided funds to the Nagambie Landcare Group coordinator to progress facilitation of on-ground works. This coordinator is majority funded through the NHT facilitators and coordinators program.

6.4 Resource material

The following resource information was accessed during the development of priority mapping:

- Satellite imagery from the DSE corporate database.
- DSE Flora Information System.
- DSE Victorian Fauna Database.
- Biodiversity Action Planning Draft Landscape Plan for the Longwood Zone.
- Aerial photographs for Longwood Zone kept at DPI Benalla.
- Bird Atlas data for the Riverina bioregion (Lowe *et al.* 2002).
- References listed at the end of this document.

7. Discussion and Recommendations

7.1 General discussion on the BAP Concept

BAP is primarily intended to be an information-providing process that is incorporated into existing programs, such as NRM programs or local government policy documents. Ultimately, it is hoped that the provision of detailed information on biodiversity assets to other land managers and the identification of priority sites for on-ground works will result in improved conservation of the identified assets.

The focus of BAP has been on information provision to help guide on-ground works, and it is envisaged that implementation of those works will be driven by existing community partnerships and extension staff (Platt & Lowe, 2002). In the Longwood experience, however, this approach has left some gaps in planning and implementation that should be considered in the development of BAP in other areas. These gaps include:

- Conservation of some biodiversity assets may primarily depend on policy change rather than on-ground action, which requires a time commitment by other relevant staff to drive this policy change for a particular issue. In the Longwood trial, for example, lack of environmental flows was readily identified as a major threat but little progress has been made on abating this threat, even though the BAP process has identified this as a key issue.
- Strategic conservation in a particular landscape requires the participation of all land managers with significant biodiversity assets on their land. In the Longwood trial, the focus of the project officer and the landcare group facilitator has been on-ground works and involvement primarily with private landholders, extension officers from DPI, DSE and the CMA, and Parks Victoria staff. In addition, however, relevant staff from the Shire of Strathbogie, Vic Roads, Goulburn Murray Water and the Public Transport Corporation also need to be informed of the BAP process to discuss and facilitate management of biodiversity assets on land under their management. Effective implementation of the information developed through BAP at a local or regional level thus requires considerable commitment from the organisations driving natural resource management programs. Effective implementation may also need the development of various partnerships, operating at various scales.

From the Longwood trial we have realised that through BAP we were trying to undertake all aspects of biodiversity management from planning, to integration, to delivery of works on the ground. This created some confusion about what exactly BAP is. Through a recent workshop held in the Goulburn Broken we have clarified that BAP should focus on the planning and development of science-based information and integration of this into existing programs (see Figure 3) rather than on the extension and delivery of works on the ground.

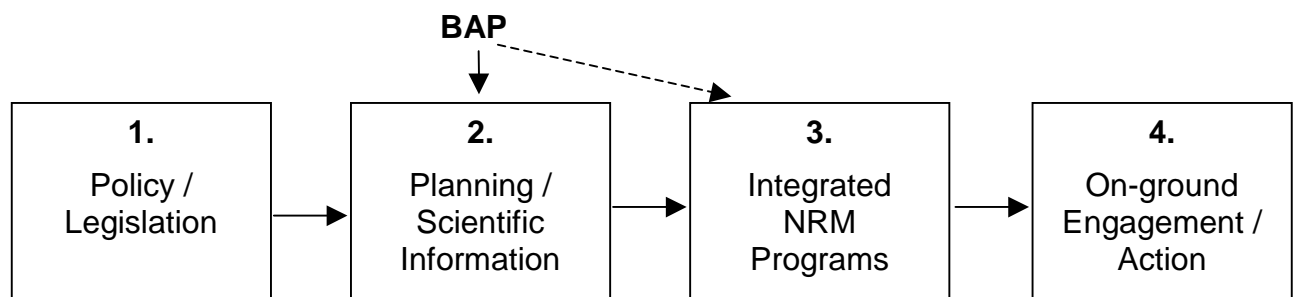


Figure 3. BAP needs to focus on area 2 in order to inform existing on-ground programs.

The vision is that BAP ‘aims to build trusting long-term relationships, understanding and capacity’ (Platt & Lowe 2002). Achieving this vision in terms of delivering BAP priorities on the ground is difficult. As with all on-ground projects, the relative success of the Longwood trial to date has been assisted by the receipt of specific funding for on-ground implementation via TSN, the contribution of NAP funding by the MGBIC, the proactive involvement of the landcare group coordinator who also acted as project facilitator for the BAP trial one day a week, the willingness of members of the Longwood Working Group to participate, and additional on-ground commitments to the trial from the project officer in his Trust for Nature role. However, not all areas in the State will necessarily receive this level of investment.

In relation to the above stated vision for BAP, it should also be noted that the Longwood zone community has not substantially changed as a result of the trial and not all landholders have been keen to be involved in the project. Notably, however, the direction and activities of the Nagambie Landcare Group have been influenced by the project.

The BAP Trial in the Longwood Zone has raised many issues and developed a much greater understanding of the process of incorporating specific biodiversity asset information into existing NRM programs. BAP is more likely to be sustained in the longer-term if it is integrated into existing NRM programs rather than run as a separate process. However a broader integrated extension program is needed to support the BAP priority mapping to ensure community adoption and on-ground outcomes.

The Longwood Zone Trial has been a learning process with some very effective on-ground and policy outputs as a result. Whilst future BAP activities in the catchment may not replicate all parts of the Longwood Zone Trial, much of the information from this trial will be very useful in informing future activities.

Recommendations:

- | | |
|---|--|
| 1 | That BAP activities, at this stage, focus on developing scientific-based information on assets and priorities in order to feed into existing NRM programs. |
| 2 | The relationship of BAP to other biodiversity and NRM programs needs to be clearly articulated to all staff involved. |
| 3 | The local community need to be informed early of the BAP process if we are to achieve community trust and long-term adoption and implementation of BAP priorities in a local area. |
| 4 | BAP focuses on the identification and prioritisation of assets, but more resources need to be invested in community extension to promote the principles of biodiversity conservation and BAP priorities. |

7.2 Suggested changes to conservation planning methodology

7.2.1 Identification of conservation priorities

One of the limitations found with the site prioritisation in the Longwood trial is that the emphasis on focal species and their ecological needs in terms of protection, enhancement and restoration potentially ignored larger landscape threats which might require action. Although the BAP prioritisation process sets out a hierarchy of assets to be conserved from the ecosystem level through to the focal species or even lower threshold species level, the main driver for determining conservation priorities in the

Longwood zone was focal species. This also seems to have been true in other BAP zones (see Platt & Lowe 2002; Guildford-Muckleford Local Area Biodiversity Plan 2001).

The Longwood Zone Trial (and trials in other areas) has taken a reductionist view of the landscape and ecosystems, by contrast with The Nature Conservancy’s ‘systems’ approach. The ‘systems’ approach starts at the scale of ecosystems or communities in terms of asset identification, and only includes individual species if their conservation needs are not otherwise met (Lowe, 2002).

7.2.2 The role of focal species

One of the confusions encountered by many people in the BAP process has been the rationale behind the selection of focal species. The way focal species have been presented is as conservation targets in their own right. A more useful way to think about them may be as ecological entities that can be used to establish thresholds in response to a particular ecological threat or process and which can be used to assess the effectiveness of any actions implemented to address those issues (see table below). Using this approach, appropriate species selection to set thresholds and assess actions may be more straightforward, once the ecological threats and processes relevant to the EVC have been identified. As cautioned by some studies, however (Abensperg-Traun *et al.* 1996; Robinson 1998; Lindenmayer *et al.* 2002), the use of focal species or particular groups of biota may be still leave some gaps in the conservation planning process.

Examples of the rationale behind focal species selection on an EVC/ecosystem basis

Ecological issue	Management action required	Relevant focal species	Conservation Objective
Habitat loss, especially the loss of woodland patches	Establishment of large patches Establishment of more medium-sized patches Establishment of more small patches	Diamond Firetail (high threshold) Rufous Whistler (medium threshold) Restless Flycatcher (low threshold)	Increase in population size or number of occupied patches
Predation by foxes	Targeted fox control	Bush Stone-curlew Fat-tailed Dunnart Fox Lambs	Increasing pairs/breeding Increase in abundance Decrease in numbers Increased success
Gilgai drainage	Maintain and restore gilgai wetlands	Gilgai plant community	Increase extent by 50%

7.2.3 Integration of plant conservation needs

Because of the focus of the Longwood trial on mapping priority sites for actions at a landscape scale, the focus has tended to be on actions intended to benefit larger vertebrates, particularly birds. Consequently, there has been little attention given to the particular conservation needs of the State-threatened or regionally-threatened species of plants occurring there, as the conservation scale required for the plants is much finer and the management required may be more intensive.

The intention now in the Longwood trial is to nominate the group of threatened plants found there as an explicit biodiversity asset and then develop a management plan that deals with all of their needs.

Recommendations

5. An approach to identification of biodiversity assets to be conserved should be trialled using a similar methodology to The Nature Conservancy's 'systems' approach and compared to the Longwood Zone Trial.
6. The use of focal species, especially birds, as part of BAP is extremely useful, but the purpose of focal species in BAP may need to be clarified. In particular, BAP needs to define the ecological issues it is trying to address in a more explicit manner so that focal species selection and monitoring processes are more clearly linked to particular threat-abatement or recovery actions
7. It would be worth using a combination of the approaches used by current BAP process (using focal species as conservation assets) and The Nature Conservancy (identify assets in terms of ecosystems or communities) for future BAP activities.
8. The particular conservation needs of plants and perhaps invertebrates need to be recognised as part of any BAP.

7.2.4 Identification of ecological needs, threats and actions for biodiversity assets

Following from the above, if assets to be conserved are identified at a broad scale, it is equally important that key threats are also assessed at that scale.

Recommendations

9. A process that better identifies threats to the assets and ways to prioritise those threats needs to be developed. A summary of the most important threats across the landscape for all of the assets can then be generated.

7.2.5 Identification and mapping of priority sites.

Initial site mapping for the Longwood trial was done manually and involved physically re-entering mapped sites into a GIS layer. As a result the mapping was far slower than it could have been and could have been improved with the use of a GPS.

An adaptation trialled later in the mapping was the use of the new model created as part of the Catchment Assessment Tool (CAT) to model landscapes for the conservation of native biodiversity (Wilson and Lowe 2003). Some of the rules for the biophysical modelling were rewritten to take into account specific needs of the targeted conservation assets in the Longwood Zone. From these modified rules, a modelled map of potential sites (each with a unique code) was generated to base ground-truthing upon.

Comparisons between the computer modelling of priority sites and the results of ground-truthing showed a 75% correlation in terms of identification of sites. Importantly, even for sites that were missed by the computer modelling (e.g. paddocks of scattered trees), the computer model generally identified other priority sites in the same one square kilometre, such that ground-truthing visits would usually locate these additional sites. The modelling however will not prioritise sites and this needs to be undertaken through ground truthing.

In the ground-truthing phase the project officer carried out a brief habitat quality assessment of each site in order to prioritise sites. This was not based on the habitat hectares methodology and would be difficult to replicate in other trial areas. Since then a rapid habitat hectare assessment has been

developed that could be applied to all sites for future mapping tasks. However, further discussion is required as to the effectiveness of the rapid assessment versus the full habitat-hectares assessment. In addition, clarification is still needed about how to rank and prioritise sites in terms of the requirements of focal species rather than just on the condition score alone (see Section 3.3).

Recommendations

10. Based on targeted conservation assets, it is possible to alter the biophysical model rules in the Catchment Assessment Tool (CAT) to create a 'modelled map of priority sites to assess in the field. This should be used as a starting point before any ground truthing.
11. Where ever possible, available technology should be used to reduce the number of data-transfer steps (e.g. identifying sites through modelling during the desktop stage and using a laptop and GPS in the field to record site assessments).
12. Always undertake ground-truthing in the project area and of priority sites to evaluate the quality of identified sites and to survey for additional sites missed by desk-top mapping.
13. Conduct a standard assessment at every site to maintain consistency and rigour of the site prioritisation process. A standard methodology for data collection and prioritisation of sites needs to be defined and documented.
14. The prioritisation process needs to consider the habitat requirements of the targeted species.
15. It is important to note that sites may be of high value but low priority for action because they are already protected. These categories need to be distinguished in the field and documented as part of the site prioritisation methodology.

7.2.6 Development of policy and research actions

As noted in 6.1, further consideration needs to be given to the development and implementation of policy actions that help to conserve targeted assets in a BAP zone.

Recommendations

16. Ensure that there is a clearly defined process between the leading agencies for the development and implementation of appropriate policy actions.
17. Biodiversity programs need to establish partnerships with tertiary institutions and regularly provide them with lists of possible research topics as knowledge gaps become apparent.

7.2.7 Development of a monitoring framework

The development of monitoring guidelines is still not complete for the Longwood trial area. However, it is critical that monitoring be undertaken in all trial areas. Some of the issues that need to be considered are:

- The purpose of the monitoring.
- Ensuring that any changes shown by the monitoring are real (i.e. they are an effect of changed management, not just a wider effect in relation to seasonal conditions).
- Identifying some ecological attributes that will respond rapidly to changes in management so that positive feedback can be provided in the short-term to the community (waiting ten years for revegetation sites to be used by focal bird species may be too long!).

Recommendations

18. Monitoring needs to be established early and should reflect the Biodiversity Monitoring Framework being developed for the Goulburn Broken and other catchments.

7.3 Discussion on the process for community and agency engagement

Whilst the Longwood Zone trial has been underway for 18 months the project has only reached on-ground 'implementation' in the last few months. The real on-ground success of the strategic planning will remain to be seen over the next few years. However the outcomes of the project to date have already highlighted the importance of strategic biodiversity planning at a landscape scale and the importance of community and agency involvement at the local scale.

As mentioned in Section 7.1, it is now recognised in the Goulburn Broken that BAP needs to focus on the development of science-based priorities and not on 'implementation'. There needs to be a clear distinction between BAP's role in identifying priority assets and sites and in the existing extension programs to assist communities to undertake works on the ground. This will help avoid confusion as to the role of BAP. However it is vital that the BAP process is communicated to extension staff and the community early in the process.

The relative success of the on-ground works to date has been very much due to the active support of the Nagambie Landcare Group, the active involvement of the Landcare Group Coordinator as project officer for the TSN project in the trial area, and the establishment and involvement of the on-ground working group.

One of the challenges in the Longwood Zone and other areas is potential disinterest by many members of the community in nature conservation or habitat protection. If BAP priorities are to be implemented on the ground this barrier needs to be overcome.

Recommendations

19. Formation of the Longwood working group and the support of the Landcare Group, committee members and the coordinator have been pivotal to the success of on-ground outcomes.
20. More emphasis needs to be given to the promotion and integration of biodiversity programs into the wider community (one option would be to trial the formation of 'teams' of extension officers from CAS, Agriculture, waterways and Flora Fauna who visit properties together to pool their expertise and develop agreed whole farm plans with the landholder).
21. Improved CMA / DSE dialogue with the relevant municipality at a senior level (staff and councillors) in regard to biodiversity issues would be likely to improve commitment to BAP priorities. If there was a dedicated environmental officer within the shire (or other interested staff) this would be likely to create more shire involvement.
22. Further funding needs to be sought to progress and promote biodiversity prioritisation and biodiversity communication activities in the Goulburn Broken Catchment.
23. The employment of a BAP Scientist at an Implementation Committee level is a priority to progress BAP asset identification and priority mapping in the catchment.

8 Summary of Recommendations

The following is a summary of the recommendations provided in Section 7 that are the key ‘lessons’ learnt so far from the Longwood Zone Trial:

1. That BAP activities, at this stage, focus on developing scientific-based information on assets and priorities in order to feed into existing NRM programs.
2. The relationship of BAP to other biodiversity and NRM programs needs to be clearly articulated to all staff involved.
3. The local community need to be informed early of the BAP process if we are to achieve community trust and long-term adoption and implementation of BAP priorities in a local area.
4. BAP focuses on the identification and prioritisation of assets, but more resources need to be invested in community extension to promote the principles of biodiversity conservation and BAP priorities.
5. An approach to identification of biodiversity assets to be conserved should be trialled using a similar methodology to The Nature Conservancy’s ‘systems’ approach and compared to the Longwood Zone Trial.
6. The use of focal species, especially birds, as part of BAP is extremely useful, but the purpose of focal species in BAP may need to be clarified. In particular, BAP needs to define the ecological issues it is trying to address in a more explicit manner so that focal species selection and monitoring processes are more clearly linked to particular threat-abatement or recovery actions.
7. It would be worth using a combination of the approaches used by current BAP process (using focal species as conservation assets) and The Nature Conservancy (identify assets in terms of ecosystems or communities) for future BAP activities.
8. The particular conservation needs of plants and perhaps invertebrates need to be recognised as part of any BAP.
9. A process that better identifies threats to the assets and ways to prioritise those threats needs to be developed. A summary of the most important threats across the landscape for all of the assets can then be generated.
10. Based on targeted conservation assets, it is possible to alter the biophysical model rules in the Catchment Assessment Tool (CAT) to create a ‘modelled map of priority sites to assess in the field. This should be used as a starting point before any ground truthing.
11. Where ever possible, available technology should be used to reduce the number of data-transfer steps (e.g. identifying sites through modelling during the desktop stage and using a laptop and GPS in the field to record site assessments).
12. Always undertake ground-truthing in the project area and of priority sites to evaluate the quality of identified sites and to survey for additional sites missed by desk-top mapping.
13. Conduct a standard assessment at every site to maintain consistency and rigour of the site prioritisation process. A standard methodology for data collection and prioritisation of sites needs to be defined and documented.
14. The prioritisation process needs to consider the habitat requirements of the targeted species.

15. It is important to note that sites may be of high value but low priority for action because they are already protected. These categories need to be distinguished in the field and documented as part of the site prioritisation methodology.
16. Ensure that there is a clearly defined process between the leading agencies for the development and implementation of appropriate policy actions.
17. Biodiversity programs need to establish partnerships with tertiary institutions and regularly provide them with lists of possible research topics as knowledge gaps become apparent.
18. Monitoring needs to be established early and should reflect the Biodiversity Monitoring Framework being developed for the Goulburn Broken and other catchments.
19. Formation of the Longwood working group and the support of the Landcare Group, committee members and the coordinator have been pivotal to the success of on-ground outcomes.
20. More emphasis needs to be given to the promotion and integration of biodiversity programs into the wider community (one option would be to trial the formation of 'teams' of extension officers from CAS, Agriculture, waterways and Flora Fauna who visit properties together to pool their expertise and develop agreed whole farm plans with the landholder).
21. Improved CMA / DSE dialogue with the relevant municipality at a senior level (staff and councillors) in regard to biodiversity issues would be likely to improve commitment to BAP priorities. If there was a dedicated environmental officer within the shire (or other interested staff) this would be likely to create more shire involvement.
22. Further funding needs to be sought to progress and promote biodiversity prioritisation and biodiversity communication activities in the Goulburn Broken Catchment.
23. The employment of a BAP Scientist at an Implementation Committee level is a priority to progress BAP asset identification and priority mapping in the catchment.

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Appendix 1 – Summary of Conservation Planning Methodology

Steps	Resources
Identification of Biodiversity Assets	
1. Collate all existing map information on biodiversity assets within a zone.	<ul style="list-style-type: none"> • Landscape Plan maps • Biomap - DSE • Satellite imagery - DSE • Aerial photographs - DSE • Local DSE Flora Fauna planner
2. Identify vegetation groups - EVCs or special environment (wetlands / native pasture) groups within a zone.	<ul style="list-style-type: none"> • Landscape Plan maps • Grassland mapping - DSE
3. For each group identify Priority 1A species.	<ul style="list-style-type: none"> • Landscape plan and mapping.
Identification of Focal Species	
4. Identify focal species for each EVC group – this will try to capture the ecological processes within groups. <ul style="list-style-type: none"> - What is patch size limited? - What is quality limited? - What is isolation limited? - Are there other species limited by other habitats (eg. hollow dependent species, large old tree dependent species, nectar dependent species)? - Are there other species limited by other ecological processes (eg. fox predation)? *Note species selection can be flexible within each group as long the species addresses the response.	<ul style="list-style-type: none"> • Atlas of Victorian Wildlife, DSE • Flora Information System (FIS), DSE • “Focal” species analysis of Bird Atlas data (summary in Landscape Plans) • Freudenberger’s reports.
5. Identify lower threshold species – this recognises that in some areas we may not be able to manage for focal species (eg. 25ha patches may not be achievable in some areas). <ul style="list-style-type: none"> - For a vegetation group what are the medium and low threshold species for the issues listed in step 4. 	<ul style="list-style-type: none"> • “Focal” species analysis of Bird Atlas data (summary in Landscape Plans)
Identification of Ecological Needs, Threats and Actions for Biodiversity Assets	
6. Collate species lists from steps 4 and 5 and determine thresholds of each species. Document ecological needs of each species – use Doug’s template for documentation.	<ul style="list-style-type: none"> • Can use Atlas maps to determine abundance of species within a vegetation group. - DSE • “Focal” species analysis of Bird Atlas data (summary in Landscape Plans)
Identification and Mapping of Priority Sites	
7. Develop rule sets for a landscape based on thresholds and produce a first cut ‘landscape restoration vision’ map. <ul style="list-style-type: none"> - Jenny’s standard rules can be refined based on focal species thresholds. 	<ul style="list-style-type: none"> • Jenny Wilson’s CAT biophysical modelling tool. - DSE
8. Ground truthing – undertake rapid assessment of potential sites and identify any additional sites. <ul style="list-style-type: none"> - minimum dataset is required for each site plus 1:25,000 boundary of site drawn on map. 	
9. Prioritise sites as per focal species requirements. <ul style="list-style-type: none"> - size and connectivity - condition. 	<ul style="list-style-type: none"> • Refinement of rational for prioritisation of sites – Doug Robinson.
10. Create GIS layer with linked database of priority sites and actions . Doug, Sue, Kim to provide data standards for this layer.	<ul style="list-style-type: none"> • Data standards metadataset
11. Develop summary list of management actions for a zone to be used in developing information package for extension staff.	<ul style="list-style-type: none"> • Start with actions in Landscape Plans
12. Gather any further information in a zone based on gap analysis – through bird surveys etc.	
13. Collate information and maps and produce first draft of biodiversity section of a Local Area Plan	Template from existing BLAPs eg Guildford, Redbank, ?Longwood.

Appendix 2 – List of Targeted Conservation Assets for Longwood Zone

EVC 1 - Plains Grassy Woodland

Target species	category	Patch size (ha)	Patch condition	Patch connectivity
Diamond Firetail	Focal species for area and quality	Sensitive: > 20 ha	Moderate: Dense shrub patches, short native cover	Sensitive: < 1 km
Squirrel Glider	Focal species for connectivity Endangered: 1A	Tolerant: mostly in roadsides	Moderate: many mature box trees, understorey, nectar sources	Sensitive: < 100 m
Bush Stone-curlew	Focal species for predation	Tolerant: < 2 ha	Moderate: Short cover; abundant fallen timber	Sensitive: < 1 km
Grey-crowned Babbler	Endangered: 1A	Tolerant: mostly in roadsides	Sensitive: Many mature box trees, patches of understorey, short native cover	Sensitive: < 1 km
Brush-tailed Phascogale	Vulnerable: 1B	Sensitive-Moderate: > 100 ha in regrowth forest; < 5 ha in roads with mature box	Moderate: mature rough-barked trees, understorey, fallen timber	Sensitive: < 1km
Lace Monitor	Focal species for tree-hollows	Sensitive: > 60 ha	Moderate: many hollow-bearing trees, fallen timber	Sensitive: < 1 km
Rufous Whistler	Moderate-threshold species	Moderate: > 10 ha	Moderate: patches of understorey or regen.	Moderate: < 2km
Restless Flycatcher	Tolerant-threshold species	Tolerant: > 1 ha	Moderate: patches of understorey, short cover, fallen timber	Sensitive: < 1 km
Waterbush Myoporum montanum	Focal plant species (Rare)			

EVC 2 - Gilgai Plain Woodland (Buloke woodlands)

Target species	Category	Patch size (ha)	Patch condition	Patch connectivity
Diamond Firetail	Focal species for area quality and connectivity	Sensitive: > 20 ha	Moderate: Dense shrub patches, short native cover	Sensitive: < 1 km
Bush Stone-curlew	Focal species for predation	Tolerant: < 2 ha	Moderate: Short cover; abundant fallen timber	Sensitive: < 1 km

Grey-crowned Babbler	Endangered: 1A	Tolerant: mostly in roadsides	Sensitive: Many mature box trees, patches of understorey or Buloke, short native cover	Sensitive: < 1 km
Lace Monitor	Focal species for tree-hollows	Sensitive: > 60 ha	Moderate: many hollow-bearing trees, fallen timber	Sensitive: < 1 km
Fat-tailed Dunnart	Threatened species	Tolerant:	Moderate: cracking soils, fallen timber, native grassland	?
Red-capped Robin	Moderate-threshold species	Moderate: > 2 ha	Moderate: patches of understorey or regen., short cover, fallen timber, open ground	Moderate: < 2km
Southern Whiteface	Tolerant-threshold species	Tolerant: > 1 ha	Moderate: patches of understorey/Buloke, short cover, fallen timber, open ground	Sensitive: < 1 km
Gilgai Wetlands (e.g. Swamp Billy-buttons, Broughtons Pea)	Distinctive habitat type within this community.		Uncultivated land; natural drainage	
Buloke Mistletoe	Focal plant species (Vulnerable 1A)	?	Sensitive: buloke patches; mistletoebirds for dispersal	Sensitive

EVC 3 - Creekline Grassy Woodlands/Red Gum Wetlands

Target species	category	Patch size (ha)	Patch condition	Patch connectivity
Brown Treecreeper	Focal species for area, condition and connectivity	Sensitive: > 20 ha; creeks > 50 m wide	Moderate: mature trees, fallen timber, open ground	Sensitive: < 1 km
Crested Shrike-tit	Moderate-threshold species	Moderate: > 5 ha; > 50 m wide creeklines	Moderate: mature trees, some box, patches of understorey or regen.	Moderate: < 2 km
Golden Whistler	Tolerant-threshold species	Tolerant: > 1 ha patches; creeklines > 20 m wide	Moderate: understorey, esp. Acacia spp.	Moderate: < 1 km
Flat-headed Galaxias	Focal fish species for minor creeklines (1B)		Sensitive: still or gently flowing waters; woody debris, Phragmites	
Golden Perch	Focal fish species for major creeks (1B)		Warm, turbid backwaters/billabongs; high spring flows	Sensitive
Rough-barked Honey-myrtle	Focal plant species for creeklines		Sensitive: only known from 1 site on castle Ck and 1 on Creightons Ck	

EVC 4 - Box-ironbark Forest/Dry Foothill Forest

Target species	category	Patch size (ha)	Patch condition	Patch connectivity
Hooded Robin	Focal species for area quality and bird connectivity	Sensitive: > 20 ha	Sensitive: patches of understorey; open ground, fallen timber	Sensitive: < 1 km
Squirrel Glider	Focal species for connectivity Endangered: 1A	Tolerant: mostly in roadsides	Moderate: many mature box trees, understorey; nectar sources	Sensitive: < 100 m
Brush-tailed Phascogale	Focal species for tree-hollows; Vulnerable (1B)	Sensitive-Moderate: > 100 ha in regrowth forest; < 5 ha in roads with mature box	Moderate: mature rough-barked trees, understorey, fallen timber	Sensitive: < 1km
Swift Parrot	Focal species for nectar resources; Endangered (1A)	Moderate; > 1 ha patches; strips > 40 m	Moderate: nectar resources; mature trees; wattle understorey	Tolerant
Jacky Winter	Moderate-threshold species	Moderate: > 10 ha	Moderate: patches of understorey/regen.; fallen timber, short cover, open ground	Sensitive: < 1 km
Southern Whiteface	Tolerant-threshold species	Tolerant: > 1 ha	Moderate: patches of understorey, short cover, fallen timber, open ground	Sensitive: < 1 km
Rising Star Guinea-flower	Focal plant species			

EVC 5 - Yellow Gum/Buloke Woodland

Target species	category	Patch size (ha)	Patch condition	Patch connectivity
Diamond Firetail	Focal species for area, quality and bird connectivity	Sensitive: > 20 ha	Moderate: Dense shrub patches, short native cover	Sensitive: < 1 km
Squirrel Glider	Focal species for connectivity Endangered: 1A	Tolerant: mostly in roadsides	Moderate: many mature box trees, understorey	Sensitive: < 100 m
Bush Stone-curlew	Focal species for predation	Tolerant: < 2 ha	Moderate: Short cover; abundant fallen timber	Sensitive: < 1 km
Grey-crowned Babbler	Endangered: 1A	Tolerant: mostly in roadsides	Sensitive: Many mature box trees, patches of understorey, short native cover	Sensitive: < 1 km

Brush-tailed Phascogale	Vulnerable: 1B	Sensitive-Moderate: > 100 ha in regrowth forest; < 5 ha in roads with mature box	Moderate: mature rough-barked trees, understorey, fallen timber	Sensitive: < 1km
Swift Parrot	Focal species for nectar resources; Endangered (1A)	Moderate; > 1 ha patches; strips > 40 m	Moderate: nectar resources; mature trees; wattle understorey	Tolerant
Red-capped Robin	Moderate-threshold species	Moderate: > 10 ha	Moderate: patches of understorey or regen.	Moderate: < 2km
Restless Flycatcher	Tolerant-threshold species	Tolerant: > 1 ha	Moderate: patches of understorey, short cover, fallen timber	Sensitive: < 1 km
Buloke Mistletoe	Focal plant species (Vulnerable 1A)	?	Sensitive: buloke patches; mistletoebirds for dispersal	Sensitive

Other significant flora and fauna species in Longwood zone

Target species	category	Patch size (ha)	Patch condition	Patch connectivity
Nagambie Leek-orchid	Endangered: known from 2 sites in Vic – 1 in area	Current population = 30 plants	Sensitive; uncultivated; regularly burnt grassland	
Mueller's Daisy	Nationally Endangered; 1 population in area	Current population , 100 plants	Uncultivated ground; occasional flooding; Gilgai Plain Woodland	
Spreading Eutaxia	Regionally Rare (1 population)	Current population < 10 plants	Creekline Grassy Woodland	
Weeping Pittosporum	Regionally rare	4 relict stands containing single mature trees and suckers	Gilgai Plain Woodland	

Appendix 3 – Example of table of ecological needs, threats and actions for each some of the conservation assets in the Longwood trial

Biological data for conservation targets in Longwood Zone							
Asset	Pop. Size (present)	Pop. Target	Main EVCs	Ecological needs	Ecological stresses	Sources of stress	Key actions
Grey-crowned Babbler	50	75	Plains Grassy Woodland (PGW)	large box trees, u'storey clumps, short native ground-layer, litter, fallen timber, connectivity, wider roadsides, low-intensity land use	low breeding success; loss of ground-feeding habitat, lack of understorey, small pop size, weed invasion of roadsides, high mortality, loss of paddock trees, loss of old trees, isolation	habitat fragmentation, intensified land use, increased road traffic, cat and fox predation, pasture improvement, stock-grazing, edge effects	1. Widen all key PGW roads by at least 25 m; 2. Signpost all significant roads - if needed slow traffic or insert speed humps; 3. Maintain all paddock trees; 4. Revegetate significant gaps > 500 m; 5. Restore u.s. to fenced strips next to roads, in roadsides and reserves; 6. identify all GB wood patches and URs that could provide habitat opps - fence and enhance. Should be 4 ha +; 7. cat and fox control; 8. Identify and retain all low-intensity land use sites (options = Shire overlays, land purchase, covenanting); N8
Bush Stone-curlew	30	50	Plains Grassy Woodland (PGW)	clumps of trees; very short ground cover at shelter.short grass in surrounding paddock; abundant fallen timber; other remnant tree cover within 1 km	lack of fallen timber; long grass; low breeding success and juvenile survival	Timber removal or burning, intensified land use; fox predation, cat predation? habitat fragmentation, edge effects	1. District-scale fox and cat control; 2. Identify and retain all low-intensity land-use sites; 3. Education campaign in conjunction with fox control media to encourage leaving fallen timber; 4. Identify and establish predator-proof breeding sites (see Act. St); 5. For known pairs, establish new potential day shelters through reveg; 6. Maintain all paddock trees; 7. Widen all key PGW roads by 25+m; 8. Reduce grass cover at potential sites (e.g. H66, s. side)
Swift Parrot	50	maintain	Yellow Gum woodland	yellow Gum, White Box; Golden Wattle clumps rather than strips, old trees	loss of mature trees, loss of understorey, habitat loss, competition	habitat fragmentation, intensified land use, roadworks, stock-grazing, edge effects	1. Protect and expand all yellow Gum/White Box sites; 2. Restore shrubs to fenced strips next to roads, in roadsides and reserves; 3. identify all URs that could provide habitat opps - fence, widen and enhance.; 4. In Yellow Gum areas, widen roadside veg by fencing strips 25+ m; 5.

							consider Noisy Miner removal at sites
Squirrel Glider	500+	maintain	Plains Grassy Woodland (PGW), Yellow Gum woodland	old trees, wattles, intersections, connectivity, wider canopies, box woodland, nectar trees	loss of mature trees, loss of understorey, habitat loss, isolation, high mortality	habitat fragmentation, stock-grazing, fox/cat predation, edge effects, barbed wire	1. Widen all key roadsides and Urs by 25+ m; 2. Revegetate gaps > 40 m along all treelines; 3. Restore u.st. to fenced areas, roadsides, reserves; 4. District-scale fox/cat control program; 5. Encourage removal of top barbed wire from all fences next to treelines; 6. Retain all paddock trees
Brush-tailed Phascogale	200+	maintain	PGW, Yellow Gum wood	box woodland, old trees, u'storey	loss of mature trees, loss of understorey, habitat loss, isolation, high mortality	habitat fragmentation, stock-grazing, fox/cat predation, edge effects	1. Widen all key roadsides and Urs by 25+ m; 2. Revegetate gaps > 40 m along all treelines; 3. Restore u.st. to fenced areas, roadsides, reserves; 4. District-scale fox/cat control program; 5. Encourage removal of top barbed wire from all fences next to treelines; 6. Retain all paddock trees
Fat-tailed Dunnart	NA	increase	Gilgai Plain Woodland	cracking soils, fallen timber, invertebrate supply, native grassland	habitat loss, removal of fallen timber, loss of food; mortality	cultivation, intensified land use, timber removal or burning; weed invasion; fox and cat predation	1. Survey for species and promote through local media; 2. Identify and retain all low-intensity land-use sites; 3 encourage leaving fallen timber; 4. Incorporate timber retention in Shire roadside plan; 5. District-scale fox/cat control; 5. Widen roadsides to reduce weed invasion risk
Instream fauna	NA	increase	Creekline Grassy Wd	still or gently flowing waters; substrate of coarse sand and mud, debris and Phragmites	habitat loss; competition; predation	sand slugs; Stock-grazing; introduced fish	1. Maintain deep pools in all creeklines identified as known or potential habitat for the species; 2. Remove exotic fish; 3. Fence and restore creeklines.
Diamond Firetail	10	25	PGW, Box-ironbark, yellow gum woodland	patches > 25 ha, isolation < 2 km, short, native ground cover; dense patches of shrubs or in multi-aged stands of Buloke, patches of open ground; accessible water in summer/autumn	1. Habitat loss; 2. Population isolation; 3. Small pop. Size; 4. Loss of understorey and Buloke; 5. Loss of native ground cover; Noisy Miner exclusion; mortality,	1. Habitat fragmentation; 2. Intensified land use; 3. Stock-grazing; 4. Grazing by ferals; 5. Edge effects; 6. Pasture improvement; 7. Fox/cat	1. Identify and retain all low-intensity land-use sites; 2. Within 3 km of existing groups, identify all patches that are > 25 ha in size but need u.s. or that could be increased to 25+ ha and enhanced; 3. Increase density of Bulokes in paddocks with large no. of

					excessive groundcover	predation; 8. Lack of grazing	scattered trees; 4. fox/cat control
Red-capped Robin	20	100	PGW, Box-ironbark, yellow gum woodland	patches > 10 ha; if B-I, dense understorey patches required; if PGW or YG, mostly in Buloke stands; isolation < 1 km; short, native ground layer, ground litter and fallen timber; patches of shrubs and open ground	1. Habitat loss; 2. Population isolation; 3. Small pop. Size; 4. Loss of understorey and Buloke; 5. Loss of native ground cover; Noisy Miner exclusion; mortality, loss of fallen timber; excessive groundcover	1. Habitat fragmentation; 2. Intensified land use; 3. Stock-grazing; 4. Grazing by ferals; 5. Edge effects; 6. Pasture improvement; 7. Fox/cat predation; 8 bird predation (ravens, magpies, etc); 9. firewood collection; 10. Lack of grazing	1. Identify and retain all low-intensity land-use sites; 2. Within 5 km of existing groups, identify all patches that are > 10 ha in size but need u.s. or that could be increased to 10+ ha and enhanced; 3. Retain all paddock trees to maintain connectivity; 4. Increase density of Bulokes in paddocks with large no. of scattered trees; 5. fox/cat control; 6. Widen key roadsides by 25+m
Jacky Winter	25	100	Box-ironbark, PGW patches next to creeks	patches > 10 ha; often in woodland sites next to creeklines; short native ground-layer, ground litter and fallen timber, patches of shrubs/saplings and open ground; isolation < 2 km	1. Habitat loss; 2. Population isolation; 3. Small pop. Size; 4. Loss of understorey and Buloke; 5. Loss of native ground cover; Noisy Miner exclusion; mortality; loss of fallen timber; excessive groundcover	1. Habitat fragmentation; 2. Intensified land use; 3. Stock-grazing; 4. Grazing by ferals; 5. Edge effects; 6. Pasture improvement; 7. Fox/cat predation; 8 bird predation (ravens, magpies, etc); 9. firewood collection; 10. Lack of grazing	1. Identify and retain all low-intensity land-use sites; 2. Within 5 km of existing groups, identify all patches that are > 10 ha in size but need u.s. or that could be increased to 10+ ha and enhanced; 3. Retain all paddock trees to maintain connectivity; 4. Increase density of Bulokes in paddocks with large no. of scattered trees; 5. fox/cat control; 6. Widen key roadsides by 25+m; 7. firewood collection controls on roadsides
Brown Treecreeper	1000	25% increase	Creekline Grassy Wd, Red Gum wetlands	Creeklines . 50 m wide; red gum wetlands > 10 ha; PGW patches next to creeks; isolation < 1 km for patches and < 500 m along creeks; large trees for foraging and nesting; aBabundant fallen timber; some nearly bare areas	1. Habitat loss; 2. Population isolation; 3. Small pop. Size; 4. Loss of native ground cover; 5.mortality; 6. loss of fallen timber; 7. Excessive ground-cover	1. Habitat fragmentation; 2. Cutting of standing and fallen timber for firewood; 3. Intensified land use; 4 Over-grazing by stock; 5. Fox/cat predation	1. Identify and restore all gaps > 500 m in length along creeks > 50 m wide; 2. Identify and prioritise secondary creeklines to be fenced and enhanced to 50+ m; 3; stricter controls on firewood collection; 4. Target low-intensity land-use sites; 5. For isolated pops in wetlands or patches restore connectivity by wide (> 50 m) corridors; 6. Fox and cat control.

Golden Whistler	100s	25% increase	Creekline Grassy Woodland; PGW, Yellow Gum and Box-Ironbark sites with u.s.	Understorey; healthy foliage in canopy; creeklines > 20 m wide; isolation along creeklines , 1 km	1. Habitat loss; 2. Loss of understorey	1. Habitat fragmentation; 2. Edge effects; 3. Over-grazing by stock' 4. Grazing by ferals	1. Widen all key roadsides and Urs by 25+ m; 2. Revegetate gaps > 1000 m along all treelines; 3. Restore u.st. to fenced areas, roadsides, reserves
Buloke Mistletoe	100 sites	50	PGW, Yellow Gum wood	Clumps, patches of Buloke; Mistletoebird presence; healthy trees; butterflies for pollination?	1. Habitat loss; 2. Population isolation; 3. Tree dieback/death; 4. Lack of host recruitment	1. Habitat clearance and fragmentation; 2. Fertiliser/herbicide use; 3. stock damage to host trees by trampling and grazing; 4. Over-grazing; 5. Stubble-burning; 6. Intensification of land use	1. Identify and assess sites with mistletoes, pop size and condition of host, adjacent land use; 2. Protect and restore all known sites; 3. Create new Buloke patches by fencing/planting
Euroa Guinea-flower	?	maintain	box-ironbark, YGW	?	?	?	1. Identify known sites in roadside mgnt plan and identify on-ground; 2. Manage sites for weed invasion
Lace Monitor	100s	increase	PGW	65 ha home range; large box trees, litter, fallen timber, dead standing trees, connectivity, low-intensity land use, termites, abundant prey	loss of mature trees, loss of fallen timber, habitat loss, isolation?, high mortality	habitat fragmentation, intensified land use, timber removal or burning; fox and cat predation; edge effects; vehicle mortality	1. Widen all key roadsides and Unused rds by 25+ m; 2. Revegetate gaps > 40 m along all treelines; 3. Restore u.st. to fenced areas, roadsides, reserves; 4. District-scale fox/cat control program; 5. Retain all paddock trees; identify low-intensity use paddocks in box woodland areas and try to retain; 6. protection of dead standing trees; 7. encourage protection of fallen timber

Appendix 4 – List of Summary Conservation Actions for Longwood Zone

Key to Habitat actions for the Longwood zone

<u>Action</u>	<u>Code</u>
Widen key roadsides and unused roads	1
Fill in road gaps > 50 m long	3
Fill in road gaps > 1000 m long	4
Enhance existing Grey Box patches > 4 ha in size	5
Identify woodland sites to be established as patches > 4 ha in size	6
Identify and enhance patches > 10 ha in size	7
Identify patches to be increased to 10+ ha	13
Identify and enhance patches > 25 ha in size	8
Identify patches to be increased to 25+ ha	14
Fill in creekline gaps > 500 m	9
Identify and enhance key creeklines > 50 m in width	10
Identify key creeklines to be widened to 50+ m	11
Identify key pools and wetlands for aquatic works	15
Establish corridors between patches > 10 ha in size	16
Expand Buloke patches	18
Protect known VROTS	20

Appendix 5 – Guidelines for on-ground works provided to extension staff.

Roadside buffers

- Aim to fence 25 m wide to allow regeneration and rapid growth beyond canopy of existing trees
- Minimum width 20 m.
- Aim to fence wider at corners to create small patches
- Do not rip within 5 m of dripline of roadside trees to prevent damage to roots.

Roadside revegetation

- Primary aim is to provide corridors for dispersal, rather than habitat.
- Primary target species is Squirrel Glider, which needs mature trees to be spaced at gaps of < 50 m and small trees to be almost touching
- Propose eucalypt plantings at spacings of about 10 m with some understorey in between.
- However, understorey re-establishment at these sites not generally a priority: higher priority is to enhance sites with existing cover of mature trees.

Patch enhancement

- Primary purpose of understorey addition to the site is to permit new bird species to live in the patch.
- If Noisy Miners are present, they will exclude nearly all smaller species of bird, so understorey plantings within the patch may not be beneficial.
- Instead, plant understorey as dense patches close to the existing patch but not within.

Small patch (4-10 ha) establishment

- As above, the presence of Noisy Miners will determine what types of actions should occur.
- If miners are present, focus on the establishment of non-eucalypt patches away from existing large trees, as Noisy Miners require large eucalypts as part of their habitat and will be less likely to use non-eucalypt patches of understorey or Buloke.
- If miners are absent, focus on the reconstruction of the EVC with appropriate spacings of eucalypts and shrubs.
- Always leave some patches of open ground between patches of tree/shrub cover.
- One option to encourage uptake may be to use the Potter Farm fencing technique whereby 1-2 rolls of hingejoint are strained around star pickets angled inwards but without any corner assemblies. The ground in between then remains available for grazing.

Large patch enhancement (10-25+ ha)

- At this size, patches are large enough to potentially think about covenanting if in good condition.
- The benefits of covenants are:
 - Full costs for fencing and labour
 - Eligibility for income tax deduction
 - Flexible management options

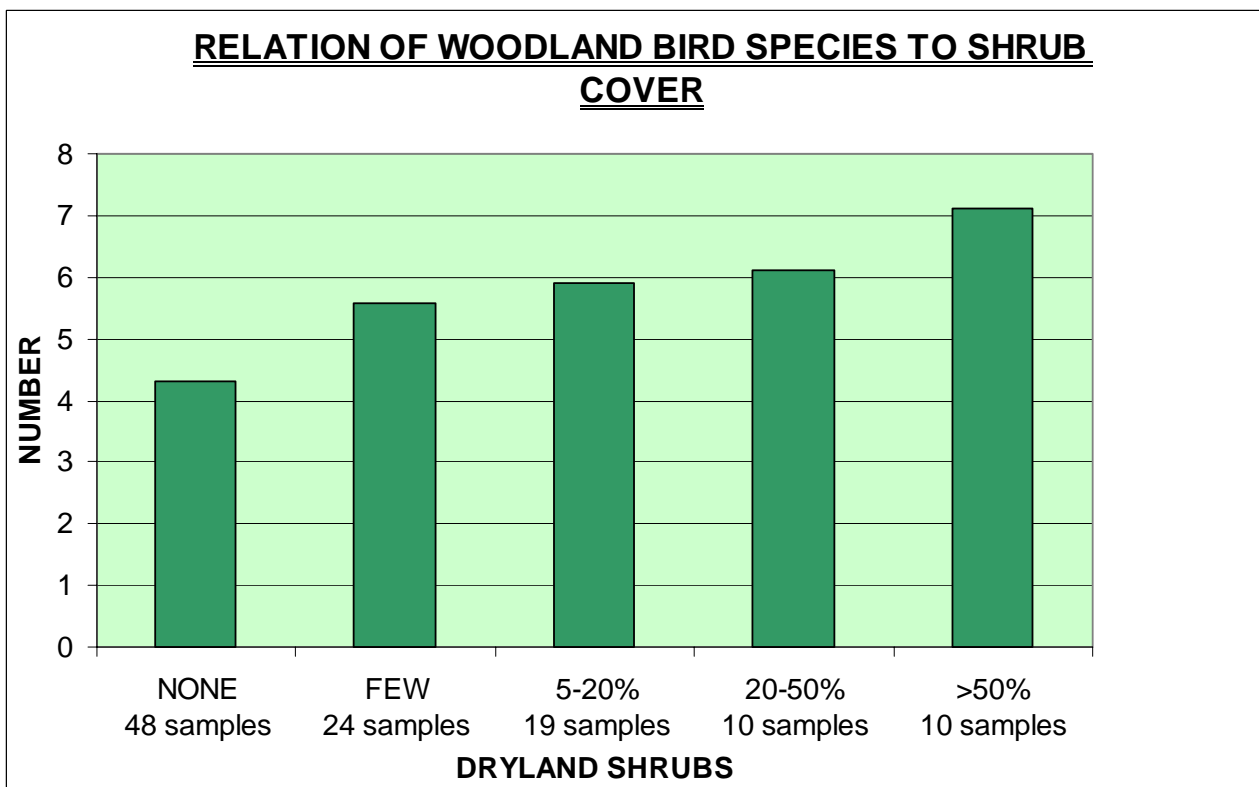
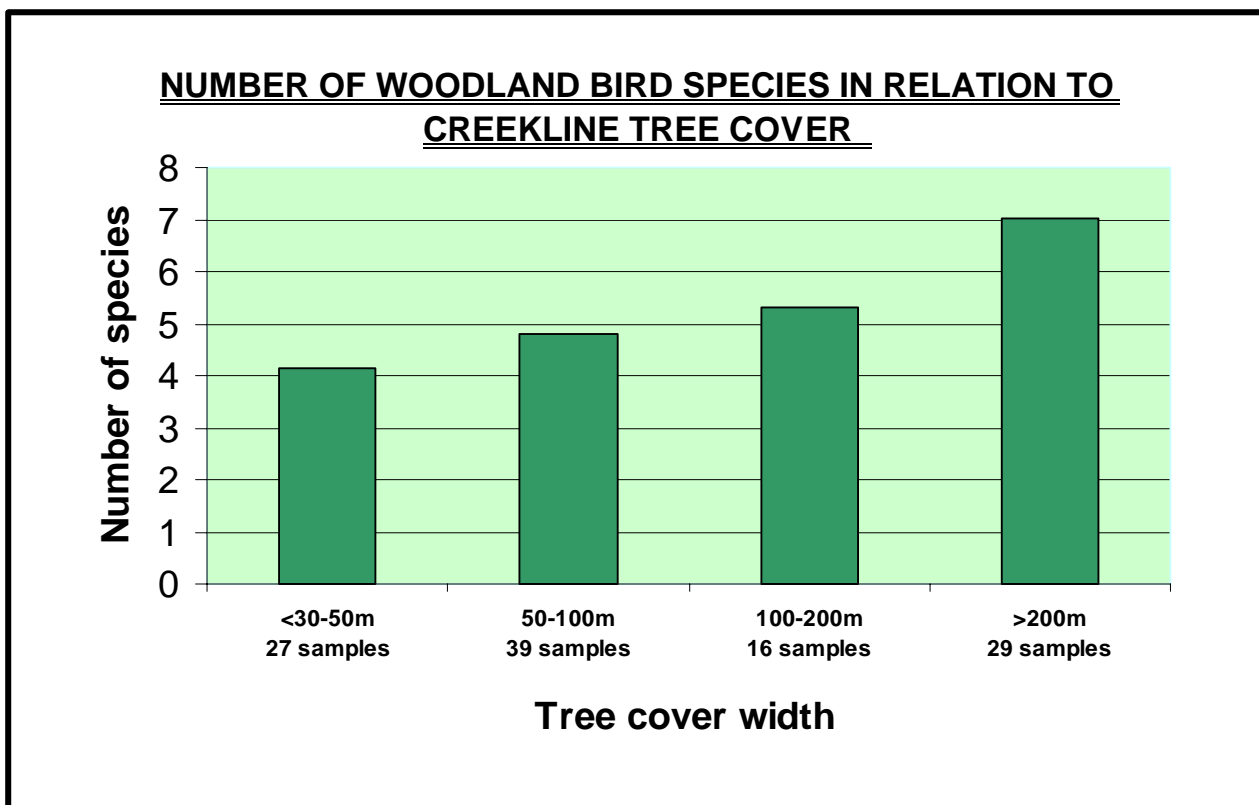
Large patch establishment (10-25+ ha)

- The most useful extension tool may again be the potential for covenanting, particularly if land still able to be used for grazing.
- One option may be to fence areas using the Potter farm technique as scatters through paddocks, giving us some large new patches.
- Land purchase may be a possibility for larger sites, if restoration potential high.

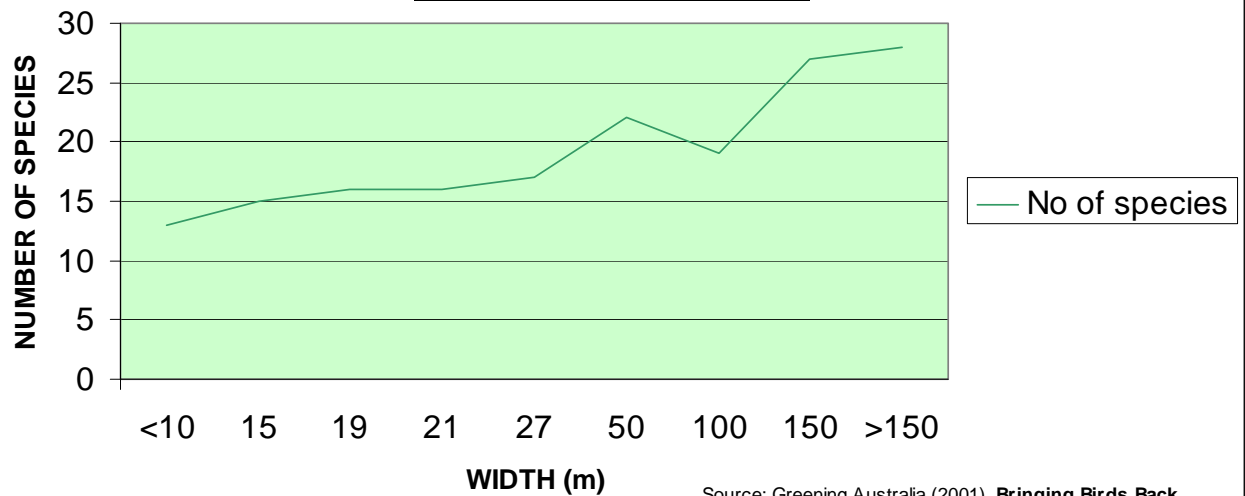
Creepline restoration

- Fencing is the first priority. Data show that fenced sites under grazing licence are still grazed less often and tend to show regeneration of shrubs, trees and groundcovers.
- Focus should be sites where pools or surface water still present and upstream of these, to prevent further degradation and siltation.

Appendix 6 – Graphs for Biodiversity Extension Material



THE NUMBER OF COMMON WOODLAND BIRD SPECIES FOUND IN REVEGETATED SITES OF DIFFERENT WIDTHS.



IMPACT OF REMOVAL OF NOISY MINERS ON SMALL BIRD SPECIES AT ARCADIA RESERVE

